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Amateur Radio

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CQ

Seasons Greetings

THE RADIO AMATEUR'S JOURNAL

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KENWOOD

...pacesetter in amateur radio

Digital Code Squelch...

TR-2600A

Kenwood's TR-2600A introduces DCS (Digital Code Squelch) circuitry, a signaling concept developed by Kenwood. DCS allows each station to have its own "private call" code or to respond to a "group call" or "common call" code. There are 100,000 different 5-digit ASCII code combinations possible. You can program in call signs up to 6 digits in the ASCII code. When operating in the DCS mode, this information can then be automatically transmitted each time the transmit key is depressed. This revolutionary feature is only the beginning! The TR-2600A also sports a high impact plastic case, that is extra rugged and scuff-resistant. The molded-in color adds to the attractive appearance. The large L.C.D. display is easy to read in direct sunlight or in the dark with a convenient lamp switch. It displays transmit/receive frequencies, memory channels, and five arrow indicators for "F LOCK" frequency lock, "REV" repeater reverse, "PROG.S" programmed scan, "MS" memory scan, "ALERT.S" alert scan. A star indicates "MEMORY LOCK-OUT" is activated, and repeater offset indicated by "+, −, S and M." The TR-2600A has 10 memories, nine for simplex or transmit with frequency offset ±600 kHz and one (memory 0) for non-standard split frequencies. Memory scan and programmable band scan have the added convenience of "Time operated Resume" that stops on busy channel and holds for approximately 5 seconds, then resumes scanning, or "Carrier Operated Resume" that stops on busy channel and resumes when signal ceases.
Memory scan, scans only those memories in which data is stored, and memory lock-out allows you to skip selected memory channels without loss of data previously stored! Manual Scanning UP/DOWN in 5-kHz steps and programmable automatic band scan are also useful features. The TR-2600A has a built-in "S" meter on the top panel which also indicates battery level when in transmit mode. Extended frequency coverage, 142.000-148.995 MHz allows transmit capability in 5-kHz steps for simplex or repeater operation on most MARS and CAP frequencies. Receive frequency coverage includes 140.000-159.995 MHz.

These features only tell part of the story. The TR-2600A also has keyboard frequency selection, built-in 16-key autopatch encoder, "TX STOP" switch, HI (2.5)/LOW (300 mw) power switch, REV switch, "SLIDE-LOC" battery pack, high efficiency speaker, BNC antenna terminal, and all of this in an extremely compact and lightweight package!

Kenwood's TR-2600A, with D.C.S., leads the way in high technology handheld transceivers!

Optional accessories:

- TU-35B built-in programmable sub-tone encoder
- ST-2 Base Stand
- MS-1 Mobile Stand
- PB-26 Ni-Cd Battery
- DC-26 DC-DC Converter
- HMC-1 Headset with VOX
- SMC-30 Speaker Microphone
- LH-3 Deluxe Leather Case
- SC-9 Soft Case
- BT-3 AA Manganese/Alkaline Battery Case
- EB-3 External C Manganese/Alkaline Battery Case
- RA-3, 5. Telescoping Antenna
- CD-10 Call Sign Display

More information on the TR-2600A is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, CA 90220.

Specifications and prices are subject to change without notice or obligation.

KENWOOD

pacesetter in amateur radio

TS-430S "Digital DX-terity!"

TS-430S

Digital DX-terity...that outstanding attribute built into every KENWOOD TS-430S that lets you QSY from band to band, frequency to frequency, and from mode to mode with the speed and ease that will give you a dominant position in DX operations.

KENWOOD'S TS-430S, a revolutionary, ultra-compact, HF transceiver has already won the hearts of radio Amateurs the world over. It covers 160-10 meters, including the new WARC bands (easily modified for HF MARS). Its high dynamic range receiver tunes from 150 kHz-30 MHz. It utilizes an innovative UP conversion PLL circuit for superior frequency stability and accuracy. Two digital VFO's allow fast split-frequency operations. A choice of USB, LSB, CW, or AM, with FM optional, are at the operators fingertips. All Solid-state technology permits inputs of 250 watts PEP on SSB, 200 watts DC on CW, 120 watts on FM (optional), or 60 watts on AM. Final amplifier protection circuits and a cooling fan are built-in.

Eight memories store frequency, mode, and band data, with Lithium battery memory back-up. Memory scan and programmable automatic band scan help speed up operations. An IF shift circuit, a tuneable notch filter, and a Narrow-Wide switch for IF filter selection help eliminate QRM. It has a built-in speech processor. A fluorescent tube digital display makes tuning easy and fast. An all-mode squelch circuit, a noise blanker, and an RF attenuator control help clean up the signal. And there's a VOX circuit, plus semi-break-in, with side-tone. All-in-all, it just could be that the expression "Digital DX-terity" is a bit of an understatement.

TS-430S Optional Accessories:
In typical KENWOOD fashion, there are plenty of optional accessories for this great HF transceiver. There is a special power supply, the PS-430. An external speaker, the SP-430, is also available. And the MB-430 mounting bracket is available for mobile operation. The AT-250 automatic antenna tuner was designed primarily with the TS-430S in mind, and for those who prefer to "roll their own," the AT-130 antenna tuner is available. The FM-430 FM unit is available for FM operations. The YK-88C (500 Hz) or YK-88CN (270 Hz) CW filters, the YK-88SN SSB filter, and the YK-88A AM filter may be easily installed for serious DX-ing. An MC-60A deluxe desk microphone, MC-80 and MC-85 communications microphones, an MC-42S mobile hand mic., and an MC-55 8-pin mobile microphone, are available, depending on your requirements. TL-922A linear amplifier (not for CW QSK), SM-220 station monitor, PC-1A phone patch, SW-2000 SWR/power meter 160~6 meter, SW100A SWR/power/volt meter 160-2m, HS-4, HS-5, HS-6, HS-7 headphones, are also available.

More information on the TS-430S is available from authorized dealers of Trio-Kenwood Communications, 1111 West Walnut Street, Compton, California 90220.

Specifications and prices are subject to change without notice or obligation

ICOM Handhelds

Dollar-size and Dollar-wise

To meet your VHF and UHF communications needs, choose the ICOM 2-meter IC-02AT or the 440MHz IC-04AT full featured LCD readout handhelds. For exceptional features, quality built to last and a wide variety of interchangeable accessories, the IC-02AT and IC-04AT are optimum values.

Standard features include full frequency coverage...140-149.995MHz and 440-449.995MHz with transmit frequencies covering U.S. MARS and CAP frequencies without modification ...10 memories, DTMF, duplex offset storage in memory (standard 600KHz plus four odd offsets), 32 keyboard selectable PL tones which store in memory, high/low power and internal lithium battery backup to maintain the memories for up to seven years. Slide-on battery packs with a battery lock, frequency lock and lamp on/off button provide operating convenience.

CM-60
Six-position
charger

Scanning systems are priority scan, memory scan and programmable band scan. Increments of 5, 10, 15, 20 or 25KHz are front panel selectable for band scan.

Keyboard entry with the 16-button pad allows easy access to all frequencies, duplex modes, memories, scanning, dial lock, PL tones, priority and DTMF.

An LCD readout indicates frequency, memory channel, transmitter output, dial indicator, offset direction, PL tone and scan functions plus Rx signal strength.

An aluminum case back provides superior heat sinking when the IC-02AT and IC-04AT are run at the standard three watt level or optional five watt level. Output power is determined by the battery pack used.

Accessories for the IC-02AT and IC-04AT include all accessories for the IC-2A series plus the new long-life IC-BP8 and high power (13.2 volt) IC-BP7 battery packs, HS-10 boom headset, HS-10SA VOX unit, HS-10SB PTT switchbox and CM-60 six-position charger.

One method of charging the IC-BP7 and IC-BP8 is by applying 13.8 volts through the top connector of the transceiver. This allows operation of the transceiver with or without the battery connected.

See the IC-02AT and IC-04AT handhelds at your nearest ICOM dealer.

The IC-02AT and IC-04AT come standard with an IC-BP3 NiCd battery pack, flexible antenna, BC-25U wall charger, belt clip and wrist strap.

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Offices: 76 North Broadway, Hicksville, NY 11801. Telephone: 516 681-2922. CQ (ISSN 0007-893X) is published monthly by CQ Publishing Inc. Second Class postage paid at Hicksville, NY and additional offices. Subscription prices: Domestic—one year $16.00, two years $29.00, three years $42.00; Canada/Mexico—one year $18.00, two years $33.00, three years $48.00; Foreign—one year $20.00, two years $37.00, three years $54.00; Foreign Air Mail—one year $73.00, two years $143.00, three years $213.00. Entire contents copyrighted CQ Publishing Inc. 1984. 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.

CQ The Radio Amateur's Journal

ON THE COVER: Santa has made his list, checked it twice, and is now arranging for delivery in time for the holidays. Photo by Larry Mulvehill, WB2ZPI.

DECEMBER 1984 **VOL. 40, NO. 12**

FEATURES

DEPARTMENTS

Zero Bias AN EDITORIAL

The holiday season is one of those double-sided situations. Christmas and Chanukah fall very close together this year, and both are joyous occasions celebrated with gift giving and warm feelings towards all. It is also a time when we mark the end of one year and the beginning of the next. We can see where we've been and what we've accomplished and perhaps think about what we'd like to see in the new year ahead. One side, therefore, is more carefree and definitely joyous, and the other is a bit more introspective.

Santa on the cover symbolizes the immediacy of the holiday season, the merriment and the gift giving. In that regard, all of us at *CQ* wish you had the foresight to pick up a pair or two of King Kong's socks to hang by the fireplace, and may they be filled with wonderous things to delight you in the coming year. May you get the station of your dreams (or at least a good part of it), and may someone else get the socks and underwear.

When you think about how 1984 treated you, some of the good times, and the fun you got out of amateur radio, think about how you can help amateur radio in 1985. Think about getting at least one person involved in amateur radio—start there, just one new person. Think about helping your club involve itself with the volunteer program. If you don't belong to a club now, why not join one? If there's no club in your area, why not start one? Come alive in 85!

This has been a good year for *CQ*. We've all worked very hard, and with your loyal support we've continued to grow and expand. October saw the first issue of our new magazine, *Modern Electronics*, reach the newsstands. Reader response has been extremely favorable. Although it is not an amateur radio magazine, many of you who have seen it at recent hamfests have liked it, too. What about 1985? Well, we do have some plans for additions to our contest program. In response to many suggestions from readers, we will be adding a v.h.f. program in 1985. The February issue will detail what we think will be an exciting concept in v.h.f. contesting. It might even be challenging enough to entice some of the h.f. gang to get involved. We are also ironing out some details for an ongoing v.h.f. column. We've even managed to talk Irwin Math, WA2NDM, into writing a few more Math's Notes columns. Irwin was one of the first people to see a future in fibre optics and went into the fibre optics business. The growing success of his business caused a halt in his column, but we did manage to extract the promise of a column on an irregular basis.

We intend to work just as hard if not harder for you in 1985. We're enthusiastic about you and amateur radio and the fact that there is still a lot of fun to be had in our hobby. We'd like you to enjoy amateur radio more and to have fun at it, too. We would also like to enjoy your continued support of *CQ* and our advertisers, who make a lot of this possible.

We still will try to meet as many of you as possible at as many hamfests as possible. Supporting local groups is very important for the continued growth of our hobby. Besides the positive exposure to amateur radio, it is one of the only ways now to take a license exam. Your entrance fee at a hamfest not only gives you a shot at a prize that you can take home, but also a stake in an even bigger prize—the future of amateur radio itself.

Everyone here at *CQ* would like to extend to you and your families wishes for a very joyous holiday season and a very happy new year.

Travels With CQ

The four week odyssey I told you about last month is over, and the intrepid *CQ* Team is once again back home. On Sept. 21st, Dick and I went to Chicago (actually Mundelein) for the 1984 Radio-Expo. At the same time, Herb and Arnie went to Virginia Beach for the annual hamfest there. I don't know when it is that you reach the stage of having enough "stuff" and can resist the bargains, but on Monday when we all compared notes, it seems that we all added to our collection of "stuff." Radio-Expo is held at the Grays Lake Fair Grounds and is the scene of several hamfests and swapmeets during the year. Along with the commercial exhibits (offering every new goodie) there's quite a large fleamarket offering all sorts of great "stuff." The Virginia Beach Hamfest is held in a spacious Civic Center building and has an indoor fleamarket adjacent to the commercial exhibits.

The following week we marshalled a large crew for the Boxboro, Massachusetts Hamfest. I think everyone wanted to head up to New England to watch the foliage change color and the gold, red, yellow, and green leaves usher in the fall season. We had Dick and Cathy, Jack and Ruth, Lew and Martha McCoy, Carl Dane, and me. The weather was beautiful, and it brought out the people. One amateur even flew up to Boxboro in his own helicopter and landed it in the parking area (that's style!). Dick and Jack managed to find a mint TR-3 (well, pretty mint) at a good price in the fleamarket and brought it back for Arnie. Dick and I got a good buy on a couple of amber monitors; now all I need is a computer.

The next week Dick and I were on our way to Houston, where we met Carl Dane and set up shop at the Astro Village for the Texas State Convention. Although not quite as big as last year's National, there was plenty to see and do. This year, in deference to the humidity the fleamarket was held indoors so that one could enjoy the whole convention in air-conditioned comfort. I picked up a Fluke autoranging VOM to replace my old 260, the battery of which is getting harder and harder to find. It's as good a reason as any.

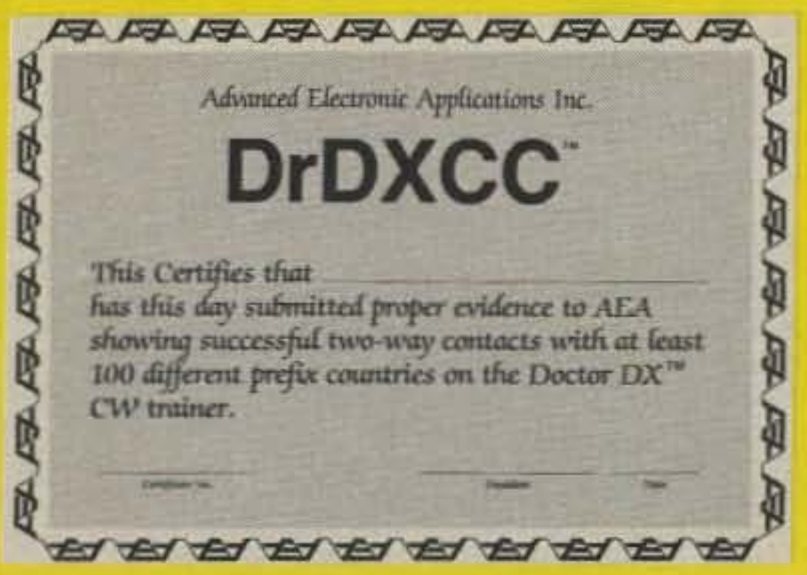
This past weekend Lew McCoy and I showed the *CQ* flag at the hamfest in Santa Maria, California. I met Lew at the airport in Los Angeles, and we flew up together on Wings West Airlines (another new one for me). I mention the airline because I think I'll start another awards program for flying the most and varied airlines. Although active DXpeditioners and some contest groups have a head start, a lot of the exhibitors at these hamfests and conventions could tally up a lot of airlines. Santa Maria is beautiful, the weather was terrific, and the people were very friendly. The only other thing you could ask for was a few more tables at the fleamarket. The Los Angeles area has a big monthly fleamarket at TRW, and that seems to concentrate the fleamarket activity. I was sorry that we had to leave Sunday morning before the show closed and their famous banquet barbecue. I understand from people who have been there that it is quite an event with really great food.

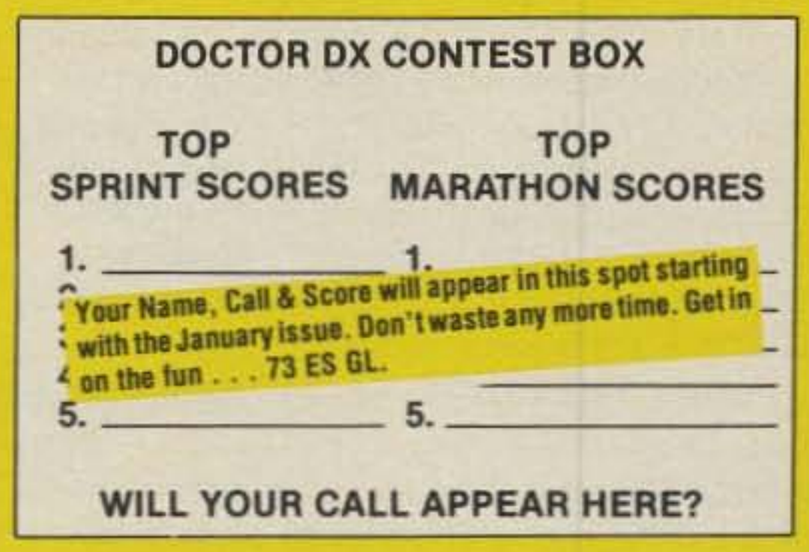
From comments I've received at virtually all of these hamfests, these "Travels With *CQ*" are very popular. I know that it has brought some people out of the hamshack and into the crowds. For those of you still reluctant to get out there among your fellow amateurs, you're missing out on a lot of fun. It's still the best way to meet the people you've been talking to, plus some new friends, and to see firsthand the full range of gear available. It's a chance for the exhibitor to show off how much he knows about his products and especially to answer any questions you might have. Where else can you get that person's undivided attention? You, the amateur, are the important ingredient in these events. They all are designed with you in mind. So, if you can't stand the thought of having fun, seeing what's new, meeting new people, and exchanging the latest information (even gossip), then stay home and be miserable.

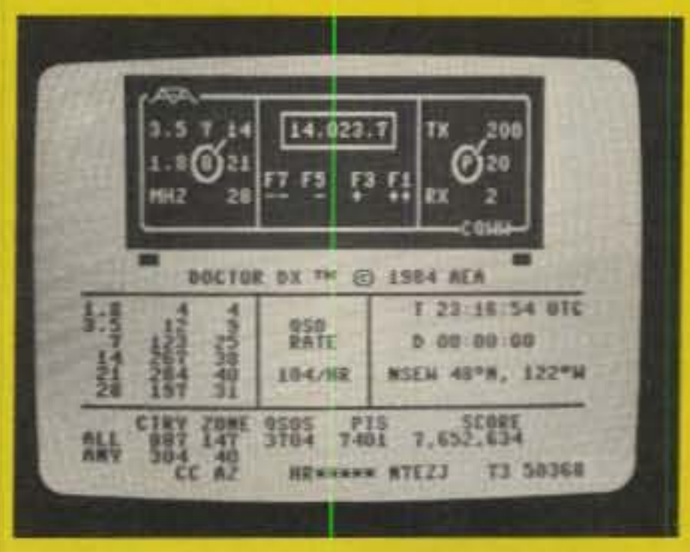
73, Alan, K2EEK

Doctor DX™ Challenge

BY AEA







For good clean, competitive fun, Doctor DX™ shows your score and QSO rate for continuous monitoring of your improved CW operating skills. The DDX-64 can be a vehicle for fairly settling those club rivalries by competing with your friends under identical operating conditions.

AEA also has two on-going CW contests that you can enter with Doctor DX as your own schedule permits. The AEA SPRINT CONTEST is a timed non-stop eight hour event and the AEA MARATHON CONTEST is a timed 24 hour non-stop event. The top 5 contest scores will be published in our future advertisements and upgraded periodically as new higher scores are achieved.

In addition to the two AEA contests, we are offering award certificates for achieving certain milestones. You will be automatically alerted when you have achieved these milestones by a display at the bottom of the monitor screen.

AEA DrDXCC is achieved when you have worked 100 different countries, regardless of the frequency band or the amount of time operated. DOCTOR DX WAZ can be earned by working all 40 CQWW zones of the world, without regard to the band or duration of operating time. The DOCTOR DX HONOR ROLL is reserved for top notch operators capable of working 250 countries without regard for band or operating time. Additional endorsement awards are available for each additional 10 countries worked up to 300 (out of 304 possible) countries. AEA 5 BAND Dr DXCC is a very difficult award to achieve. It requires working 100 countries on each of five different bands, without regard for the amount of operating time.

Each award can be obtained by filling out a photocopy of the award application form (supplied) along with the score information and qualifying check sum from your screen display. Please enclose $3.00 to cover handling costs for each certificate ($1.00 for Honor Roll endorsements). Awards will only be granted to owners having a Doctor DX warranty card on file.

There is no need to ever be bored with your hobby again just because the bands are dead or you are apartment bound. Try Amateur Radio's own version of Solitaire - DOCTOR DX.

Send Us Your QSL Today And We Will Rush Full Details!

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AEA Brings you the Breakthrough!

HAPPY HOLIDAYS HAPPY HOLIDAYS

SANTEC LS-202A SINGLE-SIDEBAND & FM 2-METER HANDHELD TRANSCEIVER

Single-sideband really works in nonrepeater situations and has over 5 times the battery life per battery charge according to the engineers who developed the LS-202A. The slide-on, locking battery pack can contain either Ni-Cd 'AA' cells or 'AA' alkaline-type batteries, or a special higher voltage Ni-Cd pack can be purchased as an option. The special VXO and RIT circuits add flexibility to the 5 kHz step synthesizer to provide continuous tuning for Upper or Lower SSB. High (2.5 W PEP) or Low (0.5 W PEP) is selectable by a switch. Lighted receive 'S-Meter' with Transmit battery level display and thumb-wheel switch lighting make using the LS-202A more comfortable.

FM mode is still the FUN MODE to many people, and the LS-202A works all the repeater frequencies from 144 to 148 MHz with the normal ± 600 kHz offset. Good, crisp audio comes from the internal mic, and there is the capability of using an external speaker mic of the popular variety.

Santec and SSB simply just got better. See one today at your Santec dealer.

SANTEC®

Technical Talk

SPECIFICATIONS	SSB/FM
Freq. Range	144.000–147.995 MHz
Synthesizer	5 kHz Steps + VXO
Modes	USB (A3J), LSB (A3J), FM
Voltage Range	6–12 VDC
Current Drain	30 mA RX Standby 750 mA TX Peak
Power Output	2.5 W PEP (9 V) 3.5 W PEP (10.8 V)
Receiver Bandwidth	2.4 kHz (– 6 dB) SSB 15 kHz (– 6 dB) FM
Sensitivity	0.25 uV (12 dB S/N) SINAD
IF Frequencies	10.695 MHz SSB, 10.695 MHz and 0.455 MHz FM
Spurious	– 60 dB

WATTS OF WINNERS FROM WELZ CORP.

THE WELZ CORPORATION LINE OF STATION ACCESSORIES

SUPERIOR ACCESSORIES

WELZ specializes in WATTS. Measuring Watts and switching Watts, radiating Watts and dissipating Watts is what the WELZ line of winners is all about. Welz is the source for top quality, superior performing, affordable products to compliment your mainframe radio equipment from any source. Increase the versatility of your measuring capability with WELZ WIDE-Z Sensor (TM) power and V.S.W.R. meters, precision 50 ohm terminations. Conserve your coax dollars with the dual band Diamond Antennas for 144/430–440 MHz for base and mobile applications. Welz dual band duplexers let you feed two antennas on two different bands with one feed line with no switching or two transmitters onto one dual band antenna simultaneously. WELZ has wattmeters and V.S.W.R. bridges from 200 mW to 2000 Watts from 500 kHz to 500 MHz frequency range. When you need to measure in RF Watts WELZ has a winner for you. The full line of Wattmeters encompasses many different models, some of which are shown in this family portrait. In addition to both in-line and terminating type wattmeters the WELZ line of Winners includes several high quality dummy loads for testing and tuning plus applications requiring precision 50 Ohm terminations. Frequency ranges of the WELZ loads are typically wider than similarly priced items from other sources. WELZ has winners in the economy circle also. The performance value of the economy line of Wattmeters from WELZ is really superior. The instruments from WELZ are extremely well built and very easy to view. The portable units such as the SP-10x and the SP-380 provide reliable service in the field as well as in the fixed station. Send QSL type card for complete catalog of WELZ products.

ENCOMM

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ENCOMM

HAPPY HOLIDAYS HAPPY HOLIDAYS

USER FRIENDLY

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- FEATURES
- VALUES

SANTEC®

SIMPLY SMARTER HANDHELDS

144 MHz • 220 MHz • 440 MHz

Smart enough to be user friendly means the newest Santec radios are more useful in your hands. Without sacrificing features and functions you really want, you can have an easier to use, yet smarter handheld from the broad line of models for the most popular VHF and UHF bands 144, 220, and 440 MHz. Plenty of accessory items are available for the Santec radios to make your personal application of Santecnology (TM) the smoothest yet. And don't forget the transistor and semiconductors in all Santec products are guaranteed for two full years.

Santec's smarter handhelds help the user by providing widest frequency coverage for MARS and CAP operations as well as amateur radio. Any value of offset on 10 KHz steps can be set and stored in any memory location, thus requiring only one memory per transceive frequency pair. Single stroke memory recall of all 10 memories and the required offset means no more switch flipping when repeater frequencies are changed. Because lower power output from the transmitter helps the user to get longer service times on each battery charge, Santec provides three switchable power levels from the full power level of 4 watts plus down to a midrange of around one watt and a battery conserving 100mw. The Santec user gets plenty of helpful information from the complete display on the large size LCD frequency display using six digits plus the offset direction and memory number. Mode of scan, PLL lock and the receiver and transmitter indicator are all usable at the same time without any extra effort. All the neat features you expect plus a good, solid performing transceiver section with excellent sensitivity and high quality audio make Santec your best choice for a handheld transceiver.

For specifications and a full catalog of Encomm, Inc. products send us a QSL. Specifications subject to change without notice or obligation. Information in this ad does not constitute warranty.

THL CORP.

AMPLIFIERS • PREAMPS • COUPLERS

AMPS • PREAMPS • COUPLERS

The helpful line of handsome products.

The THL line of amplifiers, pre-amps, antenna couplers and transceivers provides a broad line of solutions to help solve life's problems of needing "just a little more." Whatever it might be, look to THL helpful products to aid in solving the problem. THL can make your signal stronger, your receiving better and can make your HF transmitter happier with the match to the antenna. THL amplifies to a level of 160 Watts on VHF and 90 Watts on UHF. Using THL amplifiers, handy radios can talk like mobiles with low power input models which provide 30, 100 or 160 Watts of output. Models for 10-14 Watts input power or 25 Watt output mobiles are available.

The THL line of antenna couplers provides fine quality hand crafted antenna matching networks for both low power applications and larger power amplifiers running the legal limit. The THL antenna coupler series has full features like built-in antenna switching for changing antennas or by-passing the coupler and an accurate V.S.W.R./power output indicator on all models. Sturdy construction and honestly rated components and capabilities make the THL series of tuners your best choice.

THL has introduced a unique 440 MHz handheld product, the MICRO-7 utility transceiver. This transceiver can be on the air for less than you would ever guess. THL now has 1 dB GAS-FET pre-amplifier for the 2 m and the 70 cm bands. See your THL dealer for details.

Put The Helpful Line to work helping you. Drop us a QSL type card with your name and address for a full catalog of THL products and specifications.

Bottom row: HL-160V25 25W in 150W out 2m • HL-160V - 3 or 10W in for 160W out 2m • HL-90U 10W in 90W out UHF • HC-2000 2KW antenna tuner • Second Row: HL-110 3 or 10W in 100W out 2m • HL-82V 10 in 80W out 2m • HL-45U 10W in 45W out UHF • HC-400 200W antenna tuner and VSWR Power Meter • Third Row: HL-30V economy HT amp 3W in 30W out 2m • HL-32V 3W in 15 or 30W out 2m SSB or FM portables • HL-20U .2 or 3W in 20W out UHF • HC-200 the Economy-With-Quality HF antenna tuner. An HRA2 GAS-FET preamp sits atop the HC-200 • Also shown is the MICRO-7 Utility UHF transceiver and headset.

ENCOMM

2000 Avenue G, Suite 800, Plano, Texas 75074
Phone (214) 423-0024 TLX 79-4783 ENCOMM DAL

ENCOMM E

Our Readers Say:

Frequency Control For A Blind Amateur—Addendum

Editor, *CQ:*

The following new information is offered concerning the frequency control gadget for a blind amateur described in the October 1984 issue of *CQ* ("Frequency Control for a Blind Amateur, Another Alternative, p. 42).

Better gears and ready-made bushings have been found. The gears are Delrin the same size but with set screws installed in brass inserts, and they have bores such that the ready-made bushings will fit all the gears onto ⅛" shafts. All anyone would need to do is drill side holes in the bushings to pass the set screws down onto the shafts. These gears are available from Stock Drive Products, 55 South Denton Ave., New Hyde Park, NY 11040 (516-328-0200). The plain bronze bearing bushings with ⅛" inside diameters and all the outside diameters needed for the above gears are available from Eastern Bearings, Inc., 60 Felton St., Waltham, MA 02154 (800-225-8996).

Also, plates ⅛" × 3" × 18" of No. 6061 grade aluminum should be much better, and are available from Scruggs Hardware, Woodsville, NH 03785. These plates are better grade and also longer than the ones I used, so there would be enough left after cutting off 9¼" for the gear box to make longer bottom plates (±4") to project farther out the back so as to set the legs farther apart for greater stability. There would also be enough left to make longer idler gear plates (±4¾") projecting down out of the gear box.

Many radios are physically larger than the TS130S and some probably would require two idler gears to reach down to the tuning dial shaft, in which case the two idler gears should be the same size (number of teeth) to keep gear box shaft No. 2 turning at the same rate as the tuning dial shaft. The size of the two idler gears and the length of the plates holding them would depend on the distance between the gear box and the tuning dial shaft. I would set the idler gear shafts in a fixed position and let the idler gears rotate on their bearing bushings, using shaft collars as necessary to keep them from sliding back and forth. It should also be noted that two idler gears would reverse the rotation of the pointers, requiring reversal of the layout of the Braille numbers on the faceplate from counterclockwise to clockwise.

In addition to your suggestion of getting amateur radio clubs to undertake these projects, another possibility for anyone who cannot find local help is a nearby high school shop or vocational education institution. At least one high school shop instructor has informed me that it could be done easily by such students.

Arthur L. Stewartson, KA1BRG
Colebrook, NH

"Music of the Spheres"

Editor, *CQ:*

I congratulate Mr. C. Alexander Brown of Ottowa, Ontario, Canada, for his excellent letter in *CQ* September 1984, wherein he calls the rejection of "no code" a backward step. I work CW 98% of the time, and the dits and dahs are to me as the "music of the spheres." However, CW is a quaint antique to be cherished by romantics and relics of the past like myself. Let us open our ranks in the manner described by Mr. Brown, and then marvel at the even greater strides this hobby will take.

William P. Henneberry, KN2X
Chief Radio Electrician W-2,
US Navy, Retired
Yonkers, NY

Too Many "Ham Hackers"

Editor, *CQ:*

Re: Our Readers Say, September 1984, "Living in the Past?" by C. Alexander Brown. This reader seems to have the mentality that is so prevalent in today's "make is simple" approach to accomplishment. Mediocrity is the end result of simplism, whether mental or physical. Modern aircraft are capable of flying without pilots (human type) in the cockpit, but that does not mean we should do away with pilots or reduce the requirements for becoming a pilot.

Mr. Brown spoke of computer hackers who do things mischievously. If those individuals do not have the drive and ambition to pass a code test to become a ham, what makes him believe they will not become "ham hackers," which there are too many of now? As for myself, I am not a ham yet, but have enjoyed the challenge of code and am now copying 22 wpm solid. The rejection of "No Code" is not a backward step. It is a sound decision. Disciplined individuals do not regard growth in learning as an obstacle to reaching a goal. There are now and will always be hams who love to communicate with code using the hand key and pen or pencil. "No Code" CB can have the "hackers."

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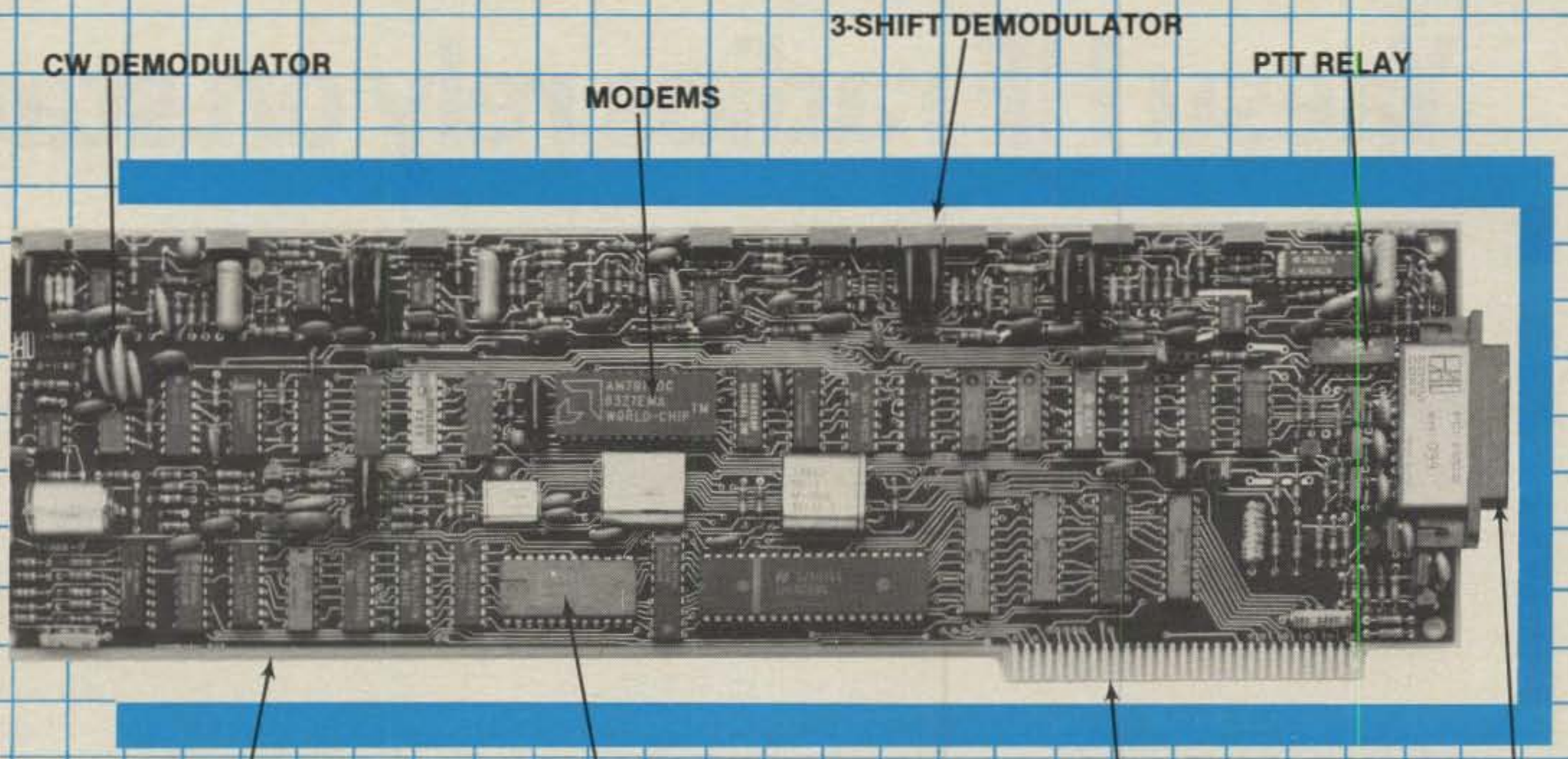

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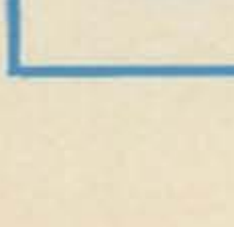

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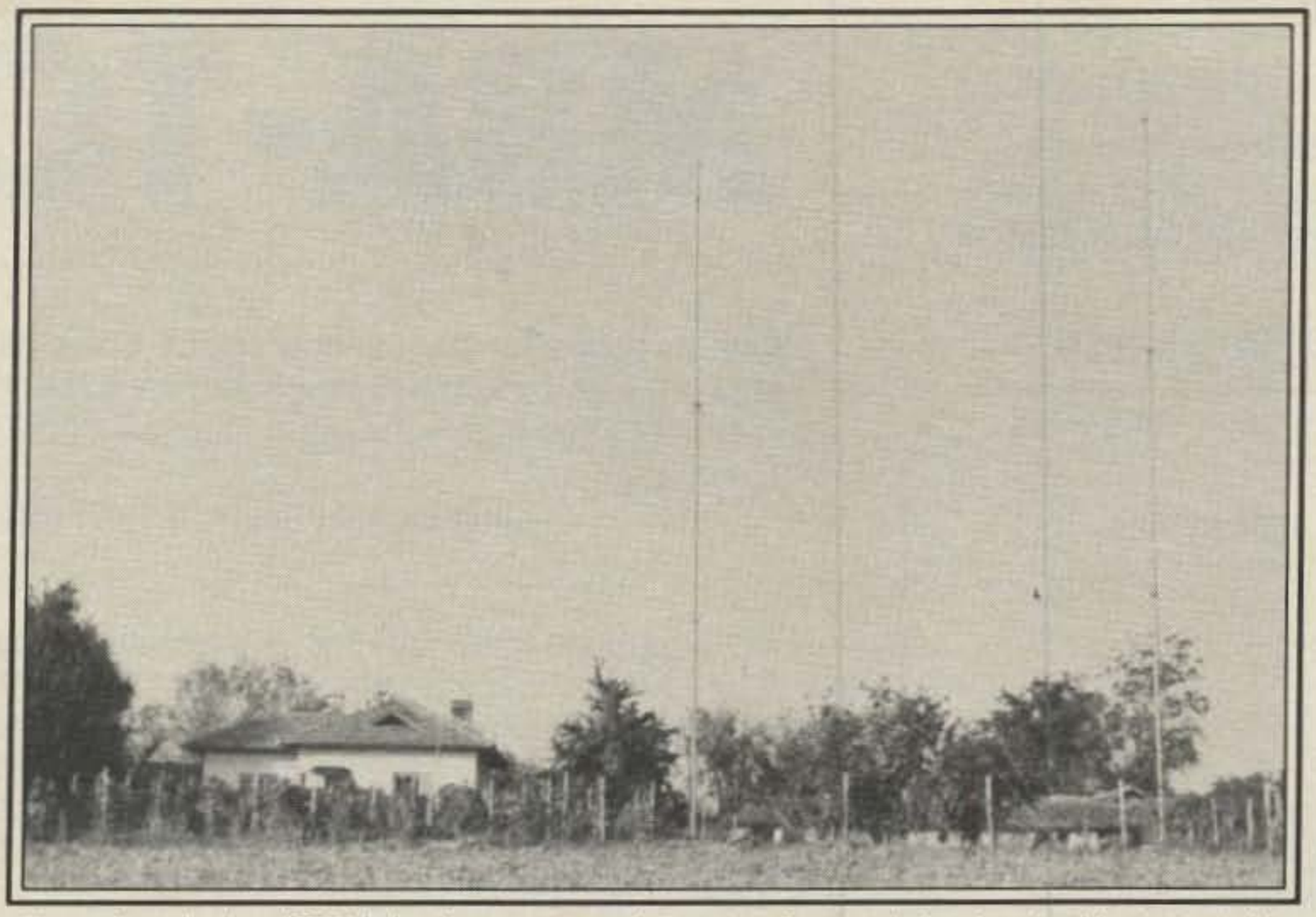

Phased verticals at LZ2CJ plus beverages and Russian fluency helped make him top world single-op on phone, and third world high multi- op on c.w.

Results of the 1984 CQ 160 Meter C.W. and Phone DX Contests

BY DONALD McCLENON*, N4IN

Worldwide interest in these contests is growing fast. Participation in both c.w. and phone is up about 50% from last year. The extra activity only produced about the same number of logs as last time. We want them all, even the smallest ones.

There was surprisingly little interest shown in whether you like or dislike exchanging a serial number with each contact. Only 29 votes were received, with a slight majority for return to serial numbers. This is not a strong enough case for a change, so it will stay NO SERIAL NUMBERS again next time, with a repeated request to vote on it in your log comments.

As the activity in these contests increases over the years, the work of carefully checking for dupes, phonies, "non-contacts," improper multipliers, and arithmetic errors has reached the point where timely reporting of results calls for computer assistance. Knowing far too little about computers, I was indeed fortunate to be steered to Ed Sleight, K4SB. He is an active DX and contest-knowledgeable ham who has been in our 160 meter contests, and who is very much up on computer technology. When briefed on everything I wanted done on contest log processing, he developed software for doing it and arranged for me to obtain the necessary hardware. Logs are now checked more accurately for correct points, multipliers, and dupes than the best manual checking, and all logged calls can be loaded into a giant alphabetically arranged master list. "Unique" or first-time calls can be put in limbo until someone else works them before they go into the master list. Dupes are flagged instantly, and it can be arranged to automatically invoke the 4-for-1 dupe penalty. Don't send in any more logs you haven't dupe checked, hoping I won't find them! There is no penalty for marked dupes when no points are claimed. This year's logs required sending about 136,000 calls through the computer, which is still quite a chore.

The DX window concept to allow weak DX to be heard in the W/VE area, while W/VE's transmit elsewhere as requested by the DX, appears in danger of extinction. This may be because so many transceivers not arranged for convenient split-frequency operations are now in DX stations. Because of very many complaints about DX stations insisting on operating in the 1825–1830 and 1850–1860 windows and taking calls on frequency, we don't have much choice but to disqualify anyone who does this. It is especially bad when the offending station himself has a big signal such as XE, VP9, YV, and Caribbean stations. For DX stations: If you must transceive on frequency, at least *don't do it in the DX windows* if you hope to see your scores published or receive any contest awards. Newcomers should be warned about this as soon as anyone contacts them. Don't just work them and go away, as many did last time.

C.W. Contest—January

Conditions were not as fantastic as last year, but they were quite good at times. Activity was so much greater that new records were made in nearly all categories. There were 4066 stations (4247 operators) reported active worldwide in 107 countries, 50 states, and 12 provinces. North Dakota was by far the rarest state, worked by very few, with South Dakota probably the next rare, having only four calls noted from there. We are grateful for Newfoundland activity from VO1MP, Labrador from VO2CW, P.E.I. from VE1BPY, N.B. from VE1ASJ & VE1AXT, NWT from VE8CM & VE8XO, and Alaska from KL7GIH & KL7GKY. Some of the rarer active DX prefixes for W/VE's included C6, CX, EA6, EA8, EA9, FC, FO8, GD, GU, HI, HL, HZ, I, J3, J7, JX, KG4, KL7, KV4, LU, LX, OY, P29, PY, SV, SV5, TF, TU, all USSR prefixes, V3, VK9, VP2K, VP2M,

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                                    hh:mm:ss

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 R. RTTY
 T. AMTOR
 U. AUTO AMTOR
 X. AUTO CALL
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 O. OPTIONS
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- → Selects command menu.
- → Selects options menu.

+ Complete precompose split-screen display with status information.
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OPTIONS MENU SCREEN

```
                                    hh:mm:ss
 I. CALLSIGN          ??????
 S. SELCALL             ????
 T. ARQ TIMEOUT           30
 U. USOS                  ON
 M. MORSE FILL (BT)      OFF
 R. RTTY SYNC (NUL)      OFF
 A. AUDIO FEEDBACK       OFF
 C. AUTO CR               ON
 L. AUTO LF               ON
 B. BEACON RECORD        OFF
 W. WRAP-AROUND           ON
 K. CW BREAK-IN          OFF
 O. OUTPUT MODE         WORD
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COMMAND MENU SCREEN

```
                                    hh:mm:ss

 L. LOAD
 E. EDIT
 M. MOVE
 S. SAVE
 X. SET XMT BUFFER SIZE
 C. SET COLOR
 T. SET TIME
```

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EA6ET and his dog CQ were welcome c.w. multipliers for many in EU and a few W/VE's.

It's a summer contest at PY1BVY, making each contact a major achievement.

VP2V, VS6, VU, XE, Y, YB, ZD, ZK1, ZS, 5B4, 5N1, 5W1, 8P6, 9H1, 9K2, 9M2, 9Y4. A phony A22 station appeared to be somewhere in Kansas. Several other exotic prefixes were found to be equally valid.

K1ZM again piloted NP4A to the world high score. His 631,182 also set new QSO, multiplier, and country records. The next 11 world high scorers were as follows with asterisks denoting multi-op stations. EA3VY* 327,120, WA2SPL 318,636, G3SZA 257,720, T32AF 232,505, LZ1KDP* 204,408, LZ2CJ* 201,530, UK2RDX* 193,579, AA1K 190,944, YU1EXY* 184,325, VE3ABG 176,952, and YU3EF 174,096. Top 10 scores in the W/VE Single Operator, DX Single Operator, and Worldwide Multi-Operator categories are shown in the score boxes.

QSO leaders were NP4A 846, WA2SPL 767, K5UR 667, WA0AIH/9 666, AA1K 662, N9MM 659, WB8JBM 636, K8NZ 609, KJ0D/0 608, N5AU 607, K0RF 601, W1CF 599, UK2RDX 598. Last year's top was 633. Outside W/VE besides those shown, high QSO totals were EA3VY* 547, LZ1KDP* 511, LZ2CJ* 510, UK2PCR* 471, UK2PRC* 466, YU3EF 432, G3SZA 425, OZ1LO 416, YU1EXY 415. (Asterisks denote multi-ops). High contact totals outside N.A./EU were T32AF 365, 4X4NJ 291, RA9AKM 229, UK7PAL* 169, KH6DX* 166, RF6FFW 159, UH8DC 156, UA9MR 153, YV3AGT 152. (Again, asterisks for multi-ops.) All these categories ran well above similar figures last year.

The multiplier record keeps on rising. This year NP4A with 118 and WA2SPL with 106 were ahead of last year's max. They were followed by AA1K 96, W1CF 93, K1IK 91, EA3VY 87, N4WW 87, G3SZA 85, KS8S 85, K5UR 84, WB8JBM 83, K5RR 81. DX multiplier leaders not shown above were CT2DV 74, YU1EXY 73, YU3EF 72, LZ2CJ 70, LZ1KDP 68, OK1KSO/P 68, OK3KFF 67.

Country worked totals were way up, with so many new ones active. Leaders were NP4A 64, LZ1KDP 60, LZ2CJ 60, UK2RDX 53, WA2SPL 52, OH1XX 52, YU1EXY 51, EA3VY 50, G3SZA 50, OK3KFF 50, UK2PRC 50. Highest W/VE country totals were WA2SPL 52, AA1K 41, W1CF 40, K1IK 37, N4WW 35, VE1YX 33, K5UR 30, KS8S 29, WB8JBM 28, K5RR 27.

The computer master list made up from all logs received after correcting obvious phonies and call copying errors shows the following number of active stations in each country having more than 10 participants:

Country	Stations	Country	Stations
W	1710	UP	24
OK	347	UQ	22
UB	334	SM	17
UA	327	LA	16
G	225	SP	16
JA	168	EA	15
DL	126	GM	15
VE	111	UC	15
UA9	102	UL	13
YU	75	OE	12
OH	32	LZ	11
F	29	Others	246
PA	29	Total	4066
UR	29		

Check the Plaque Winners box for the eligible winners. Top scorers WA2SPL and G3SZA are not eligible for this year's awards in their respective areas due to the three year eligibility restriction.

There are no sponsors for the World and U.S.A. awards for 1985. We need spirited individuals or groups interested in furthering 160 meter operation to support these and multi-operator awards. Anyone interested please contact Frank Anzalone, W1WY, for details.

Phone Contest—February

More noise and poorer propagation prevailed during the phone activity, but the tremendous increase in stations (5140 operators reported) enabled the better-equipped stations to set many new records. At least 12 stations worked all 50 states. There were 11 provinces and 83 countries active. The rarest state was Mississippi, represented by N5GDO and WB5USN. Hawaii had AH6BK and KH6DX most active, and Alaska had KL7Y, KL7GKY, and KL7XO. All W/VE's would welcome any of these active prefixes: C6, C31, CT1, CT2, EA6, EA8, EA9, FC, FO8, GD, HI, HK, HK0, HR, I, J6, KH8, KP4, LA, LX, OA, OE, OH, OH0, PJ, SV, T3O, T77, all Russian prefixes, V3, VK, VP2K, VP2M, Y, ZB, ZK1, ZL, 4X4, 5B4, 5N1, 6Y5, 8P6, 9H1, 9Y4.

Top world score of 328,140 was made by LZ1KDP*, who worked an incredible number of Russians, as they did in the *CQ* Worldwide DX Contest. The next 11 high scores were as follows, with asterisks denoting multi-op stations: LZ2CJ 243,236, YU1EXY (YU1PKC Op.) 196,092, K5UR 182,286, VP9AD* 173,329, W9ZRX 161,111, AA1K 154,980, N8ATR 130,166, N4SF* 125,020, KD4NI 116,340, VE3MFA 115,754, EA9KF 115,752. Top 10 scores in the W/VE Single Operator, DX Single Operator, and Worldwide Multi-Operator categories are shown in score boxes next to those for c.w.

QSO leaders were K5UR 1006, LZ1KDP 988, W9ZRX 972, LZ2CJ 972, W0EJ 770, N8ATR 749, W9AZ 743, KD4NI 720, KC8JH 718, N4SF 706. Last year's top was 827. These are well above the c.w. figures, because there were more stations on, and contact speed is greater. High QSO totals outside W/VE, besides those already shown, were as follows, with multi-ops starred: YU1EXY 690, UK2PCR* 643, UK2BCC* 572, VP9AD* 507, UR2RNA 503. Outside N.A./EU, high contact totals were EA9KF 214, YV2IF 137, KH6DX 94, HJ4RCA 80, YV3AGT 71, EZ6GAW 35, UK7PAL 21, UJ8JKO 17.

Last year's multiplier top of 75 was exceeded by AA1K 90, AA4S 82, WA2SPL 79, K5UR 78, AA4MM 77, and N4SF 76. They were followed by N8ATR 74, W9ZRX 73, K1NG 72. DX multiplier leaders were VP9AD 67, G3SZA 62, LZ1KDP 60, 4X4NJ 59, EA9KF & YV2IF 56, YU1EXY 52, YU3EF 51, LZ2CJ 49.

All these stations exceeded last year's top of 37 countries: LZ1KDP 50, LZ2CJ 46, YU3EF 45, G3SZA 44, YU1EXY 43, SP3IBS 42, SP5INQ 39, EA9KF & UK2BCC 38. Best W/VE country totals were AA1K 35, WA2SPL 29, AA4S 28, AA4MM & K5UR 25, N4SF 21, N8ATR 20, K1NG/W4PZV/W9ZRX 19, W3BGN 18, N4IN 17.

The corrected computer master list shows the following number of active stations in each country having more than 10 participants:

Country	Stations	Country	Stations
W	2356	SP	20
UB	937	UL	17
UA	811	HB	16
G	186	UA9	15
VE	153	OE	12
DL	59	UO	12
OK	53	LZ	11
EA	44	UF	11
UP	36	UR	10
YU	32	Others	222
UC	31	Total	5065
UQ	21		

This is a huge increase in activity from last year, especially in the Russian countries. Now if they can improve their stations or if conditions get better, maybe more W/VE QSO's will be possible!

Plaque winners will also be found in the Plaque Winners box. This is the first time around for the three winners, so there were no eligibility problems. LZ2CJ, the world winner, could not also win the European award, so that plaque went to European runner-up YU1EXY (YU1PKC Opr.). We also do not have any sponsors for the World or U.S.A. for 1985. Potential

Plaque Winners

C.W.

World: Station NP4A (Opr. Jeffrey Briggs, K1ZM) The Charlie O'Brien, W2EQS Memorial. Donated by Frank Anzalone, W1WY, and Bernie Welch, W8IMZ.
U.S.A.: Jon P. Zaimes, AA1K. Donated by West Gulf ARC.
Europe: Albert Javernik, YU3EF. Donated by Don Busick, K5AAD.

Phone

World: Wally Stefanoff, LZ2CJ. The John Doremus, W0AW Memorial. Donated by "Friends of W0AW."
U.S.A.: Richard A. Roderick, K5UR. Donated by West Gulf ARC.
Europe: Station YU1EXY (Opr. Vladan Kecman, YU1PKC). Donated by Don Busick, K5AAD.

Aggregate C.W. and Phone Club Scores

Total Score	Club Name	C.W.	Phone
1,402,122	Yankee Clipper Contest Club	NP4A	WA2SPL
990,814	LZ Contest Group	LZ1KDP	LZ1KDP
751,128	Northern Ohio Amateur Radio Soc.	WB8JBM	N8ATR
619,956	Potomac Valley Radio Club	K3ZZ	N4UU
399,147	Kaunas Polytech Inst Radio Club	UK2PCR	UK2BCC
380,417	Club Mihailo Pupin	YU1EXY	YU1EXY
373,557	Kansas City DX Club	KJØD/Ø	N7DF
363,171	Rubber Circle Contest Club	WB7FFF	N7TT
342,815	North Texas Contest Club	N5AU	N5JB
278,923	Viimsi Radio Club	UK2RDX	UR2RNA
253,401	Pohorski Bataljon R.C.	YU3EF	YU3EF
226,910	Central VA Contest Club	NE4J	WU4G
184,106	Sheboygan County DX Assoc.	KE9A	KE9A
176,952	Ontario Contest Club	VE3ABG	—
170,525	Carolina DX Assoc.	—	AA4S
150,831	Frankford Radio Club	W3BGN	W3BGN
135,297	Grand Mesa Contesters	KIØG	NØDWR
126,709	Radioclub Omega	OK3KFE	OK3KFE
125,423	Kankakee Area R.C.	W9AZ	W9AZ
120,904	Radioclub Chomutov	OK1KSO/P	—
119,615	So. Cal. Contest Club	K6SE	K6SE
109,377	Central AR DX Club	KB5DN	KB5DN
108,787	Radioclub OK1KPU	OK1KPU	OK1KPU
108,205	Mid Ohio Valley ARC	—	KC8JH
98,445	Student's Radio Club	SPØTBC	SP7KTE
97,448	Murgas ARC	N3CXB	K3YTL
95,140	Texas DX Soc.	KZ5M	—
91,953	Radioclub Ivan Cankar	YT3T	—
84,678	Central AZ DX Assoc.	K7OX	—
79,445	Club SP5KEI	SP5INQ	SP5INQ
75,628	O.S.U. ARC	W8LT	W8LT
72,009	Davenport ARC	WØBXR	—
68,802	No. Cal. Contest Club	K6RU	K6PJY
57,582	Amateur Radio Xmtg Soc.	N4XM	—
49,308	PZK Iskra	SP9DH	—
41,778	Eastern IA DX Assoc.	—	KØGVB/C6A
41,152	Oslo Society of NRRL	LA4O	—
37,512	Monte Capra DX Gang	—	I4RYC
36,244	Radioklub Machod	OK1KNA	—
34,408	Lakeway ARC	—	N4FNB
33,912	Radioklub OK1KZD	OK1KZD	—
33,200	Providence Radio Assoc.	W1OP	—
30,205	Radioclub Havlickuv Brod.	OK1KRU	—
30,180	PI4ZA Contest Group	PI4ZA	—
28,524	MI DX Assoc.	W8UVZ	W8UVZ
27,713	Radio Club Lanskroun	OK1KTW	—
20,450	Dixie DX'ers	NQ4I	—
19,876	Petaluma DX Soc.	WB6EGE	WB6EGE
18,326	Central VA DX Club	KG4W	—
17,700	Central PA DX Club	W3CNS	—
16,275	PZK Krakowski	SP9BRP	—
15,552	Dayton A.R. Assoc.	W8ILC	—
14,670	Radioclub OK1KNT	OK1KNT	—
13,494	Radioclub Zeliv	OK1KZW	—
12,645	Cuesta Experimenters	WA6RKE	—
11,408	Lithuanian Contest Group	UP2BLW	—
11,040	Nagoya Univ. Radio Club	JA2YKA	—
10,492	South FL DX Assoc.	W4OO	—
8,266	Radio Amateur Club of Milwaukee	WA9TZE	—
7,812	Radioclub OK1ORA	OK1ORA	—
7,440	Radioklub Braca Stojakovic	YU7AJD	—
5,061	Radioklub Svazarmu	OK2KHD	OK2KYD
4,860	Osaka Univ. Radio Club	JA3YKC	—
4,245	Radioclub OK1OPT	OK1OPT	—
2,982	Radioclub OK1VSZ	OK1VSZ	—
2,460	SP DX Club	SP9AKD	—
1,656	Meiji Univ. Radio Club	JA1YCL	—
812	Radioclub OK1KLV	OK1KLV	—
340	Akita Univ. Radio Club	JA7YGW	—
324	Radioclub OK2KIW	OK2KIW	—
120	Kaliningradsk Radio Club	UK2FAA	—
116	Sendai College Ham Club	JA7YCQ	—
24	Univ. of Tokyo Radio Club	JA1YWX	—

sponsors should contact Frank Anzalone, W1WY.

Club Competition

Seventy clubs identified themselves on the logs from both modes, about the same number as last year. Yankee Clipper Contest Club was again top scorer with a new club record of over 1.4 million points, well ahead of all the rest. The huge number of Russian contacts made by the four big Bulgarian entries put them firmly in second place, while Northern Ohio Amateur Radio Society was far below their last year's score in third place. There were 23 six-figure scores, compared to 20 last year.

Next Time

The C.W. Contest will be held the last full weekend of January 1985 (Jan. 25, 26, 27), and the phone contest the last full weekend of February (Feb. 22, 23, 24). Send your s.a.s.e. to *CQ* with enough postage for the log and summary sheets you plan to use. Send your logs, however small, to my home address. Also send appropriate black-and-white photos for publication. Then you let everyone know you care about this activity.

73, Don, N4IN

Soapbox W/VE C.W.

Amazing activity, minimum window bashing, and lots of DX. Great test— *VE1BNN*. No new ones, but UC2AA called me —*VE1YX*. Four new countries. Looking forward to next year—*VE3ABG*. Heard VS6DO the day after test—*VE3INQ*. Neighbors and I both happy my tower stayed up this year— *VE3MFA*. Condx not as good as last year, but still best contest of them all—*VE3LSK*. Sorry missed so many in power noise and snow static—*VE6OU*. Hated to lose 9M2AX in the last few minutes—*VE7BS*. Condx varied from poor to excellent hour to hour—*WØHW*. My first test; lots of fun—*KKØC*. Finally heard JA on 160—*N8BJQ*. Best east US condx ever on 160. Two new ones CT2DV & P29PR. Getting older; took too many breaks—*K6SE*. Good signals, good operators; truly a gentleman's band. It gets better every year—*K6MO*. Oh to live on a farm instead of a city lot—*AD6D*. Pet peeve: 40 wpm CQ's and 2 second listening periods with the gain turned down—*W6PFE*. Great condx; worked two EU this year—*K7OX*. I like contests, because my signal is always 599—*W7IWU*. Got my new call 4 days before the contest—*KD7SP*.

Uruguay hero CX8DT works miracles to hear any of us through his summer static.

This contest represents more challenge to operator skill and antenna design than any other band. My months of antenna work sure paid off—*K5UR*. Someone cut all my beverages and shot off 5 support poles— *KK5I*. For DX stations who took calls in the window; may you spend eternity listening to static crashes and parts of exotic calls— *N5JB*. Good condx, but not fantastic like last year—*N4IN*. First time ever had so sore a throat, couldn't talk during a CW test—*AA1K*. Wee-hour DX is what ham radio really is— *W1WAI*. Thrill raising KH6DX after a half hour of calling—*N1ACH*. Thrill working country number 100—*K1IK*.

Window monitors should be employed so US working DX there will be disqualified—*W1OP*. A22ME was worked on 15 meters and says he has never been on 160. He will advise bulletins if he decides to try it—*N4WW*. Best DX receiving ant was old rusty barbed-wire fence—*KZ5M*. Learned once again this contest is won by receiving those weak sigs—*NA5R*. Night-time antenna changing is not recommended—*K5MR*. Band open nationwide all both nights; best ever in 7 years—*KS7T*. Lots of local competition. Highlight was working 9M2AX—*K7IDX*. Next year will do house cleaning before, not during, the contest—*KG7D*. DX stations that solicit QSO's in the window should be disqualified—*KS8S*. It was a shame YV3AGT worked transceive in the window during a good European opening—*KE9A*. Power company said they would fix our line noise a week after the test!—*WØBXR*. Boy, what a difference an amplifier makes!—*WAØTKJ*.

Soapbox DX C.W.

Had only been on 160 a few days before the contest. Did my best with 3 hour late start, barefoot rig, and low antenna. Next year hope to do better—*CT2DV (155,548 points!)*. After 30 minutes calling 9M2AX, discovered my ex-

ternal VFO was turned off—*OK2MMW*. Am not a top-band man, but wanted to try out new vertical antenna, and it did great—*OK3EA*. Good condx and many stations on. Looking forward to next time—*OK2BMA*. K7VIC was paying no attention to the many EU's calling him, as he worked only locals—*OZ1LO*. Things could have been better, but it was damn good fun—*G3SZA*. Some DX could only be copied on an outside loop nulling out local noise—*G3IGW*. Amazed to hear N6ND the first night and ZS5LB the second—*G3XTT*. How top band has changed over the past few years; so much DX now—*G3TXF*.

Soapbox W/VE Phone

Phone contests aren't my bag, as you can see by my score—*W2DW*. Conditions seemed marginal, so DX totals way down. Enjoyed the time I was able to be on—*WA2SPL*. Another fine contest, even through QRN. High wind broke my feed line, so had to limp along with makeshift endfed ant—*W2FJ*. Nice openings to EU both nights. Lots of SSB DX activity—*AA1K*. We went through a lot of 807's this time—*K3YTL*. If we don't enforce split operation in the window, 160 will become just like 80—*WB3CAC*. Made 20 QSO's with battery power and candle light logging during a 45-minute power failure—*W3TS*. Enjoy meeting so many old friends in this contest—*W3BGN*. Worked all continents the first night—*AA4MM*. Getting over flu as it started, but always a most enjoyable contest—*W4TMR*. I don't use 160 much and was surprised at the distant contacts—*N7FMB/4*. When multi-op in a small motor home, don't feed the 5 operators chile with beans—*N4FNB*. Such a change, everybody *helps* each other!—*AA4S*. Each listening period is like opening gifts on Christmas morning—*N4BNO*. Tremendous condx first night— *KE5BC*. It was a great contest; lot of fun— *K5UR*. Congratulations to anyone who heard me—*K5ZD*. All summer work of planting radials was worth it—*WA5NFC*. Best results ever with my modest equipment—*W5SOD*. First time ever managed to get all 50 states in a 160 meter s.s.b. contest—*K6HNZ*. Finally got Alaska on 160—*WB6EGE*. This is a fun contest—*AK7F*. Too much static second night—*W9ZRX*. This has become my favorite test—*KR9G*. Most active station was ST0RM—*N0DKZ*. Good condx, great operators = best 160 test going—*N7DF*. Nice to work so many east coast stations for a change. My first contest. A thrill to work off the continent. Will be back next time—*VE6VC*. Entered to give some points to friends, and made my first UA0 contact—*VE7BS*.

Soapbox DX Phone

Two-element full-size Yagi gave excellent performance as in c.w. contest—*LZ1KDP*. You have to speak good Russian to get them all involved in the contest. Even had USA pileups this time. Had several multiplier skeds. See you all next year—*LZ2CJ*. First day was outstanding. There were more stations on than the space could match—*XE1HHA*. Special call sign HJ4RCA used for the first time. Lots of QRM but wonderful and beautiful—*HJ4RCA*. This contest great for climbing DX hounds—*OK1JDX*. My fourth 160 contest; this time with my personal call. Second night no good for USA—*EA9KF*. This is the first contest for San Marino. I have trouble with the accents— *T77V*. Wish we had all those Russians in the *CQ* Worldwide Contest—*YU1EXY*. Thanks for the nice contest—*UQ2GLW*. Called many USA and DX stations that did not answer— *UR2RNA*. Bad condx, especially Sunday— *DL8PC*. Unusually high noise this time, and even loops didn't help much. Even so, we got some new states and a new country—*KH6DX*. Good activity in poor conditions, but still a good contest—*G3SZA*. Abaco has stores so my XYL can have a good time shopping while I ham—*K0GVB/C6A*. US stations strong all first night, but only at sunrise second night. QRM awful as usual—*HB9AMO*.

Sunday morning 160 c.w. mobile didn't get W7IWU much of a score, but he looked better than most of us did by then.

K0GVB/C6A and wife at his Abaco Island location. She got to shop during the contest.

C.W. Multi-Op Station Crews

K1RQ & KB1W, KS1N. **W1OP:** K1DT, KA1DUV, KA1KCD, N1AKO, WB1FDY. **WA2GZB** & K2RS. **K3YTL:** W3DZH, WA3YON, WB3CAI, WB3FAA. **N4WW** & N4KE. **N4XM** & KD4U. **N4EHJ** & K4JM, N4ND, W4HJ, WU4G. **KB5DN** & AF5M, WA5KAK, W9BN. **KZ5M** & K5VWW, NM5L. **NA5R** & K5GA, K5RC, KN5H. **K5MR** & WD5BIK. **KG6DV/W6** & WA6DIL. **WB6EGE:** KA6OPN, N6MQ, N6QC, WB6WPO, WB7DEG. **WA6RKE:** KF6NX, W6HDO, WB6DPG. **KS7T** & KA7GVI. **WB7FFF** & K7SS, KE7V, KT7H. **K7IDX** & W7WA. **KG7D** & KT7G. **W7BYK** & W6TSE, W7KJ. **KC8KQ** & K8AQM. **WB8JBM:** KC8MK, N8ATR, N8DCJ, KW8N, W8JI. **KS8S** & AD8P, KN8S, N8ET, W8FN. **K8NZ** & KA8RXQ, KR8Y, W8CAR, WB8PHI. **WA8RCN** & WA8DXB. **K8US** & K8CS. **KG9X** & KS9W. **W9AZ:** AK9F, K9NR. **KB8AC** & WD8LLR, KA9KDZ, N9AG, N9AX. **N9MM** & KM9D, N9NC, W9ZRX, WB9POH. **W0AIH/9** & K0FVF, KM0O, W0UC. **KE9A** & KO9Q, WB9YXY. **K0RF** & W0UN. **KI0G** & KA0LRW, ND0E, W0KEA. **W0BXR:** K9AYK, K9WA, KM9P, W9TW, K0IS. **WA0TKJ** & K0UR. **UK9CAA:** UA9CFV, UA9CLT, UA9COO.

LZ1KDP: LZ2UU, LZ2-F-166, S. Petroff. **LZ2CJ** & LZ2DB, K. Penkoff. **OK1KSO/P:** OK1AEZ et al. **OK3KFF:** OK3CPN, OK3CQW. **OK1KPU:** Not given. **OK1KNA:** OK1AVN et al. **OK1KZD:** OK1DHJ et al. **OK1KRU/P:** OK1ATY, OL5BGM, OK1-19817. **OK1KFQ/P:** Not given. **OK1KNT:** OK1BM, et al. **OK1KZW:** OK1DGE, OK1DQW, OK1-21999. **OK2KQO:** OK2BWB & OK2-22828. **OK1ORA:** OK1AYD, OK1-21662. **OK1KQH:** 3 Oprs. **OK3VSZ:** OK3-27739, OK3-27740. **OK1KLV:** OK1DVZ, et al. **OK2KHD:** OK2BLX, OK2PFV. **UK2RDX:** UR2RNA, UR2RNJ, UR2RRJ, UR2-083-166. **UK6LAZ:** UA6-150-1071, UA6-150-1103. **UK4WAB:** Enoktaev, Klepanov. **OH2VY** & OH2BAZ. **KH6DX** & KH6KV. **JA2YKA:** JE2VYM, JF2DQJ, JG2BFR, JA9SSY, JA9XXS. **JA7YGW:** JE7CKK, JA9IIG. **JA7YCQ:** JR7MZC, et al. **UK2FAA:** UA2FCZ, UA2FFD. **UK7PAL:** UL7PAE, UL7PAO, UL7PBY, UL7PCZ, UL7-023-434. **UK2PRC:** UP2BDM, UP2BIL.

UK2PCR: UP2BBT, UP2BCR, UP2BCT, RP2BFU, UP2-038-918. **UK2BCC:** UP2BDW, UP2BJK, UP2-038-346, UP2-038-728, UP2-038-1656. **PA0KHS** & PA3ADJ, PA3AWN, PA3CKX, PA0ADP, PA0ADP, PA0HOP, PD0ME0. **PI4ZA:** PA3AFF, PA3AUC, PA3BAS, PA3CLH, PA3CPZ, PA0NZH. **LA4O:** LA4DCA, LA9HW. **SP8TBC:** SP7AW, SP7IFM, SP7IIT, SP-0046-KI. **EA3VY** & EA3VV, EA3EEE, EA3KU, EA3LL. **DJ1BZ/A** & DL3SAS, DL3SAZ, DL5TT, DL5TV. **DK0TU:** DF5GX, DK5GB, DL4EBY, DL7NJ, DL7WC. **DL8FJ:** DC4LZ, DF8IM, DJ2EA, DK4VP, DK8LN, DL1LAM, DL3LAO, DL4LV. **DL8MZ/P:** DF2PI, DK7PE. **UK2WAM:** UC2WBP, UC2WJ, UC2-006-19. **YU1EXY:** YU1EW, YU1MSK, YU1PZO, Dragan, Gan, Vel. **YT3T:** YU3EIJ, YU3TUX. **YU2KDE:** Bozo, Ivo. **YU7AJD:** YU7ORS, Stupar.

Phone Multi-Op Station Crews

K3YTL: KB3QI, WA3JWP, WB3EMG, WB3FAA, WB3FYT. **N4SF** & AA4VK, WA4YOM. **N4FNB** & KA4UEU, KC4LU, KF4CB, WD4EOX. **KB5DN** & AF5M, KD5ZM, KI5Q, W4VN/5. **KE5BC** & K5MS, KB5CX, KE5KT, N5GNI. **KC5DX** & NN5E. **WB6EGE:** KA6AHK, KA6OPN, N6QC, WB6WPO. **WA6PVA** & WA7QXH. **N7TT** & KE7V. **K7IDX** & W7WA. **NF8C** & W8RA. **W8LT:** KD8NS & WD8IXE. **K8US** & KC8XK, N8EDE. **W9AZ:** AK9F, WB9HAD, K9NR, KC9QZ, W9HPR. **KS9O** & KA9DVY, KC9XM, N9BZR.

W0AIH/9: K0FVF, KM0O, W0UC. **N0DWR** & KG7Z. **N0DKZ:** N0BSA, N0EOY. **N7DF** & AB0I, KJ0D. **VE6VC** & VE7EML. **OE3WQB:** OE1ELU, OE7YDS. **VP9AD** & VP9IJ, W3MA. **LZ1KDP:** LZ1JY, LZ10M, LZ2UU, LA1-0-243, LZ1-0-275. **HJ4RCA:** HK4DUM, HK4PX. **UK6LAZ:** UA6-150-1071, UA6-150-1103. **UK4HCB:** Bondarenko, Evstigneev. **UK3RAD:** Chernyshow, Chevlykow, Fokin. **KH6DX** & KH6KV. **UK7PAL:** UL7PBY, UL7-023-434. **UK2BCC:** UP2BDW, UP2BKF, UP2-038-346, UP2-038-728, UP2-038-1656. **UK2PCR:** UP2BJK, UP2BMW, UP2BNY. **SP7KTE:** SP7AW, SP7IIT. **UK2AAG:** UC2-009-105, UC2-009-490, UC2-009-758.

Top 10 Scores

Top 10 W/VE Single Op. C.W.

WA2SPL	318,636
AA1K	190,944
VE3ABG	176,952
W1CF	169,632
	(N1EE Op.)
K5UR	150,444
VE3DAP	148,596
K1IK	147,602
VE1YX	116,660
N5AU	112,125
	(K5ZD Op.)
N4UU	111,650

Top 10 W/VE Single Op. Phone

K5UR	182,286
W9ZRX	161,111
AA1K	154,980
N8ATR	130,166
KD4NI	116,340
VE3MFA	115,754
AA4S	114,226
	(NE4G Op.)
KC8JH	108,205
W0EJ	104,160
W3TS	101,844

Top 10 DX Single Op. C.W.

NP4A	631,182
	(K1ZM Op.)
G3SZA	257,720
T32AF	232,505
YU3EF	174,096
4X4NJ	161,896
CT2DV	155,548
OZ1LO	148,864
PA3BFM	140,790
OK1DXS	111,410
OK2MMW	105,273

Top 10 DX Single Op. Phone

LZ2CJ	243,236
YU1EXY	196,092
	(YU1PKC Op.)
EA9KF	115,752
UR2RNA	85,344
YU3EF	79,305
G3SZA	77,252
YV2IF	73,864
T77V	54,054
EA3ALD	44,160
SP5INQ	40,365

Top 10 Multi-Op C.W.

EA3VY	327,120
LZ1KDP	204,408
LZ2CJ	201,530
UK2RDX	193,579
YU1EXY	184,325
UK2PRC	144,368
WB8JBM	142,013
DJ1BZ/A	134,550
N9MM	132,009
K0RF	125,652

Top 10 Multi-Op Phone

LZ1KDP	328,140
VP9AD	173,329
N4SF	125,020
UK2BCC	112,242
W9AZ	99,735
N7DF	96,832
W0AIH/9	94,208
UK2PCR	92,945
KC5DX	76,032
KS9O	72,216

Number groups after calls denote score, total QSOs, multiplier, and DXCC countries worked. Multi-op scores follow single-op listings. State, province, and country certificate winners are shown in boldface.

C.W. SCORES
SINGLE OPERATORS

Connecticut				
W1WEF	**80,443**	**421**	**71**	**19**
W1WY	22,542	166	51	10
Maine				
K1NBN	**10,206**	**107**	**42**	**4**
WA1YXL	3,640	56	28	4
K1SA	451	19	11	2
Massachusetts				
W1CF	**169,632**	**599**	**93**	**40**
	(N1EE Op.)			
W1WAI	97,867	455	77	24
K1MEM	37,740	248	60	15
AA1O	20,382	213	43	3
KQ1F	16,856	141	49	8
W1YN	16,650	115	50	11
New Hampshire				
N1ACH	**53,533**	**284**	**67**	**20**
W1HNZ	10,480	105	40	7
Rhode Island				
KA1SR	**10,455**	**113**	**41**	**4**
Vermont				
K1IK	**147,602**	**466**	**91**	**37**
New Jersey				
W2FJ	**89,850**	**410**	**75**	**23**
NC2V	33,489	220	61	12
N2IN	4,875	90	25	2
W2FCR	2,052	35	18	6
New York				
WA2SPL	**318,636**	**767**	**106**	**52**
K2IGW	94,125	500	75	20
K2UU	41,646	230	66	20
K2RD	38,912	210	64	17
W2GKZ	16,974	160	46	6
K2MN	16,422	165	46	4
KN2Q	13,202	142	41	4
W2DW	12,920	136	40	6
KR2V	7,680	105	32	3
K2VV	5,910	64	30	7
K2GBH	5,792	86	32	2
Delaware				
AA1K	**190,944**	**662**	**96**	**41**
Maryland				
K3ZZ	**84,456**	**461**	**72**	**20**
K2ITG	51,408	333	63	15
WB3JRU	32,718	241	57	9
W3ICM	32,065	251	55	7
W3GG	31,650	286	50	6
W3GN	5,568	90	29	3
Pennsylvania				
W3BGN	**74,550**	**311**	**71**	**26**
W3TS	67,896	368	69	19
W3BUR	46,421	312	61	13
W3AP	36,729	224	63	14
N3CXB	31,200	273	52	4
K4JLD	27,918	250	47	7
W3UHP	24,059	226	49	3
WB3CAC	21,291	195	47	5
W3CNS	17,700	155	50	5
W3ARK	11,137	137	37	4
WB3FYT	5,820	88	30	2
Florida				
N4IN	**71,632**	**325**	**74**	**26**
N4EJW	14,352	120	48	9
N4EJV	10,755	105	45	5
W4OO	10,492	105	43	7
K8UNP	5,332	59	31	8
Georgia				
NQ4I	**20,450**	**167**	**50**	**8**
KX4R	16,110	164	45	4
N4UZ	14,238	155	42	5
K4BAI	7,210	94	35	4
North Carolina				
W4TMR	**60,552**	**475**	**58**	**8**
W3ESU	53,985	314	61	14
	(K4XU Op.)			
AA4S	29,892	200	53	13
South Carolina				
W4MAF	**31,050**	**288**	**50**	**3**
KC4LB	2,356	35	31	3
Tennessee				
K4XO	**5,676**	**80**	**33**	**3**
N4HQT	5,022	75	31	2
Virginia				
N4UU	**111,650**	**574**	**77**	**25**
K4PQL	56,355	338	65	15
K4XL	27,730	167	59	13
KG4W	18,326	148	49	10
W4KMS	8,073	93	39	4
W4YE	7,735	100	35	3
KT4U	5,040	78	30	3
N4MM	2,366	40	26	3
K4OD	752	22	16	2
Arkansas				
K5UR	**150,444**	**667**	**84**	**30**
W5KL	40,651	361	53	2
K5VR	4,061	64	31	2
Louisiana				
N5TV	**10,179**	**123**	**39**	**4**
W5KC	9,480	108	40	5
N5EKF	980	35	14	1
New Mexico				
W7LHO	**19,845**	**182**	**49**	**4**
Oklahoma				
KK5I	**86,658**	**573**	**66**	**13**
N5AFV	1,088	32	17	1
Texas				
N5AU	**112,125**	**607**	**75**	**22**
	(K5ZD Op.)			
K5RR	109,269	498	81	27
	(N5TP Op.)			
K5NW	53,550	371	63	11
N5JB	48,165	282	65	13
KB5UL	27,489	264	49	3
W5FIX	13,725	142	45	3
AA5C	12,587	140	41	3
W5QF	11,205	120	45	2
W5IRP	4,818	70	33	2
W5SOD	1,596	42	19	1
California				
K6SE	**80,577**	**405**	**63**	**13**
N6ND	57,820	351	59	9
W6TMD	29,172	224	51	8
K6RU	28,800	209	45	4
K6MO	28,670	204	47	8
AD6D	25,168	201	52	6
W6PM	21,411	116	61	11
AA6DP	18,375	162	49	6
KI6O	16,611	144	49	5
K6TS	15,007	146	43	5
N4ARO/6	11,439	122	41	5
W6PFE	7,416	90	36	3
NW6S	5,332	72	31	5
K6PJY	2,714	45	23	5
N6VR	2,222	42	22	3
W6SX	2,142	41	21	4
AA6EE	814	37	11	1
Arizona				
K7OX	**84,678**	**522**	**66**	**5**
AK7Y	49,533	379	57	7
W7YS	1,694	37	22	2
Idaho				
N7SU	**30,141**	**255**	**51**	**7**
KA7T	8,680	106	35	6
W7IWU	304	19	8	1
Montana				
K7VIC	**69,168**	**393**	**66**	**15**
W7LR	19,502	180	49	5
Nevada				
KD7SP	**26,850**	**239**	**50**	**4**
Oregon				
N7SC	**49,324**	**279**	**59**	**11**
W7TC	5,698	122	22	3
KA7FEF	1,944	51	18	2
Utah				
KC7PA	**11,308**	**115**	**44**	**4**
Washington				
WA7OFH	**52,923**	**272**	**59**	**11**
W7TJ	44,631	249	57	10
N7CKD	33,165	205	55	10
N7TT	26,977	210	53	9
W7KJI	23,150	205	50	5
W7IEU	10,257	113	39	5
W7ACP	4,725	71	27	4
K7WA	1,080	39	12	2
Wyoming				
W7HLA	**4,433**	**70**	**31**	**2**
Michigan				
KC8P	**28,998**	**226**	**54**	**9**
W8VSK	15,705	154	45	4
AC8W	13,442	128	47	4
W8UVZ	11,136	99	48	5
K8DD	2,967	57	23	3
Ohio				
KU8E	**31,110**	**280**	**51**	**5**
W8LT	20,008	226	41	3
	(KD8NS Op.)			
N8BJQ	18,081	165	49	4
W8ILC	15,552	139	48	4
K8MR	14,319	150	43	3
AD8C	5,904	70	36	3
N8AXA	3,870	60	30	2
N8DSG	2,838	57	22	2
KA8ETK	2,398	50	22	2
West Virginia				
K8OQL	**57,600**	**349**	**64**	**16**
Illinois				
W9UCW	**79,152**	**486**	**68**	**16**
W9YYG	62,558	439	62	10
KV9S	45,522	392	54	5
W9LNQ	15,228	150	47	4
KG9D	10,458	114	42	3
W9PNE	4,131	33	27	11
Indiana				
K9CLO	**57,204**	**384**	**63**	**10**
N9NB	56,007	390	63	11
Wisconsin				
W9MQZ	**12,857**	**132**	**43**	**4**
WA9TZE	5,536	75	32	4
WB9HRO	3,892	62	28	3
KD9ET	2,730	51	26	2
Colorado				
NØZA	**28,850**	**269**	**50**	**4**
WØEE	16,992	159	48	3
K9PQG	8,214	99	37	2
WØRSG	3,689	55	31	2
Iowa				
WØEJ	**61,236**	**422**	**63**	**11**
NØBB	24,076	209	52	3
Kansas				
KJØD/Ø	**110,482**	**608**	**74**	**18**
N7DF	5,202	72	34	2
Minnesota				
WØHW	**45,485**	**378**	**55**	**5**
KKØC	15,204	172	42	2
WØEKS	9,159	89	43	5
Missouri				
KBJPL	**28,143**	**240**	**53**	**5**
WØJU	23,874	235	46	5
Newfoundland				
VO1MP	**23,200**	**100**	**40**	**16**
Nova Scotia				
VE1YX	**116,660**	**251**	**76**	**33**
VE1BNN	50,750	153	58	22
Quebec				
VE2GSW	**6,670**	**61**	**23**	**2**
Ontario				
VE3ABG	**176,952**	**491**	**73**	**19**
VE3DAP	148,596	499	61	8
VE3INQ	106,702	350	62	13
VE3MFA	90,060	307	60	11
VE3NBE	37,109	181	43	4
VE3LSK	33,626	151	46	4
Saskatchewan				
VE5RA	**99,651**	**344**	**59**	**11**
VE5XU	70,896	264	56	7
Alberta				
VE6OU	**36,984**	**166**	**46**	**5**
British Columbia				
VE7BS	**63,882**	**232**	**54**	**11**
Northwest Territory				
VE8XO	**66**	**5**	**3**	**2**
Asiatic Russia				
RA9AKM	**87,906**	**229**	**42**	**42**
UA9SJL	44,520	145	35	35
UA9MR	38,135	153	29	29
UA9AJX	18,603	84	27	27
UA9ND	6,858	42	18	18
Austria				
OE5KE	**103,565**	**342**	**55**	**42**
OE9SLH	31,152	183	33	33
Azores				
CT2DV	**155,548**	**302**	**74**	**43**
Balearic Is.				
EA6ET	**72,192**	**284**	**47**	**40**
Brazil				
PY1BVY	**8,762**	**42**	**26**	**10**
Czechoslovakia				
OK1DXS	**111,410**	**350**	**65**	**47**
OK2MMW	105,273	342	63	47
OK3EA	99,820	348	62	50
OL5BJW	44,764	278	38	37
OK1DRU	43,218	243	42	39
OK1DFF	39,080	230	40	40
OK3CQR	38,171	225	41	41
OK3CWQ	37,539	199	43	40
OL2VAH	32,487	201	39	39
OL9CPG	29,540	207	35	35
OK1KTW	27,713	186	37	37
	(OK1AAE Op.)			
OK1HBT	27,010	177	37	31
OL9CPN	26,075	185	35	35
OK2EC	25,080	147	38	36
OK1AXK	23,800	170	34	34
OK2HI	23,596	168	34	34
OK8COS	21,054	157	33	33
OK2FD	20,831	119	37	33
OK3LL	20,536	138	34	34
OL8COZ	19,808	155	32	32
OK2TBC	19,620	120	36	36
OK2QX	18,880	148	32	32
OK1AES	18,172	168	28	28
OK3TAY	16,320	130	30	30
OL1BIC	16,225	173	25	25
OK1MP	15,741	104	33	33
OK2PGT	14,222	146	26	26
OL1BIR	14,066	141	26	26
OK1DOZ	13,800	160	24	24
OK3CPY	13,419	126	27	27
OL1BGA	9,650	93	25	25
OK1AZI	9,275	96	25	25
OL4BHI	9,262	119	22	22
OL9CMU	9,246	90	23	23
OK1DVK	9,196	39	38	35
OK1AYU	8,400	85	24	24
OK1HCH	8,350	90	25	25
OK1KZ	7,140	96	20	20
OK2BEJ	7,000	96	20	20
OK1DZD	6,426	93	21	21
OK2PAW	6,194	94	19	19
OK1AIJ	6,069	82	21	21
OK1DNB	5,780	77	20	20
OK2SBJ	5,220	75	18	18
OL4BIA	5,112	76	18	18
OK1AXB	5,111	70	19	19
OK2BCI	5,040	28	24	20
OK2KYD/P	4,656	84	16	16
	(OK2BEY Op.)			
OL1BGS	4,635	93	15	15
OK2KMT	4,518	67	18	18
OK1MZO	4,408	62	19	19
OK1OPT	4,245	80	15	15
OL5BJD	3,765	73	15	15
OLØCOB	2,873	61	13	13
OK3KXG	2,028	45	13	13
	(OK3CKC Op.)			
OK2SWD	1,560	35	12	12
OL5BIW	1,404	54	9	9
OK1FBH	935	11	11	11
OK1AIA	840	21	10	10
OK2ABU	558	13	9	9
OK2KIW	324	15	6	6
OK3CQD	120	4	4	4
OL9CQN	84	11	3	3
Denmark				
OZ1LO	**148,864**	**416**	**64**	**51**
OZ1W	20,644	160	26	26
England				
G3SZA	**257,720**	**425**	**85**	**50**
G3XWZ	93,856	318	56	41
G3IGW	82,707	286	57	45
G3XTT	71,955	182	65	46
G3TXF	61,103	248	49	44
G4OBK	56,832	249	48	40
G3SXW	30,135	152	41	38
G3BBD	25,865	160	35	33
G4ARI	10,010	84	26	26
G3BDQ	5,400	30	24	18
G2CIL	3,515	40	19	19
Estonia				
UR2RGN	**8,725**	**68**	**25**	**25**
UR2RNU	2,522	43	13	13
European Russia				
UA3PFN	**47,628**	**209**	**42**	**42**
UA3EAL	36,618	203	34	34
UA6AJG	4,720	39	20	20
UA3IAK	3,924	42	18	18
UA3AQW	2,222	39	11	11
UA3VLZ	1,760	35	11	11
Finland				
OH1XX	**81,432**	**276**	**54**	**52**
OH3TQ	40,131	199	39	39
OH8VJ	8,040	82	20	20
OH2BWL	1,708	25	14	14
France				
F8VJ	**45,421**	**132**	**53**	**32**
F3AT	28,272	139	38	30
Georgia				
RF6FFW	**45,150**	**159**	**30**	**30**
Greece				
SV8AA	**16,224**	**94**	**32**	**32**
Haiti				
HH2VP	**76,928**	**222**	**64**	**18**
Hawaii				
KH6IJ	**8,175**	**59**	**15**	**4**
India				
VU2JXO	**120**	**8**	**3**	**3**
Ireland				
EI4DW	**50,895**	**213**	**45**	**37**
EI9J	31,524	164	37	35
Israel				
4X4NJ	**161,896**	**291**	**59**	**47**
Jan Mayen				
JX5DW	**4,400**	**55**	**16**	**16**
Japan				
JA7NI	**29,196**	**117**	**36**	**25**
JA4LKB	11,224	83	23	19
JA3YKC	4,860	72	15	13
			(JH4RHF Op.)	
JA1DDH	4,858	62	14	7
JF1NZW	3,692	47	13	8
JG3AAB	1,670	19	10	6
JA1YCL	1,656	58	8	4
JE1SPY	1,480	43	8	5
JA3BCT	999	19	9	7
JH8JYV	670	27	5	3
JR3XEX	258	35	3	3
JA6YBR	152	12	4	4
			(JF6DEA Op.)	
JH7IMX/2	92	19	2	2
JA7EDZ	84	17	2	2
JA1AAV	28	3	2	2
JA1YWX	24	12	1	1
			(JA6-9330 Op.)	
JR4ISK	12	6	1	1
Kaliningradsk				
UA2FCW	**51,319**	**261**	**37**	**37**
UA2EC	14,612	109	26	26
Kiribati				
T32AF	**232,505**	**365**	**65**	**18**
Kuwait				
9K2BE	**3,360**	**28**	**14**	**14**
			(G4BWP Op.)	
Latvia				
UQ2GKM	**16,825**	**128**	**25**	**25**
Lithuania				
UP2BLW	**11,408**	**98**	**23**	**23**
UP2BBF	5,222	76	14	14
UK2PAD	48	5	3	3
			(UP2-038-1050 Op.)	
Malaysia				
9M2AX	**7,130**	**41**	**23**	**23**
Malta				
9H1CG	**17,760**	**113**	**30**	**30**
Netherlands				
PA3BFM	**140,790**	**364**	**65**	**42**
PAØLOU	21,888	118	36	36
PA2REH	2,520	45	12	12
PA3AMA	869	17	11	11
Neth. Antilles				
W1BIH/PJ2	**26,425**	**77**	**35**	**6**
New Zealand				
ZL3GQ	**43,428**	**103**	**44**	**20**
ZL1AIZ	480	13	8	8
Norway				
LA2GV	**81,216**	**330**	**47**	**46**
LA7JO	78,144	316	48	46
Papua				
P29PR	**630**	**12**	**6**	**6**
Poland				
SP9DH	**49,308**	**225**	**42**	**42**
SP5AD	41,020	225	35	35
SP5INQ	39,080	185	40	39
SP9BRP	16,275	158	21	21
SP9AKD	2,460	34	15	15
Portugal				
CT1AOZ	**45,990**	**185**	**45**	**36**
Puerto Rico				
NP4A	**631,182**	**846**	**118**	**64**
			(K1ZM Op.)	
Scotland				
GM3YOR	**77,691**	**225**	**57**	**39**
GM3OXC	21,547	147	29	28
Spain				
EA2CR	**1,935**	**26**	**15**	**15**
Switzerland				
HB9ZY	**5,460**	**51**	**21**	**21**
Trinidad				
9Y4IH	**990**	**12**	**9**	**3**
Turkoman				
UH8DC	**50,050**	**156**	**35**	**35**

Ukraine				
UB5ZAL	**91,572**	**334**	**52**	**49**
UB5UKW	32,964	143	41	40
UB5UAG	27,020	145	35	35
UB5FFZ	24,360	156	30	30
UB5UKH	19,620	127	30	30
UB5UGO	19,312	107	34	34
UB5FDZ	16,848	119	27	27
UY5OO	13,299	81	31	31
UY5TE	12,804	113	22	22
UB5LCV	10,978	102	22	22
UB5UCF	10,854	75	27	27
EZ5FAN	7,924	115	14	14
Uruguay				
CX8DT	**7,705**	**36**	**23**	**9**
Venezuela				
YV1OB	**90,805**	**169**	**55**	**18**
YV3AGT	89,340	152	60	17
YV2IF	7,458	36	22	14
Wales				
GW3JI	**32,253**	**158**	**39**	**36**
West Germany				
DK6AS/A	**56,610**	**243**	**45**	**42**
DL1JF	28,512	173	33	33
DL8CM	20,196	119	34	34
DL1AM/A	7,700	74	22	22
DL7YS	1,572	28	12	12
White Russia				
UC2AA	**28,440**	**134**	**36**	**36**
Yugoslavia				
YU3EF	**174,096**	**432**	**72**	**56**
YU4VML	30,870	173	35	35
YU3TOJ	2,466	30	18	18
YU7SF	282	13	6	6

MULTI-OPERATORS

Massachusetts				
K1RQ	**112,784**	**556**	**76**	**22**
Rhode Island				
W1OP	**33,200**	**298**	**50**	**4**
New Jersey				
WA2GZB	**48,035**	**295**	**65**	**17**
Pennsylvania				
K3YTL	**13,728**	**161**	**39**	**3**
Florida				
N4WW	**125,454**	**454**	**87**	**35**
Kentucky				
N4XM	**57,582**	**396**	**63**	**11**
Virginia				
N4EHJ	**100,016**	**516**	**76**	**23**
Arkansas				
KB5DN	**42,241**	**361**	**53**	**7**
Texas				
KZ5M	**95,140**	**548**	**71**	**19**
NA5R	74,316	476	66	17
K5MR	58,752	357	68	17
California				
KG6DV/W6	**31,720**	**198**	**52**	**8**
WB6EGE	14,596	151	41	5
WA6RKE	12,645	114	45	6
Montana				
KS7T	**38,335**	**315**	**55**	**6**
Washington				
WB7FFF	**90,279**	**442**	**63**	**13**
K7IDX	76,482	362	63	13
KG7D	53,256	323	56	10
W7BYK	41,361	276	51	6
Michigan				
KC8KQ	**79,560**	**546**	**65**	**10**
Ohio				
WB8JBM	**142,013**	**636**	**83**	**28**
KS8S	124,780	568	85	29
K8NZ	106,412	609	74	19
WA8RCN	62,172	400	66	15
K8US	59,236	453	59	7
Illinois				
KG9X	**54,684**	**381**	**62**	**10**
W9AZ	25,688	207	52	6
KB8AC	22,620	188	52	5
Indiana				
N9MM	**132,009**	**659**	**79**	**25**
Wisconsin				
WBAIH/9	**124,332**	**666**	**78**	**22**
KE9A	101,088	584	72	18
Colorado				
KØRF	**125,652**	**601**	**74**	**22**
KIØG	96,117	490	69	17
Iowa				
WØBXR	**72,009**	**498**	**63**	**11**
Kansas				
WABTKJ	**79,235**	**531**	**65**	**13**
Asiatic Russia				
UK9CAA	**25,668**	**95**	**31**	**31**
Bulgaria				
LZ1KDP	**204,408**	**511**	**68**	**60**
LZ2CJ	**201,530**	**510**	**70**	**60**
Czechoslovakia				
OK1KSO/P	**120,904**	**343**	**68**	**48**
OK3KFF	113,029	330	67	50
OK1KPU	71,736	281	56	47
OK1KNA	36,244	218	41	39
OK1KZD	33,912	231	36	36
OK1KRU/P	30,205	217	35	35
OK1KFQ	25,534	172	34	34
OK1KNT	14,670	127	30	30
OK1KZW	13,494	146	26	26
OK2KQO	10,600	108	25	25
OK1ORA	7,812	105	21	21
OK1KQH	6,555	101	19	19
OK3VSZ	2,982	60	14	14
OK1KLV	812	40	7	7
OK2KHD	405	27	5	5
Estonia				
UK2RDX	**193,579**	**598**	**59**	**53**
European Russia				
UK6LAZ	**59,928**	**254**	**44**	**43**
UK4WAB	25,288	167	29	29
Finland				
OH2VY	**47,794**	**192**	**46**	**46**
Hawaii				
KH6DX	**69,520**	**166**	**44**	**12**
Japan				
JA2YKA	**11,040**	**94**	**24**	**20**
JA7YGW	340	14	5	4
JA7YCQ	116	25	2	2
Kaliningradsk				
UK2FAA	**120**	**4**	**4**	**4**
Kazakh				
UK7PAL	**53,445**	**169**	**35**	**35**
Lithuania				
UK2PRC	**144,368**	**466**	**56**	**50**
UK2PCR	119,004	471	47	46
UK2BCC	74,316	325	44	42
Netherlands				
PA0KHS	**60,639**	**288**	**41**	**38**
PI4ZA	30,180	203	30	30
Norway				
LA4O	**41,152**	**249**	**32**	**32**
Poland				
SP8TBC	**84,960**	**360**	**45**	**45**
Spain				
EA3VY	**327,120**	**547**	**87**	**50**
West Germany				
DJ1BZ/A	**134,550**	**336**	**65**	**40**
DK0TU	116,688	324	66	47
DL0FJ	44,240	252	35	34
DL0MZ	43,344	197	43	39
White Russia				
UK2WAM	**19,200**	**153**	**24**	**24**
Yugoslavia				
YU1EXY	**184,325**	**415**	**73**	**51**
YT3T	91,953	350	51	46
YU2KOE	54,600	268	40	40
YU7AJD	7,440	76	20	20

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PHONE SCORES
SINGLE OPERATORS

Connecticut				
W1WEF	**11,357**	**110**	**41**	**6**
W1WY	8,748	107	36	4
Maine				
K1NBN	**2,990**	**50**	**26**	**3**
Massachusetts				
KQ1F	**23,324**	**203**	**49**	**8**
New Hampshire				
AF1T	**36,386**	**346**	**46**	**6**
N1ACH	35,245	261	53	14
Rhode Island				
K1NG	**95,616**	**539**	**72**	**19**
			(KI1G Op.)	
KA1SR	44,640	311	60	11
Vermont				
WB1GMH	**10,846**	**143**	**34**	**3**
KA1ETQ	7,347	105	31	3
New Jersey				
W2FCR	**39,672**	**299**	**57**	**8**
W2FJ	26,125	188	55	9
K2FL	8,320	118	32	4
K2LG	8,096	113	32	3
New York				
WA2SPL	**98,434**	**462**	**79**	**29**
K2VV	73,856	492	64	11
KN2Q	9,205	118	35	3
W2DW	3,925	71	25	3
Delaware				
AA1K	**154,980**	**638**	**90**	**35**
Maryland				
W3ICM	**47,532**	**418**	**51**	**7**
Pennsylvania				
W3TS	**101,844**	**642**	**69**	**15**
W3BGN	19,458	115	47	18
W3UHP	18,816	203	42	3
WB3CAC	11,476	133	38	4
W3AP	637	23	13	2
Florida				
AA4MM	**74,536**	**377**	**77**	**25**
N4IN	27,594	170	63	17
W4PZV	25,048	145	62	19
WB4VQO	9,307	106	41	3
W1AYR	5,436	68	36	4
North Carolina				
AA4S	**114,226**	**564**	**82**	**28**
		(NE4G Op.)		
W4TMR	61,376	511	56	7
KF4HK	56,298	361	66	14
N4BNO	55,275	451	55	11
WA4SLC	3,720	56	30	4
South Carolina				
W4MAF	**23,616**	**228**	**48**	**6**
W4TWW	5,440	79	32	4
Tennessee				
N4HQT	**5,510**	**92**	**29**	**2**
N4BSN	3,074	44	29	3
WA4JYY	1,102	29	19	1
Virginia				
KD4NI	**116,340**	**720**	**70**	**15**
N4UU	86,912	598	64	13

WU4G	85,974	541	69	15
KG4W	40,920	310	55	15
N4MM	34,888	267	56	9
K4OD	13,899	150	41	4
N7FMB/4	3,024	57	24	3
W1LUG/4	2,134	47	22	2
Arkansas				
K5UR	**182,286**	**1006**	**78**	**25**
WA5NFC	29,950	286	50	3
W5KL	8,400	137	30	2
Louisiana				
WD5JBX	**6,444**	**88**	**36**	**2**
Oklahoma				
N5AFV	**7,452**	**99**	**36**	**2**
Texas				
N5JB	**14,168**	**141**	**44**	**7**
WD5JWG	9,080	105	40	5
W5SOD	6,993	93	37	2
K5ZD	336	14	12	1
California				
K6HNZ	**64,764**	**433**	**63**	**10**
KB6JK	20,790	198	45	4
WB6FNI	18,048	165	48	5
K6PJY	12,120	133	40	4
KI6O	10,222	117	38	4
K6SE	7,644	84	39	3
K6MO	5,635	72	35	4
W6PFE	2,882	61	22	2
AA6EE	108	9	6	1
Arizona				
WB7FDQ	**2,210**	**38**	**26**	**2**
Idaho				
N7SU	**13,080**	**137**	**40**	**5**
Montana				
K7VIC	**46,421**	**318**	**61**	**8**
Nevada				
KD7SP	**50,032**	**363**	**59**	**8**
Oregon				
W7EJ	**62,806**	**428**	**62**	**9**
ND7U	5,829	89	29	3
Washington				
KA7AUH	**45,445**	**303**	**61**	**8**
N7CKD	43,586	287	62	12
W1MT	8,028	90	36	4
AK7F	1,584	38	18	3
Wyoming				
KB7M	**1,140**	**27**	**19**	**2**
Michigan				
KC8P	**44,250**	**339**	**59**	**7**
W8UVZ	17,388	180	46	3
W8VSK	252	11	9	2
Ohio				
N8ATR	**130,166**	**749**	**74**	**20**
KC8JH	108,205	718	67	14
KC8MK	30,672	254	54	3
N8LL	27,342	303	42	3
AD8C	23,670	242	45	3
N8BJQ	17,748	149	51	7
N8DSG	16,400	196	40	2
W8KKF	15,224	158	44	3
W8IMZ	14,766	140	46	6
K8HF	7,992	102	36	3
W8FDN	4,437	72	29	2
N8AXA	3,888	69	27	2
KA8ETK	2,222	46	22	2
K8MR	1,088	32	17	1
West Virginia				
K8OQL	**20,976**	**205**	**46**	**6**
Indiana				
W9ZRX	**161,111**	**972**	**73**	**19**
W9RE	9,984	106	39	4
Illinois				
KG9D	**13,392**	**126**	**48**	**3**
KR9G	9,072	98	42	3
W9LNQ	5,226	61	39	3
KB9PY	2,576	50	23	2
Wisconsin				
KE9A	**83,018**	**606**	**62**	**9**
Colorado				
W0KEA	**900**	**22**	**18**	**3**
Iowa				
W0EJ	**104,160**	**770**	**62**	**8**
K0GT	17,013	143	53	4
K0DGX	8,200	92	40	3
Kansas				
WA0TKJ	**68,608**	**481**	**64**	**12**
AB0X	18,400	185	46	3
Minnesota				
W0EKS	**21,700**	**199**	**50**	**3**
W0HW	8,960	113	35	2
W9RXJ	2,507	53	23	2
Missouri				
K0IFL	**25,400**	**225**	**50**	**5**
Nebraska				
K0HA	**101,335**	**701**	**65**	**12**
North Dakota				
KA0LIL	**1,638**	**39**	**21**	**1**
Quebec				
VE2QO	**11,550**	**80**	**30**	**2**
Ontario				
VE3MFA	**115,754**	**390**	**62**	**12**
VE3INQ	32,208	153	44	3
VE3NBE	13,862	101	29	3
Saskatchewan				
VE5XU	**18,876**	**104**	**39**	**2**
Alberta				
VE6OU	**62,116**	**248**	**53**	**4**
VE6AQI	3,066	31	21	2
British Columbia				
VE7ERY	**24,467**	**122**	**43**	**4**
VE7BS	2,771	32	17	5
Northwest Territory				
VE8CM	**688**	**19**	**8**	**2**
VE8XO	553	20	7	2
Andorra				
C31LD	**105**	**5**	**3**	**3**
C310F	75	3	3	3
Armenia				
EZ6GAW	**6,300**	**35**	**18**	**18**
Bahamas				
K0GVB/C6A	**24,765**	**126**	**39**	**7**
Bulgaria				
LZ2CJ	**243,236**	**950**	**49**	**46**
Ceuta				
EA9KF	**115,752**	**214**	**56**	**38**
Czechoslovakia				
OK1KPU	**18,879**	**127**	**29**	**28**
		(OK1JDX Op.)		
OK3KFF	13,680	115	24	24
OK1AJN	11,610	86	27	27
OK1DVK	3,925	29	25	25
OK2BHQ	2,265	31	15	15
England				
G3SZA	**77,252**	**204**	**62**	**44**
Estonia				
UR2RNA	**85,344**	**503**	**32**	**32**
European Russia				
UA6AJG	**1,946**	**27**	**14**	**14**
RA3DKE	1,414	21	14	14
Italy				
I4RYC	**37,512**	**201**	**36**	**36**
Latvia				
UQ2GLW	**3,552**	**43**	**16**	**16**
Lithuania				
UP2PBW	**640**	**14**	**10**	**10**
Malta				
9H1CG	**6,371**	**51**	**23**	**23**
Mexico				
XE1HHA	**17,464**	**92**	**37**	**6**
Poland				
SP5INQ	**40,365**	**199**	**39**	**39**
*SP3IBS	39,400	195	40	42
SP6CZ	2,070	30	15	15
San Marino				
T77V	**54,054**	**235**	**42**	**36**
Scotland				
GM4KHE	**24,564**	**83**	**46**	**34**
Spain				
EA3ALD	**44,160**	**179**	**46**	**36**
EA3CCN	38,940	166	44	34
EA2QU	7,238	68	22	22
EA5TX	522	13	9	9
EA2CR	427	11	7	7
Tadzhik				
UJ8JKO	**1,200**	**17**	**8**	**8**
Ukraine				
UB5MGT	**9,106**	**56**	**29**	**29**
RB5IIU	8,667	63	27	27
UB5IUA	7,656	63	24	24
UB5MNO	6,300	61	21	21
RB5SBI	4,158	48	18	18
RB5SBL	3,760	47	16	16
UB5TCS	2,844	34	18	18
UB5UGO	1,950	24	15	15
UB5ULM	1,188	21	12	12
RB5IOV	890	19	10	10
EZ5HCO	270	9	6	6
Venezuela				
YV2IF	**73,864**	**137**	**56**	**25**
YV3AGT	28,098	71	42	13
West Germany				
DL8PC	**12,012**	**90**	**28**	**28**
Yugoslavia				
YU1EXY	**196,092**	**690**	**52**	**43**
		(YU1PKC Op.)		
YU3EF	79,305	290	51	45

MULTI-OPERATORS

Pennsylvania				
K3YTL	**46,700**	**425**	**50**	**4**
North Carolina				
N4SF	**125,020**	**706**	**76**	**21**
Tennessee				
N4FNB	**34,400**	**326**	**50**	**4**
Arkansas				
KB5DN	**67,136**	**475**	**64**	**11**
Louisiana				
KE5BC	**34,045**	**284**	**55**	**5**
Texas				
KC5DX	**76,032**	**541**	**64**	**12**
California				
WB6EGE	**5,280**	**77**	**33**	**3**
Oregon				
WA6PVA	**42,066**	**315**	**57**	**6**
Washington				
N7TT	**46,740**	**338**	**57**	**8**
K7IDX	45,942	335	57	9
Michigan				
NF8C	**62,496**	**435**	**63**	**11**
Ohio				
W8LT	**55,620**	**485**	**54**	**4**
K8US	34,920	361	45	3
Illinois				
W9AZ	**99,735**	**743**	**61**	**8**
KS9O	72,216	566	59	6
Wisconsin				
W8AIH/9	**94,208**	**661**	**64**	**10**
Colorado				
N0DWR	**38,280**	**299**	**58**	**6**
N0DKZ	30,305	255	55	6
Kansas				
N7DF	**96,832**	**685**	**64**	**11**
Alberta				
VE6VC	**10,432**	**68**	**32**	**4**
Austria				
OE3WOB	**5,080**	**50**	**20**	**20**
Bermuda				
VP9AD	**173,329**	**507**	**67**	**16**
Bulgaria				
LZ1KDP	**328,140**	**988**	**60**	**50**
Colombia				
HJ4RCA	**30,198**	**80**	**42**	**22**
European Russia				
UK6LAZ	**6,480**	**63**	**18**	**18**
UK4HCB	5,434	47	22	22
UK3RAD	2,240	32	14	14
Hawaii				
KH6DX	**28,512**	**94**	**33**	**7**
Kazakh				
UK7PAL	**2,057**	**21**	**11**	**11**
Lithuania				
UK2BCC	**112,242**	**572**	**39**	**38**
UK2PCR	92,945	643	29	29
Poland				
SP7KTE	**13,485**	**90**	**29**	**29**
White Russia				
UK2AAG	**15,960**	**106**	**28**	**28**

Check logs are gratefully acknowledged from the following: DE1BMH, HB9AMO, OH1XX, RA6HKQ, UA3AQW, UB5UKO, UB5UYR, UB5VAA.

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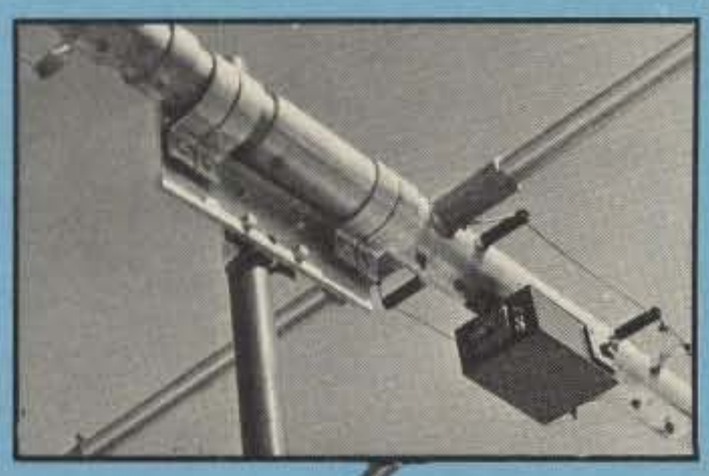

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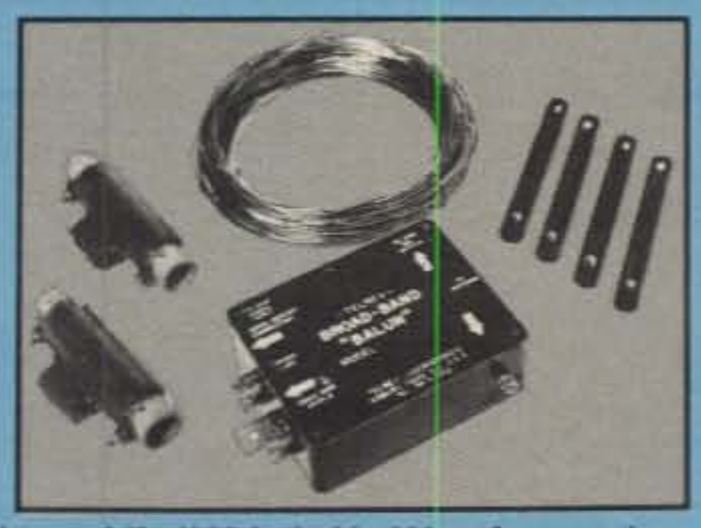

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15M532	15 Meter 5 element	(13 DBD)	631.00	**485.00**
15M845	15 Meter 8 element	(15 DBD)	1268.00	**975.00**
20M536	20 Meter 5 element	(12 DBD)	760.00	**585.00**
20M646	20 Meter 6 element	(14 DBD)	1294.00	**995.00**
40M214	40 Meter 2 element	(5.6 DBD)	865.00	**665.00**
40M329	40 Meter 3 element	(8.3 DBD)	1294.00	**995.00**
40M346	40 Meter 3 element	(9 DBD)	2210.00	**1700.00**
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TB5ES	10, 15, 20M Tri-Band	(8.5 DBD)	468.00	**359.00**
TB6EM	10, 15, 20M Tri-Band	(10 DBD)	774.00	**595.00**

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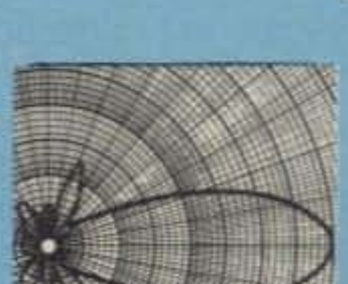

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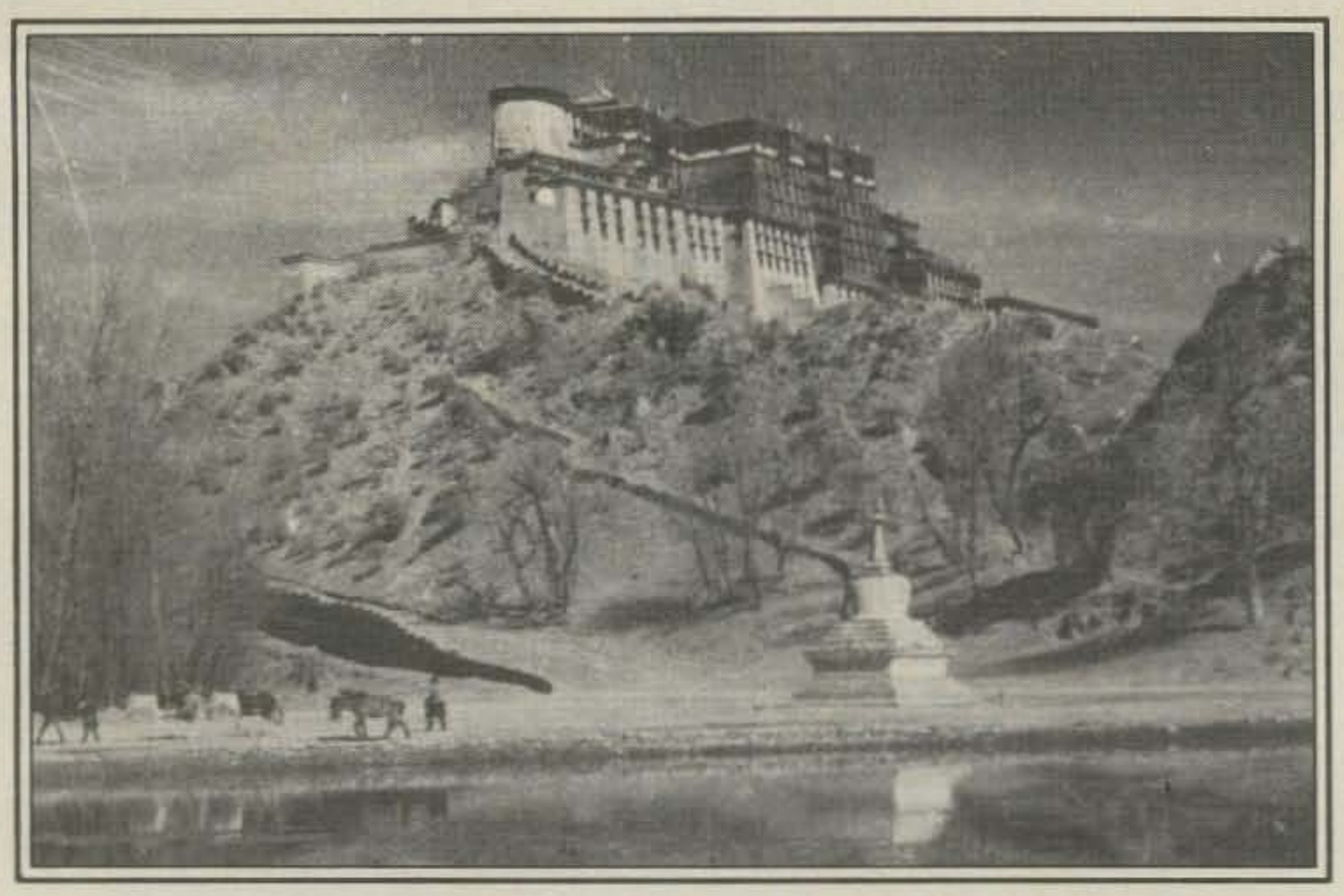


Potala, the winter palace of the Dalai Lama, ruler of Tibet. At 14,000 feet, it's the largest palace at the highest altitude in the world.

The only individual ever to operate from French India, Deb Shankar Seal, had dreamed for years of visiting "The Forbidden City"—Lhasa, Tibet. One day Shankar's wish came true, and he found himself working pileups from the roof of the world.

DXING FROM THE SUMMIT

BY MICHAEL HUDGENS, W6YQ*, AND JAN PERKINS, N6AW†

In 1949, when setting foot on the moon was 20 years away, the world was still a big place. The word *remote* frequently described faraway lands.

DXers listened on what became legendary receivers: the Eddystone, Super Pro, SX-28, and the remarkably quiet HRO. Twenty phone was wall-to-wall in heterodynes. Lower down, c.w. signals chirped and were often rough. A report such as *336C* could be taken without offense. Yet the art of hearing DX was much as it is now: ear and mind become the coherent detector.

Among those wisps of signals on 20 c.w. was that of FN8AD, Deb Shankar Seal, who now signs VU2AX. He lived in the city of Chandernagore, one of five French enclaves on the eastern side of the Indian subcontinent. France's colonial empire there dated back to 1769, and all five of the areas were ceded to India in 1954. Like the CR8 locations of Goa and Diu/Damao in western India, each city would have counted as a separate country, but activity occurred only at one location. The FN8AD card was the sole QSL ever submitted or accepted for French India DXCC credit, according to someone who should know, Bob White, W1CW.

Shankar confirms it. "There were no other licensed FN8s except me. I know of a few pirate stations such as FN8MS, FN8DC, and FN8AB. Sometimes someone would use my portable callsign, FN8AC."

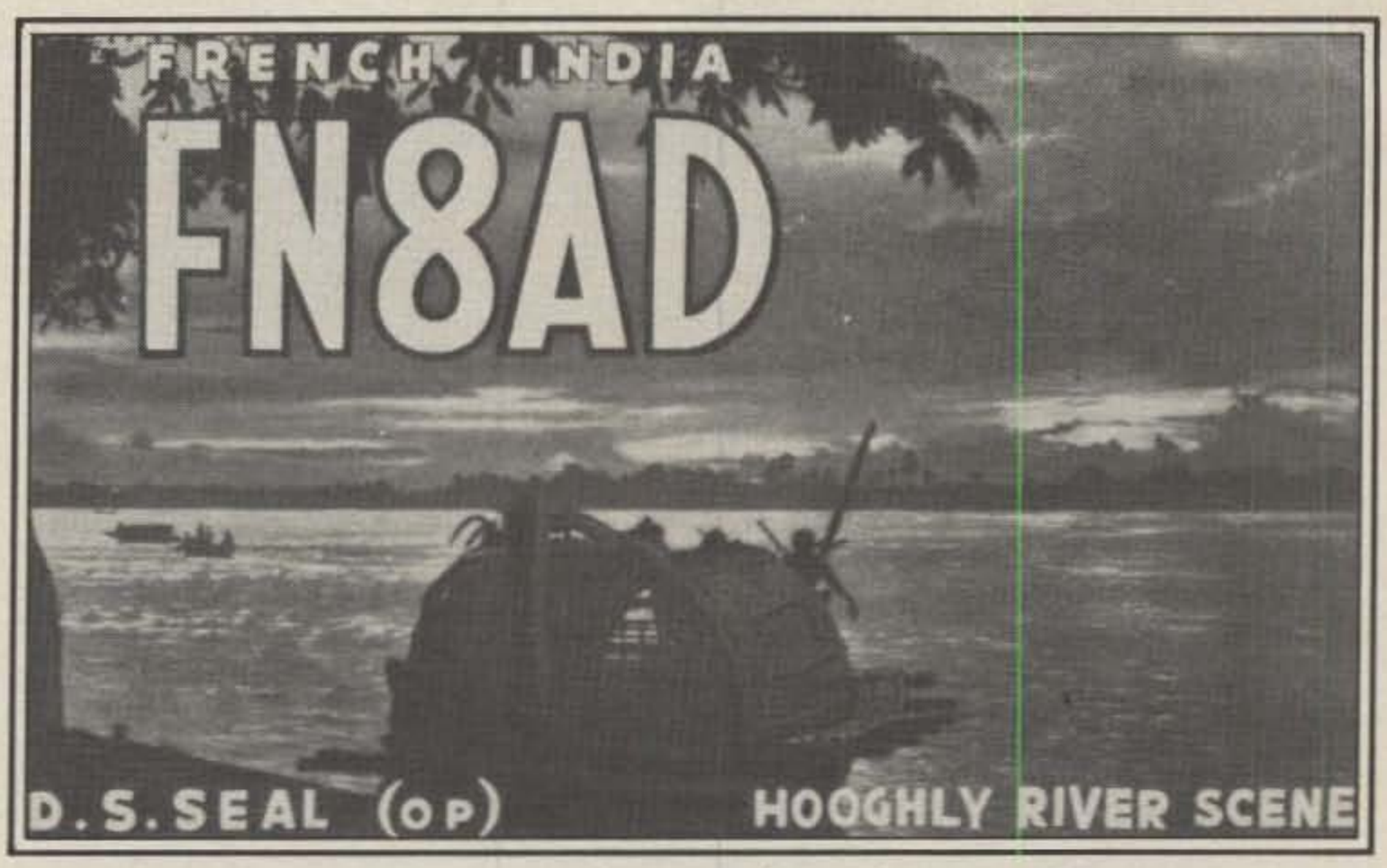
A few weeks after the French administration sent the FN8 ticket, the Indian government issued him VU2AX. "In May 1949," he says, "FN8AD was on the 7 and 14 MHz bands, both on c.w. and phone, with a homebrew rig—the same old rig I am still using" (an 807 at 15 watts input, driven by a crystal-controlled 6L6 and modulated with a pair of 6L6s). "My receiver is still a BC-312N, converted to a.c. mains, which here in India is 220 volts, 50 cycles. I have a half-wave Windom strung northeast-southwest and a full-wave end-fed Zepp running north-south."

His presence on the bands caused a furor. "Whenever I gave out CQ calls, it was very difficult to identify the stations. They came like a swarm of bees, and I would wait for those who could overcome the rest. I made about 2,500 contacts in the next five years, but only received 50 percent of the QSL cards."

An FN8AD card is rare and greatly

*7760 Paseo del Rey, Playa del Rey, CA 90293
**11942 Bos, Cerritos, CA 90701

Shankar, VU2AX (ex-FN8AD, ex-AC4AX), and wife, Namita, at the summer palace, in Lhasa, Tibet.



An FN8AD card is rare and greatly treasured.

The Consulate General of India where Shanker installed the radio station. He and Namita lived here. The altitude of this spot is 15,000 feet.

Operating position of the Consulate General of India radio station, installed by Shankar.

treasured, needless to say. Shankar would listen for a phone signal when asked, but showed some reluctance to confirm a one-way. On a well-known DX-er's card, for instance, he wrote: *I am very sorry to let you know that I did not contact you on fone on that date because I have no fone at present. I have seen my log but the QSO on 10 July was a c.w. QSO, not fone. So please correct your log. I heard your fone sigs (and) if you want that report I will gladly send the QSL to you.* That one eventually counted as a one-way phone contact. Other cards, however, did not count for anything; they turned out to be forgeries. As a result, several callsigns disappeared from the DXCC ranks.

During those years Shankar worked on the embassy staff in Chandernagore. He longed for an assignment to "The Forbidden City" of Lhasa, Tibet. The year he received his FN8 and VU licenses he undertook an installation job of a communications facility in Sikkim. The success of this endeavor led to Lhasa, but he had to wait almost eight years.

"At long last," he says, "I left for Tibet in June 1957 by crossing Nathula Pass at 14,500 feet on horseback. This is northeast of the Sikkim-Tibet border. I arrived at the town of Yatung, Tibet and stayed there about a year for some specific jobs with our trade mission."

Yatung is at 9,000 feet. "It's small, with a bazaar and a hospital. There's a river, the *Amu-chu,* that flows in the middle of town. It was full of trout, and I enjoyed fishing during my stay. It rained a great deal. The winters were supposed to have only moderate snowfall, but while I was there I had to face a 14 foot snowfall in December 1957. It was a record."

The following May he was ordered to Lhasa. "I got married in Yatung, and we left for Lhasa by motor vehicle." Her name is Namita, and she and Shankar crossed the Himalayas. "On the way to Lhasa, we went to Pharidzong, which is at 10,000 feet; to Gyantse at 12,000 feet; and to Shigatse, also at 12,000 feet, which was the site for His Holiness, the Panchen Lama. Shigatse was very picturesque."

When they reached Lhasa "the weather was very dry," Shankar recalls. "No rain or snow. Clear, deep blue sky. Lhasa was the site for His Holiness, the Dalai Lama, ruler of Tibet. Both his winter palace, the *Potala,* and summer palace, the *Narbu-Linga,* are there. The *Potala* at 14,000 feet is the largest palace at the highest altitude in the world."

He found the people simple, very hospitable. "You saw no beggars or thieves. There was a large bazaar, a modern hos-

VU2AX has not changed significantly since the days when it was FN8AD.

pital along with a mobile hospital for emergencies. We visited an old Tibetan surgery institute called *Chokpori*, and we went to *Zokhang*, the famous Buddhist cathedral with a huge image of Lord Buddha that takes up an area of 1.5 square miles. There was a post office, a power station, and a radio station."

Shankar's task was "to install a half-kw wireless station and to establish the longest distance communications possible. The reception conditions were extremely good, and there were little atmospherics and static. I utilized the full power from a BC-610E with a longwire antenna current of 7 amps. The receivers were an Eddystone and a BC-348Q."

Signing AC4AX, Shankar worked a lion's share of 20 meter phone because his predecessors—AC4YN, AC4NC, and AC4RF—had concentrated on c.w. AC4RF was Bob Ford, whom the Chinese arrested when they occupied Tibet in 1950. Ford was released five years later and sent back to England. Later he wrote a book, *Wind between the Worlds*, describing his experiences in Tibet.

In March 1959 there was a Tibetan uprising against the Chinese. Shankar found himself in the midst of it. "During those days of revolt we had a very crucial time. I had to maintain wireless communications under heavy overhead shelling. There was machine gun fire within 100 yards of me. We escaped by the blessings of God."

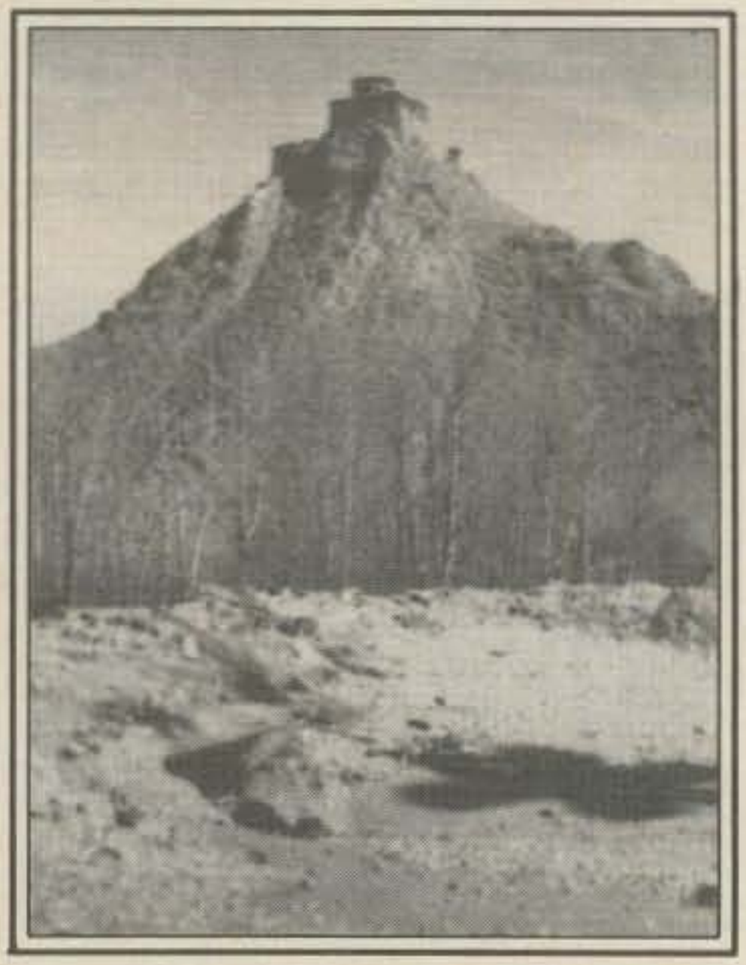
Winters in Lhasa were severe. "It was very difficult to remain there during winter," he says. "The temperature dropped to ten below zero. Yak was the only animal there at times. Out of her milk, butter and cheese were made. Yak meat is used by Tibetans. Sheep and goat are available, too. We ate mutton throughout the year. Tibetan dogs were very dangerous, but lap dogs and apso were available. We found birds to be in short supply."

In December 1962, after five years in Lhasa, Shankar and Namita went home. Two years later, Gus Browning would make a whistle stop under cover of darkness signing AC5A/AC4. The following year he showed again briefly as AC4H. No one else managed to get in before China annexed the country in 1974, so Gus has the distinction of closing the curtain on amateur radio in Tibet.

Lhasa is now called *Lasa*, and if Air India flew the route, the former Forbidden City would be a two-hour hop out of Calcutta. So much for remoteness.

As for Shankar, he still lives at the same location—near the Hooghly River in the West Bengal Region of India. Signing VU2AX, he doesn't attract quite as much attention. "I fulfilled my long desire to visit the Forbidden City," he says, "and beyond that I gained five years of day-to-day experiences living there."

Shankar's logs—FN8AD, 1949–1954, and AC4AX, 1957–1962—are still intact, by the way, and if you need assistance in confirming a past contact, write to N6AW. *(Thanks to W6AM, W1FH, W6FR, VU2CZ, and W8GZ.)* CQ



Chokpori, the Surgical Institute of Tibet, located at the summit of the mountain.

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73 Shankar VU2AX AC4AX

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This month we conclude our discussion of RTTY codes and modes. We suggest that you save this material for your reference files.

Understanding Modern RTTY Codes And Modes

Part II—Conclusion

BY BILL HENRY*, K9GWT

Now that we have thoroughly defined MARK and SPACE as well as the variations between the codes, we should consider how the RTTY signal is actually transmitted. There are two different ways in which a Baudot, ASCII, or AMTOR code may be sent on wires or radio signals. The RTTY character can be sent by devoting a separate wire or radio channel to each bit of the code. This is called a **PARALLEL** communications connection. Conversely, the bits of the code can be sent in sequence, one after the other over one radio or wire channel, much like we do for Morse code. This is called **SERIAL** data communications.

Data Format

Parallel Data

A **parallel** data connection is most often used within a computer and in wire connections to a computer peripheral. A common example of a parallel circuit is the "Centronics-compatible"[1] parallel printer output used on many computers. In this connection a separate wire is used for each of the eight ASCII data bits. The computer places the appropriate "1" or "0" voltage (Mark or Space) for a character on all eight wires at the same time. It then sends a signal on a control line to tell the printer to print the character. If the printer is still printing the previous character, a "busy" signal tells the computer to hold the new character until the present print operation is complete. Each character is then sent from computer to printer in this parallel fashion. A parallel connection can be very fast in operation, but requires separate wires for each data bit plus several control wires. The same technique is used within a computer for communications between the processor and memory and peripheral device handling circuits.

The parallel data circuit may also be used in a radio system, but becomes very complicated because of the need for multiple radio channels (or frequencies). Although this technique has not been used by radio amateurs, it has been used for government communications.

Serial Data

The format used for amateur RTTY is to send the data in a **serial** manner: each bit or code-combination for a character is sent one after the other. So, if we are using the Baudot code, a sequence of 5 pulses (plus start and stop pulses as will be discussed shortly) is sent along the wire or radio channel for each character transmitted. This is very similar to the way in which we send Morse code, except that in RTTY there are no "dots" and "dashes"—each pulse has the same length in time and there is no space between code elements.

There are two ways in which an RTTY signal can be sent in a serial format. These are **SYNCHRONOUS** or **ASYNCHRONOUS** serial formats.

In a **synchronous** serial code the bits or elements for one letter are followed immediately by the bits for the next letter without any intervening control or synchronizing pulses. AMTOR/SITOR and Packet Radio are good examples of synchronous serial communications systems. Because there is no definite demarcation between the end of one character and the beginning of the next, complex circuits or software routines are required to establish and maintain synchronization between the transmitting and receiving stations. The stability of the oscillator controlling both stations is quite critical, and often the receive station's timing is derived from the received signal with clock recovery circuits.

The **asynchronous** code is more commonly used for RTTY, and it adds two control, or synchronizing, pulses to those required to represent the character. The first control pulse occurs before the data bits and is called a **START** pulse. The **start** pulse is *always* a **SPACE** pulse, and it signals the teleprinter or RTTY terminal that a character is about to be received. Next the data bits are sent in sequence (5 for Baudot, 8 for ASCII). Finally, the **STOP** control pulse is added to the sequence to inform the machine that this is the end of the character. The **stop** pulse is *always* a **MARK** pulse. In general, the start pulse is the same time length as the data pulses. For slower speed Baudot and ASCII signals the stop pulse is 1.4 to 2.0 times the length of the data pulses. For ASCII signals faster than 110 baud, the stop pulse is the same length as the start and data pulses. Since the start and stop pulses clearly define the beginning and end of each character, the receiving station equipment may synchronize on each received character. Therefore, serial

*Box 365, Urbana, IL 61801

[1]*Centronics Data Computer Corp. initially set up a standard for connecting their printers which has become a semi-universal method for hooking up all printers.*

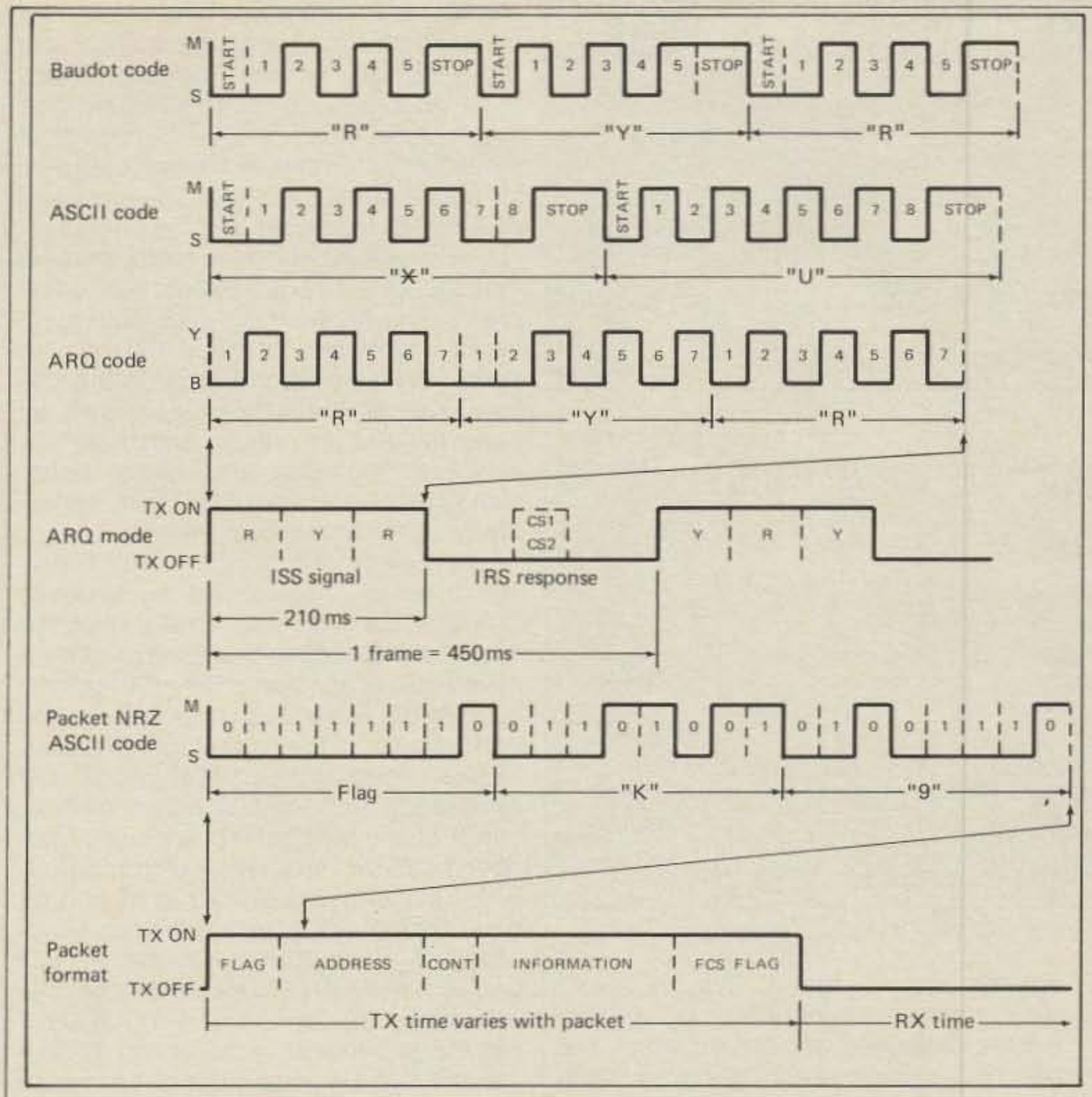

Fig. 3– Comparison of various serial data codes.

asynchronous equipment is not usually as complicated or critical as that used for synchronous communications.

Time diagrams for Baudot and ASCII asynchronous signals and ARQ and Packet Radio synchronous signals are shown in fig. 3. Notice that more serial pulses must be transmitted per character for ASCII and ARQ codes. Therefore, for a given bit pulse time, it takes longer to send a character in these codes. The implication is that, for a given baud rate, the **through-put** of a system using the ASCII or ARQ codes will be less than if the Baudot code were used. Through-put is usually measured in terms of the number of characters per second or words per minute passed through the system. This concept of system through-put is very convenient when discussing total data system capabilities, but becomes very difficult to define precisely when error correcting systems such as ARQ and Packet Radio are considered. In these cases system performance is usually specified as maximum through-put when no errors are received.

RTTY Speed

A prime consideration in an RTTY system is how fast the text may be transmitted between stations. RTTY is generally much faster than Morse code, but the speed may not be increased or decreased at will. The first amateur radio RTTY operators used surplus machines which were usually adjusted for approximately 60 words per minute (w.p.m.). The speed of a mechanical machine is determined by motor r.p.m. and gear ratios, so changing speeds was not simple. Some machines were equipped with expensive gear transmissions that would allow selection of three or four speeds, but these were uncommon. The electronic RTTY terminal and computers have removed a lot of these restrictions, and modern systems allow selection of a wide range of operating speeds. Nevertheless, RTTY speeds (or baud rates as they are now called) tend to follow the standards set up for mechanical machines.

Speed and Baud Rate

Early Baudot RTTY systems usually specified the speed of operation in terms of words per minute (w.p.m.), much like we have always done for Morse code. This and the available gear combinations set the standard for 60, 66, 75, and 100 w.p.m. Baudot RTTY. However, when the diagrams of fig. 2 are examined (see the November issue), it is apparent that the really important parameter of serial data is the width of the data pulses. In fact, the w.p.m. specification is an approximation based upon precise timing of the data pulse. Modern RTTY systems therefore specify a baud rate that is related directly to the data pulse width. The **baud rate** is defined as follows:

$$\text{Baud Rate} = \frac{1}{[\text{pulse width}]\,(\text{sec})}$$

Associated with a speed specification in an asynchronous system is the length of the start and stop pulse. The start pulse is always the same time length as the data pulses. This length is often called the **unit pulse length**. The stop pulse length varies between 1.0 and 2.0 times the unit pulse length. The time it takes to send a character and therefore the overall w.p.m. rate will depend upon the length of the stop pulse. Therefore, there are several Baudot speeds which have the same baud rate but differing w.p.m. speeds. Nonetheless, **ALL** speeds with the same basic baud rate are compatible, particularly when electronic terminals or computers are used.

The speed in words per minute is defined as the number of five-character-plus-space groups that may be sent in one minute (six RTTY characters per word). The words-per-minute speed therefore depends upon the total time required for the start, stop, and data bits of information. The words-per-minute rate of an asychronous serial RTTY signal may be computed with the following formula:

$$\textbf{W.P.M.} = \frac{1\ (\text{char})}{[\text{Start} + \text{N(data bits)} + \text{Stop}]\ (\text{sec})} \times \frac{60\ (\text{sec/min})}{6\ (\text{char/word})}$$

The parameter "N" refers to the number of data bits in the code used (5 for Baudot and 8 for ASCII). Another measure of the speed or rate of a data system is the number of characters per second **(c.p.s.)** that may be sent. The c.p.s. and w.p.m. speeds are naturally related as shown below.

$$\textbf{C.P.S.} = \frac{1}{[\text{Start} + \text{N(data bits)} + \text{Stop}]\ (\text{sec})}$$

$$\textbf{W.P.M.} = \frac{\text{C.P.S. (char/sec)} \times 60\ (\text{sec/min})}{6\ (\text{char/word})}$$

The common Baudot data rates and speeds are shown in Table VI. ASCII rates and speeds are shown in Table VII. Note that several different Baudot speeds have the same baud rate and are therefore compatible.

Through-put

Another speed concept that gives a measure of the total system capabilities is that of system "through-put." In simple Baudot and ASCII systems where the typist types as fast as characters can be encoded, the maximum through-put is just the w.p.m. or c.p.s. specification for the baud rate used. For example, the

Baud Rate	Data Pulse (ms)	Stop Pulse (ms)	W.P.M.	Common Name
45.45	22.00	22.0	65.00	W U Baudot
45.45	22.00	31.0	61.33	60 Speed
45.45	22.00	33.0	60.61	45 Baud
50.00	20.00	30.0	66.67	50 Baud
56.92	17.57	25.0	76.68	75 Speed
56.92	17.57	26.36	75.89	57 Baud
74.20	13.47	19.18	100.00	100 Speed
74.20	13.47	20.21	98.98	74 Baud
100.00	10.00	15.00	133.33	100 Baud

Table VI– Baudot rates and speeds.

Baud Rate	Data Pulse (ms)	Stop Pulse (ms)	CPS (1)	WPM (2)
110	9.091	9.091	11	110
110	9.091	18.182	10	100
134.5	7.435	7.435	13.5	135
150	6.667	6.667	15	150
300	3.333	3.333	30	300
600	1.667	1.667	60	600
1200	0.8333	0.8333	120	1200
1800	0.5556	0.5556	180	1800
2400	0.4167	0.4167	240	2400
4800	0.2083	0.2083	480	4800
9600	0.1041	0.1041	960	9600
19200	0.0520	0.0520	1920	19200

Table VII– ASCII rates and speeds.

maximum through-put of a Baudot 45 baud channel using one start and 1.5 unit stop pulses is 60.61 words per minute (6.06 c.p.s); a 300 baud ASCII channel maximum through-put is 30 c.p.s. Obviously, we must discuss maximum through-put because the system performance for a slow typist will depend upon the typist's speed, not RTTY parameters.

This semi-direct relationship between baud rate and system speed no longer applies when block systems such as AMTOR and Packet Radio are considered. In AMTOR only three characters are transmitted at a time, using only 46.67% of the available time. The remaining time between blocks is used to receive the IRS control signal and to provide a time window for delays due to propagation. Under a no-error situation the maximum through-put of the AMTOR system is approximately equivalent to use of a 50 baud Baudot asynchronous code—approximately 66.67 w.p.m. Thus, error correction of the ARQ mode is done at the expense of system speed.

The same situation applies for Packet Radio, but is not easily computed for the general case because of the time uncertainties caused by bit-stuffing and stripping, length of the address field, and the purposely random nature of timing of bursts to prevent "collisions" with other packet stations on the same frequency. Thus, although packet radio may send data at 1200 baud, the system speed will never approach the 120 c.p.s. speed of Table VII. Again, the addition of error correction, station addressing, and multiple users per radio channel are traded off against system speed. System speed may of course be increased by increasing the baud rate within the packet, but only by also increasing signal bandwidth and degrading signal-to-noise ratio.

Speed, Bandwidth, and Error Rates

As the speed of the RTTY signal is increased, the bandwidth required by that signal also increases. Therefore, the bandwidth of the transmitted signal and the required receiver bandwidth also must increase to accommodate the faster signal. If the receiver bandwidth is increased, the received noise level also increases and, therefore, the signal-to-noise ratio decreases and the printed error rate will increase. A radio channel that supports 45 baud Baudot with a few errors may have an unacceptable number of errors when 110 baud ASCII is tried under the same conditions. When the baud rate of the data is increased, all bandwidths of the radio system must also increase, including transmitter bandwidth, receiver bandwidth, and, importantly, demodulator bandwidth.

The bandwidth of the serial mark/space signal (often called the **baseband** signal) is one-half the baud rate. Thus, the 45.45 baud Baudot signal itself requires a bandwidth of approximately 23 Hz; 110 baud ASCII, 55 Hz; 120 baud, 600 Hz. The bandwidth of the actual radio signal used is determined by the frequency shift and modulation technique used plus the sidebands of the baseband pulse signal produced by the modulation. Thus, an h.f. RTTY signal using 170 Hz shift and 45 baud Baudot will have a minimum bandwidth of $170 + 2(23) = 236$ Hz. A 100 baud h.f. AMTOR (170 Hz shift) signal has a minimum bandwidth of $170 + 2(55) = 280$ Hz. In practice, receiver and demodulator filters are usually designed to pass both the first- and third-order sidebands of the pulse signal, giving a bandwidth of $170 + 3(45) = 305$ Hz for 45 baud and $170 + 3(100) = 470$ Hz for 100 baud. Also, since it is usually inconvenient to switch

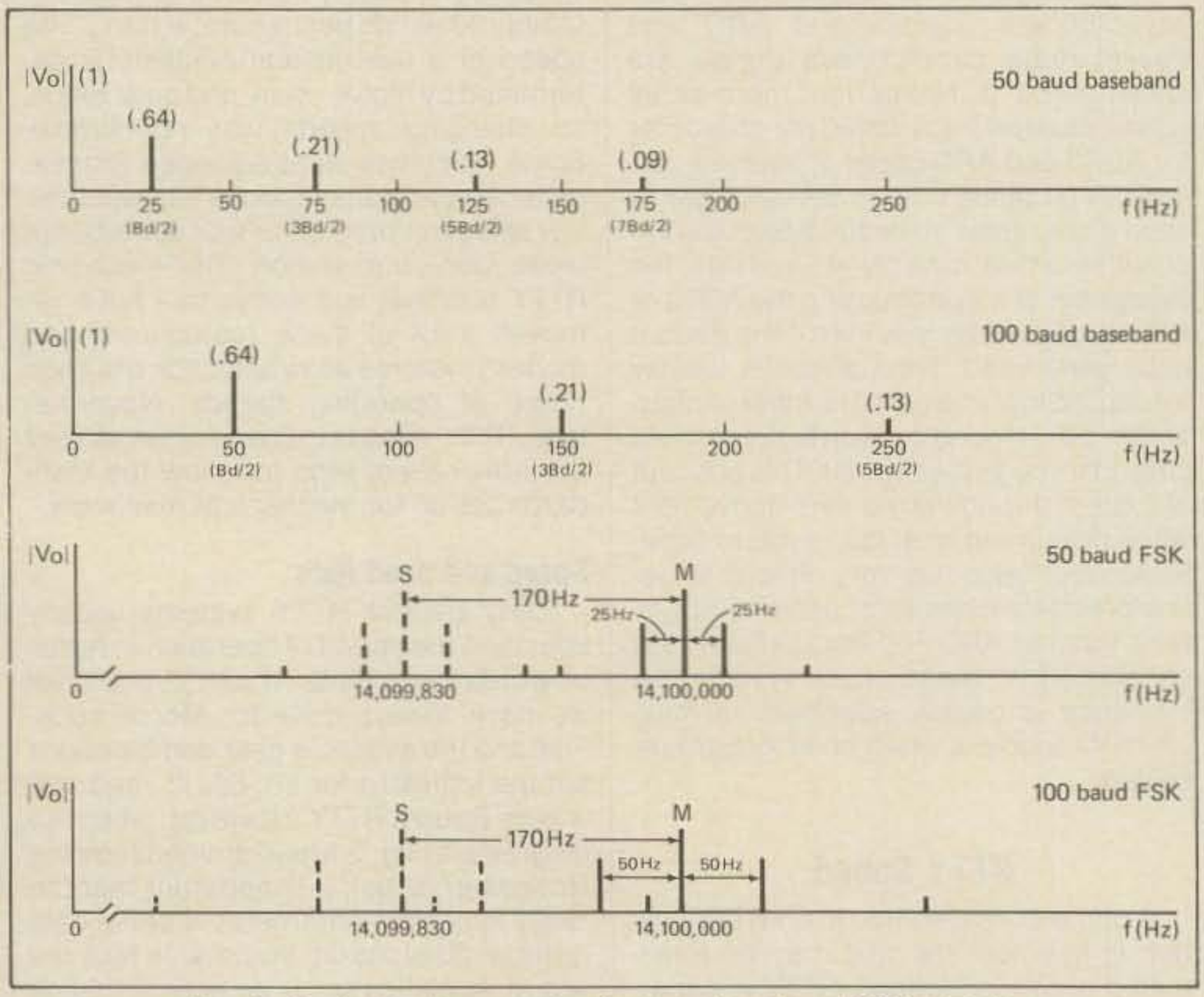

Fig. 4– Typical pulse spectra for baseband and FSK signals.

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PS-25 Internal power supply	99.00	89.95
AG-20/EX-338 2m preamplifier	56.95	
IC-471A 25w 430-450 SSB/CW/FM xcvr	799.00	699.95
AG-1 Mast mounted 15dB preamp	89.00	
PS-25 Internal power supply	99.00	89.95

Common accessories for 271A/H and 471A/H		
SM-6 Desk microphone	39.00	
EX-310 Voice sythesizer	39.95	
TS-32 CommSpec encode/decoder	59.95	
UT-15 Encoder/decoder interface	12.50	
UT-15S UT-15S w/TS-32 installed	79.95	

VHF/UHF mobile multi-modes		
IC-290H 25w 2m SSB/FM xcvr, TTP mic	549.00	489.95
IC-490A 10w 430-440 SSB/FM/CW xcvr	649.00	579.95

VHF/UHF/1.2 GHz FM	Regular	SALE
IC-22U 10w 2m FM non-digital xcvr	299.00	249.95
EX-199 Remote frequency selector	35.00	
IC-27A Compact 25w 2m FM w/TTP mic	369.00	329.95
IC-27H Compact 45w 2m FM w/TTP mic	409.00	369.95
IC-37A Compact 25w 220 FM, TTP mic	449.00	399.95
IC-47A Compact 25w 440 FM, TTP mic	469.00	419.95
UT-16/EX-388 Voice synthesizer	29.95	
IC-120 1w 1.2 GHz FM transceiver	499.00	449.95
ML-12 10w amplifier	TBA	

6m portable	Regular	SALE
IC-505 3/10w 6m port. SSB/CW xcvr	$449.00	399.95
BP-10 Internal Nicad battery pack	79.50	
BP-15 AC charger	12.50	
EX-248 FM unit	49.50	
LC-10 Leather case	34.95	
SP-4 Remote speaker	24.95	

Hand-held Transceivers

Deluxe models	Regular	SALE
IC-02AT for 2m	349.00	299.95
IC-04AT for 440 MHz	379.00	339.95

Standard models	Regular	SALE
IC-2A for 2m	239.50	214.95
IC-2AT with TTP	269.50	219.95
IC-3AT 220 MHz, TTP	299.95	239.95
IC-4AT 440 MHz, TTP	299.95	239.95

Accessories for Deluxe models	Regular
BP-7 425mah/13.2V Nicad Pak - use BC-35	67.50
BP-8 800mah/8.4V Nicad Pak - use BC-35	62.50
BC-35 Drop in desk charger - all batteries	69.00
BC-60 Six position gang charger - all batts	TBA
BC-16U Wall charger - BP7/BP8	10.00

Accessories for both models	Regular
BP-2 425mah/7.2V Nicad Pak - use BC35	39.50
BP-3 Extra Std. 250 mah/8.4V Nicad Pak	29.50
BP-4 Alkaline battery case	12.50
BP-5 425mah/10.8V Nicad Pak - use BC35	49.50
CA-2 Telescoping 2m antenna	10.00
CA-5 ⅝-wave telescoping 2m antenna	18.95
FA-2 Extra 2m flexible antenna	10.00
CP-1 Cig. lighter plug/cord - BP3 or Dlx	9.50
DC-1 DC operation pak for standard models	17.50
LC-02AT Leather case for Dlx models w/BP-7/8	39.95
LC-2AT Leather case for standard models	34.95
LC-11 Vinyl case for standard models	17.95
LC-14 Vinyl case for Deluxe models w/BP-7/8	17.95
RB-1 Vinyl waterproof radio bag	30.00
HH-SS Handheld shoulder strap	14.95
HM-9 Speaker microphone	34.50
HS10 Boom microphone/headset	19.50
HS-10SA Vox unit for HS-10 (dlx only)	19.50
HS-10SB PTT unit for HS-10	19.50
ML-1 2m 2.3w in/10w out amplifier	SALE 79.95
ML-25 2m 2.3w in 20w out amplifier	SALE 179.95
SS-32M Commspec 32-tone encoder	29.95

Shortwave receivers	Regular	SALE
R-71A 100 Khz-30 Mhz digital receiver	$799.00	689.95
FL-32 500 Hz CW filter	59.50	
EX-310 Voice synthesizer	39.95	
RC-11 Wireless remote controller	59.95	
CR-64 High stability oscillator xtal	56.00	
R-70 100 Khz-30 Mhz digital receiver	749.00	569.95
EX-257 FM unit	38.00	
IC-7072 Transceive interface, 720A	112.50	
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FL-63 250 Hz CW filter (1st IF)	48.50	
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demodulator bandwidth for each speed to be used, the bandwidth of demodulators is fixed to allow operation at 110 baud (500 Hz), thus givjng a small compromise to 45 baud signal-to-noise performance. When f.m. modulation techniques are used on v.h.f., the signal and receiver bandwidths of course depend upon the modulation index used. However, the demodulator bandwidth requirements are the same for either FSK or AFSK modulation. Fig. 4 shows typical frequency spectra for the baseband and FSK signal for 50 and 100 baud.

It can be seen that the use of 170 Hz shift is more than is required to send the 23 Hz bandwidth of 45 baud Baudot information. Some government and commercial systems do, in fact, use 50 or 85 Hz shift for slow RTTY communications. However, 170 Hz shift allows a great deal of tolerance to transmitter and receiver drift and receiver tuning inaccuracies, and there is little need to further reduce our slow-speed RTTY bandwidth. Theoretically, 170 Hz shift should be sufficient for data rates up to 340 baud. Above this speed we must use wider shifts. (This does not imply that most commercial demodulators may be used directly at 300 baud with 170 or other shifts: a modification of the low-pass filter and detector filter bandwidths is also necessary.)

The desire to increase system speeds to handle 1200 baud Packet Radio has led Rinaldo and others (see 1984 *Radio Amateur's Handbook* in bibliography) to propose a **M**inimum **S**hift **K**eying (**MSK**) standard shift of 600 Hz. This system would then be compatible with all data rates up to 1200 baud.

In general, as the speed and bandwidth are increased by a factor **F**, the error rate will be increased by **F squared.** Thus, doubling the baud rate from 50 to 100 baud (as in the ARQ system) will theoretically increase the errors received by a factor of four. Although the ARQ system does have error correction, it will inherently have more errors to correct because of the higher data rate used. A similar situation holds for Packet Radio at 300, 1200, or higher baud rates.

In practice, this disadvantage may not be noticed because our h.f. amateur signals are often either quite strong (few errors at either baud rate) or fade slowly up and down. ARQ mode and Packet Radio take advantage of the slow fading by bursting text through the system when signals are good and passing a small amount of text under poor signal conditions, all with no errors. A normal Baudot or ASCII signal will give correct print when signals are strong and many errors when when signals fade into the noise. The total system error-free performance with fading signals can be considerably better when ARQ or Packet Radio are used, even though their higher baud rate would at first glance predict poor performance.

Conclusions

RTTY has grown from simple 5-bit Baudot code at 60 w.p.m. to use of ASCII and ARQ codes at many speeds or rates. The requirements of the RTTY terminal and radio transmitter, receiver, and demodulator are all affected by our choice of code and speed. Amateur RTTY now also includes new formats or protocols that allow for total error correction between transmitting and receiving station when ARQ and Packet Radio techniques are used. The equipment requirements for these modes may be different from those we have used for RTTY in the past. Both ARQ and Packet Radio have introduced the concept of burst or packetized communications where text is sent interactively between stations. Packet Radio protocol now supports the simultaneous use of a frequency channel by multiple stations in different conversations rather than the one-at-a-time rule we have previously had to follow. Large amounts of information such as computer programs or multiple traffic messages may now be sent rapidly on v.h.f. and soon on satellite circuits via Packet Radio.

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Addendum

In Part I mention was made under Data Codes of a "Truth Table." Below is an example of a Truth Table. This is the conventional way of writing a Truth Table or counting using a binary code. Note that the bits are listed in reverse order (4-3-2-1). The far right-hand bit (No. 1) is called the Least Significant Bit (LSB) and the far left bit is called the Most Significant Bit (MSB). For longer codes, just keep adding to the left side of the table. A 5-bit code has 32 states, 6 has 64 states, 7 has 128 states, and 8 has 256 states; each bit added doubles the number of possibilities.

2-bit code: (four states)

	2	1
1	0	0
2	0	1
3	1	0
4	1	1

3-bit code: (eight states)

	3	2	1
1	0	0	0
2	0	0	1
3	0	1	0
4	0	1	1
5	1	0	0
6	1	0	1
7	1	1	0
8	1	1	1

4-bit code (16 states)

	4	3	2	1
1	0	0	0	0
2	0	0	0	1
3	0	0	1	0
4	0	0	1	1
5	0	1	0	0
6	0	1	0	1
7	0	1	1	0
8	0	1	1	1
9	1	0	0	0
10	1	0	0	1
11	1	0	1	0
12	1	0	1	1
13	1	1	0	0
14	1	1	0	1
15	1	1	1	0
16	1	1	1	1

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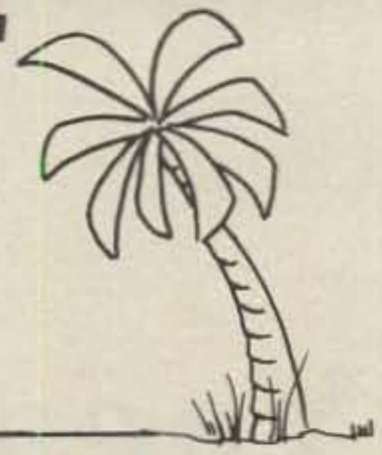

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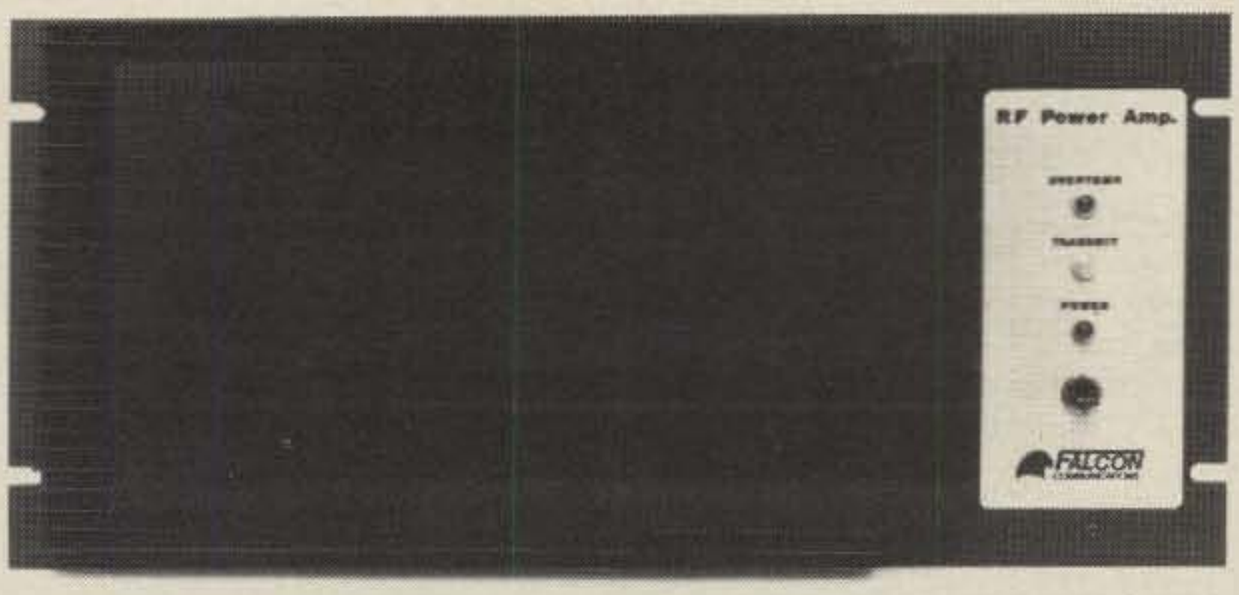

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2 Watt Input - 30 Watt Output
20 Watt Input - 100 Watt Output

4112: 220 MHz Power Amplifier
2 Watt Input - 25 Watt Output
25 Watt Input - 100 Watt Output

4114: 2 Meter Power Amplifier
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CQ REVIEWS:

Yaesu FT-77 Compact H.F. Transceiver

BY JOHN J. SCHULTZ*, W4FA

The front panel of the FT-77 is strictly functional and free of extraneous controls.

Is the Yaesu FT-77 just a cosmetic redo of the Yaesu FT-707 transceiver? There certainly are some very strong similarities. The FT-707 was basically an all-band s.s.b./c.w. transceiver having a single 9 MHz i.f. and measuring 93 × 240 × 295 mm overall. The FT-77 is an all-band s.s.b./c.w. transceiver (with an f.m. option) having a 9 MHz i.f. and measuring 95 × 240 × 300 mm overall. I would classify the FT-77 as a transceiver which has taken many basic circuitry ideas from the FT-707, improved on them, and repackaged them for more reliable and lower cost production.

The FT-77 is, in a sense, a simpler transceiver than the FT-707. The front-panel design is much cleaner and simpler than that found in the FT-707. For instance, the rather colorful but difficult to interpret LED bar graph meter found in the FT-707 has been replaced by a far more functional, conventional meter. The "knob count" has been reduced somewhat and better placed and sized, particularly for mobile operation. Overall, the FT-77 is a distinct improvement over the FT-707 and should appeal to those who want a solid, compact 100-watt-class h.f. transceiver without a lot of "bells and whistles" (although a few of the latter can be added via the optional FV-700 DM External Scanning VFO). Table I summarizes the overall specifications for the FT-77.

Circuitry Overview

Fig. 1 shows a block diagram of the FT-77. There seem to be a lot of blocks, but in reality all of the circuitry is contained on only nine basic PC boards.

Referring to fig. 1, an incoming r.f. signal is passed through the low-pass filter assembly, through a switchable 20 dB attenuator, through one of the eight diode-switched high-pass filters, and on to r.f. amplifier stages Q1002 and Q1003. The signal then is frequency translated in a passive double-balanced mixer stage, Q1005, to the 9 MHz i.f. frequency and goes through a broad 20 kHz i.f. filter.

*c/o CQ Magazine

GENERAL

Frequency coverage:
All amateur bands between 3.5 and 29.9 MHz, including the three WARC bands

Operating modes:
A3J (LSB/USB), A1 (CW)
F3 (FM) optional

Power requirements:
13.5V DC; 1A receive, 20A transmit

Size:
240(W) x 95(H) x 300(D) mm, including heat sink

Weight:
6 kg (13.2 lb)

TRANSMITTER

Power input:
240W DC for nominal 100W output (85W on 10 meter band)

Spurious radiation:
Less than –40 dB

Carrier suppression:
Better than 40 dB

Unwanted sideband suppression:
Better than 50 dB (W/1 kHz modulation)

Audio response:
350–2700 Hz (@ –6 dB)

Stability:
Less than 300 Hz drift during the first 30 minutes after a 10 minute warmup, less than 100 Hz every 30 minutes thereafter

Microphone input impedance:
500–600 ohms

RECEIVER

Circuit type:
Single conversion superheterodyne (double conversion for FM, when installed)

Intermediate frequency:
8987.5 kHz (plus 455 kHz for FM)

Sensitivity:
0.3μV for 10 dB S+N/N (SSB and CW-W)
0.15μV for 10 dB S+N/N (with CW-N option)
0.7μV for 12 dB SINAD (FM, with FM option)

Image rejection:
More than 70 dB

IF rejection:
More than 50 dB

Selectivity (@ –6/–60 dB):
2.4/5 kHz for SSB, CW-W
600/1300 Hz with CW-N option
12/24 kHz with FM Unit option

Audio output:
3W (4-ohm internal speaker, @10% THD)

External speaker impedance:
4–16 ohms

Table I– The straightforward specifications for the FT-77.

Fig. 1– Block diagram for the FT-77.

These stages are shown in some detail in fig. 2. Yaesu has made various changes, compared to the FT-707, in these stages, the most significant of which was to replace the old 3SK73GR dual-MOS FET r.f. amplifier stage with a combination 2SK125 junction FET and 2SC380TM bipolar transistor stage.

The 9 MHz i.f. signal is then further amplified, and a portion is fed to the noise-blanker circuitry starting with Q2016. The noise-blanker circuitry amplifies the noise signal, detects it, and controls the operation of noise-blanker gate stage D2002-4. The signal is passed through this gate whenever a noise pulse has not switched it off. Although this circuitry is in principle the same as in the FT-707, most transistor and diode types and various time constants have been changed. Also not noticeable in fig. 1 is the fact that the noise-blanker circuitry has been provided with two selectable time constants—a narrow position for impulse noise and a wide one for over-the-horizon radar-type signals. The 9 MHz signal then proceeds to the main i.f. selectivity, the standard 2.4 kHz s.s.b. filter, or an optional 600 Hz c.w. filter. There is no passband tuning or i.f. shift in the FT-77, just the straight-forward use of the standard s.s.b. filter or selection of the optional c.w. filter. After the selectivity stage, the received i.f. signal goes on through some more i.f. amplification, a product detector, and then audio amplifier stages which can provide 3 watts (at 10% THD) maximum to the built-in speaker or to an external speaker. Again, many of the transistors and other components used have been changed in comparison to the FT-707.

In the transmit mode a d.s.b. signal is produced at the 9 MHz i.f. frequency and fed through the 2.4 kHz s.s.b. filter. The signal is then translated to the output frequency in the same double-balanced mixer stage, Q1005, used in the receive mode. After further low-level amplification it is delivered to the 100 watt PA unit. This unit is the same as is used in the FT-707 as well as in other Yaesu designs. It seems to be a very proven design, and it's an integrated package with a heatsink and a cooling fan. The cooling fan is temperature controlled and comes on automatically.

After the PA stage the output is routed through one of five low-pass filters, a directional coupler, and the antenna transfer relay. An interesting feature about the low-pass filters is that they are switched directly by the bandswitch and not via relays. There is absolutely nothing wrong with such switching, but it does mean that an operator should take care not to switch bands for some reason when in the transmit mode, or else the bandswitch contacts will suffer. The low-pass filter assembly is shown in fig. 3. The figure also shows the directional coupler. The directional coupler performs several functions. It supplies relative forward and reflected power information to the metering circuitry for s.w.r. measurement. It also supplies a control voltage to the PA stage to reduce the input power if the s.w.r. should rise above a preset point (75% of full power output is still delivered into a load presenting a 1:3 s.w.r., but with increasing s.w.r. the output power falls off very rapidly). Finally, it supplies a control voltage to an a.l.c. amplifier stage. The FT-77 does not appear to have any speech processing incorporated as such, but the a.l.c. circuitry seems to be more elaborate than in the FT-707.

The frequency control and display circuitry is much more sophisticated in the FT-77 than in the FT-707, although here again one can be fooled by a too quick glance at the circuitry. Basic tuning is still done by an analog 5.0 to 5.5 MHz variable oscillator. This signal is mixed with various crystal-controlled frequencies to produce the proper local oscillator signal for a 9 MHz i.f. However, the FT-77 has a PLL loop for which one of eight v.c.o.'s and one of ten crystal reference oscillators are selected. The output of the applicable v.c.o. is applied to the i.f. mixer stage, not to that of the crystal oscillator directly. The PLL mixer receives a portion of the signal from the v.c.o. being used and from the crystal oscillator stage, while a phase detector stage receives an output from the PLL mixer and the internal v.f.o. (or from an external v.f.o. when used). The result of all this is that the v.c.o. signal is phase locked to the v.f.o. signal and drift in any direction by the v.f.o. is cancelled. The v.f.o. circuitry itself is beautifully simple as shown in fig. 4. Provisions are made for the installation of one crystal in the 5.0 to 5.5 MHz range for fixed-frequency operation. This one crystal will allow for an output on all of the bands, but the output frequency on bands other than that for which the crystal was specifically selected will not be obvious, as one might think. For instance, if a crystal were selected for 21.2500 MHz, the output frequencies on the various other bands would be:

3.7470 MHz (LSB)	24.750 MHz
7.2470 MHz (LSB)	28.250 MHz
10.2500 MHz	28.750 MHz
14.2500 MHz	29.250 MHz
18.250 MHz	29.750 MHz

One obviously can get a lot of mileage out of one crystal, but one does have to be careful not to get into a situation where out-of-band operation is possible. It's all explained in the FT-77 manual.

The frequency display unit is driven from the PLL circuitry, and its counter has preset offests for the different modes, so the correct carrier frequency is always displayed. The display unit has its own internal time base. The six-digit display is of the green fluorescent type and is very easy to read. Besides the frequency display, the display area also includes **VFO-A**, **VFO-B**, and **F** symbols to indicate whether the internal v.f.o., external v.f.o., or fixed crystal is being used. The display does not follow the **RIT** control setting in the receive mode.

Test Results

Most of the claimed specifications for the FT-77 are conservative. The power output averaged about 110 watts on all bands, falling to about 90 watts at the high end of 10 meters. IMD products were about −30 dB at full power input. Unwanted sideband suppression, spurious radiation, and carrier suppression figures were all around −45 to −50 dB. The harmonic attenuation on some of the lower frequency bands was better than 60 dB, and never less than about −45 dB. No sophisticated measurements were made of receiver performance, since most amateurs probably would not be buying an FT-77 based on such specifications. Sensitivity figures were better than those specified, ranging around 0.4 uv for 20 dB S + N/N ratio on s.s.b. The only specification that could not be verified was an image rejection of 70 dB. No more than 50 dB could be measured on 10 meters, and this is in line with that achievable by most single conversion designs with a 9 MHz i.f. In reality, 50 dB is

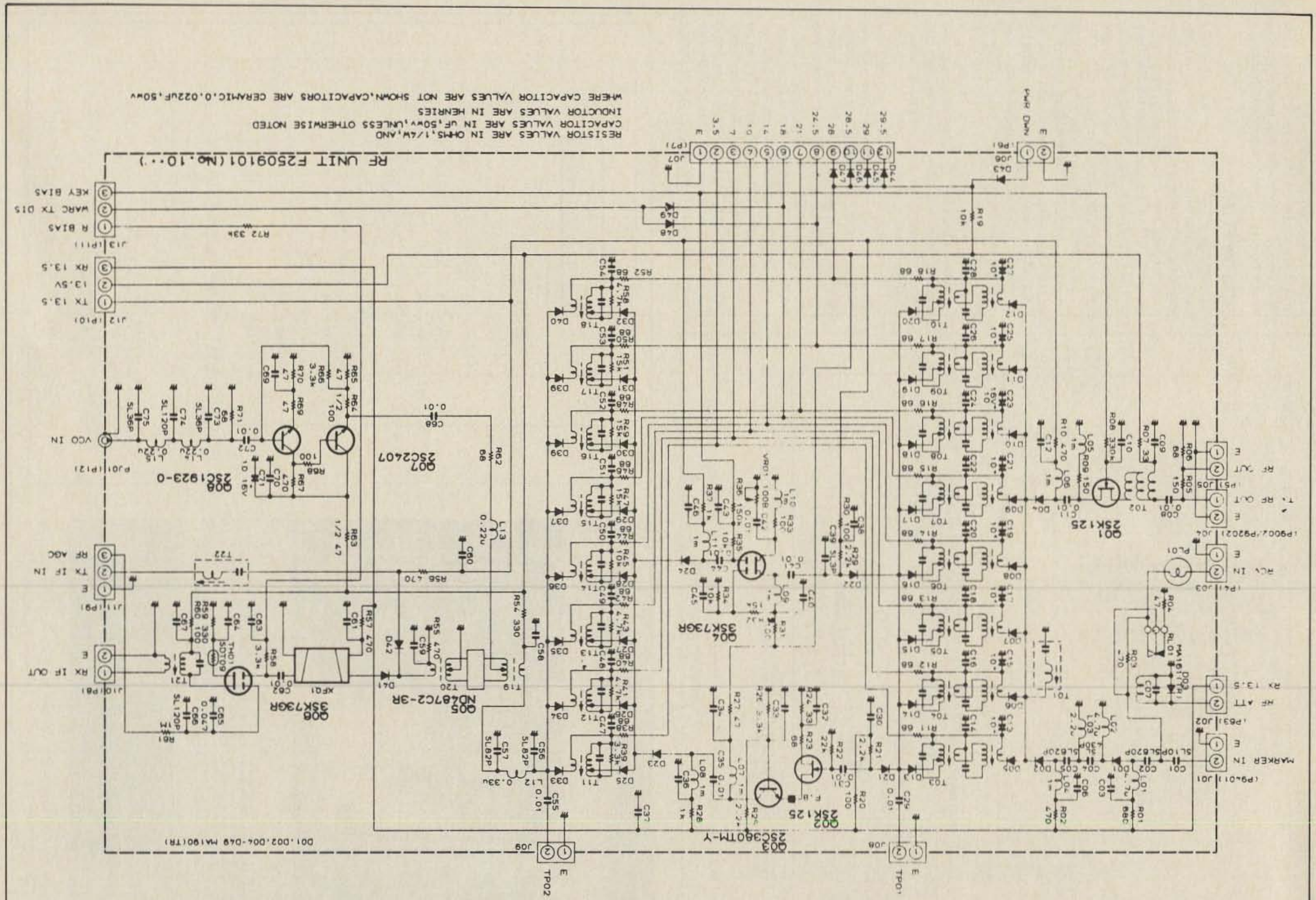


Fig. 2– The "front end" of the FT-77. The 3SK73GR stage is not the receive r.f. preamplifier as one might imagine. It is a buffer stage for the transmit signal chain.

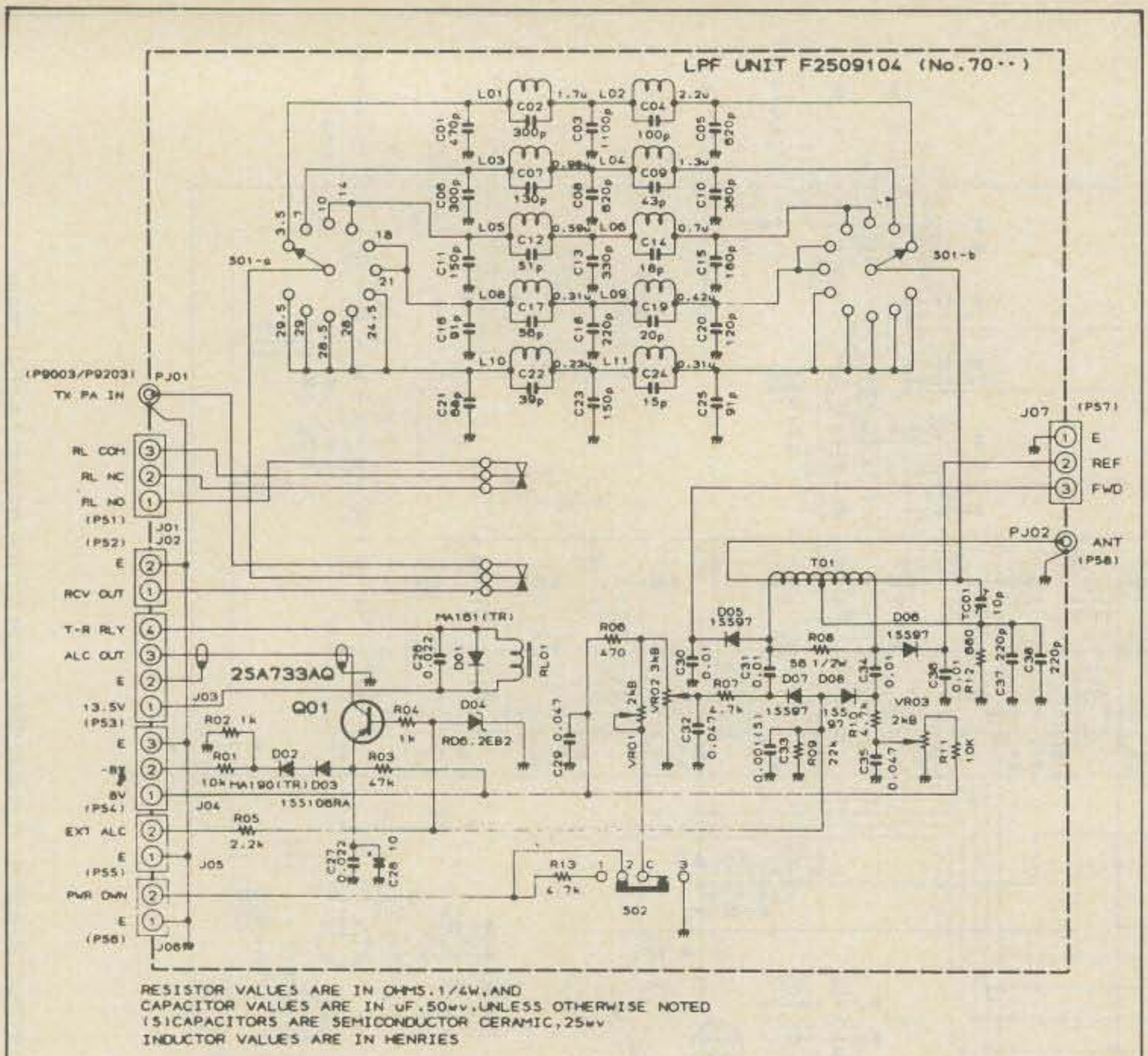


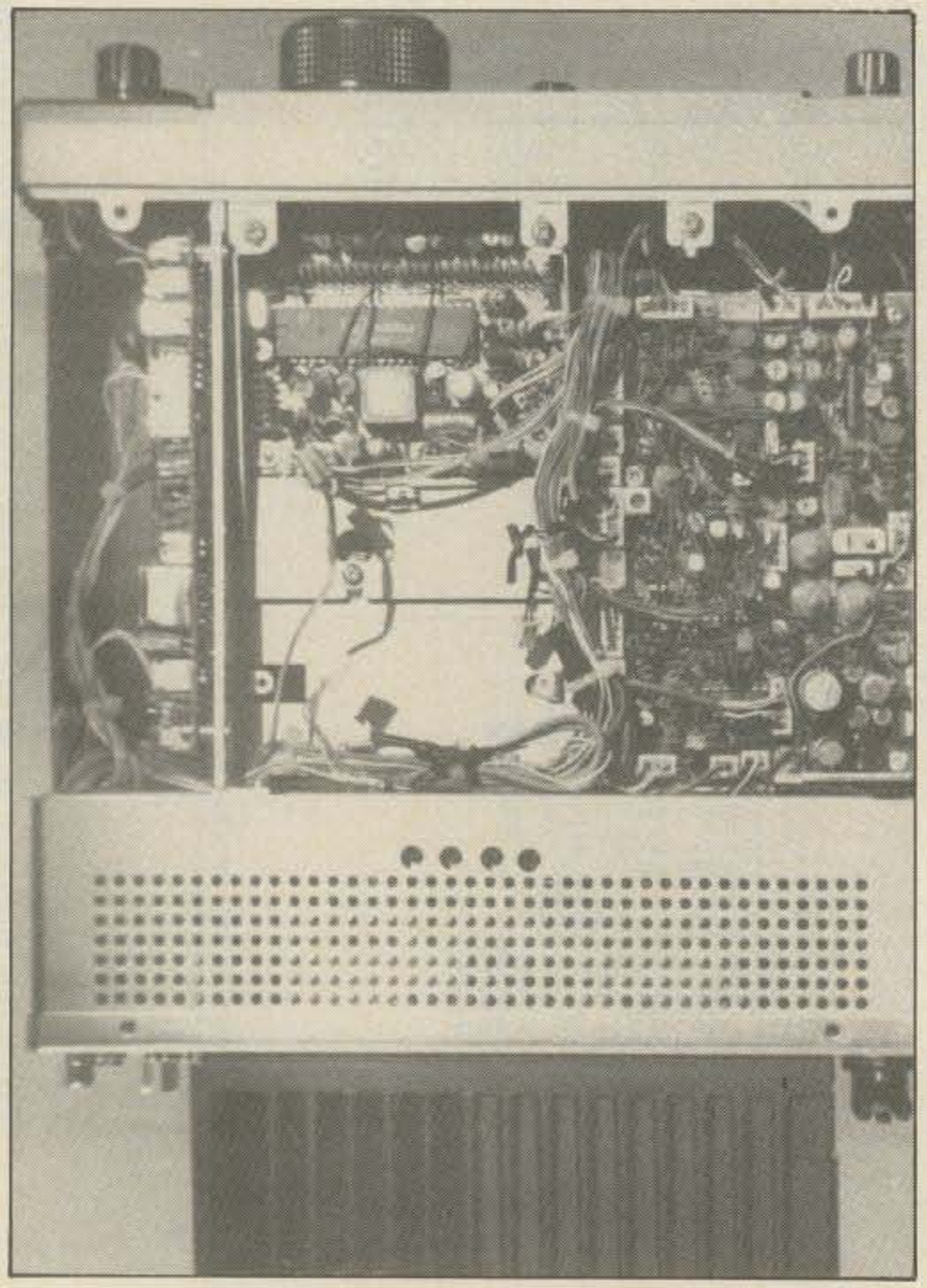
Fig. 3– The bandswitch in the FT-77 switches the PA output lowpass filters directly instead of having relays do the job.

a quite respectable figure for 10 meters, and the difference between 50 and 70 dB will not mean much under most practical operating situations on 10 meters, especially mobile.

Using the FT-77

Using the FT-77 is just about simplicity itself. If the antenna load is known and reasonably matched, there is nothing more to do on s.s.b. except set the operating frequency, close the PTT circuit, and adjust the **Mic/Drive** control so the meter indicates within the a.l.c. range as one modulates the transceiver. There is no VOX circuitry; operation is strictly PTT. On c.w. operation is equally as simple. Under key-down conditions the **Mic/Drive** control is set such that the a.l.c. indication on the meter is just at the upper edge of the a.l.c. zone indicator (for full power output), and the transceiver is ready for operation. Sidetone as well as a delay feature for semi-break-in are built-in. Two controls in a recessed panel on top of the transceiver are available to adjust the *sidetone level* and *delay time* after the last keyed character before the transceiver switches to the receive mode.

If an antenna tuner has to be adjusted for minimum s.w.r., one simply has to reduce the **Mic/Drive** control to minimum, set the operating mode to **CW,** and close the PTT line or key-down the transceiver (the PTT line and key line are the same circuit), and then slowly increase the **Mic/Drive** level as the antenna tuner is adjusted. The s.w.r. meter in an antenna tuner or the s.w.r. reading circuitry in the FT-77 can be used to make the adjustment. The only slightly awkward thing about using the s.w.r. feature in the FT-77 is that the switch that changes the meter indication from a.l.c. to s.w.r. during



A look inside the FT-77 reveals a "busy" but not over-crowded layout. The v.f.o. unit and PA unit are shielded separately.

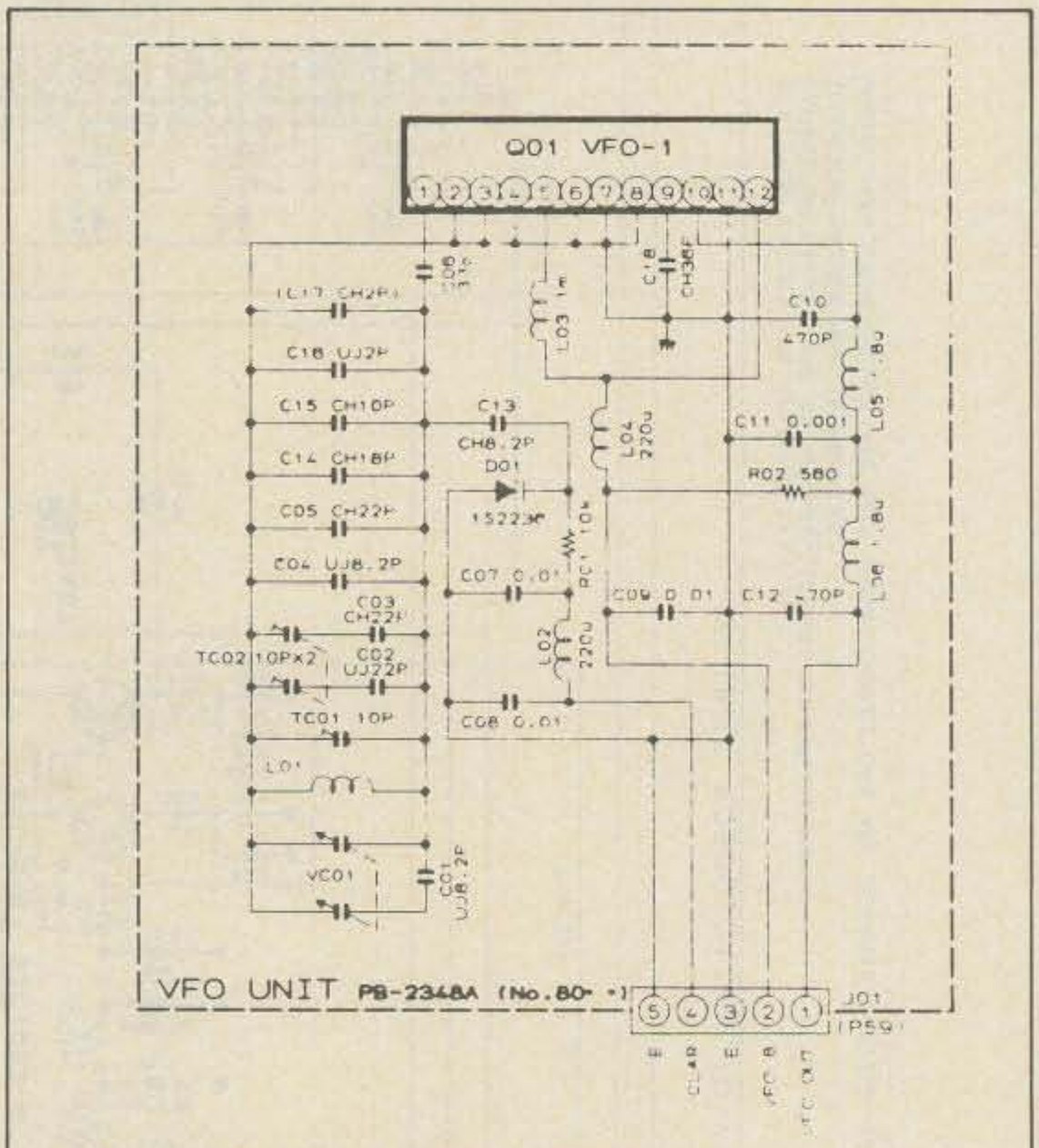
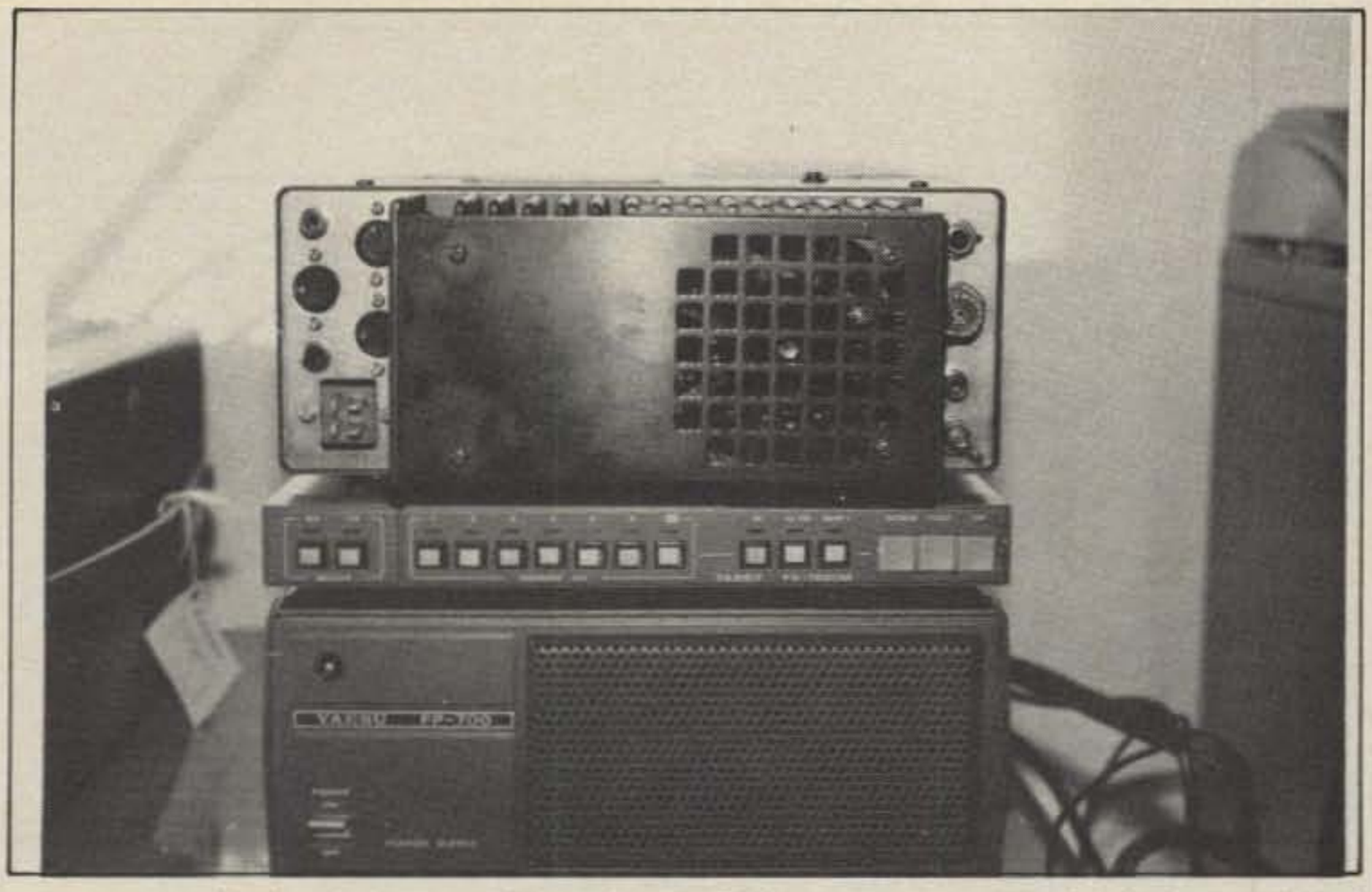


Fig. 4– The elegantly simple analog 5 MHz v.f.o. in the FT-77.



The back panel looks simple enough, but the use of DIN connectors allows for the connection of many accessories.

transmit is located under the recessed panel on top of the transceiver. Therefore, one has to access the switch twice during the tune-up/operation sequence, a chore which might be a bit awkward in a mobile or portable installation. The situation can easily be corrected by those who are a bit handy with circuitry wiring. One of the front-panel switches for an unused accessory item (e.g., the marker option) could be used to switch the meter between its a.l.c. and s.w.r. reflected power functions.

The "feel" of the main tuning knob is excellent. The knob itself is about 1 inch deep and has a rubberized finish for a very comfortable yet firm feel. It covers about 18 kHz/revolution, which is a good compromise for s.s.b. tuning and even c.w. tuning using the optional 600 Hz c.w. filter. The frequency display is very comfortable to view either under bright or dim ambient light conditions. It does not have the "glare" that sometimes is associated with LED readouts. The frequency display is very stable except when the 100 Hz digit is just set on the fringe between 100 Hz digits. At some times a bit of flickering back and forth was observed when, for instance, the display couldn't decide whether to display 28.547.5 or 28.547.6 MHz.

All of the rest of the front-panel controls respond very smoothly. The **Clarifier** (RIT) control covers about ±2.5 kHz, and a red LED indicator signals that it is in use. Another red LED indicator signals when the 20 dB attenuator has been switched in the receive antenna line. The noise blanker on/off switch is on the front panel, while the selector switch for wide/narrow operation is under the recessed top cover. The separation of these two switches did not pose any inconvenience. The noise blanker always provided positive action against impulse noise in its narrow position and variable results against over-the-horizon radar signals in its wide position. Sometimes it was extremely effective against the radar signals (reducing an S9 signal to S1), and at other times it didn't seem to react to such signals at all.

The **CW-W** position on the mode switch means nothing more than the standard s.s.b. filter. The **CW-N** position selects the optional 600 Hz c.w. filter. This filter is nicely shaped with a 600/1300 Hz bandwidth at −6/−60 dB and fits very well with the fixed main tuning rate. Although there is no r.f. gain on the FT-77, c.w. operation using the 600 Hz filter proved to be very pleasant using the selectable fast a.g.c. action. By proper setting of the c.w. delay control, almost any c.w. operator, except those who demand high-speed full QSK, should be satisfied with the break-in action. The keying waveform rise/fall times were not measured, but monitoring of the keying indicated it was very clean with being just the slightest bit on the "soft" side.

Received s.s.b. audio was very clear using either the built-in speaker or the speaker in the FP-700 a.c. power supply. Reports on the transmitted audio using the MH-1 microphone supplied with the FT-77 were always favorable. Some stations, in fact, inquired as to whether any particular form of speech processing was being used because of the clear, "punchy" audio.

Accessory Provisions/Options

Although the back panel of the FT-77 is covered 80% by the PA heatsink, Yaesu did fit in very nicely a variety of connectors for various external accessories and options. There is a six-pin DIN connector dedicated to the switching and a.l.c. connections needed when using a phone patch or linear amplifier. An eight-pin DIN jack accepts the output of and provides regulated power for an external v.f.o. Still another seven-pin DIN jack is meant for interconnection with the optional FV-700 DM or FV-707 DM v.f.o.'s if one desires the frequency scanning/memory features provided by those units. Those connections are in addition to the usual ones for r.f. output, external speaker, d.c. input, ground, key, and low-power output (approximately 1 milliwatt) for a transverter.

The internal options for the FT-77 are the narrow c.w. filter, an f.m. unit, and a Marker unit. The narrow c.w. filter was mentioned before and is a highly effective unit. The f.m. unit installs directly in the FT-77 using the cable assemblies supplied with it. When it is installed and the mode switch on the FT-77 set

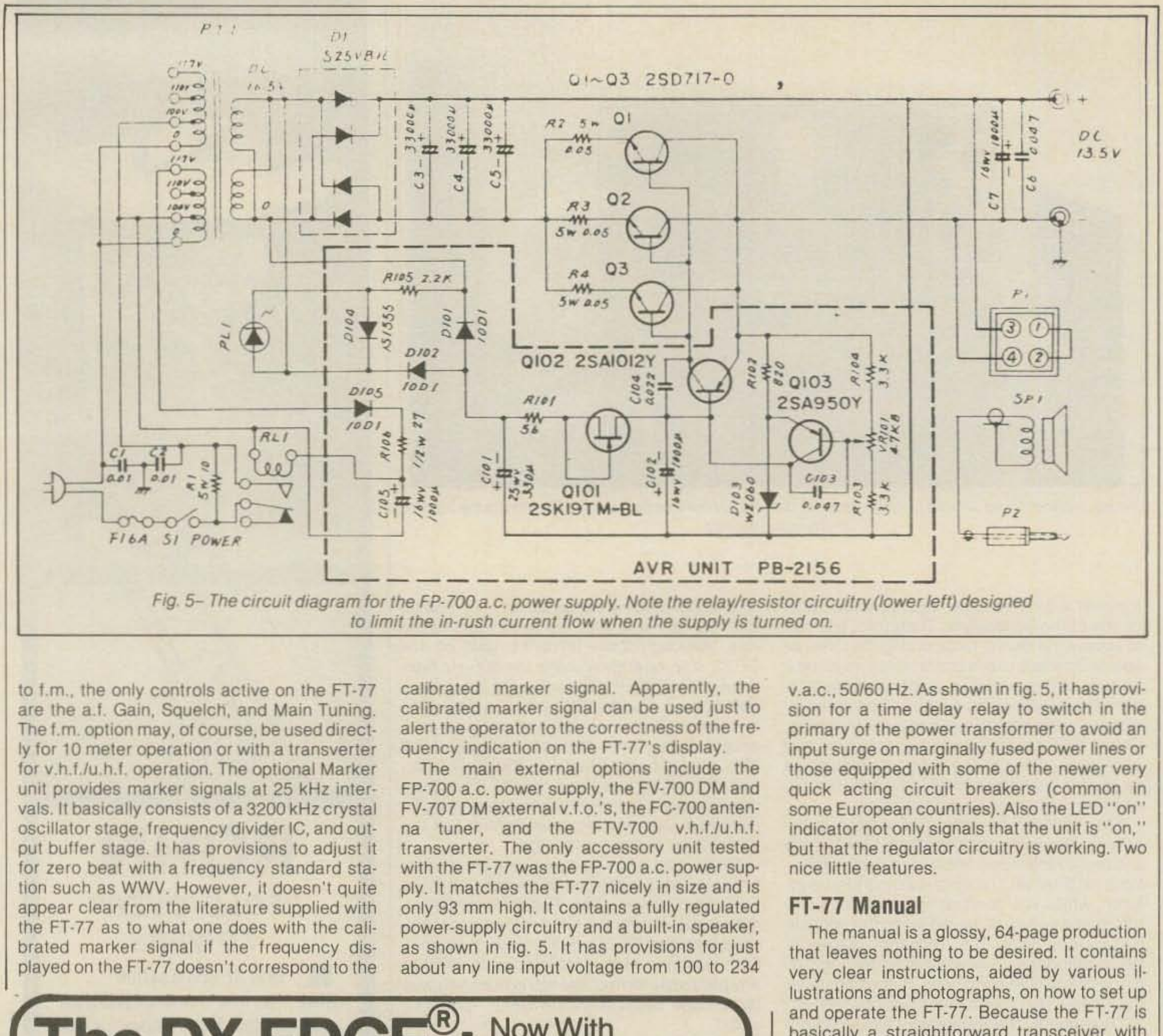


Fig. 5– The circuit diagram for the FP-700 a.c. power supply. Note the relay/resistor circuitry (lower left) designed to limit the in-rush current flow when the supply is turned on.

to f.m., the only controls active on the FT-77 are the a.f. Gain, Squelch, and Main Tuning. The f.m. option may, of course, be used directly for 10 meter operation or with a transverter for v.h.f./u.h.f. operation. The optional Marker unit provides marker signals at 25 kHz intervals. It basically consists of a 3200 kHz crystal oscillator stage, frequency divider IC, and output buffer stage. It has provisions to adjust it for zero beat with a frequency standard station such as WWV. However, it doesn't quite appear clear from the literature supplied with the FT-77 as to what one does with the calibrated marker signal if the frequency displayed on the FT-77 doesn't correspond to the calibrated marker signal. Apparently, the calibrated marker signal can be used just to alert the operator to the correctness of the frequency indication on the FT-77's display.

The main external options include the FP-700 a.c. power supply, the FV-700 DM and FV-707 DM external v.f.o.'s, the FC-700 antenna tuner, and the FTV-700 v.h.f./u.h.f. transverter. The only accessory unit tested with the FT-77 was the FP-700 a.c. power supply. It matches the FT-77 nicely in size and is only 93 mm high. It contains a fully regulated power-supply circuitry and a built-in speaker, as shown in fig. 5. It has provisions for just about any line input voltage from 100 to 234 v.a.c., 50/60 Hz. As shown in fig. 5, it has provision for a time delay relay to switch in the primary of the power transformer to avoid an input surge on marginally fused power lines or those equipped with some of the newer very quick acting circuit breakers (common in some European countries). Also the LED "on" indicator not only signals that the unit is "on," but that the regulator circuitry is working. Two nice little features.

FT-77 Manual

The manual is a glossy, 64-page production that leaves nothing to be desired. It contains very clear instructions, aided by various illustrations and photographs, on how to set up and operate the FT-77. Because the FT-77 is basically a straightforward transceiver with regard to its circuitry, the manual also provides complete service and alignment information. There are detailed diagrams and photographs (for parts layout) of every PC board. There is also a complete parts list giving the Yaesu part number and commercial equivalent, except in the case of a few custom IC's.

Summary

The FT-77 is a dandy little transceiver and a delight to use. It has one or two minor convenience faults, in my strictly personal opinion, but none of them detract from the operating quality of the unit. It is very ruggedly constructed, and one would have to rate it as a prime choice for someone who wants a top-performing mobile or portable unit or a starter-type home station unit, without a lot of "bells and whistles," at a modest price.

Numerous accessory items (FC-700 antenna tuner, MD-1 microphone, FV-700DM digital v.f.o., and the FTV-707 2 meter transverter) were only made available after this article was finished. They will be covered in a follow-up article which should be of general interest, since only the FV-700DM is a dedicated accessory for the FT-77.) CQ

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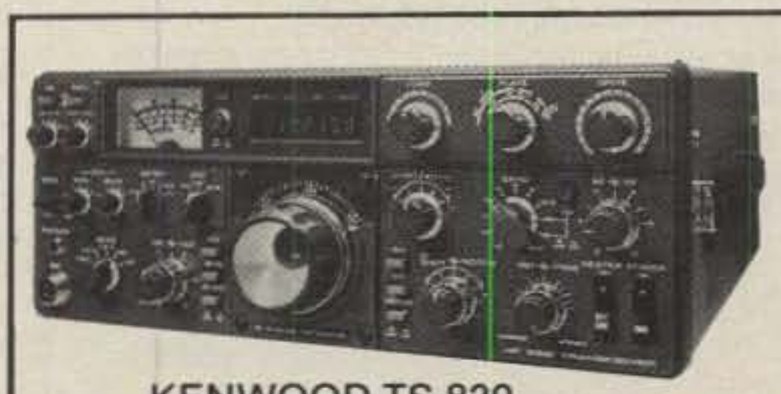

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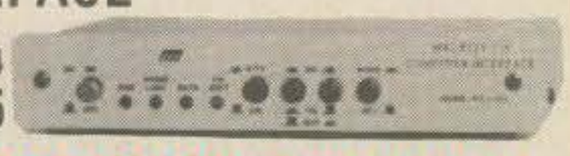

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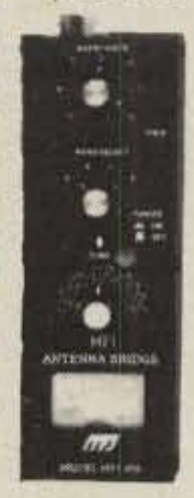

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Sometimes the solution to a problem is simple. KA9CAP came up with an idea to increase his enjoyment of computers and RTTY with this simple modification.

How To Modify The HAL ST-6 For RS-232 I/O

BY RON BERKMAN*, KA9CAP

This article was written as a direct result of a need to modify a HAL ST-6 for use with RS-232 from a TRS-80 Model III. Our goal was to key the Audio Generator Board in the ST-6 directly, and to obtain received data from the ST-6 to be used by the TRS-80 Model III so that WD9DKV and I could interchange programs over a path of about 30 miles between our QTH's. We were both using a program called "MODEM80" acquired through the Alternate Source. This program is intended for use with computers in the ASCII mode only using land-line modems. Due to the limitations of the ST-6 having the ability to produce and receive only standard RTTY tones, we restricted our operation to 110 baud ASCII. (See the article in the November 1982 edition of *CQ* pp. 42–48 about use of different tone pairs for high-speed data transfer.)

Leading up to our venture, WD9DKV received a TRS-80 Model III from his wife so that he could use it for business purposes and RTTY work. We did some searching around and finally found a program called "Contact 80" from Royal, which comes with a little black box that hooks to the bus on the bottom of the Model III. This little black box provides for both RTTY and c.w. connections to the amateur gear, but it needs a good terminal unit to work with RTTY. I went to the Peoria, Illinois "Superfest" and found the ST-6 at a reasonable price. The ST-6 was felt to be the most desirable used gear due to its excellent filters for use in the h.f. bands where there is crowding, QRM, and QRN. We tried using the TRS-80, "Contact 80," and the ST-6 for some program transfers, but we were not satisfied with the results. We decided to use the other program for the transfers, but this necessitated modification of the ST-6 for use with the RS-232 I/O from the Model III.

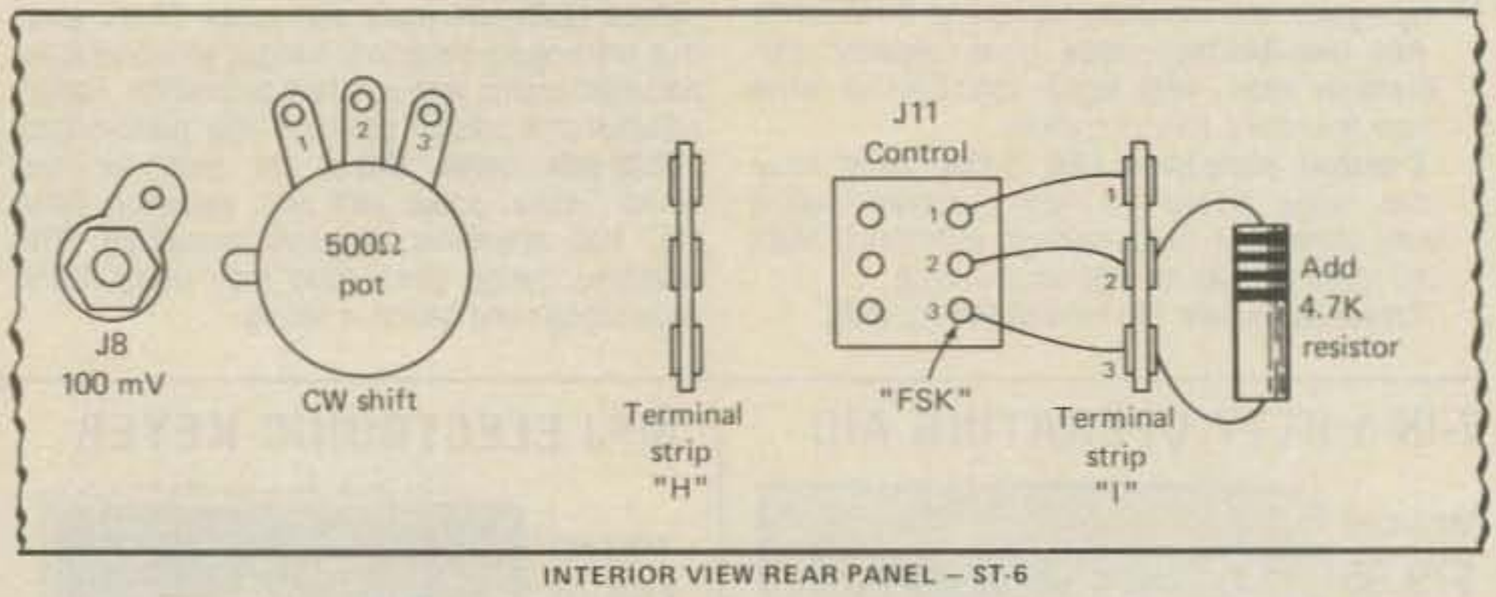

Fig. 1– Interior drawing of the ST-6 rear panel as seen from the inside. This shows the location of Terminal Strip "I" and the 4.7K resistor.

It turned out that the conversion was very simple, as the ST-6 uses a compatible circuit in it to key the Audio Generator Board and it already has an almost compatible RS-232 output called "FSK" which we could use to output to the TRS-80 Model III for receiving purposes.

We consulted with the friendly staff at HAL on the value of the resistor to be added and then acquired the needed parts and set a date for doing the work on the ST-6. Following is the procedure to use.

The first step is to remove the top cover of the ST-6. You will then be able to see all the circuit boards and wiring of the unit. It looks complicated, but it is laid out with lots of space in which to work.

The next step is to locate Terminal Strip "I" on the back panel of the ST-6. If you have the instruction manual for the ST-6 available, this will be an easy matter. If not, I would suggest contacting HAL for a copy. If you want to take your chances, then continue on! I have provided a rough drawing in fig. 1 to give you the location of the desired Terminal Strip "I." It is located (as viewed from the front inside) immediately to the right of the 6-pin molex connector marked "Control." The goal here is to solder a 4.7K, ½ watt resistor from the center lug on Terminal Strip "I" to the bottom lug. The manual shows this as lug 2 to lug 3. This is to prevent the higher voltage of the circuit in the ST-6 from doing any damage to your RS-232 board in the TRS-80.

Now you have to have something handy to allow you to use RS-232 without a lot of hassle. The little black box with "Contact 80" is connected to the bus of the TRS-80 and not to the RS-232 plug. In our case we decided to use a stereo plug and jack in the front panel to allow easy connection to the circuits of the ST-6. The TRS-80 Model III has a DB-25 female connector on the bottom to access the RS-232. That means that all you really need is a two-conductor shielded cable to run between the TRS-80 and the ST-6, with a stereo plug on one end and a DB-25 plug (male) on the other end! (See fig. 2.)

*1003 S. Philo Rd., Urbana, IL 61801

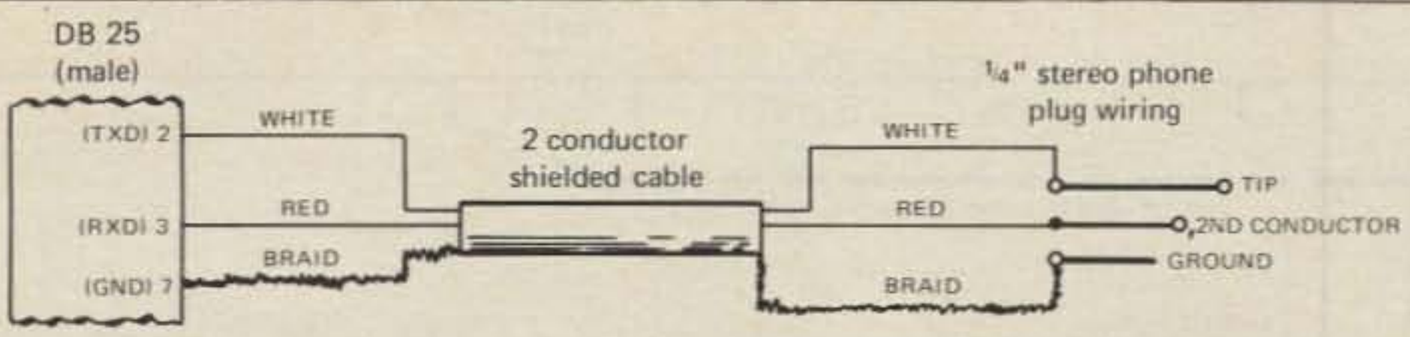

Fig. 2– Cable diagram for connecting the Radio Shack TRS-80 Model III to the HAL ST-6.

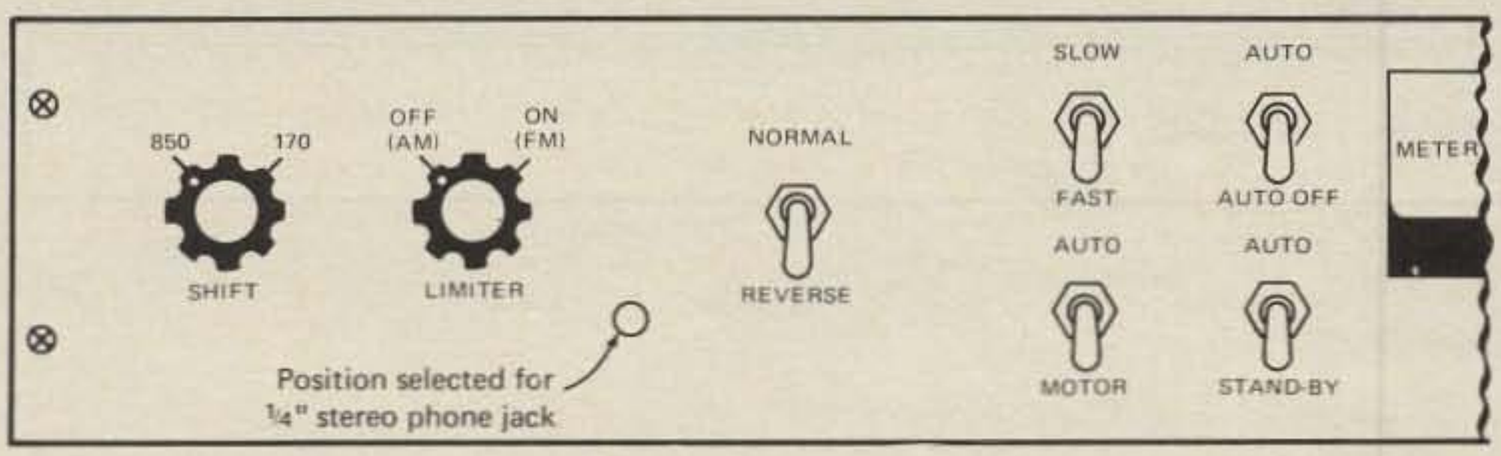

Fig. 3– Front-panel drawing of the ST-6 showing the location of the stereo jack.

Obviously, a hole in the front panel must be cut, so in our case we looked it over and found the most room to work between the **Limiter** knob and the **Normal/Reverse** switch in line with the lower bank of switches under and to the left of the meter (as viewed from the front—see fig. 3). You might want to locate your jack in a position different from the one that we used, so look around, find your spot, and drill the ⅜" hole for the ¼" stereo jack. Note that this jack has to have a normally closed contact arrangement to allow internal keying to occur without the stereo phone plug in the jack! Make sure you leave enough room to do some soldering, etc. Cover components, etc., with a rag to catch shavings from the drilling operations. After removing burrs and any paint around the hole on the inside of the front panel, install the stereo jack with the lugs in a convenient position for soldering work.

In our case we used single-conductor shielded cable to run from Terminal Strip "I" to the stereo jack (see fig. 4[A]). We routed it along the same path that other cables used around the upper edge of the case and routed it to the jack. The braid was connected to the middle lug (lug 2) of Terminal Strip "I," and the center conductor was connected to the bottom lug of Terminal Strip "I" (lug 3). At the stereo jack end we connected the center conductor to the *second* conductor lug and the braid to the ground lug (see fig. 4[B]).

Now we come to the most difficult part. Locate the wire that is connected from lug 6 of the edge connector (located at the far left as viewed from the front) for the AK-1 or XTL-1 Audio Generator Board to lug "B" of the edge connector located closest to the power supply on the right-hand side (i.e., the last one to the right as viewed from the front). Lug "B" is the second lug from the bottom of the edge connector (see fig. 5). Once this wire is found, disconnect it from lug 6 of the far left edge connector by heating the solder with a *small* soldering iron with a *small* tip that is capable of reaching into the tight space involved without burning other wires, etc. Cut and solder the loose end of the wire you just disconnected to the *normally closed* circuit lug on the stereo jack (see fig. 4[B]). Now cut a piece of wire of similar size to that in ST-6 and bare the ends to about ¼" and tin them. The length of the wire should be "cut and tried" to go

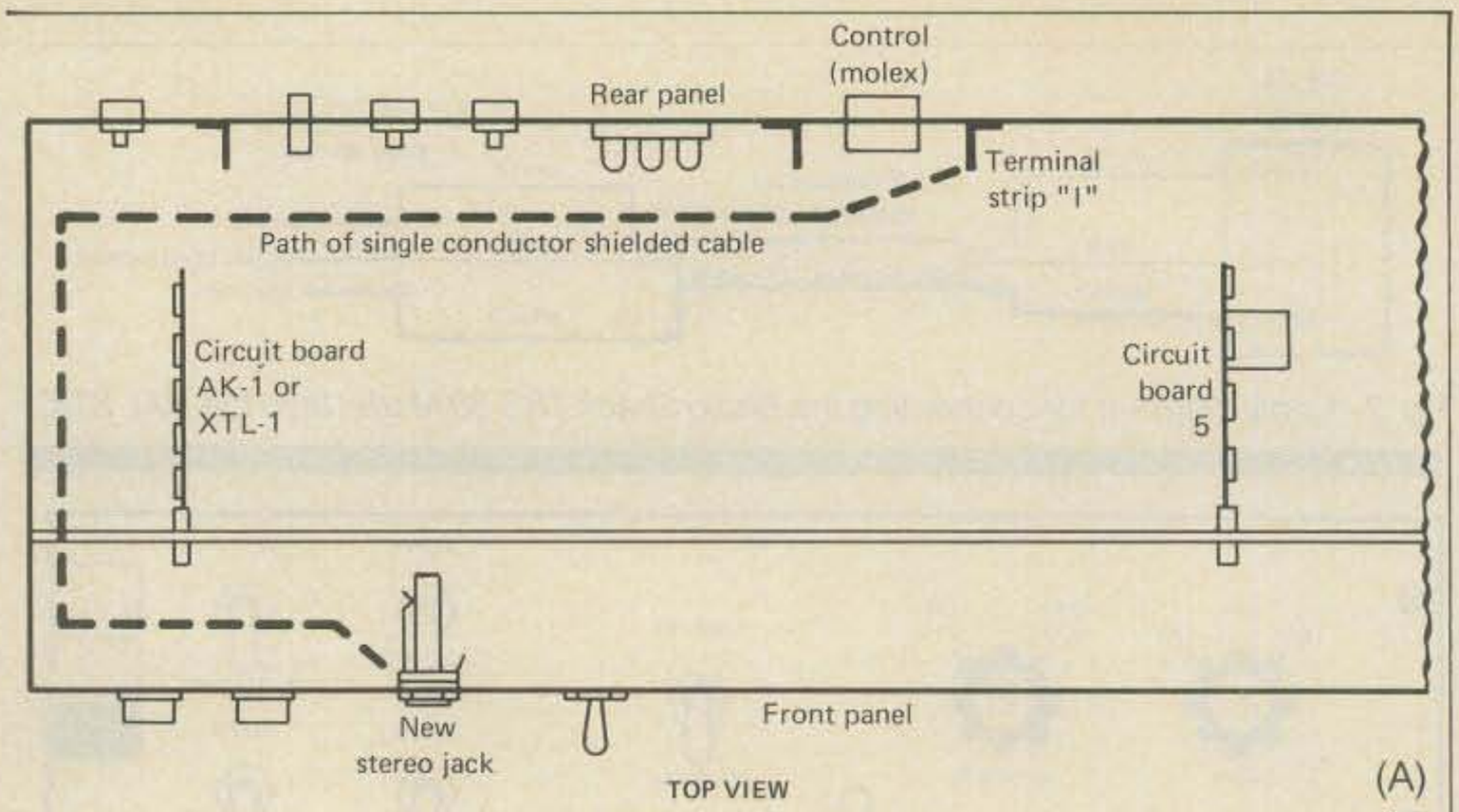

Fig. 4– (A) This interior drawing shows the routing of the new cable from the stereo jack to Terminal Strip "1" in relation to other major components. (B) Cable connection details.

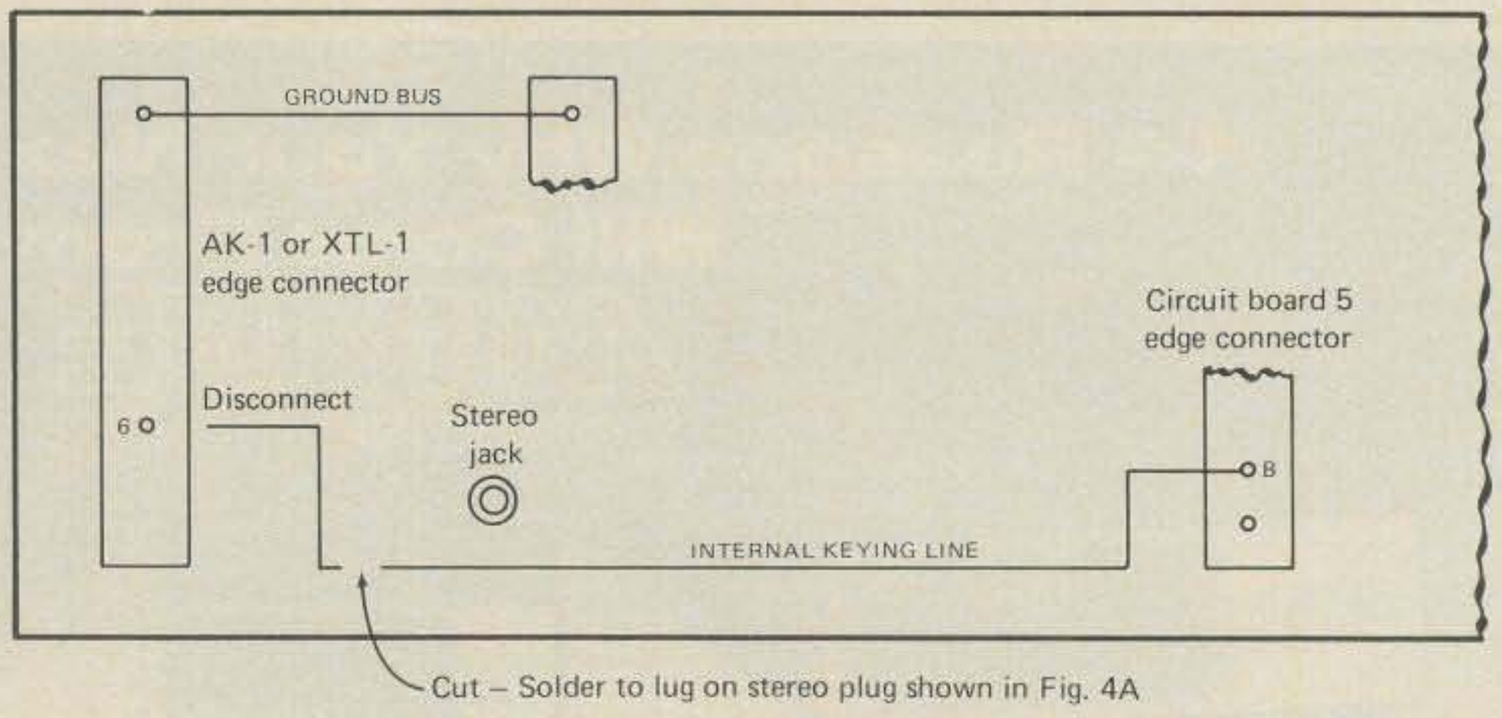

Fig. 5– This drawing shows the location of the internal keying line to pin 6 of AK-1 or XTL-1 which must be connected to the stereo jack as shown in fig. 4(B).

from lug 6 of the edge connector on the far left to the *tip connection* of the stereo jack. Cut a piece of wire to go from the ground lug of the stereo jack to a convenient ground on the ST-6 such as lug 12 (top lug—see fig. 5) on the most convenient edge connector near the stereo jack. This completes the wiring and installation inside the case!

If you have already prepared your cable from the TRS-80 to the ST-6 as previously described, then you are ready to plug in and test the unit. I had my HAL MPT-3100 set on 110 baud ASCII at home with the Mailbox (MSO) "on" so that we could run a test of the new installation. We loaded the communications program in the TRS-80 and plugged in the stereo plug. Since the communications program which is not intended for amateur work does not have a key-operated switch (KOS), we had to turn on the transmitter by hand. After sending the command to activate the MSO, it came on, and we worked with the system for a while to make sure it was operating properly. It was, so we put the cover back on the ST-6 and it has been working fine ever since.

Good luck! Happy computing and communicating over the air! CQ

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Reconditioning early s.s.b. transceivers can be enjoyable and useful. Here's a guided approach that can be applied to many of these now classic units.

The Restoration of a Classic

BY DAVE INGRAM*, K4TWJ

As you probably have noticed in daily activities, there's a present and popular trend of restoring and occasionally using various classic items from not too remote past times. One commonly recognized example of this interest involves restoring and/or maintaining autos of the 1950s such as MG-TDs, early model Corvettes, Ford "Vickeys," etc. Considering the financial investments such autos often reflect and the amount of work required outdoors, however, enjoying such vehicles on a daily basis can prove a mite discouraging. As radio amateurs our situation is somewhat more flexible and attractive. We can rather easily secure an appealing and/or classic rig from a previous era, refurbish it to like new, and then enjoy it to our heart's content.

What are some of the driving forces that might inspire one to revitalize some special unit from a prior decade? Maybe it's nostalgic interest or appreciation for the qualities of yesteryear, or possibly it's the sheer enjoyment of finally using that special rig which was just beyond financial reach when it was first introduced. Old man time is, indeed, a price leveler.

While vintage gear such as that from the 1930s initially may seem appealing, its capabilities on today's bands are somewhat limited. Receiver selectivity and sensitivity are minimal, and transmitter operation is usually restricted to c.w. on lower frequencies. Progressing forward a couple of decades, however, we find the warm and glamorous era of tube rigs with both s.s.b. and c.w. capabilities. Compact amateur transceivers began to hit the market during 1957, and several of them gained widespread popularity, introducing many amateurs to "armchair s.s.b." The first of these transceivers was the Collins KWM-1. Later transceivers included the Sideband Engineers SB33, National's NCX-3, Drake's TR-3, and the Galaxy III. While each of these units might be considered a modern-day classic destined to become a collectible, the KWM-1 holds precedence as being the first true compact s.s.b./c.w. transceiver,

The classic Collins KWM-1 restored and ready for action at K4TWJ's QTH. Rig is placed atop other gear for both ventilation and beauty.

plus it can be used on upcoming 12 and 17 meter WARC bands as easily as it was used on 20, 15, and 10 meters 27 years ago. Personally, the KWM-1 was my dream rig when I was first licensed in 1957. It could hardly have been purchased at that time with profits from a $7.00 a week paper route.

Profile: The Collins KWM-1

The KWM-1 was manufactured as a triband transceiver covering the 20, 15, and 10 meter bands, and it boasted a frequency operating concept that was slightly ahead of its time. The front-panel exciter tune control is frequency calibrated from 14 to 30 MHz and mechanically ganged to the receiver's r.f. amplifier, the transmitter's driver, and the heterodyne oscillator. Any 100 kHz range between 14 and 30 MHz thus can be operated on both transmit and receive by simply adding an appropriate frequency crystal and tuning to the desired range. The final amplifier features dual roller coils in a Pi-L setup for resonating the 6146s tank circuit at the desired operating frequency. Those front-panel controls are also directly calibrated in MHz for tuning ease. Since the rig's "bandswitch" merely selects heterodyne oscillator crystals, it's almost ready for the 12 and 17 meter WARC bands. Simply insert the proper frequency crystal and "load up" (operating frequency = 2 × crystal frequency – 4 MHz. Example: 18.0 MHz = 11.000 × 2 = 22.000 – 4.000).

Although the KWM-1 doesn't contain all the bells and whistles of many modern rigs, it is an outstanding unit for casual operation on today's bands. The transceiver isn't cold or blank; it has personality and class. Its all vacuum-tube circuitry and 3.1 kHz mechanical filter produce beautiful audio on both transmit and receive, and its coated metal knobs become pleasantly warm after an hour's operation. Looking inside while operating in a dimly illuminated room, the rig's 24 soft-glowing tubes resemble a starlit sky on a clear summer's eve. The resulting impressions could easily set one scurrying to save such beautiful rigs from full extinction!

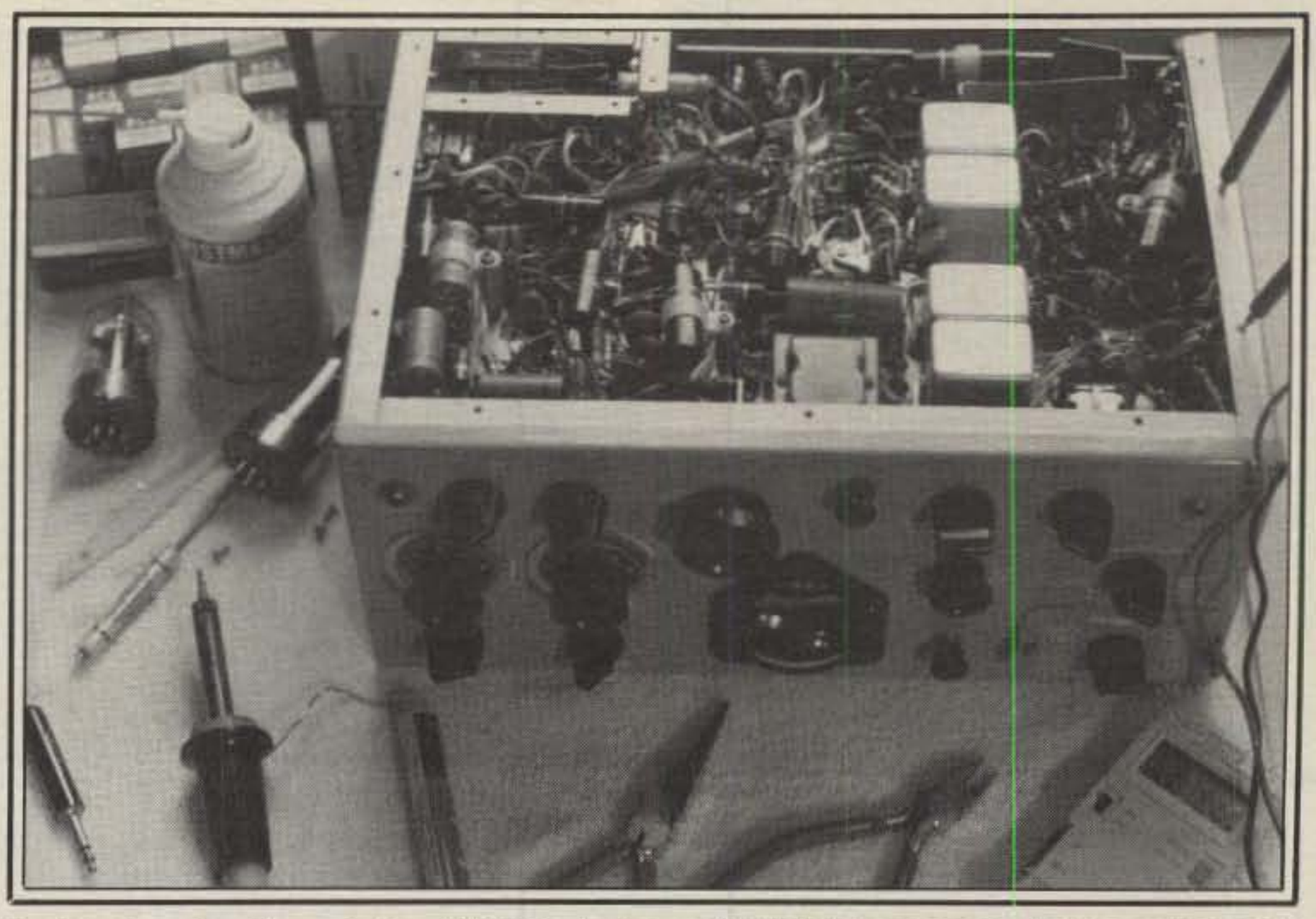
The Reconditioning

Procedures and involvement levels for refurbishing older gear, like on-the-air operating techniques, vary widely among amateurs. While some dedicated individuals prefer sandblasting a chassis they've previously stripped clean and then reinstalling new parts and wires, oth-

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

ers merely install new tubes and clean the rig's cabinet. Since my KWM-1 was purchased in comparatively good condition, I used a happy medium approach to reworking—along with a self-promise to delve much further after operating the rig and exchanging notes with others interested in similar units. My methods can be used successfully with almost any rig.

The rig's manual was first studied from cover to cover and a decade of local library *QSTs* were reviewed for KWM-1 notes. Next, the rig was checked for receiver performance sensitivity and frequency stability/calibration. A second transceiver was "Tee connected" with the KWM-1 and antenna (both transmit keyers disabled!), and both were tuned to the 14.100 MHz beacon network for those checks (that network was recently described in our *CQ* World of Ideas column). Transmitter quality/output on each band was checked next, and then all measurements were logged for later comparison. Listening closely to the KWM-1's transmitted signal on an in-shack receiver revealed a very minute amount of "hash," which was traced and cleared by replacing diodes and filter capacitors in the bias power supply and resoldering a couple of frayed shields on relay cables. All relays were then cleaned with a high-quality spray which wouldn't harm plastic. Several "questionable looking" paper bypass capacitors were replaced to avoid any unnoticed or future problems (paper and electrolytic capacitors tend to dry out over the years and "set in" at lower working voltages. Capacity drops, plus they become susceptible to breakdown. An ounce of prevention is always worthwhile.).



Under-chassis view of the KWM-1 during refurbishing process. Loose wires and braids were resoldered, questionable capacitors were replaced, etc. Canned air obtained from a photo supply store assisted in the cleaning. Note the towel below the rig to protect the cabinet's highly waxed finish.

Since the rig's mic cartridge was ruined and I lacked a small impedance matching transformer for mating with a Heil HC-3 replacement element (a superb-sounding cartridge), I elected to use a classic D-104 mic. Its slightly tinny sound was

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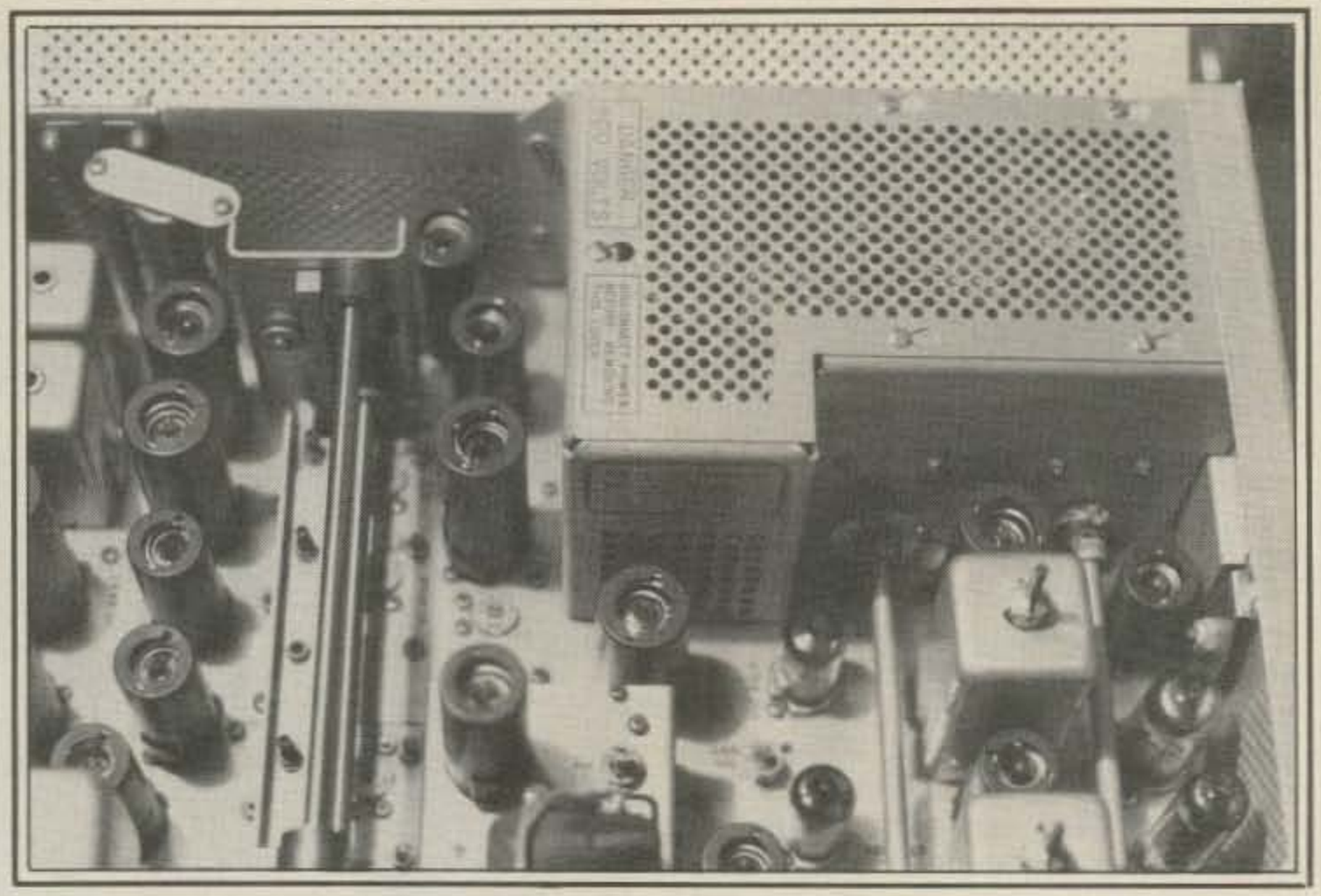

Inside view of the refurbished KWM-1 reveals a clean, neat layout that's easy to work with and handle. During operation the tubes' warm glow resembles a starlit night.

"equalized" for truly sparkling audio by barely "rolling off" some of its high frequencies to ground. A .07 mF capacitor and 500K pot were series-connected between the element's "hot lead" and ground, and then adjusted while constantly monitoring the transmitted signal on an auxilliary transceiver.

The KWM-1 was placed on the air at that point, and consequent rig discussion brought some interesting returns. As one example, we met W6CC, the owner of three (!) reconditioned KWM-1s. Norm's insight on alignment and neutralization techniques was invaluable (how to rebuild stuck trimmers, how to use a driver tube with a clipped filament pin to simplify neutralizing, etc.). Learning from old timers who were "down the path" several years earlier is definitely an asset that must not be overlooked! With smooth operation confirmed, the advanced refurbishing began.

All of the rig's tubes were replaced with new RCAs or Sylvanias, but the move was broken into several logical steps. The transmitter section from mic input up to final driver was first "retubed" and rechecked for proper operation. Similar steps followed for the receiver's audio and i.f. stages, then all control stages, oscillators, receiver "front end," and concluded with a new driver and 6146B's. Although new idiosyncracies occasionally surfaced (such as unstable a.l.c. and microphonic receiver), the stepped retubing permitted immediate trouble spotting without searching through the complete transceiver. The rig was next realigned by following the manual's instructions. As an early precaution, however, each trimmer capacitor and potentiometer was position marked for "return to before" if problems developed.

Finally, the KWM-1 was given a suitable cleaning inside and out. A soft-hair brush removed loose dust, and then a box of Q-tips moistened in denatured alcohol followed. The brush was use again, and then compressed air was used to blow out the remaining trash. All panel knobs were removed and cleaned or replaced, and both cabinet and knobs were beautifully waxed with a high-grade auto polish. *Viva la difference!*

The Results

The reconditioned KWM-1 was placed on the air and checked against originally logged measurements with very gratifying results. Receiver performance was noticeably improved, and transmitter output measured 110 watts. The interesting point was that only basic amateur test equipment had been used in the refurbishing. Almost anyone thus could achieve comparable results with similar tube-era gear.

The classic KWM-1 is truly an enjoyable rig to operate, especially during casual activities. Audio reports are consistently outstanding, some of which I accredit to tube-generated second harmonic distortion being more ear-pleasing than the semi-irritating odd harmonic distortion produced by transistors. In addition to being "roomy" and easy to service, tube rigs exhibit both nostalgic romance and signal punch. Although the KWM-1 lacks a speech processor, its average s.s.b. output equals that of many "processed" solid state rigs. Finally, there's a refreshing feeling of disconcern for next month's models outmoding the classic rig. We're merely sitting on a stockpile of tubes that should keep it going for many moons. Try restoring a classic rig for yourself. It's a blast. CQ

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Say You Saw It In CQ

Here's a worthwhile addition you might consider to increase your competitive edge.

How To Add C.W. Break-In To The Kenwood TR-9000

BY JOHN L. REHAK*, N6HI

If you are a relative newcomer to amateur radio and have been itching to get your feet wet in your first electronic construction project, then read on, because this article is for YOU! Perhaps in the past you have seen articles that advocate various circuitry modifications to commercial rigs, but maybe you have been a bit reluctant to drill that first hole to mount the switch, jack, or control that will alter forever the face (and hence the resale value) of your expensive piece of equipment. Well, take heart, fellow hams, because here is a modification for your Kenwood TR-9000 that will provide a very useful enhancement to this fine rig's c.w. operation, and yet this modification will not require you to drill any holes in the rig or to butcher its appearance even a tiny bit! As a matter of fact, you can construct, try out, and permanently use this modification without even opening the case on the TR-9000, because all required connections to the transceiver can be made externally via existing jacks on the rig's rear panel.

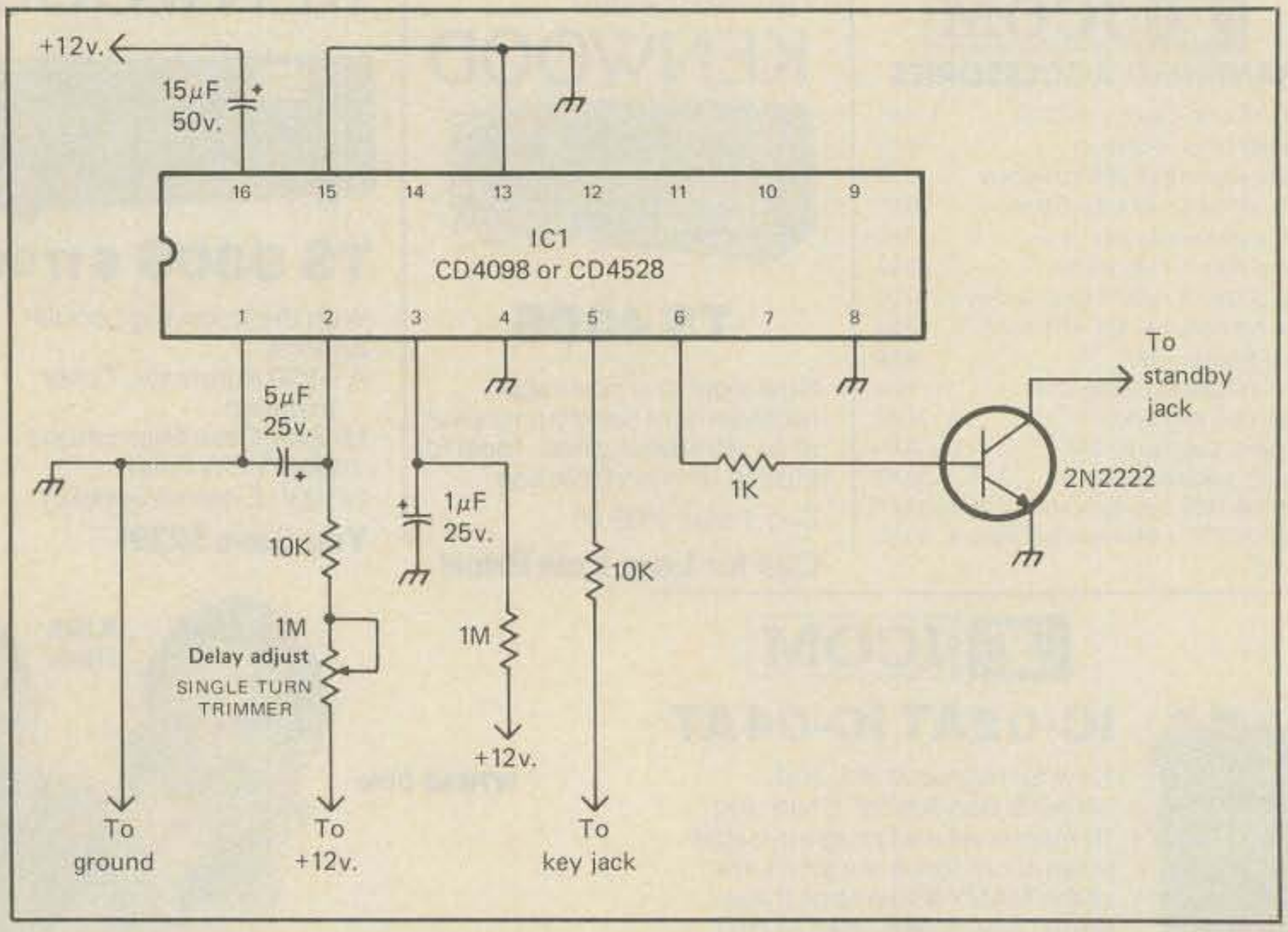

Fig. 1– C.w. break-in circuit for the Kenwood TR-9000.

Why Modify the TR-9000?

The Kenwood TR-9000 is a multi-mode transceiver providing f.m., s.s.b., and c.w. operation on 2 meters in a compact package with excellent features. I enjoy operating c.w., and the TR-9000 does a very respectable job in this mode with one small exception: it does not have any c.w. break-in system, which means that you must manually throw a switch each time you change between transmit and receive. To make matters worse, the designers of this excellent transceiver, apparently in the interests of keeping this multi-mode marvel physically small, neglected to provide the necessary transmit/receive switch on the front panel of the TR-9000. Instead, what they did provide is a small jack on the rear panel which will accept a subminiature plug that can be wired to an external switch which, upon contact closure, will activate the transmit mode for c.w. transmitting operation.

I am used to operating c.w. on the h.f. bands, so I have become very accustomed to operating rigs with "VOX break-in," a system which detects telegraph-key contact closure and automatically switches the transceiver into the transmit mode and holds it there as you are keying. A preset delay time will automatically switch the transceiver back to the receive mode if you pause in your sending for more than about a second (the delay time is usually adjustable).

This article describes a very simple yet reliable circuit that you can build and that will provide a "VOX" type break-in system for the TR-9000. The circuit is built with only ten components and requires only four connections to the transceiver! You can even operate this circuit outside the transceiver, as all connections that need be made to the TR-9000 are accessible at the rear panel of the rig! You may also elect to do as I did, and install the circuit inside the transceiver. Because this circuit is fully automatic, it does not require any holes to be drilled for switches or other panel components. The modification may be installed and removed again at any time, leaving a "stock" rig.

Circuit Description

Fig. 1 is a schematic diagram of the c.w. break-in circuit for the TR-9000. I have drawn this circuit in a slightly modified manner to make it easier for beginners or others not experienced in working with integrated circuits to see a correlation between the 16-pin integrated-circuit package and the schematic diagram of the circuit in which it is used. This circuit is constructed around a CMOS integrated circuit, a CD4098 retriggerable monostable multi-vibrator. You may also use a type CD4528 integrated circuit, as those two are identical in function and pinout. Referring to fig. 1, when your tele-

*8701 MacAlpine Road, Garden Grove, CA 92641

graph-key contacts close and the c.w. keying circuits in the TR-9000 are activated via the transceiver's key jack, pin 5 of the CMOS chip will be pulled to a logic low. This triggers the timer in the chip to put out a pulse of a fixed time duration. This pulse turns on the 2N2222 switching transistor, which switches the transceiver to the transmit mode for a period of time equal to the delay time determined by the setting of the "delay adjust" control in the circuit. The CMOS chip is a retriggerable timer. This means that as long as you keep inputting c.w. characters with your key or keyer, the timer will keep getting reset, and your transceiver will stay in the transmit mode. However, when you stop keying or pause with the key up for a period of time longer than the set period of the timer, the rig will automatically flip back to receive and stay in the receive mode until the next key closure. The result is a real convenience: You no longer have to operate an external switch to go back and forth between transmit and receive when operating c.w. with your TR-9000. Simply touch the telegraph key and the rig will automatically switch to transmit!

Construction

I built the c.w. break-in circuit on a small piece of perf board, the insulated "miniature peg board" with holes drilled on tenth inch spacing to accommodate standard dual in-line integrated circuits. Component placement is not critical, but I do suggest you use a 16-pin integrated-circuit socket and plug the chip in last, being careful not to touch the metal pins if possible, because CMOS chips are subject to damage from stray static voltage discharge.

Operation

This modification may be left in place and will not affect operation in modes other than c.w. In c.w. operation simply adjust the delay time control so that it is appropriate for the c.w. speed you are using. I like to have mine set so that the transceiver will drop back into the receive mode between words as I am sending, but stay in transmit between letters within a word. You may prefer to adjust for a little longer time such that your rig will tend to stay in the transmit mode during your entire transmission, flipping back to receive only when you pause for a longer time or when you turn transmission back over to another station.

Conclusion

The Kenwood TR-9000 is a fine performer on all modes. The addition of this simple circuit eliminated the only deficiency I ever found in the rig's performance: its lack of a break-in circuit for c.w. operation. So go ahead . . . get your feet wet . . . build this "no risk" break-in circuit for your TR-9000 and make a great little rig even better! CQ

Necessity often forces us to think through a variety of options. KA9CAP came up with a solution that helps him out in two hobbies.

How To Modify The HAL CT2200 For Use With RS-232

BY RON BERKMAN*, KA9CAP

In 1979 I faced the problem of upgrading my station's RTTY capabilities. I started with a Teletype Model 19 and a HAL ST-5000 before low-cost computers and interfaces were available. With this system I learned a good deal about RTTY, and I also obtained a HAL DS-2000, which I learned to interface with the Teletype unit via the 120 volt 60 milliamp "loop." Along the way I picked up a typing perforator so I could copy data and pictures off the air via punched paper tape. This punched paper tape could be run through the tape reader on the Model 19. This was all a lot of fun and surely helped to teach me what was happening in RTTY. I still have the old hardware, but it was fast growing obsolete! As a result of our local group going to 74 baud Baudot on our 2 meter repeater, I wasn't able to use the old equipment anywhere except where they were still using 45 baud RTTY unless I got high-speed gears for the Model 19.

The bug finally bit me in 1980, and I acquired a TRS-80 Model I with an expansion interface and a disk drive. I have since upgraded the Model I to 48K and a second disk drive. Then the thought occurred to me to try to interface the computer with the amateur gear. I built a couple of unsuccessful interfaces and finally reached the conclusion that I would need to add the RS-232 interface to the Model I for two purposes. The first was to allow access to a land-line modem so I could access a local computer system run by my computer club, and the second was to have a more convenient way to access my amateur gear. I also learned at this point that I was not going to become a good programmer overnight, not enough to write my own programming, anyway. I also came to the realization that it would be better to have separate dedicated equipment for RTTY and for regular computer work so there would be no interference between the systems, as I also use the computer for a small business.

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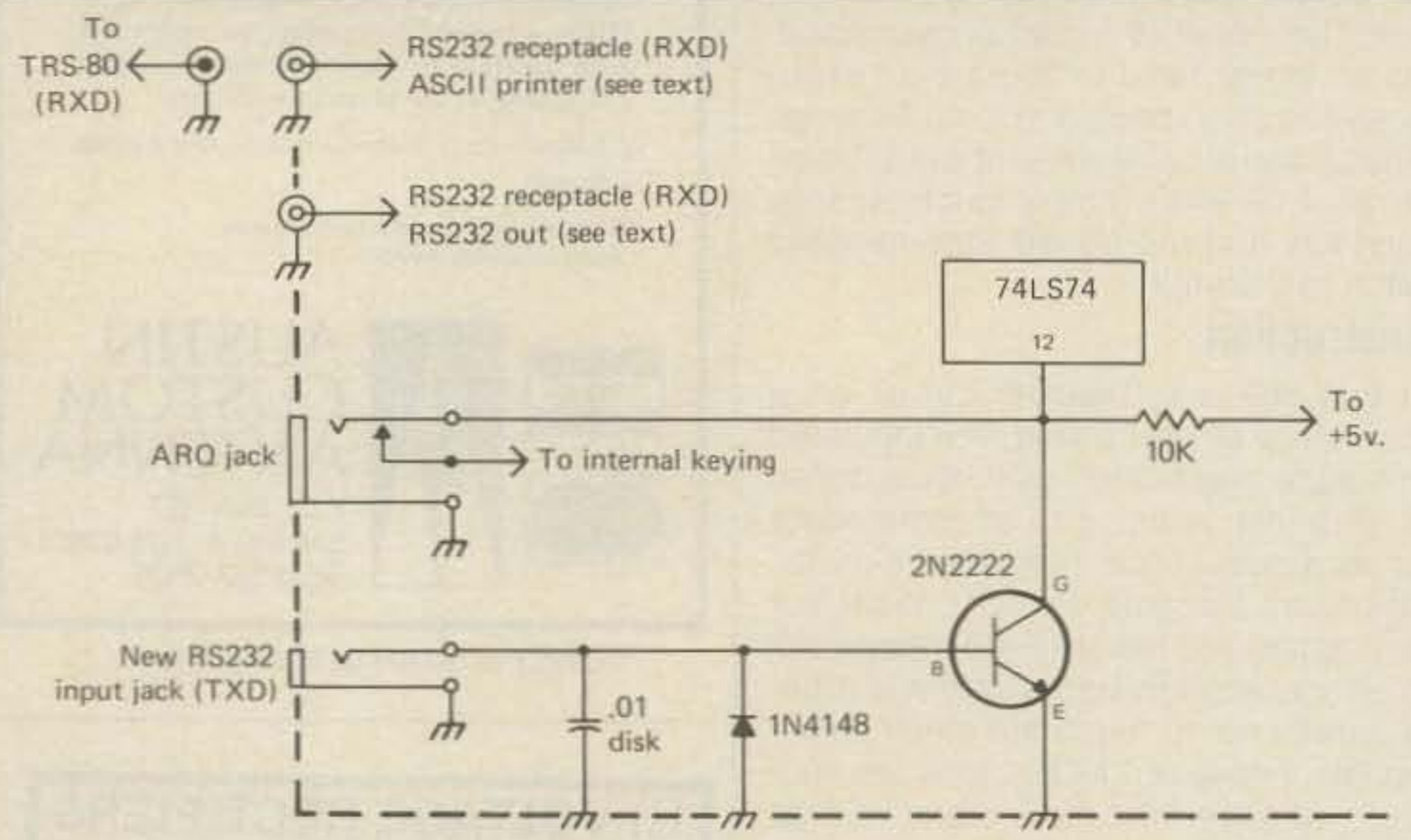


Fig. 1– Circuit diagram showing the connection of RS-232 from the TTL circuit to the ARQ jack and the two options for received data (RXD) to be fed to the TRS-80.

I looked around and learned that the only unit that really met my needs in terms of real versatility was the HAL CT2100, which would allow me an easy interface with a tape recorder, the high voltage loop, and most important, RS-232 input and output. I could also interface the printer output to my TRS-80 at 300 baud ASCII, and with a suitable program in the TRS-80 I could actually copy data directly to the TRS-80 off-the-air whether in Baudot or ASCII. This was nice, but I still did not have a way to interface the output of the computer with the CT2100 so that I could directly key the audio output of the unit. At about this time HAL came out with the modification for the 2100 to make it into a CT2200. I got one of the first modification kits and installed it without incident. After some consultations with the friendly people at HAL. I learned that the circuit in fig. 1 would allow me to key the audio generator of the CT2200 directly so that no need existed for disabling the normal functions of the CT2200 by using the RS-232 button on the front panel!

The modification is very simple if you have the CT2200, but if you have not added the update kit to your CT2100 to make it into a CT2200, you won't be able to do what I am suggesting. There are a number of significant changes to the circuits in the 2100 to make it a 2200! The most important of the changes is the jack in the back panel that allows you to hook the ARQ1000 AMTOR unit to the CT2200 for that method of operation. To disconnect internal keying circuits from the ARQ jack, insert a ¼ inch plug with no connections in this jack. By adding another jack in the back panel and a suitable conversion circuit, this connects your computer's RS-232 output to the input line of the ARQ1000. This addition connects you to the audio generator of the CT2200 with suitable conversion from RS-232 (+ and −12 v) when you insert your RS-232 input plug in the new jack (see the circuit

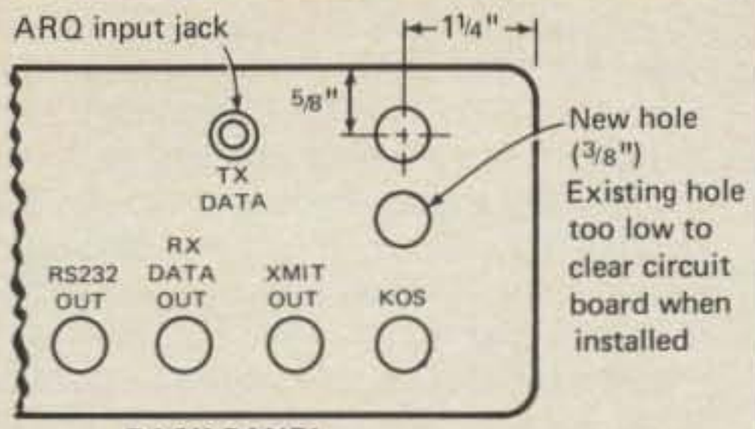


Fig. 2– Detail showing the location of the new hole for the RS-232 input jack.

shown in fig. 1). The circuit uses a 2N2222 transistor which follows the input from the RS-232 and keys the audio generator with TTL.

To make the modification to your CT2200, place the main unit on your work surface and remove the six screws that hold the top half of the case in place. Remove the top half of the case. On the right-hand side looking at the rear of the unit you will then see where the ARQ1000 input jack is installed. You will be working just to the right of this jack (see fig. 2 for details). Assuming you have the new jack available, place a cloth over the circuit board near where you will be drilling the new hole for the new jack so that it will catch metal shavings! Drill the hole by first drilling a small pilot hole and progressively using larger bits until you have a hole large enough for you to insert the jack in the case. Clean off burrs and scrape away enough paint around the hole to allow a good ground for the new jack. Now remove the cloth you used to cover the board and remove any remaining shavings in the case. Install the jack in the back panel. I selected an enclosed jack in order to minimize the possibility of any unwanted short circuits.

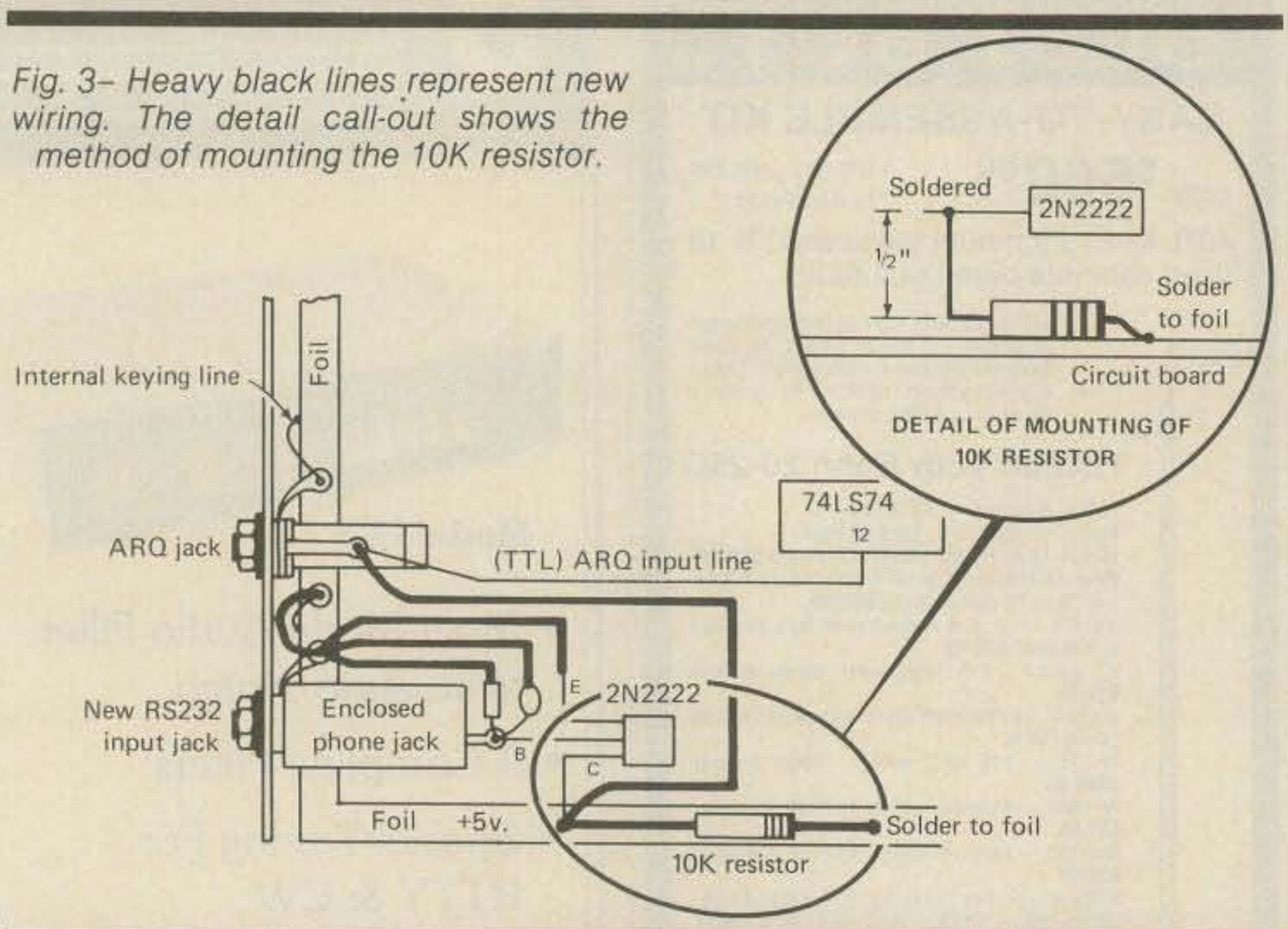
See fig. 3 for the physical arrangement of the parts that will be mounted on the jack and on the circuit board. *Please* note the way that the HAL board is laid out. The foil that runs around the top of the board is the +5 v or TTL voltage! The foil that runs on the bottom of the circuit board is *ground*.

Using a 37 watt or higher soldering pencil with the *smallest* tip you can get, solder one lead of a 10K ohm resistor to the top (5 v TTL) wide foil on the top of the circuit board near the jack you just installed. Now solder the *collector* of the 2N2222 NPN transistor to the free lead of the 10K ohm resistor (see detail in fig. 3).

Next, take the .01 uF disk capacitor and fit it to the ground lug and the center-pin lug of the new jack. You should also fit the *base* lead of the 2N2222 transistor to the center pin of the new jack. Now you can fit the 1N4148 diode between the ground lug and the center pin of the new jack. Now solder all the connections you have made between the ground lug and center pin of the new jack.

Next take some very small wire from

Fig. 3– Heavy black lines represent new wiring. The detail call-out shows the method of mounting the 10K resistor.



your junk box and measure the length you will need to connect the *collector* of the 2N2222 to the lug on the jack that goes to the center-pin contact on the ARQ jack. Use the "eyeball" method, keeping the lead as short as possible, but still clearing the plug when it is inserted in the jack.

The only remaining connection is to cut a small length of the same small wire you used before to connect the *emitter* of the 2N2222 to ground on the new jack. I would also recommend a small length of wire to connect the two grounds of both ¼ inch jacks to each other.

Now inspect your work, looking for solder bridges, and verify that all connections are in the right places. No other connections are required. Take a ¼ inch plug with no connections and insert it in the ARQ jack. Make sure that the plug does not foul the wires.

The next step is to bring a shielded lead from your computer with RS-232 *transmit data* (**TXD**) to a ¼ inch plug and solder the braid to the ground of the plug and solder the center wire to the tip connection of the plug. This should bring RS-232 keying from your computer to the new phone jack you have just installed. This should also key the audio generator on your CT2200.

To get RS-232 from the CT2200 to your computer, prepare a lead by soldering the center wire of a shielded cable to the center pin of an RCA plug. Solder the braid to the outside of the RCA plug. You may use the connection marked **RS-232 OUT**, or the connection marked **PRINTER OUTPUT**, to send RS-232 data to your computer. If you use the **PRINTER OUTPUT**, it will always be in ASCII, which is usually set at 300 baud at the factory. If you use the **RS-232 OUTPUT** connection, it will be keying the circuit in your computer in the *same code* as that being received by the CT2200 and at the *same speed!*

Another important consideration is that the CT2200 *will not* convert what you are inputting via your RS-232 line to another code (i.e., ASCII to Baudot). This means that your program in your computer should be able to send data to the RS-232 output in whatever code and at whatever speed you want to use on the air.

Now we get to the fun part! The CT2200 has the ability to use different tone pairs in accordance with an article in *CQ* in November 1982, pp. 42–48. When you decide that you want to experiment with 300 baud, all you need do is push the **RTTY/ MODEM** button so it is in the **OUT** position, and you will be using modem low tones. If you want to run 600 baud or higher, push the **HIGH/LOW** button so it is in the **OUT** position, and you will be able to run at these higher speeds using modem high tones. We have run tests on 2 meters up to 1200 baud ASCII with no trouble. As a result of being able to key the audio of the CT2200 directly and its ability to send the data from/to your computer and given a terminal program in your computer that allows you to select your baud rate (speed) in ASCII, you will be able to transfer data and programs with your CT2200 with ease! The only thing that you won't have available to you at your computer is the **K**ey **O**perated **S**witch (**KOS**) that you are already accustomed to with the 2200. To key the transmitter, use the manual transmit button on the 2200. It will turn the transmitter on and off for you with the touch of a button.

For those who are using a TRS-80, I have included a circuit diagram and pin-out reference for connection to the CT2200 (see figs. 4 and 5). I use a program called MODEM80 from the Alternate Source on my TRS-80 to run program transfers on the air. This program can be used on either the Model I or the Model III. It *might* also work on the Model IV.

Good luck! Happy computing and communicating! CQ

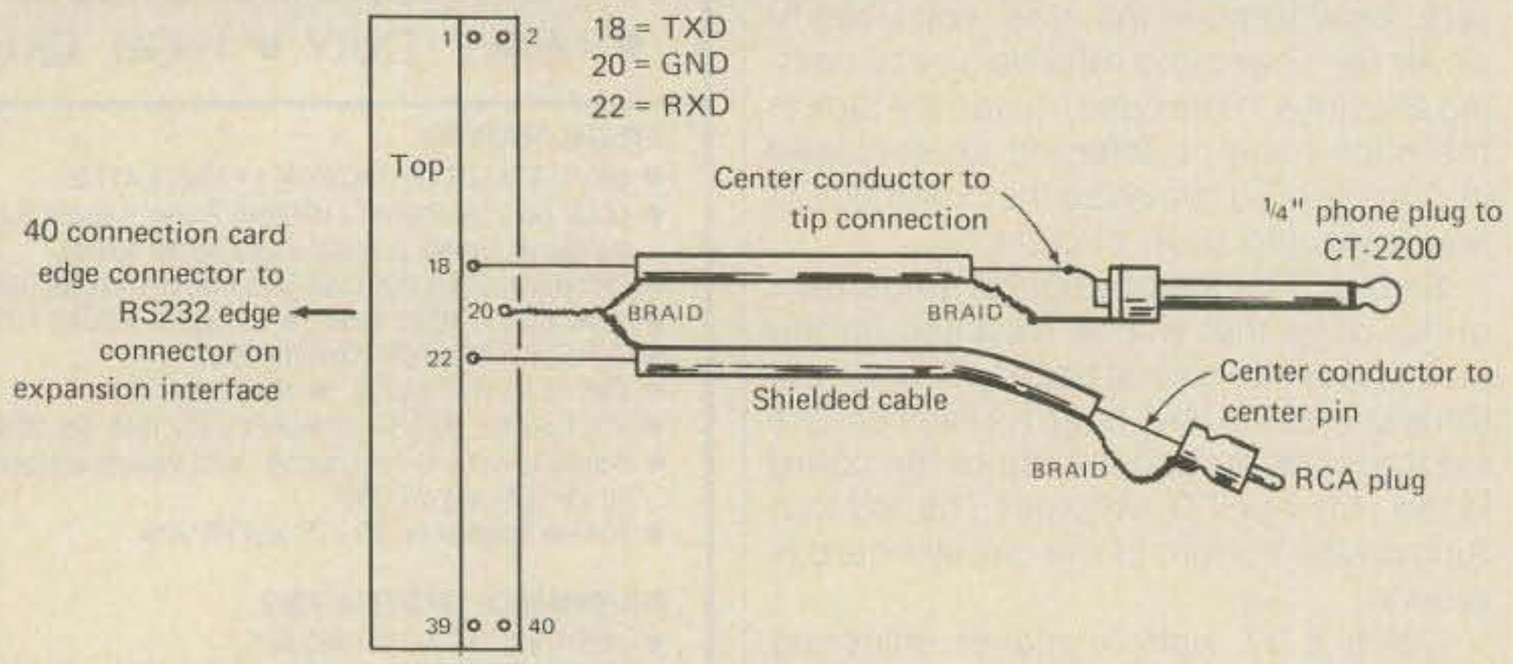


Fig. 4– Connector diagram using a 40-pin card-edge connector to a ¼ inch phone plug (TXD) and to an RCA plug for (RXD). From Radio Shack Hardware Manual, 26-1145.

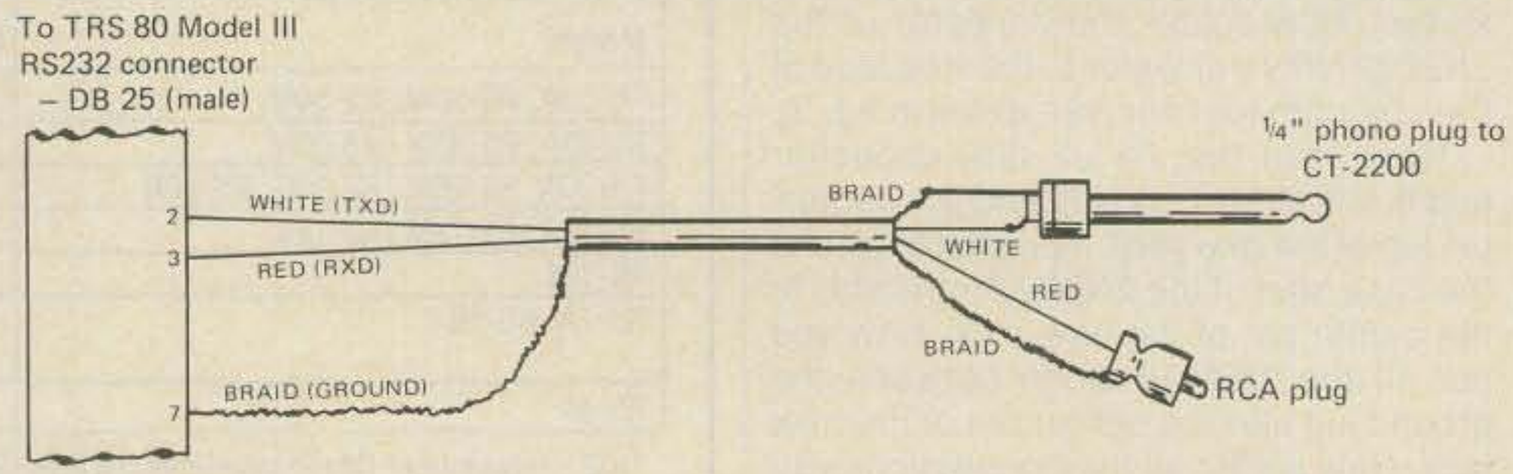


Fig. 5– This method uses a DB25 male RS-232 connection to a ¼ inch phone plug (TXD) and RCA plug for (RXD).

Here's a simple hands-on method of tuning up antennas. You can give your calculator and computer a rest for this one.

How To Adjust Antennas

BY LEW MCCOY*, W1ICP

After writing the article "What? Another 2 Meter Antenna?" in February 1984 *CQ*, I received quite a bit of mail asking questions about how I tune and adjust antennas. Most of these were from recently licensed amateurs, and primarily amateurs who have only been exposed to commercially made antennas. After looking over the current literature on antennas, I can well understand why all the questions. There are loads of articles about antennas, but none that I could find on how to adjust them, assuming one wants to experiment on one's own. This, of course, led to this article. I can't say how thorough it is, but it might help some would-be experimenter who could profit from some of my experience.

Before I discuss testing and adjusting antennas, I think we need to get some basics out of the way. In today's world 50 ohm coaxial cable seems to be the only feed line amateurs want to use to feed antennas. This is not to say that open-wire and other types of feeders are not good —in fact, they are better in many installations. However, coax seems to be what everyone wants, so this article will be based primarily on using coax feed line.

Impedance and All That Stuff

I think most newcomers have a problem understanding what coax is and how it should be used. Coaxial feed line is made up of two conductors—an inner conductor that is surrounded by a dielectric (insulating) material, which in turn is covered by the outer conductor (usually copper braid). (There is, of course, an outer covering over the braid for weather protection.) The impedance of a coaxial line is determined by the spacing between the conductors and the composition of the dielectric material used to separate the two conductors. In amateur radio the popular types of coax are RG-8 and RG-58 and other varieties that are all on the order of 50 ohms impedance. Actually, this number can vary a little, but we refer to it as 50 ohm cable.

One must keep in mind that the impedance of the coax does *not change* when feeding an antenna; it *always stays at the same impedance.* This is a very important fact when it comes to adjusting and tuning antenna systems. By using standing-wave indicators or power bridges that are designed for 50 ohms, the fact that we are dealing with a 50 ohm line makes our adjustments a lot easier. In the good old days—whenever they were—amateurs had to do a lot of groping in the dark because it was nigh onto impossible to do the things we take for granted today. We didn't have s.w.r. bridges to put in our 50 ohm line, so making antenna or feed-line adjustments was hit-or-miss.

Let's assume we make a simple dipole one-half wavelength long—say for 20 meters. We go to the handbooks and find that the formula 468 divided by the frequency will provide us with the approximate resonance length for our half wave. If we study the handbook a little further, we find that the impedance of this dipole should be 70 ohms. Suppose we feed this antenna with 50 ohm coax. What should our match be? It *should be* 50 divided into 70, or 1.4 to 1. The standing-wave ratio is determined by dividing the impedance of the coax (that is always 50 ohms) into the impedance of the antenna, which as we will see, can vary considerably.

There is one other important point I should inject at this time. For all practical purposes, most of the s.w.r. indicators of the power-bridge type are very accurate for our use, as long as the readings are *below* 3 or 4 to 1. (All but the very expensive bridges tend to lose accuracy above 3 to 1.) So if we put such a bridge in the 50 ohm coaxial line feeding our 20 meter dipole, it should read 1.4 to 1. And more important, it should give that figure at the resonant frequency of the dipole. In other words, if one cuts the dipole to be resonant at 14,250, it should read 1.4 to 1 at that frequency with the mismatch increasing as we go up or down in frequency. Unfortunately, life is never that simple—particularly in amateur radio!

The problem is that the impedance of a dipole depends on several different factors: how high it is above true ground, its proximity to nearby objects, and other things. However, this article is about tuning and adjusting antennas, so there are ways to check and possibly correct the dipole impedance.

Let me first say that a matched dipole (1 to 1 s.w.r.) is not normally important—at least it wasn't back in those good old days. When I say it isn't important, I mean that an unmatched dipole will radiate power just as well as one that isn't matched, assuming, of course, we can get the power into it. However, our problem is not with the antenna, but rather with the trasmitters as they are designed today. We find that if our antenna load is not 50 ohms, or an s.w.r. of say less than 1.5 to 1, the transmitter will shut itself off. Therefore, the main reason for having a matched system is not so much that it will perform any better, but simply we need a match to get our rig to work.

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You will hear many amateurs make the statement that a resonant antenna is always better than one that isn't resonant. This is pure hogwash. As long as you can get the power into an antenna, the antenna will radiate just as well whether it is resonant or not. There are exceptions, but as a rule you can take the above statement to the bank. Of course, if the above is true, then why bother to match and adjust antennas? Why not put a Transmatch in the system and forget about matching? Believe me, in many instances the best and simplest way is to make a wire dipole, feed it with open-wire line, and use a Transmatch. However, this article is primarily about tuning and adjusting antennas—but don't sell the Transmatch route short.

Getting Low S.W.R. on a Dipole

While I stated a moment ago that a resonant antenna is no better a radiator than a non-resonant one, there are other considerations. For example, if we make a dipole resonant in the center of a desired portion of a band, usually (not always) the dipole will have a broader (lower s.w.r. response across the entire band. How do we check to see if an antenna is resonant where we desire it to be? The simplest method, and one that is fairly accurate, is to make a frequency run on the antenna with an s.w.r. bridge in the line. Let's say we cut a dipole for 14,250 kHz and get it up in the air. First install an s.w.r. meter in the coax line going to the antenna as per fig. 1—and don't have anything else in the line between the bridge and the antenna. Next, set your v.f.o. to 14,000 kHz and feed enough power to the antenna to get an s.w.r. reading. Write down the reading. Let's say it's 2 to 1. Move the v.f.o. up to 14,050 and take another reading and write it down. Say it's 1.7 to 1. Do this every 50 kHz across the entire band.

For the sake of our discussion, let's say the s.w.r. goes as low as 1.3 to 1 at 14,150 and then climbs up to 3 to 1 at 14,350. For all practical purposes our dipole is resonant at the point of the lowest s.w.r. reading, or about 14,150 kHz. We could assume (by working backwards) the impedance of the antenna is somewhere near 65 or 35 ohms (65 or 35 ohms would give us an s.w.r. of 1.3 to 1). However, the important thing we have discovered is that even though we cut the antenna to the formula, it appears to be wrong for 14,250 kHz.

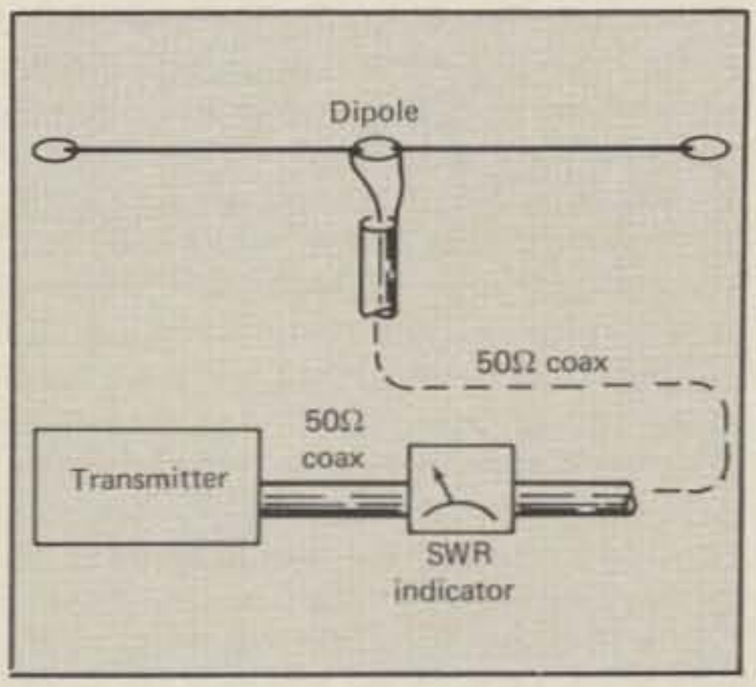

Fig. 1– Details of the arrangement for checking dipole resonance and s.w.r. Be sure to use the minimum amount of power for any s.w.r. readings.

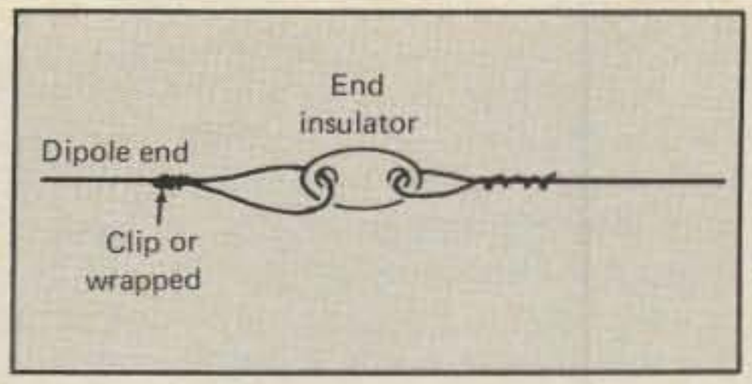

Fig. 2– The end of the dipole is run through the end insulator and then back to the antenna wire. The end wire can have a clip installed or just twisted back onto the antenna wire.

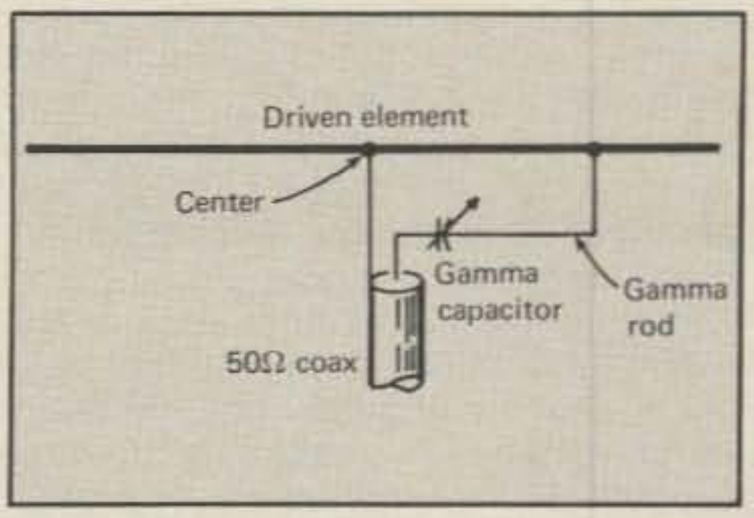

Fig. 3– Electrical circuit of a gamma match. Details are described in the text.

As I said earlier, there could be many reasons why the antenna impedance doesn't come out to be what the book says. However, we are now at the cut-and-try method of correcting the error. Actually, if the antenna is resonant lower than desired, it means that it is too long for the frequency. By the same token, if it is resonant higher than desired, it is too short.

In our example, cut a few inches off each end of the antenna, measure it again, and see how far the s.w.r. curve is moved. If you don't like cutting off wire, there is a simpler trick. Make the dipole a few feet longer than required, and then loop the ends of wire back through the end insulators and short the ends to the antenna wire itself. This method is shown in fig. 2.

In any case, the object is to get the right antenna length so that it is resonant on the desired frequency. If you are very lucky and everything happens in your favor, you may wind up with a dipole that matches the cable exactly with a 1 to 1 s.w.r. However, don't be disappointed with an s.w.r. of 1.2 or 1.3 to 1 at resonance. Check you rig and see if it loads up to full rated power. If it does, there is no point in looking for any better match. Your antenna system for *that* dipole is as good as it is going to get!

There are many dipole matching methods described in the handbooks. However, my advice to anyone new to amateur radio is that it is not worth the time and effort (and probably expense) to get an exact (1 to 1) match for a simple dipole. If you cannot achieve a close enough match for your rig to load properly, then you probably should install a Transmatch in the system. However, on 40 through 10 meters you should be able to come up with a satisfactory dipole to cover the band. The 80 meter band is another subject. I don't know of any home-made dipole that will cover the entire band with a low enough s.w.r. for modern equipment. Typically, a dipole cut for 3750 kHz and matched to exactly 1 to 1 at resonance will be radically different at the band ends. The s.w.r. will rise to very high values, 8 to 1 or so, at the band ends.

Beam Antennas—Another World

The meat of this article should be (and hopefully is) about matching and adjusting beam antennas. That was what the bulk of my mail asked for. Again, the important tool for this job is the s.w.r. bridge. I already told you how to take a frequency run to determine resonance. Of course, the bridge is most important when it comes to getting a match.

There are countless methods for matching antennas—and beam antennas. To me the simplest, and the one that I have used the most, is the gamma match. Fig. 3 shows the gamma match. I am probably going to oversimplify this explanation, but here goes. If you look at a dipole opened and fed at the center, the impedance is on the order of 70 ohms. If you take that same dipole and don't open the center but connect the center (ground it) to the boom of your antenna, the center of that grounded element could be said to be at zero impedance, or ground. As one moves out the element from the boom on one side, the impedance increases until it reaches maximum at the end (something probably on the order of 4000 ohms). For our gamma match we merely tap the gamma rod at or near the 50 ohm point. The gamma capacitor is used to tune out any reactance that is present. However, keep in mind that the impedance gamma-rod point can vary because of several factors. Our driven element is affected by the other element spacings and lengths. The height of beam above ground is another controlling factor. In other words, no two beams are *exactly* alike, and consequently, the matching point for the gamma rod and gamma capacitor can be different for each one. (Otherwise, I wouldn't be writing this article!)

We find, therefore, that in the real world we would have to adjust every single beam for its particular location in or-

der to obtain a perfect match. I should qualify that statement by saying that this isn't necessarily true for v.h.f. antennas. Such antennas can be manufactured so that they will provide an accurate match as long as they are installed in the clear and at least a few wavelengths above ground. But with the lower bands—10 on up through 40—the height above true ground is going to be different in each case. What follows naturally is the question, what about my commercially made beam, particularly with a triband beam where the height above true ground must be a compromise? I really cannot answer that except to say that the manufacturer builds his antenna and installs matching devices that hopefully will meet all of the different buyers' needs. Unfortunately, that is an impossible task, because no two beams go up to the same height, etc. In such a case there isn't a great deal that can be done about matching, because commercially made antennas have fixed matching sections and don't allow for adjustment.

Getting back to our homemade beam and gamma matching, how about some general guidelines? That's easy. The gamma capacitor can be figured at roughly 7 pF per meter. In other words, a 2 meter beam would require a variable capacitor of 14 pF maximum. For 10 meters, 70 pF should do the job. Receiver-type plate spacing, say 0.025, should be adequate for powers of 1 kw. I usually insulate the capacitor by housing it in a plastic freezer box which I mount on the boom directly at the driven element. (I always use a ground-to-boom driven element.) Incidentally, I usually mount a coax fitting right on the plastic freezer box with a metal bracket to hold the fitting. The bracket is secured to the boom as close to the driven element as possible. This means the shield (outer coax conductor) is grounded right at the driven element. As to the gamma rod, I recommend an adjustable one if possible. Once you find the correct length, a fixed rod can be used. I have used ¼ to ½ inch diameter aluminum tubing for the gamma rod spaced anywhere from 2 to 4 inches from the driven element. The spacing of the rod from the driven element and the diameter of the rod will, of course, depend on the frequency/band of the beam. For the 2 meter beam, my gamma rod was a piece of No. 12 wire spaced about 1 inch from the driven element. For 10 meters and lower, I would use ¼ to ½ inch material.

I won't guarantee these figures, but a starting guess for gamma-rod point of attachment to the driven element is as follows: 10 meters, 10 inches from the center of the driven element; for 15, try 20 inches; and for 20, try 30 inches. I know these dimensions worked for me on a triband delta loop and on individual Yagis.

With an s.w.r. bridge in the line, feed enough power into the system to get a reading. I prefer installing the bridge right near the driven element for these tests. Switch the s.w.r. meter to read reflected power. Next, adjust both the gamma rod and gamma capacitor for a perfect match. It should be possible to get the s.w.r. bridge to a zero reading, indicating a 1 to 1 match. If not, move the gamma tap in or out and try again.

I should have mentioned that your rig should be set at the resonant frequency of the driven element. (Or it should be set at the frequency you *think* is resonant.) A question that pops up is that of the beam being matched via the gamma system at some other frequency rather than at resonance. In other words, assume the beam's driven element is cut for a given frequency. Can we match it via the gamma on a different frequency? It so happens that his is possible with the gamma matching device. However, this isn't really important, because the point to keep in mind is that the beam *is* matched to 50 ohms, plus the gamma won't work very far off frequency—at least not from my experience. Some purists may argue that the driven element must be exactly resonant, because by matching the antenna at resonance a lower s.w.r. across the band will result. This is true, but the problem is one of determining *exact* resonance of the beam. If you cut the beam elements to the formula lengths given in the handbooks, you should be close enough for all practical purposes. It would be nice if you could open the driven element and make a frequency run as described earlier, but as you can see, this is practically impossible.

Tune the Elements—Or Not?

Back in the late 40s when a lot of us were just discovering Yagi-type beams, there were countless discussions and arguments about tuning the beams (again, I am referring to 10 through 40, not v.h.f.). By tuning, I mean adjusting the element lengths and spacings for maximum gain or front-to-back. One thing most of us found out was that it was impossible to get any kind of meaningful results. If there was another amateur a mile or so away, it was possible to work back and forth adjusting beams, but such situations did not occur often. In any event, over the years and with the accumulation of much information, the handbook figures for element lengths have become very accurate. Therefore, save yourself the tears and headaches and just accept the figures.

If you want the best performance on v.h.f., however, then element adjusting for maximum gain is desirable. Here there is an advantage because it is possible to set up an antenna range over a short distance—25 to 50 feet—that will work. For descriptions of really accurate methods of adjusting and measuring beams, I would definitely bow to the experts who run v.h.f. and u.h.f. antenna gain contests. (By the way, *CQ* wouldn't mind receiving an article on that subject.) However, to tune a beam simply for maximum gain—not accurately, but satisfactory—isn't that difficult. One easy method is to make a dipole (horizontal or vertical, as needed) and feed a small amount of power into the antenna. On 2 meters, for example, a low-power handheld will work. Mount the dipole about 25 feet or more away from the beam and at the same height as the beam. Using a short length of 50 ohm line, connect a receiver with an S-meter or signal indicator to the beam. A tunable absorption wavemeter would also work. You may have to play with the amount of signal being fed to the transmitting dipole to get it down to a level that is usable at the beam end. A resistor-divider network (pad) could be helpful here. Once you get the reading on the receiver to a usable range, then adjust the beam directors for maximum reading. (I am assuming, of course, that you built a beam with adjustable elements!) After you get maximum reading, rotate the beam so that the back is on the power source and adjust the reflector for minimum reading. Your beam should be fairly well tuned. Admittedly, this is a rather crude method, but it does work. More important, it will give you a feel for designing and adjusting your own beams.

There are a few more points I should mention. For one, always use the least amount of power possible in making any of the adjustments described. High power can give false readings in many ways. Always make sure you have good electrical connections, or false readings will result. The most important tool is your s.w.r. bridge; it provides you with visual indications. This is not to say that noise bridges are not good; they are just a little more difficult to interpret.

Some Closing Thoughts

Study the available handbooks for matching methods. While I like the gamma system, there are many other good ones. I like the gamma because I am familiar with it, having used it to match grounded towers, verticals, and Lord knows what else—oh yes, a rain gutter, bed springs, and a wire fence! Bill Orr, W6SAI, describes another matching system similar to the gamma called the Omega match, which is supposed to be smoother to use than the gamma. It is described in any of his recent handbooks.

I hope this has been helpful and will provide the reader with some ideas of his or her own. My plan for a future issue of *CQ* is to describe some matching methods using toroids, particularly for single and multiband verticals.

Experimenting with antennas is a great deal of fun and can be very rewarding. Good luck! CQ

Dan & Frank Have It All!

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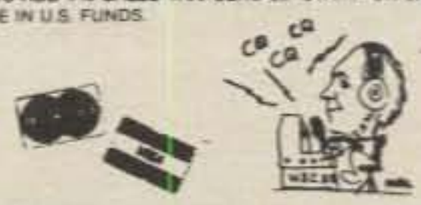

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CIRCLE 128 ON READER SERVICE CARD

The 1985 CQ World Wide 160 Meter DX Contest

C.W.: January 25–27 **S.S.B.: February 22–24**
Starts: 2200 GMT Fri. **Ends: 1600 GMT Sun.**

This year's rules are the same as those used last year with the new scoring format adopted in 1983.

Tradition has established the DX window as an essential part of the 160 Meter C.W. Contest. Keeping the 1825–1830 kHz segment of the band free of U.S. and VE activity had made it possible to work the weaker DX stations who use the window for split-frequency operation. However, with the ever-increasing number of countries now allowing 160 meter operation, many of the new stations on the band use transceivers and cannot work split frequency. Working on frequency in the window is not only nonproductive, but it also disrupts the whole concept of the DX window. Therefore, it is recommended that on-frequency operation be confined to areas outside the 1825–1830 kHz portion of the band.

Classes: Both single operator and multi-operator (maximum of 5 operators per station).

Exchange: RS(T) and QTH. State for U.S. and province for Canada. Not necessary for DX to spell out their QTH, but it is recommended that only standard prefixes be used in their call.

Scoring: Contacts with stations within own country, 2 points. Contacts with stations in other countries but in the same continent, 5 points. Contacts with stations in other continents, 10 points. (KH6 and KL7 are considered countries.)

Multiplier: Each U.S. state, VE province, and DX country. (U.S. and Canada are not country multipliers.) There are three VE1 provinces: New Brunswick, Nova Scotia, and Prince Edward Is.

Final Score: Total QSO points times the sum of the multipliers (U.S. states + VE provinces + DX countries). Maritime mobile scoring will be determined by the location.

Penalties: Three additional contacts will be deleted from the score for each duplicate, false, or unverifiable contact removed from the log. A second multiplier will also be removed for each one lost by the above action.

The *CQ* Contest Committee is strongly considering disqualifying repeated offenders and stations that solicit on-frequency contacts in the window. The 1850–1860 kHz window has not been well established as yet, but the same procedure should be used for that sector of the band for s.s.b. operation.

Disqualification: Violation of the rules and regulations pertaining to amateur radio in the country of the contestant, violation of the rules of the contest, unsportsmanlike conduct, or taking credit for excessive duplicate contacts or multipliers will be deemed sufficient cause for disqualification.

Disqualified stations or operators may be barred from competing in future *CQ* contests for a period of up to three years.

Awards: Certificates to the top scorers in each class, in each U.S. state, VE province, and DX country.

Two Plaques: Europe—C.W. and S.S.B., donated by Don Busick, K5AAD. World and U.S.A. awards will be announced in the Contest Calendar column later if they are available.

The same plaques may be won once only by the same station within a two-year period. Winner of the World Plaque will not also be considered for a sub-area award. That award goes to the runner-up of that area.

Sample log and summary sheets may be obtained from *CQ* by sending a large s.a.s.e. with sufficient postage to cover your request. It is not necessary to use the official forms. You can make up your own, 40 contacts to the page, time in GMT, and columns for exchange sent and received, multiplier, and QSO points. Indicate the multiplier only the first time it is worked.

Include a summary sheet with your entry showing the scoring and other essential information, and a signed declaration that all rules and regulations have been observed. Mailing deadline for c.w. entries is February 28th, and March 31st for the s.s.b. section.

Logs can be sent directly to the 160 Contest Director, Don McClenon, N4IN, 3075 Florida Avenue, Melbourne, FL 32901 USA. They can also be sent to *CQ* 160 Meter Contest, 76 North Broadway, Hicksville, NY 11801 USA. *(Please indicate c.w. or s.s.b. on the envelope.)*

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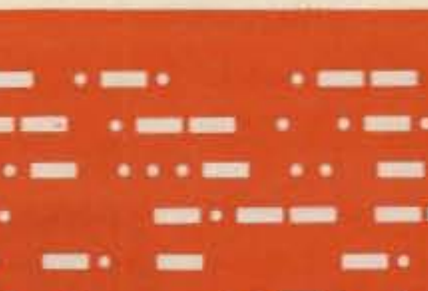

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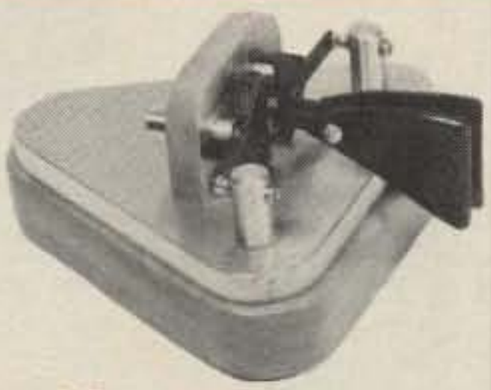

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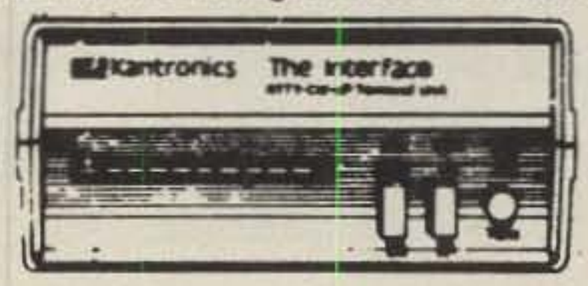

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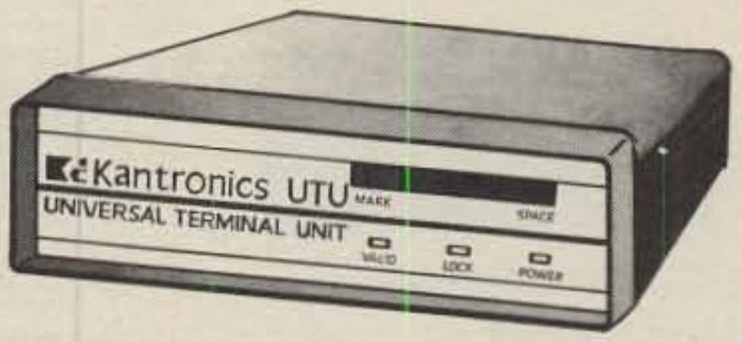

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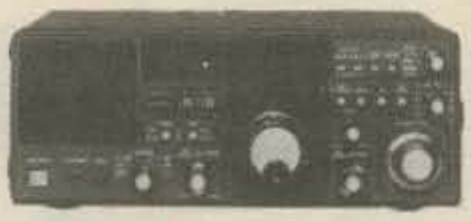

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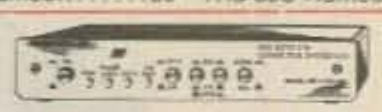

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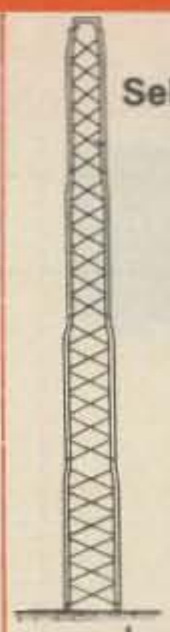

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LM354	54.0 ft	21.0 ft	16 sq ft	$2010	$1599
LM470D (Motorized)	70.0 ft	22.0 ft	16 sq ft	$4195	$2999
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Up to 600 ft via UPS

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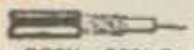

- RG8X—95% Bare Copper Shield
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Coaxial Cable Loss Characteristics (DB/100 ft)

Cable Type	Imped.	10MHz	30MHz	150MHz	450MHz
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RG8X	52	.8	1.2	3.5	6.8
RG-58/U	52	1.4	1.9	6.0	12.5
½" Alum	50	.3	.5	1.2	2.2
½" Heliax	50	.2	.4	.9	1.6
⅞" Heliax	50	.1	.2	.5	.9

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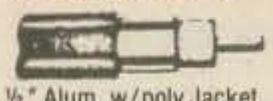

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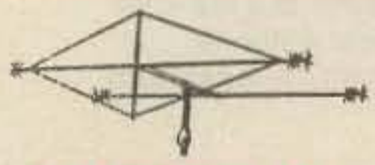

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FK4554	54 ft	29.1 sq ft	$1259
FK4564	64 ft	28.4 sq ft	$1359
25G Foldover Double Guy Kit			$199
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*Above antenna loads for 70 MPH winds and Guys at Hinge & Apex.

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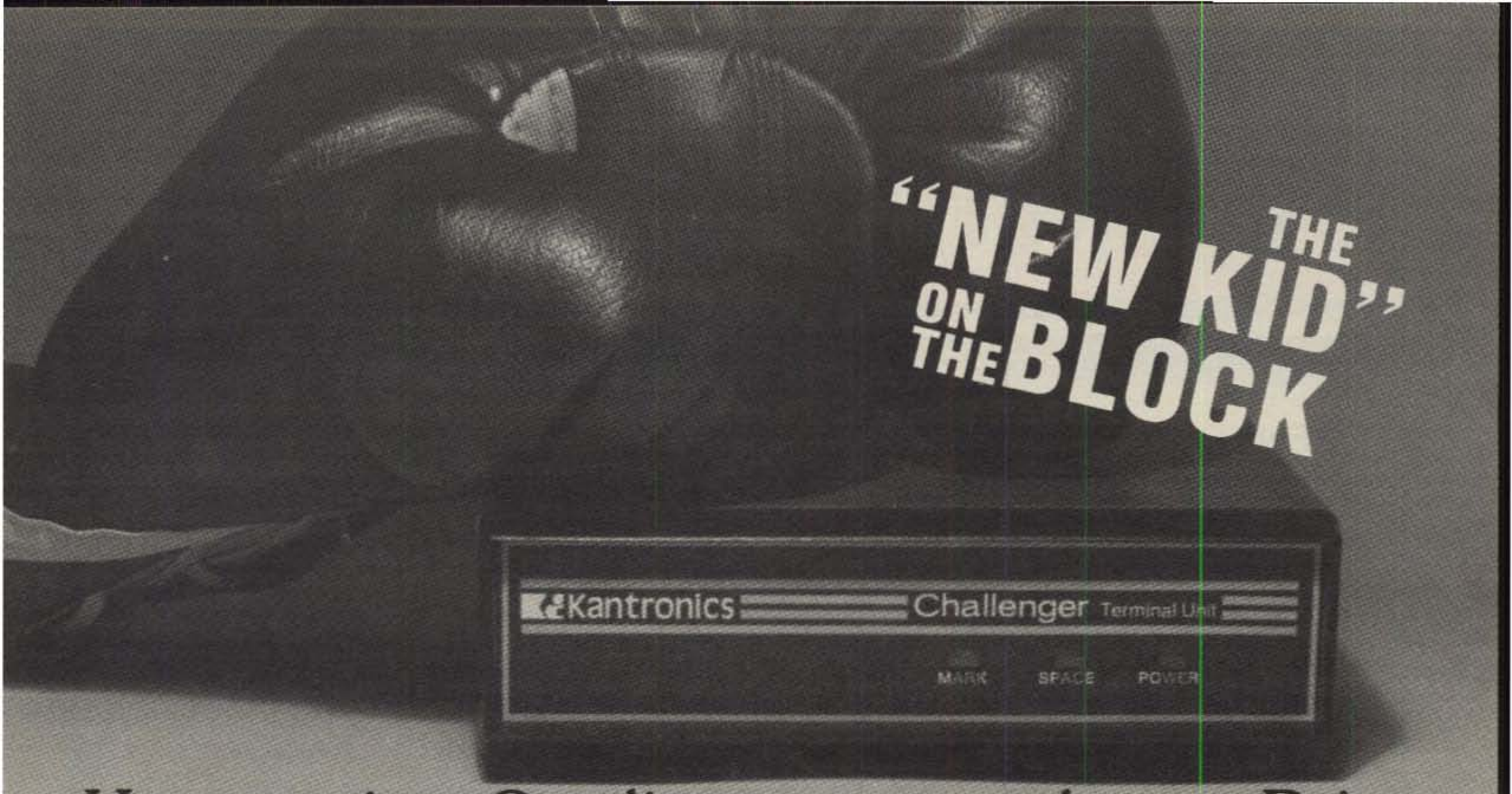

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Hamsoft — Send/Receive CW, RTTY, ASCII ★ Split Screen Display ★ Message Ports ★ Type-Ahead Buffer ★ Printer compatibility.

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Specifications

Input Filter — Four pole Switched Capacitance Filter with 170Hz Shift RTTY bandwidth of 260Hz nominal. Copies any shift.

Audio Input — Minimum level 5mvRMS. Input impedance is 600 ohms unbalanced. Accepts baudot or ASCII code up to 300 baud. Max input level is 12VRMS.

AFSK Output — Crystal controlled. Mark-2125Hz; Space-2295Hz (170 shift). Level 100mvpp (35mvRMS) standard. Optional 500mvpp (175mvRMS). Output impedance 600 ohm unbalanced.

FSK Output — Open Collector +40 VDC Max. Polarity can be reversed.

Scope Output — 10K ohm output impedance.

PTT Output — Open Collector +40 VDC Max.

Computer Connection — TTL Compatible. Inputs also RS232 level compatible.

Power Requirements — 11 to 15 VDC (12VDC nominal) 75ma

Construction — Precision Extruded Aluminum Alloy Case

Dimensions — 1.9"H x 5.9"W x 7"D

Weight — 1¾ lbs.

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1202 E. 23rd Street
Lawrence, Kansas 66044

Everything is possible if you believe hard enough, but sometimes it's hard to believe what you actually see.

Maggie's Kid Sister

BY C.J. WILLIAMS*, W1ROM

I don't think there has ever been an amateur who at one time didn't know a guy who was always interested in being a ham but never got around to doing it for some reason. This kind of person was always around when there was an antenna raising, field day, or hamfest. Usually the reason why the guy wasn't an amateur was because he couldn't conquer the c.w. part of the hobby. The guy in this story could copy c.w., and I don't know what his hang-up was. I *do* know he is an amateur now.

I first saw the guy at a local amateur fleamarket, and he appeared to be no one out of the ordinary. He had a small girl with him, about ten years old, pretty as a picture, and well behaved. He had her by the hand and was browsing through the junk on a lot of the tables.

The fleamarket was in a large building in Maine, and at the far corner there was a table set up for a c.w. contest. As they worked down through the tables and approached the table where the c.w. contest was about to take place, some guy was starting up the practice tape and adjusting the speed.

I wouldn't have given the guy or the kid a second thought, except that when the little girl discovered where the c.w. was coming from, she started to get all excited and yanked her old man's arm and pointed in the direction of the c.w. For some reason I couldn't avoid the display of a kid getting all worked up about c.w., so I eased over to the where they were standing to see what was going on. The c.w. tape was going about 20 w.p.m., and the girl was reading the text to her dad. I nearly fainted from surprise. This was too good to be true. I couldn't imagine a kid this young reading c.w. and doing it so smoothly. I couldn't contain myself any longer, so I asked the guy, "Is that kid really copying that code, mister?"

He looked a little embarrassed and said, "Yes, I am afraid she is."

"How come?" I asked.

"Well," he said, "I have always been interested in amateur radio, so I started to learn the code a few years ago, and Maggie went along learning it with me. In fact," he continued, "we whistle it, hum it, and make all kinds of noises, so we're pretty good at it now."

"How fast can the kid copy?" I asked, and at the same time patted the little girl's head. She was really a cute little kid.

"I really don't know," he replied. "We haven't found anybody yet on our old receiver who gets fast enough for her not to get it all. In fact she is so far ahead of me that I have no idea what her speed is. You see, she makes a game of it all the time."

This was getting good. I was getting some good ideas. "Why don't you enter her in the contest here?" I asked.

"Oh no," he replied. "She couldn't do that."

"Oh, Daddy, please," shouted the kid. "Let me try it?"

"No, honey, you don't want to get involved in this. Let's go along and I'll get you something to eat."

"Wait a minute, friend," I said. "Why don't we have a little fun. It won't do any harm, and the kid may win a prize. In any event, if you let her try it, I'll buy lunch for all of us, and it's your choice, okay?"

The guy hesitated, but I kept the old sales talk going and could see he was weakening.

"Well, I guess there is no harm in it. Do you really want to try it, Maggie?"

"Yes! Yes!" she replied.

It wasn't long before the old timers gathered around the table, each one taking his place with a pencil and paper in front of him until there were probably 20 participants around the table. The little girl sat down. I put a pencil in her hand and a piece of paper in front of her. The guys around the table snickered, and a few made wise remarks—nothing bad, you understand, just something like, "What's the kid doing here?" Anyway, the guy running the c.w. machine gave his spiel about starting off at 15 w.p.m. and gradually increasing to where no one could copy or gave up. He asked if everybody was ready. He mentioned that the first prize was a year's subscription to *CQ* magazine, and then mentioned that a series of V's would be followed by the text for the contest.

The machine started up. Out came a bunch of V's, then the copy. Everybody, including Maggie, went to work, except that Maggie seemed to be bored at the copy. She would write a few lines, sit back, look around, and write a little more. The kid had me confused. Either she was putting on an act or wasn't copying anything. I looked over her shoulder and the kid had solid copy and was waiting for more. The speed picked up to 20–25 w.p.m., and a few guys dropped out. Again the speed picked up, this time to somewhere around 40 w.p.m. I got little or nothing, but Maggie was right in there, just a shade above being bored, though. In fact, she stopped copying for a few moments, and my poor old heart stopped, but all she did was reach in her pocket to take out a lollipop, unwrap it, and shove it in her mouth. She picked up the pencil and must have caught up with the copy in a few moments, because she looked around with those big, innocent blue eyes as if to say when do we get going with this.

By now the speed had to have been 50 w.p.m. or more. Almost everyone except two old timers and Maggie had thrown in the towel. In a few minutes the machine stopped and everybody breathed out a sigh of relaxation, so to speak. The guy running the show walked around the table and picked up the papers. He then went up to the head of the table and started to correct them.

By this time I was so excited over the forthcoming results that I couldn't stand still. Finally, the guy looked up with the most stupid look on his face you could ever imagine.

"Who is Maggie?" he asked.

The little girl put up her hand and said, "Me."

The guy went over to a couple of old timers, bowed down and talked for a few minutes, then straightened up and made the hardest announcement he had ever made.

"The winner appears to be this little girl," and he pointed to Maggie. "Her copy is without a mistake. In fact, it's solid from start to finish."

At this point all eyes were on Maggie with questions ready to bubble forth. I grabbed the kid by the hand, took her old man by the elbow, and moved away from the crowd.

"Look, pal," I said. "This kid is good. We can pick up her prize in a minute, but

*Sokokis Trail, Limerick, ME 04048

let's go get some chow and talk, okay?''

We moved over to a small tent that was putting out hamburgers, hot dogs, and junk food, and in a few minutes we were all stuffing our faces. The old man's name, I found out, was Jim, and we got to talking about Maggie's skills in short order. Meanwhile, Maggie was putting the fries and burgers into that pretty mouth like it was going out of style. Jim filled me in on the kid's talents again. As he had mentioned before, when he decided to learn c.w. he and Maggie made a game of it. They hummed or whistled c.w. until they both used this method of communication to converse with one another just for the heck of it. He said it was great fun to have a sort of secret way of talking that was only between the two of them. In fact, he said Maggie's sister, Debbie, was better at it than Maggie. When I heard this I choked.

''Maggie's sister?'' I said. ''Where and how old is she?''

''Oh, she's about 8 years old,'' said Jim.

''And you mean she can copy c.w. as well as little 'old' Maggie here?'' I pointed to the kid who had a mouthful of fries and was in the process of washing it down with a big coke.

''Oh, yeah, she's faster than Maggie,'' he went on to explain. When Maggie and he were learning code by whistling and humming it together, Maggie's kid sister, then 6 years old, wanted in on the new game, so they let her. Apparently now Maggie and Debbie used this medium to talk to one another around the house in their play. In fact, he had to stop them from using it all the time. It seems they picked up a few plastic whistles and it was a continuous game between them.

I could not believe him. ''Where is she?'' I asked.

''Home,'' he replied.

''Where is home, Jim?'' I asked.

He went into the details about his little farm along the Saco River in Maine.

It wasn't long before the day was over. Jim packed up Maggie's prize subscription and we made a date for me to visit them on the farm the next Sunday.

I visited the farm bright and early Sunday morning, and Maggie's sister was all Jim claimed. I brought along a c.w. tape all in five character coded groups and the speed was 35 w.p.m. The kid got it all solid, easy as a piece of cake. Another tape at 65 w.p.m. straight text—also a piece of cake. These two kids could whistle or hum c.w. that would put Ted McElroy to shame. I had a bright idea at once. There was an ARRL hamfest scheduled for early the next month in Boxboro, Massachusetts. I asked Jim if he would come along with the kids—you know, make a day of it. He agreed, if his ''old'' lady could come along. What the heck, I thought. With what I had in mind he could bring the whole family!

When the first of the month rolled around, Jim, Maggie, Maggie's kid sister Debbie, and Jim's wife all rode with me to the big one at Boxboro, where I knew there was going to be a big c.w. contest, and I had a really big idea brewing. Boxboro turned out to be as big as any New England ARRL sponsored hamfest. The parking lot was jammed and we had to walk at least half a mile before we got into the building. We looked just like a typical family on a day's outing. Jim had Maggie by the hand, and his wife had Maggie's sister. I had two or three old timers in mind who I knew would be there, and I was just bursting to get going on plans of the day.

The first few hours were spent visiting the booths and display units in the big main room. I had left Jim and the kids with instructions that we would all meet at noon near the water fountain in the center of the building. In the meantime I checked around and confirmed that the top c.w. net men from New England were there—you know those old timers who still call s.s.b. ''Donald Ducking,'' etc. A few well-placed questions on my part put me on to the location for the c.w. contest, and I found the room with a sign on the door stating that the contest was to take place at 1:30 p.m.

We all met at the water fountain at noon, and I took the family out to lunch. If you think Maggie could put away fries and burgers, you should have seen her sister! We finished the meal, and as per previous arrangements I separated Jim and Debbie from Jim's wife and and Maggie and headed for the contest room. By the time we got there the place was half full of guys all milling around. Many of them recognized me and asked what I was doing in the c.w. contest room. Some of these old timers really know how to hurt a guy. Before long a bunch of us got to ragchewing about the various c.w. speed artists and who we thought might come out as the c.w. winner. One of the guys asked me what I was doing and did I intend to enter. I replied that I was sponsoring a candidate. Naturally they wanted to know what it was all about, so I introduced Debbie. Boy, you should have heard the snickering and comments. It took some real hard convincing to prove to them I was not kidding. The typical remark was, ''You mean to say that kid is going to enter the contest?''

''Better than that,'' I replied. ''This kid is going to win, and I'm giving odds of two to one that she can take any one of you at any speed.''

It wasn't long before I had a couple of C notes on markers out and was ready to take on more. By the time the guy running the show called things to order, I had bets on the books totalling $700. I will admit that I was sweating a little, since at 2 to 1 odds I could be out 1400 big ones if Debbie got rattled. In a few minutes all the guys took seats, and I placed Debbie at the far end of the table. The guy up front had the c.w. machine ready to go and was briefing all on the rules and methods for determining the winner. The first run was to be at 25 w.p.m. straight text and then up to 75 w.p.m. in steps of 10. He said that if everyone was ready, he was.

Debbie sat as cool as a cucumber, but something was wrong. Her face only came up even with the table. She was going to have a hard time writing in this position, so I asked the guy to wait a minute, and I found an empty wooden soda box for her to sit on. This brought her up to table level, and with a pretty blue ribbon in her hair the kid looked like a million. All was set to go, and the guy turned on the c.w. machine. Everybody started to copy at the introduction speed with no problem. The speed picked up to somewhere around 40 w.p.m. gradually and a few dropped out. Debbie stopped copying and I had a slight coronary, but all she did was reach into her pocket, unwrap a lollipop, and shove it into her mouth, never missing a character, I'm sure. At 50 w.p.m. only four people were left: Maggie's kid sister and three old died-in-the-wool traffic men. The kid was something else; she would stop copying, pull the sucker out of her mouth, look at it, lap off each side, shove it back into her mouth, and then write. The speed picked up to where it sounded like a machine gun, and the three traffic guys were in trouble, I thought. Debbie was writing, and the lollipop stick was rigid in her mouth. Probably 3 or 4 minutes into the 75 w.p.m. speed the three old timers were in deep trouble and ready to throw in the towel. They were missing a lot, as was evident by their not writing down very much. The kid showed no strain or pain as far as I could see. The copy stopped and the guy up front started to pick up the papers. When he got to the kid his face went two shades whiter because the kid had filled out two complete pages.

It took about a half hour to correct all the papers. The guy running the show asked, ''Debbie?''

''Right here,'' the little darling said.

He walked over to her and asked, ''Whose kid is this?''

''She isn't my kid, but I'm her sponsor,'' I said. He called me aside and said, ''This kid has solid copy for the entire text. What do I do now?''

''What else can you do but announce it?'' I replied.

After they looked over the papers they looked at me and dug into their jeans for the prizes. The first prize was a c.w. rig which we picked up and I gave to her dad.

Maggie and her kid sister now have two new ten-speed bikes, and I have the start of a new h.f. station.

Oh, by the way, anybody out there thinking of going to Dayton this year? Maggie's kid sister and I might be! CQ

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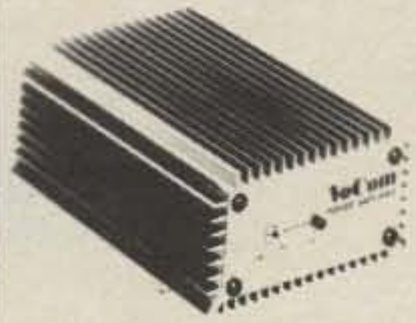

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Antennas

a monthly feature by
KARL T. THURBER, JR., W8FX

DESIGN, CONSTRUCTION, FACT, AND EVEN SOME FICTION

Product Peek—Part II

Last month columnist W8FX "peeked into" a number of antenna-related product offerings from several manufacturers. This month, it's more antenna products and some new topics, as well.

In last month's Antennas column we highlighted several new and interesting products from a number of manufacturers. We also shared with you some "DITY" (do-it-yourself) antenna ideas as submitted by readers, piggybacked on a previous discussion of so-called "gray line" propagation, and touched on a few software topics.

This month we will continue our look at several commercial product lines, focusing as we did in the last column on the wares of relatively small firms, particularly those who may not advertise extensively, in order to acquaint you with their offerings. We will also open the mail pouch again and share notes on a particular ham software package, as well as make some suggestions on how to go about seeking out and evaluating software for your own brand of home computer. Let's begin with a peek into some antenna products from some interesting manufacturers.

Product Peek II

The Jaybeams. Spectrum International, Inc., P.O. Box 1084, Concord, MA 01742, distributes an extensive line of these British-produced antennas for v.h.f., u.h.f., and microwave work.

Spectrum International's catalog shows specs on several v.h.f./u.h.f. and microwave antennas for amateur applications. Among these are a 2 meter slot-fed Yagi sporting a 12.3 dBd gain; a 1296 MHz loop Yagi, a 20 dBi gain antenna reportedly equivalent to a 4 foot dish; an 18.5 dBd 70 cm Yagi; a "long-range repeater access" Yagi; and a 2 meter crossed Yagi, particularly suitable for satellite work.

The latter antenna, the 10XY/2M, is particularly interesting. It consists of two electrically independent, ten-element Yagi arrays which are mounted at right angles to each other on the same boom. The two arrays may be used independently for f.m. (vertical polarization) and c.w./s.s.b./a.m. (horizontal polarization) applications. Two coaxial cables, or one cable and a relay to switch between the two arrays, are needed for these terrestrial applications. For communications via the OSCAR or RS satellites, it is desirable to use circular polarization to minimize fading effects associated with linear polarized antennas. The problem is overcome by using this antenna and connecting the two Yagi sets with a phasing harness (the PMH/2C) to produce circular polarization.

The phasing harness can be connected to the 10XY/2M either at the an-

317 Poplar Drive, Millbrook, AL 36054

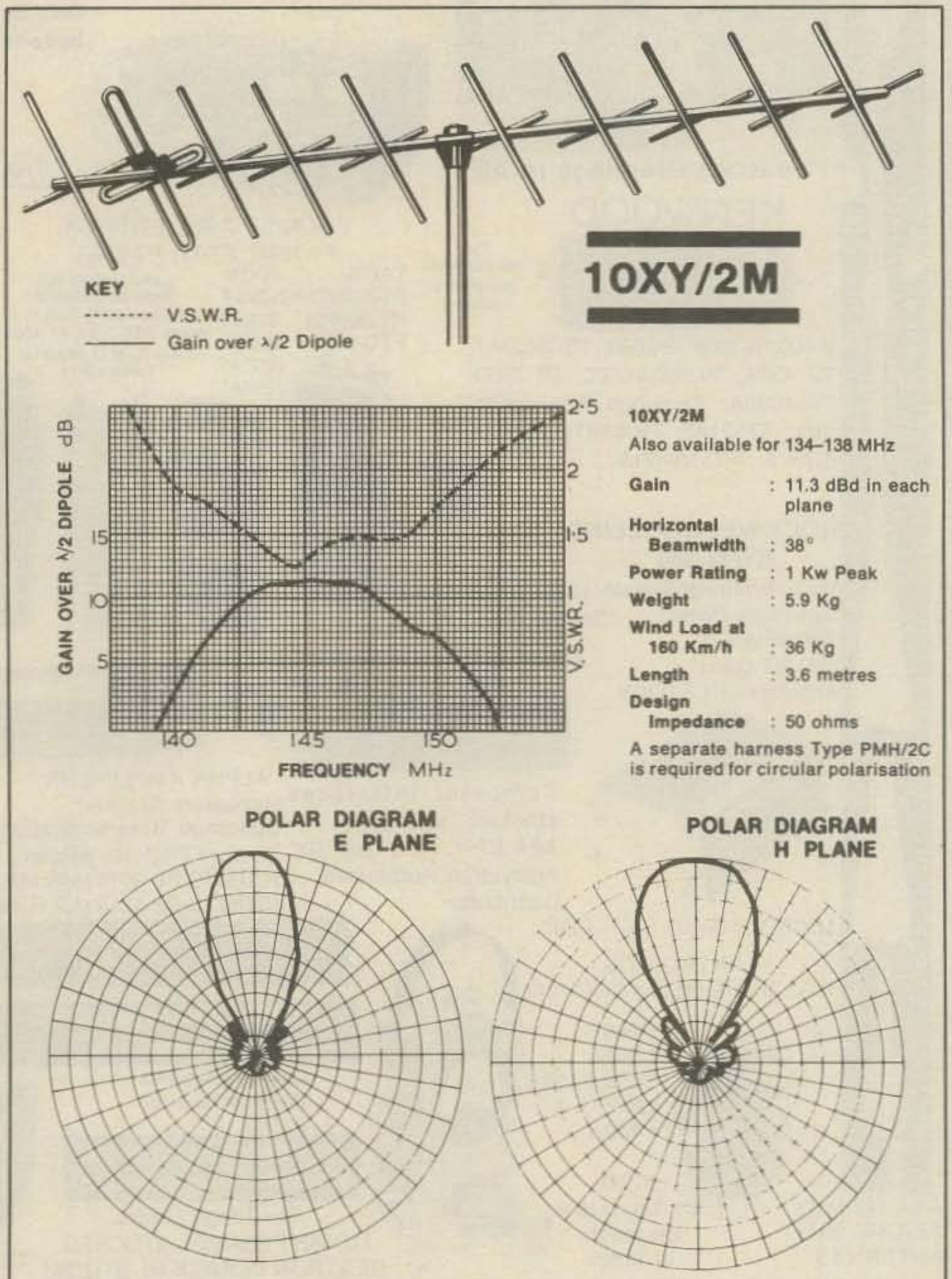
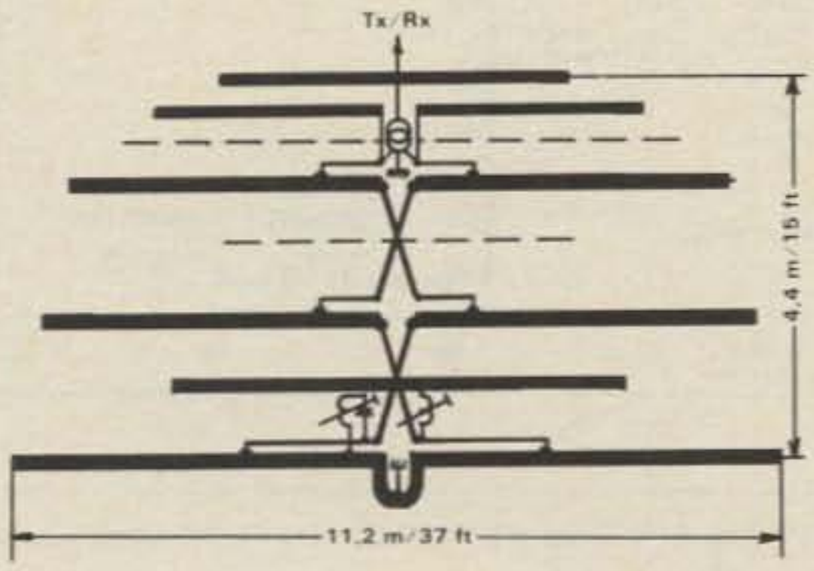
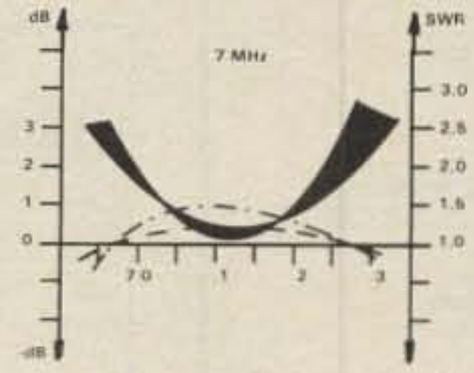
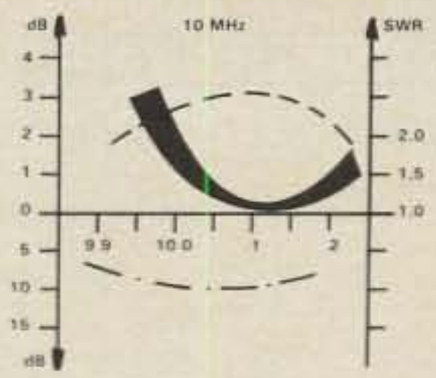


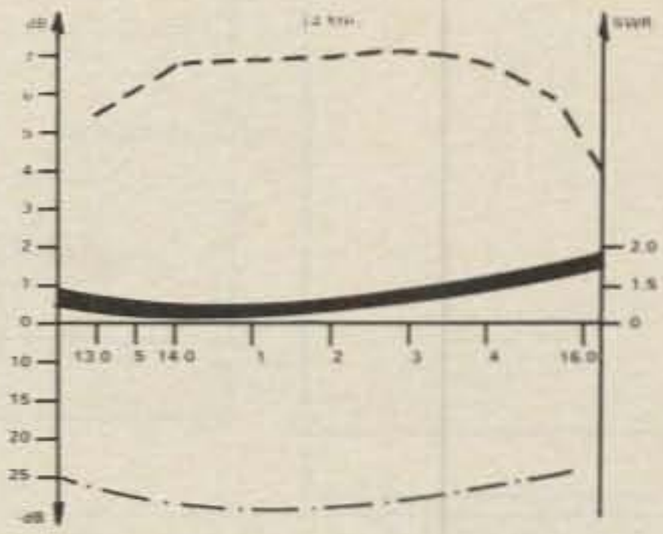
Fig. 1– Jaybeam 10XY/2M crossed Yagi antenna. This antenna—actually two electrically independent, ten-element Yagis mounted at right angles to each other on the same boom—is suitable for vertical, horizontal, or "circular" polarization applications. The latter application is particularly useful for space communications through the OSCAR or RS satellites.

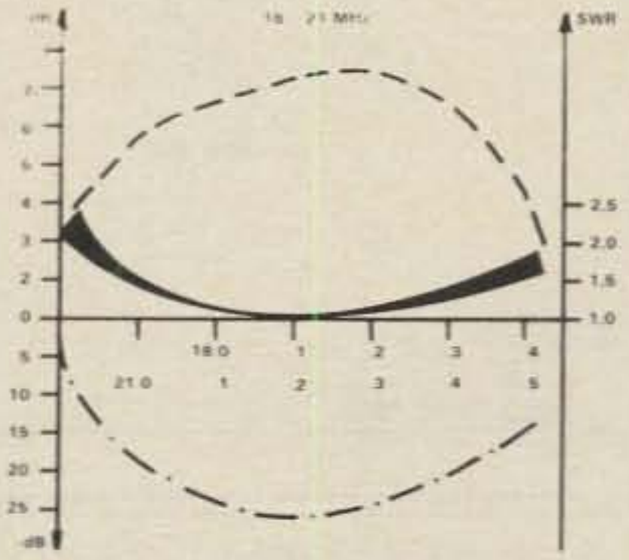


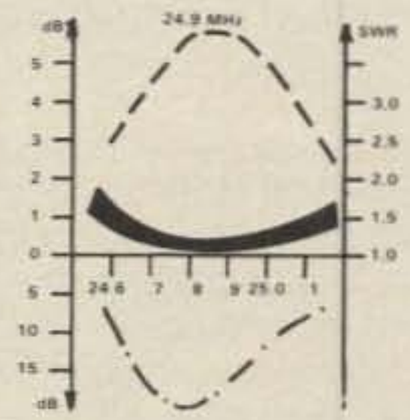
(dotted lines = WARC)











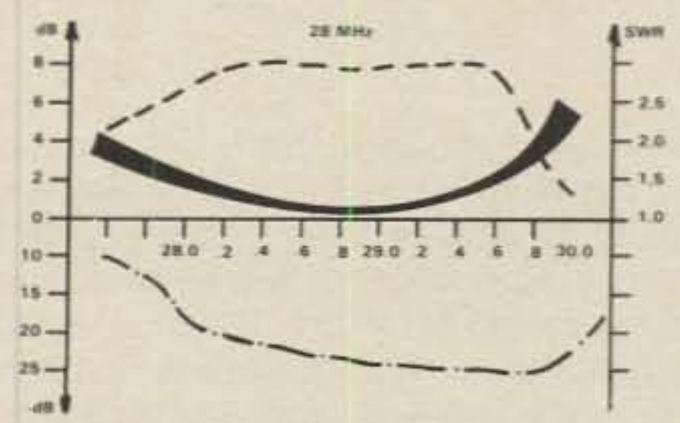


Fig. 2– DJ2UT series XP-50 multibander. XP-50 element and phasing line configuration is shown at left, while performance graphs provided by the manufacturer are at right.

tenna or via equal lengths of coax. In either case, a four-position switch or relay box arrangement can be used to make available all four possible polarizations: horizontal, vertical, right-hand circular, and left-hand circular.

Fig. 1 shows a sketch of the Jaybeam 10XY/2M crossed Yagi. The firm also offers a wide range of harness kits, combiners, and other antenna accessories.

DJ2UT Multiband Trapless Beams. Well-known in Europe but only recently achieving a measure of popularity in the U.S.A. is the line of trapless DJ2UT h.f. beams. The Sommer GmbH beams are now imported and distributed in this country by Dennis J. Lusis, W1LJ, President of Eurotechnik, 125 West Main Street, P.O. Box 843, Plainville, CT 06062.

The DJ2UT multibanders are distinctly different from standard multiband beams in that the L/C traps normally found on such antennas have been eliminated. Generally, such traps are required for proper operation and transmission-line impedance matching on each band. However, L/C trap loading schemes introduce some negative features into overall antenna performance, including shortened element length, power losses in the devices, and weather-sensitivity, among others. The DJ2UT arrays represent an attempt to get around such limitations.

Nearly a dozen different versions of the trapless DJ2UT h.f. lines are offered by Eurotechnik, as well as a 16 dBi gain helical antenna for 70 cm work. The design goal in the h.f. antennas is to achieve true "monoband performance" in a multiband array through elimination of the traps. While slightly different techniques are used in the various models offered to achieve good performance without using traps, the main effort revolves around sophisticated use of phasing lines and all-driven elements. The basic beams, available in 8, 15, and 20 foot boom lengths, are designed for triband 10-15-20 meter operation, but can also operate on 40 meters in dipole-like fashion. WARC models and WARC conversion kits are also available to enable seven-band operation. Admirably, the design philosophy and working principles are clearly spelled out band-for-band in the Sommer GmbH advertising brochures, which make for some interesting reading.

Fig. 2 shows a sketch of the Series XP50 15 foot beam multibander, along with some representative s.w.r. curves.

In past columns we have highlighted some of the smaller firms that provide essential, sometimes hard-to-find antenna construction hardware and components. One firm we would like to bring into focus this month is the Budwig Manufacturing Company, P.O. Box 829, Ramona, CA 92065. The Budwig product line features their "Hye-Que" ABS copolymer dipole antenna connectors and insulators. These inexpensive components (the connector is $5.95 and the insulators $1.25 a pair, at this writing) are constructed of a tough, 35% glass-filled ABS copolymer material, and they reportedly have a tensile strength of 18,000 p.s.i. According to the manufacturer, these components have an unlimited service life and are virtually unaffected by weather and sunlight. The center connector is of watertight molded construction, has a built-in connector that accepts a standard PL-259 plug, and includes a rain drip shield for the coaxial fitting. The devices are designed to handle full legal amateur power levels.

W9INN Antennas. Bill Fanckboner, W9INN, has for years produced a line of trapless, multiband dipoles and slopers especially for use on the lower h.f. bands (30–160 meters), where beams are not usually within practical reach of most hams. In fact, as sunspot activity declines and the MUF does not even hit 14 MHz on many evenings of the coming "sunspot low," it's a good idea to put some effort into antenna construction for the lower bands. Bill has done this through his line of preassembled, ready-to-use h.f. antennas.

W9INN's 10-page catalog lists a variety of antennas (including even a "very

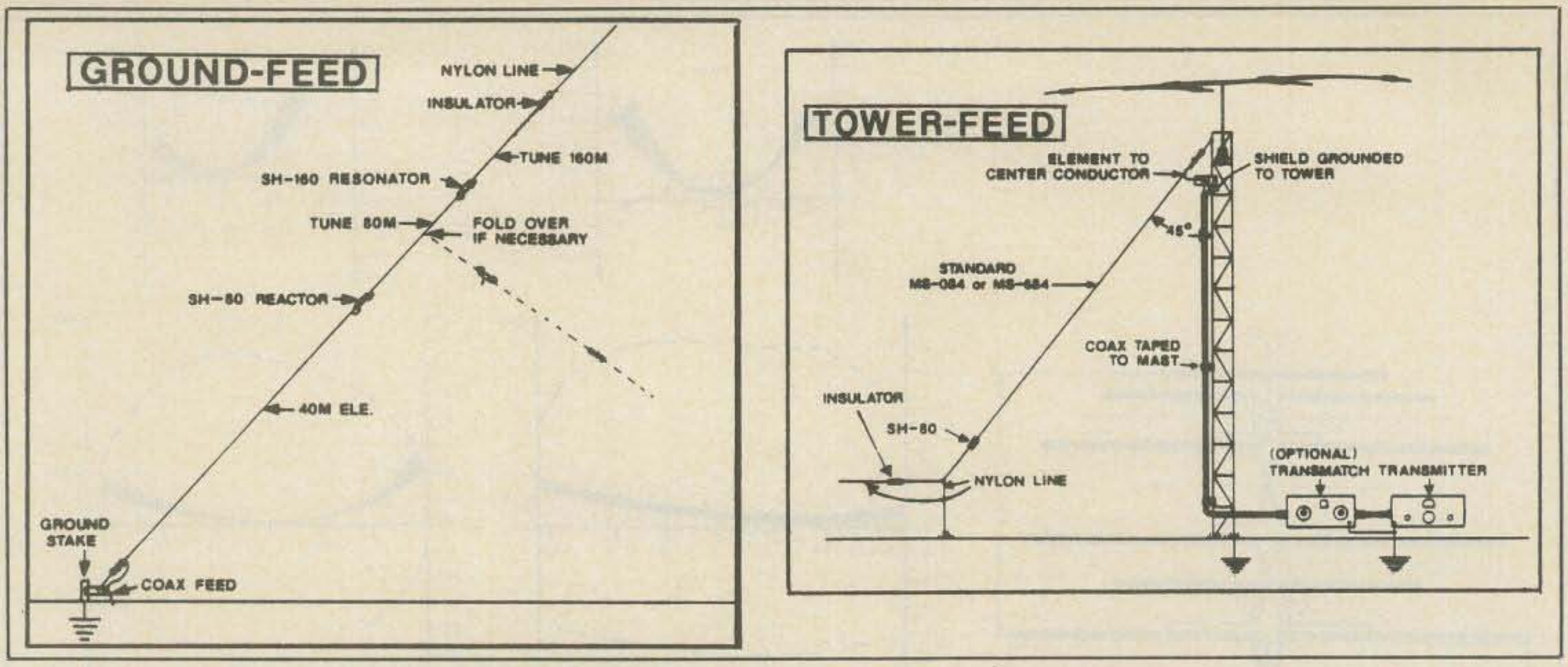


Fig. 3– W9INN half-slopers. The ground-fed half-sloper configuration is shown on the left, and the tower-fed half-sloper is on the right. (Source: W9INN product literature)

portable" 2 meter motel special antenna), but his primary focus is on trapless multiband dipoles and half-slopers. One of Bill's dual-band, 80 and 40 meter antennas is the MAX-084, which is a full-size, dual dipole fed with coaxial cable or with ladder line if desired. Although it's a full-size antenna (up to 125 feet long), it can be folded or bent as necessary to permit use of a flattop straightaway as short as 80 feet, with only a slight reduction in bandwidth and overall effectiveness over an unfolded, straight-shot installation.

Another much smaller dipole should be of interest to the mobile home and condo amateur; this is the 46 foot "Space Saver" dipole. Operating without traps, the antenna is usable on all nine h.f. bands, 160 through 10 meters, and is designed to be fed with ladder line. An antenna tuner or transmatch must be employed with this antenna for proper operation, however.

Bill's favorites, however, are the so-called "half slopers" which are about half the length of ordinary dipole slopers and are intended to be worked against ground. The multiband half-slopers make use of coils which function as resonators or "reactors," in his parlance, depending on the frequency being used. Multiband operation is provided automatically using a single semi-vertical antenna element. Several versions of these antennas are described in the W9INN catalog, covering various band combinations from one to four h.f. bands. The antennas may be fed either directly with coaxial cable, or through an antenna tuner using ladder line. Ranging from 41 to 60 feet in length, the half-slopers are designed with the fellow who already has an existing tower in mind; the antennas may be "sloped" off of the tower and fed against ground as with conventional verticals, or "tower-fed" at the top, working against the tower. As with all of Bill's antennas, the half-slopers are furnished complete, to include everything except the transmission line and ground stake—wire, insulators, coils, hardware, nylon line, mounting bracket, etc., are all provided. Fig. 3 shows examples of W9INN half-slopers in the two configurations described.

For more information, write to W9INN Antennas, P.O. Box 393, Mt. Prospect, IL 60056. I should mention that Bill's catalog includes a good deal in the way of dipole and sloper construction details and tips, and also has an extensive discussion on "remote tuning" of his dipoles and slopers.

LaCue Communications. In last October's column we mentioned that it is often difficult to obtain antenna parts. For the ham who lives near a major electronic parts supply house, or who is "regular" on the hamfest circuit, obtaining reasonably priced antenna parts is generally not too big of a problem. But for the ham who is distant from a walkin supplier, getting those individual parts (wire, insulators, feedline, connectors, etc.) can be difficult. After all, you don't just walk down to your local Radio Shack or Team Store and pick up several hundred feet of open-wire line or hardline! Mail-order buying is a good bet in many situations, and to that end we published in the column a listing of some 20 suppliers who specialize in mail-order antenna products.

But your ol' columnist had egg on his face by omitting, quite accidentally, one of the largest retailers of antenna parts for the ham trade. That's LaCue Communications, operated by proprietor Leonard L. LaCue.

LaCue's retail antenna line is an extensive one and includes a wide assortment of wire and cable, towers, antennas and rotors, and antenna accessories. Some non-antenna ham gear is also sold by the firm, which prides itself on same-day shipping. Contact LaCue Communications, 132 Village St., Johnstown, PA 15902.

Into The Mailbag

Tony Leneis, N6DXX, wrote to us advising that ". . . I enjoy reading your Antennas column in *CQ* very much, and after reading your May column, I had an idea: perhaps you could explain the 'whys and wherefores' of the various matching devices for beams and quads —stubs, gamma matches, etc."

Actually, we've already done just that in *CQ* through two series which appeared in 1981 and 1982, so let's refer to them here. The first was a three-part series conducted separately from the column and entitled "A Primer: The Cubical Quad Antenna." Parts I and II appeared in the August and December 1981 issues, while Part III (which described matching and tuning considerations) appeared later, in the April 1982 issue. This series covered topics such as the historical origins of the quad, loops, two- and multiple-element quads, and the "Yagi vs. quad" controversy. Also discussed were mini-quads, so called "Quagi's," expanded and delta quad designs, feeding and matching, tuneup, and v.h.f./u.h.f. operation.

Four full columns in 1982 were devoted to the Yagi. "The H.F. Yagi" series appeared in four parts, running from February through May 1982. Topics covered included the basic dipole element, Yagi array design, gain and front-to-back (F/B) ratio, multiband and trap Yagis, construction techniques, and Yagi feeding, tuning, and matching. Part IV contained information along the lines sought by N6DXX, though I should mention that both series were beginner's tutorials and did not contain specific construction details for

matching devices. If you're going to construct a quad or Yagi and design a matching device for it, then you'll want to consult a standard antenna text such as the *ARRL Antenna Book* or the *Antenna Anthology*. Look over some of the titles carried by the *CQ* Book Shop, as well.

While we're discussing previously covered topics, readers might want to review the May and June 1984 Antennas columns. These two columns constitute a review and index of our first four years of stewardship of the column, from 1980 through 1983, and this review includes a description of the major topics covered in each issue. If you missed saving a particular column or issue (you *do* save them, now don't you?) and can't obtain the particular issue locally, you can obtain back copies of most *CQ* issues or columns reprints for $2.00 each directly from the magazine's editorial offices. Your request should be addressed to *CQ* at 76 N. Broadway, Hicksville, NY 11801. Alternately, I can provide copies of past Antennas columns and other *CQ* articles which I've authored. Figure about $1.25 per column or article to cover the costs of copying and postage, and write directly to me at 317 Poplar Drive, Millbrook, AL 36054.

While my home QTH is before you, let me suggest that when you have a question regarding something in the column or would like to contribute material to the column, you write directly to me rather than via the magazine's editorial offices in New York. While *CQ* faithfully forwards correspondence to me, there's a delay involved in forwarding inquiries. Also, sometimes *CQ*'s infamous automatic letter opener unintentionally "does a number" on your correspondence! Naturally, an s.a.s.e. would be appreciated to speed your reply.

Feedback: Anthony F. Japha, proprietor of Xantek, Inc., which makes the "DX Edge" gray-line propagation aid described in the May 1984 issue, sent us a nice note. Writes he: "Many thanks for the fine writeup which you gave to the DX Edge in your May column. I enjoyed reading it very much. I have found your reviews of some of the newly available software of particular interest. As the sunspots go down over the next few years, the personal computer aspects of ham radio promise to make up some of the slack and keep interest high . . . ."

Right on, and thanks for the kind words. We will continue to broaden the column's horizons to describe many of the practical applications for the personal computer (PC) in the hamshack, with special emphasis on propagation and antenna calculation software that has some relation to the basic "antenna theme" of the column, though we will continue to reach out occasionally to describe other hamshack software in which we believe readers will be interested. And, if you're fascinated by the exciting possibilities of so-called "gray-line DX-ing," we'll refer you to past columns, such as the May issue which highlighted the DX Edge. Take a look also at last month's issue in which we presented some s.w.l.-oriented details on the gray-line phenomenon as contributed by fellow author and tropical shortwave-band DXer John D. Tuchscherer.

Software Notes

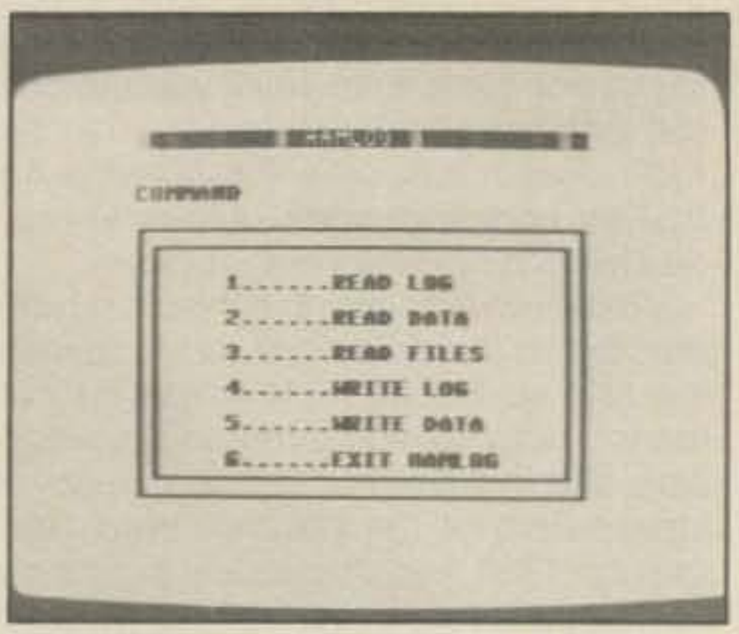
Where to find software that's specifically designed to run on one's own PC can be a problem, and we receive many cards and letters asking just how we "ferret out" software sources. For various reasons, certain computers seem to be favored with hamshack software—notably the Vic-20 and the Commodore 64 (my own computers), as well as the various flavors of Apples and TRS-80s. Lesser quantities of software have appeared for other popular PCs such as IBM's several models, the TI 99/4, Timex/Sinclair, and Atari—or so it seems to me. And precious little (though some) hamshack software is to be seen for business-oriented computers such as the Franklin, Kaypro, Osborne, and various Japanese imports.

Of one is sufficiently frustrated by a real lack of hamshack software for his or her own PC, it usually isn't too difficult to write one's own program tailored to meet specific needs. But for commercial software offerings, I suggest that for starters you peruse the back-of-the-magazine ads, particularly the classifieds, to identify possible software sources for your PC. Bear in mind that most ham software is produced by hams like you and me, whose offerings are largely in the "cottage industry" stage, thus precluding easily-found, full-page ads. As you might expect, the quality of ham-produced software often reflects the fact that amateur radio still *is* a hobby!

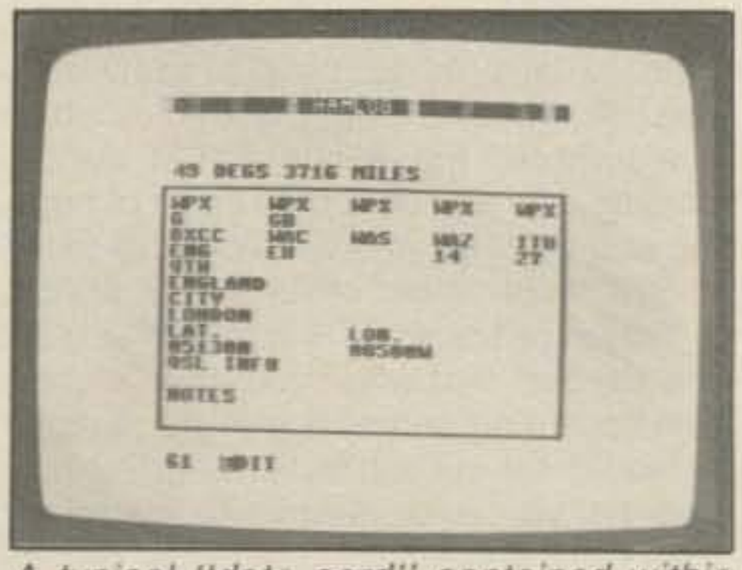
I regularly peruse the major ham publications such as *CQ, QST, 73,* and *Ham Radio,* as well as various newsletters and computer "green sheets," to identify new sources. I periodically assemble these to provide a software-sources update in the column, so look for this update from time to time.

On-the-air QSOs, particularly on RTTY and c.w. where computer-assisted contacts abound, provide good vehicles for the exchange of software information. It's surprising how very good and very bad software will be the topic of many an extended QSO! Too, there are many computer-specific user nets in operation which provide the opportunity for exchange of program ideas relating to your particular PC.

Also, don't overlook two very good close-at-hand sources of computer software information: your local amateur radio club and user's group! Both types of organizations can be excellent vehicles for software information exchange. For



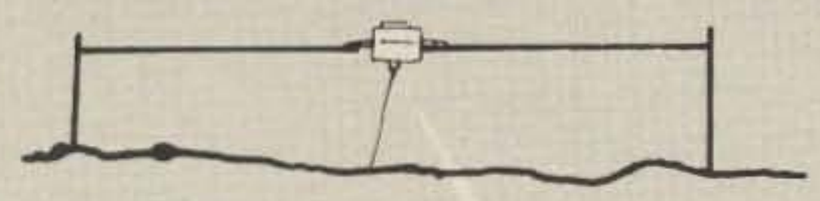
HAMLOG main menu offers five operational functions plus an exit from the program. Menu options 1 and 4 are concerned with primary station logging functions, while options 2, 3, and 5 relate to the program's built-in, DX-oriented databases. (W8FX photo)

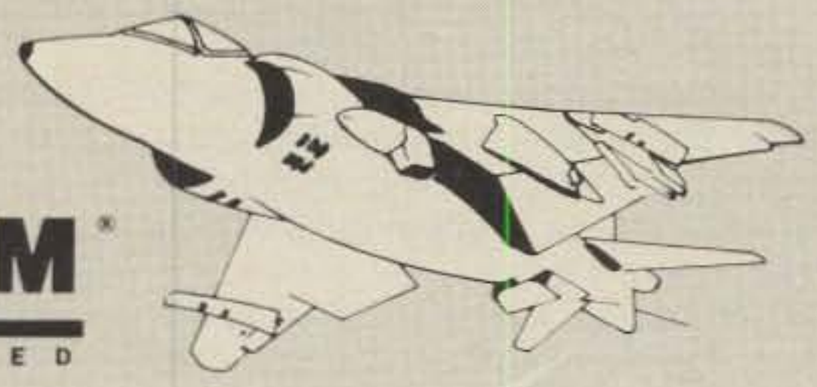


A typical "data card" contained within the HAMLOG program presents a wealth of specific information for a given DX point. Much in the fashion of beam-heading and distance programs, HAMLOG also displays this data upon command; shown here is the DX path between the author's Alabama QTH and London. (W8FX photo)

example, an amateur radio "special interest group" or "SIG" can be formed within the user's group for computer hams to meet and exchange information. The SIG can also present programs on amateur radio to the full user's group, with the potential to recruit future hams who already have a "leg up" with their knowledge of computers. Conversely, formation of a computer sub-group within the local amateur radio club can yield many of the same benefits, though from the standpoint of "hams who use computers" rather than "computer users who also are hams."

Postscript: For an overview of computers in the hamshack, you may want to read my article "Radio-Active Software," which appeared in the July 1984 issue of *Run*, a computer-specific publication serving Commodore 64 and Vic-20 users. While the *Run* article is primarily a survey aimed at the non-ham and s.w.l., I believe it constitutes a good orientation to the dozen or so major hamshack uses I have found for the PC. The article stresses the





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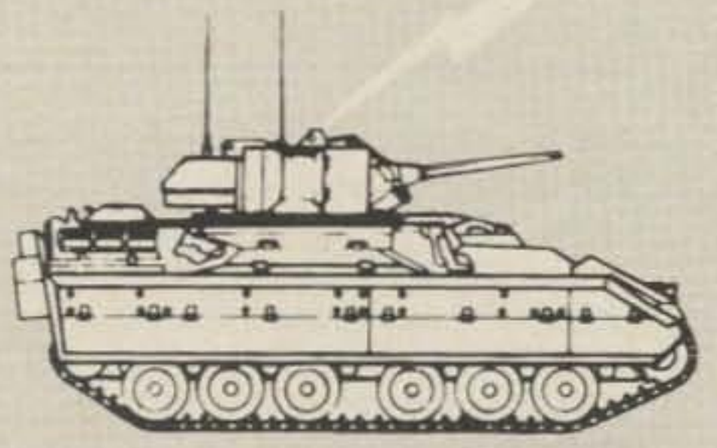

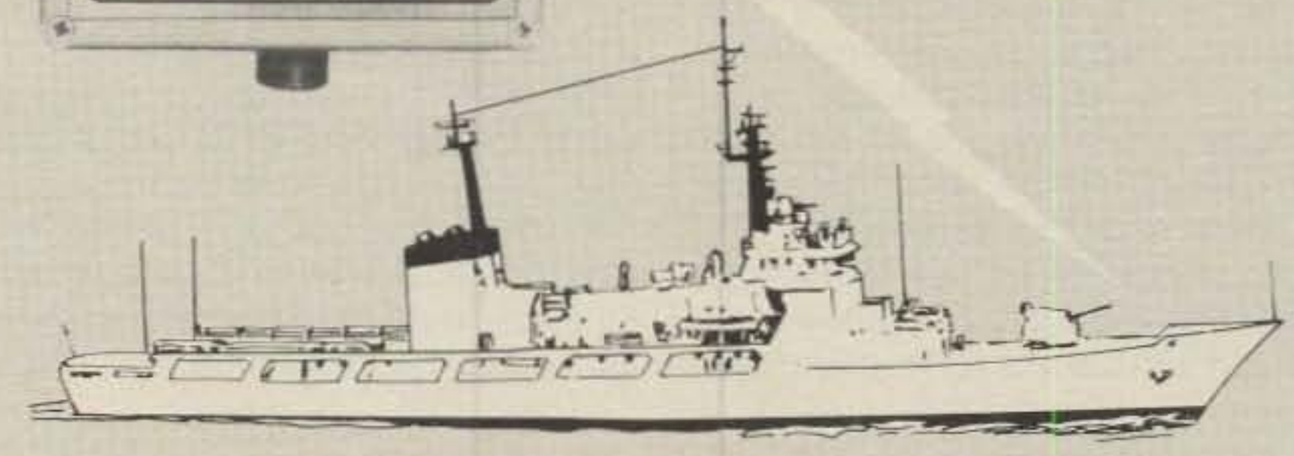

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CIRCLE 97 ON READER SERVICE CARD

unique character of the two hobbies—personal computing and amateur radio—which can make them go together as well as bread and butter. From the article you may glean some ideas for PC use in your own shack, as well as develop some ideas for a hamshack computing presentation either at your amateur radio club or computer user's group.

This month we'll take a look at HAMLOG for the Commodore 64 and Vic-20 offered by the firm of the same name at P.O. Box 308, Englewood, OH 45322. Over the past year or so I have had the opportunity to browse through numerous logging programs for Commodore and other computers, and I have found both good and bad ones, and others that are "just o.k." This one easily fits into the "good" category, and it sports some features not usually found in the average logging program.

The disk-based HAMLOG is designed to store some 700 logbook entries on a separate data disk, and it contains an extensive, built-in, user-modifiable database. The program will search for contacts by callsign, name, time, date, frequency, state, and other parameters, and full editing of logbook entries is provided for. Interestingly, the program allows you to search on just the first letter of the callsign, as well as the complete callsign prefix. This feature is useful for looking up any call that you might not remember in its full entirety. HAMLOG will send its information to the printer as well as the the screen, printing out either QSL stickers or the entire log (or selected portions), using about 50 contacts to the page. Readily-accessed, fast "relative files" are used for the logbook entries.

Two additional database features are worthy of mention. To support the basic log, the program also includes five sequential files that provide the user with standardized abbreviations for callsign prefixes, states, continents, DXCC countries, and ARRL sections. This read-only database is included primarily to assist you in using consistent, standardized abbreviations in making logbook entries, in order to facilitate smooth data searching and retrieval of logbook file data.

To further support the log, there are some 333 preprogrammed relative file entries that can be thought of as "data cards" on the various countries of the world. Probably the most useful data element is a personalized beam heading to the particular country, based on the user's QTH. A wealth of data is included on each "data card," including the country prefix, country name and DXCC abbreviation, continent, *CQ* and ITU zone, capital or principal city with its latitude and longitude, and other important DX information. These data cards may be edited for you to input QSL information and other remarks. In addition, as these are read/write files, you may create data cards for new DXCC countries or for other purposes. All beam headings may be customized to your QTH before running the program for the first time, or they may be changed to reflect a new operating location at any time.

I found HAMLOG to be an interesting and good-performing logging program with several nice "pluses." Fig. 4 shows several examples of the program's printed log output, while fig. 5 shows an example of the QSL stickers produced.

```
CONFIRMING 2 X A3 QSO WITH
LA4YW ON 14 MHZ.
83 JAN 4 GMT 1632 RST 5/7
PSE/TNX QSL


CONFIRMING 2 X A3 QSO WITH
YU1DZ ON 14 MHZ.
81 OCT 22 GMT 1407 RST 5/9
PSE/TNX QSL


CONFIRMING 2 X A1 QSO WITH
JH1WIX ON 21 MHZ.
81 NOV 15 GMT 0134 RST 559
PSE/TNX QSL


CONFIRMING 2 X A3 QSO WITH
I2KRR ON 21 MHZ.
81 NOV 25 GMT 1324 RST 5/8
PSE/TNX QSL


CONFIRMING 2 X A3 QSO WITH
EI9DZ ON 21 MHZ.
81 DEC 24 GMT 2042 RST 5/7
PSE/TNX QSL
```

Fig. 5– HAMLOG produced QSL stickers. The ability to print out QSL stickers directly from the station log can be a real boon to high-volume contest and DXpedition operation. Shown here is a sampling of QSL stickers produced by the HAMLOG logging program described in the text. The five stickers shown here correspond to five QSO "line items" in the log example of fig. 4.

HAMLOG 81 TOTAL

DATE	TIME	CALL	NAME	FREQ (MHZ)	MODE	PWR	RSTS	RSTR	QSLS/R
81 OCT 22	GMT 1407	YU1DZ	TOMA	14	A3	100	5/9	5/9	Y/N
81 NOV 15	GMT 0134	JH1WIX	TAROK	21	A1	100	559	549	N/Y
81 NOV 25	GMT 1324	I2KRR	RENZO	21	A3	100	5/8	5/9	Y/Y
81 DEC 24	GMT 2042	EI9DZ	GERRY	21	A3	100	5/7	5/7	Y/Y

HAMLOG 82 TOTAL

DATE	TIME	CALL	NAME	FREQ (MHZ)	MODE	PWR	RSTS	RSTR	QSLS/R
82 NOV 28	GMT 0322	VE3INQ	IVAN	1.6	A1	100	599	599	Y/Y
82 NOV 30	GMT 1820	YV3BRF	GENNARO	21	A3	100	5/9	5/9	N/Y

HAMLOG 83 TOTAL

DATE	TIME	CALL	NAME	FREQ (MHZ)	MODE	PWR	RSTS	RSTR	QSLS/R
83 JAN 4	GMT 1632	LA4YW	LIV	14	A3	100	5/7	5/7	Y/Y
83 FEB 28	GMT 1430	LA8BH	TORB	21	A3	100	5/9	5/9	Y/N
83 APRIL 25	GMT 1551	IV3EHH	PETER	14	A3	100	5/7	5/6	N/Y
83 MAY 14	GMT 1500	EA1BCU	MIGUEL	21	A1	100	459	259	Y/Y
83 JULY 13	GMT 0000	FG7BP	ANDRE	21	A1	100	599	599	Y/Y

HAMLOG GMT TOTAL

DATE	TIME	CALL	NAME	FREQ (MHZ)	MODE	PWR	RSTS	RSTR	QSLS/R
JAN XX 19XX	GMT TIME	KA8XXX	BILL	21.150	A1	100	599	589	YES/NO
81 OCT 22	GMT 1407	YU1DZ	TOMA	14	A3	100	5/9	5/9	Y/N
81 NOV 15	GMT 0134	JH1WIX	TAROK	21	A1	100	559	549	N/Y
81 NOV 25	GMT 1324	I2KRR	RENZO	21	A3	100	5/8	5/9	Y/Y
81 DEC 24	GMT 2042	EI9DZ	GERRY	21	A3	100	5/7	5/7	Y/Y
82 NOV 28	GMT 0322	VE3INQ	IVAN	1.6	A1	100	599	599	Y/Y
82 NOV 30	GMT 1820	YV3BRF	GENNARO	21	A3	100	5/9	5/9	N/Y
83 JAN 4	GMT 1632	LA4YW	LIV	14	A3	100	5/7	5/7	Y/Y
83 FEB 28	GMT 1430	LA8BH	TORB	21	A3	100	5/9	5/9	Y/N
83 APRIL 25	GMT 1551	IV3EHH	PETER	14	A3	100	5/7	5/6	N/Y
83 MAY 14	GMT 1500	EA1BCU	MIGUEL	21	A1	100	459	259	Y/Y
83 JULY 13	GMT 0000	FG7BP	ANDRE	21	A1	100	599	599	Y/Y

Fig. 4– HAMLOG sample printed log output. This printout is shown by year (81-82-83) and also in its entirety by GMT. Printout is selective, as desired by the user. Operator has the ability to edit all data, including QSL sent/received information.

Summing Up

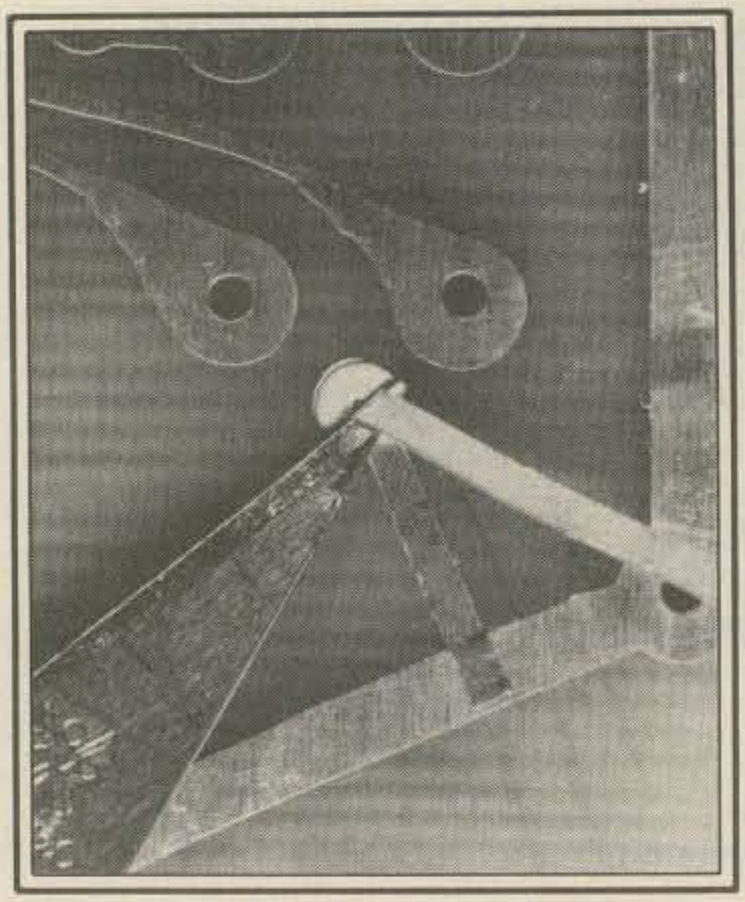
This month we have perused several antenna companies' wares with part two of our "Product Peek" series. We also caught up on some reader mail and went on to discuss several software topics, focusing on a new and sophisticated logging program for Commodore computers. Next month we plan to "peek into" a few more product lines before moving on to new topics. See you then.

73, Karl, W8FX

CQ SHOWCASE

Datak Corporation
Copper Donuts and Traces

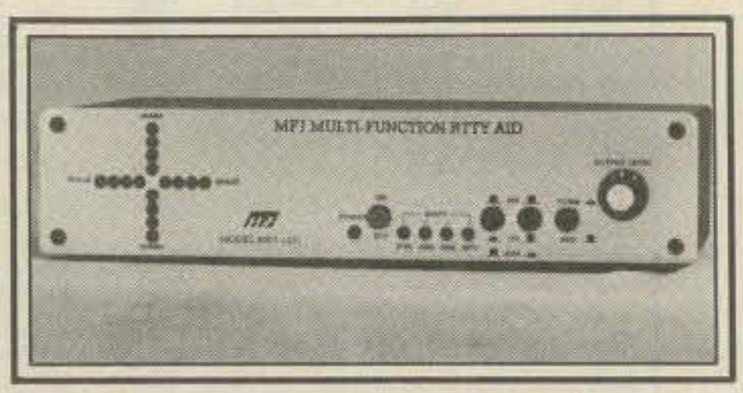
A set of adhesive-backed copper donuts can rescue damaged printed circuit boards from the trash pile. Part of DATAK's new "Circuit-Fix™" series, the set has 308 assorted round terminal pads, including 0.062", 0.093", 0.125", and 0.156" diameter. The pads have no center hole, only a pilot mark designed to be pierced with a needle or with the actual component lead. Donut pads are electrically connected to traces by bridge soldering. Donuts are used with the original trace or with a replacement cut from a copper foil sheet with a special patented (pending) tool.



The CF-2 Donut Set and the CF-3 Copper Foil set are $4.00 each. A complete repair set, the CF-1 "Circuit-Fix™ Kit," is available for $21.95. For more information, contact the Datak Corporation, 65 71st Street, Guttenberg, NJ 07093, or circle number 101 on the reader service card.

MFJ-1221 RTTY Operating Aid

Called the 7-in-1 RTTY Operating Aid, the MFJ-1221 has seven distinct features. Just plug the MFJ-1221 between your receiver and computer interface and you're ready to go. The unit has a new 16 LED crosshair tuning array. Tune the unit for maximum vertical (mark) and horizontal (space) display. While the crosshair tuning array simulates a scope ellipse, the MFJ-1221 also features mark



and space outputs for connection to an oscilloscope for true scope tuning. The 7-in-1 RTTY operating aid has a shift indicator that allows you to identify 170, 425, or 850 Hz shifts by tuning the mark LED until it blinks. The appropriate shift indicator will then blink to identify either 170, 425, or 850 Hz shift. This feature is useful for indicating inverted shift as well as identifying RTTY shifts outside the amateur bands. The 7-in-1 RTTY operating aid also features a Normal/Reverse switch that allows checking for inverted RTTY without changing side bands and retuning; an output level control that allows adjusting the input signal level to the RTTY computer interface for proper operation; and a limiter that evens out signal variation for easier, smoother copy.

The product comes with a one-year unconditional warranty and a 30-day money-back guarantee. The unit sells for $79.95 plus $4.00 shipping. For more information, contact MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762, or circle number 104 on the reader service card.

ICOM IC-47A Mobile Transceiver

The ICOM IC-47A 25 watt, 440 MHz mobile transceiver features built-in speaker, 9 full-function memories, 32 built-in PL frequencies, 3 scanning functions (memory scan, band scan, and priority scan), IC-HM23 DTMF microphone with up/down scan buttons, internal lithium battery backup to maintain memories for up to 5 years, and IC-MB27 mobile mount. The unit measures 1½"H × 5½"W × 7"D and is priced at $469.00. A variety of options are available, including an IC-UT16 speech synthesizer and IC-SP4 and SP5 external speakers. For more information, contact ICOM America, Inc., 2112 116th Avenue NE, Bellevue, WA 98004, or circle number 108 on the reader service card.

World Distributors, Inc.
LCD Pen-Type Tester

The Checkman DM1350 autoranging LCD pen tester features four DC volt ranges (2V/20V/200V/2000V), four AC volt ranges (2V/20V/200V/2000V), four resistance ranges (2K/20K/200K/2000K), and continuity test. Data hold function allows the user to lock the reading, and the continuity test features audio sound. The unit comes complete with case, test lead, clip, and batteries. Price is $44.95 (quantity prices available). For more information, contact World Distributors, Inc., 709 N. Memorial Parkway, Huntsville, AL 35801, or circle number 105 on the reader service card.

Hamtronics® Simplex Autopatch

For several years, Hamtronics, Inc. has offered a Repeater Autopatch in kit form, including the DTMF Tone Decoder/Controller module. Now they have a new module, which can be used with the Autopatch, which allows operation on simplex transceivers. When an autopatch is used on a repeater, the duplex operation of the repeater allows the mobile operator to break into the telephone conversation anytime he has something to say. When operating simplex, it is necessary to have a method to allow the mobile operator to access the base station receiver even though the base transmitter is on the same frequency. The AP-2 Simplex Autopatch Timing Module kit provides the required timing and logic circuits to allow the mobile operator to bring up the autopatch through touch-tone control, and it keys the base station transmitter with an automatic window generator circuit, which breaks periodically to allow the receiver to listen for the mobile station. If

the mobile station is on the air, the window generator stops the base transmitter for the duration of the mobile transmission so the mobile operator maintains complete control of the transmit/receive switching of the base transceiver.

The AP-2 module with the basic Autopatch and DTMF Tone Decoder modules sells for $200. The system is also available wired and tested. For more information, contact Hamtronics, Inc., 65 Moul Road, Hilton, NY 14468-9535, or circle number 106 on the reader service card.

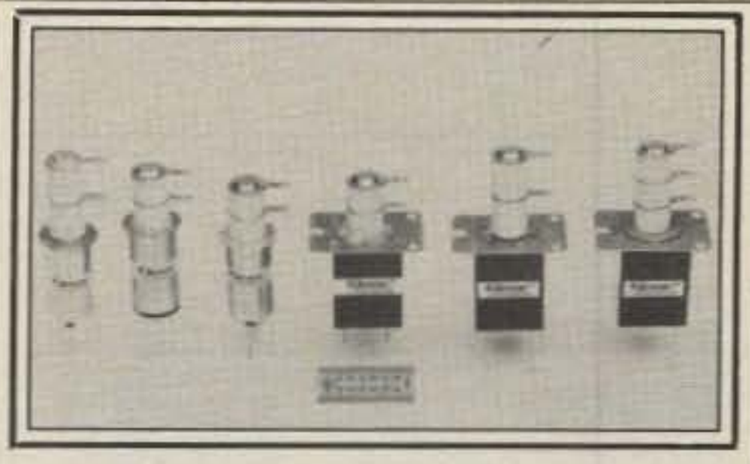
Dipole Construction Handbook From Microwave Filter

The Dandy Dipole is a 24-page handbook for constructing over 180 variations of the dipole. It shows where and how to place it, and how to quickly design a multiband dipole—using traps—without guessing at the wire lengths. Best height for good s.w.r. and radiation and dozens of practical details are collected in this handbook. Among the contents are computing the wire length and pruning to resonant frequency; proper height for best s.w.r. and radiation; the multiband trapped dipole, 183 band combinations (complete wiring tables); inverted "V" and dipole components as insulators, baluns, traps, and wire.

The book was written inhouse by Daniel Bostick, WA2ZYR, and Donald Shatraw, technical consultants. Cost is $3.95 plus $1.00 for shipping. For more information contact Microwave Filter Company, Inc., 6743 Kinne St., East Syracuse, NY 13057, or circle number 103 on the reader service card.

Kilovac Miniature High-Voltage Relays

An entire family of ceramic vacuum relays has been announced by Kilovac Corporation. Available in SPST, SPDT, failsafe, and latching configurations, the K40 Series of relays includes both 5 kV and 10kV rated models, with current carry of 15 amps at d.c. and of 3.8 amps



at 32 MHz. Weighing only one ounce, the miniature relays are offered in both a low-cost commercial version and a military version conforming to MIL-R-83725B. With operate times as fast as 4 milliseconds, the K40 Series relays are especially suited for applications in digital antenna couplers, laser systems, medical instruments, and numerous industrial high-voltage switching requirements.

A new short form catalog, No. SF5, is available from Kilovac. It contains complete specifications on the K40 Series as well as the rest of Kilovac's broad line of high-voltage relays to 100 kV. For more information, contact Kilovac Corporation, P.O. Box 4422, Santa Barbara, CA 93103, or circle number 102 on the reader service card.

No - 83 - 84

Awards

a monthly feature by
DOROTHY H. JOHNSON, WB9RCY

NEWS OF CERTIFICATE AND AWARD COLLECTING

The story of the month as told by Kyle is:

Kyle P. Chavez, WA4PGM
All Counties #470 3-31-84

"I became interested in amateur radio through a friend who was a 'CB Buddy.' One evening he told me about a fellow who was talking to New York, California, and all around the world. I was very interested in that. Later in that same week we visited the QTH of WA4QQI, and he explained amateur radio to me.

"Fortunately, the Farmville, Virginia ARC was giving a Novice class, so I joined them. I passed the exam and was licensed as WN4PGM on May 28, 1976 at the age of 16. Because I was traveling and spending some time in Moab, Utah and Springfield, Missouri, I remained a Novice for the next six years. I passed the General class exam in February 1982 in St. Louis, Missouri.

"While tuning the 20 meter band I came upon the county hunter at 14.336. It sounded like a DX pile-up. I was soon 'hooked' and began chasing counties. I will always treasure my USA-CA Award. It is one of the most difficult awards to earn.

"Since I was licensed, I have earned WAS, WAC, RCC, CP 30WPM, A-1 OP, DXCC, and two years in a row first-place portable in the CW County Hunters Contest.

"Don, K5CKQ, gave me my very last county, Kiowa County, Kansas. I returned the favor by giving him his last one. I will always be grateful to Don for taking a newcomer off the net frequency and showing me the right way to go.

"I am now working for a QRP endorsement and have over 2000 counties worked and confirmed.—73, Kyle" *(Note: Sorry, we have no photograph of Kyle—ed.)*

Awards Issued

Henry C. Lybrand, W3HQU, finished them all and qualified for USA-CA All Counties #481, All C.W., 8-18-84.

James Grandinetti, KZ2P (ex-WA2SRM), completed the paperwork for the last 76 counties and now has USA-CA All Counties #482, All S.S.B., 8-25-84.

Tom Ross, K9GTQ, added another endorsement to his fine collection, and now has USA-CA #250, 9-20-79, endorsed All 20M, All Mobile, All S.S.B.

USA-CA 3000 #511, All C.W., All 14 MHz, went to Henry C. Lybrand, W3HQU.

333 South Lincoln Ave., Mundelein, IL 60060

ON5KL, Mat. Van Campenhout, U.B.A. HF Awards Manager.

Henry, W3HQU, also has USA-CA 2500 #570, All C.W., All 14 MHz.

Esther E. Frost, KA4IFF, won USA-CA 2500 #571, All C.W., 8-24-84.

USA-CA 2000 #626, endorsed All C.W., went to Esther E. Frost on 8-24-84.

Tom van Ettsger, WC4K, added USA-CA 1500 #693 to his collection.

USA-CA 1500 #694, All C.W., All 14 MHz, 8-18-84, now belongs to Henry C. Lybrand.

Esther E. Frost, KA4IFF, was awarded USA-CA 1500 #695, All C.W., 8-24-84.

Barry C. Dutcher, KA1CLV, qualified for USA-CA 1000 #852, All C.W., 7-17-84.

Henry C. Lybrand, W3HQU, has USA-CA 1000 #853, All C.W.

KA4IFF, Esther E. Frost, sent for USA-CA 1000 #854, All C.W., 8-24-84.

USA-CA 500 certificates went to:

David Lynn Smith, ND4Y, #1964, 8-1-84, Mixed.

Fumio Iwashita, JA1KRU, #1965, 8-4-84, Mixed Band, All C.W. Mode.

Steven M. Wheatley, KU9C, #1966, 8-10-84, All S.S.B.

Mat. Van Campenhout, ON5KL, #1967, 8-10-84, Mixed.

Stephen E. Press, WA1UDH, #1968, 8-17-84, Mixed.

Barry C. Dutcher, KA1CLV, #1969, 8-17-84, All C.W.

Henry C. Lybrand, W3HQU, #1970, 8-18-84, All C.W., All 14 MHz.

M. S. Lumban, YB0WR, #1971, All S.S.B., 8-23-84, #2 to Indonesia.

Ronald E. Johnson, WB0VNN, #1972, 8-23-84, All C.W.

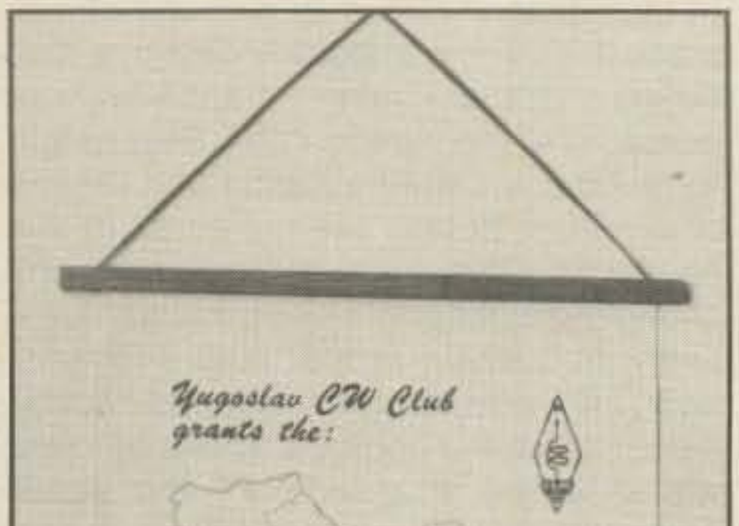
Esther E. Frost, KA4IFF, #1973, 8-24-84, All C.W.

New Awards

Worked Yugoslav CW Club. Sponsored by the Yugoslav CW Club, the WYUCWK Award is available to radio amateurs upon confirmation of c.w. QSO's with Yugoslav CW Club member stations. YU applicants need to confirm c.w. QSO's with 30 different club members. EU stations must confirm 15 different club members. DX stations must confirm 10 different club members. Only contacts after Janaury 1, 1983 are valid. Award fee

Special Honor Roll
All Counties
#481 Henry C. Lybrand, W3HQU 8-18-84
#482 James Grandinetti, KZ2P 8-25-84

New Endorsement
#250 Tom Ross 9-20-79, endorsed All 20M, All Mobiles, All S.S.B., 8-23-84



The Yugoslav CW Club Award.

USA-CA Honor Roll

3000		2500		2000		1500		1000		500	
W3HQU	511	W3HQU	570	W3HQU	625	WC4K	693	KA1CLV	852	ND4Y	1964
		KA4IFF	571	KA4IFF	626	W3HQU	694	W3HQO	853	JA1KRU	1965
						KA4IFF	695	KA4IFF	854	KU9C	1966
										ON5KL	1967
										WA1UDH	1968
										KA1CLV	1969
										W3HQU	1970
										YB0WR	1971
										WB0VNN	1972
										KA4IFF	1973

is 10 IRC's to the award manager: Radovan Nesic-Rade, YU7FN, P.O. Box 42, 23272 Novi Becej, Yugoslavia. This is a beautiful award printed on canvas.

Club members include: **YU1:** BM, DA, DW, DZ, EA, EW, EX, FD, FU, GV, HC, KL, MV, NVT, OBU, OII, OTZ, OYF, PZO, RL, UA, UB, VT, VV, YU. **YU2:** CW, DW, DX, HW, KR, LM, OB, OK, OP, PG, QS, TS, VB, VC, WJ, XT. **YU3:** AR, BO, CM, CV, EJ, EO, EW, EY, EZ, GO, IB, II, IW, SO, TQT, ZV. **YU4:** EA, EU, GD, HA, IA, KW, SA, VCW, VMW, VQT, VSZ, VXW, WDR, WIL, WSO. **YU5:** PK. **YU6:** OGW, ZAN, ZAX. **YU7:** AD, AF, AV, AW, DM, DX, EU, FN, KW, NGO, NTN, ORN, PEA, QCP, QDY.

WAKI, The Kwajalein Award. WAKI, the Worked All Kwajalein Award, is still available to any station that has confirmed five KX6 stations located on Kwajalein Atoll (Kwajalein, Ebeye, Roi-Namur Islands). Anyone desiring a WAKI certificate should send a list certified by a club official containing call sign, band, mode, and date worked. Send the list to KARC, Secretary, P.O. Box 444, APO San Francisco 96555-0008, with U.S. $5.00.

For those who are working for this award, KARC has also sent the following information: KABU will again be on the air commemorating the 41st anniversary of the Battles of Kwajalein and Roi-Namur. Operation will start at 0600Z February 1 and end at 0600Z February 9, 1985. Frequencies will be s.s.b. 28.600, 21.350, 14.250; c.w. will be 28.050, 21.050, 14.050, and 7.050. Stations working KX6BU will be issued a QSL, certificate, and a 64-page book of the Battles of Kwajalein and Roi-Namur for U.S. $6.00. For $3.00 a QSL and certificate will be issued. All requests should be sent to KX6BU, Box 444, APO SF 96555-0008.

BRYLA—Brazilian YL Award. Radio amateurs are eligible for this award after two-way radio communication with YL stations in Brazil as follows: *DX*—12 YL stations from different countries (3 continents), 8 YL stations from Brazil; *PY*—20 YL stations from Brazil, 5 YL stations from different countries (3 continents). Contacts must be made from the same QTH, in any band or any mode, and in accordance with international regulations. QSO's after July 1975 are valid for this award.

Applicants must send a standard log certified by a recognized amateur radio association. List the stations worked, date, time, mode, report, and band. This award may also be earned by s.w.l.'s.

The BRYLA Net meets every Wednesday at 1900 GMT on 14.250. When applying for the BRYLA, please send a QSL for BRYLA's files and 10 IRC's for return postage addressed to: BRYLA, c/o PT2TF, P.O. Box 07/0004, 70.00 Brasilia, DF, Brasil.

International Short Wave League Awards Programme. Each award is a separate color certificate available to all, members or not. Send GCR list of QSL's together with

ISWL Monitor Award.

ISWL Zone Award.

ISWL V.H.F. County Award.

1 pound .50 U.K. or $5.00 U.S., or 10 IRC's for each award (free to ISWL members) to: ISWL Awards Manager, Mr. Clifford A. Tooke, 6 Chelmer Avenue, Rayleigh, Essex. SS6 7TB, England.

Century Club: For verified contact/reception of 100 countries as defined on the ISWL Country List, with stickers for each additional 25 countries up to 350.

Zone Award: For verified contact/reception of 25, 50, or 75 ITU zones as defined on ITU zone map. The country, zone, continents, prefix list is available from HQ or Awards Manager for 35p or 3 IRC's.

Monitor Award 1: For verified contact/reception of 25 licensed ISWL members since 1-1-70, with stickers for each additional 25 members up to 200. Licensed members may count QSL's from ISWL s.w.l. members, together with licensed members' cards. The list of members is produced annually and is available from HQ for 20p or 2 IRC's.

Monitor Award 2: This is issued for verification of 225 members, with stickers to 400.

Monitor Award 3: This is issued for verification of 425 members with stickers to 600.

VHF County Award: For verified confirmation of working/hearing 10 counties on VHF, including television. Stickers issued for 20, 30, 40, 50, and 70 counties.

(Note: This is only a partial list of the ISWL Awards. More next month.—ed.)

Members of the Mobile Amateur Radio Club of Colorado. Top row, left to right: N0CKC, N0RYK, N0DPX, KC0VB, KC0VA, Ellen, XYL of KY0E. Front row: W0RSR, KY0E, KV0E, SK. (Photo by N0CKC.)

One of our DX County Hunters, Mico Avramovic, YU7DX, at his station in Novi Sad, Yugoslavia.

Notes

It is with great sorrow that we report that Michael Gergory Mutnick, KV0E, age 39, is a Silent Key. Apparently, Mike was murdered while he was on a county hunting trip. Mike was voted c.w. operator of the year, 1983 and 1984, by the county hunters. He will be sorely missed by his many friends.

We made a mistake. The correct address for the Green Mountain Award is W5NS Awards Manager, 1800 Moonlight Drive, Bartlesville, OK 74006. Sorry, Dave.

Happy Holidays to you. May you have your family close and joy in your heart. CU in January!

73, Dorothy, WB9RCY

Contest Calendar

a monthly feature by
FRANK ANZALONE, W1WY

NEWS/VIEWS OF ON-THE-AIR COMPETITION

As indicated last month, we are making some corrections in the 1983 contest results. Due to the relocation of the Contest Directors and not having the logs at my disposal, I was only able to correct the errors in the Trophy Awards. Same will be found in the Erratum box. Hopefully that has covered most of the major errors.

The Carib./C.A. all-band awards vacated by N6TJ have been picked up by Peter Munroe, WB1DQC, for the c.w. section. The phone award has already been sponsored by Alex Kasevich, VP2MM. Both are for the recent 1984 contest.

If you heard and worked more than the usual number of contest expeditions in the recent contest, it was probably due to a new referral system organized by Lee Strain, N7DF. If you are interested and want to be part of a contest expedition team in the future, send an s.a.s.e. to Lee, Box 125, Holton, KS 66436, and he will provide you with the necessary registration forms (no charge). Unfortunately, I was unable to make this known in time for our recent contest, but there is plenty of time for you to line up something for our WPX Contest coming up in March and May, as well as other contest activity this spring.

The 160 Meter Contest rules in this issue show no increase in the penalty for excessive duplicate contacts, but be assured it will be more strictly enforced. What we will be closely monitoring is the abuse of using the DX window for on-frequency contacts. So be forewarned. More next month.

Deadline for the March issue is December 15th, and January 15th for the April issue. This is the December issue, isn't it? A very Happy Holiday to all of you.

Have you checked the expiration date of your license lately?

73 for this time, Frank, W1WY

Calendar of Events

*	Nv.30	De.2	ARRL 160 Meter Contest
*	Dec.	1-2	TOPS 3.5 MHz CW Contest
	Dec.	1-2	Spanish C.W. Contest
*	Dec.	1-3	Telco. Pioneers QSO Party
†	Dec.	8-9	Hungarian C.W. Contest
	Dec.	8-9	ARRL 10 Meter Contest
	Dec.	30	Canada Contest
	Jan.	12&13	"73" 40&75 M SSB Contest
	Jan.	19-20	"73" 160 M SSB Contest
	Jan.	21-27	A5 ATV WAS SSTV Contest
	Jan.	**25-27**	**CQ WW DX 160M C.W. Contest**
	Jan.	26&27	"73" 15&20 M SSB Contest
	Jan.	26-27	French C.W. Contest
	Jan.	27-28	Classic Radio Exchange
	Feb.	9-10	QCWA C.W. QSO Party
	Feb.	9-10	YL-OM Phone Contest
	Feb.	**22-24**	**CQ WW DX 160M SSB Contest**
	Feb.	23	"73" RTTY Contest
	Feb.	23-24	YL-ISSB Phone QSO Party
	Feb.	23-24	French Phone Contest
	Feb.	23-24	YL-OM C.W. Contest
	Mar.	9-10	QCWA Phone QSO Party
	Mar.	16-17	YL-ISSB C.W. QSO Party
	Mar.	16-17	G-QRP Club QRP CW Contest
	Mar.	**30-31**	**CQ WW WPX S.S.B. Contest**

**Covered last month.*
†Not official.

Spanish CW DX Contest

1600Z Sat. to 1600Z Sun., Dec. 1–2

It's the world working the Espanoles with separate weekends for phone and c.w. Only single operator operation is permitted, all bands 3.5 through 28 MHz.

Exchange: RST plus a three-figure QSO number starting with 001.

Scoring: Contacts between EA stations and the following prefixes are worth 3 points: DU, CE, CM/CO, CP, CX, HC, HI, HK, HP, HR, KP4, LU, OA, PY, TG, TI, XE, YN, YS, YV, ZP, or equivalent prefixes.

Between EA and all other non-Hispano and non-European countries, 2 points.

Between EA and Europeans, 1 point (WAE boundaries).

Multiplier: For EA, each DXCC country worked on each band. All others use EA call districts worked on each band.

Final Score: Total QSO points from all bands times the multiplier from each band.

Awards: Gold, Silver, and Bronze medals to the first 3 places, phone and c.w., in Spain and to overseas winners. Certificates to first-place winners in each country. A minimum of 100 points is required to qualify.

Include a summary sheet with your log showing the scoring and other pertinent information, the usual signed declaration that rules and regulations have been observed, and your name and address in block letters.

Your entry must be postmarked no later than February 15th to: U.R.E. International Contest, P.O. Box 220, Madrid, Spain.

Hungarian C.W. Contest

1600Z Sat. to 1600Z Sun., Dec. 8–9

It's the world working the HA's on all bands 3.5 through 28 MHz on c.w. only.

Operation will be in three classes: Single operator, single band and all band, and multi-operator all band. (Club stations are considered multi-operator.)

Exchange: RST plus a contact number starting with 001. In addition, the HA's will send two letters to identify their county (BA, BP, BE, BO, CS, FE, GY, HA, HE, KO, NO, PE, SA, SO, SZ, TO, VA, VE, ZA, total of 20 on each band).

Scoring: One point for each HA contact, and a multiplier of one for each different county worked on each band. (Same station may be worked once on each band for QSO and multiplier credit.)

Final Score: Total QSO points from all bands times the sum of the county multiplier from each band.

Awards: Certificates to the first place winners in each class in each county.

Include a summary sheet with your entry including the usual signed declaration. Send within six weeks from the end of the contest to: Radio Amateur League of Budapest, P.O. Box 2, H-1553, Budapest, Hungary.

ARRL 10 Meter Contest

0000Z Sat. to 2400Z Sun., Dec. 8–9

This is the 12th annual 10 Meter Contest organized by the ARRL.

It's a worldwide activity in which DX stations are permitted to work other DX

Erratum

1983 World-Wide Contest
Trophy Winners Omissions

Phone All Band—S. America—David Novoa, KP4AM Award. Winner: YV30S (Opr. Bill Ovca, N1GL).

Phone/C.W. All Band—World—John Knight, W6YY Award. Winner: NP4A (Opr. Andrew Blank, N2NT on Phone, and Phillip Koch, K3UA on C.W.).

Phone/C.W. Single Band—World—Yuri Blanarovich, VE3BMV. Winner: Station LZ2KTS.

Corrections

Phone 28 MHz Zone 14—Europe—A.G. Anderson, GM3BCL Award. Winner: DL3ZA, Friedrich Serwe. (EA6ET not eligible; won in 1981.)

Phone 21 MHz—Japan—DX Family Award. Winner: JR1WHW, Masashi Tanaka. (JA2APA not eligible; won in 1981.)

C.W. Multi-Opr., Multi-Xmtr.—U.S.A.—James Rafferty, N6RJ Award. Winner: Station KN3O. (N2AA not eligible, won in 1981.)

The multi-multi donors were reversed. K2GL is the World donor, and N6RJ is the U.S.A. donor.

14 Sherwood Road, Stamford, CT 06905

stations. You are not limited to working W/K's and VE's only.

The same station may be worked once on phone and again on c.w.; no cross-mode, however. A maximum of 36 hours operating time is permitted out of the 48-hour contest period for all stations.

Categories: Single operator, mixed mode, phone only or c.w. only. Multi-operator mixed mode only.

Exchange: W/VE stations (including KH6 and KL7) send RS(T) and state or province. DX stations (including KH2, KP4, etc.) send RS(T) and QSO number starting with 001. Maritime mobiles send RS(T) and ITU region. Novice and Tech. stations must identify /N or /T.

Scoring: Phone QSOs are worth 2 points, c.w. 4 points, and Novice 8 points.

Multiplier: Fifty U.S. states, VE call areas, DX countries, and ITU regions.

Final Score: Total QSO points times the state, province, DX country, and ITU region multiplier.

Awards: Certificates to the top single operator in each category for each ARRL section and DX country, and to the top multi-operator station in each ARRL division and each continent.

Indicate the multiplier only the first time it is worked. Dupe sheets are required for logs with 500 or more QSO's. The usual disqualification criteria will be observed. A large s.a.s.e. will get you log and instruction forms. Mailing deadline for all entries is January 12th to: ARRL Communications Dept., 10 Meter Contest, 225 Main Street, Newington, CT 06111.

Canada Contest

0000Z to 2400Z Sun., Dec. 30

Again sponsored by the Canadian Amateur Radio Federation, this contest follows the same pattern as the Canada Day Contest last July.

Activity will be on all bands, 2 through 160 meters, phone and c.w. Single operator, single and all band, multi-operator all band only.

The same station may be worked on each band and each mode for QSO and multiplier credit.

Exchange: RS(T) and QSO number starting with 001, and province.

Scoring: 10 points for each contact with Canada, 4 points if with others, and 20 bonus points for each contact with any CARF official news station using the suffix TCA or VCA.

Multiplier: Number of VE provinces/territories worked on each band and mode (12 prov./terr.) Contacts with stations outside of Canada count for QSO points no multiplier.

Frequencies: 1810, 1840, 3525, 3770, 7025, 7070, 14025, 14150, 21025, 21250, 28025, 28500, 50040, 50110, 144090, 146520.

Awards: Certificates to the top-scoring

entries in each class, in each VE prov./terr., U.S. call area, and DX country. Trophies to single operator, all band, and multi-operator winners.

Include a summary sheet with your log showing the scoring, etc., and a dupe sheet. Official log forms are available.

Mailing deadline is January 31st to: CARF Contest, c/o N. Waltho, VE6VW, General Delivery, Morinville, AB, T0G 1P0 Canada.

"73" 40 & 75 S.S.B. Contest

40 M.: 0000Z to 2400Z Sat. Jan. 12
75 M.: 0000Z to 2400Z Sun., Jan. 13

This is the fourth time around for both these contests sponsored by *73 Magazine*. Each band is treated as a separate contest and requires separate entries.

There are two classes: single operator and multi-operator single transmitter. Single operator stations are limited to 16 hours of operation. Multi-operator stations can operate the full 24 hours. Off periods must be no less than 30 minutes each and indicated on your log and summary sheet.

Exchange: RS and QTH. State, province, or territory for U.S. and Canada; country for DX (including KH6 and KL7).

Points: Five points per contact made within the continental U.S. and Canada; 10 points for all others.

Multiplier: One for each U.S. state (48), each Canadian prov./terr. (13), and each DX country worked.

Final Score: Total QSO points times the total multiplier points.

Awards: Awards will be issued to the winners in each class, in each U.S. state, each Canadian prov./terr., and each DX country. (A minimum of 100 QSO's is required to be eligible.)

Duplicate contacts in excess of 2% of the final score and other infractions will be considered grounds for disqualification. Include a dupe and summary sheet and the usual signed declaration. Entry and log forms are available by sending a large s.a.s.e. to the addresses below.

Mailing deadline for all entries is February 12th. Forty meters go to: Dennis Younker, NE6I, 43261 Sixth Street East, Lancaster, CA 93535. Seventy-five meters go to: Jose A. Castillo, N4BAA, 1832 Highland Drive, Amelia Island, FL 32034.

1983 VK/ZL/O Contest Results
North America

Phone

K6SVL	AB	27000
W3GM	"	6526
W7PQE	"	2552
K9GTQ	"	540
N4MM	"	306
WA3HUP	20	1800
VE3GCO	"	1320
W2FCR	"	576
VE3FEA	"	224
N1BRT	"	150
KW2J	"	54
K1BV	"	30
W0GOQ	10	1794
AA6EE	"	24

C.W.

KF1Z	AB	10406
W3GM	"	8020
W8UVZ	"	5184
K4JRB	"	4648
K4PI	"	2860
K3ND	"	1886
KW2J	"	1792
AJ0N	"	1548
W7PQE	"	1086
K9VKY	"	928
NE8I	"	784
KA7FEF	"	400
VE3AEJ/3	"	306
K3NTD	"	224
AA6EE	"	192
W9YCV	"	50
KA2MXO	10	144

You will be hearing a lot of activity from Alex Kasevich, VP2MM, from his neat and comfortable station in Montserrat.

"73" 160 Meter S.S.B. Contest

0000Z Sat. to 2400Z Sun., Jan. 19–20

This is the sixth annual 160 Meter S.S.B. Contest sponsored by *73 Magazine*. There are two classes: single operator and multi-operator single transmitter. Single operator stations are limited to 32 hours of operating time; multi-operators may operate the full 48-hour contest period.

Exchange: RS and QTH. State for the U.S., province/territory for Canada, and country for DX stations.

Points: Five points for contacts between W/VE stations; 10 points for all other contacts.

Multiplier: One for each U.S. state (48), Canadian prov./terr. (13), and each DX country worked.

Final Score: Total QSO points times the sum of the multiplier points.

Awards: Will be issued in both classes in each U.S. state, Canadian prov./terr., and DX country. A minimum of 100 QSOs must be worked to be eligible.

U.S. and Canadian stations are expected to observe and not transmit in the DX Window, the 5 kHz segment between 1825–1830 kHz.

Disqualification may result for irregularities in logging, failing to omit duplicate contacts, and other infractions resulting in a score reduction of more than 2%.

Include a summary sheet, multiplier check list, and a QSO dupe sheet for logs with 100 or more contacts. Log forms are available by sending a large s.a.s.e. to the address below. Mailing deadline for entries is February 20th. This year they go to: Harry Arsenault, K1PLR, 603 Powell Avenue, Erie, PA 16505.

CIRCLE 134 ON READER SERVICE CARD

CIRCLE 57 ON READER SERVICE CARD

World of Ideas

a monthly feature by
DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

Equipment Views For The Holidays

That festive time of year is once again upon us . . . a time of international friendship and goodwill, and a chance to realize some of life's special pleasures. Many of you will probably be interested in creating or experiencing your own form of "breather" during the season, possibly even buying a new transceiver or some rig accessories during the holidays. Thus, we're briefly changing directions this month in light of catering to those views. During following months we'll proceed with discussions on p.e.p.'s and s.w.r.'s, amateur collectibles, and other areas of special interest. Meanwhile, let's reflect on some amateur items which might add a refreshing flair to the coming year's activities.

Dream Rig Overviews

During previous months we have conducted an open-ended amateur radio survey of today's dream rigs and various operating trends. The survey began with opinions/viewpoints on "bells and whistles" transceivers and expanded into related equipment use and performance. The results were quite interesting, to say the least. A surprisingly large number of operators were motivated towards superfeatured and multi-memory transceivers. However, closer examination often revealed operating preferences which were rather basic in nature. Amateurs with tube-type rigs planned to purchase an all solid state unit (a very good move). Amateurs with single v.f.o.-type rigs planned to "move up" to digitally tuned units such as ICOM's 745, citing dual v.f.o's, multiple memories, and general-coverage receiver attractions. Operators with 745's expressed interest in switching to a Kenwood 930, while 930 operators were interested in ICOM 751's or other "deluxe" rigs. Green grass really is an unidentified variable, isn't it.

So which rig really is "best"? I've used almost every modern transceiver, and actually they are all very close to equal in performance. You really won't hear or work anything on one rig that you can't hear or work on another rig. There's also miniscule difference in r.f. performance between "high tech" and "compact" rigs. Yaesu's FT-757 is a good example here; it's small in mass, but heavy in competition to high-tech rigs (high tech is anything that weighs 40 or more pounds, runs rather hot, and draws over 500 watts from the AC line to deliver 100 watts output—an iron with knobs).

Interested in adding a sparkling new sound to your transmitted audio? Connect an "Americanized" cartridge or mic such as this Heil HM5 to your transceiver and enjoy long overdue compliments.

The "dream rig" syndrome thus reflects personal attractions more than one-upmanship in operating capabilities and technical performance. If multiple memories are used merely for pushbutton bandswitching rather than QSO/DX operating aids, they are essentially unnecessary. Likewise, portable shortwave receivers can be purchased inexpensively, and they don't tie up use of a transceiver. If you find a rig that's really you during this holiday season—one with an ideal panel layout, full c.w. break-in, pleasant sounding audio, or some other flexibilities you can enjoy—go for it! The ultimate transceiver for all operators doesn't have a model number, but rather a list of common features: all solid state, instant on and no tuneup, high performance noise blanker (not merely an ignition noise suppressor), quality audio processor, memory flexibilities according to one's operating style, and a *reliable service policy*. Dollar per dollar versus returned enjoyment, any of today's amateur gear is truly an electronic bargain.

Further survey notes revealed notable interest in special c.w. "frills" and improved transmitted audio. Both of these areas generate interesting situations. Why are many U.S. stations beating their heads against difficult communications on s.s.b. when c.w. is wide open for DX? Compare the two modes directly for yourself on OSCAR 10. That should be tangible proof of c.w.'s advantage. Maybe too many amateurs are forgetting code. Maybe they need more inspiration. Concerning poor audio qualities, I must agree. Japanese rigs sound like boom boxes because of their mike's frequency response (most Japanese voices can use a brass boost; American voices can't). Using an imported rig with its "matching" mike reminds me of running four bald tires on a new Cadillac. Line up some station accessories that will complement your on-the-air image. You'll definitely appreciate the results, and the items will probably stay with you for many moons. Continuing our views along those lines, let's now enjoy scanning some items that can add renewed pleasure to almost any amateur setup. Properly "hinted," one of these goodies might show itself in your own Christmas bag.

Gifts No One Exchanges

Locating a microphone that truly enhances your voice and complements an h.f. transceiver involves more consideration than matching plugs or checking frequency ranges. Two competitive mic cartridges can boast response of 350 to 3500 Hz, for example, but one may have a 6 dB rise at 400 Hz (extremely bassy) and the other a 10 dB peak at 2400 Hz (very clean and clear). The difference between two such microphones or mic car-

DXers and contesters alike can enjoy supreme operating with Heil Sound's new dual-channel rig mixing system. The unit has a 2 watt amplifier with equalization and voice-tuned boom mic that can be switched between two rigs.

*Eastwood Village No. 1201 So., Rt. 1, Box 499, Birmingham, AL 35210

tridges is directly noticeable on the air. Bassy microphones create power-robbing garble and splatter, while higher response mics produce beautiful audio which also cuts the QRM. Switching to a classic D-104 isn't really the answer. That microphone has such high response that it's tinny. Try one of the Heil Sound HM-5 microphones or substitute a Heil HC-3 element in your existing mic's case. The resultant sound is a perfect mix of frequencies: highs with just enough mellowness to produce glamorous audio. The HC-3 cartridge, incidentally, can also be substituted in ICOM-type preamplified hand mics. Stock 730's never sounded so great.

Contest buffs and DXers often prefer maximum-articulation/restricted-range microphones and quality headsets for serious operating stints. A super attractive unit for those activities is the Heil "HCS" earphone, boom mike, audio interface system. The removable mic features Heil's new HC-4 "DX element" for maximum talk power, and lightweight earphones which can be used "dual fashion" with a single transceiver or split for listening to separate transceivers in each ear. The system's control box handles both earphones and microphone switching. The mic can be switched for talking with a second headset-equipped logger, or switched to a v.h.f. rig for DX net tip-off operation. In addition to separate volume controls for left and right phones, the control unit also contains an active received audio equalizer. That feature is great for minimizing band grumbles, grunge, and noise. Could this unit be used for working two h.f. rigs/ bands simultaneously? Probably, provided there's a good information control center between the headphones.

Moving toward the "other end of the band," so to speak, there are a number of c.w. signals which can benefit significantly through the use of a good electronic keyer. Indeed, recent keyers with dot/dash memory and iambic operation can produce beautiful code from the most shakey fist. Try one for yourself and experience these new c.w. pleasures. Iambic, or "squeeze key" operation, requires use of a dual-lever paddle with the keyer. Squeezing both levers or paddles produces ditdahditdahditdah or dahditdahditdahdit, depending on which contact was touched first. A *C* is sent in a single squeeze, with the dash contact "leading the squeeze." A period is sent when the dit contact "leads." The name *Frank* thus can be sent in five "timed" squeezes. A dot/dash memory "follows behind" your fist slightly and produces perfect characters when you don't. Merely "bump" the dit contact once, the dash contact twice, for example, and move your hand while a perfect *W* is produced. Electronic keyers and paddles are available in a variety of styles to suit anyone's preference. One especially attractive unit, the MFJ422 and Bencher paddle, is equally adapted to home or mobile setups. The keyer slides onto the paddle's rear, creating a fully self-contained, compact unit. The keyer is powered via an internal 9 volt battery. Insert a NiCad, add a simple wall charger, and you have a "rechargeable" keyer that's portable. If you really want your keying to sound beautiful, set the unit's weight control toward the "heavy side." Choppiness is then replaced with Morse, which sounds better than "computer generated." You'll have to hear it to fully appreciate it!

If your c.w. is a mite rusty, renew interest with a smooth operating electronic keyer and paddle. This MFJ/Bencher combo is fully portable and features iambic operation with dot/dash memory.

Here's a holiday treat that will complement any setup: ICOM's world globe with dual time displays and time zone synched LEDs. The unit is gold in color and operates for a year using two AA cells.

Whether one's interests are primarily phone or c.w. in nature, a world globe holds special appeal when visualizing signal paths and various times around the world. Unfortunately, such globes usually require excessive desk room for daily use or display. ICOM solved that problem in an attractive manner with their GC-4 mini-globe. The globe's base contains a dual time display: one indicates local time and the other indicates either the date or one of 24 selected time periods. When the globe is turned, a single LED is activated for a major city around the world, and its corresponding time is displayed within the clock's "date" mode. Clever and functional, the world globe includes a built-in alarm and runs for almost a year on two "AA" cells.

Conclusion

That's our holiday views from this end, gang, and we wish you the best in fine-tuning your setup. Additional information and operating details on the items mentioned this month are available directly from the manufacturers. Check our ads for addresses and phone numbers.

Today's solid state h.f. transceivers and accessories are quite different from yesteryear's counterparts, and they're truly worth investigation. Consider the number of hours you devote (or would like to devote) to amateur radio enjoyment, and visualize which aspects or modes can yield the greatest personal returns. It's interesting how many of us can realize any returned enjoyment with our time-hashed and weather equipment. Maybe it's time to upgrade.

73, Dave, K4TWJ

DX

This month by
JOHN A. ATTAWAY, K4IIF

NEWS OF COMMUNICATIONS AROUND THE WORLD

Merry Christmas and a Happy New Year!
Feliz Navidad!
Froliche Weinachten!
Joyeus Noel!
Buon Natale!
Kellemes Karacsonyt es Boldog Ujevet Kivanuk!
Hauskaa Joulua!
S. Rozhdestvom Khristovym!
Shinnen Omedeto!
Glaedelig Jull!
Nodlaig Mhaith Chughat!
Kull Am Wa Antum Bekhir!
Wesolych Swiont!
Chanuakh Lesinchah!
St'Astne Vanoce!
Ch'ing Chu Yeh Su Sheng Tan!

To all DXers the world over from the staff of the *CQ* DX Department: Hugh, WA6AUD; Leo, W4KA; Norm, K6ZDL; Billy, N4UF; and yours truly, John, K4IIF. May Christmas Eve bring you a QSL confirming your 40th zone, your 300th prefix, or your 100th country.

Jose Castillo, N4BAA, has made his mark on the DX trail in just three years, having earned WAZ, 20 meter single-band WAZ, and 5-band DXCC. He is missing only 1 zone on 40 meters and 6 zones on 80 meters for 5-band WAZ, the ultimate DX award. Jose's antennas include a KT-34XA and sloper systems for 40, 80, and 160, all on a 100 ft. tower. He is an avid contester and won second place in the USA during the 1981 CQ WPX Contest. Jose is a member of the North Florida DX Association. He was born in Salamanca, Spain and is 20 years old.

De Extra

For 15 years this column has stressed the importance of the *CQ* World-Wide Phone and C.W. Contests to both new and experienced DX award chasers. The *CQ* World-Wide Contests are the most popular of the DX tests. Participation is so great that a determined operator can work 100 countries, 300 prefixes, and sometimes even 40 zones in a single contest weekend, propagation being reasonable. For the beginning DXer, the *CQ* tests are the jumping-off place for the major DX awards. For those who join in contests for fun and recreation, the *CQ* tests are the end all. I have operated every year of the past 25 years, frequently from overseas locations. Contest operations include four times from the U.S. Virgin Islands (KV4AA and K4IIF/KV4), twice from the British Virgin Islands (VP2VD and VP2VDG), four times from the Bahamas (VP7NA, K4IIF/C6A, and C6ABC), once from Puerto Rico (K4IIF/KP4), once from the Turks and Caicos Islands (VP5JA), once from the U.N.-Geneva (4U1ITU), once from Iceland (K4IIF/TF), and once from Finland (K4IIF/OH2).

Despite the great popularity and success of the *CQ* WW DX Contests, there are those who feel that our scoring system could be improved, and they make some significant points. It cannot be denied that factoring continental boundaries into the scoring system creates inequities. A QSO with a station on your own continent receives only one point credit, except in North America where two points are allowed, while you receive three points for a contact with a station on another continent. As a result, a station in Israel, Turkey, or Cyprus working across the entire Asian land mass to Japan receives only one point credit for completing a QSO over a distance of 6000 miles. However, a short hop into southern Europe nets him three points. Consequently, there is no advantage at all in his working a pileup of JA's; one Japanese station per band as a multiplier is all he really needs.

In a related situation, NP4A, KV4FZ, and other Caribbean stations classified as North America receive only two points for working KL7, but three points for working YV, HK, or any of the other countries along the north coast of South America. At the same time, Caribbean stations in South America, such as Aruba, Curacao, or Trinidad, receive three points per U.S. or Canadian contact, while NP4A, KV4FZ, and the other Caribbean stations in North America receive only two points.

These inequities were underscored about seven or eight years ago when an outstanding group of U.S. DXers assaulted the multi-operator/multi-transmitter record from the Turks and Caicos Islands, but lost to an equally outstanding group from Finland who operated from the Canary Islands. Each U.S. *and* each European contact nets three points from the Canary Islands, as they are part of Africa.

Consequently, DXpeditions for the contests break down into two groups—those who do it strictly for fun and to provide new countries and multipliers to the multitudes, and those who want to shoot for a world-record score. Those who go all out for points must pick their spots carefully. The best locations generally are considered to be the islands along the north coast of South America, such as 9Y4 and PJ2, which not only score three points for each W/K and VE contact, but are also rare and attractive to DXers in the contest who only get to work a few new ones, and the Canary, Madeira, or Cape Verde Islands, which are also rare enough to attract the country chaser and are well-located for three pointers to both Europe and North America. Good scores have also been made from islands in northern Oceania, such as Saipan, with perfect coordinates for three-point contacts with Japan as well as a reasonable shot to the U.S. The difficulty in Oceania is the expense of a DXpedition from the U.S., as compared with the costs of a trip to the Caribbean, and the poor propagation to the European countries needed for a good multiplier.

Those who operate for fun and not for a world-record will go to a North American island in the Caribbean.

Knowledgeable DXers have proposed modifications in our system, particularly at the Contest Forum of the Visalia DX Convention. Some of their suggestions have merit. A proposal receiving considerable support provided zero points for your own country (but your country could be worked for a zone multiplier or multipliers), one point for a different country in your own zone, and three points for each contact with a different country in a different zone. However, some prominent contesters in north and central Europe felt that this proposal was biased in favor of certain zones, such as zone 20. They favored zero points for your own country and three points for all other countries, including the ones in your own zone. Others expressed the feeling that allowing the Europeans to receive three points for working each other might bias the scoring in their favor, and so it goes.

Both of the above proposals left the present multiplier system in place. For those readers not familiar with the *CQ* contests, the multiplier is a sum of the zones and countries worked in the fall contests and prefixes in the spring WPX contests. This writing chiefly concerns the fall contests.

P.O. Box 205, Winter Haven, FL 33880

The WPX Program

Mixed

1121	OK1KPX	1125	JF1RDC
1122	JA4JBZ	1126	DJ3GE
1123	JO1BMV	1127	KØHQW
1124	KR9O		

S.S.B.

1679	KZ2W	1682	JA1UBZ
1680	ZP5JCY	1683	ZS5BCR
1681	KCØMB	1684	AH9AB

C.W.

2287	JH1LME	2289	JA4JBZ
2288	DF6KB	2290	PA3DBG

Endorsements

Mixed: 450 KN1I, NB2T, JA4UBZ, JO1BMV, KR9O, JF1RDC, DJ3GE, KØHQW, ZS6BCR. 500 KN1S, JA4UBZ, KR9O, DJ3GE, HØHQW, ZS6BCR. 550 KN1S, KR9O, KØHQW. 600 K2HWF, KN1I, KR9O. 650 KN1I, KR9O. 700 KR90. 750 JA4ESR. 800 AE1T, JA4ESR. 850 AE1T, JA4ESR. 900 WD4RAF, AE1T, JA4ESR. 1300 YU2CBM. 1350 YU2CBM. 1400 YU2CBM. 1450 KF2O, YU2CBM. 1500 KF2O, I2PHN. 1550 KF2O, I2PHN. 1550 I2PHN. 1600 I2PHN. 1650 I2PHN. 1700 I2PHN. 2100 W4BQY.

S.S.B.: 350 ZP5JCY, AH9AB. 400 ZP5JCY, WØCON. 450 ZP5JCY, G4KHF, DL1AM, KU9C. 500 ZP5JCY, G4KHF. 550 ZP5JCY. 600 ZP5JCY. 650 ZP5JCY. 700 ZP5JCY. 750 ZP5JCY. 800 ZP5JCY. 850 ZP5JCY. 1000 IØPSB. 1250 I2PHN. 1300 I2PHN. 1350 I2PHN. 1400 W4BQY, I2PHN. 1450 I2PHN. 1500 I2PHN. 1550 I2PHN. 1600 I2PHN. 1650 I2PHN. 1700 F6DZU.

C.W.: 350 HA8BJ, JA4UBZ, ZS6BCR, PA3DBG. 400 W2YVQ, ZS6BCR. 450 ZS6BCR. 550 KW9N. 650 OZ5EDR. 950 K9UE, OK1DKR. 1000 KF2O, DL1AM. 1050 K9QVB. 1100 K9QVB. 1150 K9QVB. 1200 K9QVB. 1250 K9QVB. 1300 K9QVB. 1500 VE7CNE. 1650 W4BQY. 1850 K6JV.

10 meters:	ZP5JCY, WB2QEU.
15 meters:	ZP5JCY, W6YMH, JA8RII, JA4JBZ.
20 meters:	ZP5JCY, I2EOW.
40 meters:	ZP5JCY.
80 meters:	SM5DAC, HA8BJ.
160 meters:	OK1KPX.
Asia:	JA2KVD, ZP5JCY, JA8RII, JA4JBZ, OZ5EDR.
No. America:	ZP5JCY.
So. America:	ZP5JCY, JA4ESR.
Europe:	JA4JBZ, PA3DBF, ZP5JCY, OK1KPX, KA9GXM.
Oceania:	JA4JBZ.

Award of Excellence: W1NG.

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.

Should there be a change? The present system has served the contest community very well. Consequently, any changes should be made only after serious consideration, and with the assurance that the results will be an improved contest.

The contests as they are now operated have 30-plus years of tradition behind them. Many outstanding operators have their names in the *CQ* book of record. A new system of scoring would mean starting over the records from scratch, or an asterisk by the name of one of the record holders, as in the case of the Babe Ruth/Roger Maris homerun record.

De Extra (K4IIF) would like to hear your opinions and will pass them on to the Contest Committee. I am an extremely enthusiastic contester and Chairman of the *CQ* DX Awards Advisory Committee, but I am not a member of the *CQ* Contest Committee.

What do you think? Should we change the system or leave it as is? Let me hear from you.

Larry Larison, W7HKI, at the rig of his motor home/mobile station. Larry and his XYL, Maxine, W7HKL, use bumper-mounted Hustler antennas to draw in those DX signals, and Larry earned c.w./phone WAZ #2884 operating mobile. His home QTH is Marysville, Washington.

News From The DX Clubs

The *Dixie DXers Contest Club* has elected the following new officers: K4JPD, President; WI4R, Vice-President; WD4IKI, Secretary-Treasurer; W5VUX, Membership Chairman; and NQ4I, Activities Chairman. The club meets on the third Thursday of the month near the Atlanta airport.

The *Redwood Empire DX Association's* new officers are: Ron Pipes, WB6NBR, President; Dick Wilson, K6LRN, Vice-President; and Chod Harris, VP2ML, Secretary-Treasurer.

Newly elected officers for the *Long Island DX Association* include George Buchanan, K2ON, President; John Reiser, KB2CB, Vice-President; Arthur Albert, K2ENT, Secretary; and Peggy Arciero, WB2OHD, Treasurer.

The *Heard Island DX Association* is interested in enlarging its membership. Interested DXers are invited to join in the Association Net Friday nights at 0500 GMT on 14,220 kHz. Further information can be obtained from Jim Smith, VK9NS, the President, or from W8MEP/6, 123 Forest Ave., Pacific Grove, CA 93950.

Re-elected or newly elected Directors of the *International DX Association* are J37AH, VK6RU, VS6CT, and LA8CJ. Returning Directors include K3ZR, OA4OS, W3DJZ, and PY2PE. The association's officers are W4WMQ, President; K5OS, First Vice-President; W4FRU, Second Vice-President; OH2BH, Third Vice-President; NK5K, Secretary; and W4UNP, Treasurer. The net frequency is 14,236 kHz at 2330 UTC.

Other Sources of DX Information

Since our comprehensive article on sources of DX information (September 1984 *CQ*, pages 101–103) we have received information regarding the following additional DX aids.

DXer's QSL Manager Directory. Consists of a 190-page, computerized listing of over 10,000 QSL Managers, both foreign and U.S., covering the time period 1979 to the present. The information is arranged alphabetically according to the callsign of the DX station. Supplements are issued periodically to keep the *Directory* up to date. The publisher is Fred Smith, WB4KCL, 2265 Sweetbriar Drive, Alexandria, VA 22307. The price is $9.95 for the U.S., Canada, and Mexico, including supplements. WB4KCL makes a special effort to address the problem of multiple QSL Managers for the same DX station when different operators use a call for different time periods.

Directory of QSL Managers. Published for some time by DX Hall of Fame member Franz Langer, DJ9ZB, it contains over 50 pages, two columns per page, of QSL Managers listed alphabetically. Information on rates and current printing may be obtained by writing to Franz at Carl-Kistner Strasse 19, D-7800 Freiburg, Federal Republic of Germany. Franz now has a new reference, the *Handbuch Fur Den Kurzwellenamateur.*

Northern California DX Foundation Newsletter. This is a very informative

The WAZ Program

10 Meter Phone

282	EA8XS	283	W9NUF

15 Meter Phone

205	EA8XS	206	JN1KEJ

20 Meter Phone

507	EA8XS	510	KS9K
508	JA8KSF	511	WA3CGF
509	XE1DU		

40 Meter Phone

27	EA8XS

10 Meter C.W.

53	DL1VJ

15 Meter C.W.

111	DL1VJ

20 Meter C.W.

221	W2SGK	222	W4JD

All Band WAZ

S.S.B.

2889	K3BCG	2892	VE3KPD
2890	VE3EZU	2893	GW4BLE
2891	DL9JI	2894	DJ7AX

C.W. and Phone

5806	WB1GOO	5809	WD8IXE
5807	SP9BRP	5810	WAØADX
5808	JA7IC		

Applications and reprints of the latest rules may be obtained by sending a self addressed stamped envelope (37 cents) size 4½ × 9½ to the W A Z 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.

5 Band WAZ

Standings as of September 1, 1984

All 200 zones worked:

1. ON4UN	28. LA5YJ	55. WA1AER
2. K4MQG	29. DL3RK	56. N4RR
3. SM4CAN	30. N4WJ	57. UW0MF
4. AA6AA	31. G3MCS	58. W4DR
5. W8AH	32. SM5AQD	59. OK1MP
6. W6KUT	33. W0MLY	60. W1NW
7. EA8AK	34. I0RIZ	61. OE1ZJ
8. LA7JO	35. ON5NT	62. HB9AHL
9. EA3SF	36. OH6JW	63. HB9AMO
10. OH1XX	37. OK1AWZ	64. LA6OT
11. EA8OZ	38. IV3PRK	65. UR2QD
12. W0SD	39. DJ6RX	66. UK2RDX
13. K0ZZ	40. OH3YI	67. ZS5LB
14. ON6OS	41. I4RYC	68. F6DZU
15. OK3TCA	42. ZL1BIL	69. DL4YAH
16. K6SSS	43. I4EAT	70. LA7ZO
17. ZL3GQ	44. ZL1BQD	71. W9ZR
18. OK3CGP	45. TG9NX	72. W1NG
19. SM0AJU	46. XE1J	73. VK9NS
20. OZ3PZ	47. F5VU	74. N4KG
21. I3MAU	48. W3AP	75. YU7DX
22. I2ZGC	49. YO3AC	76. DL8MAG
23. 4Z4DX	50. K3TW	77. OK3DG
24. N4KE	51. XE1OX	78. ZL1BOQ
25. K5UR	52. VE7IG	79. EA9IE
26. K9AJ	53. OK1ADM	80. DL7HZ
27. SM3EVR	54. CT1FL	81. DJ9RQ

The top 11 contenders for 5 Band WAZ:

1. DK5AD, 199	7. LA9GV, 198
2. JA3EMU, 199	8. W6GO, 198
3. N4WW, 199	9. K4CEB, 198
4. EA8XS, 199	10. OK1MG, 198
5. K6YRA, 199	11. W2YY, 198
6. W8VUZ, 198	

278 Stations have attained the 150 zone level

20-page paper edited and published by N6ST aided by AA6AD for the members of the Foundation. It has a variety of interesting articles about DXpeditions sponsored by the Foundation, plus articles of general DX interest. It is published on a quarterly or semiannual basis. The address of the Northern California DX Foundation is P.O. Box 2368, Standford, CA 94305.

DX World. This is the monthly column by John Minke, N6JM, in *World Radio.* It is an excellent source of information. John usually has 8–10 full columns of DX news and views.

Carolina DX Association Bulletin. Published monthly by Murph Ratterree, W4WMQ, for the members of the Carolina DX Association, the bulletin contains general DX information for the purpose of informing and interesting the group's newer members. Except for exchanges with the editors of major bulletins and DX columns, it is exclusively for CDXA members.

The DX Bulletin. Published 50 times per year by Jim Cain, K1TN, this bulletin contains much helpful news and advice for both the new and the old-time DXer. The bulletin conducted the only world-

Left to right are Murph Ratterree, W4WMQ, of the Carolina DX Association and Ron Wright, ZL1AMO, at the QTH of W4WMQ in Rock Hill, South Carolina. Wright, one of the outstanding DXers of the 1980s, was guest of the International DX Association and the Carolina DX Association during this visit.

wide survey of DXers' needed countries in 1984, with 768 subscribers responding. Subscription rates are $35.00/year for first-class mail and $50.00 for overseas airmail. The address of *The DX Bulletin* is Andover, CT 06232.

The International DX Association Newsletter. Edited by John Parrott, W4FRU, for the membership of the association, the newletter appears four times per year. The content includes profiles of DXers, history of rare countries, and association news. The address is P.O. Box 5127, Suffolk, VA 23435.

Here and There

Chagos: VQ9AC on Diego Garcia likes the low end of 20 meter s.s.b. after 0000 UTC.

China: Several stations are active from the People's Republic. BY4AA can be found on different frequencies near the low end of 14 MHz s.s.b. BY1PK frequently works list style on 14.155 from 1200 UTC on Saturdays, and BY1QH is on 15 meter s.s.b. at about that same time. QSL BY1QH to P.O. Box 2654, Beijing, P.R.C. BY5RA was operated by a team from Japan last summer. The QSL address for this station is P.O. Box 730, Fuzhou, P.R.C.

Falkland Islands: VP8AXJ appears with some regularity on 21,235 kHz after 1830 UTC.

Mongolia: JT1AO is in the Family Hour Net on 14,227 at 1500 UTC. QSLs for contacts made during the net operation may be sent to W7PHO.

Pitcairn Island: Kari, VR6KY, checks into the INDEXA Net Tuesdays, Thursdays, and Sundays from 0500 UTC on 14,236 kHz and the Brown Sugar Net on 14,309 kHz at 0200 UTC.

St. Kitts/Nevis: V4A to V4Z is the new callsign block allocated to St. Kitts and Nevis. St. Kitts and Nevis became an independent country on Sept. 19, 1983, the 12th new country formed in the British West Indies since 1962.

St. Paul Island and Sable Island: The Canadian Department of Communications made a change in the callsigns for these two islands last summer. CY9SPI is now correct for St. Paul Island, and CY0SAB for Sable Island.

Saudi Arabia: Bob, W7SE, operates HZ1AB near 14,185 kHz at 1800 UTC and will makes skeds for 160 meters. His QSL Manager is K8PYD.

South Yemen: It is reported in *DX'Press* that word has been received from OE6EEG indicating that a citizen of South Yemen will be on the air soon. OE6EEG hopes to help with the first operation.

Spain: The prefixes EC1–EC9 are used by novice stations in Spain and can usually be heard above 28,900 kHz.

Syria: Alfons, OE8AJK/YK, was putting in a good signal from the Golan Heights in the early fall. He was frequently heard on 14,205 at 2300 UTC. QSLs were directed to his home call.

United Arab Emirates: A61AA is operated by G3LCS. He has a contract with the A6 government. Listen for him on both 20 meter c.w. and s.s.b.

Upper Volta: XT2BR likes 14,220–14,230 kHz s.s.b. at around 0200 UTC. There has been a change in government in this country, and it is reported that the name has been changed from Upper Volta to the "Popular Democratic Republic of Burkino Faso."

CQ DX Awards Program

S.S.B.

1354	W9NUF	1358	KD9J
1355	OZ5EV	1359	KA9ABC
1356	XE1MMD	1360	JH8NYK
1357	KI5F	1361	K9MNT

C.W.

619	W9NUF

S.S.B. Endorsements

310	I0ZV/315	275	YU7KV/290
310	OZ5EV/311	275	JH8NYK/279
310	IV3YRN/310	275	W9NUF/277
300	W7OM/306	275	VE6PW/277
300	G4CHP/301	275	KI3L/275
300	K3UA/300	275	KA9ABC/275
300	W8IMZ/300	200	K9MNT/232
275	EA9IE/298	200	VE2ANE/222
275	XE1NI/298	28 MHz	W9NUF
275	KE3A/296		

C.W. Endorsements

275	K3UA/295	250	VE7CNE/250
275	WA2HZR/286	28 MHz	W9NUF
275	WD9IIC/284	3.5/7 MHz	W9NUF
250	W9NUF/254		

Total number of active countries is 315. 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.

The WPX HONOR ROLL

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ master prefix list. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or to confirm present total. If no up-date, file will be placed into "inactive" until next up-date. Lifetime Honor Roll fee $2.00, with no fees required for up-dates.

MIXED

3216	YU7DX	1730	YU7BPQ	1291	K9LJG	1003	N3ED	837	VE2FOU
2653	YU1HA	1699	SM7TV	1240	N6AW	999	W6OUL	828	K2POF
2631	F9RM	1697	N2AC	1231	N6JM	999	KS7T	827	PY1DFF
2488	YU2DX	1689	I2PHN	1226	W7CB	999	G3ZRH	824	VE2PD
2368	K6JG	1660	YU7AW	1212	PY4OD	994	YU2CBK	783	K7CU
2357	W2NC	1648	W8CNL	1207	NN4Q	992	W8ILC	742	JH8NYK
2305	K2VV	1636	YU2RTW	1200	KL7AF	990	YU2CQ	741	DF6EX
2237	VE3GCO	1603	I6SF	1187	JH1VRQ	982	N4IB	730	N2AIF
2230	K6XP	1592	I8YRK	1174	W8RSW	956	WD9IIC	707	OE1KJW
2109	N4MM	1577	K9BG	1164	CT1LN	955	N3RL	701	K8HF
2030	W4BQY	1553	YU1DZ	1162	YU7KV	951	KO8T	697	YU1OHF
1964	W9DWQ	1501	KF2O	1140	LA7JO	929	EA2IA	696	KJ7N
1951	YU7BCD	1491	WØSFU	1140	I2MQP	922	W6YMH	683	WB1GOO
1875	N4UU	1467	K6ZDL	1131	W1NG	915	N8BJQ	675	IØAOF
1862	N6JV	1415	WA1JMP	1116	WB8ZRL	905	WØJIE	672	NE6I
1838	N4NO	1401	K6DT	1045	KA3A	876	DK2BL	662	K9LJN
1815	PAØSNG	1401	IN3ANE	1034	YU7AJD	865	EA1JO	657	ND6U
1755	N9AF	1356	N6FX	1018	G4FAM	860	WD4RAF	622	KN1I
1748	N6CW	1335	SM3EVR	1017	K2QF	855	AI8S	619	JA6GWU
1740	K5UR	1311	W9NUF	1006	WA8YTM	843	AI6Z		

S.S.B.

2547	F9RM	1498	WD8MGQ	1092	ZP5RS	908	WB6GFJ	747	N3RL
2227	IØZV	1495	I6ZJC	1076	W2CC	902	KC8YM	721	IN3AHO
2032	K6JG	1479	K5UR	1064	G4CHP	900	K8LJG	707	WB7SRK
2028	IØAMU	1450	W9DWQ	1030	KC4OV	894	AC2J	700	EA7AZJ
1985	K6XP	1396	W4BQY	1025	N6FX	889	W2LZX	693	ON6IT
1968	K2VV	1396	YU7AW	1023	CT1FL	869	XE1XF	690	WO4L
1944	K2POA	1383	N4UU	1008	I1HAG	864	WA2FKF	680	CT4UW
1898	ZL3NS	1365	N4NO	1005	W6YMV	859	W1NG	667	JH5FQO
1895	N4MM	1341	N2SS	996	YU7DX	846	W3GXK	663	KBØC
1695	I4ZSQ	1341	WA4QMQ	996	TG9GI	817	I1POR	661	K8ZZU
1678	HB9AAA	1248	KF2O	993	N2AC	811	VE2PD	650	W6YMH
1654	WØYDB	1208	WB2NYM	992	W9NUF	810	IØSGF	649	IK5ACO
1653	I2PHN	1208	VE1YX	992	I8KCI	798	N4IB	617	WI4K
1634	IØMBX	1203	I6NOA	980	W3ARK	795	PY4OD	616	WN5MBS
1622	CT1UA	1197	WF4V	958	WB8ZRL	787	WØULU	612	YBØACL
1621	OZ5EV	1138	I2MQP	956	NN4Q	787	W2XQ	610	PY4VX
1606	I8KDB	1136	PY3BXW	944	KL7AF	765	W6LQC	610	VO1AW
1588	PAØSNG	1105	WA4OIB	939	XE1OX	759	CT1BY	606	KA3A
1588	I8YRK	1101	CT4NH	926	KC8CC	748	N3ED	600	KK5P
1578	YU7BCD	1096	W2NC						

C.W.

2833	YU7DX	1573	YU7BCD	1278	4X4FU	929	W9NUF	732	JA5SIX
2122	W2NC	1561	W9DWQ	1274	W9FD	921	K8LJG	726	AK2H
2010	W8RSW	1544	N4UU	1262	LZ1XL	902	KA7T	708	YK1AO
1850	DL1QT	1537	G2GM	1227	YU3NP	897	KL7AF	700	VE2FOU
1841	K2VV	1503	N2AC	1180	K6ZDL	871	IT9VDQ	694	AI6Z
1823	N6JV	1469	VK4SS	1099	N6FX	862	AK9Z	687	G4FAM
1817	W8KPL	1452	N4MM	1092	W4WJ	848	W1IHN	664	YU2CQ
1749	WA2HZR	1449	VE7CNE	1091	I2DMK	828	W1NG	652	OE1KJW
1714	K6JG	1442	YU7SF	1087	N4YB	827	NN4Q	633	W2XQ
1655	K6XP	1372	I6SF	1032	I1YRL	788	AG5C	604	SM5DAC
1643	W3ARK	1363	K5UR	1032	JE1JKL	781	N3ED	603	N2AIF
1638	ON4QX	1345	VO1AW	1004	JA8KRU	776	DJ1YH	600	N3RL
1605	N4NO	1294	K9QVB	1000	KF2O	744	KA3A	600	W6YMH
1596	W4BQY	1292	YU7AW	990	PY4OD	741	EA1JO		

USSR: For single-band WAZ chasers looking for zone 21 on 40 meters, UF6DA frequents 7005 kHz from 0030 UTC.

Station R10 is located in rare Franz Josef Land. If you work him, route your QSL card to UB5KW in care of P.O. Box 88, Moscow.

RI8C was the call used by a DXpedition to oblast 049 last September. This is the rarest oblast in the USSR. QSLs may go either to P.O. Box 15, Izhevsk 426064, USSR, or care of RA3AR, P.O. Box 88, Moscow.

Dxpedition to Southern Africa

Dave Church, WA2HZR, will operate again this year from the Republic of South Africa, Ciskei, and Transkei using the callsigns WA2HZR/ZS (counts as ZSO for WPX), WA2HZR/V9, S42HZR, and S8HZR. His call during the *CQ* Worldwide DX C.W. Contest, and the week of Nov. 21–28, will be WA2HZR/V9. From Nov. 29 to Dec. 5 he will be at S8HZR. This will be an all c.w. operation using split frequency if necessary. All QSLs go to WA2HZR, P.O. Box 592, Mexico, NY 13114.

Oblasts, Krays and ASSRs—Geographical Units in the USSR

Russian articles on amateur radio frequently contain confusing references to krays, oblasts, and rayons, to SSRs, ASSRs, and the RSFSR. An understanding of the geographical breakdown of the Soviet Union is useful, since the radio sport federations are organized on the basis of the larger geographical units which are unique and frequently not comparable with units used in other countries. Simple English translations frequently do not exist. For example, the English word *region* may translate to either of two Russian geographical terms: oblast or rayon.

Grant Mitchell, KA2DIV, of the South Florida DX Association, made 20 meter, single-band WAZ in 2 years from start to receipt of the 40th QSL. Grant has been licensed since December 1978 and holds an Extra class ticket. He uses a Mosley Classic 33 for his high-frequency contacts and verticals/inverted Vees for the lower bands. His most difficult zones to confirm were the Russian zones, as the QSLs were slow to arrive. Grant is 46 and owns an auto parts company.

In Soviet usage, *nationality* refers to ethnic origin rather than country of allegiance. The Soviet Socialist Republics are the principal units based on nationality and are recognized as "countries" for amateur radio award purposes. These countries or republics are based on the dominant ethnic group residing within their borders. Each has its own language, flag, and Council of Ministers. Actually, the Soviet Constitution is said to guarantee the Union Republics the formal right to withdraw from the USSR.

Constitutionally, the USSR is just what the letters stand for—a "union" of republics. The highest level entity, the country as a whole, is indicated by terms such as "all union," "of the USSR," or "of the Soviet Union."

The 15 Soviet Socialist Republics normally are thought of as the constituent parts of the USSR. These are Russia itself (the Russian Soviet Federated Socialist Republic, or RSFSR), the Ukraine, Belorussia, Azerbaijan, Georgia, Armenia, Turkoman, Uzbek, Tadzhik, etc. They are termed Union Republics to differentiate from the ASSRs, or Autonomous Soviet Socialist Republics, which are lesser units not having "country" status for amateur radio awards. Any given location in the USSR lies within one or another of the Union Republics. The RSFSR occupies roughly 75% of the land mass of the USSR. As its title suggests, the RSFSR

Father Marshall D. Moran, 9N1MM, of Kathmandu, Nepal with a class of bright-eyed junior ops. Over a period of several decades 9N1MM has confirmed Nepal for thousands of DXers.

has a federated substructure and is sometimes called the "Russian Federation."

The Union Republics are divided into variously named units, the most common being the *oblast* and the next most common the *kray*. Krays are usually more extensive in area and sparser in population than oblasts. Some of the smaller Union Republics lack the oblast/kray structure and break down directly into rayons.

If a portion of a Union Republic is inhabited principally by a distinct ethnic group, it may be designated an *Autonomous Soviet Socialist Republic*, or ASSR, instead of an oblast or kray. ASSRs have a more complex governmental structure, including a Council of Ministers, language, etc., than do oblasts and krays. Lower down on the scale are *autonomous oblasts* and *autonomous okrugs*, an okrug roughly translating to a district. The former are subordinate to a Union Republic, and the latter to an oblast or kray. The amateur press in Russia occasionally reports on DXpeditions to some of the more remote units.

Rayons, literally "regions," although region can also be translated to oblast, are the most pervasive basic units in the country. A comparable unit in the USA would be the county. Large cities such as Moscow have rayons within their borders, a reversal of the our relationship.

At the local level there are cities and towns, the Russian word *gorod* translating to both. *(Thanks DX-NL)*

Some Unique DX Vacations (Thanks to DX'Press)

If the South Pacific is your secret fantasy, Victor, ZK1CG, can help you with a vacation DXpedition to the South Cook Islands. He has a radio-equipped chalet near the airport on the north side of the island. Propagation to North America is excellent from his QTH. For full information, write to ZK1CG at P.O. Box 489, Rarotonga, Cook Islands, South Pacific.

Should the far side of the world beckon, however, P. V. Paul Perera, 4S7NMR, offers a guesthouse near Colombo, Sri Lanka. The use of his shack and equipment are included, and he can also help you with a license application. Contact Paul at 84 Templars Road, Mount Lavinia, Sri Lanka.

73, John, K4IIF

QSL Information

A22WZ to ZS6BCR
A92DQ to K2IJL
BV2AB to JH6SOR, Box 10, Hoshiguma, Kukuoka 814-01, Japan
BY5RA to Fuzhou China Sports Association, P.O. Box 730, Fuzhou, China
CE0AA to P.O. Box 700, Santiago, Chile
CN8EL to W2PD
CS9DI to CT3BM
C21KH to Box 214, Nauru
C3BLBS to IK1CJT
C3BZA to WP2ABZ
ED8RCT to EA8RCT
ET3PS to DJ9ZB
F0CH/TK to HB9TL
FH4AA (Mayotte) to J. Respaut, B.P. 4, Mamoutzou, Mayotte 97600 via France
FO0DCW to W6AM
FO0KI to KA6LAF
FO0SIW to W6MI
FW0BJ to ZL1BJC
FW0BT to ZL1AXU
GK0JFK G3VIE
H44SH AD1S
HH2Q to I2YAE
HV3SJ to I0DUD
JW1UW to LA1UW
KC6DX to KS7L
KC7UU/5N8 to K6EDV
KD4HE/OA4 to WB2MOQ
OD5NT to WA3HUP
PJ8UQ to W3HNK
R1O to UB5KW
RJ6K to UJ8JMM
RJ6R to UJ8JJ
SV5TH to P.O. Box 282, Rhodes, via Greece
S79DOC to HB9KX
T30AT to G4GED
TK5FF to FC6FPH
TT8AD to Box 815, N'Djamena, Chad
V3TV to G3ATK
VP2MF (CQ World-Wide Phone Test, Oct. 27-28, 1984) to G3RRS
VP2VIX to WP2ABZ
VP8AXJ to G4NFT
VP8MT to GW4KGR
W3TB/TF to W3IVG
WP4ATF/KP5 (Desecheo) to J. Maldonado, Sr., Box 449, Palmer, PR 00721
XT2BR to Box 116, Quagadougo
XU1SS to JA1HQG
YB3DC to KO2A
YB5ASO to W4BBP
YO0O to YO3KAA
YZ0U to YU2BHI
ZC4CZ to G4MGQ/G8MWS
3A2RI to WB2ABZ
3D6AK to G3WPF
3V8ZY & 3V8AI to IN3RZY
4S7NMR to KZ8Y
5N3RTF to DK2IF
5N6PDC to K6EDV
5U7LD to IN3RZY
5V7NG to WB4LFM
5X5GK to WB4LFM
7P8DF to DJ1TC
9J2TJ to N8JW
9M6VW to KO2A

Novice

a monthly feature by
BILL WELSH, W6DDB

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

40 Meter Novice Band Operation

Those of us who have tried to work contacts on the 10 and 15 meter Novice bands lately know that operating conditions have been poor to terrible on these bands. There are occasional openings, but they continue to become shorter and less frequent as we approach the projected 1987 low point in the 11-year sunspot cycle. Deteriorating conditions on the 10 and 15 meter bands force Novices to increase operation on the 40 and 80 meter Novice bands. Unlike the 10 (28.1–28.2 MHz) and 15 (21.1–21.2 MHz) meter Novice bands, the 40 (7100–7150 kHz) and 80 (3700–3750 kHz) Novice bands are each only 50 kHz wide. The normal congestion on these narrow 40 and 80 meter Novice bands is increased due to Novices moving to the 40 and 80 meter bands because the 10 and 15 meter bands are usually ineffective at this point in the sunspot cycle. In effect, the Novice frequency spectrum in the high-frequency (3–30 MHz) range is reduced from 300 kHz to 100 kHz.

Fourteen-year-old Lisa (KA9QHL, left) and eleven-year-old Lori (KA9QDR, right) of Mt. Carmel, Illinois are daughters of Larry Benham, KR9M. When they got out of school in June of 1983, the girls dug in and prepared themselves to obtain their Novice licenses. They passed their examinations within six weeks of the time they started working for their Novice tickets. Larry advises that it was harder preparing them to pass the written test than the code test. The girls share the use of one rig with their dad.

Foreign Broadcast Interference

The 40 meter band that is internationally established for the exclusive use of amateur radio is just 7000–7100 kHz. Amateurs in International Telecommunications Union (ITU) Region I (Europe and Africa) and in ITU Region III (Australasia, India, and the rest of the southern hemisphere) are restricted to using this 100 kHz narrow 40 meter segment. Only in ITU Region II (North, Central, and South Americas) is the 40 meter amateur band 7000–7300 kHz. This difference in frequency allocations creates several operating problems for American Novices, plus unusual challenges.

One obvious problem is the interference that ITU Regions I and III international shortwave broadcasts cause to American Novices. These powerful stations are heard every 5 kHz throughout the 40 meter Novice band. One can use them as frequency markers at 7105, 7110, 7115, and all other 5 kHz points in the 40 meter Novice band. At the present time the FOT (optimum transmission frequency) between America and countries in ITU Regions I and III frequently dips into the 40 meter band, causing these broadcast stations to be extremely strong in America. When this condition exists, American Novices are forced to use frequencies between these foreign broadcast stations. Novice band frequencies ending in 2, 3, 7, or 8 are least subject to foreign broadcast station interference. Simply use frequencies such as 7107, 7118, or 7133 kHz to minimize this interference problem. DX contacts with foreign amateurs in ITU Regions I and III would be optimum when foreign broadcasts are strong in America; however, those DX amateurs are not allowed to transmit above 7100 kHz.

2814 Empire Ave., Burbank, CA 91504

Split-Frequency Operation

Since ITU Region I and III amateurs are not allowed to transmit above 7100 kHz, and American Novices (in the continental United States) are not permitted to transmit below 7100 kHz; split-frequency operation is required to enable these groups to contact each other.

There is nothing illegal about American Novices listening below the 40 meter Novice band and contacting amateurs heard outside the Novice band. It is simply a situation wherein the American Novice must transmit within the limits of the Novice band. The DX operator is in a similar situation; she/he can only listen in the American Novice band (for split-frequency contacts) and must transmit below 7100 kHz. This split-frequency operation is easy if both operators have transceivers with auxiliary (second) frequency controls, or if they use separate receiver and transmitter combinations. If one uses a transceiver without auxiliary frequency control, split-frequency operation is almost impossible to achieve.

Assuming that one has equipment which permits easy split-frequency operation, the procedure is simple. The American Novice tunes from 7090 to 7099 kHz listening for DX (foreign) amateurs calling to work USA Novices. When this type of DX call is heard, listen to find out the frequency the DX amateur states she/he is going to listen on for a reply. If no frequency is stated, simply answer the DX amateur at the low end of the band—preferably between 7101 and 7107 kHz. The DX amateur is probably not limited to radiotelegraphy (code) emissions in the upper portion of his 7000–7100 kHz band, so listen for voice (lower sideband) calls as well as code calls.

It is a simple matter to work cross-mode contacts, such as may occur in this split-frequency operation. If you are using a separate receiver and transmitter combination, simply leave your receiver set for LSB reception at the DX station's transmit frequency and leave your transmitter set for code transmissions in the American Novice band. If you are operating a transceiver with remote (auxiliary) frequency control, tune the auxiliary control to the DX station's frequency and leave the main tuning control set to your Novice band transmitting frequency. When it is your turn to transmit, set the function switch to the CODE/CW position. When you want to listen to the DX station's voice transmissions, set the function switch to LSB. This type of DX operation is not as complicated as the preceding description might make it seem to be; just try it a few times, and you will become expert at split-frequency and (possibly) cross-mode operation.

You are welcome to make CQ DX calls in the lower portion of the 40 meter Novice band. Conclude each call by stating

that you will be listening for code or voice answers near some specific frequency, such as 7097 kHz. Then listen very carefully for a reply at your stated frequency. This is unusual operation and it is advisable to use longer calls than normally are used during routine (in-band) contacts. Instead of using the usual 3 (CQ) by 3 (callsign) calling system repeated 3 times, a 5 by 3 calling system repeated 5 times should be used.

Antennas

The single, most common first antenna erected by beginning amateurs is the dipole (doublet). The May through July 1983 Novice columns contain a thorough explanation of dipoles. This month's column just mentions a few facts about dipoles.

The simplicity of a dipole makes it a natural first choice for amateurs assembling their initial stations. The overall (end to end) physical length of a 7125 kHz resonant dipole is 65 feet 8 inches. Each resonant leg (side) of this dipole is 32 feet 10 inches long. Each leg should be cut to 33 feet 10 inches with 6 inches used at each end of each leg to make the required attachments to the antenna insulators. Attach a good feedline to the dipole and solder all joints, including those at the outer insulators.

The August 1983 Novice column provides excellent coverage of military radio frequency transmission lines. The dipole should be erected as high as possible and clear of possible contact with a.c. power lines and telephone cables. When a dipole is close to ground (low), its fire (receive/transmit) angle is almost vertical (straight up) and its radiation pattern is almost omnidirectional (nondirectional). When a dipole is erected about one-half wavelength above r.f. ground, its fire angle is lowered to about 35 degrees, and optimum reception and transmission occurs broadside (front and back) to the antenna. This relatively high fire angle is not very useful for working long-distance (DX) contacts, but it should provide good coast-to-coast contacts.

When a dipole is erected at least one full wavelength above r.f. ground, a new lobe is developed with a fire angle of about 15 degrees. This new lobe provides good DX capability. At this increased height, a second lobe exists at a fire angle of about 50 degrees. This higher lobe is useful for coast-to-coast contacts. It is not easy to install a dipole one-half wavelength above electrical ground because one-half wavelength at 7125 kHz is approximately 21 meters, and it is about 69 feet above r.f. ground. One wavelength at 7125 kHz is 42.15 meters, and it is about 138 feet 3 inches above ground.

It is a lot easier to talk about high dipoles than it is to erect them. However, the preceding information clearly illustrates the benefit derived from installing a dipole as high as possible.

Mike Bragen, KA9OWC, lives in the southwest part of Chicago, Illinois. He is 19 years old and he has been a Novice since January 1983. His station includes a Kenwood TS-520 transceiver, 40 meter dipole, and a combination s.w.r./power meter. He uses the DX-160 receiver for shortwave listening. Mike was a CQ reader long before he became an amateur, and he credits this magazine with giving him a good start in the amateur radio service. Mike has contacted amateurs in 32 states and 5 countries.

Multiband (trap) antennas are popular because they enable one to operate two (or more) bands using one antenna and a single feedline. Trap antennas function best at their highest frequency band, and their efficiency is worst at their lowest frequency band. In other words, a trap antenna designed for use on the 10, 15, 40, and 80 meter bands is most efficient on 10 meters and least efficient on 80 meters. Please note that this type of antenna functions best on the two Novice bands that are presently least useful (10 and 15 meters), and it is least efficient on the two Novice bands that are now most useful. If you are going to install a trap antenna, it is advisable to put up a dual-band one for 40 and 80 meters. A dual-band trap antenna costs less than a four-band trap antenna, and the dual-band trap antenna is more efficient on 40 and 80 meters than an equivalent four-band antenna. It does not make sense to pay more money for an antenna that is less efficient on the bands you will operate most often during the next few years.

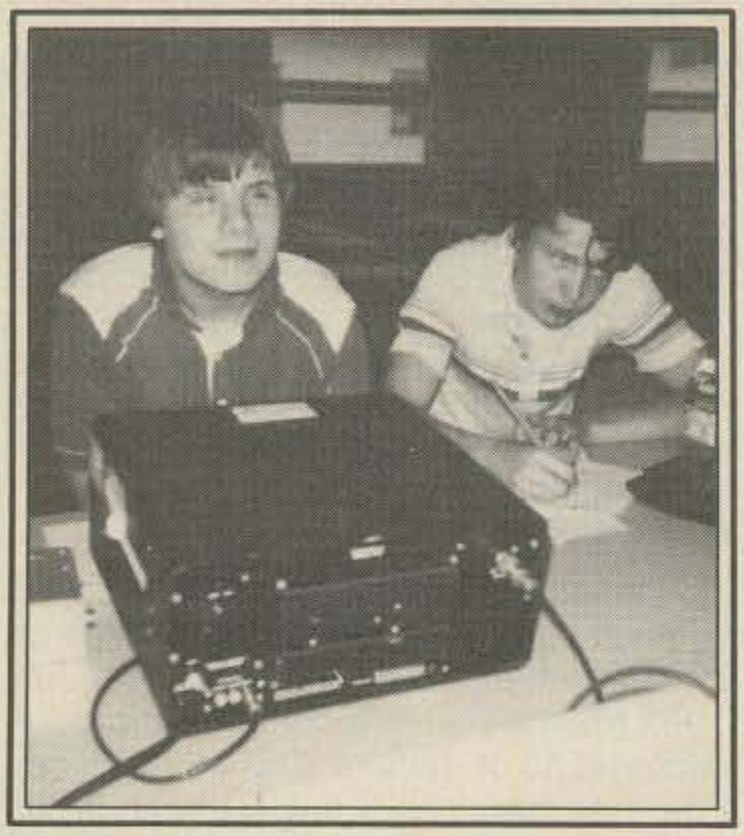
Directive antennas are preferred over dipole, vertical, random-wire, and similar antennas. However, the large size of 40 meter antennas causes Yagi-Uda, quad, delta-loop, rhombic, and other highly directive antennas to be rare. If you can erect a directive 40 meter antenna, it will be worth the trouble and expense, because 40 meters will continue to offer improved DX communication possibilities during the next few years. As 10, 15, and 20 meters decline in usefulness, 30, 40, 80, and 160 meters improve.

If you decide to use a random-wire antenna on 40 meters, it should be at least

33 feet long. The associated tuner and an s.w.r. (standing wave ratio) meter are used to make the antenna electrically (not physically) resonant at any desired frequency. If the random wire is tuned to act as a quarter-wave (Marconi) antenna, three-fourths of its electrical length is in the station's ground system. If the random wire is tuned to act as a half-wave (Hertz) antenna, one half of its electrical length is in the station's r.f. ground path. In either case, it is essential that the station have an excellent r.f. ground, or antenna efficiency will be poor. The September through November 1978 Novice columns provide station grounding information.

Conclusion

I hope this month's column provided some information that will help you improve your operating results on 40 meters. Now is the time to be very active on 40 and 80 meters and to work all of the states and countries that one does not usually hear on these bands during the peak sunspot activity years. The increased congestion on these bands makes it important to operate in a courteous and responsible manner.



Here are two 16-year-old young men who enjoy amateur radio. Alan Deaton, KA5PTY, on the right in this photograph, has been licensed since December 1982. Tracy Bennett is a student at the Arkansas School for the Blind. He got started in amateur radio as a member of Explorer Post 73, which is jointly sponsored by the Arkansas School for the Blind and the Metropolitan Amateur Radio Club of Little Rock. Tracy passed the Novice exam shortly before this picture was taken.

Wall Calendars

Novice column readers are again offered an opportunity to obtain 13.5″ × 19.5″ amateur radio 1985 wall calendars. Send $4 and your self-addressed mailing label to W6LS, 2814 Empire, Burbank, CA 91504. These calendars make welcome gifts for your amateur friends.

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 s.a.s.e. 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, 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. I have never received pictures from Novices in Connecticut, Hawaii, Louisiana, and Vermont.

73, Bill, W6DDB

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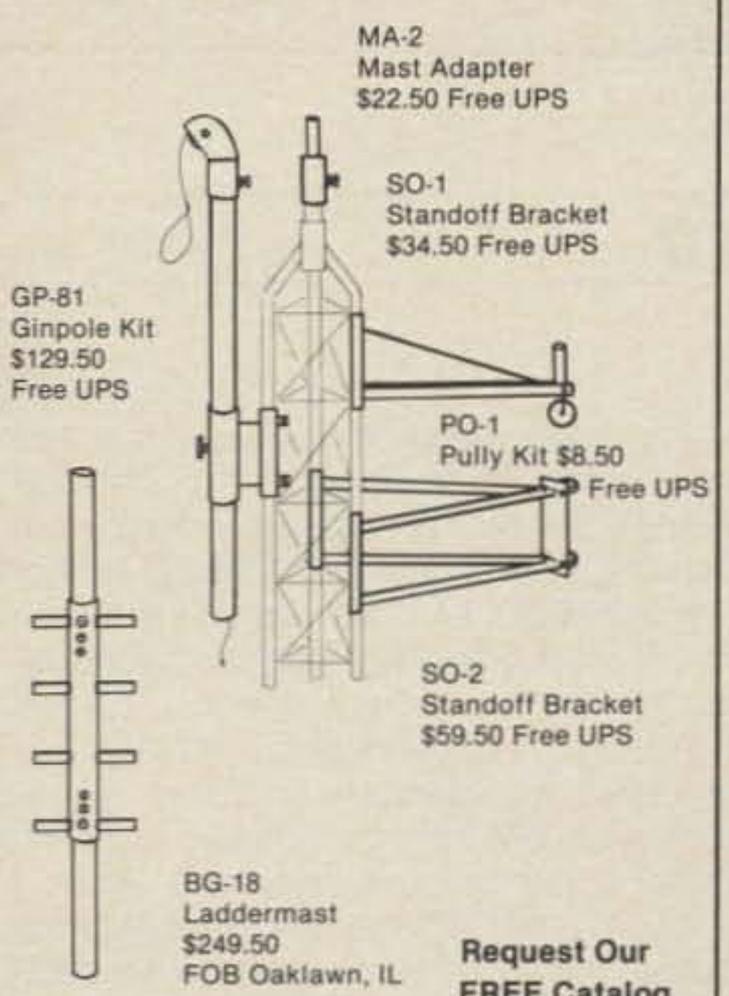

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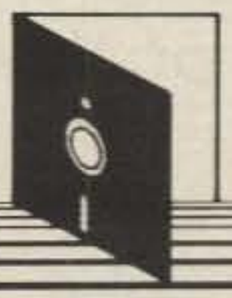

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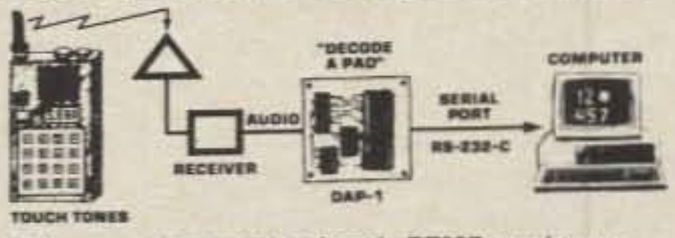

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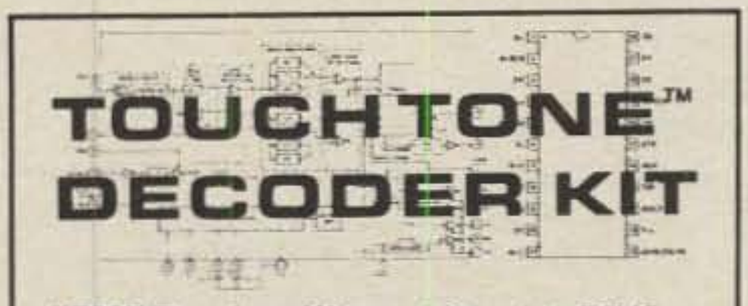

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CIRCLE 37 ON READER SERVICE CARD

dateline... Washington, D.C.

a regular feature by
THEODORE J. COHEN, N4XX

THE INS AND OUTS OF THE WASHINGTON SCENE

220 Grab: Tip of the Iceberg

The grab for our 220 MHz band by the Land Mobile Communications Council (LMCC) and Sideband Technology, Inc. (SBI) is only a small part of a larger problem facing v.h.f. and u.h.f. users, in general, and the Federal Communications Commission, in particular. Simply put, the problem is: How can the Commission accommodate the large number of land mobile users who demand access to the spectrum? Here are some facts bearing on the matter:

•Land mobile usage is increasing at an annual rate of between 6 and 10%;

•In many areas, available land mobile spectrum allocations are becoming saturated, if they are not already saturated;

•The equipment currently used in the Land Mobile service—specifically, narrowband f.m.—is considered by many to be "spectrum inefficient" (i.e., it uses more spectrum than is required).

Expanding the frequencies available for land mobile use is certainly one way to accommodate new users. However, it can be argued that the growth now underway in the Land Mobile service can easily be absorbed within existing allocations *provided* more efficient use is made of current allocations. One way to do this would be to introduce new, more spectrum-efficient modulation techniques into the Land Mobile service. Two options are available:

1. Permit the evolutionary introduction of new modulation techniques—for example, amplitude compandored sideband (ACSB)—into existing land mobile bands (so-called "permissive use");

2. Allocate new bands to the Land Mobile service—bands such as the Amateur service's 220 MHz band—and introduce new modulation techniques only in these bands.

Land mobile operators, of course, have invested heavily in the plants and equipment necessary to meet their communication needs. Further, entrenched manufacturers of the equipment used today are obviously unwilling to perturb what, for them, is a very lucrative market. In other words, neither group has reason to seek a change in the status quo. Accordingly, they have taken, and will continue to take, whatever steps are necessary to stop the implementation of new modulation techniques into existing bands. This explains, in large part, why those seeking to provide Land Mobile services using new modulation techniques have petitioned the Commission to consider reallocation of the 220 MHz band.

The Amateur service's 220 MHz allocation was not the only band cited in the Land Mobile Communications Council petition. This group also asked the FCC to explore the possibility that u.h.f. TV channels, government frequencies, and other bands also be considered for land mobile use. To this end, amateurs have a number of allies within the television broadcast industry, and elsewhere, who are also working to protect their allocations. We would do well to join forces with them at the earliest possible date, and to turn aside vigorously those who seek to grab our frequencies.

In the meantime, it is essential that we convey our position on 220 MHz to the Commission in an objective and rational manner. To be sure, write-in campaigns and Congressional inquiries have their place in a democratic society. However, much of what passes for "comments" to the Commission today on this matter appear to be based on unfounded, misleading rumors . . . comments that can only hurt our credibility.

If the Commission does decide to look further into reallocation of all or part of the 220 MHz band to the Land Mobile service, it will take six months to a year before the necessary internal studies have been performed and a staff position determined. This is sufficient time for the amateur community to research the problem, develop counter-proposals, and convince the Commission that the permissive use of new technologies in existing land mobile bands is the only viable, long-term solution to the spectrum crowding problem.

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Goldwater Introduces Bill To Prohibit Willful or Malicious Interference

Sen. Barry Goldwater (R., AZ) recently introduced Senate Bill S. 2975, ". . . to amend the Communications Act of 1934 to eliminate willful or malicious interference with communications." The bill would statutorily prohibit individuals from creating interference and would authorize the FCC to "prevent interference while proceeding against the perpetrator."

According to Goldwater, the FCC has recorded a significant increase in the number of complaints received involving willful or malicious interference. While a large number of these complaints resulted from interference to amateur communications, problems have also been noted in the citizen's band, maritime mobile bands, land mobile bands, and in bands dedicated to public service operations (i.e., police, fire, and rescue). Even the bands used by the Federal Aviation Administration and the Department of Defense have not been spared. Said Goldwater: "The increase in willful interference to authorized communications simply must be stopped in order to ensure the reliability of the authorized public interest and safety uses of the radio spectrum."

The bill is desirable because present law is not comprehensive or clear. Although the Communications Act appears to prohibit willful or malicious interference, said Goldwater, it may apply only to FCC licensees. Furthermore, the penalty for such illegal activities may only involve suspension of an operator's license. The bill, then, would provide a stronger basis for the Commission to investigate interference complaints and to seek prosecution by the U.S. attorney based upon violation of both the Criminal Code and the Communications Act.

The full text of S. 2975 can be found in the Congressional Record—Senate, September 10, 1984.

Maximum Service Telecasters Releases Report on Meeting Land Mobile Requirements

According to MST President T. E. Paro, a report prepared by Dale N. Hatfield Associates shows that available new technologies and advanced spectrum management techniques can meet public safety mobile communications requirements. The report, dubbed "Hatfield II," follows a Hatfield study last year that out-

lined achievable gains in mobile radio capacity and utility.

Hatfield's studies are part of an industry-wide response to proposals by land mobile users—taxicabs and delivery services as well as police and fire departments—to operate their radios on u.h.f. television frequencies. This would make it impossible, says MST, for the public to receive television service on those channels.

In its report, Hatfield presented a plan that, using existing technology, created more than 500 new communications channels for public safety on frequencies near 150 MHz. Using techniques such as amplitude compandored sideband, for example, it is possible to create three or more channels out of the same channel now occupied by signals using conventional modulation technologies. Users would shift from wide to narrowband systems using the concept of "progressive conversion," an approach Hatfield developed to take advantage of the unused spaces between existing land mobile channels.

For more information on Hatfield I and Hatfield II, as well as MST's efforts to ward off the threat to the u.h.f. television band from users in the Land Mobile service, contact: Maximum Service Telecasters, Inc., 1735 DeSales Street, NW, Washington, DC 20036, telephone (202) 347-5412.

Cable Television Association Warns Its Members on Interference

Following the rejection by the FCC of the ARRL's petition for CATV operators to vacate Channels E and K, the Commission cautioned cable operators that it considered signal leakage a major problem and that it would fine CATV operators who did not clean up their systems. On the heels of this action, the Community Antenna Television Association (CATA), whose 70 members include some of the largest cable television operators in the U.S., cautioned its members that the Commission's Field Operations Bureau is putting emphasis on the signal leakage problem, and that "the FCC monitoring van may roll into your city any day now."

In commenting on the signal leakage problem, CATA also noted that in the last 2½ years, fines of more that $300,000 have been imposed on CATV operators who did not seek clearance to operate their cable systems on frequencies used by the Federal Aviation Administration (FAA). This, too, said CATA, is an area where the FCC is not fooling around.

ARRL Files For Declaratory Ruling On State and Local Regulation of Amateur Installations

The League has requested the Commission to issue a Declaratory Ruling of Limited Federal Preemption of State and Local Regulation of Amateur Radio Station Installation and Operation. If issued, the ruling would set limits on the extent to which local zoning and other local and state regulations could exercise control over amateur radio stations. According to *The ARRL Letter*, the League is concerned with numerous attempts by local authorities who, citing the (alleged) threat amateur operations pose to health and safety, seek to limit such operations.

The League's filing follows a similar action by United States Communications, Inc. (USCI), which is seeking a declaratory ruling regarding the installation of its television receive-only (TVRO) earth stations in residential areas.

Comments to the Commission (original plus four copies) were due to the Secretary, FCC, by 9 November 1984. Reply comments are due on or before 14 December 1984. In your comments, refer to document PRB-1. Copies of the League's filing are available from ARRL headquarters (send 9"×12" s.a.s.e. with $.88 postage).

Midway ARC Assumes Management of NA Teleconference Radio Net

On 15 September 1984, the Midway Amateur Radio Club of Kearney, Nebraska, assumed sponsorship of the North American Teleconference Radio Net (TRN). Club president "Mert" Feikert, WBØUSW, named Timothy Loewenstein, WAØIVW, as the new Net Manager.

The net links together over 150 gateway stations (mostly v.h.f./u.h.f. repeaters) across the U.S. and Canada to present high-quality technical and informational programs of interest to radio amateurs. When available for uplinking from the U.S., the OSCAR 10 satellite also transmits the net to one-third of the northern hemisphere. It is estimated that a single TRN has had as many as 75,000 amateurs tuned in, plus uncounted scanner listeners. Past speakers on TRN have included Vic Clark, W4KFC, and Senator

Barry Goldwater, K7UGA. A fact not generally realized is that the technology behind TRN allows any of the amateurs tuned in, whether in Alaska, Florida, or New Brunswick—in their car, at home, or walking down the street with a hand-held radio—to talk to one another or to the featured speaker.

"Packet Radio Overview and Prospective" will be the subject of the first TRN to be presented under sponsorship of the Midway Club on Sunday, 2 December 1984, at 6 p.m. CST (local nets may begin earlier). The speakers will be Lyle Johnson, WA7GXD, and Harold Price, NK6K, both highly respected authorities and pioneers in packet radio technology.

Correspondence and requests for TRN information should be sent to: TRN Manager, *c/o* Midway Amateur Radio Club, P.O. Box 1231, Kearney, NE 68847-1231. U.S. amateurs should include a business-size s.a.s.e. with their request for information.

Amplitude Compandered Sideband (ACSB) Debuts on AO-10

According to *Amateur Satellite Report*, the Radio Amateur Satellite Corporation's (AMSAT) newsletter for the amateur space program, the first test of ACSB in the Amateur service showed that the technique offers the potential for significantly improving the intelligibility of voice signals under less than ideal conditions. The test took place in August 1984 as part of Project Companion, a joint endeavor of AMSAT, the ARRL, and Project OSCAR.

In the test, Greg Bonaguide, WA1VUG, of the ARRL operated a W1AW transmitter that had been modified to include ACSB equipment. The equipment was on loan from Sideband Technology, Inc. (STI), of Rochester, NY. (This is the same company that earlier this year filed a petition with the Commission [RM 4831], asking that the band 216–222 MHz be allocated to the Land Mobile service for ACSB use.) At STI, unprocessed (i.e., non-ACSB) and ACSB transmissions were taped and evaluated. Preliminary results were encouraging, with subsequent analyses expected to show an improvement in intelligibility equivalent to a 10 dB improvement in signal-to-noise ratio.

An overview of ACSB and a bibliography on the subject can be found in the 1984 edition of the *ARRL Handbook*.

First Successful 2 Meter Meteor Scatter Packet QSO Reported

Also reported by *Amateur Satellite Report* was the first successful meteor scatter contact using packet radio techniques. Operating on the 2 meter band, K1HTV in Maryland contacted a station in Iowa during the Perseids meteor shower on 12 August 1984. Despite the fact that it took almost three hours for the exchange to be completed, the 1200 mile contact will probably stand as a "first."

Tucson Amateur Packet Radio (TARP) Opens Office

According to TARP President Lyle Johnson, WA7GXD, his organization, an international amateur packet radio research and development group, has opened a new office in Tucson, Arizona. Staffed by Manager Karen Makus, the role of the new office is to expedite the servicing information requests, to provide spare-parts support for your packet radio projects, and to fill orders for TAPR products. Makus is a non-technical person, so technical questions will be routed to the volunteer staff for answering. The office address is: Tucson Amateur Packet Radio, 1016 East Pennsylvania Avenue, Suite 302, Tucson, AZ 85714, telephone (602) 746-1166. Technical questions should be sent to: Tucson Amateur Packet Radio, P.O. Box 22888, Tucson, AZ 85734-2888.

Your Washington editor thanks Mr. David R. Siddall, K3ZJ, President, Capitol Hill Amateur Radio Society, for his contribution to this month's column. And to all our readers, best wishes for a Joyous Holiday Season and a Happy, Healthy New Year!

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CIRCLE 4 ON READER SERVICE CARD

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Propagation

a monthly feature by
GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Bulletin

Since this issue of *CQ* will reach most subscribers before the CQ WW DX C.W. Contest weekend of November 24–25, here is an updated day-to-day forecast for the contest. It now looks like a radio storm could begin during the contest period. I am calling for Low Normal conditions at the beginning of the contest and through part of the 24th. Conditions are expected to drop to Below Normal late during the 24th and continue through the 25th.

Solar activity during the month of August was the lowest recorded since November 1977. The Royal Observatory of Belgium, the world's official keeper of sunspot records, reported a monthly mean level of 24.8. The lowest daily count recorded was 9, on August 19, while the highest level was only 49, recorded on August 26.

The monthly mean level recorded for August results in a 12-month running smoothed sunspot number of 56 centered on February 1984. The solar cycle is based on the value of smoothed sunspot number, and February's count represents a four point drop from January's level, as the present cycle continues its decline. A smoothed sunspot number of 39 is forecast for December 1984.

Progress Cycle 21

Cycle 21, the present solar cycle, began in June 1976 with a smoothed sunspot number of 12. The cycle soared to a peak value of 165 recorded during December 1979 and has been declining since then, albeit somewhat erratically. Table I lists the smoothed sunspot numbers to date during the present cycle, and a prediction for the remainder of the cycle. Cycle 21 is expected to reach its minimum sometime between December 1986 and June 1987 with a smoothed count between 10 and 14.

December Conditions

Solar activity has now declined to a point where daytime DX conditions on *10* and *15* meters will be noticeably poorer than they were during the winter seasons of high solar activity. This probably will be the last year for fairly widespread DX openings on *10* meters until well into the new solar cycle.

Some *10* meter DX openings, mainly to southern and tropical areas, should be possible during much of the daylight period. Fairly good *15* meter DX openings are expected to most areas of the world sometime during the daylight hours, and the band occasionally may remain open towards the west during the early evening. *Twenty* meters should open for DX in almost all directions for an hour or two after sunrise, and remain open to one area of the world or another through the daylight hours and into the early evening. When conditions are above normal, *20* meters is likely to remain open towards the south and west during the hours of darkness to about midnight, and perhaps beyond.

With static levels at seasonally low values in the northern hemisphere, and the hours of darkness at a maximum, a considerable improvement is expected in DX conditions on the *40*, *80*, and *160* meter bands during December. Forty meters should open for DX during the late afternoon hours, with the first signals coming from Europe and other areas in a northeasterly direction from the USA. During the hours of darkness DX should be possible to many areas of the world. The band should peak shortly before sunrise to Oceania and to other areas in a generally southerly and westerly direction.

Fairly good DX conditions are also expected on *80* meters. Openings with relatively strong signal levels should be possible to many areas of the world during the hours of darkness, with conditions expected to peak as the sun rises at the easternmost terminal of a DX path. Even the *160* meter band is expected to have its share of DX during December. Some openings are likely to take place when the transmission path is entirely in darkness, or when part of the path is in darkness and the other in either twilight or dawn.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for November 1984

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 2, 29	A	A	B	C
High Normal: 5, 9-10, 27	A	B	C	C-D
Low Normal: 1, 3-4, 6-8, 11, 15-17, 20-24, 28, 30	A-B	B-C	C-D	D-E
Below Normal: 12, 14, 18-19, 25-26	B-C	C-D	D-E	E
Disturbed: 13	C-E	D-E	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 S1 and S3, and with considerable fading and noise.

E—No opening expected.

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 the 1st, excellent (A) on the 2nd, good-to-fair (B-C) on the 3rd and 4th, good (B) on the 5th, etc.**

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
1976						12	13	14	14	13	14	15
1977	17	18	20	22	24	26	29	33	39	46	52	57
1978	61	65	70	77	83	89	97	104	108	111	113	118
1979	124	131	137	141	147	153	155	155	156	158	162	165*
1980	164	163	161	159	156	155	153	150	150	150	148	143
1981	140	142	143	143	143	142	140	141	143	142	139	138
1982	137	133	129	124	120	117	115	109	101	96	95	95
1983	93	90	86	82	71	71	66	66	68	68	67	64
1984	60	56	(54)	(51)	(50)	(49)	(48)	(46)	(44)	(42)	(41)	(39)
1985	(38)	(36)	(35)	(34)	(33)	(31)	(30)	(29)	(28)	(27)	(26)	(26)
1986	(25)	(25)	(24)	(22)	(21)	(20)	(18)	(17)	(16)	(15)	(15)	(14)
1987	(14)	(13)	(13)	(12)	(11)	(10)	-	-	-	-	-	-

**Maximum value.*
( )Predicted values.

Table I– Smoothed sunspot numbers to date during Cycle 21, plus prediction for remainder of the cycle.

11307 Clara Street, Silver Spring, MD 20902

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart approprate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8 KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 Meters) for a particular DX region, as shown in the left-hand column of the Charts. An * indicates the best time to listen for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. 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.

4. 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. Appropriate *standard* time is used, *not* GMT. To convert to GMT, add to the times shown in the appropriate chart 8 hours in PST Zone, 7 hours in MST Zone, 6 hours in CST Zone, and 5 hours in EST Zone. For example, 13 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 04 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength 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.

6. 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.

December 1984 to February 1985 Time Zone: EST (24-Hour Time) EASTERN USA TO

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Western & Central Europe & North Africa	09-11 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (2) 13-14 (1)	06-07 (1) 07-09 (4) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-17 (1)	15-16 (1) 16-17 (2) 17-19 (3) 19-00 (4) 00-02 (2) 02-03 (3) 03-05 (1) 17-19 (1)* 19-20 (2)* 20-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & European USSR	08-10 (1)	07-08 (1) 08-10 (2) 10-12 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-14 (1)	16-19 (1) 19-23 (2) 23-03 (1) 19-02 (1)*
Eastern Mediter-ranean & Middle East	08-10 (1)	08-09 (1) 09-10 (3) 10-11 (2) 11-12 (1)	06-09 (1) 09-10 (2) 10-13 (3) 13-15 (2) 15-17 (1)	18-20 (1) 20-22 (2) 22-00 (1) 20-23 (1)*
West Africa	09-11 (1) 11-13 (2) 13-15 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	18-22 (1) 22-00 (2) 00-03 (1) 03-04 (2) 00-02 (1)*
East & Central Africa	10-13 (1)	08-10 (1) 10-12 (2) 12-13 (3) 13-15 (2) 15-16 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	18-00 (1)
Southern Africa	09-10 (1) 10-12 (2) 12-13 (1)	07-09 (1) 09-12 (2) 12-14 (3) 14-15 (1)	07-09 (1) 12-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-20 (1)	18-19 (1) 19-21 (2) 21-00 (1) 19-22 (1)*
Central & South Asia	Nil	08-10 (1) 17-19 (1)	06-07 (1) 07-09 (2) 09-11 (1) 18-21 (1)	06-08 (1) 20-22 (1)
Southeast Asia	Nil	08-11 (1) 17-19 (1)	06-07 (1) 07-09 (2) 09-12 (1) 19-21 (1)	06-08 (1) 20-22 (1)
Far East	Nil	16-17 (1) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-21 (1)	05-08 (1) 05-07 (1)*
South Pacific & New Zealand	13-17 (1)	11-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-20 (1)	03-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (1)	01-02 (1) 02-04 (2) 04-07 (3) 07-08 (2) 08-09 (1) 04-05 (1)* 05-07 (2)* 07-08 (1)*
Australasia	16-18 (1)	09-12 (1) 15-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (2) 16-18 (1) 18-20 (2) 20-22 (1)	03-05 (1) 05-07 (2) 07-09 (1) 05-08 (1)*
Caribbean, Central America & Northern Countries of South America	09-10 (1) 10-12 (2) 12-14 (1) 14-16 (2) 16-17 (1)	07-08 (1) 08-11 (3) 11-13 (2) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (2) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-06 (1)	17-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-02 (3)* 02-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-12 (1) 12-15 (2) 15-16 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (4) 16-17 (3) 17-18 (1)	13-14 (1) 14-15 (2) 15-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-03 (1) 05-06 (1) 06-08 (2) 08-09 (1)	19-21 (1) 21-02 (2) 02-05 (1) 21-03 (1)*
McMurdo Sound, Antarctica	Nil	07-10 (1) 16-18 (1)	07-09 (1) 17-18 (1) 18-22 (2) 22-00 (1) 00-02 (2) 02-03 (1)	00-05 (1)

**Predicted times of 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 better.*

December 1984 to February 1985 Time Zones: CST & MST (24-Hour Time) CENTRAL USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Western & Southern Europe & North Africa	09-11 (1)	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (2) 12-13 (1)	06-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-15 (1) 22-00 (1)	16-18 (1) 18-20 (2) 20-00 (1) 00-02 (2) 02-03 (1) 17-20 (1)* 20-01 (2)* 01-02 (1)*
Northern & Central Europe & European U.S.S.R.	Nil	07-08 (1) 08-10 (2) 10-12 (1)	07-08 (1) 08-11 (2) 11-13 (1) 23-01 (1)	17-19 (1) 19-22 (2) 22-01 (1) 19-00 (1)*
Eastern Mediter-ranean & Middle East	Nil	08-11 (1)	06-09 (1) 09-12 (2) 12-14 (1) 22-00 (1)	18-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
West & Central Africa	08-10 (1) 10-12 (2) 12-13 (1)	07-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-11 (1) 11-13 (2) 13-16 (3) 16-17 (2) 17-19 (1) 22-02 (1)	18-21 (1) 21-23 (2) 23-01 (1) 19-22 (1)*
East Africa	10-12 (1)	07-11 (1) 11-13 (2) 13-14 (1)	06-12 (1) 12-14 (2) 14-16 (3) 16-17 (2) 17-19 (1)	19-23 (1)
Southern Africa	08-09 (1) 09-12 (2) 12-13 (1)	07-09 (1) 09-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)	07-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-20 (1) 23-01 (1)	18-19 (1) 19-21 (2) 21-23 (1)
Central & South Asia	Nil	08-10 (1) 19-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 19-22 (1)	06-08 (1) 19-21 (1)
Southeast Asia	Nil	08-11 (1) 17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 16-17 (1) 17-19 (2) 19-20 (1)	04-07 (1)
Far East	Nil	07-09 (1) 16-17 (1) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 15-17 (1) 17-19 (2) 19-21 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-07 (1)*
South Pacific & New Zealand	12-14 (1) 14-16 (2) 16-18 (1)	10-12 (1) 12-14 (2) 14-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (3) 09-12 (2) 12-15 (1) 15-17 (2) 17-20 (3) 20-21 (2) 21-22 (1) 02-04 (1)	23-01 (1) 01-02 (2) 02-06 (3) 06-07 (2) 07-08 (1) 03-07 (1)*
Australasia	14-15 (1) 15-17 (2) 17-18 (1)	09-11 (1) 13-15 (1) 15-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-12 (2) 12-18 (1) 18-21 (2) 21-22 (1)	02-04 (1) 04-07 (2) 07-09 (1) 03-06 (1)*
Caribbean, Central America & Northern Countries of South America	08-10 (1) 10-14 (2) 14-16 (1)	07-08 (1) 08-09 (2) 09-13 (3) 13-16 (4) 16-17 (2) 17-19 (1)	06-07 (2) 07-11 (3) 11-14 (2) 14-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 22-00 (2) 00-06 (1)	18-20 (1) 20-22 (2) 22-03 (3) 03-05 (2) 05-07 (1) 19-21 (1)* 21-01 (2) 01-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	08-11 (1) 11-15 (2) 15-17 (1)	07-08 (1) 08-13 (2) 13-15 (4) 15-16 (3) 16-17 (2) 17-19 (1)	05-06 (1) 06-08 (2) 08-10 (1) 12-14 (1) 14-15 (2) 15-17 (3) 17-19 (4) 19-20 (2) 20-22 (1) 22-00 (2) 00-03 (1)	19-21 (1) 21-02 (2) 02-05 (1) 21-04 (1)*
McMurdo Sound, Antarctica	Nil	07-09 (1) 16-18 (1)	06-07 (1) 07-09 (2) 09-11 (1) 17-18 (1) 18-22 (2) 22-00 (1) 00-02 (2) 02-03 (1)	22-05 (1)

December 1984 to February 1985 Time Zone: PST (24-Hour Time) WESTERN USA TO:

Reception Area	*10 Meters*	*15 Meters*	*20 Meters*	*40/80* Meters*
Western & Southern Europe & North Africa	07-09 (1)	07-08 (1) 08-10 (2) 10-11 (1)	05-07 (1) 07-10 (2) 10-12 (1) 23-01 (1)	18-20 (1) 20-23 (2) 23-01 (1) 19-23 (1)*
Central & Northern Europe & European USSR	Nil	07-09 (1)	06-07 (1) 07-10 (2) 10-13 (1) 23-01 (1)	17-00 (1) 19-23 (1)*
Eastern Mediter-ranean & Middle East	Nil	07-09 (1)	06-07 (1) 07-09 (2) 09-11 (1) 21-23 (1)	18-21 (1)

West & Central Africa	09-12 (1)	07-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	06-10 (1) 10-13 (2) 13-16 (3) 16-18 (2) 18-19 (1)	18-22 (1)
East Africa	Nil	08-11 (1)	08-10 (1) 13-16 (1) 21-23 (1)	18-20 (1)
Southern Africa	08-11 (1)	06-08 (1) 08-10 (2) 10-12 (3) 12-13 (2) 13-14 (1)	07-11 (1) 11-13 (2) 13-16 (3) 16-18 (2) 18-19 (1) 00-02 (1)	18-20 (1)
Central & South Asia	Nil	09-11 (1) 17-19 (1)	08-10 (1) 17-19 (1) 19-20 (2) 20-21 (1)	05-07 (1) 18-20 (1)
Southeast Asia	15-18 (1)	09-11 (1) 15-16 (1) 16-18 (2) 18-19 (1)	07-09 (1) 09-11 (2) 11-16 (1) 16-19 (2) 19-20 (1)	03-08 (1)
Far East	15-17 (1)	14-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	08-10 (1) 13-14 (1) 14-15 (2) 15-18 (3) 18-19 (2) 19-21 (1)	00-01 (1) 01-03 (2) 03-06 (3) 06-08 (2) 08-10 (1) 02-08 (1)*
South Pacific & New Zealand	12-14 (1) 14-16 (2) 16-17 (1)	09-12 (1) 12-14 (2) 14-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	07-08 (1) 08-10 (2) 10-15 (1) 15-16 (2) 16-18 (4) 18-19 (3) 19-20 (2) 20-22 (1) 03-05 (1)	22-00 (1) 00-03 (2) 03-06 (3) 06-07 (2) 07-08 (1) 00-03 (1)* 03-06 (2)* 06-07 (1)*
Australasia	13-15 (1) 15-17 (2) 17-18 (1)	08-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-10 (3) 10-12 (2) 12-17 (1) 17-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	01-03 (1) 03-06 (2) 06-08 (1) 01-03 (1)* 03-06 (2)* 06-07 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-14 (2) 14-16 (1)	06-07 (1) 07-08 (2) 08-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (2) 07-09 (3) 09-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-20 (2) 20-22 (1) 22-00 (2) 00-06 (1)	18-20 (1) 20-22 (2) 22-02 (3) 02-04 (2) 04-05 (1) 19-21 (1)* 21-01 (2)* 01-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	10-12 (1) 12-14 (2) 14-15 (1)	07-10 (1) 10-12 (2) 12-13 (3) 13-15 (4) 15-16 (2) 16-18 (1)	08-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-23 (1) 23-01 (2) 01-06 (1) 06-08 (2)	20-22 (1) 22-01 (2) 01-04 (1) 22-02 (1)*
McMurdo Sound, Antarctica	Nil	07-09 (1) 12-15 (1) 15-17 (2) 17-18 (1)	16-18 (1) 18-19 (2) 19-22 (3) 22-01 (2) 01-03 (1) 07-09 (1)	23-05 (1)

For *short-skip* openings of less than 250 miles try *80* meters during the day and *160* meters at night. Between 250 and 750 miles the best bet is *40* meters during the day and *80* at night. Between 750 and 1300 miles try *20* during the day, *40* during the early evening, and *80* later in the evening until sunrise. Between 1300 and 2300 miles *20* meters looks best during the day, *40* during the evening to about midnight, and *80* for the remainder of the dark hours to sunrise. Short-skip openings should be possible on *15* meters between distances of approximately 1300 and 2300 miles during much of the daylight period. An occasional opening on *10* meters may also be possible during the early afternoon.

This month's column contains DX Propagation Charts valid through mid-February 1985. Short-skip Propagation Charts for December appeared in last month's column.

V.H.F. Ionospheric Openings

Quite a bit of meteor activity is expected during the month. *Geminids*, classified as a major meteor shower, should begin on December 12 and last for about three days. Maximum intensity is expected on December 13, with a meteor rate of about one a minute. This should permit fairly good meteor-type openings on both *6* and *2* meters. A second, but somewhat less intense, shower period is expected later in the month. Called *Ursids*, it should last from December 22–23, peaking on the 22nd. A meteor rate of about 15 per hour is expected during this shower.

Trans-equatorial scatter or TE openings on *6* meters should fall off quite a bit during December. An occasional opening may still be possible, however, between the southern half of the USA and South America during the hours of 8 and 11 p.m.

A secondary seasonal peak in sporadic-*E* propagation generally takes place during December (the major peak occurs during the summer months). This should result in a few fairly good short-skip-type openings on 6 meters between distances of approximately 800 and 1400 miles. Conditions should peak during the early evening hours, but some openings may occur at other times as well.

Some auroral-type v.h.f. ionospheric openings are also likely to occur during December, especially during periods when ionospheric conditions on the h.f. bands are below normal or disturbed. Check the Last Minute Forecast at the beginning of this column for the days that are most likely to be in those categories during the month.

The Editor of this column would like to take this opportunity to extend his warmest wishes for the Holiday Season, and his best wishes for good propagation during 1985, despite declining sunspot activity.

73, George, W3ASK

Announcing

•**W9CZH From Santa Claus, IN** - The Pike County Amateur Radio Club of Winslow, Indiana will operate station W9CZH from Santa Claus, Indiana on December 1 starting at 1700Z until December 2 at 1700Z. The frequencies will be: 3.925, 7.265, 14.265, 21.395 phone; 7.133 c.w.; 146.52 f.m. (all frequencies approximate). A special QSL/Xmas card postmarked from the Santa Claus Post Office will be sent upon receipt of an s a.s.e. to W9CZH, R.R. #1 Box 311, Winslow, IN 47598.

•**Handi-Ham Winter Hamfest** - The annual Handi-Ham Hamfest will be held Saturday, December 1, at the Eagles Club in Faribault, Minnesota starting with registration at 9 a.m. There will be a handi-ham equipment auction, dinner at noon, program, and prize drawing. Talk-in on 19/79. For more information, contact Don Franz, W0FIT, 1114 Frank Avenue, Albert Lea, MN 56007.

•**Everglades National Park, Florida** - The Everglades ARC will operate Special Event Station W4SVI December 1 and 2 to commemorate the 37th anniversary of the dedication of the Everglades National Park. W4SVI will operate from Flamingo on the southern tip of Florida between 1300Z and 2300Z both days. Frequencies: lower edge of the 10 to 40 meter General phone bands as well as 146.52 f.m. Certificate for large s.a.s.e to Everglades ARC, 14511 SW 287 Street, Leisure City, FL 33033. Enclose your QSL card for display at the Miami Hamboree in February.

•**Special Event From Liverpool, England** - Merseyside Special Event Group will be operating the special event call-sign block GB0,1,2,4,6, and 8, B.C.L. (Beatle City Liverpool) from 0000 December 1st to 2400 December 31st "8 days a week" inclusive. The group will operate all h.f. bands (pre-WARC) and also 2 meters and 70 cm, all modes. QSL direct to QSL Manager G4VKV, c/o Beatle City, P.O. Box 12, Liverpool, England (U.K. amateurs enclose s.a.e., Europe 2 IRCs, DX 3 IRCs or $1.00 U.S.). Special QSL cards will be issued.

•**Bethlehem Award Station** - W1FHP has 8000 Christmas special cards already. For December through January 7 operation on 10, 15, 20, and 40 meters, send first-class stamp only. If interested, they also have covers with Santa and Bethlehem, Connecticut postmarks. QSL Callbook.

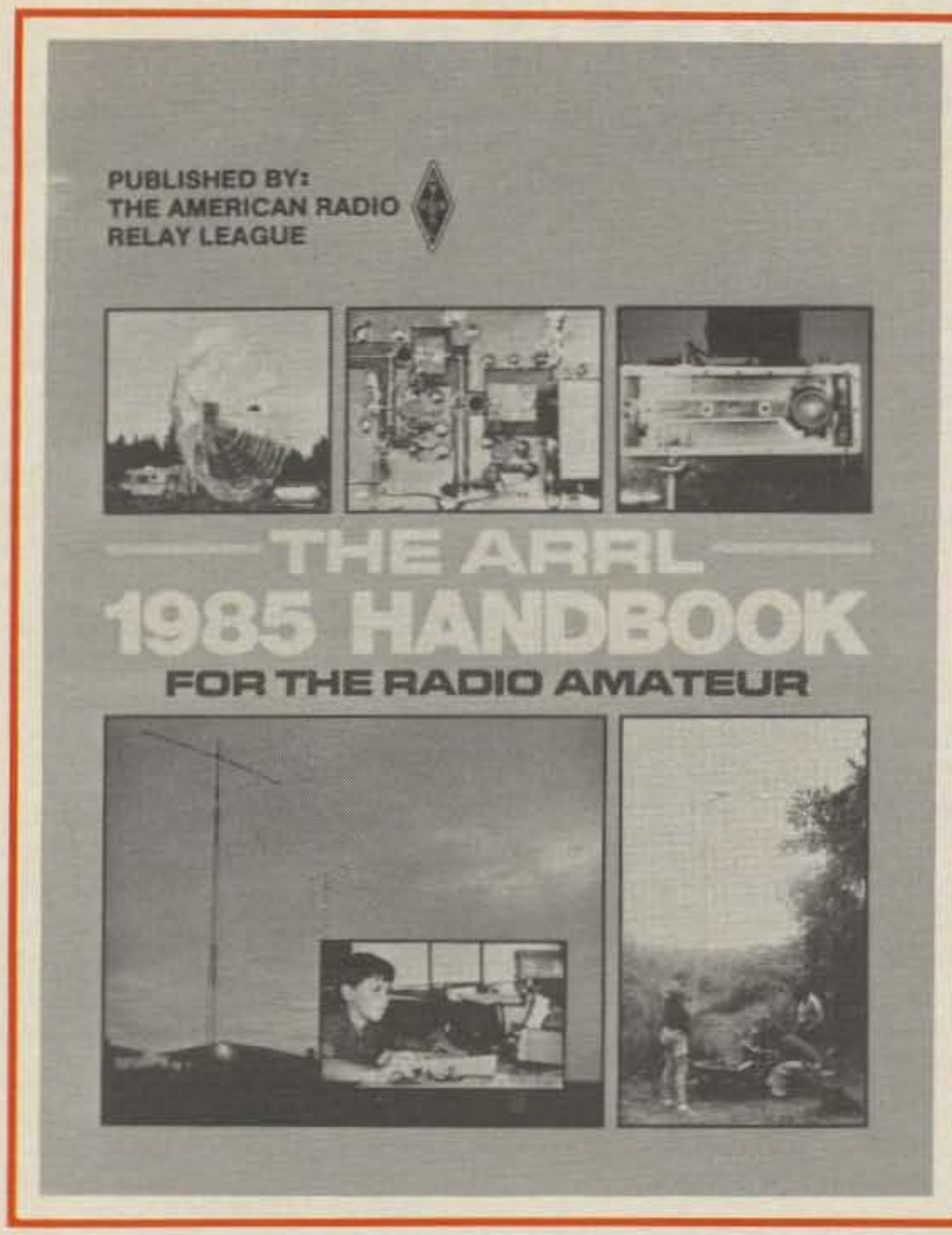
•**Bethlehem, West Virginia Expedition** - The Triple States Radio Amateur Club will operate from Bethlehem, West Virginia, December 15–16, from 1400 to 2300 UTC daily. Operating frequencies for WB8ZTY will be 7.275, 14.325, 21.425, and 28.550 MHz on s.s.b., and 7.110, 14.075, 21.110, and 28.110 MHz on c.w. A special holiday certificate will be sent to all those contacted who send an s.a.s.e. to WB8ZTY, 42 Willow Lane, Bethlehem, Wheeling, WV 26003.

•**Farmington, Maine Special Event** - The Sandy River Amateur Radio Club will operate the Chester N. Greenwood Special Event Station in commemoration of the inventor of the earmuff from 1500Z December 21 to 2100Z December 23 10K up from the General split on 80, 40, and 20 meters. QSL with 40 cents postage to KA1CNG via Callbook for special 8 × 10 certificate.

•**W3OK From Bethlehem, PA** - The Delaware-Lehigh Amateur Radio Club (W3OK) in conjunction with the Christmas City—Bethlehem, Pennsylvania—as an expression of the warmth of the season to all, will operate December 21, 22, and 23 from 1500 to 0200Z on the following frequencies: 3990, 7299, 14,225, 21,325, and 28,525 kHz. Large s.a.s.e. for a colorful certificate of contact via DLARC, W3OK, Greystone Building, Gracedale, Nazareth, PA 18064.

•**Free NASA Satellite Prediction Bulletins** - Free satellite orbit prediction charts are available from NASA. The following amateur radio satellites are available (satellite followed by NASA identification number): Oscar 9 1981 100B, RS-3 1981 120A, RS-4 1981 120D, RS-5 1981 120C, RS-6 1981 120F, RS-7 1981 120E, RS-8 1981 120B, Oscar 10 1983 58B. In order to fully understand the bulletins, ask for the "Format Explanation of the NASA Prediction Bulletin." Also request the "Map Overlay Method of Hand Computing Station Predictions." This will show you how to determine viewing angles and times from your station. Send your request to: R. V. Tetrick, Head, Project Operations Branch; NASA, Goddard Space Flight Center; Greenbelt, MD 20771.

•**Space Shuttle Commentary Via Oscar Satellite** - The Spaceport Amateur Repeater Club (SPARC) has been authorized by AMSAT to transmit Space Shuttle mission commentary for all missions on Special Services Channel H2, 145.963 MHz, of AMSAT-Oscar 10. Special Services Channel Coordinator Butch Mason, W6KAG, has authorized use of SSC H2, 145.963 MHz, in addition to AMSAT bulletins from England and Australia. SPARC, through the facilities of K4GCC and WB4ZXS, AMSAT Area Coordinator, will provide Space Shuttle mission audio for several hours each day as time permits. All amateur radio operators are invited to submit reception reports to: SPARC, P.O. Box 672, Merritt Island, FL 32952.



CONTENTS

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CIRCLE 9 ON READER SERVICE CARD

Ticket Talk

BY DICK BASH*, KL7IHP

Welcome to the December column of *Ticket Talk*, a column devoted to answering questions you may have about the amateur radio licensing structure. If you still have questions, please write me c/o *CQ* or else at the address shown below. A reply will be sent to those enclosing a self addressed stamped envelope. If you can't wait for an answer, either call us at (415) 278-8275 between 10AM and 6PM, Monday thru Friday, California time, or else call your local FCC Field Office.

Morse Code Help

In the September column, I explained about the FCC's standard for Morse Code code test tapes and asked if there was a computer programmer out there who could incorporate these standards into a computer program. Well, George E. Lang - KA3JZR, an electronics instructor at Penn Tech Institute in Pittsburgh, PA, answered the call. George explained to me in a phone call that his program is written on the Commodore 64™ and takes up about 4K of RAM. In addition to the needs I spelled out, George added a few other niceties. If you would like details on the program, please contact George E. Lang - KA3JZR, 1500 Rutherford Avenue, Pittsburgh, PA 15216, phone (412) 343-3499 (call anytime; there's a recording on the phone with message taker capability). Thanks George!

VE Pass Rates Low???

Since the FCC is now out of the exam business and only volunteer examiners are giving tests, what are the results of this masterful idea? I have spoken with hams nationwide who have either taken or administered the volunteer test(s). I figure that the nationwide *failure* rate for these volunteer tests has to be at least 60%. It was 30%. If you're a VEC, please send us your statistics and we'll publish them. By the way, in the January issue we will publish a list of VEC's.

Tips from the VEC's

Every VEC I've spoken with is saying the same thing: the applicants for tests are not being careful about filling out the FCC Form 610. Please make sure you *sign the form*. Also note that if your mailing address is the *same* as your station location, you *cannot* just write "Same" in the station location box. You must instead put in the street address (not P.O. Box, RFD number, etc.), city, and state. A zipcode is not needed for station location. If you have a location that is something like "5 miles past the Shell station on Route 3" then that's what the FCC wants for the station location. This is particularly important for hams in rural areas. Keep in mind that "station location" means where the rig is located (on a permanent basis) and they want you to tell them exactly where that is, if it isn't a house number and street. Also, be sure to PRINT or type the information on the form. When any or all of these points are overlooked, it causes the volunteer examiners a great deal of delay in processing your paperwork.

New FCC Form 610 Available

The FCC has a new Form 610 and if you need them in *quantity*, please write to: FCC Forms Distribution Center, 1919 M Street N.W., Room B-10, Washington, DC 20554 or telephone them at (202) 632-7272. Use of the old form will be permitted for awhile. If you need one or two copies of the form, send me an SASE (self addressed stamped envelope—legal size) and we'll shoot it right back.

Station I.D. Rules

There seems to be some misunderstanding about the rules on giving station i.d. This is important on tests. The details are spelled out in 97.84 of the current rules and they say that you are to give your station's callsign every **ten minutes** or less. The only exception to the 10 minute rule is for *beacon stations* (97.84 d3) and beacon stations must i.d. at intervals not exceeding one minute.

Do you **have** to give the other station's callsign when you i.d.? Normally, no. The exception is during *international* third party traffic. In 97.84 (h), it states: *At the end of an exchange of third party communications with a station located in a foreign country, each amateur radio station shall also give the call sign of the station with which third party communications were exchanged.* So, you only **have** to give the other ham's callsign during internation 3rd party communications, not during domestic 3rd party traffic or during domestic or international QSO's where there is *no* 3rd party traffic.

Things to Come

In our future columns, beginning with the January, 1985 issue, we will start covering the material in the various PR Bulletins that you can expect to see on the written tests. Also be aware that the FCC is going to change some of the questions in the various Bulletins. The first group was the Novice and those are all done. Next is the General/Tech. In testing, as in physics, the only thing that's constant is change. See you next month!

*Bash Educational Services, Inc., P.O. Box 2115, San Leandro, CA 94577

Please send all reader inquiries directly.

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Ham Shop

FREE TO CQ SUBSCRIBERS

Advertising Rates*: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Non-commercial ads free to CQ subscribers, as space permits, maximum 3 lines each. All ads must be typewritten double spaced. Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

***PLEASE NOTE PRICE CHANGE:** As of January 1, 1985, cost for a non-commercial ad will be 20 cents per word, and cost for a commercial ad will be 60 cents per word (both rates include abbreviations and addresses). Non-commercial ads of 3 lines maximum will remain free to CQ subscribers who enclose a recent mailing label.

QSLs & RUBBER STAMPS—Top Quality! Card Samples and Stamp Information 50¢. Ebbert Graphics D-2, Box 70, Westerville, OH 43081.

NEW KID on block: For QSL free samples write Kings Grove Press, Box 9, Ellerslie, MD 21529. Also custom printing—instructions included. Stamp appreciated.

WANTED: Early Hallicrafter "Skyriders" and "Super Skyriders" with "Silver" panels. Also "Skyrider Commercial" early transmitters such as HT-1, HT-3, HT-19, and other Hallicrafter gear, parts, accessories, manuals. Chuck Dachis, WD5EOG, The Hallicrafter Collector, 4500 Russell Drive, Austin, TX 78745.

QUALITY TOWER ACCESSORIES TO SOLVE YOUR PROBLEMS: SO-1 standoff brackets for small 2 meter, Ringo, TV antennas, $34.50. SO-2 Heavy-duty standoffs for large 2 meter, beams, commercial, $59.50. MA-1 and MA-2 mast adapters put the top of your tower mast to good use, $22.50. GP81 and GP51S Ginpole Kits provide safety for your tower work, $129.50. BG-18 tower mast for those big beams, $249.50. These accessories work fine on all tubing-type towers. Special accessories can be custom made to order. Request our 1983 catalog. Visa, Mastercharge. IIX Equipment Ltd., P.O. Box 9, Oak Lawn, IL 60454. Phone 312-423-0605.

IMRA-International Mission Radio Assn. helps missioners—equipment loaned; weekday net, 14.280 MHz, 2:00–3:00 PM Eastern. 1 Pryer Manor Rd., Larchmont, NY 10538.

KNOW FIRST! Ham radio fanatics—you need THE W5YI REPORT, a twice-monthly award-winning Hot Insider Newsletter. Acclaimed best! Confidential facts, ideas, insights, nationwide news, technology, predictions, alerts. Quoted coast-to-coast! We print what you don't get elsewhere! $18.00 annually w/money-back guarantee! FREE SAMPLE for S.A.S.E. (two stamps). W5YI, Box 10101-C, Dallas, Texas 75207.

HALLICRAFTERS Service Manuals. Amateur and SWL. Write for prices. Specifiy Model Numbers desired. Ardco Electronics, P.O. Box 95, Dept. C, Berwyn, IL 60402.

QSL's by W4TG. Prices from $16 per 1000. Send SASE to P.O. Drawer F, Gray, GA 31032.

STERLING SILVER Callsign jewelry: Pin or tack $11.95. Alligator tie clip $19.95. All ppd. Info. SASE. Tom's Silver, Post Office Box 3758, Manchester, NH 03105.

WANTED: Cash paid for used SPEED RADAR EQUIPMENT. Write or call: Brian R. Esterman, P.O. Box 8141, Northfield, Illinois 60093, phone (312) 251-8901.

FOR SALE. CQ/Ham Radio/QST/73 magazines @ 35¢ (thru 1975) and 50¢ (1976-up) each, including shipping. W6LS, 2814 Empire, Burbank, CA 91504.

SCHEMATICS: Radio Receivers, 20's/60's. For details send namebrand, Model No., SASE. Scaramella, P.O. Box 1, Woonsocket, RI 02895-0001.

CHASSIS AND CABINETS KITS: SASE K3IWK.

HELP! Need Collins 30 L-1 linear amplifier for parts. Will pay cash. Poor condition or basket case ok. Contact Jim Mozzillo, 619 Prospect Avenue, Hot Springs, Arkansas 71901.

CERTIFICATE for proven contacts with all ten American districts. SASE to W6LS, 2814 Empire, Burbank, CA 91504 brings data sheet.

RTTY HEADQUARTERS: All your RTTY needs. Dealers for "HAL" and "INFO-TECH" products. You can't beat our prices! Call or write Dick, DIALTA Amateur Radio Supply, 212 48th Street, Rapid City, SD 57701. Phone (605) 343-6127.

REPAIR, Alignment, Calibration. COLLINS written estimates, $25; NON-COLLINS, $50. K1MAN (207) 495-2215.

COMMUNICATIONS GEAR, ELECTRONIC PARTS, and more. Government direct! Buy locally and/or global. Complete worldwide surplus directory, $2.00. LRC Publications, Box 471, Lafayette, OR 97127.

DX HEADING MAPS for Boston, NYC, Phila., Baltimore, Detroit, Atlanta, Chicago, New Orleans, Saint Louis, Dallas, LA, 11×17 $1.75 pp, 22×34 $5.95 pp, specify city. W. Massey, W2HOJ , P.O. Box 397, Hainesport, NJ 08036.

Amateur Radio's NEWSpaper—WORLDRADIO. Latest info. One year subscription (12 issues) only $10. Worldradio, 2120-D 28th St., Sacramento, CA 95818.

MICRO MOONLIGHTER NEWSLETTER turns your computer into an exciting, profitable, at-home business. Our third successful year! Twelve issues $30.00, Sample $3.00. Dept. CQ, 4121 Buckthorn Court, Lewisville, TX 75028.

KEYER/CODE TRAINER CHIP. One-evening project. Great project for beginners, clubs, or anyone who needs a good, low-cost iambic keyer or code trainer. Reviewed by Lew McCoy, *CQ* July 1983. $15 p.p., VISA/ MASTERCARD accepted. MICRO DIGITAL TECHNOLOGY, P.O. Box 1139, Mesa, AZ 85201, phone (602) 897-2534.

HAM COMPUTER SOFTWARE Top Quality! From $6.95. Send SASE for catalog. ELECTRONIC PUT-ONS, 7805 N.E. 147th Ave., Vancouver, WA 98662.

DELTA LOOP BOOM: For 10 through 20 meters. Lightweight, strong, quality boom with element brackets attached. Element kits available or make up your own. Full details: DL Manufacturing, Box 457, Verplanck, NY 10596.

160 METER top-loading sections and systems for fixed, mobile, and multiband verticals. Free information. Wavemaker Products, POB 397, Niceville, FL 32578 (tel. 904-678-8943).

WANT: 1920's and 1930's radios, magazines, and horn speakers. W6THU, 1545 Raymond, Glendale, CA 91201.

GREAT CIRCLE BEARING. Send us your QTH or Lat. and Long. and get a computer printout of bearings and mileage from your QTH to over 500 countries and cities throughout the U.S. and World, $3.95. APCA Systems, P.O. Box 978, Arbuckle, CA 95912.

"KT5S" Super DX Sloper 80–10M, Only $59.95. "KT5B" Multiband Dipole 160–10M, Only $59.95. 2 KW Roller Inductor (28 uH), $47.50. Weather Boot Kit (PL-259), $8.95 pp. Much More! Info available. Kilo-Tec, P.O. Box 1001, OakView, CA 93022. Tel: (805) 646-9645..

COLOR COMPUTER OWNERS: Free software and hardware CoCo catalogue. Spectrum Projects, POB 9866, San Jose, CA 95157-0866.

CLANDESTINE CONFIDENTIAL NEWSLETTER: Latest info on secret broadcasters. Six issues $10 US, $13 foreign, US funds. RR4 Box 110, Lake Geneva, WI 53147.

FOR SALE: Kenwood R-300 RCVR., mint cdx, US $200 or nearest offer. VE7EHD, 604-265-3175.

RCA VIDEOVOICE TRANSCEIVERS, transmit pictures via audio. Only slightly used. Service Manual. Worth $20–25,000. Asking $1,800 each. Ralph (405) 524-2471.

WANTED: COLLINS S Line/KWM Junkers or Scrappers. VE2FW, P.O. Box 642, Victoria Station, Montreal, Canada H3Z 2Y7, phone (514) 482-1984.

Old Radio Tubes Wanted: 2A3, 45's, 50's, 71's, 80's, 81's, 82's, 83's, 202, 203, 211, 242, 845, 5691, 5692, 5693, VT-4C, VT-52, VT-62. Also Old Western Electric Amps, Mixers, Consoles, Drivers, Tweeters, Horns, Speakers, Parts, Tubes (Type: VT-1, VT-2, VT-3, VT-25, VT-52, 101, 102, 104, 201, 211, 212, 216, 242, 252, 262, 271, 274, 275, 284, 285, 300, 301, 339, 347, 348, 349, 350, 422, etc.). Tel.: (818) 576-2642. David, POB 832, Monterey Park, CA 91754.

GROUND RADIALS WORK—Solve your vertical antenna radial problems with the fantastic ground plane one (GP-1). A 10″ diameter, 24-point cast aluminum buss that fits any 2″ diameter or smaller mast. Reviewed in August 84 CQ magazine. Radial problems solved for only $24.95. Send as SASE for photos and brochure. Lance Johnson Engineering, P.O. Box 7363, Kansas City, MO 64116.

CDE ROTOR OWNERS—You need a "D-Lay-5"! This easy-to-install circuit protects the rotor from damage caused by accidental braking. Works with the Ham II, Ham III, Ham IV, and Tailtwister models. Provides a five-second safety factor in your rotor brake. Incredible value at $19.95. Postage paid world wide. LANCE JOHNSON ENGINEERING, P.O. Box 7363, Kansas City, MO 64116.

QSL DISCOUNTS: $19.95 per 1,000, white cards, black ink, one or two sides. Two to three week delivery. SASE for free samples. Jim's Printing Service, 2155 Young Ave., Memphis, TN 38104.

HAM TRADER YELLOW SHEETS, in our 23rd year. BUY, SWAP, SELL Ham Radio gear. Published twice a month. Ads quickly circulate—no long wait for results! SASE for sample copy. $9 for one year (24 issues). P.O.B. 356, Wheaton, IL 60189.

CHESS PLAYERS! Enjoy radiochess. For information write K2VJ, Box 682, Cologne, NJ 08213.

APPLE USERS Antenna Design Software. Design and optimise your antennas and feed lines. For novice and expert HF, VHF, and UHF. Apple II + and IIe $15.00 check or MO for diskette and manual. SASE for details. Smith Software Systems, 3767 Coldspring Creamery Road, Doylestown, PA 18901.

C-64 ANDVIC-20 HAM SOFTWARE: Over a dozen programs for each computer. L.S.A.S.E. for catalog. Specify computer. Walt, KA9GLB, 4880 N. 49th St. Dept-C, Milwaukee, WI 53218.

HAM SOFTWARE: Send SASE for free information on Custom Beam Headings, MUF, Morse Trainer, & Code Practice for C-64. No computer? Custom Heading List; $5.95. ULTRA HAM SOFTWARE, Box 119, Macedonia, OH 44056.

RADIO ARCHIVES "HARK" newsletter. Sample $1/SASE. Quarterly $6. TIMM, 2308 Garfield #304, Minneapolis, MN 55405.

TI 99-4/a SOFTWARE: Electronics engineering; electronics testing; Morse code: practice and keyboard; teacher; printing aids; program aids; home/office utility. Disk/cassette. Send for FREE catalog. FREE program with disk. $16.95 + $2.00 shipping. Jack, WB4KOH. KOH Software, P.O.B. 18517, Charlotte, NC 28218.

WANTED: Old Western Electric, RCA, Cunningham, De-Forest, McIntosh, Marantz, Tubes, Amps, Speakers. Maury, 11122 Atwell, Houston, TX 77096.

SOFTWARE: Commodore 64, VIC-20, Sanyo 550, Atari 400/800, TI99/4A—Amateur Radio and Utility software. Write RAK Electronics, Box 1585, Orange Park, FL 32067-1585.

QSL's: Since 1956, U.S. Flag, Statue of Liberty, full color, many others, free samples. Rusprint, Box 7575, Kansas City, Missouri 64116.

SATELLITE-HELP! How can I receive and decode commodity prices off the satellites without paying high monthly fees? Will pay for system or design secrets. Ed, P.O. Box 170, Lagrange, KY 40031.

KENWOOD TS-830S FOR SALE: Equipped with YG-455C and YK-88C filters. AT-230 tuner, SP-230 speaker, and MC-50 mike. Used sparingly—mint condition, $1200, package deal only. Also, Gotham 10, 15, 20M Quad $75.00 plus UPS; TH3-JRS $125.00 plus UPS. Both new and in original shipping boxes unpacked. W1IVW, 617-682-1604 eves.

YO BRO U got the card we got the wall and you may also get our QSL OF THE WEEK award. Contact WB2JKJ and the crew at The Core Of The Big Apple.

DECEMBER SPECIALS: BUTTERNUT HF6V $105.00, MINI-QUADS $136.25, UPS extra. Send stamp for flyers. Don, WB2RTW, HART EASTERN COMMUNICATIONS, 1444 Darlington Drive, Derby, NY 14047.

CCMUF: TRS-80 Color program plots, prints MUF, beam heading. Minimum 16K Extended. Tape or disk $14.95. SASE details. K1WB, 460 Hale St., Suffield, CT 06078.

"SUPER SAVINGS" ICOM ICR-71-A $689.50 Kenwood R-2000 $495.50, R-1000 $409.50. Sony 2002 $219.50. Uniden 2021 $149.50. Panasonic RF-3100 $266.50, RFB-300 $214.50. Regency HX-1000 $239.50, MX-5000 $388.50, HX-3000, MX-7000 CALL!!! Bearcat BC-250 $265.50, BC-300 $359.50, BC-180, BC-201, CALL!!! HAM GEAR: Kenwood, ICOM, Cushcraft, Hustler, Kantronics, MFJ, Yaesu, Ten-Tec, Much More!!! FREE UPS SHIPPING & INSURANCE TO 48 STATES. 25-page picture catalog $1.00 (refundable). GALAXY ELECTRONICS, Box 1202, 67 Eber Ave., Akron, OH 44309 (216-376-2402) 9–5 pm EST.

DIGITAL AUTOMATIC DISPLAYS for FT-101's, TS-520's, (functional DG-5 replacement), Collins, Drake, Swan, Heath, and others. Six ½" digits. Write for prices and information. GRAND SYSTEMS, Dep't. D, P.O. Box 3377, Blaine, Washington 98230. Telephone (604) 530-4551.

SELL: Heath SB-104A Transceiver, Power Supply, CW Filter, Noise Blanker, Excellent Condition with all manuals. You Pay Shipping. WB8YJF, 4523 Kenfield Road #A, Columbus, Ohio 43224, phone (614) 263-9219.

FOR SALE: GR-1606A RF Impedance Bridge. For serious MF/HF antenna work, $700. Serious inquiries/offers Please! John Lenahan, K0RW, 1202 Jay St., Ottuma, Iowa 52501, phone 515-682-0711.

Please send all reader inquiries directly.

ORBIT MAGAZINE back issues wanted, numbers 1–15, 18–21. Also any Oscar-10 users in the Detroit area. Zack Schindler, N8FNR, 113 West Barrett, Madison Heights, MI 48071, phone 313-546-0343.

HEATHKIT DX-60, HG-10 VFO, spkr, rcvr. Aligned, reasonable rec. needs 2-6CL6 tubes, reas. condx. $95. S. Elenbaas, 7459 Missaukee Blvd., Lake City, MI 49651.

FOR SALE OR SWAP: B&W Ap-10 apartment antenna, hardly used. Includes coils, 35 ft. coax, $30 I ship, or trade for CW/RTTY Interface for Commodore 64 excellent condition. Also Radio Shack SWR/FS Bridge $12. Call Eliot (212) 852-8965 or write KA2VBJ.

Heath SB-220 Linear With 10 meters $450.00; Cubex 4-ele Tri-band Quad With 30' Boom $250.00; 80' Rohn 25 Tower Complete $350.00; Drake R4C, T4XC, AC4, MS4 $500.00. Atlanta area, you pickup. W4OWY.

DXPEDITION TO MONTSERRAT FOR $250/week. VP2ML, Box 4881, Santa Rosa, CA 95402.

INCREASE YOUR CODE SPEED! (1–25 wpm) The International Morse Code Trainer (IMCT) keeps getting better. Version 1.3 is now ready for your 64. User-defined tests, random tests (letters only or with numbers), straight key simulator, and for the beginner: 3 step-by-step lessons, plus a whole lot more. $14.95, AC3L Software, Box 7, New Derry, PA 15671 (PA add 6%).

SELL: 14 AVQ 4-band vertical with radials and roof mounting kit, $60. Alex, KA2TXP, (212) 684-1148.

COAXPROBE: Coaxial in-line probe for oscilloscopes and frequency counters. Connect in the antenna coax line to sample a small portion of your signal to feed your counter or oscilloscope. Output has 3700 volt isolation. Probe rated to full legal power. Can be left in-line while operating for constant monitoring. Over 2,000 sold to amateurs and government in the past 6 years. Only $7.95 plus $1.50 shipping to Eagle Electronics, 4475 W. Milham, Portage, Michigan 49081. SASE for flyer.

"Merry Christmas fellow DXers de WB8OWM/QRPp."

FOR KENWOOD TS-430S OWNERS ONLY! Jabco's STOP SCAN! ALL-mode, SQUELCH operated (when the squelch breaks the scan STOPS)! Adjustable resume scan delay. Automatic operation ('HOLD' overrides Stop Scan). Six-wire connection (4 plug into existing sockets, 2 solder) NO MODS! NO CUT TRACES! Small 1¾ in. PC board. EASY KIT (½ hr. to build) with instruction manual $18.95. ASSEMBLED (100% checked and guaranteed with manual $28.95. (Indiana residents include 5% sales tax.) JABCO, R1 BOX 386, ALEXANDRIA, INDIANA 46001.

ATLAS 210X mobile transceiver 10 to 80 meters with NB, microphone, manual, and mobile mount, 12 VDC, mint condition, can be used on 11 meters out of USA, $395.00. COLLINS 32V-2 transmitter, 10 to 80 meters, good shape but needs low-voltage transformer, tubes alone worth this, $75.00. Lower mast support for Ham 4 or T2X rotor, new in box, list $75.00, sell for $35.00. HALLICRAFTER S-120 four-band worldwide shortwave receiver, $100.00. Mobile linear amplifier, 10 to 80 meters, 300 watts, new in box, $375.00. Base Station Bilinear amplifier, tube-type variable power with AM/SSB switch, 10 to 80 meters, new, never used, $350.00. Both above linears can be used on 11 meters outside of USA. ROYCE 1-625 CB 40-Channel base station radio, new in box, original price $295.00, sell for $110.00. COBRA 135XLR 40-channel AM/SSB CB base station radio, never used, in warranty, original price $519.95, sell for $275.00. Paul Duncanson, 6846 Calumet Ave., Hammond, Indiana 46324. Tel.: 219-932-2196.

YAESU 400 "TWINS," SPKR, SSB, CW, AM, FSK, XMIT. All mode rec. inc. FM, CW 500 Hz mech filter, and mem. keyer (full QSK), $350 or swap Bearcat MX 5000, 7000 or 2M all-mode XCVR. S. Elenbaas, 7459 Missaukee Blvd., Lake City, MI 49651.

ICOM 2AT, HM9, BP4, SM-32 pl, like new in box, 6 months old, $215. KA9JYO, 5862 W. Skyline Dr., Laporte, IN 46350.

COMMODORE-64 5-Band DXCC Log includes custom beam headings, distances to DX, plus continent, country, zones, QSO'ed/QSL'ed on any band, phone or c.w., upon country name or call-sign entry. Diskette and instructions $18.99 ppd. Sondor Software, P.O. Box 416, Sarnia, Ontario, Canada N7T 7J2.

FOR THE 99/4A USER. Computer-assisted Morse code practice. Variable frequency, variable speed, sends random text, or you type/it sends, more. Disk version requires X-basic, mem-exp. $9.95. Write for info, or disk: 99/Aware, P.O.B. 2494, Vail, CO 81658

HELP! To keep in touch with my family, a Venezuelan student needs donation of equipment. CB's with SSB are also accepted. R. Lopez, YV1DWO, 1409 Oak St., Melbourne, FL 32901.

CQ: Complete July 1945 to 1977. Full years 1936 to 1961. Single copies July 1945 to January 1976. $300 or best offer. Will sell singly. SASE for other magazines. Mrs. Marcy, 461 Third Avenue, Satellite Beach, FL 32937.

WANTED: A small camper, between April and mid-May, to rent or exchange for apartment in Costa del Sol. Cesar, VE2GBR/EA, Palmaces, Guadalajara, Spain.

HELP NEEDED for a 30-year-old victim of multiple schlerosis in securing free radio equipment. Unable to work due to disability. Recently received Novice ticket. Has 40 meter inverted V and antenna tuner. Needs receiver and transmitter or transceiver to get on air. Would like a Commodore 64, interface and software because of limited mobility. If you have anything to donate, please call Toni at 202-225-5865 (collect) between 9 and 6.

WANTED: Rack-mount coil container for HRO, Navy CNA-10037, or equivalent. Also complete I.F. Plug-in unit for R-390 with tubes.

WANTED: Johnson Viking KW Matchbox, good condition, for $160 cash. EX-W3JVY, Louis, 415-322-8543, ans. mach., 40 seconds, will return call.

MOTOROLA HT200 2 meter, 2 channel, 2 watt. Will sell or swap for Commodore 64. Rick Thompson, 626 Valkyrie, KI Sawyer AFB, MI 49843.

HW-101, PS, CW fil., $320. Sears Roadtalker 40, 28.2-29.2 MHz ac/dc $90. HW-2021 2m HT, TTPad, $95. All checked by FCC 1st Class. KA1ETQ, RD 2 Box 1420, Putney, VT 05346.

HEATHKIT HR-1680 Receiver, Mint, $125. GALAXY 3w/P.S. just overhauled, VGC, $285. TRS-80C COCO 64K $200. KC9TD, RR #4 Box 23, Manito, IL 61546.

QRO PARTS: 3-1000Z, 4-1000A, PL172, EIMAC sockets (all new), 432 MHz KW amplifier $450, UHF Repeater, controller parts. W6MTF, Reid, 200 Irene Ct., #39, Belmont, CA 94002, phone 415-593-0597.

SOUTH AMERICAN HAMS please help me get a telegraph key made in South America for my collection. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

FOR SALE: Collins Mechanical Filter F 455 H-21, new condition, $100. J. Ambrose, Box 536, Leavenworth, WA 98826.

VERY GOOD TEMPO 2020 xcvr with mike and manuals, $430 certified check. Ship UPS. Richard W. Randall, 1263 Lakehurst Rd., Livermore, CA 94550.

WANTED: Millen VFO 90711, 304TL tubes. W6RNC, P.O. Box 478, Nevada City, CA 95959.

WANTED: 72' E-Z-Way; power supply, manual (can copy) for RCA CC-002 video camera; P.C. Electronics TC-1 + ATV station, J antenna. W4EOB, 1412 Winkler Ave., Fort Myers, FL 33901.

BUTTERNUT antenna HF6V including 160 meters, 3 mos. old, can't use in new QTH, $40, I ship. Carl, N2EOQ (518) 374-6399.

12 VDC MOBILE POWER WINCH. New in box, originally $150, now $75. Will pull a car. Call Paul 1-219-932-2196.

WANTED: Dentron Super-Tuner Plus. WBØRXF, Leola, SD, 605-439-3202.

WANTED: 811A tubes, NEW or USED, any quantity. Collins KWM-1 in any condition. W1DGJ, Ludlow, MA 01056.

WANTED: Old AC power supplies for the H23 P33 talkies. Jim, 121 Hilton, Elgin, IL 60120.

WANTED: Kenwood AT-200 antenna tuner. Sell Sams Fotofact Vol. 1–112. W8HAT, 5888 St. Joe Ave., Stevensville, MI 49127.

WANTED: ARRL LICENSE MANUALS 1940's and earlier. Write or call: Phil Gruskin, N6HOO, 27943 Ridgecove Ct., Rancho Palos Verdes, CA 90274, (213) 541-4485 night (PST).

FREE SHIPPING IN 48: Ten-Tec Omni-D, Series B and 252M/O PS, All Filters and NB, $585. MFJ-496 Super-board, $210. Leave Message, Andracke, (212) 580-9964.

FOR SALE: Amateur radio wall calendars at $4 each, including postage cost. Send self-addressed label and payment to W6LS, 2814 Empire, Burbank, CA 91504.

SELLING: Hallicrafters all-band radio, SX-62A; GE speaker, and enclosure EN-54W; GE console radio A-125 (mfg. circa 1933). Reasonable offers invited. Jacobs, 209 Washington Ave., Saugerties, NY 12477.

QTH for rent near Washintgton. D.C. in northern Virginia. Four-bedrrom brick home and garage. Five-minute walk to Ballston subway. Sixty-foot tower, 3-element beam, ½ acre, fenced yard. Karl, K4YT, Arlington, VA 703-525-0485 evenings.

WANTED: Hallicrafters PS-150-120 AC power supply for SR160. Gordon Wolterstorff, RR3 Box 289, Kankakee, IL 60901.

TRS-80 Level 2, 16K Computer software, $325. TS-820 with CW filter, digital and VFO-820, mint $650. G. Skloot, KE2N, 2923 Mandalay Beach Road, Wantagh, NY 11793 (516-221-3535).

WANTED: Ten-Tec 515 Argonaut. Write to WB3AAL, 1030 Windsor St., Apt. #3, Reading, PA 19604.

FOR SALE: ICOM R-70, mint, $495 firm. Autek audio filter QF I, $60. Joe Coleman, 157 Walton Pl., Lansdowne, PA 19050 (215-626-3376).

SELL: Hallicrafter HT-32B, SX-101, MK3A, R-46B, Heathkit SB-630, SA-2040, GR-78, FR-110, DX-40, HD-19. Mint condition. All manuals. No shipping. Complete package for only $325. Paul F. Stefancic, K3IVZ, 1939 Tara Drive, North Huntingdon, PA 15642, phone 412-864-1788.

2M TRANSCEIVER: Sears (Yaesu) 22 channel 1/10 Watts with pwr supply, $80. WB6ZWS, 1028 Fairview Rd., Ojai, CA 93023.

WANTED: Atwater-Kent Speaker, Any Model. Q. R. Galbraith, K5TVC, 4303 Kingsway Dr., Farmington, NM 87401.

TUBES FOR SALE: (2) RCA 813, unused, $25 each, free shipping. Dwight Morrison, 38 Lake Avenue, Jackson, TN 38301, phone 901-423-0620.

WANTED: Siltronix 1011C or Siltronix 1011D with manuals. W. McClimans, P.O. Box 131, West Sunbury, PA 16061.

WANTED: Lafayette HA-350 Receiver w/Matching Speaker, Knight T-60 Transmitter, 2-813's for Linear Amplifier w/Ceramic Sockets. Contact WA1JFX, OK in Callbook.

NEW CUSHCRAFT AV3 antenna $40. New MFJ-900 transmatch $40. Postpaid. K6XZ (707) 539-0316.

LAFAYETTE HA-600 solid-state rcvr broadcast thru 30 MHz plus 150–400 kHz, calibrated ham bands, nice, $75 UPS free. WA2PCL, 101-23 Lefferts, Jamaica, NY 11419.

FOR SALE: CQ and QST Magazines from 30's. WB4CVH, Don Trayes, 38 Elmwood Place, Goose Creek, SC 29445.

SELL: SWAN 400, VFO, MIC & PS, also Kenwood R-1000. Al, N3BOI, 200 Rothwell Drive., Lutherville, MD 21093, phone 301-828-5568.

SELL: DL-QTC (German), QST, CQ, 73, Kilobaud. SASE for listing. Paquee, 53 Jerome Ave., Trumbull, CT 06611.

TENNELEC MP-1 memory scan, $45. Regency ACT-16K, $45. Both need repair. Clem Duval, 33727 Brownlea, Sterling Hgts., MI 48077 (313-268-2467).

WANTED: Manuals for GR783A pwr mtr. Singer SB-12BS T-100 SSB-4 spectrum analyzer, RF7-A head, REC-1 conv. W7KSG, 1876 E. 2990 So., Salt Lake City, UT 84106.

WANTED: ARRL handbooks from 1930 through 1950; also, Hammarlund HiQ and Comet Pro Receivers, state condition. Nakano, 3471 Bulter, Los Angeles, CA 90066 (tel. 213-391-4738).

FOR SALE: R.M.E. Electro-Voice VHF-126 Converter, covers 50, 144, 220 MHz, with manual, exc. cond, $75. WA9AXA, 201 E. 59th Street, Westmont, IL 60559.

ICOM Extension Terminal, IC-EX1, new in original box, never used, $20. W9BM, 888 E. Schirra Dr., Palatine, IL 60067.

ICOM 720A, 2 mikes, PS15, $649. Also 103, $295. Don Bishop, NØEA, 5625-102 S. Sycamore, Littleton, CO 80120.

WANTED: COLLINS 312B-3 Speaker for S-Line. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

SELL: Bencher XZ-2 audio-CW filter, mint, with matching power transformer. Postpaid $55. W8FDN, 371 Claymore Blvd., Richmond Hts., OH 44143.

MAGAZINES FOR SALE: CQ/HR/QST/73. Send SASE for list. E. Guimares, RFD 1 Bedford St., Lakeville, MA 02346.

WANTED: Kenwood SP-70 speakers, MARS-7600 adapter, and TS-600 transceiver. C. T. Huth, 130 Hunter St., Tiffin, OH 44883.

MANUAL wanted for Tektronics 533 scope, original or copy. P. K. Pierpont, KF4OW, 204 Cedar Point Cres., Yorktown, VA 23692. Tel. (804) 898-3774.

FOR SALE: Ten-Tec Delta XCVR with noise blanker and extra filter, $600. Power Pack $100. Speech Processor $85. Les Basham, W7TCT, 735 Cave Hwy., Cave Junction, OR 97523.

WANTED: Heath HW-16. Mike Ryder, KA9N, 201 Depot St., Oregon, IL 61061.

YAESU FRG-7/GILFER filter kit. Never used, mint, $225. Evenings: 703-221-8344.

TEKTRONIX 545B w/PI, Hewlett-Packard HP-606A Signal Generator, HP-620A UHF Signal Generator Sell/Trade. Want Vacuum Capacitors/Relays. A. Emerald, 8956 Swallow, Fountain Valley, CA 92708.

FOR SALE: 75S3-B, 32S3, 516F2, 312B4, $700. KWM2, PM-2, $395. 75A4, $200. James Craig, 32 Birchwood Drive, Rye, NH 03870.

SELL: Heath HW-8 with 2A power supply, ½W audio board, offers $200? Also nearly new 12" B&W TV $75. Or trade for 18A PS. Kopulo, Box 252, St. George, N.B., Canada E0G 2Y0.

WANTED: Viking Adventurer. Premium for unassembled kit or serial #75815. KBØYK, 15441 Dewey Cr., Omaha, NE 68154.

WANTED: Recent Model Alpha 76A or PA. Will Trade SB-221 Plus Cash. KZØI, Dennis, 612-535-7189.

WANTED: Heights Mfg. tower sections, 26" Or 22" straight sections needed. Tom Roscoe, K8CX, RD#1, Brookfield, OH 44403, or call 216-448-0306.

IC255A 2 m. scvr, excellent, $235; MFJ 949B Ant. Tuner $100. L. Basham, W7CT, 735 Caves Hwy., Cave Junction, OR 97523.

TRADE: Mint Nikon Nikkormat FTN w/leather case, Nikon 1:2 lens, Vivitar 2:8 wide-angle lens, Vivitar 283 flash, and telescoping tripod. Will trade all for mint TS130S or TS120S. Robert Boone, WB4FNH, 813-755-2589.

SELL: Ten-Tec 234 Speecj Processor $139, with 214 Electret desk microphone, $45, for $139 pp. Also radio books ½ off. W9DI, tel. 312-323-2419.

HALLICRAFTERS S38D Rec $30, S38E $35, HT-18 $25, Syl-216 RF Sig-Gen 80 kc–60 mc $30, HP-200B Audio Sig Gen $40. K6KZT, 2255 Alexander, Los Osos, CA 93402.

SELL: DL-QTC (German), QST, CQ, etc. WU FAX, TTY, etc. SASE for listing. Paquee, 53 Jerome Ave., Trumbull, CT 06611.

WANTED: Kenwood MARS 7600 adapter. C. T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

HELP: Any donations of old equipment, parts, code cassettes, and books will help our ham radio program. Send to G. Skloot, JHS180, 320 B. 104 Street, Rockaway Park, NY 11694.

FOR SALE: 120' steel microwave tower, 18" square, extremely strong and heavy, 20' sections, $150 each, or whole tower $700. You pick up. T. N. Colbert, 13609 Colony, Burton, OH 44021.

WOULD LIKE INFORMATION on the SANDRA repeater system. Jim, 121 Hilton, Elgin, IL 60120.

WANTED: Used SSB gear that will operate on C.A.P. frequencies, 4585 kHz, etc. Must be reasonably priced. Contact: Joe Roberts, W7DRR, P.O. Box "Q," Page, AZ 86040.

SELL OR TRADE Xitex line (keyboard modem UDT 170, monitor). Cost me $1450, sell for $700. Brand new, worked only 15–20 hours total. SV1IG, A. D. Panos, P. O. Box 19063, Athens 11710, Greece.

HEATHKIT Model SBA-104-1 Noise Blanker Kit for SB-104 and HW-104 transceivers, unassembled, original box with instructions, $20. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

FOR SALE: Mint SX101A Receiver with speaker. Eico 723 transmitter and Heath VFI-VFO. All for $120 or will trade—KCØUM.

WANTED: Pre-1950 bugs and Spark keys for my collection. Vibroplex, Martin, McElroy, Marconi, DeForest, etc. K5RW, Neal McEwen, 1128 Midway, Richardson, TX 75081.

FOR SALE: Carbon and wire-wound resistors; pots; audio-power and filament transformers; coils; relays; small speakers. T. Wojciechowski, 101-45 94th St., Ozone Park, NY 11416, phone 212-845-4756.

WANTED: Orbit magazines. K8LJQ, 355 Mower Rd., Pinckney, MI 48169.

H*A*R*K: Hear Amateur Radio (Over) Radio Archives Newsletter. SASE. Electronic Avocations, 2308 Garfield #304, Minneapolis, MN 55405.

WALKIE-TALKIES WANTED: Excellent, Midland 13-520, Clegg HT-146. Jim, 121 Hilton, Elgin, IL 60120.

SWAP: Alliance Tenna Rotor Model U-100. OK for 2 meter beam, good condx for 2000 ohm headset. No junk! D. C. Pugh, WA6HYB, 4660-125 N. River Road, Oceanside, CA 92056.

CANADIAN HAMS: Heath HR-1680 rcvr, HS-1661 spkr., HW-8 xcvr, HD-1250 dipper, SA-5010 uMatic Keyer. R. W. Boyd, Box 793 STN "A," Montreal, P.Q., Canada H3C 2V5. Tel.: (514) 481-4830 after 18:00 hrs.

SELL: Heath GR-110 VHF Scanner, AC/DC with all 2 Mtr. Xtals, $50. Home Security System Kit $25. Larry Kellough, WB9AZQ, 2108 Potomac Dr., Marrero, LA 70072.

FOR SALE: Heath SA-2060 Ant. Tuner, perfect condition inside & out, $200 firm. Write to D. E. Wagner, Sr., Rt. 2 Box 314-A, Boonsboro, MD 21713.

DX-PEDITIONS are in need of qualified operators. Get on the list to operate from "the other end." Send a large-size SASE to Operator Referrals, P.O. Box 125, Holton, KS 66436.

SELL: Bencher paddle, $20; Info-Tech converter, model 75, Info-Tech keyboard, model 150, Panasonic monitor, 9", with cables and manuals, $500; HW-7 with power supply and manual, $50. Joseph Schwartz, 2701 Sunrise Lakes Drive E., Sunrise, FL 33322, phone 305-748-5138.

WANTED: Used or surplus He-Ne laser tube and/or complete assembly. W. Worley, 305 Hickory Bend Rd., Enterprise, AL 36330. Work ph: 205-255-6829.

WANTED: ICOM IC-2A or IC-2AT, Collins S-line any condition, 811A tubes any quantity. W1DGJ, Ludlow, MA 01056.

WANTED: Meter for Knight "T-50" (used original) or your XMTR (any condition). VIC-20 software for SSTV? Call (312) 223-4067, 676 Quail Creek, Grayslake, IL 60030.

HT COLLECTORS: Varitronics HT-1 handheld, no antenna nor nicads, $50. Michael A. Persson, W9MP, Chetek, WI 54728.

BC-611 WALKIE-TALKIES WANTED. Also want 250th and 100th Tubes plus any other BC-610 parts. AA7W, 13428 29th Avenue SE, Bothell, WA 98012.

FOR SALE: Century 21 $220, Yaesu 221R with QSA 5 preamp $350, mint. K2FS. 212-353-8485.

FOR SALE: Cushman CE-5 FM service monitor, $400. Rt. 3 Box 378K, Longview, TX or 214-643-2236.

SELL OR SWAP: Heathkit VF-2031 HT 5 xtals, with PL leather case, external mike, charger, aligned by Heath, mint $100. KX8N 616-469-2734.

WB2BLY ESTATE: SX101A, HT32A, HT33A, Mike, Manuals $500. Drake T4X, R4B, MS4, Mike, Manuals $600. Many more items, SASE. J. Wasiewicz, 229 Sarles Lane, Pleasantville, NY 10570.

FOR SALE: Gem Quad with rotor and mast, $200. N2CLS, 39 Coventry Rd., Endicott, NY 13760, phone 607-754-7160.

FOR SALE: TS-120-S, PS-30, MIC-30S, mint cond., $425. W4IIS, Walt Stock, 8401 N.W. 48 St., Lauderhill, FL 33321.

HELP! To keep in touch with my family, a Venezuelan student needs donation of equipment. CB's with SSB are also accepted. R. Lopez, YV1DWO, 1409 Oak St., Melbourne, FL 32901.

WAVETEK 3000 Signal Generator, 1–50 MHz digital, good condition $2000. National NCX5 $300. Hal RKB-1 & RVD-1002 make offer. Kenwood R-300 with digital display $225. Kenwood TR9000 with HM PS $375. Regency AR-2 2M amp $50. DID Model 555 Scope, needs crt $50. R. O. Gibson, W8TYY, 7700 Cubbage Road, Westerville, OH 43081, telephone 614-882-6660.

COMPUTER PROGRAMS for the TI-99 4/A Computer. Send SASE to KB4HLH, Rt. 4 Box 492, Somerville, AL 35670.

HEWLETT-PACKARD HP-606A Signal Generator, Tektronix Oscilloscope Probes—New, Eimac 4CX3000A W/Socket & Chimney—New, Amphenol RG17A/U, 500 ft. roll—Unused, Signal-One CX7A. Sell/Trade. A. Emerald, 8956 Swallow, Fountain Valley, CA 92708.

WANTED: A 3–30 MHz wattmeter any make. Also have for sale or trade a B&W tube tester and 3 adapters, asking $75. KAØQPQ, Box 95, S. Greenfield, MO 65752.

SELL: YAESU FT101E, ssb/cw/am, all bands 160m to 10m with mic., very clean, $395. W2KZT, 70 Mitchell Ave., Poughkeepsie, NY 12603, phone 914-454-4846.

FOR SALE: IC-745 with PS35 Int. Power Supply and SM6 Desk Mic. purchased 11-18-83. Mint, $850 inc. ship. Bob Bradley, W9WGD, 1002 Forest Road, La Grange Park, IL 60525, phone 312-354-6031.

1984 FOREIGN Edition Callbook, $4 for postage, please include s.a.s.e. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

SMALL RADIO CLUB needs donations for a club "loaner" 2 meter FM radio for handicapped YL ham. Contact Dan Bivins, WB4WRL, Treasurer, Triangle ARC, 919-286-7927 after 5:30 p.m.

HEATH HW-8/PS, all Mods: RIT, CW Filter, SWR/wattmtr, Spkr, Feather Fones, all Manuals/Mods, Excellent, $165. Morton Berger, K4JIL, 305-735-9137.

WANTED: SB620, SB650, SB310, SB110, SB600, SBA301-1, SBA301-2, SBA300-3, SBA300-4 (in wrkg cndx w/manuals). Manual for Heath QF1 Q-Multiplier. VE1CBF, Box 584, Sydney, NS, B1P 6H4, Canada.

75A3 & SPKR $150; 51J w/mech filter $225; 754A all filters, original, no mods $375 or swap for SB200 FL2100B. Manuals all. Art Ford, 552 Hillside Ct., Melbourne, FL 32935.

WANTED: Heathkit HW-12, HW-22a, HW-32a, complete with supply and mike. KA3KVW, Box 268, Sadsburryville, PA 19369.

FOR SALE: New 21CBP4A B-W Picture Tube. Make offer, plus $6.00 shipping. Royce Haskell, Littleton, NH 03561, phone 603-444-2674.

FOR SALE: Henry Radio Tempo S-1, 2 m. synthesized handie-talkie with leather case/charger/ant $175. Henry Radio Tempo 2020, 80–10 m. digital transceiver $325. Heathkit DX-40 xmtr. $35. Homebrew Grounded-Grid linear Amp pair 813, 2KW $125. New B/W coax switch 5 band $15. Homebrew Slow Scan Monitor/Power Supply from ARRL Handbook $125. Hustler Mobile Antenna and Resonators 15, 20, 40, 75M $100. Everything in good shape and works well. Sell all or part. K4WWY, Barry W. Wright, Royte 3, Calhoun, GA 30701, phone 404-629-9628.

ICOM 720A, ps, mics, $675. Magazines, list SASE. Don Bishop, NØEA, 5625 So. Sycamore, Littleton, CO 80120.

FOR SALE: Ideal Novice rig. Ten-Tec Century 21 CW rig. Excellent shape, $239. I pay shipping. N8BPI, Box 25004, Lansing, MI 48909, phone 517-646-6925.

TENTEC 580 Delta Transceiver, Ultramatic Keyer and 280 Power Supply, $475. Ray Burford, 6884 N.W. 12th Street, Plantation, FL 33313.

WANTED: Info on Courier PORT-A-LAB. Serial #S/NE 25161. KA4EAH, Columbia Bible College, Box 3122, Columbia, SC 29230.

AMPEX black-white camera Model CC450 with 5 inch monitor, zoom lens, tripod, manual, cord, etc., $350 or best offer. Brownie, W3CJI, 2705 Andrea Drive, Allentown, PA 18103, phone 215-433-4485.

FOR SALE OR TRADE FOR HAM GEAR: Criterion 6" reflector telescope with 2 eyepieces and Barlow lens. Excellent condition. Pick up only. WB5ZKR 601-265-5134.

WANTED: Parts for TET 3F37DX antenna due to ice storm. Write or call collect, Lewis Young, 816 W. 5th St., Larned, KS 67550, phone 316-285-6705.

FOR SALE OR TRADE for VHF/UHF gear. Heath HX-1681 QSK CW 80–10 meter xmtr and power supply, $225. Ken, N4KS/6, 916-583-2504.

NEW CUSHCRAFT AV3 Antenna $40. New MFJ-900 Transmatch $40. Postpaid. K6XZ, 5519 El Encanto Circle, Santa Rosa, CA 95405.

COLLINS mechanical filter F455FA21, 455 kHz CF, 2.1 kHz BW, $25. David Wells, 3522 Boston Ave., Oakland, CA 94602, phone 415-531-2800.

WANTED: COLLINS S-Line & accessories any condition. Mans for SINGER SB-12-BS T-100 SSB-4 spectrum analyzer. W7KSG, 1876 E. 2990 So., Salt Lake City, UT 84106.

CURIS KEYER, Model EK 480M wanted for a private collection. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

FOR SALE: Robot Model 70, 80 HRO 60W SPKR, 5 coils, HX50A, HQ170A UHF, all mint. Also QST, 73, CQ, HR. Call 205-434-4245.

WANTED: Service manual or zerox copy for a digital voltmeter, Now-Liner System Co., Model LX-2A. Tom Richison, K5FRI, 905 Terrawood Place, Coweta, OK 74429.

WANT: To rent Carribean QTH for contests, vacation. W. Roberts, Box 1401, Aberdeen, NC 28315, (919) 949-3918.

HAMMARLUND HQ-100A Receiver $85, WWV Receiver $35, R.F. Sign-Gen. 80kc to 60mc $30, RCA Mobile Test Set $15. K6KZT, 2255 Alexander, Los Osos, CA 93402.

CRYSTALS: Large S.A.S.E. for my list. K8LJQ, 355 Mower Rd., Pinckney, MI 48169.

PLEASE HELP: Does anyone have an old 2 meter FM transceiver or HT to donate to our school program? G. Skloot, KE2N, c/o JHS 180, 320 B. 104 Street, Rockaway Park, NY 11694.

WANTED: KENWOOD SP-70 speakers, RSK-7 kit, MARS-7600 adapter, and YAESU FR-101(SD) or (D). Charles T. Huth, 130 Hunter St., Tiffin, OH 44883.

Drake TR-7, high serial, PS7, SP7, 7077 mic., 500 and 1800 filters, NB-7. All mint with manuals, cartons, dust cover. $1095. (617) 274-6260. KB1BX.

NEEDED: Service Data or Factory/Manufacturers address for DIGICOM 800, 2M, FM, Handheld Transceiver. Call collect 919-867-1749, or write to Jim Mulhall, WA4KBI, Box 41637, Fay, NC 28309.

WANTED: Motorola AC and switcher supplies for H23 and P33 tube-type talkies. Jim, 121 Hilton, Elgin, IL 60120.

ICOM IC-701 mobile HF rig (160, 80, 40, 20, 15, 10 meters), excellent condition, $500 or best offer, N2DUP, Box 1119, Flemington, NJ 08822-5019.

FOR SALE: Telrex "Big Bertha" pole, antennas and rotor box. Approx. 100 ft. tall with 9 antennas, $6,500. Write for picture. Mrs. Z. Reynolds, 700 Wellington Road, Winston-Salem, NC 27106.

WANTED: Service manual or information for Hammarlund Receiver Navy Model RBG-2. Will buy or pay copy cost. B. Eichholz, 5358 Agate Way, Carmichael, CA 95608.

SELL: *DL-QTC* (German), *QST*, *CQ*, etc. WU FAX, TTY, etc. SASE for listing. Paquee, 53 Jerome Ave., Trumbull, CT 06611.

FOR SALE: Old type radio tubes 6 volt, Octal 12 & 14, some transmitting tubes, tube checker. A. Jacobson, 416 West 2nd St., Williston, ND 58801.

HEATH GR-54 Shortwave Receiver, 200 kHz–30 MHz, $50. Richard T. Yerian, KE4YC, 1525 La Rochelle Lane, Charlotte, NC 28226, (704) 366-3127.

WANTED: Pre-1950 bugs and Spark keys for my collection. Vibroplex, Martin, McElroy, Marconi, DeForest, etc. K5RW, Neal McEwen, 1128 Midway, Richardson, TX 75081.

FOR SALE: Tempo One with A.C.-1 power supply in good condition with manual, $200. KØHQW, Tort Isaacson, 65 Dellbrook Ct., O'Fallon, MO 63366.

KENWOOD TS-520, with remote VFO-520. Perfect operating condition, for sale by first owner. Nice upgrades included. SASE for fuller description. H: 617/259-0088. O: 617/899-1025. Fred, K1VR, Willarch Road, Lincoln, MA 01773.

WANTED: Control box and/or schematics for HY-GAIN AR-30 ROTOR. KA9NCC, 3008 Fairoak Dr., Ft. Wayne, IN 46809.

WANTED: Carrying case for Standard Vibroplex. W7AM, Box 8173, Sisters, OR 97759.

CURTIS KEYER, Model EK 480M, Bunnell miniature and US Army "J" series of keys wanted. Dick Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

POPULAR ELECTRONICS magazines, 1959 thru 1971, excellent condition, 25 cents each plus postage, by year or individual issue, include s.a.s.e. Nate Williams, W9GXR, 6915 Prairie Drive, Middleton, WI 53562.

SELL: Super station—Drake TR-3, Heath HA-14 amp. $800.00, ICOM 2AT $185.00, Regency HR-2 $90.00, 2 ea. Gonset 3338 $300.00. All power supplies and manuals. S.A.S.E. O. Smith, Jr., Rte. 6 Box 416-F, Daphne, AL 36526.

HAM RADIO STATION: Heathkit HW 16 Transceiver, and Johnson VFO. CW on 15, 40, 80. Key, Crystals, manuals. $135.00. W. Warren, 2851 Vermillion, Lake Station, IN 46405.

DRAKE Twins, R4B, T4XB, AC4/MS4, manuals, cables. Mint condition, $450. Eleven Drake Xtals, $5 each. Steve Weber, KD9BO, 219-464-2877 (Novice XYL needs simpler rig).

HALLICRAFTERS SX-25 Rcvr, Speaker, Manual, $100. Knight t-60 Xmtr, $50. Heath HW-7 QRP rig, $50. Steve Weber, KD9BO, 219-464-2877.

SIGNAL GENERATOR, AN/TRM-1, 190 kHz to 400 MHz, calibrated output, $125.00 with book. Michael P. Murphy, 11621 Valle Vista Rd., Lakeside, CA 92040, (619) 561-2726.

NIKON Mount Lenses, Antique Cameras, other photo equipment for trade for Ham Gear. Vivitar Series One Macro new condition, much more. Bruce Vaughan, N5GIY, P.O. Box 203, Springdale, Ark. 72764.

RADIO ARCHIVES "views/news of Radio enthusiast" SASE. Electronic Avocations, 2308 Garfield #304, Minneapolis, MN 55405.

WANTED: Self-supporting towers, Rohn 25 and 45. K8UR/1, P.O. Box 662, Marlboro, MA 01752, 617-481-2091.

FOR SALE: Yaesu FT-101EE transceiver with microphone, FT-650B six meter transverter, and SP-101PB speaker/phone patch. All in excellent condition. Asking $550 plus shipping. Phil Finkle, K6EID, 8913 Enfield Ave., Northridge, CA 91325.

AUTEK QF-1A audio filter, $50.00. Dentron CM2 tuned input $25.00. Will ship UPS. KA9JDW, 1002 E. 4th St., Coal Valley, IL 61240.

SELL: 40 year collection of receiving tubes, only dollar each. Send list of requirements for availability. TRADE H.P. and general radio test equipment for machinist tools from retired machinists. Milt Levy, W5QJT, P.O. Box 13151, El Paso, TX 79912.

FOR SALE: SWAN 350 xcvr w/power supply, microphone, extra new matched finals, manual, in excellent condition $325. REALISTIC DX-60 excellent condition $100. WB7ERJ, 406-728-0065.

FOR SALE: Dentron Clipperton KW Linear, like new, 160–10 mtrs., $425, plus shipping. KF6PB, C.J. Roth, 24661 Coleford, El Toro, CA 92630, (714) 581-4424.

CANADIANS! HW-8 in nice condition. One year old, little used, 1 amp power supply, $190 or best offer. Kop, Box 252, St. George, N.B. EØG 2YØ.

DRAKE TR4-C, RV4-c (vfo), pwr sply, D104 mic, built-in Curtis 8044 keyer, $425 includes shipping. Call 914-338-2407, days and eves. N2EIK.

SELL: Kenwood R-1000 General-Coverage Receiver. A.A. Treadwell, 200 Rothwell Dr., Lutherville, MD 21093, 301-828-5568.

WANTED: Antennascope. These units were manufactured in the early 50's. Norman Crane, 12020 E. Snyder Rd., Tucson, AZ 85749.

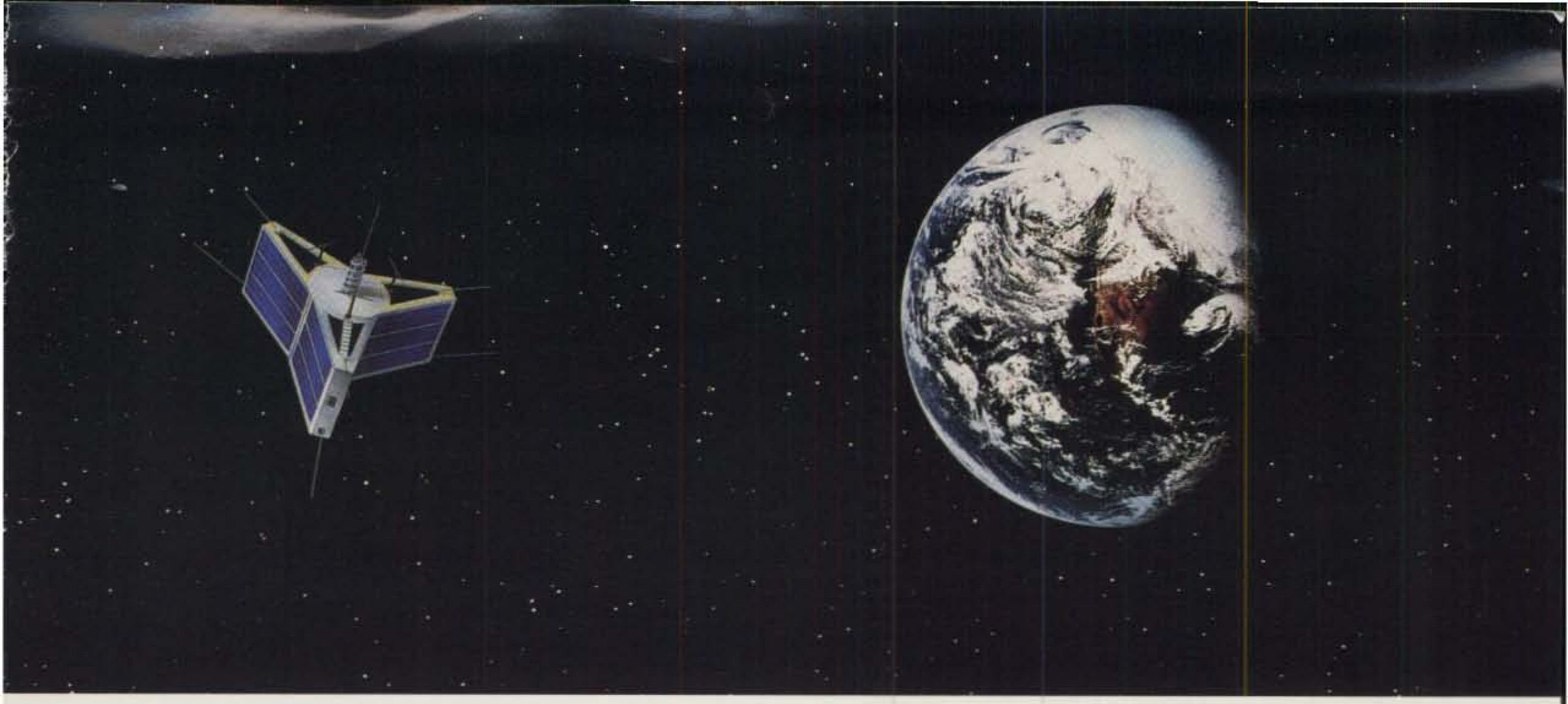
WANTED: Six mtr. FM XCVR, HR-6, Geneve, Motorola, need to only operate 52.525 simplex XMIT/receive. K8LEN, Patrick O'Brien, Rt. 2, Pekin, IN 47165.

WANTED: Hallicrafters SX146 and HT46, or Hammarlund HQ 170 and HX50. Mike Ryder, KA9N, 503 S. 5th St., Oregon, IL 61061.

Please send all reader inquiries directly.

Advertiser's Index

Please send all reader inquiries directly.



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Plus you get a lot more extras, including a built-in speech processor, all-mode squelch and a noise blanker.

So no matter where your shack is, let Yaesu's FT-726R introduce you to OSCAR 10. The world is waiting.

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(513) 874-3100

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For the ultimate in 2-meter communications, ICOM presents the IC-271H transceiver with a high dynamic range receiver and a 100 watt transmitter...And all the advanced functions of the latest CPU controlled radios.

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- IC-HM12 Microphone with Up/Down Scan
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Optional Features. AG-25 switchable preamp, UT-15S CTCSS encoder/decoder (encoder is standard), IC-EX310 voice synthesizer, IC-SM8 two-cable desk mic and IC-SM6 desk mic. PLUS a variety of power supplies... IC-PS30 system power supply, IC-PS15 external or IC-PS35 internal power supplies.

The IC-271A. The 25 watt IC-271A has the same outstanding featues as the IC-271H, including an internal power supply, IC-PS25.


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