

KENWOOD

...pacesetter in Amateur Radio

220 MHz
TH-315A
Here Now!

This HT Has it All!

TH-215A/315A/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, TH-315A for 220 MHz, 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 hamshack 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-315A covers 220-225 MHz, 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.**
- **Odd split, any frequency TX or RX, in memory channel "0".**
- **Nine types of scanning!** Including new "seek scan" and priority alert. Also memory channel lock-out.
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power saver 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 applied, RF output is 5 W! (Cable supplied!)
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **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 keypad 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, DC cable, 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 (1-4 W input)
- LH-4, 5 leather cases
- MB-4 mobile bracket
- BH-5 swivel mount
- PG-2V extra DC cable
- PG-3D cigarette lighter cord with filter



KENWOOD

KENWOOD U.S.A. CORPORATION
2201E Dominguez St. Long Beach, CA 90810
P.O. Box 22745, Long Beach, CA 90801-5745

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

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All New
Compact HF!

“DX-citing!”

TS-440S Compact high performance HF transceiver with general coverage receiver

Kenwood's advanced digital know-how brings Amateurs world-wide “big-rig” performance in a compact package. We call it “Digital DX-citement”—that special feeling you get every time you turn the power on!

• Covers All Amateur bands

General coverage receiver tunes from 100 kHz—30 MHz. Easily modified for HF MARS operation.

• Direct keyboard entry of frequency

• All modes built-in
USB, LSB, CW, AM, FM, and AFSK. Mode selection is verified in Morse Code.

• Built-in automatic antenna tuner (optional)

Covers 80-10 meters.

• VS-1 voice synthesizer (optional)

• Superior receiver dynamic range

Kenwood DynaMix™ high sensitivity direct mixing system ensures true 102 dB receiver dynamic range. (500 Hz bandwidth on 20 m)

• 100% duty cycle transmitter

Super efficient cooling permits continuous key-down for periods exceeding one hour. RF input power is rated at 200 W PEP on SSB, 200 W DC on CW, AFSK, FM, and 110 W DC AM. (The PS-50 power supply is needed for continuous duty.)

• Adjustable dial torque

• 100 memory channels

Frequency and mode may be stored in 10 groups of 10 channels each. Split frequencies may be stored in 10 channels for repeater operation.

• TU-8 CTCSS unit (optional)

• Superb interference reduction

IF shift, tuneable notch filter, noise blanker, all-mode squelch, RF attenuator, RIT/XIT, and optional filters fight QRM.

• MC-43S UP/DOWN mic. included

• Computer interface port

• 5 IF filter functions

• Dual SSB IF filtering

A built-in SSB filter is standard. When an optional SSB filter (YK-88S or YK-88SN) is installed, dual filtering is provided.

• VOX, full or semi break-in CW

• AMTOR compatible



Optional accessories:

- AT-440 internal auto. antenna tuner (80 m—10 m)
- AT-250 external auto. tuner (160 m—10 m)
- AT-130 compact mobile antenna tuner (160 m—10 m)
- IF-232C/IC-10 level translator and modem IC kit
- PS-50 heavy duty power supply
- PS-430/PS-30 DC power supply
- SP-430 external speaker
- MB-430 mobile mounting bracket
- YK-88C/88CN 500 Hz/270 Hz CW filters
- YK-88S/88SN 2.4 kHz/1.8 kHz SSB filters
- MC-60A/80/85 desk microphones
- MC-55 (8P) mobile microphone
- HS-5/6/7 headphones
- SP-40/50B mobile speakers
- MA-5/VP-1 HF 5 band mobile helical antenna and bumper mount
- TL-922A 2 kw PEP linear amplifier
- SM-220 station monitor
- VS-1 voice synthesizer
- SW-100A/200A/2000 SWR/power meters
- TU-8 CTCSS tone unit
- PG-2S extra DC cable.

Kenwood takes you from HF to OSCAR!



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3 Choices
70 W/45 W/25 W

Three Choices for 2m!

TM-2570A/2550A/2530A

Feature-packed 2m FM transceivers

The all-new "25-Series" gives you three RF power choices for 2m FM operation: 70 W, 45 W, and 25 W. Here's what you get:

- Telephone number memory and autodialer (up to 15 seven-digit phone numbers). **A Kenwood exclusive!**
- High performance GaAs FET front end receiver
- 23 channel memory stores offset, frequency, and subtone. Two pairs may be used for odd split operation
- 16-key DTMF pad with audible monitor
- Extended frequency coverage for MARS and CAP (142-149 MHz; 141-151 MHz modifiable)
- Center-stop tuning—a **Kenwood exclusive!**
- New 5-way adjustable mounting system
- Automatic repeater offset selection—**another Kenwood exclusive!**
- Direct keyboard frequency entry
- Front panel programmable 38-tone CTCSS encoder **includes** 97.4 Hz (optional)



• Big multi-color LCD and back-lit controls for excellent visibility

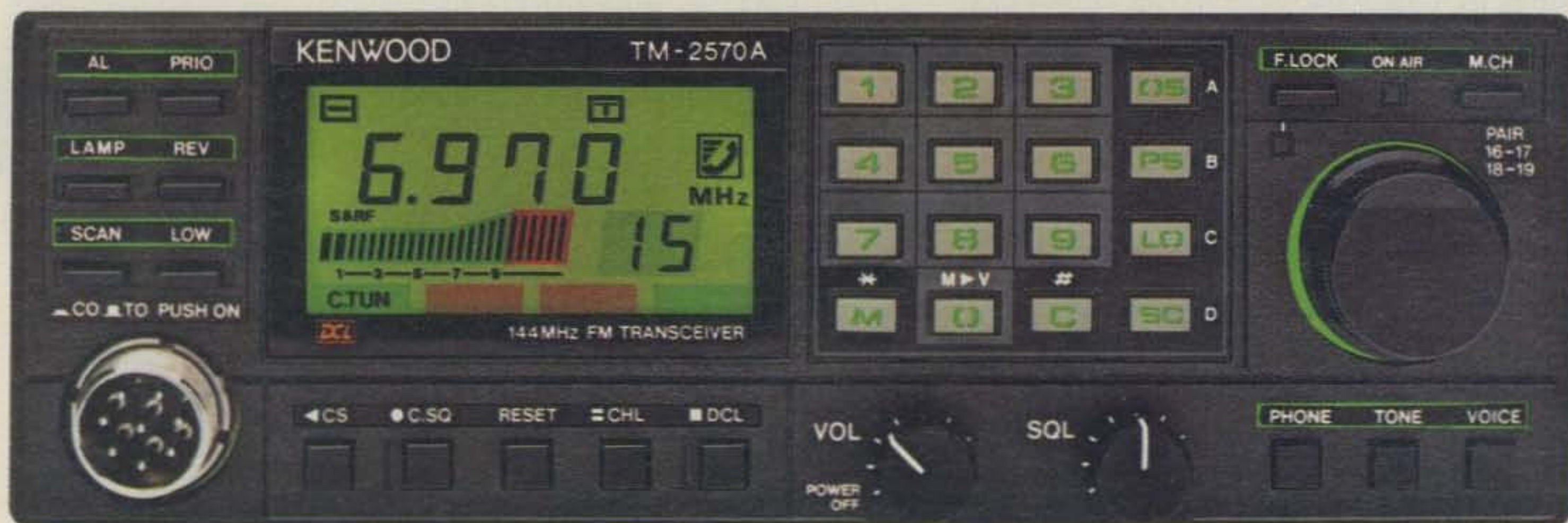
• The TM-3530A is a 25 watt version covering 220-225 MHz. The first full featured 220 MHz rig!



Introducing... Digital Channel Link

Compatible with Kenwood's DCS (Digital Code Squelch), the DCL system enables your rig to **automatically** QSY to an open channel. Now you can automatically switch over to a simplex channel after repeater contact! Here's how it works:

The DCL system searches for an open channel, remembers it, returns to the original frequency and transmits control information to another DCL-equipped station that switches **both** radios to the open channel. Micro-processor control assures fast and reliable operation. The whole process happens in an instant!



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 for TM-2550A/2530A/3530A
- PS-50 DC power supply for TM-2570A
- MC-60A/MC-80/MC-85 desk mics.
- MC-48B extra DTMF mic. with UP/DWN switch
- MC-43S UP/DWN mic.
- MC-55 (8-pin) mobile mic. with time-out timer
- SP-40 compact mobile speaker
- SP-50B mobile speaker
- SW-200A/SW-200B SWR/power meters
- SW-100A/SW-100B compact SWR/power meters
- SWT-1 2m antenna tuner

Actual size front panel

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Offices: 76 North Broadway, Hicksville, NY 11801.
 Telephone: 516 681-2922. FAX (516) 681-2926. CQ (ISSN 0007-893X) is published monthly by CQ Communications Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices: Domestic—one year \$19.95, two years \$38.00, three years \$57.00; Canada/Mexico—one year \$22.00, two years \$42.00, three years \$63.00; Foreign—one year \$24.00, two years \$46.00, three years \$69.00; Foreign Air Mail—one year \$77.00, two years \$152.00, three years \$228.00. Entire contents copyrighted CQ Communications Inc. 1988. CQ does not assume responsibility for unsolicited manuscripts. Allow six weeks for change of address. Printed in the United States of America.
 Postmaster: Please send change of address to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.



The Radio Amateur's Journal

ON THE COVER: Here's Gene Jacobson, WA7TAI, of Kirkland, Washington, logging some time on packet radio. Photo by Larry Mulvehill, WB2ZPI.



NOVEMBER 1988

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As the year comes to an end, the hamfest calendar seems to speed up. Since last month's issue went to press and before this one finishes up we will have been to five hamfests. Just as last month's issue was being completed, Dick went to the annual event in Huntsville, Alabama. Although last year they had hoped to be in larger quarters this year, it wasn't in the cards. This year, however, Dick reported that the committee went all out for the exhibitors by providing not only a tasty lunch, but also help with the booth if an exhibitor wanted to walk around. Unlike a lot of groups, the Huntsville committee seems to have their act together.

The first weekend in September found Arnie and me heading off to Shelby, North Carolina for their annual hamfest. This one is held at a big fairgrounds with campground facilities for RVs. The exhibitors display their wares in buildings that seem to be designed to hold critters of one sort or another. People start getting there three to four days ahead of time just to get good spots for camping and setting up fleamarket tables. Shelby does draw a lot of people, and you can see the need to get there early. Do they have fun? You bet!

There is a whole lot of truth to the concept of southern hospitality. It does exist and it is true. As of late the big question I'm asked is "How's the food?" Well, southern cooking is good, filling, and does stick with you. The food at this big event is good, varied, and served by friendly people who say thank you. That's quite refreshing. And speaking of food, Bill Kennedy, WO4K, came by the booth with his wife and asked me about the food, too. However, he produced a paper bag full of tomatoes for me to take home. Thanks, Bill. I really enjoyed them.

The concession food, as I said, was quite good, but the highlight came Saturday night. Our booth was right across the way from Doc's Communications. Doc, KC4EV, and his wife, Maxine, N4ECA, invited Arnie and me to join them and their friends, John, WA4BLM, and Sue, KA4OWE, for their annual barbeque. Well, a dozen of so folks chewed their way through a herd or two of ribs and consumed gallons of Brunswick stew. Sue did a magnificent job, and I can't see how anyone left there hungry. However, I must admit it did take some time to get (or chip) the barbeque sauce out of my beard. It was more than worth it, though.

We did see Buck Rogers, K4ABT, our Packet Editor, out in the fleamarket selling some goodies in order to buy some more. I have a feeling that the Rogers' car

didn't travel home empty. There was something for everyone, and if you didn't find it, you really weren't looking very hard.

The following weekend, Dick, Arnie, and I were at the National in Portland. Lew McCoy was also there manning the booth. Lew, as usual, drew them in for several "standing room only" talks. I have to admit that I'm not particularly fond of so-called National Conventions. Typically, these are not very well attended or organized events, and they usually do not have a fleamarket. This one ran contrary to the rule. It was well attended, reasonably organized, and did have a pretty good fleamarket. It also had a vast array of exhibitors. Everyone seemed excited and happy to be there to see all the latest amateur gear and meet their friends.

The convention was held at the Red Lion Hotel, so there wasn't the typical food concession. Hotel food was available, and it was pretty good. There were some fast-food places within a block's walking distance to add variety. However, I don't think that anyone anticipated the crowd being as large as it was, so there were long lines for food at various times no matter where you went. As an exhibitor, it would have been nice to have a sandwich at the booth or to be able to get something quick to eat. We generally can't get away from the booth area for a long period of time. Probably the enforced diet did us all some good.

Celebrities at the convention were Senator Barry Goldwater, K7UGA; Father Marshall Moran, 9M1MM; and astronaut Dr. Tony England, W0ORE. At the banquet Barry was presented with the Ambassador of the Year Award by AEA.

In addition to perfect location, good food, lots of people enjoying themselves, and plenty of goodies to bring home, the weather was ideal. I would have to say that Portland ranks pretty high on the list for 1988.

This coming weekend Dick and his wife, Cathy, head down south once more for the annual Virginia Beach event. Over the years this one has also enjoyed a good reputation for crowd and location. It features a sizeable fleamarket with very interesting goodies, so I expect that the Ross's car will probably travel back to New York a bit heavier.

The week after will find Arnie and Peter at Radio Expo in Chicago, and the week after that we will all be up in Boxboro, Massachusetts. This one is held every other year, so everyone looks forward to

being there. Usually it is season-changing time in New England, and the leaves turn colors. It is a beautiful sight, and if you haven't enjoyed the experience, you've missed out on one of nature's wonders.

I'll let you know what happened at Virginia Beach and Boxboro next month. I guess it will be December or January before I can tell you who won the Best Hamfest for 1988 Award. With regard to airlines, so far it's a tie between Delta and Piedmont as to best travel. Piedmont has made some big strides in the last year or so in upgrading their service and especially their food.

The Ides of Something

While one of the big topics of discussion at Portland was the 220 MHz decision and what that meant or didn't mean, another harbinger of concern cropped up the day we left for the show. The front page of *The New York Times* had an article (9/8/88) on HDTV and what it meant. High Definition TV is a system in use in other parts of the world that is now being studied here. It offers much higher picture quality via more scanning lines. About two-thirds of the way through the article it talks about normal TV signals being 6 MHz wide and that for HDTV you would need 8 MHz; the additional 2 MHz would carry greater information. Well, if you look at a spectrum chart with respect to TV channels, you quickly come up with the realization that there are no "buffer" channels or space between current users and the TV channels. So all you have to do is figure out what is being used either 2 MHz up or down or 1 MHz on opposite ends from current TV allocations to see what may be next on the agenda. Maybe not, but it sure bears watching down the road.

The Buyer's Guide

CQ's 1988 Buyer's Guide was introduced at the Portland Convention and was a huge success. Dick flew out a day after Arnie and I left for Portland so he could hand-carry a box of *Buyer's Guides* from the first shipment. The copies we had for sale were all gone within the first hour or so of the convention. The response so far has been tremendous. Peter did an excellent job of putting it together and can personally attest to all the work involved in bringing out amateur radio's first *Buyer's Guide*. If you haven't seen a copy, you can order one directly from *CQ*.

73, Alan, K2EEK

Others May Try to Imitate, But...

Only One Can Be The Best



Morse Code - Baudot - ASCII - AMTOR - Packet - Facsimile - Navtex

Amateur Net Price \$319.95

It's a lesson you learn very early in life. Many can be good, some may be better, but only one can be the best. The PK-232 is the best multi-mode data controller you can buy.

1 Versatility

The PK-232 should be listed in the amateur radio dictionary under the word Versatile. One data controller that can transmit and receive in six digital modes, and can be used with almost every computer or data terminal. You can even monitor Navtex, the new marine weather and navigational system. Don't forget two radio ports for both VHF and HF, and a no compromise VHF/HF/CW internal modem with an eight pole bandpass filter followed by a limiter discriminator with automatic threshold control.

The internal decoding program (SIAM[™]) feature can even identify different types of signals for you, including some simple types of RTTY encryption. The only software your computer needs is a terminal program.



PC Pakratt Packet TX/RX Display



Facsimile Screen Display

2 Software Support

While you can use most modem or communications programs with the PK-232, AEA has two very special packages available exclusively for the PK-232....PC Pakratt with Fax for IBM PC and compatible computers, and Com Pakratt with Fax for the Commodore 64 and 128.

Each package includes a terminal program with split screen display, QSO buffer, disk storage of received data, and printer operation, and a second program for transmission/reception and screen display of facsimile signals. The IBM programs are on 5-1/4" disk and the Commodore programs are plug-in ROM cartridges.

3 Proven Winner

No matter what computer or terminal you plan to use, the PK-232 is the best choice for a multi-mode data controller. Over 20,000 amateurs around the world have on-air tested the PK-232 for you. They, along with most major U.S. amateur magazines, have reviewed the PK-232 and found it to be a good value and excellent addition to the ham station.

No other multi-mode controller offers the features and performance of the PK-232. Don't be fooled by imitations. Ask your friends, or call the local amateur radio store. We're confident the PK-232 reputation will convince you that it's time to order your very own PK-232.

Call an authorized AEA dealer today. You deserve the best you can buy, you deserve the PK-232.

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AEA Brings you the Breakthrough!

Announcing

• **Attention D-Day Amateurs** - The A.R.A.M. amateur radio club in St. Lo, France is seeking U.S. amateurs who were members of the armed forces and who participated in the invasion of France in WW II on D-Day (or very shortly thereafter) landing on Utah Beach. The purpose is to join the A.R.A.M. club on the air in a special 45th anniversary commemoration on June 6, 1989. Write with an SASE and include your unit identification and date of landing to: W2QFC, 308 Parkdale Ave., East Aurora, NY 14052-1619.

• **QRA 40th Anniversary QSO Party** - The Quannapowitt Radio Assn. of the Boston northern suburbs will hold their QSO Party from 0000 UTC Nov. 1 to 2400 UTC

Nov. 20. All licensed amateurs worldwide are invited. Work at least one QRA member on any band, any mode. QRA members will identify themselves by sending "QRA." To claim a certificate send QSL and SASE to Jim Chetwynd, W1UZK, 124 Forest St. Melrose, MA 02176. Claims must be received by Feb. 28, 1989. The club is also having a special club meeting (dinner, speaker, prizes, etc.) on Nov. 18 at 7 pm in celebration of its 40th anniversary. The meeting will take place at the Wakefield-Lynnfield United Methodist Church.

• **From Aberdeen, WA** - The Grays Harbor ARC will operate from Aberdeen, Washington from 1600Z Nov. 5 to 2400Z Nov. 6

in honor of the city's 100th anniversary. They will also operate from the Grays Harbor Historical Seaport from 1600Z Nov. 12 to 2400Z Nov. 13 to commemorate the launching of the *Lady Washington*. For both events look for W7ZA on the lower 25 kHz of the General phone bands on 15-80 meters, on 28.310 on the Novice portion of the 10 meter band, and on the first 25 kHz of the General CW bands. For special QSLs for each event send SASE and QSL to Joe Ledesma, KA7AIR, 516 6th St., Hoquiam, WA 98550.

• **Tourist Awareness Week** - The St. Mary AR Transmitting Society will operate KA5LMZ from St. Mary Parish, Louisiana. Operation will be on the 10-80 meter bands at various times from Nov. 6-12. All contacts will be sent a special QSL and tourist information. Contact KA5LMZ.

• **Granite City, Illinois** - On Nov. 19-20 the Egyptian Radio Club, W9AIU, will hold a special event from Granite City, IL. Starting at 1800Z on Nov. 19 work W9AIU or any club member for a certificate. Suggested frequencies: CW up 50 kHz from the bottom of the bands; phone lower portion of the General 80-15 meter bands; Novice 28.428 MHz. For certificate send large SASE to W9AIU, P.O. Box 562, Granite City, IL 62040.

• **The following hamfests, etc., are slated for November:**

Nov. 6, **Cabarrus ARS 10th Annual Hamfest**, New National Guard Armory, Concord, NC. Contact Cabarrus ARS, P.O. Box 1290, Concord, NC 28025.

Nov. 12, **The 6.91 Friendly Fest**, Serb Hall, Milwaukee, WI. Call 414-444-4589.

Nov. 13, **HAMEXPO '88**, Suffolk County Community College, Selden, LI, NY. Contact KB2QQ at 516-689-6336, or WB2FXN at 516-928-3868.

Nov. 13, **South Central Connecticut ARA Hamfest**, North Haven Park and Recreation Center, North Haven, CT. Contact Brad Oestreicher, WA1TAS, 203-265-6478 from 7-10 pm. (Wheelchair accessible.)

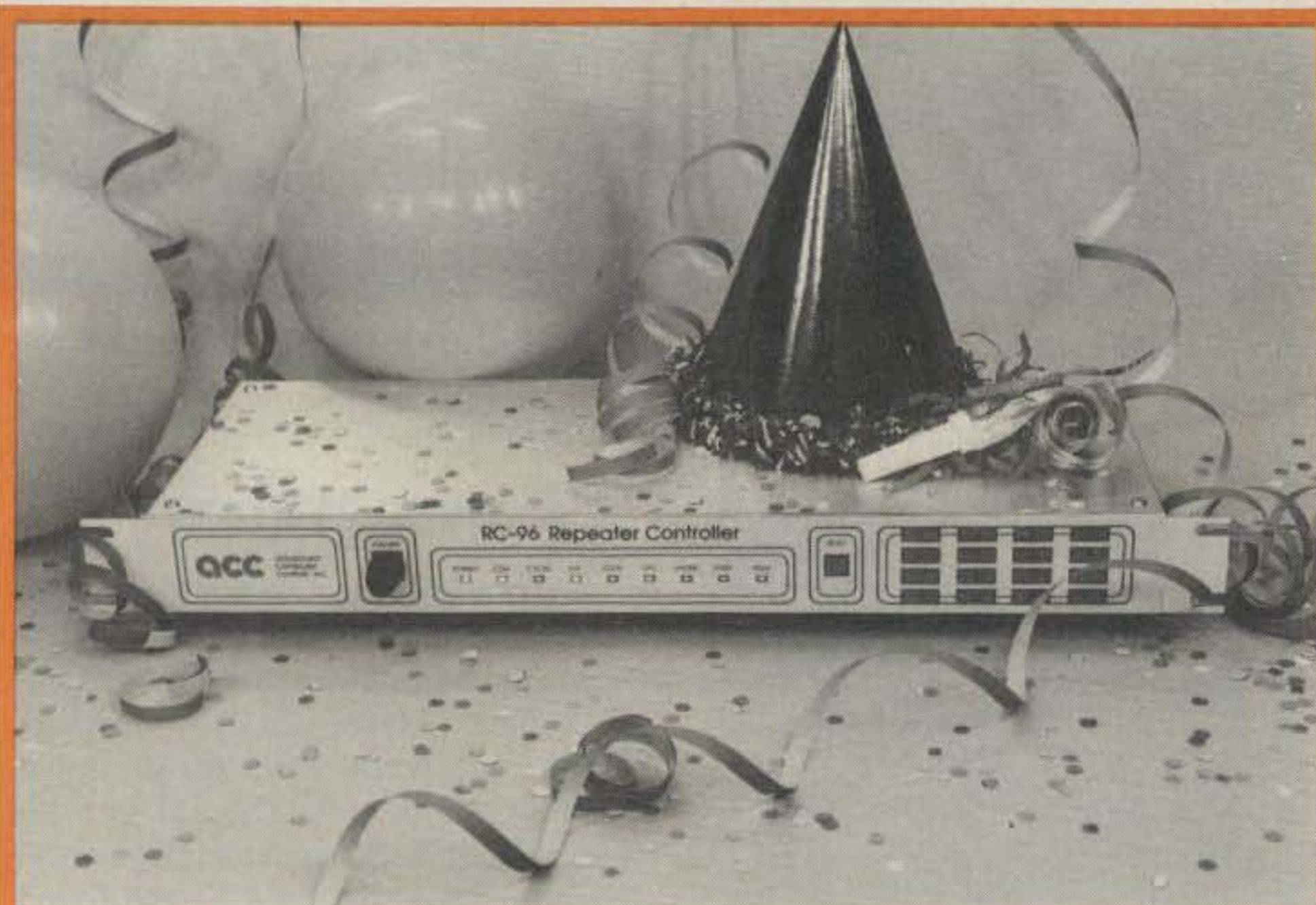
Nov. 13, **16th Annual Fort Wayne, Indiana Hamfest**, Allen County Memorial Coliseum, Fort Wayne, IN. Contact AC-ARTS Hamfest, P.O. Box 10342, Fort Wayne, IN 46851, or call KA9GWE at 219-432-6951 from 6-10 pm EST.

Nov. 19, **11th Annual Central Alabama Hamfest**, Garrett Coliseum, Montgomery, AL. Contact Montgomery Hamfest, P.O. Box 3141, Montgomery, AL 36109, or call W4CNQ at 205-272-9130.

Nov. 19, **Sumter Hamfest**, South Carolina National Guard Armory, Sumter, SC. Contact SARA, P.O. Box 193, Sumter, SC 29151-0193, or call KK4QZ at 803-773-5053.

Nov. 20, **Auctionfest 88**, Massillon K of C Hall, Massillon, OH. Contact Massillon ARC, P.O. Box 73, Massillon, OH 44648 (SASE).

Nov. 26-27, **Greensboro, North Carolina Hamfest**, National Guard Armory, Greensboro, NC. Contact Fred Redmon, N4GGD, 3109 Goodall Drive, Greensboro, NC 27407 (919-852-9244 from 9-11 pm only).



"Give your repeater something to celebrate!"

The new RC-96 controller for your repeater will make its day. And yours.

For you, remote programming will let you easily make changes to your repeater from anywhere without a trip to the hill. Change codes, autodial numbers, ID messages and more, with reliable storage in E²PROM memory.

Your users will love the outstanding patch and autodialer, with room for 200 phone numbers. The talking S-meter will let them check their signal strength into the repeater. Plus support for pocket pagers, linking to other repeaters, and a bulletin board.

Your technical crew will appreciate the built-in keypad and indicators. And the ease of hookup through shielded DIN cables. With pots and DIP switches easily accessible at the rear of the unit. They'll be impressed by the gas discharge tube across the phone line and transient suppressors on each I/O signal to keep lightning from taking your system down.

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Features Galore. The IC-900 is an operator's dream... Listen on two bands simultaneously or transmit on one band and receive on a different band when using a second speaker (**true full duplex crossband operation**), 10 memories per band, independent PL tones and

offset into each memory, memory and programmable band scan, and all subaudible tones in actual Hz readout.

The IC-900 includes an ultra compact remote controller, an Interface A unit, Interface B unit, SP-8 speaker, HM-14 up/down DTMF mic, fiber optic and controller cables.



Speaker

Interface Unit A is installed in a location near the driver's seat.

Interface Unit B controls the six band units and can be installed in your car's trunk. A fiber optic cable runs from Interface A to Interface B, which transports an abundance of information through a 3/16" cable and eliminates RF feedback.

Band Units/Interface Unit B

Interface Unit A

Remote Controller.

Measuring only 2 inches high by 5.7 inches wide by 1 inch deep, the remote controller can be installed on your car's dash or sun visor with the supplied velcro. And, if you want, take the controller with you when you leave your car. The controller features a super large, highly visible LCD.

Band Units are "stacked" onto the Interface B Unit via the supplied mounting bracket. Optional band units available are:

Band Unit	Power Output	Frequency
UX-19A	10W/1W	28-30MHz
UX-29A	25W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-29H	45W/5W	138-174MHz Rx; 140.1-150MHz Tx
UX-39A	25W/5W	216-236MHz Rx; 220-225MHz Tx
UX-49A	25W/5W	440-450MHz
UX-59A	10W/1W	50-54MHz
UX-129A	10W/1W	1240-1300MHz

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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions.



The PARAGON, Performance Plus...

The Paragon

All mode versatility and a transmitted signal you will be proud of. A receiver that has set new standards for sensitivity and quietness. Receives from 100 kHz to 29.999.99 MHz. Transmits on all bands from 1.8 MHz to 29.999.99 MHz with 100 watts output. SSB, CW, real FSK and optional FM. Standard equipment includes speech processor, noise blanker, dual VFOs, TX split, RX split and QSK with a changeover time of 30 ms or less. Five I-F filter positions with the 6 kHz AM filter and 2.4 kHz SSB filter, standard. Optional 1.8 kHz, 500 Hz and 250 Hz filters are selectable independent of mode. Two selectable tuning rates. Passband tuning, notch filter, audio bandpass filter, tone control, squelch and more! Sixty-two programmable memories that store

frequency, mode, filter selected, channel number and a 7 character alpha-numeric "tag" for entering channel I.D. Scan rate is selectable and as each memory is scanned all of the stored information is displayed (what a light show!). Alternately, the memories can be tuned with the main tuning knob.

Frequency selection is with the main tuning knob, direct keypad entry or up/down buttons that will shift in 100 kHz or one MHz increments or to the next ham band. DISPLAY button selects 24 hour clock or date or tag. VOICE button causes a voice frequency announcement with optional synthesized voice board installed.

Rear panel controls are provided to adjust the VOX, cw monitor level and tone, and SSB

sidetone monitor level. Switching is provided to control conventional linear amplifiers and of course, high speed switching for QSK linears, such as the Titan or the Hercules II. Other rear panel inputs and outputs for transverters, FSK (170 Hz shift), fixed level audio out, audio in, external speaker, aux dc jack and provision for the optional RS-232 control interface. An absolute delight for the all mode operator.

The Paragon is the result of a three year engineering effort. We are proud of the Paragon and we think it has set new standards of excellence in synthesized rigs. Check it out yourself. We think that you will share our pride in the Paragon.



The Classic CORSAIR II...

Unique in all the world, the CORSAIR II is the only ham transceiver available that uses a crystal mixed, permeability tuned oscillator. The ability of this scheme to reject strong adjacent signals and to dig out weak signals under the most adverse conditions is legendary. The 95 dB of dynamic range is all useable!

Frequency tuning is also unique. The main tuning is 18 kHz per turn. Dual range offset tuning

can control transmit, receive or transceive. Selectivity is enhanced with a 16 pole crystal ladder filter and pass band tuning. The 50+ dB notch filter virtually eliminates carrier type interference. An eight pole audio filter is standard and the I-F filters are selectable independent of mode for superior operation on the digital modes.

The transmitter is well known for outstanding audio quality on SSB and QSK CW performance is

simply beyond comparison. All ham bands are covered, 160 through 10 meters with WWV at 10 MHz. The front panel is a thoughtful and spacious arrangement with only the controls that you need.

If your number one priority is outstanding performance on the ham bands, and simplicity is still a virtue, you may be the kind of purist who deserves the classic CORSAIR II.

Add Satellite Communications To Your HF Station



Model 2510B

The Model 2510B, mode B, satellite station is a 70 cm, 10 watt SSB and CW transmitter with a super-sensitive, low noise, 2 meter to 29 MHz receive converter. The receive conversion idea takes advantage of the excellent selectivity and sensitivity that you already have in your HF station. Frequency tuning is with the PTO in the 2510B and the transmitter automatically tracks the receive frequency for "transceive" operation. "Split" operation is also provided. Two bands are included for full coverage of Oscar 10 and Oscar 13.

The Model 2410 is an all mode, broadband, 100 watt, 70 cm amplifier that adds 10 dB of gain to your up-link signal. Tx/Stby control can be hard-wired or automatic when the drive signal is present. Primary power is 12 to 14 Vdc at 20 amps.



Model 2410



Titan

TITAN: A Gallon And A Half Out! (5.68 Liters)

The TITAN has it all! 1500 watts output with ease, all legal bands 160 through 15 meters including MARS frequencies (10 meters after owner mod), lightning fast QSK for full break-in CW or the digital modes and a two speed blower for quiet operation on SSB. This awesome performance from a 17 lb desk top amplifier is made possible by a pair of Eimac® 3CX800A7 ceramic triodes and an external 45 lb power supply that is an absolute "horse."

The heart of the power supply is our own tape wound, four core Hypersil® transformer that weighs in at an impressive 41 lbs. The

transformer is conservatively rated at 2.5 kva CCS. (9.5 kva IVS.) The power supply is housed in a separate utility enclosure and is nearly noiseless even at full power.

Front panel features include a ten element LED bargraph that displays peak power, a multi-meter selectable to read plate voltage, forward or reverse power and grid current. A matching meter is dedicated to display plate current. The TUNE and LOAD controls use 3:1 vernier drives which, in combination with a great RF deck design, make the TITAN a real "pussy cat" to operate.

The low drive requirement of the TITAN (65 watts for 1500 watts output, typical) makes life much nicer for your exciter too. This is especially comforting when operating keydown modes such as RTTY. Two product review articles have been published, see QST April 1986, CQ February 1986.

If you are ready to choose your dream amplifier the TITAN has everything but the highest price. Check it out!

THE TITAN IS BACKED BY A THREE YEAR LIMITED WARRANTY.



Mobile or Base—Solid State

Hercules II No Tune HF Amplifier

The HERCULES II, Model 420, is an amplifier design that offers a combination of unique features that can only be achieved using modern solid state technology. Instant on, 12 - 14 Vdc operation, no-tune broadband final and compact size. General coverage operation from 1.8 to 22 MHz (to 29.999 MHz with authorized modification). Add to that lightning fast QSK cw, remote control, superb linearity and a low drive requirement. Outstanding!

The HERCULES II will interface nicely with virtually all transceivers. The front panel includes an analog multi-meter for collector current, voltage, forward power and SWR. A 10 element LED bar-graph display indicates peak output power. Band selection is made from the front panel switch or remotely controlled through a rear panel connector. Accessories are available for mobile remote control and automatic band tracking when using a Paragon. A front panel speaker is built-in.

The Model 9420 115/220 Vac power supply is in a separate utility enclosure and connects to the RF deck using a 6 foot power cable. It provides 80 amps to the amplifier plus 20 amps at 13.8 Vdc to power a 100 watt output exciter.



KW Antenna Tuner

The Model 229B adds a lot of versatility to your HF station antenna system. With this tuner you can load virtually any unbalanced (coax or single wire) antenna. With the accessory balun, antennas with balanced feeders can be used. Maximum legal power may be used from 1.6 to 30 MHz. The modified "L" network will tame an SWR of at least 10:1, any phase angle, without "false load" problems. Lighted multi-meter shows power in two ranges plus reflected power. A great way to operate all bands with something less than a world-class antenna farm.

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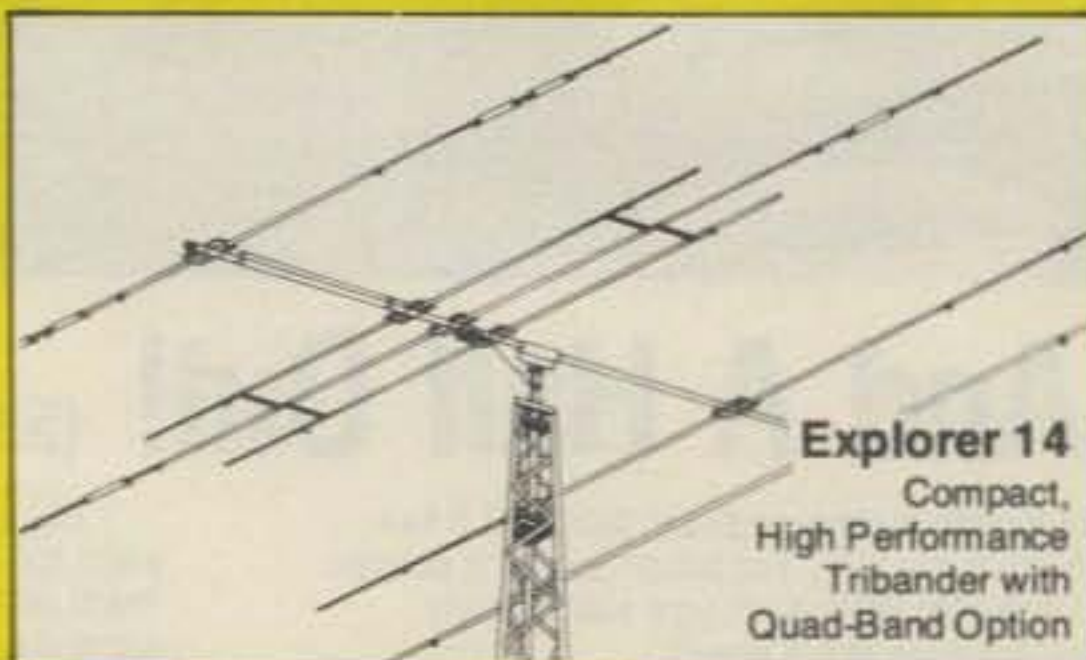
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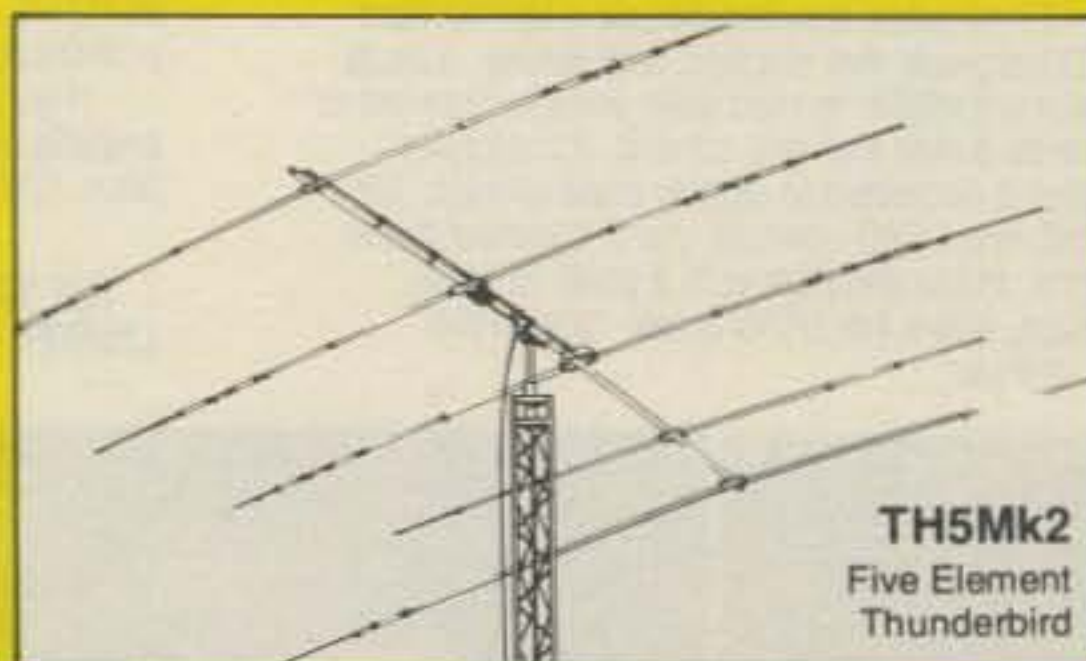
Explorer 14

Unique PARA-SLEEVE design (patent pending) achieves exceptional broadband performance in this compact antenna. Forward gain and front-to-back ratio outperforms other antennas of the same size. Surface area is 7.5 sq. ft. (.69 m²). With a 14 ft. (4.3 m) boom the turning radius is only 17 ft. (5.3 m). The ideal choice where space is limited. Great for roof mounts or small towers. Optional kit for 30 or 40 meters.



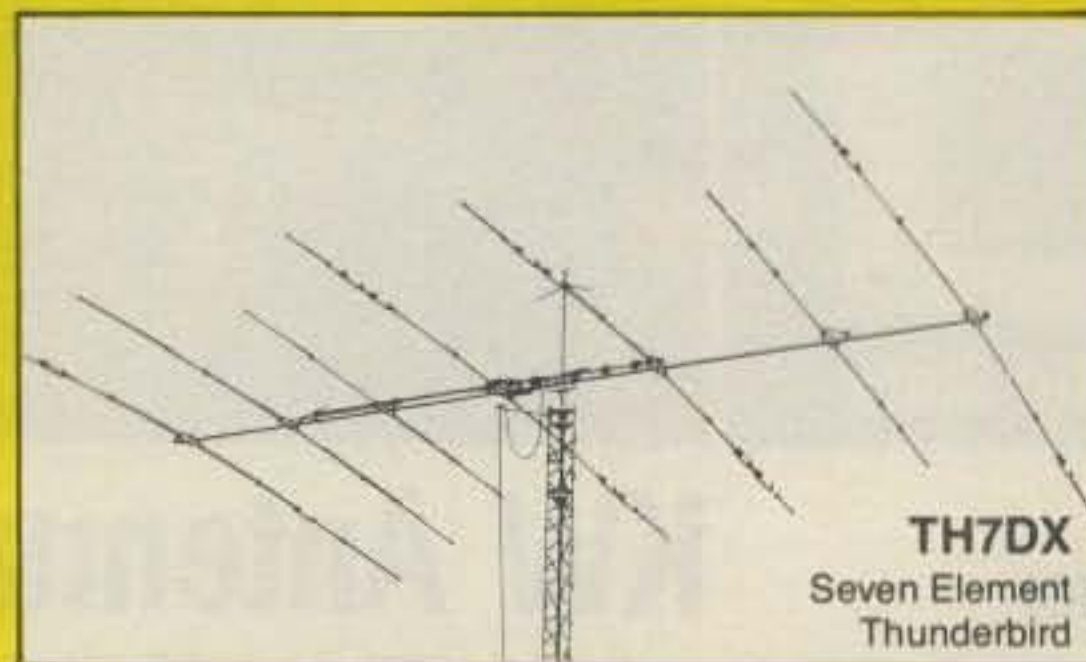
Five Element Thunderbird TH5Mk2

Broadbanding is achieved with our unique dual driven element system. Five elements on the 19 foot boom (5.8 m), with four active elements on each of the three bands. A rugged antenna with 7.4 sq. ft. (.68 m²) of surface area. Turning radius is a manageable 18.4 ft. (5.6 m).



Seven Element Thunderbird TH7DX

Successor to the legendary TH6DXX. Five active elements on 10 meters and four elements on both 15-20 meters. The TH7DX represents the ultimate in high-performance arrays whether you're comparing other large tribanders or stacked monobanders. Surface area of 9.4 sq. ft. (.87 m²), a 24 ft. (7.3 m) boom and a turning radius of 20 ft. (6.1 m). Conversion kits for TH6DXX available.



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Our Readers Say

Official QRP Net Formed

Editor, CQ:

I've been a ham for ten years and have been QRP for eight years. I use a Ten-Tec 515 Argonaut for QRP work with an electronic keyer. I recently moved to the east side of the island to a town called Waimanalo. It's a very rare county to work for those of you who are county hunters.

I have a homebrew monobander on 20 meters and get on 14.222 and 14.220 a couple of times a week. I've tried to get on the QRP nets but I can't hear anyone. For several years I have tried, but due to the time of the nets the band is not open yet. So one Sunday afternoon I thought why don't I make our own QRP net! I got on and called CQ QRP net and all of a sudden I had a pile-up coming on. I had a total of ten stations check in on the first unofficial QRP net. I have therefore decided to make it an official net (The Pacific QRP DX Net, first Monday of the month at 0500 UTC on 14.060 MHz).

Check in with your call sign sent twice, then the exchange will be RST only. After all stations have checked in, they will be allowed to call and exchange RST only with any stations on the net. The purpose of the net is to help QRPers work DX and Pacific Ocean stations; get their WAS, WAC, DXCC QRP Award, QRP member award, etc.; and enhance the art of operating QRP. Net control will be me, AH6EK/QRP, and substitutes will be KH6JOI/QRP or KH6U/QRP or KH6IJS/QRP.

Alan Jay, AH6EK/QRP
Waimanalo, HI

Booby Trapped?

Editor, CQ:

It was with interest that I read Dick Rollema, PA0SE's article on the Tonschreiber "b" German tape recorders in the July '88 issue. It brought back memories.

I was at No6 Central W/Shops R.E.M.E. and I well remember the day when these crates of German captured packing cases were delivered to the wireless (Bld. 412) workshops. Nobody knew what they contained, and for all we knew they could have been booby-trapped. At the time there were about 150 personnel working in the building. Anyway, the Major in charge went to the Sergeant and told him to open the crates. He did not fancy the job because of the suspicious nature of the crates, so the Sergeant went to the Corporal with orders for him to open them. Of course, the Corporal did not like the idea either, so he passed the buck to a Private who could not pass the buck to anyone. So with a great deal of nervousness I set about opening the packing cases. Obviously, they were not booby-trapped, but they were the first tape recorders we had ever seen, and they certainly created a lot of interest in the workshop, and they were certainly well-made equipment.

By the way, the Major, the Sergeant, and the Corporal took an extra long coffee break at that time!

Norm Roll, VE4AEO
Winnipeg, Manitoba, Canada

Yaesu's FT-736R. Because you never know who's listening.

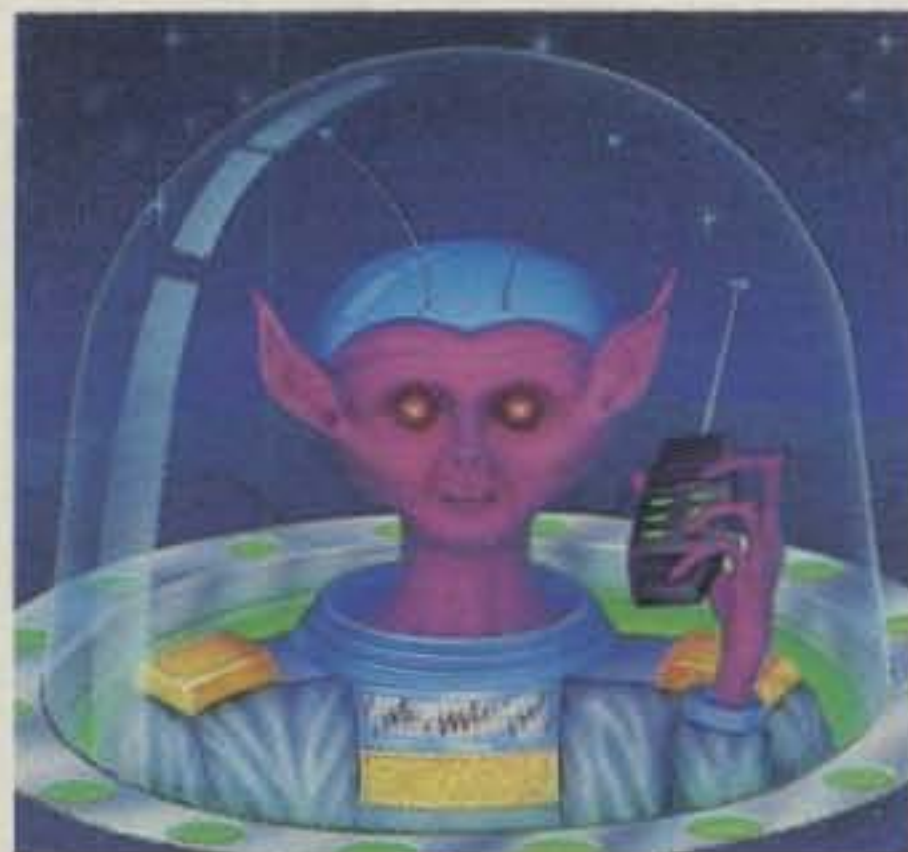
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With Yaesu's new FT-736R VHF/UHF base station, you can discover some of the best DX happening in ham radio. Via moonbounce. Tropo. Aurora. Meteor scatter. Or satellites.

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For starters, the FT-736R comes factory-equipped for SSB, CW and FM operation on 2 meters and 70 cm (430-450 MHz!), with two additional slots for optional 50-MHz, 220-MHz, or 1.2-GHz modules.

Crossband full duplex capability is built into every FT-736R for satellite work. And the satel-



lite tracking function (normal *and* reverse modes) keeps you on target through a transponder.

The FT-736R delivers 25 watts RF output on 2 meters, 220 MHz, and 70 cm. And 10 watts on 6 meters and 1.2 GHz. Store frequency, mode, PL frequency, and repeater shift in each of the 100 memories.

For serious VHF/UHF work, use the RF speech processor. IF shift. IF notch filter. CW and FM wide/narrow IF filters. VOX. Noise blanker. Three-position AGC selection. Preamp switch for activating your

tower-mount preamplifier. Even an offset display for measuring observed Doppler shift on DX links.

And to custom design your FT-736R station, choose from these popular optional accessories: Iambic keyer module. FTS-8 CTCSS encode/decode unit. FVS-1 voice synthesizer. FMP-1 AQS digital message display unit. 1.2-GHz ATV module. MD-1B8 desk microphone. E-736 DC cable. And CAT (Computer Aided Transceiver) system software.

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CQ REVIEWS:

The ICOM IC-781 HF Super Transceiver – Part I

BY DAVE INGRAM*, K4TWJ

Surely the hottest "big news" item appearing in amateur radio magazines and at larger conventions during recent months is ICOM's new top-of-the-line IC-781 HF transceiver. This rig is absolutely packed with new designs, features, and attractions. Indeed, a mere front-panel tour of its 98 controls is a complete article within itself. The rig is unreal!

Realizing that IC-781 owners would be more interested in operating their new super transceiver than in taking time to write about them, I enthusiastically volunteered to handle that task. I have now used two different IC-781s during two separate periods, wrangling them through clever diversions (in other words, the IC-781s visited my station for a few weeks between nearby convention appearances). Due to my long-term association with amateur radio magazines, book publishers, worldwide organizations, and manufacturers, I have enjoyed using almost every SSB transceiver built. In my opinion, the IC-781 is a top performer and a genuine modern-day classic. I can easily work three countries on three separate frequencies *simultaneously* with it; listen to one pileup while working another, overview a band's full activity with a single spectrum-scope glance, and use the memories like 99 VFOs. Those are only opening views, however, so let's get on to the facts.

Overview

The IC-781 is packaged in a smoke-gray cabinet, measures 5.9"H x 16.7"W x 16.1"D, and weighs 50.7 pounds (see fig. 1). The side handles and rack mounts you see in IC-781 ads are optional and extend the rig's width to 19 inches. Inside the cabinet there's a full-duty-cycle rated AC power supply, automatic antenna tuner, RF speech processor, iambic keyer, 60 wpm full QSK CW system, simultaneous dual receive system, dual noise blankers, numerous mixed bandwidth filters, and *much more*. There's also more



Fig. 1—ICOM's IC-781 Deluxe HF Transceiver is a complete station in a single full-sized cabinet.

transceiver circuitry inside than in any rig I have ever seen. Ten years ago this much technology would have overflowed an army base or sunk a battleship. Additional technical details are included in fig. 2. Study it closely. We will refer back to several of its listed parameters from time to time.

The most obvious and unmistakable front-panel feature of the IC-781 is its center-located 5 inch CRT screen rather than a dial or fluorescent readout. This display is a central monitor system boldly indicating your present operating frequency and selected parameters at the top, standby frequencies in the middle, the time (local or UTC), and several additional functions in its lower area. Notice the **F1** through **F6** keys in the CRT's bottom escutcheon; they control the CRT's lower functions. You can use them to select a band spectrum display, memory contents with scrolling, scan presets, various filter combinations, clock functions and timer actions, plus interface parameters for on-screen RTTY or packet readouts.

The spectrum display is adjustable in 50, 100, or 200 kHz spans either side of center (your present operating frequency). Horizontal division marks are superimposed for frequency calibrations, and vertical divisions are easily related to signal strengths (see fig. 3). Band noise ap-

pears along the display's bottom, with signals rising like simulated trees. After a few minutes use you can easily distinguish DX pileups and differentiate between SSB or CW signals. The spectrum display also indicates your own signal during transmissions, and it is great for comparing SSB levels with your CW carrier.

Pressing a CRT function key changes the screen's lower area to display memory contents (see fig. 4). Notice that separate frequencies, modes, filter combinations, and operating notes can be stored in each memory location. Since all memories can't be displayed simultaneously, you press the **F1/Roll** button while rotating the main tuning knob to scroll through memories (the IC-781 stays tuned to your selected operating frequency during that step). A cursor on the memory list's left side indicates the presently available/ready for recall memory. All memories can be tuned and even reprogrammed completely independent of VFO A or B operation. If you prefer to add personal notes into memory for keeping track of nets or skeds, pressing the **F5** button "brings up" an electronic note pad in the screen's top right area. You then use the main tuning knob to select letters while tapping the **F1** key for entering them into memory. Yes, and all this can be done while in QSO. A full entertainment center!

*Eastwood Village No. 1201 So., Rt. 11, Box 499, Birmingham, AL 35210



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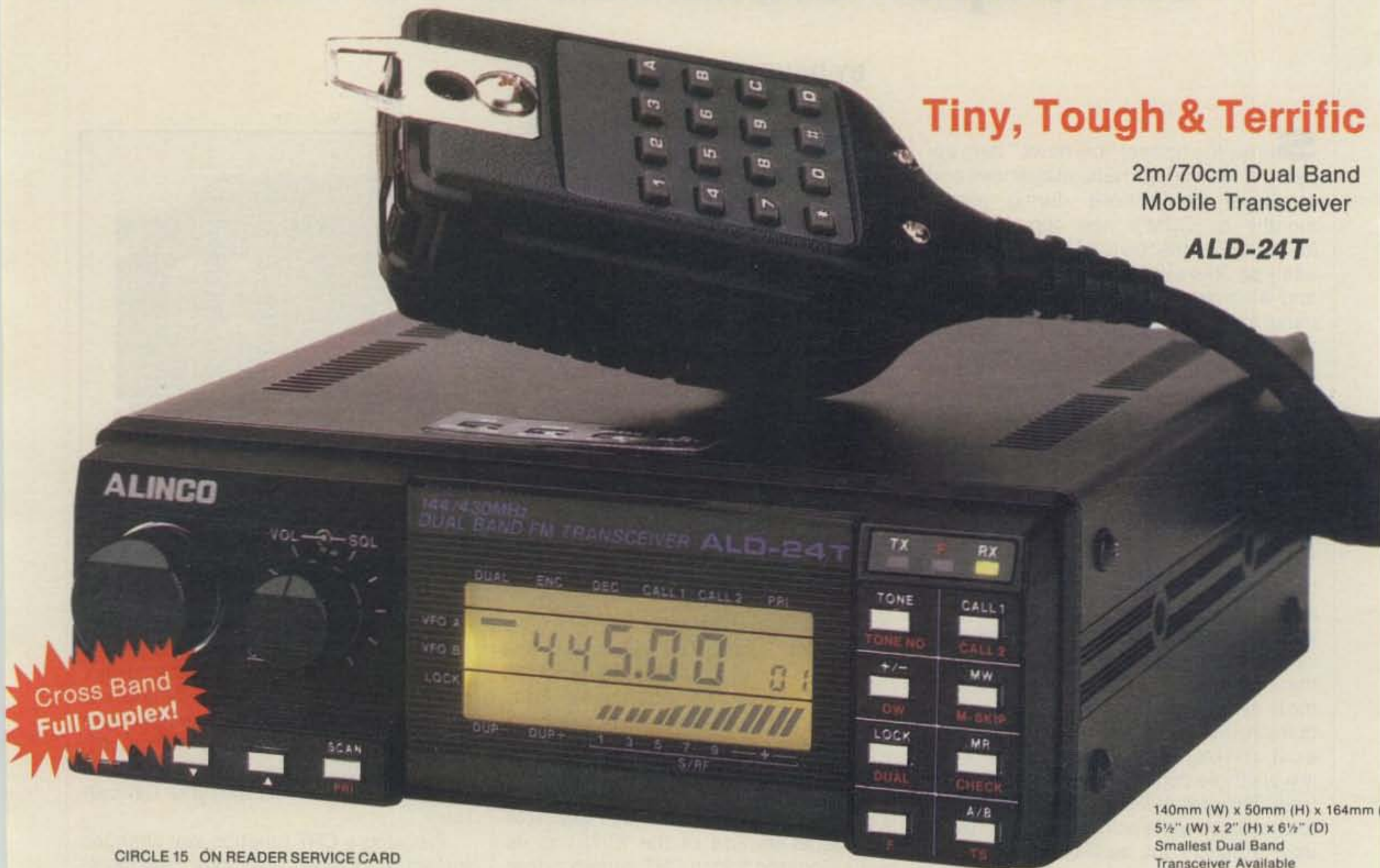
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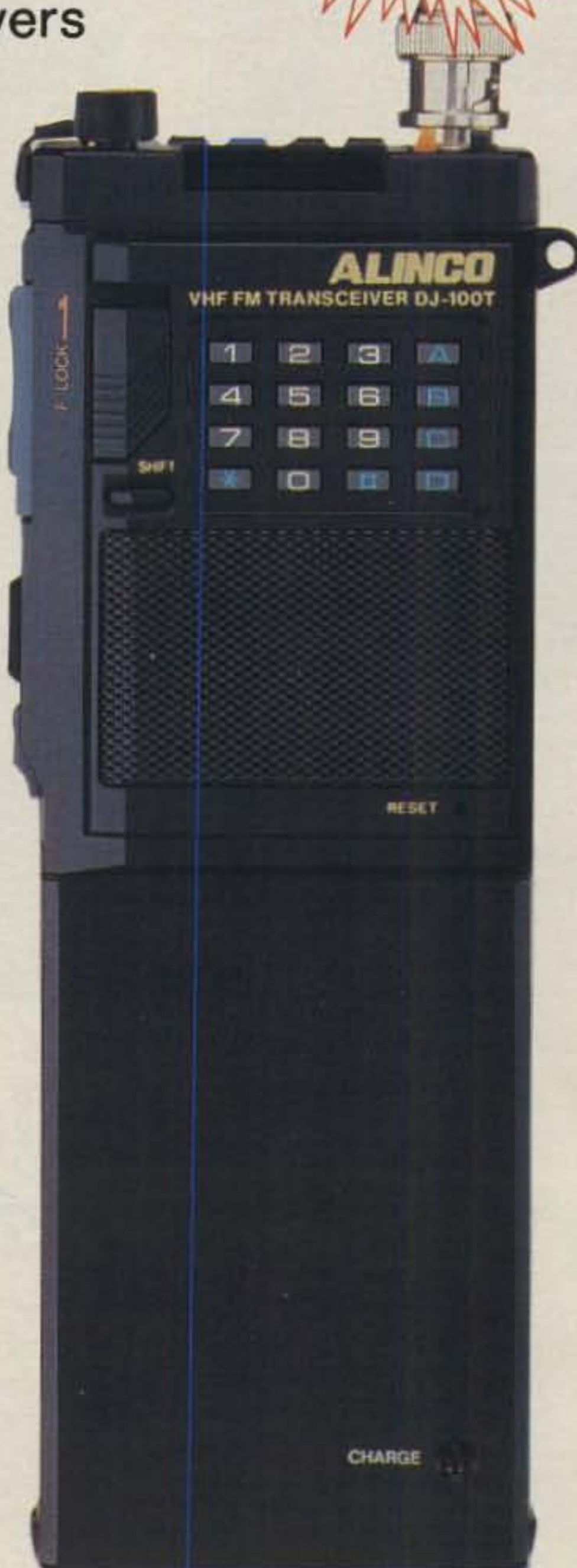
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Quement Electronics - San Jose, CA
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■ GENERAL

• Frequency coverage

Receive :	0.1000~30.0000MHz
Transmit :	160m band 1.8000~ 2.0000MHz
	80m band 3.4000~ 4.1000MHz
	40m band 6.9000~ 7.5000MHz
	30m band 9.9000~10.5000MHz
	20m band 13.9000~14.5000MHz
	17m band 17.9000~18.5000MHz
	15m band 20.9000~21.5000MHz
	12m band 24.4000~25.1000MHz
	10m band 27.9000~30.0000MHz

• Modes

A3J(SSB), A1(CW), F3(FM), F1(RTTY), A3(AM)

• Tuning step

10Hz (With [TS] OFF)
1kHz (With [TS] ON)

• Antenna impedance (With [TUNER] OFF)

50Ω unbalanced

• Power supply requirement

100~120V AC (U.S.A. version)
220~240V AC (Australia, Europe, France versions)

• Ground

Minus

• Power consumption

Receiving max. audio : 150VA
stand by : 140VA
Transmitting HIGH : 760VA
LOW : 325VA

• Usable temperature range

-10°C~+60°C (+14°F~+140°F)

• Frequency stability

±15Hz (-10°C~+60°C) (+14°F~+140°F)

• Dimensions

425mm(W)×149mm(H)×411mm(D)
16.7"(W)×5.9"(H)×16.1"(D)
(Projections not included)

• Weight

23kg (50.7lbs.)

■ TRANSMITTER

• Max. output power

SSB : 150W PEP
CW, RTTY, FM : 150W
AM : 75W

• Modulation

SSB : Balanced modulation
FM, RTTY : Reactance modulation
AM : Low level modulation

• Max. frequency deviation

±5kHz

• RTTY shift width

170Hz, 425Hz, 850Hz selectable

• Spurious emissions

Less than -60dB

• Carrier suppression

Less than -40dB

• Unwanted sideband

Less than -55dB (with 1kHz modulation)

• Microphone impedance

600Ω

■ RECEIVER

• Receiving system

SSB, CW, RTTY, AM : Quadruple-conversion superheterodyne
FM : Triple-conversion superheterodyne

• Intermediate frequencies

	SSB	CW, RTTY	AM	FM
1st	46.5115	46.5106	46.5100	46.5100
2nd	9.0115	9.0106	9.0100	9.0100
3rd	0.4550	0.4550	0.4550	0.4550
4th	10.6950	10.6950	10.6950	—

Unit: MHz

• Sensitivity ([PREAMP] ON)

SSB, CW, RTTY (for 10dB S/N):

0.1~0.5MHz Less than 0.5μV

0.5~1.8MHz Less than 1.0μV

1.8~30MHz Less than 0.16μV

AM (for 10dB S/N):

0.1~0.5MHz Less than 3.2μV

0.5~1.8MHz Less than 6.3μV

1.8~30MHz Less than 1.0μV

FM (for 12dB SINAD):

28~30MHz Less than 0.23μV

• FM squelch sensitivity

28~30MHz Less than 0.23μV

• Selectivity

SSB, CW-W, RTTY-W, AM-N:

More than 2.4kHz/-6dB Less than 3.8kHz/-60dB

CW-N, RTTY-N (With [CM250Hz] OFF):

More than 500Hz/-6dB Less than 1.0kHz/-60dB

CW-N, RTTY-N (With [CW250Hz] ON):

More than 250Hz/-6dB Less than 800Hz/-60dB

AM-W:

More than 6.0kHz/-6dB Less than 15.0kHz/-60dB

FM:

More than 15.0kHz/-6dB Less than 30.0kHz/-50dB

• Spurious and image rejection ratio

Image: Less than -80dB IF: Less than -70dB

• Audio output

More than 2.6W at 10% distortion with an 8Ω load.

• Notch filter attenuation

More than 45dB

• RIT variable range

±9.99kHz

■ ANTENNA TUNER

• Output matching range

16.7~150Ω unbalanced.

• Minimum input power

15W

• Band switching time

Less than 3sec.

• Auto tuning time

Less than 3sec.

• Auto tuning accuracy

VSWR less than 1.2:1

• Insertion loss

Less than 0.5dB (after tuning)

■ CRT DISPLAY

• Output level

Composite video signal : 1Vp-p

Video components : 0.7Vp-p positive

Synchronous components : 0.3Vp-p negative

• Output impedance

75Ω

• Usable humidity range

10~90% (Keep the transceiver away from moist environments.)

• Horizontal frequency

15.75kHz

• Vertical frequency

60Hz

Fig. 2- Technical specifications of the IC-781. The discussion of various parameters is presented in the text.

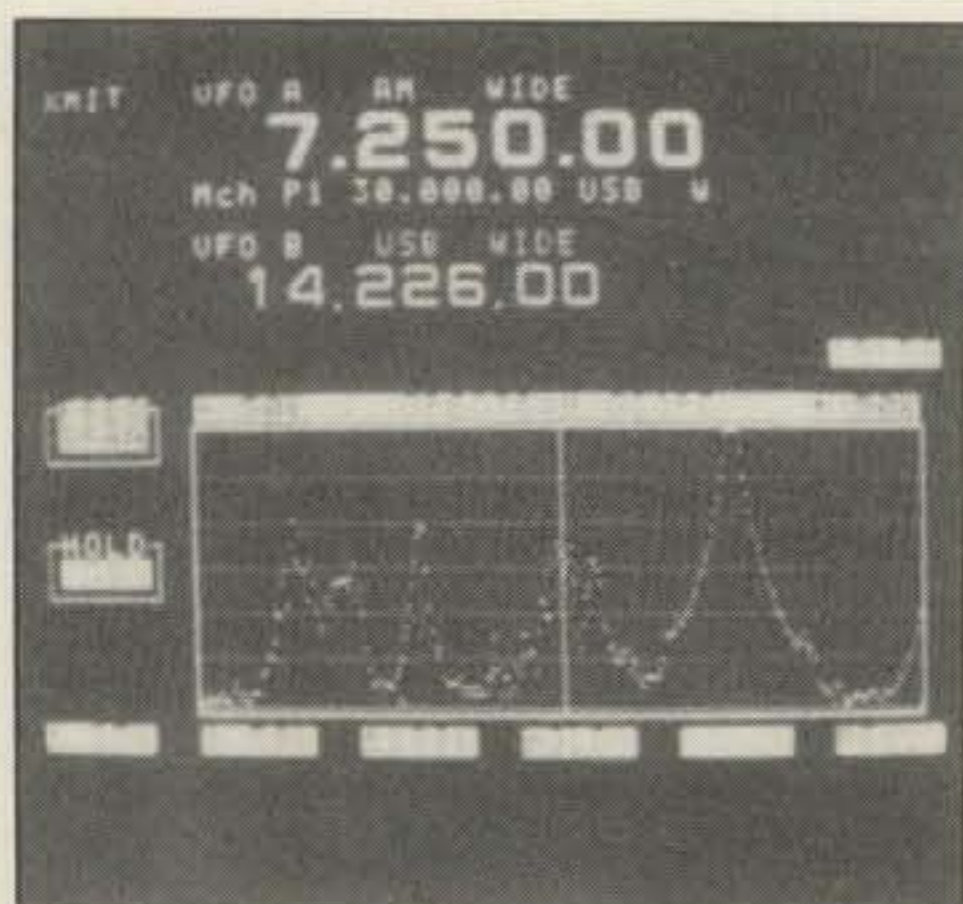


Fig. 3— Close-up view of the IC-781's screen with spectrum display activated in lower area. Center vertical line is present operating frequency.

More function-key activations "bring up" scan modes and limits that also can be changed while in QSO as well as the IC-781's dual clocks with weekly sleep timers (see figs. 5 and 6). Suppose you want to catch a choice DX station at 4 AM. Program the frequency into memory, set the clock, and hit the rack. At 4 AM you'll be awakened to the heartwarming sounds of DX. What a rig!

Using the CRT's lower area as an RTTY or packet display involves connecting an external TU/interface to a rear socket on the IC-781. You then select compatible speeds and data formats using F keys and bingo: RTTY readout right on the IC-781 (see fig. 7). A built-in test program is also included to keep you entertained and to impress the natives. If you're wondering how six F keys handle all the previous actions, relax. Each new lower screen operation designates new functions to the F keys, and they are marked on the screen according to their new purpose. It's the equivalent of 30-plus separate keys. We could continue several more pages on the CRT, but let's instead balance this review with variety in all areas.

A Front-Panel Tour

Since an unbelievable array of special features are included in the IC-781, a slightly different review approach is necessary to get everything in (if that's possible). Let's thus begin on the IC-781's right side and work toward its front panel's left side. Grab a big IC-781 ad photo and follow along with me.

The IC-781's front keypad can be used for direct band or frequency selection as desired, or you can simply tune frequencies with the rubberized main knob. The vertical row of silver buttons beside the keypad also interact in some interesting ways. Pressing **A** or **B** determines which VFO is tuned with the main knob, for ex-

ample, and that can also be "separated" from your present operating frequency. In other words, you can dial up a 10 or 15 meter frequency on VFO B while continuing a QSO on VFO A, then use the **Change** buttons to instantly swap operating frequencies. A similar concept can also be used for programming the memories while you continue an uninterrupted QSO with VFO A or B.

Notice the **Dual Watch** button right below the keypad. It activates the IC-781's simultaneous dual receive mode, and the adjacent **Balance** control blends the levels of VFO A and B in a single speaker. Think about this feature while reflecting back on the previous paragraph's discussion of separate VFO A/B operations. You can work the DX action on one band, use the spectrum scope to spot new pileups, and tune another band for special openings—all at the same time. What's more, you can tap the **Change** button to toggle operations between those selected frequencies and work opposite sides of the world on different bands almost simultaneously. If all that does not get your adrenalin pumping, switch both VFOs for CW operation on a favorite band, activate the **Dual Watch** and **Split** functions along with full **QSK** and fast **AGC**, and work two countries by transmitting to one while receiving from the other. Details of that "super operating" concept, incidentally, were featured in my October 1987 "World of Ideas" *CQ* column.

Returning to our front-panel tour, your attention is next directed to the upper-right area's four IF filter switches. During SSB operations, they select wide/narrow filter bandwidths of 2.8 and 2.4 kHz, respectively. During CW and RTTY operations they are used to select 2.4 kHz, and 500 and 250 Hz bandwidths. FM operations use a 15 kHz filter, and 6 kHz or 2.4 kHz is selectable for AM. All of the previous filters are preinstalled in the IC-781. Notice you can also activate the second and third IF's 250 Hz filters separately or in tandem for varying overall passband skirting and strong signal rejection. Merely saying these filters are the "bees knees" is an understatement, as you can

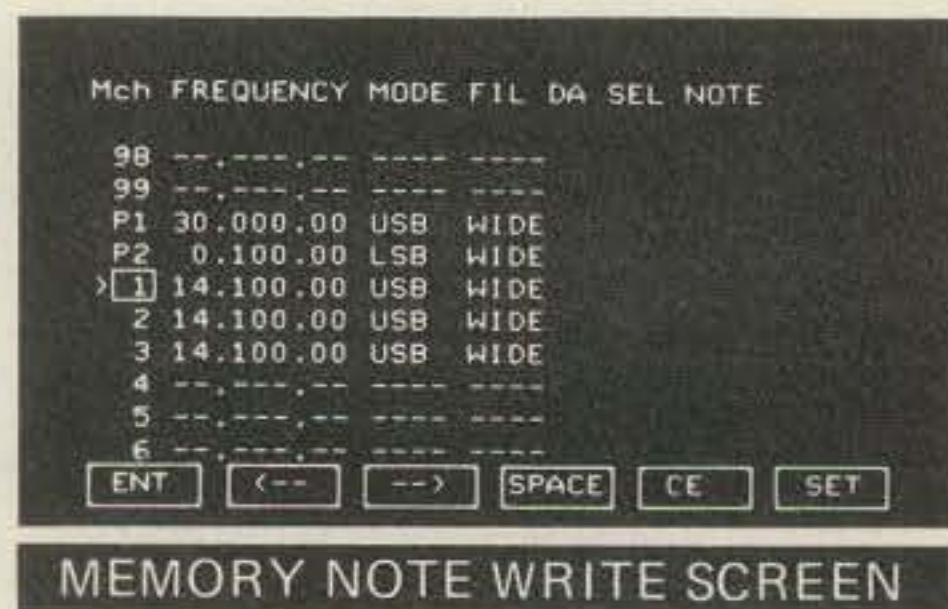


Fig. 4— Sample of screen's bottom display when memory-contents mode and electronic notepad functions are activated.



Fig. 5— The IC-781's lower screen display during scan-mode programming.

slice between adjacent signals with uncanny accuracy . . . and our next highlighted feature also works in conjunction with the filters.

A new twin Passband Tuning system is also featured in the IC-781, and its concentric controls that independently adjust second and third IF stages are located immediately below the filter switches. "Separating" or rotating the controls in opposite directions further narrows a selected filter's bandwidth while accentuating low or high frequency response to a desired signal. The controls move in detented steps so you can almost "feel" a bandwidth changing as they are adjusted. The SSB width can be narrowed to 1.8 kHz or less for DXing, and the CW width can be cut to a proverbial gnat's hair. The overall effect reminds me of having a double handful of various filters "tied to a front-panel knob."

Rotating both Passband Tuning controls in the same direction creates a twin IF Shift action. That is, low or high frequency response to a desired signal is accentuated while a selected filter's bandwidth remains unchanged. The effects of twin Passband Tuning and twin IF Shift are quite pronounced and noticeably more effective than their conventional/single-stage equivalents. Technical details of twin Passband Tuning are included later in this review.

Right beside the Passband Tuning and electrically "following" it in IC-781 circuitry is an IF Notch filter. This control moves a sharply tuned and very deep notch across the bandpass to remove heterodynes on SSB and almost-zero-beat interference on CW. Since it functions at the IF level, it really stops QRM from acting on AGC circuitry: a deficiency I have noticed in several other transceivers. More than a few times an IF Notch has really been my trump card in hopeless pileups. That's when the DX is working stations rapid-fire style, but long callers continue generating QRM rather than listening (the alligator syndrome—all mouth and no ears). I use the IF Notch to quickly block out alligators and/or band noises. Yes, an IF Notch even helps a noise blanker to minimize band and power noises. Just adjust it for best reception

HF Equipment Regular SALE
 IC-781 Xcvt/Rcvr/ps/tuner/scope... 5995.00 Call



IC-761 Xcvt/Rcvr/ps/tuner... 2699.00 2369
 HM-36 Scanning hand microphone 47.00
 SP-20 Ext. speaker w/audio filter... 149.00 139⁹⁵
 FL-101 250 Hz 1st IF CW filter... 73.50
 FL-53A 250 Hz 2nd IF CW filter... 115.00 109⁹⁵
 FL-102 6 kHz AM filter... 59.00
 EX-310 Voice synthesizer... 59.00



IC-751A 9-band xcvr/.1-30 MHz rcvr 1699.00 1469
 PS-35 Internal power supply... 219.00 199⁹⁵
 FL-32A 500 Hz CW filter (1st IF)... 69.00
 FL-63A 250 Hz CW filter (1st IF)... 59.00
 FL-52A 500 Hz CW filter (2nd IF)... 115.00 109⁹⁵
 FL-53A 250 Hz CW filter (2nd IF)... 115.00 109⁹⁵
 FL-33 AM filter... 49.00
 FL-70 2.8 kHz wide SSB filter... 59.00
 RC-10 External frequency controller 49.00



IC-735 HF transceiver/SW rcvr/mic 1099.00 949⁹⁵
 PS-55 External power supply... 219.00 199⁹⁵
 AT-150 Automatic antenna tuner... 445.00 369⁹⁵
 FL-32A 500 Hz CW filter... 69.00
 EX-243 Electronic keyer unit... 64.50
 UT-30 Tone encoder... 18.50

Other Accessories Regular SALE
 IC-2KL 160-15m solid state amp w/ps 1999.00 1699
 PS-15 20A external power supply... 175.00 159⁹⁵
 PS-30 Systems p/s w/cord, 6-pin plug 349.00 319⁹⁵
 MB Mobile mount, 735/751A/761A... 25.99
 SP-3 External speaker... 65.00
 SP-7 Small external speaker... 51.99
 CR-64 High stab. ref. xtal for 751A... 79.00
 PP-1 Speaker/patch... 179.00 164⁹⁵
 SM-6 Desk microphone... 47.95
 SM-8 Desk mic - two cables, Scan... 89.00
 SM-10 Compressor/graph EQ, 8 pin mic 149.00 139⁹⁵
 AT-100 100W 8-band auto. antenna tuner 445.00 389⁹⁵
 AT-500 100W 9-band auto. antenna tuner 589.00 519⁹⁵
 AH-2 8-band tuner w/mount & whip 659.00 589⁹⁵
 AH-2A Antenna tuner system, only... 519.00 449⁹⁵
 GC-5 World clock... 91.95 79⁹⁵



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 IC-375A 25W 220 FM/SSB/CW (c/o) 1399.00 899⁹⁵
 IC-475A 25W 440 FM/SSB/CW w/ps 1399.00 1099
 IC-475H 75W 440 FM/SSB/CW... 1599.00 1289
 IC-575A 25W 6/10m xcvr w/ps... 1399.00 1129
 IC-471H 75W 430-450MHz base (c/o) 1399.00 989⁹⁵
 PS-35 Internal power supply... 219.00 199⁹⁵
 AG-35 Mast mounted preamp... 99.95
 AG-35 (Purchased with IC-471H) 99.95 9⁹⁵
 SM-6 Desk microphone... 47.95
 EX-310 Voice synthesizer... 59.00
 TS-32 CommSpec encode/decoder... 59.95
 UT-15 Encoder/decoder interface... 34.00
 UT-15S UT-15S w/TS-32 installed... 96.00

VHF/UHF/1.2 GHz Mobiles Regular SALE
 IC-37A 25w 220 FM/TTP mic... (c/o) 499.00 349⁹⁵
 IC-47A 25w 440 FM/TTP mic... (c/o) 549.00 399⁹⁵
 PS-45 Compact 8A power supply... 145.00 134⁹⁵
 UT-16/EX-388 Voice synthesizer... 34.99
 SP-10 Slim-line external speaker... 35.99
 IC-28H 45W 2m FM, TTP mic... 499.00 439⁹⁵
 IC-38A 25W 220 FM, regular mic... 459.00 329⁹⁵
 IC-38A 25W 220 FM, TTP mic... 489.00 349⁹⁵
 IC-48A 25W 440-450 FM, regular mic 459.00 369⁹⁵
 IC-48A 25W 440-450 FM, TTP mic... 509.00 449⁹⁵
 HM-14 Extra TTP microphone... 59.00
 UT-28 Digital code squelch... 39.50
 UT-29 Tone squelch decoder... 46.00
 HM-16 Speaker/microphone... 34.00
 IC-228A 25W 2m FM/TTP scan mic... 509.00 449⁹⁵
 IC-228H 45W 2m FM/TTP scan mic... 539.00 479⁹⁵
 UT-40 Pocket beep function... 45.00
 IC-900A Transceiver controller... 639.00 569⁹⁵

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\$969⁹⁵

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 UX-29A 2m 25W band unit... 299.00 269⁹⁵
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 UX-39A 220MHz 25W band unit... 349.00 289⁹⁵
 UX-49A 440MHz 25W band unit... 349.00 319⁹⁵
 UX-59A 6m 10W unit... 349.00 319⁹⁵
 UX-129A 1.2GHz 10W band unit... 549.00 499⁹⁵
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 IC-3200A 25W 2m/440 FM/TTP (c/o) 695.00 499⁹⁵
 UT-23 Voice synthesizer... 34.99
 AH-32 2m/440 Dual Band antenna... 39.00
 AHB-32 Trunk-lip mount... 35.00
 Larsen PO-K Roof mount... 20.00
 Larsen PO-TLM Trunk-lip mount... 22.00
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 RP-2210 220MHz 25W repeater... 1649.00 1469
 RP-3010 440MHz 10W FM repeater... 1299.00 1149

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Hand-helds Regular SALE
 IC-2A 2-meters... 289.00 259⁹⁵
 IC-2AT with TTP... 319.00 279⁹⁵
 IC-3AT 220/TTP (c/o) 349.00 269⁹⁵
 IC-4AT 440 MHz, TTP 349.00 299⁹⁵
 IC-02AT/High Power 409.00 349⁹⁵
 IC-03AT for 220 MHz 449.00 289⁹⁵
 IC-04AT for 440 MHz 449.00 389⁹⁵
 IC-u2AT for 2m w/TTP 329.00 289⁹⁵
 IC-u4AT 440 MHz, TTP 369.00 299⁹⁵
 IC-2GAT for 2m, TTP 429.00 379⁹⁵
 IC-4GAT 440MHz, TTP 449.00 399⁹⁵
 IC-32AT 2m/440MHz 629.00 559⁹⁵

IC-u2A for 2m w/o TTP
 Reg. \$299 - Closeout \$249⁹⁵

Aircraft band handhelds Regular SALE
 IC-12AT 1W 1.2GHz FM HT/batt/cgr/TTP 473.00 369⁹⁵
 A-2 5W PEP synth. aircraft HT... 525.00 479⁹⁵
 A-20 Synth. aircraft HT w/VOR... 625.00 569⁹⁵

Accessories for all except micros Regular
 BP-7 425mah/13.2V Nicad Pak - use BC-35 79.00
 BP-8 800mah/8.4V Nicad Pak - use BC-35... 79.00
 BC-35 Drop in desk charger for all batteries 79.00
 BC-16U Wall charger for BP7/BP8... 21.25
 LC-11 Vinyl case for Dlx using BP-3... 20.50
 LC-14 Vinyl case for Dlx using BP-7/8... 20.50
 LC-02AT Leather case for Dlx models w/BP-7/8 54.50

Accessories for IC and IC-O series Regular
 BP-2 425mah/7.2V Nicad Pak - use BC35... 49.00
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 BP-5 425mah/10.8V Nicad Pak - use BC35 65.00
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 CP-10 Battery separation cable w/clip... 22.50
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 MB-16D Mobile mtg. bkt for all HTs... 25.99
 LC-2AT Leather case for standard models... 54.50
 RB-1 Vinyl waterproof radio bag... 35.95
 HM-9 Speaker microphone... 47.00
 HS-10 Boom microphone/headset... 24.50
 HS-10SA Vox unit for HS-10 & Deluxe only 24.50
 HS-10SB PTT unit for HS-10... 24.50
 SS-32SMP Commspec 32-tone encoder... 27.95

For other HT Accessories not listed please CALL

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 R-71A 100kHz to 30MHz receiver... \$999.00 869⁹⁵
 RC-11 Infrared remote controller... 70.99
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 FL-63A 250 Hz CW filter (1st IF)... 59.00
 FL-44A SSB filter (2nd IF)... 178.00 159⁹⁵
 EX-257 FM unit... 49.00
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 MB-12 Mobile mount... 25.99
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of a weak signal rather than notching it out. Once you're accustomed to using an IF Notch, you'll wonder how you survived without it. They are great.

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While most of the front panel's lower middle switches are self-explanatory, some of their aspects warrant extra mention. The speech button's voice synthesizer, for example, is preinstalled. In fact, all the options are built into an IC-781. It has everything. Although I have not yet found its front control, there's probably a rocket launcher in there somewhere!

Notice the RF preamp and 10, 20, 30 dB attenuator buttons. These increase and decrease "front end" sensitivity like a whiz. The amazing fact, however, is the IC-781's noise floor of 105 dB changes to only 103 dB when the preamp is switched on! Talk about low noise reception! The special circuitry responsible for this high performance will be discussed later. Now let's move to the front panel's left side.

There are eleven controls along the panel's bottom, some of which pop out for adjustment and press back in. A dimmer control varies meter illumination, and a "bright" control adjusts the CRT intensity. A mike tone adjustment lets you tailor transmit audio to enhance your

voice—a very useful feature. Other adjustments control scanning, VOX, and everything else known to modern man.

Working our way on up the panel, the IC-781's **RF PWR** control continuously adjusts power output from 5 to 150-plus watts. This extra amount of power is quite noticeable on the air, and it flat drives "killer amps" to viscous full output. Using the IC-781's RF speech compressor with that 150 watts output gives almost as much "talk power" as a classic 1 kilowatt amplifier connected to an ordinary transceiver. The panel's **Drive** control, incidentally, adjusts the compressor's action. Don't even ask what it's like using both the compressor and 150 watts with a big amp!

Notice the IC-781 includes dual noise blankers, and they are continuously variable in both insertion level and blanking width. This rig means business! You can set it to remove noise but not create "buckshooting" from overblanking. Nice! The width adjustment is mainly for handling a wide variety of over-the-horizon or "woodpecker"-type noises, but I find it's

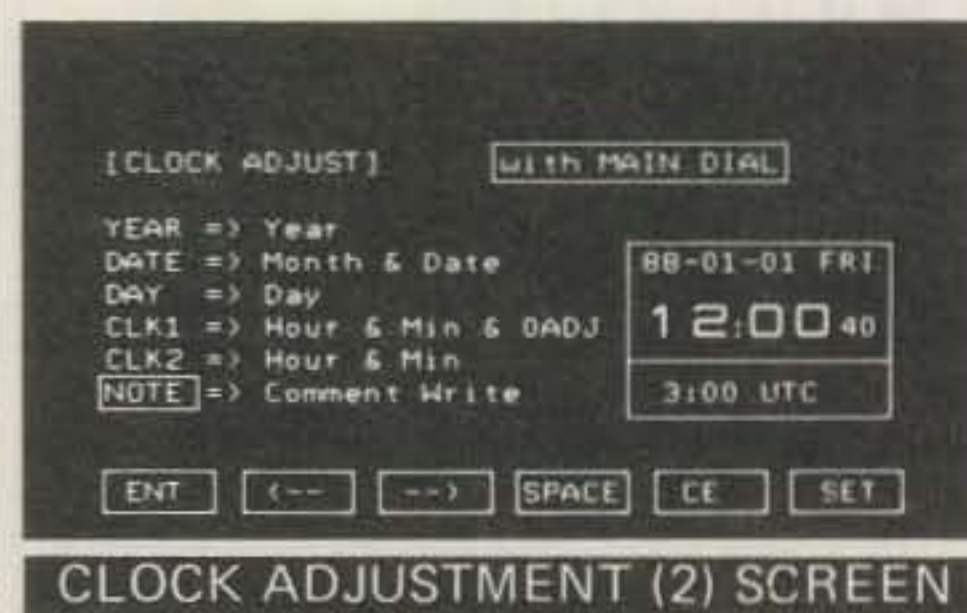


Fig. 6—Clock and timer adjustments are also made on the screen's lower area.

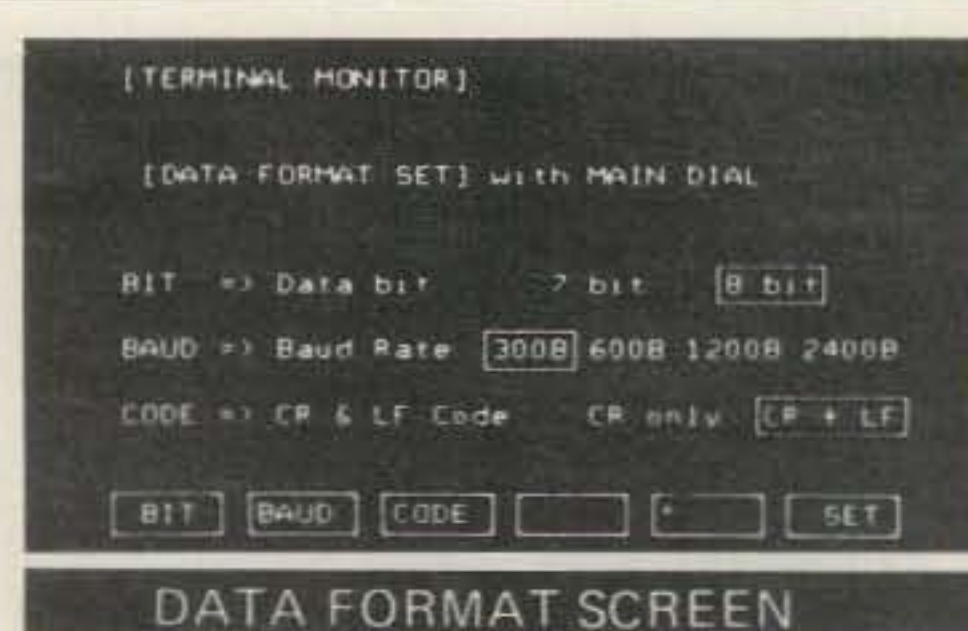



Fig. 7—Lower screen display for setting parameters when terminal-monitor function is utilized.

also great for eliminating several types of power-line interferences. This is one super feature we would really like to see in more transceivers! Woodpecker noises are often accompanied with long-path echoes; consequently, each "peck" varies in duration. The IC-781's blanker is thus variable from 2 to 15 milliseconds to eliminate all types of woodpecker noises and their echoes.

Continuing along, the IC-781's built-in iambic CW keyer is quite similar to popular Curtis units. It is panel-adjustable in speed and sidetone level, and an internal adjustment varies weight. Semi and full break-in operation rated to 60 wpm (!) is also included in the IC-781; it is quiet and extremely smooth—the best I have seen. As I mentioned earlier, you can even use split VFOs and listen to another QSO in between your own transmitted Morse.

The IC-781's built-in automatic antenna tuner is a real dream. You simply press the button, and it does its thing within a second and without any intervention. It is so fast that you really must watch closely to see the **Wait** LED flicker. Adjustments are also included under a top hatch if you prefer tuning it manually or want to match some ridiculous SWR. A self-calibrating SWR-meter function is also included in the IC-781. It is also super-effective and accurately indicates SWRs during SSB transmission or QRP operations. The "pushbutton" luxury of the automatic antenna tuner and SWR meter are fantastic.

That winds down our nutshell front-panel tour and the first part of the IC-781 review. Next month we will continue with discussions of the numerous special circuit designs and technical aspects of the IC-781. We will also report on its on-the-air performance (getting behind a rig like this is true ham-world fantasyland!) and some other treats you will enjoy. Watch for it, and bear with me on occasionally missing a "World of Ideas" column so we can bring you super reviews of super rigs. All too often 24 hours in a day and 30 days in a month are not enough! One thing's certain, however. Amateur radio life is great regardless of its time length. 

(To Be Continued)

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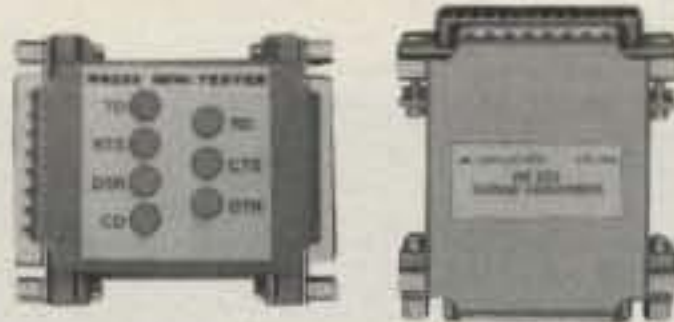
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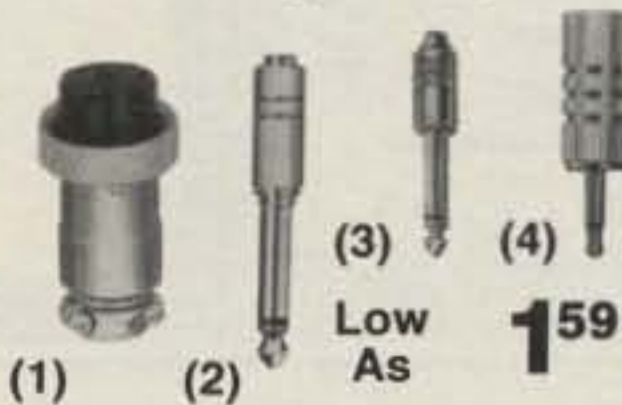
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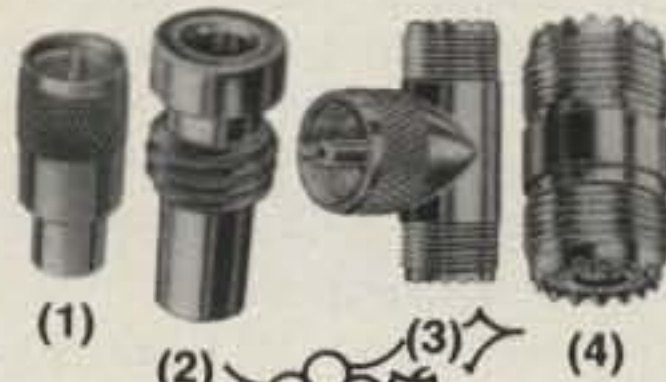


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DX can be only a vacation away if you know how to do it. W1ICP explains how to easily get an XE call from our neighbor to the south. As the Boy Scouts say, "Be Prepared."

Getting An XE Call

BY LEW McCOY*, W1ICP/XE2VHT

For years there has been a lot of information passed out—and a lot of it wrong—on how to obtain a Mexican call sign. Recently, within the last year or so, the Mexican government has set up a system whereby a visiting citizen of the United States can obtain a Mexican call. I went through the experience, so I thought the information would be worth passing on.

My very good friend Hank Scharfe, W6SKC/7, knew I usually make a trip or two to Mexico each year, and I had talked to him about getting a Mexican license (because he holds one). Hank informed me of requirements needed, so I decided to try it.

I usually travel down to Bahia Kino (Kino Bay), which is a rural Mexican seaport town on the Sea of Cortez, about 300 or so miles from Nogales. Also, Kino is about 60 miles from Hermosillo, the capital of the Mexican state of Sonora. Hank informed me I needed the following in order to get a license:

1. A written (typewritten) request for an XE amateur radio license.
2. A valid Mexican tourist card.
3. A copy of my American FCC amateur radio license.
4. An HD-5 Mexican tax receipt, which is obtained from a Mexican tax office.
5. A copy of my birth certificate or other proof of citizenship of the U.S.A.
6. A written letter of endorsement from a licensed Mexican amateur.

This may indicate a lot of material, but actually it is not. I plan to take you on a "walk-through" of my experiences so you'll see what happened.

When you cross the border into Mexico and plan to stay as a tourist or whatever, you are issued a tourist permit or card by the Mexican Immigration Bureau for a pe-



This is Dario, XE2WGM, who is the Engineer In Charge in the state of Sonora.

riod of six months (the permit can be renewed every six months). At this point you'll need a birth certificate or proof of citizenship. I crossed the border at Nogales, receiving my tourist permit there. Hank had suggested I might try to get my license in Nogales, Mexico (and I may have been able to), but because I was traveling with other people, I decided to go on to Kino Bay and then come back to Hermosillo and do the job there.

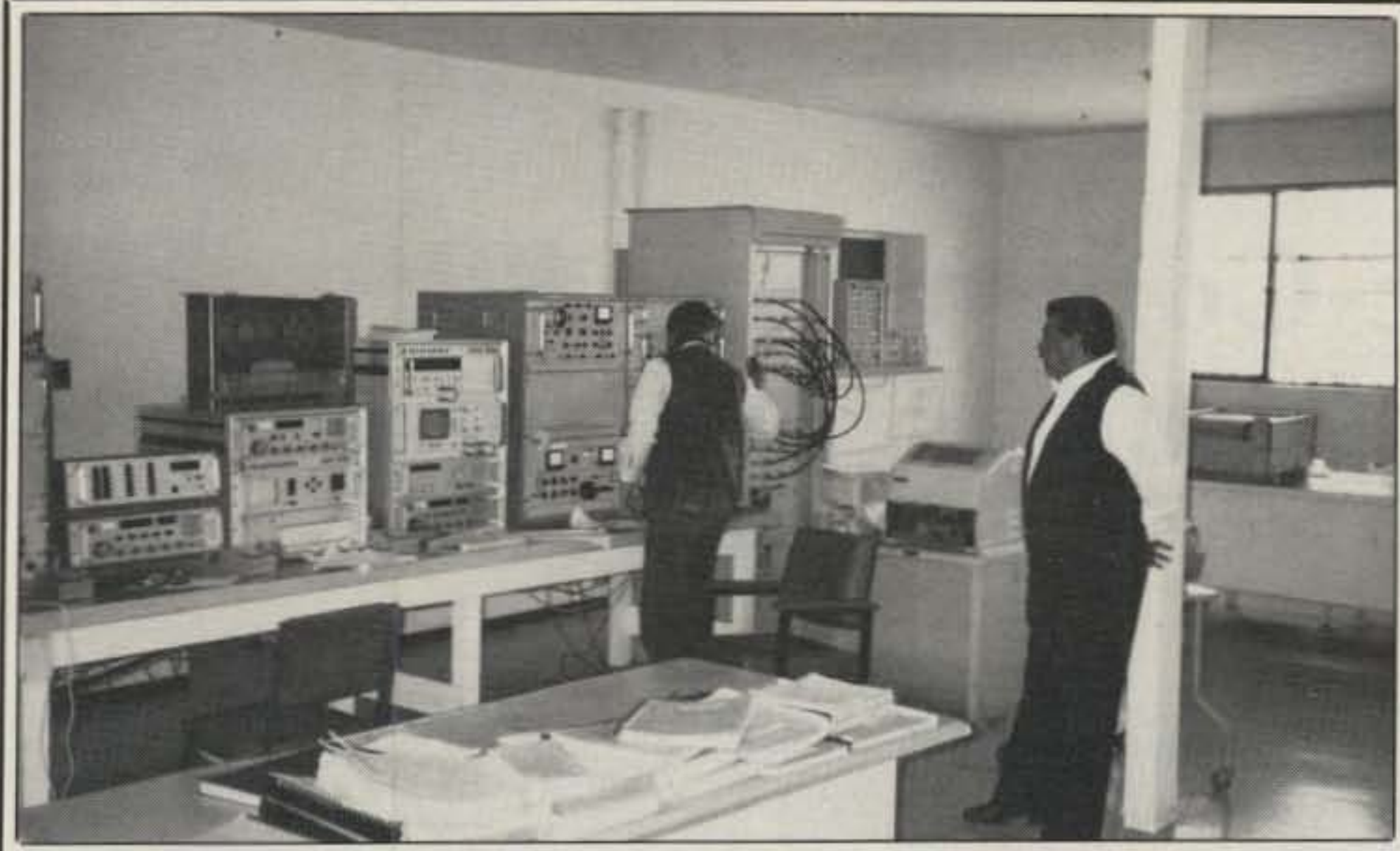
I drove back over to Hermosillo the following morning. Before you can get the license you must have a tax permit, and that is nearly always obtained at a location different from where you get the license. The tax permit is obtained at "The Secretaria De Hacienda," which is the tax collector's office. (Be advised that the hours are usually 8 a.m. until 1:30 p.m.)

At this point I would recommend that if you don't speak Spanish or don't have a translator with you, you prepare a letter in

Spanish that states you wish to get a permit for a "Radio Aficionado," which is what a ham is called in Mexico. They are also called "Radio Locos" (which is probably a more accurate appellation for all of us!). The receptionist at the Secretaria de Hacienda did not speak English and my Spanish is minimal, so I showed her a letter that Hank had prepared. She immediately said "A Radio Loco!" laughing like the dickens (I joined in because it seemed the most diplomatic thing to do). She then gave me a couple of simple forms to fill out and directed me to the cashier. The fee at that time, fall of 1987, was \$64,000! This turned out to be \$28.50 American, which they insisted on in pesos, not American dollars. I understand a renewal fee is required, but it is only a few dollars.

I then drove to the Delegacion Regional de Normatibad y Control de Comunicaciones, which is similar to an FCC office. I noted several large dish antennas

*Technical Editor, CQ, 200 Idaho St., Silver City, NM 88061



Some of the engineers at the monitoring station in Hermosillo. Most of the equipment is German made.

plus other arrays behind the office building. I entered the building and showed my papers to the very charming (and beautiful) receptionist. Of course, she could not speak English, but she looked at me after reading my papers and said, "Radio Loco, Si?" and then laughed. I nodded my head and laughed, too. She got up and went into another office for about five minutes. She came out and dialed a phone number. At this point I didn't have the foggiest idea what was happening. She said something in Spanish into the phone and then looked at me, handing me the phone. I have to admit I felt pretty stupid at that point because I had no idea what I was supposed to do. Naturally, I said "hello" into the phone.

The voice on the other end spoke in a very charming English accent, telling me his name was Dario, XE2WGM, and he wanted me to visit him. My first thought was how was I going to find out where he lived and what in heck was going on at this point. After I managed to converse in my broken Spanish with the receptionist, I realized with much stupidity on my part that Dario was working in the large building several hundred feet behind the main building. Dear readers, please bear with me because all this is relevant.

So my wife and I, with my folder of papers, walked back to the building in the rear where all the antennas were mounted. We entered. Dario was there to greet us. Let me say here that Dario is one of the most gracious and charming amateurs I have met. More than that, Dario Marmolejo Lopez, XE2WGM, was the engineer in charge for the state of Sonora. We talked about Mexican and American enforcement of amateur and radio rules, and he showed me through the extensive

monitoring setup of which he was in charge. What I didn't know at the time, and what my friend Hank had not been sure of, was that in order to get a Mexican license you must be endorsed by a Mexican amateur. Dario dictated a letter to his secretary, who typed it and gave it to me. Essentially what the letter said was that Dario was vouching for me. In any case, I shot a few photos, some of which are shown in this article.

I then returned to the main office. The receptionist looked at me and laughed, and I laughed with her and handed her my papers plus the letter from Dario. She smiled at me, got up, and went into that same office with the closed door, and about three minutes later she came out with a letter that she handed me, of course written in Spanish. I thought to myself, "What now?"

I studied the letter but broke into a smile when I read and translated the last sentence—"Para identificacion de las comunicaciones que se efectuen con la estacion autorizada se le asigna el distintivo de llamada XE2VHT."

I am usually very quick with funny phonetics, and I told Martha, my wife, "I just was issued XE2 Very Hot Tamales." And she broke out laughing. Naturally, I was elated and couldn't wait to get back to Kino and get on the air, which I did.

As I stated at the outset, the whole procedure sounds more complicated than it actually is. Just be sure you have the necessary paperwork. It shouldn't be any problem to get a Mexican amateur to sponsor you with a short letter. And, as I like to say, "You too can be a Radio Loco!" But you've probably already reached that state of existence in amateur radio.

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The Pac-Comm TNC-220 Terminal Node Controller

BY JONATHAN L. MAYO*, KR3T

From their beginnings as just another TAPR TNC-2 clone manufacturer, Pac-Comm has distinguished themselves from other up-start packet companies because of their expanding product line and continual advancement of amateur packet radio hardware technology. Their TNC-220 is a good example of this trend. I recently had the opportunity to evaluate an assembled version of the TNC-220.

The TNC-220 is similar to "regular" TNCs such as Pac-Comm's TNC-200 and other TAPR (Tucson Amateur Packet Radio) TNC-2 clones. However, it offers several built-in features that are usually considered options on other TNCs in this price range. The TNC-220 is designed for packet operation on HF as well as VHF, and a tuning indicator is built in for HF operation. There are two radio ports on the unit, allowing the simultaneous connection of two separate radio systems.

Physical Design and Features

The TNC-220 measures in at 6" W x 7½" D x 2" H. The case is dark gray extruded aluminum. The back panel contains a barrel power connector, two radio connector sockets, and a DB-25 socket for the RS-232 connection. These connectors are discussed later in the section on interfacing.

The front panel contains a power switch, an LED bar tuning indicator, and five indicator lights. They are color coded so they can be discerned in dim light. The **PWR** (power) indicator lights whenever 12 VDC is supplied to the unit and the power switch is turned on. The **CON** (connect) indicator lights whenever the TNC-220 is connected, or linked, to another packet station. The **STA** (status) indicator lights whenever there is user information contained in the TNC-220's memory that has not been acknowledged (received successfully) by the packet station to which the TNC-220 is connected. The **PTT** (Push-To-Talk) indicator lights whenever the TNC-220 is transmitting. The **DCD** (Data



The Pac-Comm TNC-220.

Carrier Detect) indicator lights when a signal is being received by the TNC-220. By monitoring the status of the indicator lights, it is possible to keep track of exactly what the TNC-220 is doing.

The TNC-220 (or any hardware TNC for that matter) serves as an interface between a terminal and a transceiver. The basic packet radio station is composed of four main components: the terminal/computer, a TNC (Terminal Node Controller), a modem, and a transceiver. The TNC is the "heart" of a packet radio station. The TNC organizes and controls the transmission and reception of the data.

The TNC-220 is actually a small microcomputer; the digital section of the TNC-220 is based around a Z-80 microprocessor. The TNC-220 (and most other TNCs) also contains a built-in modem. The modem (**MO**dulator **DE**Modulator) converts the digital signals used by the TNC and terminal into analog signals which can be transmitted over radio. On the receiving side, the modem converts the analog signals back into digital signals. The built-in modem in the TNC-220 is switchable between the Bell 202 standard, which is commonly used for packet operation on VHF frequencies, and the Bell 103 stan-

dard, which is commonly used for HF operation; the built-in tuning indicator is helpful for HF operation.

The modem section in the TNC-220 is based around the 7910 integrated circuit. The modem is configured using the TNC-220's built-in command software. A particular configuration (such as Bell 202) can be linked to a radio port. Thus, if an HF radio is connected to port 1 and a VHF radio is on port 2, the appropriate modem standard will be automatically selected.

The Manual

Much of the TNC-220's manual is a close copy of the original TAPR TNC-2 documentation. Of course, the manual has been updated to reflect fully the new features of the TNC-220. The type is rather small. However, the pages are bound with a plastic spine that allows the manual to lay open without any problem.

The first part of the manual is a reference section. It describes how to interface the TNC to the terminal and radio. And it also contains a detailed listing of software commands along with plenty of examples. The second part of the manual is the assembly section. Each step is checked off as the parts are installed. A

*3908 Short Hill Drive, Allentown, PA 18104

complete parts list and schematic are included.

Interfacing

A packet radio station must have three basic components: a terminal, a TNC (the TNC-220 in this case), and a transceiver(s). The terminal converts characters into digital codes and vice versa. The TNC-220 processes the digital codes and converts them to analog tones and vice versa. Finally, the transceiver(s) transmits and receives the analog tones.

The TNC-220 must be interfaced to the terminal and radio. Any RS-232 compatible terminal may be used. Most operators use the serial port of a microcomputer running terminal emulation software. Check your transceivers' manuals for the proper wiring, and use shielded cable for the audio lines. The TNC-220 comes with two bare 5-pin DIN plugs for the radio connectors; however, you will have to supply all the necessary cables. The manual contains all the information you will need to get the TNC interfaced properly.

The average TNC-220 station probably consists of a TNC-220 connected to a microcomputer running terminal emulation software, a modern synthesized HF transceiver, and a 2 meter FM radio.

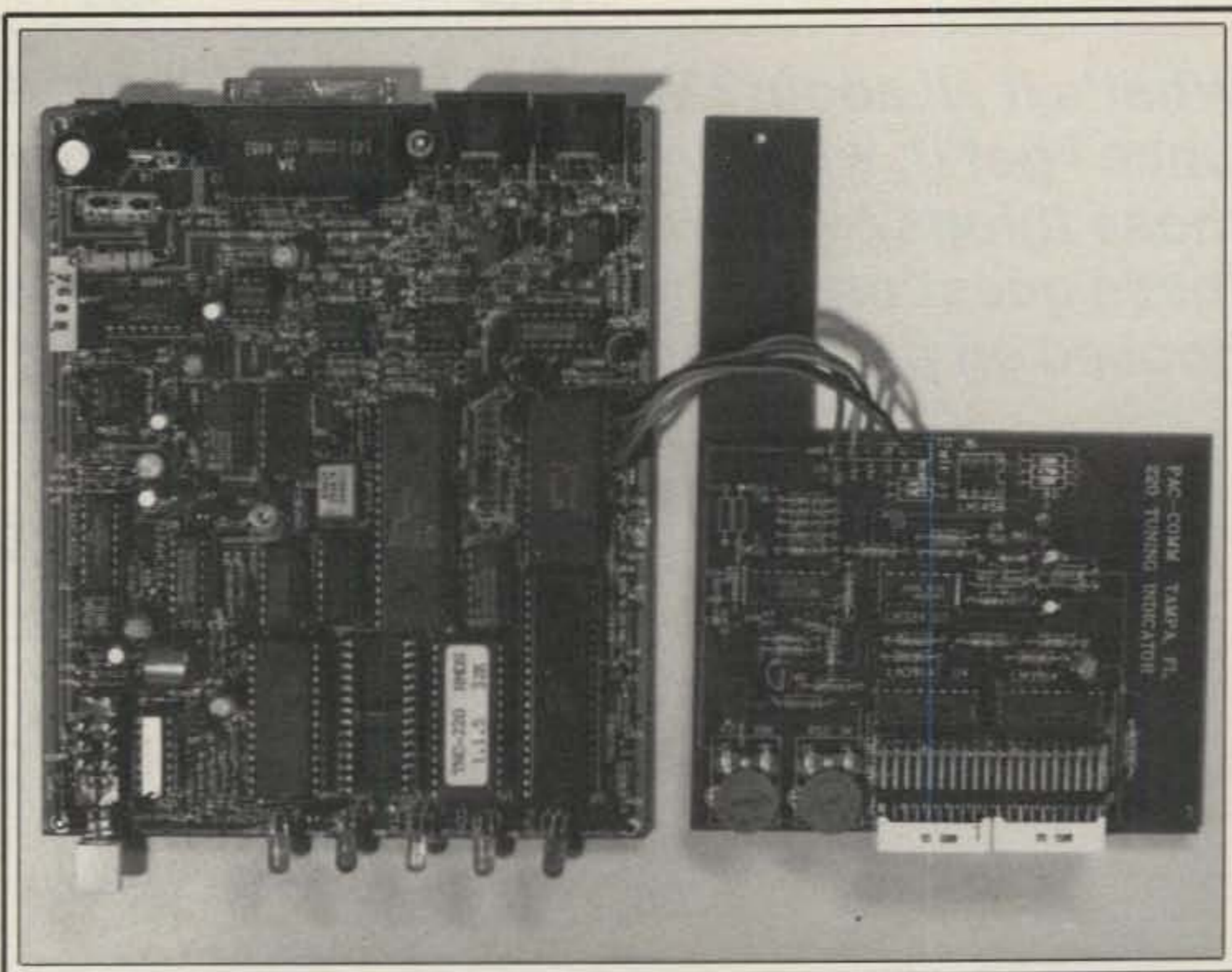
Operation

I have operated the TNC-220 on both VHF and HF. I used an IBM-PC/XT computer and a TRS-80 Model 100 portable computer as terminals. I had no problems interfacing the TNC-220 to the computers with a straight 25-pin RS-232 cable. An ICOM IC-02AT and an ICOM 271-A transceiver was used for 2 meter operation, and a Kenwood TS-430S was used for HF. Again, I had no problems interfacing the TNC-220 to the transceivers.

The TNC-220 comes pre-set for HF operation on radio port 1 (Bell 103 tones) and VHF operation on radio port 2 (Bell 202 tones). Thus, I interfaced the 2 meter transceivers to port 2 and the TS-430S to port 1. I was able to switch from one port to the other using the built-in command software in the TNC-220.

VHF operation is basically the same as with most other TNCs. The built-in command set very closely follows the original TAPR command set, so I did not have to learn any new commands right away. However, when I switched to HF operation I had to consult the manual for the proper commands.

HF operation takes some getting used to. There is much more interference and noise on HF than on VHF, and transmission speeds are slower (300 baud on HF compared to 1200 baud on VHF). The built-in tuning indicator in the TNC-220 is almost a necessity for HF operation. I found the TNC-220 to be very sensitive to the audio output from the transceivers.



The TNC-220's circuit boards. The L-shaped board is the built-in tuning indicator.

However, once I found the right setting, the TNC-220 reliably decoded all strong incoming packets.

Conclusion

The TNC-220 is an interesting unit. It fills a gap between "regular" VHF-only TNCs and multi-mode digital units such as the AEA PK-232. If you are looking for a packet-only unit that is capable of both

VHF and HF operation and is easy to operate, the TNC-220 is for you. The dual radio ports and tuning indicator make switching between VHF and HF packet almost effortless.

The TNC-220 lists for \$129.95. For more information on the TNC-220, contact Pac-Comm Packet Radio Systems, Inc., 3652 West Cypress Street, Tampa, FL 33607-4916.

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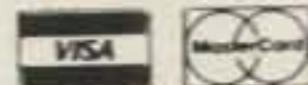


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What's it all about? What do I need? Where do I get it? Once I get it, what do I do with it? People really do those things? Why would I want to? KC8WH answers these questions as he relates how he got involved and hooked on packet radio.

The Making of a Packeteer or The Confessions of a Computer Novice

BY MIKE HAYWARD*, KC8WH

It all started on the way to Dayton. My friend Phil asked, "Hey, you have a computer, don't you?"

"Yeah", I replied. "I've got the Coco Two that I got from that computer course I was taking."

"Well, then, you ought to get on packet. You've already got the computer. All you need is a TNC. That plugs into your 2 meter rig and you're on the air."

"I don't know, I've got a lot of things going on right now. There's stuff at work, and I don't have the time I need for all the regular operating I want to do."

"Yeah, but packet is different. You can leave it on all the time, like an answering machine. Come home and have messages waiting on your computer. You can carry on conversations with people and never have to be on the same frequency at the same time. They've got a message-forwarding network set up. You can send messages clear across the country with just your 2 meter handheld."

"Yeah, I know about the national traffic system. I handle some traffic on 75."

"No, this is different. You don't have guys transcribing messages with pencil and paper. The computers do all the reading and writing. You just type the message into your computer, push a few keys on the keyboard, and your rig sends it to a bulletin-board system. That system electronically sends it to the next one down

the line, and eventually it gets to where you want it to go. No paper gets handled. Nothing gets written down."

"Well, that sounds kind of interesting. What else is on there?"

"They have electronic bulletin boards. You can read the ARRL bulletins, the DX bulletins, local bulletins, and leave and pick up personal messages to and from friends. Heck, you can even handle national traffic system messages on there. If you've got a printer, you can print out a hardcopy of all this and never have to write down anything."

"Well, that's starting to sound pretty good. All I need besides my computer is a TNC, huh?"

"Yup, you've already got the computer. I'm looking for a TNC down here myself. Gonna hook it up to the Atari that the kids have been playing games on."

"Well, let's look around and see what we can find."

At Dayton we found vendors selling TNCs. Phil found the one he had been looking for, and they had a Hamvention special on them. They even had a better deal on the kit version. He decided to go ahead and buy one, and wanted to know if I was ready to take the packet plunge.

"I don't know," I stalled. "I don't really have time to put a kit together."

"No problem," Phil replied. "I'll put it together for you. It won't take much longer to put two together than it will to do one. Heck, I like putting kits together."

"Well, okay. If you can get a better deal on two of them, I'll get one and give it a try. That's the only thing I need, right?"

"Yup, that's all," he declared. "Oh, and a packet program. But they're easy to come by and won't run you much."

"Well, let's do it then."

We got a good deal on two of the TNC kits. So we came home with, among other things, two cardboard boxes containing the makings of our entry into packet radio. About two weeks later Phil announced that the TNCs were built, tested, working, and ready. In fact, he had his on the air and was making contacts with it.

"I even got you a couple of programs to try out," he said. "One of them is a minimal program—single screen, not many extras. The other one is a dandy: split screen so you can see what comes in at the same time you're typing; easy-to-do multiple connects; you can edit the buffer and save or print the whole buffer or just blocks of it; it's easy to save stuff, load in stuff, and print stuff out on the printer. This is a good program."

"Yeah, okay. That sounds like the one I ought to have, then."

"Looks like. The only problem is you need a disk drive to make it work."

"A disk drive? How come?"

"That's what the program is on. Need a disk drive to load it. But once you have a disk drive, you can load and run other programs easier and faster. And you can save stuff to disk and reload it easier than you can on cassette."

"Okay. I don't have a decent cassette player. I was going to have to get a better one for the CoCo anyway. Now I'll just get a disk drive. You know a good place to get one?"

"Sure do. I marked this ad in this computer catalog for you. You need a Drive 0 and a controller. Make sure to tell them the controller needs RS-DOS in it."

"RS-dose?"

"Yeah, it's the disk operating system for the color computer. Otherwise it won't work."

*5017 N. Twp. Rd. 175, Republic, OH 44867. The term CoCo refers to the Radio Shack Color Computer and is a registered trademark of Tandy Corp.

"Okay, I'll get one."

"Get a Y-cable, too. I've already got your 232 program pak."

"What?"

"Your disk drive plugs into the RS-232 port on the side of the computer. You need that to load the program and save anything to disk. Your TNC needs to plug into a Radio Shack RS-232 Program Pak, which also needs to plug into the same port on the side of the computer. To plug in both of them at the same time you need either a Y-cable or a Multi-Pak Interface. The Y-cable is cheaper."

"I'll get one of those, then. What about the Program Pak?"

"The local Radio Shack had them marked down, so I picked up one. I figured if you didn't want it I'd sell it to Bill."

"No, if I need it for the split-screen program I'll take it."

Three days later I had my disk drive with RS-DOS and Y-cable. Two days later I had all my cabling made up. The TNC plugged into the Program Pak, plugged into the Y-cable, plugged into the computer port. The other side of the Y-cable was plugged into my drive controller (with RS-DOS), which was in turn plugged into the disk drive. The other end of the TNC was hooked up to my 2 meter handheld and set to 145.01. All this was set up on Phil's XYL's kitchen table so we could see what was happening at both stations as we set parameters and sensitivity levels. We loaded the program and entered the commands to connect to Phil's station, and I was on packet.

Since then I've gotten an updated version of the packet program. The new one plugs into the serial I/O port on the back of the computer and eliminates the need for the RS-232 Program Pak and the Y-cable. But I'm hanging on to them. I may use them to add a modem to the setup. I've also added a printer. Of course, the printer plugs into the same port as the TNC, so I had to get another Y-cable. I got a serial-parallel interface that lets me use the more standard parallel printer with a Centronics connector. The interface I got has a serial port on the side of it so I can plug in the TNC.

How do I like packet operating? I think it's great. It won't replace any of my other amateur activities, but has sure added to my enjoyment of them. Besides adding an entire new dimension of its own, it has been a big help in making use of the DX bulletins, ARRL bulletins, propagation forecasts, and lots of other information available on packet. I just save it in the buffer then print it from there. Then the printout goes on a clipboard by the HF operating position.

Now, with packet, we no longer need both operators on at the same time to speak with someone via amateur radio. It is possible to connect to another station and leave a message even if the other op-

erator is not around. I have carried on conversations with friends that went on for days, during the course of which we were never on the air at the same time. I come home, read my messages in the buffer, and connect to those stations needing a reply. If I get no answer, I leave a reply in the buffer. This makes it possible to communicate daily, directly with someone who is working a different shift and whom you normally wouldn't get to talk to except maybe on weekends.

Looking back at it, I see that most of the items I bought to get on packet were nec-

essary for me to get more use of my computer, whether I got on packet or not. A disk drive is much more versatile than cassette loading, and a printer is extremely useful, whether you are on packet or using a word processor. So at my computer layout the only thing I have that I don't use for other computing chores—be it word processing, game playing, or anything in between—is the TNC.

So if you have a computer and are not on packet but have been thinking about it, my advice to you is "Come on and join us. All you need is a TNC."



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The Kantronics KPC-4

BY BUCK ROGERS*, K4ABT

Dual port, dual baud, PBBS, KANode, 300, 1200, and 2400 BPS—the KPC-4 is truly a multi-function packet controller. Since I last mentioned the KPC-4 in the column, there have been many favorable features and attributes added to this top-of-the-line controller. This dual-port, multi-baud, Mailbox/PBBS, KANode, WE-FAX, and packet controller has reached the point where it should be reviewed in detail. This is the only way we will be able to discover the capabilities of this controller, short of owning one. While we are looking over the KPC-4, I will define a few of the configurations and applications for which it was designed.

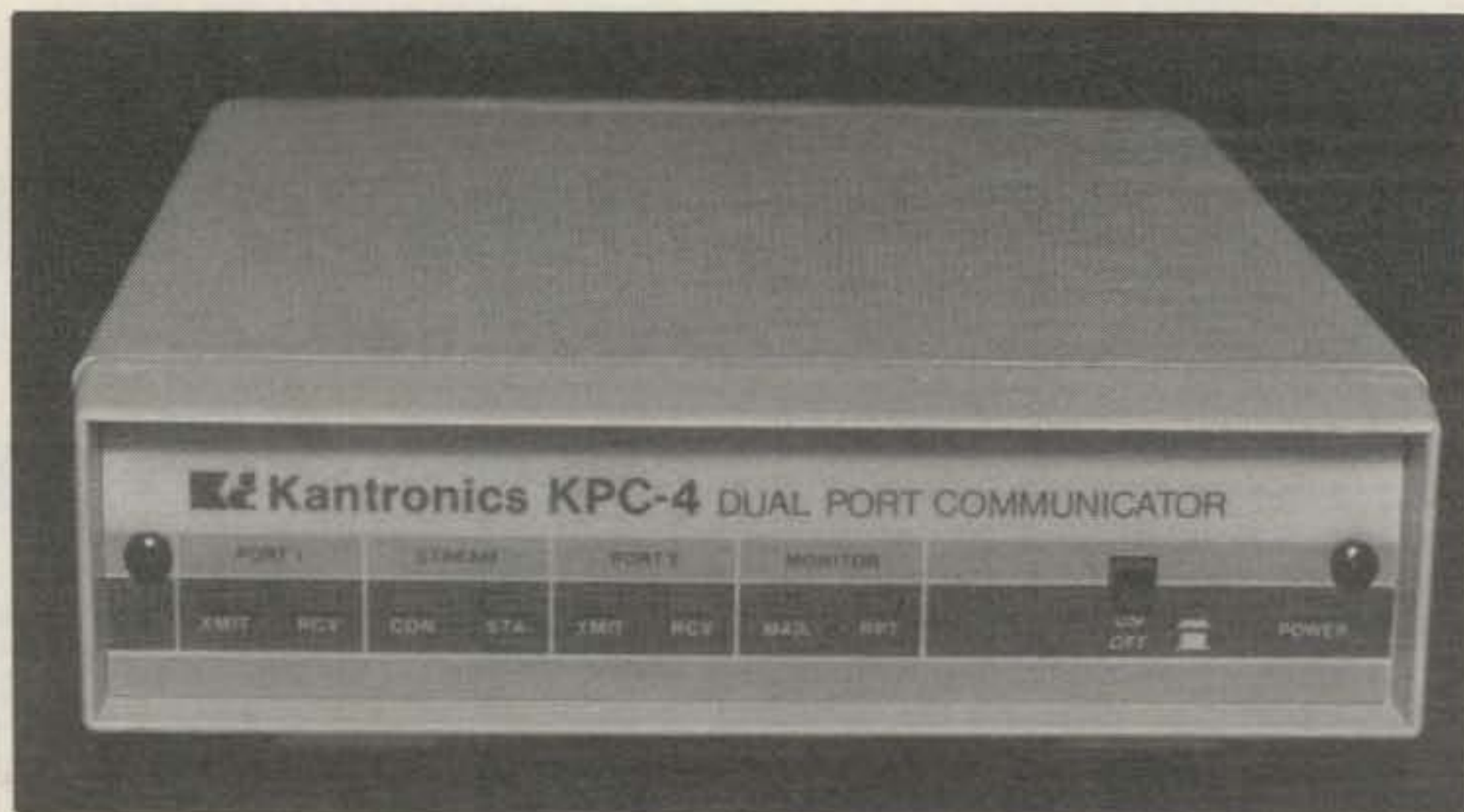
Here is state-of-the-art technology which was developed with the packet radio operator in mind. Central Georgia was one of the first areas in the southeast to implement a KANode, and among the first in the nation to use 2400 BPS for direct station-to-station communicating, digipeating, trunking, and gateway roll-over from 2400 BPS to 1200 BPS.

These advances are accomplished via the KPC-4. Here is the packet technology and architecture we have long looked for in a controller. We have given the KPC-4 a solid workout and it has passed all the tests.

I will describe the way in which we configure the KPC-4 and the manner in which it is used. My descriptions will surround the "calls" and "configurations" we are using. The first system is the ONEradio, dual-baud, dual-port, digipeater setup (see fig. 1). (This KPC-4 is equipped with the optional 2400 modem.) Edward, KB4KIN, has addressed his Kantronics KPC-4 in the following manner:

Port 1 and Port 2 MYCall = KB4KIN-1
Port 1 and Port 2 MYAlias = 54A
(Marshallville, GA airport ID)
MYGateway = KB4KIN-3 (1200 BPS to 2400 BPS and 2400 BPS to 1200 BPS)
ONEradio = ON (both ports sent to one radio)
EXTmodem = ON (sets port 2 to 2400 BPS)
MYPBBS = KB4KIN-10
GATeway = ON

506 Pheasant Ridge Drive, Warner Robins, GA 31088



The Kantronics KPC-4 dual port communicator.

ALias = ON
PBBS = 50 (KPC-4 is expanded to 64,000 bytes mailbox RAM)

From the above settings we have the following capabilities:

1. Any station may connect to any other at the same baud rate.
2. Any station may connect to any other station at a different baud rate via MYGate call sign.
3. The KPC-4 can connect to any other station at either baud rate using stream switching.

4. The Personal Packet Mailbox is accessible at either baud rate by addressing the MYPBBS call.

5. All the above functions are available simultaneously.

The RS-232 cable and the two radio port cables are supplied with the KPC-4. The cables in the case of the above configuration are connected in parallel. As you quickly observe, any signal appearing at either port will be addressed to the one radio. Likewise, any signal coming into the one radio will go to either port. This is where the magic of the KPC-4 begins. If

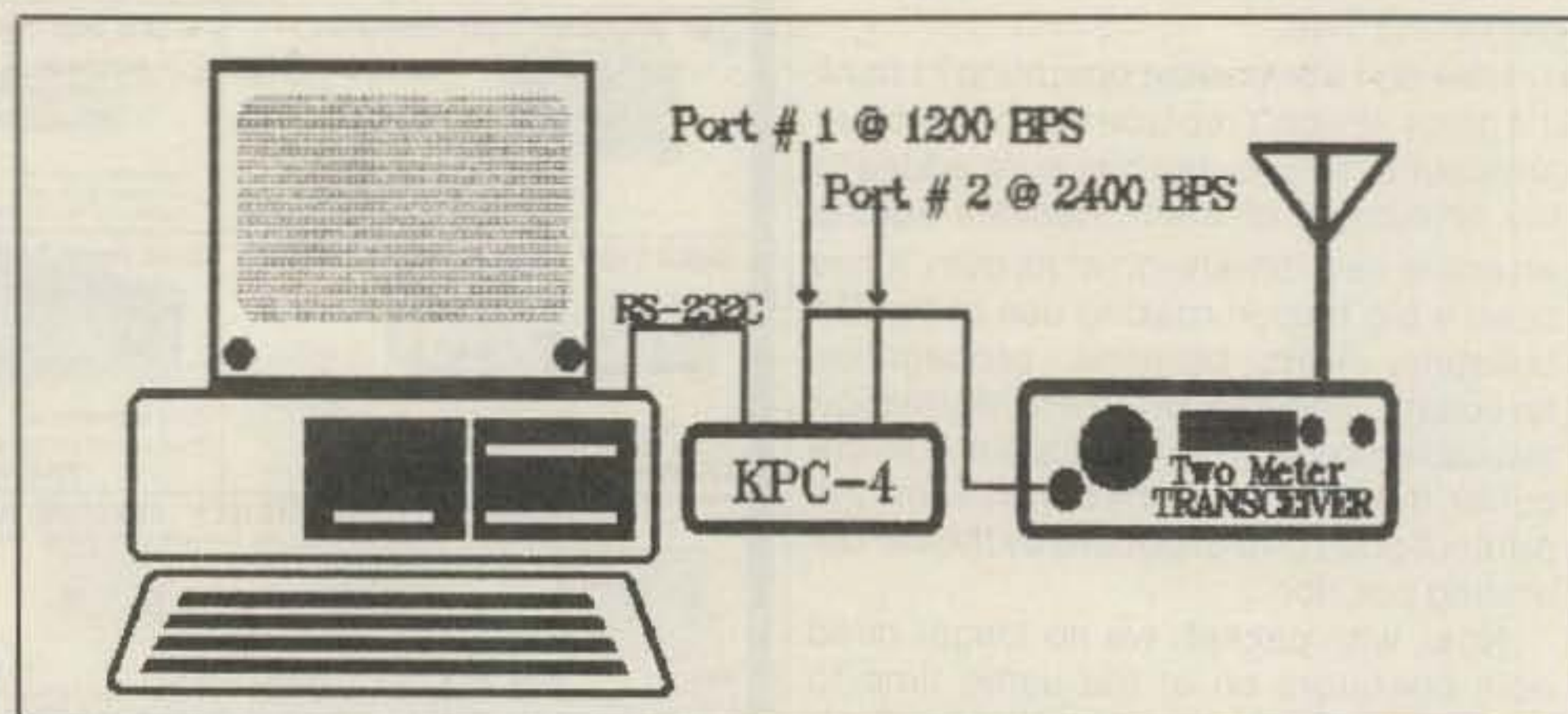
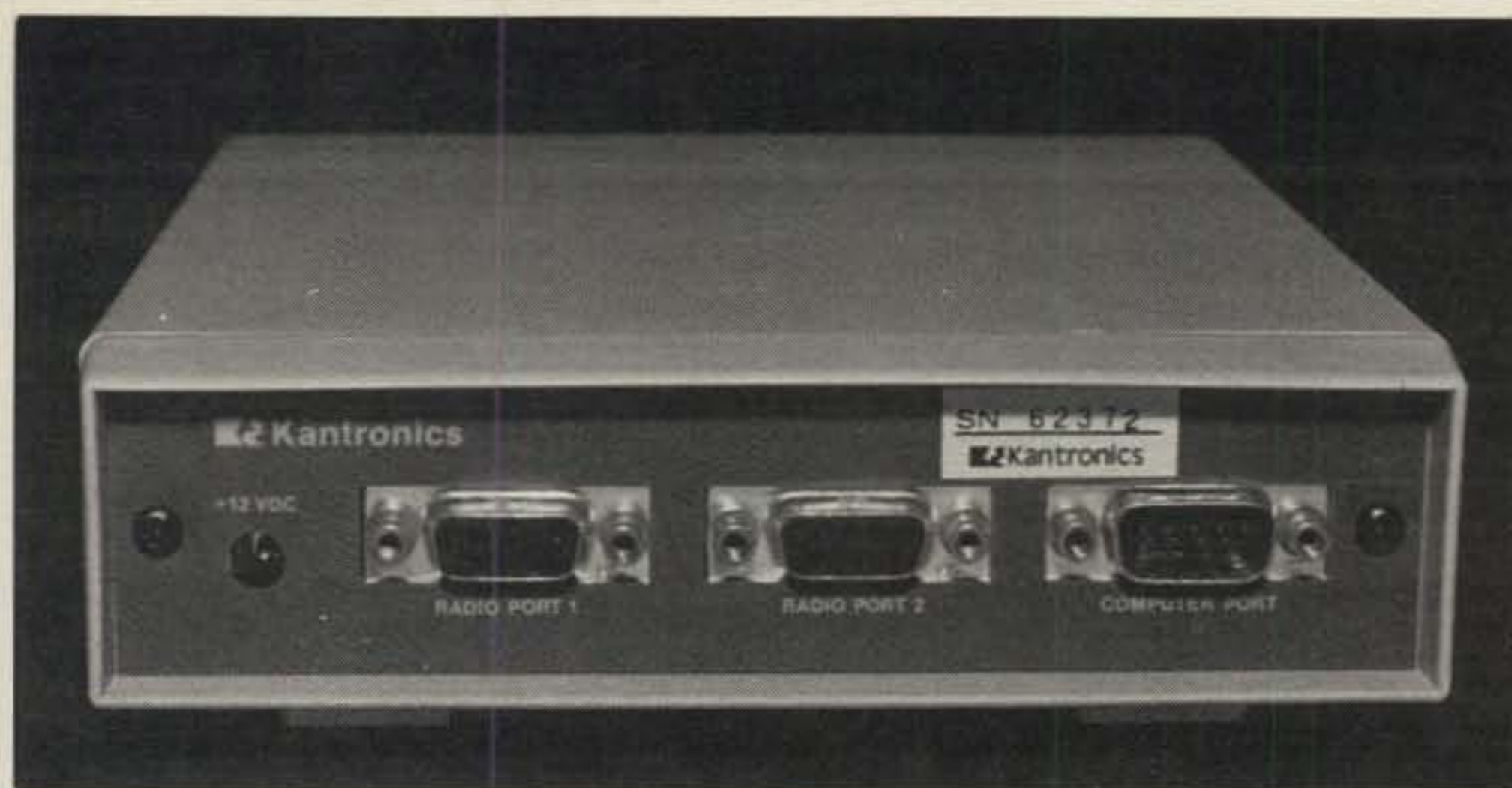


Fig. 1—Features of the dual-baud/dual-port KPC-4. Add the optional 2400 BPS modem and turn ON the EXTERNAL and ONEradio commands.



The back of the KPC-4 showing the connections.

the incoming signal is addressed via KB4KIN-1 or 54A, it will be digipeated on to the next station/digipeater.

An incoming signal at 1200 or 2400 BPS does not matter since the KPC-4 is, in effect, two separate controllers connected to one radio. If port 2 hears 2400 BPS, it will digipeat the signal via the one radio. The same is true for port 1; if it hears 1200 baud, it will be digipeated via the same one radio.

In this case, if I want to connect to Glynn, WB4RHO, from my KPC 2400 station, which is set to 2400 BPS operation, and he is operating at 1200 BPS, I do so in the following manner:

```
cmd: C WB4RHO V GQX2,KB4KIN-3
<enter>
```

This allows me to connect to Glynn through the 1200/2400 BPS gateway without having to configure my KPC-2400 to 1200 BPS. Since 2400 BPS is twice as fast as 1200 BPS, I soon discover the real joy of smooth digipeating when I connect to Glynn in Abbeville, Alabama.

Using the KPC-4 at a remote location. Glynn has installed a similar KPC-4 system on a mountaintop near Clayton, Alabama. Here are some of the ways we make use of the KPC-4 when making connections.

If I want to move my traffic faster and prevent colliding with other packets at 1200 baud, I switch to 2400 BPS. This gives me faster through-put and less chance of collision. I can stay at 2400 BPS all the way from my QTH to Glynn's QTH, since WB4RHO-1 is both a 1200 and 2400 BPS digi. I will use this path:

```
cmd: C WB4RHO V
KB4KIN-1,WB4RHO-1 <enter>
```

Glynn has a KPC-4 at his home QTH which will read both 1200 and 2400 BPS at the same time (equipped with the optional 2400 Kantronics modem). Let's

pretend for a moment that Glynn can only receive 1200 BPS packets and I want to talk with him via packet. I don't want to change from 2400 BPS to 1200 BPS, so I use this path to connect to Glynn:

```
cmd: C WB4RHO V
KB4KIN-1,WB4RHO-3 <enter>
```

Here we note that Glynn has configured the WB4RHO-1 digi (KPC-4) for a gateway with a call of WB4RHO-3. This is where my 2400 BPS packets are rolled over from 2400 BPS to 1200 BPS, and I can converse with Glynn even though I am operating at 2400 and he is at 1200. The WB4RHO-1 digi is also equipped with the mailbox feature, since it is included in the firmware as supplied. We therefore see how the KPC-4 becomes a very versatile digipeater when configured with the **ONE-radio** command turned ON.

Now, let's look at the KPC-4 as a stand-alone, dual-port, two-radio, single-baud, cross-frequency or cross-band gateway!

Here we have two separate operating ports, and they are connected by a large hallway called a *gateway*. We have configured this one somewhat differently. The command changes are as follows:

```
MYCall = KB4KIN-14
MYGateway = KB4KIN-11
EXTmodem = OFF
ONERadio = OFF
MYALias = KB4KIN-5
```

Stations may digipeat to other stations within their own LAN via MYALias call.

Since this digi serves as a gateway to the local LAN, let's imagine that Jim New, WA4DHD, in Griffin, Georgia wishes to connect to my 145.05 station here in Centerville, Georgia. Jim is unable to connect directly from Griffin to me. At present, there are few 145.05 digis around. (We hope to remedy this soon.) Instead, Jim will use this path beginning on 145.010 MHz and arriving on 145.050 via the dual-port, dual-frequency, KPC-4 digi to connect to my station on 145.050 MHz.

```
cmd: C K4ABT V
WB4GQX-2,KB4KIN-1,KB4KIN-11
<enter>
```

Here is how Jim is able to get from 145.01 to 145.05. WB4GQX-2 and KB4KIN-1 are on 145.01 MHz; KB4KIN-11 is the gateway on the second KB4KIN-5 digipeater. When the -11 hears a signal addressed via one of the ports, it will automatically exit that signal via the opposite port. The reverse occurs as the response from my station is heard and the connect is made (see fig. 2).

Two Ports, Two Frequencies, and Two Bauds

Here is the "creme de la creme" of setups for the KPC-4. This is where I get excited about this controller! Those of us

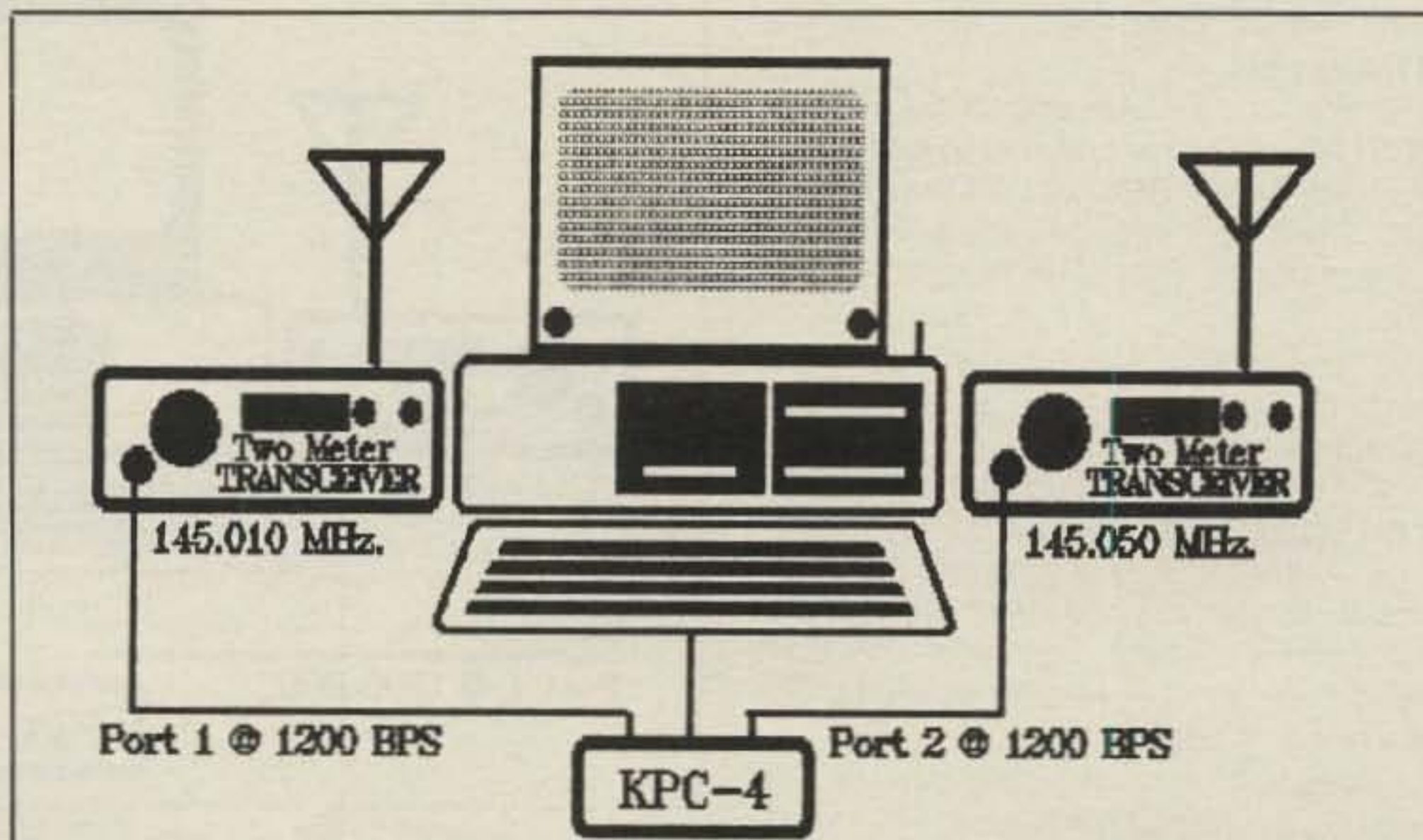


Fig. 2—How the gateway feature of the KPC-4 is used to interconnect LANs.

- Personal Packet Mailbox
- KANODE * Dual Ports
- WEFAX
- True Gateway port to port
- TCP/IP "KISS mode"
- 64,000 bytes on board RAM buffer
- 300/1200 BPS (2400 BPS w/optional modem)
- Watchdog Timer
- Features are Software Selectable
- Feature upgrades are made simple via EPROM chip change

Table 1—KPC-4 advanced packet features.

who have been in the packet radio hobby for quite a while can remember how it was when we had to call a friend in another city via land-line to set up a "sked" for a packet contact. It is far from that nowadays.

We need to look at a way to relieve some of the traffic on the through-put frequency, 145.010 MHz. The KPC-4 offers us that relief. We've heard about all the networking, trunking, and back bone—the much talked about mediums for giving us the band-congestion relief we need. Some states are already implementing the system I'm about to describe as configuration number 3—operating in two separate LANs on two separate frequencies with port 1 at 1200 BPS and port 2 at 2400 BPS (this requires the optional 2400 Kantronics modem).

MYCall = K4ABT
 MYPBBS = K4ABT-10
 MYNode = K4ABT-7
 MYGate = K4ABT-3
 MYALias = CGA/CGA
 Gateway = ON
 EXTmodem = ON
 ONERadio = OFF

This configuration offers these capabilities (see fig. 3):

1. Stations may digipeat to other stations within their own LANs via the **MYALias** call.
2. Stations in LAN operating at 1200 BPS (145.010) may connect to stations in our LAN at 2400 BPS (223.400) via **MYGate** call. The KPC-4 changes speed between ports automatically. The reverse is also true.
3. The KPC-4 may connect to either station in either LAN using stream switching.
4. The PBBS is accessible from either LAN using the **MYPBBS** call.
5. All functions are available simultaneously. So far, we have we received a lot for our investment, but what you have read thus far was just for openers. The party is just beginning.

Does your node ever give you the feeling it is "dumping garbage in your yard" when it unloads the strange characters on you while passing an ASCII file? Add to

this the collision that occurs, causing several tries. There is no real benefit to that so Kantronics gave us a break and developed another way to relieve some of this clutter by placing a node into every new KPC-4, KAM, and KPC-2400.

The *KANode*, as it is known, delivers us from those clutter problems by allowing us to get a local "acknowledgement." To add even more to the *KANode* features, we can:

1. digipeat via:
2. connect to:
3. connect from:
4. cross-connect:
5. Receive a "Just Heard" list which will show the last 18 stations heard by the *KANode*. Not only do we get this list, but we get the time they were heard by the *KANode/digi*. There's more! It will also show us the path that was used by each station. Wow! Now we can see where that long-wanted contact is located, and the path to use when we try our connect to it.
6. The *KANode* offers a bonus which allows the user to poll it for a list of *KANodes* heard. This command behaves the same as the **Just-Heard** command.

Digipeating is something we take for granted. However, in many instances we find the return "ACKs" from the distant end never make it back through umpteen digis, so we are likely to retry out. This is where the *KANode* comes into play.

By connecting to the local *KANode*, we are given a local acknowledgement, and our packet is forwarded to the next station, digi, or *KANode*. The fuss and retry problems are reduced, and in turn the traffic congestion within the LAN is also reduced. The initial connect was made to the local *KANode*, where instructions to connect to the next station, or *KANode*,

are given. If a second or even a third *KANode* is used, then the same kind of commands are directed to them. In few words, *the KANode functions as if it were a remotely controlled packet communicator!*

The "cross connect" feature would go as any other connect, but the *KANode*, in the case of the KPC-4, is a bit more defined. If the KPC-4 is used in the two-radio two-frequency configuration, we will discover a more exciting form of packeting.

Station N2IHX is operating on 223.400 packet (KPC-4 port 2), and station K4ABT is on 145.670 packet (KPC 4 port 1). The *KANode* call is CQ-1. K4ABT wishes to communicate with N2IHX. K4ABT connects to CQ-1, then issues the command **X N2IHX**. The call request is sent out the opposite port to N2IHX, and the connect is made (see fig. 4). Let's assume the 223.400 LAN is a 2400 BPS link or trunk frequency; then the same feature and connection scheme will apply. Traffic can be forwarded to other LANs in the same manner by using a *KANode* at each end of the link. Again we see the improvement in through-put from one LAN to the other without cluttering the already loaded, so-called national calling frequency.

The next scenario deals with the **ONERadio** and **EXTernal** modem commands. It also involves the 2400 BPS modem option. Set the **EXT** and **ONE** commands to **Y** or **ON**. (The Kantronics packet communicators will accept Y as ON and N as off; try it.) In this configuration the *KANode* will allow the connect at either 1200 or 2400 BPS and will cross-connect to the other baud rate to connect to a station using the other baud rate.

Again, K4ABT is operating 1200 baud and wishes to communicate with N2IHX, who is using 2400 BPS. K4ABT connects to CQ-1 at 1200 baud and gives the com-

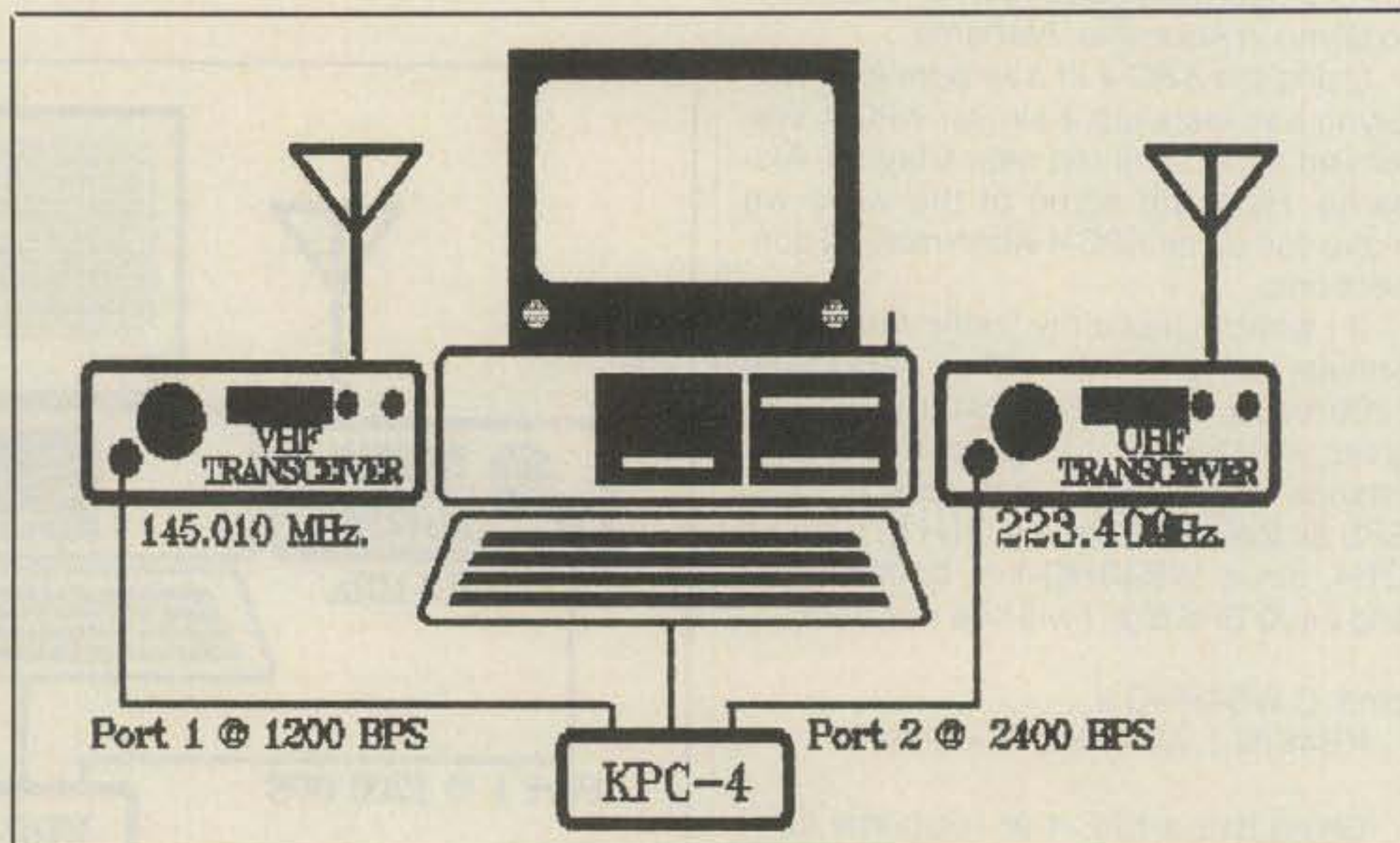


Fig. 3—A method of using the KPC-4 on two different bands for back-bone traffic. The KM-2400 optional modem is added to port 2.

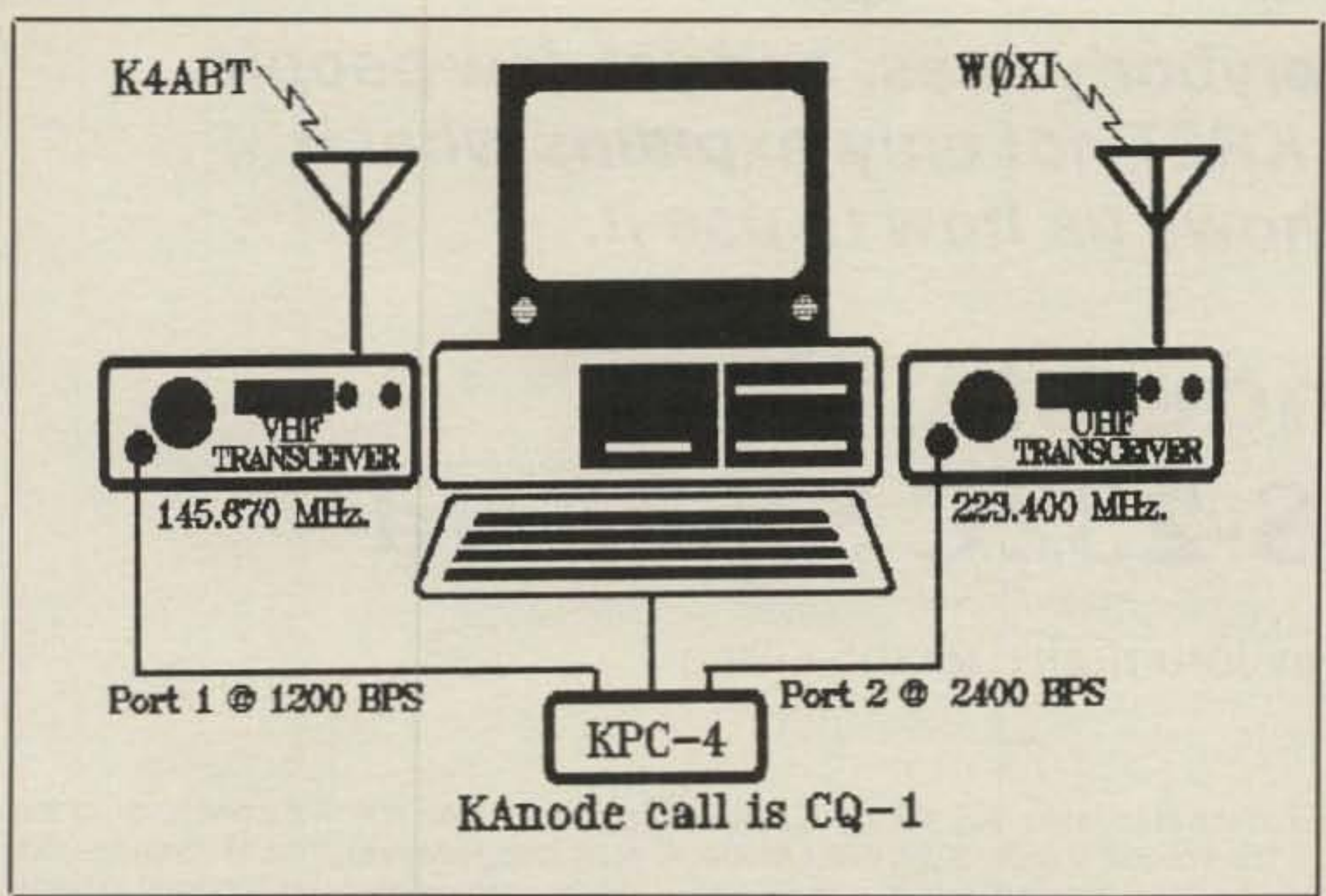


Fig. 4— How K4ABT connects to WØXI via KANode "CQ-1" and from VHF to UHF.

mand X N2IHX. This will send out the connect request at 2400 BPS. Bingo! K4ABT is connected to N2IHX. Without the dual-baud/dual-port KPC-4 node CQ-1, this would not be possible.

To add some flavor to the KANode fea-


tures Kantronics has added the **Just heard** command to the list of active features. A list of nodes can be displayed in the usual manner, but if you would like to see a list of the last 18 stations that have been heard by the KANode, you can give the

KANode a **J <space> L** command and receive a complete listing of up to 18 of the latest stations heard. Even better, the KANode will display the paths and routing of each call sign displayed (not to mention the time at which it was heard).

The KANode is in many ways a more desirable way to operate in "node level." The KANode uses only the recognized AX.25 protocol. A problem that has appeared in past nodes is the link hangup. In the KANode several safeguards are included to prevent this occurrence. If a hangup should happen, the internal timer of the KANode will drop the problem and reset itself after a defined period.

There is one last item I would like to mention. The KPC-4 as shipped includes the mailbox feature. If a station connects to your mailbox (PBBS) and leaves a message while you are away, a message light will be flashing when you return to let you know you have mail waiting.

The list of features goes on and includes enjoyable items such as WEFAX. By using the PACFILE terminal program you are able to place the KPC-4 into the WEFAX mode automatically. Add to this the other features we have barely mentioned, and you can see why I call this small box a "consummate controller."

The KPC-4 is available from Kantronics Inc., 1202 E. 23 Street, Lawrence, KS 66046. List price is \$249.00. 

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Here's a term that everybody uses, and yet few people know what it means. KR3T not only explains what it means, but he also shows us how to use it.

Understanding The RS-232C Standard

BY JONATHAN L. MAYO*, KR3T

While the RS-232C communications standard (often referred to as RS-232) was developed in the late 1960s, it remains the standard interface specification for serial asynchronous communications equipment. Other standards have been developed which have advantages over RS-232, but the new standards have failed to supplant RS-232 because of its widespread use. The reason we, as amateur radio operators, are concerned with the RS-232 standard is because most microcomputers and terminals, as well as TNCs, multimode units, and other modem devices that are used in amateur digital communications, support RS-232 communications.

In serial asynchronous communications, digital signals are sent as groups of a specified length sequentially on a single channel, and uneven intervals between transmissions are allowed. The digital signals usually represent characters in text. There are several standardized codes in use today for the transmission of text data; ASCII (American Standard Code for Information Interchange) is the most common.

At first the RS-232 standard may seem a blessing because it seems to solve our serial communication needs very easily. After all, if two units each support RS-232, we can just wire them together and they will work; no problem. However, it is not that easy. Some so-called "RS-232 compatible" devices are not really very compatible. Compatibility is a matter of degrees; some devices are more compatible than others. This is definitely the case with most RS-232 implementations.

Some devices only support a subset of the RS-232 standard. Others vary pin assignments or voltage levels to meet their own requirements. Because of these potential problems, this article examines

what the standard *really* standardizes.

The RS-232 standard will most probably be encountered when connecting your hardware packet TNC (Terminal Node Controller) or other digital modem device to your terminal or computer. Should you run into problems with the interface, a thorough understanding of the RS-232 standard will help you in diagnosing the problem and coming up with a solution. A knowledge of the standard can also be very helpful when wiring RS-232 cables.

Introduction

The proper name for the RS-232 standard is "Interface Between Data Terminal Equipment and Data Communications Equipment Employing Serial Binary Data Interchange." The standard was developed by the Electronic Industries Association (EIA), and the latest version is C—thus, the reference to RS-232C. CCITT (Comite Consultatif Internationale de Telegraphique et Telephonie) Recommendation V.24 is almost identical to the RS-232C standard.

The RS-232C standard covers four main areas. The first is the mechanical characteristics of the interface. The second is the electrical signals across the interface. Third is the function of each signal. And fourth is the subsets of signals used for certain applications.

Data Terminal Equipment (DTE) and **Data Communications Equipment (DCE)** are the two device classifications in RS-232C. A **DTE** is a terminal, a computer, or any device capable of transmitting and receiving data. A **DCE** is a device that establishes, maintains, and terminates a connection. A DCE also provides any necessary signal conversion between the data it receives from and sends to the terminal and the data it sends and receives over the communications channel. Telephone modems and packet radio TNCs are DCE devices. We will learn more about the physical differences between DTEs and DCEs later in this section.

There is no specific connector in the standard. However, the DB-25 connector is most commonly used. Virtually all hardware TNCs use the DB-25 connector as the port for terminal communications. The DCE usually has the female connector, DB-25S (Socket). The maximum recommended cable length is 50 feet, and the maximum cable capacitance is 2500 pF. Cable runs of greater than 50 feet are allowed, provided the load capacitance measured at the interface point and including the signal terminator does not exceed 2500 pF.

Signals

RS-232 electrical signals and their functions are referred to by four different systems: pin number, EIA designation, CCITT designation, and abbreviation of signal description. The following paragraphs provide information about the electrical signals most encountered when interfacing a DTE terminal to a DCE device. Fortunately, the full set of RS-232 signals is rarely used, so we are able to overlook numerous signals without worry.

Pin 1 is referenced by the EIA as AA, the CCITT as 101, and the abbreviation **GND**. It serves as the chassis ground between the two devices. However, it should not be depended on for shock protection. But this pin should definitely be connected at each end because opening in the chassis ground can cause problems that are very difficult to trace.

Pin 7 is referenced by the EIA as AB, the CCITT as 102, and the abbreviation **SG**. It serves as the signal ground. Pin 7 is the reference for all other pins and completes the circuit for the flow of current.

Pin 1 and pin 7 are the only two ground pins. Both should be connected. However, in most devices pin 1 and pin 7 are connected to the same ground in the equipment. Thus, it is usually possible to get by with only one of the two connected. If there are separate chassis and signal grounds, and pin 1 is not wired and the ground at each device is at different po-

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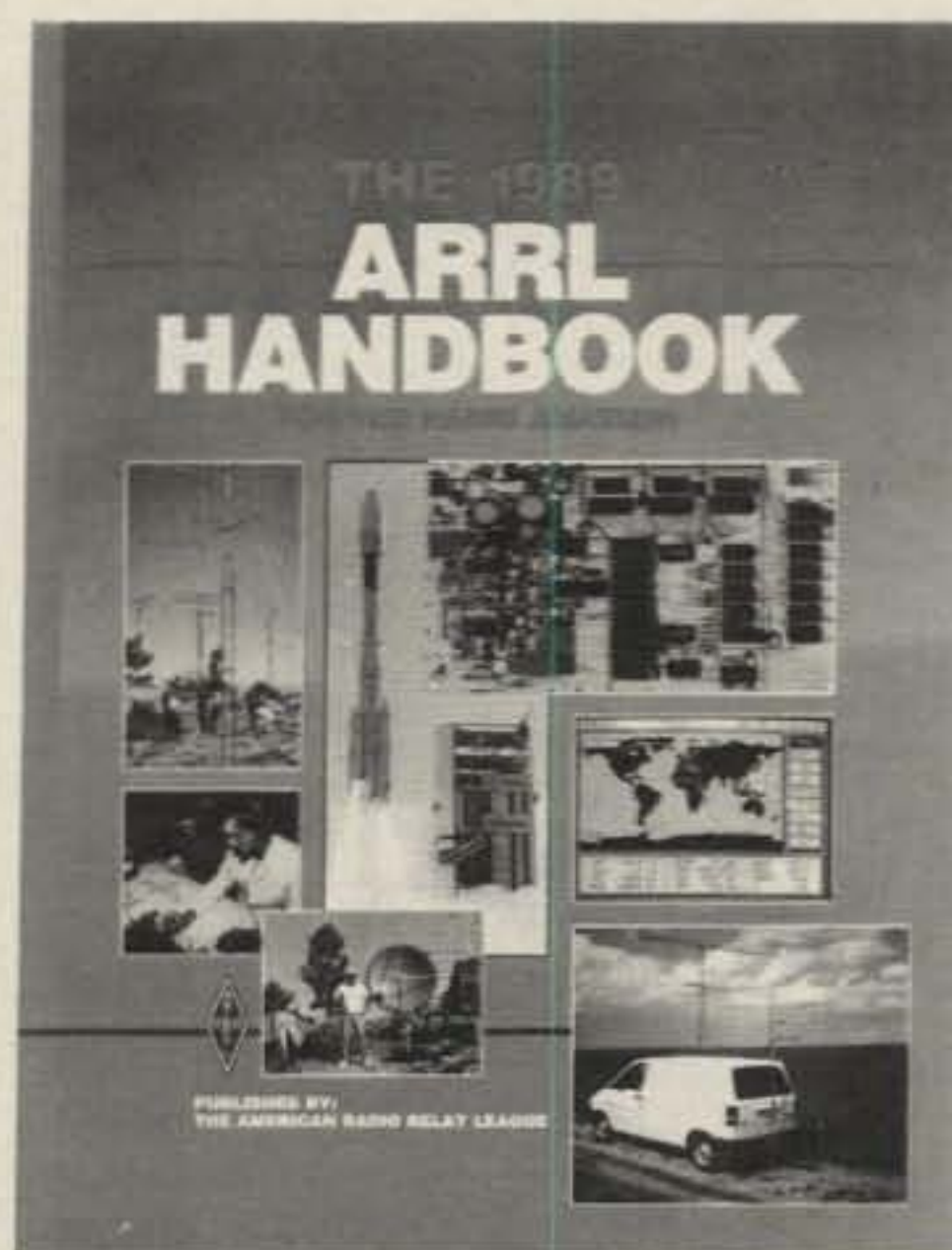
The 1200-page sixty-sixth edition contains over 2100 tables, figures and charts. The new Handbook is better than ever with revised information on phase noise measurement, direct frequency synthesis and spread spectrum communication techniques. The section on repeaters has been updated including a new CW identifier circuit. You'll find new spectrum analyzer and oscilloscope material, as well as several new projects in the test equipment chapter.

As always, we've added a host of new construction projects to this new edition. Just some of the new projects include: A 500-MHz frequency counter, 160 through 10 meter legal limit amplifier, simple CMOS keyer project, digital audio memory keyer and a L/Q meter for measuring coil inductance.

But that's not all. You'll find many other popular construction projects that can be built in a weekend such as power supplies and VHF/UHF preamps. For the more ambitious builder there are projects like the 1.8 MHz QSK transverter (there are VHF/UHF transverter projects too) and there are many amplifier designs to suit your needs from HF through microwaves.

The Handbook has always been famous as a reference for component data and you will find an entire chapter devoted to everything from transmitting tube and transistor specifications to aluminum tubing sizes. Satellite enthusiasts will find that the digital TR sequencer will add operating convenience to your station. Of course, you'll find the most up-to-date information on digital techniques, and the video communications chapter is packed with information not only on SSTV, ATV and FAX but Weather FAX as well. QRP enthusiasts will find the famous "Cubic incher" transmitter; not much bigger are the QRP SWR indicator and QRP Transmatch. There is also a VXO-controlled 6-watt CW transmitter for your favorite band between 80 and 15 meters. There are a number of useful station accessories that you can build like DTMF encoders and decoders, PIN-diode TR switch, digital PEP wattmeter and SWR calculator, Transmatches and dummy loads.

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Here is a description of what is covered in the Handbook:

The first 5 chapters serve as an introduction and cover: basics of Amateur Radio, electrical fundamentals, radio design technique and language, and solid state fundamentals. Vacuum tube principles as they pertain primarily to high power amplifier design are also presented in these introductory chapters. There are 12 chapters devoted primarily to these radio principles: power supplies, audio and video, digital basics, modulation and demodulation RF transmitters, receivers, transceivers, repeaters, power amplifiers, transmission lines and antenna fundamentals. Another 4 chapters cover voice, digital, image and special modulation techniques. The RF spectrum, propagation and space communications are covered in 2 chapters. The construction and maintenance section has 12 chapters of useful projects ranging from power supplies and antennas through digital equipment. You'll find up-to-date component data that the Handbook is famous for. The final 5 chapters cover how to obtain your license, station design and operation, interference, monitoring and direction finding. An abbreviations list, huge index and etching patterns make up the balance of the book.

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tentials, current may flow through pin 7 and possibly interfere with data flow.

Pin 2 is referenced by the EIA as BA, the CCITT as 103, and the abbreviation **TD**. This pin serves as the Transmit Data pin. All information sent via the RS-232 port comes out on this pin.

Pin 3 is referenced by the EIA as BB, the CCITT as 104, and the abbreviation **RD**. This pin serves as the Receive Data pin. All data received via the RS-232 port comes in on this pin.

These descriptions are viewed from the DTE. DCE sends data on pin 3 and receives on pin 2. Thus, the DTE transmits on pin 2 and the DCE receives on pin 2, and the DCE transmits on pin 3, and the DTE receives on pin 3.

Pin 4 is referenced by the EIA as CA, the CCITT as 105, and the abbreviation **RTS**. This pin serves as the Request To Send indicator. When the DTE has data to send, it asserts the RTS.

Pin 5 is referenced by the EIA as CB, the CCITT as 106, and the abbreviation **CTS**. This pin serves as the Clear To Send indicator. The DCE asserts the CTS when it is able to receive data from the DTE. According to the standard, the CTS may only be asserted after receiving a RTS from the DTE.

Pin 6 is referenced by the EIA as CC, the CCITT as 107, and the abbreviation **DSR**. This pin serves as the Data Set Ready indicator. It is asserted as a response to the DTR signal and indicates that the DCE is ready for operation.

Pin 20 is referenced by the EIA as CD, the CCITT as 108/2, and the abbreviation **DTR**. This pin serves as the Data Terminal Ready indicator. The DTR indicates that the DTE is ready to send and receive data. The DTR is asserted whenever the DTE has data to send, or in some cases, whenever the terminal is operating.

Pin 8 is referenced by the EIA as CF, the CCITT as 109, and the abbreviation **DCD**. It serves as the Data Carrier Detect (or just Carrier Detect) indicator. The DCE asserts this pin when the communications channel is ready. Many DTEs will not transmit or receive data unless this pin is asserted. In some cases, pin 8 is wired to pin 20 so it is always asserted.

When the RS-232C standard is properly implemented, data will not be transmitted unless the RTS, CTS, DSR, DTR, and DCD pins are asserted. There are many other RS-232C signals, 20 in all, but the ones listed above are the most commonly used.

Signal Levels

RS-232 signal voltages are not compatible with those utilized by most computer circuitry, so an additional power supply is incorporated in RS-232 equipment to provide the necessary voltages. RS-232 signals are referenced to the pin 7 signal ground. The positive voltages can range

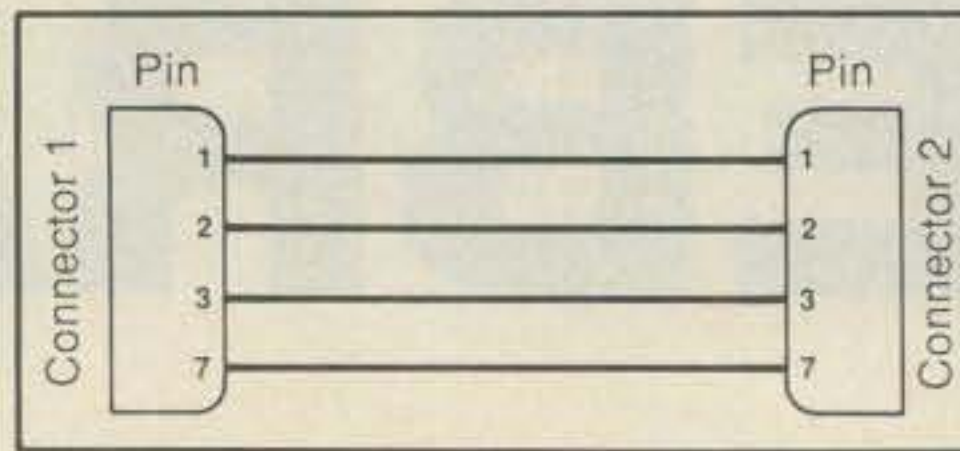


Fig. 1—Diagram of RS-232 minimum cable.

from 5 to 25 volts. On pins 2 and 3 a positive voltage indicates a logic 0 level. The negative voltages range from -5 to -25 volts. On pins 2 and 3 a negative voltage indicates a logic 1 level. The polarities are reversed for the control line logic levels with a logic level 1 meaning the pin is asserted on. When transmitting, voltages of +12 and -12 volts are usually used by most devices. When receiving, the positive voltage must be greater than 3 volts and the negative voltage must be less than -3 volts in order to be correctly interpreted by the receiving circuitry.

Cable Configurations

The following section describes several examples of RS-232 cables for a variety of applications. These may be of help when wiring your own cables or attempting to diagnose problems with your cable and interface.

Minimum Cable

In a minimum RS-232 cable as few as three pins may be connected. This is very convenient for use in lengthy cable runs. Pins 1(GND), 2(TD), 3(RD), and 4(SG) are connected (see fig. 1). If the signal and chassis ground are connected in the equipment, only one pin is necessary; pin 1 is usually chosen. In order for this cable to work, the RTS/CTS and DSR/DTR pairs must be ignored. If a piece of equipment will not work unless a pin is asserted, just wire it directly to the voltage required. Software flow control must be used with this three-wire cable; more on flow control later.

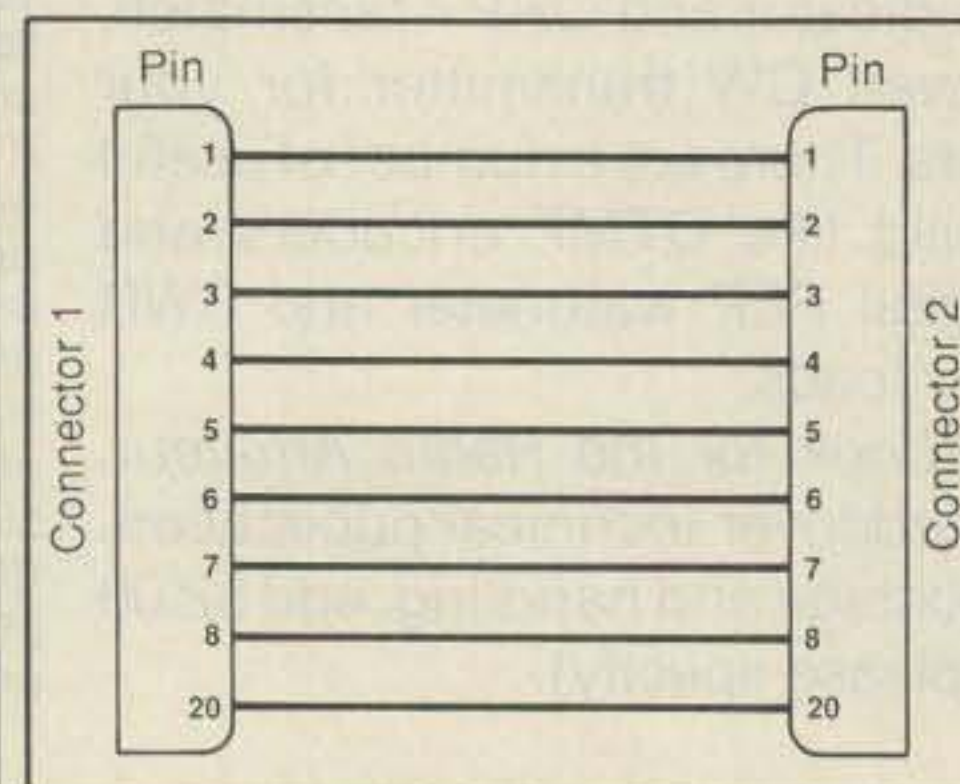


Fig. 2—Diagram of an RS-232 full cable.

Full Cable

This cable should provide all connections necessary for most RS-232C applications. The following pins should be connected: pin 1 or pin 7, pin 2, pin 3, pin 4, pin 5, pin 6, pin 8, and pin 20 (see fig. 2). This cable works in most situations and allows for hardware flow control.

Null Modem

A null modem adapter allows two DTEs or DCEs to communicate with each other. Several pins must be reversed to allow the proper signals to reach the proper pins (see fig. 3). If you recall from the signal descriptions of pins 2 and 3, a DTE transmits on pin 2 and receives on pin 3, and a DCE transmits on pin 3 and receives on pin 2. So when connecting two devices of a like type, these pins must be cross-connected so that one device's pin 2 is wired to the other device's pin 3, and the first device's pin 3 is wired to the other's pin 2. This allows the two devices to transmit and receive on their proper pins.

The RTS of each device should be wired to its own CTS and to the DCD of the other device. This allows a Request To Send to receive an instant Clear To Send and also asserts the Data Carrier Detect so the other device knows a transmission is coming. Additionally, the DTR and DSR pins must be cross-connected in the same manner as the TD and RD pins to allow for proper signaling. The pin 1 and 7 grounds are wired straight through as usual.

This null modem adapter is useful when transferring files between two computers or when connecting a computer to a printer that is wired as a DTE. It can be incorporated into a cable by switching the cable wires or through an adapter which is inserted into the cable.

Flow Control

Flow control is one of the potential problem areas of the RS-232 interface. Flow control is the process of stopping and starting the flow of data between de-

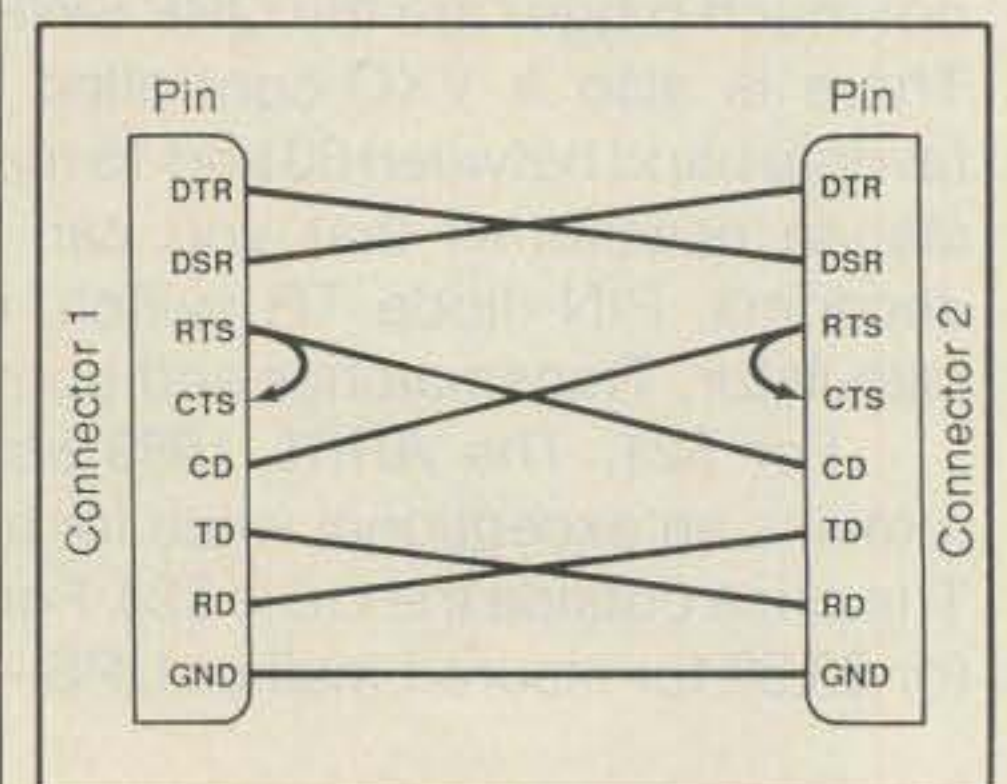


Fig. 3—Diagram of an RS-232 null modem.

Best Amateur Tribanders Available — KT-34A*/KT-34XA

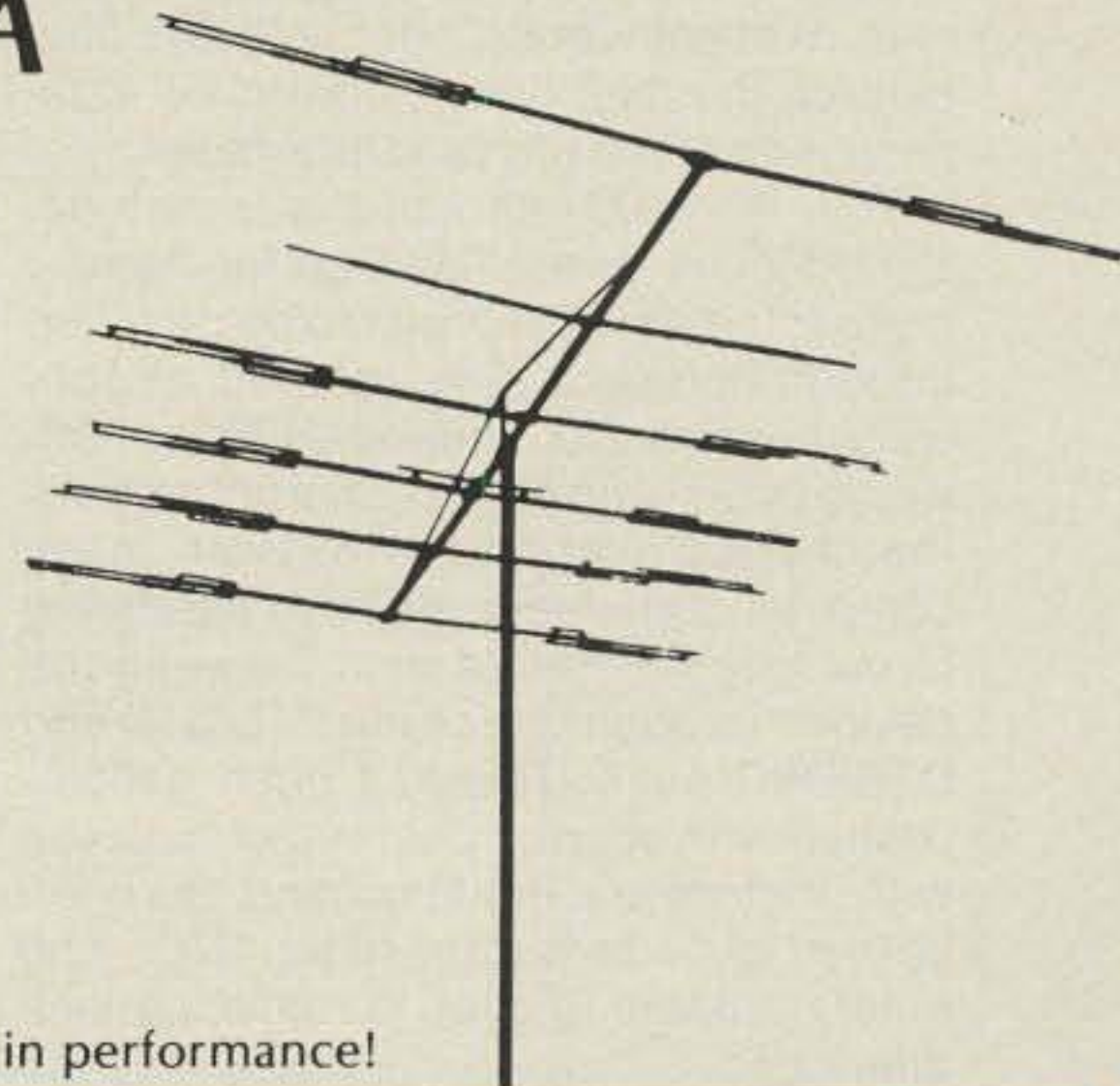
SPECIFICATIONS — KT-34XA

ELECTRICAL

- | | |
|---------------------------------------|---|
| • Bandwidth 14.0-14.350 MHz | • VSWR 1.5:1 |
| 21.0-21.450 MHz | • F/B 20 dB |
| 28-29.7 MHz | • F/S 40 dB |
| • Gain 8.5-9 dB | • Feed Imp 50 Ohms with balun |
| 9-9.5 dB | • Balun 4:1, 5 kW PEP |
| 11-11.3 dB | |

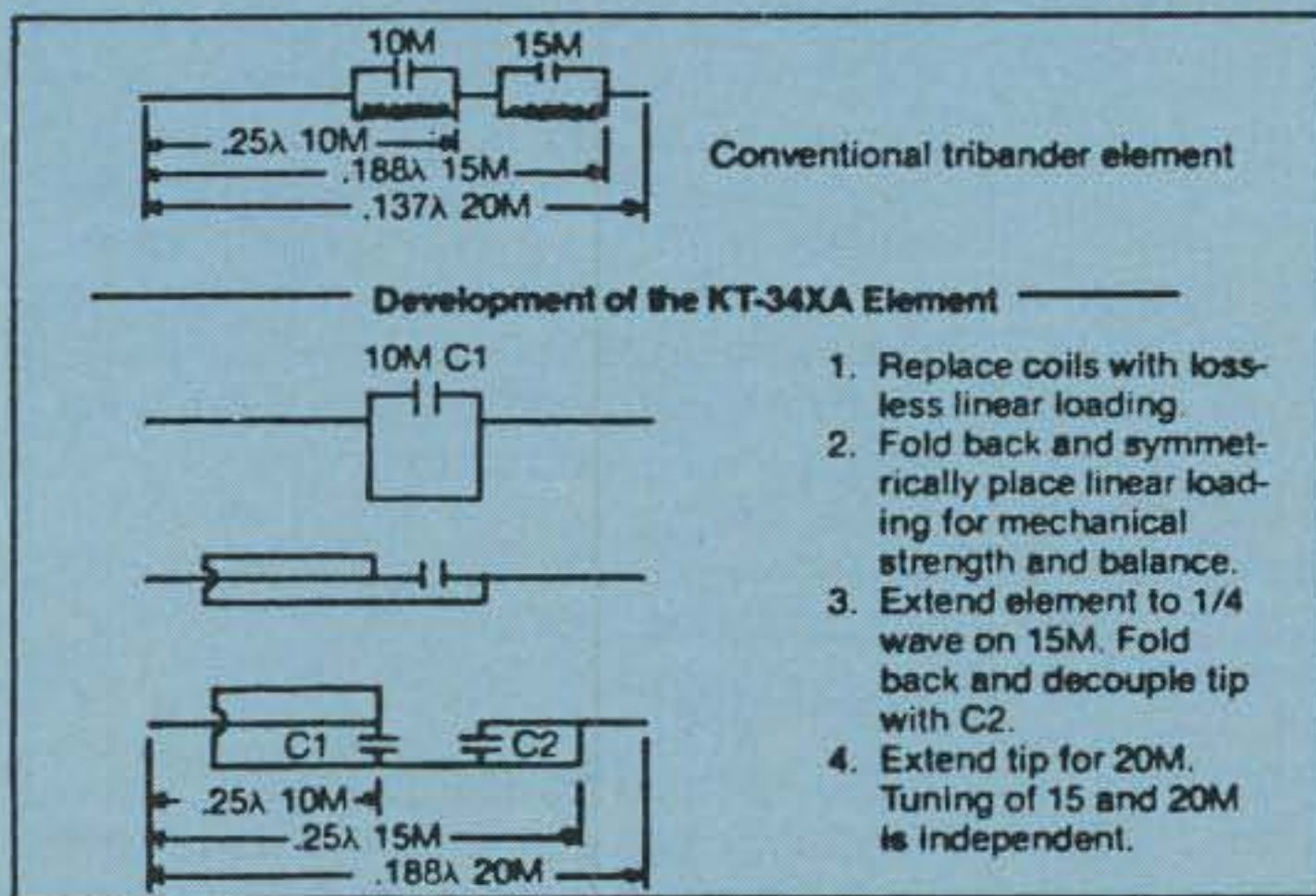
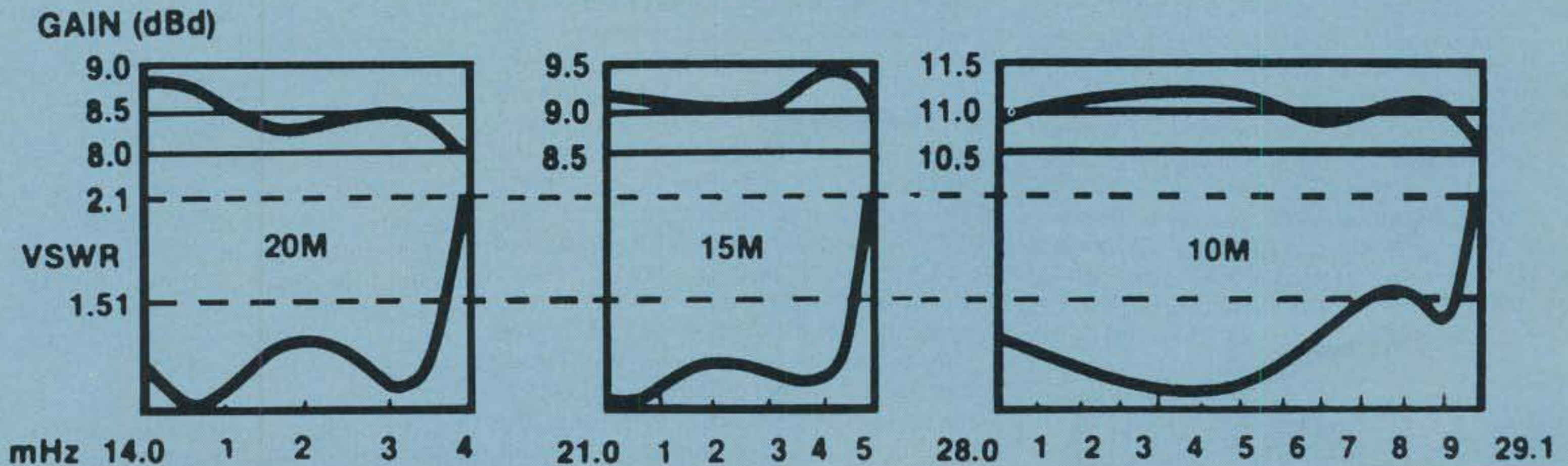
MECHANICAL

- | | |
|-----------------------------------|--------------------------------|
| • Element Length 24 ft. | • Windload 9 sq. ft. |
| • Boom Length 32 ft. | • Weight 68 lbs. |
| • Turn Radius 21.5 ft. | • Mast 2 in. O.D. |



*Lack of space or funds? How about a KT-34A? It's upgradable to a KT-34XA and similar in performance!

KT-34XA Gain vs. VSWR



The KT-34XA's design represents the first major advancement in tribander technology in over 20 years! The conventional traps, coils, and capacitors have been discarded in favor of integral linear loading and hi-Q air capacitors, all composed of aluminum tubing. These give the KT-34XA a conservative power handling capability of 5KW PEP and an unusually high level of operating efficiency. Linear loading also makes full 1/4-wave elements possible on 10 and 15 meters, and brings 20 meters much closer to the desirable 1/4-wave than any conventional tribander. The etch above diagrams the profound differences between the KT-34XA and a typical tribander element and the electrical activity of its various sections. Note also the lower windloading profile!

Mr. W.M. Scott
Mirage/KLM
P. O. Box 1000
Morgan Hill, Ca. 95037

Hello Scotty

Just want you to know that once again your KT34XA is the king of the 10/15/20 meter bands!

In 1987, just closed, I worked 268 countries on 10/15/20 SSB with your KT34XA - and this was done in only 11 months - (since I spent October in China at BY4 RA and BY4 AOM in Shanghai - away from my home qth.) -congratulations, Scotty, on providing the finest tri-bander available anywhere - and you can quote me!

73/Ken Miller
KG9R/3

(See the Feb. issue of S.E.R.A. Repeater Journal's "Dream Farm" story — reprints available).

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CIRCLE 7 ON READER SERVICE CARD

VICES. Flow control can be implemented in hardware, using the interface's signals, or in software. Under software flow control, the data flow is controlled independently of the physical interface.

The RS-232C standard was not designed for hardware flow control. Rather, it expected all flow control to be provided through software. One method of software flow control, known as X-on/X-off, works by sending control characters over the physical interface. However, many computer manufacturers have attempted to control the flow of data between the devices through use of the RTS/CTS and DTR/DSR pairs. This has been accomplished with varying degrees of success with printers and modems, and has been carried over to packet-radio TNCs and other amateur digital communications interfaces.

According to the RS-232 standard, the DCE is not allowed to drop the CTS until the DTE drops the RTS. The DCE should not drop its CTS at random for flow control. The proper use of the RTS/CTS pair is to allow the terminal to request use of the communications channel. However, hardware flow control using these pins is possible. Many TNCs don't have full RTS/CTS capability, so they may be used for flow control if the terminal will allow it, and most terminals will. Another approach, DTR/DSR flow control, works by turning off the DSR pin when the device

can accept no more data.

There is no guarantee that hardware flow control will work, but it usually does. There are many problems that can occur when using hardware flow control, such as when to stop accepting data, what to do with a character that is partially sent when the device is told to stop sending, and when and at what character to resume sending. Check the terminal and TNC manuals carefully if you are planning to implement hardware flow control. For general use, it is usually best to stick with X-on/X-off software flow control.

Non-Standard Implementations

Another problem that can pop up when working with RS-232C "compatible" devices is non-standard voltage levels. Instead of utilizing the standard +12 and -12 volts, some equipment uses voltages such as +5 and -5 or +5 and 0. Depending on how sensitive the RS-232 devices are to voltage levels, these non-standard voltage levels may or may not work. In most cases they usually do.

Non-standard pin assignments are yet another problem that may be encountered. Some TNCs have other uses assigned to some pins other than as specified by the standard. These pins are usually not used for I/O (Input/Output) and are usually ones that are not commonly used by most devices. These pins may have strange voltages on them or may be used as special control lines. It is a good idea not to connect these pins unless you are certain they will not interfere with the data transmission or damage any equipment. Check the manuals for more specific information about a particular pin's function.

Limitations

While the RS-232 standard has been a great aid over the years in standardizing serial data communication between devices, it does have many limitations. These limitations are usually not of concern to us as amateur radio operators, but they should be considered when working with RS-232C communications.

The maximum cable length of 50 feet is not often found to be very limiting for amateur digital communications applications. The value of 50 feet is derived by dividing the maximum capacitance of 2500 pF by the capacitance of a foot of cable, which is usually about 50 pF. The cable length can be increased through the use of shielded cable and in-line amplifiers.

The fact that the voltages utilized by RS-232C are not the same as those used to power most computer components requires the addition of another power supply.

RS-232 utilizes what is known as an *unbalanced ground*. There is only one signal ground for all the pins, and a difference in ground potential at each end can change the allowable voltage detection range.

Because of this signal detection errors may occur.

Despite the above-mentioned drawbacks, the RS-232C standard is fine for limited-distance medium-speed applications such as microcomputer communications.

Wiring Cables

Wiring your own RS-232 cables can save you a great deal of money over the price of a completed cable, and you can very easily modify the cable to meet your own needs. There are three main decisions to be made when wiring RS-232C cables: connector type, cable type, and number and type of pins.

The most common RS-232C connector is the DB-25. The DB-25 connector comes in several varieties. You must first determine whether your equipment needs male or female connectors. The male connector is known as DB-25P (Plug), and the female connector is known as DB-25S (Socket). Each plug comes in two varieties: solder type and friction type.

With the solder type, individual wires are soldered to each needed pin. The cable can be composed of individual wires, usually a 4-5 wire ribbon cable, or 4 wire telephone cable. Hoods are protective covers designed to fit over the back of the solder type DB-25 connector and provide a convenient handhold for plugging and unplugging the connector.

The friction type (also called insulation displacement) connectors are for use with ribbon cable, usually 25 wire. The cable is simply placed in a slot on the back of the connector, and the connector is compressed. Connector pins puncture the ribbon cable's insulation and make contact with the wires. Friction connectors provide a convenient means to quickly wire all 25 pins.

When constructing a cable, it is a good idea to always add an extra foot or so of cable. This makes rearranging the station much easier by not tying down the TNC to one particular location.

Conclusion

The RS-232C standard can be a pain to work with and diagnose if not working properly. But in most cases the interface works fine the first time. If you already have an RS-232 connection to a modem or other device, simply substitute the TNC (or whatever device you are using) for that device and everything should work fine.

Should you have problems with an RS-232 interface, it is important to determine whether the interface cabling, the TNC, or the terminal's hardware and/or communications software is at fault. If the fault is isolated to the interface cabling, the information in this article should make finding and solving the problem a little easier.

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1988 CQ WPX CW Contest High-Claimed Scores

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U.S.A. SINGLE OPERATOR ALL BAND

KT3Y	4,085,712
KM1H	4,065,684
K3ZO	3,188,094
KB0G	2,724,108
KZ2S	2,536,952
N5RZ	2,529,384
NN7L	2,301,026
KY7M	2,220,742
W9SU	2,159,040
KM9L	2,062,988
K3IPK	1,982,923
AB2E	1,676,920
NC7K	1,480,714
KA5W	1,358,278
KG4W	1,319,472
K8HVT/1	1,292,740
KM0L	1,200,562
AA4U	1,191,030
AB8Q	1,119,131
KW2J	963,402
N9AEJ	879,648
K9BG	872,616
N2AZS	840,322
K3WW	819,770
W2HG	601,092

28 MHz

WA6FGV	87,889
KG5U	67,133
KU2Q	52,765
WZ4F	40,145
KH6DW/KS6	29,432
WA1FCN	11,484
KD1U/4	10,332
NN3SI	36

21 MHz

K6LL/7	2,162,831
N0BSH	1,888,195
NE8T	1,850,948
N3RS	1,847,580
NX7K	1,710,592
WB2Q	1,363,120
K4BAI	1,255,626

WB4TDH	1,212,896
K9QVB	1,095,930
WM5K	890,568

14 MHz

K2VV	2,078,072
N2AA	1,993,374
W5FO	1,656,286
K2TW	1,573,200
NI8L/1	1,404,200
AI7B	1,270,976
KK9A	1,068,795
WD8LLD	1,035,425
KD2SX/1	946,895

7 MHz

NM2Y/3	437,492
W3BGN	340,775
W3AP	113,520
KF0T	32,016

3.5 MHz

NA3J	13,392
WA4SSB	8,652

1.8 MHz

K5NA/2	8,184
--------	-------

ORP/p

W8VSK	A	528,504
NA6A	A	417,952
AA2U	A	372,402
N4KG	21	295,240
K9OSH	14	44,844

MULTI-OPERATOR SINGLE TRANSMITTER

N4WW	5,682,866
WC4E	5,376,552
KI6P	5,138,705
AI6V	3,983,610
K0RF	3,735,009
KB1W	3,019,440
NA9J	3,003,168
N9AG/8	2,836,480
NQ7M	1,926,732
W200SKH	1,809,645

MULTI-OPERATOR MULTI-TRANSMITTER

NS0Z	10,893,960
WM5G	8,553,717
AD6C	5,671,620

WR6R	2,786,984
NV6Z	2,457,222

DX SINGLE OPERATOR ALL BAND

PJ0R	3,592,404
TW5E	3,112,725
KG6DX	2,928,420
OK1ALW	2,750,095
DL4BBO	2,617,344
4C2JTW	2,392,680
HA0MM	2,384,272
6Y6A	2,252,980
JH7WKO	2,196,099
HZ1HZ	2,182,824
OH6YF	2,164,734
OH1AF	2,003,100
JA8RWU	1,823,848
W2KVA/VP2M	1,670,380
XX9MF	1,433,796
JR1JV	1,375,780
VE3AT	1,322,187
SK0LM	1,275,844
YC3HCM	1,246,308
JF1SEK	1,096,137
JA2EU	1,054,584
DF6FBL/A	1,049,916
4X0V	1,046,064
K1BAZ/DV1	1,019,480
VE7DLM	1,018,248
FH5EF	1,010,691
GW4RHW	1,004,544

28 MHz

ZY5ZBA	2,543,476
9J0A	1,782,426
AY4F	1,691,895
CE3DNP	1,661,844
4M7A	1,650,150
LU6UO	1,137,240
9H1EL	805,552
9J2AL	665,280
YE2ZE	456,692
YU3C	395,970

21 MHz

9Y3VU	3,340,098
ZW4OD	3,057,282
VP2VDX	2,500,830
HK1KXA	2,384,446
4Z4NUT	2,356,393
YT3L	2,138,566

C30LFD	1,927,200
KH2D	1,800,890
JH8YCT	1,756,493
LZ1KZM	1,156,500
JA6YAJ	1,155,830
IO3VJW	1,050,776
G4CP	1,040,520

14 MHz

YY5A	4,145,382
VP2VCW	3,432,598
OH1ZAA	2,351,117
NY6M/NH2	2,210,565
N7DF/WH2	2,130,975
CT2BOH	2,092,720
VO7MP	1,804,968
G4CNY	1,662,918
VE2ZP	1,485,792
SV7RP	968,100
G3SXW	940,182
VO8AC	911,070

7 MHz

TW4O	1,286,714
KH2F	985,748
SP3RBR	867,672
EA8BLC	557,872
CE6NOT	382,430
LA9HW	376,656
EA3FER	304,600
YO8KOS	289,224
OH3KN	250,860
OH2BYS	193,338
PA3DQW	192,618

3.5 MHz

I4AVG	558,056
HA6NL	186,756
HA3PD	168,888
HA6PX	141,728
F5MF	141,100
YU3HF	90,872
VE6CB/3	42,084
OK3CAB	30,590

1.8 MHz

OK1DRO	20,230
CT1AOZ	15,840
KX6DC	12,240
OL8CLU	10,956
OK1DQT	6,064
YV1OB	5,184
EA1AUI	3,268

OL1BSI	2,952
OL9CUD	1,740
VE7BS	1,248

ORP/p

4X1IF	A	798,985
SM5GMG	A	664,122
FF5OJ	A	499,150
EA3EGV	28	48,081
JA6GCE	21	153,090
JA2DN	14	134,976
G3VMY	7	87,480
OK2PCN	1.8	3,520

MULTI-OPERATOR SINGLE TRANSMITTER

HG5A	6,588,864
HG1S	6,210,828
HG7B	5,739,224
LS1E	5,595,920
HG6N	5,579,095
5H1HK	5,360,820
TW6A	5,323,968
HG9R	5,046,951
GB2MM	4,730,865
HV3SJ	4,534,933
OH6EI	4,091,088
I1ZEU	3,714,697
JA7YAA	3,689,034
OG1AD	3,613,545
FV8NDX	3,414,841
JE2YRD	3,380,127
HG8Q	3,368,056
OH2AQ	3,161,145
VE7ZZZ	2,764,944
JA1YAD	2,589,642

MULTI-OPERATOR MULTI-TRANSMITTER

WL7E	12,411,520
YT2R	10,758,488
OH1AA	9,559,490
JA2YKA	6,937,920
JA1YFG	5,232,476
JA0YAK	4,764,123
JA1YXP	1,708,445
JA4YPE	1,465,010

NOTE: Queries pertaining to the WPX Contest should be sent to N8BJQ at 4121 Gardenview Dr., Beavercreek, OH 45431.

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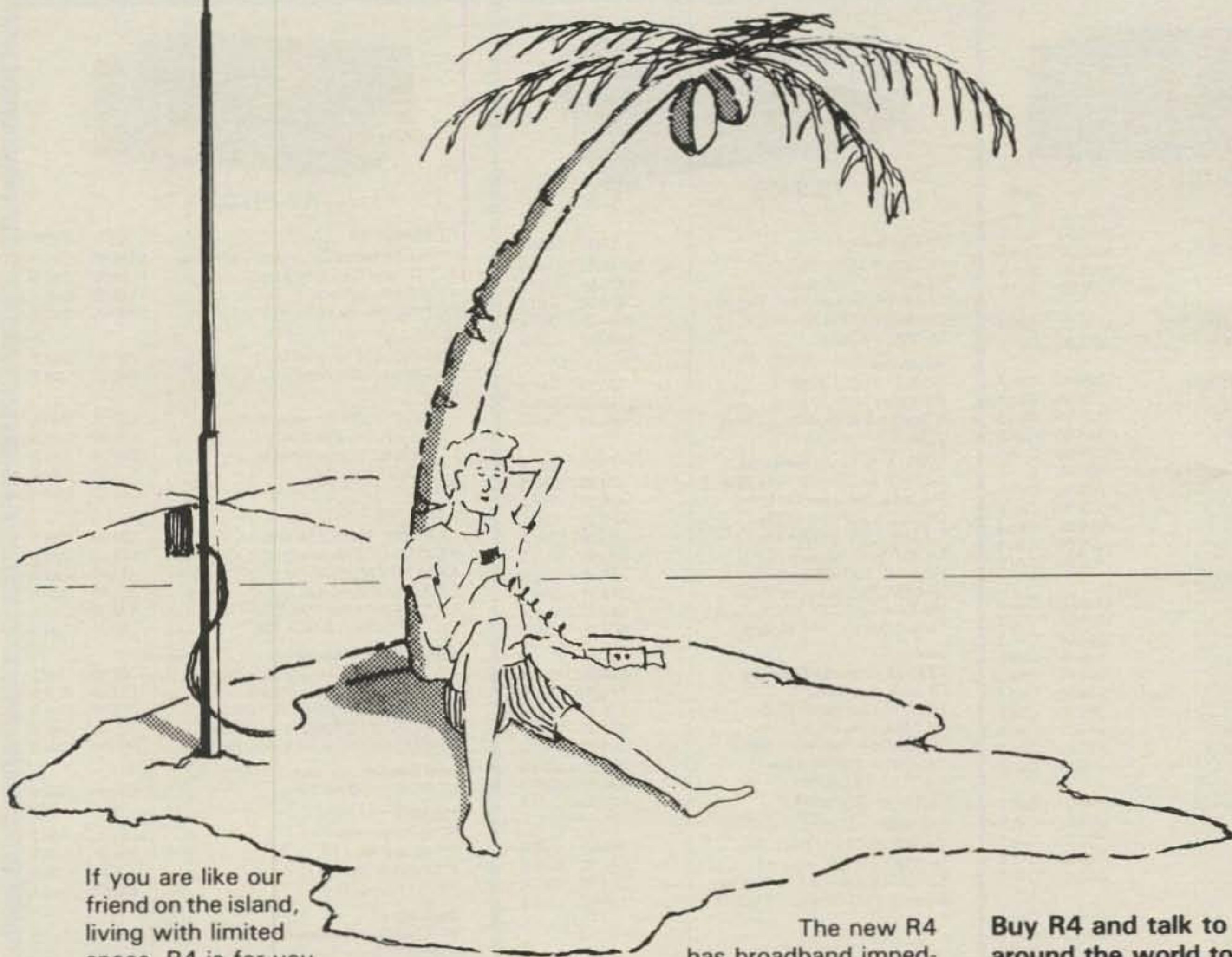
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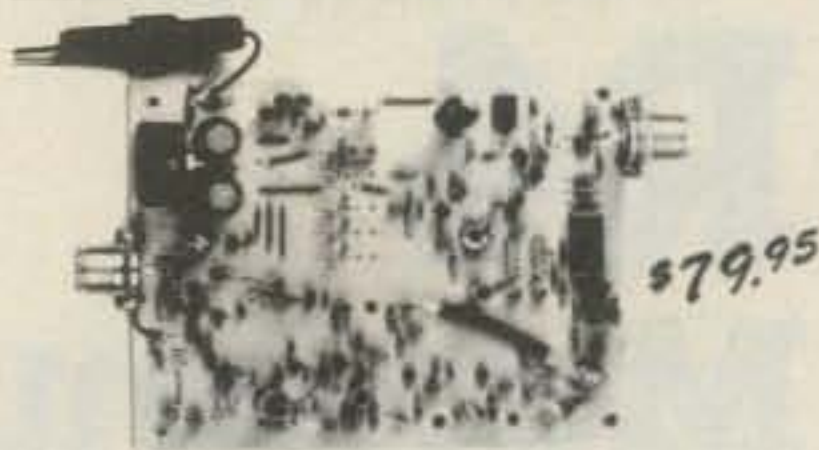
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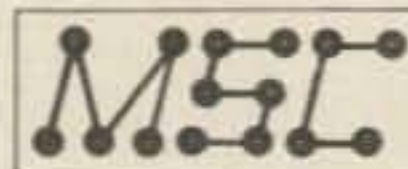
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IC-28A FM Mobile 25w	469.00	Call \$
IC-28H FM Mobile 45w	499.00	Call \$
IC-2GAT, New 7w HT	429.95	Call \$
IC-2AT FM HT	319.00	Call \$
IC-02AT FM HT, HP	409.00	Call \$
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VHF		
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TM-2530A FM Mobile 25w	479.95	Call \$
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TH-45AT 5w Pocket HT NEW	369.95	Call \$
TW-1100A, 2m/70cm FM	599.95	Call \$
TH-55 AT 1.2 GHz HT	499.95	Call \$
TR-50 1w 1.2GHz FM	629.95	Call \$
220 MHz		
TM-3530A FM 220 MHz 25w	499.95	Call \$
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CQ Showcase

Tape Program Fights CW Mental Blocks

PASS Publishing has announced a new audio cassette tape and work booklet program that helps users overcome mental blocks to Morse code. Unlike approaches that depend on repeated CW practice to overcome mental blocks, the PASS program aims at eliminating the psychological mechanisms that impede progress. The double sided cassette teaches users a meditation technique and how to make "mental movies" of the results they want. The work book has several exercises designed to help the user uncover any subconscious ideas and thoughts that may be blocking their progress. Another section deals with setting realistic goals. For more information, contact PASS Publishing, PO Box 570, Stony Brook, NY or circle number 101 on the reader service card.

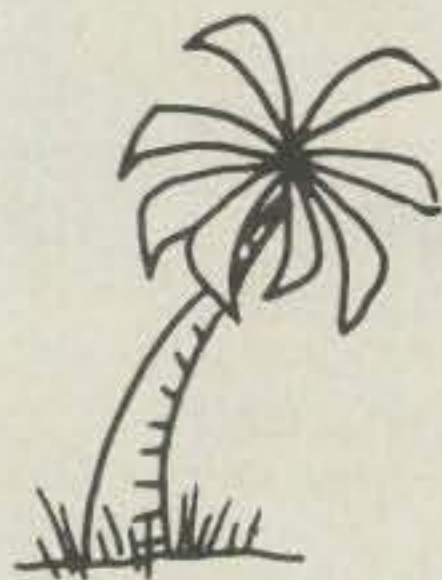
Radio Shack Updates Computers

Radio Shack has announced updated versions of its popular IBM compatible line of computers for the shack and home. Models Tandy 1000LS and Tandy 1000TL are PC/XT compatible and feature MS-DOS 3.3 and Tandy's DeskMate



3.0 graphical interface stored in ROM. Both units come with industry-standard enhanced keyboards, digital-sound editing capability, parallel and serial ports and CGA/monochrome video output.

Model Tandy 3000 NL is designed for the user who demands more enhanced performance and OS/2 capability. Based on a high-performance 80286 microprocessor, the 3000 NL is PC/AT compatible. All Tandy compatible computers come with one internal 3 1/2" disk drive. Hard drives and tape back-up units are available in ranges from 20Mb to 344Mb. For more information about Radio Shack computers stop by your local Radio Shack store or contact the Radio Shack



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Circulation Department, 300 One Tandy Center, Fort Worth, TX 76102 or circle number 102 on the reader service card.

Ham IV Brake Wedge

Large antennas and gusty winds sometimes prove to be too much for the stock brake wedge used in Hy-Gain Ham IV rotators. If the wedge fails, the antenna may turn the rotator (free-wheel) and cause damage to other components. C.A.T.S. has announced a heavy-duty replacement for the wedge, which has been tested with antennas having a boom length of 40'. It also fits the "III" series and can be adapted to the "M" series. For more information, contact C.A.T.S., 7368 S.R. 105, Pemberville, OH 43450 or circle number 104 on the reader service card.

Kenwood 1200-MHz Handheld

Kenwood USA has announced a new 1200-MHz handheld transceiver, the TH-55, that has all the features of the 2-meter TH-25AT and the 450-MHz TH-45AT. Frequency coverage is 1258—1300 MHz, and output power is limited to 1 watt, regardless of battery pack used, to protect



the finals. A DTMF pad is standard, and the housing is water resistant. For more information, contact Kenwood USA, 2201 E. Dominguez St., Long Beach, CA 90810 or circle number 106 on the reader service card.

Dual-Band Mobile Transceiver

ICOM has introduced the IC-3210 25-W 2-meter/450-MHz mobile transceiver that features 20 full-feature memory channels, 2 call channels, programmable scan, memory scan, priority watch and wide-band 2-meter receive frequency coverage. The IC-3210 features a multi-colored LCD display for easy viewing and only 14 front-panel controls for ease of operation when mobile. A complete line of options are available for the unit. For more information, contact ICOM America Inc., 2380 116th Avenue N.E., Bellevue, WA 98004 or circle number 107 on the reader service card.

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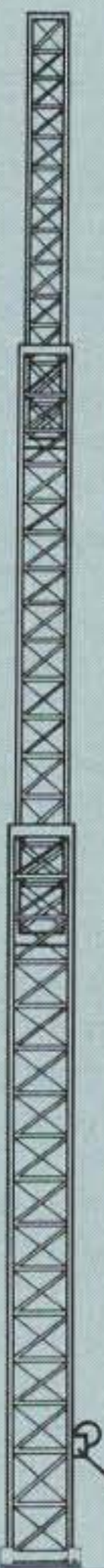
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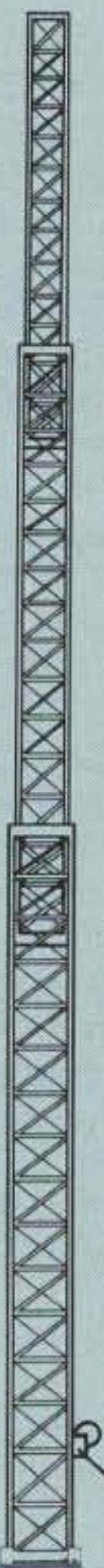
MA SERIES CRANK-UP TUBULAR TOWERS
 Will handle 10 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
					Top	Bot.	
MA-40	40'	21'6"	2	242	3" sq.	4 1/2"	\$ 809.00
MA-550	55'	22'1"	3	435	3" sq.	6"	\$1369.00
MA-550MDP*	55'	22'1"	3	620	3" sq.	6"	\$2909.00
MA-770	71'	22'10"	4	645	3" sq.	8"	\$2509.00
MA-770MDP*	71'	22'10"	4	830	3" sq.	8"	\$3969.00
MA-850MDP*	85'	23'6"	5	1128	3" sq.	10"	\$5349.00

*MDP models complete with heavy-duty motor drive with positive pull down.

Shown w/optional MARB550 rotorbase and rotator.




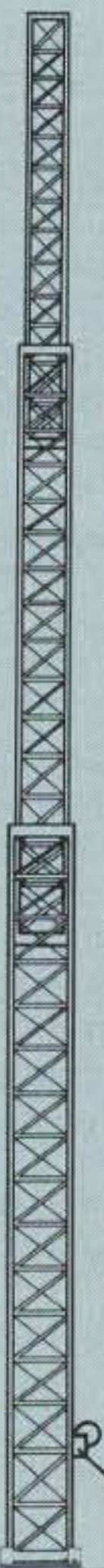


FREE STANDING CRANK-UP TOWERS
 Will handle 18 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
					Top	Bot.	
TX-438	38'	21'6"	2	355	12 1/2"	15"	\$1019.00
TX-455	55'	22'	3	670	12 1/2"	18"	\$1539.00
TX-472	72'	22'8"	4	1040	12 1/2"	21 1/2"	\$2529.00
TX-472MDP*	72'	22'8"	4	1210	12 1/2"	21 1/2"	\$4069.00
TX-489	89'	23'4"	5	1590	12 1/2"	25 1/2"	\$4399.00
TX-489MDPL*	89'	23'4"	5	1800	12 1/2"	25 1/2"	\$6599.00

*TX-472MDP includes heavy-duty motor drive with positive pull down. TX-489MDPL comes with heavy-duty motor drive with dual level wind and positive pull down. (Both motor drive models include limit switch brackets).




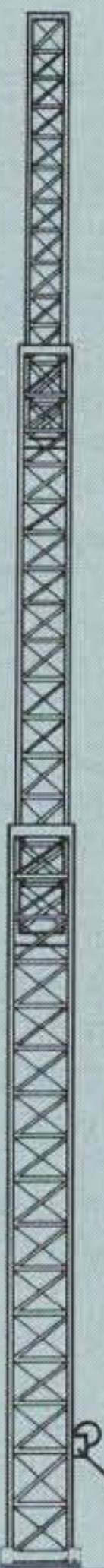


FREE STANDING HEAVY-DUTY CRANK-UP TOWERS.
 Will handle 30 sq. ft. antennas at 50 MPH winds.

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
					Top	Bot.	
HDX-538	38'	21'6"	2	600	15"	18"	\$1319.00
HDX-555	55'	22'	3	870	15"	21 1/2"	\$2309.00
HDX-572	72'	22'8"	4	1420	15"	25 1/2"	\$3959.00
HDX-572MDPL*	72'	22'8"	4	1600	15"	25 1/2"	\$6049.00
HDX-589MDPL*	89'	23'8"	5	2440	15"	30 1/2"	\$7919.00

*Includes heavy-duty motor drives with dual level wind and positive pull down. HDX-572MDPL includes limit switch brackets only. HDX-589MDPL includes limit switches and limit switch brackets.







FREE STANDING "LOW PROFILE" COMPACT CRANK-UP TOWERS.
 Will handle 18 sq. ft. antennas at 50 MPH winds. (TMM-433HD handles 24 sq. ft.)

MODEL NO.	HEIGHT MAX.	HEIGHT MIN.	NUMBER SECTIONS	WEIGHT POUNDS	SEC. OD		SUGGESTED HAM PRICE
					Top	Bot.	
TMM-433SS*	33' w/o mast	11'4"	4	315	10"	18"	\$1089.00
TMM-433HD*	33' w/o mast	11'4"	4	400	12 1/2"	20 1/2"	\$1319.00
TMM-541SS*	41' w/o mast	12'	5	430	10"	20 1/2"	\$1429.00

*Hy-Gain and some Alliance rotors when installed inside tower will restrict retracted height by approx. 24". Most Kenpro models allow full retraction.



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CIRCLE 80 ON READER SERVICE CARD

The following article is a commentary on Robert B. Cherry, K2HBX's article in our August issue. What PRB-1 is or isn't still makes for very interesting discussion and even still more interesting law.

Beauty Is In The Eye Of The Beholder

BY JOSEPH MERDLER, N6AHU, AND MARCI MERDLER, N6QFU*

The analysis of *Izzo v. Borough of River Edge* printed in the August 1988 issue of *CQ* magazine cries out for comment because of an apparent error in emphasis of what the case holds, and possible effects of perhaps setting a precedent that is not wanted—i.e., a 40 foot tower height limitation.

The Federal Courts have long sought to impose restrictions on the initial use of its system to impose Federal jurisdiction in an effort to prevent this so-called "Dual Jurisdiction" from giving rise to inconsistent federal and state interpretations of a state scheme, and thus the "abstention doctrine" (when a federal court defers to a state court to hear the case) of *Burford v. Sun Oil Co.*, 319 U.S. 315 (1943).

The Court after analysis of numerous cases involving the abstention doctrine, the Federal interests as set forth in PRB-1, *Thernes v. City of Lakeside Park*, 779 F.2d 1187 (6th Circuit 1986), *Guschke v. City of Oklahoma City*, 763 F.2d 379 (10th Circuit 1985) and (pre-FCC declaratory ruling on preemption): *Kroeger v. Stahl*, 248 F.2d 121 (3rd Circuit, 1957) the Court states: "If only state law applies, 'Burford' abstention carries more weight than when federal interests require evaluation as well." The court further refers to a commentator who states in order to have "Burford" abstention three conditions must be present:

1. The subject of the regulation be of significant and special concern to the state;
2. The state regulatory scheme be detailed and complex;
3. The federal issues be unresolvable without requiring the district court to im-

*14557 Friar St., Suite 101, Van Nuys, CA 91411-2386. N6AHU is licensed to practice law in the state of California, and is an ARRL Volunteer Legal Counsel. N6QFU has started her second year as a law student at Loyola School of Law, Los Angeles, CA.


merse itself in the technicalities of the state's scheme.

The court further states: "In this case an express narrow and quite specific federal provision threatens, at most, only a minimal disruption of a broad state policy. The rationale of 'Burford' is not apposite, and the general obligation of the federal courts to retain jurisdiction of matters of federal law, predominates . . . the special circumstances here require that the district court retain jurisdiction and adjudicate this dispute. We express no view, of course, on the proper resolution of the controversy."

Given this analysis we see that the *only issue* involved in WA2INW's appeal is whether the district court should have heard the case. All of the other matters stated by the Court in its opinion are what lawyers call dictum and have no effect and are not binding beyond the scope of the final holding of the case.

The good news is that the court held that there was an issue requiring the district court to take jurisdiction and that the Borough of River Edge capitulated and settled the case.

This case could have had a possible bad side. Amateurs have been fighting for years to have the courts allow them to erect antenna towers at a height which will permit "world-wide communication." Many have argued that the minimum height should be at least 75 feet and they have introduced expert testimony to this effect and in some cases have even argued for a greater height.

There is a saying among lawyers that "bad cases make bad law." *Caveat*: Should a lawsuit have been filed to get a variance for 5 feet to allow a 40 foot tower and have a case of record that this is the proper height for "world-wide communications"? What about the hams who have fought for years to have antennas at 75 feet? Hence, because of the difference in the interpretation of the meaning of the case and whether or not an action to establish 40 feet is "rolling the dice," we have entitled this commentary "Beauty Is In The Eye Of The Beholder." 

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The Heath PackKit HK-232 Multi-Mode Packet Controller

BY PETER O'DELL*, WB2D

Last August Jonathan Mayo, NR3T, reviewed the AEA PK-232 packet controller. Some of you may have noticed that the outward appearance of the PK-232 is similar to that of the HK-232. There is a good reason, since the two are electrically equivalent. Heath and AEA are working together to bring the same product to the amateur market in both factory finished and kit form.

There are some differences that you might not suspect that arise out of different philosophies of the two companies. First of all, AEA has been noted as a company that caters to the amateurs who tend to congregate on the cutting edge of technology. Heath, on the other hand, has, at least in the past, been noted for providing the average amateur with solid, tried and true equipment and **documentation** to go along with it.

And this is one of the areas where the two controllers differ dramatically. Although electronically equivalent, the two products have quite different manuals. The AEA manual is addressed to the sophisticated, experienced packet/computer user. It is a thorough reference manual for the experienced, knowledgeable user. Heath has taken this piece of technical excellence and modified it to produce a manual suitable for the newcomer to digital communications as well as the "oldtimer" in this field.

Heath assumes that the new owner knows very little about packet and the other modes (AMTOR, Baudot RTTY in three slightly different formats, ASCII RTTY, Morse CW, and WEFAX with an Epson compatible printer). The explana-

tions are quite clear and easy to understand, even for a beginner.

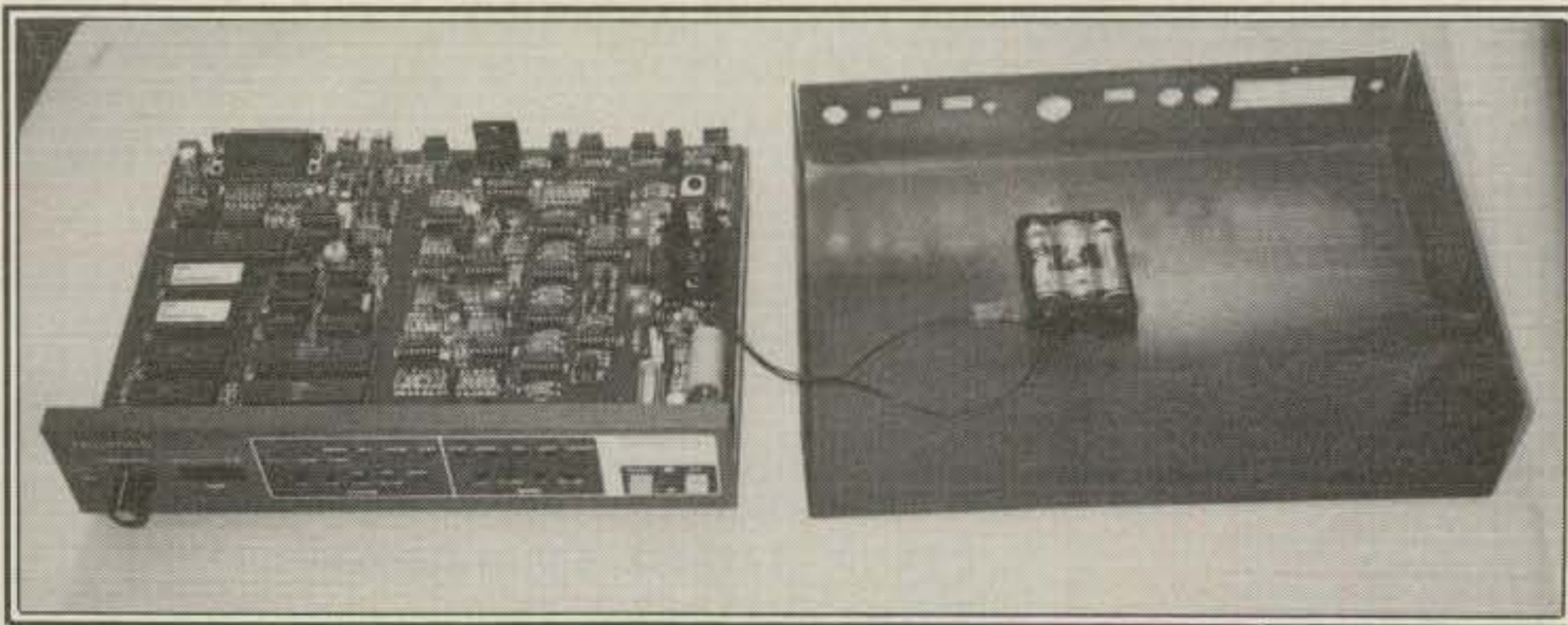
After taking the builder through the basics of alignment, Heath adds a brilliant and thoughtful touch. Noting that packet operation can be quite complicated, Heath realizes that the new owner wants to get on the air as quickly as possible. So this is where they put the section that leads you through your first contact. Pointing out that efficient operation requires properly setting numerous parameters, they tell you how to set the really important ones and just what you have to do to make that first contact. After you've had some fun, there will be plenty of time to learn the more esoteric aspects of operation.

Although I certainly thought it was a good idea, I didn't realize how much trouble some amateurs have with other manuals until a few weeks ago in Charolette. A fellow came over to the CQ booth and told us how he had been struggling for six months attempting to make his packet station work. Somehow, it just didn't



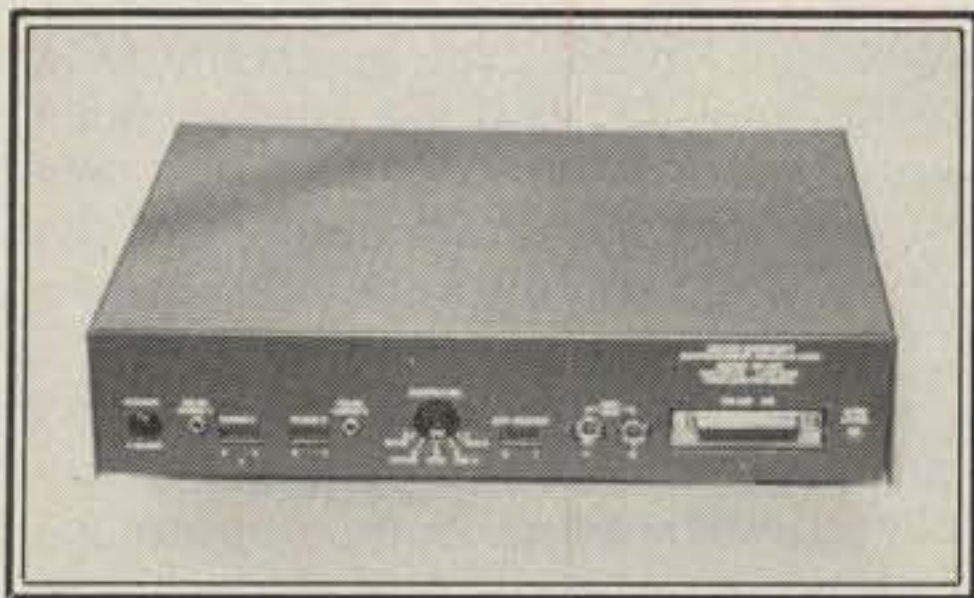
External view of the HK-232. Its modern, sleek look should complement any station.

seem to work for him, and he found the manual for his equipment totally confusing. After we talked for a while, I suggested that he pick up a copy of Heath's manual. Unless he happened to have an AEA PK-232, it wouldn't have been an exact match-up with his rig. But the manual is so well written that anyone struggling with a packet controller manual would probably derive some benefit from it. And this would certainly be true of someone



Interior view. The optional back-up battery supply is attached to the case top. Notice that although the board is full of components, they are not so densely packed as to make it difficult to work on the unit.

*Associate Editor, CQ
CompuServe 76440,271



Rear view of the Heath PackKit. A socket is provided for attaching an external modem for those wishing to operate above 1200 baud.

who owns an AEA PK-232 and finds portions of that manual over his head.

By the way, using Heath's excellent instructions, it only took me about 10 minutes to make a connection with a local BBS after I got everything hooked up. Actually, I should say that it was only about 10 minutes after I put up an outside antenna. For a couple of days, I tried hooking up with a couple of BBSs and other stations on an indoor antenna. Well, what I was using was an HT with a rubber duck—in the basement. Hey, we haven't been in the house very long, and I was trying to get off easy.

Speaking of hook ups, Heath has put together three pages of charts listing the proper plugs, pin numbers, etc. for most of the popular HF/VHF rigs marketed in the past five years or so. They probably missed something, but looking over the list I couldn't think of anything that wasn't covered. You should have no trouble figuring out what connections to make to get the PackKit connected to your rig.

Construction

Anyone with some building experience should have little difficulty constructing the PackKit. There are two circuit boards, and wiring the kit consists primarily of stuffing these boards. The main board carries most of the parts, and a lot of them are resistors, capacitors and diodes. If you've ever built a kit, you know that stuffing these parts is the most time consuming and boring aspect of building. Well, stuffing isn't really the problem, it is finding the right resistor or capacitor or diode. Ayah, I know you are supposed to sort all of them out and arrange them in ascending order of value before you start building. In my opinion, anybody who would actually do that should probably consider seeing an analyst, or at least a psychic.

Heath now supplies these items, or at least most of them, on two strips of tape. The builder finds the right strip of parts and affixes it to pages in the manual. These pages have silhouettes of the parts with the appropriate parts numbers on them. Each tape matches up with a portion of the circuit board. The builder just

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pulls each component off in order and stuffs it into the proper holes on the board. Where was this concept when I built the SB-303 15 years ago?

I wish I could tell you that everything worked fine when I applied power, but it didn't. The voltages seemed right, and a few LEDs lit up, but nothing else happened. I called the service department, and the technician suggested a couple of things to check. These didn't pan out, so I called back and this time I was connected to Matt. He's been in the Heath Service Department for the last 10 years or so, and he is good.

I barely got some of the symptoms described before Matt told me "It is D2. You put it in the wrong holes. Go home and look at the board really closely. There's a couple of plate-through holes on the board near D2. You bent the leads too close to the diode and put it in the wrong

holes. I've seen two or three of them come back in here with that same mistake." I was skeptical that I could have made such a stupid error.

He was right. I pulled the diode out and put it in the right holes and the PackKit worked like a charm. I marvel at Heath's technical service department. These people know what they are doing.

Alignment

Alignment consists of setting the frequency of the clock—computer jargon for master frequency oscillator for the built-in microprocessor and associated chips. Heath suggests you use a frequency counter for this. All other measurements are made using the built-in diagnostics in the controller. To properly set the afsk level, you will need a second receiver besides whatever radio you con-

nect to the HK-232. You adjust the AFSK control until you find the "knee" point where output volume does not increase for any additional advancement of the control. Then you back the control off a bit.

This setting worked fine for me until I started fooling around attaching the controller to other radios. I forgot to reset the AFSK level after one of my experiments. A few days later, I got a message from Norm, W2JUP, asking if I needed some help. We hooked up on the landline, and I got a wealth of information from him—he wrote the 232 manual for AEA and used to be a CQ columnist.

Before I called him, I had reset my AFSK level. When he had first noticed me, I was splattering at least 20 kHz either side of my frequency. He has on-the-air monitoring equipment and had noticed that I had been grossly over deviating when I caused the splatter. Since I had reset the AFSK level, I wondered how close I was. His equipment indicated that I was pretty close to the right level, just using Heath's "by the ear" method. There was still a little too much deviation, which caused the high tone to be compressed resulting in what the engineers call "twist." "Twist" can cause your otherwise perfectly readable signal not to be decoded by certain decoders, notably those used in the inexpensive TNC-2 clones.

Norm told me that he had seen this happen time and time again in the last five years as he worked with packet here on LI. He said it was the most common cause for being able to connect with some stations and not others in the area. If you are having trouble connecting to some stations, or even to any station, and everything else is okay, check your deviation. You'll need a deviation meter or service monitor. If you are over deviating, do yourself and your neighbors a big favor and reduce your deviation to 3.5 kHz. You'll make more "connects" and less enemies.

Summary

AEA's hardware intensive approach to digital communications has resulted in a design that features excellent filtering, which is extremely important when you move away from 2-meter packet. The 232 has an excellent reputation for on the air performance. Heath has taken this basic design, left it intact, and improved upon it for the newcomer by redoing the manual and providing material for the newcomer to packet. In short, it is an excellent performer that should prove useful to any amateur interested in exploring the fastest growing segment of amateur radio. When you are ready to graduate from 2-meter packet, the HK-232 has everything you need for packet or the other modes on HF. List price is \$279. An external 12V, 1A regulated supply is required.



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All Packed And Ready To Go

BY JOHN DAEBELLIEHN*, KC9YQ

Amateur radio is only one of my hobbies, but it is the one I enjoy taking with me whenever possible. This includes carrying the 2-meter handheld on motorcycle vacations that I take with the XYL. I have always been concerned about the safety of the rig in such an environment. (Fortunately, there has been no problem, so far.) Worse yet, the transmit range of a 1½-watt handheld with nothing more than a "duck" antenna has meant that I've often been limited to listening only.

As this project began to take shape in my mind, I knew that I wanted a system that included a better antenna than the duck. The system had to be totally self-contained. It must provide some margin of safety for the radio should it happen to fall off the cycle during transit.

I came across a rugged plastic carrying case for a soldering gun. Any similar type case should perform just as well; you might consider a small plastic tool or tackle box.

The ground plane, which is necessary to obtain a good match and keep the angle of radiation low, consists of four pieces of thin brass stock. Brass is easy to solder to, but if you would prefer to use aluminum because it is easier to find, you can always use Miracle Rod to facilitate the soldering. Glue the brass (or aluminum) stock to bottom and top of the case. Size of the pieces isn't all that critical, but in general the bigger the better. I used solder wick to connect the four pieces of metal to the feed point of the antenna. It is flexible and easy to work with.

You'll need a telescoping whip antenna capable of extending to at least 19 inches. In my case, I found an old set of TV rabbit ears in the junk box. I detached one of the whips and mounted it, swivel connector and all, to the bottom of the case with a metal screw and washer.

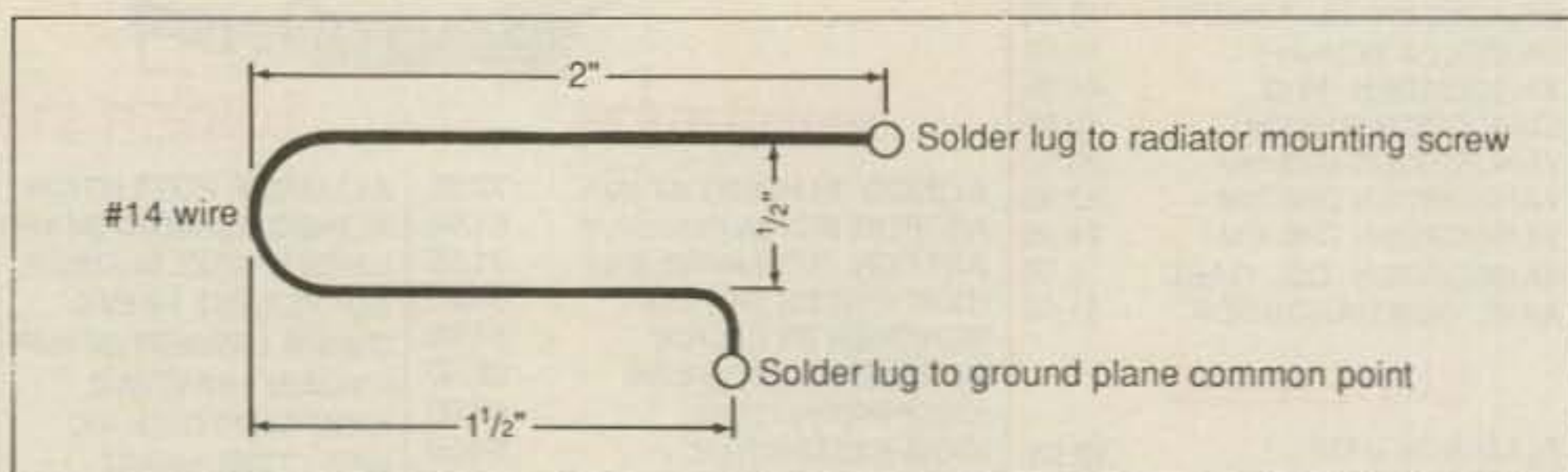
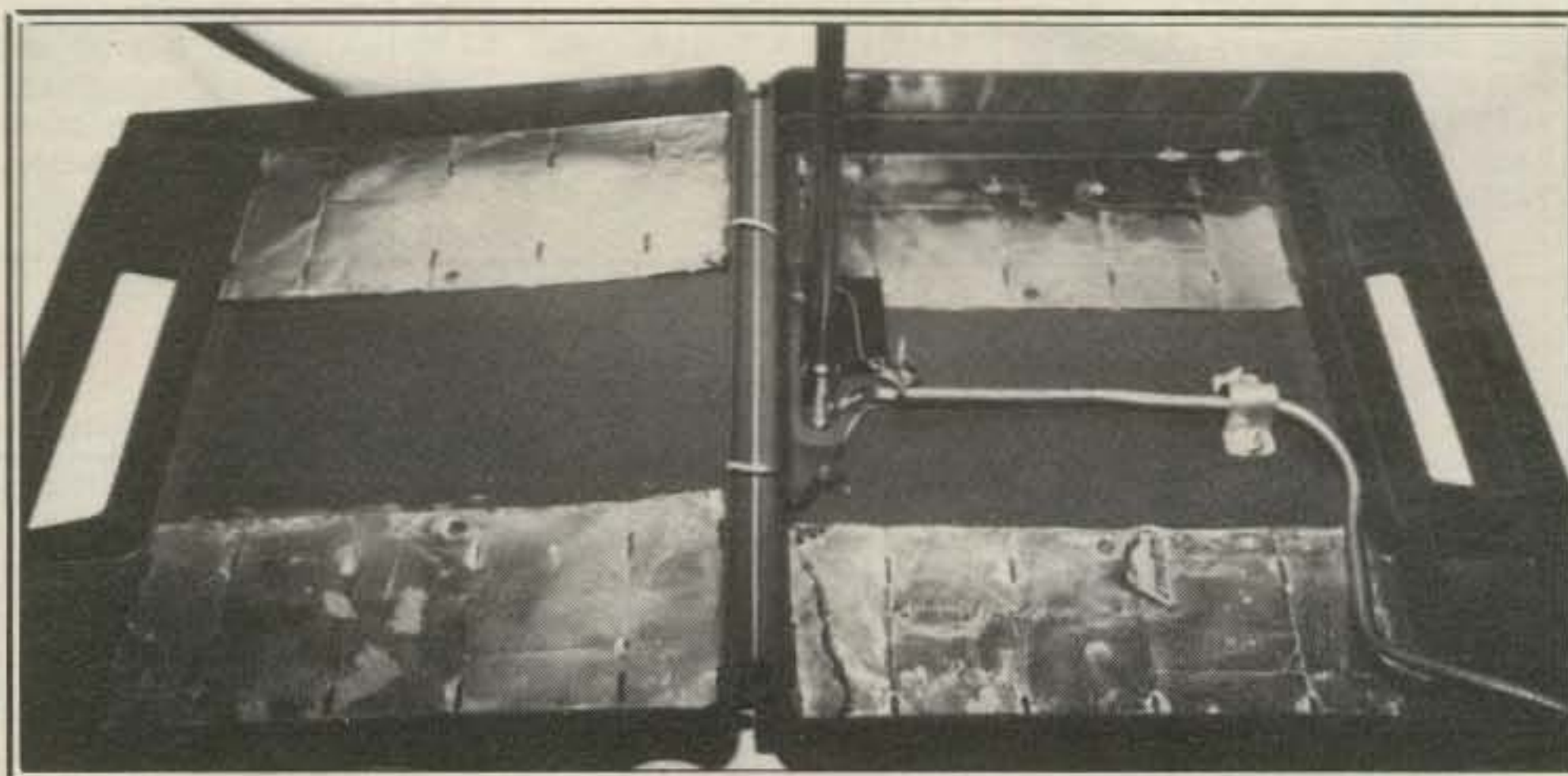


Fig. 1—Dimensions for the hairpin match, if you decide to use it. You may have to slightly alter the dimensions for your installation.

plane. I used ordinary electrical tape, and it seems to have held up well. The match really isn't necessary, since any rig designed to operate into a duck antenna is capable of handling much higher SWR. But I wanted the best possible system. Feeding the base of the antenna directly resulted in an SWR of approximately 2:1. I added the hairpin match (fig. 1) shunted from the feed point to ground to bring the SWR down to close to 1:1. You'll need to insulate the match from the ground

An alternative would be to mount a BNC female connector on the bottom of the box. Then you could select between a duck antenna, a quarter-wave rod, or a gain-type antenna. If you are going to switch among antennas, you will probably be better off without the hairpin matching section.

The final steps consist of attaching a piece of coaxial cable with the correct connector on the other end to match to your radio. You'll need some foam pad-



Assembled package before installing the foam.

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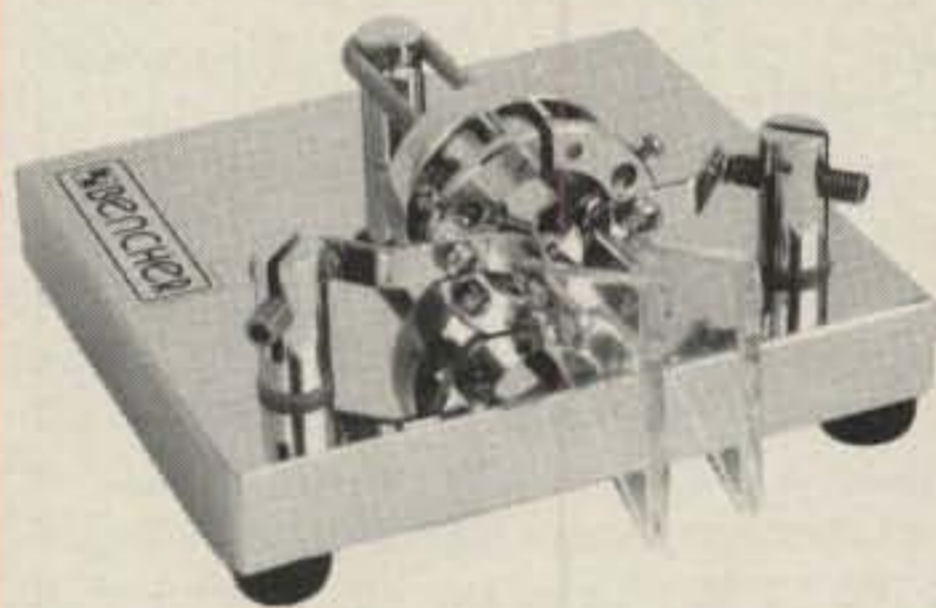
Completed package with all the accessories for a fun vacation.

ding and a sharp knife to cut it to shape. If you don't have any foam in your junk box, try your local fabric store or upholstery shop. Once you have the foam cut to fit inside the box, place your radio and any accessories you want to carry on the open box. Move the items around until you find the best layout, then carefully cut out holes to fit the items. Use a felt-tip pen to trace the outline of the items to ensure a snug fit.

That's all there is to it. In a matter of a couple of hours, you can be *all packed and ready to go.*

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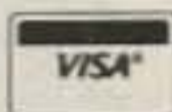
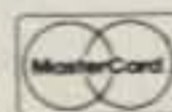
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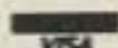
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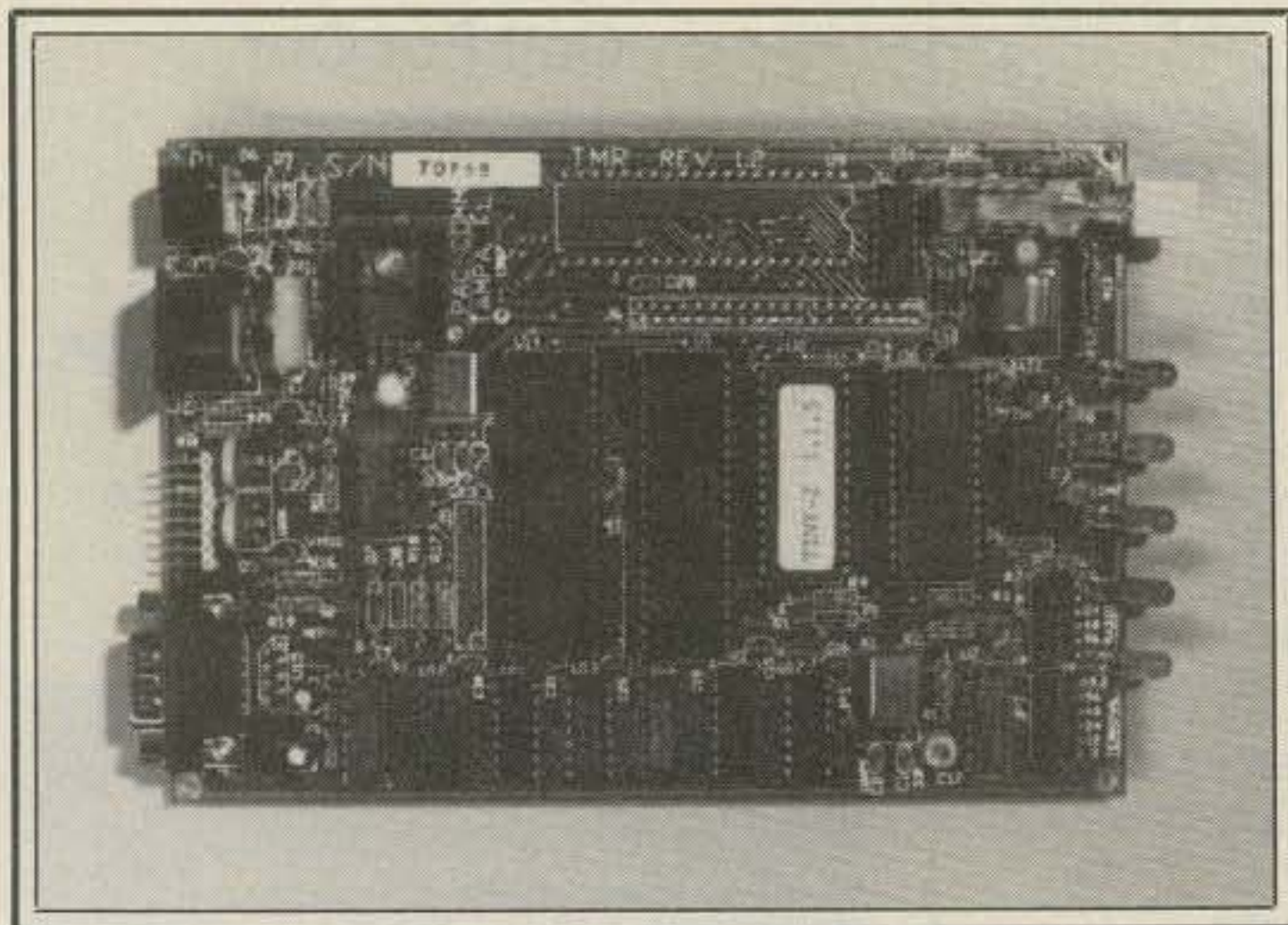
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CIRCLE 26 ON READER SERVICE CARD

The Pac-Comm TINY-2 Packet Controller

BY JONATHAN L. MAYO*, KR3T



The TINY-2's circuit board.



The TINY-2 set on the Pac-Comm TNC-200 with their back left-hand corners aligned. The TINY-2's compact size is apparent.

Considered one of the best TAPR (Tucson Amateur Packet Radio) TNC-2 clones is Pac-Comm's TNC-200. However, time marches on, and even a classic unit like the TNC-200 can be supplanted. Pac-Comm's chosen successor to the TNC-200's reign is the TINY-2 Packet Controller. While it is sad to note the demotion of the venerable TNC-200, the TINY-2 lives up to, and even surpasses, its predecessor's capabilities.

The Pac-Comm TINY-2

The first thing I noticed about the TINY-2 was its size; it is a very compact unit. But the TINY-2 is no lightweight when it comes to capabilities. The TINY-2 comes with TAPR firmware (version 1.1.5) in a 32K EPROM as well as 32K of battery-backed RAM. The unit fully supports the AX.25 Level 2 Version 2 protocol. Additionally, the TINY-2 is NET/ROM compatible; just plug in the NET/ROM EPROM and you're ready to go. NET/ROM is a networking system developed for the TNC-2 by Ron Raikes, WA8DED,

and Mike Busch, W6IXU, that has gained widespread acceptance across the country.

Physical Design and Features

The TINY-2 measures in at 5"W × 7½"D × 1½"H. The case is dark gray extruded aluminum. The back panel contains a barrel power connector, a radio connector socket, a TTL interface socket, and a DB-9 socket for the RS-232 connection. The DB-9 socket is used in place of the standard DB-25 socket to reduce space. These connectors are discussed later in the section on interfacing.

The front panel contains five indicator lights. They are color coded so that they can be discerned in dim light. The **PWR** (power) indicator lights whenever 9 to 12 VDC is supplied to the unit and the power switch is turned on. The **CON** (connect) indicator lights whenever the TINY-2 is connected, or linked, to another packet station. The **STA** (status) indicator lights whenever there is user information contained in the TINY-2's memory that has not been acknowledged (received successfully) by the packet station to which the TINY-2 is connected. The **PTT** (Push-To-Talk) indicator lights whenever the TINY-2 is transmitting. The **DCD** (Data

Carrier Detect) indicator lights when a signal is being received by the TINY-2. By monitoring the status of the indicator lights, it is possible to keep track of exactly what the TINY-2 is doing.

The TINY-2 (or any hardware TNC for that matter) serves as an interface between a terminal and a transceiver. The basic packet radio station is composed of three main components: a terminal/computer, a TNC (Terminal Node Controller) and modem, and a transceiver. The TNC is the "heart" of a packet radio station. The TNC organizes and controls the transmission and reception of the data.

The TINY-2 is actually a small micro-computer; the digital section of the TINY-2 is based around a Z-80 microprocessor. The TINY-2 (and most other TNCs) also contains a built-in modem. The Modem (MODulator DEModulator) converts the digital signals used by the TNC and terminal into analog signals which can be transmitted over radio. On the receiving side, the modem converts the analog signals back into digital signals. The built-in modem in the the TINY-2 is configured for the Bell 202 standard, which is commonly used for packet operation on VHF frequencies; however, an external modem header is included on the circuit board

3908 Short Hill Drive, Allentown, PA 18104

and can be used to interface the TNC with another modem.

The Manual

The manual is divided into two sections. The first section is a generic description of the TAPR command set that is used with all of Pac-Comm's hardware TNCs. All of the available commands are thoroughly covered, many with detailed examples. Information on the AX.25 protocol is also included.

The second section of the manual is specific to the TINY-2 and covers the hardware specifications. All of the information you will need to interface the TINY-2 is included here. There is also a brief rundown of the major circuits that make up the TINY-2 and a removable schematic. On the whole the manual is adequate and even includes an index. As an added convenience, the pages are bound with a plastic spine that allows the manual to lay open without any problem.

Interfacing

The TINY-2 TNC must be interfaced to a terminal and radio. Any RS-232 or TTL compatible terminal may be used; most operators use the serial port of a micro-computer running terminal emulation software. Check your transceiver's manual for the proper wiring, and use shielded cable for the audio lines. The TINY-2 comes with a bare 5-pin DIN plug for the radio connector; however, you will have to supply all the necessary cables.

The terminal baud rate is set by jumpers on the circuit board. The available settings range from 300 baud to 19,200 baud. The built-in modem's baud rate is limited to 1200 baud. The TINY-2 includes both an RS-232 and a TTL port. If your terminal does not have an RS-232 level serial port, you will need to interface the terminal to the TTL port. The RS-232 port is a DB-9 socket. A bare DB-9 plug with a hood is included; you will probably need to wire it to a DB-25 connector since most RS-232 interfaces use the 25-pin connector. The manual contains all the information you will need to get the TINY-2 interfaced properly.

Operation


My evaluation station consisted of the TINY-2, an ICOM IC-271A 2 meter transceiver, and a TRS-80 Model 100 portable computer. To save myself the trouble of wiring a DB-9 to DB-25 cable for connecting the TINY-2 to the Model 100, I used a prewired cable that I normally use to connect the DB-9 serial port connector on an IBM-PC/AT to the DB-25 connector on external modems. You should be able to obtain the same cable at almost any computer store. I experienced no problems with the unit at all. In fact, I left it running for several days straight (a common occurrence in most packet stations) without


observing any deficiencies. The software command set is straight TAPR, so most packet operators will not even have to refer to the manual.

Conclusion

I have found the TINY-2 to be a capable unit. Because of its small size, the TINY-2 would make an ideal portable TNC. If you are looking for a basic, reliable VHF TNC, the TINY-2 is certainly worthy of consideration. The TINY-2, which comes assembled and tested, lists for \$119.95.

For those of you who would rather have an original TNC-200, Pac-Comm still carries it in their latest catalog. An assembled and tested basic TNC-200 lists for \$174.95. If you are interested in learning more about the TNC-200, see my review of it in the November 1987 issue of CQ. This 1988 issue also contains my review of the TNC-220, Pac-Comm's newest TNC.


For more information on the TINY-2 or TNC-200, contact Pac-Comm Packet Radio Systems, Inc., 3652 West Cypress Street, Tampa, FL 33607-4916. 



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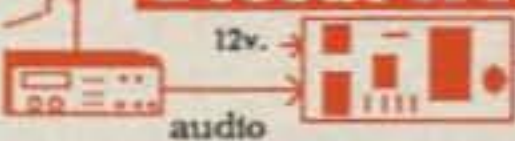

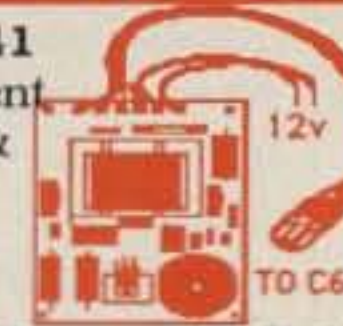

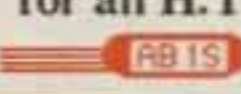

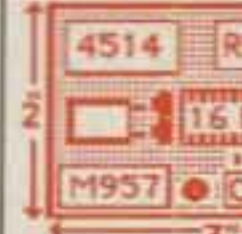

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Say You Saw It In CQ

November 1988 • CQ • 55

Tired of fumbling behind your TNC changing cables to switch from one radio to another? Here's a quick project to make swapping rigs as quick as connecting to a local PBBS.

Packet Quick Connector

BY PETER O'DELL*, WB2D

I've just become active on packet, and I can't remember when I've had so much fun. Heath's Packkit 232 came with everything that you need, including cables to attach it to two radios and a computer. Because there are so many different possible plugs and adapters for radios, Heath was forced to leave bare wire at the radio ends of the two cables. The other end has a special single-in-line plug that attaches to one of two jacks on the TNC back.

That all seemed just fine, until I found out how much fun I was having. I started out on 2 meters with a Kenwood 2500 HT. The HT really isn't powerful enough in this area for all the QRM, so I decided to connect the trusty old Heath VF-7401 up. But then I figured out that there is activity on 220. I also wanted to use it on HF. Did I mention that I have two different HF rigs? All these units require a different connector (or connectors) at the radio end. Suddenly, two cables was not enough. Heath's plot becomes clear. They made the Packkit 232 so much fun to use just to sell more cables!

Not really, since the major difficulty with having more than two of their cables is that they plug into the rear of the unit. To switch from one to another requires pulling the unit off the operating table and turning it upside down or sideways—or standing on my head. My solution to this problem is to place a female in-line jack on the Heath cable and attach the corresponding male plug to the connectors for the various radios in use.

One criteria in mind was availability. Boiled down to its simplest terms, if Radio Shack didn't carry it, I didn't want it. Too many times, I've been frustrated Saturday afternoon in the midst of a spur-of-

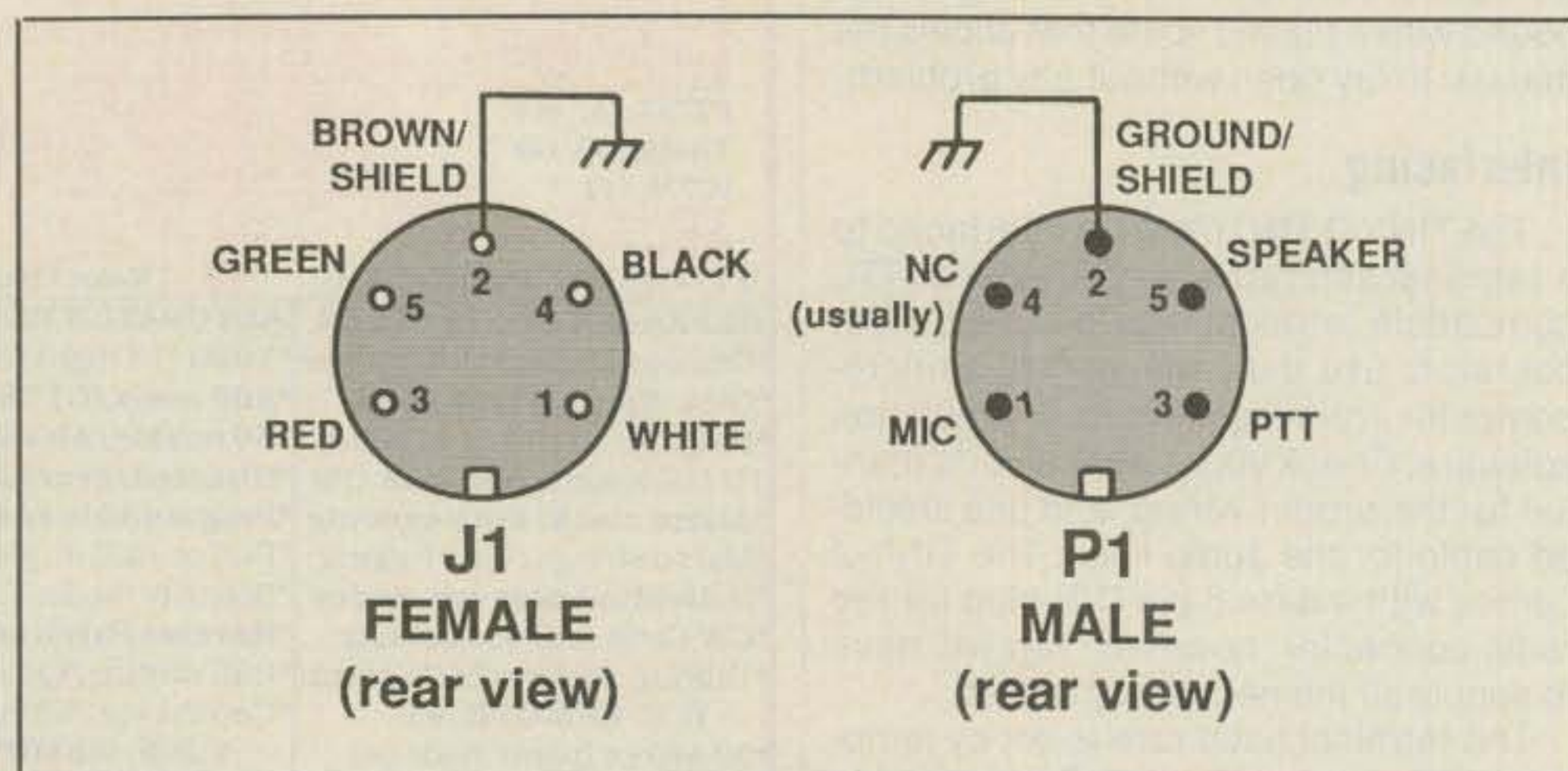


Fig. 1—Wiring diagram for connectors. The colors of the wires connected to the female DIN connector are those for the cable supplied with the Heath Packkit 232. If you are using a different brand of TNC, make changes accordingly.


the-moment project because I didn't have the right connector.

Now the question reduces to which style connectors to use. The first thought that I had was to use the polarized nylon shell connectors (Radio Shack #274-226). The worst thing about these connectors is that they do not provide strain relief. Using several different styles of audio connectors and terminals crossed my mind at one time or another.

What I settled on is the DIN-type connectors for the following reasons: First of all, Radio Shack has an inline jack as well as chassis-mount jack available. Right now I just want to attach something to the cord. The inline jack is ideal. It is possible that later on I will want to mount the jack inside some sort of enclosure. If I decide to do this, it will require a minimum of re-wiring. Besides being readily available in a variety of styles, DIN connectors are easy to work with. They are sturdy, and the "rubber boot" housing provides good strain relief for cables.

Fig. 1 shows the wiring scheme that I

settled on. There is nothing critical or sacred about which pins are used for which functions. Normally, ground should be connected to the housing. I used the five-pin type, although you could use the six-pin type. This system or something similar can be used for other packet controllers. Be sure to double check your owner's manual for the color coding used with your cable. Once you have determined it, you will probably want to record the wiring diagram for the connectors in the manual. Six months or a year from now when you get that new rig, having a diagram that clearly shows the connections will speed you along your way. Be sure to indicate whether your drawing represents the front or back of the plug and jack.

It certainly has made life easier. Now it's no problem to switch between the Kenwood HT, the VF-7401, the 220 rig and the HF rigs. I understand there is packet activity on 440. Wonder where I could get a 440 rig? Gee, I bet Sally wouldn't mind skipping vacation this year. Sure. 

*Associate Editor, CQ
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A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

Long Antennas at Fort Collins

We've long been fascinated by the sheer size of the antennas required to radiate a signal at low frequencies (LF) and very low frequencies (VLF), such as by the National Bureau of Standards' (NBS) stations WWVB and WWVL at Fort Collins, CO, close by the familiar HF time-and-frequency ticker, WWV.

Back in the June 1978 issue of *CQ's* sister publication, *Modern Electronics*, we examined WWVB and WWVL from a fairly nontechnical "listener's" standpoint. This time, we'd like to revisit our coverage, update it with some information from the Fort Collins complex engineer-in-charge, and highlight some of the more technical aspects of the two stations and their antennas.

Most of us are familiar with WWV for checking time, calibrating equipment, and making propagation forecasts. WWV's HF signals are well-known in most parts of the world. Lesser-known are sister stations WWVB and WWVL, also located near Fort Collins, CO. Both of these stations use quite low frequencies—60 kHz (LF) for WWVB, and 20 kHz (VLF) for WWVL. Unfortunately, only WWVB is on the air today. WWVL has been retired and transmissions curtailed in 1972, although its antennas are still in the air.

As far back as 1956, the NBS labs were experimenting with 60 kHz transmissions, using the experimental callsign KK2XEI. Four years later, in 1960, WWVB on 60 kHz was joined by WWVL on the much lower 20 kHz frequency—which, of course, lies just at the top end of the audio range.

Why are such low frequencies considered for time-and-frequency standard stations? They are favored because of the improvement in received signal accuracy that is possible. At such unusually low frequencies, reception doesn't suffer the slight time delays and unpredictable atmospheric variations that distort regular reception of WWV and its Hawaiian counterpart, WWVH. While most amateurs aren't concerned with these problems, such possible errors make some laboratory applications impossible when the labs are located far from the transmitter sites, and especially when reception is by skywave. LF and VLF waves travel almost completely by ground-wave means.

WWVL was probably capable of producing the best quality of all the NBS stations because of the very low frequency used. But there were some problems to be overcome in working at such long wavelengths. For example, the signal phase had to be carefully controlled to prevent errors and to allow the best possible receiving-end accuracy.

Because the extremely short (by VLF standards) antenna system used was so heavily loaded, it was susceptible to small phase changes. As a result, the station had a com-



This photo shows the connection point between the WWVB/WWVL antenna downlead cage and the counterbalance insulator. The cage is comprised of six aluminum conductors mounted around rings approximately six inches in diameter. One of the support towers is also shown. (Photo courtesy NBS)

plex servomechanism to sense any such phase shifts at the antenna loading coil. It would then send a correction command to a phase-shifting compensation system in the transmitter. Quartz crystal oscillators and "drift correctors" were used in the WWVL transmitter to generate the carrier frequencies. Actually, one, two, or three operating frequencies could be selected: 19.9, 20.0, and 20.9 kHz. The station could simultaneously transmit on all three frequencies if desired.

On July 1, 1972, transmissions were suspended from WWVL, with station WWVB carrying on with its LF transmission. According to the NBS, the WWVL antennas are still in the air, though the frequency generation equipment is gone. But WWVB is still on 60 kHz. It also uses a highly stable crystal oscillator as its frequency generator, which is carefully referenced and checked against the main NBS frequency standard. It transmits 24 hours a day.

WWVB is located near the WWV site, and its central location allows it to cover the entire continental U.S. with a good signal. Its transmitter has an effective radiated power (ERP) of 13 KW. Because it uses a much higher frequency than WWVL (some 40 kHz higher) the antenna system behaves a good deal better,

and so, the complex phase-control circuitry used in WWVL doesn't have to be used.

For practical reasons, both the WWVB and WWVL antennas are top-loaded, and they are identical even though they are used on different frequencies. The antenna system for each of the stations is made up of four heavily-guyed steel towers which are arranged into a diamond shape, 1900 feet long and 750 feet wide. Interestingly, there are counterbalances on the inside and base of each tower that help to maintain the proper tension at the tops of the towers. This is necessary to compensate for the very high winds which whip down from the adjacent Rocky Mountains.

Each antenna structure is free-floating and is completely insulated from the tower system. The antennas themselves can be thought of as high-Q capacitors which are tuned to the operating frequency with very large coils. Since the antennas are quite short with respect to the very long wavelengths involved, they're not very efficient. WWVB's 60 kHz antenna is about 35 percent efficient, while the much shorter (electrically speaking) WWVL antenna is only 5 percent efficient. Surprisingly, though, the WWVB signal is heard well over most of the U.S. using standard LF receivers (or VLF/LF converters) and simple wire antennas or loops. The station is, in fact, so reliable that it is used by many foreign time and frequency stations as a cross-check on their own transmissions.

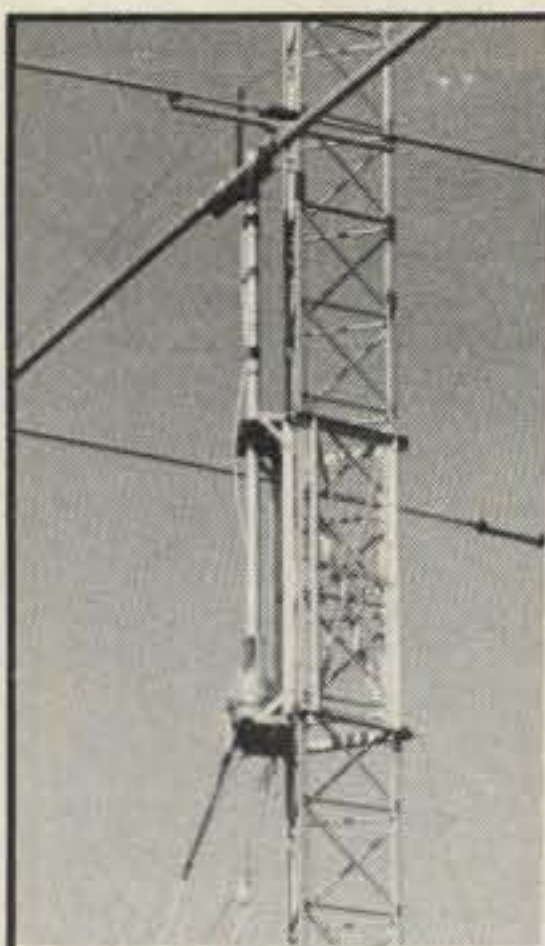
John B. Milton, the WWV/WWVB Engineer-in-Charge, responded to our letter for more technical details on the antenna system with some comments that shed light on its design and operation:

"WWVL is off the air; transmissions were discontinued in 1972. The antenna has been returned to be used as a backup for WWVB on 60 kHz. The tuning coil still has the capability of being used on 20 kHz, but the transmitters and all 20 kHz frequency generation equipment are long gone to the scrap heap.

"The theory behind a LF or VLF antenna is very simple. The antenna is a series tuned system with energy coupled to it using simple RF transformer theory. The normal coupling coefficients, mutuals, and RLC equations apply. The only real difference is one of degree. The antenna Qs can be quite high. In fact, the lower the frequency, the higher the Q. The WWVB antenna has a Q of about 90, while the WWVL antenna operating at 20 kHz has a Q of 530. With bandwidths this narrow, the modulation capability is quite minimal.

"Antenna currents at these frequencies can be quite high, and the efficiencies low. The radiation resistance (50 to 600 ohms in the ham world) is part of the gross resistances that are nominally 1 ohm or less. This gross resistance rises as the antenna structures are made larger and larger. The loss component rises more slowly than the radiation component, thus the efficiency also rises.

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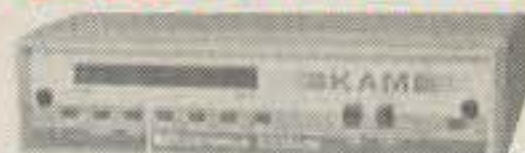
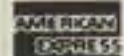
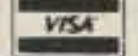
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This is one of the 400-foot antenna towers used by WWVB and WWVL. Each antenna is a top loaded vertical supported by four guyed towers arranged in a diamond. The structures are free-floating and completely insulated from the towers. Electrically, the antennas act like high-Q capacitors tuned to the operating frequencies of 20 KHZ (WWVL, now off the air) and 60 KHZ (WWVB). (Photo courtesy NBS)

"The WWVB antenna is capable of antenna currents of 300 Amperes, but the transmitter has only the power capability of 180 antenna Amperes. The WWVL antenna was limited to about 200 Amperes because of its higher tuning inductance. At about 180 Amperes, the beehive insulator on top of the helix house would flash over. This insulator was rated at 100 KV., and if you happened to be in the helix house at the time of flashover . . ."

John advises that the public is always welcome to come to the site and take pictures of the antennas, but the buildings are normally closed to casual touring. He adds that the staff is quite minimal and busy with the day-to-day operations of the stations.

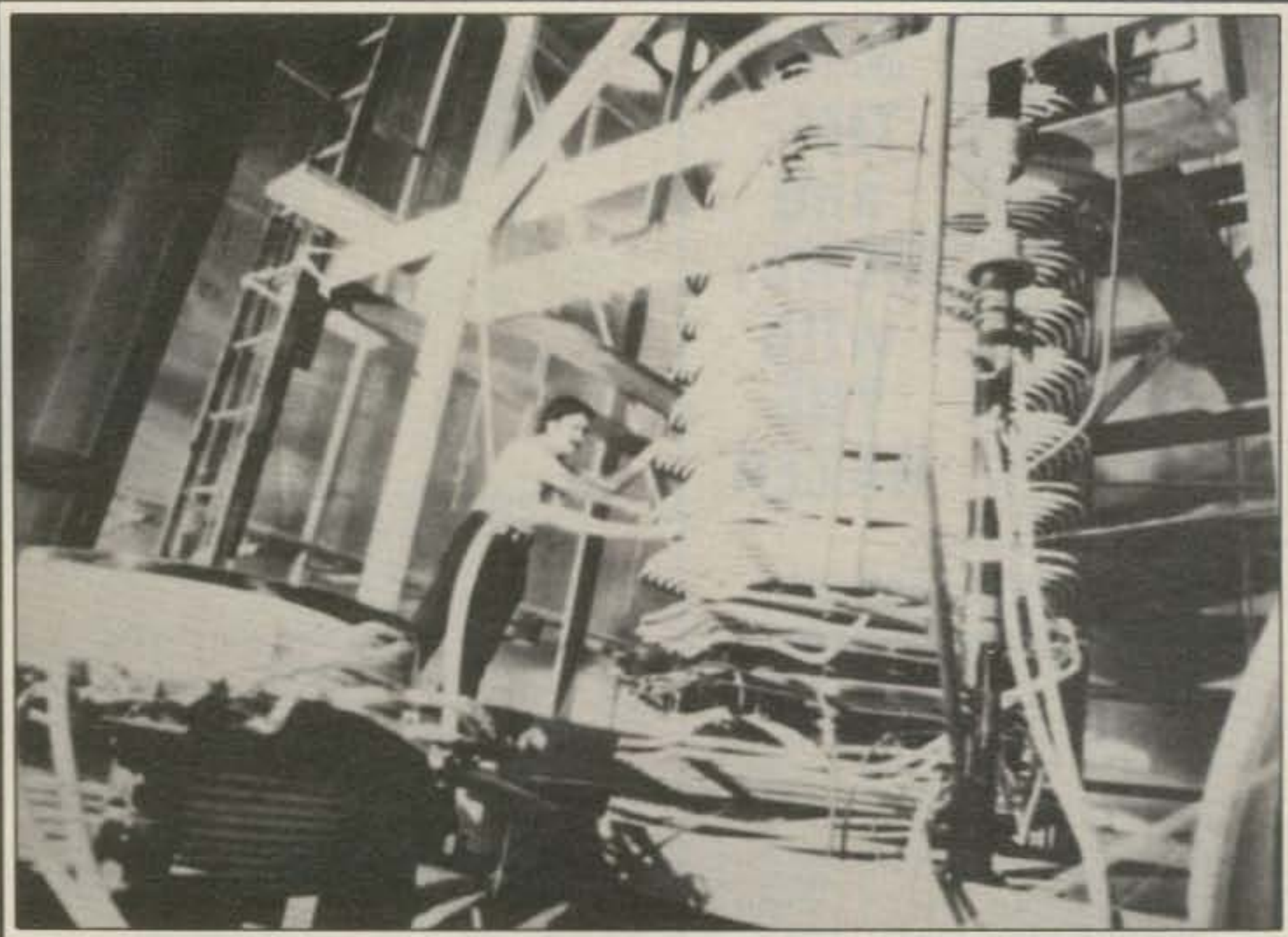
Fig. 1 shows field intensity contours for WWVB. Fig. 2 summarizes NBS broadcast services.

(These figures are not 100 percent up-to-date, as they were taken from NBS Special Publication 432, *NBS Time and Frequency Dissemination Services*, which hasn't been updated since September 1979. Apparently, budget cuts have taken their toll!)

Antenna Potpourri

Acoa Quads. The Antenna Company of America offers a line of single-band Quads that cover 144-148, 220-225, and 420-450 MHz.

The 2-meter, two-element version has a claimed 7.5 dB gain with a front-to-back ratio of 25 dB (reference points not given). The 1 1/4 meter version has a similar gain and F/B ratio, while the 70-cm. Quad is of four-element design and has a gain of 11.5 dB and a F/B ratio of 40 dB. All of the antennas feature rugged, all-metal (except for the insulators) construction, copper radiator and reflector elements, low weight and surface areas (9 lbs. and 0.85 ft., respectively, for the 2-meter model), and full-band coverage. The Quads are priced at \$159 (\$185 for the 70-cm. model).



Here's the old WWVL helix house. The beehive insulator on top of the helix house was rated at 100 KV; the WWVL antenna was limited to about 200 Amperes current because of its high tuning inductance, and the possibility that the beehive insulator could flash over with serious consequences to anyone working in the helix house at the time. (Photo courtesy NBS)

For more details, contact William Maron at the Antenna Company of America, PO Box 2308, Santa Clara, CA 95051-2308.

Henry Radio Masthead Preamps. Jack Somers, WA6VGS, advises us of a pair of premium quality VHF/UHF GaAsFET-input-transistor masthead preamplifiers for 2 meters and 70 cm. that are especially designed for OSCAR work.

Henry Radio imports the preamps from Europe; they are manufactured by the well-known firm Landwehr Electronic G.M.B.H. According to the rather detailed spec sheets I

have on the preamps, the performance characteristics are impressive. The 2-meter model, for example, boasts a noise figure of about 0.7 dB and a gain of 18-20 dB, with excellent large signal handling characteristics. The unit can handle up to 750 W. PEP when used in PTT operation, or 150 watts PTT operation. There are negligible insertion losses on transmit, and SWR is 1:1 with a 50 ohm load at the input. The 70-cm. model's specs are only slightly less impressive: about a 1 dB noise figure and gain of 17-19 dB.

Each unit's circuitry is installed in a water-

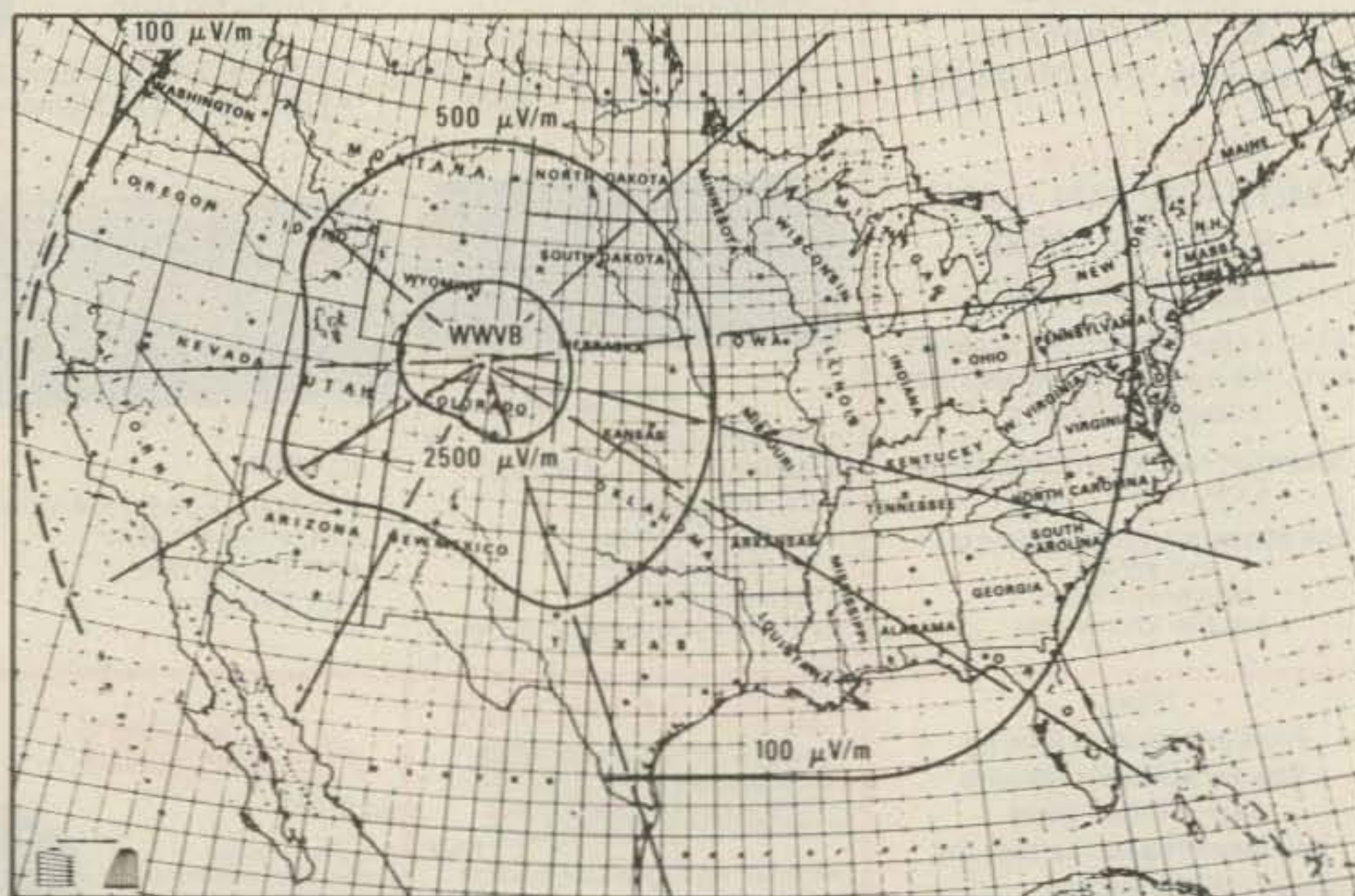


Fig. 1—Measured field intensity contours of WWVB at 13 KW ERP. The map and overlay show field intensity contours for WWVB at 13 KW ERP. (Source: NBS Special Publication 432)

STATION	DATE SERVICE BEGAN	RADIO FREQUENCIES	AUDIO FREQUENCIES	MUSICAL PITCH	TIME INTERVALS	TIME SIGNALS	UTI CORRECTIONS	OFFICIAL ANNOUNCEMENTS
WWV	1923	X	X	X	X	X	X	X
WWVH	1948	X	X	X	X	X	X	X
WWVB	1956	X			X	X	X	
WWVL	1960	X						

COORDINATES:

WWV	40°40'49.0"N	105°02'27.0"W
WWVB	40°40'28.3"N	105°02'39.5"W
WWVL	40°40'51.3"N	105°03'00.0"W
WWVH	21°59'26.0"N	159°46'00.0"W

Fig. 2—NBS broadcast services summary. Depicted here is a summary of NBS radio broadcast services. Although shown here, WWVL is no longer on the air. (Source: NBS Special Publication 432)

proof aluminum diecast box. Hot-dipped galvanized bolts with stainless steel screws enable the unit to be mounted on all the common diameter masts. RF type N connectors are provided as standard.

According to Jack, who also is AMSAT's Assistant Vice President, Public Affairs and Development, the 2-meter model is priced at \$179 and the 70-cm. model is \$189. Discounts are available to AMSAT members.

Contact Jack at Henry Radio, 2050 S. Bundy Drive, Los Angeles CA 90025.

Indoor BCB Antenna. The C. Crane Company offers an unusual broadcast band (BCB) signal booster of interest to listeners. The "SELECT-A-TENNA" is a high sensitivity, compact, add-on antenna for AM BCB use. It requires no power for operation.

The Crane unit is a large tuned loop that intercepts BCB signals and reradiates them to the loop or other internal antenna of the receiver with which it is used. Thus, it is primarily intended to be used with sets that don't have provision for an external antenna; no direct connection to the receiver is required. The Crane antenna boasts a typical mid-BCB "near proximity effect gain" of 30 dB.

The basic SELECT-A-TENNA is \$41.95. The two-pound antenna covers 535-1600 kHz and is made of durable ABS plastic. Another version, the Model M, is available which also features external antenna and ground connections. This model is useful for indoor installations or within campers or trailers, and is priced at \$58.95.

For more details, contact the C. Crane Company, 147 Watson Lane, Fortuna CA 95540.

Software Notes

Bsoft Educational Engineering Software. Bob Blackburn, President of Bsoft Software, dropped us a line to advise us of his trio of IBM-PC technical software.

Bob's firm offers three major products: CompView, CompDes, and CompMath, low-

cost engineering software tools that can be used by most anyone.

CompView (Computer-Aided Waveform Viewer Program) was developed as an introduction to digital signal analysis and FFT (Fast Fourier Transforms). It's a menu-driven program that enables the examination of an infinite number of waveforms and filter types, and it includes built-in waveform generators and filter software to view the spectrum. Data may also be entered via the keyboard or a disk file.

CompDes (Computer-Aided Circuit Design Program) can be used as an electronics learning tool or as a circuit design tool. It offers the user designs and calculations across a broad range of electrical engineering topics.

CompMath (Computer-Aided Mathematics Program) was developed to be both educational and useful in solving many of the mathematical problems involved in business, engineering, or any technical area (including amateur radio). Five broad areas of computation are available, including general, complex, matrix, engineering, and statistical mathematics.

Each non-copy protected disk package comes with its own tutorial manual and is priced at \$49. For more information, contact Bsoft Software, 444 Colton Road, Columbus OH 43207.

SWL Logger. Terry C. Johnston of Niche Software advises us of Niche's SWL-oriented DXLOG, designed for use on any MS-DOS computer.

According to Terry, DXLOG accommodates one or two disk drives and is menu-driven. The program lets you enter your log records into a file for storage. Once your records are in the file, you can search the file by the date of the record, the particular frequency of the record,

or the station (Voice of America, Radio Canada, Radio Moscow, etc.) contained in the record. All of the searches are controlled by pressing the keyboard's space bar.

You can also print out your log entries by date. The entire log can be printed at once, and each page can be punched and inserted into a three-ring binder for a permanent record. You may also print out individual records by date.

The program also comes with a delete option which allows you to erase an old log file that you no longer want. Exiting the program automatically closes all open files and returns your computer system to DOS.

The only information I don't have on DXLOG is the current price; contact Terry for details at Niche Software, 4417 Sawmill Valley Drive, Mississauga, Ontario, Canada L5L 3H8.

WP/Key. Actually, this isn't a software product, rather it's an ingenious and inexpensive mechanical floppy "add-on" device.

WP/Key is a small device that looks like a small key. It slides into a floppy disk from the disk's backside to cover (or uncover) the disk's write protect notch as one desires, thereby ending the tediousness of scraping off sticky write-protect tabs every time you want to write to a disk. The product also affords protection from erasing valuable information from a disk just because you hate to use those nasty little tabs that often work loose and become lodged in your disk drive and possibly damage it.

With the WP/Key in place, a quick glance at the drive door tells you if the disk is write-protected or not. Being light in color, the WP/Key contrasts with the disk and can be easily seen with the drive door closed. When you wish to write to the disk, you simply remove the key from its write protect position and place it in

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*Note-towers rated at 50 mph to EIA specifications

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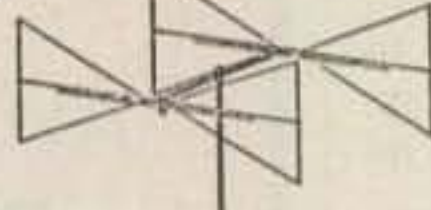
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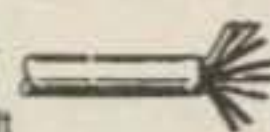
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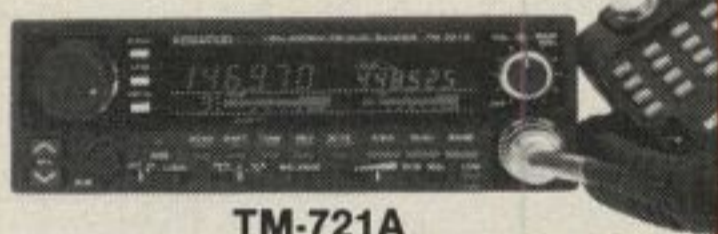
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According to the company's M. R. Baney, WP/Key is priced at ten (10) keys to a package for \$1.50, plus shipping and handling; quantity discounts are available. For more information and a sample key, contact Near Future Computer Co., PO Box 1726, Walla Walla WA 99362.

Short Bursts

Keeping Track of Warranties. After purchasing an item such as a new piece of amateur or test gear, or other valuable equipment, place a label on the back or bottom cover of the equipment. Show the date purchased and the

warranty expiration date in case the item needs repair later on. It's best also to include the address where the repair center is located, and also to keep a permanent copy of the original invoice for obtaining repairs under the warranty. Of course, you'll want to record the item's serial number in a separate file for insurance purposes.

Electronic Ten Commandments. Curt Phillips, editor of the "Electronic Omnibus" column in CQ's sister publication, *Modern Electronics*, wrote in last May's issue of the "Ten Commandments for Technicians," which he found on an Atlanta computer bulletin board system. Although this particular version of

what Moses came down from the mountain with was written with broadcast technicians in mind, we amateurs should take note as well. These "commandments" humorously but firmly remind us of the deadliness of the circuits many work with every day:

I Beware the lightning that lurketh in the undischarged capacitor, lest it cause thee to bounce upon thy buttocks in a most untechnician-like manner.

II Cause thou the switch that supplieth large quantities of juice to be opened and thus tagged, that thy days in this earthly vale of tears be long.

III Prove to thyself that all circuits that radiate and upon which thou toil are grounded and thusly tagged, lest they lift thee to radio heaven.

IV Tarry thou not amongst those fools that engage in intentional shocks, for they are surely nonbelievers and are not longeth for this world.

V Take care that thou useth the proper method when thou takest the measure of a high-voltage circuit, lest thou incinerate both thyself and thy meter.

VI Take care thou tampereth not with interlocks and safety devices, for this incurreth the wrath of thy supervisor and bringeth the fury of the safety inspector upon thy head and about thy shoulders.

VII Toil not thou on energized equipment, for if thou so dost, thy fellow workers will surely buy beers for thy widow and console her otherwise.

VII Service thou equipment not alone, for electrical cooking is a slothful process and thy might sizzle in thy own juices for hours upon a hot circuit before thy maker sees fit to end thy misery.

IX Trifle thou not with radioactive tubes and substances lest thou commence to glow in the dark like a lightning bug and thy wife hath no further use for thee except for thy wages.

X Causeth thou to be tagged all modifications made by thee upon equipment lest thy successor tear his hair and go slowly mad in his attempt to decide what manner of creature made a nest in the wiring of such equipment.

While several of these entreaties don't really apply to low-voltage solid state circuits in modern-day amateur equipment, and I don't know who the original author of these ten commandments is, that's nevertheless wisdom in them there words! So take heed.

Computer Software: Why Won't It Sit Still? We've often lamented the fact that whenever we write up a blurb about a new software product, by the time our writeup gets to print, a lot of what we said is "O.B.E."—overtaken by events. Either a new version of the software is out that doesn't look at all like the product we reviewed, or the product has changed price, or (to consider the worst case) the product bombed in the marketplace and the company went under.

Unfortunately, such is life when it comes to computers and software. Philosophically, it's a good example of the accelerating pace of technological change and its consequences. As one software entrepreneur remarked, "Updating a software manual is like changing tires on a moving car."

How true—and scary, too!

Overheard: No matter what stage of completion one reaches in a construction project, the cost and time needed to complete the rest of the project remains constant!

73, Karl, W8FX

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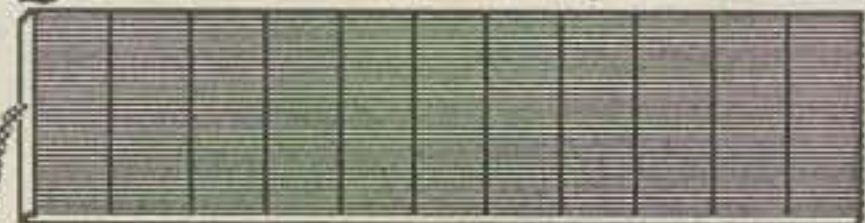
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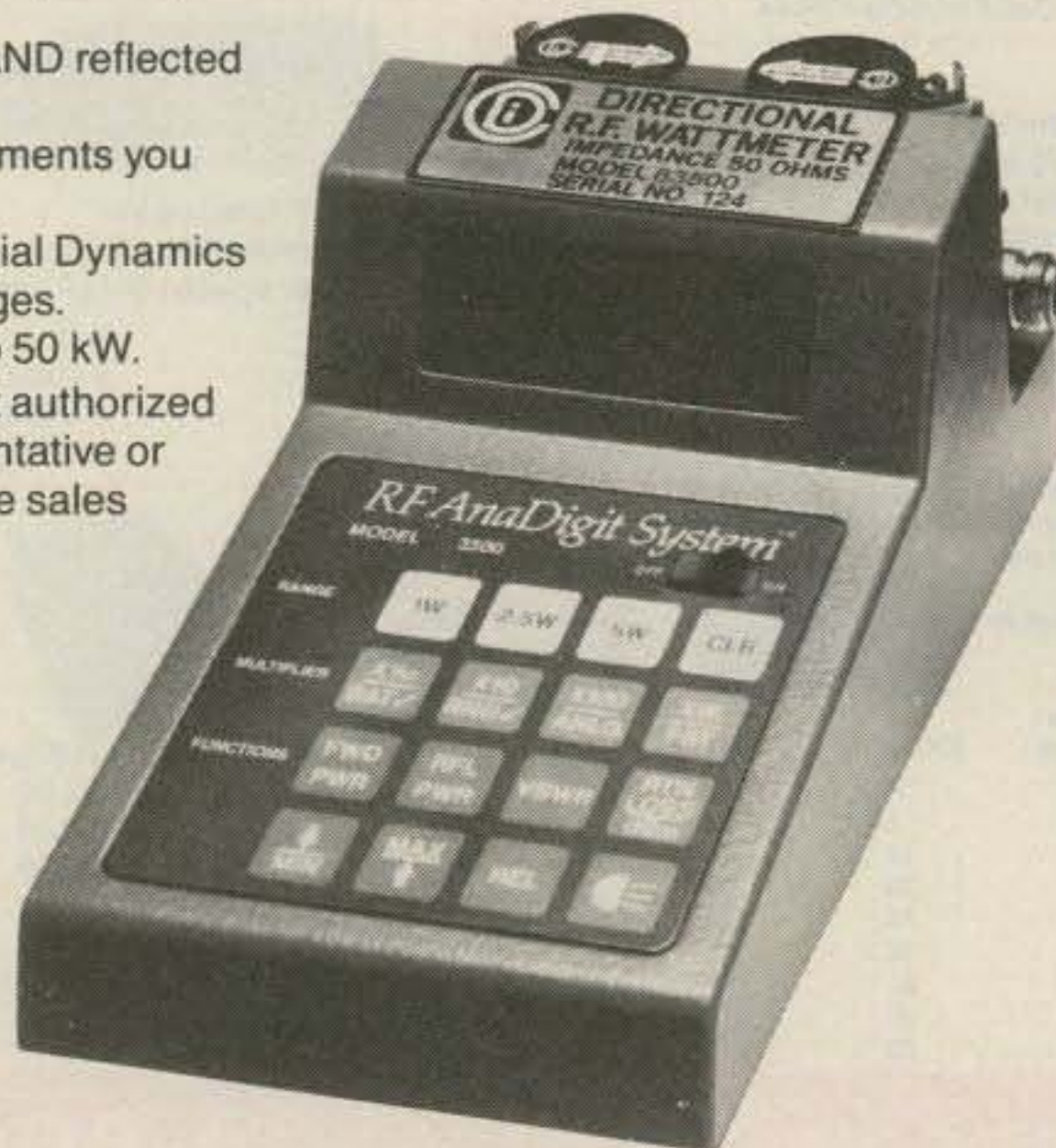
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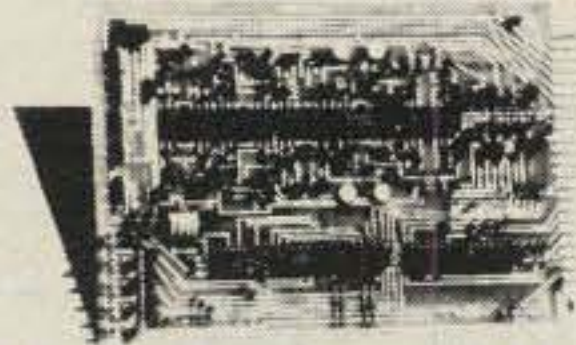
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A LOOK AT THE WORLD AROUND US

OSCAR 13: Amateur Radio's New Super Satellite—Part I

If you have enjoyed the friendly communications and globe-spanning capabilities of OSCAR 10 in the past, or if you are now anxious to catch up on missed fun, get ready for even more excitement with our new OSCAR 13 super satellite. This latest and greatest amateur satellite was launched from Kourou, French Guiana on June 15, 1988 and was opened for full amateur use a month later. Its performance is absolutely magnificent. If you have ever visualized expanding your interests and enjoying new areas—of really being the first kid on the block with an unquestionably new toy—here is your golden opportunity.

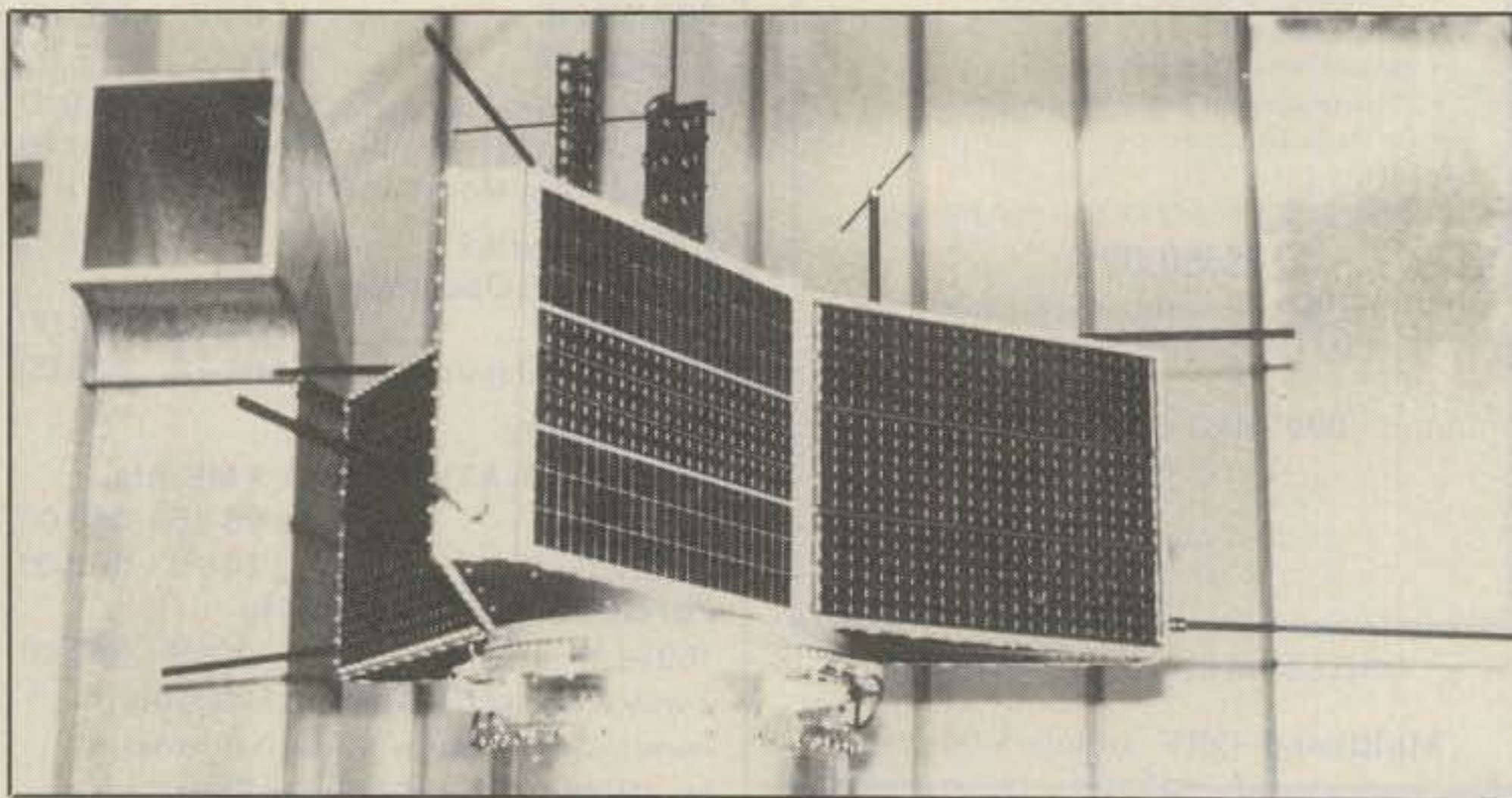
OSCAR 13 travels in a highly elliptical orbit, circling the globe once every 12 hours. The satellite passes 1000 km above the earth during a 2 or 3 hour period, and then travels over 30,000 km into space during the remaining 9 hours. From its vantage point in space, OSCAR 13 "sees" approximately one third of the world's area and relays VHF/UHF signals in a highly predictable line-of-sight manner. The overall results or effects are comparable to a unique new band (indeed three bands!) in which all operators copy both local and DX signals equally without skip fades or sunspot variations. Full duplex operation or simultaneous reception while transmitting is normally utilized. Thus, your own signal is heard just like it sounds to others, and QRM is minimized. Attractive? Yes, indeed, and all amateurs holding a Technician or higher class license can join the action!

This month's column briefly describes OSCAR 13 and explains how to become operational on the satellite in a success-proven manner. A future column will delve further into equipment selections, antenna variations, and special notes on station assembly. If you need additional easy-to-understand information relative to all amateur satellites highlighted in past columns, my new book *OSCAR Satellite Revue* advertised in May and June 1988 *CQ* continues to be available for \$7.00 plus \$2.00 shipping.

A Mini Tour of OSCAR 13

As shown in the accompanying photo, our new super satellite is only a mite

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Starlet OSCAR 13 posed for this picture prior to its launch from Kourou, French Guiana aboard the European Space Agency's mission 22 rocket. Photo courtesy AMSAT.

larger than many home TV sets. It carries several wideband transponders for operation within select portions of the 2 meter, 70 cm, 1269 MHz, and 2400 MHz bands in a clever mix-and-match manner. A packet digipeater known as RUDAK is also included aboard OSCAR 13.

The satellite's antenna farm consists of both omnidirectional and high-gain arrays for various bands. Rods extending from each of the tristar's wings are 2 meter beam elements, and top-mounted radiators are mainly used for upper bands (plus unity-gain "back-ups" for 2 meters). The wing areas are covered in solar cells that recharge the satellite's internal batteries, and a spare battery is aboard for callup at a later date. Internal satellite functions and "piloting" are handled by a sophisticated on-board computer or Integrated Housekeeping Unit that accepts and negotiates ground commands. The satellite maneuvers or changes its position (and antenna pointing angles) within its fixed orbit by activating magnetorquers on each wing, and aligning by the earth's magnetic fields. In "space terminology," this is called attitude adjustment. The kick motor at the satellite's bottom was fired after launch vehicle separation to attain the high elliptical orbit. Since the fuel was highly corrosive, all of it had to be used in one burn.

While not immediately apparent in the photo, all of the parts and components in OSCAR 13 (or any satellite) must be qualified as "space ready." Simply explained,

that means they must be proven capable of ten times the life and stress of normal counterparts—and they typically cost ten times the usual value. That explains why amateur satellites are expensive undertakings and why your supporting funds to (and membership with) AMSAT (P.O. Box 27, Washington, DC 20044) are vital to a continuing OSCAR program. Think of it as contributing your fair share to an artificial ionosphere that can be enjoyed by all radio amateurs.

Joining the Action

Getting started in amateur satellite activities typically involves the interrelated factors of equipment and antenna selections for desired bands of operation plus the technical expertise to assemble those items into a smooth-working system. Once beyond that point you are free to concentrate on effective satellite operating techniques. Since VHF and UHF signals are significantly attenuated by long cable lengths and outdoor obstacles like buildings or foliage, strive to locate your satellite setup and antenna within 25 feet of each other. Likewise, select an antenna site that provides a relatively clear sky view. A small tree 25 or 30 feet in front of your antennas is not seriously degrading, but a jungle is disastrous. A metal structure behind your antennas or between them and a local power line noise source may provide interference "shading" and actually be beneficial. If your antennas are blocked from sky views

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You get an extremely versatile 6-position antenna switch for selecting 2 coax lines (direct or through tuner), random wire or balanced line and dummy load.

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This results in a highly efficient tuner that puts maximum power into your antenna and a compact size that complements your rig and fits right into your station.

Tuners using two tapped inductors need a large cabinet not just to house the coils but also to help reduce coupling between the inductors.

What's really important

What's really important is a tuner's ability to get your SWR down to a minimum. The two continuously variable capacitors in the MFJ-949C give you the precise control you need for minimum SWR. Plenty of inductance gives you the widest matching range possible.

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It effectively places your rig near actual earth ground potential even if your rig is on the second-floor or higher with no earth ground possible.

Also, it lets you electrically place a far away RF ground directly at your rig -- no matter how far away it is -- by tuning out the reactance of your ground connection wire.

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eight digital modes for...\$249.95

Amateur radio's newest multi-mode data controller -- the MFJ-1278 -- lets you join the fun on Packet, AMTOR, RTTY, ASCII, CW, Weather FAX, SSTV and gives you a full featured Contest Memory Keyer mode...you get 8 modes...for an affordable \$249.95.

Plus you get high performance HF/VHF/CW modems, software selectable dual radio ports, precision tuning indicator, 32K RAM, AC power supply and more.

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A high resolution 20 LED tuning indicator lets you tune in signals fast in any mode. All you have to do is to center a single LED and you're precisely tuned in to within 10 Hz -- and it shows you which way to tune!

All you need to join the fun is an MFJ-1278, your rig and any computer with a serial port and terminal program.

You can use the MFJ Starter Pack to get on the air instantly. It includes computer interfacing cable, terminal software and instructions... everything you need. Order MFJ-1282 (disk)/MFJ-1283 (tape) for C-64/128/VIC-20; MFJ-1284 the IBM or compatible; MFJ-1287 for Macintosh, \$19.95 each.

Packet

With MFJ's super clone of the industry standard -- the TAPR TNC-2 -- you get genuine TAPR software/hardware plus more -- not a "work-a-like" imitation.

Extensive tests published in *Packet Radio Magazine* ("HF Modem Performance Comparisons") prove the TAPR designed modem in the MFJ-1278 gives better copy with proper DCD operation under all tested conditions than the other modems tested.

Hardware DCD gives you more QSOs because you get reliable carrier detection under busy, noisy or weak conditions.

A hardware HDLC gives you full duplex operation for satellite work or for use as a full duplex digipeater. And, it makes possible speeds in excess of 56K baud with a suitable external modem.

A new KISS interface makes MFJ-1278 TCP/IP compatible.

Good news for SYSOPs! New software lets the MFJ-1278 perform flawlessly as a WORL/WA7MBL bulletin board TNC.

New AMTOR mode!

Now MFJ-1278 has a new AMTOR mode, making it the only controller to feature eight digital modes.

MFJ-1278 transmits and receives AMTOR in the standard 100 baud rate.

MFJ gives you all the AMTOR modes: ARQ (Mode A), FEC and Mode S (Mode B).

Baudot RTTY

You can copy all shifts and all standard speeds including 170, 425 and 800 Hz shifts and speeds from 45 to 300 baud. You can copy not only amateur RTTY but also press, weather and other exciting traffic.

You can transmit both narrow and wide shifts. The wide shift is a standard 850 Hz shift with mark/space tones of MARS and standard VHF FM RTTY.

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You can transmit and receive 7 bit ASCII using the same shifts and speeds as in the RTTY mode and using the same high performance modem. You also get Autostart and selectable "Diddle".

CW

You get a Super Morse Keyboard mode that lets you send perfect CW effortlessly from 5 to 99 WPM, including all prosigns -- it's tailor-made for traffic handlers.

A huge type ahead buffer lets you send smooth CW even if you "hunt and peck".

You can store entire QSOs in the message memories, if you wanted to! You can link and repeat any messages for automatic CQs and beaconing. Memories also work in RTTY and ASCII modes.

A tone Modulated CW mode turns your VHF FM rig into a CW transceiver for a new fun mode. It's perfect for transmitting code practice over VHF FM.

An AFSK CW mode lets you ID in CW.

The CW receive mode lets you copy transmitted CW. Even with sloppy fists you'll be surprised at the copy you'll get with its powerful built-in software.

You also get a random code generator that'll help you copy CW faster.

Weather FAX

You'll be fascinated as you watch WEFAX signals blossom into full fledged weather maps on your printer. Other interesting FAX pictures can also be printed -- such as some news photographs from wire services.

Any Epson or IBM graphics compatible printer will print a wealth of interesting pictures and maps.

Automatic sync and stop lets you set

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it and leave it for no hassle printing.

You can save FAX pictures and WEFAX maps to disk if your terminal program lets you save ASCII files to disk

Pictures and maps can be printed to screen in real time or from disk if you have an IBM or Macintosh with the MFJ-1284 or MFJ-1287 Starter Pack.

You can transmit FAX pictures right off disk and have fun exchanging and collecting them.

Slow Scan TV

The MFJ-1278 introduces you to the exciting world of slow scan TV.

You'll not only see what your ham buddies look like but you can send your own pictures to them, too.

You can print slow scan TV pictures on any IBM or Epson graphics compatible printer. If you have an IBM or Macintosh you can print to screen in near real time or from disk with the MFJ-1284 or MFJ-1287 Starter Pack.

You can transmit slow scan pictures right off disk -- there's no need to set up lights and a camera for a casual contact.

You can save slow scan pictures on disk from over-the-air QSOs, audio tapes and other sources if your terminal program lets you save ASCII files.

The MFJ-1278 transmits and receives 8.5, 12, 24, and 36 second black and white format SSTV pictures using two levels.

Contest Memory Keyer

Nothing beats the quick response of a memory keyer during a heated contest.

You'll score valuable contest points by completing QSOs so fast you'll leave your competition behind. And you can snag rare DX by slipping in so quickly you'll catch everyone by surprise.

You get lambic operation with dot-dash memories, self-completing dots and dashes and jamproof spacing.

Message memories let you store contest RST, QTH, call, rig info -- everything you used to repeat over and over. You'll save precious time and work more QSOs.

You get automatic incrementing serial numbering. In a contest it can make the difference between winning and losing.

A weight control lets you penetrate QRM with a distinctive signal or lets your transmitter send perfect sounding CW.

More Features

Turn on your MFJ-1278 and it sets itself to match your computer baud rate. Select your operating mode and the correct modem is automatically selected.

Plus... printing in all modes, threshold control for varying band conditions, tune-up command, lithium battery backup, RS-232 and TTL level serial ports, watch dog timer, FSK and AFSK outputs, output level control, speaker jack for both radio ports, test and calibration software, Z-80 at 4.9 MHz, 32K EPROM, and socketed ICs. FCC approved. 9x1 1/2 x 9 1/2 in. 12 VDC or 110 VAC.

Get yours today and join the fun crowd!

New Firmware Update

A new KISS/AMTOR Firmware update is available if you already have your MFJ-1278. Contact your dealer or MFJ to get your upgrade today.

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\$129⁹⁵ MFJ-422B

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

This MFJ Keyer is small in size but big in features. It features iambic keying, adjustable weight and tone and has front panel volume and speed controls (8-50 WPM), dot-dash memories, speaker, sidetone and push button selection of semi-automatic/tune or automatic modes. It's also totally RF proof and has ultra-reliable solid state outputs that key both tube and solid state rigs. Uses 9 V battery or 110 VAC with MFJ-1305, \$9.95.

The keyer mounts on a Bencher paddle to form a small (4 1/8 x 2 5/8 x 5 1/2 inches) attractive combination that is a pleasure to look at and use.

America's favorite paddle, the Bencher, has adjustable gold-plated silver contacts, lucite paddles, chrome plated brass, and a heavy steel base with non-skid feet.

You can buy just the keyer assembly, MFJ-422BX, for only \$79.95 to mount on your Bencher paddle.

MFJ's best selling TUNER

MFJ-941D \$99.95



The MFJ-941D is MFJ's best selling (and probably the world's best selling) 300 W PEP antenna tuner! Why? Because it has more features than tuners costing much more and matches everything from 1.8 to 30 MHz for your solid state or tube rig: dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines.

New dual-range SWR wattmeter reads forward and reflected power in both 30 and 300 watt ranges. Convenient front-panel mounted 6-position antenna switch lets you select 2 coax lines, direct or through tuner, random wire/balanced line or tuner bypass for dummy load. New, larger, more efficient airwound inductor gives lower losses and more watts out. Plus . . . built-in 4:1 balun for balanced lines. 1000 V capacitor spacing, brushed aluminum front panel on all-metal cabinet. 11x3x7 inches.

RX NOISE BRIDGE

Make your antenna perform like you know it should! MFJ-202B tells



whether to shorten or lengthen antenna for minimum SWR. Also measure resonant frequency, radiation resistance and reactance.

Exclusive features: individually calibrated resistance scale, expanded reactance range, built-in range extender for measurements beyond scale readings. 1-100 MHz. Uses 9 V battery. 2x4x4 in.

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MFJ-250 \$44.95

Tune up fast, extend life of finals, reduce QRM! Rated 1KW CW or 2KW PEP for 10 minutes. Half rating for 20 minutes, continuous at 200 W CW, 400 W PEP. VSWR under 1.2 to 30 MHz. 1.5 to 300 MHz. Oil contains no PCB. 50 ohm non-inductive resistor. Safety vent. Carrying handle. 7 1/2 x 6 3/4 in.



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Tune, Band, Gain, On-off bypass controls. 6x2x6 inches. 9V battery, 9-18 VDC or 110 VAC with MFJ-1312, \$9.95.

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Grandmaster MEMORY KEYER

MFJ-484C \$139.95



The MFJ-484C "GRANDMASTER" memory keyer is THE choice of CW contesters. Why? Because it's so easy to use, it's second nature . . . you don't have to use complex commands . . . and it has all the features you'll ever need for easy CW.

Features like these . . . you can store up to twelve 25 character messages plus a message of up to 100 characters. Or use a switch to combine 25 character messages for up to three 50 character messages. Send at any speed from 8-50 WPM. Repeat any message continuously or pause between repeats and change or insert into a playing message by simply sending. And you don't lose your settings when you lose power.

The MFJ-484C is RF proof, sends 5-50 WPM and measures just 8x2x6 inches. It uses 12 to 15 VDC or 110 VAC with MFJ-1312, \$9.95.

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Turn your synthesized scanning 2 meter handheld into a hot Police/Fire/Weather band scanner! 144-148 MHz handhelds receive Police/Fire on 154-158 MHz with direct frequency read-out. Hear NOAA maritime coastal plus more on 160-164 MHz. Mounts between handheld and rubber ducky. Feedthru allows simultaneous scanning of both 2 meters and Police/Fire bands. No missed calls. Crystal controlled. Bypass/Off switch allows transmitting (to 5 watts). Use AAA battery. 2 1/4 x 1 1/2 x 1 1/2 in. BNC connectors.



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\$59.95 MFJ-901B

The MFJ-901B is our smallest -- 5x2x6 inches -- (and most affordable) 200

watt PEP Versa tuner -- when both your space and your budget is limited. Matches dipoles, inverted vees, random wires, verticals, mobile whips, beams, balanced and coax lines from 1.8-30 MHz. Excellent for matching solid state rigs to linears. Efficient airwound inductor. 4:1 balun.



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RECEIVER ANTENNA TUNER/PREAMPLIFIER

MFJ-959B \$89.95



Impedance match your antenna to your receiver to increase your signal strength with this MFJ-959B and you may hear signals that you didn't even know were there. A 20 dB preamplifier with gain control boosts weak stations and a 20 dB attenuator prevents overload. It has switches for selecting between two receivers and two antennas. Covers 1.8 to 30 MHz. 9x2x6 inches. Uses 12 VDC or 110 VAC with MFJ-1312, \$9.95.

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The North American Callbook lists the calls, names, and address information for 495,000 licensed radio amateurs in all countries of North America, from Canada to Panama including Greenland, Bermuda, and the Caribbean islands plus Hawaii and the U.S. possessions.

The International Callbook lists 500,000 licensed radio amateurs in countries outside North America. Its coverage includes South America, Europe, Africa, Asia, and the Pacific area (exclusive of Hawaii and the U.S. possessions).

The 1989 Callbook Supplement is a new idea in Callbook updates, listing the activity in both the North American and International Callbooks. Published June 1, 1989, this combined Supplement will include thousands of new licenses, address changes, and call sign changes for the preceding 6 months.

Every active amateur needs the Callbook! The 1989 Callbooks will be published December 1, 1988. Order early to avoid disappointment (last year's Callbooks sold out). See your dealer now or order directly from the publisher.

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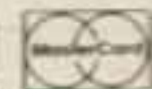
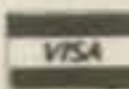
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in one or two directions, select operating days and/or times when the satellite moves into your clear view area. Use your ingenuity!

An outline of OSCAR 13's bandplans or modes of operation is shown in fig. 1. Due to economical equipment for 2 meters and 70 cm plus the strong signal levels associated with these "low frequencies," Mode B operation is always very popular among satellite users. Close on its heels is Mode J, with its reversed transmit/receive bands requiring an additional RF amplifier and GaAsFET preamp in your station's equipment. Adding Mode L to your setup requires including 1269 MHz multimode transmit capabilities and maybe an RF amplifier plus a high-gain 1269 MHz loop Yagi antenna. Finally, adding a highly sensitive receive converter and 5 foot dish antenna for 2400 MHz expands your system for Mode S operation. Let's now take a closer look at specific equipment requirements and selections for each of those modes.

Equipment Considerations

As previously mentioned, the wide availability of 2 meter and 70 cm multimode (SSB and CW) equipment makes OSCAR 13's Mode B operation very popu-

lar. For transmitting or "uplinking," you need a minimum of 150 watts ERP when the satellite is lightly loaded and up to 600 watts ERP when activity is heavy. That higher power requirement can be sidestepped, incidentally, by operating CW rather than SSB. During OSCAR 13's first day of operation, for example, I could not copy my own SSB signal (a busy day!) but enjoyed several good CW QSOs. Morse really has a 10 dB advantage!

Effective Radiated Power (ERP) is calculated as your rig's RF output plus antenna gain minus coax cable losses. Every 3 dB doubles or halves a previous level. A 50 watt signal feeding a cable with 3 dB loss, for example, will deliver 25 watts to its antenna. Assuming that antenna's gain is 10 dB, your approximate ERP is 250 watts. Likewise, reducing your cable loss to 1.5 dB increases your ERP to 380 watts. That's the reason why I emphasize short cable lengths. Two more points: Within reasonable limits you can juggle rig and antenna requirements. A 100 watt signal connected to a small 6 dB gain antenna via low-loss coax gives roughly 350 watts ERP. Also, a 25 watt signal similarly connected to a 13 dB gain antenna gives approximately 400 watts ERP. The difference is higher gain/longer

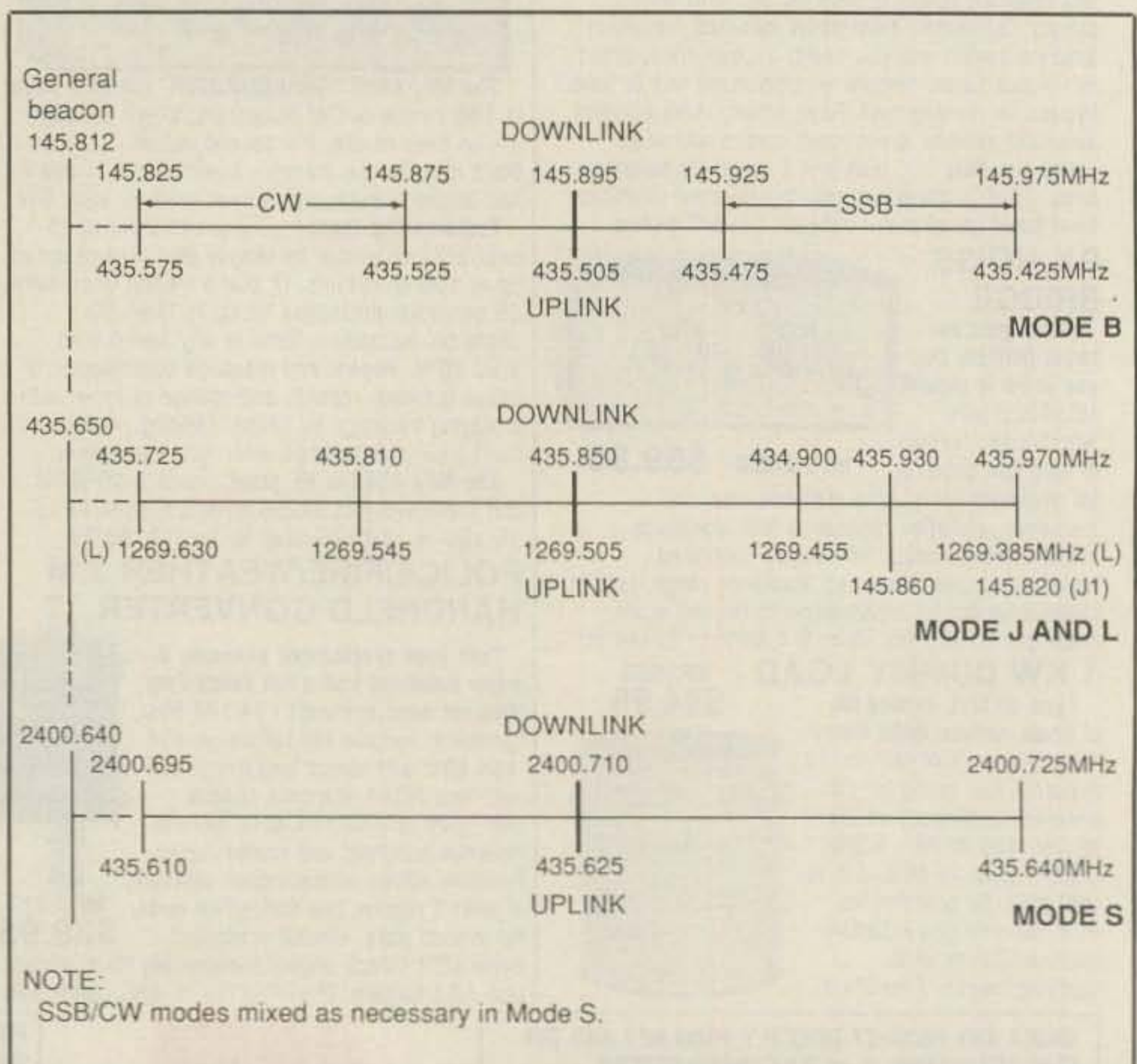


Fig. 1—Bandplans for OSCAR 13's Mode B, J, L, and S transponders. The transmit/uplink frequencies are shown in lower areas with corresponding receive/downlink frequencies directly above. All frequencies vary 5 kHz with Doppler shift. Monitor general beacons for late-breaking news or schedule changes.

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Satellite Status	Anomalistic Counts
OFF	224 - 31
Mode B	32 - 99
Mode J & L	100 - 180
Mode B	181 - 223

Fig. 2— A sample of OSCAR 13's transponder scheduling for August 1988. Information was copied on AMSAT's Sunday Net (see text).

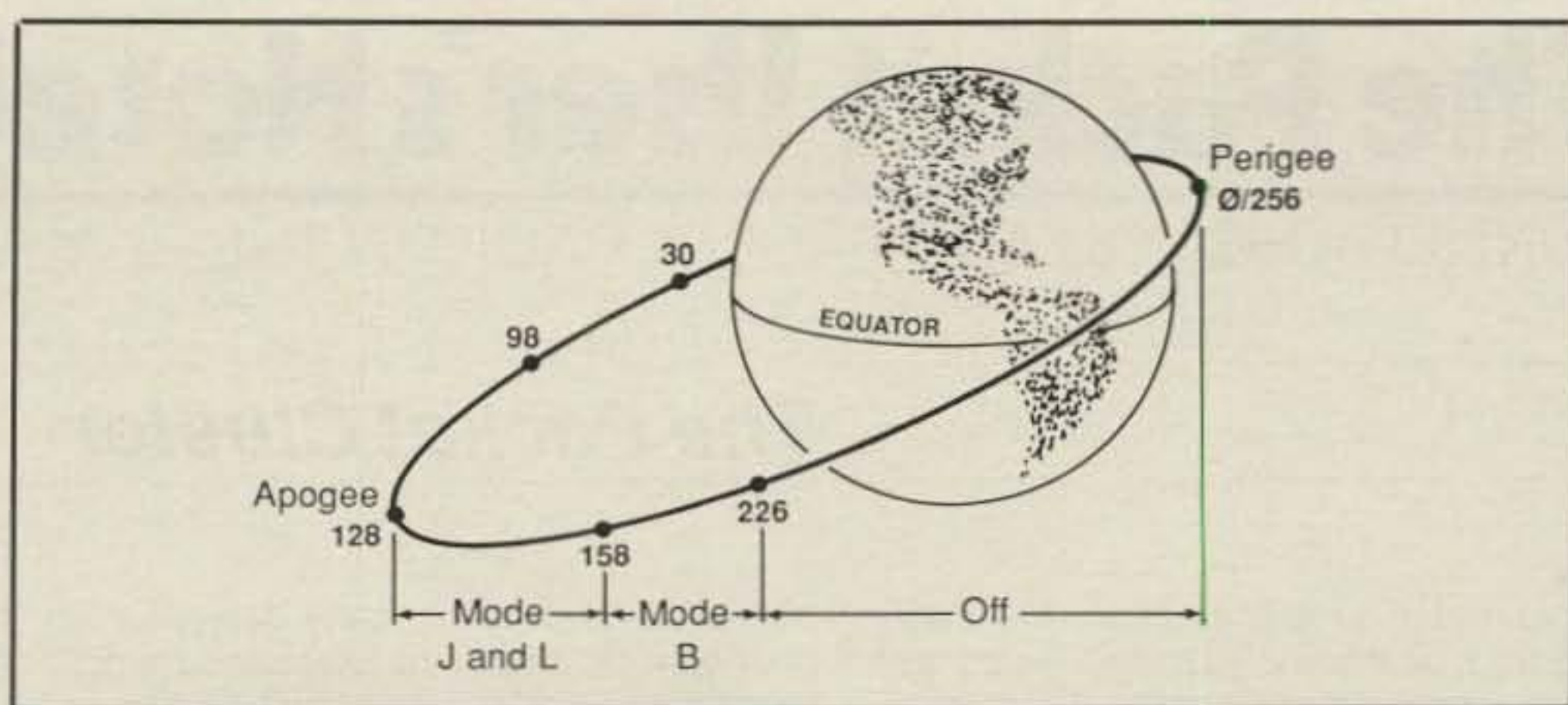


Fig. 3— Sketch of OSCAR 13's orbit illustrating how anomalistic counts, apogee, and perigee are visualized. Compare this information with fig. 2 for clarity. Notice also this August 1988 sample orbit reached apogee 38,000 km over the South Pacific Ocean. Apogee shifts from southwest to south to southeast (as viewed from U.S.) approximately 14 degrees longitude per day. That cycle repeats roughly every 10 days.

boom antennas exhibit more narrow beamwidths and require more accurate aiming at the satellite. Our previous notes, incidentally, apply to all modes and satellites. Remember those facts. They will help you later on down the road.

A similar antenna gain and GaAsFET preamp arrangement (plus a good transceiver) is required for reception on Mode B. Do not shortchange this receive area. Unlike HF communications, your maximum efforts should always pursue weak-signal reception. Regardless of the mode, always purchase the lowest noise GaAsFET preamp you can afford. A 10 to 14 dB gain antenna is then perfect for Mode B reception. Check your setup's performance by tuning OSCAR 13's beacon on 145.810 kHz (Doppler shift). If the beacon is 3 or 4 S-units above your noise level, you are doing well. If your noise level is S4 to S7 and the beacon does not move the meter, you probably need more antenna (or a clear sky view). If your noise level and the beacon are both S1 or less, you probably need more GaAsFET preamp. Considering the previously discussed basics, let's now overview other OSCAR 13 mode requirements.

As this column is being written, Mode J appears to be 3 to 5 dB more fickle than expected. Uplink requirements are between 400 and 600 watts ERP, and downlink reception of weak signals is enhanced by a good GaAsFET preamp. Mode J's bandwidth is narrow, but it is a convenient way to add two bands to your satellite operations. Further, Modes J and L are often activated simultaneously, while Mode B is off (transponder operating schedules will be discussed later under "Operating Notes").

Mode L requires approximately 1500 watts ERP for uplinking and downlink/receiving gain comparable to Mode J (12 dB gain and a good GaAsFET preamp). A typical Mode L uplink setup is ICOM's 10 watt output IC-1275 transceiver connected via "hardline" quality coax to Down East Electronic's 45-element loop Yagi antenna. As of this column's writing (mid August), RUDAK and Mode S have

not been activated. Predictions are Down East's 2400 MHz downconverter mounted at the focal point of a 5 foot dish will be adequate for Mode S reception, and a Mode B equivalent signal will uplink in fine style. Mode S is OSCAR 13's "new frontier" for gusto pioneers, and it looks most promising. Specific SSB and CW frequency allocations have not been announced for Modes L and S. SSB is always popular, but CW has the signal advantage.

Antenna Requirements

Since a satellite "rolls" while orbiting in space, circularly polarized antennas are used for uplinking and downlinking signals. "Twist," or crossed, Yagis are popular for 2 meters and 70 cm (regular Yagis are highly susceptible to spin modulation), loop Yagis are favored for 1269 MHz, and tentative discussions indicate a dish is mandatory for 2400 MHz. Fortunately, all of these high-gain antennas are available from amateur equipment dealers nationwide. When purchasing "twist" antennas, remember to add their optional polarity switches. OSCAR 13 usually requires right-hand circular polarization, but past experience indicates the polarity changes in an unpredictable manner. Additional antenna and station assembly details will be presented in part two of this column. Meanwhile, you have enough basics to get rolling (and this month's space is tight).

Operating Notes

Simply explained, satellite operations involve following the Golden Rule. No one's downlink signal should ever be stronger than a transponder's beacon. Compare your signal to that continuously available reference often and reduce your uplink power as necessary. Sharing

satellite energy is the key to friendly co-existence. Likewise, supporting AMSAT with your membership is just as logical as supporting your local FM repeater.

Communicating via OSCAR 13 centers around knowing the satellite's skyward location from your QTH, the times of that visibility window, and the scheduled periods of each transponder's operation. Computerized tracking handles those first two requirements in fine style, and AMSAT's Software Exchange (P.O. Box 27, Washington, DC 20044) sells tracking programs for most popular home computers. Initialize the program with the Keplerian data announced on the weekly AMSAT Net (14.282 MHz Sundays at 1900 GMT), and your computer displays/prints orbit times and locations, beam antenna headings, etc. Transponder scheduling is also announced on the AMSAT Nets, so you simply compare anomalistic counts with your computer readout while visualizing DX-attractive positions of the orbit and join the action (see fig. 2).

The satellite's orbit is divided into 256 counts, each equalling approximately 2.68 minutes. As illustrated in fig. 3, counts between 226.0 and 30 correspond to near-earth passes (OSCAR 13 is usually off during this time of perigee) and counts between 98, 128, and 158 are prime times for DXing (apogee is at 128). Times between 158 and 226 or 30 and 98 are good for medium-range DXing and in-continent QSOs.

That wraps up this month's column featuring OSCAR 13, and we invite you to join the action on this new satellite. Two months from now we will continue with more notes on OSCAR gear and special ideas on station assembly. Meanwhile, occasionally tune your multimode 2 meter rig around 145.900 and listen to the action. It's fantastic!

73, Dave, K4TWJ

The Packet User's Notebook

a feature by
BUCK ROGERS,
K4ABT

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

The Packet Cluster

This month's installment of "The Packet User's Notebook" is a topic which is of interest to many packeteers. The packet-cluster is rapidly gathering interest among packet users and DXers alike. Not so long ago packet radio didn't have much to offer the staunch DX chasers, but the atmosphere has taken a very pronounced and sudden turn.

The packet-cluster provides a "ring" concept or multi-user conference capability. It interfaces every user to the next, and so on. Each time another user signs on to the cluster, he too is included in any messages, reports, or open forum text which may be disseminated throughout the network.

The packet-cluster also allows individual one- or two-line messages to be sent to a single user within the connected group on the network. If this one-line message gives reason to establish more lengthy dialogue, then provisions are made within the software of the node for an eventual connect within the cluster network. This would enable the two stations to extend the conversation or QSO. Chit-chat is discouraged because these

packet-clusters are usually designed to provide a service to the connected users other than a QSO, which can be handled on a simplex, direct connection.

The packet-cluster that we use here in Georgia, Alabama, Tennessee, South Carolina, North Carolina, and Florida uses 145.750 MHz.

The purpose of this packet-cluster is to distribute DX information throughout the southeastern United States. The nodes are linked to each other through a system of private digipeaters and the network is established on its own frequency independent of other packet networking traffic. The frequency has been cleared for use in Alabama, Georgia, Tennessee, and North and South Carolina. Any user in the system has access to the same DX information and user lists, and all users anywhere in the system have talk capability to each other.

Within the packet-cluster we are able to support more than 25 users at each node. The nodes or KANodes are distributed along the "digi" routes and are designed to serve the area around them. The node is usually placed where most stations can access it without a need for an intermediate digipeater. In the case of our area, which is the exact center of the state of Georgia (Centerville), we must use a digipeater to reach the packet-clus-

ter node. This node is located in Atlanta and is operated by Dean Fredriksen, W8ZF. The digi I must use to access the KANode at Dean's QTH is W8ZF-7, while the actual call sign of the node is W8ZF.

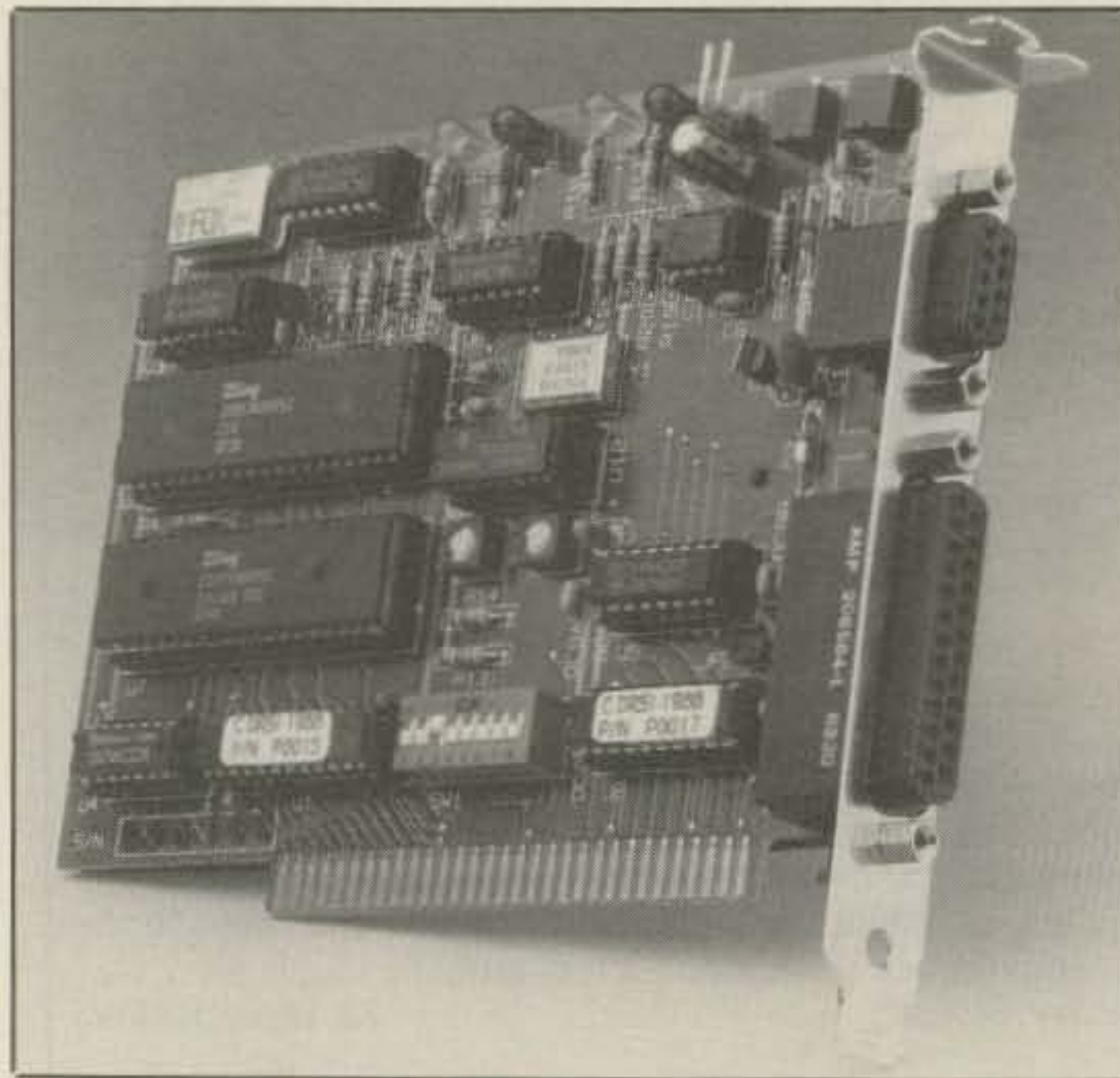
Because this DX packet-cluster has become so popular, we had to resort to better and faster methods of access and distribution. There was only one way to achieve this, so we turned to the Kantronics KPC-4's for the 2400 BPS and KANodes and added the 2400 BPS Kantronics KM-2400 modems to the other system nodes.

Many of the users have purchased the KPC-2400 TNC, which allows all three speeds (300, 1200, and 2400 BPS/QPSK) at the Hbaud or "on-the-air" speed.

At this writing, this DX packet-cluster is spreading both to the north and south. There is an almost automatic migration to the west.

Here is a good reason to consider this type of communication as a possible adjunct to the RACES or emergency communications corps. The manner in which the author, Dick Newell of Pavillion Software, has arranged it would allow the cluster to be utilized in the following manner. A central node or station with the packet-cluster software implemented could provide the incoming data or emergency messages to the connected cluster participants. They could then deliver it

506 Pheasant Ridge Drive, Warner Robins, GA 31088



◀ The DRSI VHF TNC on an IBM-compatible expansion card.

The matching HF modem that allows the DRSI TNC on any other RS-232C compatible modem to be used on frequencies below 28 MHz.



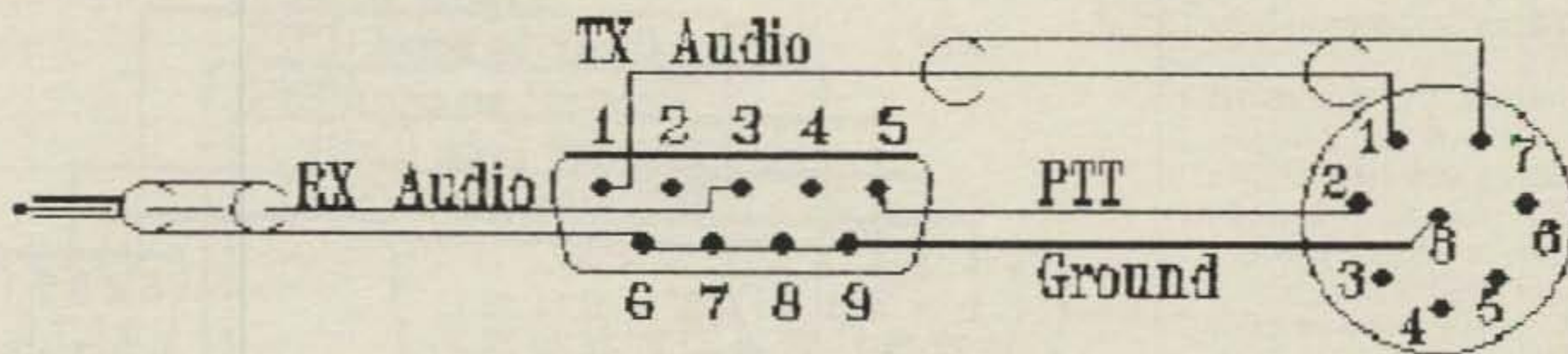


Fig. 1— The DRSI PC packet adapter which plugs into the IBM PC.

to the Local Area Network (LAN) via a smaller version of a LAN cluster or to the LAN via an "unproto" message.

Even the National Weather Service could benefit from this type of operation. The NWS in fact could deliver their information to the amateur radio packet user while at the same time updating the weather conditions to other NWS stations and distribution points. With PacFile they could even speed up the sending of weather maps, as compared to the slow Fax methods.

Getting into the packet-cluster activity can be as much fun as you had when you first entered the packet hobby. It is the next best thing to having an ear to a "sounding stob" driven into hard ground. You have the eyes and ears of many DXers listening to all bands, and you have every good DX frequency available.

Also, these guys don't take a back seat to anyone when it comes to sending out a notification of a rare DX station that is on 21.009 MHz, etc.

The beauty of the DX packet-cluster is when the "all mode" (KAM/The cluster must have "true" HF to VHF gateway capability.) is used in conjunction with the DX packet-cluster. This is where you see a new world of packet really open up!

Here is the scenario. ZUB9PUN in the island country of Bomgone, Barnailia (appears in the "third party" agreement list) hears about the DX packet-cluster and has also heard about the gateway from 21.105 to 145.750 MHz. He immediately gets on 21.105 MHz and connects to one of the KAM/KANodes or digipeats via the gateway call to W8ZF on 145.750. ZUB9UN will type H and <enter> and get full instructions for using the packet-cluster. If he is already familiar with the DX packet-cluster, he goes ahead and types DX <space> and sends the message that he is listening on or near 21.244 MHz.

The next step is for any station connected to the DX packet-cluster that needs this rare DX station to tune to the frequency that was mentioned and give a call to this station. Now we see even more opportunities for this kind of networking. With the addition of the KAM's true dual port capabilities and the built-in

gateway feature we have a "natural" for this new way of packet communicating and DXing.

This is just for openers. Dick Newell has not stopped. He evidently has been in the same situation or "trap" that many of us have stumbled into at one time or the other. I'm referring to the times we have made a number of DX contacts and either failed or forgot to record the call sign of one of the stations.

Commands

SHOW/DX. This command will list the latest five DX entries. You can modify this if you like and get more, say 12, by doing a SHOW/DX/12. You can make it band selective, if you like, by typing in

SHOW/DX 15. Note the space there which will give you 15 meter entries only. You can also use this command to search the DX database for information on times, dates, and frequencies for stations you're seeking—such as SHOW/DX VS6, which will list the last five VS6 entries, or SHOW/DX 40 VS6 which will list the last five 40 meter VS6 entries!

Wow! This is really a terrific search tool. No longer will you have to ask on the repeater if anyone can remember the time or frequency on which a station last appeared. It's right there and available on your packet terminal! And help is as close as typing **HELP SHOW/DX.**

SHOW/SUN. This command is for the low-banders. It is followed by a prefix—anything from the countries list. An exam-

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CIRCLE 99 ON READER SERVICE CARD

ple is SHOW/SUN ZL, which shows you today's sunrise and sunset times in New Zealand!

SHOW/MUF. Entering this command followed by a prefix shows you the maximum and minimum usable frequencies to that country for the current clock time—a great on-line tool for scheduling your contacts on another band.

SHOW/HEADING. When followed by a prefix, this command gives you the great-circle-route heading based on your own latitude and longitude—on-line help for which way to point the beam. It also gives you the distance in statute miles for the path.

SHOW/USERS This is a good command to use when just signing on, or if you have been away from the terminal a few moments. It gives you an immediate list of all the people currently connected to the system. SHOW/USER followed by a call will search the user file and respond with that person's name and QTH if he has entered it. We keep this file on-line all the time.

SHOW/CONFIGURATION. This is a variation on SHOW/USERS which will give you the same data, but shows you which user is connected to which node. This command will supply the issuing station a list of all the users on the Atlanta node, followed by the Huntsville node users, the users on the Charlotte node, and those on the Nashville nodes. Note that we are not always connected to those other nodes, but when we are, the users are listed separately.

DX. Enter DX into the system by typing DX "call sign" "frequency" (without the quote marks). You may also enter it as DX frequency call sign; the order does not matter. The information you enter will be

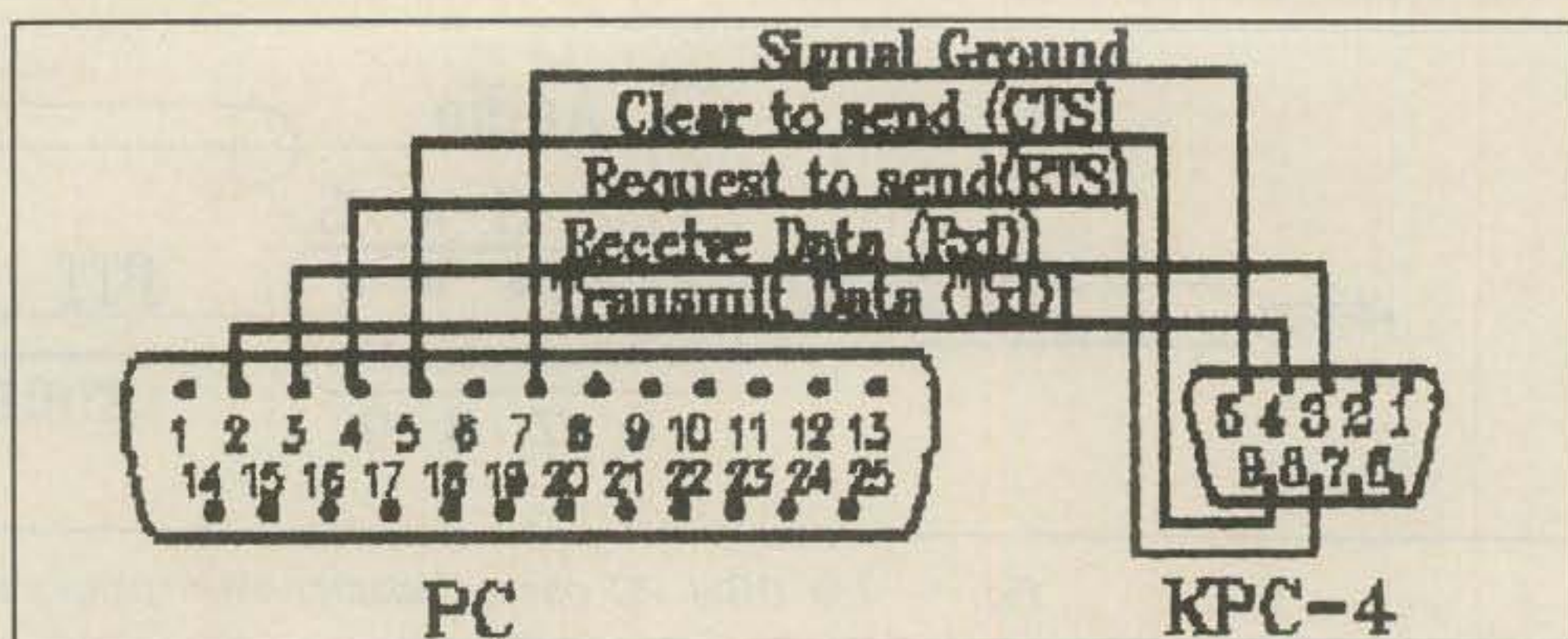


Fig. 2— IBM PC or clone RS-232C port to Kantronics KPC-4.

distributed to all the other users in the system, and the system will automatically append today's date, the time (UTC), your call, and enter it into the DX log file.

SHOW/WWV. This command will give you the five latest WWV propagation entries, including the solar flux, A-index, and K-index, along with the forecast. This data is also used in the SHOW/MUF calculations.

SHOW/OBLAST. Here is a command for those interested in finding out what oblast a given Russian call sign is in. You can do a SHOW/OBL followed by a return to get extra help on this one.

TALK. TALK "call sign" can be used to send a message to anyone in the user list, regardless of which city he/she is in. The computers do the work of message routing. There are two kinds of TALK command. The full Talk mode is entered by doing a TALK followed by a call sign and a carriage return. This puts you in the Talk mode until you type a Control Z and terminate it. It is used when you intend to

carry on a brief conversation with someone that may encompass several lines. Remember that anything you type from here on out is sent to that person, so it takes special care once you are in Talk mode to do a SHOW/USERS or a SHOW/DX. You must preface this with a * or the person you are "Talking" to suddenly sees a SHOW/DX on his screen.

The second type of Talk mode is used for simple one-line messages and is by far the most often used. TALK "call sign" followed by a one-line message before the carriage return will accomplish a lot.

Again, you can do one of these to any user and send him a brief message.

ANNOUNCE. This gives everyone a shot at whatever you have to say, as an announcement to everyone on the network on all nodes. This is good for notices of DX interest such as: ANNOUNCE ZUB9PUN will be on 28.510 MHz at 1530Z tomorrow.

CONFERENCE. Here is a neat device, but it is not used a lot. It results in sending a lot of packets and can make the system very busy if several users are involved. Anyone who types CONFERENCE puts themselves in Conference mode, and all Conference users see whatever any of the other users type. An asterisk is placed in the User list beside the call of anyone in the Conference mode. This works across nodes also. A user in Nashville, one in Huntsville, one in Atlanta, and one in Charlotte who all enter the Conference mode will each see what the other types. Notice is given to all in Conference mode as others enter.

When you wish to remain connected but are not in the shack, enter a SET/NOHERE and a set of parentheses is placed around your call in the user list, signifying your inavailability at the moment. When you return, type in a SET/HERE and they are removed.

The packet-cluster is just as much fun as it is a tool for further experimentation. When you add a packet-cluster to your system, you will immediately discover many ways in which it can be used in amateur radio.

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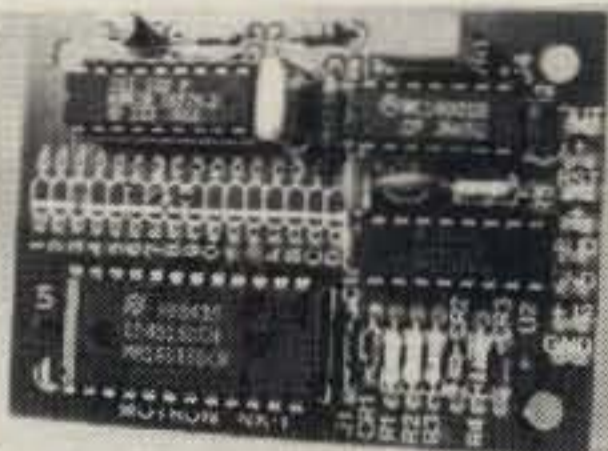
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CIRCLE 22 ON READER SERVICE CARD

NEWS OF CERTIFICATE AND AWARD COLLECTING

The Story of the Month for November is:

Larry Allen, K1ZIT
USA-CA All Counties #549, Mixed,
9-5-87

"I have been an amateur radio operator since November 1962. I have spent 99 percent of my operating time on CW, chasing DX and making many friends overseas.

"I was interested in ham radio as a lad but never could find out very much about it, so I put it on the back burner, so to speak. I got married when I was nineteen and my wife, Dorothy, and I had five children. From that time on, until the children were grown, there was no time for anything but work. On November 19, 1962 I got my Novice ticket (KN1ZIT) and then the fun started. By this time my family had grown up. The children were getting married and leaving home, and I had time to study and get my General class license in 1963. From then until 1983 it was CW for me.

"While having an eyeball QSO with Cary Wallace, KM1I, we got to discussing ham radio in general, and I made the statement that I wanted to find something else to do. Cary suggested that I try County Hunting. He gave me some information about it, along with telling me the frequency on which the county hunters net operates—14.336 MHz.

"In mid-January 1983 I made my first mobile contact on 14.336 MHz with Dave, WB4RFP. Dave was in Abbeville County, South Carolina. From then on I was hooked.

"I retired in 1983 at the age of 62 and turned to County Hunting every day, all day. Bill Tillett, W4TS, gave me the last one on July 27, 1987. I sure did enjoy working all the many hams throughout the USA. I wish I could have an 'eyeball' with each and every one of them and be able to express my thanks for all the counties they gave me. Many thanks!

73, Larry, K1ZIT, USA-CA #549."

Awards Issued

Oscar J. Reiner, WB6TJW, completed his quest and claimed USA-CA All Counties #573, USA-CA 3000 #605, USA-CA 2500 #680, and USA-CA 2000 #749, All SSB Mobiles, dated 7-11-88.

J. Victor Ouellette, Jr., K1CGI, did it all



Larry Allen, K1ZIT, his "Last County!" in July 1987.

in one giant leap by claiming USA-CA All Counties #574, USA-CA 3000 #606, USA-CA 2500 #681, USA-CA 2000 #750, USA-CA 1500 #838, USA-CA 1000 #1023, and USA-CA 500 #2260, Mixed, dated 7-14-88.

Michael L. Shoop, K3GWA, also took one giant step from start to finish and received USA-CA All Counties #575, USA-CA 3000 #607, USA-CA 2500 #682, USA-CA 2000 #751, USA-CA 1500 #839, USA-CA 1000 #1024, and USA-CA 500 #2262, Mixed, dated 7-16-88.

Frederick G. Roberts, W6TKV (ex-K2AMN), filed his final application and received USA-CA All Counties #576, USA-CA 3000 #608, USA-CA 2500 #684, and USA-CA 2000 #752, All SSB, dated 7-20-88.

Ben A. Laws, Jr., W6PXE, made a clean sweep of it by filing his good application for USA-CA All Counties #577, USA-CA 3000 #609, USA-CA 2500 #685, USA-CA 2000 #753, USA-CA 1500 #840, USA-CA 1000 #1025, and USA-CA 500 #2264, Mixed, dated 7-21-88.

Edgar E. Newman, W2RPZ, updated his good record by claiming USA-CA 3000 #604, All CW, dated 7-6-88.

Harry H. Incho, N2CWG, added another endorsement to his certificate by claiming USA-CA 3000 #610, All CW, dated 7-30-88.

Joe M. Chambers, KF5AT, reached the next-to-last plateau and received USA-CA 3000 #611, Mixed, dated 7-30-88.

Bob Matthews, KG8I, added another gold seal to his certificate by claiming USA-CA 2500 #683, Mixed, dated 7-18-88.

Robert Tirk, KE9FG, received USA-CA 1000 #1022, Mixed, dated 7-11-88.

USA-CA 500 certificates went to:

Larry R. Johnson, K7LJ, USA-CA 500 #2259, Mixed, dated 7-6-88.

J. Victor Ouellette, Jr., K1CGI, USA-CA 500 #2260, Mixed, dated 7-14-88.

Richard A. Genaille, W4UW, USA-CA 500 #2261, All SSB, dated 7-15-88.

USA-CA Special Honor Roll

Oscar J. Reiner, WB6TJW
All Counties #573, All SSB Mobiles,
7-11-88

J. Victor Ouellette, Jr., K1CGI
All Counties #574, Mixed, 7-14-88

Michael L. Shoop, K3GWA
All Counties #575, Mixed, 7-16-88

Frederick G. Roberts, W6TKV
All Counties #576, All SSB, 7-20-88

Ben A. Laws, Jr., W6PXE
All Counties #577, Mixed, 7-21-88

USA-CA Honor Roll

3000	2500	2000	1500	1000	500
W2RPZ 604	WB6TJW 680	WB6TJW 749	W6TKV 752	KE9FG 1022	K7LJ 2259
WB6TJW 605	K1CGI 681	K1CGI 750	W6PXE 753	K1CGI 1023	K1CGI 2260
K1CGI 606	K3GWA 682	K3GWA 751		K3GWA 1024	W4UW 2261
K3GWA 607	KG8I 683			W6PXE 1025	K3GWA 2262
W6TKV 608	W6TKV 684				NL7D 2263
W6PXE 609	W6PXE 685				W6PXE 2264
N2CWG 610					KB2YY 2265
KF5AT 611					

The total number of counties for credit for the United States of America County Award is 3076. The basic award fee for subscribers to CQ is \$4.00. For non-subscribers, it is \$10.00. Initial application must be submitted in the USA-CA record book which may be obtained from CQ Publishing Company, 76 North Broadway, Hicksville, NY 11801, U.S.A. for \$1.25. To qualify for the special subscriber rate please send a recent CQ mailing label with your application. To be eligible for the USA-CA, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated April 2, 1985. A complete copy of the rules may be obtained by sending a SASE to the USA-CA Custodian, 333 South Lincoln Avenue, Mundelein, IL 60060, U.S.A. DX stations must include extra postage for air mail reply.

Michael L. Shoop, K3GWA, USA-CA 500 #2262, Mixed, dated 7-16-88.

Tim Michael, NL7D, USA-CA 500 #2263, All SSB, dated 7-18-88.

Ben A. Laws, Jr., W6PXE, USA-CA 500 #2264, Mixed, dated 7-21-88.

John L. Biester, KB2YY, USA-CA 500 #2265, All SSB, dated 7-30-88.

Awards Available

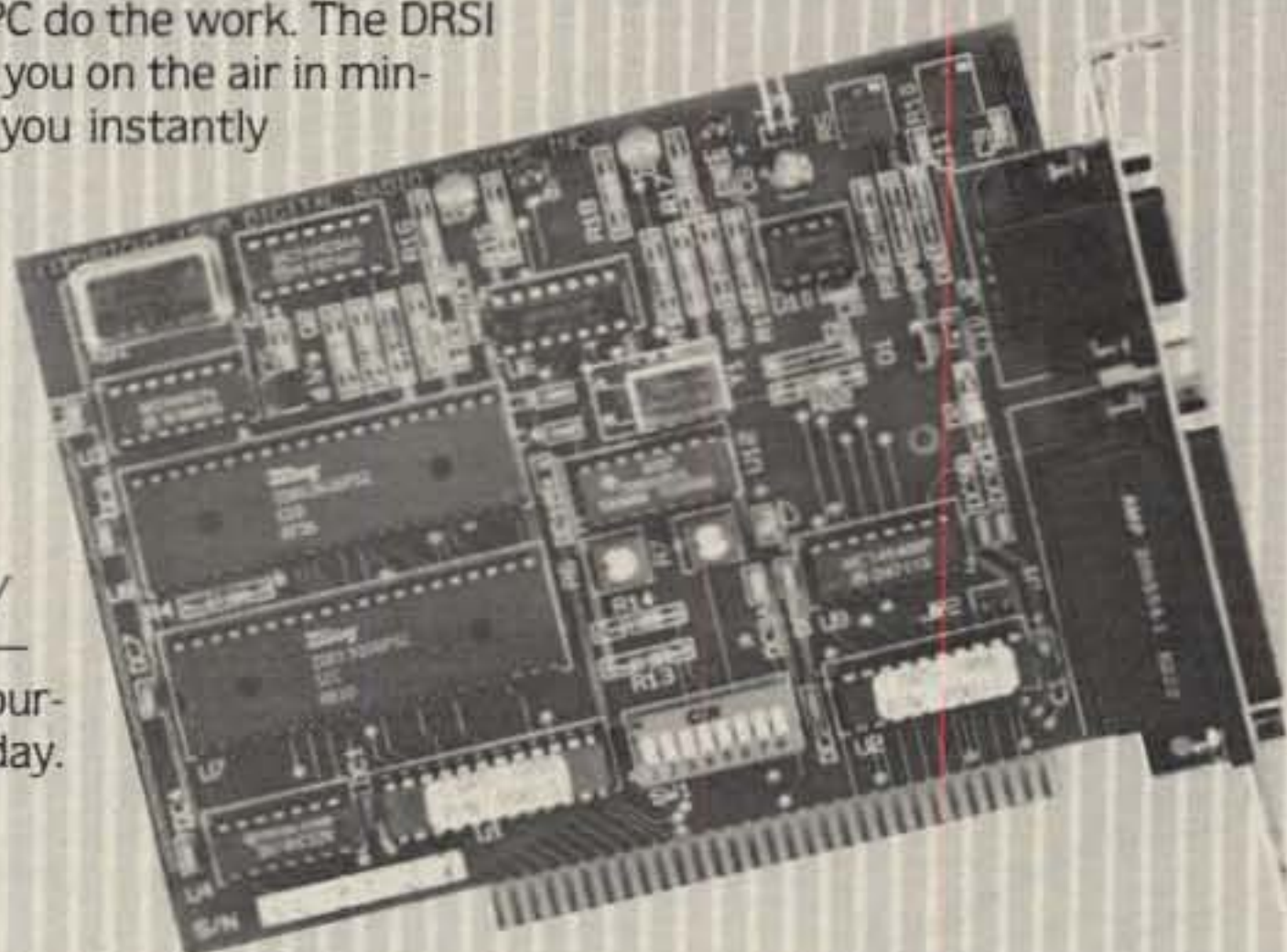
Twin Towns Award. The Twin Towns Award, offered by the Amateur Radio Club of Maribor, Yugoslavia, was instituted in 1986 on the occasion of the tenth

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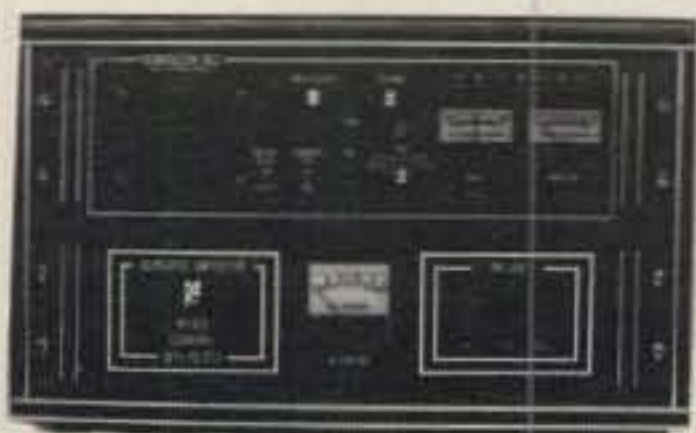
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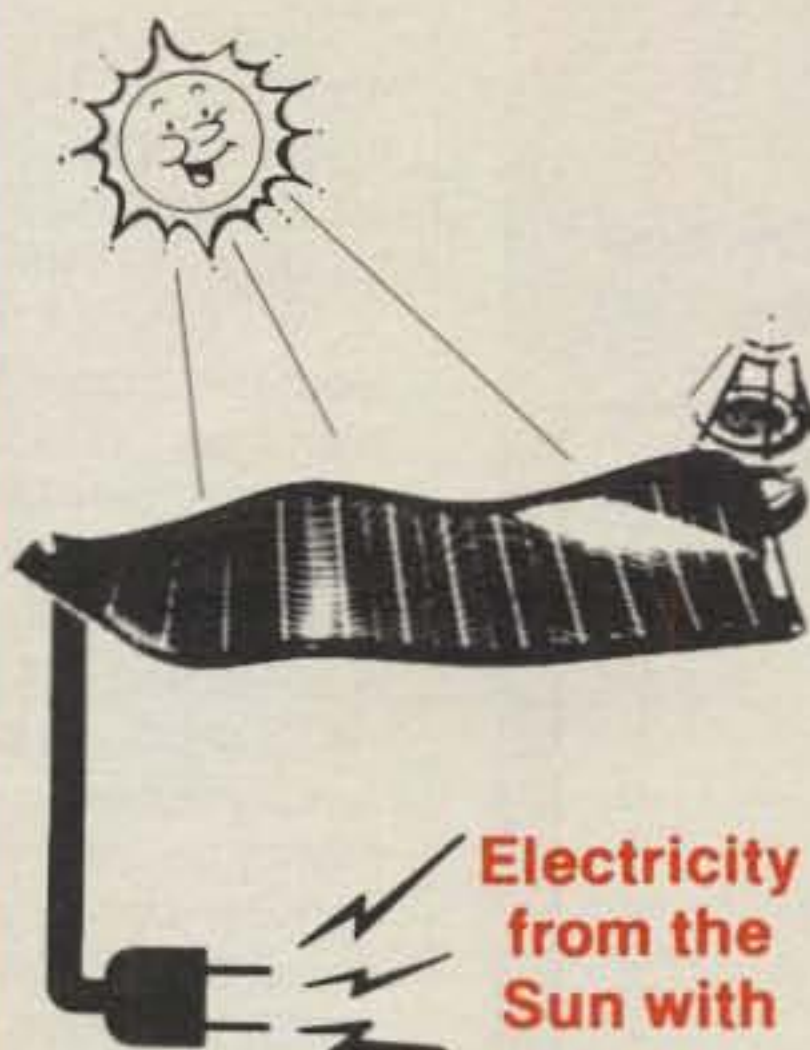
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Twin Towns Award offered by Radio Klub Maribor, Maribor, Yugoslavia.

anniversary of the club. It is based on mutual written agreement aimed at developing open and friendly relationships in order to enrich and refine life and labor of the inhabitants of Maribor (YU3), Kraljevo (YU1), Greenwich (G), Marburg/Lahn (DL), Szombathely (HA1), Udine (IV3), and Graz (OE6).

The Twin Towns Award can be granted upon the fulfillment of the following conditions:

1. EU stations must have two (2) QSOs, and DX stations on the other hand one (1) QSO with stations in the geographical areas where the twin towns are located. These are YU1, YU3, G-London Country, DL-DOK F, HA1, IV3, and OE6.

2. The collection—14 QSOs for EU, 7 QSOs for DX—must contain 2 QSOs (EU) or 1 QSO (DX) directly from the above mentioned twin towns (QTH direct).

3. Contacts on and after January 1, 1986 are valid for this award. There are no other limitations. The award is multi-colored representing the towns with their coats of arms and flags, and is suitable for display in the shack.

To apply for the award, send QSO list from the station log and 10 IRCs to Award Manager, YU3NP, Radio Club Maribor, p.p.12, 62001 Maribor, Yugoslavia.

The Worked All Britain Awards Group. The Worked All Britain Awards (WAB) Group was formed in 1969 by the late John Morris, G3ABG, to promote greater amateur radio interest in Britain. The group promotes an award program, contests, and activity weekends. WAB makes regular donations to groups such as the Radio Amateur Invalid and Blind Club, who help the less fortunate members of the amateur radio fraternity.

The award program is based on the geographical and administrative division of Britain. QSL cards are not required, only log entries. Special record books are available.

The award program is open to licensed amateurs and shortwave listeners.

Basis of the award system: Great Britain and Northern Ireland are divided geographically into a grid system. In great Britain this is referred to as the National

Grid Reference (NGR) and in Northern Ireland as the Irish Grid. Both systems divide the countries into 100 by 100 km grid squares which are referred to as large squares. On the NGR these squares are given a two-letter reference—e.g., HP, ST, TL, etc.—and on the Irish Grid a single-letter reference—C, D, G, H, and J. These large squares are then broken down into 10 by 10 km squares which are given a two-number reference—00, 01, 02, . . . 99. The large square and the two-number reference then give rise to the WAB areas—e.g., SP38, TL00, J04, G82, and so on.

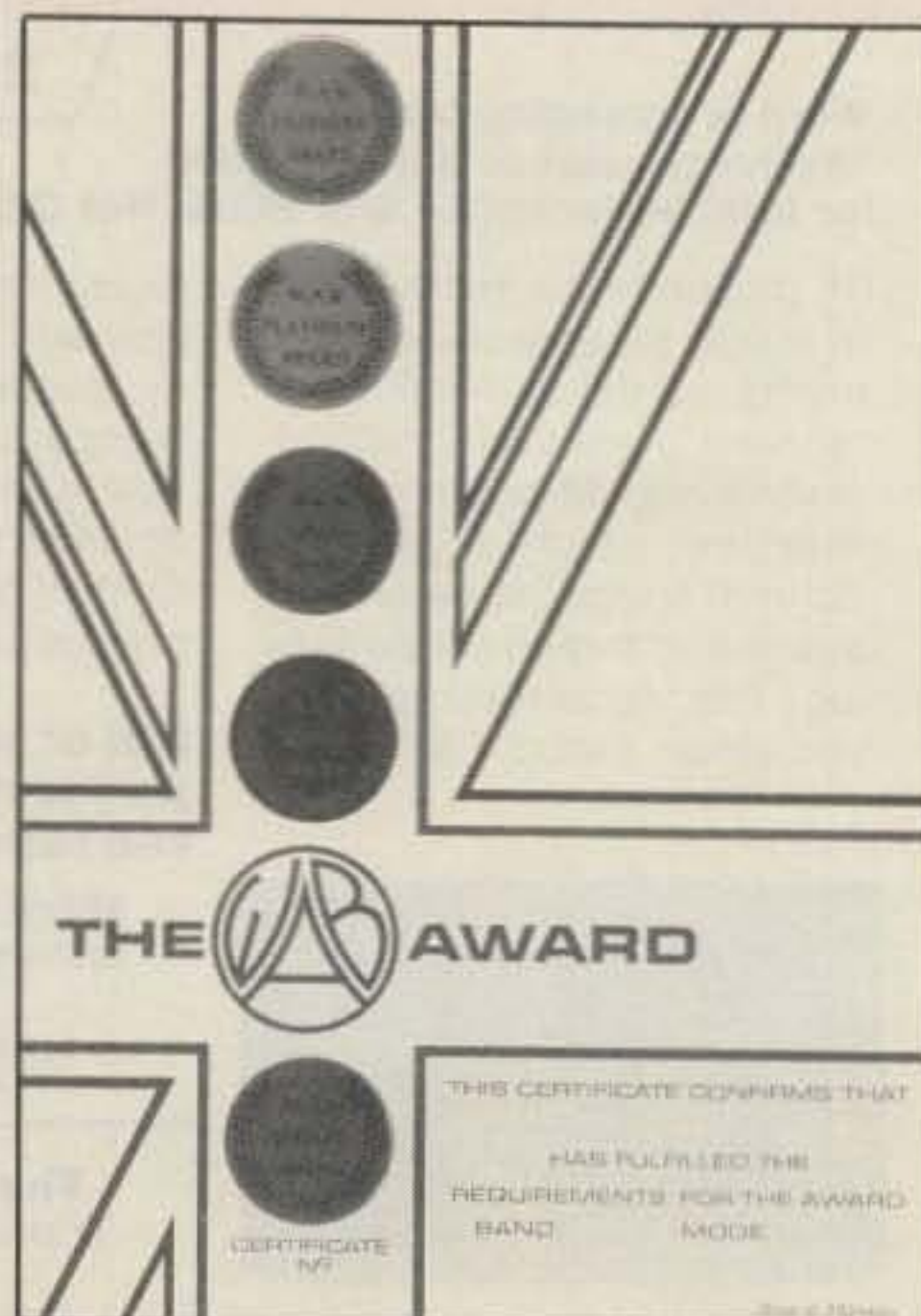
Great Britain and Northern Ireland are broken down for administration purposes into counties, the boundaries of which are drawn up arbitrarily. The WAB areas are linked with the counties—e.g., HP61 Shetland Isles, SP38 West Midlands, SS98 Mid Glamorgan, C82 Antrim, etc. There are in excess of 4000 WAB areas.

WAB record books: To help with the logging of WAB contacts a special record book is available. This book lists each WAB area, county by county, together with a list of towns and villages lying in each area. Claim sheets for the awards are supplied with this book. The record book is available for 6 pounds (\$10 US) from Brian Morris, G4KSQ, 22 Burdell Avenue, Sandhills Estate, Headington, Oxford OX3 8ED, England. Make checks and money orders payable to "The Worked All Britain Awards Account."

The main WAB awards are as follows.

WAB Overseas Introductory Award: This award is open to non-European stations and is intended as an introduction to WAB. The award requires that 25 WAB areas and 10 counties be worked.

WAB Areas Award: This award is given



The WAB Award offered by the Worked All Britain Awards Group.



The Bartolomeu Dias Award available from the South African Radio League or Rede Dos Emissores Portugueses.

for working WAB areas. There are six classes of award: Basic, Bronze, Silver, Gold, Platinum, and Sapphire. The requirements for European stations are 300, 500, 750, 1000, 1500, and 2000 areas. For non-European stations the requirements are lower at 100, 200, 400, 600, 800, and 1000 areas.

WAB Counties Award: There are 78 counties in Great Britain and Northern Ireland. Awards are given for 55 and 76 counties.

WAB Large Squares Award: There are 61 large squares in the WAB list. Awards are given for working 30, 40, and 55 large squares.

WAB Newsletter: A regular newsletter is produced containing information about WAB.

WAB QSL Cards and Stickers: Attractively designed and priced QSL cards, and stickers for existing cards, are available.

All new members are assured a warm welcome. For more detailed information readers can contact the membership secretary, Brian Morris, G4KSQ (at the address given earlier) or write to Dave Bird, AA6DB, 11226 Quinn St., Downey, CA 90241, USA.

Lisbon City Award. The Lisbon City Award is sponsored by Rede Dos Emissores Portugueses. To qualify for this award stations must meet the following requirements:

1. Demonstrate having made contact with ten Portuguese stations located within the city of Lisbon. This number, however, can be reduced to seven should contact be made with CT1REP, IARU Representative Member.

2. Contacts only after June 1, 1988 will be accepted.

3. This award is available under the following modes: VHF (FM-SSB); HF (SSB, CW, Mixed, RTTY).

4. The award can be obtained by request to REP (Rede Dos Emissores), Rua D. Pedro V, 7 - 40, 1200 Lisbon, Portugal, along with certified log and 5 IRCs or \$5.00 US.

5. The Lisbon City Award is also available to SWLs.

Bartolomeu Dias Award. In commemoration of Bartolomeu Dias's arrival at the Cape of Good Hope in 1488, Rede Dos Emissores Portugueses and its South African counterpart are proud to sponsor the Bartolomeu Dias Award. Bartolomeu Dias was a renowned Portuguese navigator and explorer.

To earn this award stations must meet the following requirements.

1. Portuguese stations: demonstrate having made contact with 20 Portuguese stations and 5 South African stations.

2. South African stations: make contact with 20 South African stations and 5 Portuguese stations.

3. Others: make contact with 5 Portuguese stations and 5 South African stations.

4. Contacts must have been made after January 1, 1988.

5. Send copy of log (Xerox) to Rede Dos Emissores Portugueses (address above under Lisbon City Award) or to South African Radio League, Box 2327, Johannesburg 2000, South Africa.

6. Cost: REP and SARL members, 300 Escudos or R. 5.00 SA; other amateurs, \$5.00 US.

Ed. note: This latest information re-

ceived on the Bartholomeu Dias Award differs slightly from that published in the August 1988 column.)

YLRL 50th Anniversary Award. The Young Ladies Radio League invites you to join in the celebration of their 50th anniversary in 1989. A special award is offered in recognition of the event. The YLRL 50th Anniversary Award is available to any licensed amateur in the world.

Two-way communications must be established on the amateur radio bands with 50 YLRL members during the calendar year 1989. Any and all amateur radio bands may be used. Crossband, repeater, or net contacts *do not* count.

Applications must be received no later than December 31, 1990 and should include a list of contacts including date, call sign, time, RS(T), band, and mode. Indicate and sign on the list that you have operated consistent with the rules of the award and your license privileges. Include name, call sign, and mailing address. Applications should be accompanied by \$4.00 US. Non-USA applicants may choose to remit \$4.00 US or 5 IRCs. Any proceeds over and above the cost of printing and distributing the certificate will be transferred to the YLRL Scholarship Fund.

Decisions of the Certificate Custodian regarding interpretations of these rules as here stated or later amended shall be final. All inquiries regarding applications or the certificate should be addressed to the custodian, Joan M. Gibson, KG1F, RR1 Box 1465, Waterbury, VT 05676 USA.

See you next month.

73, Dorothy, WB9RCY

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 RFC 2-417, 45W in = 170 out

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 RFC 3-211, 2W in = 110 out
 RFC 3-112, 10W in = 120 out
 RFC 3-312, 30W in = 120 out

440 MHz Amps
 RFC 4-32, 3W in = 20 out
 RFC 4-310, 30W in = 100 out
 RFC 4-110, 10W in = 100 out

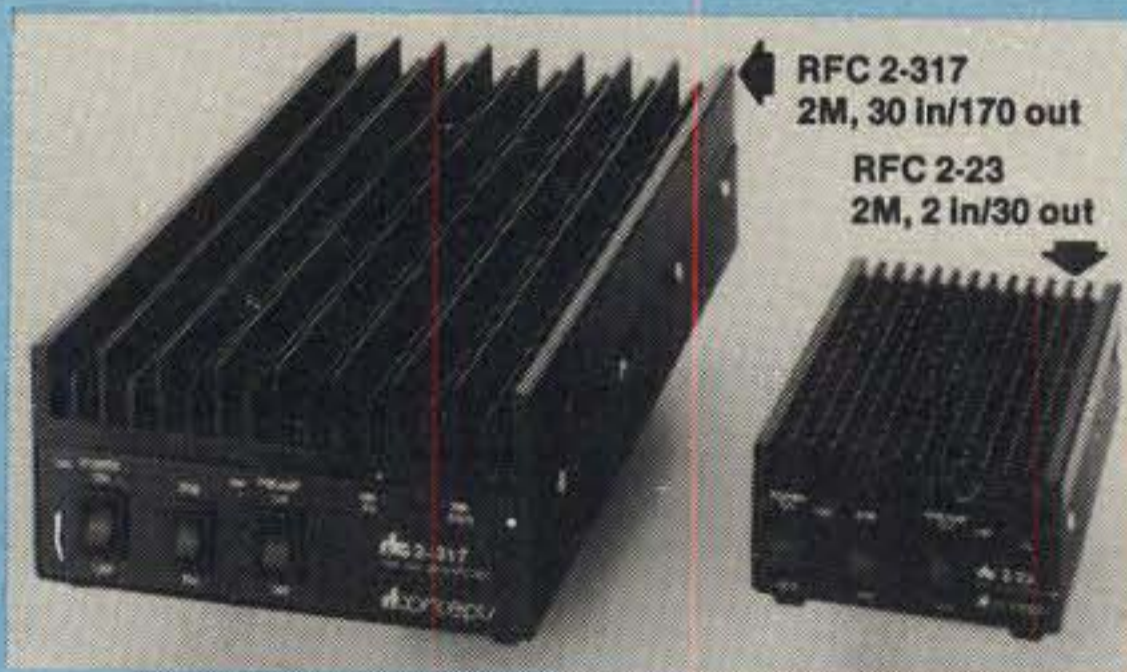
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Please send all reader inquiries directly.



Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

Received much too late for publication was a contest celebrating the Independence of Costa Rica. Organized by the Costa Rica Radio Club, it was scheduled for September 24-25. It was a phone-only contest, 10-80 meters, worldwide-type operation. If you made a minimum of 20 contacts, including 5 TI stations, you are eligible for a certificate. If you were involved and want to submit your log for the above award, it goes to Club de Radio Experimentadores C-27, Apartado Postal 200, Guadalupe, Costa Rica.

It has been my observation when listing the results of many of the overseas contests that sometimes a station is indicated as a certificate winner in the call area identified by the call. In fact, however, the station was not operating from that district, and neglected to indicate his actual location by not signing portable. The FCC no longer requires that you sign portable when you move to a new QTH and still use your original call, but it is definitely required when you operate in any of our CQ contests, and the rule is strictly enforced. Overseas organizations should keep this in mind and follow our policy of requiring stations to properly identify their location and prevent awards being made to stations who do not qualify by reason of their location.

Deadline for announcements for the February issue is November 15th and December 15th for the March issue. Using my home address is to your advantage.

73 for this time, Frank, W1WY

Int. Police Assn. Contest

CW: Sat., Nov. 5 SSB: Sun., Nov. 6
0600Z-1000Z & 1400Z-1800Z

This contest is organized by the International Police Assn. Radio Club and is open to all amateurs and SWLs.

There are three classes: single operator, multi-operator, and SWL. The same station may be worked on each band and mode for credit. You must remain on the same band for a minimum of 15 minutes before changing to another band. Use separate logs for CW and SSB.

Exchange: RS(T) and QSO number starting with 001. Club members will identify by including IPA and state if they are in the U.S. Non-members in the U.S. will also include state.

Scoring: One point per QSO; 5 points if it's with an IPA station. Multiply total by

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

* Oct.	26-28	YLRL Anniv. SSB Party
** Oct.	29-30	CQ WW DX SSB Contest
Nov.	5-6	IPA Radio Club Contest
Nov.	5-7	ARRL CW Sweepstakes
Nov.	11-13	Japan Intrn. DX Contest
Nov.	12	ALARA (VKYL) Contest
† Nov.	12-13	Czechoslovakian Contest
Nov.	12-13	European RTTY Contest
Nov.	12-13	Oklahoma QSO Party
Nov.	12-13	Tennessee QSO Party
† Nov.	19-20	AOEC 160 M CW Contest
Nov.	19-21	ARRL SSB Sweepstakes
Nov.	26-27	CQ WW DX CW Contest
Dec.	2-4	ARRL 160 M Contest
Dec.	3-4	TOPS 3.5 MHz CW Contest
Dec.	3-4	Texas State QSO Party
Dec.	3-4	Telco. Pioneers QSO Party
Dec.	10-11	ARRL 10 Meter Contest
Dec.	11	ARCI QRP CW Sprint
Dec.	18	CARF Winter Contest
Jan.	7-8	Hunting Lions CW Contest
Jan.	14-15	Hunting Lions SSB Contest
Jan.	27-29	CQ WW 160 M CW Contest
Feb.	11-12	QCWA CW Party
Feb.	11-13	YLRL YL/OM SSB Contest
Feb.	18-19	ARRL DX CW Contest
Feb.	24-26	CQ WW 160 M SSB Contest
Feb.	25-27	YLRL YL/OM CW Contest
Mar.	4-5	ARRL DX SSB Contest
Mar.	11-12	QCWA SSB Party
Mar.	18	YLRL East Meets West Party
Mar.	25-26	CW WW WPX SSB Contest

* Covered last month.

** See September issue.

† Not official.

DXCC countries and U.S. states worked on each band with an IPA station.

Frequencies: CW—75 kHz up from low end of each band. SSB—3650, 7075, 14275, 21275, 28575 kHz. DX—3775, 3800, 7075, 7100 kHz (plus or minus 25 kHz).

Awards: Certificates to the highest scoring stations in each class and each mode. Contest contacts may be applied for the Sherlock Holmes Award and Trophy. (Write to WA8VDC for details.)

Rules were brief and sketchy. I recommend you write to WA8VDC if you desire more information (include an SASE).

Mailing deadline for entries is December 31st and go to: Thomas Jenkins, WA8VDC, 4828 Elm Street, Newport, MI 48166.

ARRL Sweepstakes

CW: Nov. 5-7 Phone: Nov. 19-21
Starts: 2100Z Sat. Ends: 0300Z Mon.

This is the 55th running of the Sweepstakes, making it the oldest domestic

competition going, and it really stirs up a lot of activity.

Operation is limited to stations in ARRL sections, which also includes the West Indies section (KP4, KV4, etc.) and U.S. possessions in the Pacific. Operation is limited to 24 out of the 30 hour contest period. Times off may not be less than 30 minutes and must be clearly indicated in your log.

In order to minimize QRM to non-contesters it is recommended that operation be confined to certain portions of the bands. It is recommended that you check QST for details.

A new QRP category has been added this year.

There are several other regulations, including a cross-check sheet if you make 200 or more contacts. A large SASE (45¢ in postage) will get you the "SS Package" and Operating Aid #6 with enough log and summary sheets for an average outing.

Exchange: QSO no., power class, call, last two digits of year first licensed, and your ARRL section.

Stations using 150 watts or less are classed "A" and over 150 watts "B." The same station may be worked once only regardless of the band.

Scoring: Each completed QSO is worth 2 points. The multiplier is derived from the number of ARRL sections, plus VE8, worked (maximum of 74).

Awards: The usual certificates in each class and mode for single operator stations in each section and multi-operator stations in each division.

Logs must be received no later than December 31st and go to: ARRL Communications Dept., 225 Main Street, Newington, CT 06111.

Japan International DX Contest

2300Z Fri. to 2300Z Sun., Nov. 11-13

This is a new one organized by the Japanese *Five Nine* Magazine. It's the JAs working the world on SSB only, all five bands, 10-80 meters (no WARC bands).

Classes: Single operator, single and all band, multi-operator all band only. Single operators are limited to 30 hours out of the 48-hour contest period. Off periods of at least 30 minutes must be clearly indicated in the log. Multi-operators can operate the full 48 hours. Stations must remain on the same band for at least 10 minutes before changing bands.

Exchange: RS plus a Prefecture number (1-50) for JAs, RS plus a progressive 3-digit QSO number for DX.

Points: Two points for 80 meter QSOs, 1



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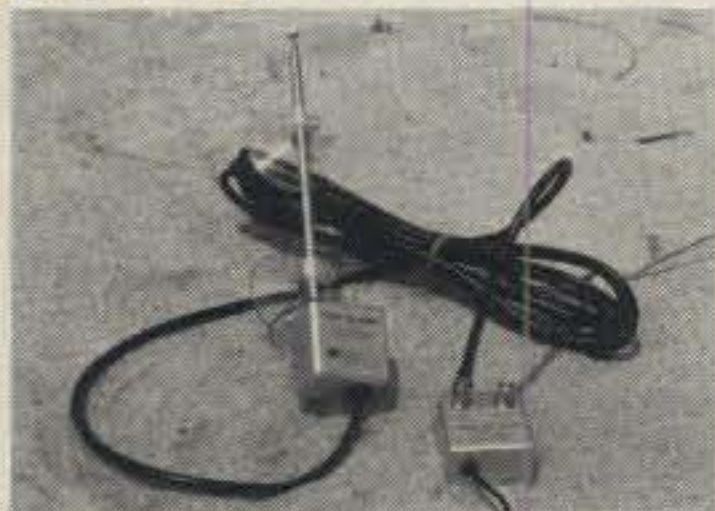
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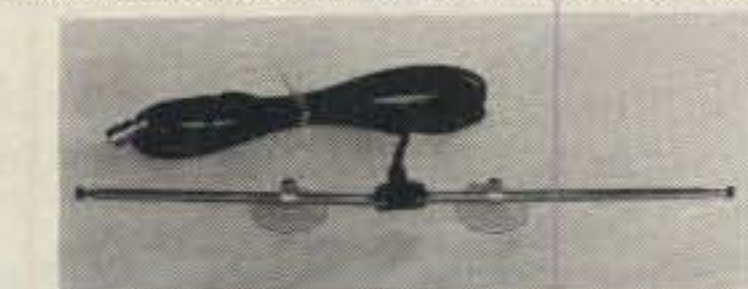
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point for 40–15 meters, 2 points for 10 meters.

Multiplier: Total number of JA Prefectures, plus #48 JD1 Ogasawara Is., #49 JD1 Okino-Torishima Is., and #50 JD1 Minami-Torishima Is. (maximum of 50 per band).

Final Score: Total QSO points from all bands times the sum of the multiplier from each band.

Awards: Certificates to the top scorers in each class in proportion to the number of entries from each country and each call area in the U.S. and Japan. Plaques to the continental winners in each class, single and multi-operators, and to the three U.S. CQ zones. And a special award to the U.S. single operator, all band winner of a round-trip ticket to Japan (*LA or SF to Tokyo*). (That should stir-up the bands, *Wow!*—ed.) Stations working all JA Prefectures (1–47) during the contest can request a special award with their entry.

Logs: Use a separate sheet for each band. Indicate the multiplier in a separate column only the first time it is worked on each band. Entries with more than 500 contacts must include a cross-check dupe sheet. There are the usual penalties for taking credit for duplicate contacts; more than 2% means disqualification.

Mailing deadline is December 31st to *Five Nine Magazine*, Japan International DX Contest, P.O. Box 8, Kamata, Tokyo 144, Japan.

ALARA YL/OM Contest

0001Z to 2359Z Sat., Nov. 12

Organized by the Australian Ladies Amateur Assn., this activity is open to all YLs, OMs, and SWLs worldwide. YLs work everyone, OMs work YLs only, and SWLs log YLs only.

Use all five bands, 3.5 through 28 MHz (no WARC bands). Each station may be worked once on each band and each mode for point credit.

Exchange: RS(T), QSO number starting with 001, and name. ALARA members will identify.

Scoring: Phone—Contacts with ALARA members 5 points, with non-member YLs 4 points, with OMs 3 points. Double above points for CW contacts. SWL—5 points for ALARA YLs logged, 4 points for non-member YLs logged. Total QSO points from all bands for final score. There is no multiplier.

Frequencies: Tune up band from following frequencies: 3525, 7100, 14060, 21100, 21350, 28100, 28500 kHz.

Awards: A wide selection of certificates to YL, OM, and SWL winners, both CW and phone, in each VK call area, each country, and each continent. And the Florence McKenzie CW Trophy to the top-scoring VK YL Novice operator.

This being the Australian Bicentennial

Year, the following Special Awards are available. For VK YLs and OMs—score at least 200 points including 10 ALARA members. For DX YLs and OMs—score at least 88 points including 5 ALARA members.

Only original logs are acceptable and must be received by December 31st. They go to: Marlene Perry, VK3JAW, 218 Ninth Street, Mildura, 3500 Vic. Australia.

Czechoslovakian Contest

1200Z Sat. to 1200Z Sun., Nov. 12–13

Some changes in the format of this year's OK-DX Contest were expected. However, no word has been received. Following are the rules that were used last year. In the past it was a worldwide-type contest, so do not limit your activity to working Czechs only.

Use all six bands, 1.8 to 28 MHz. The same station may be worked once per band, either phone or CW, for QSO and multiplier credit.

Classes: Single operator, both single and all band, multi-operator all band only, and SWL. (Club stations will be considered multi-operator.)

Only one transmitter and one band permitted during the same 10-minute period, no QSYing to another band.

Exchange: RS(T) and number of your ITU zone.

Scoring: One point per QSO; 3 points if it's with a Czech (OK4/mm 1 point only). Own country may be worked, but for multiplier credit only.

Multiplier: Sum of different ITU zones worked on each band.

Final Score: Total QSO points from all bands times the sum of the zone multipliers from each band.

A penalty of three additional contacts of the same point value will be deducted for each duplicate QSO or multiplier removed by the committee. Taking credit for excessive duplicates and other violations (regulations, unsportsmanlike conduct, etc.) will be deemed cause for disqualification.

Awards: Certificates in each class to the top-scoring station in each country. Additional awards will be made if returns justify. The "100 OK," "OK SSB," "Slovensko," and other Czech awards will be issued for contacts in the contest if a written application is submitted with your log.

Use a separate log for each band, indicate the zone multiplier only the first time it is worked on each band, and include a cross-check list for each band with 200 or more QSO's.

A summary sheet showing the scoring and the usual signed declaration that all rules have been observed is also requested.

All entries must be postmarked no later than December 15th and go to: Central

Radio Club, P.O. Box 69, 113 27 PRAHA 1, Czechoslovakia.

European RTTY Contest

1200Z Sat. to 2400Z Sun., Nov. 12–13

Rules for the WAEDC RTTY contest are the same as for the CW and Phone sections held in August and September.

Exchange: RST plus a progressive QSO number.

Points: Each QSO and each QTC exchanged are worth one point.

Multiplier: For non-Europeans is determined by the number of European countries worked on each band. (See the European country list in August Calendar.)

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 meters by 3, and on 10/15/20 meters by 2.

There is one main difference, however. To generate more activity in Europe and increase the QSO points, contacts between European stations are also permitted. QTC traffic, however, is only permitted between Europeans and non-Europeans, same as in the CW and Phone contests. The multiplier regulations remain the same.

The above will have no effect on the US and other non-European stations.

Check the August Calendar for all the other detailed rules and regulations.

Awards: Certificates will be awarded to the highest scorers in each class in each country with a reasonable score. Continental leaders will receive a plaque. Certificates will also be awarded to stations with at least half the score of the continental leader.

It is suggested that you use the official DARC log forms. A large SASE (IRCs) to the address below will get you a supply.

Mailing deadline for all entries is December 15th to: WAEDC Contest Committee, Postbox 1328, D-8950 Kaufbeuren, West Germany.

Oklahoma QSO Party

1200Z Sat. to 1200Z Sun., Nov. 12–13

This is the inaugural Oklahoma QSO Party co-sponsored by the Edmond ARS and the South Canadian ARS.

Participation is for single operator stations only. Each station can be worked on each band and mode, and portable/mobiles in each county change.

Exchange: RS(T) and QTH. County for OK stations; U.S. states, Canadian areas, and DX countries for others.

Scoring: One point for phone contacts; 2 points for CW.

Multiplier: For OK—U.S. states (48), Canadian areas (13), and DX countries worked. For non-OK—OK counties (77) and OK bicentennial "200" stations.

Final Score: Total QSO points times sum of the multipliers.

Frequencies: CW—1810 and 35 kHz up from bottom of each band. Phone—1855, 3860, 7260, 14260, 21360, 28360 kHz. Novice/Tech.—CW 3715, 7115, 21115 kHz.

Awards: Certificates to top scorers in each state, Canadian area, and DX country. Also to top scorers among Novice/Tech. entries. Participation recognition will be given to all entries with 50 points or more.

Include a summary sheet with your log which must be received before January 1, 1989. Logs go to: Oklahoma QSO Party, P.O. Box 73, Norman, OK 73070.

Tennessee QSO Party

1400Z Sat. to 2359Z Sun., Nov. 12-13

This is the 18th annual QSO Party, and this year it is sponsored by the Dickson Amateur Radio Team. Tenn. stations can make in-state contacts for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for Tenn.; state, province, or DX country for others.

Scoring: Two points for CW contacts, 1 point for phone. Novice/Tech 4 points for CW, 2 points for phone. Novice/Tech must identify their class after their call (N or T).

Multiplier: Out-of-state stations use Tenn. counties (maximum of 95). Tenn. stations the sum of U.S. states (50), Tenn. counties (95), VO and VE1-VE8 (8). DX stations count only for QSO points, no multiplier.

Bonus: Portable and mobiles add a bonus of 500 points to final score for each county operated outside of home county (minimum of 10 contacts in each county).

Extra Bonus: A one-time-only bonus of 10 points per QSO for the initial contact with a club member. (*How do you identify a club member?—ed.*)

Frequencies: CW—1815 kHz and 50 kHz up from bottom of each band. Phone—1860, 3980, 7280, 14280, 21380, 28480. Novice/Tech—3725, 7125, 21125, 28125, 28480.

Awards: Certificates to the highest scoring Tenn. station, phone only and CW only. And to each U.S. state, Canada, DX entry, and out-of-state Novice/Tech station.

Plaques to the top scorers in Tenn., Home, Mobile, Portable, and Novice/Tech. stations. And out-of-state station.

Logs: Dupe sheets are required for each band and mode with 100 or more contacts. Mobiles compete against mobiles, portables against portables. Portables must set up using Field Day guidelines. The same station may be worked on each band and mode and Tenn. county.

Logs must be postmarked no later than December 31st and go to: Tennes-

see QSO Party, P.O. Box 74, Burns, TN 37029-0074. Include a large SASE for results or certificate earned.

AOEC 160 Meter CW Contest

1800Z Sat. to 0700Z Sun., Nov. 19-20

Sponsored by the OVSV of Austria, this is a worldwide contest, so you are not limited to working OE only. However, you earn extra multiplier credit for working different Austrian areas. Operation is limited to single operators, and there is an SWL division.

The OE's are permitted to operate from 1810 to 1950 kHz and probably generate a lot of European activity, making it attractive for overseas participation.

Exchange: RST and QSO number starting with 001. OE's will include their District Locator number.

Scoring: One point per QSO.

Multiplier: (A) Each of the 9 Austrian call areas worked are worth 2 points. (B) Each Austrian Locator District counts 1 point. (C) Each prefix worked counts 1 point. (*I assume they mean from other countries—ed.*)

Final Score: Total QSOs times the sum of the multiplier points. SWLs use the same scoring system.

Awards: Certificates will be issued to the 10 top-scoring entries from each continent.

There is a 5-point penalty for each unmarked duplicate contact for which credit has been taken.

The usual signed declaration that all rules and regulations have been observed is requested.

Mailing deadline for logs is December 31st, and they go to: OVSV AOEC 160 Meter Contest, Theresiengasse 11, A-1180 Vienna, Austria.

CQ WW DX CW Contest

0000Z Sat. to 2400Z Sun., Nov. 26-27

Just a reminder, as if you needed one, that the CW section of our WW DX Contest is coming up the last weekend of this month. The phone section of course is past history. Complete rules were published in the September issue. There are no changes from those used in previous years, as they are well established worldwide. The contest trophies list has been updated and well covered in the rules.

All logs, both Phone and CW, must be sent to the CQ office: CQ World-Wide DX Contest, 76 North Broadway, Hicksville, NY 11801 USA.

Deadline for logs for the Phone section is December 1st, and January 15th for the CW section coming up. Be sure to indicate Phone or CW on your envelope. This will avoid your log from being entered in the wrong section.

ARRL 160 Meter CW Contest

2200Z Fri. to 1600Z Sun., Dec. 2-4

This is the 19th year for this "Top Band" activity. Exchange is between US stateside, VE, and DX stations. DX to DX not permitted for contest credit.

Classes: Single operator, and multi-operator single transmitter.

Exchange: RST and ARRL section for W/VE. RST only for DX stations; ITU Region for maritime and aeronautical mobiles.

Scoring: Contacts between stations in ARRL sections count 2 points, with DX stations 5 points.

Multiplier: Determined by number of ARRL sections plus VE8/VY1 (maximum of 74) and DX countries worked (for W/VE). (DX use ARRL sections only.)

Final Score: Total QSO points times the ARRL section and DX country multiplier.

Awards: Certificates to the top-scoring single operator station in each ARRL section and DXCC country. And to top-scoring multi-operator station in each ARRL Division and continent.

The ARRL 160 band plan requires that the 1830 to 1850 segment of the band be used for intercontinental QSOs only.

Indicate the multiplier in a separate column only the first time it worked. Entries with 200 or more QSOs are required to include a dupe sheet. Official log forms are recommended and are available from the ARRL. A large SASE and 45¢ postage or 2 IRCs will get you a supply for more than 300 contacts.

The usual grounds for disqualification—violation of established rules, excessive duplicate contacts, etc.—will prevail.

Mailing deadline for logs is January 6th to: ARRL Communications Dept., 160 Contest, 225 Main Street, Newington, CT 06111.

TOPS Activity Contest 3.5 MHz CW

1800Z Sat. to 1800Z Sun., Dec. 3-4

TOPS is an international club for CW enthusiasts founded in Great Britain in 1946. Their objective is to encourage CW operation on the top bands.

Classes: Single operator, multi-operator, and QRP (5 watts or less input).

Single operator stations must take one break of 7 hours during the contest period; multi-operators can operate the full 24 hours.

Exchange: RST plus a three-figure QSO number starting with 001. TOPS members will also include their membership number.

Scoring: QSO's within own country, 1 point, in own continent 2 points, with other continents 6 points. Work a TOPS member and get 2 bonus points (members get 3 points).

Each call area in W, VE, VK, PY, U, and

JA will count as a separate country for scoring. The multiplier is determined by prefixes worked (same as CQ WPX Contest).

Final Score: Total QSO points times the total number of prefixes worked.

Frequencies: Operation will be between 3500-3585 MHz, with the lowest 12 kHz reserved for out-of-continent DX contacts only. (When sending CQ send TAC, not Test).

Awards: At least 15 certificates will be awarded based on the top scores in each class.

Logs must be received no later than January 31st and go to: Bertil Arting, SM3VE, Bergesvegen 26, S-823 00 Kilafor, Sweden.

Texas State QSO Party

0001Z Sat. to 2359Z Sun., Dec. 3-4

This year's QSO party is sponsored by the San Benito ARC. The same station may be worked on each band and mode (CW, RTTY, SSB). Portables and mobiles in each county change. Texas may work in-state stations for QSO and multiplier credit.

Exchange: RS(T) and QTH. County for Texas; state, VE province, and DX country for others.

Scoring: One point for SSB contacts, 2

points for CW/RTTY, and 3 points for Novice.

Bonus points: 100 for QRP contacts; 100 for QSOs with club stations N5GNK or WA2VJL.

Multiplier: For Texas—Texas counties, other U.S. states, VE provinces, and DX countries. Out-of-state stations use Texas counties (maximum of 254).

Final Score: Total QSO points from all bands \times the sum of the multiplier from each band + any bonus points.

Frequencies: 40 kHz up from lower band edge. SSB—1890, 3885, 7285, 14285, 21360, 28404 kHz. Novice—25 kHz from low edge of Novice bands.

Awards: Certificates to top scorers on each band and mode, single operators and multi-operators; Texas single operator; club operating from rarest Texas county; and Novice/Tech entry.

Deadline for all entries is December 31st to: San Benito Amateur Radio Club, #2247 SSC, P.O. Box 1382, San Benito, TX 78586-1382.

Telco. Pioneers QSO Party

1900Z Sat. to 0500Z Mon., Dec. 3-5

This is the 24th annual QSO party of the Telephone Pioneers of America, and this year it is jointly sponsored by the George S. Ladd and John I. Sabin Chapters. (For many years it was coordinated by Ted

Phelps, W8TP, of the John D. Burlie Chapter of Columbus, Ohio.)

Members may be worked on each band and mode if they are in different chapters, but only one contact is permitted between stations in the same chapter.

Exchange: QSO number and chapter number.

Scoring: One point per QSO on each band and mode. And one multiplier for each different chapter worked (maximum of 115). There are 105 TPA and 10 USTPA chapters.

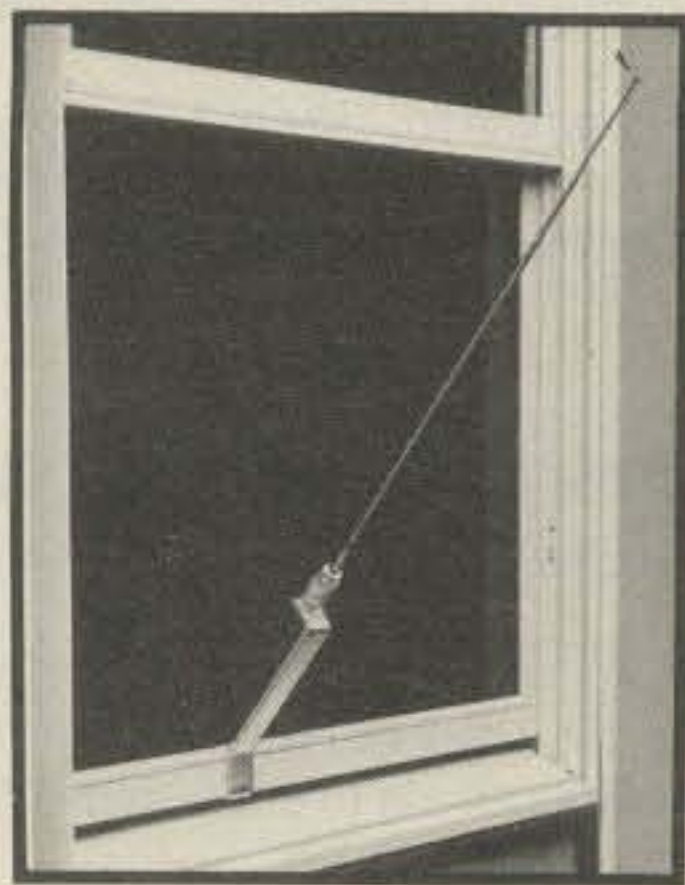
Frequencies: Tune up band from the following frequencies: CW—1800, 3555, 7055, 14055, 21055, 24920, 28055, 50.0, 144., 222.1 MHz. Phone—1855, 3905, 7260, 14260, 21360, 24960, 28360, 50.1, 144.1, 220.1 MHz. Novice—3725, 7125, 21125, 28125 MHz. RTTY—3630, 7100, 14100, 21100 MHz.

Awards: There is a wide selection of certificates for Life Members, Active Members, and Pioneers.

It is suggested that members who have not received this announcement from their chapter write to the John I. Sabin Chapter for additional detailed information and a list of chapters.

Mailing deadline for all entries is January 15th to: George S. Besley, c/o John I. Sabin Chapter, 2700 Watt Ave., Room 3151, P.O. Box 15038, Sacramento, CA 95851.

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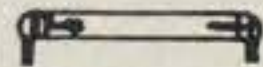


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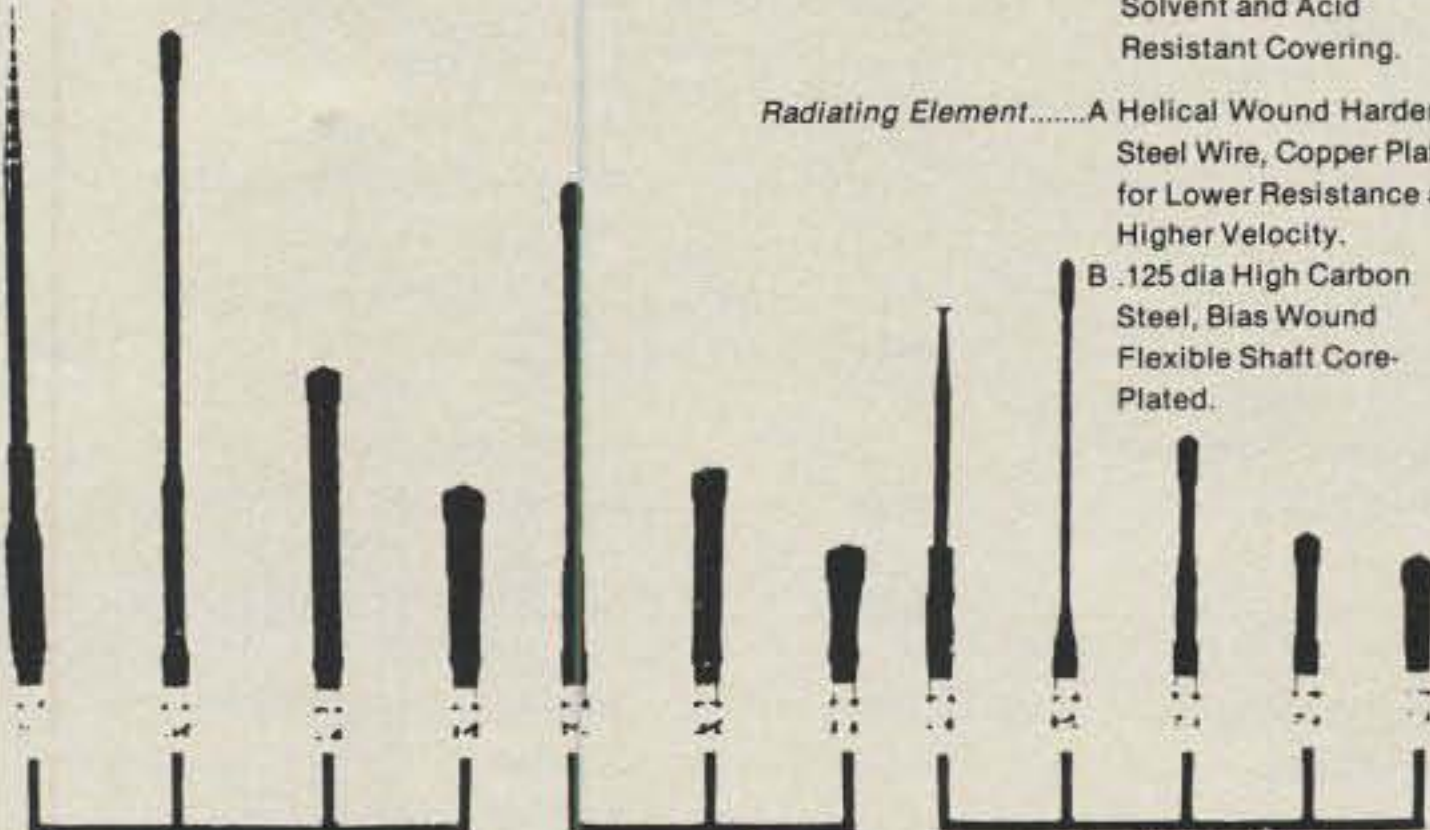
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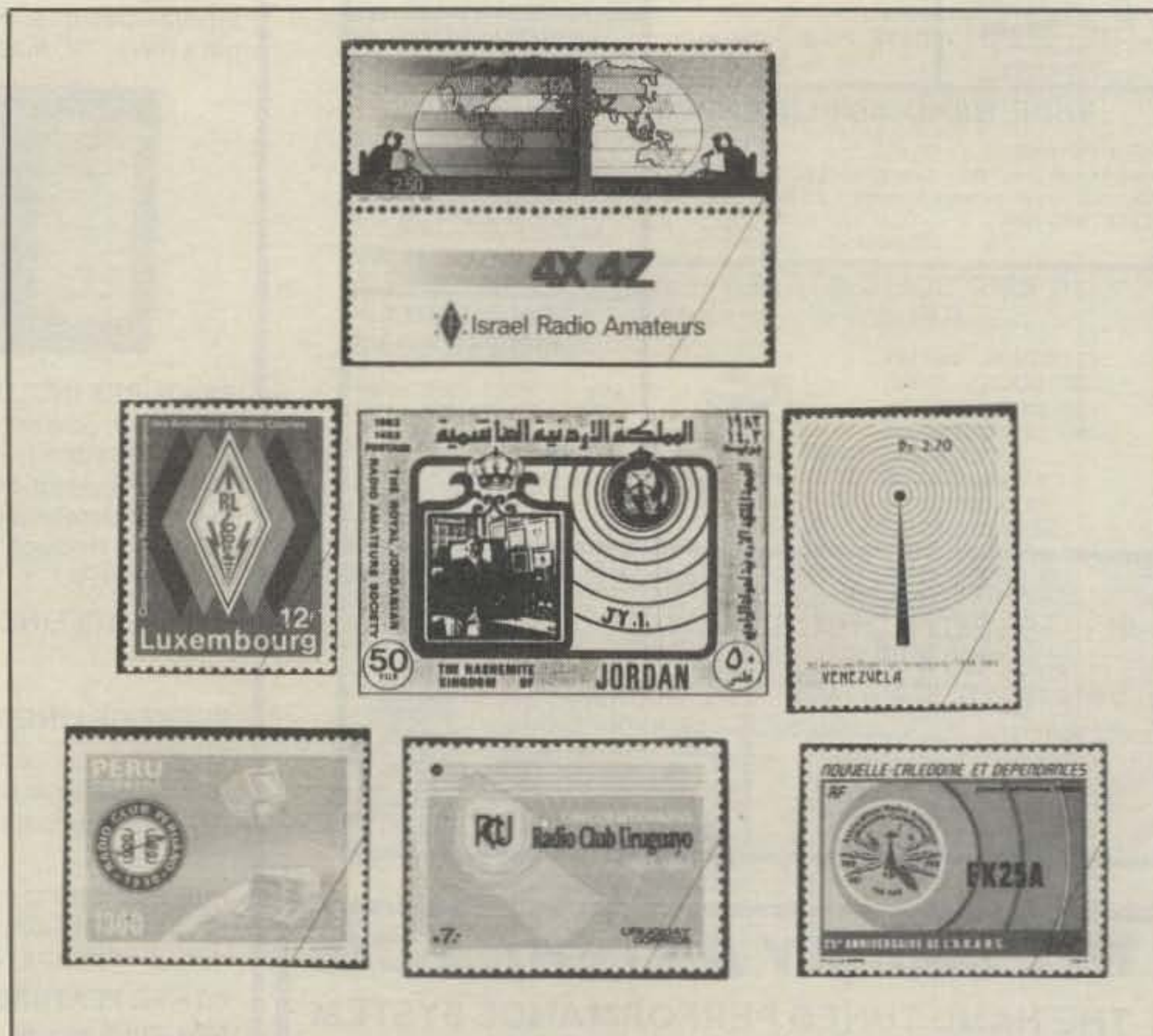
"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

Amateur Radio Stamps—Part I of II

I am not a philatelist (stamp collector). My knowledge of stamps is very limited. However, I have collected an assortment of stamps which are associated with amateur radio. This article is directed to people who are not experienced stamp collectors. I believe my restricted interest in stamps (amateur radio only) may be shared by many other amateurs.

Scope of Coverage

Some stamps are directly related to amateur radio, whereas other stamps are indirectly related to our service. This article includes separate lists for these two categories of stamps. Stamps directly related to amateur radio (Table I) include ones which honor anniversaries of amateur radio societies, show amateur radio stations/equipment, honor DXpeditions, and honor amateur radio conferences or conventions. Stamps indirectly related to our amateur radio service (Table II) include those which show old equipment that could also have been used by amateurs, honor the International Telecommunications Union (ITU), honor radio/electronic pioneers (Armstrong, Bell,



2814 Empire Ave., Burbank, CA 91504

Stamps directly related to amateur radio.

Country	Scott #	Description	Country	Scott #	Description
Argentina	1287	Society 59th Anniversary	Luxembourg	767	Club 50th Anniversary
Ascension Islands	303	ZD8JAM on one stamp	New Caledonia	C206	Society 25th Anniversary
	304A	s/s 301-304	Nicaragua	1296-1297	Fracap 1983
Bolivia	638	Society 38th Anniversary	Oman	306	Society 15th Anniversary
Brazil	1533	Radio Day	Peru	860	Club 50th Anniversary
Bulgaria	2980	Society 60th Anniversary	Poland	993	Club Logo s/s 991-993
Chile	631D	Society 60th Anniversary		993A	s/s 991-993
Colombia	C735	Society 50th Anniversary	Romania	2088	IARU ITU Region I Conference
	813	Society 40th Anniversary		2015	Amateurs as Pioneers
Costa Rica	C633-C635	Convention 16th Anniversary			s/s 2010-2015
Czechoslovakia	910	Radiosport 10th Anniversary	Russia	4733	RS-1 and RS-2 Satellites
		s/s 908-910		4917	Design Contest
Djibouti	528	Club	San Marino	1051	World Communications Year
Dominican Republic	C246	Club 50th Anniversary	Solomon Islands	512	H44SI Station
	C286	Beata Island DXpedition	Sri Lanka	655	Society 55th Anniversary
	C320	Catalina Island DXpedition			s/s 653-657
	773	Club 50th Anniversary	Switzerland	679	Society 50th Anniversary
German Dem. Rep.	1391	Sports and Technology			s/s 677-680
		s/s 1388-1392	United States	1260	ARRL 50th Anniversary
Israel	964	Club 4X4Z 40th Anniversary	Uruguay	1157	Society 50th Anniversary
Japan	1312	Society 50th Anniversary	Venezuela	1323	Society 50th Anniversary
Jordan	1156-1160	King Hussein and JY1 Station	Yugoslavia	809	Society 20th Anniversary
Liberia	?	Society 25th Anniversary			
		s/s of four			

Table I—Amateur radio stamps.

Country	Scott #	Description	Country	Scott #	Description
Central African Rep.	C29	ITU—Shows Satellite		1895	Yuri Gagarin, UA1LO s/s 1894-1898
	210	ITU 100th Anniversary		2310	Yuri Gagarin, UA1LO s/s 2308-2311
Colombia	697	Miss Universe, HK6LT		2463	Yuri Gagarin, UA1LO s/s 2463-2465
Czechoslovakia	954	E.H. Armstrong s/s 949-954	Russia	4084	Ernest Krenkle, RAEM
	2356	Yuri Gagarin, UA1LO		4791	Radio Moscow
Chad	112-114	ITU—Shows Old Telegraph		4801	Ernest Krenkel, RAEM s/s 4799-4801
Dahomey	202	ITU—Shows Old Telegraph	Senegal	247-249	Old Telegraph
Fed. Rep. of Germany	1116	Maximilian Kolbe, SP3RN	South Korea	431-432	Telegraph Operator
	1295	1979 WARC—Shows KWM-2		549	ITU—Shows Satellite
Great Britain	676-679	Marconi-Kemp Experiments	Spain	1927-1930	King Juan de Carlos, EA0JC (1927 is Queen)
Guinea	C73-C74	ITU 100th Anniversary		2367	King Juan de Carlos and Family
Hungary	C241	Yuri Gagarin, UA1LO s/s C236-C247	Sweden	1133A	Telegraph Key on Booklet Cover
	1381	Yuri Gagarin, UA1LO s/s 1381-1382	United States	890	Samuel F. B. Morse
Indonesia	436-440	Telegraph Service		893	Alexander Graham Bell
Italy	1141	Guglielmo Marconi		924	Telegraph 100th Anniversary
Ivory Coast	228	ITU 100th Anniversary		945	Thomas A. Edison
Jordan	525	King Hussein, JY1		1274	ITU
	1139-1144	King Hussein, JY1		1500-1502	Progress in Electronics (also C86)
Madagascar	367	ITU 100th Anniversary		1683	Telegraph Key
Mali	74-76	ITU—Shows Old Telegraph		2055-2058	Tesla and Armstrong
Morocco	16	King Hassan II, CN8AA	Yugoslavia	448-451	Nikola Tesla
Nauru	198-200	ITU CCIR—Shows Bug			
Netherlands	587-588	Telegraph Key			
Oman	?	His Majesty A4XAA			
Pitcairn Island	221-224	One Stamp Shows Operator			
Romania	C103	Yuri Gagarin, UA1LO s/s C103-C104			

Table II—Associated stamps.

Kemp, Morse, Tesla, etc.), or show famous amateurs (King Juan de Carlos, Yuri Gagarin, King Hassan, King Hussein, etc.). In some cases it is difficult to decide the category in which a stamp should be listed. Consequently, the lists in this article include brief descriptions to help you decide whether or not specific stamps may be of interest to you.

Next month's column will cover varie-

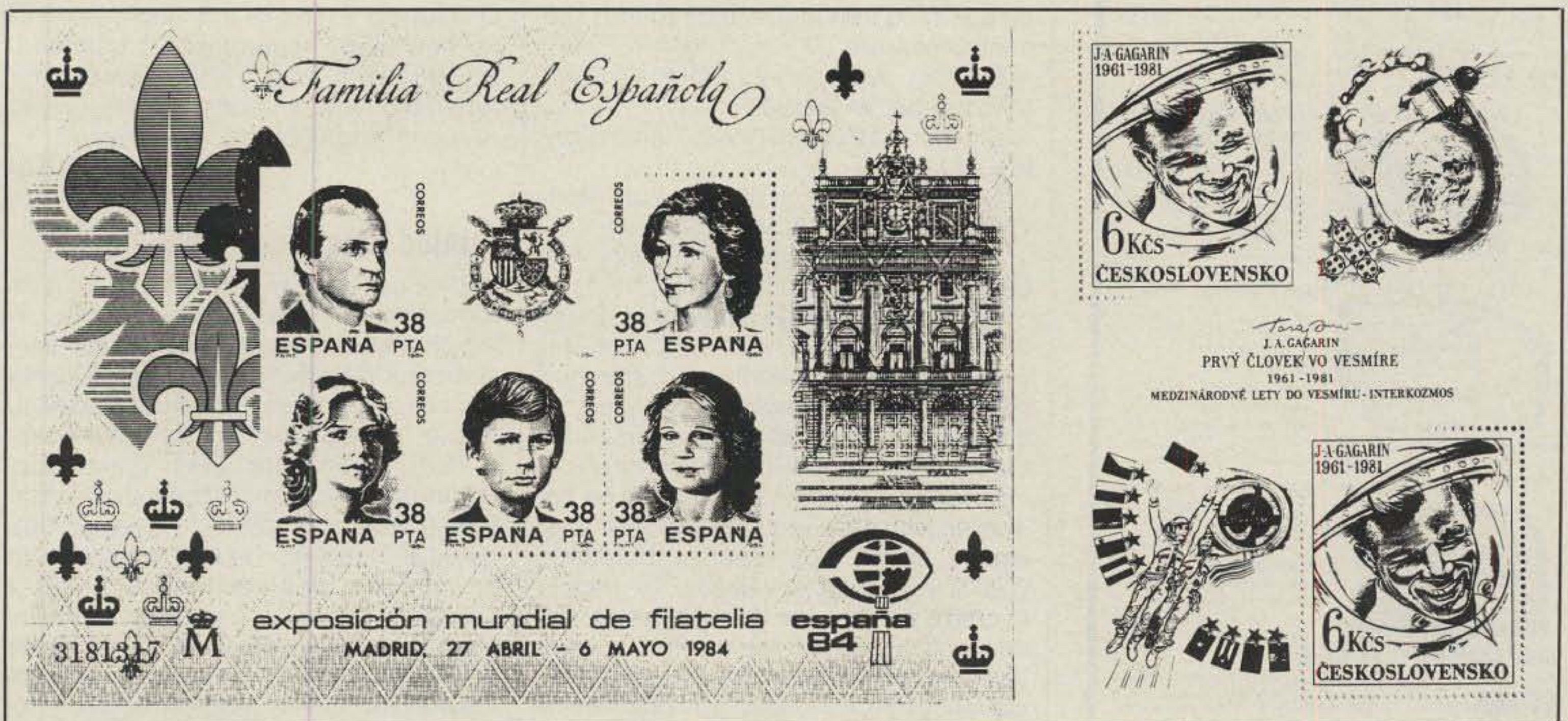
ty, stamp sets, prices, numbers, sources, and getting serious about collecting.

Esperanto

The August 1988 column about Esperanto resulted in my receiving several letters. Most of the mail has been requests for additional information about Esperanto. I do have information that will be sent to anyone who requests it and supplies a

number ten (business size), self-addressed envelope with double first-class postage attached. However, much more information can be obtained from the Esperanto League for North America, Box 1129, El Cerrito, CA 94530. The ELNA telephone number is 415-653-0998.

Some of the received letters ask for the address to write to when requesting the ten-lesson correspondence course men-





This is Scott Lithgow, KA3LUW, with his daughter, Amanda. Scott has been licensed since November 1983 and he upgraded to Technician during December 1987. His station includes a Kenwood TS-520 transceiver that he uses with a ground-mounted vertical antenna. Scott uses a Kenwood 205AT handie-talkie on the 2 meter band. He lives in Landisville, Pennsylvania and has worked 45 states, 5 Canadian provinces, and 6 other countries. Following a surge of 10 meter voice activity, Scott returned to the Novice code bands. He has increased his code speed to about 18 wpm. Scott upgraded to Technician and passed the 13 wpm code test in his quest to earn a General class license. Amanda is interested in his amateur radio operation.

tioned in the August issue. That course can be taken through ELNA or Intertalk. The Intertalk address is 3610 West 6th Street, Suite 537, Los Angeles, CA 90020 (telephone 213-388-3508).

DX (non-USA) amateurs who use Esperanto are requested to send information to me using the California address shown on the first page of this column. Name, call sign, and normal operating information (modes, bands, times, etc.) would be appreciated. Written correspondence can be in English or Esperanto.

Long-Wire Antenna Article

If you want a corrected reprint of the long-wire antenna article printed in the April and May 1988 issues, you are welcome to one at no charge. Send your request and your self-addressed, stamped envelope (number 10, business size) to my California address.

DX Stamps

The September 1988 column is about postal rates and receiving DX QSL cards. That column mentions that a good way to expedite the receipt of DX cards is to enclose a self-addressed envelope with the card you are sending to confirm the DX contact, and to attach airmail postage stamps to the envelope that is to be mailed back to you. This system is effective, but it is expensive. Nevertheless, new amateurs are usually very anxious to receive their first few DX cards, and they are probably willing to spend money to receive them. Similarly, long-standing amateurs may be willing to buy foreign postage to expedite receipt of a card from a country they do not have confirmed.

There are probably many sources of foreign airmail stamps, but I just know the ones listed herein. If you know others, please send that information to me. The ones I know are:

DX QSL Associates, 434 Blair Road NW, Vienna, VA 22180.

Bill Plum, 12 Glenn Road, Flemington, NJ 08822.

George Robertson, W2AZX, 7661 Roder Parkway, Ontario, NY 14519.

If you are interested in obtaining foreign airmail stamp price data, request it by writing to one (or more) of these sources. As always, it is appreciated if you enclosed a self-addressed, stamped number 10 envelope with your request for information. The listed suppliers offer much more than foreign postage stamps. Your requests for information will be answered with data about special fill-in-the-blanks QSL cards, special European QSL-size airmail envelopes (to handle oversize cards without folding them), incoming DX QSL Bureau 5 by 7.5 inch envelopes, where and how to use U.S.A. currency internationally, and many other topics of interest.

It has been my experience that it is ad-



Amos Greene, KC4CYV, of Wendell, North Carolina is 13 years old and shares the use of this station with his uncle, Jimmie Wootton, K4CMH. Amos is a basketball player.

visible to attach stamps to envelopes before mailing them to DX amateurs. Do not provide loose stamps that could easily be attached to other envelopes.

Photographs Wanted

Photographs of Novices in their shacks provide introductions to a few of the newer amateurs. Photograph size is unimportant, but good definition, contrast, and subject matter are important. Color pictures can be used, but black-and-white photographs are preferred. Operating activities and achievements, plus a self-introduction, are needed with each picture. Send an SASE if a picture must be returned. A free one-year CQ subscription (or renewal) is awarded to the one amateur whose picture I select as the winner for the month. If you are a subscriber, please enclose the mailing label (or copy) from your latest CQ issue. One award is made each month, no matter how many photographs are printed. DX amateurs, who frequently work the American Novice bands, are also urged to submit photographs.

73, Bill, W6DDB

Printed Aids

Previous Novice columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business size (#10) self-addressed and stamped envelope to my California address.

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REGULATORY HAPPENINGS FROM THE WORLD OF AMATEUR RADIO

FCC Issues Report & Order on 220-222 MHz Reallocation

In an exhaustive, 10-page Report & Order (R&O) in General Docket 87-14, the FCC on September 6 defended its reasons for reallocating the 200-222 MHz band to the land mobile radio market and allocating 222-225 MHz to amateur radio on an exclusive basis.

The R&O praises the Amateur Service at some length while refuting in detail the many arguments voiced by amateurs against the reallocation of this prime portion of spectrum. In fact, the FCC believes the reallocation will help amateur radio by removing the "cloud" that has, in the FCC's words, "discouraged investment and use of the 220 MHz band by the amateur community." Also, the FCC appears to have defended amateur operations against the proposed removal of additional spectrum as requested by Forest Industries Telecommunications and the Electronics Industries Association.

Background

The Commission explained that the 1979 World Administrative Radio Conference (WARC) allocated 216-220 MHz to maritime mobile and fixed services and 220-225 MHz to the mobile, fixed, and amateur services. It provided for phasing-out of the radiolocation service that had been authorized in 216-225 MHz before the WARC.

In the U.S. the FCC allocated 216-220 MHz to the Automated Maritime Telecommunications Service in certain regions of the country and permitted aeronautical, fixed, and land mobile telemetry operations to operate in the band on a secondary basis. The FCC allocated 220-225 MHz on a co-equal primary basis to amateur, fixed, and mobile services, but did not allow fixed and mobile services to start until an allocation plan for government/non-government sharing was completed.

In 1984 and 1985 the FCC received three petitions to modify the 220 MHz allocations from the Land Mobile Communications Council, a group of commercial two-way radio trade associations; Sideband Technology, a manufacturer of

ACSB radios; and LA0AD, a communications consulting firm operated by Robert M. Snyder, W9GT, of Lockport, Illinois. (LA0AD is Bob's Norwegian amateur radio call sign.) These petitioners argued that more land mobile spectrum is needed; LA0AD asked for primary channels for fixed industrial telemetry usage in particular.

The FCC initiated its proposal to reallocate the band on February 1, 1987, relying on the ARRL *1985-86 Repeater Directory* to provide an indication of repeater activity: "The *Repeater Directory* indicated that most repeater operations were concentrated above 222 MHz. Further, because the number of repeaters was light in comparison with other amateur bands, it appeared that displaced amateur 220-222 MHz operations could be reaccommodated above 222 MHz." Many hams contradicted this assessment, noting that the *Repeater Directory* does not contain many types of fixed and experimental uses, such as control, auxiliary, and repeater links; packet radio and propagation beacons; and weak signal and moonbounce operations.

Land mobile interests supported the proposal, arguing that enough frequencies for narrowband operations were not available in the land mobile bands at 150 and 450 MHz and the interference restrictions together with heavy usage of these bands precluded growth of narrowband activity. United Parcel Service, in late-filed comments, wanted to develop a "state of the art" delivery system at 220 MHz using narrowband technologies.

Commenters Propose Alternatives

The ARRL filed a technical report arguing that 30-50 MHz was a feasible band for narrowband technology. The FCC disagreed, noting that the skip interference, radio noise, and long wavelength of this band made it inappropriate for reallocating other land mobile bands for narrowband at this time. (A quarter-wavelength antenna would vary between 4½ feet and about 8 feet—impractical for portable use.) The FCC similarly dismissed arguments that reallocating other land mobile bands for narrowband was not feasible due to the displacement and cost to the thousands of existing users.

It believed that TV channel 13 interfer-

ence as well as conflict with the maritime services would result if increased land mobile operations were permitted at 216-220 MHz. LA0AD had suggested that 225-235 MHz be examined as an alternative for narrowband land mobile, but the FCC said that band is "used for government military operations that are vital to national security interest," in particular for "air-ground communications by high-performance military aircraft."

In disputing amateurs' claims that reallocation would have a great impact on their service, the FCC noted land mobile interests' comments that amateur radio has 69 MHz of spectrum in the VHF and UHF bands, with approximately 425,000 licensees. In contrast, the private land mobile services have 90.8 MHz of spectrum with 8 to 9 million transmitters. Stephens Engineering Associates, another ACSB radio manufacturer, stated that amateur allocations provide 1.62 MHz of spectrum per 10,000 operators as opposed to .11 MHz for every 10,000 private land mobile operators.

Lightly Used From Any Perspective

The FCC said "We continue to believe that the ARRL *Repeater Directory* provides the best available representation of amateur fixed/mobile/repeater operations" along with ARRL filings documenting the use of 220: "In the 220-220 MHz band, ARRL's comments list 773 fixed operations. This is less than eleven fixed operations per channel on a nationwide basis. This leaves an extremely large number of unused channels throughout most of the country. In fact, we find that there are only three states—California, New York and Texas—that even have enough operations to require sharing of frequencies. . . . We conclude that from any perspective the 220-225 MHz band is lightly used by the Amateur Service."

The Commission also found light use is made of the band for packet radio. Of the *Directory's* 1272 packet listings in all bands, "only 9 percent are in the 220-222 MHz band and 4 percent are in the 222-225 MHz band. The majority of the packet operations, 80 percent, are in the 144-148 MHz band. . . . For this reason, we believe very few of the packet operations will be affected by this rule making, as most are already in bands

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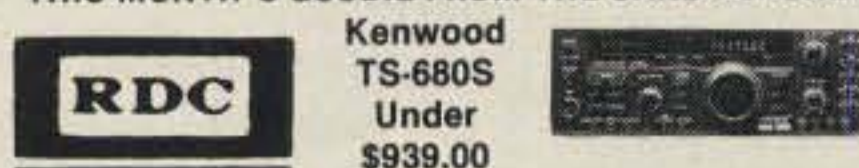
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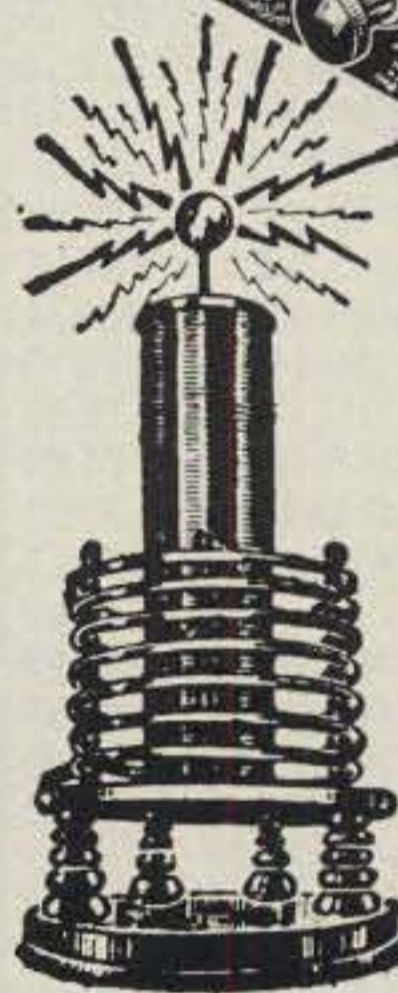
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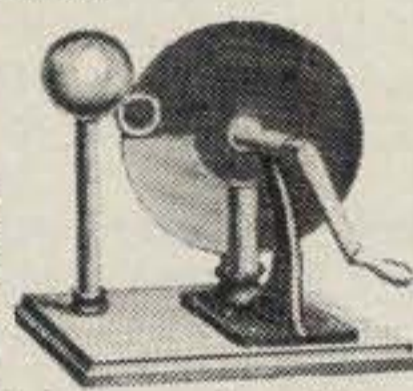
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other than the 220-222 MHz band." The R&O also said, "With regard to the development of long distance packet operations, we believe there is ample spectrum available in the 222-225 MHz band, particularly in the rural areas between cities."

Regarding control links, the FCC said that "using an exclusive channel for each control link is extremely wasteful and poor spectrum management. Further, we note the Commission recently proposed allowing auxiliary operations, which includes control links, on all amateur frequencies. This proposal was opposed by many amateurs, including ARRL."

With regard to moonbounce, the FCC noted that the suggested ARRL band plan provides allotments for fixed and experimental uses including moonbounce in 222-225 MHz. It noted that a principal objective of moonbounce is "to achieve long distance communications," yet ITU regions I and III do not have amateur operations at 220-225 MHz and thus would not have moonbounce activity. This would *not* be an incentive to moonbounce at 220, the FCC believed.

Amateurs argued that 220-222 MHz is needed for future growth of their service. In response, the FCC said that amateur radio growth "appears to be relatively stable with a modest average 1 percent annual growth over the last 5 years" and about 5.3 percent total growth over the last 5 years.

"We note that there are a large number of frequency bands throughout the usable spectrum allocated and available to the Amateur Service. A number of these bands are capable and do support amateur operations similar to those of the 220-222 MHz amateur band. In particular are the 28-29.7 MHz, 50-54 MHz, 144-148 MHz, 222-225 MHz, 420-450 MHz, 902-928 MHz, and 1240-1300 MHz bands. These bands provide the Amateur Service with 128.7 megahertz of spectrum. . . . Further we believe that the loss of use of the 2 megahertz from the 220-222 MHz bands, which represents less than a 2 percent reduction in amateur spectrum, will have little impact on the growth of the Amateur Service."

The FCC noted that the shift in operating frequency from 220-222 MHz represents about a 1 percent shift in frequency. "It should not be difficult to retune existing crystal-controlled equipment by this amount, particularly given the technical expertise of amateurs."

The FCC said that with the exception of 400 kHz of spectrum allotted for experimental and control links, all of the amateur activities listed in the band plan for the 220-222 MHz band have exact duplicate provisions above 222 MHz. "Further, it appears that control links and packet radio can be located above 222 MHz with no difficulty in most parts of the

country and with some coordination in a few areas of high density use."

Repeatedly throughout the R&O the FCC complimented the Amateur Service by recognizing, for example, "countless occasions" in which amateurs have performed public service. The agency stated its belief that the uncertainty about 220's future has discouraged amateurs from operating in the band and manufacturers from building equipment for the band.

FCC Counters Dept. of Defense, SBA

When the Department of Defense and the Small Business Administration filed in support of the existing allocation, including amateur usage, many believed these key shows of support would be powerful enough to persuade the FCC not to tinker with 220. Defense had indicated that it is interested in using 220-225 MHz for an advanced radar system and opposed a primary land mobile allocation.

In response, the FCC noted in the R&O that the Department of Commerce's National Telecommunications and Information Administration (NTIA), which has the authority to make frequency assignments to government stations, concurs with the FCC allocations in the proceeding. The FCC said it is impossible to determine if 220-225 MHz is really needed or if the radar could be accommodated in other bands. It also noted that 216-225 MHz has been reallocated internationally and will only be available to existing radiolocation operations and then only on a secondary basis starting in 1990.

The FCC also refuted the Small Business Administration's suggestion that small businesses would be affected detrimentally by the reallocation: "We recognize that there are some small businesses that manufacture amateur equipment that may be used in the 220-222 MHz band. We are also aware that some amateurs construct their own equipment and may sell units to other amateurs. However, it is our observation that much of the amateur equipment on the market is produced abroad by large companies. Further the comments addressing the manufacture of amateur equipment made no showing that their equipment could not be used in either the 222-225 MHz band or other amateur bands."

Forest Industries Telecommunications (FIT), a trade association of forestry two-way radio interests, asked the FCC to allocate more than the proposed amount of spectrum—3, not 2, MHz—to land mobile at 220. FIT held this position while at the same time applying to the FCC for permission to become a Special Call Sign Coordinator (SCSC) in PRB-3!

Fortunately for amateurs, the FCC disagreed. "We do not believe the benefits of providing an extra megahertz for land mobile outweigh the negative impact that it would have on the Amateur Service. Cur-

rent amateur repeater equipment in the 220-225 MHz band use a separation between the transmit and receive frequency of 1.6 MHz. To decrease the amateur allocation to 2 MHz would decrease the number of channel pairs for fixed/mobile/repeater operations from 54 channel pairs to 20 channel pairs or would require changing the frequency separation of the amateur equipment to 1 MHz which would make current amateur fixed/mobile/repeater equipment obsolete. Neither of these options is acceptable," the FCC said.

The Electronics Industries Association (EIA) had asked the FCC to allocate 1 MHz out of 220 for cordless telephones. The FCC again disagreed, stating that the frequencies the EIA requested "would have far greater impact on amateur operations due to existing repeater use."

In summary, the R&O allows amateur use of 220-222 MHz under current allocations until the FCC establishes rules for usage by government and non-government stations, a process that will probably take at least a year. "Amateurs are cautioned," the FCC said, "to refrain from making any investments in equipment that would only be suitable for operation in this band. Amateur stations should begin an orderly transition of ongoing operations in the 220-222 MHz band to other Amateur Service frequency bands so that an abrupt termination of such activities will not be necessary."

The FCC also invited petitions for rule making "to address any changes to the amateur service rules that it finds desirable in preparation of the removal of the 220-222 MHz band." It gave examples such as lifting of the prohibition on auxiliary link operation on some or all of the longer wavelength bands and placing a prohibition on repeater operation in a portion of the 222-225 MHz band.

The FCC said that the Report & Order to reallocate the 220 MHz band responds to the unresolved issue of General Docket 80-739, Implementation of the 1979 World Administrative Radio Conference, which left the allocation of this band open until a separate proceeding could address all of the issues involved. The R&O is effective October 1, 1988.

Petitions for Reconsideration

Numerous Petitions for Reconsideration of the reallocation from amateurs have already been received at the FCC, and the ARRL will submit its petition within 30 days after release of the R&O. FCC rules provide that the agency will only grant a Petition for Reconsideration of an action if the petition meets certain criteria. For example, it may favorably consider the petition if it relates to facts or events that have occurred or circumstances that have changed since the last opportunity to present them to the Commission.

Another criteria is that the facts relied on were unknown to the petitioner until after the last opportunity to present them to the FCC, and could not through the exercise of ordinary diligence have been learned before that opportunity. The FCC can always decide, in any event, that consideration of the facts relied on is "required in the public interest."

The FCC has been given considerable leeway to decide frequency allocation issues, and expectations are not high that the Petitions for Reconsideration will be granted. Great tension exists between the land mobile and broadcasting industries as they compete for spectrum allocations—tension that puts much pressure on the FCC. This grant of 2 MHz at 220 to land mobile is not expected to satisfy land mobile completely in its quest for more spectrum, but it functions as a valve to relieve some of the pressure created by this conflict between powerful interests. The FCC may not wish to close a valve it finds useful. A court appeal by the ARRL is virtually certain.

Still to be resolved is a petition from TV Answer, Inc., requesting that 500 kHz be allocated somewhere between 216 and 222 MHz for a TV broadcast viewer response system. The FCC said this petition will be considered on its own merits and addressed in a separate proceeding.

FCC Proposes Amateur Access to 18 MHz Band

On September 1, 1988 the Commission initiated a rule-making proceeding to determine the best way to permit use of the 17 meter band by the Amateur Services.

Specifically, it proposed allowing amateur station operation in the entire 17 meter band. Additionally, it proposed creating a 42 kHz telegraphy/digital emissions subband (18.068 to 18.110 MHz) similar to those in the other high-frequency Amateur Service bands. In the balance of the band, the Commission proposed authorizing telephony, facsimile, and television emissions.

The FCC proposed making the 17 meter band available to General, Advanced, and Amateur Extra class operator licenses. It tentatively concluded that use of the 17 meter band requires the skill and knowledge of General operators and above. (The Technician Class amateur radio operator examination is primarily geared to VHF and higher frequency operation.) Finally, the Commission proposed no power limitations in the band other than those which generally govern the Amateur Services.

The Final Acts of the 1979 World Administrative Radio Conference allocated the 17 meter band (18.068-18.168) to the Amateur and Amateur-Satellite Services. Normally, a two-step process follows domestically after such an allocation of a

frequency band internationally. The FCC has taken the first step, by amending the domestic Table of Allocations, to add 17 meters as an Amateur Services allocation.

The second step has awaited the removal of Government fixed operations from this band. These operations must be terminated no later than July 1, 1989. To then make this spectrum available to amateur stations by July 1, 1989, the FCC must adopt rules in the Amateur Services for use of the spectrum, which is initiated by this NPRM.

New Extra Class Question Pool

New Element 4(B) (Extra class) questions take effect on November 1st. All VECs use exactly the same, word-for-word, examination questions, multiple choices, and answers. The new questions may not yet be readily available in the publishing marketplace. Write to W5YI if you need copies of any of the amateur radio operator test-question pools, which come complete with all multiple choices and the correct answer identified. The cost is only \$2.00 per written test element. There are five of them: Element 2/Novice, Element 3(A)/Technician, Element 3(B)/General, Element 4(A)/Advanced, and the new Element 4(B)/Extra class. Cost is only \$8.95 if you need all of the question pools—over 1800 total questions. They are available from: W5YI, P.O. Box 565101, Dallas, TX 75356.

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NEWS OF COMMUNICATION AROUND THE WORLD

"Where's DX?" you sadly say,
Then come with me and fondly stray
Over the hills and far away.
'Twill be DX tonight and across the day,
Forever!

Some years back, actually over two decades back, DXers were split internally by a scandal which has never quite died and never quite been forgotten. And while the cause of those DX troubles did seem abundantly clear to many DXers, the matter was often not quite understood at other levels. The DXers themselves understood things very definitely, and immediately divided into two camps. Eventually the whole matter exploded wide open, reaching even into the courts, and many were shocked to find that the absolutely unbelievable allegations were true. Even today some who believed have not quite recovered their innocence. These days the problem is often in making someone understand just how it all happened. What can be crystal clear in hindsight can strain the bounds of credulity when recounted to one who did not know those years.

Many remember those as the golden years when every DXer was young and slim and lithe, filled with bubbling enthusiasm for DXing. Those indeed were the golden days, and we were the honorable Secretary-Treasurer of a DX club. After faithfully fulfilling our required duties for a full year, we prepared to relinquish the office and move on to higher and nobler things. With the elections at hand and everything on a downhill pull, we approached one of the club's Old Timers and asked about arranging for an audit of the club's accounts and cash flow preparatory to delivering the books to the newly indentured successor. The Old Timer was aghast.

"An audit?" he said incredulously. "Why, we never have audited the books. It would be a reflection on the Secretary-Treasurer to audit the books. After all, DXers are honest and we trust them. It can be no other way!"

How could we disagree? We had been in office for a whole year. In addition to the normal club dues and funds we had also handled the cash flow for the International DX Convention that year. While we would have liked a verification of our faithful attendance to duty as well as accounting for every dime handled, who would ever dare argue with an Old Timer? Not us. Not then, anyhow. The wisdom and the infallibility of age was yet to come, though we were working on it.

It would be incorrect to think that this might be but an isolated happening. Back then there could be no doubt that DXers were anything but without sin, above reproach, and never with an occasion to be questioned. That's the way it was, but as in a number of other areas things do change, and what you see in DXing



Generally it is not known that when the descendants of the mutineers on the Bounty were found on Pitcairn, many were resettled on Norfolk Island, some later returning to Pitcairn. David Miller, NZ9E, was on Norfolk this summer to help celebrate "Bounty Week" and operated with the call of VK9LU. "Bounty Week" marked the 200th anniversary of the first European settlement on Norfolk in 1788. Here is Dave at VK9ND's station glowing with the success he found on 10 and 15 meters.

today is not the same as was seen yesterday. Yesterday in this instance is close to a quarter century back.

However, it would be correct to say that then all DXers, at least among themselves, were considered to be noble, honest, and with prime virtues. You would also be correct to think that DX was pretty much of a sideshow in the amateur world, inhabited by a race of reclusive zealots who seldom surfaced at the organized amateur gatherings and were too often noted by their absence from the exalted callings of traffic handling and emergency preparations. DXers were generally outside the mainstream, maybe even sometimes a bit difficult to understand when noted by the more dedicated traffic and emergency types.

These days you will find DXers everywhere, often strident with their own special bulletins and publications, loud in recounting their triumphs, proud of their high towers and big beams, and well entrenched in the halls of amateur officialdom. DXers are the world travelers, always seeking to find what might lie beyond the utmost purple rim. Visit a DX convention and you will see DXers greeting visiting friends from other continents. DXers need no secret grips or distinctive hats. They are DXers, and DXers always know and welcome other DXers. That is the way it was meant to be in amateur radio.

But back in those years after WW II it usually sufficed for a DXer just to say that he had operated from the country for which he was handing out QSLs. Unless there was some good reason to raise a question, a DX operation was accepted routinely for credit in years far back in DX history. Even if the operation was in a country where no amateur licenses were currently being issued or amateur operation ap-

proved, the operation was accepted for credit. The policy was that such operations were credited because "... amateur licenses were not being issued in a normal manner." This was not an unspoken policy. It was freely discussed at DX forums.

Those were the days. There were instances of operations from obscure ocean reefs shown on nautical charts from sightings reported in the last century but not since verified. In these days of LORAN and satellite navigation it might be surprising to learn that in earlier days the location of islands given on the first sighting later proved to be several hundred miles off. The confusion at times did lead to a number of islands being shown on charts in a given area, these being different sightings given with different coordinates of the same island. Bouvet is one example of this confusion. There also have been instances reported where large islands with indigenous populations apparently disappeared beneath the sea, such instances being reported both in the South Pacific and South Atlantic.

Back in those days there were alleged DX operations from such areas of seismic activity. On enterprising type is countering some doubting questions about an operation in one such area, stating: "... as I approached the location of the island, I saw it rise up out of the sea all covered with seaweed and coral and things like that. I landed though the waves at times would still break over the island, and operated, the water at times up to my knees. Then, when I was departing we looked back and saw the island slipping into the ocean."

You laugh? It is hard to believe? Back then there were believers. Maria Theresa was once such an instance. This is an island first reported in 1843 by a New Bedford whaler named the *Maria Theresa*. Since then no one has been able to locate it, though as late as 1978 it was still being shown on NOAA Chart 2683. In 1983 after a study of the New Bedford whaler's log, it was moved to 136°W from 151°W and retained on the chart. It might be noted that sailing directions for the area note that there are numerous submerged dangers in a semicircle extending two hundred miles north from the location shown on the charts.

A check of the current DXCC Countries List will find no mention of Maria Theresa, not even as a deleted country. Check the Country List of around 1968 and a couple of years later and you will find it listed with the prefix of FO8M. Even while awash with doubt, it was not dropped from the country list until 1972, the notice being in the September issue of *QST* some five years or so after the operation was first claimed and accepted.

It is considered possible that the concept of all DXers being true-blue and honest helped bring on the big uproar in 1967. Until that time the policy had been that any application for credit for a DX operation would be accepted on reasonable assurance that the operations were as claimed, and unless contrary evidence was presented to question the opera-

The WPX Program

Mixed

1354 DF4ZL 1355 YU3PG

SSB

1995 IK7DBB 1997 I8IYW
1996 ISZJK 1998 SM0MIW

CW

2523 JA1AKH 2526 YU3NU
2524 K2GI 2527 F6BVB
2525 YU3PG 2528 I1HLI

Endorsements

Mixed: 450 JE2GMO, 500 JE2GMO, WA4WIN, 5H3RB, 550 JE2GMO, WA4WIN, 5H3RB, 600 JE2GMO, K4MEF, WA4WIN, 5H3RB, 650 JE2GMO, WA4WIN, 5H3RB, 700 PA0JMJ, WA4WIN, 5H3RB, 750 WB4FOT, LA9SN, 5H3RB, 800 WB4FOT, LA9SN, 5H3RB, 850 DK8KC, LA9SN, 5H3RB, 900 DK8KC, 5H3RB, 950 DK8KC, 5H3RB, 1000 DK8KC, SM4-3434, 1150 DF6EX, 1100 DF6EX, KB0G, YU3BQ, 1150 I1ZEU, L9ZO, KB0G, 1200 KC8CC, I1ZEU, K9ZO, KB0G, JA6GMU, 1250 I1EEW, I1ZEU, K9ZO, 1300 W4UW, 1350 SM6CST, W4UW, 1650 I2MQP, 1700 I2MQP, 1750 I2MQP, 1800 I2MQP, 2150 I2PJA, 2200 I2PJA, 2250 I2PJA, 2550 W4BQY, 2600 W4BQY, 2650 W4BQY.

S.S.B.: 350 NK3U, I8IYW, SM0MIW, 400 I8IYW, SM0MIW, G4POF, 450 I8IYW, WA4WIN, 500 KS0Z, WA4WIN, 550 KS0Z, HK6BER, KB0G, WA4WIN, 600 KS0Z, K3ZPG, HK6BER, KB0G, WA4WIN, 650 HK6BER, KB0G, WA4WIN, 700 HK6BER, WA4WIN, 800 KE6KT, 900 KE6KT, 950 KD9OT, 1000 DK5WQ, KS3F, 1100 I2EOW, 1150 KC8CC, 1200 I1EEW, PP2ZDD, 1250 PP2ZDD, 1350 W4UW, 1650 I2MQP, 1700 I2MQP, 1750 I2MQP, 1850 W4BQY, 1900 W4BQY, 1950 W4BQY, 2150 I2PJA, 2200 I2PJA, 2250 I2PJA.

CW: 350 JA1AKH, F6BVB, I1HLI, 400 JA1AKH, F6BVB, I1HLI, 450 JA1AKH, F6BVB, I1HLI, 500 JA1AKH, IK6ASR, F6BVB, I1HLI, 550 F6BVB, I1HLI, W9IAL, 600 EA7OH, WC4K, F6BVB, I1HLI, 650 EA7OH, WC4K, 700 KT2C, EA7OH, OZ4RS, 750 EA7OH, 800 EA7OH, 850 EA7OH, OZ5UR, 900 EA7OH, KB0G, 950 EA7OH, 1000 EA7OH, 1050 EA7OH, 1100 EA7OH, HA5LZ, 1200 SM6CST, KL7AF, HA5LZ, 1250 SM6CST, HA5LZ, 2050 W4BQY.

10 Meters: I1EEW, KB0G
20 Meters: Y81ZN, JA1AKH, G4MVA
40 Meters: G4MVA
80 Meters: Y81ZN, HA0DU
160 Meters: F6BVB

Asia: JA1AKH, YU3PG
Africa: I1ZEU, KB0G
So. America: I1EEW, KL7AF
Europe: JA1AKH, YU3PG, K2GI
Oceania: VO1AW, JA1AKH, KB0G, KE6KT, AB5C, HA0DU

Award of Excellence Plaque Holders: W5UR, CT1FL, W8RSW, WA4QMQ, W8ILC, VE7DP, K9BG, W1BWS, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IC, W3ARK, LA7JO, VK4SS, K6JG, N4MM, I8YRK, W4CRW, SM0AJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SJJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DE0DXM, DK4SY, UR2**, AB90, FM5WD, I2DMK, W4BQY, I0JX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, K0JN, W4VQ, KF2O, K3UA, HA8UB, W8CNL, K7LJ, W1JR, F9RM.

Award of Excellence Plaque Holders with 160 Meter Endorsement: KF2O, K5UR, OK1MP, N5TV, W8CNL, W1JR, W6OUL, W4BQY, W5UR, N4NO, W8RSW, N4KE, I2UIY, W8ILC, W1BWS, NN4Q, G4GUE, LU3YL/W4, I4EAT, VE7WJ, W9NUF, N4NX, VK9NS, DE0DXM, VE7IG, K9BG, AB90, FM5WD, SM0DJZ, DK5AD, SM6CST, I1JQJ, W3ARK, HI8LC, KA5W, UR2**, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SM0AJU.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX Awards, P.O. Box 1351, Torrance, CA 90505-0351 U.S.A.



On one of his business trips to China, Ken Miller, K6IR/3, operated from BY4AOM and BY4AY. Here Ken is at the operating position at BY4AOM. The home QTH is Rockville, Maryland, and Ken is the president of the National Capitol DX Assn. and one of their best-dressed members. Ken is also a member of the Radio Club of America, says he is a DXAHOLIC, and worked 268 countries in the DXCC Golden Jubilee Award effort, all on SSB.

tion. While this was the general policy and adequate in most instances, it also created a situation where some might take advantage of it. It also made it difficult to determine the validity of an operation and to have any doubt at all on the word of one of the honorable DXers.

However, doubts did arise, and in September 1967 a strong policy affecting the acceptance of claims for a DX operation and the requirement of substantiation was announced, this to include some, if not all, items such as passport endorsements, hotel bills, authorization to operate, certification by the captain of a private vessel when such transport was used, photos, local licenses if issued, documentation by local authorities, and anything else that might be relevant. While this was an attempt to close all possible loopholes, it also raised the hackles of a good many overseas amateurs as well as DXpedition types who loudly complained that the new requirements constituted a blot on the family escutcheon. Overseas amateurs threatened to have nothing to do with W/K amateurs if such requirements were enforced, the whole thing being a matter of sacred honor, and nothing less than full satisfaction would be acceptable.

While this did bring a lot of noise and fireworks, the ARRL did not back off. Then came the deletion from DXCC Credit several operations which had gladdened the hearts of the needy DXers. These included VQ9AA/C on Chagos, VK2ADY/VK0 on Heard Island, and PY0XA on St. Peter and Paul Rocks. Then there were deletions for K1IMP/KC4 on Navassa and VU2WNV in the Laccadives. The Laccadives were shot down when the license, issued by the Indian government, was stated by that authority not to include permission for a Laccadive operation. Chagos went under when the operator could not prove that he had been in that archipelago. St. Peter and Paul were deleted for the same reason, it later developing that the operation had been from a boat 1800 miles to the northwest off the coast of Venezuela. Heard Island credit was withdrawn because the Australian government said the license did not authorize operation from the island, and the request for permission to go to the island had been denied. Navassa founded because the Coast Guard had not given permission to land on the island. A couple

more were named as not acceptable for DXCC credit, these being 1A6SBO on Bishop's Rock and 1B9WNV on Blenheim Reef.

DXers were up in arms over these matters, all of them involving the activity of one individual with various other amateurs joining to participate in his efforts from time to time. Lines of dissent were formed, some clubs taking official steps to condemn or protest the ARRL actions, some terming the actions as "hasty." Every DXer was ready to give an appraisal of the situation. Most readily suggested remedies to alleviate the problem. Then a half-million dollar lawsuit was filed against the League, and when this got to the deposition stage things fell apart. It was admitted that the St. Peter and Paul Rocks operation had been a hoax and the lawsuit was withdrawn.

You might think that things would have ended at this point, but they did not. There were still believers, one DX bulletin maintaining that the whole thing was a clash of personalities wrapped in a personal vendetta against the DXer involved. And while some of the deletions stuck, the operations from Blenheim Reef, Geyser Reef, and the Chagos were stipulated in the court settlement to be restored for DXCC credit. The person involved was even nominated in a subsequent election for the Director's post from the Central Division; the petition was found to be invalid. Blenheim and Geyser Reefs are now found in the Deleted Countries list. Blenheim was included as part of Chagos in 1975, and in 1978 Geyser Reef went under Rule 4 of the DXCC Country criteria, this on the non-eligibility of unadministered areas.

One enduring result from all this mid-sixties uproar was a move to create the Advisory Committees with the DX Advisory Committee leading the pack. Some beliefs did surface during all the uproar, during the deletions and the lawsuit months, and the beliefs were sounded that some Directors were not too familiar with the DX scene. The stout protestations of innocence and the loud support for the individual involved from many quarters did not make things any easier. It was a time for change and changes came. Some say that DXer has never been the same, but also admit that the causes for the uproar back then could not happen these days.

As Buffalo Bob taught us on TV in other years, straight-shooting DXers always win, and eventually things quieted down. In 1972 the documentation requirements were relaxed, there having been few problems in the intervening five years since the initial announcement. Over 400 DX efforts had been up for DXCC credit with but a handful needing a second look. Some when queried refused to offer the needed documentation, while others failed to reply to requests and, in cases such as these, the efforts were disallowed. While the documentation requirements were relaxed, it was also noted that DXers should be aware that there might be instances in which they would be required to submit such proof and to be prepared.

We started out here noting that the belief had once existed that all DXers are unquestionably honest, and it was hardly proper to even hint at any other possibility. While the foregoing recounts what brought things to the battle stage, it has never been noted that anyone ever stood up four-square and said that this was the first time that some DXers had felt some doubt. There are old DXers, something perhaps only occasionally realized, who have heard only veiled and cryptic references to

The WAZ Program

10 Meter Phone

322 IT9TQH

15 Meter Phone

256 IT9TQH 258 NY2E
257 WB8TLI

20 Meter Phone

679 WA4GKT 684 N6DX
680 IT9TQH 685 K7TUH
681 I7UNX 686 LA1VFA
682 DU1KT 687 TI2TEB
683 I9WDX 688 K2PEO

40 Meter Phone

45 IT9TQH

80 Meter Phone

42 LU9FFA 44 JA1XAF
43 IT9TQH

15 Meter CW

129 IT9TQH

20 Meter CW

304 IT9TQH 306 KJ4BK
305 K4MF

40 Meter CW

82 NY2E 84 N6DX
83 IT9TQH 85 LA8XM

80 Meter CW

18 JH1RES

All Band WAZ

SSB

3216 KB1JV 3219 DL5OAH
3217 JA2DSF 3220 N8ARA
3218 I8DVJ

Phone/CW

6358 DL8KBT 6368 W1RFW
6359 DJ8NK 6369 DJ4ET
6360 ON7PO 6370 DL7AIO
6361 DF2SL 6371 IQZUT
6362 I5BG 6372 IK0FWI (CW)
6363 DJ1XP 6373 IK0FWI
6364 WU4G 6374 G4KHM
6365 KC1GN 6375 DK7CY
6366 I8DVJ 6376 DL1EAL
6367 HB9BOS

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (39 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants forwarding QSL cards either direct to the WAZ manager or to a check point should include sufficient postage for safe return of their QSL cards. The processing fee for all C.Q. awards is \$4.00 for subscribers and \$10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application.

other possibilities. Possibly some of those have never even heard of the big uproar in the sixties. QST from 1967 to 1968 will give a lot of information. (May '68, p. 81; Aug. '68, p. 10; Sept. '68, p.86; Oct. '68, p.9; Oct. '68, p.83 are sources which will give much information and understanding of the how and why of the whole matter.)

Some DXers continue to believe that the whole uproar marked a watershed in DXing, and things in some ways were never again the same. Possibly they are right, but certainly most consider that the eventual result was for the good, with light brought into some of the shadier areas of DXing. It also brought a clearer understanding of what DX might be proper and acceptable. But with all of this there still remain DXers who continue to cringe at the memory of the uproar and refuse to even think



How does one earn 5BWAZ? By DXing at every opportunity. G4BWP and G4GIR drove to the big European hamfest at Friedrichshafen this summer, doing a bit of DXing at every stop. Here in Luxembourg G4GIR does some DXing on the return trip. Does it help in getting 5BWAZ? Well, G4GIR just sent in his application for the award and G4BWP got #165 last February. Never miss a chance to work DX! It brings its own rewards.

of or mention the participants who brought some exciting days of DXing, some of which turned out to be ephemeral with only the memory remaining.

To know is to perhaps gain a better understanding. We continue to believe that DX in these days is the best ever, and DXers have moved to assume their rightful place in things. But it also helps to remember and understand how it all got his far. At times it was not easy.

WAZ

There has been mention that the WAZ award is not exactly easily gained, and the 5BWAZ is probably the toughest major award for DXers to acquire. Anyone who is involved in handling the award is quickly aware that the 5BWAZ is a cyclical award, the applications often peaking at the bottom of a sunspot cycle then tapering off as the cycle rises. The reason always is that the low bands are the last usually to be completed with 80 meters often being the final one to be filled.

In the Northern California DX Club bulletin, "The DXer," Jim Maxwell, W6CF, fills in some of the history on the WAZ Award. W6CF notes that the thirties were a time of change in amateur radio and especially in DXing. With there being rapid developments in equipment, DXers advanced along with it, and the early 1930s brought discussions of "countries" and similar interesting matters. Keep in mind that CQ was yet to come on to the amateur scene, but there were other well-known and popular magazines including QST, Radio, and R/9, these being the three major amateur magazines published.

In November 1934 R/9 published the rules for WAZ, the article announcing the program also included a zone map and a list of countries by zone. The WAZ Award was mentioned as a future possibility but was not offered in the initial announcement.

Who came up with the idea? As in other DX awards, the originator of WAZ is not known these days, the identity not mentioned in the original announcement. W6CF notes that it must be a certainty that Killian V.R. Lansingh, W6QX, had a hand in the formation.

In 1935 W6QX bought out Radio and com-

bined it with R/9, and with the January 1936 issue that combined journal was published under the Radio title. In February of that year the WAZ Award was announced in the newly combined journal but with no mention of it having previously been offered in R/9. Herb Becker, W6QD, was the DX columnist for Radio, and Herb handled the award and promoted it among DXers.

WAZ was not even easy back then. It was not until October 1936 that Herb published any standings. At that time 28 stations had 26 or more zones. None had reached the full 40 zone mark and 6 were at the 39 zone level. ON4AU was the first to earn a WAZ, J. Mahieu, the operator, being announced as the winner of WAZ #1 in March 1937. Zone 23 was a tough one, and ON4AU made it by including a QSO with AC4AA in Tibet.

A phone award was made available, and that was a time when phone was a difficult mode. W5DBD led the phone pack with 27 zones. G2ZQ achieved the second WAZ in June 1937, AC4YN in Zone 23 again being the last zone worked. Zone 23 was the difficult one with AC4YN the only station regularly active from that zone, and Reg Fox, the operator, was running 35 watts to a Zepp antenna aimed at Europe. It was not until 1939 that AC4YN worked any W stations, working three that January. Others in the U.S. also managed during that year to get their needed Zone 23.

The third and last WAZ gained prior to WW II was by Fumio Horiguchi, J5CC, this coming in 1940. With the U.S. neutral at that time and U.S. DXers asked to avoid contacts with amateurs in countries that were engaged in hostilities, things went downhill, DXing with it.

The WAZ Award was not announced before things were shut down in the early forties. It came as a post-war offering. There were many DXers working for the WAZ accomplishment, many of them stuck at the 39-zone level. These included W8CRA who was number 1 in gaining the DXCC Award, and W2PHW (now W6PM) who also was stuck at that level. In the phone WAZ W3LE was at the top with 38 zones.

5 Band WAZ

As of August 1, 1988 187 stations have attained the 200 zone level.

New recipients of 5 Band WAZ with all 200 Zones worked:

G4GIR IT9TQH LU9FFA

The top 8 contenders for 5 Band WAZ are:

- | | |
|---------------|----------------|
| 1. N4WW, 199 | 5. SP6JCY, 199 |
| 2. W8UVZ, 199 | 6. W2YY, 198 |
| 3. K6YRA, 199 | 7. W7UR, 198 |
| 4. K9GX, 199 | 8. KB0U, 198 |

490 Stations have attained the 150 Zone level.

Applications and reprints of the latest rules may be obtained by sending a self-addressed stamped envelope (45 cents) size 4 1/2 x 9 1/2 to the WAZ Manager, Leo Haijsman, W4KA, 1044 S.E. 43 Street, Cape Coral, Florida 33904. Applicants should include sufficient postage for safe return of their QSL cards. The processing fee for all CQ awards is \$4.00 for subscribers and \$10 for non-subscribers. In order to qualify for the subscriber rate, please enclose your latest CQ mailing label with your application.

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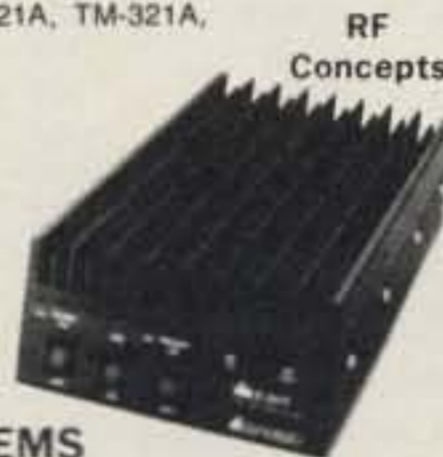
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FRG-8800, FT-736, FRG-9600, FT-
711RH, FT-2700RH, FT 212/712RH.

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FT-2/1/709R/H
FT-1903/1123
FTH-2005/7005

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IC2/4GAT
IC-A2/U16

Landmobile HTs
ICOM: U16, H16, V100, U400
YAESU: FTH 2005/2007
UNIDEN, REGENCY, KING, TAD
MARINE ICOM: M5, M55, M700
AVIATION ICOM: A20 H.T.

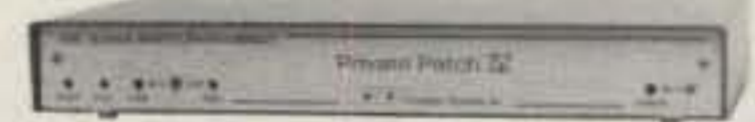


RF Concepts



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DJ-100T
YAESU FTR-2410, Wilson
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ICOM IC-RP 1210 (1.2 GHz)
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ALL
SALES
FINAL

When the war ended and amateurs returned to the air, CQ magazine sponsored the WAZ program and things really took off. However, it should be noted that six years after WAZ was originally offered, only three stations qualified for it and none of these were Ws or VEs. It is still a hard one to get, the 5BWAZ being the most difficult DX award of them all.

Antigua

The feeling has long existed that DXers never really lose all their interest in DXing. Some may wander for a few years, but most eventually return to the scene of their greatest DX triumphs. G6QQ was first licensed in 1932 (that's 56 years back), but was off the air from 1937 to 1983. But Dave returned to find that the DX contests are better than ever. And he will be in V21-Antigua for the CQ WW Phone Test. He will be on the island for a week and most of the time he will be on the air. He will be running low power, about 100 watts, but he will be persistent. Look for him mostly on 15 meters during the contest where he will be trying to accumulate a good single-operator, single-band score. QSL to: David Dutton, G6QQ, 55 Stalham Road, Hoveton, Norwich, NR12 8DU. We have everything here but the call which Dave did not know at the time of writing. But just work every V21 station you hear and he is sure to be one of them.

WPX

Norm Koch, K6ZDL, notes that the printout of one's file in the WPX is available for those on the Honor Roll and for the Honor Roll only. The cost is \$3.00 per mode, and requests should go directly to Norm. It might be a good time to note that foreign applicants for WPX must enclose a self-addressed envelope with sufficient IRCs for the return postage—that or U.S. stamps.

Sometimes the question arises as to what is a valid prefix for the Honor Roll. A good rule of thumb is to consider that if the prefix is listed in the *Callbook*, it is good for the Honor Roll. The exception is the special prefixes such as those used during the Olympics. These do count. Discontinued call prefixes such as ZE-Rhodesia do not. If you have worked everything else, 5BWAZ and 5BDXCC, try the WPX. That's one action where you will never run out of possible new ones!

USSR QSLs

Often the question is asked, "Are IRCs good in a country? Is a greenstamp okay?" DXers learn to be cautious in such matters, but what might have been a question yesterday may be readily answered today.

First the IRCs. This is regularly discussed. Some say that IRCs are not good in certain countries. They technically are wrong though often a problem is encountered in getting them accepted. If a country has any international exchange of mails, it must be a member of the Universal Postal Union based in Geneva. This is a treaty organization just like the ITU. One of the provisions of the treaty states is that all members of the UPU must issue and accept IRCs. And one IRC is good for one surface rate of international mail, whatever that might be, and it varies from country to country. The problem is that some post offices never see an IRC in their lifetime. And when someone shows up with a not recognized coupon and demands stamps, there may be some reluctance or out-

CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries for the mode indicated. The ARRL DXCC Countries List is used as the country standard. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. Deleted countries do not count and are dropped from listing as they occur. Total countries are now 319. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be made at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement. All updates must be accompanied by an SASE for confirmation. The fee for endorsement involving the issuance of a sticker is \$1.00.

CW

N4JF	319	K1MEM	313	EA2IA	307	N5FW	294	K4CXY	286
K2FL	319	N4MM	313	SM6CTQ	306	K9BWO	294	I8WY	286
W9DWO	319	W4BOY	312	K3UA	306	IT9TOH	294	W1WAI	283
K4CEB	318	W2FXA	312	AB4H	304	NN4Q	293	W9SC	283
K9MM	318	K6EC	312	W0IZ	303	WD9IIC	292	G2GM	282
SM6CST	317	OK1MP	312	W6SN	303	IT9ZGY	292	JH1VRO	282
W6PT	316	SM3EVR	312	WA8DXA	302	N5DX	291	K1VHS	282
ON4QX	316	YU1HA	312	YU2TW	301	WA4JTI	290	WA4DAN	281
N4PN	315	N4MM	312	I3OBO	301	KQ9W	290	N4AH	281
DL7AA	315	N6AR	311	WB4RUA	300	IT9QDS	290	K7ZR	280
N6AV	315	DJ1XP	311	W0SR	300	W1WLW	289	I5XIM	280
K6LEB	315	W6ID	311	DL6QW	300	W4BV	289	W2LZX	280
W1NG	315	DL3RK	311	W7CNL	299	N8MC	289	W9NUF	280
WBKPL	314	K9QVB	311	K3FN	298	K8NA	288	HB9AFI	279
K6JG	314	K4XO	311	K9IW	298	W9WAQ	288	DL1QT	277
K9AB	314	AA6AA	309	DJ7CX	297	W6YO	287	KA3R	276
DL8CM	314	W9RY	308	K8LJG	297	G2FFO	287	W6DN	276
N6CW	313	W4OEL	307	WD9IIX	296	K2OWE	287	K4SE	275
DL1PM	313	N2KW	307	W0HZ	295	NN4Q	286	K2JF	275

SSB

N4JF	319	W1NG	314	NN4Q	308	WZ4I	300	JA5PUL	289
K6WR	319	W1LQO	314	NY5L	308	WB5TED	300	W9TA	289
DL9OH	319	W8JXM	314	VE4SK	307	I2ZGC	300	G4ADD	289
F9RM	319	DL6KG	314	WB1DOC	307	NW5K	300	A19U	289
W6EUF	319	W8ILC	313	I0MBX	307	WB6GFJ	300	KA3HXO	288
VE3MR	319	EA4LH	313	KV2S	307	JH1VRO	300	OK1AWZ	288
W4UG	319	W8PCA	313	KB9OC	307	WB6PSY	300	WA6DTG	288
K2FL	318	N2SS	313	VK3JF	307	IT9TOH	300	KI3L	287
DJ9ZB	318	VE7WJ	313	K9IW	307	WA0TKJ	299	EA3KW	287
W4NKI	318	K4XO	313	NJ2C	307	I6PLN	299	AB9E	287
4Z4DX	318	N6AHU	313	W4UNP	307	KABT	299	XE1MDX	287
W4DPS	318	OE2EGL	313	WA2MID	307	DJ7CX	298	PA9XPQ	287
W0YDB	318	F2MO	312	N4KE	306	K9SM	298	F6BF1	287
ZL3NS	318	K8PYD	312	KC8EU	306	I8LEL	298	N8BJO	286
W9DWO	318	W0SD	312	KB5FU	306	JH4PRU	298	N3ARK	286
VE1YX	318	K9RF	312	K8CMO	306	EA9IE	298	K9MNT	285
W4EEE	318	K4MOG	312	XE1OX	306	XE1HI	298	KB5RF	285
VE3GMT	318	K9HDZ	312	KE3A	306	KC8YM	298	I8IGS	285
W9JT	318	LA7JO	312	W6NLG	306	K4LR	298	K4JLD	285
ZL1AGO	318	LU3YL	312	EA1QF	305	K5DUT	297	K0BV	284
K6YRA	318	W7FP	312	NA5W	305	HP1JC	297	KC2FC	284
I8AA	317	N6OC	312	KZ8Y	305	YU7KV	297	KC7EM	284
I0ZV	317	SM4CTT	312	K8VJV	305	XE1OW	297	KB2MY	284
DJ1XP	317	K3UA	312	WB4UBD	305	WA4ECA	297	WB3HAZ	283
ZS6LW	317	W6DN	312	K4RIG	305	WB3GPR	296	VE3MV	283
OZ3SK	317	PY2DBU	312	K9HOM	305	KB3KV	296	IN3ANE	283
K9MM	317	9H4G	312	K8ZZU	305	W4BOY	296	ZP5JCY	283
KD8VM	317	VE3MRS	312	W6BCQ	304	I0SGF	296	CX4HS	283
W2SUA	317	W4SSU	311	WA4DAN	304	K8NWD	296	AE5B	282
CT1FL	317	K6EC	311	KB4HU	304	W0IYR	295	A19R	282
KS2I	317	I4LCK	311	XE1KS	303	KK0C	295	TG9EP	282
N7RO	317	W0SR	311	W2LZX	303	KS0Z	295	N1ALR	282
W0SFU	317	K8NA	311	KB0U	303	G3XTT	295	F6BF1	281
K5OVC	316	NJ0C	311	KB3OQ	303	W6MFC	295	W9SC	281
I0AMU	316	N2KW	311	K0GT	303	KA9ABC	295	K9TI	280
T12HP	316	W2CC	311	K1MEM	302	VE3XO	295	ZL1BOO	280
YV1KZ	316	G4CHP	311	N5FG	302	K4LR	295	G4FAM	280
VE2WY	316	IV3YRN	310	W6FET	302	WA2FKF	295	KU9Z	280
W3AZD	316	DK2BL	310	I3OBO	302	I8ZTE	294	VE6PW	280
OA4OS	316	AA6AA	310	K9UAA	302	WD0BNC	294	XE1XM	280
OK1MP	316	WA4JTI	310	KP4EQF	302	I5BDE	294	WD9IIC	280
W9SS	316	AB9O	310	N5FW	302	K1VHS	294	KB5DN	279
PY1APS	316	W7OM	310	I5EFO	302	WB3CON	294	EA6DE	279
IT9ZGY	316	WA4WTG	310	KQ9W	302	SM6CST	294	JH8NYK	279
EA2IA	316	WD8MGO	310	I2MOP	302	W4UW	294	KX5V	279
I8ACB	316	K1UO	310	K4CXY	302	KE4HX	294	K4BYK	278
OZ5EV	316	KU9I	310	WD8PUG	302	K4SE	293	VE3IUE	278
XE1AE	315	W6SN	310	I8XTX	302	KC8JH	293	KB8O	278
I8YRK	315	KZ2P	310	WB4NDX	301	A15I	293	KG9N	278
N6AR	315	W8IMZ	310	WA3HUP	301	W9NUF	293	KB7VD	278
I4ZSQ	315	K2JLA	310	VE3FJE	301	G4GED	293	WB0UFL	277
I8KDB	315	N4PN	309	WB1LC/QRPp	301	KD5ZM	293	W4PTT	277
K9LKA	315	ZL1BIL	309	W9OKL	301	WB6OKK	293	KB0SY	277
N4WF	315	WD9IIX	309	YU2TW	301	W5LLU	293	IK8BQE	277
OE3WWB	315	KB8DB	309	N4CRU	301	WA4LOF	292	N0AMI	276
YU1AB	315	K9QVB	309	KZ0C	301	AC0A	292	N7ASL	276
ON5KL	315	W2FGY	309	N8BKF	301	VE3FEA	292	WA4OPW	276
OZ8BZ	315	KR9O	309	WT4T	301	VP9CP	292	KC2RS	276
K9AB	315	WB3DNA	309	YV1AJ	301	W8LKG	292	WA9IVU	276
N6AW	315	VK4VC	308	K3LUE	301	SV1JG	292	WA9RCQ	276
K1UO	315	YV5AIP	308	KB2HK	301	VE3DLR	292	K0HQW	276
K9BWQ	315	N6AV	308	K7LAY	301	WD9GQV	292	I2WZX	276
YV5DFI	314	A18S	308	AG9S	301	VE3IPR	291	I8INW	275
K6JG	314	N4KG	308	KB9KD	301	N5AWS	291	WB1EAZ	275
VE3XN	314	I8KCI	308	K2JF	301	W4JFE	291	VE7BSM	275
YS1RRD	314	I4EAT	308	W0ULU	301	DU9RG	291	VE5FX	275
K8LJG	314	A18M	308	VE4AT	300	XE1CI	291	KE4VU	275
W3GG	314	NS7Z	308	I1POR	300	VE3CKP	290	N9CPW	275
I2LLD	314	VE7DX	308	SV8CS	300	WE2L	290	I2EOW	275

CQ DX Awards Program

SSB

1618	KB2MY	1621	N8IMZ
1619	I8IYW	1622	W4TMN
1620	KI40I		

SSB Endorsements

275	KS0Z/295	200	I8IYW/212
275	W5LLU/293	28 MHz	KB2MY
275	KB2MY/284		

CW Endorsements

300 K3UA/306

Total number of active countries is 319. The basic award fee for subscribers to CQ is \$4. For non-subscribers, it is \$10. In order to qualify for the reduced subscriber rate, please enclose your latest CQ mailing label with your application. Endorsement stickers are \$1.00. Updates not involving the issuance of a sticker are made free when an s.a.s.e. is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for air-mail reply. Please make all checks payable to the awards manager.

right stubbornness. In such cases you are more informed than the clerk or even the post master, if you can believe that.

Now a recent note came to Bill Mark, K2PEQ, from Valery, RA9YD, in central Barnaul in the Soviet Union. Valery says, "... it is likely that a lot of your friends or hams need to get confirmation something from USSR, whether new country or oblast and zone, etc. I will help everybody for their application, 3 IRCs per QSL. One IRC goes to destination and two to pay postage for airmail return; one green-stamp is acceptable instead of 3 IRCs. Under the new conditions, such actions are allowed. I hope to develop this kind of QSL managing; possibly it should help get a lot of needed QSLs from rare ones in the USSR."

That's the letter received by K2PEQ in mid-summer. If you need help, think of Valery Tyulypin, Box 2535, Barnaul, 65057, USSR. Always keep in mind that the attitude towards currency in the mails, as well as the privacy of the mails themselves, varies greatly from country to country. There are places where possession of foreign currency can bring swift action from the authorities, while in other places there is little concern. The privacy often is not what one might be used to or expect. Always be circumspect and consider the possible effects at the receiving end.

Congo/Zaire

Tom Gregory, N4NW, returned to his Congo QTH in August and will have TN4NW on the air again. Tom also obtained a license for Zaire and will have a station in Brazzaville, the equipment being shipped from the States in May. The plan was to run about a week or so operation when the Brazzaville station comes on line signing 9Q5NW. After the initial activity 9Q5NW will probably be found mostly on weekends. Such operations will depend on family and work commitments. CW and SSB will be used, but no other modes. Frequencies to monitor include 3750, 7043, 14145 and 14180 kHz; 21250, and 28490 kHz for SSB. CW will be 25 kHz up from the lower band edge.

TN4NW uses a PC logging program and can easily identify multiple QSO stations. QSLs for

Tom's operations go to Tom Harrell, Box 368, Stockbridge, Georgia 30281-0368. Send nothing to TN4NW.

Micronesia

There will be activity from the Eastern Carolines later this November with Dave Sublette, KX6DX, active from Pohnpei in the Federated States of Micronesia. Dave will sign KC6TO from November 20th through the CQ WW CW DX Test and all the way to November 28th. There will be good activity by KC6TO in the CQ World-Wide DX Test, and all bands from 160 through 6 meters will be used.

Check for KC6TO at or about 1831, 3505, 7005, 14030, 21030, 28030, and 51150 kHz. For the latter it might help to list it as 51.115 MHz. Dave was out to Pohnpei in 1986 for the CQ World-Wide DX Test working 1800 QSOs during a week's stay, 71 countries being in that bundle. One-sixty action was held down by the lack of an amplifier then, but this time Dave will have a 500 watt linear for that band.

QSLs will go to the North Alabama DX Club, Box 4563, Huntsville, Alabama 35815. An SASE or SAE/2 IRCs will be needed for a direct reply; no return postage and they go via the bureau. QSLs will not be handled by Dave from his mid-Pacific address where he is currently stationed.

Mozambique

Kjell Grahan, SM7DZZ, put C9MKT on the air a few months back and should be showing about one week or so a month. Kjell is using a log periodic antenna at the Swedish Embassy in that country's capital but hopes to have his own operation going, signing C9MKG this fall. Kjell is awaiting the needed official approval.

Look for him from 1200Z onward, sometimes around 14300 kHz and sometimes around 21300 kHz, and tune around as he often is 10 or 15 kHz off those frequencies. He also shows on 10 meters around 28530 kHz and will work CW on his SSB frequency if requested. QSLs go to SM5KDM.

New Book—DX Around The World

Franz Langner, DJ9ZB, has a new QTH and a new book. Recently published, *DX Around The World* is a reference book aimed at the needy DXer—one who needs all the information he can get.

Arranged in alphabetical order of the call sign prefixes, the book shows every country by geographical location, showing either an outline of the geographic limits or, in the case of islands, photos of the island. A QSL or a photo of a DXer in that country, often both, are shown, plus the licensing authority and its address and more. Concise but all that you might need if you are thinking of traveling, it can be helpful to anyone who needs a quick reference.

Franz Langner recently moved QTHs, a horrible experience for any DXer, and currently he is receiving mail at Box 150, 7637 Ettenheim, Federal Republic of Germany.

Years back at one of the International DX Conventions we saw a young fellow sitting in a chair against an outside wall, and as DXers learn to do, we checked his name plate—DJ9ZB. We were delighted because we considered him one of the top DXers in the world but had no idea that he was so young and unassuming. A member of the DX Hall of Fame, Franz has put together a lot of good information in his book *DX Around The World*.

Curacao

Rich Smith, N6KT, will be signing PJ2FR in the CQ WW Phone test and aiming for a single-op record—along with a few others. Rich has been to Curacao previously, being there for the 1983/84/85 Tests. Watch for PJ2FR most anywhere the action is open. Rich named no frequency he would be watching. N4WW and NX4N will also be there signing PJ1W.

Dodecanese

Bruce Butler, W6OSP, will be in SV5-islands for the CQ WW CW Test. Bruce is the president of the Redwood Expire DX Assn., so watch for him when the bands are open to six-land. QSL to CBA.

More CQ World-Wide DX Test Notes

Remember that GD4UOL will be on the Isle of Man for the CW test doing scientific research to determine whether the Isle of Man is really DX. Listen for his signal and make the Isle of Man safe for posterity.

K3KG, K3ZR, and K4FJ will be in Barbados to sign 8P9X in the sideband portion the end of October, and NE8Z will return to the Galapagos for some HC8 activity, this also in the SSB CQ World-Wide.

Jim Cain, K1TN, will be operating from The Last Resort on Montserrat in the CQ World-Wide CW Test the end of November, as will AD5DX who will be heard the same weekend signing VP2MW. KB2HZ will be on from Aruba in the phone test signing P40T, this to be a 15 meter single-band effort, and AI6V will again put P40V on the air in a multi-multi effort. N1GL will be in Aruba for a multi-band, single-op effort signing P40A.

You might also watch for VK9YG which will be signed by G4JVG the last two weeks in October and which is expected across the CQ WW Phone Test. Even the long-awaited Ogasawara effort by 7J1ADI, which has slipped its schedule, may end up across the CQ Phone Test.

OH2BH will be in Guinea-Bissau signing J52US for the CQ WW Phone Test with another OH operator scheduled to work the same station in the CQ WW CW Test. Other Finnish DXers might be found far from their familiar skies at this time with OH2BAZ and OH1RY making the Grand Pacific DX Circuit starting in mid-October and DXing for five weeks. Peter, OH1RY, will listen for the SSB signals, while Vili, OH2BAZ, will cover the CW side of the bands. During the CQ WW DX Tests the team will be in YJ8-Vanuatu for the SSB go-round and in A35-Tonga for the CW exhilaration. The full list of DX stops includes FO5, ZK1/South Cooks, 3D2, FW8, YJ8, A35, and then doubling back to 3D2 and ZK2.

Some Shortened DX Notes

EK0AKW a month or so back was on Wrangell Island. Back in August it was noted that this one disappeared from the DXCC Country List without anyone having worked it, though it was on the list for a long time. We got some copies of QSL cards for Wrangell, but alas, for contacts subsequent to the deletion. If it had been worked before the deletion date, it would not have been deleted. One has to understand things such as this to understand the DXCC Country List.

While some DXers consider that a receiver, a transmitter, maybe both of these in one unit, a linear with a thick power line running out to

the local utility tap, a high tower, and a big beam are all that a DXer will ever need, there seem to be more DX types operating the DX machine with one hand and a computer keyboard with the other.

TN4NW does his logging with the aid of software available from Don Greenbaum, WB2DNB. The software does provide duplicate contact checking by band, with TN4NW forwarding the QSO disk to the QSL Manager, who takes things from there. This software for logging purposes is available from WB2DND, Box 79, Plymouth, Massachusetts 02364, and information will be provided if an SASE is sent. Any proceeds from this service go to TN4NW DXpedition efforts. The software is PC compatible.

The XANTEK software the Super DX Edge® is also PC compatible and has a lot of quick information available, including the shifting location of the gray-line terminator. This can be calibrated to the curve position of any of the world's time zones. There is a full file of country names, prefixes, great-circle bearings, and MUF calculations. Tony Japha, N2UN, at Xantek (Box 384, Madison Square Station, New York, NY 10159) will supply the flyer on the DX aid if you ask for one.

And don't forget: The Great New DX Season opens the last weekend in October with the first leg of the CQ World-Wide DX Tests. The 1988 Contest announcement was in the September issue of CQ. As the Old Timer of Contesting, Frank Anzalone, W1WY, will say, "DXers, man your rigs!" With that call every true-blue DXer will be in the shack the last weekends of October and November. It can be no other way!

73, Cass, WA6AUD

WNZ #1

We have come across more than one DXer who cautiously admitted to regularly reading Bill Welsh, W6DDB's column for Novices as a refresher for some basics perhaps forgotten and for gaining some new insights. Here is the result of some of that Novice effort.

Larry J. Hale, KA0GZS, is the holder of the first WNZ certificate, working the required zones all on CW. Larry has ambition for more awards, already having WAC and WPX, and he is closing in on a Novice DXCC with 95 countries worked.



This is Larry Hale, KA0GZS, who won WNZ #1, this award to Novices working the required number of the WAZ Zones. Considering that the antenna system consists of a 40 meter dipole, one must acknowledge that being WNZ #1 did not come easily.

The gear includes a Kenwood TS-180S. The antenna is a 40 meter dipole. That's it. Married, he has a brother who is also licensed, this being Ron Hale, W0PLW. Larry is employed in the family jewelry business in Cape Girardeau, Missouri. He is also a member of the Southeast Missouri Radio Club (SEMO).

It is always interesting to note what a Novice can do even with the confines of that license. It is more so when one manages to achieve results that are even difficult to higher class licensees. In this case Larry Hale, KA0GZS, has WNZ #1 to show what can be done.

DX Ten Years Back

In November 1978 Marty Laine was in the Madeira Islands for the CQ World-Wide, active in both portions of the DX Test. VR0M was being studied as a possible new one, this Malden island in the Line Island Group in the Pacific.

The eternal Colvins were headed out on one of their trips and were at KG4 for the CQ WW and planned to head south across the Caribbean. Navassa was scheduled for the end of November. A4A was on from Halala in Oman, and WA2TFC was operating ST2SA in the Sudan. It was a good time for DXers, and DXers always enjoy the good times.

Peter I Island was being discussed with LA2AD advising that a license had been issued but that prospects of getting to and landing on the island were rather slim. The needed countries in the Great W1AM poll showed the top ten, in order, to be: Bouvet, China, 8Z-Neutral Zone, VS9K-Kamaran, Burma, Albania, Spratly, Heard Island, Laccadives, and Abu Ail. Ahmed, the Qatar ambassador to Iran and Afghanistan, was signing A7XAH on 20 and stoking DXers' hopes for a couple of the other rare ones in that area.

HV2VO was operating the Vatican Station, Father Ed having previously signed VU2SX from St. Xavier's College in Bombay. QSLs were going into the mails for the Desecheo operation with the needy DXers waiting for their new country QSL, this being for the advance activity from that promised land. LU3ZY was on from the South Sandwich Group, and SM0AGD was in Beijing seeking some way to get on the air. Some killjoys were raising the point that in 1959 there had been an agreement that everything south of 60°S would be one country without boundaries. South Shetland and the South Orkneys were within that 60°S boundary and Peter I was at 69°S. South Shetland and South Orkneys were considered safe for DXers, they having been DXCC countries prior to 1959. But it was Peter I status that brought some worries. Would it ever come on the air? Would I work it? Would it count for DXCC? DXers always fear the worst and worry that it won't happen.

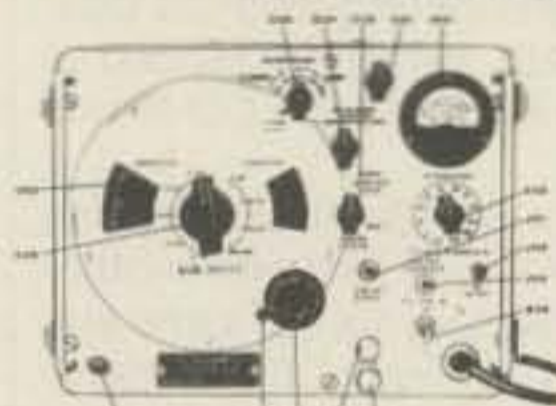
QSL Information

Available to DX stations needing an experienced DX Manager, Larry McKay, K5MK, stands ready to serve. Larry previously has handled the QSLing for two DX stations. Qualified—31 years a DXer!

CE2DZN to LU9FFA
 CR5CQK to CT1COK
 C6A/WF2S to WB2CZC
 C9MKT to SM5KDM
 EJ1000 to EI7CC
 F2DX/FJ/FS to DF4GV
 FT8ZB to F6ESH
 HB8/DF4GV to DF4GV
 HD8DZ to HC2DZ
 HP2XVB to KB4WZQ
 HS8A (June 88) to JA1AJT
 HS8U to JH8BKL
 HS8YDY to JH8BKL
 J79MD to N4CRU
 KA2IJ to KB1BE
 KC3RE/TA3 to K3BEQ (state-side), to SM5CAK (overseas)
 KH6LW/KH3 to KH6JEB
 OH8/K8MFO to W8TPS
 OX/11DMK to I2MQP
 P48GO to K5GO
 P48W to WA4CMS
 TL8HW to KJ4GK
 TN4NW to AL7EL
 TU4CQ to WA0NDF
 T31JS to VK9NS
 UI9PK to UK3A
 UA3TT/UF2 to UA3TT
 VK9LU to NZ9E (ex-K9POX)
 VP2MDC to K1TN
 VP2MR to W5STI
 VR6MW to NZ9E (ex-K9POX)
 XE11KG to WQ5Y
 ZC4EE to G4SSH
 ZF2MN to KA3MQI
 ZK1QC to K9QVB
 ZK3RVC to VK2BCH
 3C1JFP to ON7GV
 5H3RB to NM2R (87-88 CB)
 5X5SP to DK2RZ
 8P6JQ to KA6V
 9H3IJ to DF5BM
 9Q5NW to AL7EL
 DJ9ZB to Franz Langner, Box 150, 7637 Ettenheim, West Germany

H44X to Solomon Island Radio Society, Box 418, Honiara, Solomon Islands
 HS88 to Box 2008, Bangkok 10501, Thailand
 KV4AM to Harold McBirney, 1428 Northern Way, Winter Springs, FL 32708
 LR1V to Radio Club Bariloche, Box 397, Bariloche (RN) Argentina
 P29KF to Box 997, Madang, Papua-New Guinea
 P29KN to Keith Newhard, Box 133, Bulolo, Monobe Province, Papua-New Guinea
 SV9AKD to P.O. Box 1224, Iraklion, Greece
 T38MA to Harold McBirney, 1428 Northern Way, Winter Springs, FL 32708
 UM8MRG to Alex Lavrenchenko, Box 392, Frunze 55, Khirz 720055, USSR
 VK9LU to Dave Miller, 7462 W. Lawler, Niles, IL 60648
 VR6MW to Dave Miller, NZ9E, 7462 W. Lawler, Niles, IL 60648
 YB8ARC to c/o ARCO Indonesia, Box 63, Jakarta, Indonesia
 ZF2ML to 78 Medford Indian Mills Road, Vincentown, NJ 08088
 WA4WTG to Bob Kaplan, 718 S.E. 3 Lane, Dania, FL 33004
 YB2BAR to YB0SY, Box 4770, Jakarta, 1001 Indonesia
 ZK3YY to Box 1625, Apia, Western Samoa
 4F4FF/5N4 to Bob Kaplan, 718 S.E. 3 Lane, Dania, FL 33004
 5K3B to HK3NTI, Box 484, Bogota, Colombia

Signal Generators SG-103/URM-25F

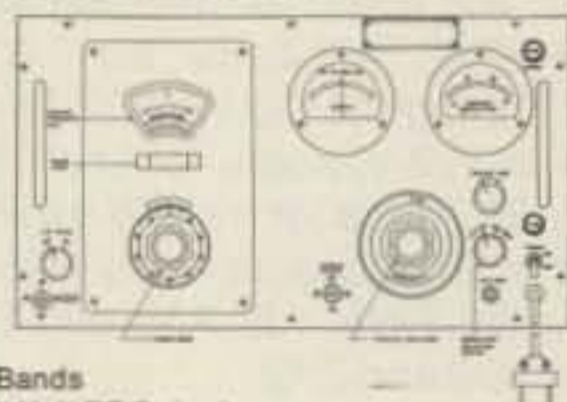


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Accessories Available
\$25.00 Additional

- 10 kHz-50 MHz in 8 Bands
- Sub-Microvolt to 2 Volt RF Output
- Resistive Attenuator
- Crystal Calibrator
- Checked out with schematic

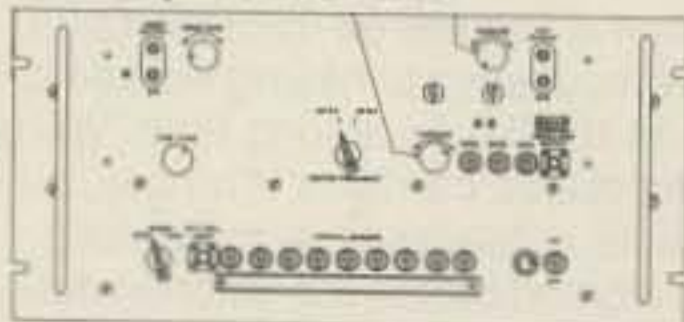
TS-497 B/URR



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- Piston Attenuator
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CIRCLE 29 ON READER SERVICE CARD

1 ANTENNA = 9 BANDS

The GARANT GD-6 dipole was tested and recommended by TCA (The Canadian Amateur, similar to QST) in June 1985. The GD-6 and GD-8 were tested and recommended as first choice in a test of three wire antennas by the CNIB (Canadian National Institute for the Blind.) TCA and CNIB confirmed that the GARANT GD-antennas need no tuner on all bands tested.

MODEL	BANDS	LENGTH
GD-6:	80-40-20-17-12-10M	137'
GD-8:	80-40-30-20-17-15-12-10M	137'
GD-7:	160-80-40-20-17-12-10M	255'
GD-9:	160-80-40-30-20-17-15-12-10M	255'

Choose between 500W PEP or 2KW versions. Install as a horizontal dipole or an inverted-V. SWR usually better than 1.5:1. No tuner needed if properly installed. See letters of our ham customers in our data report. The GD-windom dipoles are no dummy load antennas. Our special GD-balun (500W or 2KW) matches the low impedance (50Ω) coax feedline to the high impedance windom-type antenna. All GARANT GD-windom dipoles come with a 3-year limited warranty and a 10-day money-back guarantee. Who else has that much confidence in his products?

VE2MNL, Michel: "I have installed my GD-7. Only one antenna to cover 7 bands with practically perfect SWR on all bands. **VE1AZZ, Gordon** on his GD-8: "I find the SWR exactly as you claimed." **VE7TH, John** on his GD-9: "FB on all bands. Great for DX." **VE7BKU, Rob** on his GD-8: "A great antenna. Excellent bandwidth." **VE1VCD, Stu:** "Very pleased with the GD-6/2KW. In less than six months operation have logged over 85 different countries. Recommend it to anyone considering a wire antenna."



Write or phone for our free data report on all our GARANT GD-windom dipoles with technical data, actual SWR curves, customer comments, and our low factory direct prices. Take advantage of our sale prices. We ship worldwide & accept VISA or MASTERCARD.

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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 assembled or in kit form.

No adjustments, calibration, or test equipment are required. The kit can be completed by most builders in one or two evenings. SuperSCAF is available in kit form for \$139.95 and assembled for \$179.95. Please add \$7.00 shipping and handling. Order from AFtronics, Inc., PO Box 785, Longwood, FL 32752-0785. Florida residents should include state sales tax.

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CIRCLE 151 ON READER SERVICE CARD

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THE SHURE 444D

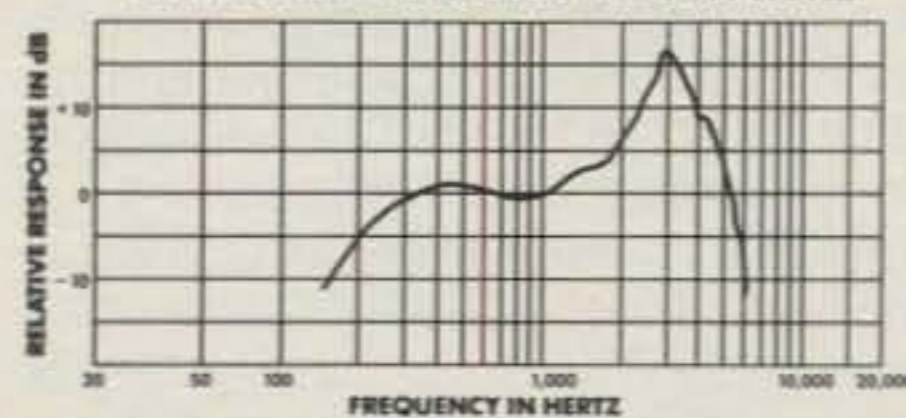
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CIRCLE 152 ON READER SERVICE CARD

THE SCIENCE OF PREDICTING RADIO CONDITIONS

CW Contest Weekend

Bulletin

Since this issue of *CQ* should reach most subscribers prior to the start of the *CQ* World-Wide DX Phone Contest weekend of October 29-30, here is an updated forecast made at press time of general conditions expected for the contest weekend. Conditions look somewhat better than discussed in last month's column. With a month's additional solar and ionospheric data now available, it looks like Low Normal conditions should occur on Saturday, October 29th with a 20% chance they may climb to High Normal. Chances for radio storminess appear to be less than 10%. On Sunday, October 30th expect mostly Low Normal conditions again, but there is a greater possibility (on the order of 25%) that some radio storminess may occur. The likelihood that conditions will rise to High Normal on the 30th is less than 10%. All in all, a fairly good weekend is expected for the Phone Contest.

The initial forecast for the CW contest weekend of November 26-27 is about the same as the above forecast for the Phone weekend. Mostly Low Normal conditions are expected for both days, but with somewhat greater chances for periods of radio storminess on Sunday, November 27th. There will be a fine-tuned updated forecast for the CW weekend as a bulletin in next month's column.

The *CQ* World-Wide DX CW Contest weekend is November 26-27. Last month's column contained comprehensive HF band-opening predictions to all areas of the world from North America for use during *both* the Phone and CW weekends. In addition, a sample multiband operating schedule for the CW weekend is included in this month's column.

This year's World-Wide DX Contest is being held during a period of *rapidly rising* solar activity. The Royal Observatory of Belgium reports a monthly mean sunspot number of 112.6 for July 1988. This results in a smoothed sunspot number, upon which the solar cycle is based, of 58 centered on January 1988. A smoothed

11307 Clara Street, Silver Spring, MD 20902

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for November 1988

Propagation Index	Expected Signal Quality			
	(4)	(3)	(2)	(1)
Above Normal: 11, 17, 19	A	A	B	C
High Normal: 8, 10, 12, 16, 18, 20-21, 24	A	B	C	C-D
Low Normal: 1, 5-6, 9, 13-14, 22-23, 25-27, 30	B	C	D	D-E
Below Normal: 2, 4, 7, 15, 28-29	C	C-D	D-E	E
Disturbed: 3	C-D	D	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9.
B—Good opening, moderately strong signals varying between S6 and S9+, with little fading or noise.
C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.
D—Poor opening, with weak signals varying between S0 and S3, and with considerable fading and noise.
E—No opening expected.
3 dB per S-Unit.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good-to-fair (B-C) on Nov. 1st, fair-to-poor (C-D) on the 2nd, poor (D-E) on the 3rd, fair-to-poor (C-D) on the 4th, good-to-fair (B-C) on the 5th and 6th. During the CW Contest weekend of Nov. 26-27 conditions should be good-to-fair (B-C).

sunspot number in the range of 120 (plus or minus 25%) is expected for November 1988. This would be the highest level of solar activity to occur during any CW Contest weekend since 1981.

There was a corresponding increase in the 10.7 cm solar flux level during July. The Algonquin Radio Observatory in Ottawa, Ontario reported a mean level of 152.7 for the month. The level in November could be in the 175 range or higher!

Check the Last Minute Forecast appearing in this month's column for day-to-day conditions expected throughout the entire month of November.

CW Contest Tips

Look for excellent DX conditions on 10, 15, and 20 meters during most of the *daylight hours* from shortly after sunrise until sunset.

From *sundown* to *midnight* DX honors should be shared between 20 meters, for openings towards the south and west, and 40 meters, for openings towards the east, north, and south. Good DX openings to the same areas of the world as 40 meter openings should also be possible on 80 and 160 meters during this period.

Between *midnight* and *sunrise* the best DX band should be 40 meters, with 80 meters not far behind. Openings on both bands should be possible to most areas of the world, with conditions peaking towards the south and west. Some fairly good 20 meter openings are also expected during this period, mainly towards the south and west. Be sure also to check the 160 meter band for DX openings. Propagation patterns should be similar to those observed on 80 meters, but with somewhat weaker signals and higher noise levels.

CW Contest Work Plan

The accompanying sample work chart for the CW Contest section was devised from the DX Propagation Charts which appeared in last month's column. This particular example is for multiband operation and for a PST zone QTH. Similar work charts can be devised for other bands, for other operating conditions, and for other time zones.

VHF Ionospheric Openings

Solar activity is at a high enough level to permit 6 meter DX openings during November. Conditions should peak towards Europe and in a generally easterly direction before noon. Openings should improve towards Africa shortly after noon and continue to swing in a clockwise direction during the early afternoon hours. Expect openings towards the Caribbean and Central and South American areas from late morning until shortly after noon. By late afternoon, start looking for openings towards the south and southwest. For the most part, 6 meter DX openings may be erratic, and the band may remain open for only short periods of time. The best days to look for 6 meter DX openings are those which are expected to be either High or Above Normal.

Some trans-equatorial (TE) type 6 meter propagation may also occur during November. The best time to check for such conditions is between approximately 8 and 11 p.m. local standard time. TE

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (10 through 40 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 80 meter openings.

2. The propagation index is the number that appears in () after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of days during the month on which the opening is expected to take place, as follows:

- (4) Opening should occur on more than 22 days
- (3) Opening should occur between 14 and 22 days
- (2) Opening should occur between 7 and 13 days
- (1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. On the Short-Skip Chart appropriate daylight time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between N.Y. and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 P.M. in Los Angeles; 18 or 6 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to daylight time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the propagation index will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

**CQ Short-Skip Propagation Charts
November & December 1988
Local Standard Time at Path Mid-Point
(24-Hour Time System)**

Band (Meters)	Distance From Transmitter (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	Nil	07-09 (0-1) 09-11 (0-2) 11-15 (0-3) 15-16 (0-2) 16-18 (0-1)	07-08 (1) 08-09 (1-2) 09-11 (2-3) 11-15 (3-4) 15-16 (2-4) 16-18 (1-4) 18-19 (0-3) 19-20 (0-2) 20-21 (0-1)
15	Nil	08-10 (0-1) 10-16 (0-3) 16-17 (0-2) 17-18 (0-1)	07-08 (0-1) 08-09 (1-3) 09-10 (1-4) 10-16 (3-4) 16-17 (2-4) 17-19 (1-4) 19-20 (0-3) 20-21 (0-1)	07-08 (1) 08-09 (3-2) 09-19 (4) 12-15 (4-3) 19-20 (3) 20-21 (1-2) 21-00 (0-1)
20	09-11 (0-1) 11-15 (1-2) 15-17 (0-1)	07-09 (0-2) 09-11 (1-4) 11-15 (2-4) 15-17 (1-4) 17-18 (0-4) 18-19 (0-3) 19-20 (0-2) 20-07 (0-1)	07-09 (2-3) 09-18 (4) 18-19 (3-4) 19-20 (2-4) 20-21 (1-4) 21-23 (1-3) 23-02 (1-2) 02-07 (1)	07-09 (3) 09-12 (4) 12-15 (4-3) 15-21 (4) 21-23 (3-4) 23-02 (2-3) 02-06 (1-2) 06-07 (1)
40	07-08 (0-2) 08-09 (1-3) 09-19 (4) 19-21 (2-3) 21-00 (1-2) 00-07 (0-1)	07-08 (2-4) 08-09 (3) 09-15 (4-3) 15-19 (4) 19-21 (3-4) 21-00 (2-4) 00-02 (1-3) 02-06 (1-2) 06-07 (1-3)	07-08 (4) 08-09 (3-2) 09-15 (3-1) 15-17 (4-2) 17-00 (4) 00-02 (3-4) 02-06 (2-4) 06-07 (3-4)	06-07 (4-3) 07-08 (4-2) 08-09 (2-1) 09-15 (1-0) 15-17 (2-0) 17-19 (4-3) 19-06 (4)

Time PST	Band Meters	Areas To Which DX Conditions Expected To Be Optimum
00-03	20	Southeast Asia, Far East, South Pacific & New Zealand, Australasia, Caribbean, Central America, Antarctica, Africa, * South America*
03-06	20	South Pacific & New Zealand, Australasia, Caribbean, Central America, Southeast Asia, * Far East, * South America, * Antarctica*
06-09	20	Caribbean, Central America, South America, Southeast Asia, Far East, South Pacific & New Zealand, Australasia, Central and South Asia, Europe, * Eastern Mediterranean, * Middle East, * Antarctica*
09-12	15	Europe, Southeast Asia, Far East, South Pacific & New Zealand, Australasia, Caribbean, Central America, Western Africa, Eastern Mediterranean, * Middle East, * Eastern, Central & Southern Africa, * South America*
12-15	10	Africa, South Pacific & New Zealand, Australasia, Caribbean & Central America, South America
15-18	10	Central & South Asia, Southeast Asia, Far East, South Pacific & New Zealand, Australasia, Caribbean & Central America, South America
18-21	15	Southeast Asia, Far East, South Pacific & New Zealand, Caribbean & Central America, South America, Central & South Asia, * Australasia, * Antarctica*
21-00	20	Far East, South Pacific & New Zealand, Australasia, Caribbean & Central America, South America, Antarctica, Europe, * Africa, * Southeast Asia*

*Propagation index (2), all others (3) or (4).

Table I- Sample multi-band contest operating schedule, western USA.

Aries-1

Amateur Radio Integrated Entry System

A
L
L
M
O
D
E

ID(Sta): W0ABC Name: CHAR City: DENVER State: CO
 Date: 08-10-88 Begin: 21:05 End QSO: 21:07:22 Freq: 28.485.0
 Type (mode): USB My RST: His RST: 59 Power: QSL:
 Remarks: Data Base / Status Window
 Data: [CLD] [Sp/F] [Qu/eX]
 Status: [T/R] [CLS] Manual Mode Log of NV2I

W0ABC DENVER CHARLIE
HOME BREW XMTR, 3 ELEMENT TRIBANDER, LIVES NEAR UNCLE JOE

Scratch-Pad
Term Unit I/O Window

CW/RTTY/AMTOR type ahead Window

[MANUAL] [RTTY] [CW] [AMTOR] [PACKET] [ToneON] [ToneOFF] [Clear] [Log] [Optns]

S
O
F
T
W
A
R
E

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Aries-1...

- ... Inserts DATE / TIME from Computer - FREQUENCY / MODE from Transceiver (certain Kenwood and Icom models) into log.
- ... Interfaces with Kontronics KAM and AEA PK-232 Terminal Units for totally integrated ON-SCREEN I/O.
- ... Works with a Mouse and/or Function Keys for fast and easy control of Terminal Units and Data Entry.
- ... Is useful with or without interfacing to Terminal Units and Transceivers.
- ... Changes TU Modes, operating parameters and files data into the Log file with the press of a key or the click of a mouse.
- ... Has a Contest Mode and automatic string replacement capability which give new meaning to quick exchanges.
- ... Has Automatic Dup checking and the ability to search / print data base by Call, Country, Freq, QSL info, etc.
- ... Lets you run other programs (or access DOS) while staying resident in memory along with your data.
- ... Logs voice contacts, while simultaneously connected to a packet mail box and down-loading messages into a capture file.

An Extremely useful program! Most Aries-1 Users "fire up" the program whenever they are in the shack. Whether operating Voice, AMTOR, Packet or any other mode, you will enjoy having your Log available on screen simultaneously with your Terminal Unit and access to your other ham software just a keypress away.

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ash-ton

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openings favor locations in the southern tier states, and generally take place to South American countries south of the equator. At best, TE openings are very erratic, with weak signals subject to intense flutter fading.

Two significant meteor showers are expected during November, which should result in some meteor-type ionospheric openings on the VHF bands. The *Taurids* shower, which should last for a day or two, is expected to peak on November 1st, with a peak meteor count of approximately 15 an hour. A second shower of about the same duration and intensity, called *Leonids*, should reach peak intensity on November 14th.

November is usually a month of fairly intense and widespread auroral activity, which can result in short-skip propaga-

tion on the 6 and 2 meter bands for distances up to approximately 1200 miles. Auroral activity is often associated with periods of radio storminess, and is most likely to occur on those days shown as Below Normal or Disturbed in the Last Minute Forecast, which appears at the beginning of this column.

This month's column contains short-skip propagation data for use between distances of approximately 50 and 2300 miles, and between the states of Hawaii and Alaska and the continental areas of the United States.

Good luck in the CW section of the 1988 CQ World-Wide DX Contest, and be sure to let me know how these special contest propagation forecasts work out.

73, George, W3ASK

80	08-15 (4-3) 15-02 (4) 02-04 (3-4) 04-07 (2-3) 07-08 (3-4)	08-09 (3-2) 09-15 (3-1) 15-18 (4-3) 18-04 (4) 04-07 (3-4) 07-08 (4-3)	08-09 (2-1) 09-15 (1-0) 15-18 (3-1) 18-06 (4) 06-07 (4-3) 07-08 (3-1)	08-09 (1-0) 09-15 (0) 15-18 (1-0) 18-20 (4-1) 20-05 (4) 05-06 (4-3) 06-07 (3-1) 07-08 (1)
160	07-09 (3-2) 09-11 (2-0) 11-17 (1-0) 17-19 (3-2) 19-07 (4)	07-09 (2-1) 09-17 (0) 17-19 (2-1) 19-04 (4) 04-07 (3-2)	07-09 (1-0) 09-17 (0) 17-19 (1-0) 19-21 (4-2) 21-04 (4) 04-06 (2) 06-07 (2-1)	07-19 (0) 19-21 (2-1) 21-04 (4-3) 04-06 (2-1) 06-07 (1-0)

ALASKA November & December 1988 Opening Given in GMT#

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	17-18 (1) 18-20 (2) 20-22 (3) 22-00 (2) 00-01 (1)	15-16 (1) 16-17 (2) 17-21 (3) 21-23 (4) 23-00 (3) 00-01 (2)	12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-02 (3) 02-03 (2) 03-05 (1)	06-12 (1) 07-11 (1)*
Central USA	17-18 (1) 18-20 (2) 20-00 (3) 00-01 (2) 01-02 (1)	15-16 (1) 16-17 (2) 17-20 (3) 20-23 (4) 23-01 (3) 01-02 (2) 02-03 (1)	12-16 (1) 16-18 (2) 18-20 (1) 20-22 (2) 22-00 (3) 00-02 (4) 02-03 (3) 03-04 (2) 04-06 (1)	06-08 (1) 08-13 (2) 13-14 (1) 07-12 (1)*
Western USA	18-19 (1) 19-20 (2) 20-21 (3) 21-23 (4) 23-00 (3) 00-01 (2) 01-02 (1)	16-17 (1) 17-18 (2) 18-20 (3) 20-01 (4) 01-02 (3) 02-03 (2) 03-04 (1)	12-16 (1) 16-18 (2) 18-22 (3) 22-02 (4) 02-04 (3) 04-05 (2) 05-07 (1)	02-03 (1) 03-05 (2) 05-14 (3) 14-15 (2) 15-16 (1) 04-06 (1)* 06-14 (2)* 14-16 (1)*

HAWAII November & December 1988 Openings Given in Hawaiian Standard Time

TO:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	06-07 (1) 07-08 (2) 08-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (4) 09-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	12-14 (2) 14-17 (4) 17-21 (3) 21-00 (2) 00-06 (1) 06-08 (3) 08-09 (2) 09-12 (1)	17-18 (1) 18-20 (2) 20-02 (3) 02-03 (2) 03-04 (1) 19-20 (1)* 20-01 (2)* 01-03 (1)*
Central USA	06-07 (1) 07-08 (3) 08-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-09 (4) 09-13 (3) 13-17 (4) 17-19 (3) 19-20 (2) 20-21 (1)	08-13 (2) 13-14 (3) 14-20 (3) 20-00 (3) 00-02 (2) 02-05 (1) 05-06 (2) 06-08 (3)	17-18 (1) 18-20 (2) 20-21 (3) 21-01 (4) 01-03 (3) 03-04 (2) 04-05 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-03 (2)* 03-04 (1)*
Western USA	07-08 (1) 08-09 (2) 09-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-12 (3) 12-18 (4) 18-20 (3) 20-21 (2) 21-22 (1)	08-10 (4) 10-15 (3) 15-22 (4) 22-01 (3) 01-04 (2) 04-06 (1) 06-08 (3)	17-18 (1) 18-19 (2) 19-20 (3) 20-03 (4) 03-05 (3) 05-06 (2) 19-20 (1)* 20-21 (2)* 21-04 (3)* 04-05 (2)* 05-06 (1)*

#See explanation in "How To Use Short-Skip Charts" in the box at the beginning of this column.

*Indicates best time to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2), or higher.

Check for 6 Meter openings at times when the 10 Meter forecast rating is shown as (4).

Note: The Alaska and Hawaii Propagation Charts are intended for distance greater than 1300 miles. For openings over shorter distances, use the preceding Short-Skip Propagation Chart.

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MFD-2	80-40M max-performance dipole, 55' long 982	99' 568 ppd
HPD-3*	160-80-40M hi-performance dipole 113' long	\$79 ppd
SSD-8*	160-80-40-20-15-10M space-saver dipole 71' long	\$125 ppd
SSD-5*	80-40-20-15-10M space-saver dipole-specify L, 42'-\$105	52'-\$108 ppd
SSD-4*	80-40-20-15M space-saver dipole-specify L, 48'-\$93	60'-\$ 98 ppd

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<p>RM-A SERIES</p>  <p>MODEL RM-35M</p>	<p>19" X 5 1/4" RACK MOUNT POWER SUPPLIES</p> <table border="1"> <thead> <tr> <th>MODEL</th> <th>Continuous Duty (Amps)</th> <th>ICS* (Amps)</th> <th>Size (IN) H x W x D</th> <th>Shipping Wt. (lbs.)</th> </tr> </thead> <tbody> <tr> <td>RM12A</td> <td>9</td> <td>12</td> <td>5 1/4 x 19 x 8 1/4</td> <td>16</td> </tr> <tr> <td>RM-35A</td> <td>25</td> <td>35</td> <td>5 1/4 x 19 x 12 1/2</td> <td>38</td> </tr> <tr> <td>RM-50A</td> <td>37</td> <td>50</td> <td>5 1/4 x 19 x 12 1/2</td> <td>50</td> </tr> <tr> <td colspan="5">• Separate Volt and Amp Meters</td> </tr> <tr> <td>RM-35 M</td> <td>25</td> <td>35</td> <td>5 1/4 x 19 x 12 1/2</td> <td>38</td> </tr> <tr> <td>RM-50 M</td> <td>37</td> <td>50</td> <td>5 1/4 x 19 x 12 1/2</td> <td>50</td> </tr> </tbody> </table>	MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H x W x D	Shipping Wt. (lbs.)	RM12A	9	12	5 1/4 x 19 x 8 1/4	16	RM-35A	25	35	5 1/4 x 19 x 12 1/2	38	RM-50A	37	50	5 1/4 x 19 x 12 1/2	50	• Separate Volt and Amp Meters					RM-35 M	25	35	5 1/4 x 19 x 12 1/2	38	RM-50 M	37	50	5 1/4 x 19 x 12 1/2	50													
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<p>RS-A SERIES</p>  <p>MODEL RS-7A</p>	<table border="1"> <tbody> <tr> <td>RS-4A</td> <td>3</td> <td>4</td> <td>3 1/4 x 6 1/2 x 9</td> <td>5</td> </tr> <tr> <td>RS-5A</td> <td>4</td> <td>5</td> <td>3 1/2 x 6 1/8 x 7 1/4</td> <td>7</td> </tr> <tr> <td>RS-7A</td> <td>5</td> <td>7</td> <td>3 3/4 x 6 1/2 x 9</td> <td>9</td> </tr> <tr> <td>RS-10A</td> <td>7.5</td> <td>10</td> <td>4 x 7 1/2 x 10 3/4</td> <td>11</td> </tr> <tr> <td>RS-12A</td> <td>9</td> <td>12</td> <td>4 1/2 x 8 x 9</td> <td>13</td> </tr> <tr> <td>RS-20A</td> <td>16</td> <td>20</td> <td>5 x 9 x 10 1/2</td> <td>18</td> </tr> <tr> <td>RS-35A</td> <td>25</td> <td>35</td> <td>5 x 11 x 11</td> <td>27</td> </tr> <tr> <td>RS-50A</td> <td>37</td> <td>50</td> <td>6 x 13 3/4 x 11</td> <td>46</td> </tr> </tbody> </table>	RS-4A	3	4	3 1/4 x 6 1/2 x 9	5	RS-5A	4	5	3 1/2 x 6 1/8 x 7 1/4	7	RS-7A	5	7	3 3/4 x 6 1/2 x 9	9	RS-10A	7.5	10	4 x 7 1/2 x 10 3/4	11	RS-12A	9	12	4 1/2 x 8 x 9	13	RS-20A	16	20	5 x 9 x 10 1/2	18	RS-35A	25	35	5 x 11 x 11	27	RS-50A	37	50	6 x 13 3/4 x 11	46								
RS-4A	3	4	3 1/4 x 6 1/2 x 9	5																																													
RS-5A	4	5	3 1/2 x 6 1/8 x 7 1/4	7																																													
RS-7A	5	7	3 3/4 x 6 1/2 x 9	9																																													
RS-10A	7.5	10	4 x 7 1/2 x 10 3/4	11																																													
RS-12A	9	12	4 1/2 x 8 x 9	13																																													
RS-20A	16	20	5 x 9 x 10 1/2	18																																													
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<p>RS-S SERIES</p>  <p>MODEL RS-12S</p>	<ul style="list-style-type: none"> • Built in speaker <table border="1"> <tbody> <tr> <td>RS-7S</td> <td>5</td> <td>7</td> <td>4 x 7 1/2 x 10 1/4</td> <td>10</td> </tr> <tr> <td>RS-10S</td> <td>7.5</td> <td>10</td> <td>4 x 7 1/2 x 10 3/4</td> <td>12</td> </tr> <tr> <td>RS-12S</td> <td>9</td> <td>12</td> <td>4 1/2 x 8 x 9</td> <td>13</td> </tr> <tr> <td>RS-20S</td> <td>16</td> <td>20</td> <td>5 x 9 x 10 1/2</td> <td>18</td> </tr> </tbody> </table>	RS-7S	5	7	4 x 7 1/2 x 10 1/4	10	RS-10S	7.5	10	4 x 7 1/2 x 10 3/4	12	RS-12S	9	12	4 1/2 x 8 x 9	13	RS-20S	16	20	5 x 9 x 10 1/2	18																												
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<p>VRM/VS-M SERIES</p>  <p>MODEL VS-35M</p>	<ul style="list-style-type: none"> • Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load <table border="1"> <thead> <tr> <th></th> <th colspan="3">@ 13.8VDC @ 10VDC @ 5VDC</th> <th>@ 13.8V</th> <th></th> </tr> </thead> <tbody> <tr> <td>VS-20M</td> <td>16</td> <td>9</td> <td>4</td> <td>20</td> <td>5 x 9 x 10 1/2</td> <td>20</td> </tr> <tr> <td>VS-35M</td> <td>25</td> <td>15</td> <td>7</td> <td>35</td> <td>5 x 11 x 11</td> <td>29</td> </tr> <tr> <td>VS-50M</td> <td>37</td> <td>22</td> <td>10</td> <td>50</td> <td>6 x 13 3/4 x 11</td> <td>46</td> </tr> <tr> <td colspan="7">• Variable rack mount power supplies</td> </tr> <tr> <td>VRM-35M</td> <td>25</td> <td>15</td> <td>7</td> <td>35</td> <td>5 1/4 x 19 x 12 1/2</td> <td>38</td> </tr> <tr> <td>VRM-50M</td> <td>37</td> <td>22</td> <td>10</td> <td>50</td> <td>5 1/4 x 19 x 12 1/2</td> <td>50</td> </tr> </tbody> </table>		@ 13.8VDC @ 10VDC @ 5VDC			@ 13.8V		VS-20M	16	9	4	20	5 x 9 x 10 1/2	20	VS-35M	25	15	7	35	5 x 11 x 11	29	VS-50M	37	22	10	50	6 x 13 3/4 x 11	46	• Variable rack mount power supplies							VRM-35M	25	15	7	35	5 1/4 x 19 x 12 1/2	38	VRM-50M	37	22	10	50	5 1/4 x 19 x 12 1/2	50
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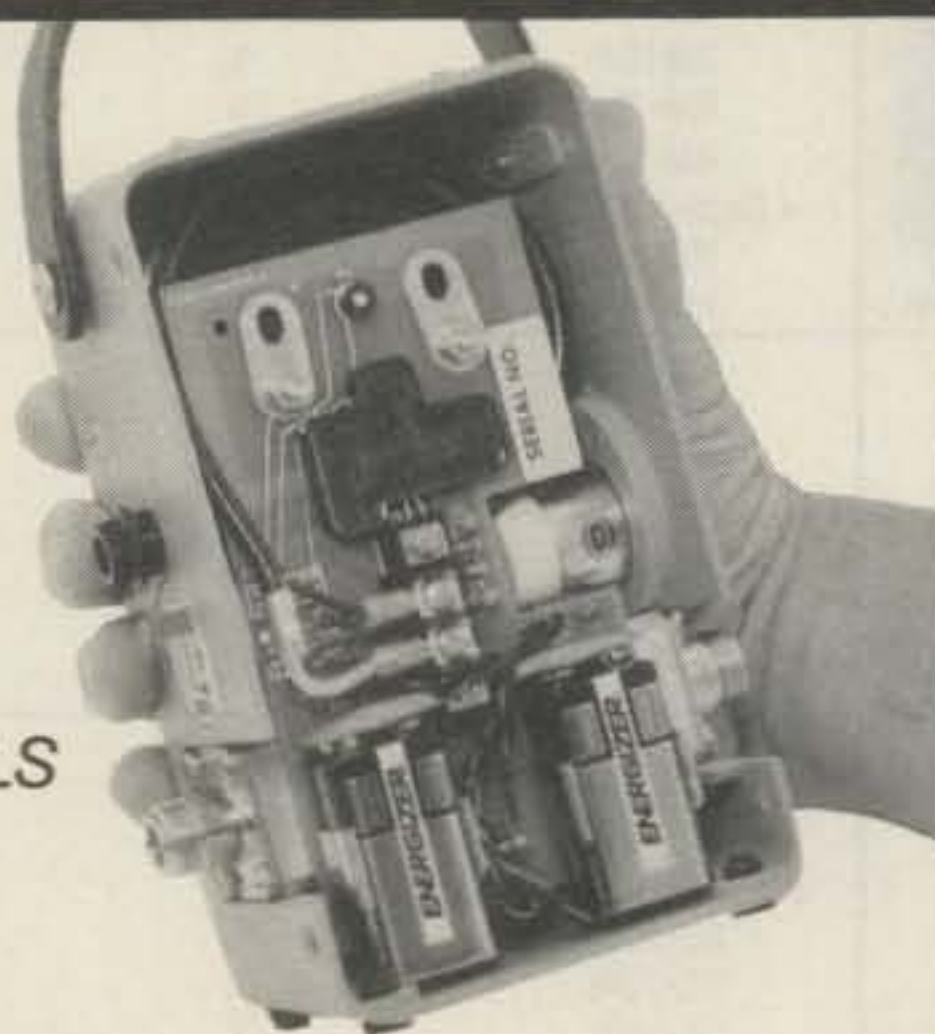
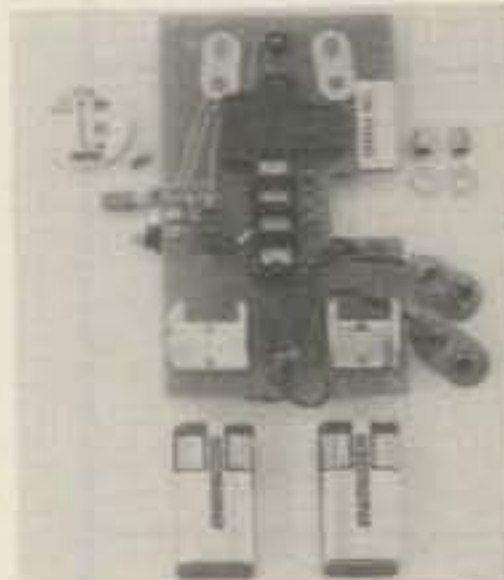
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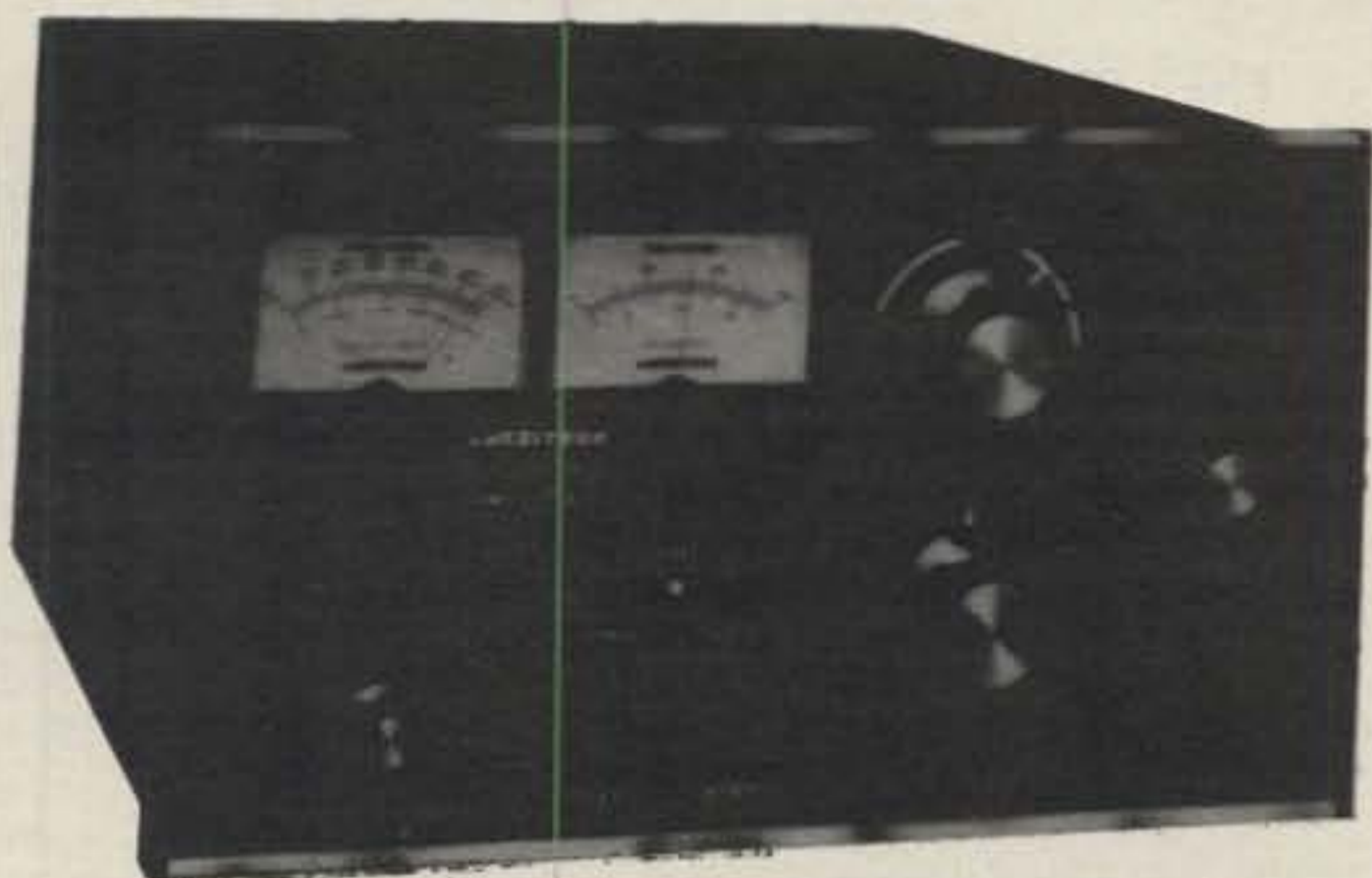
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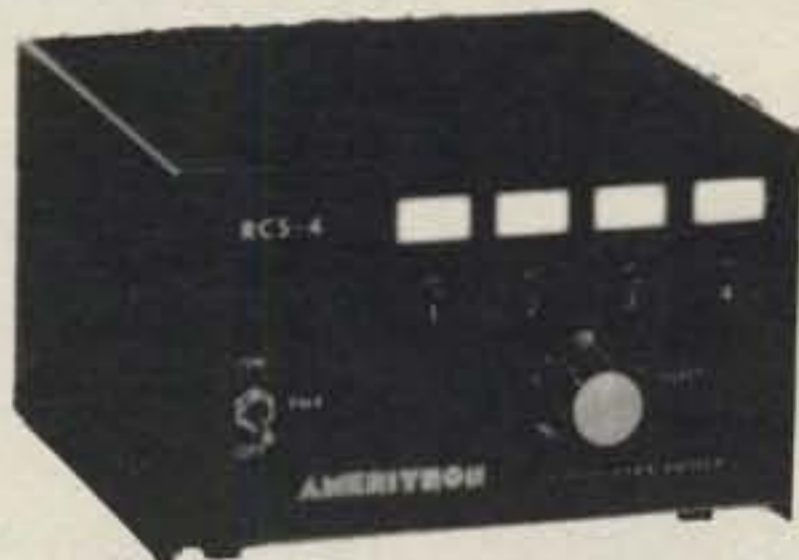
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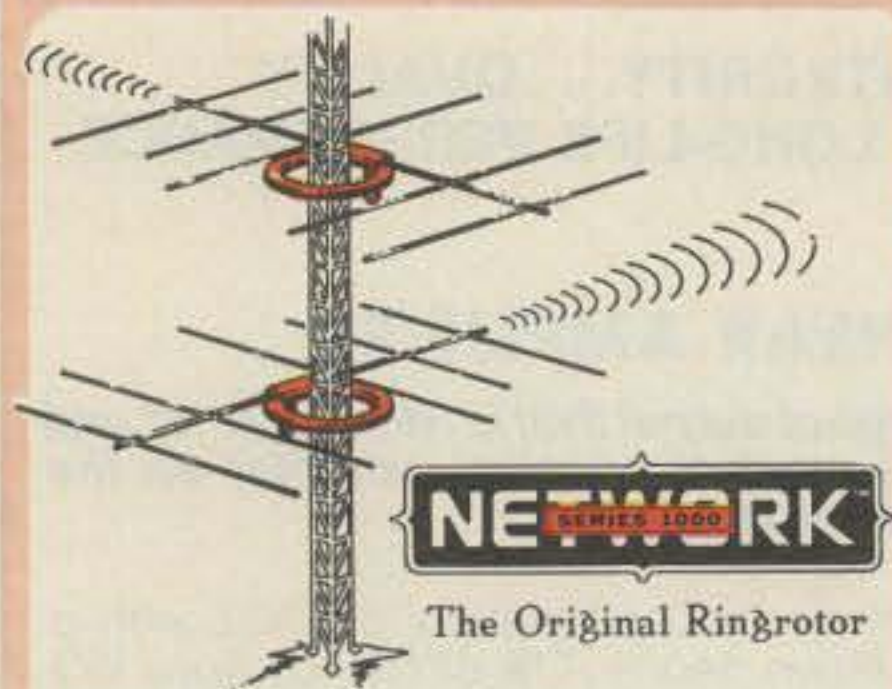
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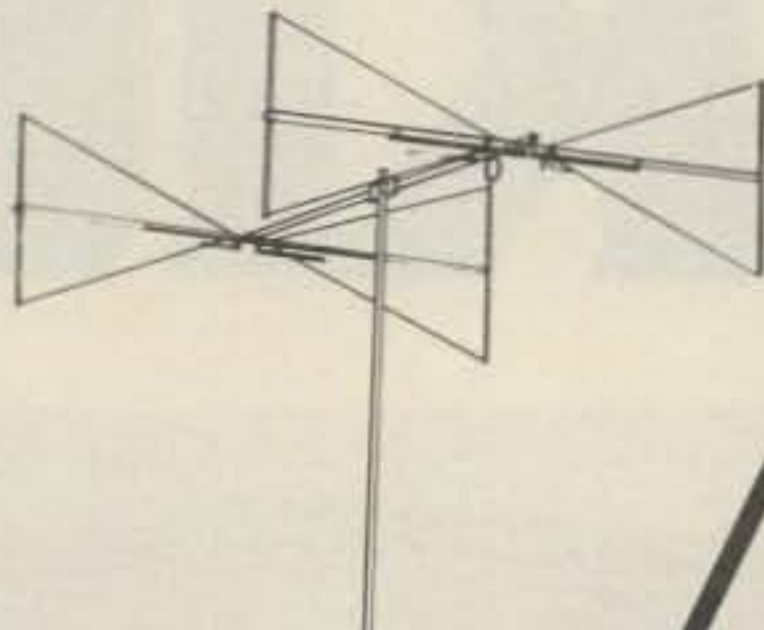
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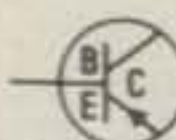
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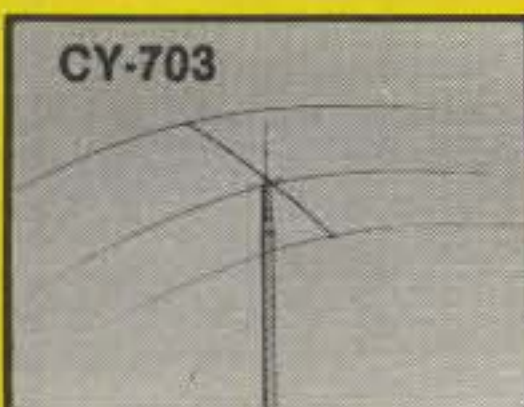


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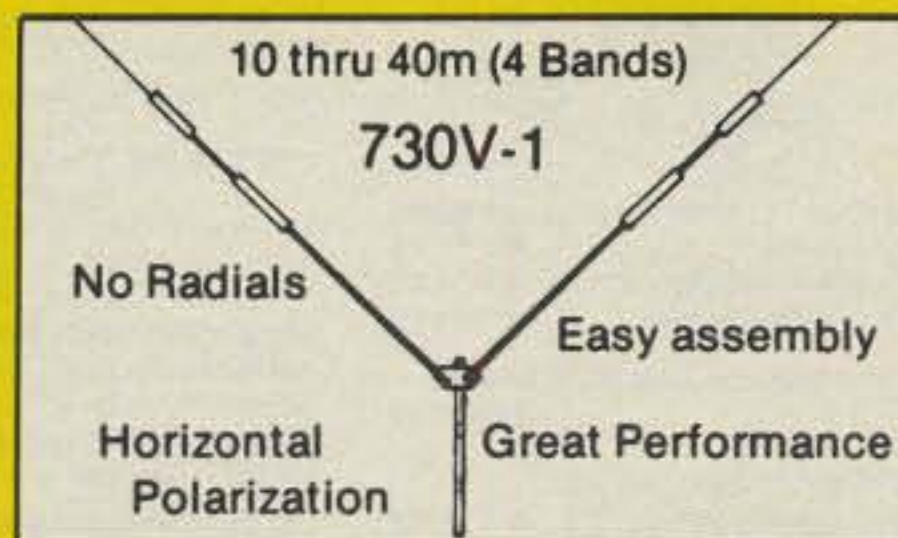
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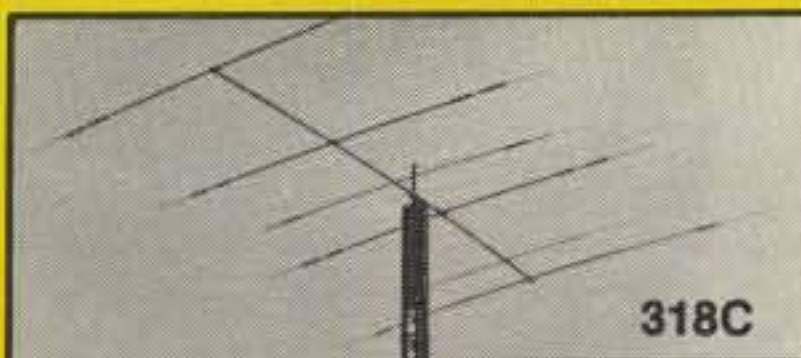
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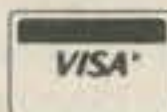
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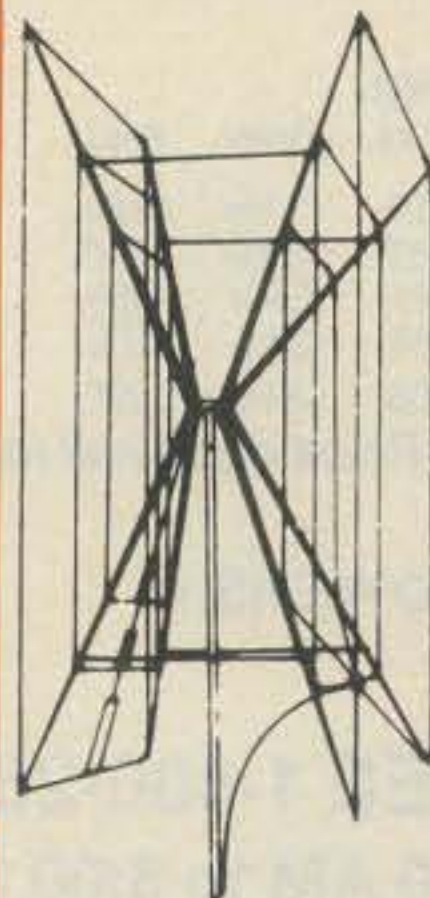
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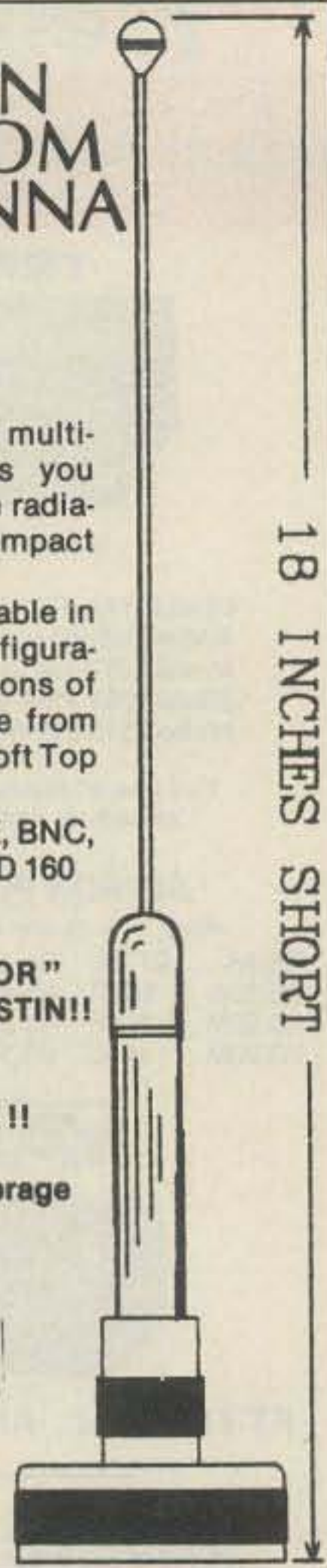
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WANTED: Basketcase SB-200. Also want ARR MML-144VDD preamp. C. Hays, 3675 Estates Dr., St. Louis, MO 63033.

WANTED: Amateur Radio Equipment, good/bad, condition, price. Joe Bedlovies, 241 Dover Street, Bridgeport, CT 06610.

SWAP: Commodore-64 Ham Programs. Have 500 different. Swap disk for disk. Don Traves, WB4CVH, 38 Elmwood Place, Goose Creek, SC 29445 (803-797-5185).

WANTED: HF amplifier 500 watts, IC-2 KL, used in mint condition. Pls. write to Gil, PY2GY, P.O. Box 688, Santos-SP-Brazil. (Final destination in USA: New York).

HAMMARLUND HQ-160 receiver, manual, Hallicrafters R46B speaker, \$100 plus shipping. K0EDA (515) 233-3535.

HELP: For G3ICH need schematic and all info on Johnson Viking Navigator TX. Costs paid. 190 Douglas Fir Court, Alpharetta, GA 30201.

WANTED: Service manual for Azden PCS-4000 2 m transceiver. Write to Jim Winney, 5526 Portola Cr., Rocklin, CA 95677.

CQ, QST, Ham Radio, and 73 magazines; 1940s to present, 35 cents an issue. Also other radio books and publications. Send large SASE for list. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

FOR SALE: TRS-80 Color Computer 2 64K w/Kantronics Challenger Interface, suitable for RTTY. 1-602-272-4973, Howard, N7ETP.

JOHNSON VIKING II parts for sale. R.M. Bell, WA4BNO, 3900 Colebrook Rd., Charlotte, NC 28215.

FOR SALE: MICROLOG ART-1 RTTY CW interface complete for Commodore C-64, \$80 p.p. Phone 712-542-4715.

MOSLEY: TA-33 Beam Complete with manual. First \$100.00 ship UPS. WR5A, 1701 Westside Dr., Sherman, TX 75090. Info for SASE. Or call Mac (214) 892-9074.

FOR SALE: Ten-Tec Omni 546C, filters, Xtals, 280 P.S., VFO, and tuner, \$780.00. Call WB8HLI, 419-447-8229.

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WANTED Vacuum capacitors, vacuum relays and Eimac power tubes, sockets, and chimneys. A. Emerald, 8956 Swallow, Fountain Valley, CA 92708.

WANTED: QRP Xcvr-HW-7 or 7—reasonable. Q.R. Galbraith, K5TVC, 4303 Kingsway, Farmington, NM 87401.

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HAMS INCARCERATED: Are you an incarcerated ham? Do you know an incarcerated ham? Would you like to QSO/QSL an incarcerated ham? If you answered "yes" to any of the above questions, please contact: Jim Cranford 107159, P.C. Unit N5AAN, Rt. 2 Box 75, Homer, LA 71040.

Donate OLD ARRL handbooks, QST, CQ for Korean Ham Club, KARL. Mike Bae, 1340 Miravalle Ave., Los Altos, CA 94022.

WANTED: Help! High bidders who purchased remaining video and equipment stock of now-defunct Denson Electronics Co. D.M.T., Box 9064, Newark, NJ 07104.

WANTED: AT-250 tuner. State price and condition. Orv Monson, 14305 Greenbelt Dr. E., Sumner, WA 98390.

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WANTED: Any old AM radios from the 40s, 30s, 20s, or earlier. Please contact Gerry Skloot, KE2N, 2923 Mandalay Beach Road, Wantagh, NY 11793 (516-221-3535).

FOR SALE: Kenwood TH41AT W/PL, Stubby Duck, and Belt clip, \$150. Pace Communicator II 25W 2m FM mobile, PL and touch tone mike, \$150. KF5JQ, Scott, 312-830-7689.

FOR SALE: Approximately 200 vacuum tubes (mostly 40-50 years old). Send SASE for price list and type. Mac, WR5A, 1701 Westside Dr., Sherman, TX 75090.

NEED IC CHIP C-578-1 or 91001 for Bearcat 210 Scanner. Harold Clark, Rt. 2, Box 398A, West Fork, AR 72774.

HY-GAIN Duo-Band 10/15 Beam 3EL, \$80. MFJ 941 Tuner, \$40. SP102P, \$40. Tom Redmon, KC4NX, 404-923-8202.

WANTED: Coil sets for HRO-50-1; AC21.0-21.5MC, E 900-2050KC, F 480-960KC, Schematic for Philco Model 48-482. H. Pasteur, 1024 S. 4th St., St. Charles, IL 60174 (312-584-1701).

FOR SALE: Drake T4XC W/PWR supply, Yaesu FT-DX-401B XCVR, HQ-145C, FR-101S. All supermint, you ship. Alex, VP2MM, 305-564-4327.

FOR SALE: Or trade for late-model HF transceiver 300 Sams Photofact CB Service Manuals. All mint. Sell by lot only. Call Al, WA8CPB, 419-695-1827, anytime OK.

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WANTED: Manuals for R-391 and R-392 military short-wave receivers. Originals preferred but copies O.K. Terry Robinson, VK3DWZ, 21 Russell Avenue, Woodend, Vic. 3442, Australia.

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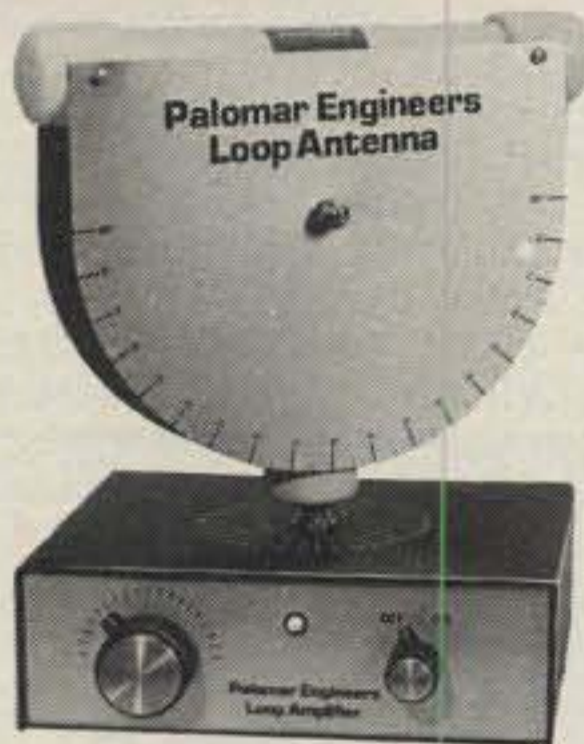


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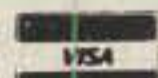
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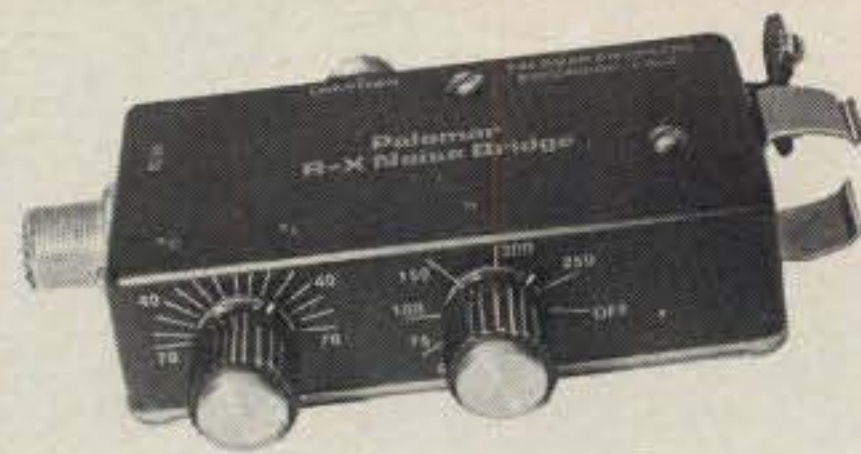
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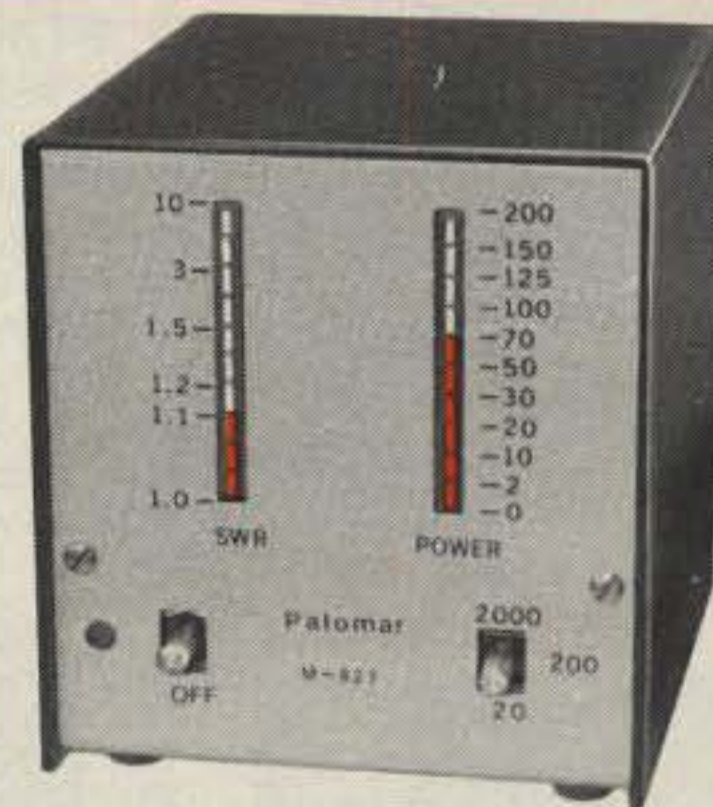


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- Mobile 10 Meter Transceiver
- SSB/AM/FM/CW
- 25 Watts PEP
- Computer Controlled Operation

SALE PRICED

KENWOOD



TS-140S AFFORDABLE DX-ing!

- HF Transceiver With General Coverage Receiver
- All HF Amateur Bands
- 100 W Output
- Compact, Lots of Features

YAESU



FT-736R VHF-UHF BASE STATION

- SSB, CW, FM on 2 Meters and 70 cm
- Optional 50 MHz, 220 MHz or 1.2 GHz
- 25 Watts Output on 2 Meters, 220 and 70 cm
- 10 Watts Output on 6 Meters and 1.2 GHz
- 100 Memories

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IC-781 NEWEST SUPER RIG

- 5 Function Display Screen
- Built-in Spectrum Scope
- 150 Watts Output
- Built-in PS and AT

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AT-300 and AT-3000 Antenna Tuners

- AT-300 Rated for 300W
- AT-3000 Rated for 3 kw
- Dual Movement Cross Needle Power and SWR Meter
- AT-300, Amateur Net \$159.95
- AT-3000 Amateur Net \$259.95

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RZ-1 COMPACT SCANNING RECEIVER

- 500 kHz-905 MHz
- Narrow & Wideband FM, AM
- 100 Memories
- Direct Keyboard Entry or VFO

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FT-212RH THE "ANSWERING MACHINE" MOBILE

- Rx: 138-174 MHz
- Tx: 144-148 MHz
- 45W Output
- Digital Voice Recorder
- FT-712 RH for 70cm

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IC-2GAT IC-4GAT 2 Meter & 440 Handhelds

- IC-2GAT RX 138-174 MHz TX 140-150 MHz 7 Watts
- IC-4GAT 440-450 MHz 6 Watts

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- RS12A . . . \$72
- RS20A . . . \$92
- RS20M . . \$109
- VS20M . . \$129
- RS35A . . \$139
- RS35M . . \$155
- VS35M . . \$175
- RS50A . . \$199
- RS50M . . \$225
- RM50M . . \$245
- VS50M . . \$239

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- Frequency Coverage: 141-163 MHz (Rx), 144-148 MHz (Tx)
- Front Panel DTMF Pad
- 5 Watts Output
- 14 Memories
- TH-45AT Available for 440 MHz

ALINCO



DJ-100T 2 METER HANDHELD

- 144-147-995 MHz
- CAP and MARS Modifiable
- 10 Memories
- 6.5 Watts w/optional EBP-8NAZ Battery Pack

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MFJ-986 ANTENNA TUNER

- 3 kw Roller Inductor Tuner
- Peak Reading Cross-Needle SWR/Wattmeter
- 6 Position Antenna Switch

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FT-4700RH control head
(1¹⁵/₁₆" x 5⁷/₈" x 1")

Introducing Yaesu's FT-4700RH dual-band mobile. Choose Yaesu's FT-4700RH, and you open the door to a lot of tight spaces.

While other dual banders just won't fit in today's small cars, the FT-4700RH utilizes a versatile "remote head" design. So you can mount the "brains" on your dash, visor, or door, and hide the "muscle" under your seat.

High-performance package. Packing a solid 50-watt punch on 2 meters (40 watts on 70 cm), the FT-4700RH includes Dual-Band Watch for simultaneous monitoring of both bands, with independent squelch settings on the main and secondary bands. When you transmit, opposite band monitoring goes on in a full-duplex mode.

You can adjust the relative volume of the two receive channels with the balance control, too. And with Yaesu's bright LCD display, transceiver status is clearly visible in sunlight or shade.

Convenience on the road. Human engineering, long a Yaesu specialty, is an important aspect of the FT-



4700RH design. The ten-button front panel keypad includes a "do-re-mi" audible command verification, and all important controls are backlit for night operation. Plus you get extended receive coverage of 140-174 MHz (MARS/CAP permit required for transmit on 140-150 MHz, or 430-450 MHz on 70 cm). Nine memory channels on each band. High/low power selection (low power: five watts). One-touch reverse repeater shift button. Optional CTCSS module. And 16-key DTMF microphone.

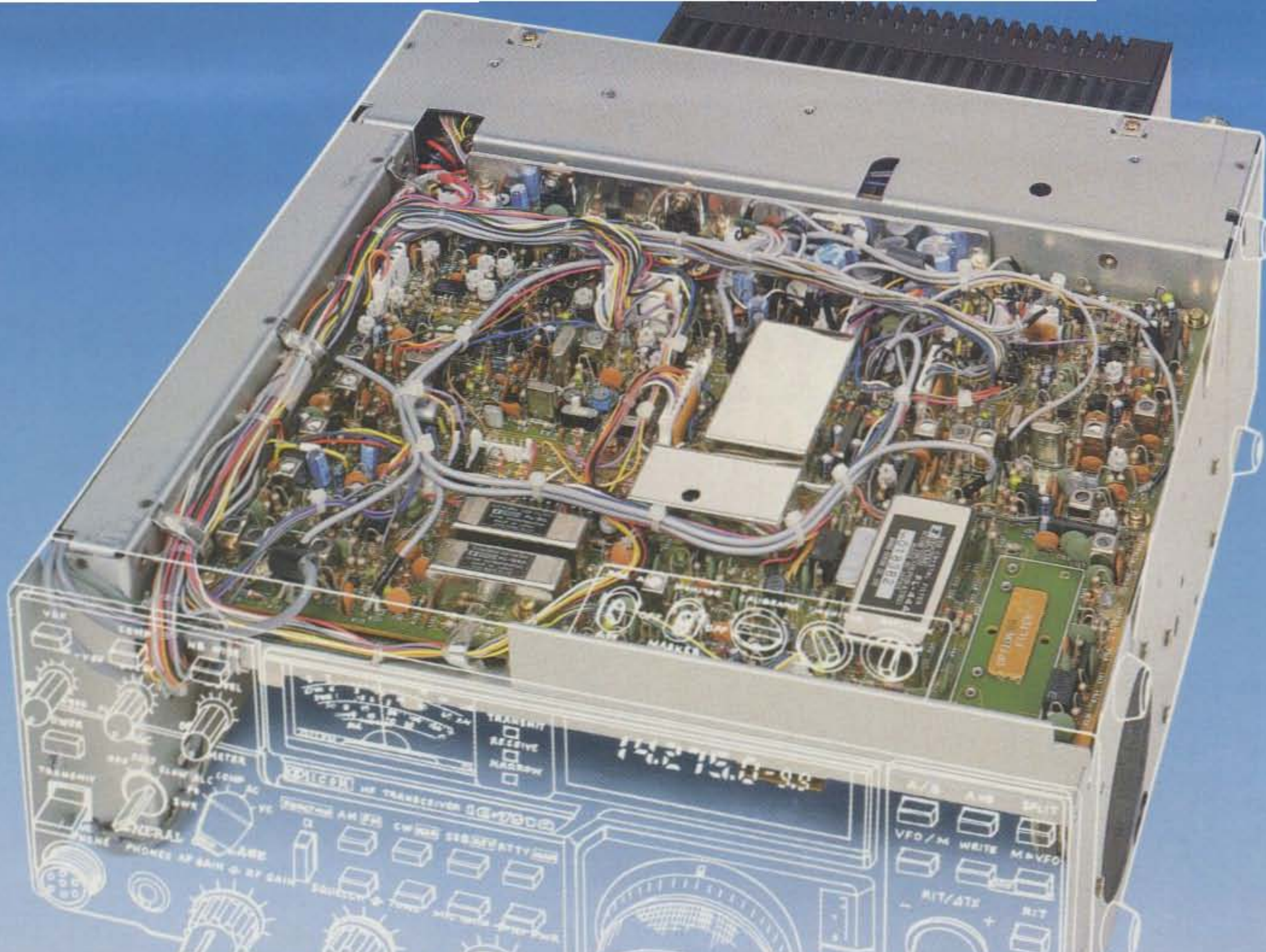
Optional accessories. FTS-8 CTCSS unit. MH-15D8 Autodialer Microphone with 10-telephone number memory. SP-3 or SP-4 External Speakers. And YH-1 Headset/Boom Mic or MF-1A3B Flex-Arm Boom Mic, both with SB-10 PTT Switch Unit.

Discover Yaesu's FT-4700RH today. And see what "high performance" really means. For dual-band mobile operation, Yaesu's FT-4700RH really fits!

Yaesu USA 17210 Edwards Road, Cerritos, CA 90701
(213) 404-2700. Repair Service: (213) 404-4884.
Parts: (213) 404-4847. Prices and specifications subject to change without notice.

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CIRCLE 57 ON READER SERVICE CARD



ICOM IC-751A

"IT'S WHAT'S INSIDE THAT COUNTS!"

- All HF Band Transceiver / General Coverage Receiver
- Advanced Circuit Designs
- All Modes Built-in USB, LSB, FM, AM, CW, RTTY
- Superb Frequency Stability
- Continuous Duty Operation
- Crystal Clear Signal Quality

Midsize Masterpiece! The deluxe IC-751A includes more high performance features and professional circuitry per cubic inch than any other HF transceiver. Its smooth-as-silk operation and long-term reliability produce the ideal contesting, DX'ing, mobiling and portable rig. Owning an IC-751A truly means "Going First Class!"

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All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 751A187