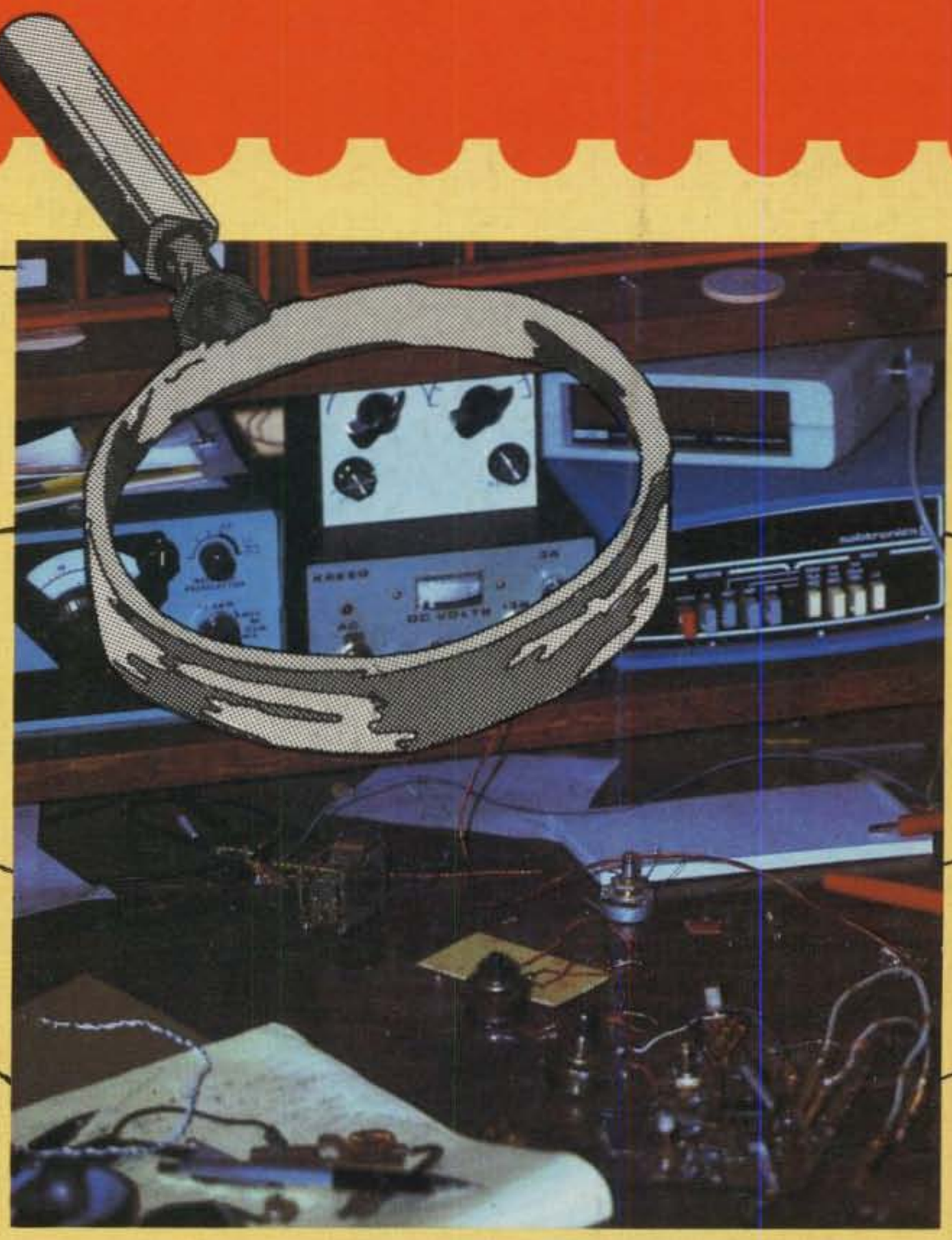
ICD 08241

Amateur Radio

SERVING AMATEUR RADIO SINCE 1945
JUNE 1980 $2.00

CQ



74820 08241 06

THE RADIO AMATEUR'S JOURNAL

Introducing . . . . .

the All New DTR Component Series.

Is your operating ability superior to the equipment you're using?

If you're a serious amateur who takes pride in his talent you should own the best, the new DTR Communication Stystem.

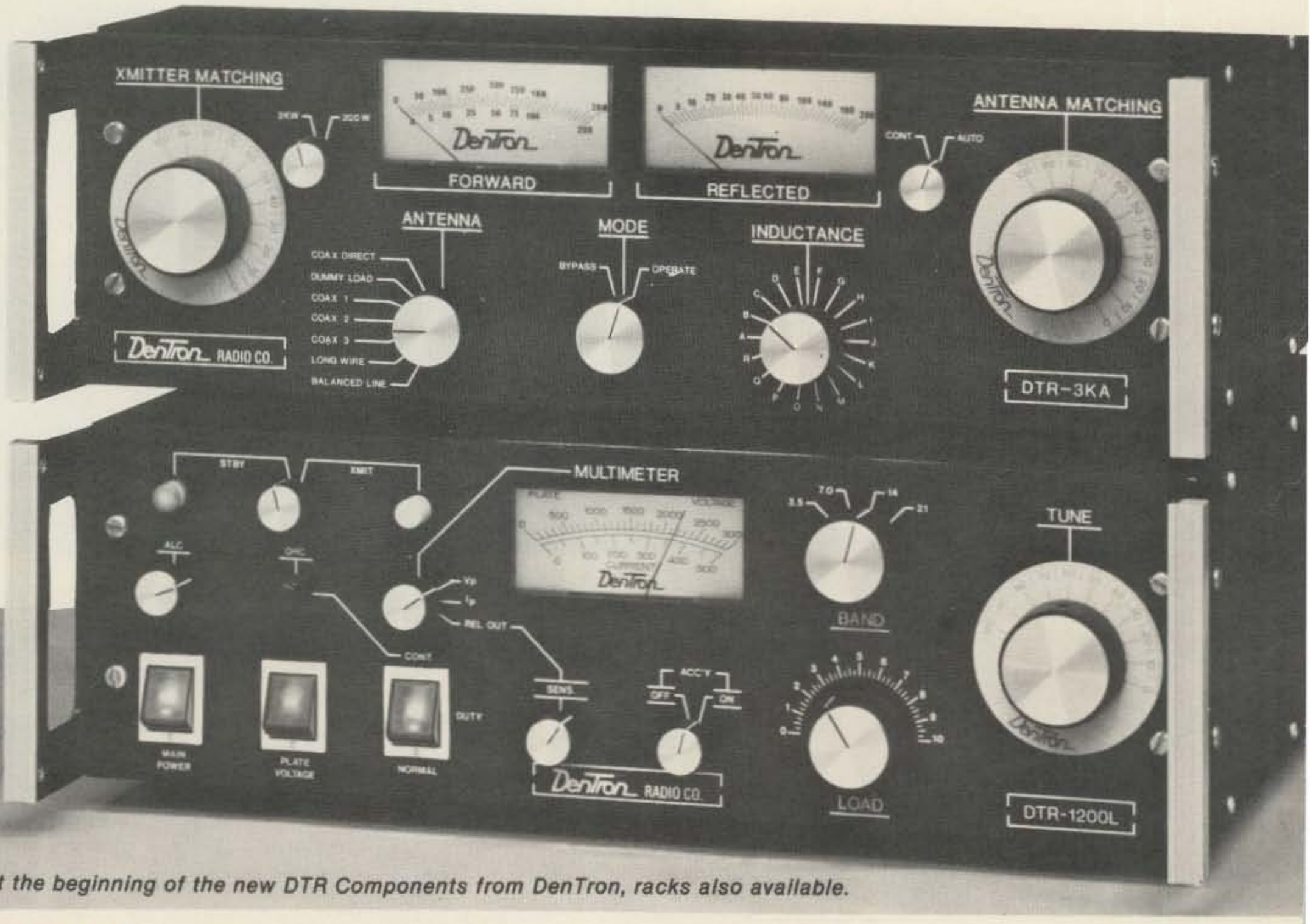
Amateur Radio has developed over the years into a sophisticated hobby. We all recognize the thrill of transmitting global signals, but to many hams it is the finesse with which those signals are transmitted that determines his pride and success as a ham.

The DTR 1200 linear amplifier provides 1200 watts SSB and 1000 watts CW input, continuous duty. We used large, 3½" shadow box, back-lit meters for easy reading, and tuned input for compatibility with solid state or tube transceivers.

The DTR 3KA antenna tuner handles a full 3KW PEP. It features a built in 2KW dummy load with thermostatically controlled forced air cooling, a remote sensor box to insure meter accuracy and 50 ohm impedance.

The DTR stackable components are designed to give you a complete communication system with mobility and versatility. Rack mount the DTR components on either a stationary rack or one on wheels. The DTR components are equipped with heavy-duty handles for easy rack mounting. If you opt for a desk-top station, the DTR components may be stacked or used separately.

Isn't it time you owned equipment to match your ability and increase your station's success?



This is just the beginning of the new DTR Components from DenTron, racks also available.

FCC TYPE ACCEPTED

DTR

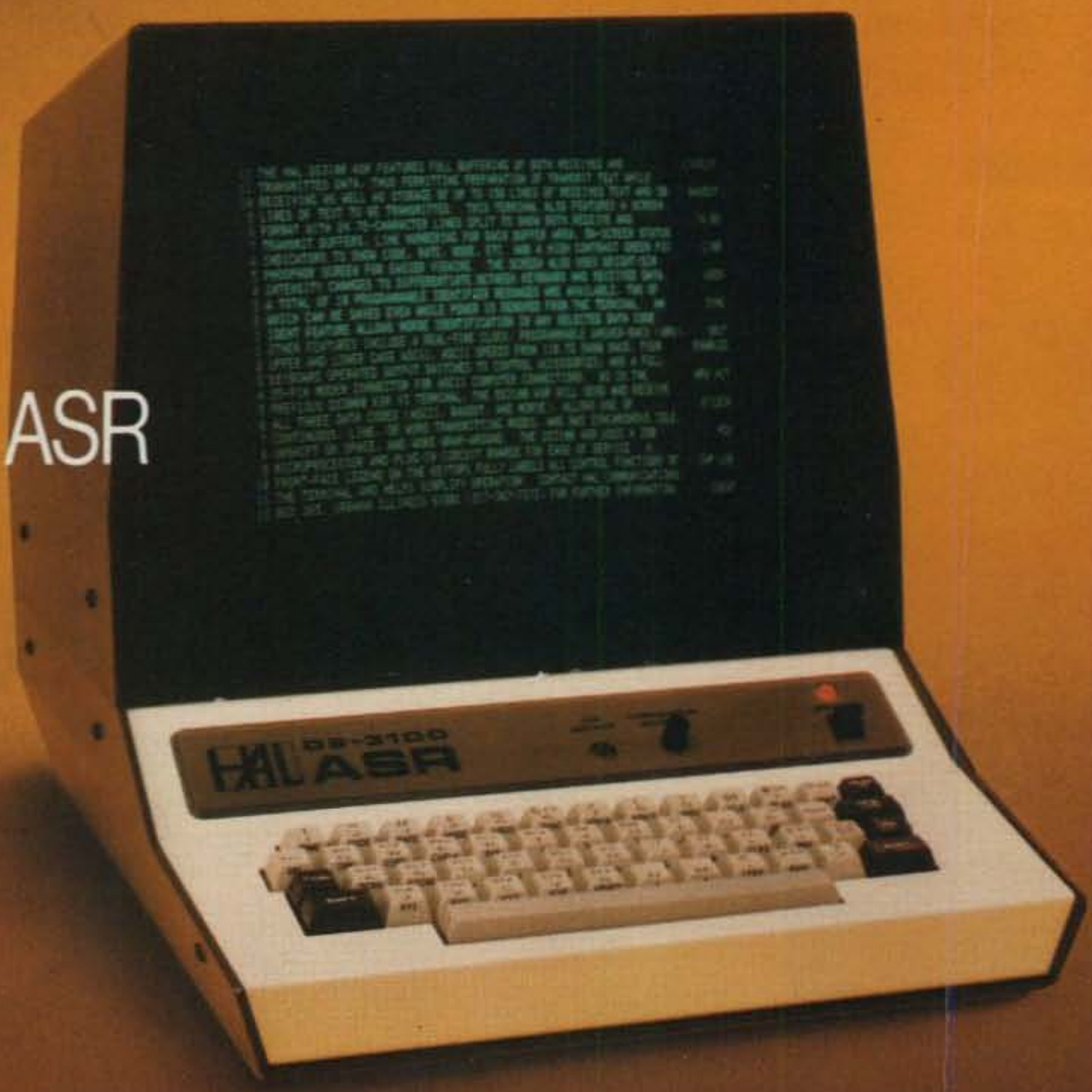
DenTron®

1605 Commerce Drive
Stow, Ohio 44224
(216) 688-4973

CIRCLE 8 ON READER SERVICE CARD

WHEN OUR CUSTOMERS TALK...WE LISTEN.

DS3100 ASR



We've Been Taking Notes.

Combining your ideas with some of our own, we've come up with what has to be the most advanced and convenient terminal available. These are some of the conveniences you can now enjoy by putting the DS3100 ASR in your RTTY and CW station:

ASR Operation (Compose your transmission *WHILE* receiving)

- 150-line Receiver Buffer
- 50-line Transmit Buffer
- Split Screen to Show Buffers
- Internal Real-Time Clock
- 10 Programmable Messages
- Automatic Answer-Back (WRU)
- Morse, Baudot, or ASCII Operation
- RTTY and CW Identification
- Full 128-Character ASCII
- 110-9600 baud ASCII
- 60-130 WPM Baudot
- 1-175 WPM Morse

Write or call for the DS3100 ASR specifications and see how *YOU* have helped design the new standard in amateur radio terminals.

HAL COMMUNICATIONS CORP.
Box 365
Urbana, Illinois 61801
217-367-7373

For our European Customers Contact:
Richter & Co., Hannover
I.E.C. Interelco, Bissone

Please send all reader inquires directly

FREE PHONE! 800 854-6046

CALIF. CUSTOMERS PLEASE CALL OR VISIT STORES LISTED BELOW

PLUS FREE SHIPMENT U.P.S. (Brown).

(Except where otherwise noted)

SERVING HAMS *BETTER!*

North ... south ... east ... west

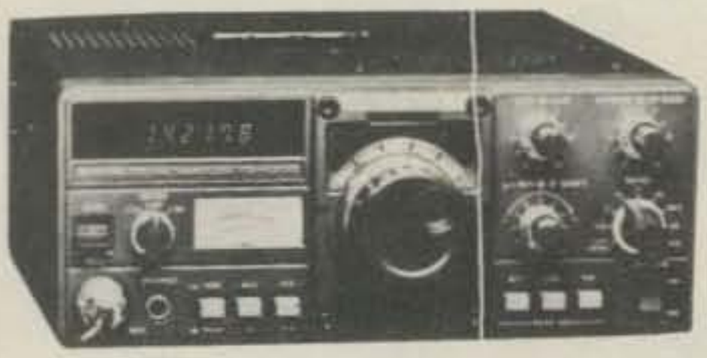
All leading brands ... in-depth stocks ... new/used gear.

Bob Ferrero, W6RJ/K6AHV, Jim Rafferty, N6RJ other well known hams give you courteous, personalized service.

ALSO SHIPPING REGULARLY TO COUNTRIES ON ALL CONTINENTS ...

KENWOOD TS-520 SE

KENWOOD TS-120S



CALL (or visit us) FOR YOUR DEALS ON KENWOOD's "BIG 4" or any and all other Kenwood ham products

KENWOOD TS-180S/DFC

KENWOOD TR-2400

2 METER HAND-HELD

HD-73

$109.95

ALLIANCE ROTATORS

U-100

$41.95

CDE ROTORS

T2X

CALL FOR PRICES

HAM IV

SHURE/HAM RADIO OUTLET

444 MICRO-PHONE

$36.95

BRAND NEW!

Highly effective... modestly priced.

VHF/FM DEVIATION METER

Set FM deviation precisely, 0 to ±7kHz with direct meter readout (marked for nominal tone pad and voice deviation). Instrument covers 144-148MHz with exact frequency selected by crystal. Crystal for 146.52MHz is furnished.
Supply voltage: 11.9 to 16 VDC. Polarity protected.
Size: 3.25"H, 5.5"L, 3"D.

$99.95

OVER THE COUNTER (Mon. thru Sat. 10 AM to 5:30 PM) MAIL ORDER, Phone, Write.

ANAHEIM, CA 92801
2620 W. La Palma
(714) 761-3033 (213) 860-2040
1 mile east Knotts Berry Farm

SAN DIEGO, CA 92123
5375 Kearny Villa Road (714) 560-4900
Highway 163 & Clairemont Mesa Blvd.

OAKLAND, CA 94609
2811 Telegraph Ave. (415) 451-5757
Hwy 24 Downtown. Left 27th off-ramp.

BURLINGAME, CA 94010
999 Howard Avenue (415) 342-5757
5 miles south on 101 from S.F. Airport

VAN NUYS, CA 91401
6265 Sepulveda Blvd. (213) 988-2212
San Diego Fwy at Victory Blvd.

HAM RADIO OUTLET™

VISA master charge

• ALDA • ALLIANCE • ALPHA • AMECO • ATLAS • BIRD • CDE • COLLINS • CUSHCRAFT • CURTIS • • DENTRON • DRAKE • EIMAC • HUSTLER • HY-GAIN • ICOM • KENWOOD • KLM • MFJ • MOSLEY • PALOMAR • ROHN • ROBOT • SHURE • SWAN • TELEX • TEMPO • TEN-TEC • TRISTAO • TELREX • TRI-EX • WILSON • YAESU • more.

Prices/specs subject to change without notice. Calif. residents add sales tax.

Please send all reader inquires directly

MASTHEAD

EDITORIAL STAFF

Alan M. Dorhoffer, K2EEK
Editor
Gail M. Schieber
Associate Editor

CONTRIBUTING STAFF

Frank Anzalone, W1WY
Contest Chairman
John Attaway, K4IIF
DX Editor
Larry Brockman, N6AR
Robert Cox, K3EST
W.W. Contest Directors
Theodore J. Cohen, N4XX
Washington Commentary
William DeWitt, W2DD
SSTV Editor
Leo Haijsman, W4KA
WAZ Awards Manager
A. Edward Hopper, W2GT
USA-CA Director
Robert Huntington, K6XP
WPX Award Manager
George Jacobs, W3ASK
Propagation Editor
Rod Linkous, W7OM
Assistant DX Manager
Donald McClenon, N4IN
160 M. Contest Director
Irwin Math, WA2NDM
Math's Notes
Hugh R. Paul, W6POK
Technical Evaluations
Karl T. Thurber, Jr., W8FX
Antennas
Adrian Weiss, K8EEG/Ø
QRPp Editor
Bernie Welch, W8IMZ
WPX Contest Director
Bill Welsh, W6DDB
Novice Editor

BUSINESS STAFF

Richard A. Ross, K2MGA
Publisher
Dorothy Kehrwieder
Assistant to Publisher
Jack M. Gutzeit, W2LZX
Advertising Sales Manager
Janet T. Kurtz
Circulation Manager

PRODUCTION STAFF

Dorothy Kehrwieder
Production Manager
Elizabeth Ryan
Art Director
Hal Keith
Illustrations

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, N.Y. and other points. Subscriptions prices: one year $14.00, two years $25.00. Entire contents copyrighted CQ Publishing Inc. 1979. 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 form 3579 to CQ Magazine, 76 North Broadway, Hicksville, NY 11801.

CQ The Radio Amateur's Journal

ON THE COVER: Our cover this month features the creative workbench of Ade Weiss, WØRSP done up in a postage stamp motif to illustrate Vic Clark's article on amateur radio stamp collecting.

JUNE, 1980 VOL. 36, NO. 6

FEATURES

DEPARTMENTS

Zero Bias

an editorial

Like presidential hopefuls, Jack, W2LZX and I hit the campaign trail to Illinois last March. Although we didn't get to meet Mayor Byrne of Chicago we did get the chance to say hello to some old friends and make some new ones.

We arrived in Chicago early in the morning and checked into the hotel at the airport. In true amateur fashion we got a room on the highest floor available so Jack could trip some of the local repeaters. Once we got on the road we could have literally discarded our maps as the 9's guided us through the intricacies of Chicago. We had a tight schedule planned for one day and managed to keep all of our appointments, which included stops at Erickson Communications to say hello to Tim Lytle and get a tour of the facilities, then over to see the folks at Magnus to get a hands-on look at their new linear amplifier, followed by a visit with Dan Montville of Spectronics, Inc. It really was a full day and I wish we could have spend more time in the area but we had to move on.

Early the next morning we flew down to Urbana where we were met by Bill Henry of Hal Communications. Bill's very proud of Urbana and took us on a quick tour before we headed for the plant. Urbana is very much like Sea Cliff here on Long Island's North Shore. Victorian gingerbread homes abound in marvelous condition. At the center of the city is the University of Illinois, a sprawling mixture of architecture from traditional to modern.

Once at Hal we got the complete tour from design through shipping. I guess most people never really think about where and how what they buy is manufactured or by whom. It's probably nowhere near as important as the assurance that the item does work and work well. I've always been fascinated by the manufacturing process, the people, the tooling, the assembly and testing, the nuts and bolts of getting a pile of parts and metal stampings to become this or that, looking just so and being able to do it over and over again. I wasn't disappointed in my fascination here and like other trips we've made to various manufacturers, I got to see a few ingenious (to me) methods of getting from here to there.

Bill and I share a few other interests, including antiques and the opera. That afternoon, the three of us played hooky and went to an antique show where Bill's wife Cathy, had a display of her weaving prowess. She's quite good by the way. We all capped off the day by attending a very good production of Don Giovanni held at the University. The next morning we were back in Chicago heading home.

QLF?

Thanks to Martin Jue of MFJ my desk now sports one of his MFJ-410 "Professor Morse" units. The 410 is a random code generator and keyer which "sends" random characters and groups of Morse code, never repeating the sequence. Since I spend most of my time here these days, I needed a way to build up my c.w. speed that was almost painless and unobtrusive in the way of equipment. With the 410 you can vary the speed from 5 to 50 w.p.m., vary the spacing between characters and character groups (using their example of copying 5 w.p.m. with 13 w.p.m. characters). This gives the benefit of copying perfect code with proper character sound at low speeds. You can select alphabetic only or alphanumeric plus punctuation (the ones in common usage, period, comma, question mark, slash and double dash). So while the unit may occasionally be buried under letters on my desk, the earphone wire snakes its way out to plug me into the world of c.w. I don't know how painless it is, but it certainly is unobtrusive and convenient.

This Month

We're pleased that we could work up both the High Claimed Scores for the Phone and C.W. portions of CQ's WW DX Contest. For the QRP gang you will notice that we've included you in this listing. For the theoretical bunch, Yuri Blanarovich has come up with a new way to look at propagation which should raise a few eyebrows. Albert Jackson has momentarily left the world of c.w. and applied his touch-key techniques to his microphone. Vic Clark provides an interesting look at amateur radio and stamp collecting, especially those stamps that directly relate to amateur radio.

The photo used in this month's cover is actually the very creative work bench of our own Ade Weiss, WØRSP. His very familiar HW-8 can be seen along with the power supply we featured a few months back. The project that he is working on at the moment is the Viking 3X5, the first part of which ran last month. We are still preparing part II which should run next month.

Stamp Of Approval

I've been asked by several of our authors and columnists to ask you to send a s.a.s.e. with your questions to them to speed up replies. To be perfectly mercenary, stamps and envelopes also cost a lot of money. You can go a long way to ease both the time and financial crunch that most of us are facing by preparing a s.a.s.e. to include with your question or request.

73, Alan, K2EEK

enter the new world of TEN-TEC

OMNI-Series C

new features, new performance + all 9 hf bands

NEW — ALL 9 HF BANDS. Full coverage from 160 through 10 Meters. Ready to go, with crystals supplied for seven bands (crystals for 18 and 24.5 MHz bands available when bands are ready for use).

ALL SOLID-STATE. From the pioneer.

BROADBANDED. From the pioneer.

NEW 3-MODE, 2-RANGE OFFSET TUNING. Another TEN-TEC first... (1) Offset **Receiver** Tuning, (2) Offset **Transmitter** Tuning and (3) Offset **Transceiver** Tuning. None other has it. For complete flexibility, to meet all needs, fine tuning or DX. 2-ranges: ± 500 Hz or ± 4 kHz.

OPTIMIZED RECEIVER SENSITIVITY. For an ideal balance between dynamic range and sensitivity... from 2 μV on 160 to 0.3 μV on 10 Meters.

NEW OPTIMIZED BANDWIDTH. Seven response curves—four for SSB, three for CW. Standard i-f filter is an 8-pole 2.4 kHz crystal ladder type. Options include a 1.8 kHz 8-pole crystal ladder type, a 500 Hz 8-pole CW filter and a 200 Hz 8-pole CW filter. Switch an optional filter from the front panel to put it in series for up to **16 poles** of filtering. And the standard CW active audio filter has 450 and 150 Hz bandwidths for added attenuation. New toggle switches select i-f and audio filtering. Selectivity for any situation.

BUILT-IN NOTCH FILTER. Variable null eliminates unwanted signals and carriers in a pass band from 200 Hz to 3.5 kHz with a notch depth of more than 50 dB.

NEW BUILT-IN NOISE BLANKER. Standard equipment. New 2-pole monolithic crystal filter handles big signals easily, makes impossible locations usable.

GREATER DYNAMIC RANGE. Better than 90 dB, typically. Reduces front-end overload and distortion. Plus a PIN diode switchable 18 dB attenuator on the RF gain control.

NEW "HANG" AGC. Smoother operation.

2-SPEED BREAK-IN. "Fast" or "Slow" speeds. "Fast" for instant, full break-in. "Slow" has a longer mute time before receiver is actuated for working crowded bands with heavy QRM and for mobile.

WWV RECEPTION. On the 10 MHz band.

DIGITAL READOUT. 6 shielded 0.43" LEDs with 5 in red, the 6th (100 Hz) in green.

SEPARATE RECEIVING ANTENNA CAPABILITY. Use with separate components, instant break-in linears, or transverters.

"S"/SWR METER. Easy-to-read. Electronically switched.

200 WATTS INPUT. On **all** bands, when used with 50 ohm load. Proven, conservatively rated design. Fully warranted for first year, pro-rata warranty for five extra years!

100% DUTY CYCLE. Full power hour after hour without fail. Ideal for RTTY, SSTV or any hard usage.

BUILT-IN VOX AND PTT. Smooth VOX with 3 front panel controls. And PTT control at both front and rear panel jacks.

BUILT-IN PHONE PATCH JACKS. Easy interface to speaker and microphone signals.

BUILT-IN CW ZERO-BEAT SWITCH. Puts you on exact frequency of a station being worked without being on the air.

BUILT-IN ADJUSTABLE SIDETONE. Vary pitch and volume for easy listening.

ADJUSTABLE THRESHOLD AUTOMATIC LEVEL CONTROL. From low power to full output with full ALC control.

FRONT PANEL CONTROL OF LINEAR OR ANTENNA. Auxiliary bandswitch terminals on rear panel permit simultaneous control of external relays or circuits. Disregard to interface with new TEN-TEC solid-state/CW Linear.

AUTOMATIC SIDEBAND SELECTION. And you can reverse it with the mode switch.

SUPER AUDIO. A TEN-TEC trademark. Proper shaping plus low distortion.

IMPECCABLE SIGNAL. Clean. Easily exceeding FCC requirements, thanks to meticulous design, fine components, and conservative ratings.

HIGH STABILITY. Deviation is no more than 15 cycles per degree temperature change after warm-up.

HIGH ARTICULATION KEYING. 2½ msec rise and decay time for sharp, clean keying.

BUILT-IN SPEAKER. Built into the bottom of the cabinet shell. Compression-loaded for better quality and higher efficiency. External speaker connections on rear panel.

PLUG-IN CIRCUIT BOARDS. For easy removal if needed.

FUNCTIONAL STYLING. Dark front panel, convenient control groupings, "clamshell" cabinet, full shielding, and easier-to-use size: 5¾"h x 14¼"w x 14"d.

POWER. Operates on 12-14 VDC for mobile or storage battery use. For 117 VAC use, an external supply is required.

FULL ACCESSORY LINE. Model 217 500 Hz CW filter $55, Model 219 200 Hz CW filter $60, Model 218 1.8 kHz SSB filter $55, Model 243 Remote VFO $139, Model 255 Power Supply/Speaker $169, Model 280 Power Supply $139, Model 645 Dual Paddle Keyer $85, Model 670 Single Paddle Keyer $34.50, Model 234/214 Speech Processor & Condenser Microphone $163, Model 247 Antenna Tuner $69. All in matching color.

Model 546 OMNI-Series C $1189

See your TEN-TEC dealer, or write for full details.

TEN-TEC, INC.
SEVIERVILLE, TENNESSEE 37862
EXPORT: 5715 LINCOLN AVE., CHICAGO, ILL. 60646

Any successor to the Collins KWM-2 better be good. It is. The new Collins KWM-380 transceiver.

The remarkable new Collins KWM-380 transceiver continues the Collins heritage for quality amateur equipment.

KWM-380 is a complete fixed station in a smartly styled, self-contained unit.

AC/DC power supply, speaker and accessory VFO function are built in.

Microprocessor frequency control provides rate selectable tuning in 1 MHz, 1 kHz, 100 Hz or 10 Hz increments. Frequency memory provides split VFO function (half-duplex) for transmit and receiver registers. And with minor modification, the KWM-380 will accommodate *WARC* and *MARS* frequency requirements.

The high resolution frequency synthesizer locked to a high stability frequency reference is accurate to 10 Hz with no bandswitch. Eliminate undesired signals with independently selectable I.F. bandwidths and passband tuning. Optional I.F. filters can be selected independent of operating mode.

The Collins KWM-380, true professional quality for the amateur. If it wasn't a quantum jump ahead of our highly successful S/Line and KWM-2, we wouldn't have built it. See it soon at your nearby participating Collins Amateur Radio distributor. He's listed on the following page. Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, Iowa 52406. Phone: 319/395-5963. Telex 464-435.

CIRCLE 20 ON READER SERVICE CARD

Rockwell International

...where science gets down to business

Specifications†

Frequency Range: Tunable in 10 Hz steps.
Receive mode — 2.0 to 30.0 MHz, 0.5 to 2.0 MHz at reduced sensitivity.
Transmit mode — SSB or CW 160- thru 10-meter amateur bands.
Mode: CW, SSB (voice and RTTY, either sideband selectable).
Power requirements: 105, 115, 125, 210, 220, 230, 240, 250, ±5% V ac (Internal strapping option) 50-60 Hz, 12 V to 15 V dc (Connector strapping). 120 W input in receive max; 600 W input in transmit max.

Frequency accuracy: Accurate to within ±5 Hz when the 39.6 MHz oscillator and the 455.0 kHz oscillator are set within ± 3Hz. Warm-up time is 10 min.
Frequency stability: Stability is within ±150 Hz over the temperature range of 0-50°C.

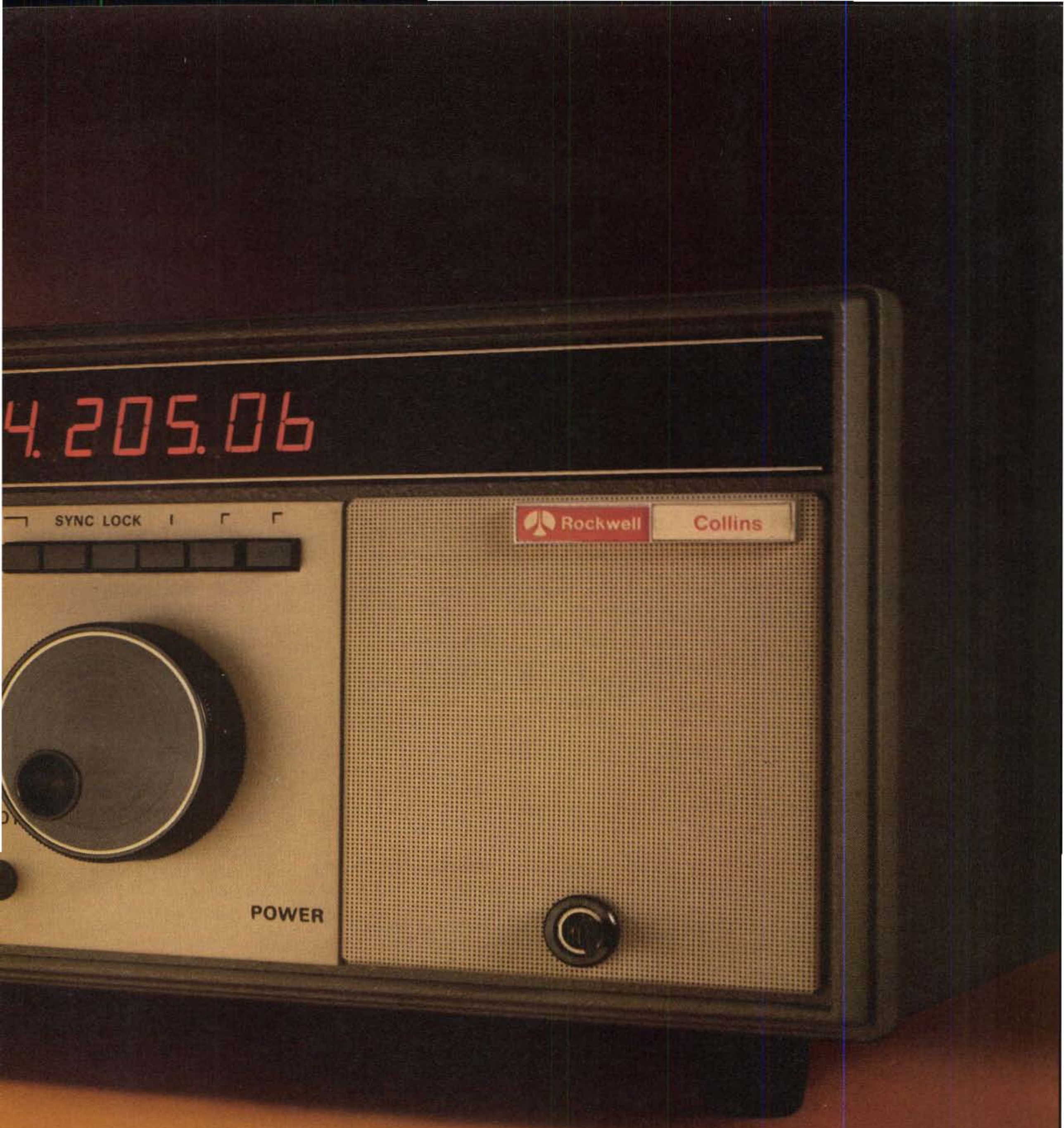
TRANSMIT PERFORMANCE
Output impedance: 50 ohms nominal.
Power output: 100 W PEP nominal from 1.6-30 MHz. In *CW* or *RTTY*, duty cycle is 50%, key down 15 minutes max.

With the optional blower kit, power is 100 W average, 50% duty cycle, key down 1 hour max. at 25°C, ½ hour max. at 50°C for all modes.

Unwanted signal suppression: (minimum values below)

Carrier suppression	50 dB
Undesired sideband, 1 kHz ref	55 dB
Harmonics (all)	40 dB
Mixer products	55 dB

Third order distortion: 25 dB below each tone of a two-tone test.
Audio inputs: Microphone — low impedance type, internal strap for HI-Z. Line — 600 ohm input unbalanced impedance; level of 40 mV is sufficient to produce full output.



Audio frequency response: Not more than 5 dB variation from 300 to 2400 Hz.

RECEIVER PERFORMANCE

Antenna impedance: 50 ohms

Sensitivity: Not more than 0.5 uV for 10 dB S+N/N at antenna input for SSB and CW, 2.0 to 30 MHz. Broadcast band attenuation is a nominal 30 dB.

I.F. and image rejection: Greater than 60 dB.

Selectivity: In operating modes of USB, LSB, CW, and AM.

BW at −3 dB (min)	BW at −60 dB (max)
2.1 kHz	4.4 kHz
*1.7 kHz	3.4 kHz
*360 Hz	1.25 kHz
*140 Hz	600 Hz
*6.0 kHz	25 kHz
8 kHz	50 kHz

*optional

Audio output: Not less than 3½ W into 4 ohm load at 1 kHz, at not more than 10% total harmonic distortion. Line audio output, −10 dBm nominal into 600 ohms.

Audio frequency response: Not more than 5 dB variation from 300 to 2400 Hz.

AGC: Audio output variance not more than 8 dB as the RF input varies from 2.0 uV to 100 mV open circuit.

Intermodulation distortion: Two signals spaced 20 kHz at a level of −10 dBm each will produce IMD down 50 dB min.

Size: 15.50" W (39.4 cm); 6.5" H (16.5 cm) (w/o feet), 7.5" H (19.1 cm) (w/feet); 18.00" D (45.7 cm).

Weight: 50 lbs. (22.7 kg).

†Subject to change without notice.

Announcing

•Chelsea Swap and Shop – The Chelsea Swap and Shop will be held on Sunday, June 1, at the Chelsea Fairgrounds, Chelsea, Michigan. Gates will open for sellers at 5 a.m. and for the public from 8 a.m. until 2 p.m. Admission is $1.50 in advance or $2.00 at the gate. Children under 12 and non-ham spouses are admitted free. Talk-in on 52 and 37/97. For more information, write to William Altenberndt, 3132 Timberline, Jackson, Michigan 49201.

•Mystery Hill DXpedition – The Mount Moriah Repeater Society will hold a DXpedition at Mystery Hill North Salem, New Hampshire on June 7 & 8 from 1800Z Saturday until 1800Z Sunday. Mystery Hill is a 4000-year-old astronomical observatory and prehistoric temple presumed built by Celtic and Iberian cultures. It is the "stonehenge of America" and has been defined as potentially the most important archaeology find in the Western Hemisphere. It is most likely the oldest man-made structure in the United States. Frequencies are phone: 3980, 7280, 14280, 21380, 28580, 146.52; c.w.: 3550, 3710, 7050, 7110, 14050, 21050, 21110, 28150. The call sign will be K1MDX (Mystery DXpedition). An attractive certificate will be awarded for all contacts. Send a legal size s.a.s.e to K1RCT, P.O. Box 123, North Salem, New Hampshire 03073, USA.

•Central Ontario Fleamarket and Computer Fest – The Guelph Amateur Radio Club, VE3ZM, is sponsoring the Central Ontario Amateur Radio Fleamarket and Computer Fest on Saturday, June 7th, from 8 a.m. to 4 p.m. at the Centennial Arena, College Ave. West, Guelph, Ontario. Commercial displays, surplus dealers, computer hardware and software, and developments pioneered by the local area TRS80 Computer Club, including "packet radio." Sidebanders dinner at 5 p.m. at the legion (contact Jack Kirby, VE3AFN). Refreshments will be available, and the event is indoors and outdoors. Drawing for a Kenwood 2400 hand-held. Admission is $1; vendors an additional $2 (bring your own table). For further information, contact Rocco Furfaro, VE3HGZ at 519-824-1157.

•Monroe County Radio Communications Hamfest – The annual Monroe County Radio Communications hamfest will be held on June 8 from 8 a.m. to 4 p.m. at Monroe Community College on Raisinville Rd., Monroe, Michigan. Tickets $1.50. XYLs and children free. Free parking. Contest, auction, and displays. Plenty of table space. Talk-in on 146.13/73 and 52. Contact Fred Lux, WD8ITZ for more information at P.O. Box 982, Monroe, Michigan 48161 or call 1-313-243-1088.

•West Virginia Birthday Celebration Award – Any ham in the world who works a West Virginia amateur the week of the birthday celebration will receive a certificate from the Secretary of State of West Virginia, bearing the West Virginia seal and signed by him. Simply send your QSL report of the contact to the attention of the Secretary of State, the Honorable A. James Manchin, Room 157, State Capitol Building, Charleston, WV 25305, and wish West Virginia a happy 117th birthday. Contest starts Flag Day, June 14th EST. Contest ends at midnight, June 20, on West Virginia's birthday. Look for West Virginia's hams 15KC up from the bottom of each general band segment.

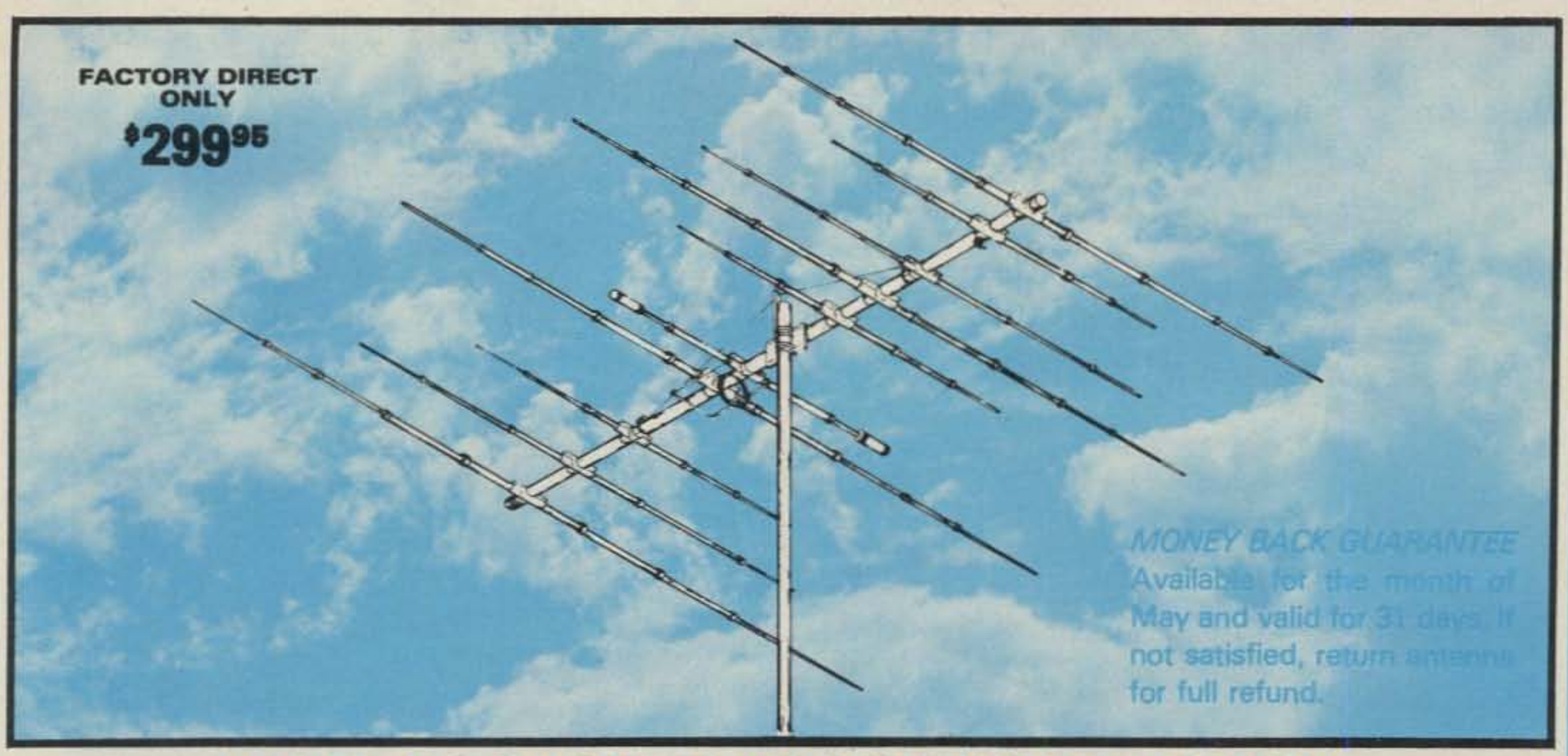
•Lake County, IN – The 8th annual Dad's Day Hamfest given by the Lake County A.R.C. (IN) will be held June 15 in the Industrial Arts building at the Lake County Fair Grounds in Crown Point, Indiana starting at 8 a.m. Plenty of door prizes and refreshments. Also for dealers, tables and electrical outlets. Take I65 to state road 231 west (Crown Point exit) to S.R. 55 south and follow the signs. Tickets are $1.50 in advance and $2.00 at the door. For more information write: Tickets, P.O. Box 1909, Gary, IN 46409. Talk-in on 147.84/24 or 146.52 simplex.

•Champaign-Logan Hamfest – The Champaign-Logan Amateur Radio Club, Inc. will hold its annual Hamfest on Sunday, June 29 at the Memorial Hall in Belle Center, Ohio. There will be a special grand prize along with many door prizes. Tickets are $1.50 in advance, $2 at the door. Trunk and table sales space is $3. Talk-in will be on 146.52 simplex. For more information contact C.L.A.R.C., Inc., P.O. Box 637, Bellefontaine, Ohio 43311.

WILSON SYSTEMS, INC. PRESENTS . . .

THE NEW SYSTEM 40 TRIBANDER

3 MONOBAND ANTENNAS IN ONE-EACH WITH FULL MONOBAND PERFORMANCE



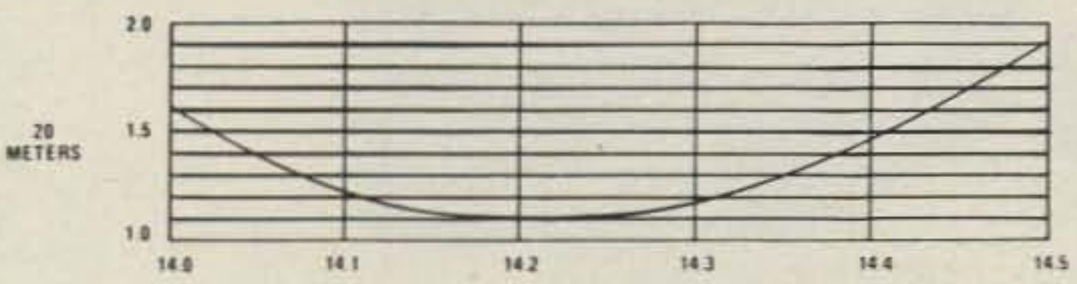
A NEW CONCEPT IN ANTENNA DESIGN

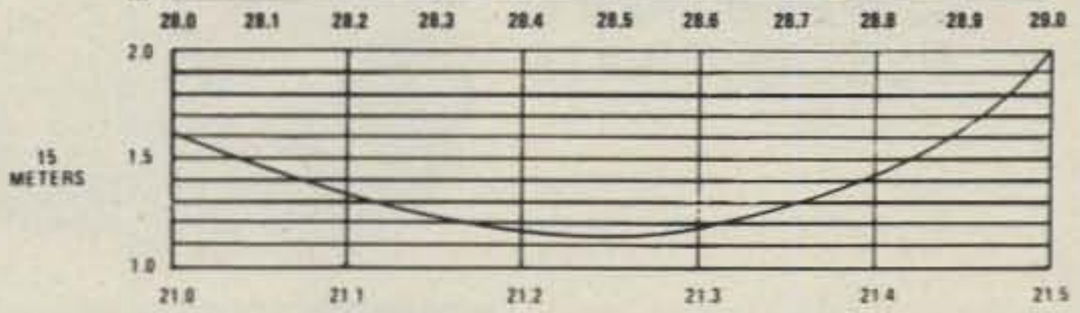
USING A 26 FT. BOOM

- FOR THE SERIOUS DXer WHO WANTS MONOBANDERS ON 10-15-20
- FOUR FULL SIZE 20 MTR ELEMENTS—CALL FACTORY FOR GAIN
- THREE WIDE SPACED 15 MTR ELEMENTS—CALL FACTORY FOR GAIN
- FOUR WIDE SPACED 10 MTR ELEMENTS—CALL FACTORY FOR GAIN
- ONLY ONE FEED LINE REQUIRED
- DESIGNED WITH NO INTERACTIONS BETWEEN ELEMENTS
- ALL PARASITIC ELEMENTS ARE FULL SIZE
- BROADBANDED — NO SEPARATE SETTINGS REQUIRED FOR PHONE OR CW
- SAME QUALITY HARDWARE AS USED IN ALL WILSON ANTENNAS

—SPECIFICATIONS—

Max. Pwr. Input	Legal Limit	Longest Element	36'
VSWR @ Res	1.2:1	Turning Radius	22' 6"
Impedance	50 ohm	Surface Area	12.1 sq. ft.
Feed Method	Coax Balun Supplied	Wind Loading @ 80 mph	309 lbs.
Matching Method	Modified Beta	Assem. Weight	75 lbs.
F/B Ratio	Call Factory	Shipping Weight	84 lbs.





AVAILABLE ONLY

FACTORY DIRECT

CALL

1-800-634-6898 **TOLL FREE**

WSI WILSON SYSTEMS, INC.

4286 S. Polaris, Las Vegas, Nevada 89103

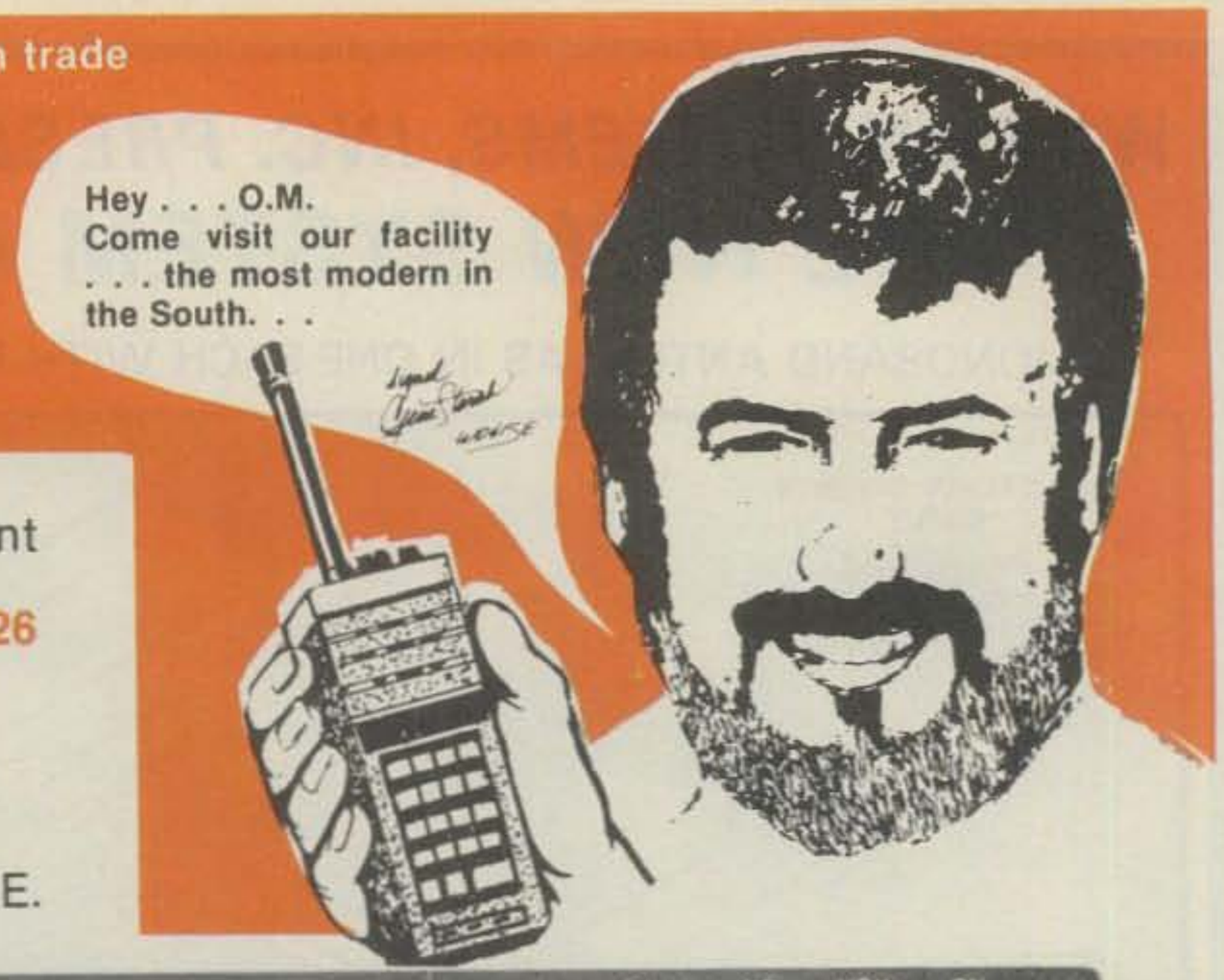
PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

CIRCLE 90 ON READER SERVICE CARD

Specializing in Central and South American trade

N&G

Direct Factory Distributors



At our new main headquarters, adjacent to Miami Int'l Airport

7201 N.W. 12th Street., Miami, FL 33126

Dade(305) 592-9685

Broward (305) 763-8170

Nosotros SI Hablamos Español

Special Export Prices.

We accept VISA and MASTER CHARGE.

SWAN ASTRO 150

HF SSB Transceivers are designed to provide the mobile or fixed base operator with the ultimate in power, stability, versatility, reliability, and ease of operation. All this human engineered into a rugged, compact, attractive package.

IF Gain Control
To complement the exceptionally wide dynamic range front end.

Dual Scale Meter
Calibrated in watts for true PEP output, and "S" units in receive (60 db over S-9)

MIC Gain
Also sets CW for tuning power output (even to QRP levels)

Provides for continuous coverage between 100 Hz steps for critical frequency setting.

RIT Control
provides approximately ± 500 Hz tuning independent of transmitter frequency

"VRS"™
"Variable Rate Scanning" allows you to tune up or down at any rate with only a "twist of the wrist!" No more knob cranking to get from here to there. VRS™ does all the work for you with no effort, and incredible precision!

Digital Readout
In high intensity orange with non-glare smoke filter for superb day or night visibility without eye fatigue. During synthesizer lock-up, audio is muted and a full series of decimals appear.

Mode Select
Gives you USB, LSB, CW normal filter AND a narrow XTAL filter for optimum CW performance — standard!

Band Switch
Selects full primary "HAM" bands (all of ten meters) PLUS the extended ranges detailed in the specifications. A unique feature remembers the last tuned frequency on every band. For example if one operated 7141.2 MHz and switched to 20 meters, when switched back to 40M, you would still be tuned to 7141.2 Hz.

Switch Selectors
To provide full or semi-break in, noise blanker, on-off, VOX or PTT and a standby position to remember the LAST TUNED FREQUENCY on each band with only milliamps of power drain.

Tuning Mic
Allows the operator to change frequency up or down in PRECISE 100 Hz steps, independent of VRS.™ Constant pressure allows frequency scanning at a fixed rate.

SWAN ELECTRONICS

Matching power supply (PSU-5) and antenna tuner (ST-3) provide the necessary additional units for a complete base station.

CIRCLE 55 ON READER SERVICE CARD

Touch-Talk That Microphone Switch

Here's a nifty gadget to perk up your operating ease and enjoyment. It's quiet, fast and best of all, nothing moves.

BY ALBERT H. JACKSON*, VE3QQ

The body-capacitive touch-control system, presented with the motionless Morse keys of previous articles,[1] can also be applied with advantage to microphone transmit-receive switching. It's mechanically silent, sensitive, and less prone to hand-relaxation drop-outs than the usual spring-loaded switch or press-bar.

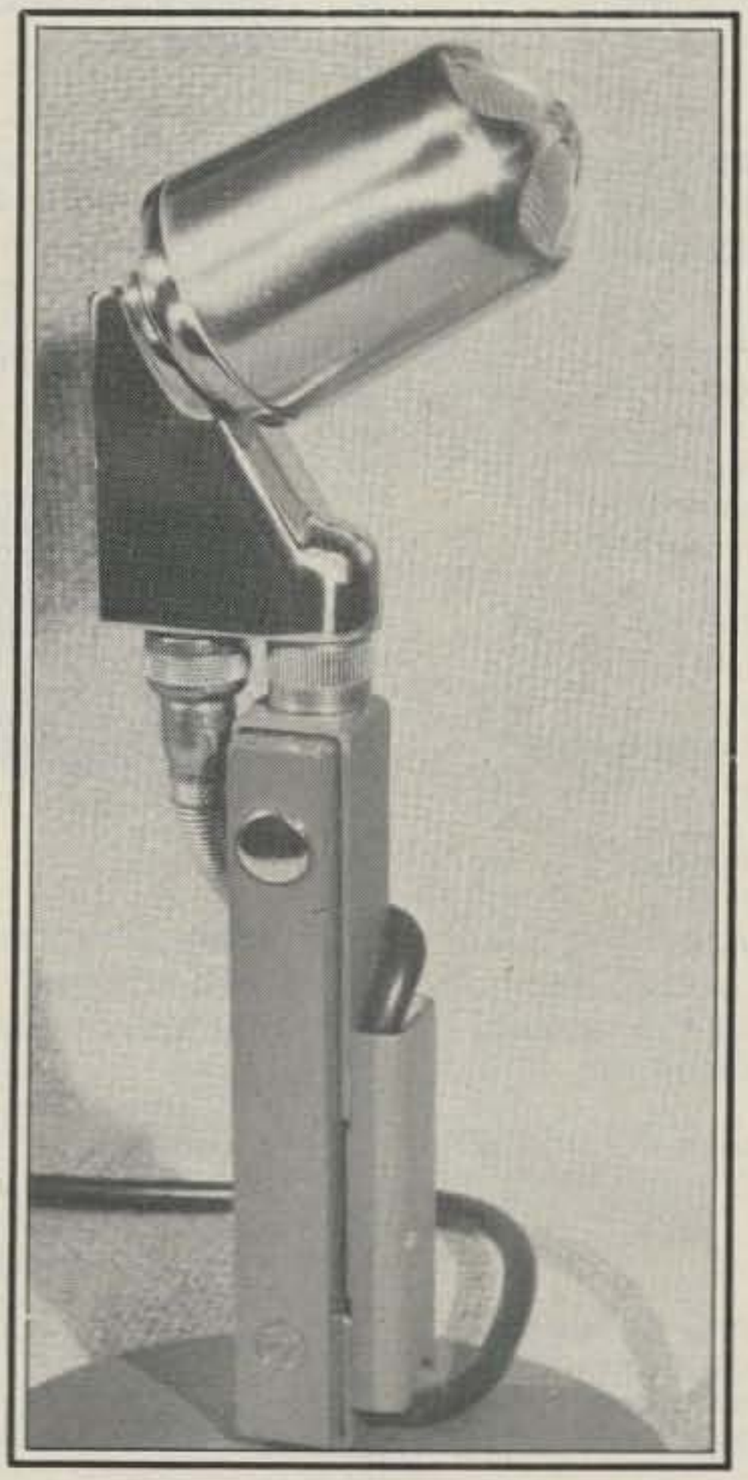
The description given here separates the circuitry into three installation-convenient segments, and though it applies specifically to the Electro-Voice 423A microphone stand, the Heath HW-100/101 and the Yaesu FT-101B transceivers, the method is adaptable to other designs and models. The oscillator section and touch-button replace the original mic switch in the stand, no additional cable conductor is needed, and the d.c. control current is less than 2 ma. The switching and power supply units should be mounted inside the main equipment, away from r.f. and high voltage components.

Altering the Microphone Stand

Referring to the photos, remove the press-bar, discard its plastic locking hook and file out the opening to take a plated ½" hole-plug button. Solder connect a 2" flexible insulated lead, and epoxy-cement the button in place. Use a soldering iron to melt off the plastic switch-operating stud, with its metal retainer, and flow the remaining edges slightly over the hinge bracket to keep its position. Be careful not to damage the front of the press-bar by overheating.

*90 Fox St., Box 516, Penetanguishene, Ontario, Canada L0K 1PO

Remove the cover and switch from the stand, and drop the bottom cable clamp 13/32" to a new tapped hole in this location. Widen the side opening to include a 3-lug, center ground-terminal mounting, tie-point strip for the cable leads, and attach this with a screw in the tapped lower switch hole. Bend the lugs, if necessary, to clear the cover on replacement. Drill and tap the top press-bar stop-post to take a flat-head 6-32 machine screw, and adjust to prevent movement of the bar when re-installed. A miniature toggle switch (S1) can be added to lock the touch circuit closed for hand-free transmission, if desired. Radio Shack's resist pen and etchant were employed to produce the circuit boards, and details appear in fig. 1.



The Electro-Voice stand and microphone, with the touch-button installed near the top of the press-bar. Body capacity activates the control circuit, and the button and bar are stationary.

Oscillator

Construct the oscillator portion as shown, file off protruding wire ends on the foil side of the board, and attach the external leads. Shorten or replace any interfering mic-stand and terminal-cover screws, slip a strip of insulating plastic underneath, insert a drilled out 4-40 nut as a spacer, and install the unit in the pedestal compartment. Fasten with a 6-32 screw in the upper switch mounting hole.

Switching Section

This unit can be combined with the power supply on a single circuit board (dashed outline in the drawing) if you can find mounting room in your equipment. Just delete hole 6, push the patterns together, and extend the hole 9 foil to the ungrounded end of C5. Note the parts list alternatives for Q3 and R3 to accommodate the greater con-

[1]*Jackson, A.H., "Touch Control For The Curtis Chip Keyers," CQ, July 1977, p. 17.*

Jackson, A.H., "The Q-Key," CQ, April 1978, p. 32.

Drake R7 Synthesized General Coverage Receiver

Full 0-30 MHz coverage, with no gaps or range crystals required. Continuous tuning from vlf thru hf. State of the art a-m, ssb, RTTY, and cw. Transceives with Drake TR7.

★ Complete transceive/separate functions for use with TR7.
★ Multi-function antenna selector/50 ohm splitter for dual receive with the TR7.
• 100% solid state broadband design, synthesized with PTO.
• Covers range 0 to 30 MHz. Both digital and analog readout.
• Special front-end circuitry with high level mixer and 48 MHz 1st i-f.
• Complete front-end bandpass filters operate from hf thru vlf.
• 10 dB pushbutton-controlled broadband preamp for ranges above 1.5 MHz.
• Various front panel switch-selected optional selectivity filters.
• Low distortion "synchro-phase" a-m detector improves international SW.
• Tunable i-f notch filter reduces heterodyne interference.
• Full electronic passband tuning system.
• Digital readout may be used as a 150 MHz counter.
• Built-in power supply: 100, 120, 200, 240 V-ac, or 13.8 V-dc.
• Built-in speaker, or external Drake MS7 speaker may be used.
• Built-in 25 kHz calibrator for calibration of analog dial.
• Low level audio output for tape recorder.
• Select up to eight crystal-controlled fixed channels. (With Aux7).
• Optional Drake NB7A Noise Blanker available.

Accessories available for use with Drake R7:

• MS7 Speaker • SL300 Cw Filter, 300 Hz • SL500 Cw Filter, 500 Hz • SL1800 Ssb/RTTY Filter, 1800 Hz • SL6000 A-m Filter, 6.0 kHz • SL400 A-m Filter, 4.0 kHz • NB7A Noise Blanker • Aux7 Range Program/Fixed-Frequency Board • R7/TR7 Interface Cable Kit • R7 Service/Schematic Book.

Drake 7-Line Accessories

Drake L7
Continuous Duty 160-10 Meters
2kW Linear Amplifier

Temperature controlled for "key-down" operation covers any WARC expanded or new hf amateur bands, MARS, etc.

• 2 kW PEP, 1 kW cw, RTTY, SSTV full rated continuous duty • Covers 160-10* meter amateur band, plus future hf band WARC expansions and MARS, embassy, government, etc. • The Drake L7 includes a pair of rugged Eimac 3-500 Z triodes. • Accurate built-in rf wattmeter. • Temperature controlled two speed high volume fan. • Adjustable exciter agc feedback. • By-pass switching. • Bandpass tuned input circuitry. • 120/240 V ac, 50/60 Hz.

Drake MN2700
2 kW Matching Network

Manages rf radiation by impedance match to antenna, measurement of rf power and VSWR, reduction of harmonic radiation, and antenna selection.

• 160 thru 10 meters frequency coverage — plus MARS, future expansions, etc. • Matches antennas fed with coax, balanced line, or random wire. (Use Drake Balun for balanced line.) • Antenna by-pass switching also selects various antennas. • Extra harmonic reduction to help fight TVI — "pi-network" low-pass filter type circuitry is a Drake exclusive. • Accurate rf wattmeter/VSWR bridge. • 2000 watts PEP, 1000 watts average. Continuous duty.

Ask about the 250W Drake MN7 and Drake B1000 Balun

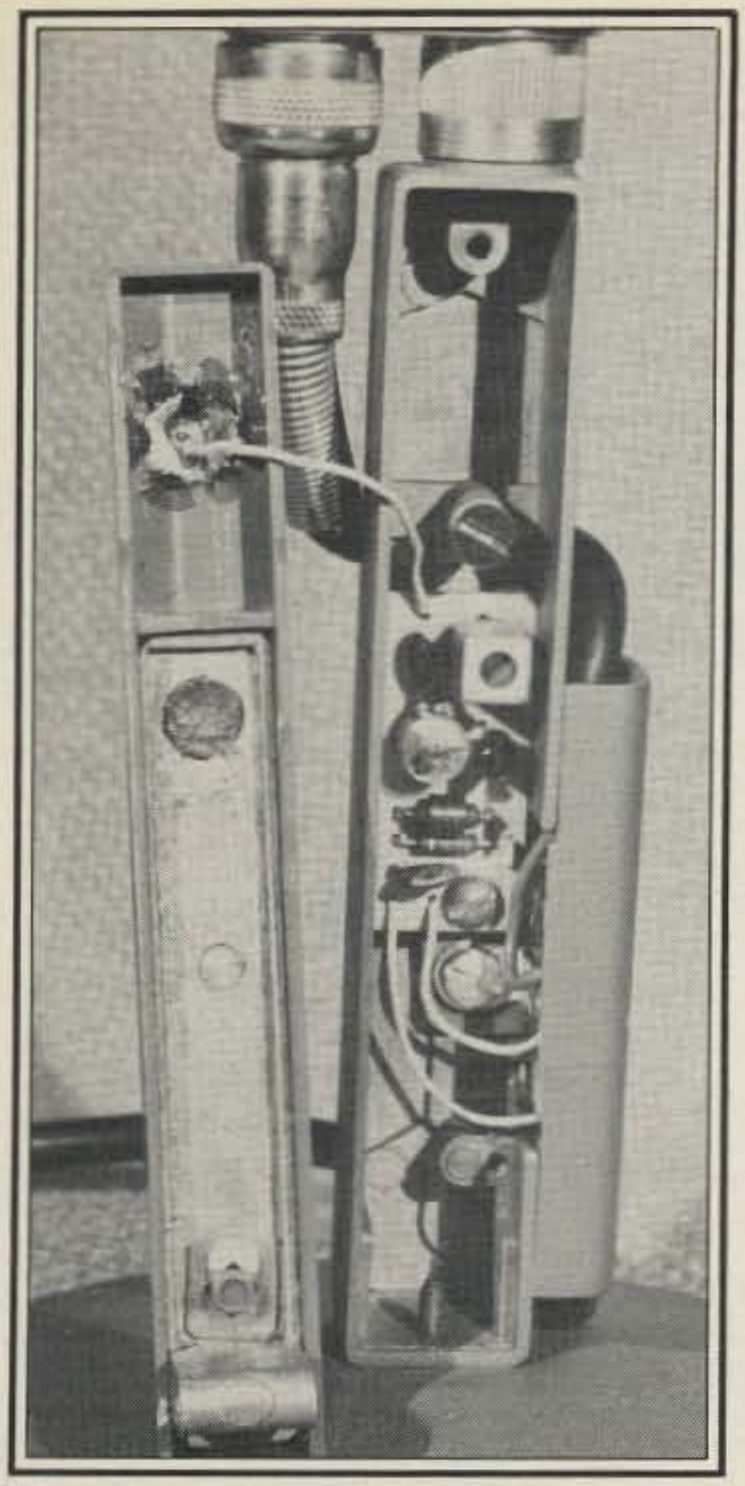
Specifications and prices subject to change without notice or obligation.

For a FREE Drake Full Line Catalog contact your favorite Drake Dealer.

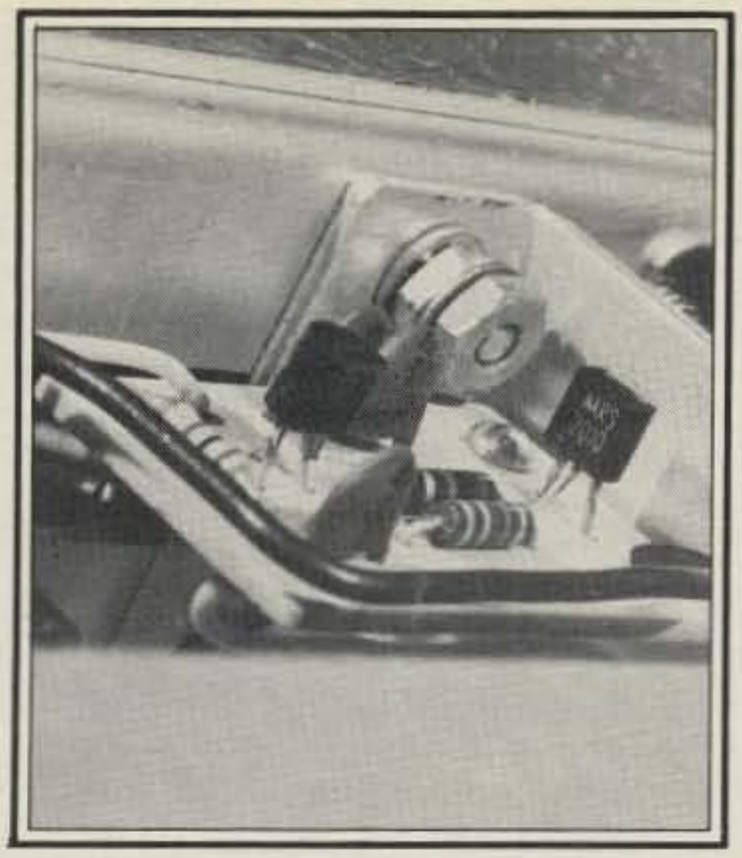
R. L. DRAKE COMPANY DRAKE®

540 Richard St., Miamisburg, Ohio 45342, USA
Phone: (513) 866-2421 • Telex: 288-017

CIRCLE 15 ON READER SERVICE CARD



A view of the touch-sensing oscillator inside the pedestal.



This is the switching section mounted in a Heath transceiver, not far from the microphone connector.

trol line current requirement of the FT-101B (100 ma as opposed to 16 ma for the Heathkits).

Power Supply and Other Data

Complete the supply separately, or together with the switching board as suggested. Finish and install the remaining sections, but leave the mic stand open temporarily for oscillator tuning and setting. Metal mounting brackets or spacers will serve to ground the units, but a wire should be run from the oscillator (hole 4) to the grounded lug on the tie-point strip.

With the Heathkits, the power supply input (hole 8) goes directly to the 12.6 volt a.c. heater line. Better low-ripple results can be obtained in the Yaesu by connecting to the load side of the low voltage d.c. choke, T12. In this case, CR1 becomes redundant and can be left either in or out of the circuit. The total current requirement is well under 15 ma.

Final Adjustment

With C1 (sensitivity control) about one-quarter meshed, tune L1 to give an output in the 1500-1600 kHz range on a nearby broadcast receiver. Set C1 for the desired touch capability: lessening capacity increases sensitivity, and adding capacity reduces it. Listen for parasitic "hash" around the oscillator frequency, and re-adjust the capacitor slightly if necessary, to get rid of it. Oscillator power input should run a little over half a milliwatt. Replace the pressbar to complete the touch-talk changeover.

Caution

Don't plug a regular microphone, with control line grounding, into a modified Heath transceiver (or any other equipment with a 2-pin mic connector): the switch would short-circuit the d.c. supply through the Q2 emitter-base junction. This problem won't occur with the Yaesu if you connect the new circuitry via the unused connector pin 4. The touch-control output (Q3 collector) attaches normally to pin 3, and modified or unmodified mics/stands/switches can then be interchanged without difficulty. See the schematic, fig. 2, for details.

Polarity Change

The positive output configuration described can be changed to negative, for other applications, simply by transposing similarly rated PNP-NPN transistor types and reversing both diodes along with the electrolytic capacitor, C8.

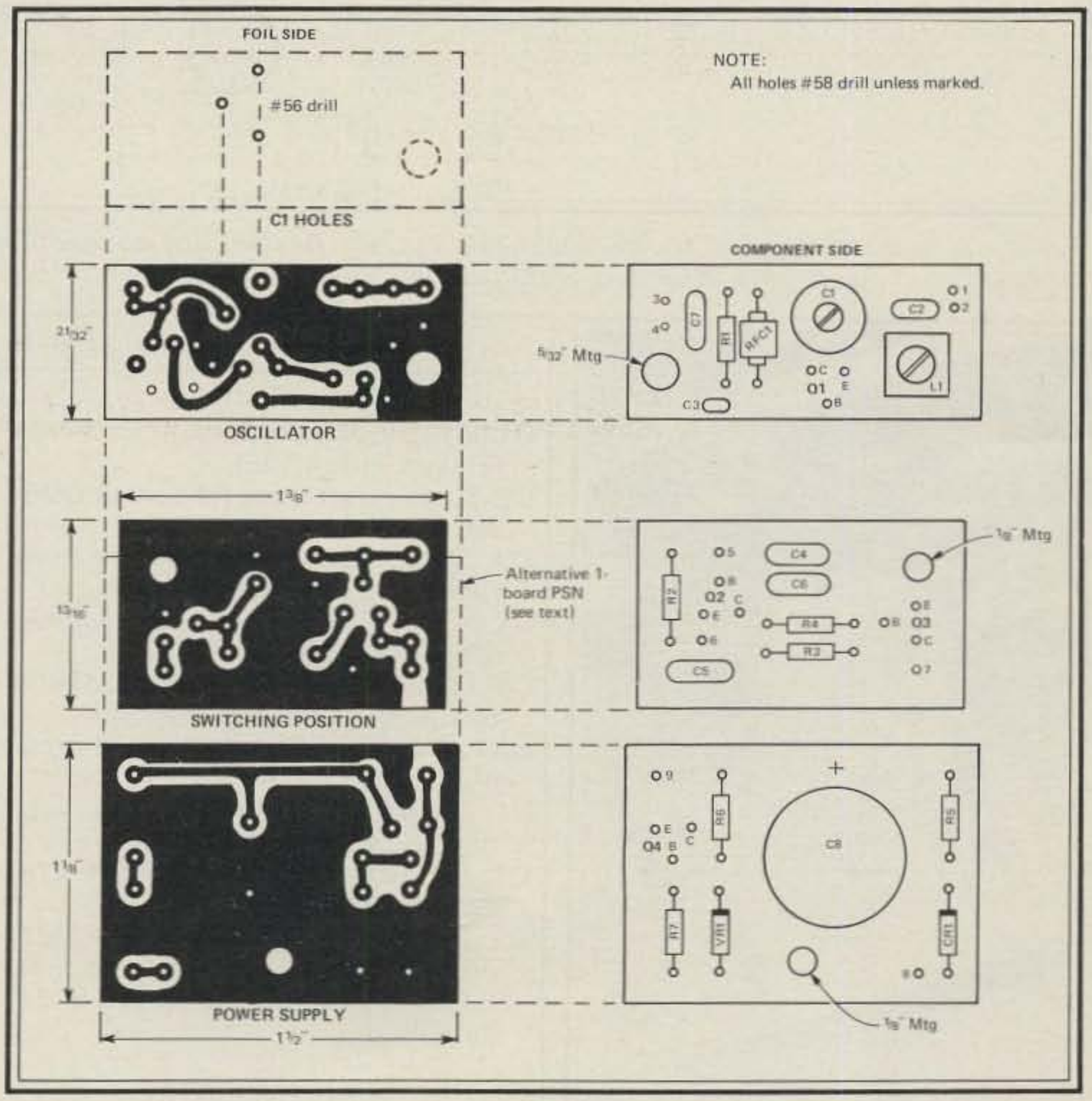


Fig. 1 – The circuit boards and parts layouts for the body-capacitive touch-control system. The circuit board is 1/16" thick, single sided copper clad. The numbered holes match those shown in the schematic diagram (fig. 2). The cathode ends of CR1 and VR1 are indicated by shading on the parts layout.

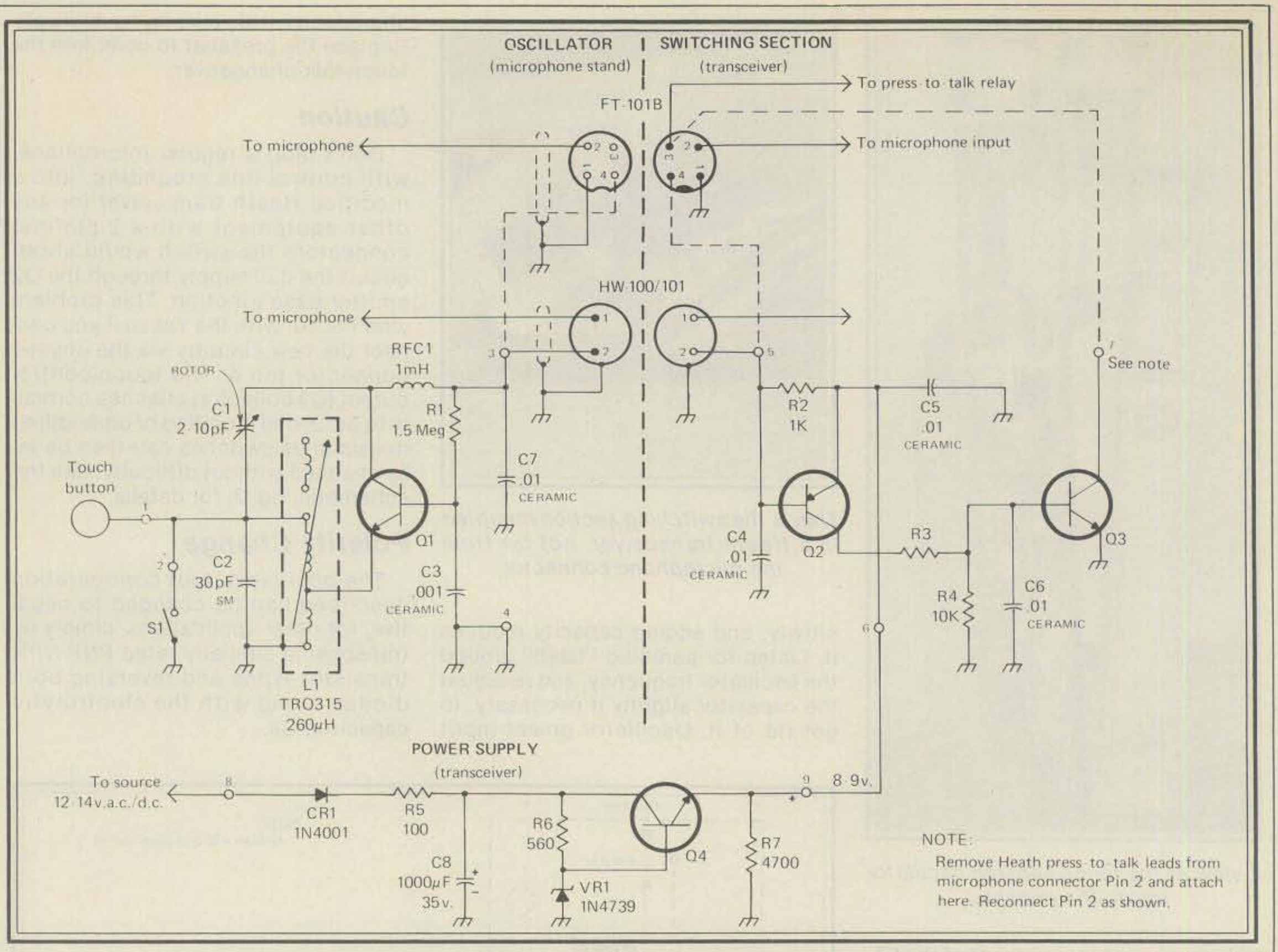
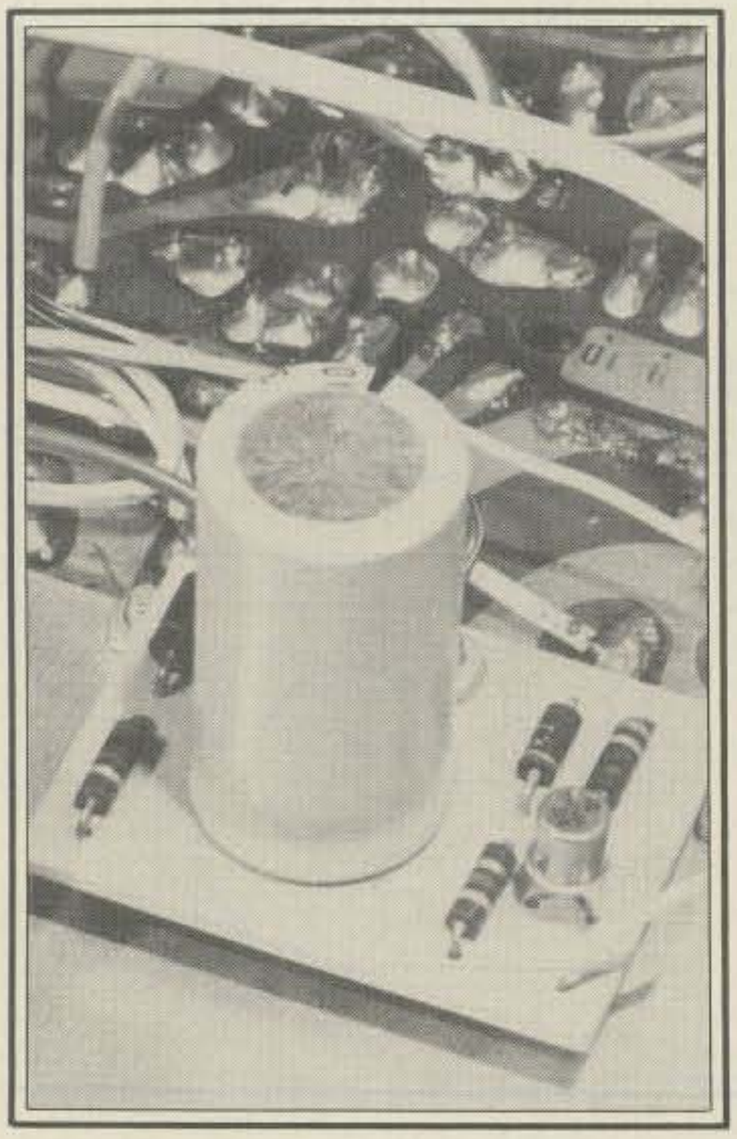


Fig. 2 – Schematic diagram for the touch-talk system. Dashed line connections are to be used with the FT-101B. All resistors are ¼ watt, 10%. Numbers within circles are hole numbers which correspond to the board drawings of fig. 1.



Almost any available corner will do for the power supply, shown near its voltage source on one side of the chassis circuit boards.

Parts List

C1: 2-10 pF plastic dielectric trimmer (Philips 010EA/10E)
C2: 30 pF silver mica (Miconics DM5-300J)
C3: .001 uF ceramic, sub-miniature (Centralab CW15C102K)
C4, 5, 6, 7: .01 uF 16-volt disc ceramic (Centralab UK16-103)
C8: 1,000 uF 35-volt electrolytic (Radio Shack 272-1032)
CR1: 1N4001 silicon, 50-volt 1-amp. (Radio Shack 276-1101)
L1: 260 uH b.c. oscillator coil, sub-miniature (Armaco TRO315)
Q1, Q4: 2N2484) (Radio Shack 276-2010) 2N5210)
Q2: 2N2605 (Radio Shack 276-2022) preferred.
2N3906 (Radio Shack 276-2034) substitute.

Heath HW100/101

Q3: 2N2484) (Radio Shack 276-2010) 2N5210)
R3: 47K

Yaesu FT-101B

Q3: 2N6012
2N3704 (Radio Shack 276-2014)
R3: 15K

R1: 1.5 meg.
R2: 1K
R4: 10K
R5: 100
R6: 560
R7: 4.7K
RFC1: 1 mH r.f. choke, miniature (Hammond 1530B103)
VR1: 1N4739 Zener, 1-watt (Radio Shack 276-562)

Parts other than Radio Shack may be obtained from:

Electro Sonic Inc.,
1100 Gordon Baker Rd.,
WILLOWDALE,
(Toronto)
Ontario, Canada.
M2H 3B3

A student exchange program rekindled WA1ZDO's interest in amateur radio, while at the same time giving him a chance to view life in the town of Ingelheim-am-Rhine.

Amateur Radio—Exchange Student Style

BY JEFF LECK*, WA1ZDO

WA1ZDO/DL with a few souvenirs of his trip. (Photos in this article by Gary Engel.)

It all began in the fall of 1977 when I was still a Novice and a feeling of boredom was beginning to creep into my operating. I had been a Novice for a year and a half and was sick of rag-chewing with some W4 for the hundredth time. In fact, I was making excuses to myself to avoid operating—heavy QRM, bad conditions, no DX around, etc.—until I actually convinced myself that amateur radio was getting boring! To add to this, I had just failed an attempt at a Technician ticket (by too small a score to mention here) and my chances at upgrading seemed dismal, to say the least. This looked like the typical amateur radio drop-out case until a little incentive came about—foreign operation!

The salvation of my amateur "career" came in the unlikely form of a student exchange between my high school in Ridgefield, Connecticut, and a small town called Ingelheim, nestled along the Rhine River in the heart of Germany. As fate would have it, the two towns became linked together because a major pharmaceutical company, based in Ingelheim, opened a branch corporation in our town. With their help, the teachers in both countries worked hard to organize the exchange. When presented with the opportunity to go along on the program, two thoughts entered my mind—money and amateur radio (not necessarily in that order). As it turned out, the former was conquered with a part time job and a little help from the parents. The latter turned out to be the factor which increased my enjoyment of the trip by a hundred-fold and renewed my lagging interest in amateur radio.

By the time I had definitely decided to go, it was mid-December, and a quick note to the ARRL brought a speedy reply with information on obtaining a reciprocal license for Germany. However, disaster struck! You must have a Technician ticket or higher to obtain a reciprocal license. Though this was a shock at the time, it provided the inspiration I really needed to upgrade, and I decided to go for the General ticket as thoughts of trans-Atlantic skeds entered my mind. By reading and studying the ARRL license manual practically every spare second, I managed to prepare myself for the written test. The high code speed requirements were overcome by listening to W1AW every night for a month. By both praying and a little educated guessing (shameful, isn't it?) I passed *THE EXAM* in the second week of March. Of course, the next day a letter with a homemade application for a German license was on its way to the German Post Office (Deutches Bundespost), which handles the licenses for all types of communication. Thanks to the supreme efficiency of the DARC (German Amateur Radio Club), I had my reciprocal license in my hands in just 14 days.

In addition to the license application, I had asked for the name of an amateur or club in Ingelheim. In answer to this query, I received the address of Josef, DL6QT. I then wrote a letter to him explaining my situation and how I wished to operate a portable DL.

To make matters more interesting, I found out that another amateur, Charley Post, WB1ATT, was also going to Ingelheim. After a discussion, we decided to wait for a letter from Josef before we figured out our equipment list. Meanwhile, Charley sent for and received his reciprocal license. Finally, in early May, we received a QSL from Josef in which he informed us that we would be met upon our arrival by the president of the Ingelheim club, Heinz Stoebener, DL6IS. In addition, we were assured full access to the club station, located in Ingelheim's community school, the Nansenhaus, where concerts, adult education classes, etc., were held.

With no further problems and a complete plan of action, the final weeks before our departure slowly crept by until, unbelievably, we were on our chartered flight above the Atlantic speeding toward Germany.

* *38 Standish Drive, Ridgefield, CT 06877*

Arriving at 10:30 a.m. local time, on June 30, 1978, we stepped out into the sunny German weather at the Stuttgart Airport. High with the excitement of being in a foreign country, we boarded a waiting bus and were soon on our way to the final destination, Ingelheim-am-Rhine. At precisely 16:10, local time, we entered the town limits with mixed feelings of anticipation, nervousness, and a sudden longing for home. As we drove up the street to the Nansenhaus, where the 33 American Exchange Students were to be paired with their guest families, Charley and I began combing the rooftops for a glimpse of a beam and/or quad. Before long, we spotted a beam and a quad right next to each other on neighboring lots. As it turned out, the beam belonged to the club and the monstrous quad belonged to Josef, who lived next door to the Nansenhaus.

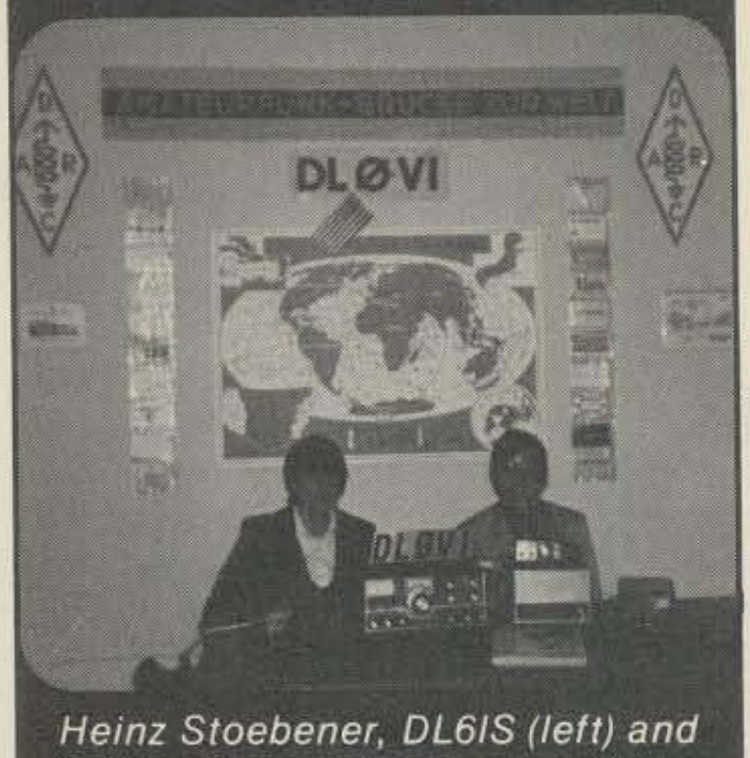
As I stepped off the bus, I was greeted by Heinz, DL6IS, who welcomed me to Germany in the spirit of amateur radio and pinned an honorary DARC emblem on me. Heinz then introduced me to my guest family, the Fehres—Wolfgang, Renate, Frank, Pia, and Nadia. Following this I introduced Heinz to Charley and we walked to another level of the school to eyeball the club station. Much to our surprise and good fortune, we found a very well equipped station sporting a Swan 500 transceiver, a separate Kenwood receiver, complete RTTY equipment, two-meter gear, literally drawers full of test equipment, and to top it all off, a tri-band beam at about 45 feet. In an adjoining room used for the amateur's weekly, yes, *weekly*, meeting, we found the beginning of an s.s.t.v. station and two ancient, surplus transceivers, one originating from a German WW II U Boat and the other from a WW II Panzer tank. Needless to say, we were astonished at our great luck, and, as visions of DX danced in our heads, Heinz had to resort to practically dragging us out of the room as dinner time approached. Charley went his separate way with his guest family and Heinz offered me a ride home with a detour to eyeball his station.

As we rode to Heinz's QTH, he demonstrated his 2-meter mobile rig and also showed me his German Citizens Band radio. Interesting to note, German CB is limited to 450 milliwatts power and only 12 channels. After about two minutes, I discovered that German CB, like its American counterpart, is ruined by the vast number of so-called "ratchet-jaws". Heinz's shack was equipped with a Swan 350 feeding a vertical and quite a bit of miscellaneous 2-meter gear.

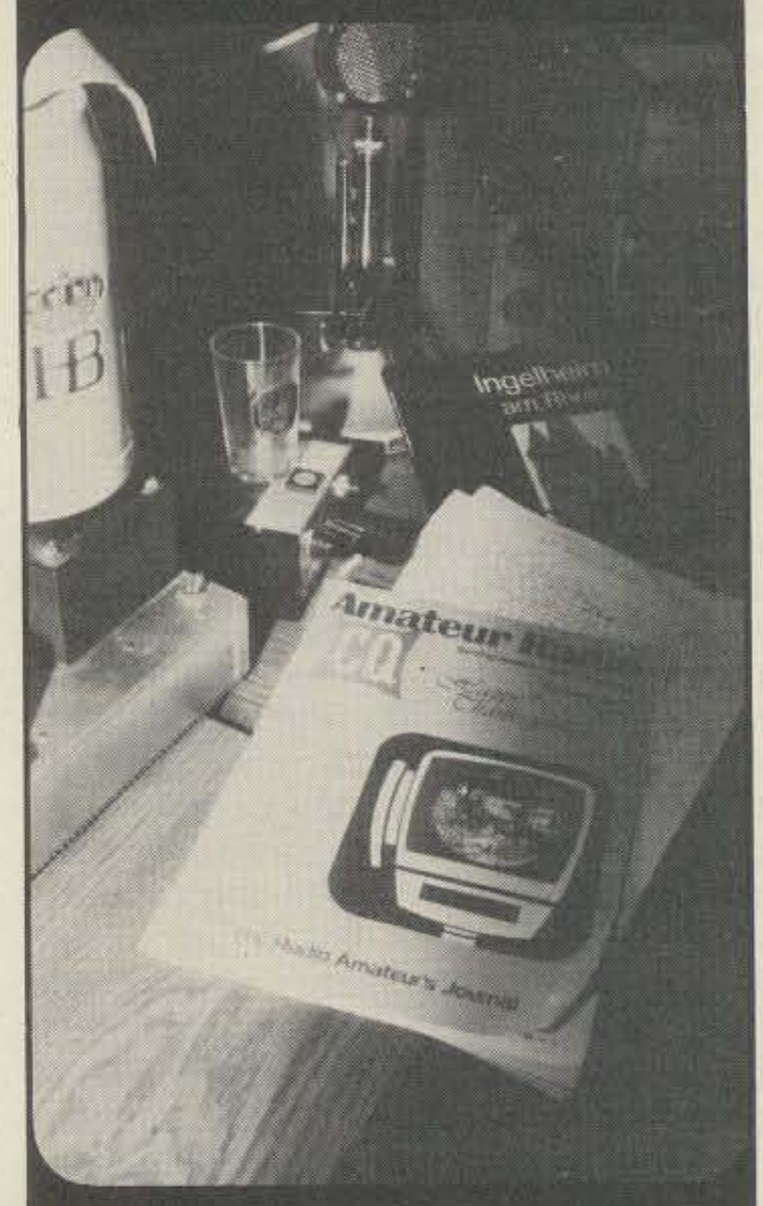
The next day we arrived at the club station around 15:30 to have a go at our first stateside sked with Charlie's father, Jerry, WB1AKY. Unfortunately, the QRM and poor band conditions killed our first attempt, and, after about 20 minutes of listening, we had a small QSO with another Ingelheim amateur, Adi, DJ3KM. He very generously invited us to his QTH for a snack and discussion. Adi was heavily involved in amateur radio and very proud of his CB which he had transformed into a 10-meter transceiver plus his microwave equipment which he had built himself. After about an hour, Adi and Heinz generously offered to loan us both portable 2-meter transceivers. Now we could get to know German 2-meter operation first hand! We were both overwhelmed by this friendly display, realizing a new adventure was in store for us. Charlie returned home with Adi's Kenwood TR2200G portable rig and I stopped by Heinz's QTH to acquire my own Kenwood TR 2200. When I returned "home" I stepped out on the Fehres' back porch, pulled up the antenna, and suddenly realized I had no idea of German or American 2-meter customs. In fact, before I borrowed the TR 2200, I had never operated 2 meters. Nevertheless, after a few minutes of careful monitoring, I threw my call in between the chatter on the busy Frankfurt repeater. Immediately, all chatter stopped and no one spoke for 20 seconds. Repeating my call a couple of times, I waited for a result, which was immediately forthcoming; each of a huge garble of voices was calling me and all were eager to work the "Whiskey Alfa" station. After my first QSO in broken German with an OM in Frankfurt, I settled down to working my own little pile-up while getting to know the German 2-meter band. As a result of my 2-meter chatter, I made many friends throughout my visit and my knowledge of the German language increased tremendously.

In fact, I met most of the other Ingelheim amateurs on 2-meters before we had an eyeball. One very generous OM, DD1PF, Norbert, talked to me on 2 meters and then invited me to his QTH to try a little 2-meter s.s.b. and hunt DX. Working 2-meter s.s.b. was another facet of amateur radio that I had never tried. Unfortunately, sporadic E was nowhere and my best DX was some 350 miles. Fritz, DK5PE, invited Charley and me on a private tour of the electronic laboratory at the

Ingelheim's club station DLØVI. Shown here are WA1ZDO (left) and a few of Ingelheim's own amateurs.



Heinz Stoebener, DL6IS (left) and the author at DLØVI.



CQ is read by amateurs all over the world.

Boehringer Corporation, of which he was in charge. The banks of test equipment made us want to sign up for a job right then and there. My Kenwood portable was checked out on a counter and we found out that, horror of horrors, the simplex channel of 145.325 MHz was really at 145.32500013! Such accuracy could make you sick!

Regarding our skeds with Charley's father, Jerry, back in Ridgefield, CT., we made many enjoyable links back to our home town after the initial failure. The only drawback was that the U.S. had no third party agreement with Germany and so messages and patches were unfortunately out. Still, just talking to our hometown and Jerry was a great feeling and we appreciated amateur radio more because of it. Meetings of the Ingelheim club also were partly the result of weekly skeds. Ingelheim was "twined" with two sister cities in both England and France. Besides regular exchanges of people, the amateurs of all three cities met on the air every Thursday. These meetings also consisted of a little wine sampling, conversation, and good-natured arguing over antenna design and the like.

Another treat came in the form of a German Hamfest. Unlike the American fests filled with fleamarkets, talks, etc., the German fest consisted of hot food, drinks, and a type of field day operation which involved the use of some 2-meter s.s.b. gear. Altogether about 40 amateurs attended this combination picnic and field day gathering. The best part of the fest wasn't the great food, or even the 2-meter operation, but was just sitting down and having an eyeball round-table with all the others. Once again, the German feeling of hospitality, "Gemutlichkeit," made us appreciate the German amateurs even more.

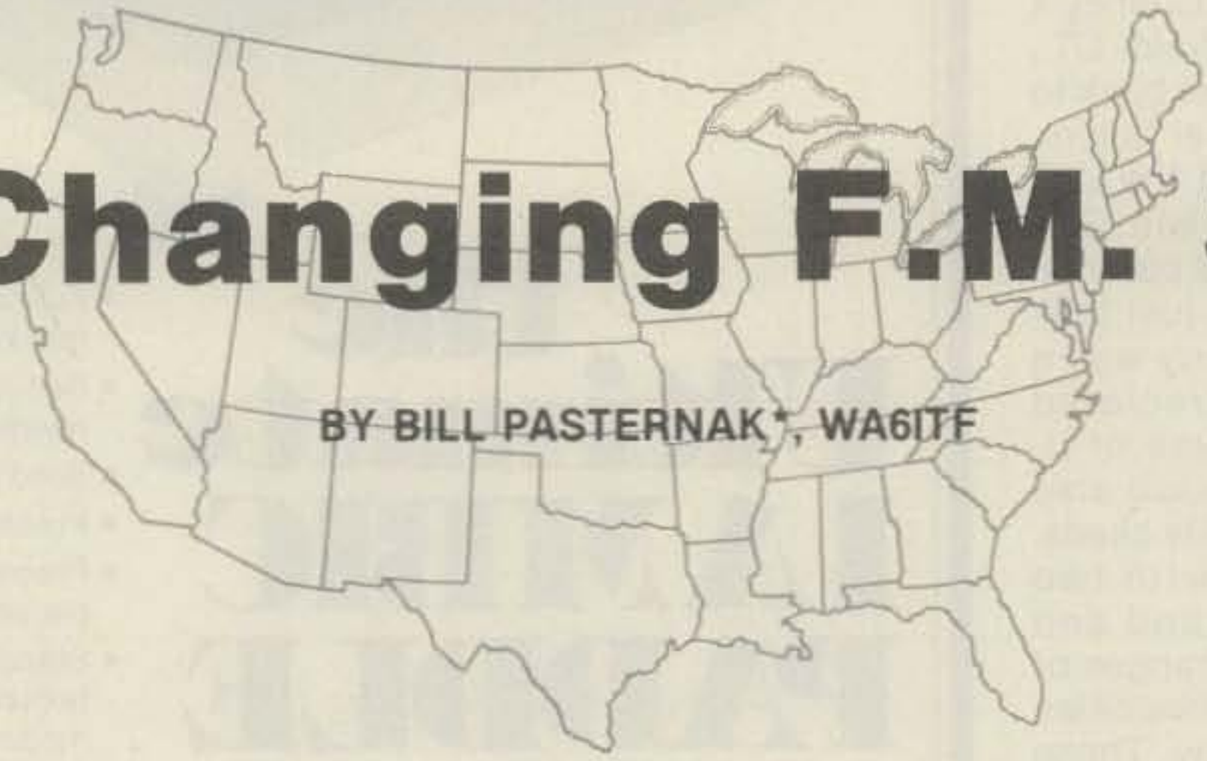
Throughout the trip, I was constantly using my Kenwood portable and working my own pileups during free moments. In fact, I worked off two TV towers and numerous medieval castles. One of my most humiliating moments came when I was on top of the "Bismarcktürme," a large tower of medieval manufacture rising about 150 feet on top of Ingelheim's tallest mountain. While calmly keying repeaters 70 miles away, Charley, who was at the base of the tower, informed me that he just noticed that the grounds keeper had just locked the huge iron-grill gate, the only exit from the tower! After terminating a short transmission to Charley, who had broken into the channel to inform me of my imprisonment, I ran down the twisting staircase at about five steps per jump. Reaching the locked iron grill, something reminiscent of torture chamber entrances, I noticed a 20 inch opening above the gate, which was adorned with some uninviting spikes. Well, minus a few scrapes, I managed to squeeze out okay in body but slightly humiliated in spirit.

After what I have already said, you would assume that I spent my whole trip with amateur radio. However, I did manage to work in trips to museums, towns, a winery, castles, a few days at school (I managed to cut classes one day to operate the club station and work Russians on phone, who were booming into the shack, with 20 over signal reports), a Rhine River cruise, and a scenic bus drive to Munich, where we spent our last few days. With the help of the Fehres' fine hospitality (and Frau Fehres' terrific cooking), I feel I was indeed given an insight into Germany which few, if any, tourists could ever hope to have.

In closing, I wish to thank the Fehres family for their help and unceasing understanding of my time-consuming hobby. Also, of course, all the amateurs who, in some way, made my trip just a little bit better. A special word of thanks must go to Heinz, who became a very special friend and who, with help from all the other German amateurs, showed me that amateur radio is indeed a "Brücke zur Welt"—a bridge to the world.

A small sample of the QSL cards that awaited WA1ZDO upon return to his home QTH.

F.M. relay devices have been in existence longer than most of you think. And thanks to the legacy given to amateur radio by Arthur Gentrey, W6MEP, who knows who may be at work building an intertied system that will link amateurs coast to coast.



The Changing F.M. Scene

BY BILL PASTERNAK*, WA6ITF

I don't suppose very many of you die-hard FMers know the name Art Gentrey or the callsign W6MEP. Probably not, but I'll tell you one thing, you each owe this man a sincere debt of gratitude. Why? Because he's the one who gave you what you have today. No, he didn't invent either f.m. or n.b.f.m. Those discoveries belong to others. Art was simply the person who succeeded in putting up one of the very first open repeaters in the nation, and both it and he have been part of the repeater scene ever since. In fact, it is generally conceded by most relay system enthusiasts that Art Gentrey, W6MEP is the true father of modern amateur relay technology, and just about everything else we have is somewhat akin to a spinoff of his famed K6MYK - Mt. Lee open repeater.

What's truly ironic is that K6MYK was not an f.m. repeater when it came into existence in the mid 1950's. No... that's not a typo. Repeaters have been around for some time in the Southwest. They're only fairly new elsewhere. In fact, Art told me that he began experimenting with the concept of relay communication in the mid to late 1940's, and it took about 10 years to develop the first truly viable system. In those days there were no ready-to-go f.m. repeaters. In fact, the earliest of the amateur systems were not f.m. but rather a.m. Some were "constant carrier" devices. That is to say that the transmitter's carrier was left operational on a 24-hour-a-day basis. Others, like K6MYK, used a system that was activated either by the a.m. receiver's a.v.c. line or in rare instances by receivers that had squelch circuits. It was not until much of the older wide-band f.m. commercial two-way equipment was surplussed to amateurs that relay communication began to take off. What's ironic is that while in the Southwest the advantages of f.m. over a.m. were immediately recognized and the equipment pressed into service as is, in most other places amateurs spent countless hours converting these radios to the far less efficient a.m. mode. The amateur magazines of that era published countless articles to this effect, and only God knows how many of these radios were butchered in an attempt to make them operate in the "in mode" of the day.

Meanwhile, in the Southwest, they were laughing at the rest of the nation. The early f.m. pioneers of the day knew where it was at. They were well versed in f.m. communication technology. They knew the overall superiority of the mode. So while most everyone else "converted," they simply re-crystalled and re-tuned. By 1960, the mountaintops in California were alive with the sound of squelch tails. By this time, K6MYK had spun off another a.m. repeater under the callsign WA6TDD under the guiding hand of its creator Burt Weiner, K6OQK. But even at this early date, a.m. was waning in places like Los Angeles. The day that W6FNO at Radio Ranch in Pomona California became operational, just about everyone here knew that the days of a.m. on v.h.f. were numbered.

W6FNO is generally considered the first truly successful f.m. repeater, and its development was aptly described by one of its creators, Ken Sessions, K6MVH, in the *F.M. and Repeater Handbook* he authored for T.A.B. back in 1969. Soon word of the W6FNO system began to spread and other interested amateurs in diverse parts of the nation began to realize that they had a communications bonanza sitting in those surplus boat anchors. Repeaters began to emerge nationally, first in the big cities and then out into the hinterlands. Today there are over 4,000 such systems operational on 2 meters alone, and if you add-in the other v.h.f./u.h.f. bands, including the repeater segment of 10 meters, the number probably approaches the 5,000 mark. The number may possibly be higher since there is no way to get a true count of every operational system in the nation.

This is not an interest limited to this nation. Our neighbors both north and south, Canada and Mexico, are peppered with repeater systems as are many European nations. Possibly the most famous of all overseas repeaters is JY73, located at the Royal Palace in Aman, Jordan. JY73 was a gift from Wayne Green, W2NSD, the editor of *73 Magazine*, to His Majesty King Hussein, JY1, and this repeater has become part of a vast educational crusade by the Jordanian government to emerge as a technologically developed nation. In Jordan, amateur radio training is part of the overall school curriculum, and the pilot project has met with such success that Jordan is well on its way to reaching its goal. Those of you who have seen the new film produced by Dave Bell, W6AQ, en-

*24854 Newhall Ave., Newhall, CA 91321

titled "The World of Amateur Radio" know for yourself exactly the way King Hussein feels. He said it himself, and it's there for the generations that will follow us. The JY73 repeater and the overall amateur radio training program in Jordan are true milestones in the overall evolution of our worldwide hobby-service.

F.m. really began to take off for the average amateur in about 1969 or 1970, when a company called Inoue Communications came on the scene with a neat little under-dash radio known as the FDFM-2S. It featured all solid state construction, six transmit/receive channels and a nominal 4 to 5 watts power output. What made it popular, and also helped to make a company called "Icom", as Inoue later became known, was its size. It was not much larger than most of the amateur 2 meter transceivers of today. Amateurs began purchasing these rigs at a rate that made the industry sit up and take notice. Within a short time just about every manufacturer had reached the conclusion that f.m. was not just another fad that would disappear like the hula hoop, and most jumped in full tilt. Soon there was a plethora of equipment available. Some of it was manufactured here in the United States by such names as Regency and Galaxy, though most of it bore Asian ancestry if not an Asian name. An example of the latter was the early f.m. equipment sold by Drake under the model names TR-22 and Marker Luxury. Both were manufactured in Japan though they bore an American manufacturer's name. Also in that vein, the Drake TR-22 is considered to be the radio that "made 2 meter f.m.," in the manner that the old Heathkit HW-32 Sixer "made" 6 meters in the a.m. days. Each was just right for the times.

It was repeaters, however, that made f.m. come into its own, and don't think that the industry that supplies amateur equipment was not aware of this fact. By the early 1970's, there were at least two pre-packaged amateur repeaters and one in kit form available. However, at first most amateurs seemed to shun these devices as if they suffered from the bubonic plague. Then, as the 70's wore on, they became accepted and highly customized items. Nowadays, it is estimated that one out of every two repeaters on 2 meters is of the prepackaged variety. This is not to say that nobody builds repeaters any more. Quite the contrary. Especially on 220 MHz, the art of home-brewing relay devices is alive and well. Nor is this art limited to f.m. repeaters. Recently, a northern California group known as the Narrow Band Communicators successfully placed the first in-band s.s.b./c.w. translator into operation on 2 meters. They had previously accomplished a similar feat on 23 cm, but the new device eventually may well replace the f.m. repeater because it utilizes the same bandwidth, the same 600 kHz input to output separation, but can handle two or more discrete QSO's simultaneously. I don't think that it will be all that long before similar devices begin to turn up elsewhere as amateurs search for more efficiency in spectral utilization. The s.s.b./c.w. translator won't replace the f.m. repeater overnight, but its introduction to the amateur relay scene is sure to have a profound effect on the future.

F.m. repeaters are not the only f.m. relay devices in use these days. Long before most of the nation had repeaters, amateurs in the Southwest discovered another use for f.m. relay systems. If you could repeat "in-band," why not cross-band. In fact, why not place your base station at some good high location and control it by radio. This was the concept that gave birth to a device known as the "individually owned and operated, advanced format, remotely controlled amateur base station radio," or more simply, the remote-base. In California, remotes out number repeaters almost two to one, and as the trend toward new repeaters declines, the number of remotes is ever on the increase.

In the early days, remote-base operation was usually isolated to single frequency downlink operation onto 2 meters with control on one of the u.h.f. bands. In the Southwest, 146.46 and 146.94 were reserved for remote-base intercom use for many years. However, with the advent of mountaintop synthesized remote-base systems, only .46 is now used as an intertie. It's not uncommon to hear amateurs conversing through personally owned remote-base systems using a repeater as an in between interlink. Nor are remotes any longer limited to 2 meter operation. Within the past few years, many systems have added fully synthesized downlinks to h.f. s.s.b./c.w., complete with k.w. linears, offset tuning and remotely rotatable beam antennas. Dozens of such systems already abound, but for the most part their existence is known only to the individual or small group who owns them. Such systems usually utilize digital tone access for security, and there is no public listing of u.h.f. remote base input/output channel pairs. However, if you happen to QSO someone on 20 meters who has a telltale hum on his s.s.b., and you hear what appears to be a squelch crash now and then, you are not imagining things. Chances are you are talking with someone who is listening to you via a hilltop and responding from the same place via a u.h.f. link. 14.265 and .282 are the in-spots.

Finally, how about an autopatch that's not a repeater at all, but is a relay device that utilizes only one channel. They exist and not just in California. The "simplex autopatch" is a real entity and about a dozen or so exist throughout the nation. I know of two in this area and a few in the midwest, and the concept is catching on all over the place. Unlike repeaters, the "simplex autopatch" is not required to abide by established repeater subbands, but smart frequency coordinators have already provided for them in area band plans.

So there you have the overview, and it's just scratching the surface of what's happening. Who knows who may be at work building an intertied system that will link amateurs coast to coast. With the advent of ASCII, and FCC permission to use it, computers and microprocessors are bound to play an important part in the evolution of amateur relay technology. The answer lies in the future and the future seems bright for relay system enthusiasts. It's hard to believe that all this has taken place in less than 25 years, but it has, and one Arthur Gentrey, W6MEP can be content in knowing that he has given amateur radio quite a legacy.

Here's a nifty tool for your shop that will add to your building pleasure. For about $15.00 you can build a press to hold negatives for double-sided boards which will ensure perfect registration and alignment.

A Double-Sided PC Board Exposure Press

BY VAUGHN D. MARTIN*

Any circuit of even moderate complexity quite often requires a double-sided PC board if it is to be put on a PC board at all. The problem of laying out double-sided PC boards is compounded though by one bothersome drawback. Just how do you expose presensitized double-sided boards? Obviously you cannot drill one side of the board after exposing it and then expose the other side. The boards are very sensitive to light; therefore, this impractical procedure would have to be performed totally in the dark. The process of exposing the first side seems to inevitably and inadvertently result in all or a portion (especially the corners) of the second side becoming exposed. Also, even if your efforts at protecting the one side while exposing the second side are successful, what ensures that the two sides will line up with any degree of precision? The answer is a resounding, "No, there is no guarantee of any degree of precision registration or alignment of the negatives."

Granted, there are a number of small padded-backed presses on the hobby market with a hinged glass to let light through while holding the negatives fast to the board. These are unfortunately best suited for single-sided boards. If the two negatives have crop marks placed around their perimeters and are positioned to exactly accommodate the dimensions of the presensitized board you intend to use, then a higher degree of success will result. If, however, you use high parts density layouts with 15 thousandths spacing and 15 thousandths conductor runs, registration becomes very crucial. The problem of registration becomes obvious when a hole drilled from one side cuts through a conductor run on the reverse side. In this case, the "cropped mark" method will not work, especially when considering the fact that alignment of these negatives usually takes place in a darkroom with a red safelight or under extremely subdued lighting conditions.

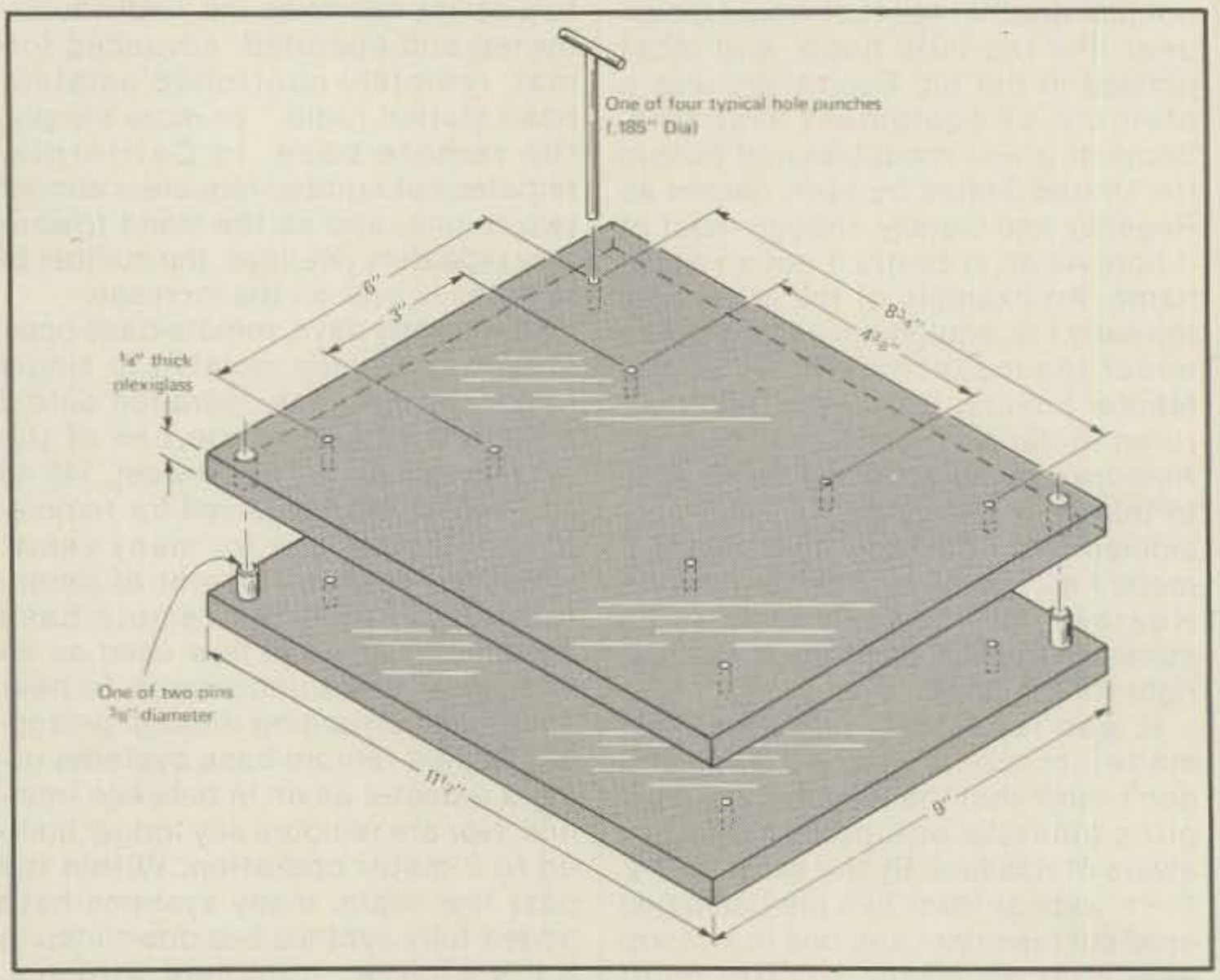


Fig. 1- The double-sided PC board press. The press is made from ¼" plexiglass.

This article presents a simple yet extremely accurate and effective method of exposing double-sided boards. The technique is a simplified version of the way professional PC board manufacturers expose double-sided boards. The device is shown in fig. 1.

I discovered that the pros in this business align negatives and then tape them together with a red tape that passes a certain wavelength light.

*P.O. Drawer 28510, 6220 Culebra Road, San Antonio, Texas 78284

After taping and aligning the negatives, they are punched. The double-sided PC board press ensures perfect alignments while holding the negatives fast in the exposure process, thus eliminating the taping requirement.

First, one of the larger pins, which are .375 inches in diameter with rolled edges, is removed. This enables the top piece of plexiglass to rotate around the other pin's axis. Next, the negatives are placed so that the circuitry portion is roughly in the center of the press. Make sure that the outer portions of the negatives line up with either the inner or outer set of holes. After alignment, press the four smaller .185-inch spear pins through the negatives. These pins have a "paper punch" type edge. These cut through two negatives quite nicely, just as a three-hole punch cuts through pieces of paper that are to be inserted later into a three-hole binder. Once punched, the negatives are perfectly aligned and the task of slipping the board between these negatives becomes quite simple. You could even do as I do and fumble around in the dark and still be able to slip a presensitized board in between the negatives and hold them fast. The results are exceptional. I cannot tell the difference between a finished product resulting from this method and a mass produced board.

Cut-Off Frequency Formulas For Identical Cascaded RC Filter Sections

BY JOHN A. KUBIN*

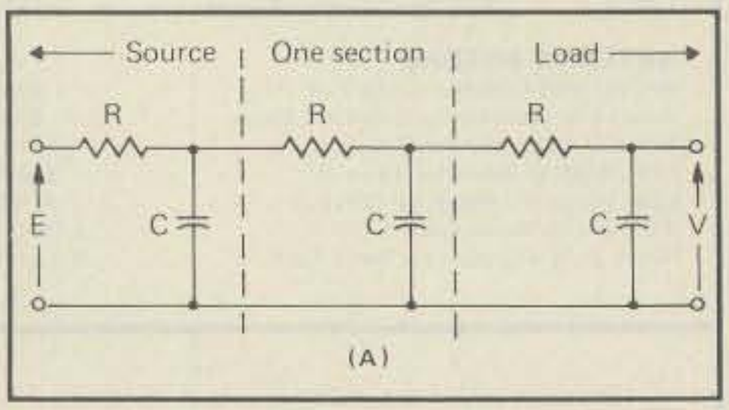


Figure I-A—Low-Pass Sections

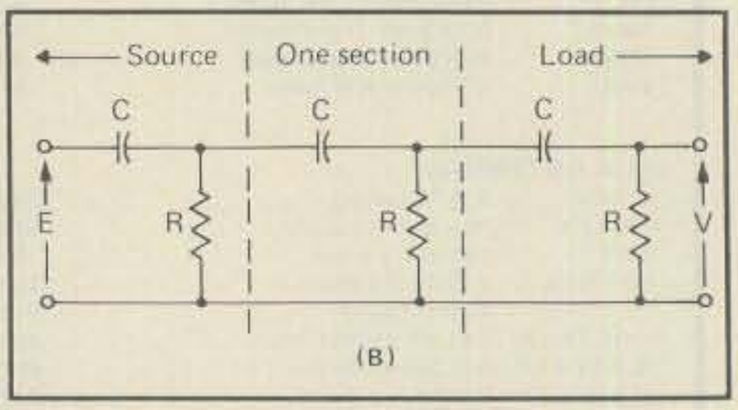


Figure I-B—High-Pass Sections

Low-Pass Sections		High-Pass Sections
	One Stage	
$f = \frac{1}{6.283\ RC}$		$f = \frac{1}{6.283\ RC}$
	Two Stages	
$f = \frac{1}{16.79\ RC}$		$f = \frac{1}{2.351\ RC}$
	Three Stages	
$f = \frac{1}{32.34\ RC}$		$f = \frac{1}{1.221\ RC}$
	Four Stages	
$f = \frac{1}{53.03\ RC}$		$f = \frac{1}{.7445\ RC}$
	Five Stages	
$f = \frac{1}{78.87\ RC}$		$f = \frac{1}{.5006\ RC}$

The cut-off frequency is that frequency at which $V = E/\sqrt{2.}$

Notes

(1) Resistance in ohms and Capacitance in farads. The numerical constants appearing in the equations may be rounded off to three or two figures.

(2) Ideal conditions are assumed: zero impedance sources and infinite impedance loads. *For best results, the following conditions should be complied with:* (a) Low-pass filters—source impedance no greater than R/10; load impedance no less than 10 NR. (b) High-pass filters—source impedance no greater than R/(10 N); load impedance no less than 10 R. R is the resistance of one stage and N is the number of stages.

(3) To effect an impedance match to the source, a resistor equal to the source resistance may be shunted across the filter input terminals.

(4) Assuming ideal or near ideal conditions (Note 2), the maximum error due to component tolerance is given by

$L = f/(1 + t_R)(1 + t_C)$

$H = f/(1 - t_R)(1 - t_C)$

where L and H are the low and high frequency limits; f = design cut-off frequency in HZ; t_R = resistor tolerance; t_C = capacitor tolerance. t_R and t_C must be expressed as decimal fractions.

Example: f = 1000 HZ; t_R = 5%; t_C = 10%.

$L = 1000/(1 + .05)(1 + .1)$
$= 1000/1.16$
$= 862$ HZ

$H = 1000/(1 - .05)(1 - .1)$
$= 1000/.855$
$= 1170$ HZ

That is, the actual cut-off frequency can be expected to be between L and H.

(5) Decibel per octave roll-off = 6N, where N is the number of stages.

*P.O. Box 474, Bethlehem, PA 18016

The 90-minute miracle

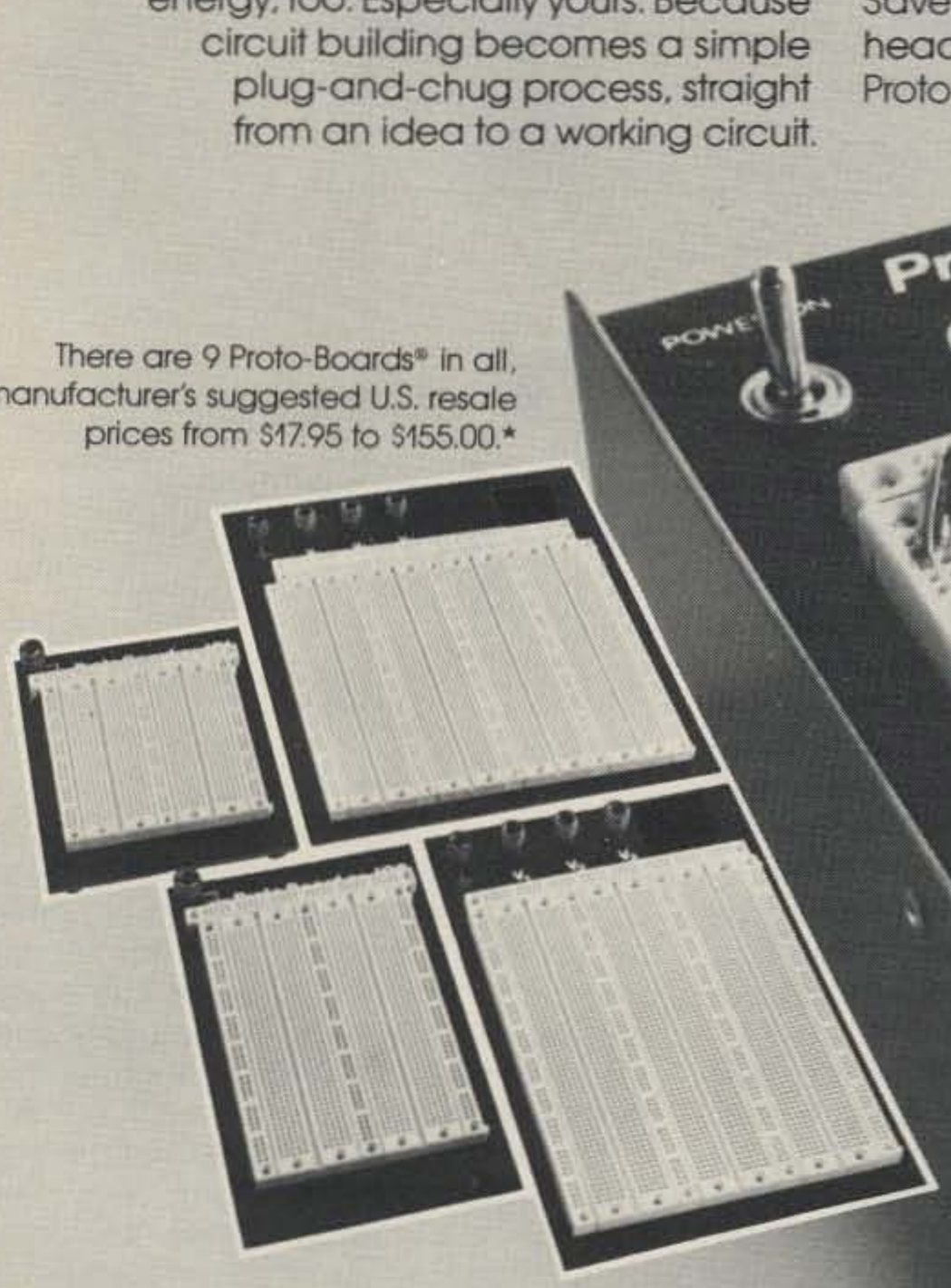
Solderless saves time like you wouldn't believe. Our Proto-Board® solderless breadboards put everything you need to get your circuit up and running on an aluminum backplane that lets you work at frequencies from DC to half a Giga-Hertz. Three Proto-Board® models feature built-in regulated power supplies—and one of them's a build-it-yourself kit!

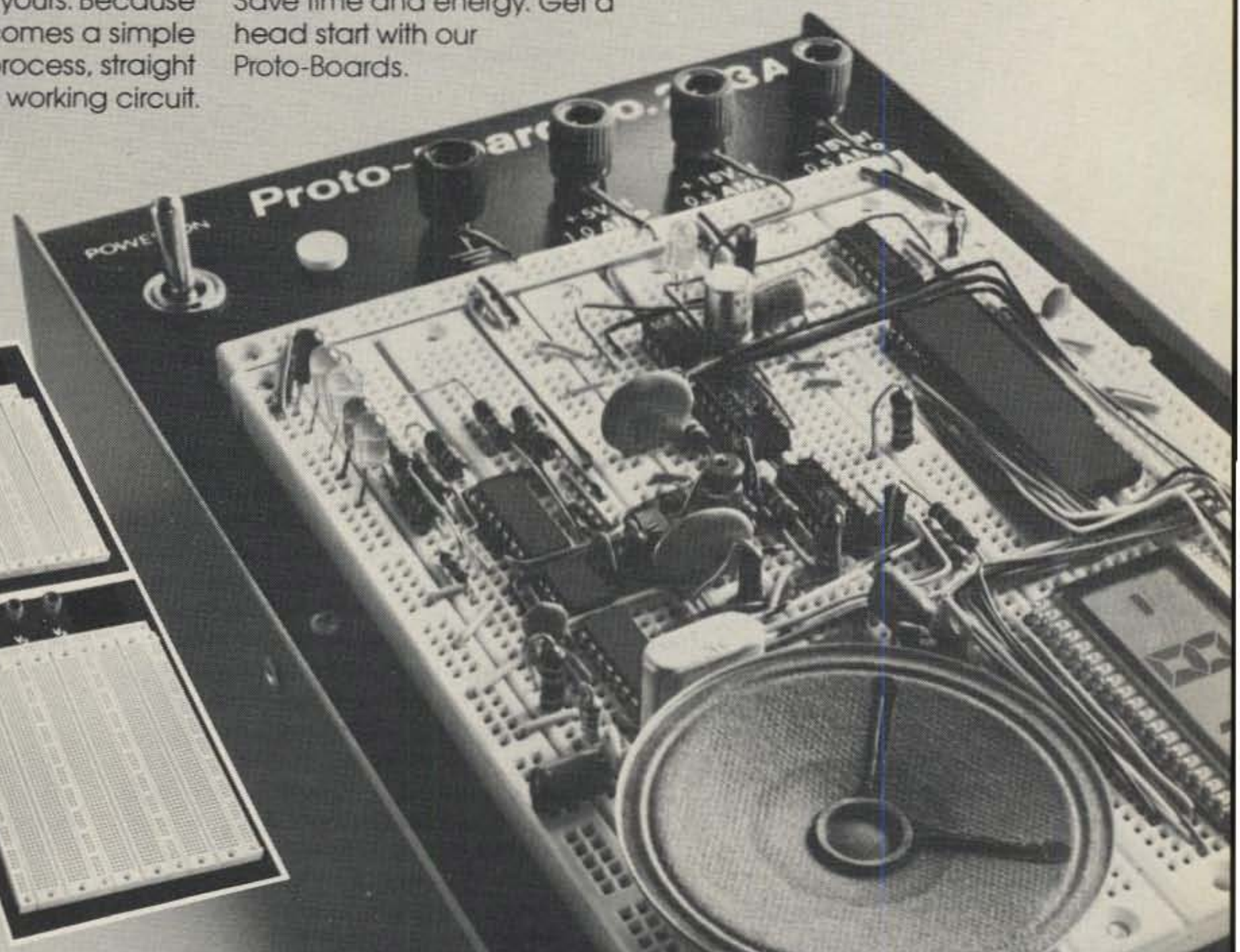
Our solderless breadboards save energy, too. Especially yours. Because circuit building becomes a simple plug-and-chug process, straight from an idea to a working circuit.

That's why we've become the easiest-to-find solderless breadboards in the world—available at more stores than anybody else in the business. Because people who know solderless best insist on ours.

Save time and energy. Get a head start with our Proto-Boards.

There are 9 Proto-Boards® in all, manufacturer's suggested U.S. resale prices from $17.95 to $155.00.*





GLOBAL SPECIALTIES CORPORATION

70 Fulton Terrace, New Haven, CT 06509 (203) 624-3103, TWX 710-465-1227
OTHER OFFICES: San Francisco: (415) 421-8872, TWX 910-372-7992
Europe: Phone Saffron-Walden 0799-21682, TLX 817477
Canada: Len Finkler Ltd., Downsview, Ontario

1-800-243-6077
Call toll-free for details

* Suggested U.S. resale. Available at selected local distributors. Prices, specifications subject to change without notice.

CIRCLE 59 ON READER SERVICE CARD

The M-200E Tri-Mode converter from Info-Tech.

The Info-Tech Tri-Mode Converter

BY ROBERT B. GROVE*, WA4PYQ

Old-timers are understandably astounded by the deluge of new pieces of electronic equipment now on the market which are designed to make the job of copying Morse code much easier. Many of these same pieces of equipment are capable of demodulating radioteletype signals and providing character displays on a video monitor. Often, these same devices provide optional outputs to directly driven printers.

The M-200E Tri-Mode converter from Info-Tech is such a unit. In addition to receiving Morse and RTTY, the M-200E is capable of displaying ASCII as well, feeding its serial output to a hard copy printer.

Morse Reception

The converter is capable of automatically copying Morse code at speeds ranging from 5 to greater than 55 words per minute. A razor-sharp audio filter assures the isolation of the desired signal in the converter bandpass. An LED signals the capture of the signal, and the converter is ready to go.

As with most digital Morse converters, the M-200E does require hearing a good "fist" for accurate character recognition. Erratic spacing of dots and dashes will inevitably lead to misinterpreted characters. In most cases this will make little difference, as the context of the received message will still be apparent.

Signal strength of the received Morse station is relatively unimportant; if an audio note is detectable, the M-200E captures it. For receivers without adjustable b.f.o's, the converter has an adjustable filter so that the audio signal may be properly processed for optimum reception.

RTTY

In the past, cumbersome demodulators and mechanical teleprinters were essential components of any RTTY station, even for reception only. Now the listener can copy perfect radioteletype noiselessly and effortlessly with a digital converter like the Info-Tech.

On amateur bands, 60 words per minute is still standard. For the utilities buff who wishes to copy press services, weather statements, and public correspondence stations, other speed options must be available. The M-200E is capable of copying 60, 66, 75, and 100 words per minute.

Standard shifts of 170, 425, and 850 Hz are selectable independently from the speed control. A pair of MARK/SPACE LED's assists the operator in centering the RTTY in the bandpass of the filters. In addition, an edgewise

*Rt.1, Box 156, Brasstown, NC 28902

meter may be used to peak the received audio signal.

For non-standard shifts, the listener may still present excellent copy to the video monitor or teleprinter by "straddle tuning", a process of balancing the center of the frequency shift at a level which is detectable by the filters. The tuning meter then becomes a signal peaking control, and copy is received normally.

Other useful features on the converter include NORMAL/REVERSE shift switching, hard limiting to correct for fading, and automatic threshold control for single-tone copy of non-standard signals.

Automatic unshift on space is also switch-selectable. Carriage return and line feed are automatically provided in any mode.

Video

The output of the M-200E is composite video, approximately 1.5-3 volts peak to peak, negative sync, crystal controlled. Its format is a 5 x 7 dot matrix. A 16 line data field may be chosen with either 32 or 72 characters per line.

Construction

The assembly of the factory-wired M-200E shows careful engineering and quality control which we appreciate and expect from Info-Tech. Double-sided plated-through glass epoxy circuit boards and sockets for all IC's help make the M-200E a quality piece of equipment.

The power supply is well-regulated, and the liberal use of MOSFET devices keeps power consumption and resultant heat dissipation low.

The converter is operated from 120 v.a.c. (240 v.a.c. available on special order), requiring only 20 watts of power.

Our Lab Test:

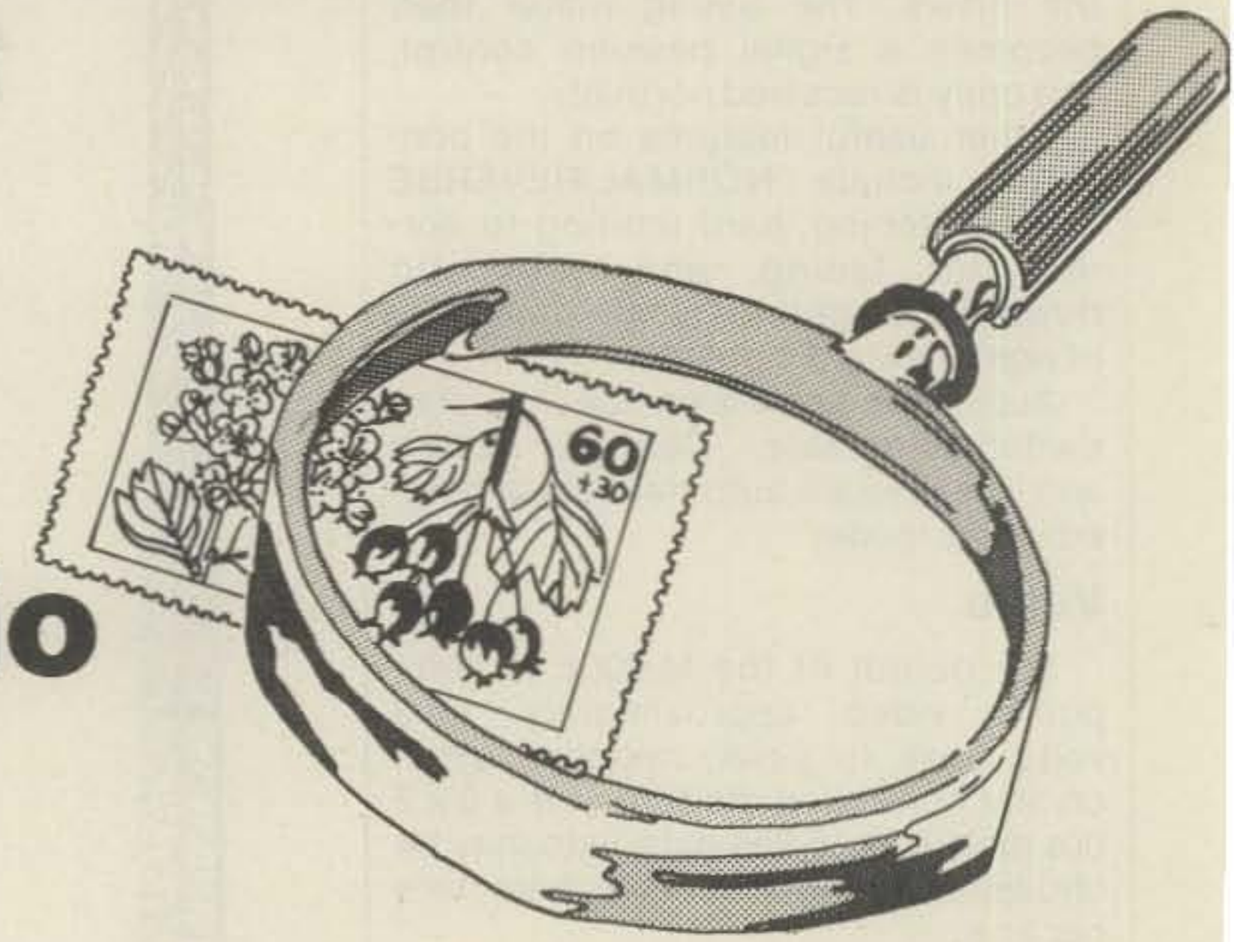
Using the M-200E in many hours of off-the-air signal copy of both RTTY and c.w. stations, we found the unit to be reliable and simple to operate. There was no heating problem, and the handsome design blends in well with any professional equipment decor.

A variety of non-standard as well as standard RTTY stations were monitored, and the M-200E did everything that Info-Tech said it would. We recommend prospective buyers seriously consider the unit as a very useful accessory in the shack or monitoring station.

The Info-Tech M-200E Tri-mode converter is priced at $500. Available from authorized dealers or Info-Tech, Inc., 2349 Weldon Parkway, St. Louis, MO 63141.

If you love your hobby and are into collecting things, give philately a try. It's an up-and-coming area of interest for amateurs and one relatively easy to get into, especially for DXers and QSL card collectors. It has our stamp of approval.

Philately—With An Amateur Radio Flavor



BY VICTOR C. CLARK*, W4KFC

Many of the QSLs we receive from overseas are accompanied by interesting, instructive, and colorful postage stamps. Some of us save these and either display them ourselves or pass them along to philatelist friends. But now there is an appealing new possibility for radio amateurs imbued with even a passing interest in stamps, and that is the collection of postage stamps devoted exclusively to the theme of amateur radio. Several such stamps have been issued during the past two decades . . . 17 in all . . . and more are expected.

No one has ever satisfactorily explained the appeal of stamp collecting, but it thrives as a compelling pasttime for a great many otherwise normal individuals, and a surprising number of radio amateurs also are philatelists. The proliferation of attractive new postage stamps issued by the various governments of the world has introduced the art of specialization into philately, even as we amateurs tend to focus our interests upon particular areas of amateur radio. Some stamp collectors collect only stamps published by a particular country; others are theme, flowers, birds, regents collectors, and so on. And now we have a new special interest category . . . amateur radio stamps!

* *12927 Popes Head Road, Clifton, VA 22024*

The U.S. Amateur Radio Stamp

Although there was an amateur radio stamp of earlier origin, most amateurs first encountered the concept of such a stamp with the issuance of the U.S. five-cent stamp. This came in late 1964, on the occasion of the fiftieth anniversary of the founding of the American Radio Relay League. The League played a large role in obtaining approval for the stamp's publication. Design of the stamp was done by a Hartford, Connecticut commercial artist who had done considerable work for *QST*. First day ceremonies throughout the country found local city officials, postmasters, and even the Chairman of the FCC taking part. In acknowledgment of the prominent role played by radio amateurs in providing emergency communications services following the disastrous Alaskan earthquake of 1964, issuance of the stamp was marked by special ceremonies in Anchorage, attended by government, postal, and civil defense officials, representatives of the ARRL, and local radio and philatelic clubs. Then FCC Chairman E. William Henry spoke at first day ceremonies in Washington, D.C. Thus a mere postage stamp, which may not loom large in the minds of many, served to bring favorable official recognition and direct public attention to the contributions of the amateur radio service.

The First Amateur Radio Stamp

The earliest known amateur radio stamp is a 2.50 zlotys stamp issued by the government of Poland in 1961 as part of a set of three stamps marking the Conference of Communications Ministers of Communist countries in that country. This small square stamp carries the logo of the Polish amateur radio society, the Polski Zwiazek Krotkofalowcow (PZK), superimposed on a world globe, and bears the message "CQ DE SP."

In 1966 Yugoslavia produced a postage stamp recognizing the twentieth anniversary of the Yugoslav amateur radio society, the Savez Radioamatera Jugoslavija (SRJ). First

day mailings included special envelopes (known to philatelists as "first day covers") bearing a printed message indicating that the stamp also was intended to mark the occasion of an International Amateur Radio Union (IARU) Region I Conference held in Opatija, Yugoslavia in May, 1966. The stamp depicts a three element Yagi antenna straddling a globe with a satellite orbiting about it.

Several years elapsed without any new amateur radio stamps. Then in 1972 the German Democratic Republic produced a set of five postage stamps depicting activities of the Society of Sport and Technology, and one of these was devoted to amateur radio. This multicolored stamp shows an artist's impression of amateur radio equipment, a stylized radiotelegraph key, and the letters "GST" (which stand for Gesellschaft fur Sport und Technik) in Morse code.

In 1973 Colombia issued a three-color .60 peso postage stamp to celebrate the fortieth anniversary of the Liga Colombiana de Radioaficionados, thus producing the first amateur radio stamp from South America. This stamp carries the insigna of the Liga, surrounded by the name of the society and its founding date.

Russia Honors A Radio Amateur

From the other side of the world in the same year came a postage stamp bearing the portrait of the well-known Russian amateur, Ernst Krenkle (1903-1971), who had been made a hero of the Soviet Union for his role in providing rescue communications for a stranded Artic expedition of which he was a member. Krenkle was better known to his fellow radio amateurs as RAEM. This was the call sign of the Arctic expedition which was later assigned to him by the government for use as his personal amateur call. While it cannot qualify as an amateur radio postage stamp, for there is no mention of amateur radio on the stamp, this one does provide the unique opportunity for many amateurs to display a stamp carrying the picture

Stamps such as these commemorate amateur radio: (1) the U.S. 5-cent stamp issued in 1964 on the occasion of the 50th anniversary of the ARRL; (2) a Yugoslavian stamp issued in 1966 recognizing the 20th anniversary of the Savez Radioamatera Jugoslavija; (3) a three-color .60 peso Colombian stamp celebrating the 40th anniversary of the Liga Colombiana de Radioaficionados, 1973; (4) the Russian stamp issued in 1973 bearing the portrait of Ernst Krenkle, RAEM; (5) from Poland, in 1975, a 1.50 zlotys stamp honoring the IARU Region I Conference held in Warsaw in 1975; (6) three separate airmail stamps from Costa Rica marking the 16th Annual Conference of FRACAP, 1975; (7) a two-stamp series from the Dominican Republic marking the 50th anniversary, in 1977, of the Radio Club Dominicano; (8) a Brasilian stamp carrying the inscription "Day of the Radio Amateur," 1977; (9) Japan issued this stamp in 1977 on the occasion of the 50th anniversary of Japanese amateur radio; (10) a 10 centavo airmail stamp issued in 1979 by the Dominican Republic to mark a DXpedition; (11) a Bolivian stamp, also issued in 1979, honoring the Radio Club Boliviano; (12) the stamp issued by the Federal Republic of Germany to recognize WARC-79.

The final stamp of 1979 is that of Switzerland, which recognizes the 50th anniversary of the founding of the Union Schweizerischer Kurzwellen-Amateure (USKA).

of someone they have worked, for RAEM was quite active on 20 meter c.w. during the 1950's and 60's.

In 1975 Poland produced another amateur radio stamp, this one a colorful 1.50 zlotys stamp which honored the IARU Region I Conference held in Warsaw. It also carries the insignia of PZK, and shows a world globe at the center (in red), on a square field in various shades of blue, green, and lavender.

In the same year, Costa Rica issued three separate airmail postage stamps to mark the occasion of the Sixteenth Annual Conference of the Federacion de Clubes de Radioaficionados de Centro-America y Panama (FRACAP), which is an international association of the six national amateur radio societies in Central America. The first day cover carries the three stamps and bears a message explaining the worldwide fraternal nature of amateur radio.

Three governments issued amateur radio stamps in 1977, the Dominican Republic producing a two-stamp series marking the fifieth anniversary of the Radio Club Dominicano (RCD). One was a six centavo surface mail stamp and the other a 10 centavo airmail stamp. These also carry a message describing amateur radio as a promoter of international friendship. Brasil was next with a stamp carrying the inscription "Day of the Radio Amateur." This unusual stamp carries an artist's rendition of a radio signal propagating outward from an antenna at the center. Issuance of the stamp resulted from the efforts of the Brasilian amateur radio society, the Liga de Amadores Brasileiros de Radio Emissao (LABRE). It is interesting to note, too, that the Brasilian government followed this up with strong support for the Amateur Radio Service at the World Administrative Radio Conference in Geneva.

The final stamp of the year was one issued by Japan on the occasion of the fiftieth anniversary of Japanese amateur radio. It shows an old style speaker and hand key. All of the amateur radio stamps issued to date reflect behind-the-scenes efforts on the part of national societies, the Japanese stamp being no exception. Japan Amateur Radio League (JARL) President Shozo Hara, JA1AN, provides this background:

> "The special Japanese stamp was issued on September 24, 1977, in commemoration of the 50th anniversary of authorized amateur radio in Japan. It was on September 10,1927, that JXAX was licensed, as the first amateur radio station to Kankichi Kusama, who now signs JA3HAM. It took us almost three years to achieve this. We hoped to have the Ministry of Posts and Telecommunications issue a special stamp on the occasion of the 50th anniversary of the League (which occurred in 1976), but this could not be done because amateur radio had not been authorized yet when the League was established in 1926. On September 24, the day of the issuance of the stamp, the commemorative ceremony for the 50th anniversary (of JARL) and that for the issuance of the stamp were held at the same time in Tokyo. We had the honor to have the Minister of Posts and Telecommunications with us during the series of ceremonies."

1979—A Bumper Year

The year 1979 witnessed four more amateur radio stamps, as well as another stamp which almost (but not quite) qualifies in that category. The first of these was a colorful 10 centavo airmail stamp issued by the Dominican Republic to mark, of all things, a DXpedition! A trip by Radio Club Dominicano (RCD) amateurs to Beata Island, off the south coast of the Dominican Republic, was employed as the basis for a special stamp calling attention both to amateur radio and this sparsely settled offshore Dominican possession. The stamp carries an outline drawing of the island, framing a montage consisting of a native iguana lizard, palm trees, and amateur radio equipment. The words around the edge of the stamp proclaim "the first expedition of radio amateurs to Beata Island," and add the call sign "HI8RCD" used during the operation.

Next came a 4 kopeck stamp from Russia which was the first to be devoted specifically to amateur radio satellite activities. This stamp shows a satellite in space (the Russian RS1 and 2) and carries a message which

translates as "October 1978 - Radio Amateur Sputniks."

Shortly thereafter, Bolivia produced a multi-colored stamp honoring the Radio Club Boliviano. This stamp is the first to show the amateur radio licensing districts of a country. It carries the RCB logo,a three element Yagi antenna, and bears the words "Quien no vive para servir, no sirve para vivir," which can be translated as "those who do not live to provide a service have no purpose in life."

A Good Try In Germany

Just prior to the world conference in Geneva (WARC-79), amateurs of the Deutcher Amateur Radio Club (DARC) attempted to obtain approval from their government for a stamp recognizing amateur radio. They encountered heavy competition from the hundreds of other special interest groups also seeking issuance of a special stamp, but they did succeed in introducing a bit of amateur radio flavor into the design of a stamp issued by the Federal Republic of Germany to recognize WARC-79. The stamp shows the front panel of a KWM-2 tuned to 21,275 kHz!

The final stamp of 1979, and the most recently-issued amateur radio stamp of which we have knowledge, is that of Switzerland, which recognizes the fiftieth anniversary of the founding of the Union Schweizerischer Kurzwellen-Amateure (USKA), the national amateur radio society of Switzerland. The timing couldn't have been better, for this stamp was placed on sale during the World Administrative Radio Conference and was on exhibit at the post office in the International Telecommunication Union conference building while WARC-79 was in progress. Thus, delegates to the conference were confronted with a display showing the stamp each time they visited the post office. Perhaps they also perceived an unwritten message which said in effect, "Your host government considers the amateur radio service to be worthy of the recognition implicit in this special postage stamp." The Swiss stamp symbolizes progress made by radio amateurs during the past half century, picturing an old-style radio-telegraph key and one of the Oscar-type satellites in orbit.

More Coming

More amateur radio stamps will be issued. Other national societies are working to obtain approval from their governments for postage stamps having an amateur radio theme. Amateur radio stamp collecting is an appropriate topic for a DX QSO; it might even sow the seed that will lead eventually to issuance of a new stamp. After all, who wants to be from a country with no amateur radio stamp? One final point: Amateurs today have the unique opportunity to acquire a complete set of all of the amateur radio stamps issued to date, for they are still available in sufficient numbers to permit this. However, this state of affairs may not long persist, for the earlier stamps in particular may soon become scarce. A collection of amateur radio stamps makes an attractive display for the shack and an interesting conversation piece, and can be added to as new amateur radio stamps appear. ▣

References

Clark, "Amateur Radio Postage Stamps," IARU *Region 2 News*, February 1977, pp. 8–10.

Clark, "Postage Stamps Honour Amateur Radio," ITU *Telecommunication Journal*, Vol. 46, December 1979, pp. 763–764.

Kanda, "Guide to Amateur Radio Stamps and Postal Items, "*Hams Almanac*, p. 8.

Montagnes, "Stamps Reflect Growth of Amateur Radio," *QST*, May 1979, p. 56.

No-29-30

While this language translator won't get you a job as a UN translator, it will add a new dimension to your DX operating and perhaps give you an edge in working that rare one.

The Language Of Amateur Radio

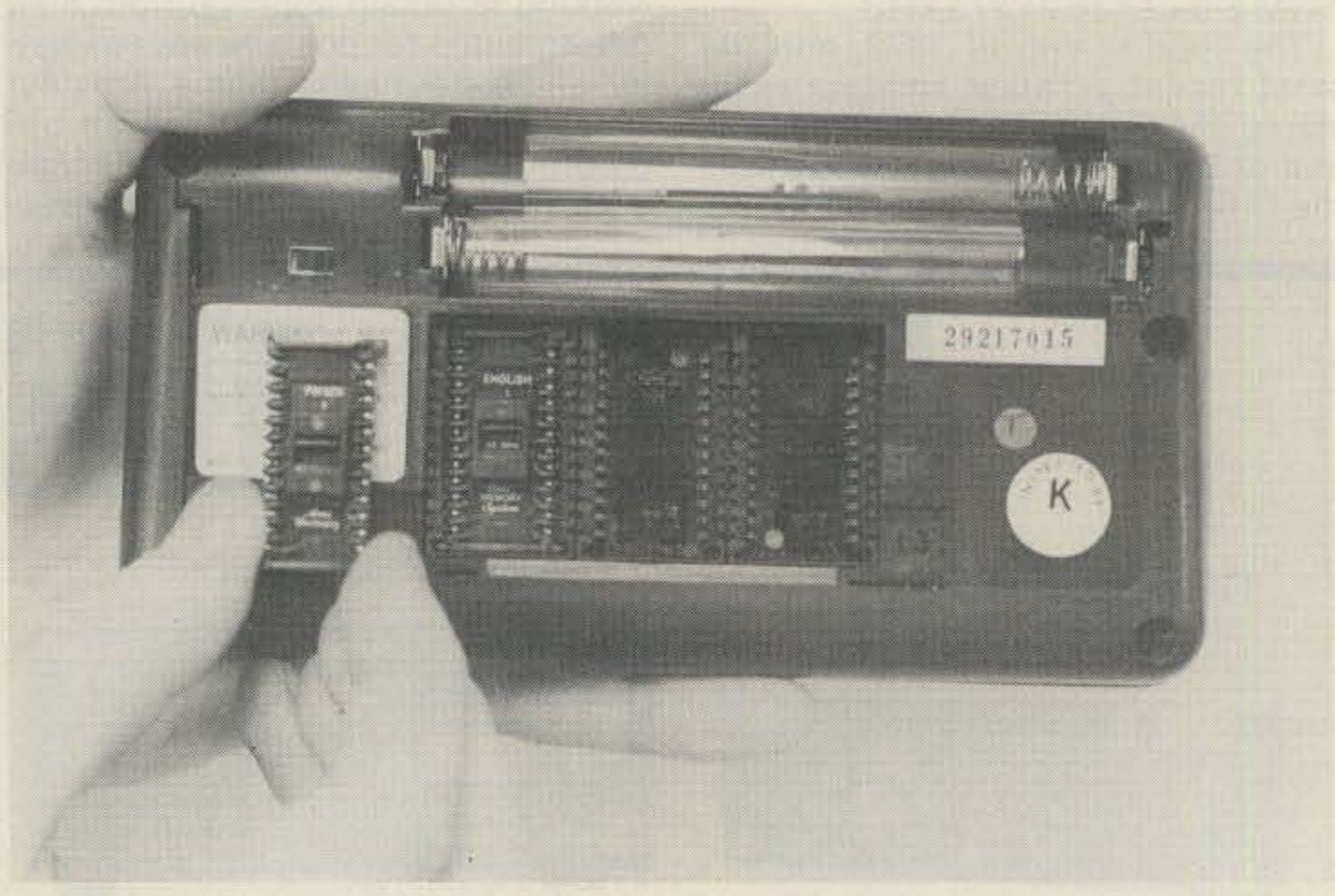
The Craig Language Translator

BY ROBERT J. TRAISTER, SR.*, WB4KTC

When working exotic DX, isn't it nice that so many of the stations know enough English to establish an authentic contact which can be claimed for WAZ, WPX, or whatever? Yes, amateurs all over the world have taken the time and trouble to be able to communicate in different languages which, fortunately for we here in the U.S., includes English. But what have we American amateurs done to return this courtesy? If you're anything like me, you may know a few phases like "Parley-voo Fransay," "Spray-ken-zee-doitch" or no-speakee-Japanease," but other than these misspelled attempts at communication, many Americans have done next to nothing to learn simple forms of voice communication in other languages.

At long last, good old yankey ingenuity coupled with the latest state-of-the art design has made up for what most of us lack in elbow grease. The Language Translator has been invented. With this device, you can enter in one language and get a printed read-out in another. For instance, you can enter in English and get the French equivalent. All this with just the push of a few buttons on a pocket-size device. The thing even makes up for your bad spelling. If you should enter "Parleyvoo Fransay", the translator, being smarter than we are, fields a whole slew of question marks on the face of the readout indicating that you are entering an incorrect word or spelling of a word. Immediately, you would depress the search key which would set this mini-computer to work on scanning its French library. Shortly, it would come up with the phrase "Parlez Vous Francais." If you're smart enough to hit the interpret key when this phrase appears, the translated version appears in English.

Seriously, the language translator offers great potential for the average, monolinguistic amateur operator. It can be used directly as a communications aid, but more importantly, it is an easy way to develop communicative skills in many different languages.



Interior of battery and module compartment. The language module is quickly inserted into the proper IC socket. Removal and changing of modules is accomplished in a few seconds.

The translator pictured is the Craig Language Translator. I obtained mine from J S & A National Sales Group in Northbrook, Illinois for $199.95. This includes only the English module. It is necessary to purchase, separately, the other language modules of your choice. And what a choice there is. Japanese, French, Italian, Portuguese, and German are just a few of the choices. The translator will hold a total of three capsules simultaneously and translate any phrase which lies within its 1200 word vocabulary in any of the languages contained within the capsules.

*501 South Royal Ave., Suite 204, Front Royal, Virginia 22630

Craig Translator showing English interpretation of French phrase, "Temps est froid."

Each capsule sells for about $25.00.

The vocabulary of the capsules tested in the Craig Translator is limited to simple words and phrases which are instrumental to basic communications. As a learning feature, a word may be entered, the "learn" key depressed, and the translator will run down a list of other words which may pertain or bear reference to the key word originally entered. By depressing the "phrase key," whole word groups like "How much is this," "How are you," etc. are instantly displayed in English to be translated with the push of another key. The operator simply memorizes the different letters which will trigger the phrases he's most likely to use and proceeds from there.

The Craig Language Translator has other features which are extremely useful to the amateur operator. Contained within the internal memory of the device and independent of all but the prime language capsule (English, in our case) are 14 key phrases in English, French, Spanish, and German. You can extend a greeting in these and other languages (with other capsules) by simply depressing a key. Again, fourteen key phrases are available, so even if you can't communicate the majority of your QSO in your contact's language, at least you can enter or sign with a flowery greeting or goodbye in his language.

Incidentally, the keyboard on the Craig Translator has an upper and lower case. You can enter numbers, commas, question marks, etc. The keyboard is not configured in typewriter keyboard fashion. The letter keys progress alphabetically. This takes a bit of getting used to if you use a typewriter often, but after a few hours, operation becomes much easier.

One problem I've always had was in converting from the metric system to measurements I could readily understand. If a UA2 told me he was 200 kilometers from Moscow, I figured 200 miles was a good enough estimate and let it go at that. The translator has a built-in metric converter. All you do is enter the word "mile" and it translates to the metric equivalent of 1.61 kilometers. Inches are given in centimeter equivalents, and other units such as yard, gallon, pint, etc. are as easily converted to metric or vice versa.

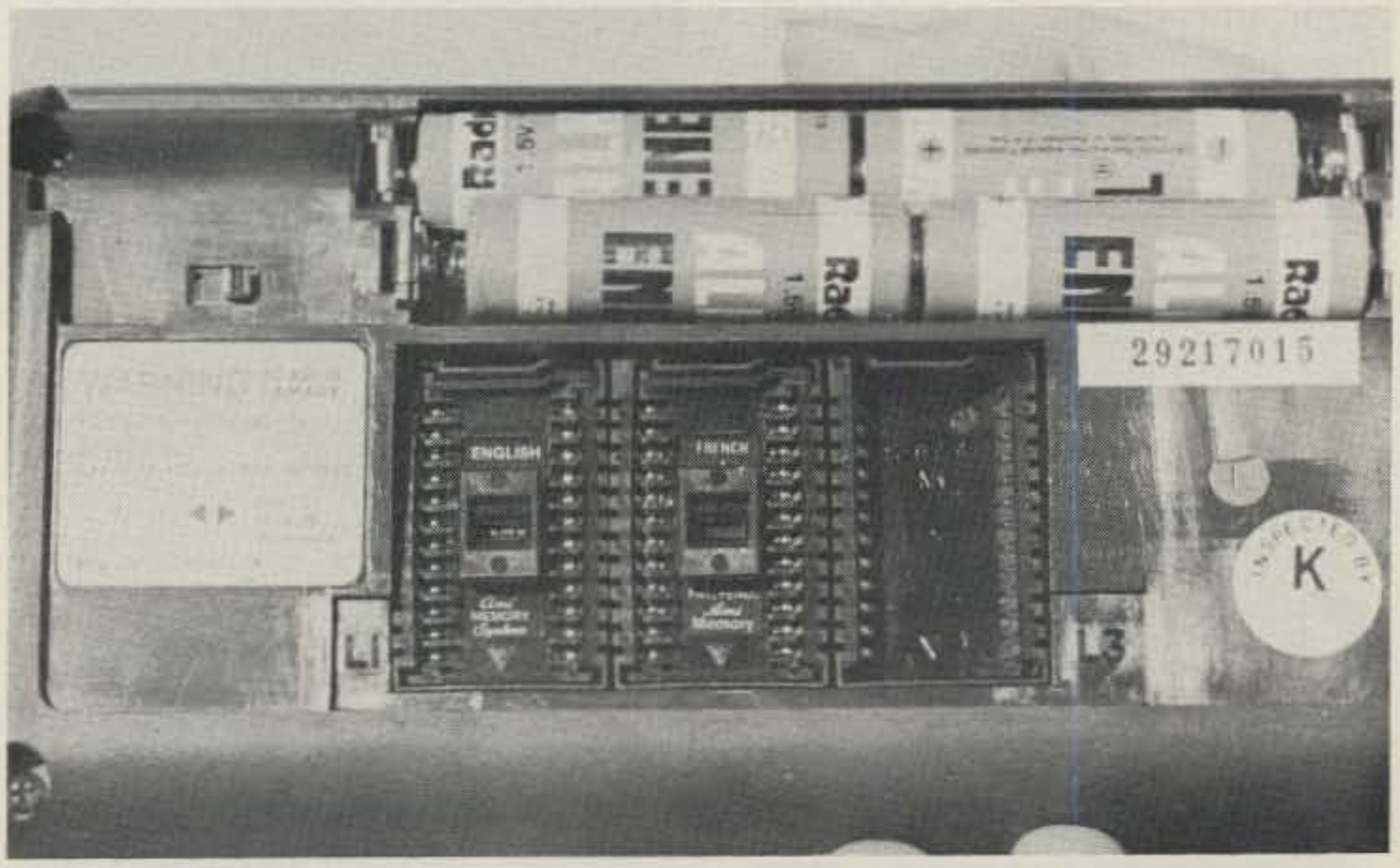
The Craig Translator also includes mathematical computation features, but the process takes a long time. A few seconds are required to get a readout after the "equals" key is depressed for such easy calculations as 2 + 2. In a pinch, this feature comes in handy, but the cheapest electronic calculators are far superior.

The electronic display of letters and numbers is easy to read, and the entire device will fit in your pocket. When phrases are entered which exceed the character limit, the display shifts to the left to allow entry of all letters. The translation then rotates in billboard fashion with the words travelling from the right hand side to the left. This rotation can be controlled at a fast or slow rate and continues until the "clear" key is depressed.

I have used the Craig Language Translator for about two months now and find that my grasp of the French language has improved immensely. It is no longer necessary for me to punch up various phrases that I have committed to memory (my own). I am beginning to recognize common word groupings when listening to QSO's in French. It reminds me very much of my experience with code as a Novice. With a bit of help in pronunciation from my son who takes elementary school French, I can sound quite convincing at times. Using this translator, any amateur should be able to learn to communicate in a foreign language (or several) if he will spend as much time practicing as he did when learning Morse code.

It has been learned that the manufacturer of the Craig Language Translator is fast at work developing more advanced capsules which will simply plug-in to the keyboard unit. All purchasers will be kept up-to-date on them as they become available. Once the simple libraries of the present capsules have been mastered, the advanced capsules can be brought into service. In a year's time, it might be possible to become reasonably fluent in another language.

It should be understood that for most operators, the translator cannot be simply substituted for a lack of knowledge about a foreign language.



Interior compartment with batteries installed along with capsules for translation of French to English and vice versa.

The translator acts as a convenient "crib note" when memory fails during a QSO. It is a constant stand-by interpreter which might help you out of a jam should you convince the DX contact (by whipping off a memorized phrase or two) that you are completely proficient in his language. This might correspond to calling CQ in Morse code at 35 w.p.m. when you can only receive at 10 w.p.m. Needless to say, you're going to be in trouble when someone answers back at 35 w.p.m.

I see a great future for the language translators in an amateur radio environment. They can be used for a multitude of purposes and add more pleasure to the entire hobby by expanding the operator's realm of interest. The day may come when a language translator will be an integral part of the shack of the serious DXer.

Just as this article was being completed, the author learned of a rumor that Texas Instruments is developing a language translator which produces translations in synthetic speech. This would add tremendously to the learning of the language, because the pronunciation problem would be handled electronically. As a matter of fact, I can see the day when the amateur may simply type his messages into a language translator and hold the mike up to the audio output for a direct communication with his contact. Surely, a translator which acts on audio input and translates in audio will be perfected eventually. This adds to the possibility that, one day, all voices heard on the bands will be those of electronic circuits parroting our human attempts at speech. This could make for a great deal of monotony, and you certainly couldn't picture an OM's face by judging from the voice you heard. Oh well, you can't stand in the way of progress.

The Craig Language Translator has been a most welcomed addition to my shack. DX has taken on a whole new meaning and hamming has been a lot more fun lately.

Take the time, no matter which methods you use, to increase your proficiency at communicating in other languages. By learning to speak and to recognize a few simple words and phrases, you can add increased enjoyment to your hobby. This proficiency will also serve as a meaningful courtesy to other amateurs throughout the world who have had the courtesy to memorize and establish communication capabilities in our language. As communication skills increase, on the personal level, amateur radio operators from around the world grow into a closer, more steadfast fraternity. 30

New MFJ 3 & 1.5 KW Versa Tuners

Run up to 3 KW or 1.5 KW PEP and match everything from 1.8 thru 30 MHz: coax, balanced line, random wire. Built-in balun.

3 KW VERSA TUNER IV's

1.5 KW VERSA TUNER III's

NEW MFJ KW VERSA TUNERS HAVE THESE FEATURES IN COMMON

These 6 new MFJ KW Versa Tuners let you run up to 3 KW or 1.5 KW PEP (depending on the model) and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire. Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions.

All metal, low profile cabinet gives RFI protection, rigid construction, sleek styling. Black. Rich anodized aluminum front panel. 5x14x14 inches. Flip down stand tilts tuner for easy viewing.

Efficient, encapsulated 4:1 ferrite balun. 250 pf, 6000 volt capacitors. 18 position dual inductor, 17 amp, 3000 V ceramic rotary switch (3 KW version). 12 position inductor, ceramic rotary switch (1.5 KW version). 2% meters. SO-239 coax connectors, ceramic feedthru for random wire and balanced line. One year limited warranty. Made in U.S.A.

3 KW VERSA TUNER IV's

[1] MFJ-984 3 KW VERSA TUNER IV

$299.95 ***EXCLUSIVE RF AMMETER insures maximum power to antenna at minimum SWR. Built-in dummy load.***

This is MFJ's best 3 KW Versa Tuner IV. The MFJ-984 Deluxe 3 KW Versa Tuner IV gives you a combination of quality, performance, and features that others can't touch at this price.

An exclusive 10 amp RF ammeter insures maximum power to antenna at minimum SWR. A separate meter gives SWR, forward, reflected power in 2 ranges (2000 and 200 watts).

Versatile antenna switch lets you select 2 coax lines thru tuner and 1 thru or direct, or random wire, balanced line or dummy load.

A 200 watt 50 ohm dummy load lets you tune your exciter off air for peak performance. Efficient, encapsulated 4:1 ferrite balun.

[2] MFJ-981 3 KW VERSA TUNER IV

$199.95 ***Accurate meter gives SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. 4:1 ferrite balun.***

The MFJ-981 3 KW Versa Tuner IV is one of MFJ's most popular Versa Tuners. An accurate meter gives you SWR, forward and reflected power in 2 ranges: 2000 and 200 watts. Encapsulated 4:1 ferrite balun.

[3] MFJ-982 3 KW VERSA TUNER IV

$199.95 ***Antenna switch lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line.***

The MFJ-982 3 KW Versa Tuner IV gives you a versatile 7 position antenna switch that lets you select 1 coax thru tuner and 2 coax thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

If you already have a SWR/wattmeter, the MFJ-982 is for you.

[4] MFJ-980 3 KW VERSA TUNER IV

$169.95 ***Heavy duty encapsulated 4:1 ferrite balun for balanced lines.***

The MFJ-980 is MFJ's lowest priced 3 KW Versa Tuner IV but has the same matching capabilities as the other 3 KW Versa Tuner IV's.

Features an efficient, encapsulated 4:1 ferrite balun for balanced lines.

1.5 KW VERSA TUNER III's

[5] MFJ-962 1.5 KW VERSA TUNER III

$179.95 ***SWR, dual range forward and reflected power meter, 6 position antenna switch, encapsulated 4:1 ferrite balun.***

The MFJ-962 1.5 KW Versa Tuner III is an exceptional value.

An accurate meter gives SWR, forward and reflected power in 2 ranges (2000 and 200 watts).

A versatile six position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 balun.

Black front panel has reverse lettering.

[6] MFJ-961 1.5 KW Versa Tuner III

$159.95 ***6 position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.***

The MFJ-961 1.5 KW Versa Tuner III gives you a versatile six position antenna switch. It lets you select 2 coax lines thru tuner or direct, or random wire and balanced line. Encapsulated 4:1 ferrite balun.

If you already have a SWR/wattmeter, the MFJ-961 is for you.

Black front panel has reverse lettering.

FOR YOUR NEAREST DEALER OR FOR ORDERS

CALL TOLL-FREE 800-647-1800

Why not visit your dealer today? Compare these 3 KW and 1.5 KW Versa Tuners to other tuners. You'll be convinced that its value, quality and features make it a truly outstanding value. If no dealer is available, order direct from MFJ and try it. If not delighted, return it within 30 days for a prompt refund (less shipping). Charge VISA, MC. Or mail check, money order plus $10 shipping/handling.

For technical information, order/repair status, in Mississippi, outside continental USA, call 601-323-5869.

Order By Mail or Call TOLL FREE 800-647-1800 and Charge It On VISA master charge

MFJ ENTERPRISES, INC.

P. O. BOX 494
MISSISSIPPI STATE, MISSISSIPPI 39762

CIRCLE 89 ON READER SERVICE CARD

"Radio Insurance": Necessary Evil or Blessing In Disguise?

PART II

BY THOMAS J. OWENS*, K7RI

Last month we gave examples of what happened to the antennas and towers of individuals who were caught in a major storm in the Pacific Northwest last year. If your equipment was damaged in such a storm, or if it caused damage to someone else's property, would you be covered by insurance? Part II tells you the ins and outs of radio insurance, and what you have to watch out for.

*3955 S.W. Ida, Seattle, Washington 98136

Obviously, my treatment herein must be relatively brief. I'll address the subject in terms of *any* loss (not just radio oriented) and comment specifically regarding the issue of amateur towers and antennas.

To begin, there are three ways to classify risks. One, **personal risks** include those relating to *life and health.* Two, **property risks** deal with those pertaining to *direct or indirect destruction of property.* Three, **liability risks** include those resulting from *the law of liability for one's acts or omissions.* Liability risks are of two major types: bodily injury and property damage. We will concern ourselves with property and liability risks (it is assumed the merits of life and health insurance are well understood as they relate to life in general and working on and around radio towers in particular).

A few comments and definitions are in order at this point. Generally, *only* those provisions and coverages specifically contained *in writing* within the policy will be enforceable by law.

An **endorsement** is any provision added to an insurance contract whereby the scope of its coverage is clarified, restricted, or enlarged.

An **act of God** is any peril operating without human influence and not preventable by human insight.

A **peril** is the cause of the loss. Perils include fire, windstorm, accidents, theft, etc.

To **indemnify** is to pay compensa-

tion or reimbursement for actual damage or loss sustained by the insured. It is to be noted that such compensation is *not* necessarily the full face value of the policy!

Declarations are statements as to the parties to the contract, the period of the contract, the property and perils insured, the premiums, and other pertinent information.

The basic conditions and exclusions that are standard throughout the industry are found on the back of the first page of all standard fire insurance contracts and are included in the popular multi-line contracts known as "homeowners' policies." There is a statement of perils normally *not* covered. Notice is given that the company has an option to either provide for a loss or restore the property to its former condition. Within 60 days after receipt of a "Proof Of Loss," amounts for which the company is liable shall be payable. The insured may *not* sue an insurer until all the policy requirements have been complied with, *nor after one year following the loss.* The requirements for filing a proof of loss are spelled out; the insured must:

1. Give *immediate written notice* of the loss to the insurer.
2. Protect the property from further damage.
3. Separate the damaged and undamaged property.
4. Furnish an inventory of the damaged property, its costs, value, and a statement of the losses sustained.
5. Render a written "proof of loss" within 60 days, including detailed information about the loss (its time, origin, insurable interests, occupancies, etc).
6. Exhibit to the insurer the property and books of account.

In addition, there are several other conditions and exclusions listed. It would behoove the insured to read the policy with particular attention to this section, the declarations, and endorsements. Be sure to get a clarification of any unclear or doubtful coverage *in writing* from your agent (and file it with the policy).

Standard fire policies cover losses from fires, lightning, and removal, and that is all. An extended perils endorsement will expand coverage to include losses due to windstorm, hail, explosion, riot, aircraft damage, vehicle damage, and smoke damage. However, perhaps the best approach is a special "All Risks" coverage endorsement; it includes *all possible perils except those specifically excluded.*

An even better approach than having several different policies for each different peril (fire, liability, theft, etc.) is to have one more-inclusive "homeowners' policy." Besides being less cumbersome than having several individual policies (each with its own policy fee), most homeowners' policies have *replacement cost coverage* for the home and garages *if* the whole amount of insurance in force on the building is 80% or more of the actual replacement cost. (This is known as the coinsurance clause). Thus, depreciation *will not be subtracted* in calculating the claim payable; and the policyholder will receive *full replacement or repair cost* on these items.

However, it is necessary to keep the value of your insurance up to date with current replacement costs. Many policies have "inflation guard" endorsements which automatically increase the policy limits from time to time (for additional premiums). However, it is wise to verify at least 80% coverage once per year with the agent. Why? *To avoid a partial payment of a loss* due to noncompliance with the coinsurance clause.

Example: A policy owner sustains a $5,000 loss on his home due to fire. His fire insurance policy has an 80% coinsurance clause. The policyholder had insured his home for $40,000, but its fair market value (replacement value) was $60,000. How much would the policy pay on the loss? $4,167. That means the insured would have to absorb $833 out of his own pocket. (If the house was totalled, a $60,000 loss, he would have to suffer a $10,200 loss.)

What might a typical homeowners' policy provide in the way of coverage limits? The following is an example.

Section I (Property)
a. Described Dwelling $80,000
b. Appurtenant Structures (Garages, Tool Sheds, Towers etc.)* 8,000
c. Unscheduled Personal Property 64,000
d. Additional Living Expenses 16,000
e. Scheduled Property (Jewelry, Cameras, Furs, Hobby Equip., etc.)** 20,000

Section II (Liability)***
f. Personal Injury Liability (Per Person & Per Occurrence) . . . $100,000
g. Medical Payments 2,000
h. Property Damage Liability (Per Occurrence) 100,000
i. Voluntary Property Damage . 1,000

Be certain your tower/antenna installation meets the policy definition requirements to qualify as an appurtenant structure. Get an affirmation in writing from your agent and file it with the policy. In addition, secure an Appurtenant Structures Form HO-48A endorsement for the full replacement value of your installation. It would read:

"In consideration of an additional premium, the additional limit of liability shown below for each appurtenant structure shall be considered specific insurance applicable to such structure."

Identification Of Structure
1. Radio Tower & Antennas
Additional Limit Of Liability
$15,000 (Or whatever it is worth)

Form HO-48A is what you are relying on in case of a loss to the tower. Otherwise, the 10% limitation for Section Ib property could fall far below your actual loss. Besides, that coverage should be saved for other appurtenant structures, if any. Be certain to attach your copy of the HO-48A to your policy!

***It is this author's opinion that properly executed Section Ie Scheduled Property endorsement is a far superior method of insuring* all *of the "in shack" equipment than group policies currently available through the ARRL. Be sure to specify the current replacement cost of the equipment (with an inflation clause, if possible) and attach the endorsement to the policy. Such a homeowners' policy would likely have a $50, or $100, deductible. That means the insured absorbs the first $50 or $100 (unless he wishes to pay more for a no-deductible policy). Such course is not recommended. It is recommended that you have a Special Homeowners' Form No. 3 which specifies:*

"All risks of physical loss, except those specifically excluded (such as flood, earthquake, landslide, war, backing up of sewers)."

Those are the perils insured against, as far as the dwelling is concerned.

The insuring clause for the contents of the dwelling would protect against the perils of:

"Fire and lightning, extended coverage perils, theft, vandalism, falling objects, collapse, water damage, rupture of heating systems, and freezing."

****Liability insurance is an absolute necessity. For those with substantial net worths, or people with attractive nuisances such as radio towers (or both), larger than standard liability limits are a most prudent expenditure. For a modest amount, an "umbrella" liability policy can be superimposed on your existing auto policy. It provides extra limits with a combined blanket single limit over your other existing limits. In addition, it provides for other liability exposures not covered by the underlying contract. Such policies are inexpensive and are written for a minimum of $1,000,000.*

Losses will be handled in one of three ways, depending on the way your policy is set up. If the tower/antennas are treated as unscheduled personal property, they likely will be depreciated from original cost and maximum coverage will be 50% of the dollar value you have on your house (Section Ia). If they qualify as an appurtenant structure (Section Ib), they may, or may not, be depreciated (depending on the language in the policy), and the maximum coverage will be limited to 10% of the dollar value of the house. If you have a special HO-48A endorsement with an inflationary clause, or "work of art" clause, you likely will recover full current replacement cost (assuming that value is not greater than your limits).

What should you do *before* a loss occurs? One, make a journal showing all costs, expenses, and labor associated with construction of the tower/antenna installation. Retain original invoices to substantiate entries. (The same type of record should be kept for equipment in the shack [as well as personal property] in event of fire or theft loss.) If you are now constructing such a journal "after-the-fact," you may or may not have original invoices. In such a case, cancelled checks in payment of equipment and services should be retained. Where neither checks nor invoices are available, use estimates based on current replacement cost and indicate such entries are estimates. Show how many man-hours of personal labor have gone into the system. Granted, this will be an estimate, but it could prove most useful should a disputed loss occur. *Two,* take pictures illustrating various stages of building and construction. Show pier holes, footings and reinforcing steel, and completed concrete piers used to support or guy the tower(s); show the erection method of the tower itself. Be sure to have pictures of "the final product" once completed and fully operational. *Three,* retain copies of plans and approved county or city building permits. *Four,* once completed, a commercial replacement evaluation for a duplicate operational system would not be entirely out of the question for very extensive and expensive systems. And *five,* design and overdesign it from the beginning for whatever weather conditions are typical or reasonably may be anticipated for your part of the country.

What should be done when a loss occurs? First, take prudent steps to prevent further damage both to your property and that of others. Not only is this a requirement of the insurance company, it is only common sense to help avoid or minimize the very real possibility of liability lawsuits for personal injury or property damage to others. If elements, antennas, towers, etc. are in jeopardy of falling, immediately take safe measures to tie them off until they may be removed. Second, notify the insurance agent orally at once; the required written notice may be made shortly thereafter. Should the agent, or an employee of the insurer, decide to waive written notification, be sure you have it in writing from a person authorized to make such a waiver. Third, take pictures of the damaged system as a whole, and detailed photos of individually damaged component parts of the system. Eyewitnesses should be used to inspect damage when it is not evident in the photos! Fourth, *before* details become difficult to recall, write a narrative of all pertinent facts relating to just what was damaged, the cause of the damage, loss of use of the system, etc. Include the date and time of the actual loss. This information will be required when settling the claim. Five, get out the policy and review it. Again, determine what is covered and what is not; know what is required of you, and do not void coverage by inadvertently failing to comply with the terms of the policy.

In handling a claim, it is *highly recommended* you make *written transcripts* of *all* conversations with the agent, adjusters, and insurance company employees. Whenever possible, tape recordings should be made of conversations *with the person acknowledging his consent thereto at the beginning of the recording.* This will serve two purposes. One, it will put them on notice that you intend to receive a fair settlement. When they appreciate your steadfastness, they are less likely to try to take advantage of you. Two, should litigation ultimately be required, such information will be invaluable to your attorney.

A few points are of interest. Often, insurance companies are obligated by their policies to provide for debris removal and clean-up of property—restoring it to its normal (before-loss) configuration. If you had to hire the labor to do this, the insurance company would absorb that expense, provided, of course, you could provide receipts for the work and the insurer agreed to the terms in advance. It follows that any labor you personally perform in reconstructing a damaged system (or its removal) is a valid cost for which you should be compensated. One way in which to establish the value of your time for these purposes is to get professionals to quote firm hourly rates for which they will provide the service. If the professional does the work, the insurer pays him. In many cases, an insurer is willing to pay you to do the work at an hourly rate somewhat less than they would pay a professional. Often, it is to your advantage to repair the system yourself and be so compensated for your time. Of course that decision depends on your individual circumstances.

In arriving at a fair settlement for your damaged, or destroyed, system, it is imperative the insurer be made to understand that what you had was a "work of art." The final product was worth far more than the sum of its parts! It was an operating system that required hundreds, perhaps thousands, of hours in construction, fine tuning, and adjustments in order to perform as it did before the loss. Although you may have started with a commercial antenna kit, hours and hours were invested before the system reached its final configuration and standard of performance. The manufacturer only supplied the material and rough dimensions which served as a starting point. It wasn't something that came in a box and you whipped together in five minutes. Such systems are most difficult to reproduce and do not depreciate in value. On the contrary, they appreciate in value with increased material and labor costs, not to mention the countless hours invested. Be certain *not* to suffer a settlement on a depreciated basis. It behooves all of us to have replacement cost endorsements as discussed previously!

Should the extent of loss exceed the dollar limits of your insurance policy, or your claim be denied in its entirety by the insurer and you simply accept that conclusion or challenge it in court and lose (most unlikely), the unreimbursed amount in excess of $100 may be claimed as an unreimbursed casualty loss on your current year's in-

Formula:

$$\frac{\text{Insurance You Actually Have}}{\text{Insurance You Should Have}} \times (\text{The Actual Loss}) = \text{YOUR RECOVERY}$$

$60,000 × 80% = 48,000 (You Should Have)

$\frac{\$40,000}{\$48,000} = .83$

$5,000 × .83 = $4,167

come tax return. Although such deduction is little in relation to the real economic loss, it is better than nothing.

In conclusion, basically there are three remedies if you feel unfairly treated by your insurance company. One, *Public Adjusters.* They represent the public in contrast to adjusters who represent insurers. They may be retained, usually on a fee basis, to negotiate loss settlements on behalf of the insured. Public adjusters utilize their expert insurance knowledge to estimate damages and effect loss settlements. Unless they are attorneys, their value is mainly limited to realistic evaluation of the loss amount. If the insurer will not agree to that dollar amount, the only alternative may be to hire an attorney. Two, *State Insurance Commissioner's Offices.* The major power of these agencies relate to licensing insurance companies to conduct business within their states, examinations for agents, and conducting investigations to determine whether or not insurers or their representatives are meeting state statutes. Their main function is to determine if companies are solvent and continue to meet state financial net capital requirements. However, some states do have fine free consumer complaint handling facilities. Unfortunately, although they can write to a company and compel an answer as to what action is being taken on a claim, they have little power to do more, even if they feel the settlement is unfair. Three, *Attorneys.* When it has become evident that legal action is the last resort, consult an attorney. It is *highly recommended* one be selected on the basis of referral from someone able to evaluate the competence of the attorney as it might relate specifically to suit dealing with the language used in amateur radio. It would be preferable to have an attorney who is also an amateur or, at least, has some degree of familiarity with the hobby lest you spend a great deal of time trying to educate him in something for which he may have no interest or affinity. Most attorneys charge either on the basis of a flat hourly fee or on a contingency basis. In the latter case, they collect a stipulated percentage of the settlement (the percentage is determined at the outset). If they collect nothing, their fee is ZERO. There are various contingent fee contracts available.

In the majority of cases it is best to deal with the insurance company representative toward a mutually fair settlement. However, in the few cases in which the insurer refuses to deal fairly with the insured, it is probably best to enlist an attorney immediately.

Summary

Design and overdesign your tower/antenna installations. If required, get an approved building permit from the city or county. Maintain a journal showing costs of the installation. Decide whether you wish to self-insure or transfer the risk to an insurance company. If you wish to transfer the risk, read and understand your policy and its limitations. Be aware of your liability; adequate liability insurance for both personal injury to others and damage to their property is a must. Adequate coverage to protect your own assets from loss should be had and take into consideration replacement cost coverage, the 80% coinsurance clause, a separate HO-48A appurtenant structures endorsement, etc. Should a loss occur, take proper measures in protecting your rights with the insurer and be certain to comply with policy requirements as they relate to your responsibilities under the contract. The vast majority of companies treat their insured fairly, but don't be beaten or badgered out of a fair settlement if you turn out to be insured by one of the very few companies whose integrity leaves something to be desired. If that should happen, see an attorney at once. HAPPY HAMMING! ▣

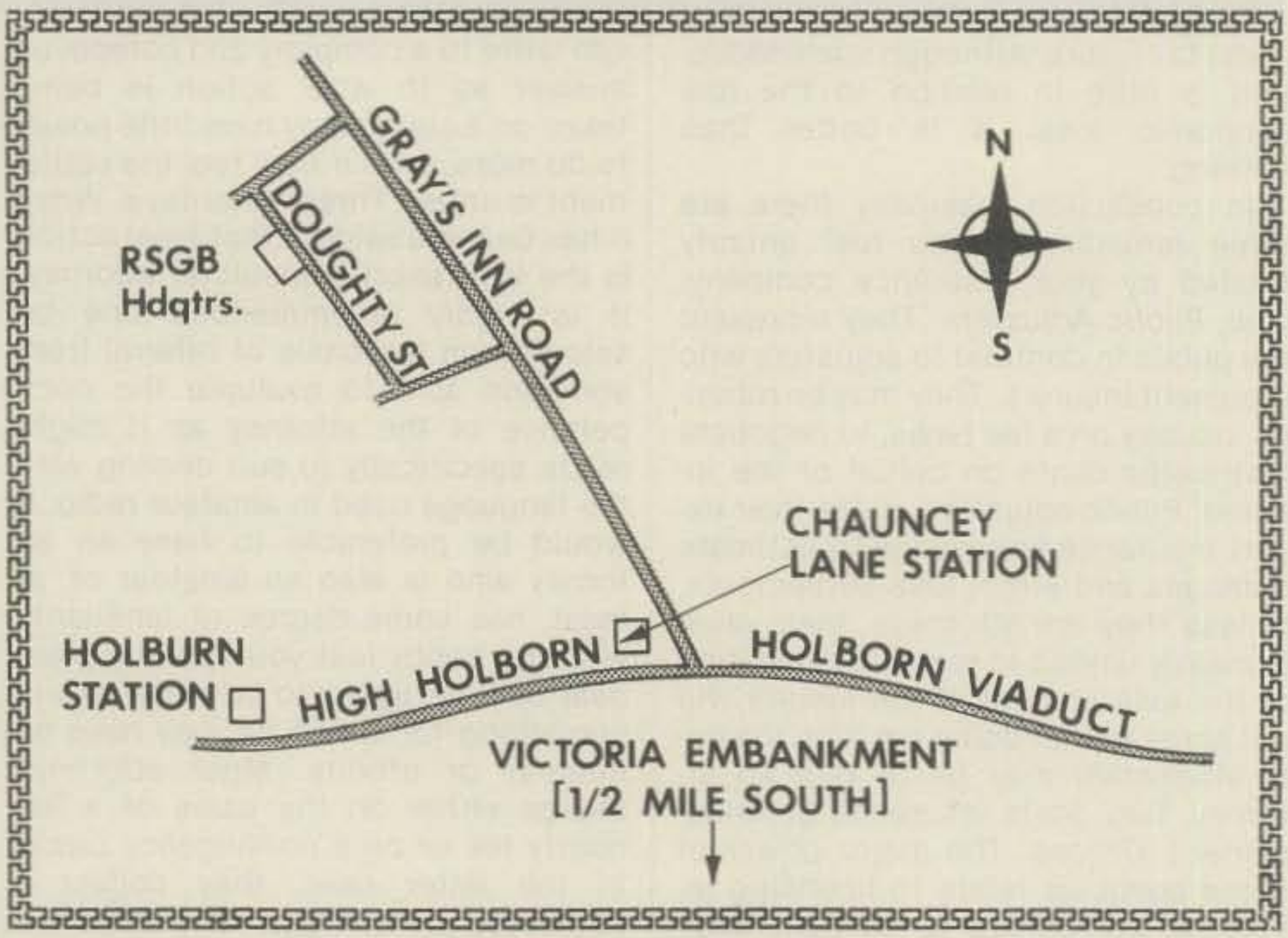
Planning on visiting London for business or pleasure? If you have a little spare time, drop in and visit RSGB Headquarters.

How To Log In At RSGB Headquarters

BY PETER M. HURD*, N1SS/K4NSS

Traditional mid-year vacations by radio amateurs and our families now take us to England in larger numbers due to reduced air fares and increased transatlantic air service. As a frequent traveler to London, it struck me that hundreds of U.S. radio amateurs probably travel within a short distance of RSGB Headquarters each year during business or pleasure trips. Here are some simple, up-to-date hints on how to log in at RSGB Headquarters during your next trip to the United Kingdom.

Location: 35 Doughty Street (Zone WC1); RSGB Headquarters is located in downtown London near the historic home of Charles Dickens. Doughty Street is a small side street which runs generally NW-SW and parallel to Gray's Inn Road in the Holborn District area (see map). If you journey to London with your wife and children, while you discuss the merits of G2FLB's aerial scheme they may prefer to spend an hour or so in the nearby British Museum and British Library complex, adjacent to the University of London. These landmarks are a 12-minute walk from the RSGB. Should your main purpose of a visit be either to speak to a particular RSGB official or purchase a publication, a previsit call to 837-8688 is suggested. The London equivalent of our area code is "01." Normal office hours are from 0845-1645, Monday through Friday. The Society offices are closed on weekends, and public and bank holidays. The Headquarters is located on the east side of Doughty Street (right-hand side as you proceed north). Don't look for a flashing neon sign or spectacular antenna complex to mark your arrival spot—it's a quaint little town house with a limited volunteer staff who will meet you with a warm greeting. Be sure to take along a QSL card for their display board. You will be invited to sign their guest log upon check-in.



Publications: Most RSGB publications are available for either cash (Sterling) or Visa Charge Card purchase. Shelf stock may be low on

* *6425 Cygnet Drive, Alexandria, VA 22307.*

some items such as Pat Hawker's ever-popular *Amateur Radio Techniques*.

Getting to RSGB Headquarters: This should be easy even for the first-time visitor to London. A ten-minute walk from the Chauncery Lane Tube Station (Central Line), RSGB can be reached easily via underground from Heathrow Airport or any of the metropolitan London British Rail Stations. If you are stuck at Heathrow with a three-hour layover, the trip to/from RSGB is a natural time-filler. Proceed from Heathrow Airport to the Holborn Tube Station via the Piccadilly Line. At Holborn, change to the Central Line, then go eastbound for one stop to Chauncery Lane. Exit the Chauncery Lane underground station to Grays Inn Road and walk north. The Heathrow-Chauncery Lane tube fare runs about $2.80 one way. Although it would be possible to take either a taxi or airline bus from Heathrow, you will save both time and money traveling the underground. Once you are in the downtown London area, taxi fares are reasonable if you are on a tight timetable of business or sightseeing. One word of caution about luggage: Storage space—unless arranged with your airline—is nonexistent at Heathrow, so if you are the carry-on traveler, be prepared to walk a total of 1-2 miles on this trip with your luggage. In this case, the taxi fare from Chauncery Lane to/from RSGB Headquarters will be good value for the money.

One other suggestion: Take the family to one of several excellent department stores on Oxford Street and arrange a redezvous place and time. Then hop the tube from the Bond Street underground station to Chauncery Lane (fourth stop, eastbound). They likely will enjoy the London retail landmark "Selfridges" or any of the myraid of shops which abound in that area.

Good luck and enjoy your trip to the RSGB! ▣

Travel Guide To RSGB Headquarters

To RSGB From	Travel Via
Heathrow Airport	"Piccadilly" & "Central" Lines**
Charing Cross BRS*	Northern Line to Tottenham Court; change to Central Line direct to Chauncery Lane Station
Liverpool Street BRS	Central Line Westbound 3 stops to Chauncery Lane Station
Paddington BRS	District Line south to Notting Hill Gate, then Central Line east 8 stops to Chauncery Lane Station
Victoria BRS	Northern Line north to Tottenham Court; then Central Line east to Chauncery Lane
Waterloo BRS	Northern Line to Tottenham Court, then east on Central Line to Chauncery Lane

* *British Rail Station*
** *Underground or tube travel*

Operating from a volcanic island can be tricky. But if you keep your wits about you, and send fast, you can rack up a lot of QSO's before your toes get singed.

Lava Can be More Than A Bar Of Soap

BY ALEX M. KASEVICH*, W1CDC (VP2MBC, VP2MM)

Mt. Misery is located on the island of St. Kitts and is over 4000 feet in elevation. This photo was taken through a porthole on board an Avro 748 aircraft.

When there is a hole in the earth's crust through which any combination of hot rocks, ashes, lava, steam, mud, and gases are expelled, it is a phenomenon called a volcano. The volcanic eruption builds a mountain in the shape of an inverted cone, and after several hundred years, a small crater lake usually forms at the top. Volcanos follow the cracks in the earth's crust or plates in a well-defined distribution pattern. The ring of volcanos surrounding the Pacific Ocean has earned the name "fiery ring of the Pacific." The ring extends from Alaska to Central America and into South America on the eastern shore of the Pacific, and to New Zealand, the East Indies, Japan, Kamchatka, and back to Alaska and the Aleutian Islands on the west and north. Other active volcanos are found in the Caribbean Ocean, East Africa, the Mediterranean area, and in the Mid-Atlantic ridge of the Atlantic Ocean.

Some volcanos, because of their spectacular and violent eruptions, get the most attention and become very well known. There are many volcanos that are quiet, with only an occasional overflow of lava that inches its way down the mountainside. Mount Stromboli in the Mediterranean is an example of a volcano that is moderately but continually active. It does not spew out any solid material but exhibits a constant glow that has been called the "lighthouse of the Mediterranean."

One of the most violent volcanic eruptions in recent history was Krakatoa in the East Indies during 1883. According to various historical reports, the sea is now over 1000 feet deep

*43 Dover Road, Manchester, CT 06040

where the mountain of Krakatoa once stood. The violent explosion was heard over 2000 miles away in Australia. The dust of the eruption remained in the atmosphere and colored the sunsets around the earth for at least three years following 1883. This giant eruption of Krakatoa caused a tidal wave over 50 feet high and took 36,000 lives in neighboring islands.

Mount Pelee, on the West Indies island of Martinique, erupted in 1902 with a resulting death toll of about 30,000 persons. Soon after, the Soufriere on the island of St. Vincent erupted. Mount Pelee had given the warning signs for several weeks before the catastrophic eruption. There had been rumblings and light earth tremors from deep in the earth. Dogs were said to howl excessively, and all animals and birds were showing signs of uneasiness. Unfortunately, the indigenous population held the general opinion of no immediate danger. It was suspected and confirmed by local seismologists that the volcano first emitted a gas which made the people insensible and unaware of the volcanic hazard. Only two persons survived the Mount Pelee eruption, and ironically, one was a prisoner on death row who was being held in an underground cell.

Volcanic activity of the 4000 foot high Soufriere Mountain on the island of St. Vincent in the West Indies dates back to 1718. There was a violent eruption on this 133 square mile island in 1902 that claimed 2000 lives. The Soufriere activity increased in 1971. The water temperature in the crater lake increased and some steam and gases were emitted, but it later returned to its quiescent state.

On Good Friday, April 13, 1979, the Soufriere of St. Vincent island erupted sending hot rocks, ashes, and smoke into the sky. More than 1500 people in the immediate area of Soufriere were evacuated to distant safer places. Emergency centers were set up in schools and community buildings to care for these displaced people.

Forecasting, or prediction, of a volcanic eruption cannot be done with any positive certainty, but two theories have been advanced. One theory states that minor activity in the volcano is an indication of bigger things to come. The other theory says the minor eruptions and activity allow the volcano to lose its power and it will soon settle down and become quiescent.

There is also a volcano in Montserrat that I have visited several times on my DXpeditions to VP2MBC/VP2MM. I find comfort in the second of the two theories. The volcano on Montserrat is continously emitting steam and gases. The second of the two theories

Chances Peak, one of the sleeping giants of the Caribbean, looms high over the quiet, serene Montserrat countryside. Its peak is shrouded by cloud cover most of the time. The southwestern slope appears to open like a large book, exposing the mountain's hot, steaming caldron known as Galway's Soufriere.

There are many dormant volcanos in the Caribbean. In this photo is shown the top of a extinct volcano. The crater has filled with water, forming a large lake, the center of which may extend to enormous depths.

The author is shown here on Montserrat exploring Galway's Soufriere and stepping carefully around the steam, smoke, and sulphur gas near the deep holes that are pressure relief valves leading to the great depths of the volcano.

suggests there will not be a build up of extremely high internal pressures within the volcano to cause a major eruption. This second theory is also quite comforting when you are standing on the edge of the crater looking down into the bubbling, boiling, and rumbling hot mud and earth of the volcano. It is also comforting when your DXpedition is running full blast in enormous pileups within a few miles of the sleeping giant volcano. In the West Indies, these sleeping giants are located on St. Vincent, Martinique, Guadeloupe, St. Lucia, Montserrat, and other islands.

The volcanos certainly add to the thrill of a DXpedition. Yes, I am going on another DXpedition very soon. I can stand the stress of the transportation problems for me and my complete transportable ham shack. I can stand the stress of the enormous pileups, the logkeeping, and the later QSL problems. You may also have noticed, I can stand the stress of the sleepless night.

The stress of the volcano is another problem that I perhaps cannot handle. Maybe the volcanic earth will open up and swallow me in one large bite. It may be over so fast I will not realize when it is happening. However, as a dedicated DXpeditioning DXer, I will be on the air the last possible minute attempting to get your call into my log book amidst the fiery ashes and hot lava. With that in mind, please do not ask me to send slower. As some have asked, " Why are you going like the world is on fire?" My answer is, "Gee fellers, it really is!!" 73

Reference: The "Caribe 1978" VP2MBC, PJ8USA DXpedition, *Montserrat Mirror.*

A sacriligious re-examination of current wave propagation theory and proposal of a new, more comprehensive and logical alternative. Noted Canadian contester VE3BMV dares to challenge traditional thinking. Don't be intimidated by the title; this is an emminently readable, fascinating, and thoroughly thought-provoking article.

Electromagnetic Wave Propagation By Conduction

An Innovative Theory Based on Fiber Optic Analogy

BY YURI BLANAROVICH,* VE3BMV

Quite often new advances in technology and measuring equipment, given the right opportunity and timing, can produce some surprising results. In my case it was the opportunity to advance from wire and vertical antennas into rotatable antennas. Being interested in the mechanics of radio wave propagation, observing the various modes of propagation and trying to put two and two together, I was not always satisfied with available explanations in the literature. The matter was aggravated when I started to play with high performance antennas: the Razor Beam of my own design. The first version of Razor consisted of 3 Quad and 2 Yagi elements. The next version—on a 60 foot boom—consisted of 7 elements: Yagi reflector, Quad reflector, two Quad driven Log cell elements, Quad director, Yagi director and Yagi director. Two stacked antennas were used on the 15 meter band, the top being at 106 feet and the bottom at 51 feet or alternately at 37 feet above ground. The antennas exhibit a very clean and sharp pattern with back and side lobes being down about 50 dB from the main lobe. The antennas were designed experimentally on 144 MHz models. As far as I was able to tell, those antennas produced maximum obtainable gain per given boom length with excellent front-to-side and front-to-back lobes. (More information on those antennas will be given in future articles.)

Being a dedicated contester, the real test of the antennas came in the contest fire. The excellent *CQ* contests, presented exceptional opportunities to observe ionospheric propagation. With the—Razor Beams, a telescope instead of field glasses. A number of things could be observed that normally would be unnoticed when using "ordinary" antennas.*

The *CQ* contests allowed me to observe a number of anomalies and exceptions to present propagation theories by virtue of the great amateur population on the air at the same time all over the world. At least 5000 stations were active on the 15 m. band.

The stacked antenna system allowed me to observe various angles of radio wave propagation and revealed some interesting facts. The deeper I got into my observations, the more I became convinced that the present theory of electromagnetic wave propagation telling us of signals bouncing between the ionosphere and the earth is not all consistent and perhaps not valid. More thinking and sorting out of ideas led some interesting conclusions that I would like to present here. It is my hope that this article will stir up quite a bit of controversy and discussion, and that it will contribute to the clarification of the matter. I believe that we are faced with another great opportunity for Amateur Radio to demonstrate it's ability to contribute to the science of radio communications.

Presented here are observations that I was able to collect in the limited time available (it *is*, after all, only a hobby). Some of the findings are summarized here. More work must be done to collect more accurate supportive evidence. In future articles I would like to elaborate more on some aspects of the subject with perhaps wider participation by other Amateur Radio operators world-wide.

Reflective Theory

The present radio wave propagation theory is based on the assumption that radio waves are propagated by reflections from a mirror-like ionosphere, returning to the earth's surface, bouncing off it back to the ionosphere and so on. Let's have a good look at this theory and where and how it started, and how valid it is.

Lets call the present propagation theory "reflective", so we can refer to it easily.

Marconi, in 1901, made his first DX contact across the Atlantic accomplishing something that his theoretical friends considered impossible

---

* *Box 292, Don Mills, Ontario, M3C, 2S2, Canada.*

*They also helped to achieve excellent results from relatively ordinary country—VE—and produced two world records in the *CQ* WPX SSB and CW contests, even with the operator being relatively out of shape!

-spanning a great distance with low power. According to calculations it was impossible to achieve such communication by propagating the signal over that great distance because with distance the signal would get so weak, that it could not be detected. A different phenomenon was at work that would allow propagation of signals beyond the line of sight.

Heinrich Hertz had demonstrated that radio waves propagated in straight lines and found that their direction could be altered by reflective surfaces of conductive material. In 1902 it was suggested in two independent studies by Kennelly from the US and Heaviside from Great Britain that the upper atmosphere consisted of an electrically conducting region that deflected signals across the Atlantic. In 1924 the British scientist. Appleton apparently discovered the electrified region and in 1925 he and his co-workers supposedly found conclusive evidence of its existence by measuring the angle of arrival of radio signals from a nearby transmitter. They figured that signals could only arrive from one direction - by reflection from the area in the earth's atmosphere about 100 miles high. For this work Appleton was Knighted by the British Empire.

In 1925 Briet and Tuve transmitted short bursts of radio energy vertically and detected echoes which they figured could be reflected only by the ionosphere.

Reflections are only one possible explanation for getting the signals from the sky at those angles. Too bad they did not get exposed to more work that was being done in optics at that time. In 1870 John Tyndall presented the earliest recorded scientific demonstration of a peculiar optical phenomenon - light being trapped in a stream of water. In his demonstration he used an illuminated vessel of water and showed that, when a stream of water was allowed to flow through a hole in the side of the vessel, light was conducted along the curved path of the stream. This was the closest thing to fiber optics. Lenses were already known. Too bad they did not see the similarity between radio waves and light, and get the idea of another way of propagating radio waves. Things had to wait. Today we know that light is on the high end or the electromagnetic wave scale.

So this was a handy explanation: "mirrors in the sky" reflecting radio waves back to earth; it was generally accepted. The idea has carried until the present. Any anomalies were judged as exceptions and all kinds of explanations have been tried in order to explain the mechanics of unusual propagation modes.

A Critical Look

Let's have a look at the reflective theory and see how well it fits real life. The first thing that really hit me is the scale to which all those nice pictures are drawn. It is immediately noticeable that the earth is usually drawn in one scale and the ionospheric layers are drawn in another scale, about 10x. See fig. 1 showing the typical picture shown in the literature. It explains how signals might reflect but it does not approximate the real geometric condition. Figure 2 shows the earth and the ionosphere drawn to scale. The average height of the F1 layer is around 180 km and the F2 layer about 500 km on a summer day. Assuming an average launch angle of 11° on the 20 m. band, it seems that we need about four hops to propagate a signal one quarter way around the earth. Now if we work Europe on long path, we'd go about twelve hops. Considering the natural dispersion of the signal with distance and loss per reflection off the ionosphere and the earth,

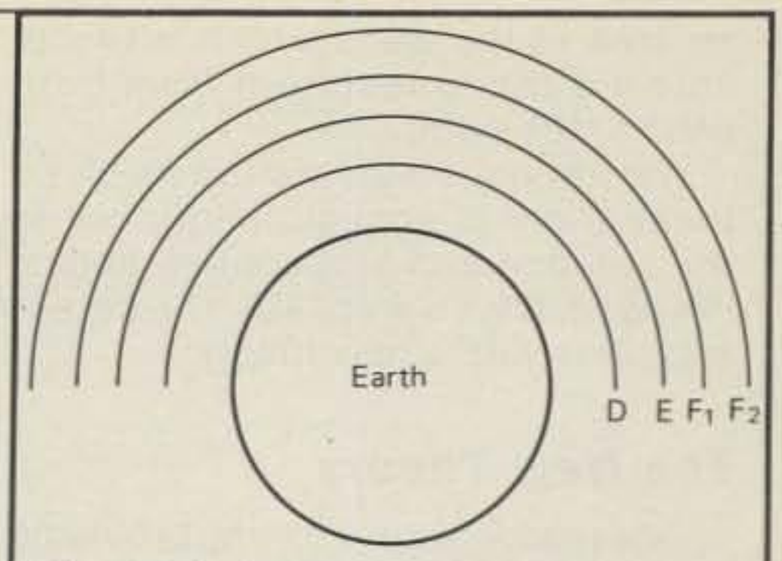


Fig. 1- Typical presentation of ionospheric layers grossly distorts actual relative sizes and distances.

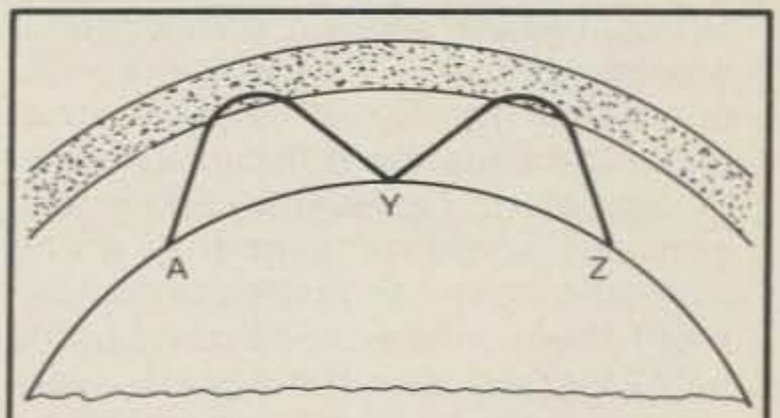


Fig. 3- Conventional graphic representation of ionospheric reflection.

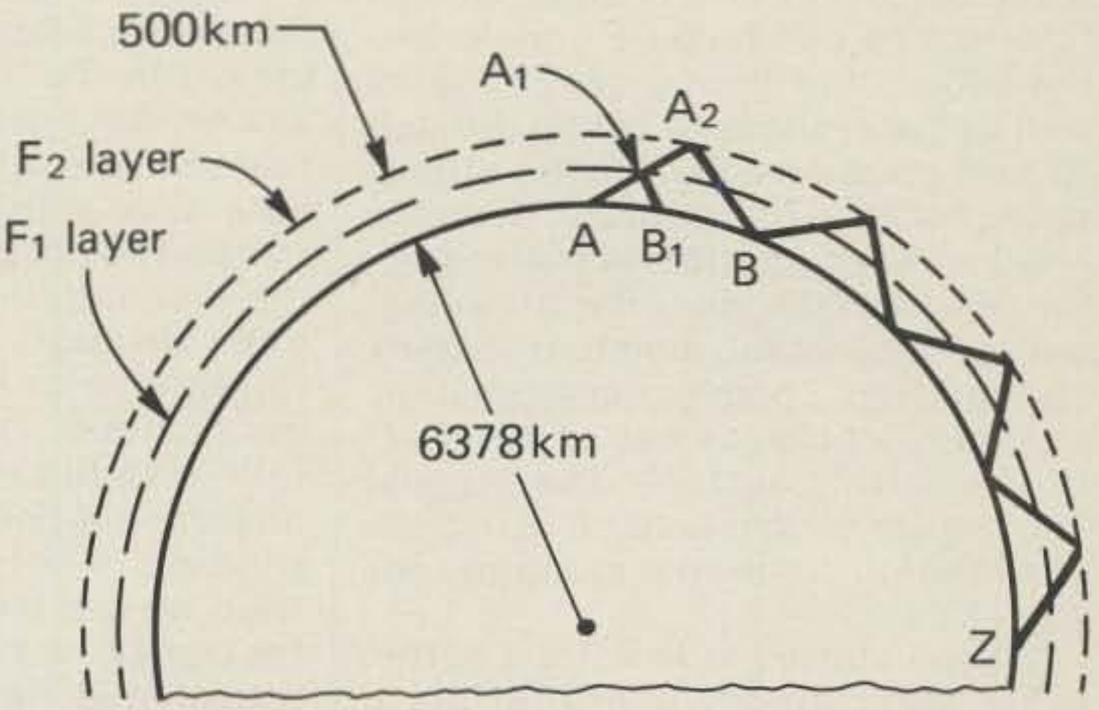


Fig. 2- When the earth and ionosphere are drawn to scale, and accurate geometry is applied, the unlikely situation of four F2 reflections for a North America to Europe contact becomes evident. Long path would require twelve such reflections.

it seems to me that it is very unlikely that we could have any signal left at the other end.

Another questionable thing is the mechanics of the reflection from the ionosphere. Figure 3 shows the typical picture used in the literature explaining ionospheric reflection. In order to reflect signals one would expect a good reflective surface, larger in size than the wavelength and of good conductivity (reflectivity) with clearly difined surface border. But we know that the ionosphere (atmosphere?) is very thin and molecules are far apart from each other. I find it hard to believe that we can get sufficient reflection of signals from that type of medium to yield the signal levels experiencing in Amateur Radio. The shape of the curve is also very unusual, it looks like refraction over about 270°. In reality, the ionosphere would rather absorb the energy than "turn it around". So I am not very convinced that the mechanics of reflection are all that clear and acceptable.

Various propagation modes that cannot be explained by present theory are labeled as exemptions and there is great deal of speculation and explanation trying to find the place for them and make them fit the theory. For example, transequatorial v.h.f. propagation: signals bouncing off ionized bubbles; one way skip: investigation inconclusive; sidescatter, backscatter: bouncing a signal from

an area of the earth which is reachable via the ionosphere from both ends of the path.

We will not elaborate too much on them; there is enough mentioned in the antenna and propagation books. We will try to explain these exemptions with a new theory.

The New Theory

One reason we are having problems understanding the mechanics of radio wave propagation is the fact that it is very difficult if not impossible to simulate the real situation in a laboratory set-up. We are dealing with sizeable objects such as the earth, the atmosphere and number of variables that make the situation difficult to model here on earth. The best we could do is conduct some experiments using available means and perhaps complement them with studies done using satelites and electromagnetic wave sources here on earth or in space.

The closest analogy we understand and have available is optics and fiber optics. Radio waves and light have one thing common - they are electromagnetic waves with different wavelengths. Recent advances in fiber optics can help us understand the behavior of light propagation as well as radio waves. It is still difficult to find good analogy for the atmosphere because of its nature, there are great number of variables such as variance of height, density, pressure, dielectric constant, moisture content, temperature, chemical composition, charged particles as well as the effect of the earth's surface. The biggest contributor to ionospheric variations is radiation from space, mainly the sun.

When I started to look for a better, more satisfactory explanation of radio wave propagation it struck me that there must be more "conductivity" going on up there than reflection. During my observations over the past six years I came to the conclusion that radio waves propagate in a medium that resembles a cloud or across between a cloud and fiber optics.

The basic of the new propagation theory can be summarized in the following statments:

A majority of the radio waves are refracted and propagated - conducted -along the borders of media with different dielectric constants and are accompanied by scintillation.

The geometry propagation is dependent on the frequency used and the condition of the atmosphere.

The propagating medium has a cloud-like formation with the density and conductivity varying along its profile and dependent on the physical condition of the atmosphere and the amount of radiation from space.

Intrepretation

It is quite difficult to accurately visualize the mechanics of the radio-wave propagation. We are dealing with a three dimension medium with varying density and a cone of radio signals propagating through that medium. The situation is also complicated when considering a broad specturm of frequencies and different angles of refraction and conductivity dependent on the frequency.

In order to clarify the situation and to make it easier to understand we will make some simplifications. The beam of transmitted radio signal will be simplified and shown as a ray. We will use a solid line for relatively strong signal, broken line for medium strength and the dotted line for the weak signal. Density or radio-conductivity will be shown as a heavier shaded area for better conductivity and the lighter shading for worse conductivity.

Looking at figure 4 we have the earth and the atmosphere drawn to scale. The signal is transmitted from the point A. Signal strength decreases rapidly in the line of sight distance and we don't get much signal beyond point B. The main lobe of the antenna puts more signal into the space. Refraction begins at point C. A portion of the signal gets refracted, a portion goes through as shown at D. The refracted signal continues through the points E, G and H, more or less following the curvature of the layer and scintillating along the path. Scintillation is noticed and received as what we call backscatter or sidescatter signals. A portion of the signal is refracted along its path and received at the points W, X, Y, Z. Part of the signal continues through point D to F, where it either gets refracted or escapes into space at S. A portion of the signal from the higher path can be refracted back to earth at point K, at a different angle and combine with the signal propagated by the lower path causing considerable QSB. This is a simplified view of what is happening "up there." In a real life situation it gets a little bit more complicated due to the wider beam width of the transmitted signal, irregularities in the medium, and the range of frequencies and angles of the transmitted signal.

There is an indication that the speed of travel or propagation of the radio waves can vary in different layers and this combined with the scintillation or scattering of the signal, can be observed as Doppler shift of signal's frequency.

Scintillation in this case can be compared to the situation where we have a strong source of light with its beam going through the patch of fog or smoke. Particles of fog will be "glowing" or scintillating and become visible - detectable by our receivers -our eyes. Portion of the beam will continue to propagate after passing through the fog patch.

Supporting Evidence

When observing the rising or setting of the sun and moon we observe refraction of light in the layers of the atmosphere. It is well known fact that sun or moon can be "seen" after they actually set below the horizon, the lag being about 12 minutes in time. Also the image or the size of the sun quite often appears to be larger than normal. This is definitely not reflection. We do not see the "mirror image" but the actual "picture." The same thing is happening when we travel along the highway during a hot summer day. Hot air above the road's surface causes the refraction of light rays and we can see the images of the objects that are actually slightly higher. (sky, fence, etc.) They are moved and blank out the background. The same is happening with 'Fata Morgana' in the desert.

Why should not radio waves behave in the similar manner? Light is electromagnetic wave with very short wavelength. The longer wavelengths are easier to refract or bend and harder to reflect.

During our "muscle flexing" with VE3HGN, who is about 70 miles East of my QTH, we have noticed an interesting phenomenon. While comparing antennas and during tests with overseas stations we found a shift in frequency on our signals when compared to the frequency of the DX station. First we thought that it was a flaw in my equipment, but repeated checks with DX stations confirmed that we were both dead-on the same frequency. But when listening to each other we were about 500 Hz lower in frequency. That could only mean that there is Doppler shift occurring somewhere. That, to my knowledge could be caused by a moving media or source, or perhaps different speeds of propagation being observed from the side. If there is a difference in the speed, of propagation, it would mean that the signals are propagating in the layers by conduction rather than reflection.

Another form of this effect can be observed when passing under the high tension power lines and listening to the car radio on the a.m. band. Depending on the location of the transmitting station and the direction of power lines, when passing under the

6 Meters + ICOM + Sunspots = The best DX

ICOM's 551D is Essential to the 6 mtr DX Formula.

The IC-551D is the high powered brother to the ICOM IC-551. With an 80+ watt output, you have all the punch you need for that really good DX when the Sunspots are working for you. The 551D has the same no-backlash, no-delay dual VFO light chopper system, coupled to the microprocessor for split frequency as well as completely variable offsets.

For quick access to DX excitement, three memories are provided for programmed beacon watching, which can be scanned and programmed to stop on the first one heard. A room full of white noise is no longer a problem with ICOM. Pass band tuning and VOX are included at no extra cost.

SPECIFICATIONS

Frequency Coverage: 50~54MHz

Power Supply Requirements:
13.8V DC±15%, negative ground
Current drain 18A max.
(at 200W input). AC power supply speaker console is available for AC operation.

Emission Modes:
A3J SSB (USB/LSB)
A1 CW
A3H AM
F3* FM

Dimensions: 111mm (H)×
241mm (W)×311mm (D)

Weight: 6.6kg

Sensitivity: SSB/CW/AM
Less than 0.5μV for 10dB S+N/N
FM* More than
30dB S+N+D/N+D at 1μV

Squelch Sensitivity: SSB/CW/AM 1μV
FM* 0.4μV

Selectivity: SSB/CW/AM
More than ±1.1 KHz at -6dB
Less than ±2.2KHz at -60dB
Adjustable to 1KHz at -6dB
FM*
More than ±7.5KHz at -6dB
Less than ±15KHz at -60dB

*Only when FM Unit is installed.

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

ICOM

ICOM AMERICA, INCORPORATED

Sales Service Centers located at:

2112 116th Avenue NE
Bellevue, WA 98004
Phone (206) 454-8155

3331 Towerwood Dr., Suite 307
Dallas, TX 75234
Phone (214) 620-2780

ICOM INFORMATION SERVICE CQ
2112 116th Ave., N.E.
Bellevue, WA 98004

Please send me: ☐ IC-551D specifications sheet; ☐ full color ICOM Product Line Catalog; ☐ List of Authorized ICOM Dealers.

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

You may send a machine copy of this form

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

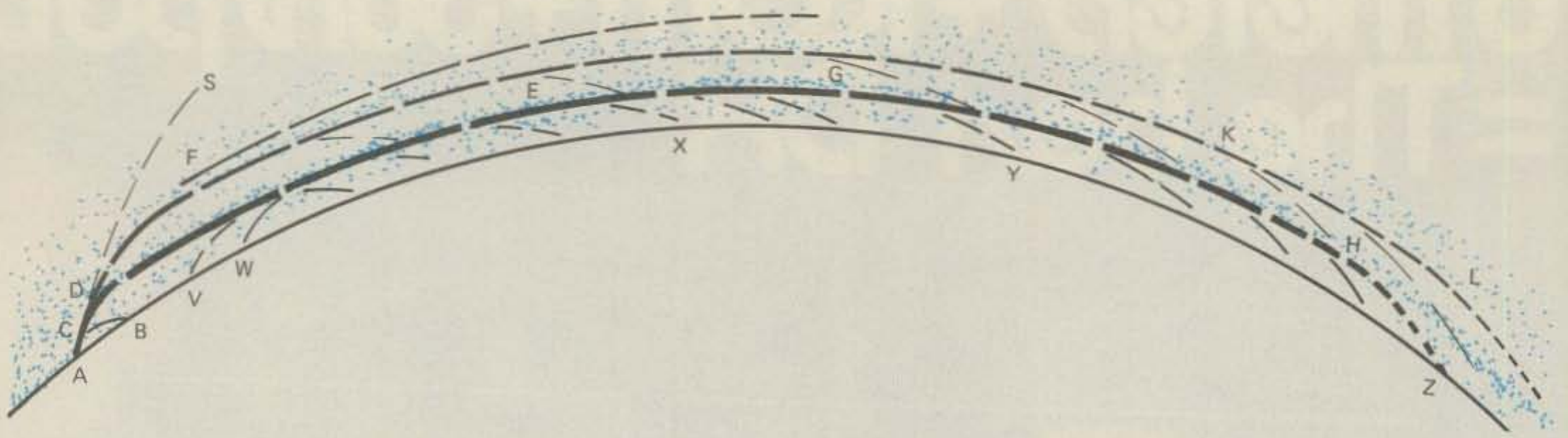


Fig. 4- Scale drawing of a portion of the earth and a conductive ionosphere showing wave propagation.

wires a sudden frequency shift if observed, very similar to what we call selective fading. This can be explained by the different speed of propagation of the signal along the wires as opposed to the speed of propagation in the air. This "selective fading" is noticeable on h.f. and the frequency shift can be also observed on the s.s.b. signals coming from Europe. During contacts with OK2RZ on 15 m. I have observed QSB of his signal and at the same time slightly frequency shifting of his signal.

Familiar "Artic Flutter" and raspy signals propagated from the Aurora are another example of the frequency shift caused by propagation of the signals through the medium. Arctic flutter can be simulated by tuning two receivers to the same signal and slightly detuning one receiver's v.f.o. The signal will sound as if it just passed over the pole, with familiar flutter. With the signals propagated through the auroral region, there is multiple frequency shift apparent, making s.s.b. signal reception almost impossible. Another noticeable feature of this frequency shift is the absence of the higher notes in the audio response of the shifted signals.

Known "Negative Doppler Effect" observed on the satellite signals can also be attributed to frequency shift caused by propagation.

Frequency shift has been observed to be present when experiments were carried out in both directions, east and west. It appears to be present at times on signals going across the Atlantic, but it is harder to detect due to the dominating "direct" signal. It is also more difficult to detect the shift on DX signals, because the shift will be more or less the same in both directions, therefore both stations will be "on the same frequency."

One important thing is apparent from this: when one is trying to calibrate his receiver to WWV, and his QTH is such that he is receiving a "backscatter" signal, then there is good chance that he might be off by about 500Hz.

Let's assume for now that signals are propagated by conductivity rather than reflections and we will have a look at the various modes of propagation and see how well they fit the theory. More detailed descriptions, will be presented in subsequent articles.

Short Path

Lets assume the simplified situation for the purpose of understanding the geometry of various modes of propagation. We will assume again that we have single ray of radio signal and simplified model of the atmosphere.

Figure 5 shows the average situation where signal is transmitted from point A and gradually bends, refracts through the atmosphere with a gradually changing dielectric constant reaching point D, placed on a more distinct border of two layers with different dielectric constants. The main portion of the signal follows the border along line D, E, G. A portion of the signal refracts back to the earth and allows us to receive the signals with relatively even strength along line W, X, Y, Z. Depending on the refractive angles we can receive signals under low or higher angles as shown along D-W and D-X. Point V gets almost no signal, because the angles of refraction will not supply any signal. Very weak signals can be onserved at point V "seeing scintillation at points E and G under low angles with low angle antennas. It appears that we are propagating the signals at considerably lower heights than previously thought. The dotted line shows the path A-M-W as explained by the reflective theory.

A portion of the signal transmitted from the point A is transmitted at a different angle and is refracted or partially refracted and reaches another layer or escapes into space as shown at A-C and A-C'.

Having antennas with low angle of radiation extends the useful range of propagation under adverse conditions with lower angles of refraction.

Day - Night Variations

Let's have a look at the typical path of a signal radiated at a 45° beam heading from VE3 over Europe to Asia, fig. 6. The Sun is over Europe, it's morning in North America, and evening in Asia. The atmosphere is warmed by radiation from the sun raising the height of the layers and changing the dielectric constant of the media affecting the refractive angles. The hump over Europe causes the signal to change its direction - refraction -and this is experienced as a "black out" following noon local time in that area. Some weak signals are being heard, with the typical hollow sound. This is mainly the result of scintillation. It is very difficult to make the contacts from OK to other areas. VE and UA0 have no problems communicating, with conditions actually peaking at UA0 This is a changing situation with time of day, radiation from the sun, frequency, and angles of refraction. Shown example is typical for higher frequencies in the range of 14 - 30 MHz. There is a delay of about 2 hours between the local noon and the "hump."

It is known that with increased sunspot activity the thickness of the atmosphere increases. (This caused Skylab to come down prematurely). This also increases the height of the propagating layers and therefore increases the height and length of the "arches", it allows us to span longer distances and extends propagation later into the night.

We have been told that during peaks of solar activity the lower frequency bands are very poor, mainly because of attenuation of the D layer of the ionosphere. On the contrary, the propagation on the low bands has been better than what we experienced during the sunspot minima. The 40m.

band has longer openings to remote areas of the world. Eighty meters is the same; we are hearing Europeans around 6 p.m. local time. During the 160m. *CQ* Contest I was hearing G stations for about 8 hours during the night. It appears again that the refracting layers are higher, allowing us to work longer distances with stronger signal levels.

It appears then that with higher sunspot activity, the average height of the media increases, refraction of higher frequencies improves, allowing us to work further and increase the number of useful frequencies for communication.

Long Path

We have no problem explaining long path propagation. It is just an extension of the short path propagation with the signals following the higher layers where the losses can be lower and signals attenuated less. We still get the refraction towards the earth and the signals are heard along most of the path. See fig. 7. The path does not have to be in a straight line. Quite often we experience skewed path. The skewed path can be the result of side refraction which will produce quite strong signals, or caused by scintillation, characterized by low angle and weak signals.

The best case of long path would be the situation when signals get "trapped" in layers with low attenuation, and travel a number of times around the earth causing long delayed echoes. There is also the possibility that signals might enter Van Allen belts and propagate within the belts.

The best answers could be provided by satellites. Observation of the various satellite signals will help to clarify a number of unanswered questions. Any room left in the space shuttle?

Grey Line Propagation

In the case of gray line propagation we have a situation where the medium is more or less at the same height, the refractive layers are more uniform, without major humps and therefore allow us to propagate signals along that path over quite wide range of frequencies with relatively small attenuation or refraction in the unwanted directions. Again the low angle antennas should perform best. When the signals are aimed in the direction of the grey line, just about any point on earth on the grey line can be communicated with especially at the lower frequencies.

One Way Propagation

Quite often we experience a sort of

KENWOOD
...pacesetter in amateur radio

Easy selection.

15 memories/offset recall, scan, priority, DTMF Touch-Tone®

TR-7800

Kenwood's remarkable TR-7800 2-meter FM mobile transceiver provides all the features you could desire for maximum operating enjoyment. Frequency selection is easier than ever, and the rig incorporates new memory developments for repeater shift, priority, and scan, and includes a built-in autopatch DTMF encoder.

TR-7800 FEATURES:

- **15 multifunction memory channels, easily selectable with a rotary control**

  M1-M13...memorize frequency and offset (±600 kHz or simplex).
  M14...memorize transmit and receive frequencies independently for nonstandard offset.
  M0...priority channel, with simplex, ±600 kHz, or nonstandard offset operation.

- **Internal battery backup for all memories**

  All memory channels (including transmit offset) are retained when four AA NiCd batteries (not Kenwood-supplied) are installed in battery holder inside TR-7800. Batteries are automatically charged while transceiver is connected to 12-VDC source.

- **Priority alert**

  M0 memory is priority channel. "Beep" alerts operator when signal appears on priority channel. Operation can be switched immediately to priority channel with the push of a switch.

- **Extended frequency coverage**

  143.900-148.995 MHz, in switchable 5-kHz or 10-kHz steps.

- **Built-in autopatch DTMF (Touch-Tone®) encoder**

- **Front-panel keyboard**

  For frequency selection, transmit offset selection, memory programming, scan control, and selection of autopatch encoder tones.

- **Autoscan**

  Entire band (5-kHz or 10-kHz steps) and memories. Automatically locks on busy channel; scan resumes automatically after several seconds, unless CLEAR or mic PTT button is pressed to cancel scan

- **Up/down manual scan**

  Entire band (5-kHz or 10-kHz steps) and memories, with UP/DOWN microphone (standard)

- **Repeater reverse switch**

  Handy for checking signals on the input of a repeater or for determining if a repeater is "upside down"

- **Separate digital readouts**

  To display frequency (both receive and transmit) and memory channel.

- **Selectable power output**

  25 watts (HI)/5 watts (LOW).

- **LED bar meter**

  For monitoring received signal level and RF output.

- **LED indicators**

  To show: +600 kHz, simplex, or -600 kHz transmitter offset; BUSY channel; ON AIR.

- **TONE switch**

  To actuate subaudible tone module (not Kenwood-supplied).

- **Compact size**

  Depth is reduced substantially.

- **Mobile mounting bracket**

  With quick-release levers.

See your Authorized Kenwood Dealer now for details on the TR-7800...the remarkable 2-meter FM mobile transceiver!

NOTE: *Price, specifications subject to change without notice and obligation.*

Subject to FCC Approval

MATCHING ACCESSORY:

- KPS-7 fixed-station power supply

TRIO-KENWOOD COMMUNICATIONS INC.
1111 WEST WALNUT/COMPTON, CA 90220

High quality...top performance!

Maximum convenience with optimum features

TS-180S

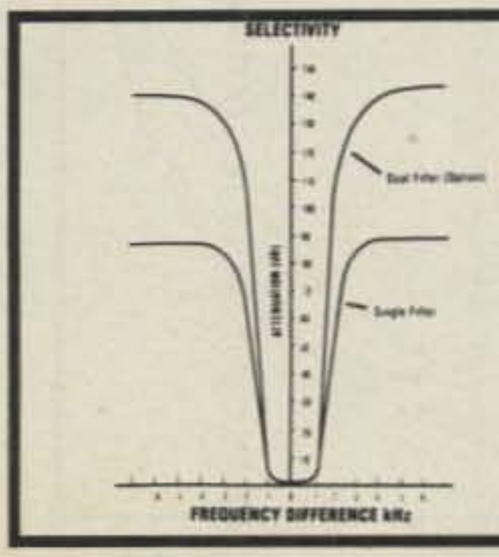
The TS-180S is Kenwood's top-of-the-line all solid-state HF SSB/CW/FSK transceiver. New circuit-design technology has been incorporated throughout the transceiver, resulting in optimum receiver and transmitter performance, as well as advanced operating features that every DXer, contest operator, and all Amateurs would desire for maximum efficiency and flexibility.

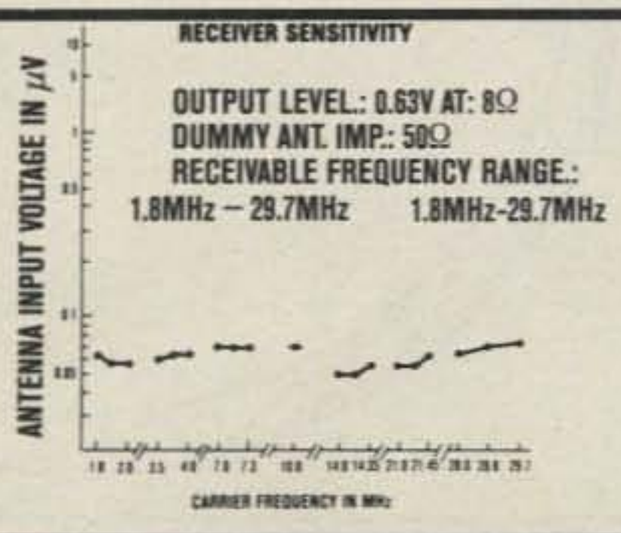
TS-180S FEATURES:

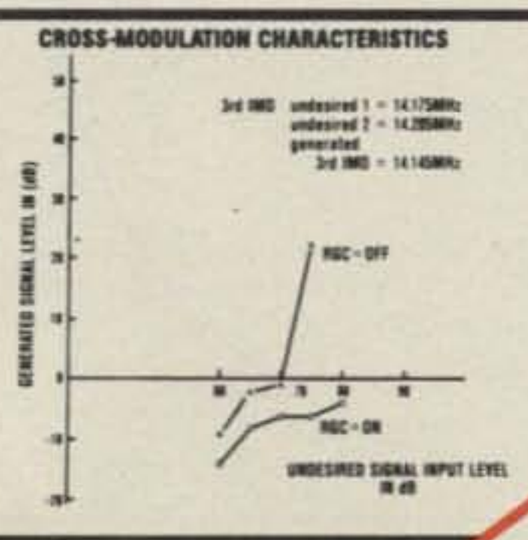
- Digital Frequency Control (DFC), including four memories and manual scanning. Memories are usable in transmit and/or receive modes. Memory-shift paddle switches allow any of the memory frequencies to be tuned in 20-Hz steps up or down, slow or fast, with recall of the original stored frequency. It's almost like having four remote VFOs!
- All solid-state...including the final. No dipping or loading. Just dial up the frequency, peak the drive, and operate!
- High power...200 W PEP/160 W DC input on 160-15 meters, and 160 W PEP/140 W DC on 10 meters (entire band provided). Also covers more than 50 kHz (100 kHz with DFC) above and below each band (MARS, etc.), and receives WWV on 10 MHz.
- Adaptable to all three new bands.
- Improved dynamic range.
- Dual SSB filter (optional), with very steep shape factor to reduce out-of-passband noise on receive and to improve operation of RF speech processor on transmit.
- Single-conversion system with highly advanced PLL circuit, using only one crystal with improved stability and spurious characteristics.
- Built-in microprocessor-controlled large digital display. Shows actual VFO frequency and difference between VFO and "M1" memory frequency. Blinking decimal points indicate "out of band." Monoscale dial, too.
- IF shift...Kenwood's famous passband tuning that reduces QRM.
- Selectable wide and narrow CW bandwidth on receive (500-Hz CW filter is optional).
- Automatic selection of upper and lower sideband (SSB NORM/SSB REV switch).
- Tunable noise blanker (adjustable noise-sampling frequency).
- RF AGC ("RGC"), which activates automatically to prevent overload from strong, local signals.
- AGC (selectable fast/slow/off).
- Dual RIT (VFO and memory/fix).
- Three operating modes...SSB, CW, and FSK.
- Improved RF speech processor.
- 13.8 VDC operation.
- Also available is the TS-180S without DFC, which still shows VFO frequency and difference between VFO and "hold" frequencies on the digital display.
- Full line of matching accessories, including PS-30 base-station power supply, SP-180 external speaker with selectable audio filters, VFO-180 remote VFO, AT-180 antenna tuner/SWR and power meter, DF-180 digital frequency control, YK-88 CW filter, and YK-88 SSB filter.

All of these advanced features can be yours... and at an attractive price! Visit your local Authorized Kenwood Dealer and inquire about the exciting TS-180S with DFC!

NOTE: *Price, specifications subject to change without notice and obligation.*







SPRING SPECIAL
STARTS APRIL 1
Ask your Authorized Kenwood Dealer

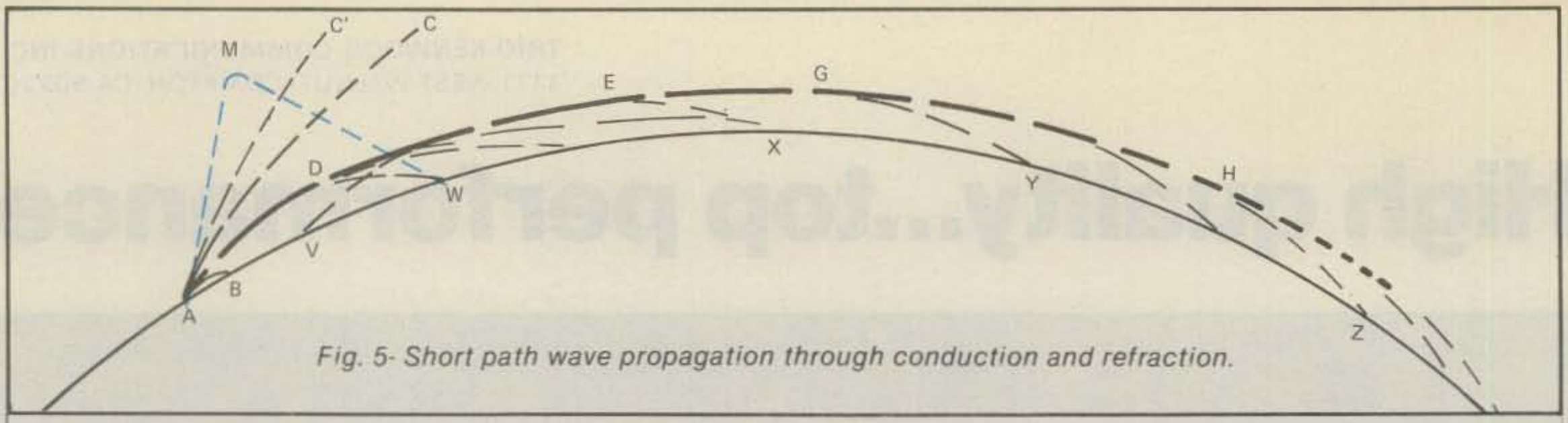


Fig. 5- Short path wave propagation through conduction and refraction.

one way propagation, *i.e.*, on the 40m,. band East Coast to Europe in the late afternoon. Strong signals from Europe are heard, but it is nearly impossible to work the Europeans. When switching between high and low angle antennas there is almost no difference. Later on, signals become stronger on the low angle antenna and contacts become possible.

This can be explained by scintillation, such as we can see on the end of a fiber optic fiber. When light exits the fiber and there are some impurities, it disperses the light at various angles. It is very difficult to enter the fiber under those conditions. A similar situation can exist with our radio signals and the conducting layers. Another form of one way propagation can be caused by different refractive indexes at both ends of the path. Going in the one direction signals can be refracted gradually and due to local conditions at the other end they can exit or be refracted towards the earth. For the transmitted signal the angle of refraction can be different and it will not refract the transmitted signal into the same layer that the received signal is coming over.

Transequatorial VHF Propagation.

This type of propagation was discovered when stations located close to the same meridian were able to work each other, typically across the equator. Contacts were made between KP4 and LU. The world record on 2m. is between 5B4 and ZS. The propagation usually peaks just after sunset.

This appears to be another form of grey line propagation, where we have uniform medium with gradually changing height around the equator, refracting signals over great distances. I would predict that given good conditions it might be possible to establish the contacts on the 2m. band between the VE and LU.

VHF Propagation

Various modes of v.h.f. propagation can be explained and understood better by applying the new theory. If refraction and scintillation are considered, then we can explain most of weird modes of v.h.f. propagation. Refraction then replaces reflection and scintillation replaces scatter. It also appears as mentioned earlier, that signals are propagated (refracted) at lower heights then previously considered assuming reflection by the ionosphere. Horizontal polarization seems to be better for the long haul v.h.f. propagation probably due to the fact that the orientation of borders of the media with different dielectric constants are oriented horizontally, enhancing the refraction of horizontally polarized signals.

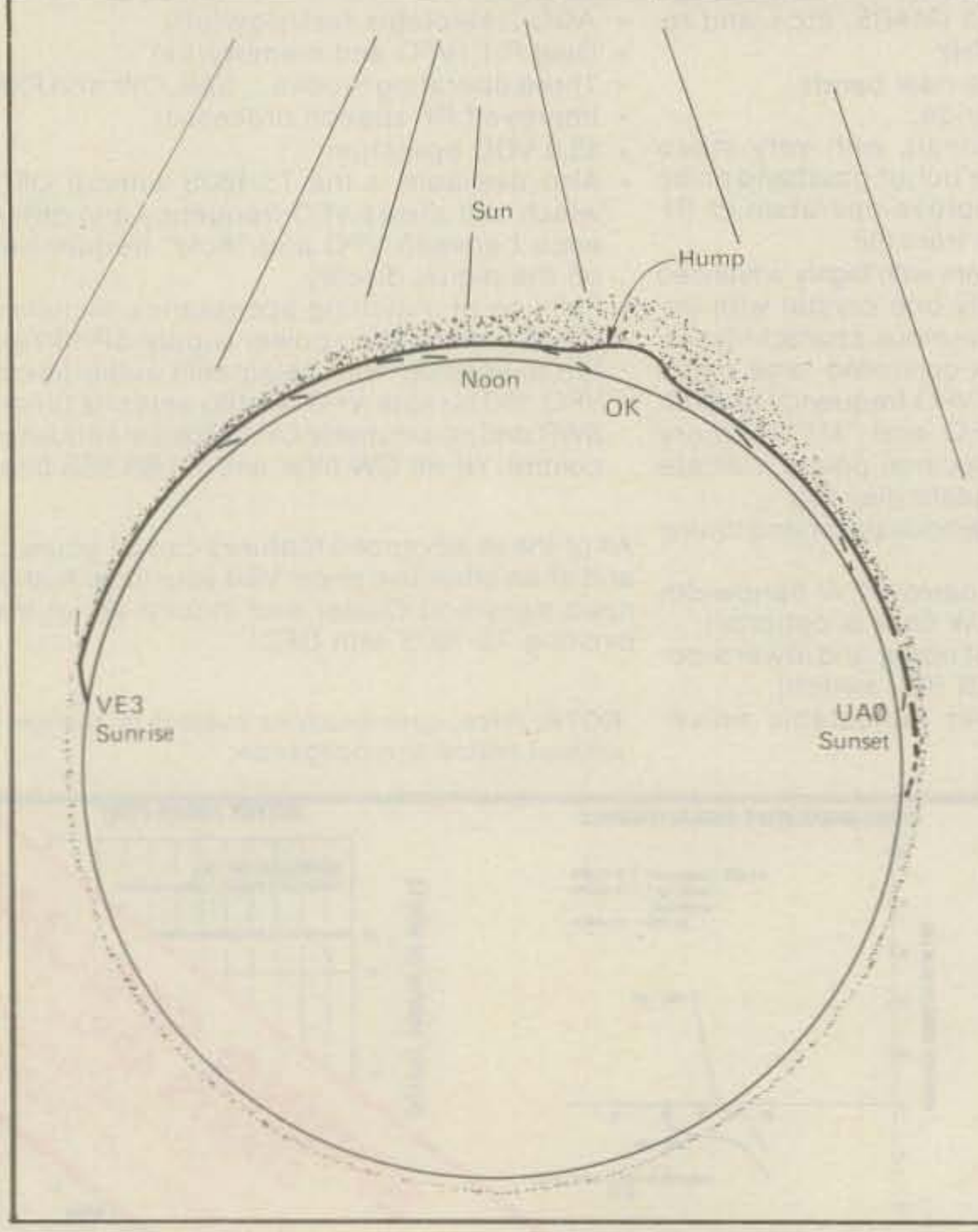
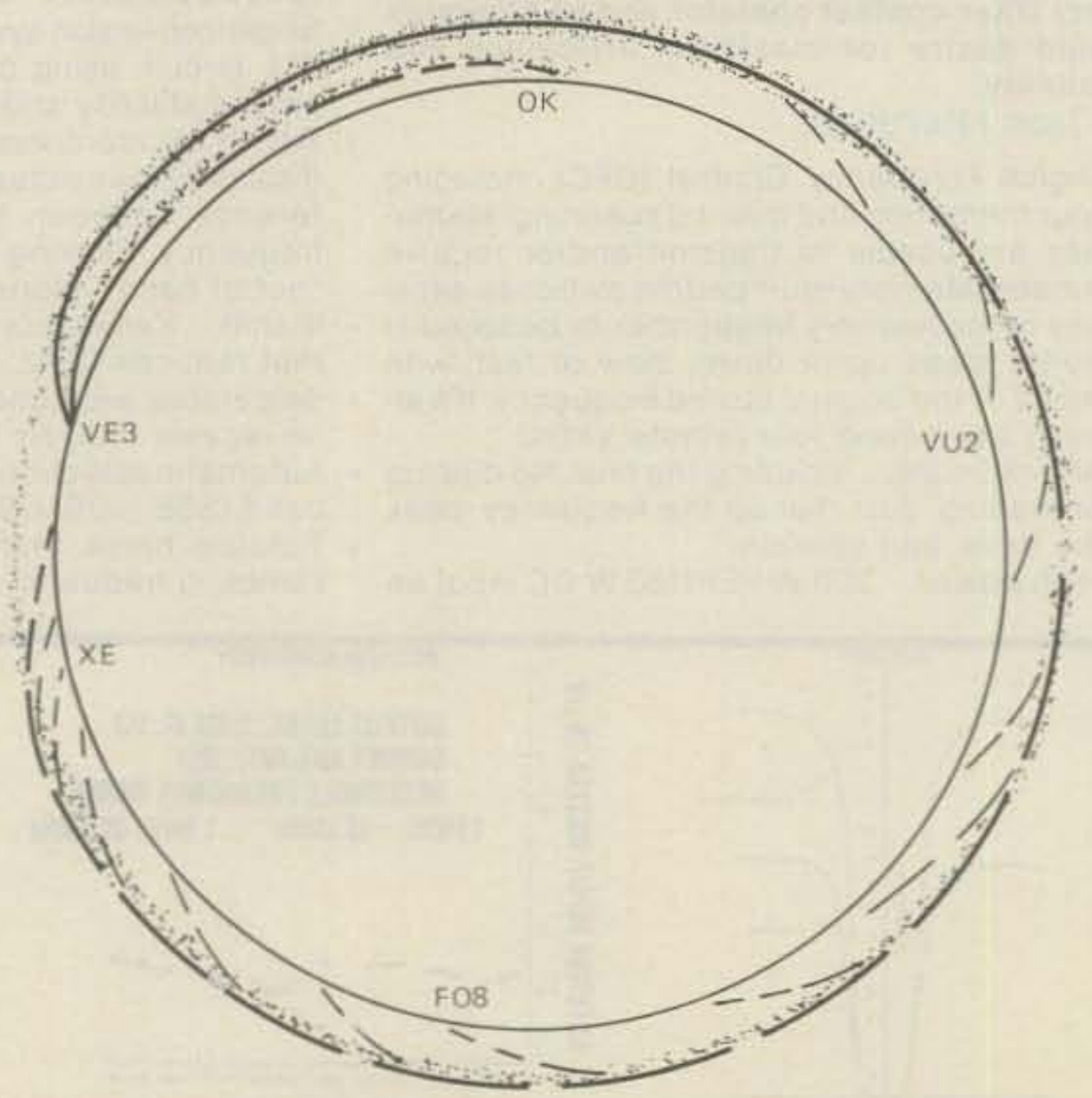


Fig. 6- Illustration of day-night variations in propagation. "Hump" over Czechoslovakia in this drawing results in a "black out" shortly past noon, OK time.

Fig. 7- Long path propagation is similar to short path, but occurs at higher altitudes where losses may be lower.



mysteries are the whistlers. They are bursts of signals in the range of 0 - 30 kHz, usually caused by the lightning strokes. They are "whistles" changing the frequency downwards and lasting from the fractions of the second to 10 seconds or so.

This can be also explained by our theory if we apply doppler shift and multiple path refractions. Consider that lightning could start the whistler and propagation by refraction and variable speed will cause the frequency to change and change the time required to travel a given distance.

Receive vs. Transmit

Having different antennas available during contests and switching between low angle and higher angle antennas I have found during numerous tests that there is quite a difference between the angles of received and transmitted signals. This has been observed on bands from 10m. down to 80m. Also the optimum angles change from day to day, hour to hour. This is very important to know, especially for contesters, who cannot afford to wait in the pile-ups. Ideally the most successful station would have antenna systems capable of directing signal in the desired direction and at the most favorable angle too. The differences at times amount to around 20 dB. The stacked beams are worth gold!

Discrimination against noise is very important too. Quite often we can select the angle where signals would be about the same strength but the background noise from the band is considerably lower. S/N ratio improves tremendously.

Another thing that was found while switching between high and low angle antennas was the fact that most of the so called "short skip" signals are strongest at the low angle. Stacked beams were the best for working W1,2,3,4's on 15m. It made the difference of about 800 US contacts in the contest as compared to another station operating the same band and having a single antenna with higher angle of radiation. This also supports the refractive theory.

Significance

In cooperation with Amateur Radio operators around the world we can further explore and experiment with the propagation of radio signals. We can probably do it better and cheaper than a government or commercial effort. Hopefully we can reinforce the new theory and can open new possibilities and modes of propagation across the whole range of frequencies. Verification of the new theory will have great implications on anten-

Whistlers

One of the very low frequency na design, improved reliability of communications, and overall performance of radio stations. It will help to establish better methods of predicting radio wave propagation and develop more reliable means of forecasting propagation based on the factors known to affect it. Hopefully it will set the record straight and make more sense and fewer exceptions.

Hopefully this article will inspire hams as well as scientific institutions to more in-depth study and eventually produce operating formulas and diagrams, which, given the right set of values, will enable us to predict propagation with much better accuracy.

Amateur satellites with transponders on the lower frequency bands such as 160 to 80m., or 80 to 40m., or perhaps one utilizing the new 10MHz band and having the eliptical orbit would be an ideal tools to explore the validity of the new theory.

Let's not be afraid to challenge a long-accepted theory.

Conclusion

What I have tried to present in this article is the expression of what I feel, what I have observed and what I think makes sense. I find it quite difficult to describe or express exactly what I am experiencing. This is partially due to the lack of good clean analogy, partially due to the difficulties of verification and expressing accurately what is happening up there. I hope that I succeed in getting the main message across: "Maybe there are no mirrors up there but more likely something like layers or clouds which can conduct or refract radio waves."

Much more work has be to done. This is just a brief outline of what I was able to gather in my limited available time.

Thanks to contests, I think I "see the light" a little brighter. Contests are moving force and inspiration for many advances in the field Amateur Radio communications, so please put up with the contest racket when you hear it and if you can, give us a point or multiplier. This is the only reward for all the work we put into those super antennas and stations.

I would like to express my sincere thanks to my XYL Sonya for letting me "play with the radio", to Don, VE3HGN for his help with the experiments, to all those participating in the contests and experiments for their cooperation and valuable reports, and last but not least to *CQ* Magazine for providing the opportunity to publish the theory for the first time and for supporting the finest in Amateur Radio Contesting.

I hope to see you all in the next contest!

a monthly feature by

JOHN A. ATTAWAY, K4IIF

DX

News of communications around the world

When the DX Hall of Fame was conceived 14 years ago, it was our intent to recognize those who have made extraordinary contributions to the DX hobby and DXers everywhere. They type of contribution we envisioned could only be made over a long period of time at considerable personal sacrifice by someone who wished to repay DX through service to DX. It was not to be an operating award which could be achieved by making thousands of QSO's from one's home station. It was also not for someone seeking rewards, financial or otherwise.

Over a decade and a half we have honored outstanding Dxpedition operators such as Gus Browning, Danny Weil and Lloyd and Iris Colvin, prolific QSL Managers such as Jack Cummings and Joe Arcure, Jr., plus many others whose exploits have endeared them to their fellow amateurs. We feel that they all have met the high standards of the award, and we are confident that the man elected to the Hall of Fame today meets all the requirements PLUS, because he is Hugh Cassidy, WA6AUD, editor and publisher of the *West Coast DX Bulletin* and the greatest DX writer the world has ever known.

There is hardly a Dxer anywhere in the world who was not helped in some manner by Hugh Cassidy during the decade of the *West Coast DX Bulletin.* The operating data he furnished us with kept us informed; his unique wit kept us entertained. There can be no better judge of his success than his peers. Let's see what they had to say upon his retirement last year:

de Geoff Watts *DX News-Sheet* (Radio Society of Great Britain) - "The FB *West Coast DX Bulletin* closed down on July 18, 1979, having been published every week without a break since May 1, 1968. Readership recently touched the 3200 mark, a weekly output of over 30,000 sheets, compiled, printed, folded and mailed by a staff of two, Hugh Cassidy, WA6AUD, and his XYL Virginia. To quote his own words, even the longest road has an end, even the most enthusiastic can tire, but thousands of DXers the world over will not only miss this continual fount of DX info, but also Cass's inimitable style, maintained throughout the whole 600 bulletin run, and which must often have brought a smile to many a reader's face. May WA6AUD and XYL Virginia long enjoy their well-earned retirement."

Left to right are Hugh Cassidy, WA6AUD, whom we honor this month by election to the DX Hall of Fame, and his XYL Virginia. Hugh and Virginia were the driving force behind the West Coast DX Bulletin. *In this photo they are watching the southbound migration of the grey whales from the beach at Pt. Reyes, California.*

de *The Totem Tabloid* (Western Washington DX Club) - "No single event in recent DX history has caused such widespread shock and dismay as the demise of the *West Coast DX Bulletin.* Crusty Big Guns and humble QRPers alike stared unbelievingly at that final issue with the hurt eyes of a wounded fawn. Few publications have achieved such a satisfying blend of fact and fantasy as the *Bulletin.* The hot DX scoop, QSL info, propagation prognosis and DX calendar will be sorely missed, but the mundane information is available elsewhere. The real loss comes from the passing of the Old Timer, the Palos Verdes Sun Dancers, dastardly Slim whose name has become a part of the language, and all the other wonderful, whimsical characters who peopled the middle earth of DX. No doubt the torch will pass as others appear to help us face the eternal enigmas, but for now our Monday fun-fest is over and we will miss it. What can we say but, as the Hero of Mafeking would almost never say, 'Thanks for the 11 years, Hugh.'"

de *DX'Press* (Netherlands) - "Since the *West Coast Dx Bulletin* stopped it is very difficult for Europeans to get reliable DX information from the Pacific."

de *HR Report* - "*West Coast DX Bulletin* editor Hugh Cassidy, WA6AUD, has announced his retirement. For 11 years Hugh's weekly efforts have made his one of the most respected and best known DX publications in the world, but he's decided to step down for a well deserved rest. Congratulations for a fine job, Hugh, and enjoy your freedom."

de *The DXer* (Northern California DX Club) - "By now you have undoubtedly heard that the *West Coast DX Bulletin* has ceased publication after over a decade of service to the DXers of the world. I am sure that I am not alone in regretting its passing from the scene. I would like to personally thank its editor, Cass, WA6AUD, for a job exceedingly well done."

---

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

CQ DX Awards Program

S.S.B.

820 ..... LA4HH	824 ..... DA1MV
821 ..... WD9DKS	825 ..... J28AZ
822 ..... WB4SXX	826 ..... W9OFV
823 ..... WB3DJF	

C.W.

414 ..... W4CEB	416 ..... WD9DEE
415 ..... WA1GTQ	417 ..... WB4SXX

S.S.B. Endorsements

310 ..... W2TP/318	200 ..... WB4SXX/204
310 ..... I0AMU/318	200 ..... W8LKG/201
310 ..... K6WR/318	200 ..... KL7AF/200
310 ..... W4EEE/318	200 ..... WD4IHV/200
310 ..... W9KRU/317	150 ..... W0ULU/199
310 ..... K9LKA/316	150 ..... WB3DJF/180
310 ..... K5OVC/310	150 ..... VK3NDY/169
300 ..... N6AW/300	150 ..... W9OFV/163
275 ..... N5FG/285	150 ..... WB4VQO/152
275 ..... K3MWV/277	3.5/7 MHz K3MWV
275 ..... AI8S/277	28 MHz W8IMZ
275 ..... I8KNT/276	28 MHz VK3NDY
275 ..... YU2RTW/276	

C.W. Endorsements

310 ..... W9DWQ/315	150 ..... KL7AF/165
310 ..... K6JG/310	150 ..... WD4IHV/150
150 ..... WB4SXX/177	

The total number of active countries as of deadline was 319 with the deletion of the Canal Zone(KZ5).

Complete 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; 911 Rio St. Johns Dr.; Jacksonville, Fla. 32211 USA.

CONGRATULATIONS to Hugh Cassidy, WA6AUD, DX Hall of Fame!

De Extra

Callarea Roulette - Much has been written in this column concerning the need to restrict unnecessary comments, carriers and commotion during Dxpedition operations. We have pointed out that deliberate interference is a cardinal sin - if it isn't it should be, check it out Reverend - and that playing policeman on the DX frequency is almost as bad, particularly when the DX station is transmitting outside the U.S. phone band.

Nothing has happened to change our opinion. There is absolutely *no* excuse for the bad behavior exhibited by many inexperienced DXers during some recent operations. However, we must do something we rarely do and take to task some of the DXpedition operators themselves, as bad behavior by the chasers may sometimes be provoked by bad practices on the part of the chased. We don't like to do this as people who go on DXpeditions frequently make significant sacrifices in both time and money, to say nothing of the physical risks to life and limb, and we feel they are entitled to operate pretty much as they please. They've earned it! However, if they are poorly organized and have no game plan they jeopardize their own efforts.

An example of this is playing "call-area roulette," which is the practice of skipping randomly among the call districts. This one, used at a time when the DXpedition has good propagation to all parts of the country, is guaranteed to keep the pack somewhere between the edge of a chair and halfway up the wall. To illustrate, there was an expedition a while back to one we "needed." It wasn't a good time for us as we were traveling a lot and working long hours. However, we managed to stake out an hour one day when we thought he would be coming through on 15 meters. We turned on the rig and were delighted to hear him 5×9 right on his advertised frequency working W2's. Great we thought, we'll have him in 15 minutes, but alas it was not to be. After half a dozen 2's he switched to 3's and logged in 6 of the mid-Atlantic gang. We picked up the mike, took a deep breath and heard him say "I think I'll work a few 6's." We exhaled to wait our turn and heard him ask for Central and South America. Doubtless the 7's were cracking their knuckles, but let's be fair. Next he jumped to 8 land, then 9 land and quickly back to the 1's, somehow forgetting the 0's. From 1's he went to 2's and his next comment was "Standby 3's, there are a lot of 1's still calling so we'll pick up a few more." Oh, Oh! - bad business, comments begin, carriers flash - then back to 2's, followed by four 3's and four 4's, none of which was us.

By now you get the picture so we'll briefly summarize the rest of the hour: W5's, W8's, W9's, Europeans, W6's (still no 7's), any DX stations, W0's (finally), W1's, W2's, W3's, W2's, W1's, W4's, W7's (finally), and end of the hour, still not in log.

We did manage to squeeze in 30 minutes the next day, but 15 of the 30 were spent listening to the DXpedition admonish the pileup for calling out of turn. One lone voice - out of the band so maybe he was a VE? - summed it up better than this entire editorial: "Fellow, if you took them in order to begin with this would never have happened."

Us - we never worked him. The last time we listened it was a list operation but nobody on the list was on frequency. Oh well, we're not dismayed. Someday, someone else will go there and we've got another pileup to anticipate. (*De Extra is the editorial voice of DXers. If you think this editorial wasn't worth writing, send one in yourself on your pet peeve. If it's any good I'll put it in the column and pay you something for it. Send directly to K4IIF, P.O. Box 205, Winter Haven, FL 33880 - DX Editor.*)

A.C. Da Costa is ex-CR7IK and future ZS6. He holds WAZ Award #883, WPX #568, DXCC 293 countries confirmed, WAC 3.5 MHz, WAS #22,599-AAA. In the 1971 CQ WW DX Contest he had the world high score 28 MHz Phone, and in the 1973 WW WPX-SSB Contest had 21 MHz world high score.

Haken Eriksson, SM5AQD, of Nykoping, Sweden, father of the very active young DXer "Hawk", SM0AQD. Note the WAZ certificate top center above the rig. (Photo via Reg, VE1BNN)

Here and There

Ile de Faisans (Pheasant's Island) -This entity was proposed for new country status in an earlier column. However, Don Search, W3AZD, indicates that as the A.R.R.L. Board of Directors has eliminated separate administration as a new country criteria it would not qualify. Ile de Faisans is located on the Spanish-French border and is governed jointly by both countries. Don cited the similarity with Morokulien, LG5/SJ9, on the border between Norway and Sweden, which also failed to qualify on this basis.

New Club Officers - The major west coast DX clubs have elected new officers for 1980 as follows: *Southern California DX Club* President is W6SP, the Vice President is N6AHU, Secretary - W6PN, Treasurer - WA6WZO and Directors - W6AQ, AA6AA, WA6EKL and W6DN. The Bulletin Editor is W6ET.

Northern California DX Club President is W6BJH, Vice President - K6OP, Secretary - W6UR, Treasurer - W6PHF, and Directors - W6ZYC, N6AN, and WB6EXW.

Western Washington DX Club President is W7YOZ, Vice President is

WA7GRE, Secretary - N7CY, Treasurer - K7YDO and Trustees - K7DS, K7GR, K7OAK, W7OTO, K7RS and WB7WEI.

VP2V Licenses - Art Swain, VP2VJ, Telecommunications Officer-Radio for the British Virgin Islands government, advises that to obtain a VP2V—call under the reciprocal agreement you must send a certified copy of your current license with a postal money order in the amount of $15.30 payable to the Accountant General. Personal checks will not be accepted. Direct your correspondence to the Government of the British Virgin Islands, Tortola, B.V.I.

Remember Brother Ed, HV3SJ - He is now in South America, HK4-land to be exact, and is standing by for a call. By the time this is in print you may have heard him as DJ0XW/HK4. If you would like to get in touch his address is Edwin M. Amram, S.J., Colegio San Ignacio, Apartado Aereo 1077, Medellin (Ant.), Columbia.

QSL Manager Directories - Franz Langner, DJ9ZB, is offering a 68 page directory featuring 3800 QSL Managers for $5.00. W6GO and K6HHD, Jan and Jan O'Brien, are continuing the *Directory of QSL Managers* previously published by Gary Yarus, WB0MSZ. This is a computerized list of over 400 stations & Managers. Contact them at 6606 Fifth St., Rio Linda, CA 95673.

QR Prefixes - To comemorate the 150th anniversary of the Kingdom of Belgium, ON stations are allowed to use the OR prefix on a voluntary basis.

Most Needed Countries in Japan - In early February, the following DX countries were at the top of the need list among the members of the Japan DX Radio Club:

1. Kamaran Island, VS9K/70
2. China, BY and Albania, ZA (tie)
3. Malpelo, HK0
4. Heard Island, VK0
5. Glorioso Island, FR

followed by TL-Central African Republic, XZ-Burma, 9U-Burundi and 3X-Guinea. Subsequent activity may have changed this order by now. (Tks JH1VRQ).

DX And Contest Operation From Iceland

The following material was contributed by Sigurdur Jakobsson, TF3CW, to enlighten us on the problems of DXing from the far northern latitudes and to acquaint us with amateur radio in Iceland. Siggy is active in the *CQ* DX Awards Program and can always be heard during the *CQ* contests. We are grateful to him for this contribution:

"Iceland is one of the DX countries of Europe and one of the most northerly countries on that continent. TF-land is located in *CQ* Zone 40, along with OX-Greenland, JX-Jan Mayen, JW-Svalbard (Spitzbergen) and UA1-Franz Josef Land. It is without doubt the most active country in this zone as TF callsigns can be heard on the bands on a daily basis. We boast a very good QSL Bureau managed by TF3AC. The following numbers of cards were sent through the Bureau over the past few years:

1976 - 7,024 cards sent
1977 - 7,173 cards sent
1978 -12,788 cards sent
1979 -11,770 cards sent thru Oct. 1.

"The number of TF-hams using the Bureau increased from 26 in 1976 to 35 in 1978. QSLs are sent to over 100 different Bureau's worldwide, always by air mail. No complaints of delays have been received for years, and if anyone has a question, TF3AC will be happy to hear from you.Cards are often missent to our Bureau by other Bureaus. These are always returned to the originating Bureau, as are cards with incorrect callsigns and cards for pirated callsigns.

"Contest participation has increased significantly during the past 3 years, with many TF calls being heard frequently in the major contests. We joined forces several times under our club call, TF3IRA, to compete in the multioperator, single transmitter class in an effort to put Iceland on the amateur radio map. We had hoped to compete with the big stations of Europe, but our nearness to the Magnetic North Pole makes propagation very unpredictable. Despite our best efforts, propagation has affected every contest

The VK2ATZ/LH team who operated from Lord Howe Island during the CQ Worldwide DX Contest, October 1979. If you worked this station during the contest and need a Lord Howe card you may QSL to VK3OT.

The WPX Program

Mixed

811...JA2KVD
812...EA8TY
813...JA9FAI
814...JF1SEK
815...S8AAT
816...K1RB
817...W2YWK
818...JA5BZL
819...JG1GGU
820...K7PJO
821...I2GXS
822...IT9QDS
823...VE3DUS

S.S.B.

1239...VK3NDY
1240...N8ARQ
1241...VK2FD
1242...AL7O
1243...I0RIZ
1244...WD0EPE
1245...I8OCA
1246...KB2DE
1247...WB6CDM

C.W.

1916...DM5QG
1917...VE2EOH
1918...SM6INC
1919...JA7ARM
1920...OK1QH
1921...DF8ZH

WPNX

171...WD8JUB
172...WA2YEX
173...KA7AHC
174...WD5HYD
175...VK3NXU
176...KA3DBN

Endorsements

Mixed: 400 JA2KVD, EA8TY, K1RB, W2YWK, JA5BZL, JG1GGU, K7PJO, VE3DUS. 450 JA9FAI, S8AAT, K7AGJ. 500 I2GXS, IT9QDS. 550 DL8IH. 650 JF1SEK, I4CSP. 800 YU2AAU. 850 K4ZYU, VE7DP. 1050 N4UH.

SSB: 300 VK3NDY, N8ARQ, VK2FD, AL7O, KB2DE. 350 WD0EPE, W6YMH, I8OCA, WB6CDM. 400 K1RB. 550 I6ICD, WB8RFN, I0RIZ, KL7AF. 600 I0WDX. 650 I8IGS. 700 K2OLG. 900 W2CC, JH1VRQ, WB9EBO. 1050 XE1J.

CW: 300 VE2EOH, OK1QH, DF8ZH. 350 N6PV, SM6INC, JA7ARM. 400 WB3JUK, AG0A. 500 KL7AF. 600 F8PM. 800 LZ1XL. 850 W1WLW. 900 OK1DH. 1250 WA2HZR.

10 meters: OK1AEH, LZ1XL.
15 meters: JA9FAI.
20 meters: VK2FD.
160 meters: W2CC.
Africa: OK1AWZ.
Asia: JF1SEK.
Europe: VE2EOH, JF1SEK, I0RIZ.
No. America: JF1SEK, W2YWK.
Oceania: JF1SED, W3ARK.

Complete rules and application forms may be obtained by sending a business-size, self-addessed, stamped envelope (foreign stations send extra postage if air-mail desired) to CQ WPX AWARDS, 5014 Mindora Dr., Torrance, Calif. 90505, U.S.A.

effort and ruined many a potential good score.

"The unpredictable propagation, plus the fact that we are part of Europe, means that it will be next to impossible to set any world contest records from here. For example, in the 1978 *CQ* Worldwide Phone Contest not even ONE signal was heard on 80 meters and 10 meters opened only to central Europe. As we are a European country we get only one point for those QSO's. Needless to say, this is not conducive to building a big total score.

"Actually, the *CQ* WPX Contests are better for us than the *CQ* Worldwide as we can compete more successfully for multipliers. In the WPX 'test a prefix can be counted as a multiplier only once, regardless of how many different bands may be contacted. Therefore, if we lose one or two bands because of poor propagation our multiplier is not affected as severely as in the Worldwide 'tests where the country and zone are counted for each band, and it is essential to make many contacts on each individual band.

"On the other hand, if propagation is good on all bands as it was during the 1979 *CQ* Worldwide Phone Contest, we know it is that much better to the south. A gap will always exist between us and the stations in the Caribbean, southern Europe and Africa. Nevertheless, we will continue to master ourselves and improve our equipment until we reach a point of acceptable performance.

"Several DXpeditions have been carried out by Icelandic hams, giving many DXers a new country or prefix. In 1976 it was TF7V from the Vestmann Islands, then TF4F to Flatey Island in 1977 and the last and best was TF6M in July 1978. Two different shacks were set up for TF6M, one for s.s.b. and one for c.w. The s.s.b. shack was our transportation truck, an old Dodge Weapon, while the c.w. station was set up in a tent several kilometers away. The antennas were 2-element, homebrew Quads for 10, 15 and 20 meters and Delta Loops for 40 and 80 meters. Unfortunately, 80 and 10 meters were almost totally dead during the operation, and 20 and 15 carried the load with 40 also producing an acceptable number of QSOs. The end result was 10,800 contacts with 121 countries in 85 hours of operating. The breakdown by mode was 6600 QSOs on s.s.b. and 4200 on c.w. No external VFO's were available at the time so all contacts were straight transceive.

"We have often thought of making a DXpedition to Jan Mayen. A trip to an island as remote as JX-land will require extensive preparation. The biggest barrier is getting there, as Jan Mayen is covered by fog for long periods of time. This rules out flying if you need to carry out an operation on schedule, so going by boat seems to be the logical and most reliable choice. Presently we are aiming at a late spring or early summer operation this year. If anyone is interested or needs Jan Mayen please drop me a line. The island belongs to Norway and the Norwegian government maintains a weather station there. The only activity is when an amateur is assigned to this weather station. The island has yet to be invaded by a DXpedition.

"The licensing system in Iceland provides for 4 different classes. First, there are Novices, identified by 3 letters in the suffix of the call ending with the letter N. Novices are allowed to use crystal-controlled, c.w. rigs only, with a power limit of 5 watts, and are restricted to 80, 40 and 15 meters. The first step in up-

Gordon F. Orelli, W1OR, now lives in Lexington, Ky. and this is his station. Gordon may be the world's record holder in the number of WAZ certificates earned from different locations. He has worked all zones 5 times as follows: #15, W6LER, Jan. 9, 1948; #1340, K1MLI, April 12, 1960; #2326, W0KAW, Aug. 19, 1967; #3514, W1OR, Jan. 30, 1973; #4525, PY2ZGF, April 23, 1979. Four of the certificates are shown in the photo. Can anyone top this?

The WAZ Program

10 Meter Phone

39...N4MM
40...JH1BBT
41...WA4JTI

15 Meter Phone

44...JI1SPX
45...K2IUK
46...W2BAI

20 Meter Phone

281...9G1JI
282...9G1JU
283...K4WSB
284...WA4LOF
285...AP2MQ
286...JA1VDJ

20 Meter C.W.

100...K0DEQ

All Band WAZ

S.S.B.

1841...K1NWE
1842...W7KNT
1843...W4ELB
1844...WN3KER
1845...LA5NM
1846...WA0HHI
1847...K3HP
1848...WA4BEC
1849...WA9NOV
1850...N6AFD
1851...YV1AJ
1852...AA4R
1853...K4JAF
1854...WA5OFJ/1
1855...G3MCS
1856...ON4TY
1857...VK3NDY
1858...W2NCL
1859...K2YIY
1860...WB7FAT
1861...W9OFV
1862...KB4I
1863...N2VW
1864...G2AFQ
1865...KT4G
1866...AA4KT
1867...N6AHU
1868...WA0GAZ
1869...JA7UMT

C.W. and Phone

4736...YU2REY
4737...YU3TFA
4738...G3VMW
4739...DK7SU
4740...DK6BW
4741...JA4BCW
4742...W6GO
4743...W8MFW
4744...OH2BDA
4745...K0MOZ
4746...JH1NPX
4747...W1ETV
4748...W2GND
4749...SM5AKT
4750...K3RH
4751...K0QMU
4752...VE3DUS
4753...JA1SJV

All Phone

556...N4MM
557...W6NAT
558...K6DG

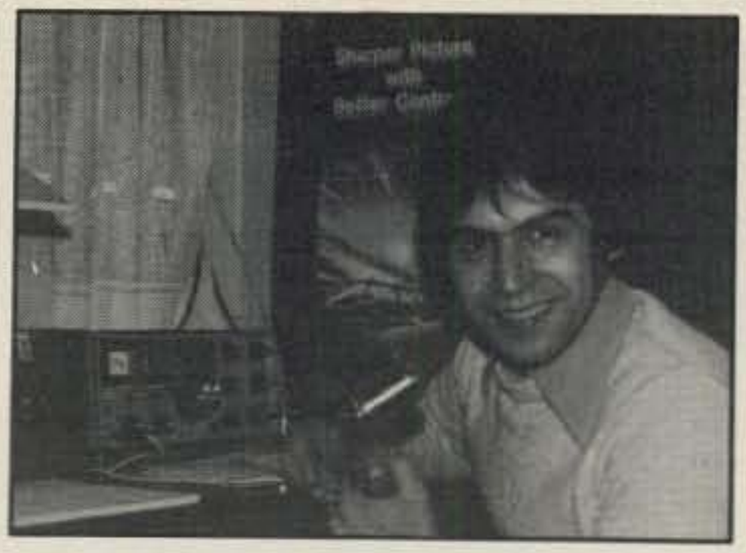
The complete rules for WAZ can be found in the January 1980 *CQ* Magazine. Application blanks and reprints of the rules may be obtained by sending a self addressed stamped envelope (30 cents) size 4½ × 9½ to the WAZ Manager, Leo Haijsman 1044 S.E. 43 Street, Cape Coral, Florida, 33904. Applicants forwarding QSL cards direct to the WAZ Manager or to a check point should include sufficient postage for the safe return of their QSL cards. The processing fee for all *CQ* certificates was raised to $5.00, this fee must accompany all applications.

grading is the Class A license, also good on c.w. only but with 50 watts power, v.f.o. control and the use of 10 – 80 meters. After 6 months as a Class A operator, an Icelandic ham is automatically upgraded to Class B which permits him to use up to 200 watts and to use s.s.b. After one year in Class B, he may take a special exam for the Class C license which affords full amateur privileges. Aside from the above, there is a special T-Class license which permits operation on 144 MHz and higher frequencies. It requires no c.w. examination.

QSL Information

There are in the world of DX an extremely small number of QSL Managers whose output is so prolific that it requires almost an entire QSL information listing to show the full list of stations whose cards they handle. One of thest select few is Franz Langner, DJ9ZB, who manages QSLs for over 70 stations. If you need a card from any of the following, send an s.a.s.e. or s.a.e. and IRC's to Franz at Carl-Kistner-Strasse 19, D-7800 Freiburg I. Br., West Germany.

A6XN	A7XAB	DU1ZB
A7XA	C31LY	DU9ZB
A7XAH	C31LO	DL2AA/W1
A7XB	C31YL	DK6CX/W1
A7XSD	C5ABL	EP2AH



Vladan, YU1ODS, is very active in the WPX and CQ DX Awards Programs. (Photo via K6XP)

F0ABI	SV1JH	
F0IF	SV5JH	
F0ZN	TA1MT	
FC0ZN	TA1SH	
FM7WN	TA1SU	
FM0RX	TA1TT	
FG0RX	TA2ZB	
FG0RX/FS7	TA6JB	
FH0RX	TF3PT	
FK8BB	VK7GK	
FO8WR	VK7GK/LH	
G5ACX	VP2LAB	
HB0LL	VP2LAG	
HB9BOE	VP5BG	
HB0BOE	VP5KG(1971)	
HZ1AB	VU2CP	
JY3ZH	VU2FC	
JY5HH	WX1ITU	
JY8ZB	YK1AA	
JY9HQ	YK1AN	
JY9KP	3A2AE	
KG6JAC	4U1ITU(March 4-6, 1977)	
KZ5WH	4W1AF	
N1DL	4W1CW	
NZ1ITU	4W1ZB	
OD5HQ	5W1AB(EU only)	
PJ8KG(1971)	9A1AA	
ST2SA	9K2FN	

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.

Mixed

1855 YU2DX	1488 W4BQY	1250 N6AV	1015 W0SFU	644 DK7XX
1814 K6JG	1475 N4MM	1193 WA0KDI	1010 IN3ANE	605 I4BFY
1814 K6XP	1462 DJ7CX	1179 YU1ODS	1008 WA2AUB	600 I2MQP
1808 F9RM	1424 K5UR	1163 YU1AG	1002 PA2TMS	
1805 W4WV	1408 N6CW	1155 W8CNL	909 PY4OD	
1623 W3PVZ	1401 PA0SNG	1150 W0AUB	902 K6DT	
1610 ON4QX	1350 KE4I	1146 DL1MD	900 K8LJG	
1610 W2NC	1332 W9FD	1126 K5DB	873 N6JM	
1609 VE3GCO	1307 N9AF	1112 K6ZDL	855 YU2CBK	
1577 YU7BCD	1287 N4NO	1109 I6SF	852 SM3EVR	
1569 N4UU	1286 AA4A	1095 I0JX	851 K8CH	
1550 K2VV	1283 N6JV	1094 N6FX	848 W6ANB	
1536 W7LLC	1275 N2AC	1066 WA1JMP	782 YU4EBL	
1525 W2NUT	1260 I2PHN	1048 JH1VRQ	668 N8II	

S.S.B.

1708 F9RM	1268 YU7BCD	1017 DL1MD	908 I0MBX	759 ZP5RS
1684 I0AMU	1250 K2VV	989 DJ7CX	900 JH1VRQ	706 WA2FKF
1610 K6XP	1225 ZL3NS	967 PA2TMS	881 N4NO	600 I2MQP
1606 I0ZV	1200 I4ZSQ	962 OZ5EV	827 W2NC	
1600 W4UG	1193 PA0SNG	962 YU7ODS	822 N6FX	
1548 K6JG	1192 K5UR	957 W6RKP	821 CT1UA	
1452 K2POA	1102 AA4A	938 OE2EGL	819 YU1AG	
1416 I8KDB	1091 N4UU	932 W6YMV	805 W4BQY	
1400 I8YRK	1051 WB2NYM	914 W0YDB	804 WA2AUB	
1303 N4MM	1050 N2SS	909 PY3BXW	760 N2AC	

C.W.

1503 W8KPL	1251 N6JV	1087 W4BQY	833 LZ1XL	647 W9OYZ
1432 ON4QX	1234 W9FD	1088 I2PHN	808 I5IZ	628 W1WLW
1413 W2NC	1176 G2GM	1067 VO1AW	802 KH6HC	623 JE1JKL
1382 DL1QT	1150 W3ARK	1062 WA0KDI	768 PY4OD	612 WA2AUB
1368 K6JG	1150 K2VV	989 K6ZDL	756 SM0GMG	607 I1TLA
1329 K6XP	1124 DJ7CX	955 YU1AG	709 DL1MD	
1292 N4UU	1123 N4NO	925 YU1ODS	700 JH1VRQ	
1288 YU7BCD	1116 N2AC	886 N6FX	658 EA2OP	
1253 WA2HZR	1096 K5UR	877 I6SF	650 K8LJG	

"Iceland has reciprocal licensing agreements with Canada, Denmark, Great Britain, Luxemburg, Norway, Sweden, Switzerland, the U.S. and West Germany. In addition, licenses have been issued to hams in several other countries on a guest license basis. *(Editor's Note: Although the U.S. and Iceland have a reciprocal licensing agreement, U.S. amateurs at Keflavik have found it difficult or impossible to obtain licenses. The reasons have never been explained through official government channels.)*

"Elected officers for the Icelandic Radio Amateur Association, I.R.A., are President, TF3KB. Vice President, TF3JB; Treasurer, TF3US; Secretary, TF3CW and Director, TF3SB. The QSL Manager/Award Manager is TF3AC and the Contest Manager is TF3CW."

The following DXers volunteer their services to be QSL Managers for a DX or Contest station:
Roland Guard, W6TWT, P.O. Box 61541, Sunnyvale, CA 94088. Ron Nebeker, K7UT, 1504 Glen Arbor, Salt Lake City, UT 84105. Gary Huff, K9AUB, 2 Circle Drive, Springfield, IL 62703.

A4XGY - Via K2RU
A7XD - To K4PHE, R.E. Smith, 549 Southwind Dr., Lilburn, GA 30247
D68AR - c/o F6ACB
EP2TY - Via JR3WRG
FR0ACB/G and FR0ACC/G(Glorioso Is.) - To DK9KD
FW8SC(Wallis Is.) - Box 15, Lano, Wallis Island, Via Noumea, New Caledonia
JA1JNI/JD1 & JA6RTJ/JD1(Ogasawara Is.) - c/o JA6RTJ, 2-4 Karishiwa-cho, Miyazaki City 880, JAPAN
JW1SO - Via LA4DM
JW2CF - To LA2CF
JW5IJ - c/o LA5NM, Box 210, 9410 Harstad, Norway
JW7FD - Via LA5NM
JW8FG - To LA8FG
JX9WT - c/o LA9WT
K9PNT/DU2 - Via Phil Hunsberger, 140 S. Western Ave., Kokomo, IN 46901
KH3AA(Johnston Is.) - Box 69, APO San Francisco, CA 96305
SV0AA/5 & SV0AA/9 - To N2OO
TZ4AQS - c/o ON6BC
XT2AW - Via KN1DPS
YN1HFC & HT1HFC - To W0SA
VK9XT(Christmas Is.) - c/o WA3HBC
VK0RM(Heard Is.) - Via VK3AKK, Box 60, Lara 3212, Victoria, Australia
VP1A(Feb. 28-March 6) - To WB0TNY
VP5EE - c/o WA4FBH
VS6DO - Via K4CIA
3C1AB, 3C1JP, & 3C1NM - To EA1QF
8P6MI - c/o VE3FCU
8P6NW - Via KA9EBM
8P6NX - To W0SA

73, John, K4IIF

We've progressed up to the point where we can begin introducing mathematical concepts and use our computer to solve problems. K8BG also touches on the aspect of video graphics.

INTRODUCTION TO BASIC

A Computer Programming Language

Part VI - Mathematical And Graphic Functions

BY BUZZ GORSKY*, K8BG

In this installment of our exploration of the BASIC programming language we will catalog the mathematic functions which the TRS80 level II BASIC provides and take a quick look at the graphic functions. Also, as I promised in the last segment, I will begin by explaining how the alphabetizing routine presented in the program last time actually works.

That routine runs from lines 500 through 560 in the second program shown last time. The subroutine from line 1000—1020 is used as is the subroutine in line 2000. Lines 570-590 simply provide for the lineprinter output of the alphabetized list. We explored the first subroutine last time, so we will just look at the second subroutine. This one at line 2000 is not required for the alphabetizing function of the program, and would be taken out of a program we intended to use. However, it is put in here to show what the machine is doing. All it does is print the calls in order at the end of each loop of the main program. Note that the comma and semicolon after the C(M) in the print statement will cause four calls to be printed on each line of the screen. The comma sets up the four columns and the semicolon prevents each call from starting on a new line.

So now we can take a look at the main part of the program, lines 500-560. In line 500 we decrease N by one since the last "call" entered was ZZ the code which branches the program to line 500. So that that call will be neglected, we subtract 1 from N. We then start a loop which will run I from 1 to N; we set C equal to each of the C(I) and go to the subroutine at 1000 to find out which character has the numeral. We return with J2 equal to the number of characters following the numeral in the call. We set J3 equal to J2. We then start a K loop which runs K from I + 1 through N. We now set C equal to C(K) and go to the subroutine for that call. When we return we set J4 equal to J2. Then in line 550 we see if the "end" (that part after the numerals) in the Ith call precedes the end of the Kth call. If so we go to the Next K. If not we switch around the two calls. For example, if the first call is W1QQZ while the second is K9AR then the end of the second should precede the end of the first since AR comes before QQZ in the alphabet. We would then swap the calls so that these two would be in the correct order. After making the switch we go to 2000 to print the calls in their new order, and then we return to line 510 and start over. Eventually we would move a call into the first position which precedes all of the other calls. In that case we would go through all of the Ks and get to I = 2 in the I loop. We then work on that until a call is in the second position which precedes all of the rest of the calls all through the Ks and then we would get to I = 3. In this step by step way, quite inefficiently this program will alphabetize a list of any size. If you did work several hundred stations in a contest, you might have to leave the computer running overnight to get the calls sorted, but with no effort on your part the list WOULD get sorted and execution would stop at line 570 waiting for you to input something indicating that the lineprinter is ready. The list would then be sent to the printer. So while this program might not be fast, it sure would be painless!

Table I - Mathematical Functions

ABS	ATN
CDBL	CINT
COS	CSNG
EXP	FIX
INT	LOG
RND(Ø)	RND
SGN	SIN
SQR	TAN

We will now take a quick look at the mathematical functions which BASIC may provide. I will not explain these in mathematical terms; obviously you will only use functions whose use you understand. Trigonometric and logarithmic functions find their place in relations involving a.c. circuits, orbital mechanics, and many other relationships derived from geometry or calculus. In LEVEL II BASIC the common functions will return single-precision values which are accurate to six decimal places. Other functions will have a precision which depends on the value on which the function is operating.

With that background, we will begin our catalog. **ABS(X)** will return the absolute value of X. That is if X is equal to or greater than zero then ABS(X) will equal X; but if X is less than zero then ABS(X) will equal minus X.

ATN(X) returns the arctangent of X, that is the angle whose tangent is X. ATN as all of the other trigonometric functions uses angles expressed in *radians*. Since pi radians equals 180 degrees, you can convert an angle expressed in radians to one expressed

* *2449 Derbyshire Road, Cleveland, Ohio 44106*

in degrees by multiplying the number of radians by 57.29578.

CDBL is a conversion function. CDBL(X) will return a double precision representation of the argument and will thus have 17 digits. Of course, valid data cannot be generated in this way if there are not that many significant figures actually present. However, if you divide one integer by another, the result would normally be presented as a single precision value. To force the value to have double precision you could let X = CDBL(A%/B%) instead of having X = A%/B%.

CINT(X) converts X to an integer in a particular way. CINT(X) will be the largest integer which is not greater than X. So if X is 5.999 then CINT(X) is 5. If X is −1.00001 then CINT(X) is -2.

COS(X) simply provides the cosine of X, again using a radian value for X. If you have X in degrees X must be multiplied by 0.0174533.

CSNG(X) converts a double precision value of X to single precision by rounding off the sixth digit. If the seventh digit is 4 or less then the sixth digit is left unchanged. If the seventh is 5 or greater then the sixth digit is increased by one.

EXP(X) provides the natural exponential of X, that is e raised to the X power. EXP(X) is the mathematical *inverse* of the LOG(X) function.

FIX(X) is another function which will change a non-integer X to an integer. FIX merely truncates or chops off everything to the right of the decimal point. So if X = 5.999999999 then FIX(X) will equal 5. CINT(X) would be the same. However, if X = −3.001 then FIX(X) will be −3 while CINT(X) would be −4. Obviously when doing conversion to an integer you would have to decide which conversion would be most appropriate.

As if that were not enough functions for converting to an integer, there is one more, **INT(X)**. This is exactly the same as CINT(X) except that for C1NT(X) X must be between −32768 and +32768 while for INT X can have any value.

LOG(X) is the inverse of EXP(X), that is LOG provides the natural logarithm of X.

RANDOM and **RND(X)** are used in programs to provide pseudorandom numbers. These numbers are called pseudo random since they are manufactured in an unpredictable way (from the standpoint of the user) which makes them seem random, but since they are generated according to a specified pattern, they are not truly random. For many purposes for games, for example, the pseudorandom numbers are good enough. RND(Ø) will provide a number between zero and one, while RND(X) where X is an integer other than zero will provide an integer between zero and X. The machine's random number generator uses a "seed number" in its effort to generate a random number. When the command RANDOM is included in the program a different seed will be provided each time a random number is required, so the numbers generated will seem even more nearly random. In any program where I will use random numbers I have the RANDOM command early in the program.

SGN(X) provides the sign of X. SGN(X) is −1 for Xs less than zero, Ø if X = Ø, and +1 if X is greater than zero.

SIN(X) provides the sine of X, again when X is in radians.

SQR(X) provides the square root of X. The exponent ½ could also be used to obtain the square root but SQR(X) is much faster.

Finally, **TAN(X)** provides the tangent of a radian angle. You will note that many trigonometric functions are not included in the BASIC repertoire. However, all of the other functions can be easily derived from the functions which do exist, and the manual provides the necessary equa-

Table II - Graphics Functions

SET(X,Y)
RESET(X,Y)
POINT(X,Y)

tions for the computation.

Graphics can be fun to play with, so we will discuss one of the graphics modes now. This discussion will have little applicability to systems other than the TRS80 level II. This computer divides the screen into 6096 little blocks, each of which can be illuminated—"turned on" or turned off. In addition the programmer can test to see if a given block is on or off. These blocks are generated by considering that the screen is divided into 128 columns and 48 rows. The three commands which control these blocks are shown in table two. For each of these commands X, the first argument must be between 0 and 127 while Y, the second argument must be between 0 and 47. **SET** turns on a graphic block at the position defined by X and Y. SET(0,0) for example would turn on a block at the upper left corner of the screen. (127,0) defines the block at the upper right of the screen, while (0,47) indicates the block at the screen's lower left and (127,47) is the block at the lower right. **RESET(X,Y)** will turn off the block at X,Y. **POINT(X,Y)** tests to see if the block is currently illuminated. If so then POINT(X,Y) has a value of −1, and if not it has a value of 0.

We can use these three program statements in a simple series of programs which will let the machine show us how these graphics blocks work. We start with the following short program:

```
10 DEFINT X,Y: RANDOM:CLS
20 X = RND(127)
30 Y = RND(47)
40 SET(X,Y)
50 GOTO 20
```

This program will run forever and will eventually illuminate the entire screen. The program selects an integer for X and Y within the required limits for the SET function, then that graphics block is turned on. The following program will do the opposite, after illuminating the entire screen:

```
10 DEFINT X,Y:RANDOM:CLS
20 FOR X = 0 TO 127:FOR Y = 0 TO
   47: SET(X,Y):NEXT:NEXT
30  X = RND(127):Y = RND(47):
   RESET(X,Y):GOTO 30
```

Here line 20 will paint the entire screen white and then line 30 will turn off blocks one by one on a random basis. We can combine these programs in an interesting way with the POINT function to provide a program which will really run forever.

```
10 DEFINT X,Y: RANDOM:CLS
20 X = RND(127)
30 Y = RND(47)
40 IF POINT(X,Y) = −1 THEN
RESET(X,Y) ELSE SET(X,Y)
50 GOTO 20
```

This program again selects an appropriate random value for X and Y. It then checks to see if the X,Y graphic block is lit. If it is then it is turned out; if not, it is illuminated. In this way the program is randomly illuminating and extinguishing the screen at the same time. At first the program will virtually always find blocks which are off, so these blocks are turned on, while eventually the probability of a block being on or off should be the same, and then the program should be turning blocks off as often as others are turned on. Playing with little programs like these will show the versatility of these few commands. For example, see if you can write a program which will draw a box at the outer limits of the screen. Can you then draw a series of boxes equidistant within that box?

Next time I will not introduce any more new BASIC statements (but I will in other installments) but instead I will consider how you approach a programming problem—how do you write a program?

(To Be Continued)

A VERY IMPORTANT ANNOUNCEMENT FROM MOR-GAIN

WORLD'S LARGEST SPECIALISTS IN THE DESIGNING, DEVELOPING
AND MANUFACTURING OF "NO COIL, NO TRAP" ANTENNA SYSTEMS.

NO TRAPS,
NO COILS, NO STUBS
NO CAPACITORS

multi-band multi-frequency HF communications antennas
one half the length of conventional antennas
high performance and maximum efficiency
lowest cost/highest performance antenna available
fully assembled and pre-tuned ready for installation

★ ★ ★ NEW ★ ★ ★

Available Only from MOR-GAIN Two Models Specifically Designed for the Novice/Technician Operator. All of the Features and Performance of the Regular MOR-GAIN HD Dipoles but Optimized for the Operating Requirements of the Novice/Technician Licensee. See Below for Specifications and Prices.

*• There is no better antenna at any price . . . **W9QIO** • I had a Mor-Gain antenna and liked it extremely well . . . **K4JMR** • The antenna has worked out well with very good reports . . . **W2TVK** • I can only give glowing reports about it . . . **WA2IRN** • I have used these fine antennas before and see no reason to change now . . . **W6BF** • It has given me excellent service and results . . . **W6CZS** • I believe I have "sold" your antenna to almost every ham I have talked to . . . **W4AHN** • Its performance here far surpasses any other antenna that I have had . . . **WA5GGS** • For several years I have used the Mor-Gain and have been very satisfied . . . **K2TSD** • Am letting everybody know that it has been doing a good job for me . . . **VE2VW** • The antenna is performing just beautifully . . . **W8WDZ/6** • My 75-40 has performed beautifully and I'm very happy with it . . . **WB8DMB** • Another chap said he had also used it and that it was the greatest . . . **W4NSP** • I do not hesitate to recommend the antennas to others . . . **K0SPR** • I heard a ham extolling the virtues of your antenna . . . **WB0PTM** • I worked a station last night and the Mor-Gain was doing quite a job for him . . . **WA3TCV***

MOR-GAIN HD DIPOLES . . . • One half the length of conventional half-wave dipoles. • Multi-band, Multi-frequency • Maximum efficiency - no traps, loading coils, or stubs. Fully assembled and pre-tuned - no measuring. no cutting. • All weather rated - 1 KW AM, 2.5 KW CW or PEP SSB. • Proven performance - more than 15,000 have been delivered. • Permits use of the full capabilities of today's 5-band xcvrs. • One feedline for operation on all bands. • Lowest cost/benefit antenna on the market today. • Fast QSY - no feedline switching. • Highest performance for the Novice as well as the extra-class op. • ST and HD models are furnished with crimp/solder lugs for transmission line connection. • HD/A models are furnished with female coax connector which mates with standard PL-259 male cable connector. • Designed for low height installation: 20-40 feet. • 50 ohm feed point impedance on all bands. • 75-(**) models are factory tuned for resonance at 3950 kHz; 75- (xx) HD (S/P) models - 3800 kHz., 80-(xx) models - 3650 kHz.

EXCLUSIVE 66 FOOT, 75-10 METER DIPOLES

• May be installed as inverted vee with negligable effect on performance. • Fabricated from high-strength 40% copperweld wire - over 500 pound breaking strength. • Stainless steel hardware. • Completely assembled and pre-tuned. No cutting or measuring necessary. • 1-year limited warranty. • Patented linear phase loading principle eliminates need for traps, loading coils or stubs. • Engineering design and manufacturing is backed by our more than 15 years experience. • Professional grade design - Amateur models are identical to those we produce for commercial/industrial systems • No antenna tuner required for operation within stated specifications. • Re-tuneable by the user to accomodate site proximity effects.

MODEL	BAND (Meters)	LENGTH (feet)	PRICE
40-20-HD	40/20	36	$58.25
40-20 HD/A	40/20	36	$63.50
75-10 HD	75/40/20/15/10	66	$94.25
75-10 HD/A	75/40/20/15/10	66	$99.50
75-10 HD(SP)	75/40/20/15/10	66	$94.25
75-10 HD(SP)A	75/40/20/15/10	66	$99.50
75-20 HD	75/40/20	66	$80.25
75-20 HD/A	75/40/20	66	$85.50
75-20 HD(SP)	75/40/20	66	$80.25
75-20 HD(SP)A	75/40/20	66	$85.50
75-40 HD	75/40	66	$68.00
75-40 HD/A	75/40	66	$73.25
75-40 HD(SP)	75/40	66	$68.00
75-40 HD(SP)A	75/40	66	$73.25
80-10 HD	80/40/20/15/10	69	$98.50
80-10 HD/A	80/40/20/15/10	69	$103.75
80-10 HD(NT)	80/40/20/15/10	69	$98.50
80-10 HD(NT)A	80/40/20/15/10	69	$103.75
80-40 HD	80/40/15	69	$72.00
80-40 HD/A	80/40/15	69	$77.25
80-40 HD(NT)	80/40/15	69	$72.00
80-40 HD(NT)A	80/40/15	69	$77.25

Please include $2.75 for shipping and insurance.

NOVICE LICENSE OPERATION. The MOR-GAIN HD Dipole is the ideal antenna for the new or Novice operator. As the Novice progresses to higher license classes, he can easily re-tune the HD Dipole to the new frequencies of his higher frequency privileges. The HD Dipole is thus a one-time investment. HD Dipoles are available for all Novice frequencies.

LEAST COST. Dollar for dollar, the HD dipoles are the highest performance, least cost multi-band antennas on the market today. For example: the 5-band 75-10 HD dipole costs less than $20.00 per band - an unbeatable low cost.

LIMITED REAL ESTATE. Where real estate for antenna installation is limited, the HD dipole is the ideal solution. Operation on 80/75/40 meters is now possible since the HD dipole is only half the length of a conventional half-wave dipole. For all around operation, the HD dipole will outperform any trap loaded horizontal or vertical dipole.

Mor-Gain
2200 C South 4th Street
P.O. Box 329 C
Leavenworth, Kansas 66048
(913) 682-3142
Monday - Friday: 9AM - 5PM CST

MOR-GAIN

BankAmericard, Visa, and Mastercharge are available.

Please write for fully descriptive 5 page brochure. Contact your favorite dealer or order direct from Mor-Gain.

Please send all reader inquiries directly

a monthly feature by

ADRIAN WEISS, K8EEG

QRP

The art of very low power operating

1979 Milliwatt Field Day Trophy—WD5BKO

It's snowing outside while I'm sitting here in my office with the darkened window. Pretty out there, but cold. Seems just the time to dream a bit about a hot sunny June day, somewhere out there in the boonies, with a cooler of Millers along, barebacked, ears sweating inside the phones, racking up a long string of QSO's. What else does a QRPp operator's fancy turn to in the middle of February? Suntanned young beautie on a beach? Whipping along through the spray behind a sleek skiboat? Tightening the sheets in a stiff breeze and feeling

The winners of the 1979 Milliwatt FD Trophy—WB5BKO (right) and K5DDJ (left). The station is set up on a picnic table at a park near Canyon Lake, Texas. A ground rod is at center-bottom of the shot, while the Argonaut and associated equipment and tools litter the table-top. The team racked up 287 contacts—all on s.s.b. Good job!

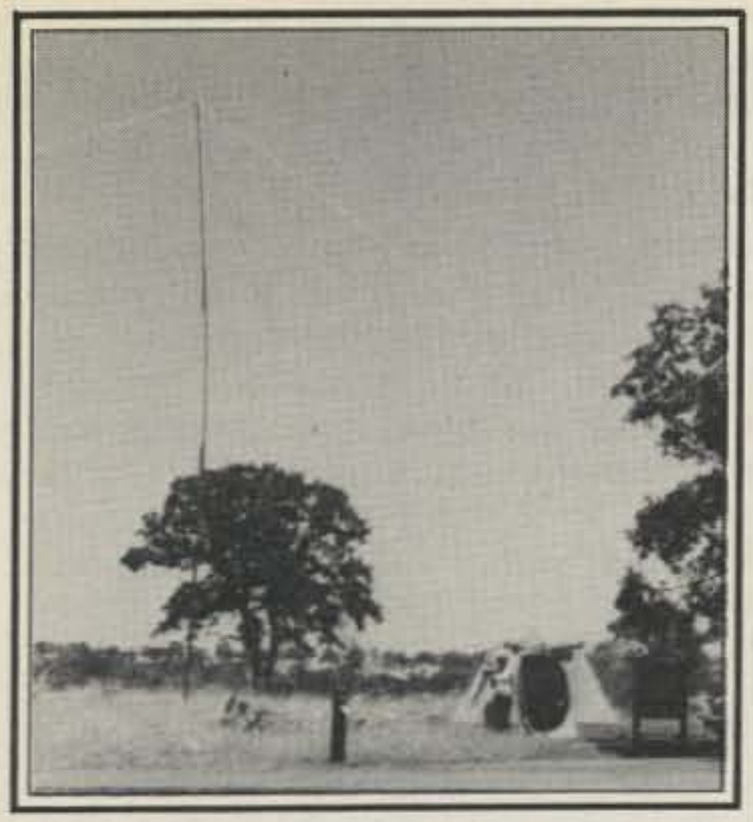
the boat heel over dangerously close to the capsize point? Heck no! He dreams of millions of easy QSO's in the upcoming Field Day, of sitting leisurely while three-hour strings of QSO's flow effortlessly onto the log-sheet. And ultimately, of having his call inscribed on that year's Milliwatt Field Day Trophy and seeing his name at the top of the list! All the joys of summer pale in comparison to the elation which accompanies a successful Field Day effort. The letters from the fellows this year tell the story. Nothing like a QRPp field day.

My gloomy predictions last year about discontinuing the trophy award produced results—a total of 18 entries this year including several newcomers to the fray. For the second year, we've come up with multi-operator entries (more than two operators). Somewhat of a problem with regard to scoring. After talking it over with some QRPp old-timers, I've concluded to continue a two-operator limit (one transmitter) on the trophy itself, but, in the meantime, to recognize the multi-op entries with a running listing over the coming years. One multi-op outfit, K8IF, produced an astounding list of 732 QSO's with 3 operators (K8IF, K8BX, WD8DWQ). On the other hand, KB8GC (WD8MCN, WD8DMX) pushed to 437 QSO's in their first outing, and set a goal of 1000 for this year! Several familiar calls are on the list, such as K6TG, who is due for an award as most faithful FD entrant, and as he gets better every year, could edge up into #1 against tough competition. W6JTH, as in past FD's, again represents the hardiest of the gang, having packed (along with KA3BLO) 60 pounds of gear to the peak of Mt. Tyndall at 14,018 feet. The climb took three days, but operating at about three watts input to the HW-8 on solid, bare rock produced 165 QSO's. As K6TG remarked, "this has got to be FD at its best by the pride of the QRPp contingent!" On the other hand, AB5N did his climbing straight up, setting up his station at the 70 ft. level of a fire tower. But, I'm telling all the good stuff, and I ought to let the fellows tell their own stories, eh? **de . . . W6TZA,** Howard Sweeney, 4594 Las Lindas Way, Carmichael, CA 95608: WA6POC and I started our preparations a month or so ahead of time, looking for a site which would be rural, suitable for a camping weekend. We finally settled on a ten acre cow pasture in the foothills near Shingle Springs, CA. It met all the requirements: away from civilization, flat areas to camp on, and enough trees to provide the antenna support for Dick and some shade.

Oak trees make great supports for an inverted Vee, but there is a problem connected with them. We used an all-band Vee which had to be lowered periodically since band change was accomplished by changing the jumpers between each segment. No traps were used. However, each time the antenna was let down for a band change, the support line moved a shade closer to the end of the branch over which it was positioned. By Sunday afternoon, we were just barely supporting it up there on the branch tips!

de . . . W6SKQ, Bob Spidell, 45020 N. Camolin Ave., Lancaster, CA 93534: "I live in the leading edge (western) of the Mojave Desert and to the ESE of us is the Los Angeles basin. Surrounding the L.A. basin there are mountain ranges from 11,000 ft. down to the normal height of 8,000 ft. MSL. For the field day trip this year I went to one of our mountain ranges about an hour's drive from Lancaster to a height of about 6,000 ft. where a lake is situated. I decided to work only one band this year—15 meters. To get a somewhat respectable signal out, some sort of antenna that had some gain had to be assembled. I chose the ZL-Special made out of twinlead and 72 ohm coax. The assembly used the following: the boom was a 6 ft. piece of 2 × 2 redwood lumber with crossmembers of 1 × 1 pine, attached to the crossmembers to get the 21 ft. length for the driven element and reflector were 8 ft. lengths of 3/4" round doweling. The doweling was hose-clamped to the 1 × 1 pine (8 ft. pieces) and the 1 × 1 pine bolted to the boom. To get this ZL-Special up in the air, I used irrigation pipe that I

**83 Surburban Estates, Vermillion SD 57069*



A close-up shot of K6TG's XYL in front of the tent. The plush interior includes a card table with lamp and other items. Note the call-sign shingle at the tent entrance. Real class!

have for a 20 ft. height, with guys at the 15 ft. level. The whole thing was lashed to a chain link fence that ended with a 5 ft. pipe stanchion where the picnic table was located. I brought along a homebrew transmatch "just in case," but found that the s.w.r. was flat across the band, and the FS meter showed a constant output across the entire band, so I didn't have to use a ground system at all. I contacted 43 sections and made 172 QSO's on 15 s.s.b. with the Argonaut 509 using a 12 volt silical gel battery.

de . . . AB5N, Ray Thornton, Rt 6 Box 155AB, Monroe, LA 71203: "There were more lies told on Field Day than ever before, unless it was some Field Day before! Of course, most people I worked had to be 599 or I didn't hear them at all. QRM seemed lightest in the Novice band for a change. The rig was an HW-8, SWR bridge, MFJ-900 tuner, homebrew balun, and a new 25 amp/hr aircraft battery. The antenna was a five-wire Vee. Each leg was 190 ft. long, with about 30 degree spacing between wires. The spacing was much too close, considering the short length. To change direction, any pair of wires could be plugged into the balun with banana plugs. I was set up at the 70 ft. level of the Luna Fire Observation Tower.

de . . . WD4EBR, Paul R. Clinton, Rt 7 Pine Mtn. Rd., Sevierville, TN 37862: "Here is my log for another QRPp FD contest. Did better this year. Our club had a FD station, so I only got to work the QRPp between times at the club station. I worked 31 contacts with a VE being the best one. Want to say thanks to you for your support of the QRPp gang. It was your feature in *CQ* that got me into QRPp in the first place. Keep the FD Trophy going—I am going to win next year with a 100% effort!"

de . . . WD4LOO, Edwin R. Lappi, 203 Lynn Drive, Carrboro, NC 27510: "Well, I gave FD a try with my trusty HW-8 on battery power, but as you can see, the results were not very good—I only managed 3 contacts! However, it was a lot of fun trying. W4XC and I started out about 2200Z on June 23rd and set up portable about 14 miles north of Chapel Hill, NC, with the rig, a supply of goodies, and stuck it out until about 0630Z on the 24th.

de . . . WB9LKC, Ray A. Sommers, RT 1 Box 238, Custer, WI 54423: Here are my FD results for booby prize! It was a real emergency test. I made up a list

1979 Milliwatt Field Day Trophy Results

		QSO's CW/SSB	Total QSO's	Total Points
1.	WD5BKO	/287	287	1872
2.	WA6POC	192/62	254	1674
3.	K6TG	233/	233	1548
4.	N4DP	200/	200	1350
5.	W6SKQ	/172	172	1182
6.	W6JTH	165/	165	1140
7.	W6IO	141/	141	564
8.	WB9LKC	51/	51	456
9.	WA2JOC	51/	51	456
10.	AB5N	34/	34	354
11.	WD4EBR	31/	31	336
12.	WD4LOO	3/	3	168
13.	WA3FNK	37/	37	148
14.	WA7NWL	15/	15	112.5
15.	K5VOL/9	15/	15	90
16.	WD4KJF	14/	14	84

Scoring: QSO's (1 pt ea.) × Pwr. Mult. (1w. output ×5, 5w. output ×4) × Battery Pwr Mult ×1.5 + 150 portable setup.

Multi-operator

1.	K8IF (3ops)	732/	732	4488
2.	KB8GC (3ops)	415/22	437	2772
3.	AD5F (5 ops)	95/128	223	1338

Friday night, got out everything Saturday morning, threw it in the car, and headed north of here about 100 miles to my old 'school house' in the north-woods. Ran my Argonaut at 5 watts input. Had to take about three hours to repair broken windows in the place. Also, our bed and table had been stolen!"

de . . . WD4KJF, George R. Bard, 689 Roxboro Ct., Lawrenceville, GA 30245: "Well OM, I took your advice and entered the FD activity running QRPp. As you can see from my log page, I did not do well. Each station was called on the average of three times before I was acknowledged—for each station listed, there were 3 or 4 more who never heard me at all. Very frustrating! My intention was not to be competitive though, but to support your efforts to keep QRPp alive—my pleasure! I've been QRPp for about 6 months, and have worked all 48 mainland states—still need KL7/KH6. Keep up the good work. I look for your column in *CQ* and am a regular reader—really enjoy the operating reports."

de . . . K6TG, Ben Saylor, Box 2314, Modesto, CA 95351: "FD conditions were not as good as last year, but I made a bigger score (probably due to improved ability in handling the Century-21), 233 contacts with 9 watts battery input and an 80 meter inverted Vee on a 40 ft. pole. The ends of the antenna were 4 ft. above ground. For the first time, a tent and normal operating table were used. Best DX was a ragchew with ZL1NG on 20c.w. The whole outing was made most pleasant by the 100% cooperation from the XYL—except when I tried to bring along her favorite Persian rug to put on the floor of the tent!

Your column in *CQ* is like a club with all the QRPp amateurs as members. The *Milliwatt FD Trophy* is a worthy addition to our club and let's show in print what we tried and how we did each FD! This does not serve just a few of us. Most hams, though they are not using QRPp, are nevertheless interested in reading the column and talking about their QRPp brethren." (Good point Ben. Also, I like your way of looking at the QRPp column as a QRPp club!—Ade)

de . . . WA3FNK, Tom Rhodes, 29 W. Church St., Williamsport, MD 21795: "In April of this year, I felt it was about time to give QRPp a try. After picking up an almost new HW-8 and power supply at a local hamfest, I set out to try and save the FD Trophy. I feel it is very much needed and hope to be portable next year for a full score. Keep up the

K6TG's location, with the 40 ft. mast consisting of three sections of 2 × 4 lumber guyed at the top, supporting an 80 meter inverted Vee fed through an antenna tuner on 80-10 meters. The mast is bowed because K6TG was too lazy to loosen the guywires. His XYL is seen in front of the tent.

fine work and again, thanks for the QRPp column and *CQ's* interest."

de . . . WD5BKO, Jim Carpenter, 17106 Mt. Everest, San Antonio, TX 78232: "Operators for WD5BKO were myself and K5DDJ, Harvey. Neither of us are avid contestors, but both being moderate to serious QRPp'rs, we thought we'd give FD a try this year after reading about the surprisingly low participation last year in your June, 1979 column in *CQ*. The location selected was a hilltop picnic area near Canyon Lake, approximately 30 miles northeast of San Antonio. Equipment consisted of my Argonaut 509 for the low bands and a Kenwood TR-2200A for 2 meter f.m. Antennas included a rotatable trap dipole constructed from an unused element of K5DDJ's tribander for 20-15-10, and a stacked 4 element yagi for 2 meters. A piece of coax run over to the Hustler whip on Harvey's car provided a back-up antenna for the low bands. The entire system was powered by a 12 volt auto battery.

de . . . N4DP, Ken Hurt, RT 3 Box 196, Hampton, GA 30228: "Enclosed are the logs for the FD operation of N4DP/4 with myself and my father, Jim W4NNU, as operators. We own a few acres of farm land on which we decided to operate FD using QRPp. My father had just built an HW-8 so we decided to use it. In the past, dad has been a 100% QRPp operator using TenTec gear around the house, so he talked me into trying it out on FD. So we built up a little installation on the farmland just before FD. We first put up a 40 ft. push-up mast supporting a TA-33. We hand rotated it by using a "T" clamp on the bottom section.

Random Suggestions

Thanks a lot for the support for the *Milliwatt FD Trophy* fellas!! Great showing in 1979. Let's make this year even better, say about 36 entries? As you can see from the above reports, getting out there is sometimes frustrating, but always rewarding. I figure I might as well provide some pointers for newcomers to FD to help out. Here goes:

1.) Check out equipment ahead of time by "dry-running" it. Load it all up in the car and cart it around a while.

2.) Carry along a handkey/bug, and if possible, other accessories such as an antenna tuner, SWR bridge, field-strength meter, #47 bulbs (current indicators), tape, extra hook-up wire, alligator clips, spare cables with connectors for the gear being used.

3.) Antenna selection is of prime importance. Regardless of what type of antenna you use, put it together and tune it before you head out for FD. Sometimes you can succeed by taking only a bunch of wire and a formula, but don't count on it! When tuning the antenna, simulate FD conditions, *i.e.*, battery operation away from the various r.f. grounds available in the homeshack. Solder joints, cable connectors, and other stress absorbing points should be given special attention.

If possible, arm yourself with an antenna that exhibits some gain over a dipole for 20-10 meters. Antenna books show a multitude of wire antennas that exhibit worthwhile gain. Pick one that will work for your proposed set-up. Again, tune it before you leave. Clearly work out your plan for erecting the antenna at the site. Try it out. Don't figure that, since the guy in the article you've read spincast his antenna line over an 80 ft. branch, it'll be a snap for you also. Or the old bow-and-arrow approach. These tricks take considerable skill! The simplest approach, if you have a good throwing arm, is the 6 lb-nylon-fishing-line-with-6 oz.-sinker. Accuracy is a must!

4.) Site selection is next. If you intend to use a wire antenna, tall trees are the key, but spacing is also important. I've headed for some good-looking 100 ft. high tree stands, excited over the prospect of an antenna up at 75 ft., only to find that the trees were close together and no clearance was available between branches for any wire. Some fellas take along their mast—telescoping TV type, or several 15-20 ft sections of 2 × 4 lumber. It is relatively easy to gain a 40 ft height with these approaches. Yagi's and similar antennas usually require at least a two-man team for erection. Actual location of the site with respect to surrounding terrain doesn't seem all that crucial. An angle of radiation of about 35 degrees is all you need for FD, and the mountains have to be pretty close in to obstruct that angle. Beyond antenna considerations, it helps if the site is reasonably near to necessary facilities and tables are available. Otherwise, supply your own!

5.) Comforts of life department—a day in the field requires some attention to regular human comforts. Fatigue builds in direct proportion to discomfort. Operating FD is grueling enough without being exaccerbated by a poor operating position. A chair and table are minimum, unless you have a very comfortable back seat in your vehicle. Food and liquid refreshments should be planned, especially the liquid—it is hot out there and a guy gets thirsty. Don't forget that it gets dark out there and there isn't a light-switch

Milliwatt Field Day Trophy Winners

		QSO's/Score
1970	K4OCE	220/1470
1971	WA6ABP	137/1175.5
1972	W7DRA	55/562.5
1973	WA5WYO	79/742.5
1974	WØIYP	439/2784
1975	WB8OSM	220/1470
1976	K6TG	128/918
1977	N2AA	389/2790
1978	WA4IAR	442/2802
1979	WD5BKO	287/1872

Multi-Operator Standings

1.	K8IF	732/4488
2.	KB8GC	437/2772
3.	WØMHK	336/2166
4.	K1GAX	342/2052
5.	W3FQR	243/1608
6.	AS5F	223/1338
7.	W3AI	126/906

The operating position of WA6POC consisting of a card table in a cow-pasture. At the controls is W6TZA, who is splitting his attention between the keyer and one of the local cattle who wandered over to investigate the FD doings. Unfortunately, WA6POC didn't manage to get a clear shot of the group of invading skunks who added a dimension of excitement (and odor) to the outing.

around—take along some makeshift light. Flashlights don't work because you focus them either on the log or rig, leaving a blind area. A 12 volt bulb with wire leads soldered on, or socket arrangement, can be hooked directly to the battery supply. Bug-spray is a must.
6.) Operating is hectic on FD. Everyone develops his own style. The top-contesters follow a sort of Einstein approach—$E = m^3c^3$, translated Energy is expended by "move-move-move-call-call-call" of course. In normal operation, listening is the key to success, but on FD, a lot of quick "- × 2" calls is more effective than a few short "3 × 3" calls. The idea is to respond instantaneously to the other guy's "BK" with a rapid "DE W0RSP" and let it go at that. If he doesn't hear you with that, he's off and running. Operators skim the top-level signals for the most part, although really sharp operators have no sensitivity to signal strength—they hear the S3 as well as the S9. Either way, the quick call gets you in, or you miss. Don't be afraid to jump in and call "CQ TEST" either on FD! But short and quick— a 3 × 2 at the longest. I've had good half-hour runs resulting from calling with QRPp! After an exchange, *always* do a "QRZ DE W0RSP" sign-off. Sharp operators are listening for callsigns, and if they hear one that they can nail, they'll do it, so the "QRZ" indicates that your call is open for QSO. Don't become frustrated and conclude that QRPp won't work on FD. Strings of QSO's depend upon propagation. In my experience, and I note a similar experience in many logs that I check, QSO's happen in strings. For twenty-forty minutes, one or two QSO's are logged, and then, all of a sudden, one per minute for the next ten minutes, and one per five minutes for another twenty minutes, then back to one per twenty minutes. It is easy during lag periods to become frustrated and slump into casual operating. The key is $E = m^3c^3$. Keep dipping for a QSO. Relentlessly, consistently. No pauses. Don't spend too much time listening and looking for the "right" signal—it'll be long gone before you spring into action. Skim for strong calls and nail them. If fatigue gets the best of you, take a break rather than operating casually—come back refreshed and ready to plow into the quick-moving action. $E = m^3c^3$!

Well gang, that's my addition to all the points made by the fellas in their reports. Hope to work a lot of you on FD. Hope to hear from a lot of you about your results. Good luck!!

73, Ade, W0RSP

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

Guidelines for Conducting Amateur Radio Shows— Part II of IV

Last month's Novice column contains the first part of this four part article. Each part is useful by itself but all parts should be read to derive maximum benefit from this article. Last month's column covered show people, planning, and location considerations.

Banquet

Responsibility. The banquet coordinator determines the location, time, menu, ticket cost, seating arrangement, and any prizes related to show breakfasts, luncheons, dinners, and the banquet. This coordinator primarily works with the finance, prize, publicity, and ticket coordinators.

Purpose. The banquet provides an opportunity to complete your show in an upbeat manner. Do not allow a negative comment to spoil the banquet for anyone.

Emcee. The show chairman should serve as the master of ceremonies during the banquet. He/she should briefly welcome the group and lead them in the pledge of allegiance to our flag, followed by the introduction of the person who will make the invocation.

Invocation. Select a religious official, who is preferably also an amateur, to conduct the banquet invocation. The show chairman or banquet coordinator should discuss the invocation subject matter and length so that this person will be aware of any special show theme and will not feel rushed. The invocation can put the attendees in the right frame of mind to really enjoy the following banquet. The emcee should thank the religious leader for his comments and promptly have the meal started.

Time. Schedule the banquet to start early enough to ensure that it will be completed in time to let attendees leave at a reasonable hour, since most of them go directly home after the banquet. Establish a firm time when the meal will start to be served.

Program. The banquet program immediately follows the meal. It is best to have a non-technical program because many amateurs will be accompanied by non-amateurs. The emcee should give the banquet speaker a good introduction and stimulate interest in the program to follow.

Banquet Prize. The banquet program should be followed by the drawing for the banquet prize. It is good to have the banquet coordinator draw this prize and announce the winner.

Recognition. Have exhibit coordinator recognize key exhibitor personnel present at the banquet. They should be thanked for their participation at this time and a special show memento can be distributed to them.

Have seminar coordinator recognize speakers at the banquet. They should be thanked and given a special show memento at this time.

Emcee should express appreciation of show support received from individuals and organizations not at banquet, such as companies that furnished free handout items and literature or supplied prizes at discount or no cost. Emcee should thank hotel/convention personnel, printer, security, and others who helped produce the show. Summarize show highlights such as total attendance, number of exhibits, total retail value of prizes, total seminar attendance, and unusual upbeat happenings.

Seating. Seat show chairman, coordinators, banquet speaker, invocation clergyman, and other key people with their families. Either seat these people at a large head table or have them seated to serve as hosts of individual tables.

Other Prizes. Contest coordinator should announce contest winners and distribute prizes to those at banquet. Obviously, it should be predetermined if winners will be at the banquet.

If exhibitors have conducted contests or drawings at the show, recognize them one at a time and have them announce the winners and award prizes.

Prize coordinator should now conduct the drawings for all remaining prizes, except for the pre-registration

Here is Evelyn Cavallo, KA7EOA, of Douglas, Arizona. She thanks Bob Selman, W7YGW, for helping her get started in amateur radio and advises that her husband has been very understanding of her new interest. Evelyn runs a Yaesu FT-101-ZD with a multiband dipole and she has worked all 50 states since May 1979. The Cavallo's put three kids through college and Evelyn did not become licensed until she retired from running a hardware store in Illinois, even though she had wanted to become an amateur for 15 years. When visiting Illinois, she runs a Ten Tec Century 21 Transceiver with a longwire antenna. Evelyn thinks that amateurs are the greatest people she has ever met. Her first contact was with KH6DSO and she was thrilled when she received Steve's beautiful card from Hawaii.

2814 Empire Ave., Burbank, CA 91520

Barry Electronics Corp.

WE SHIP WORLDWIDE

WORLD WIDE AMATEUR RADIO SINCE 1950

Your one source for all Radio Equipment!

SWAN-Astro 150

DRAKE TR-7 & R-7
L-7 2KW Linear Amplifier

cushcraft, Mosley
KLM
hy-gain

KANTRONICS
Field Day

Order The New Rockwell/Collins Pro-Mark KWM-380 at Barry's

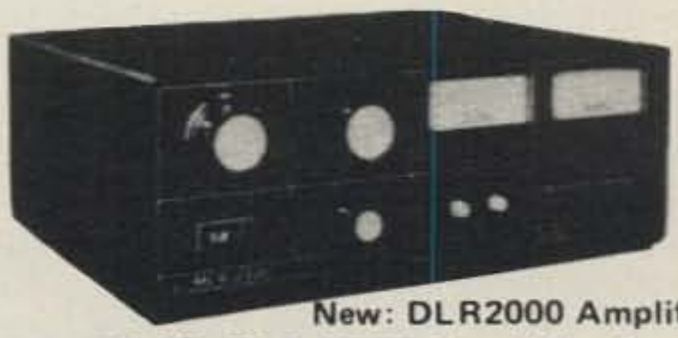
Call 212-925-7000

BIRD
Wattmeters & Elements
in stock

YAESU FT-707
FT-101ZD, FT-901DM, FT-227RB, FT-7B
FRG 7000, FT-107

Murch Model UT2000A,
UT2000B and UT2000A-LS

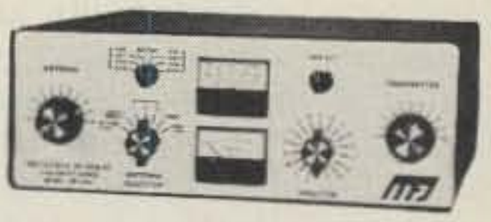
DSI Model #5500, #5600



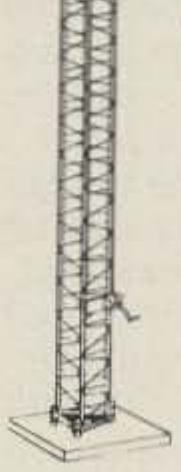
New: DLR2000 Amplifier
DENTRON MLA-2500 Amplifier &
MTA-3000 Tuners

Clipperton "L"
GL-1000

Synthesized
Handy Talkies
ICOM IC-2A
FT207R
and
Tempo S1



MFJ-Antenna Tuner



TOWERS
HY-GAIN
Tri-Ex

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

Amateur Radio Courses Given On Our Premises

Export Orders Shipped Immediately.

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

MAIL ALL ORDERS TO BARRY ELECTRONICS CORP.
512 BROADWAY, NEW YORK CITY, NEW YORK 10012
BARRY INTERNATIONAL TELEX 12-7670 212-925-7000
TOP TRADES GIVEN ON YOUR USED EQUIPMENT

AUTHORIZED DISTS. MCKAY DYMEK
FOR SHORTWAVE RECEIVERS

IN STOCK—NEW ROBOT MODEL #800 BIRD WATTMETER, HY-GAIN, LARSEN, SHURE, KDK-2015R, TURNER, ASTATIC, MOSLEY, VHF ENG., TEN-TEC, "OMNI-D", KANTRONICS, DSI, MFJ.

WE NOW STOCK THE MURCH ULTIMATE TRANSMATCH 2000B

DEALER INQUIRIES INVITED, PHONE IN YOUR ORDER & BE REIMBURSED.

CIRCLE 121 ON READER SERVICE CARD

and grand prizes. Banquet attendees should be reminded at this time that major prizes are awarded to winners, whether or not the winners are present at the time of the drawing. Urge attendees to let their friends know about prizes they have won, if the winners are not present. Remind everyone that prizes are not shipped or delivered to winners. State when and where prizes can be picked up by winners after the show and provide the name and telephone number of a cognizant show official (preferably the prize coordinator) who can be contacted about prizes. The prize drawings should not start until the preceding information has been stressed.

The major prize drawings provide an excellent opportunity to introduce the show workers. The prize coordinator should introduce one coordinator at a time and have each one introduce his workers one by one as they draw one ticket stub each. The same system should be used to introduce other key amateurs at the banquet such as ARRL officials, FCC personnel, heads of radio clubs or councils, and leaders of special interest groups.

As is always the case, it is important to clearly announce which major prize is being drawn before the ticket stub is pulled. Clearly announce the name, callsign, and address of each winner and staple each ticket stub to the associated prize record sheet. Have winners pick up their prizes immediately, if they are at the banquet.

When the major prizes have all been drawn, advise the attendees that all previously drawn ticket stubs are being returned to the drawing barrel so that they will be included in the grand prize drawing. The only exceptions are those ticket stubs still attached to major prize record sheets. Put these stubs back in the drawing barrel in full view of the audience and have the drum continuously rotated during the announcement of the pre-registration prize winner.

Show chairman should state the circumstances under which the pre-registration prize winning ticket stub was drawn to make it clear that it was completely open. Point out that no one knows who won this prize and that the stub is double-sealed inside two envelopes which have been marked to preclude any possibility of tampering. Have the appropriate people check to ascertain that the envelopes have remained sealed. Open these envelopes in clear view of the audience. Announce the name, callsign, and address of the pre-registration prize winner and attach the stub to the associated prize record sheet. Allow others to view winning stub.

The grand prize drawing concludes the banquet and the show. Before the ticket stub is drawn, thank everyone for attending and invite them to attend your next show. Have the grand prize winning ticket stub drawn in plain view of the banquet attendees. The banquet speaker is a good choice to draw this stub. The stub should be checked by the person who drew it and it should then be handed to the emcee in plain view of the audience. The emcee should carefully announce the name, callsign, and address of the grand prize winner before attaching the stub to the associated prize record sheet. The show should then be declared to be closed.

Communications

Responsibility. If you have enough people to let you have a separate person in charge of communications, it eases the work of your publicity coordinator. If you do not have a suitable volunteer available to serve as communications coordinator, these tasks are best handled by the publicity coordinator. The communications coordinator works mostly with the prize and publicity coordinators.

Talk-in Station. If you operate a talk-in station, advertise its intended operating frequencies and times of operation in advance. Station should be on the air at least one day before the show opens and operators must be cautioned against mentioning ticket prices and prizes on the air. Print a special QSL and mail one to confirm each contact.

Telephone. If a separate show telephone is used, it should be installed at the registration/control booth. It is not advisable to advertise the number of a special show telephone except to your workers and their families.

2 Meter F.M. Two meter f.m. is usually clobbered by the chatter of show attendees. If you want or need 2 meter f.m. communication to help coordinate show activities, it is wise to select a relatively unused frequency, even if it involves the purchase of special crystals.

Public Address System. It is necessary to closely control access to microphones where public address or intercommunication systems are used because amateurs won't hesitate to use them.

Announcements. Lists of hourly prize drawing winners must be made known to all attendees as quickly as possible by the communications coordinator. These lists can be posted on bulletin boards, printed on chalkboards, and announced over PA/intercom systems. Just the winner's name and callsign should be posted, not the prize description or ticket number. Each list should show the deadline by when winners must claim their prizes. This is an important function since these lower value hourly prizes can increase the enjoyment of many attendees.

The communications coordinator is responsible for all intercom use and message board use.

Contests

Responsibility. The contest coordinator decides which contests will be run, where they will be held, what rules will apply in each contest, and which prize will be awarded to the winner of each event. The contest coordinator works most closely with the communications, exhibit, prize, and publicity coordinators.

Types. A balanced selection of contests will spark maximum crowd participation. If you have a contest requiring a high degree of technical competence, offset it with one that is basically just a matter of luck. Similarly, if you have a contest such as antique tube/component identification, offset it with one requiring identification of modern components.

Typical contests are as follows:

- Amateur from most distant point
- Code receiving
- Component identification or cookie jar total
- Homebrew judging
- Mobile installation judging
- Oldest licensed amateur of each license class present
- QLF contest
- QSL judging or drawing
- Resistance maze
- Transmitter hunt
- Youngest licensed amateur of each license class present

Exhibits

Responsibility. The exhibit coordinator is directly responsible for all inside and outside/mobile displays. This coordinator works most closely with the finance, prize, and publicity coordinators. The exhibit coordinator maintains layouts showing the location of each paid and free exhibit.

Paid Booths. Competing groups are assigned to separated booths to minimize friction. Exhibitors often like to be located adjacent to a friend's booth, and these requests should be honored. Exhibitors who have participated in your previous shows have first choice of booth locations, although they usually just want the space they used in previous shows. Do not become involved in trying to curb any price war that may erupt.

Exhibit Details. Provide each interested organization with complete printed details of exhibit area layout, booth sizes, costs of specific services

(telephone and electric power connection, storage, shipping, etc.), costs of renting furnishings, and other pertinent information. Require completed booth application to be accompanied by payment in full to reserve booth space. Send potential exhibitors complete details regarding storage and handling provisions for display materials, plus a list of all local hotels and motels.

Merchandise Payment. It is preferable to have all booth fees paid by check instead of by merchandise. If you decide to accept gear or accessories as partial (or full) booth payment, they should be items of your choice. The advantages related to accepting merchandise in lieu of money are that you have extra chances to advertise exhibitor products and you usually end up with prizes of higher value than you could purchase with the cash payments. Be certain to give each paying exhibitor a signed receipt for his booth fee payment.

Free Booths. Special interest groups are important to the success of a show. Invite groups such as amateur radio councils, ARMA, ARRL, CD, FCC, MARS, MTC, nets, PCF, QCWA/OOTC, QRP, QSL bureau, RACES, repeater, RTTY, SOWP, SSTV/ATV, SWL, TVI/BCI, YL, and 10-X International. Most of these organizations have limited financial resources and they will probably not be able to put in a display if you don't provide the booth at little or no cost. It is often possible to combine two groups in one booth to reduce your expenses. Since the show pays the majority of costs related to special interest displays, it is reasonable to have their booth workers purchase their own convention tickets.

Exhibit Aids. Do everything possible to help your exhibitors establish the best possible displays. Have tools, tape, and staplers on hand to help set up exhibits. Provide the best possible environment for exhibitors and their potential customers. Provide individual exhibit identification signs.

Show Layout. Post exhibit layouts of the entire show area at key points to enable attendees to easily locate exhibits, prize booth, hospitality rooms, registration booth, seminar rooms, restrooms, parking areas, telephones, message board, restaurants, contest points, and all other show points.

Outside/Mobile Exhibits. Provide nearby outside display spaces for mobile exhibits. This area should be in an easily accessible and highly visible location.

Registration and Information Booth.Establish the show control booth at the best location available for handling a large crowd. If it is possible to do so, establish your control booth near the main entry to the exhibit and seminar area. Separately process those who pre-registered to minimize their delay in entering the show. Post several large clear signs at and near the control booth to indicate where attendees should go to get help regarding such matters as registration, tours, banquet, contests, and hospitality suites. Make everything as simple as possible for attendees. Keep a highly capable person on duty at all times in this booth just to answer questions and post a sign stating that this information service exists. Distribute printed show programs and other free handouts from this booth. It is important to have a comfortable area and good writing instruments where attendees must fill in items such as ticket stubs. A simple and effective way to minimize the loss of felt-tip pens and markers is to remove and store their caps. Very few people are apt to take a writing instrument without a cap because it would mark everything it touches. The control booth is usually furnished by the hotel at no extra charge and they know where it should be set up for maximum effectiveness. Do not crowd things in this booth since crowding leads to a mess and unnecessary confusion.

Here is Art Murray, WB3JKP, a retired mail carrier from Mechanicsburg, Pennsylvania. Art's Kenwood TS-520-S Transceiver is set up in the basement of his home and he uses a vertical antenna. His backup rig is a Heath HW-16 Transceiver. He was a radio operator on flying status with the Air Force during WWII. He has been interested in radio since he was a teenager but he just got his Novice license about two years ago. His best DX contacts so far are England and Germany. Art also enjoys bicycling and sailing. He and his wife do a lot of square dancing, which means that most of Art's operating is during the morning and on 15 meters. Art is enjoying retirement and amateur radio is an important part of his life.

Editor's Notes

This completes the second part of this four part article.

Phil Hunsberger, K9PNT is operating from the Philippines as K9PNT/DU2. He is usually in the 15 meter Novice band on 21110 (plus or minus 3) KiloHertz from 0000 to 0300 UTC. He has worked hundreds of stations around this frequency during the past several months, with most of his operating on weekends. Phil advises that he loses many contacts due to amateurs not listening carefully to his entire call; they swing directional antennas towards the Illinois/Indiana/Wisconsin area when they hear the K9 part of his callsign. Phil is anxious to work as many Novices as possible. His address is PSC#1, Box 1864, APO San Francisco, California 96286. He did not request it, but I advise you to enclose a self-addressed and stamped envelope if you work him and want a direct QSL.

Novices are urged to submit good black-and-white pictures of themselves at their operating positions. If your photograph is printed in a future Novice column, you will receive a one year subscription (or renewal) to *CQ*. A brief description of operating activities and some personal background information are needed with your picture.

Some of the stations I've worked on the novice bands are:
KA1CBD, Ted, W. Roxbury, Mass.,
KA2EOO, John, Moriches, N.Y.,
KA3CQB, Katherine, Gambrills, Md.,
WD4NMD, Frank, Nashville, Tenn.,
KA5GPV, Leon, Gretna, Louisiana,
KA6BSD, Wayne, Los Osos, Calif.
KA7EOG, Roger, McMinnville, Ore.,
WD8MFS, Fred, Wayne, Mich.,
KA9CEM, Betty, Chicago, Illinois,
KA0DMU, Warren,, Dubuque, Iowa,
WL7AGB, Lester, Dillingham, Alaska.

73, Bill, W6DDB

Oil up the lathe and get set to build another of K3WBH's mechanical marvels. Most of it can be built with simple tools you probably have and the results will certainly be worth the effort.

A Discone Antenna For 10 And 6 Meters And Lo-Band Public Service Monitoring

BY T.E. WHITE*, K3WBH

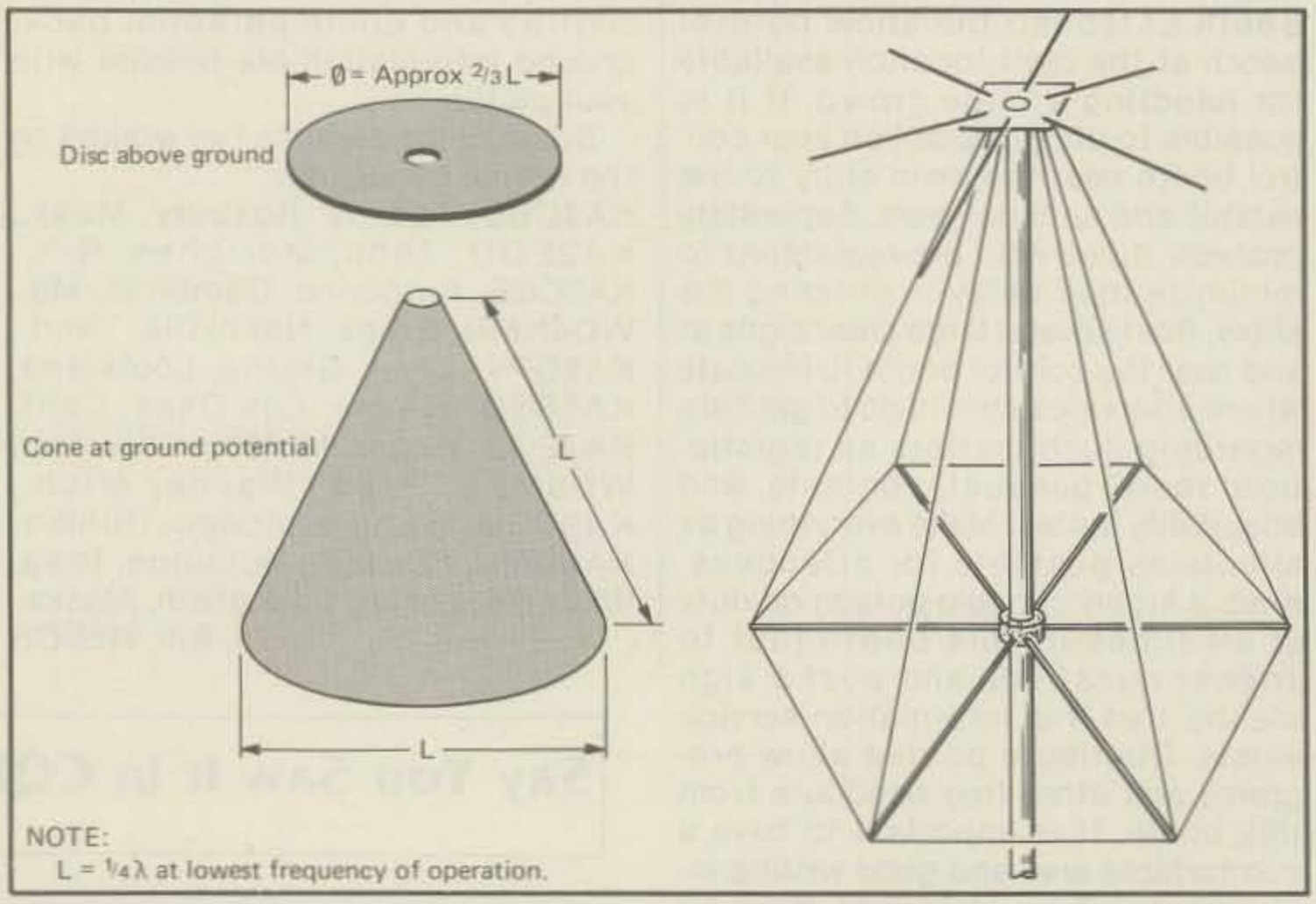


Fig. 1 – The basic discone antenna and its evolution.

"What the heck is that?" will echo through the neighborhood when you proudly erect this dashing, dramatic discone.

Amateurs wishing to get on 10 and 6 and chase sunspot and sporadic E DX will get very good results with this low-angle vertical antenna, also FB for working 6 meter repeaters. A single feed line switched at the shack between rigs serves both bands.

For those not familiar with the discone, it is a very broad-band radiator, working from its low cutoff frequency up to theoretically infinite limits. By making the cutoff (the point where the skirt is less than ¼ λ) 28 MHz, we can work 10 and 6 (and even 2) and, if we want to, listen in on public safety, transportation and other services in the 30-50 MHz band.

The discone evolves from a solid disc atop a hollow cone (fig. 1). It is not necessary to maintain plane surfaces, however. We can simulate them by rods, wires, tubes, netting, etc., and make a much lighter antenna in the bargain. The radials are bridged between tips to make a web or "hem." This may be dispensed with at higher frequencies but is helpful at low v.h.f. in decoupling skirt from disc.

Feeding is a breeze. 52 ohm coax attaches directly with no matching devices needed. The antenna is largely independent of ground reflections, works well at most any height, and is far superior to the stick-and-radials variety of vertical antenna. In fact, no other single-unit vertical equals it for low radiation/reception angle. You'd need many dipoles piled up vertically to come close, and then you wouldn't be frequency-independent.

While the discone requires some lathe work or access to a metal shop, construction is straightforward. Ex-

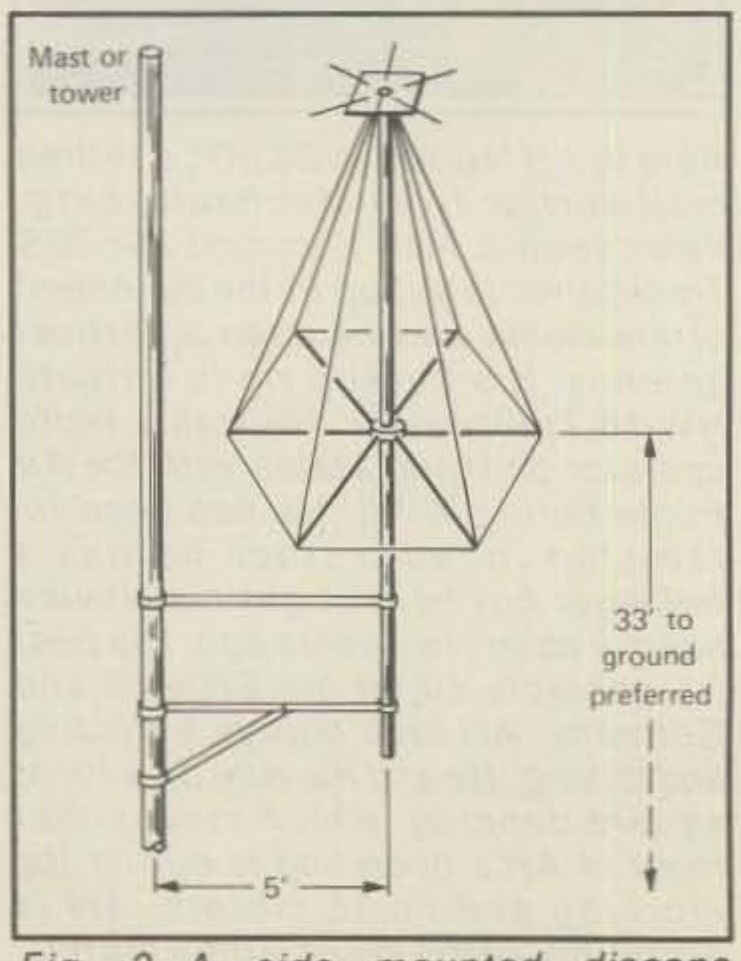


Fig. 2– A side mounted discone antenna.

*36 Lake Ave., Fair Haven, N.J. 07701

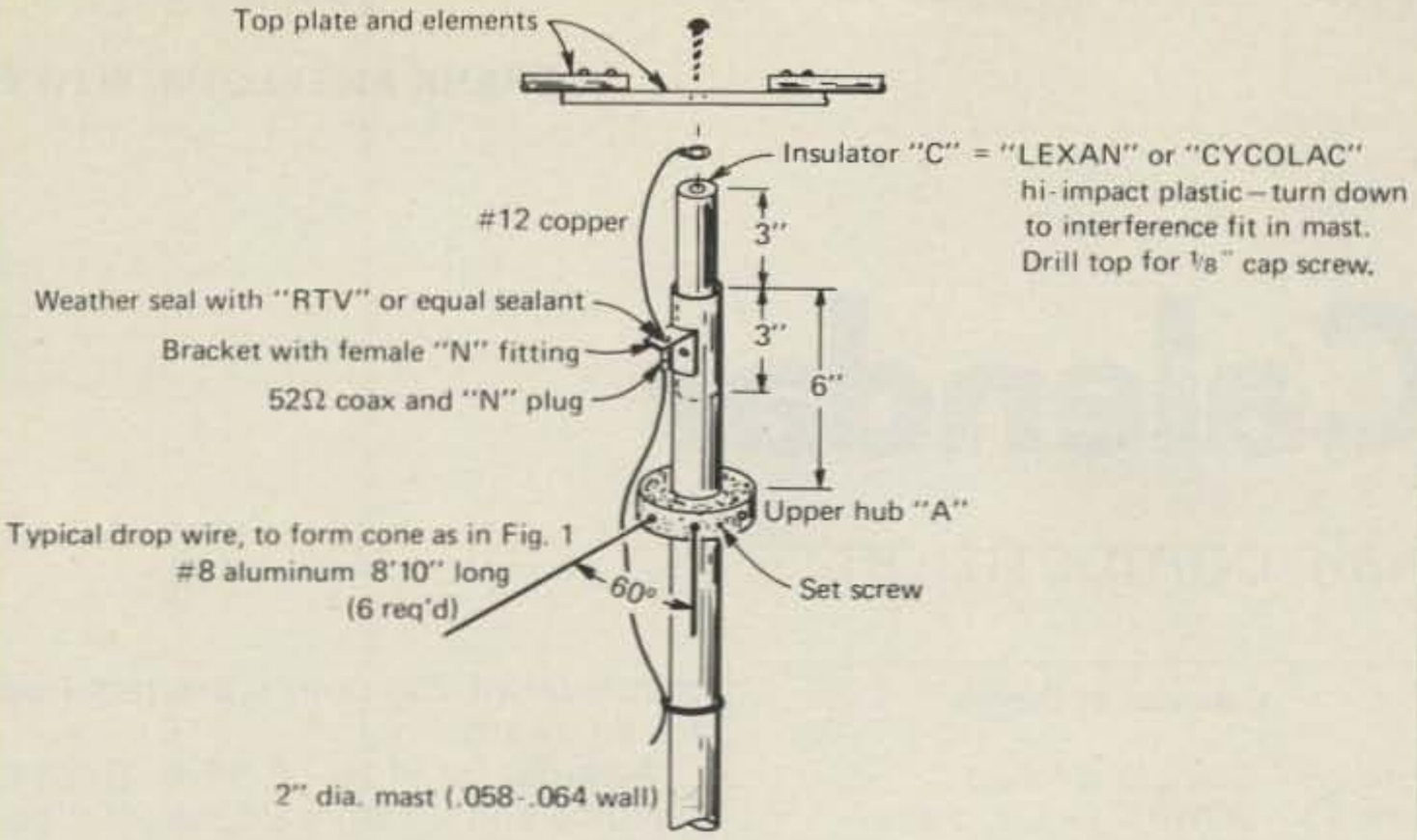


Fig. 3 – The assembly of the top junction.

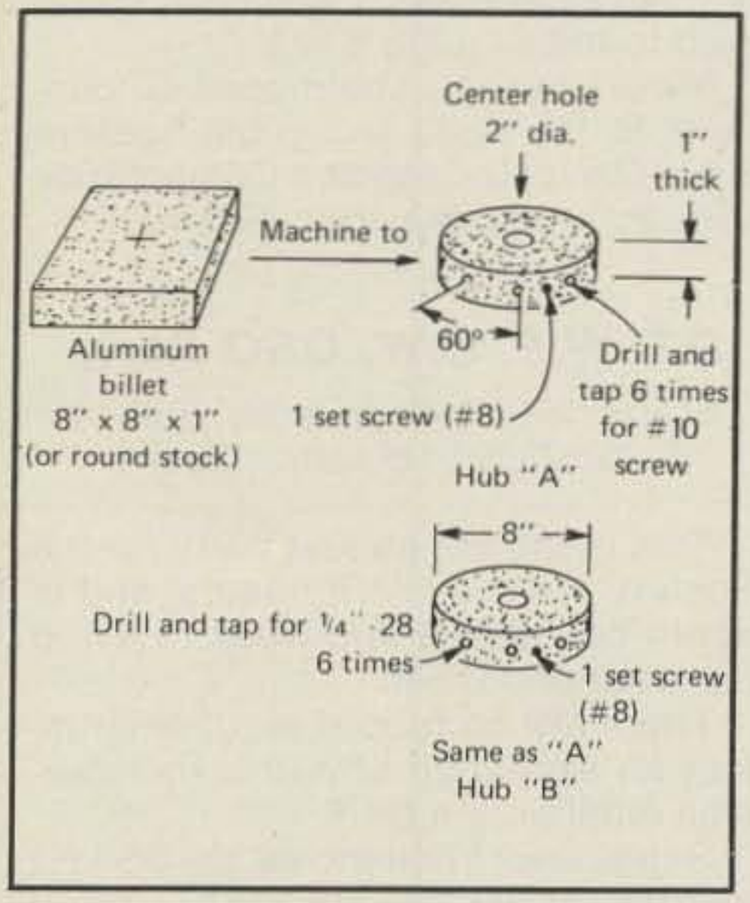


Fig. 4 – Machining details for hubs A and B.

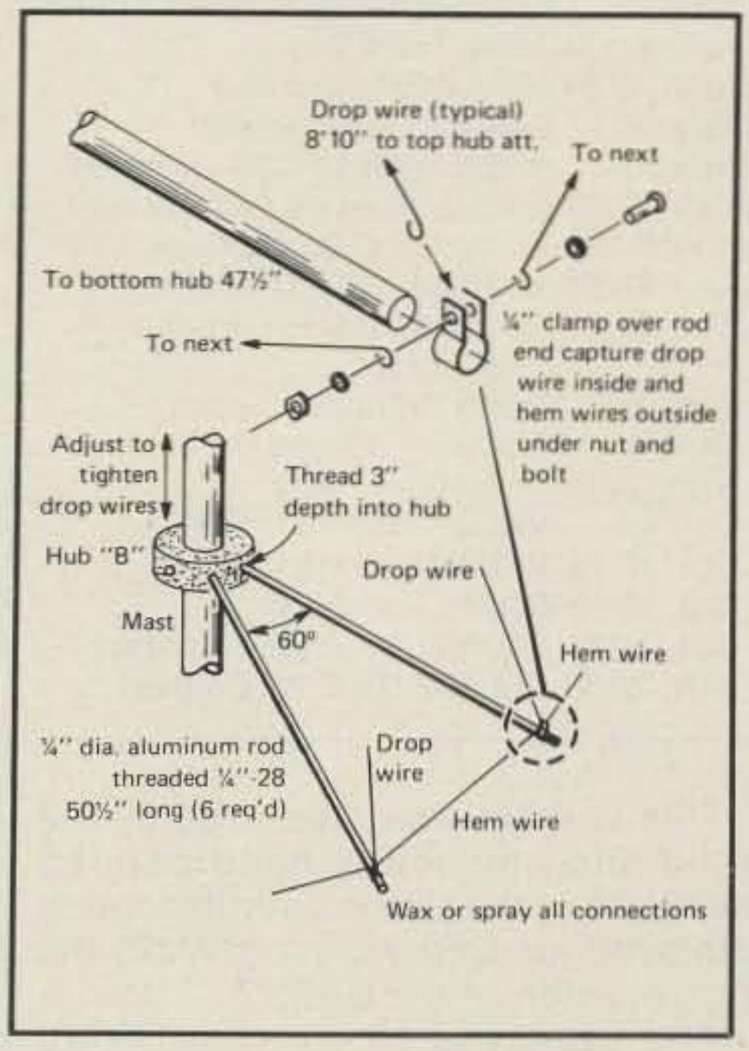


Fig. 5 – Assembly of the lower portion.

cept for the hubs, only hand labor is required. It can be mast-top mounted or hung out the side of a tower (fig. 2).

The top assembly is "live" at all times with respect to lightning, especially if mast-top mounted. When not in use, the coax should be disconnected from the rig and plugged into a receptacle whose inner conductor lug is shorted directly to ground.

The secret of 10 and 6 meter DX is not Texas kilowatts or 50 foot booms. It is low wave angle. Those sporadic E ionized clouds are often far from your QTH. To bounce off them with maximum effect requires the lowest "angle of approach" you can possibly get. Spend a few hours making this "torn umbrella" and forget the 15dB yagis. You'll be glad you did. ▣

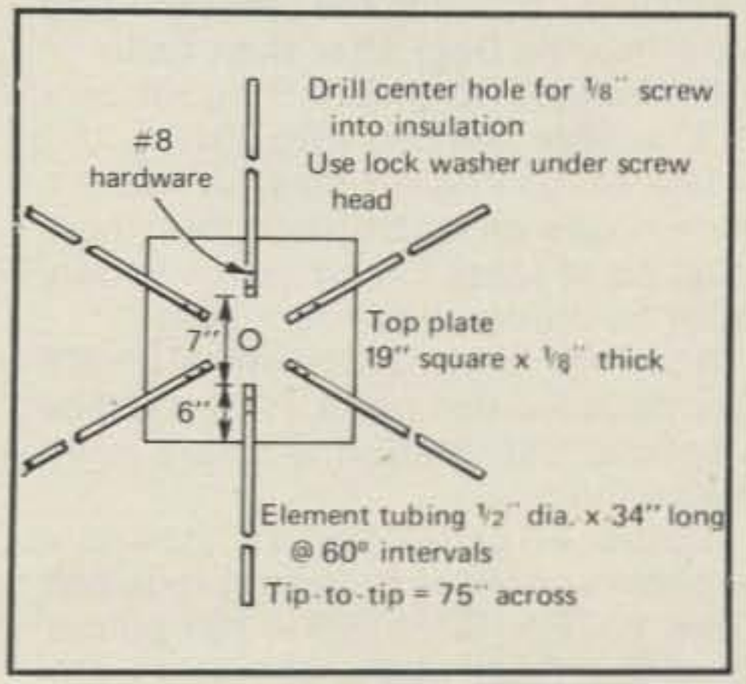


Fig. 6 – The top plate and element assembly.

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

Reading the "Contest Corral" in the March issue of *QST* I was somewhat surprised when I read that the JARL had moved their ALL Asian contest to a new date, and that it was being held the weekend of March 15–16.

I thought I had missed the boat on that one, but checking the bands on the above dates showed no JA or Asian contest activity.

Therefore I'm sticking to the original dates as indicated in this month's Calendar. I too may be wrong but will take that chance and hope that official confirmation will not leave me with egg in my face.

To keep up with the latest in DX it is almost a *must* that you subscribe to one or more of the weekly Bulletins devoted to that subject. The average Bulletin however gives little in the way of contest information except a brief announcement.

To fill this void the National Contest Journal was born a few years ago. We tell you when and how it's going to happen, here in the Contest Calendar. The NCJ tells you what happened and how the fellows feel about it. For more information drop a line to the new Managing Editor, Randy Thompson, K5ZD, P.O. Box 732, Round Rock, Texas 78664

In case you missed the announcement in the WPX C.W. contest story in the April issue, another Trophy has been added to the WPX SSB Contest, effective with this year's March contest. It is being donated by Ray Alea, KB8JF in memory of his father "Rod" Alea, CO8RA who became a silent key last November. Appropriately this one is for the Caribbean/Central American area, Single Operator, All Band. Hope we had a good turnout for this award.

73 for now, Frank, W1WY

Calendar of Events

June 2-6	Guide Dog Award
June 4-5	SOWP C.W. QSO Party
June 6	6 Meter SMIRK Contest
June 7-8	Minnesota QSO Party
June 7-8	RSGB National Field Day
June 14-15	ARRL V.H.F. Contest
June 21-22	West Virginia QSO Party
June 21-22	All Asian Phone Contest
June 22	RSGB WAB LF Phone Contest
June 28-29	ARRL Field Day
June 28-29	ARCI QRP Field Day
July 1	Canada Day Contest
July 20	RSGB WAB LF C.W. Contest
July 26-28	County Hunters CW Contest
Aug. 9-10	European C.W. Contest
Aug. 23-24	All Asian C.W. Contest
Aug. 31	RSGB WAB V.H.F Phone Contest
Sept. 6-7	North American Sprint
Sept. 13-14	European Phone Contest
Sept. 27-28	Delta QSO Party
Oct. 4-5	VK/ZL/Oceania Phone
Oct. 18-19	VK/ZL/Oceania C.W.
Oct. 18-19	Scouts Jamboree
Oct. 25-26	**CQ WW DX Phone Contest**
Nov. 29-30	**CQ WW DX C.W. Contest**

II Guide Dog Award

Starts: 0000 GMT Monday, June 2
Ends: 2400 GMT Friday, June 6

This contest was organized by the blind and physically handicapped members of the Union de Aficionados Minisvalidos Espanolas, (URME) the Vigo division of the URE.

The object is to contact URME members on all bands, 10 thru 80 meters, on phone. They will identify themselves by using the phrase "Perro Guia" (Guide Dog) after their call.

Exchange: RS plus a 3 figure contact number starting with 001.

The same station may be worked once a day on each band, but there must be at least 1 hour between contacts on different bands.

Scoring: Each QSO with a URME station is worth 1 point. (There will be a special call station with a 2 point QSO value.)

To be eligible for an award a minimum score as follows is required: Zone 1 - EA, CT, F & I - 100 points. Zone 2 - Rest of Europe and Latin America - 50 points. Zone 3 - Rest of World - 30 points.

There is a S.W.L. division. Both exchange numbers must be reported. A minimum of 250 points are required for an award.

Awards: 1st Prize - A Silver Trophy, diploma and a 4 day paid stay in Vigo. 2nd Prize - A Trophy, diploma and a special gift. 3rd Prize - Trophy & diploma.

Diplomas and commemorative trophies will be issued to top scoring stations in each country and EA district. Also to the winning S.W.L.

Make your log sheet read 40 contacts to the page and submit before July 15th to: Delegacion Comarcal de URE, P.O. Box 742, Vigo, Spain.

S.O.W.P. C.W. QSO Party

Starts: 0000Z Wednesday, June 4
Ends: 2359Z Thursday, June 5

This is the 5th annual party for the Society of Wireless Pioneers, and is again being held mid-week to avoid the week-end QRM.

There are no formal requirements, just an exchange of name, membership number and QTH.

Suggested frequencies are 55 kHz up from the low end of each band, and the middle of each Novice band. It is suggested that 10 and 15 meter bands be used for long haul contacts from 1400 to 2100 Z hours.

A special certificate will be available to all members who contact a minimum of ten members during the period of the party.

Requests for the certificate must include a list of stations worked, dates, times and membership numbers.

Include a large s.a.s.e. with your request and submit before June 20th to: Manuel "Pete" Fernadez, W4SM, 129 Hialeah Rd., Greenville, S.C. 29607.

RSGB National Field Day

Starts: 1700Z Saturday, June 7
Ends: 1700Z Sunday, June 8

This is a c.w. only affair organized by the RSGB, but activity is not con-

**14 Sherwood Road, Stamford, CT 06905*

fined to Great Britian only. I have been advised that some of the other European countries also have Field Day on this date.

Although overseas stations are not eligible to compete they can submit check logs. A certificate will be awarded to the overseas station in each continent that shows the most contacts.

Send your log to: RSGB HF Contest Committee, c/o Mr. M. Harrington, 123 Clensham Lane, Sutton, Surrey, SM1 2ND England.

6 Meter "SMIRK" QSO Party

Starts: 0000Z Saturday, June 7
Ends: 2400Z Sunday, June 8

This party will be held on the first weekend of June each year. Activity of course is confined to the 6 meter band only of course.

The party is open to all but only members are eligible for awards. Non-members are invited to participate and apply for membership.

Exchange: Call, state, province or country, and SMIRK number for members.

Scoring: Contacts with members count 2 points, with non-members 1 point. Multiply total QSO points by the number of states, provinces and countries worked for your final score.

Cross-band contacts are not permitted and competiton is for single operator stations only.

Awards: Certificates to the top scoring station in each state, province and each call area. There is a Trophy for the overall winner.

Detailed copy of the rules and log forms are being sent to all members and new applicants for membership. Include a s.a.s.e. with your request.

Mailing deadline for all entries is July 1st to: Don E. Abell, WB5SND, 6821 West Avenue, San Antonio, Texas 78213.

Minnesota QSO Party

Starts: 1800Z Saturday, June 7
Ends: 2359Z Sunday, June 8

The Heartland A.R.C. is again sponsoring this activity. Phone and c.w. are one contest. The same station may be worked on each bad and each mode. Only one transmitter may be used at any one time, and crossband contacts are not allowed.

Exchange: RS(T) and QTH. County for Minn., ARRL section or country for others. Novice and Techs. must identify their license class.

Scoring: One point for phone QSOs, 2 points if it's on c.w, and 5 points if it's with a Novice of Tech. QSOs with club station WBØTTZ are worth 10 points on each band.

Minn. stations multiply total QSO points by ARRL sections and DX countries worked for their final score. Others QSO points by number of Minn. counties worked.(max. of 87)

Frequencies: C.W. - 3600, 7075, 14075, 21050, 28050. S.S.B. - 3950, 7275, 14300, 21400, 28700. Novice - 3725, 7125, 21150, 28150.

Awards: Certificates to high scorers in each state, DX country, and Novice and Techs. County awards to Minn. stations having 10 or more QSOs.

Stations making 50 or more contacts must include a check sheet for each band and mode used. Usual disqualification criteria will be observed.

Include a large s.a.s.e. with your log and mail before July 1st to Heartland A.R.C., c/o Scott Nelson, WDØEZF, 421 W. Wisconsin Ave., Staples, Minn. 56479.

West Virginia QSO Party

Starts: 1600Z Saturday, June 21
Ends: 1600Z Sunday, June 22

The West Virginia State Radio Council is again sponsoring this one.

There is no time limit. The same station may be worked once on each band for QSO points, W. Va. stations may work each other for QSO and multiplier credit.

Exchange: QSO no., RS(T) and QTH. County for W. Va., state or country for others.

Scoring: W. Va., stations multiply total QSOs by (W. Va. counties + states + countries) worked. Mulitply total by power multiplier if any.

All others multiply total W. Va. QSOs by W. Va. counties worked. (max. of 55) and multiply total by power multiplier if any.

There is a power multiplier of 1.5 for an input of 200 watts or less.

Frequencies: C.W. - 35 kHz inside each c.w. band. S.S.B. - 10 kHz inside the "General" portion of each phone band.

Awards: To the top scoring station in each state and each country. To the 1st, 2nd and 3rd place scorers in W. Va. And the top Novice in W. Va. and in each state.

Only single operator stations are eligible for awards.

Set up your log as follows: Date/time in GMT, QSO no. sent/rec'd, Call RS(T), QTH and mode and band.

Logs must be received no later than July 15th and go to: West Virginia QSO Party, Route 1-A, Box 6-A, Moorefield, W. Va. 26836.

All Asian Contest

Phone: June 21 - 22 C.W. Aug. 23 - 23
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

This is the 21st year for this JARL activity. The exchange is between Asian countries and the rest of the world.

Classifications: Single operator, single and all band. Multi-operator, single transmitter, all band only. (no multi transmitter)

Exchange: For OM's, RS(T) plus age of operator. For YL's, RS(T) plus ØØ.

Scoring: One point per QSO. Asians use non-Asian countries for their multiplier. (ARRL list) Note: Ogasawar JD1 (Bonin & Volcano) are in Asia. Minami Torishima JD1 (Marcus) is in Oceania. (KA contacts do not count).

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

Awards: To the highest scores, both phone and c.w. as follows: Single operator all band, in each country and USA call areas, up to the 5th rank where returns justify. Single band and multi-operator entries in each country only. Continental leaders will also receive and award.

Logs: Keep all times in GMT, fill in country or prefix column only first time it is worked, and use a separate sheet for each band. Assummary sheet showing the scoring and other information, and a signed declaration is also requested.

Disqualification regulations will be strictly enforced so check your log carefully for dups and etc. And keep in mind that non-Asians use prefixes for their multiplier, not countries. Club stations are classed as multi-operator. Each operator of a multi station will give his age in the exchange.

Logs must be received no later than Sept. 30th for the Phone entries and Nov. 30th for the C.W. section. They go to: JARL Contest Committee, P.O. Box 277, Tokyo Central, Japan. Include a IRC and s.a.e. for copy of results.

(The 1980 contest has been extended to 48 hours with no rest period. There will be additional awards for the USA but I do not have a list at this writing.—Ed.)

Asian Country List

A4, A51, A6, A7, A9, AP, BV, BY, CR9, EP, HL/HM, HS, HZ/7Z, JA/JE/JF/JG/-JH/JI/JJ/JR, JD1/ JT, JY, OD5, S21, TA, UA/UK/UV/UW9 - Ø, UD6/UK6C/D/K, UF6/UK6F/O/Q/V, UG6/UK6G, UH8/UK8H, UI8/UK8A/G/I/L/O/T/Z,

UJ8/UK8J/R, UL7/UK7, UM8/UK8M/N, VS6, VS9M/8Q6, VU, VU/A, VU/L, XU, XV, XW8, XZ, YA, YI, YK, ZC4/5B4, IS (Spratly), 4S7, 4W, 4X/4Z, 7O (Yemen) 7O (Kamaran), 8Z4, 9K2, 9M2, 9M8, 9N1, 9V1.

RSGB WAB LF Phone Contest

Sunday, June 22, 0900 to 2200 GMT

The RSGB "Worked All Britian" contests are divided into five different dates and catagories. This one is the 3rd of the series and is for Phone operation in the 7., 3.5 and 1.8 MHz bands.

Rules for overseas stations were given in last month's Column. There is one small variation for this one however. The operating period has been extended 1 hour to 2200Z, but only 12 hours may be used. A 1 hour break must be taken anywhere in the contest period and clearly indicated in the log.

Working Great Britian on 7 MHz from state-side will require split frequency operation. Hopefully the British will indicate where they will be listening in the American phone band when they send a CQ.

Logs for this one must be postmarked no later than July 22nd and go to: R. L. Senter, G4BFY, 27 Station Road, Thurnby, Leicester LE7 9PW, England.

ARRL Field Day

1800 to 2100Z Sat./Sun. June 28 & 29

As Red Barber used to say in his radio broadcasts of baseball games back in the days before some of you young squirts were around, "they will really tear up the pea patch in this one."

There have been some modifications made in the rules of this year's Field Day. Briefly they are: 1) time available to set up the start of on the air operation, 2) modification of the QSO exchange, and 3) a change in the bonus scoring structure.

You will find the details in the May issue of *QST. If you have any questions or request log forms and etc. contact Tom Frenaye, K1KI at ARRL Headquarters, 225 Main Street, Newington, CT 06111.*

(The May issue of QST should also have the details of the ARRL VHF Contest on June 14 - 15)

ARCI QRP Field Day

Starts: 1800Z Saturday, June 28
Ends: 2200Z Sunday, June 29

The QRP Amateur Radio Club International has scheduled their Field Day to coincide with the ARRL Field Day to take advantage of the activity created by "The Biggie."

It's open to all, both members and non-members, and all are eligible for awards. Use all available amateur bands but no repeaters.

Exchange: RS(T) and ARRL section.

Scoring: Two points per QSO. The same station may be worked on each band for QSO credit.

Power Multiplier: Power OUTPUT.

Over 50.1 watts . . . . . × - 1
50. to 15.1 watts . . . . . × - 1.5
15. to 5.1 watts . . . . . × - 2
5. to 11.51 watts . . . . . × - 4
1.5 to 0.51 watts . . . . . × - 6
.50 to 0.15 watts . . . . . × - 10

There is also power Bonus.
Non-commercial power source . . . . . + 500.
Solar power (100%) . . . . . + 300.
Battery power (100%) . . . . . + 100.

Final Score: Total QSO points × Power Multiplier + Bonus. (Multi-operator stations divide final score by number of operators.)

Awards: To the highest scoring 1st, 2nd and 3rd place stations overall.

Include a summary sheet with your log and give a run down of your equipment, antennas and especially power supply used. Also include a large s.a.s.e.

Logs must be received by July 30th and go to: QRP ARCI Contest Chairman, Edwin R. Lappi, WD4LOO, 203 Lynn Drive, Carrboro, N.C 27510.

Shown with optional touch tone pad

tempo...

the first in synthesized portables gives you the broadest choice at the lowest price

...the new S-5

* The only synthesized hand-held offering 5 watts output. (Switchable for 1 or 5 watt operation)
* The same dependability as the time proven S-1. Circuitry that has been proven in more than a million hours of operation.
* Heavy duty battery pack.
* External microphone capability.
* The S-5's exciting low price...only $349.00
* With touch tone pad $399.00

SPECIFICATIONS

Frequency Coverage:	144 to 148 MHz
Channel Spacing:	Receive every 5 kHz. transmit Simplex or ±600 kHz
Power Requirements:	9.6 VDC
Current Drain:	17 ma-standby 900 ma-transmit
Antenna Impedance:	50 ohms
Dimensions:	40 mm x 62 mmx 170 mm (1.6" x 2.5" x 6.7")
Weight:	17 oz.
Sensitivity:	Better than 5 microvolts nominal for 20 db

SUPPLIED ACCESSORIES
Telescoping whip antenna, ni-cad battery pack, charger.

OPTIONAL ACCESSORIES
12 Button touch tone pad (not installed): $39 • 16 Button touch tone pad (not installed): $48 • Tone burst generator: $29.95 • CTCSS sub-audible tone control: $29.95 • Rubber flex antenna: $8 • Leather holster: $16 • Cigarette lighter plug mobile charging unit: $6 • Matching 30 watt output 13.8 VCD power amplifier (S30): $89 • Matching 80 watt output power amplifier (S80): $149

The new improved

Tempo S-1

- The first and most thoroughly field tested hand-held synthesized radio available. 800 channels in the palm of your hand.
- Simple to operate. (You don't need a degree in computer programming)
- Heavy duty battery pack allows more operating time between charges.
- External microphone capability
- The lowest price ever...$299.00
- *The S-1T (With touch tone pad installed)...$339.00*

The Tempo S-2

Tempo is first again. This time with a superior quality synthesized 220 MHz hand held transceiver. With an S-2 in your car or pocket you can use 220 MHz repeaters throughout the U.S. It offers all the advanced engineering, premium quality components and exciting features of the S-1. The S-2 offers 1000 channels in an extremely lightweight but rugged case.

If you're not on 220 this is the perfect way to get started. With the addition of the S-25 (25W output) or S-75 (75W output) Tempo solid state amplifier it becomes a powerful mobile or base station. If you have a 220 MHz rig, the S-2 will add tremendous versatility. Its low price includes an external microphone capability, heavy duty ni-cad battery pack, charger, and telescoping whip antenna.
Price...$349.00 With touch tone pad...$399.00

TEMPO VHF & UHF SOLID STATE POWER AMPLIFIERS

Boost your signal. . . give it the range and clarity of a high powered base station. VHF (135 to 175 MHz)

Drive Power	Output	Model No.	Price
2W	130W	130A02	$209
10W	130W	130A10	$189
30W	130W	130A30	$199
2W	80W	80A02	$169
10W	80W	80A10	$149
30W	80W	80A30	$159
2W	50W	50A02	$129
2W	30W	30A02	$ 89

UHF (400 to 512 MHz) models, lower power and FCC type accepted models also available.

The Tempo line also features a fine line of extremely compact UHF and VHF pocket receivers. They're low priced, dependable, and available with CTCSS and 2-tone decoders. The Tempo FMT-2 & FMT-42 (UHF) provides excellent mobile communications and features a remote control head for hide-away mounting.
The Tempo FMH-42 (UHF) and the *NEW* FMH-12 and FMH-15 (VHF) micro hand held transceivers provide 6 channel capability, dependability plus many worthwhile features at a low price. FCC type accepted models also available.
Please call or write for complete information. Also available from Tempo dealers throughout the U.S. and abroad.

TOLL FREE ORDER NUMBER: (800) 421-6631
For all states except California.
Calif. residents please call collect on our regular numbers.

HENRY RADIO 52 YEARS OF SERVICE

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

Henry Radio

Prices subject to change without notice.

CIRCLE 31 ON READER SERVICE CARD

a regular feature by

THEODORE J. COHEN N4XX

dateline... Washington, D.C.

The ins and outs of the Washington scene

FCC Concerned About Lack of Experimentation In The Amateur Service

According to a source at the FCC, the Commission is becoming concerned with the lack of experimentation by amateurs. Once known for their innovation and experimentation, amateurs, in the eyes of some, have largely turned their attention to various aspects of conventional two-way communications.

One experimental area that should be—but is not—receiving amateur attention is wideband modulation (WBM). As early as 1959, J.P. Costas ("Poisson, Shannon & The Radio Amateur," Proceedings of the IRE, December 1959) noted that the use of wideband techniques challenges the intuitively obvious and universally accepted thesis that congestion in the radio frequency spectrum can only be relieved by appropriate coding and modulation techniques." Yet, no amateur activity in WBM techniques is currently known.

Wideband modulation techniques, sometimes called "spread-spectrum" techniques, have long been used in satellite communications and radar applications. Systems using these techniques "spread" the transmitted power over a band of frequencies, and "de-spread" the signal at the receiver. When used in a congested band, these systems can provide *processing gains* equal to the ratio of the r.f. bandwidth to the modulation bandwidth. Spread-spectrum techniques used today include frequency hop and direct sequence. In the former, the signal is hopped over a set of frequencies which are selected using a pseudo-random number generator; in the latter, a pseudo-random code is combined with the modulation to spread the r.f. power over a broad band of techniques.

Some people in the Commission feel that with the availability of large-scale integration (LSI) spread-spectrum chips, amateurs should now be experimenting with wideband modulation techniques. To date, however, no amateur has applied to the FCC for authorization to conduct spread-spectrum modulation experiments. Worse, nothing on direct sequence spread-spectrum modulation techniques has appeared in the amateur literature.

The use of spread-spectrum techniques in the amateur service would not be without its problems. Studies would have to be performed on spurious signals generated by spread-spectrum transmitters, and on sychronization of the transmitter and the receiver. Regardless, the area of wideband modulation techniques remains fertile ground for amateur experimentation.

RFI Problems Continue At High Levels

According to Jeffrey Young, Chief, Investigations Branch (Private Radio Bureau), complaints of radio-frequency interference filed with the Commission in fiscal year (FY) 79 totaled 72,069. This number is down from the 84,404 complaints received in FY 78, but is high enough to indicate that RFI remains one of the Commissions greatest problems.

Of the 72,069 complaints received in FY 79, 55,274 complaints cited a television receiver as the victim device. Amateurs were alleged to have been involved in 1,946 of these cases, while CB operators were alleged to be responsible for 46,452 cases.

Amateur complaints about the operations of other amateurs reached 1,248. According to Young, this is one of the fastest growing areas of complaints today.

During the first quarter of FY 80 (October, November, and December 1979), RFI complaints to the Commission totaled 19,444. This number is up from the 17,583 complaints filed with the FCC in the first quarter of FY 79.

Of the 19,444 complaints received, television interference (TVI) was cited in 15,177 cases. Amateurs were alleged to have caused 651 of these cases, while CB operations were thought responsible for 12,271 cases.

Complaints by amateurs regarding the operations of other amateurs totaled 352. This is about the same number of such complaints filed in the fourth quarter of FY 79, and it indicates that co-channel interference (which accounts for most of the amateur-to-amateur complaints) is still very much of a problem in our ranks.

Abuse of Amateur 10 GHz Band Expected To Grow

As reported previously in the column, communication equipment ostensibly intended for use by amateurs in their 10 GHz band is really intended to be used by the public to jam police radar units. Up to now, only a few manufacturers were producing such equipment, and the cost of the devices was sufficiently high as to dissuade the public from purchasing and using them.

Recently, however, the cost of producing radar jammers has dropped significantly, and several new com-

* *8603 Conover Place, Alexandria, VA 22308*

panies have entered the market. Thus, the FCC expects that abuse of the 10 GHz band will increase sharply in the months ahead.

With the 10 GHz problem expected to grow, the Commission is already considering various courses of action to curb abuses in this band. One action under consideration at this time is to require that equipment built for operation in the 10 GHz band meet rigid type-acceptance criteria. Unfortunately, type acceptance, while slowing problems which are related to the misuse of 10 GHz equipment, would also slow the development of amateur equipment truly meant for operation in this portion of the spectrum.

Interference to EASCARS A Commission Concern

In recent months, an increasing number of complaints have been filed with the FCC regarding intentional jamming to EASCARS communications. The problems are not unlike those which have, in the past, been largely confined to the operations of WESCARS.

Based on the experience gained in its surveillance of amateurs who were jamming WESCARS communications, the Commission feels confident that it can identify and initiate enforcement proceedings against those responsible for jamming on the East Coast. Accordingly, the FCC monitoring system is now addressing EASCARS interference problems on a priority basis. Surveillance of jamming activites related to WESCARS continues at the same time.

Appeals Court Upholds FCC Ban On Linear Amplifiers

In February, 1980, the U.S. Court of Appeals for the District of Columbia Circuit upheld FCC rules which prohibit the manufacture and sale of external amplifiers which are capable of operating between 24 and 35 MHz. While this should come as no news to observers of the Washington scene, readers of this column may find the following background information of interest.

In its case against the FCC, the ARRL claimed that the rules banning amplifiers which operate in the range 24 to 35 MHz infringed on the ability of radio amateurs to engage in their pasttime. The League further claimed that the rules were arbitrary, capricious and unreasonable. In particular, the ARRL stated that Congress had authorized the FCC to make "reasonable regulations governing the interference potential of (radio) devices."

The Court, however, said that there was nothing significant in the word "reasonable," and that the use of the word was superfluous. It also noted that the ARRL had failed to show that the FCC had "abused the broad policymaking discretion granted it by Congress" or that it had acted "beyond the scope of its rulemaking authority."

The Court did acknowledge that it was conceivable that the FCC could have reduced the scope of the rules without reducing their effectiveness. However, the Court said that this was not a situation it could remedy in reviewing the FCC's rules, and that it was satisfied the Commission had given "due consideration" to the interests of amateur licensees.

1979 CQ World Wide DX Contest High Claimed Scores

Phone

The following are the Phone high-claimed scores received by December 31, 1979.

USA

Single Operator

All Band

N7DD	3,161,165
W1ZM	3,035,790
W7RM	2,875,450
K1VTM	2,654,834
N7UU	2,625,984
K7RI	2,418,028
W3BGN	2,330,496
W1CF	2,268,420
W3GRF	2,225,430
W9RE	2,184,776
N6RO	2,120,370
N4RV	1,945,008
K4VX	1,852,155
N6KT	1,799,658
K3TW	1,787,212
W7IL	1,686,894
W1RR	1,685,440
K2DM	1,583,349
N2IC	1,499,339
W2SUA	1,410,732
W1OO	1,259,520
N6AR	1,255,988
W3FA	1,245,624
K5NZ	1,185,030
K5NW	1,131,124
K6RR	1,099,899
K5KLA	1,077,363
K3ZJ	1,066,648
N2LT	1,011,381
K3MWV	1,011,126

Single Band

1.8 MHz

W8LRL	2,945
K5UR	2,436
K5YY	1,080
AD4U	1,067

3.8 MHz

W0MJ	49,950
W8EDU	45,150
K8XX	32,400
KG4W	32,096
WA4SVO	19,906
W9LF	17,385

7 MHz

K4JRB	75,911
N4KE	66,852
K7UR	53,922
WB9QPN	36,960
W9NWE	31,752
W8JWR	28,542

14 MHz

K0KX	330,879
K9RF	280,320
K0DD	248,976
W5FO	242,744
K1NG	215,930
W2TA	214,200
WB1ANT	205,084
W8TWA	194,951
W1GG	186,184
K5NU	166,032

21 MHz

K1RM	870,237
WA6EKL	699,448
W1NG	480,654
K6SMF	432,684
K6EVR	426,195
K8SMC	413,960
K4ISV	381,918
K6LL/7	333,852
N4CT	328,328

28 MHz

WA2SPL	735,528
W5MYA	689,520
AA8U	582,288
K5TJ	569,282
W0YK	565,760
AE6U	538,902
N8UM	524,986
K5JA	522,815
W6PU	518,980
W4RX	490,472
WA6OCV	487,940
N2PP	457,457
W4QQN	437,613
WD9DCL	437,030
K9RX	434,130
N4SW	423,253

Multi-Single

K4VX	3,847,884
W4QAW	3,558,432
K8NA	3,550,728
AB0I	3,547,531
WA7NIN	3,546,282
W5WMU	3,057,780
K3LR	2,930,944
N4ZC	2,769,120
N8RA	2,750,895
N1TZ	2,290,946
N4HP	2,253,478
K7SP	2,224,625
W9DUB	2,109,930
K1RU	2,063,390
K2BK	1,998,461
AI9J	1,814,274
W5VX	1,794,510
W2VJN	1,761,264
K0JSY	1,702,330

Multi-Multi

N2AA	13,299,750
K8LX	7,508,970
W2YV	7,405,846
K0RF	6,290,136
W3MM	6,229,350
K2UA	6,004,807
W3LPL	5,584,150
W6RDF	4,882,944
K3WW	4,813,900
N3RD	3,942,284
K0UK	3,396,568

QRPp

W6PQZ	168,156
WA2JOC	152,046
N2GC	121,992
WB2RWW	105,000
K1CGJ	89,204

DX

Single Operator

All Band

UW9AF	7,727,520
9Y4VT	6,753,705
G3FXB	4,708,014
DJ4PT	4,577,100
PA52TMS	4,413,952
OH6JW	4,389,460
OH1VR	4,182,000
YU3ZV	4,067,774
N1GL/VP9	4,035,408
DK8FZ	3,635,072
CZ6KW	3,493,340
CZ6UO	3,426,655
OH1BR	3,415,680
OH6DX	3,388,694
DL8UI	3,288,740
C6ACY	3,055,240
VE7CC	3,048,584
UA1DZ	3,001,248
VC3GCO	2,895,100
HS1ABD	2,772,192
DK8NG	2,673,468
UP2NK	2,601,860
VP2ML	2,601,356
IS0VMB	2,205,312
DJ3HJ	2,165,816
VP2MRX	2,060,865
UB5LAW	1,998,384
KG6JIQ	1,966,945
EA2IA	1,949,360
KX6PP	1,704,990

Single Band

1.8 MHz

PA5HIP	7,644
GM3ZSP	6,068
KP4AHQ	5,869
VE3BBN	4,840
G3SZA	3,895
OK1MGW	3,648

3.8 MHz

CT3BZ	232,956
YV5AMW	65,340
VE3ECP	64,496
VX3JAY	63,840
VE1AI	57,154
YU3FOP	47,475
YU4VBR	34,224

7 MHz

I5NPH	273,144
IT9SKO/IG9	190,008
DM2CMF/A	163,068
JA2BAY	155,899
OH8SR	135,360
I2VRN	115,900
OK3OM	104,625
OH1IJ	100,320

14 MHz

UA6HZ	1,014,284
YW1AWO	908,888
DL8PC	901,992
OH8OS	835,412
VE7IG	802,872
UF6CR	785,230
OH8PF	724,190
G4CNY	706,080
YB0ADI	660,960
ZL1AZV	640,134
G3VPW	605,324

21 MHz

H31LR	1,485,093
VE7CML	1,112,220
VK4VU	1,079,335
VE3BMV	1,072,126
OH1MA	870,500
4M3OS	862,663
VE4SW	805,428
F2SI	794,394
I4DLS	688,644
YU2RTC	639,212

28 MHz

OH2MM/CT3	1,827,150
EA8AK	1,791,755
KV4FZ	1,683,694
ZS3LK	1,421,164
DK3GI	1,248,072
G3ZQW	1,209,359
CZ6WQ	1,182,315
KP4O	1,158,388
IG9UN	1,129,120
SP3DOI	1,061,012
JH1JGX	1,035,464
OH5NW	1,021,348
VE5DX	998,854
VP2MBA	860,766
VK4QK	859,011
JA1PIG/PZ	848,175

Multi-Single

HI8XWP	9,947,265
UK9AAN	7,620,272
IZ3MAU	7,605,560
DL0WU	7,226,800
HH2MC	6,861,130
I1KN	6,434,166
GW6GW	6,054,540
EA6ET	5,956,284
OH2UG	5,620,200
VP2VFK	5,380,175
I1DIE	4,742,144
YZ4Z	4,392,123
G6UW	3,894,728
LA5X	3,613,752
DJ6TK	3,592,666
VP2E	3,350,730
TF3IRA	3,340,971
VE1DXA	3,280,480
DF3GY	3,100,707
HW6LY	3,058,421

Multi-Multi

VP2KC	37,774,272
9Y4FRC	24,035,925
K1CO/PJ7	19,046,262
YU3EY	16,646,364
SK2KW	14,675,821
4X6A	11,365,540
KL7D	10,928,280
DL0PG	10,507,220
KL7IRT	10,077,914
ZZ5EG	7,447,971
HB7H	7,120,179

QRPp

JK1GDD	114,400
G3FTQ	90,985
VE1AUT	87,584
OK1DKS	83,937
VE5JQ	40,356

CW

The following are the CW high-claimed scores received by January 20, 1980.

USA

Single Operator

All Band

K1AR	2,635,224
W1ZM	2,363,949
W1CF	2,360,405
N2LT	2,326,170
K5GA	2,064,160
W3GRF	2,060,214
K9DX	2,022,420
K3LR	2,016,204
N3AD	2,001,300
WA7NIN	1,968,134
N6RO	1,961,883
W1RR	1,935,549
K1DG	1,867,455
K4VX	1,852,155
W1KM	1,840,440
K7RI	1,825,410
W4RX	1,766,016
K1EA/5	1,680,673
K3RA	1,641,191
W2VJN	1,620,432
K3TW	1,502,476
N1GL	1,456,420
W2YV	1,435,152
N3CW	1,393,698
W5AC	1,317,336
N5AU	1,297,620
W3AP	1,288,815
N5JB	1,273,011
K2DM	1,231,155
K5NA	1,189,981
N6AR	1,185,043
K4PI	1,179,512
N8JW	1,104,204
K1RX	1,081,598
K6RR	1,078,000
W6RR	1,076,670
W71R	1,070,000
W0WP	1,061,450
W3FV	1,034,752
AA6DX	1,011,076

Single Band

1.8 MHz

K1PBW	11,040
W8LRL	6,232
W1BB/1	2,842
W2IB	2,632
K5GO	1,920
AE6U	1,648
K5YY	1,536

3.5 MHz

WB3AVN	35,287
K1MEM	24,780
W9LF	25,179
W2ER	21,312
N7EA	14,309

7 MHz

W5UN	202,176
K7UR	142,740
N6AW	135,620
N5TP	123,270
K21JW	112,021
W8UVZ	91,208
K6ZM	88,620

14 MHz

W6VPH	582,414
K8ZH	443,394
N4PN	433,576
K0KX	427,644
W6KPC	371,500
W5FO	366,404
K1SA	309,750
N8CC	291,141
W1YN	254,495
N6GG	242,400
N4TZ	224,896
W2AO	193,080

21 MHz

W1RM	450,120
K81A	411,733
N5CR	397,908
N7XX	352,768
K4RV	322,028
K5KU	320,569
WA8PKB	280,200
W9LT	268,525
K9RN	258,656

28 MHz

N4WW	349,206
W2AYJ	321,644
K8NZ	309,632
AE2A	306,306
W5MYA	302,562
K1NA	291,126
N4ZC	279,676
K5MR	268,464
K8CX	235,764

Multi-Single

K5RC	4,148,784
N4AR	3,199,572
W3BGN	3,045,549
N1AC	2,093,649
N0NO	1,946,610
N4KE	1,854,442
W5VX	1,780,418
W0SD	1,729,404
W3GG	1,711,620
K1RQ	1,692,972
K9KA	1,568,577
W2SUA	1,501,380
K2XA	1,497,216
K9RF	1,497,195
K8RT	1,467,930
W2YX	1,445,980
K3YL	1,420,321
N6MG	1,382,717
K3UC	1,265,888
K1IK	1,238,433

Multi-Multi

N2AA	8,545,592
K8LX	6,604,088
K3WW	6,473,068
N9MM	5,968,494
K0RF	5,715,264
W3FA	5,683,174
W3MM	5,650,940
W3RJ	5,274,060
W3LPL	5,046,336
N3RD	4,467,442

DX

Single Operator

All Band

EA8AK	4,005,050
9Y4VT	3,283,767
OK2RZ	2,916,045
OZ1LO	2,523,528
HS1ABD	2,189,770
VP2MDD	2,133,926
G3MXJ	2,122,120
EA21A	2,006,400
DJ6QT	1,827,000
SM3EVR	1,493,096
YV1NX	1,473,485
KL7RA	1,397,792
DJ5SH	1,377,252
OK3EA	1,354,752
VE3OCU	1,346,065
SM5AOE	1,326,304
KH6NO	1,281,713
G5CMX	1,249,558
YU4CF	1,165,758
DK8NG	1,115,513

Single Band

1.8 MHz

G35ZA	21,960
SP6BLV	12,060
OK1DIJ	8,930
KH6CC	7,168
LA4LE	6,840
OK1DWF	6,820
SP5IXI	5,400
YV1OB	5,103
OK1DWC	5,049
OH2SX	5,049

3.5 MHz

EA2OP	114,075
DJ2BW	110,618
YU5FAA	86,184
H31LR	81,532
LZ2PP	73,233
OH1VQ	50,236
JA6LCJ	34,068
JA6AUH	33,289
OK1MAC	30,200
VQ9KK	27,540
LZ2AB	27,440

7 MHz

YU2CDS	410,250
I2XXG	279,648
YU1EXY	223,652
GW3NYY	139,040
DK6PY	120,750
OK2BFN	115,566
YO3BEJ/9	111,972

14 MHz

ZX4BW	531,024
OH2QV	363,903
YU3BC	355,861
KH6DL	301,200
G3KDB	246,584
HK5AJF	238,245
JA2EIV	236,210
OK3UQ	216,756
DK5PR	203,580

21 MHz

VP2MEE	629,034
EA8SR	576,800
VE3BMV	574,056
I4IND	527,000
SM5GMG	526,229
PY3CFD	431,760
YU7OCV	422,136
OH6AC	418,215
JH3LPT	376,208
4X4UH	358,386
OH3UU	356,372

28 MHz

LU8DQ	1,051,904
FR0MM	978,012
KV4FZ	783,960
DK3GI	620,964
KH6XX	586,236
C5AT	495,558
VK4QK	465,015
YU3ER	433,876
GU4CHY	427,934
VE7WJ	423,306
G3FXB	389,302
OH3XZ	388,864

Multi Single

NP4A	8,126,651
UK9AAN	6,393,292
HH2MC	5,695,380
VP2SX	4,860,986
EA9EU	4,200,839
YU7BCD	4,086,314
F3TV	3,212,248
4N4Y	2,958,144
OK1KRG	2,818,530
DK0TU	2,580,084
OH2AA	2,074,800

Multi-Multi

PJ2CC	20,045,952
9Y4W	16,835,172
SK2HW	7,106,068
DL0PG	6,851,685
SK5AJ	6,019,072
OH1AA	5,375,696
DL0KF	5,127,720
VP2VEQ	4,674,108

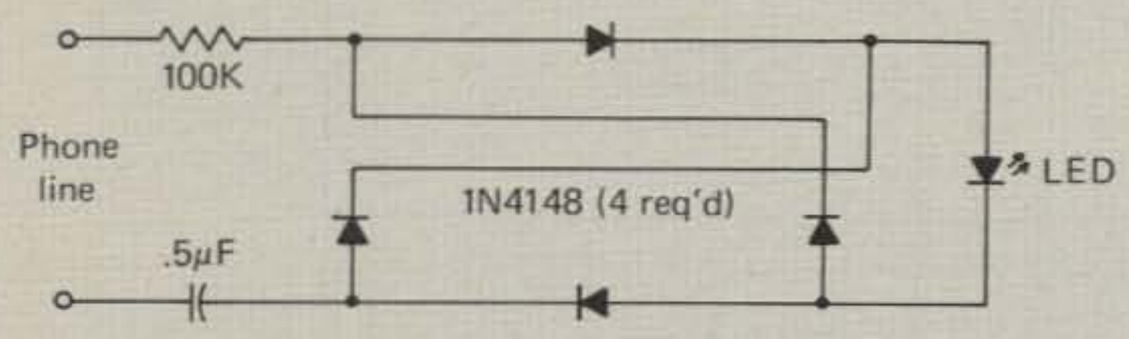
QRP

G4BUE	481,347
YT3L	374,661
OK1DKW	304,194
SM5CCT	256,365
WA4LOF	188,055
W5YZ	163,348
WA6POC	143,377

CRANIUM QUERIES

FIND THE ERROR

BY MARTIN BRADLEY WEINSTEIN, WB8LBV
c/o CQ



a monthly feature by

IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

In the process of writing this column, we often get letters requesting special circuits or answers to specific problems regarding projects that our readers have built. While we try to answer as many of these as possible, we do miss some and from time to time publish circuits of our own that can be employed to solve many of these problems. This is the intent of Math's Notes this month.

Our discussion will center around two general-purpose devices—a digital voltmeter and a frequency counter. Both are essentially one-chip devices that make use of IC's containing most of the circuitry, and both can be employed in projects of many sorts.

The digital voltmeter, shown schematically in fig. 1, uses a National Semiconductor DS8700/ADD2500 integrated circuit. With suitable range resistors it can be the basis of a very accurate power supply for experimental purposes, the heart of a multitester, a transmitter or receiver indicator of all sorts of parameters, and even a thermometer or high-fidelity readout.

The basic circuit consists of the chip, which contains all of the processing circuitry, a common cathod LED readout, and a few other inexpensive parts. What results when you assemble the components is a 0 to 1.99 volt 1% digital voltmeter. Assembly is straightforward and the only consideration is that all grounds be a single point. With 10 millivolts of resolution, ground loops can be a source of errors.

Calibration of the finished DVM requires a good VOM and a source of 1.5 to 1.9 volts. A new "D" cell will suffice. Using the VOM, measure the voltage between pin 6 of the chip and ground. Adjust the 20K "calibrate" pot for a reading of −3 volts exactly. Now connect the input leads together and adjust the 100K "zero" pot for a DVM reading of zero. Finally, connect the D cell or 1.9 volt battery and re-adjust the 20K "calibrate" pot for a reading that matches the battery. Alternately move the input between the battery and a short circuit and *SLIGHTLY* readjust both the "calibrate" and "zero" pots until the two readings are as accurate as possible. Since these adjustments interact to some degree, do this carefully.

For further information, you might wish to contact your nearest National Semiconductor office or write directly to them at 2900 Semiconductor Drive, Santa Clara, Ca. 95057, and at least request a copy of the DS8700 (ADD2500)

5 Melville Lane, Great Neck, N.Y. 11023

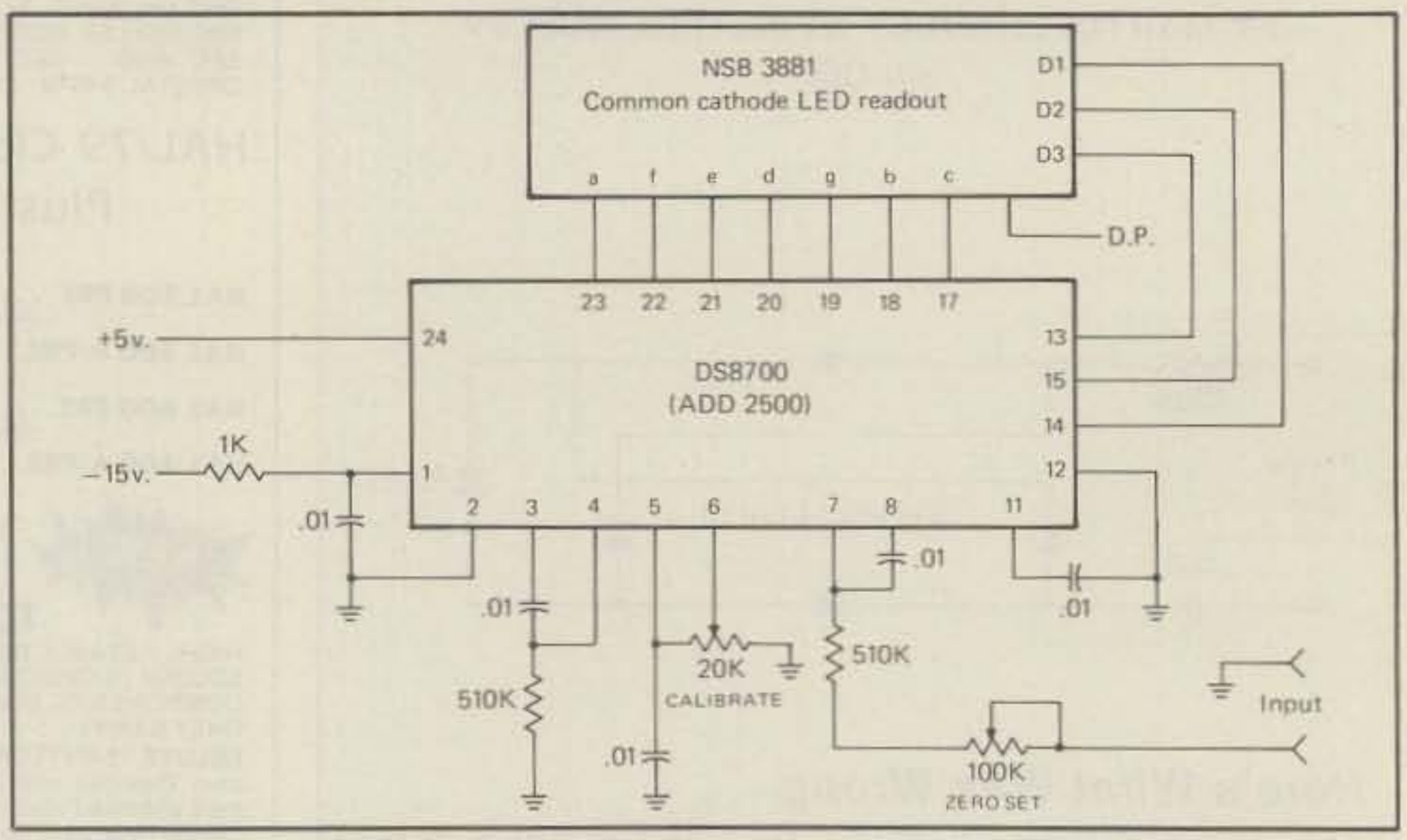


Fig. 1– The "one chip" DVM that is discussed in the text.

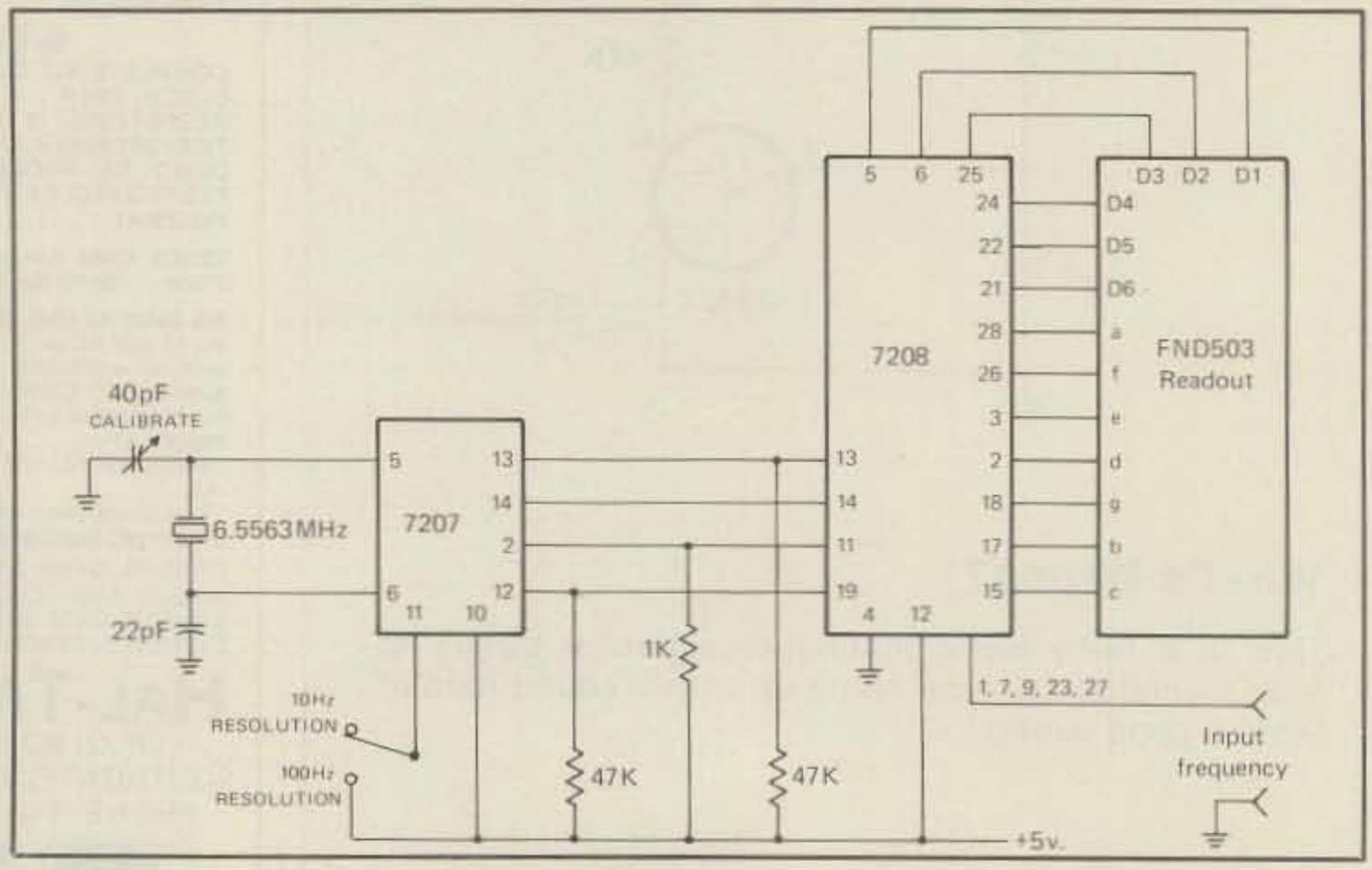


Fig. 2– A simple frequency counter as discussed in the text.

data sheet.

Building a counter, as you will soon see, is almost as simple as building a DVM. Again integrated circuitry has come to the rescue with most of the components contained within a single chip.

Fig. 2 is the schematic of the counter. The circuit can be used as a normal frequency counter up to the hundreds of megaHertz with the appropriate input divider circuit, a digital receiver tuning dial with the right selection of local oscillator frequency, or a readout to convert an inexpensive signal generator into a precision instrument (at least as far as accuracy is concerned).

The "almost" one-chip circuit uses an Intersil type ICM7208 IC which contains a seven segment decoder, seven stage counter, and all logic with the exception of an oscillator. The oscillator is supplied in a companion chip; the ICM7207. As in the case of the DVM, construction is not critical and the only consideration is that the oscillator (at 6.5 MHz) leads be short. When the circuit is wired, a known frequency in the 5 MHz region should be applied to the counter through a buffer amplifier and the 40 pf trimmer adjusted for the proper reading.

Before attempting to build this circuit it would be wise to contact Intersil at 10710 N. Tantan Ave., Cupertino, Ca. 95014 for full details on the ICM7208 and 7207.

As we mentioned last month, we are currently planning to publish a "Best of Math's Notes" technical volume and would appreciate your comments as to what areas you would like emphasized in this book. Please send your comments to me directly or to Alan Dorhoffer at *CQ*. Thank you again for your cooperation.

73, Irwin, WA2NDM

a monthly feature by

KARL T. THURBER, JR., W8FX

Antennas

Design, construction, fact, and even some fiction

Continuing with this fourth column of a new series, author Thurber sets forth more "antenna wisdom" he has acquired over more than 25 years in amateur radio. Again, nothing revolutionary, but some more solid pointers that beginners and old-timers alike can sink their teeth into.

In previous columns, we've tried to "set a baseline" for further technical discussions about antennas by first defining some of the more common antenna terms and types in the first two columns. We continued last month by presenting some "antenna wisdom" accumulated over 25 years in amateur radio. In this issue, we'll continue with more common-sense antenna pointers that beginner and old-pro alike can use. We will also build on and amplify some of the points that we have already made.

Let's continue with the following guidelines and rules-of-thumb.

Antennas: More General Comments

** The gain of an antenna is essentially the same on receiving as on transmitting. But the requirements for a good transmitting antenna are a lot more exacting than for one used only for receiving. Transmission line losses become especially important.

** A transmatch can't affect an antenna's basic s.w.r. It only affects the s.w.r. on the cable connecting the tuner to the transmitter.

** Using an antenna tuner, almost any antenna can be "loaded up" and made to take power—including the proverbial "wet string" and bedspring. These won't necessarily make *good* antenna systems, despite the fact that they appear to take power.

** Indoor and attic antennas can usually be made to take power and work reasonable well to "fill the bill" if an outdoor antenna cannot be erected. But indoor antennas constructed inside steel-frame buildings are usually notoriously poor performers.

** When comparing the overall performance of your station with others, consider factors besides the antenna. Rate your effectiveness and efficiency against your real contemporaries, in terms of equivalent transmitter power, site location and operator know-how. Also consider differing propagation conditions which can affect on-the-air comparisons.

** An S-meter point or so gained by better antenna tuning or matching is about equivalent to increasing your power by four times, but a good deal less expensive than obtaining this same power in the transmitter. (Going from, say, 75 to 1000 watts is only about 11 dB, less than 2 "S" units.)

** When installing an antenna, keep it out of reach of children. Fence off ground-mounted verticals and easy-to-climb towers. And don't let ground-plane wire radials act as guillotines for innocent passersby!

** Consider putting together a couple of "pre-fab" antennas for your favorite bands for vacation, portable and field day use. If you do so, include *everything* in the package, including halyards, insulators, feedline, and connectors.

More on H.F. Antennas

** Planning helps, but the only way to get topnotch antenna results in your location is to "cut and try". No one antenna design or brand will be superior in all installations. In the end, performance depends on factors unique to your location and installation.

** When using a vertical ground-mounted antenna, a single ground rod is rarely as good as a system of many quarter-wave radials. The difference can be 3 dB of performance, or more. Radials longer than ¼-wavelength are o.k., and tend to reduce ground losses. Never try to operate a vertical without *any* ground—it won't work very well.

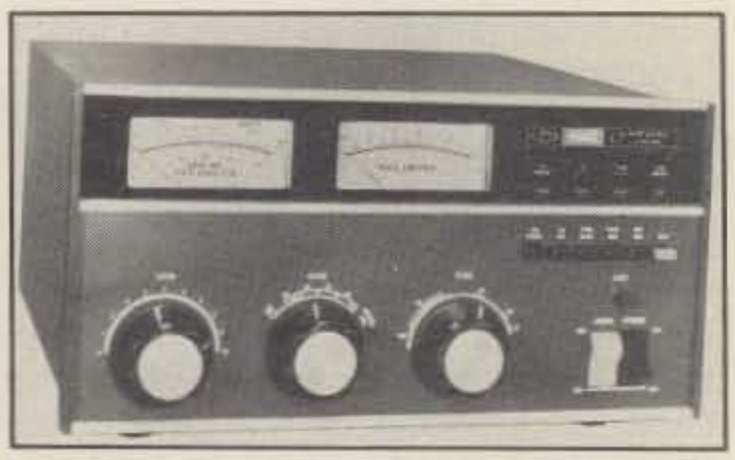
** Shortened, loaded dipole antennas can be efficient, approaching the efficiency of full-size dipoles. But weight increases (for the loading coils) and usable bandwidth suffers.

** A horizontal, half-wave dipole is considerably more efficient if it is mounted high in the air, at least ¼-wavelength above the ground. Antenna pattern will change slightly as height varies.

** A vertically polarized antenna works best if the antenna foreground is sea water, rather than earth, due to lower ground-reflection losses. Results vary widely with the type of soil under the antenna, too.

** Polarization "match" between receiving and transmitting stations doesn't mean much at h.f. frequencies, since on reception, arriving signals will be "randomly" polarized after having passed through various atmospheric layers. However, vertically-polarized antennas are more susceptible to man-made interference (QRN).

** Regular and folded dipoles are equally efficient. But the folded dipole has a wider bandwidth and a higher operating impedance—around 300 ohms or more, as opposed to the



Two main ways to increase station effective radiated power are to boost transmitter power or to use a high-gain antenna. Going, from, say 75 watts (output) to 1000 watts with the use of a linear amplifier represents a gain of about 11 dB, slightly less than 2 S-units. On the h.f. bands, it would take a 3- or 4-element Quad or a Rhombic array to equal the effect on radiated power, assuming a simple dipole is the reference antenna. (Photo courtesy R.L. Drake)

631 N. Overbrook Drive, Ft. Walton Beach, FL 32548

Type	Z_o	Power Rating 30 MHz	Power Rating 200 MHz	Loss in dB/100 feet on popular amateur bands 80	40	20	15	10	6	2	1¼
RG-8A/AU	52	1700	700	.3	.5	.7	.8	1.0	1.4	2.5	3.3
RG-8 Foam	52	2200	900	.3	.4	.6	.7	.9	1.2	2.2	2.8
RG-11U/AU	75	1400	400	.4	.6	.8	1.0	1.1	1.6	2.8	3.4
RG-58U/AU	53	400	150	.7	1.0	1.4	1.9	2.2	3.1	5.7	7.2
RG-59AU/CU	73	700	200	.7	1.0	1.4	1.5	1.9	2.5	4.2	5.2

From a glance at the table above, using light-duty coax cables such as RG-58 and 59 types at the higher frequencies is risking undue signal loss. In addition, power handling capacity is considerably reduced as frequency increases. Extra-small coax such as RG-174/U has a very high loss—about 13dB at 200 MHz.

Polyfoam cable equivalents are well worth the small added cost. Power-handling capacity is up about 30% over the polyethylene types, and attenuation losses are down about 15%. Air-and foam-dielectric Heliax types are your best bet for long cable runs on 2 meters and up, where losses on regular types of coax can become prohibitive.

The smaller cables are best-used on short, low-power runs, as in mobile installations and using low power levels. Beware: there are lots of low-quality CB and TV-type RG-58 and RG-59 cables around that won't even exhibit the characteristics shown above.

The relatively new, special small-diameter cables, such as RG-8X, can be substituted for the heavy-duty types, e.g., RG-8/U, with good results in most applications.

Figures in the table are approximate.

Table I—Typical Loss Characteristics of Common Coax Cables

typical 50-75 ohm impedance of the dipole. It's a popular antenna for the 500-kHz wide 75/80-meter band where the characteristics of ordinary dipoles tend to be a bit "ragged" at the band edges.

** For 160-meter operation, satisfactory results can often be had by tying together the ends of a 75-meter dipole or an "all-band" horizontal fed with open-wire line, thereby effectively serving to feed the resultant antenna against ground as a single-wire. "L"-type antennas, combining elements of horizontal and vertical polarization, are also popular practical antennas for the so-called "top-band." Fed in this manner, the quality of the ground system becomes an important factor, as with any vertical or single-wire antenna that is "fed against ground."

** An antenna doesn't *have* to be resonant at the operating frequency to take power and radiate. But it's easier to feed a resonant antenna and it's more likely to work well without time-consuming experimentation than a nonresonant one.

** Beams can be vertically polarized as well as horizontally polarized. Horizontal is more prevalent except on the 11-meter CB and 2-meter f.m. segments.

** Trap dipoles *can* be operated in tandem and directly fed to exhibit gain characteristics. Operating on more than one band, however, results in complicated matching-stub arrangements and for that reason is not usually recommended.

** Tri-band beams allow reasonably good 3-band operation, but are slightly less effective than isolated, separately installed antennas with optimum element spacing for each band.

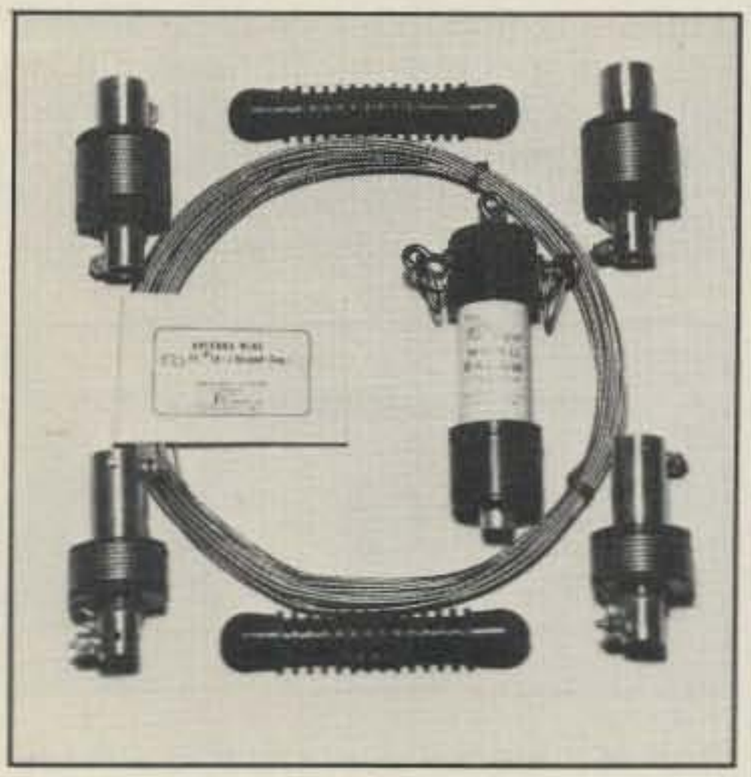
** The h.f. log-periodic array is a high-performance type antenna that can offer 10-13 dB or more gain over an extremely wide frequency range, with consistent results. Arrays are available commercially that cover 40-10 meters on one boom. On the lower bands, size and wind loading characteristics can be prohibitive, however.

** In evaluating commercially manufactured beam antennas, pay more attention to the physical dimensions and mechanical structure of the antennas than manufacturers' possibly inflated claims. Verify performance against "classic" comparable designs in the antenna handbooks, and—as we have said before—know the reference standard being used.

** Use several ground rods to ground your tower, at least one on a leg. Run feedlines *inside* the tower for best lightning protection. "Blitzbug" type lightning arrestors can give added protection against lightning effects, especially storm-induced transients that may easily damage sensitive and delicate receiver front-end components.

** In checking beam performance characteristics before raising it to its full height, take your measurements with a grain of salt. Patterns will be greatly distorted by proximity to ground and other objects, and your field-strength meter and s.w.r. bridge may not sport the laboratory-quality calibration of the manufacturer's instruments.

** Pick a cold, clear day to adjust beam loading and matching. Expect adjustments to change somewhat after final installation away from objects that can distort its field.



Getting together a couple of "pre-fab" antennas is a good idea for vacation, field day and portable use. Most important is to have everything in the package and ready-to-go when it's needed. Shown here is a special Unadilla/Reyco custom trap antenna kit that includes a balun, wire, two sets of h.f. traps, and end insulators. Halyards, feedline, and connectors would complete the kit. (Photo courtesy Unadilla/Reyco div. of Microwave Filter Co.)

On the V.H.F. Bands

** Vertically stacked Yagis may not give a noticeable improvement in signal-to-noise ratio over a single Yagi

The Dentron W-2 Wattmeter is a high-quality instrument for determination of forward and reflected power over the h.f. range at any amateur power level to 2000 watts. A remote indicator allows the "business end" to be placed in the coaxial line at the proper point without regard to the visibility of the installation point. An s.w.r. bridge or power meter is best-used for antenna coupler tuning and matching, and for general performance monitoring. An antenna noise bridge is recommended for fine-grain antenna tune-up and checkout. (Photo courtesy Dentron)

Line loss in dB when line is matched S.W.R. = 1:1	Line loss, dB per 100 feet for other S.W.R. conditions 2:1	3:1	4:1	5:1	10:1
0.25	0.25	0.35	0.50	0.65	1.15
0.50	0.60	0.75	0.95	1.15	2.00
1.0	1.2	1.5	1.8	2.2	2.5
2.0	2.3	2.8	3.3	3.5	5.5
3.0	3.4	4.0	4.3	5.0	7.0
5.0	5.5	6.2	6.7	7.3	9.3
8.0	8.5	9.2	9.8	10.5	12.9
10.0	10.5	11.3	12.0	12.5	17.0

Running coax under high s.w.r. conditions can induce additional losses in your antenna system. This table enables you to roughly predict the total cable loss induced by higher s.w.r.s than 1:1. Enter the table using the basic cable loss from Table I, interpolating as necessary.

From the above, it's clear that s.w.r.s of about 2:1 or lower don't significantly increase line losses over the perfectly matched condition, but above about 3:1 losses become appreciable. In addition, power-handling capacity of the cable at high s.w.r. levels is substantially reduced.

It follows that if your antenna system forces you to run with a high s.w.r. on the line, use large-diameter poly-foam cable to keep overall transmission loss reasonable.

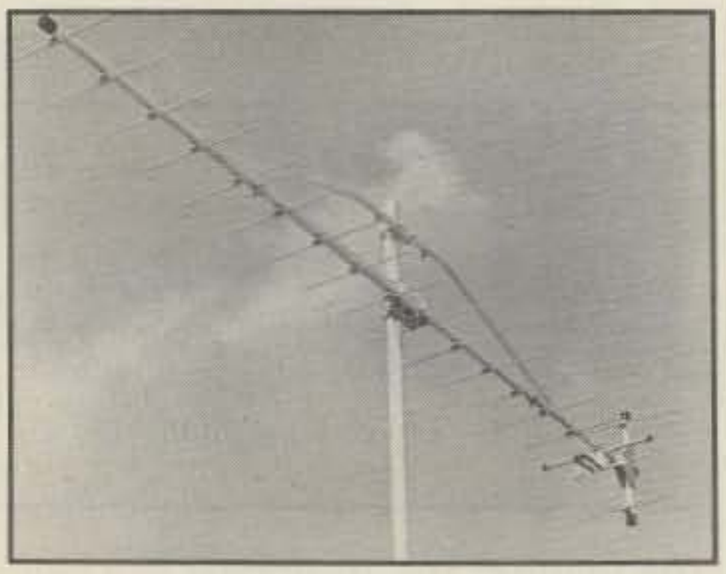
Figures shown are approximate.

Table II—Expected Line Losses Under S.W.R. Conditions

antenna on receiving, especially if noise is arriving at angles near the horizon. In this case, a longer Yagi is better than two stacked ones.

** Radiation from a perfectly-balanced transmission line is negligible below u.h.f. frequencies, but low-loss solid dielectric or air-dielectric coax lines are preferred for feeding v.h.f. and u.h.f. antennas.

**Combination mobile a.m.-f.m.-CB-2-meter cowl-mount antennas are good if you want to get on "two" without adding an amateur antenna, but the matching devices involved have the potential to introduce additional loss.



Cushcraft "Boomer" 2-meter Yagi is a relatively new, high-gain, high-side-lobe attenuation DX antenna designed for "low end" work on the 144-146 MHz segment. Antenna has a forward gain of 16.2 dB with respect to a dipole—a power multiplication factor of about 40 times! Antennas of this type may be stacked for higher gain on the same vertical mast. It is also practical to form antennas like this into quad arrays, though the resultant array becomes extremely large on 2 meters.

** Consider constructing a small, portable Yagi for "mountaintopping" expeditions on the v.h.f. and u.h.f. bands. It's easily worth the trouble.

** If you're using high power and a directional beam on 2-meter f.m. know your coverage area. Avoid "keying up" multiple distant repeaters—doing so is no way to make friends!

** The very sharp beam pattern of antennas having more than 6 or 7 elements requires accurate aiming of the antennas. Tuneup and adjustment, especially of home-made large arrays, can be time-consuming and tricky.

** On v.h.f., there is no substitute for height . . . especially in groundwave work!

** "Rubber duck" type antennas are fine for handi-talkie use. However, they are inefficient and should be replaced with full-size antennas for fixed/portable operation.

Transmission Lines, Too

** Poor solder connections cause loss and increase the potential for harmonic signal rectification and TVI. Inspect all feedline and antenna connections for corrosion periodically.

** If using an antenna tuner, remember that there are possible false tuning settings that will result in low s.w.r. but little power reaching the antenna. Verify whether your whole system is working properly by cross-checking your s.w.r. readings with the indications of a field strength meter. If s.w.r. readings and FSM indications match up, you're in business. If not, be suspicious of antenna tuner capacitor settings that occur at full-maximum or full-minimum settings, or similar inductor conditions.

** Anytime s.w.r. changes when shortening or lengthening the transmission line, there is a mismatch on the line and the s.w.r. isn't 1:1. And, s.w.r. readings will vary somewhat depending on where you place your bridge in the line.

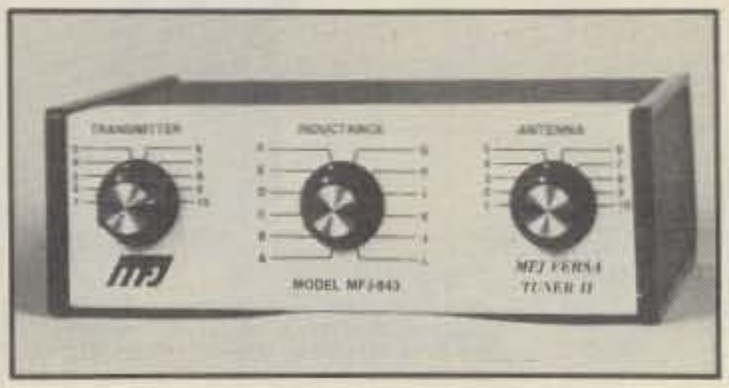
** If you find you can't load a multiband antenna on a certain band, if all else fails change the length of the transmission line. You won't change s.w.r. *at the antenna*, but may find that the antenna will at least "take power." Your feedline change may throw another band out, however. Effective impedances along a transmission line are mathematically predictable, if the antenna radiation resistance, line impedance, and line length are known.

** Don't coil up excess coax leading to your antenna system—the extra length has losses and contributes nothing to performance. Cut it off—if the line is reasonably "flat," length won't make a difference, and the coiling-up may create anomalies in loading.

** Inexpensive amateur and CB-type s.w.r. bridges are rarely highly accurate in reading *actual* s.w.r. However, they are usually very good at indicating when the line and load are matched (1:1 s.w.r.).

** If you're "into" microprocessor and computerized gizmos in your home, you may want to shy away from open-wire type transmission lines and single-wires which may pick up RFI from such devices and feed it directly into your receiver. This would be an especially important consideration if you use a computer in conjunction with your hamming—they are notorious RFI generators!

** Waterproof outdoor coax cable junctions and connection points with



For 160-meter operation, satisfactory results can often be had by tying together the ends of a 75-meter dipole or an "all-band" horizontal flattop fed with open-wire line and feeding the antenna against ground as a single-wire. An antenna tuner is required—inexpensive MFJ Versa Tuner II matches "random wire" (single-wire) antennas as well as coax, open-wire line or twin lead. Unit has a built-in balun for balanced lines (the latter two types), and handles 300 watts r.f. output over 1.8 to 30 MHz. (Photo courtesy MFJ Enterprises)

a waterproofing silicone sealant. Plugs and receptacles can be covered with plastic electrical tape after waterproofing. "Drip loops" formed in the cable ahead of connectors can help keep water from heading down the line and into the connectors.

**For most purposes, coaxial cable is the best all-round choice for amateur use, especially from the standpoint of ease of installation and the minimum care required. Most of the thin cables such as RG-58 and RG-59 are too "lossy" for v.h.f. work, except for very short mobile runs, and their power-handling capability is limited. Stick with heavier, RG-8/U or RG-11/U types or their new small-diameter equivalent at v.h.f. frequencies and when running high power. Avoid old, used, unbranded, or CB-type coax. See Tables I and II for some interesting loss figures.

This concludes our two-part collection of "antenna wisdom." Next month, we will move on to discuss the basic dipole antenna and its close relatives. See you then.

Say You Saw It In CQ!

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

Here is the June "Story of The Month" as related by Jack:

John Johnson, WD9AXF
All Counties #226, 5-8-79

"My interest in radio is relatively recent, and began with the purchase of a 23 channel CB radio for my car. I enjoyed it so much that I bought an antenna and power supply for the house.

"I moved up to s.s.b. and then enrolled in a Novice Class, all in 1976. After obtaining the Novice ticket in March 1977, I worked all states, Novice, and then went and took the General exam and passed, that was in August 1977. Being a new General, I was looking for a home and wandered throughout the h.f. bands for about two months, finally settling with the County Hunters.

"My job takes me on the road about 4 days per week and I began to operate mobile in about November 1977. From that point on, my totals began to climb very rapidly. The first award for 500 Counties was dated February 8, 1978 and the last was May 8, 1979; I was actually County Hunting for about 18 months.

"I was married in July 1978 and that cut into my radio time, a bit. I wish to thank all of the net controls and mobiles, without whom this award would be a real bear. I wish to thank K9DCJ and WB9QNX for phone calls near the end. I wish to thank especially K9GTQ, Tom Ross, for going out and getting the last one for me.

"I intend to go around again, but not with the speed realized in the first try. I'm chasing more DX and operating more c.w., both fixed and mobile, in preparation for the Extra Class Ticket.

My very special thanks to *CQ* Magazine for their sponsorship and to W2GT as Custodian of this, one of the most prestigious awards in amateur radio."

Awards Issue

Ralph Pokorny, KØXT (ex WAØJNF) added to his fine collection, USA-CA-3000 and All Counties endorsed Mixed.

P.O. Box 73, Rochelle Park, N.J. 07662

USA-CA Honor Roll

3000		2000		1000	
WA9WGJ	295	SM4EAC	409	SM4EAC	585
SM4EAC	296	WA3UXU	410	WA3UXU	586
KØXT	297	K6CR	411	N4ANV	587
N4ANV	298	N4ANV	412	500	
2500		1500		CT1GG	1441
SM4EAC	359	SM4EAC	466	F9RM	1442
N4ANV	360	WA3UXU	467	KA2CNG	1443
		N4ANV	468	SM4EAC	1444
				CT2SH	1445
				WB6CDM	1446
				WB1DQA	1447
				N4ANV	1448

Gene Tyree, N4ANV waited until he had them all and was issued USA-CA-500 through All Counties endorsed All S.S.B.

Dave Christensen, WA9WGJ added USA-CA-3000 endorsed All S.S.B. to his fine collection.

Ake Broman, SM4EAC (ex SM5EAC) who is awaiting some QSLs to have them *all*, did qualify for USA-CA-500 through USA-CA-2500 endorsed All 2×S.S.B. All 14, All Mobiles; and USA-CA-3000 endorsed All S.S.B. I believe that Ake expects to attend this year's MARAC Convention.

Tyler Stewart, WA3UXU continues to work them for USA-CA-1000, 1500, and 2000 endorsed Mixed.

Gus Gutermann, K6CR claimed USA-CA-2000 endorsed All A-1.

USA-CA-500 Certificates, endorsed Mixed, went to:

Victor Manuel Figueiredo dos Reis, CT1GG.
Jean-Pierre Guillou, F9RM.
Dr. Jorge Costa Reis, CT4SH.

Scott Douglas, WB6CDM had me send him USA-CA-500 endorsed All 2×S.S.B.

Clement Lambert, WB1DQA gained USA-CA-500 endorsed All S.S.B., All 14, All Mobiles.

Awards

Japan Osaka Century Certificate: This JOCC Award is available from the Naniwa Club for any licensed radio amateur or s.w.l. in the world.

1. Applicants must submit proof of QSOs with stations as follows:
   Junior class: 10 different JA-stations which enable you to spell "NANIWA CLUB" by the last letter of each callsign.
   Standard class: at least 10 different stations in Osaka prefecture. Then 50, 100 stations endorsed by Gold Seals.
   Special class: 100 different Osaka stations, including 62 stations located in all 31 cities, 5 guns and 26 wards of Osaka prefecture. (Cities and guns and wards list of Osaka available for 3 IRCs).
2. General Certification Rule (GCR) applies-i.e.. you may use a Certified List with all QSO data, certified by two other radio amateurs, etc.. Thus submission of the QSLs is not required but you must have the QSLs in your possession.
3. Contacts should be made from any location in the same call area, or if no call area exists, then from the same country.
4. Cost: 8 IRCs (Gold Seal 3 IRCs).
5. Application must be sent to: Awards Manager, JR3DDQ, Akio Sonoda, 3-6-8 Daikoku-cho, Naniwa, Osaka 556, JAPAN.

All Japanese DX Award (AJDXA): Applicants must submit proof of confirmation of QSOs with the four main islands of Japan: Honshu (1,2,3,4,7,9, 0 area), Skikoku (5 area), Kyushu (6 area), Hokkaido (8 area), and with the districts of Ogasawara (JD1), Minamitorishima (JD1), Okinawa (JR6, KR6), Antaractica (8J1), Maritime-Mobile (/MM), as follows.

Class	Stations per Island (4 main islands)	Districts	Total Stations
J	1	1	5
C	2	2	10
B	3	3	15
A	4	4	20
S	5	5	25

All contacts must be Japanese operators, so foreign stations like, KA, KG6I, KR6, KC4A, KC4U, CE9, FB8Y, OR4, VKØ, VP8, ZL5, 3Y1, 4K1 etc, are not valid for the AJDXA.

All Miyagi Diploma (AMD): Applicants must submit proof of confirmations of QSOs with 6 stations whose last letters spell "MIYAGI" as follows:

AMD-Basic Award - With stations in the JA7 area only.

Special Honor Roll
All Counties
#269 Ralph R. Pokorny, K0XT 2-19-80.
#270 C. Gene Tyree, N4ANV 3-3-80.

AMD-General Award - With stations in Miyagi Prefecture only.

AMD-Advanced Award - With stations in 6 cities of Miyagi Prefecture only.

SPECIAL CLASS AWARD - Applicants must submit proof of confirmations of QSOs with the 16 stations whose last letters spell "MIYAGI PREFECTURE". Contacts must be with the stations operated in all cities (11 cities) of Miyagi Prefecture.

For these two Awards, the General Certification Rule (GCR) applies and submission of your QSLs is not necessary. Your QSLs may be checked and confirmed/certified by two other amateurs. All QSLs or certified lists must include date, time, frequency and emission type.

The cost of each award is 8 IRCs, American stations may send 5 31-cent stamps instead of the IRCs.

If QSLs cards are sent, you must include enough IRCs to cover cost of returning your QSLs. Be sure to include a sample of *YOUR* QSL.

Special endorsements may be issued for specific bands or modes, provided supporting information is included with the application.

The rules apply for SWLs as well as amateurs.

Send all mail/applications to: Awards Manager, Sendai First High School HAM Clubs Union, 4 Motochabatake, Sendai-city Miyagi, 983, JAPAN.

JARL Awards Program: The Japanese Amateur Radio League has a fine awards program - full details were in my column in October 1979 -those listed were:

All Japan Districts (AJD)
Worked All Japan (WAJA) & Heard All Japan (HAJA)
Japan Century Cities (JCC)
Japan Century Guns (JCG)
Heard All Continents (HAC)
Asian DX Award (ADXA)
Worked All Cities Award (WACA) & Heard All Cities Award (HACA)
Worked All Guns Award (WAGA) & Heard All Guns Award (HAGA)

If you do not have a copy of the October issue of *CQ* (shame on you), you can get information on these awards by writing to: AWARDS MANAGER, Japan Amateur Radio League, P.O. Box 377, Tokyo Central, Japan. Send an IRC or two and more if you desire air mail reply. Cities and Guns and countries list for three IRCs.


Japan Amateur Radio League
The Nanzan Club
Japan Osaka Century Certificate
This is to certify that ____ is hereby authorized Japan Osaka Century Certificate according to the prescribed standard of this club and with seal endorsements as displayed.

Japan Oska Century Certificate (JOCC).

Notes

Per latest issue of the *DCP Newsletter*, here is the corrected list of QSL managers:

WB9RCY - manager for CT1UL/M, CT4KQ and CT4SL.

K9GTQ - manager for CT1TZ and CT1RTA.

WB2SJQ - manager for CT1RM.

WA4CHI - manager for CT1BY.

AB1U - manager for CT4RH.

WD4BRE (now KD4S) for CT1DF, CT1DFA and CT4YG.

N2BL - manager for CT1ADV and CT1AJY.

Hope you all had a good month and will tell me about it.

73, ED., W2GT.

Here is the photo of the amateurs at the MARAC 1979 Convention at Atlanta:
1st Row (Right to Left): K2PBU, WA2RYQ, K9DZG, WD9ITF, CT1BY, W4UYC, W4OWY, WA0YJL, W4IZR, W5ILR, K1VSJ, W5FS, WB8YBH, K5IW, W4MNZ.
2nd Row (Right to Left): WA6GQY, K9DCJ, W0DSY, K7GNC, K4ZA, K0AYO, W0DG, WA9OBR, W4HA, W0ACK, W2PDM, N4ANV.
3rd Row (Right to Left): WA7YID, W0DSY, WB9YZE, W9ABM, N7TT, WB0HLW, W0RP, WB2NFB, WN5MBS.
4th Row (Right to Left): W0BK, W0MRJ, WA2GLU, W4SSU, W4LQF, W4KFA, N4UF, W0KMH, WA0UHC, AD8W, W6TKV, WD4HRN, K2KQC, WD4FGW, K9DAF.
5th Row (Right to Left): WA0SGJ, WA4BDE, W0OWY, WB4RVW, WA5YSC, WD5HNG, WB1ENJ, N4DX, K5WQM, WD4RCO, K4IUO.
6th Row (Right to Left): WB6ERF, WB5GRI, W4HR, WB8SNO, W4UVP, WB2SLV, WB9RCY, WB2HTX, K1KPS, K1UNM, WB9DCZ, W0KYG, W9ZD.
7th Row (Right to Left): K4JFI, WB0ELJ, W5HDK, KB4IF, N9WA, K4ZT, WA0WOB, W6CCM, K1ORV, N4PN, W4ISF.
(Photo via W4OWY)

CQ BOOK SHOP

Grand Opening!

Introducing the CQ Book Shop, a carefully-selected array of books for the ham, from the best book publishers world-wide. Check these pages each month for new featured selections and special buys.

The Radio Amateur's Handbook (1980 Ed.)
No hamshack is complete without the latest edition of *the* handbook! It's the No. 1 bestseller in resource/reference books for the radio amateur and electronics professional. Covers basics of operating practice and equipment design. Plus new, larger section on advanced receiver design, new satellite operations techniques and antennas, a new section on measuring receiver performance, new keying circuits, revised tube and semiconductor tables, design tables for Chebyshev filters, a revised digital logic IC section, an expanded parts supplier list, practical information on discone antennas, and an updated frequency allocations chart. Paperback, $10.00. Order #A018. Hardbound, $15.75. Order #A018A.

Ameco Novice Code and Theory Package
A complete training package containing the 128-page Novice theory course and a 60-minute code cassette, which teaches how to send and receive code up to 8 words per minute, and a 32-page book. Also included are FCC-type code and theory examinations to help even a rank beginner get a ticket fast! $6.95. Order #A024.

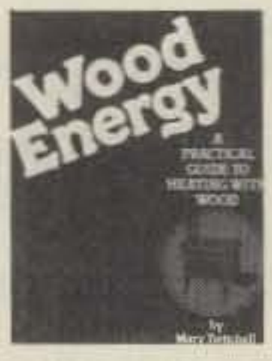
RSGB Radio Communication Hdbk (5th Ed.)
First published in 1938, and a favorite ever since, this large and comprehensive guide to the theory and practice of amateur radio takes the reader from the first principles right through to such specialized fields as radio teleprinters, slow-scan television, and amateur satellite communication. Two volumes. Expensive, but worth it! Volume 1: 480 pages, hardcover/dust jacket, $23.95. Order #R030-1. Volume 2: 336 pages, hardcover/dust jacket, $21.95. Order #R030-2.

The Radio Amateur's License Manual -ARRL
Every ham needs an up-to-date License Manual. Contains all of the latest test information and covers the new exams used by the FCC. Complete and up-to-date text of FCC part 97 rules and regulations are contained in this 172-page book. Contains sample study questions. Just about all you need to know to pass the Technician, General, Advanced, and Extra Exam. Paperback, $4.00. Order #A028.

RSGB Test Equipment for the Radio Amateur (2nd Ed.)
by H.L. Gibson, G2BUP
Explains the principles of measurement techniques, and gives constructional details of many items of up-to-date equipment of interest not only to the radio amateur but also to the electronics enthusiast. 151 pages, hardcover/dust jacket, $10.95. Order #G050.

The Energy Crunch Cookbook
by J.Bingham and D. Riccio
Fast and easy recipes to help save energy and money. Cooking techniques utilize kitchen appliances such as the mixer, slow cooker, pressure cooker, microwave oven, and more. Features a chart giving the estimated kilowatt hours used for small and major appliances. 224 pages, paperback, $7.95. Order #B121.

All Through the House: A Guide to Home Weatherization
by T. Blandy and D. Lamoureaux
An architect and a contractor reveal their unique "diagnosis," a series of simple tests to determine the weatherization needs of any home. Using the diagnosis, any homeowner can perform an energy audit during leisure time and free of charge. The authors show how an effective home-management program can save money and enhance comfort. 176 pages, hardbound, $7.95. Order #B124.



Solar Energy Sourcebook
by Marty, Moonan, Kruysmen, Robinson
Here is a solar energy directory for both laymen and professionals. Provides a short introduction to solar energy and an overview of solar systems. *includes a products-by-category section and a list of persons and companies involved in solar*. Lists by state all legislation passed and proposed in the U.S. as well as proposed federal bills. Includes a state and city index of solar products and services available. 797 pages, paperback, $15.00. Order #M119.

Home Energy for the Eighties
by R.D. Wolfe and P. Clegg
No misleading promises, no inflated savings estimates. Here is the *true* picture for each energy alternative—solar, wind, water, wood—so that you can make knowledgeable, accurate decisions about an alternate to your system: how to tell if your situation fits a certain type of alternate power, and how to calculate the economics of switching systems. Complete discussion of the theory, technology, and equipment available in each field, plus accurate, up-to-date source catalogs. 304 pages, paperback, $10.95. Order #S118.

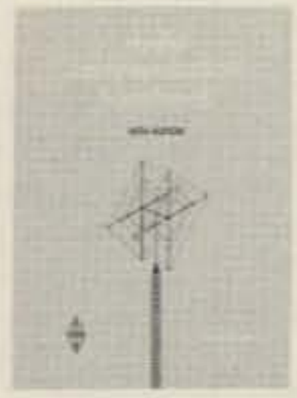
Wood Energy
by Mary Twitchell
If you've been thinking of buying a wood stove or wood-burning furnace, this book could keep *you* from "getting burned." It is a complete overview of wood-heating equipment, in which each type is evaluated by an expert. Covered are wood-burning furnaces and boilers (including combination furnaces), wood stove designs and options, chimney and stove cleaning, and the practicalities of stove use: installation, firewood, woodlot management, best use of existing fireplaces. 176 pages, paperback, $7.95.Order #T116.

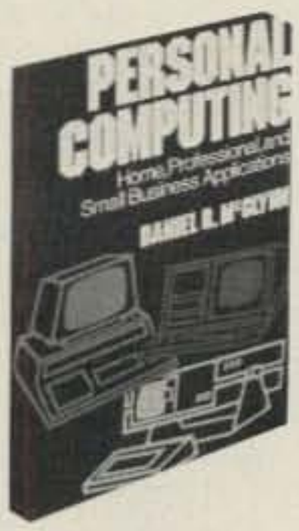
CQ BOOK SHOP

Ameco Amateur Radio General Class Question & Answer Study Guide
When you think you're ready to sit for the General ticket, this book will help you make sure. It gives easy-to-understand answers to questions based on the latest FCC study guides and includes a sample FCC-type exam. 64 pages, paperback, $1.50. Order #A034.

Ameco Amateur Radio Advanced Class Question & Answer Study Guide
This practical guide will help a General ticket holder make sure he's ready for the next step up. Easy-to-understand answers to questions based on the latest FCC study guide will help you be sure you've acquired the necessary technical knowledge. A sample FCC-type exam is included. 64 pages, paperback, $1.75. Order #A035.

Ameco Amateur Radio Extra Class Question & Answer Study Guide
As you prepare for the top in ham radio, this question-and-answer study guide will help you. It contains answers to FCC-type questions and a sample exam, which will help you know when you're ready to go. 64 pages, paperback, $1.50. Order #A036.





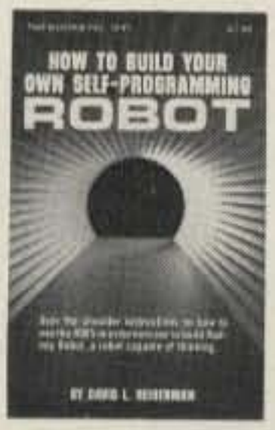
Personal Computing
by D.R. McGlynn
This nontechnical guide emphasizes systems, applications, and programming languages to make it easy for you to use and understand the personal computer. It surveys the entire field of personal and small business computing and covers: the features, capabilities, and limitations of today's hardware and software; guidelines for selecting and buying a system; the various programming languages; and disk operating systems and applications programming. 296 pages, paperback, $9.95. Order #M060.

RSGB Oscar Amateur Radio Satellites
by S. Caramanolis
A complete introduction to the orbital and electronic principles of communication satellites, with particular reference to the Oscar series of amateur radio satellites. 192 pages, paperback, $12.95. Order #G049.

OSCAR: The Ham Radio Satellites
by Dave Ingram, K4TWJ
A comprehensive guide to OSCAR satellites and earth stations, it contains all the data necessary to set up, operate, and experiment with the new OSCAR technology. Covers everything—the history of OSCAR, an armchair visit to an earth station in operation, how and where to buy equipment, how to set up an earth station, DXing, and lots more. 128 pages, paperback, $4.95. Order #I037.

The Laser Experimenter's Handbook
by Frank McAleese
This hands-on building guide shows how to experiment with homebuilt model lasers. There are six detailed and copiously illustrated laser projects, using pulsed injection type, helium-neon, CO_2 gas, ruby rod, and general-use gas lasers. In each case, complete plans, schematics, safety information, and step-by-step instructions are included. 210 pages, paperback, $6.95. Order #M090.

World Radio TV Handbook 1980
The world's only complete directory of international broadcasting and TV stations—the established, authoritative guide endorsed by the world's leading broadcasting organizations. A comprehensive listing of short-, medium-, and long-wave stations revised and updated to reflect actual conditions. Also includes special features on listening gear, how to adapt older receivers for use today, and DX club activities. 560 pages, paperback, $14.95. Order #B097.



How To Build Your Own Self-Programming Robot
by D.L. Heiserman
Over-the-shoulder instructions on how to use the 8085 microprocessor to build Rodney, a robot capable of "thinking." This is a straightforward how-to book about machine intelligence—a practical guide showing how to build a robot capable of learning how to adapt to changing circumstances in its environment. Rodney can pick up signals and stimuli from his environment and react to them just like higher animals and humans. 238 pages, paperback, $7.95. Order #H079.

RSGB Radio Data Reference Book (4th Ed.)
by Giles, G4CDY, and Jessop, G6JP
Presents a wide range of essential reference data in convenient form without needless repetition of basic theory. Chapter titles: *Units and symbols; Basic calculations; Resonant circuits and filters; Circuit design; Aerials and transmission lines; Radio and tv services; Maps and meteorological data; Materials and engineering data; Mathematical tables.* 200 pages, hardcover/dust jacket, $8.95. Order #G051.

How to Buy & Use Microcomputers
by William Barden, Jr.
Here is a complete, fully illustrated discussion of these popular computers. The author shows how you can own and use a functioning computer system in your home or business to do a variety of practical or recreational tasks from playing games to setting up a burglar alarm. Tells you what computers are, how they perform their computing, and what tools are necessary to talk to all computers. A detailed description of four low-priced minicomputers and many lower-priced microcomputers is included. 240 pages, paperback, $9.95. Order #B054.

CQ BOOK SHOP
76 North Broadway Hicksville, NY 11801

Order Date: _____

Name _____
Address _____
City _____
State _____ Zip _____
☐ Check ☐ Master Charge ☐ Visa
Card No. _____ Expires _____
Signature required on all charge orders:
X _____

QTY.	ORDER #	TITLE	PRICE	TOTAL
			Book Total	
			Shipping Charge	
			Grand Total	

Shipping charges $2.00 per order. Shipping charges waived on orders of $50.00 or more. Books shipped best way. All orders are processed the day they are received, but please allow 30 days for delivery within North America. Prices are guaranteed through June 30, 1980, but are subject to change thereafter.

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

June, during years of low and moderate solar activity, usually marked the beginning of the summertime slump in DX conditions, particularly during the daytime hours on the *10, 15* and *20* meter bands.

This June the story will be dramatically different. Solar activity continues at a very high level, with a smoothed sunspot number in the upper 130's forecast. This should produce many pleasant DX surprises on the shortwave bands, particularly on *10, 15* and *20* meters.

While the number of east-west openings on the *10* meter band will be considerably reduced from wintertime peak conditions, there should be plenty of good DX oepnings to southern and tropical regions during June. DX conditions on this band should peak during the late afternoon, but the band could open as early as a few hours after sunrise and remain open into the early evening hours.

Expect *15* meters to open for DX shortly after sunrise, and to remain open well into the evening hours. This should be the best band for DX during most of the daylight hours, with openings possible to most areas of the world. Look for peak conditions during the late afternoon hours, with the band remaining open to southern and tropical areas until Midnight or later. Nighttime DX openings on *15* meters occur during rare periods of exceptionally high solar activity as presently being experienced.

The summer slump will affect *20* meter DX during some of the daylight hours. The band should open with fairly good DX signals for an hour or two after local sunrise. High solar absorption common to the summer months should then severely limit DX openings until the late afternoon hours, when the band is expected to spring to life again. Peak DX conditions should occur during the hours of darkness when *20* meters will be the optimum DX band, with exceptionally strong signal openings to many areas of the world. From sundown to sunrise you may hear DX signals on *20* meters this June like haven't been heard often before!

Fewer hours of darkness and seasonally higher static levels will reduce somewhat DX conditions on *40* meters and will result in considerably poorer conditions on *80* and *160* meters. While the 40 meter band won't sound as good as it did during the winter and early spring months, some fairly good DX openings should be possible to many areas of the world from shortly before sundown until shortly after sunrise. While DX openings are forecast to some parts of the world on *80* meters during the hours of darkness, signals will often be weak and noisy. Not much DX is expected on *160* meters until the early fall, but an occasional opening may be possible to the Caribbean area and the northern portion of Latin America during the hours of darkness. The best times to check for *40, 80* and *160* meter DX openings during June is when it is sunrise on the *easternmost* terminal of a path.

June and the summer months are excellent for short-skip propagation up to the one-hop limit of approximately 2300 miles. For openings less then *250* miles, *40* meters should be best during the daylight hours with *80* meters as backup. During the hours of darkness, try *80* and *160* meters. For openings between *250* and *750* miles, try *40* meters during the day with *20* meters a close second choice. At night try *80* meters, with *40* a second choice. Check the *20* meter band for daytime openings between *750* and *1300* miles, with *15* meters as an alternative. *Forty* meters should be optimum for this range of distance at night, backed up by *80* meters. For openings between distances of *1300* and *2300* miles, use both *20* and *15* meters during the day, and *40* meters at night.

Sporadic-E ionization is expected to increase sharply during June. This should result in frequent short-skip openings, between distances of approximately *450* and *1300* miles, on both the *10* and *15* meter bands. Sporadic-E propagation can occur at just about any time, but is usually most prevalent between 10 a.m. and 2 p.m. and again between 6 and 10 p.m., local daylight time.

This month's *CQ* Propagation Charts contain DX predictions for the period June 15 through August 15, 1980. Short-skip Charts for June, for openings between 50 and 2300 miles, and from Hawaii and Alaska, appeared in last month's column.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for June 1980

	Expected Signal Quality			
Propagation Index	(4)	(3)	(2)	(1)
Above Normal: 11, 22	A	A	B	C
High Normal: 3-4, 7-8, 10, 12-13, 21, 23, 30	A	B	C	C-D
Low Normal: 2, 6, 9, 14-16, 19-20, 24-25, 27-28	A-B	B-C	C-D	D-E
Below Normal: 1, 5, 17-18, 26, 29	B-C	C-D	D-E	E
Disturbed: None	C-E	D-E	E	E

Where expected signal quality is: A—Excellent opening, exceptionally strong, steady signals greater than S9 + 30 dB.

B—Good opening, moderately strong signals varying between S9 and S9 + 30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, 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 fair-poor (C-D) on June 1st, good-fair (B-C) on the 2nd, good (B) on the 3rd and 4th, fair-poor (C-D) again on the 5th, etc.

For updated information, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 1714, Silver Spring, MD 20902.

V.H.F. Ionosperic Openings

The big v.h.f. news during June will very likely be sporadic-E propagation

* *11307 Clara St., Silver Spring, MD 20902*

on *6* meters. Fairly frequent openings are expected over a range between approximately 900 to 1300 miles. During intense and widespread sporadic-E ionization, two-hop openings well beyond 1300 miles may be possible. An occasional sporadic-E opening on *2* meters is also possible during June, particularly when ionization is very intense, and over distances between approximately 1100 and 1300 miles. While June is not usually a good month for F-2 layer propagation on *6* meters, an occasional DX opening may be possible. The best time to check for *6* meter DX openings is during the afternoon hours, on days when conditions are expected to be HIGH NORMAL or better. Occasional openings should be possible towards Latin America, southern Africa, the South Pacific and Australasia.

Not much meteor-type ionization expected during June, but some may occur during the *Herculids* and *Scorpiids* showers on June 3 and 5. While these are minor meteor showers it may be worthwhile to check the v.h.f. bands for unusual short-skip openings on these days.

There is also a greater tendency for v.h.f. ionosperhic openings on days that are expected to be BELOW NORMAL or DISTURBED. Check the "Last Minute Forecast" at the beginning of this column to find those days during June that are most likely to be in these categories.

A seasonal decline is expected for transequatorial propagation on *6* meters (TE) during June, but an occasional opening may still be possible between southern tier states and deep Latin America. The best time to check for T.E. openings is between 8 and 11 p.m., local daylight time.

73, George, W3ASK

June 15 - August 15, 1980
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	16-18 (1)	08-09 (1) 09-12 (2) 12-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	09-15 (1) 15-16 (2) 16-18 (3) 18-00 (4) 00-03 (3) 03-05 (2) 05-07 (3) 07-09 (2)	20-21 (1) 21-22 (2) 22-23 (3) 23-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 21-22 (1)* 22-23 (2)* 23-00 (3)* 00-01 (2)* 01-02 (1)*
Northern Europe & European USSR	15-17 (1)	11-15 (1) 15-18 (2) 18-19 (1)	09-15 (1) 15-17 (2) 17-19 (3) 19-22 (4) 22-01 (3) 01-03 (2) 06-09 (2)	21-22 (1) 22-23 (2) 23-00 (3) 00-01 (2) 01-02 (1) 22-01 (1)*
Eastern Mediter-ranean & Middle East	16-18 (1)	11-13 (1) 13-17 (2) 17-18 (3) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	12-16 (1) 16-18 (2) 18-20 (3) 20-00 (4) 00-01 (3) 01-03 (2) 03-06 (1) 06-08 (2) 08-09 (1)	20-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Western Africa	11-13 (1) 15-17 (1) 17-19 (2) 19-21 (1)	10-12 (1) 12-15 (2) 15-17 (3) 17-23 (4) 23-03 (3) 03-04 (2) 04-05 (1)	14-16 (1) 16-17 (2) 17-18 (3) 18-03 (4) 03-04 (3) 04-05 (2) 05-07 (1)	20-22 (1) 22-00 (2) 00-02 (1) 22-00 (1)*
Eastern & Central Africa	17-19 (1)	09-12 (1) 12-14 (2) 14-17 (3) 17-19 (4) 19-22 (3) 22-23 (2) 23-00 (1)	14-16 (1) 16-18 (2) 18-20 (3) 20-00 (4) 00-02 (3) 02-03 (2) 03-05 (1)	21-00 (1)
Southern Africa	10-13 (1) 09-11 (1)**	08-10 (1) 10-11 (2) 11-12 (3) 12-13 (4) 13-14 (3) 14-15 (2) 15-16 (1) 01-03 (1)	23-01 (1) 01-03 (3) 03-05 (2) 05-08 (1) 14-15 (1) 15-16 (2) 18-19 (2) 19-20 (1)	21-22 (1) 22-00 (2) 00-02 (1) 23-01 (1)*
Central & South Asia	Nil	09-10 (1) 10-12 (2) 12-13 (1) 17-19 (1) 19-22 (2) 22-23 (1)	17-20 (1) 20-23 (2) 23-03 (1) 03-06 (2) 06-08 (1)	19-21 (1) 04-06 (1)
Southeast Asia	Nil	10-14 (1) 14-16 (2) 16-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-19 (1) 19-21 (2) 21-23 (1) 23-02 (2) 02-03 (1)	04-06 (1)
Far East	Nil	09-10 (1) 10-12 (2) 12-18 (1) 18-20 (2) 20-22 (1)	06-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 18-21 (1) 21-23 (2) 23-02 (3) 02-04 (2) 04-06 (1)	04-06 (1)
South Pacific & New Zealand	16-18 (1) 18-20 (2) 20-22 (1) 14-17 (1)**	09-11 (1) 14-16 (1) 16-18 (2) 18-19 (3) 19-21 (4) 21-22 (3) 22-00 (2) 00-01 (1)	18-20 (1) 20-23 (2) 23-01 (3) 01-04 (4) 04-05 (3) 05-06 (2) 06-09 (3) 09-10 (2) 10-12 (1)	01-03 (1) 03-05 (2) 05-06 (3) 06-07 (2) 07-08 (1) 04-06 (1)*
Australasia	18-19 (1) 19-21 (2) 21-22 (1)	10-12 (1) 17-18 (1) 18-20 (2) 20-22 (3) 22-23 (2) 23-00 (1)	21-23 (1) 23-01 (2) 01-03 (3) 03-05 (4) 05-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 16-18 (1)	03-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Caribbean, Central America & Northern Countries of South America	09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 12-14 (1)**	08-09 (2) 09-12 (4) 12-14 (3) 14-21 (4) 21-01 (3) 01-03 (2) 03-08 (1)	06-07 (3) 07-10 (4) 10-11 (3) 11-15 (2) 15-17 (3) 17-03 (4) 03-05 (3) 05-06 (2)	19-20 (1) 20-21 (2) 21-23 (3) 23-03 (4) 03-04 (3) 04-05 (2) 05-06 (1) 22-23 (1)* 23-24 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	10-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-21 (2) 21-22 (1) 12-15 (1)**	07-08 (1) 08-11 (2) 11-15 (1) 15-16 (2) 16-17 (3) 17-23 (4) 23-01 (3) 01-02 (2) 02-03 (1)	10-16 (1) 16-18 (2) 18-19 (3) 19-02 (4) 02-04 (3) 04-07 (2) 07-09 (3) 09-10 (2)	20-21 (1) 21-22 (2) 22-02 (3) 02-04 (2) 04-05 (1) 22-03 (1)*
McMurdo Sound, Antarctica	15-17 (1)	16-18 (1) 18-21 (2) 21-22 (1)	17-19 (1) 19-22 (2) 22-03 (3) 03-05 (2) 05-06 (1) 07-09 (1)	02-05 (1)

Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	*Nil*	11-15 (1) 15-17 (2) 17-18 (3) 18-19 (2) 19-10 (1) 23-01 (1)	05-08 (2) 08-15 (1) 15-17 (2) 17-18 (3) 18-22 (4) 22-02 (3) 02-03 (2) 03-05 (1)	20-23 (1) 23-01 (2) 01-02 (1) 22-00 (1)*
Northern & Central Europe & European USSR	*Nil*	10-15 (1) 15-17 (2) 17-18 (1)	02-06 (1) 06-09 (2) 09-15 (1) 15-18 (2) 18-19 (3) 19-21 (4) 21-00 (3) 00-02 (2)	20-21 (1) 21-23 (2) 23-00 (1) 21-23 (1)*
Eastern Mediter-ranean & Middle East	15-17 (1)	11-16 (1) 16-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	13-16 (1) 16-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-00 (2) 00-02 (1) 07-09 (1)	21-23 (1)
Western Africa	10-12 (1) 15-16 (1) 16-18 (2) 18-20 (1)	10-12 (1) 12-15 (2) 15-17 (3) 17-21 (4) 21-00 (3) 00-02 (2) 02-03 (1)	14-15 (1) 15-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (2) 04-06 (1)	20-20 (1) 22-00 (1)*
Eastern & Central Africa	16-18 (1)	10-14 (1) 14-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-22 (1)	15-17 (1) 17-18 (2) 18-19 (3) 19-22 (4) 22-00 (3) 00-02 (2) 02-04 (1)	21-23 (1)
Southern Africa	09-12 (1) 09-11 (1)**	08-10 (1) 10-11 (2) 11-12 (4) 12-13 (3) 13-14 (2) 14-15 (1) 00-02 (1)	23-00 (1) 00-02 (3) 02-04 (2) 04-06 (1) 12-14 (1) 14-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	21-22 (1) 22-00 (2) 00-01 (1) 22-00 (1)*
Central & South Asia	*Nil*	09-11 (1) 11-12 (2) 12-13 (1) 15-18 (1) 18-21 (2) 21-23 (1)	17-19 (1) 19-22 (2) 22-02 (1) 02-06 (2) 06-08 (3) 08-09 (2) 09-10 (1)	19-21 (1) 05-07 (1)
Southeast Asia	*Nil*	10-11 (1) 11-14 (2) 14-19 (1) 19-22 (2) 22-00 (1)	07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-23 (1) 23-00 (2) 00-01 (3) 01-02 (2) 02-03 (1)	03-05 (1)

Far East	*Nil*	09-11 (1) 13-15 (1) 17-19 (1) 19-20 (2) 20-22 (3) 22-23 (2) 23-01 (1)	05-07 (2) 07-09 (3) 09-10 (2) 10-12 (1) 20-22 (1) 22-00 (2) 00-03 (3) 03-04 (2) 04-05 (1)	04-05 (1) 05-06 (2) 06-07 (1) 04-06 (1)*
South Pacific & New Zealand	14-16 (1) 16-18 (2) 18-19 (3) 19-20 (2) 20-21 (1) 14-17 (1)**	13-16 (1) 16-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	17-19 (1) 19-23 (2) 23-02 (4) 02-05 (3) 05-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-13 (1)	23-01 (1) 01-03 (2) 03-05 (3) 05-07 (2) 07-08 (1) 01-04 (1)* 04-06 (2)* 06-07 (1)*
Australasia	16-17 (1) 17-18 (2) 18-19 (3) 19-20 (2) 20-21 (1)	14-15 (1) 15-17 (2) 17-19 (1) 19-20 (2) 20-21 (4) 21-22 (3) 22-23 (2) 23-00 (1)	22-00 (1) 00-01 (2) 01-04 (4) 04-05 (3) 05-07 (2) 07-09 (4) 09-11 (2) 11-12 (1)	01-03 (1) 03-07 (2) 07-08 (1) 03-06 (1)*
Caribbean, Central America & Northern Countries of South America	10-12 (1) 12-14 (2) 14-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 11-14 (1)**	08-09 (2) 09-10 (3) 10-12 (4) 12-14 (3) 14-19 (4) 19-23 (3) 23-01 (2) 01-08 (1)	03-05 (2) 05-07 (3) 07-09 (4) 09-11 (3) 11-15 (2) 15-17 (3) 17-01 (4) 01-03 (3)	19-20 (1) 20-21 (3) 21-23 (4) 23-00 (3) 00-03 (2) 03-05 (3) 05-06 (1) 20-22 (1)* 22-04 (2)* 04-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 11-15 (1)**	07-08 (1) 08-10 (2) 10-14 (1) 14-15 (2) 15-16 (3) 16-22 (4) 22-00 (3) 00-01 (2) 01-02 (1)	10-15 (1) 15-17 (2) 17-18 (3) 18-01 (4) 01-03 (3) 03-07 (2) 07-09 (3) 09-10 (2)	20-21 (1) 21-22 (2) 22-02 (3) 02-03 (2) 03-05 (1) 20-03 (1)*
McMurdo Sound, Antarctica	15-18 (1)	14-16 (1) 16-17 (2) 17-18 (3) 18-19 (2) 19-21 (1)	17-19 (1) 19-22 (2) 22-02 (3) 02-04 (2) 04-07 (1) 07-09 (2) 09-10 (1)	02-06 (1)

Time Zone: PDT (24-Hour Time) WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	*Nil*	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (1) 21-23 (1)	23-01 (3) 01-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-21 (3) 21-23 (2)	20-23 (1)
Central & Northern Europe & European USSR	*Nil*	07-09 (1) 13-14 (1) 14-16 (2) 16-17 (1)	13-15 (1) 15-19 (2) 19-00 (3) 00-01 (2) 01-06 (1) 06-08 (2) 08-10 (1)	20-22 (1)
Eastern Mediterranean & Middle East	*Nil*	07-09 (1) 11-15 (1) 15-17 (2) 17-18 (1) 22-00 (1)	13-16 (1) 16-20 (2) 20-22 (3) 22-00 (2) 00-02 (1) 06-08 (1)	20-21 (1)
Western & Central Africa	09-14 (1) 14-16 (2) 16-18 (1)	07-11 (1) 11-13 (2) 13-17 (3) 17-19 (2) 19-21 (1)	13-15 (1) 15-17 (2) 17-19 (3) 19-22 (4) 22-00 (3) 00-04 (2) 04-08 (1)	20-22 (1)
Eastern Africa	*Nil*	09-14 (1) 14-16 (2) 16-17 (3) 17-18 (2) 18-19 (1) 00-02 (1)	15-17 (1) 17-19 (2) 19-22 (3) 22-00 (2) 00-02 (1)	*Nil*
Southern Africa	09-12 (1)	08-10 (1) 10-11 (2) 11-12 (3) 12-14 (2) 14-15 (1)	14-15 (1) 15-17 (2) 17-18 (1) 22-23 (1) 23-00 (2) 00-02 (3) 02-03 (2) 03-06 (1) 06-08 (2) 08-10 (1)	20-23 (1)
Central & South Asia	*Nil*	08-10 (1) 10-12 (2) 12-14 (1) 17-19 (1) 19-22 (2) 22-23 (1)	05-07 (2) 07-09 (3) 09-10 (2) 10-11 (1)	05-07 (1) 19-20 (1)
Southeast Asia	11-15 (1)	08-09 (1) 09-11 (3) 11-13 (2) 13-16 (1) 20-22 (1) 22-00 (2) 00-02 (1)	23-01 (1) 01-03 (2) 03-05 (3) 05-07 (2) 07-09 (3) 09-11 (2) 11-14 (1)	03-07 (1)

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate 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. wetc. Appropriate *daylight* time is used, *not* GMT. T convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 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 10dB 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.

Far East	14-16 (1)	09-10 (1) 10-12 (2) 12-15 (1) 15-17 (2) 17-19 (3) 19-21 (2) 21-23 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-04 (4) 04-06 (3) 06-07 (2) 07-09 (3) 09-11 (2) 11-14 (1)	01-02 (1) 02-03 (2) 03-05 (3) 05-06 (2) 06-07 (1) 03-05 (1)*
South Pacific & New Zealand	12-14 (1) 14-16 (2) 16-18 (3) 18-20 (4) 20-21 (2) 21-22 (1) 14-17 (1)**	11-13 (1) 13-15 (3) 15-18 (3) 18-21 (4) 21-22 (3) 22-23 (2) 23-01 (1)	17-19 (1) 19-21 (2) 21-03 (4) 03-05 (3) 05-07 (2) 07-09 (3) 09-11 (2) 11-13 (1)	22-23 (1) 23-01 (2) 01-06 (3) 06-07 (2) 07-08 (1) 23-02 (1)* 02-05 (2)* 05-06 (1)*
Australasia	14-17 (1) 17-19 (2) 19-21 (3) 21-22 (2) 22-23 (1) 15-17 (1)**	07-09 (1) 13-17 (1) 17-19 (2) 19-22 (3) 22-00 (4) 00-01 (3) 01-02 (2) 02-03 (1)	20-22 (1) 22-00 (2) 00-05 (4) 05-07 (3) 07-09 (4) 09-10 (2) 10-13 (1) 13-15 (2) 15-17 (1)	22-00 (1) 00-01 (2) 01-05 (3) 05-06 (2) 06-08 (1) 01-04 (1)*
Caribbean, Central America & Northern Countries of South America	09-11 (1) 11-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 10-13 (1)**	08-09 (2) 09-10 (3) 10-12 (4) 12-14 (3) 14-19 (4) 19-21 (3) 21-00 (2) 00-08 (1)	08-11 (3) 11-15 (2) 15-17 (3) 17-01 (4) 01-04 (3) 04-05 (2) 05-06 (3) 06-08 (4)	19-21 (1) 21-22 (2) 22-00 (3) 00-03 (2) 03-04 (3) 04-05 (2) 05-06 (1) 21-23 (1)* 23-03 (2)* 03-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	09-12 (1) 12-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 10-14 (1)**	06-07 (1) 07-09 (2) 09-13 (1) 13-15 (2) 15-16 (3) 16-23 (4) 23-00 (3) 00-01 (2) 01-02 (1)	09-15 (1) 15-17 (2) 17-18 (3) 18-01 (4) 01-03 (3) 03-06 (2) 06-08 (3) 08-09 (2)	20-21 (1) 21-00 (2) 00-02 (1) 02-03 (3) 03-04 (2) 04-05 (1) 02-04 (1)*
McMurdo Sound, Antarctica	17-19 (1)	14-16 (1) 16-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	16-18 (1) 18-19 (2) 19-02 (3) 02-04 (2) 04-06 (1) 06-08 (2) 08-10 (1)	00-23 (1) 23-01 (2) 01-04 (1) 04-06 (2) 06-07 (1)

*Indicates best time for eighty meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation Index of (2), or higher.

**Indicates best times to check for F-2 layer openings on 6 Meters.

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. Free to CQ subscribers (maximum 3 lines per month). 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.

FOR SALE: High power low pass filter $29.95. Guzman, RT.1, BOX 21-B, Santa Rosa, TX 78593.

WANTED: Instructor Ham Radio N.Y.S., Co-ed Children's Sleep-Away Camp. Write Camp Kinder Ring, 45 East 33rd St., New York, N.Y. 10016.

SELL: SB 230 Linear, never used $350. 75A4 #2285 $300. SB400 $175. All with manuals. W9VPE, 210 Le Jeune, Lockport, IL 60441.

POCKET T.V.: Sinclair microvision. Works in US, UK & Europe. As new. $225 firm. KA4LPU, 901 Spring Valley Rd., Altamonte Springs, FL, 32701.

FOR SALE-HAM EQUIPMENT: Dentron Model MLA-2500 Linear Amplifier, operating bands 160 through 10 meters $850. Drake-TR4CW-RIT transceiver only 10 Months old, including all accessories $800. or best offer. Clifton, NJ. Please call 201-471-3798.

FOR SALE: Tempo S-1 HT Rubber Duck Antenna, NiCad Charger, mint condition, 3 months old sitll in box, $200. N8BEA, 1326 12 St., Port Huron, MI 48060.

FOR SALE: Kenwood Twins T-599D and R-599D, transmitter needs some work, best offer. KA9EWB, Ken Wolfe, Box 134, Buffalo, IN 47925.

JUNE 1 - SRRC HAMFEST: Furnish large S.A.S.E. for complete info. Starved Rock Radio Club - W9MKS, RFD #1, Box 171, Oglesby, Illinois 61348, (815) 667-4614.

WANTED: (1) Military Radios beginning with the letters "SS" (example-SSR-5); (2) Military Radios built inside civilian style suticases; (3) Early miniature military receivers - transmitters. Keith Melton, Box 2037, Ogden, Utah 84404; call collect (801) 394-3290.

DIGITAL DEGREE readout module for Ham II,III,IV,T2X rotors. Superior accuracy, readability. Rf suppression. Easily adapts to other systems. Guaranteed. $39.95 Monitor, Box 55CQ, Agincourt, Canada M1S3B4.

TRAVEL-PAK QSL KIT: Converts Post Cards, Photos to QSLs. Stamp brings circular. SAMCO, Box 203, Wynantskill, NY 12198.

QSL CARDS: Custom designs for railroad employees and railfans. Send business envelope with 28¢ stamp. Request R.R. QSL samples. Marv, W0MGI, 2095 Prosperity Ave., St. Paul, MN 55109.

CLEANING HOUSE: Heath Micoder I; Yaesu FRG-7; IC-22S; Bearcat 210. All in good condition. Write Karl Thurber, W8FX, 631 N. Overbrook Drive, Ft. Walton Beach, FL 32548.

SELL: SX101-A RCVR - $80 pick up. Also variacs, small resistors, muffin for 2" and 3" round meters. Best offer. M.E. Knowles, 9 Brown St., No. Billerica, Mass 01862, Tel. 617-663-3743.

ATTENTION Certificate Hunters. Free information on beautiful operating awards. S.a.s.e. to HAROAA, P.O. Box 341, Hinckley, OH 44233.

WANTED: Hallicrafter S-1 through S-7, DD-1, 8 HPA, SX-10, SX-12, and other early Hallicrafter gear, parts, manuals, and accessories. Any condition. For my collection, please write, even if in doubt on Model No. Chuck Dachis, WD5EDG, 4500 Russell Dr., Austin, TX 78745.

QSLs with Class! Unbeatable quality, reasonable price. Samples: 50 cents, refundable. QSLs UNLIMITED, POB 27553, Atlanta, GA 30327

ANTENNA TRIPOD — Install tubular masts singlehanded in vertical position $34.95 up. Details, SASE to: Antena, 5316 Fairfax St., Shreveport, LA 71108.

FOR SALE: Grebe CR8, Grebe CR5, and Grebe matching Audio Amplifier. SASE for list of books, catalogs, call books, Handbooks and QST' fm 16. Erv Rasmussen, 164 Lowell, Redwood City, CA 94062.

CLUB CALL PINS 3 lines 1¼ × 3¼ $1.55 each call, first name and club. Colors blue black or red with white letters. (CATALOG) Arnold Linzner, 2041 Linden Street, Ridgewood, NY 11385.

SPLIT SCREEN RTTY Machine lang program for TRS80 (LII, 16K)/M80. $10 from B. Gorsky, 2449 Derbyshire, Cleveland, OH 44106.

FREE ELECTRONICS SURPLUS CATALOG Bargain Packed. Fascinating items. Many never before advertised. ETCO-003, Box 762, Plattsburgh, NY 12901. SURPLUS WANTED

WANTED: Used amateur equipment. State condition, make, model and price. H. F. SCHNUR, 115 Intercept Avenue, North Charleston, SC 29405.

SELL: 12VDC Power Supply for SB34 Transceiver with cables $125. Newtronics 6 and 2 mtr mobile whip $7.50. M103 AM-CB combination whip $9.50. Bumper Mount with SS Spring $5., Hy-Gain 6 mtr Vertical Ground Plane $20. All FOB, in excellent condition and with manuals where applicable. T.K. Brown, RD1 Box 102, Forksville, PA 18616.

FOR SALE: Ameco 6MTR Converter MD CN & PSI supply, $25. Atlas 350XL, $900. N6IC, 4447 Atoll Ave., Sherman Oaks, CA 91423.

4 SALE: Kenwood TR 7400A mint $280. ICOM IC 30A, mint $300. Henry SI (new) with TTP $341. Drake SSRI (new) $230. Gen Cov. Receiver. Wanted: Drake VHF Converters for 2-6. Drake CA Console. TS520S. K3UKW, Tony Musero, 215-271-8898.

CHEAP & EASY: My U-Chuz Chart Keep track of WK/CFM on DXCC, WAS, any! $2.00 & SASE to Cody, 1213 W. Ashton, Gastonia, NC 28052.

FOR SALE: Complete collection of Government amateur call books from 1913 to 1931 including the supplements. Large selection of catalogs from 1900. Send list of those you are interested in for quotation. No list available. Erv Rasmussen, W6YPM, 164 Lowell Street, Redwood City, CA 94062.

SELL: Hallicrafters SX-42 500kc-108mc clean $110, Hickok tube tester $35, HP 525 C 100-500 mc converter $65. K6KZT, 2255 Alexander, Los Osos, CA 93402.

SELL: Drake 2-B Receiver, Excellent Condition, Xtal Calibrator, CW Filter, Q-Multiplier/Speaker, $170. WD8KRE, 27 Boehler St., Tiffin, OH 44883.

SELL: NRI Model 452 synthesized 2 meter transceiver, mint, $190. David Mitchell, 1620 Young Rd., Lithonia, GA 30058.

SELL: Drake 2-C Receiver, 2-CQ Multiplier, "WARC"-Ready, Clean; $185. SSB Processor; $49. HQ-129X, HC-10, $150. More. WA2OVG, 212-490-2160 Days. 796-8617 Eves.

WANT TO TRADE: Galaxy 5 xcvr & p.s., Heath DX-40 xmtr & HD-10 keyer, Knight grid dip meter for Ten Tec Argonaut & p.s. Rick, KA8AKL, 216-564-7767 after 5 pm, or send SASE to 14470 Bassiake Road, Newberry, OH 44065.

C. Q. MAGAZINES: From Dec. 1972 on. Pick up only. Ed, K3BDA, 264-6566, 2004 Philadelphia Ave., Chambersburg, PA 17201.

SELL: Hallicrafter SR-400, cw filter & mike, $550. Best offer considered. Hammerlund HQ 145, $150. R. Begnoche, R2, Box 155, Clifton, TN 38425.

STAMP COLLECTORS: 75 World stamps from 25 different countries, only $1.00 postpaid. Stamps KA4IRR, P.O. Box 366, Clifton Forge, VA 24422.

FREE! SUPERIOR, C+, TRAJECTORY -UNIFIED RELATIVITY reforms Einstein's Optics, Eclipse, Scandals! Thomas, 408 Vermont, Daytona Beach, FL 32018.

NEED CONSTRUCTION MANUAL: For Heathkit AM-1 Antenna Impedance Bridge. Ed Morrison, Box 175, Blandinsville, IL 61420.

FOR SALE: Yaesu FT-227R Memorizer. Nearly new, perfect condition. $275. R.J. Moraine, 1432 Pamela, Hurst, TX 76053.

WANTED: EX-106 FM adapter for IC-551D, Sei SPS-20M or SPS-30M, MFJ 101 clock, Heath ID-1390 thermometer, BN-86 balun, 6 element-6 meter beam. F. Kauppi, 690 Vermilion Trail, Gilbert, MN 55741.

SELL: Drake R4A, T4X, AC3, $550. GSB-201 KW linear $275. SX-88 $160. K8AC, 7991 Lutz Ave. N.W., Massillon, OH 44646, 216-854-4884.

QUALITY QSL's Printed 300/$5 500/$9. White & colored stock. All Postpd.; D. TESTA, PO Box 9064-CQ, Newark, NJ 07104 USA.

AM INTERESTED IN LOCATING: Amateurs who have operated in former European colonies or territories for informational purposes. WA1GXE, Box 1003, Fairfield, CT 06430.

SELL: Conar Model 452 2-Meter synthesized transceiver, Mint, $180. David Mitchell, 1620 Young Rd., Lithonia, GA 30058.

SELL: Yaesu FRDX400 cw filter 2 and 6m converters $325. Heath Oscilloscope IO-4541 $200. Heath trainers ETW-3100 and ETW-3200. Offers. D. Smith, 1544 Broadway, S. Portland, ME 04106, 207-775-1537.

FOR SALE: Drake-TR4-CW-RIT transceiver is only 10 months old in original packing including: power supply, speaker, Shure Microphone-Model 444, 34-PNB noise blanker-installed, optional crystals 42.5 & 43.6 MHz. for 28.0-28.6 and 29.1-29.7 MHz. segment of 10 meter band-installed, and 3 (spare) brand new Sylvania-matching 6JB6 tubes, $850.00 shipping via UPS prepaid. Wm. D. Shevtchuk, 1 Lois Avenue, Clifton, NJ 07014.

SELL: YAESU World Clock QTR-24, new $29.50 includes UPS. Bolex H-16 movie camera, 3-lenses, like new $200. Write DS, Box 48, Ballardvale, MA 01810.

HEATHKIT SB102 Transceiver and power supply; $325. J. Sikora, 8155 Woodlawn St., Munster, IN 46321.

SALE: Back issues CQ, QST, Ham Radio, 73. Send SASE for lists & prices. F.J. Wojcik, W2SNJ, 33 Hughes St., Maplewood, NJ 07040.

SELL: Telex 5×5 Pro I headset/mike $45, Telemetry Display Unit TDU-2 $100. Don, N6IC, 4447 Atoll Ave., Sherman Oaks, CA 91423.

NOVICE ALL-AMERICAN CERTIFICATE: Work a novice in all 10 call areas. Send list and $1. K6ASI, 25 Rudnick Ave., Novato, CA 94947.

WANTED: Yaesu FT 101 E accessories. VFO, Speaker Phone Patch, FL 2100 B Linear. Write "WB7RCL" Doug Humphrey, Rt. 3, Box 155, Milton Freewater, OR 97862

SELL: RCVR, HR1680, mint, $150—you ship. W2EZ, 9 Whitney Farms Circle, Fairport, NY 14450.

FOR SALE: Old issues of CQ. All copies '47 thru '57. Partial copies of '46 and '58. Highest bid. John R. Palmer, 7425 Schuyler Dr., Omaha, NE 68114.

WANTED: Radio Boys, Radio Girls, other juvenile radio/electric fiction books. State price, condition. W6CF, Box 473, Redwood Estates, CA 95044.

WANTED: All types of service manuals. SASE for list of electronic items for sale. W7KSG, 1876 E. 2990 So., Salt Lake City, UT 84106.

FREE: Einstein superceded! Refraction/Velocity energy balance returns C+ photos to normal. W.T. Thomas, Jr., 408 Vermont, Daytona Beach, FL 32018.

WANTED: Paperback copy of James Bond's "Casino Royale" by Ian Fleming. WB4PIQ, Rt. 4, Box 348-A, Glen Allen, VA 23060.

SELL: Ten Tec Triton II 200 w. xcvr SSB with Model 262 spkr, pwr unit and vox unit. $595 firm, mint condx. W7TCT, L. Basham, 735 Caves Hwy, Cave Junction, OR 97523.

FOR SALE: Heath Freq. Counter IB-1000, mint, $50. E.H. Nadolny, W9BM, 888 E. Schirra, Palatine, IL 60067.

FOR SALE: Magnum Six T4XB or T4XC. $80.00 firm. N5DX, Box 486, Siloam Springs, AR 72761.

WANTED: I need a reasonably priced Kenwood MC-50 mike. Larry, WB9AZQ, Box 144, Robinson, ILL. 62454.

SELL: Signal-One CX7A $950, Atlas 350 XL $950. Don, N6IC, 4447 Atoll Ave., Sherman Oaks, CA 91423.

WANTED: R-48/TRC-8 Rcvr; C-905, C-853, and C-1024/ARC-27 boxes, and IMSAI vector interrupt board. C.T. Huth, 146 Schonhordt, Tiffin, OH 44883.

WANTED: Drake 2-BQ Q-Multiplier must be in good condition. Matt Stennett WH4TKG Jacksonville Florida.

SELL: Drake TR4C with AC-4 Power Supply and MS-4 Speaker $500. You ship or pick up. Matt Stennett, WH4TKG, Jacksonville, Florida.

FOR SALE: Kenwood TS-520 with CW filter & Remote VFO. Mint Condition. $575/Best offer. W7IL, PO Box 1941, Eugene, OR 97440 (503) 697-9649.

SELL: Model 80 Sig Gen $175, Lampkin 205A Dev Meter $60, HP-205AG Audio Sig Gen Lab Type $80, K6KZT, 2255 Alexander Ave., Los Osos, CA 93402.

WANTED: Schematics and instructions for use of James Millen type No. 90911 and 90912 module oscilloscopes. L. Applebaum, 23747 Walden Ct., Southfield, MI 48034.

FOR SALE: 700Sp Kenwood all-mode two-meter rig, Tempo S-1 H.T., Clegg FM-DX, Send S.A.S.E. To 7602 Timberwood Drive, Jacksonville, FL 32224.

SELL: Hallicrafter SR400, cw filter & mike. $550. Best offer considered. Hammarlund HQ 145, $150. R. Begnoche, R2 Box 155, Clifton, TN 38425.

GO MOBILE! Mobile P.S. for Drake TR4, TR3 only $59 shipped. WB9JHS, 7720 W. 162 Pl., Tinley Park, IL 60477.

CALL COLLECT on Sundays if you have 100 feet or more of large tower (45G, AB105, etc) and you want to sell for a reasonable price. All responses answered. Tom, N4NW 301-461-9585. State your call when calling.

SELL: Summer 1962 US callbook, $20. 1962 or 1963 ARRL Handbook, $10. 1964 National Radio Aniversary Photoalbum, $10. WA9IYF, Madison, IN.

SELL: SSTV-Venus SS1 monitor, A1 condition, $150. Bob Schenck, N2OO, Box 345, Tuckerton, NJ 08087.

WANTED: YAESU-FT 101 E with fan. Also interested in Read-out or other accessories. No junk. Joe, WB9GHJ, 120 E. George St., Bensenville, Il. 60106; phone #—312-595-8090.

MAKE YOUR CAR INVISIBLE to police radar. Complete, simple plans - Send $5.00 for manual to: Microwave Systems Engineering, Box 936 CQ, Woodside NY, 11377.

WANTED ALIVE - Collins Antenna Tuner 180S1. State price and condition. Norm Zink, 15 Dera St., Greenville, SC 29615.

COLLINS SALE: KWM-2 $450; Mobile Rack w/mobile power supply $100; all three $500 firm. S-LINE: 75S3 $450; 32S3 $525; 516F2 $125; take all (S-Line) $1000 firm. ALL OF THE ABOVE for $1425 firm. Jack M. Gutzeit, W2LZX, c/o CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

SALE: SB101, mint with AC & DC supplies $350. Jim, WA4MYF 904-478-0018 or 434-5763.

SALE: D104TUG8, amplified, wired for Kenwood, new $30. Jim, WA4MYF, 904-478-0018 or 434-5763.

WANTED: E and F coil sets plus corresponding dial tuning strips for NATIONAL HRO-60. Don Chepurna, 41 Clinton St., Waterbury, CT 06710.

SALE-TRADE: Wyoming-Utah ranch land. 10 acres $50 down, $50 month. (Offer void in California.) FREE maps, photos, information. Trade for ham gear, home computer, test equipment, etc. Owner- Mike Gauthier, WB7QGR, 9550-Q-Gallatin, Downey, California 90240.

WANTED: TBY Walkie Talkies WW II vintage. Will pay shipping. Matt Vania, Box 31, Stockbridge, MA 01262.

WANTED: Greenlee punches round or square any size, schematics for Johnson Navigator, Globe 90, Globechief, SX100, HQ100, HQ110, call books, vibroplex anttunner, RF meters, insulators, wire. K4FCR, Box 8352, Savannah, GA 31402.

SALE: Heath SB-301, $190; DX-60, $80; HD-10 keyer, $17; HS-1661 Speaker, $5; HG-10B VFO, $70; 40 mtr QRP transmitter, $20. Carl Carpenter, P.O. Box 3102, Clarksville, TN 37040.

AUTHENTICATION TABLES FOR TRANSMISSION SECURITY, be it CW, RTTY, or Voice. Code names for Traffic Security. Ciphers for Cryptography. Military proven Signal Security measures. Details: TAC-COM, Dept. 260, P.O. Box 3255, York, PA 17402.

DX-AWARDS GUIDE: Rules, applications for over 60 DX awards in single booklet. Introductroy price $14.95 ppd US, Canada, elsewhere add 16 oz postage. Sase for sample pages. POB 1136 Welch, Ames, Iowa, 50010.

MONTSERRAT - FANTASTIC DX location available for rent. "VP2M"-land. Oceanfront villa 2-bedroom 2-bath, private pool, maid service. Spectacular Caribbean and mountain views. Beaches, golf, tennis nearby. $250/wk until Dec. 15. 914-693-6888 evenings.

ROHN TOWER: Buy wholesale from worldwide distributior, - 20G $28.44 each 25G, $37.62 each, 45G, $83.60 each. 48 ft. foldover tower, $660.00 freight paid. 48 ft. BX free standing $224.02. Hill Radio, 2503 GE Road, Box 1405, Bloomington, IL 61701, 309-663-2141.

CALL LETTERS! Let us put your call letters on a quality T-Shirt or Cap. Specify letters/size/color. S-M-L-XL, Red-Black-Yellow-Blue-White. Caps come with adjustable band in Red-Black-Yellow-Blue. Send check for $4.98 each to Pier III Company, Dept. AR-1, Box 298, New Carlisle, Ohio 45344 Satisfaction guaranteed!

CENTRAL MICHIGAN: Amateur Repeater Association SIXTH Annual Swap & Shop in Midland, Michigan, June 21st at the Midland County Fairgrounds. Computer Demonstrations, Door Prizes. Talk-in: 146.73 WR8ARB and 146.52 Simplex. Tickets & info, s.a.s.e. to: R. L. Wert, W8QOI, 309 E. Gordonville Road, R#12, Midland, Michigan 48640.

ADVERTISER'S INDEX

To speed information to you on products shown in CQ advertising, a new computerized Reader Service System has been designed. For additional information on a particular ad in this issue, tear out the Reader Service postcard bound in this issue and circle the numbers on the card which correspond with the Reader Service numbers listed on the INDIVIDUAL ADS. DON'T CIRCLE THE PAGE NUMBERS! Fill in your name and address, and mail. We'll have your information on the way in short order.

FT-707 is shown with optional FV-707DM VFO & Scanning Microphone

THE FT-707 "WAYFARER"

The introduction of the "WAYFARER" by Yaesu is the beginning of a new era in compact solid state transceivers. The FT-707 "WAYFARER" offers you a full 100 watts output on 80-10 meters and operates SSB, CW, and AM modes. Don't let the small size fool you! Though it is not much larger than a book, this is a full-featured transceiver which is ideally suited for your home station or as a traveling companion for mobile or portable operation.

The receiver offers sensitivity of .25 uV/10 dB SN as well as a degree of selectivity previously unavailable in a package this small. The "WAYFARER" comes equipped with 16 poles of IF filtering, variable bandwidth and optional crystal filters for 600 Hz or 350 Hz. Just look at these additional features:

FT-707 with Standard Features

- Fast/slow AGC selection
- Advanced noise blanker
- Built-in calibrator
- WWV/JJY Band
- Bright Digital Readout
- Fixed crystal position
- 2 auxiliary bands for future expansion
- Unique multi-color bar metering—monitors signal strength, power output, and ALC voltage.

FT-707 with Optional FV-707DM & Scanning Microphone

- Choice of 2 rates of scan
- Remote scanning from microphone
- Scans in 10 cycle steps
- Synthesized VFO
- Selection of receiver/transmitter functions from either front panel or external VFO
- "DMS" (Digital Memory Shift)

Impressive as the "WAYFARER" is its versatility can be greatly increased by the addition of the FV-707DM (optional). The FV-707DM, though only one inch high, allows the storage of 13 discrete frequencies and with the use of "DMS" (Digital Memory Shift) each memory can be band-spread 500 KHz. These 500 KHz bands may be remotely scanned from the microphone at the very smooth rate of 10 Hz steps.

The FT-707 "WAYFARER" is a truly unique rig. See it today at your authorized Yaesu Dealer.

YAESU
The radio.

CIRCLE 48 ON READER SERVICE CARD

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

In 2 Meters Today...
ICOM Leads the Way!

ICOM IC-251A

ICOM has always been the amateur communications equipment industry's leader in 2 meter solid state digital technology. ICOM continues its established leadership with the all new IC-251A 2 meter multi-mode base transceiver. ICOM's advanced engineering incorporated a multi-memory system, 2 programmable scanning systems, 2 internal VFOs, and built in repeater offsets.

The New ICOM 251A is the most advanced, flexible 2 meter system on the market, incorporating features customers ask for most:

- ☐ Memory scan — automatically stops on an active frequency programmed in the memory.
- ☐ 3 memories built in (quick access to your favorite frequencies)
- ☐ Programmable band scan — scan the whole band, or any portion of it you desire (adjustable scanning speed). Automatically resumes scanning after 16 seconds if desired.
- ☐ Squelch on SSB! The 251A will automatically and silently scan the SSB portion of the band seeking out the SSB activity on 2.
- ☐ Multi-mode operation — USB, LSB, CW, FM. Great for getting into Oscar, plus enjoying SSB rag chewing as well as repeater operation (including the new subband).
- ☐ 600kc Repeater offset built in. Easy repeater operation on the FM portion of the band.
- ☐ Variable repeater split — with the 2 built in VFO's, it's possible to work the odd splits plus accommodate future repeater band plan changes.

The RF amplifier and first mixer circuits using MOS FET's, and other circuits provide excellent Cross Modulation and Intermodulation characteristics. The IC-251A has excellent sensitivity demanded especially for mobile operation, high stability, and with Crystal Filters having the high shape factors, exceptional selectivity.

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

ICOM

ICOM AMERICA, INCORPORATED

Sales Service Centers located at:

2112 116th Avenue NE
Bellevue, WA 98004
Phone (206) 454-8155

3331 Towerwood Dr., Suite 307
Dallas, TX 75234
Phone (214) 620-2780

ICOM INFORMATION SERVICE CQ
2112 116th Ave., N.E.
Bellevue, WA 98004

Please send me: ☐ IC-251A specifications sheet: ☐ full color ICOM Produat Line Catalog: ☐ List of Authorized ICOM Dealers.

NAME _____ CALL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

You may send a machine copy of this form

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