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The NEW CQ Is Born Dec. 1979

THE RADIO AMATEUR'S JOURNAL

Any successor to Rockwell-Collins' KWM-2 better be good. It is. The Pro-mark™ KWM-380.

The remarkable new Pro-mark KWM-380 continues the Rockwell-Collins heritage for quality amateur equipment.

Pro-mark KWM-380 is a complete base station in a smartly styled desktop configuration. The look is unmistakably professional.

All in one 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.

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.

Pro-mark KWM-380, the mark of the professional. 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 Rockwell-Collins distributor. He's listed on the following page. Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, IA 52406. Phone: 319/395-5963. Telex 464-435.

CIRCLE 35 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: SSB (voice and RTTY, either sideband selectable), CW, or AM (receive only).
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.

†Subject to change without notice.

Frequency accuracy: Accurate to within ±5 Hz when the 39.6 MHz oscillator and the 455.0 MHz 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, there is automatic turndown to 50 W after 10 seconds, 50% duty cycle, 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 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).

You'd expect the distributor who sells Rockwell-Collins' new Pro-mark™ KWM-380 to be an expert.

He is.

He's your Rockwell-Collins Distributor, a real pro at answering questions and solving problems.

He's especially proud to have been selected to represent the new Pro-mark KWM-380. And he's made it his business to know it inside out. See him soon. He'll be glad to give you a demonstration. And remember, he'll be there to support your needs for years to come. Collins Telecommunications Products Division, Rockwell International, Cedar Rapids, IA 52406. Telex 464-435.

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CIRCLE 66 ON READER SERVICE CARD

Antenna Tuner

$299.95

Here is a new tuner that puts more power into your antenna, works from 160 through 10 meters, handles full legal power and then some, and works with coax, single wire and balanced lines. And it lets you tune up without going on the air!

WE INVESTIGATED

All tuners lose some rf power. We checked several popular tuners to see where the losses are. Mostly they are in the inductance coil and the balun core.

So we switched from #12 wire for the main inductor to ¼'' copper tubing. It can carry ten times the rf current. And we've moved the balun from the output, where it almost never sees its design impedance, to the input where it always does. Thus more power to your antenna.

IMPOSSIBLE FEAT

The biggest problem with tuners is getting them tuned up. With three knobs to tune on your transceiver and three on the tuner and ten seconds to do it (see the warning in your transceiver manual) that's 1½ seconds per knob.

We have a better way; a built-in 50-ohm noise bridge that lets you set the tuner controls without transmitting. And a switch that lets you tune your transmitter into a dummy load. So you can do the whole tuneup without going on the air. Saves that final; cuts QRM.

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For further details on this exciting new high-power low-loss, easy-to-use tuner send for our new brochure. Or visit your Palomar Engineers dealer.

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

Please send all reader inquiries directly

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FEATURES

DEPARTMENTS

The following are excerpts from unsolicited letters and registration cards received from owners of the new TEN-TEC OMNI transceiver.

"I sold a Yaesu to buy this and am very impressed" —*WB5ULA*

"My first QSO with OMNI-A was LA1SV on CW and second was EA8SK on SSB." —*N2CC*

"Excellent rig, just as advertised." —*WB5TMD*

"Very pleased with performance. QSK feature very slick." —*WB0ELM*

"This is my 5th TEN-TEC transceiver in less than 2 years. I loved them all and still have 3." —*WB0VCA*

"Through the years I have had complete Drake and Collins stations. I tried a 544 Digital and liked it the best so decided to purchase the 546 OMNI-D Digital." —*WA4NFM*

"Your OMNI is the best rig I have had in 20 years of haming." —*K4IHI*

"As a owner of Collins rig, your OMNI-D is the best." —*K9JJL*

"I already have an OMNI-A, 544 and a TRITON IV. You may ask why I own so many TEN-TEC rigs. In case there is a great RF famine, I want to be ready!" —*WD4HCS*

"You guys really know how to turn on an old timer!" —*K8ELS*

"Best operating & most conveniences of any transceiver I've ever used." —*W6LZI*

"I like CW. Compared OMNI against IC701 (rcvr) and OMNI won hands down. XYL WD6GSB really enjoys rig on SSB. Finds rig is very stable and digital readout accurate." —*AC6B*

"Have checked it out on both modes from "top band" (160) all the way to 29 MHz. Terrific!!!!" —*W4DN*

"Works well, parts layout and design much better for any possible servicing than other ham gear. The Japanese hybrid sets can't compare to TEN-TEC for audio. Audio reports excellent without special speech processors, etc., to distort the signal." —*AG8K*

"I have been using the S-Line over 15 yrs and never thought anything could outperform it. I got the biggest surprise and THRILLED with this OMNI-D even though I have been a ham since 1936." —*KV4GD*

"This must be the greatest. I've spent enough money on final tubes to almost pay for this." —*KA4BIH*

"This transceiver was recommended to me by old time hams (Xtras) whom I have known for 40 yrs. Has excellent break-in." —*N6AVQ*

"Best package job I've ever seen! First licensed 6AAV in 1926. Now in operation—a sweetheart!" —*W7LUP*

"From a 32V2/SX115 to an OMNI is a big step!" —*K6YD*

"Receiver prominent—transmitter likewise—working comfortable—pleasing design." —*OE1FAA*

"First new rig for me in 10 years but seems to be very good." —*W5GBY*

"The best transceiver I ever used or owned." —*W3TS*

"I wouldn't swap my OMNI for anything on the market, regardless of price." —*WD0HTE*

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All solid-state; 160-10 meters; Broadband design; Standard 8-Pole 2.4 kHz Crystal Ladder I-F Filter + Optional 1.8 kHz SSB Filter & 0.5 kHz 8-Pole CW Filter; 3-Bandwidth Active Audio Filter; Choice of readout — OMNI-A (analog dial), OMNI-D (digital); **Built-in VOX and PTT, Selectable Break-in, Dual-Range Receiver Offset Tuning, Wide Overload Capabilities, Phone Patch Interface Jacks; Adjustable ALC; Adjustable Sidetone; Exceptional Sensitivity; 200 Watts INPUT; 100% Duty Cycle, Front Panel Microphone and Key Jacks; Zero-Beat Switch; "S"/SWR Meter; Dual Speakers; Plug-In Circuit Boards; Complete Shielding; Easier-to-use size:** 5¾"h x 14¼"w x 14"d; **Full Options:** Model 645 Keyer $85; Model 243 Remote VFO $139; Model 252MO matching AC power supply $139; Model 248 Noise Blanker $49; Model 217 500 Hz 8-Pole Crystal Ladder CW Filter $55; Model 218 1.8 kHz 8-Pole Crystal Ladder SSB Filter $55.

Model 545 Series B OMNI-A . . . $949
Model 546 Series B OMNI-D . . . $1119

To add your name to the fast-growing list of OMNI owners, see your TEN-TEC dealer, or write for full details.

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Please send all reader inquiries directly

OMNI OWNERS SAY:

Zero Bias

an editorial

Seasons Greetings From All Of Us To All Of You

WOW, The American Dream is possible and true! It gets easier to believe each day as we settle in our new offices and crank out the work. This first issue will probably be remembered by Dick and I longer than any other and we're looking forward to having it framed for our office. We're mentally keeping track of "firsts" here as we gain our sea-legs and I'd like to report that as soon as the phones were installed, our first official *CQ* phone call was from an old friend John Nagle, K4KJ. Sorry, but there's no *CQ* certificate or award to cover this monumental occurence only the personal satisfaction of knowing you were the first, John and we really don't have to exchange QSLs or even bother the Bureau.

December is an auspicious month for beginnings and the celebration of religious holidays. Having our first issue appear in December is a lucky omen and puts us in very good company. We as amateurs and businessmen can celebrate the anniversary of our first issue along with celebrating the fact that on December 17, 1903, Orville Wright made the first successful flight in a heavier-than-air mechanically-propelled airplane, making future aero-mobile possible. We can also take joy in celebrating that on December 5, 1933 the United States ended Prohibition thereby making future Hamfests and Conventions far more pleasant places to be. However, as amateurs in particular, we mark an event that took place about 12:30 in the afternoon on December 12th, 1901. The dapper man on the cover changed the course of history and communications forever. On that particular day, seventy-eight years ago, Guglielmo Marconi, without benefit of Prop Charts, received a "wireless" message in St. Johns Newfoundland sent from a place called Poldhu in Cornwall, England. The simple message, the letter "S", over a distance of 2,000 miles proved that wireless worked; Marconi had opened a new era in communications. Amateur radio can actually trace its roots back to that day and add the fact that this monumental event also included the first DXpedition, for Marconi had travelled to Newfoundland to set up this experimental station. Our cover illustration is from an original print which appeared in a British publication called *Vanity Fair* on 1905. The print was part of a series called Men Of The Day and this particular print was titled "Wires Without Wires".

So, while we still sort through cardboard boxes and locate letters and files packed for our move, we manage to find the time to put this issue together. Our first issue is a significant achievement for both personal and traditional reasons. In contrast to Marconi's DXpedition, we present one led by Lewis H. Strauss, AH6I. Lewis headed a marine biology expedition for the Smithsonian Institute last October in the Western Admiralty Islands and managed to find the time to enter our WW DX Contest from there. Some of you may recall that he was on a similar trip in 1976 to the Southwest Indian Ocean. If the pattern holds, Lewis can be found in some interesting part of the world entering our Contest in 1980. We are also presenting the results of the 20th annual *CQ* 160 Meter DX Contest, and looking forward to having the 21st annual event next month. The Post Office here is becoming aware of a *CQ* Contest Department by now as the logs come in from the *CQ* WW Phone Contest. . .tradition carries on.

Though we are in a sense "the new kids on the block" we take with us a long history and tradition. Since its founding in 1945, *CQ* has fostered, nourished and led the way for many innovations within amateur radio and electronics in general. We as new owners or caretakers of these traditions are proud to maintain the heritage summed up on our cover... "Serving Amateur Radio Since 1945." We are dedicated to serving even better in the future. Dick and I have over 34 years of combined time invested in *CQ* so far and it has been truly a labor of love. A hobby, if you will, turned into a livelihood and became a career. It's been a fortunate chain of events that brought us here today, embarking on a new phase, charting a new course that all started with a Novice License many years ago.

To our many readers, writers, columnists, advertisers. . . in short, all of our friends who made this possible, we thank you. And to all of our friends we add "The best is yet to come." We approach a new year with a new beginning. In fact, this is being written on the Jewish holiday of Rosh Hashanah or New Year so that everything seems to be concentrating on the word "NEW." I'm sorry you can't experience or feel the elation I feel as I write this. . .it's a truly wonderful feeling, and I'm enjoying every moment of it.

Before I get too carried away, I'd like to express all our wishes for you and yours to have a happy and safe holiday season. May we all prosper and be well in the years to come.

73, Alan, K2EEK

WHEN THE KT-34 SPEAKS . . . THE WORLD LISTENS.

(JUST ASK JAY O'BRIEN, W6GO)

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- ★ ***Now, booms of strong 6063-T832 aluminum alloy***

And, equally important, the absence of power robbing coils puts the KT-34 in an **ENERGY-EFFICIENT** class all by itself . . . your signal goes out, not up in smoke. **Just ask Jay!**

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KLM, 17025 Laurel Rd., Morgan Hill, CA 95037 (408) 779-7363

CIRCLE 23 ON READER SERVICE CARD

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If you're like most of us, a rare DXpedition is more a dream than a reality, but the Clipperton Linear Amplifier from DenTron brings the thrill of a DXpedition to you.

The Clipperton-L™ was inspired by the famous DXpedition on which 3 MLA-2500's were used. We built the Clipperton with 4 rugged, economical, 572 B's in the final to provide a full 2KW PEP on SSB and 1KW CW on 15 through 160 meters. With features like hi-lo power selector for equal efficiencies at 1 or 2 KW, a power transformer that is vacuum impregnated, wide spaced tuning and loading capacitors, built-in ALC and an improved whisper-quiet cooling system, the excitement of crashing a pile-up can be yours.

Clipperton-L suggested price $699.50
FCC type accepted.

CIRCLE 17 ON READER SERVICE CARD

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5600A-K	$149.95	50Hz-600MHz	Proportional Oven .2 PPM 10°-40°C	10MV	10MV	50MV	9	.5 Inch	*115 VAC or 8.2-14.5 VDC	3¼" x 9½" x 9"
5600A-W	$179.95									
3550	99.95	50Hz-550MHz	TCXO 1 PPM 17°-40°C	25MV	25MV	75MV	8	.5 Inch	*115 VAC or 8.2-14.5 VDC	2⅛" x 8" x 5"
500HH	$149.95	50Hz-550MHz	TCXO 1 PPM 17°-40°C	25MV	20MV	75MV	8	.4 Inch	*115 VAC or 8.2-14.5 VDC or NICAD PAK	1" x 3½" x 5¾"

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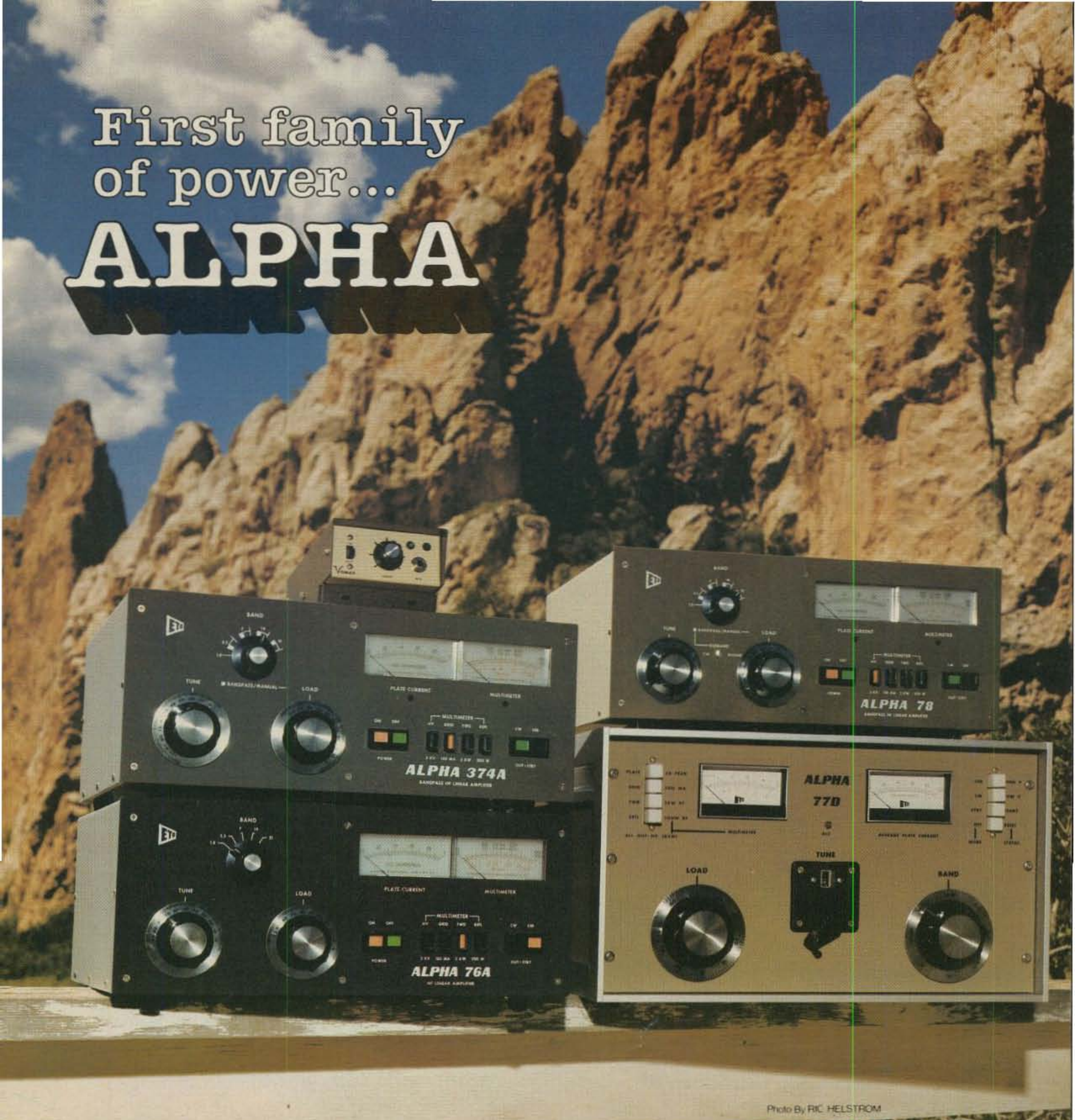

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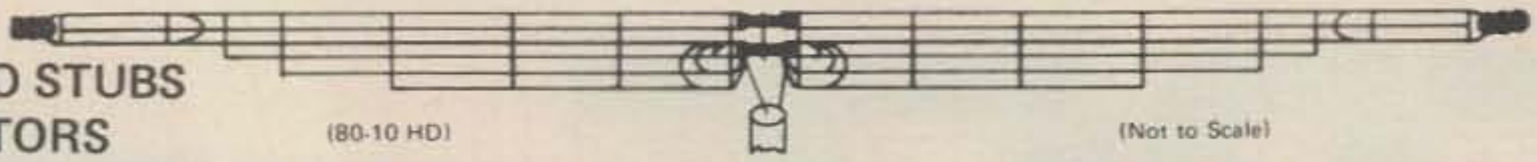

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40-20 HD/A	40/20	36	$63.50
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75-10 HD(SP)	75/40/20/15/10	66	$94.25
75-10 HD(SP)A	75/40/20/15/10	66	$99.50
75-20 HD	75/40/20	66	$80.25
75-20 HD/A	75/40/20	66	$85.50
75-20 HD(SP)	75/40/20	66	$80.25
75-20 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
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Please include $2.75 for shipping and insurance.

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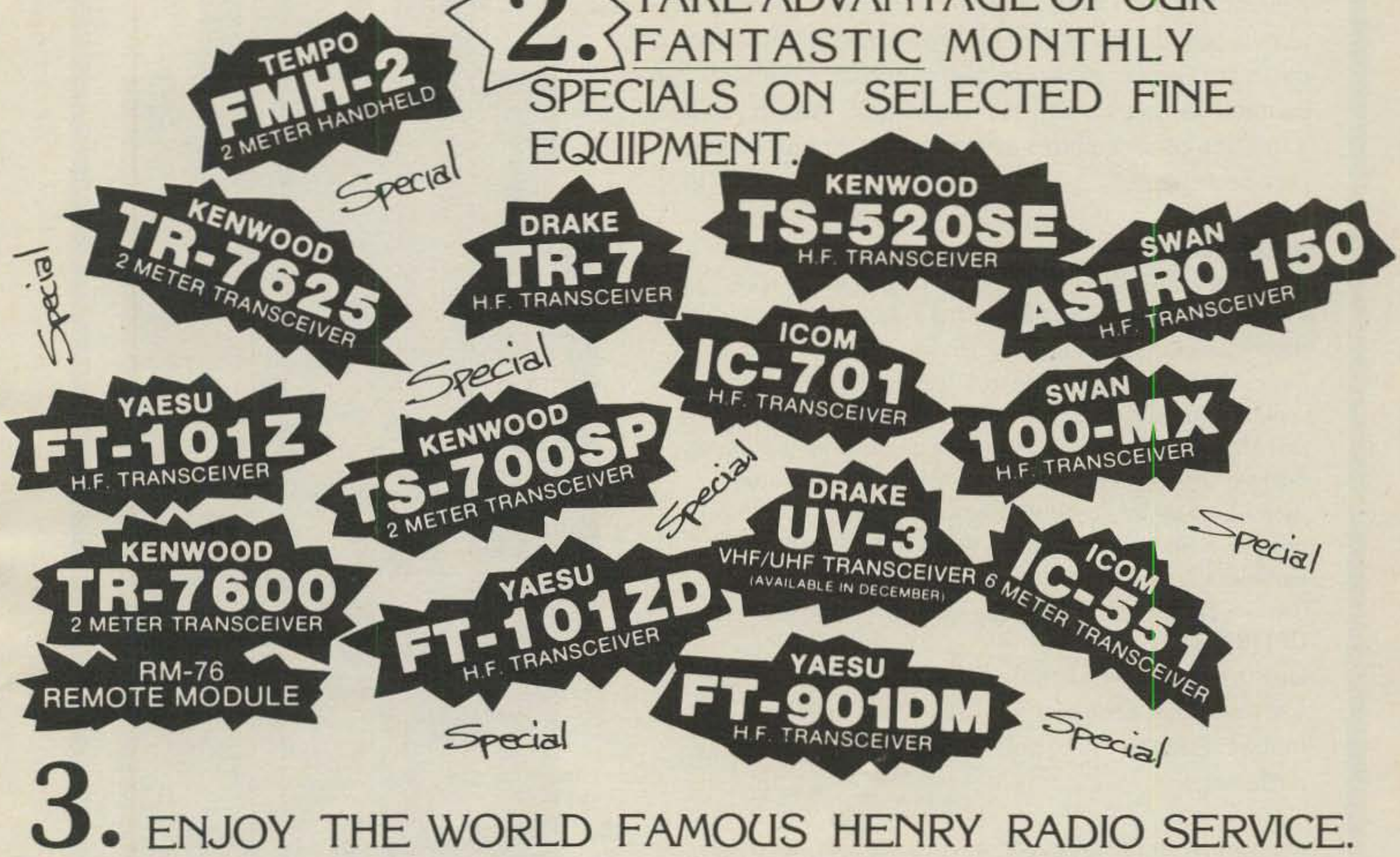

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Prices and specifications subject to change without notice.

CIRCLE 53 ON READER SERVICE CARD

Announcing

• **Find The Error Contest** - This month's "Find the Error" contest should be labled "Find the Folder" contest. For those who waited long and hard for last month's solution and this month's error, take heart. I promise to find the folder and have everything ship shape for next month's issue. My apologies to you and Martin Bradley Weinstein for having to delay it one month. ed

• **Las Vegas, Nevada** - SAROC-January 10-13, 1980 at Dunes Hotel and Country Club. Las Vegas NV. Exhibits, Techical sessions. Advance Registration $15.00 per person, your check is your receipt, the number we place on your check is your SAROC registration number. We will make refunds to those who request same in writing and is postmarked on or before January 9. SAROC special room rate is $33.00 plus room tax per night, single or double occupancy. Dunes Hotel accommodations request will be sent to SAROC registered delegates. SAROC, P. O. Box 945 Boulder City, NV 89005

• **Foundation In Amateur Radio** - The foundation For Amateur Radio announces the 1979 winners of the six scholarships which it administers. The John W. Gore Memorial Scholarship ($900) Alicia Ann Moore, WB9LAD-Rensselaer, IN. The Richard G. Chichester Memorial Scholarship ($750) Philip R Schaefer, WD8OKD-Wooster, OH. The QCWA Silent Key Memorial Scholarship ($750) Katherine Hevener, WB8TDA-Franklin, WVA. The Edwin S. Van Deusen Memorial Scholarship ($300) Steven R. Harris, WD5GZL-Cabot, ARK. The Young Ladies Radio League (YLRL) Scholarship ($300) Linda J. Skjervem, WB5LMZ-El Paso, TX. The Radio Club of America, Inc. Scholarship ($250) Charles M. Betz, NØAKC-Caledonia, MN. These scholarships were open to all radio amateurs holding at least an FCC General Class license of equivalent. This year applications were received from 28 states. The FOUNDATION is a non-profit organization representing forty-eight clubs in the Maryland, District of Columbia and Northern Virginia. It is devoted exclusively to promoting the interest of amateur radio and to the scientific, literary and educational pursuits that advance the purposes of the Amateur Radio Service. Information regarding the scholarships to be awarded next year will appear in the May 1979 issues of the major amateur radio publications.

Our Readers Say

K6BX Remembered

Editor CQ:

Clif Evans, K6BX, died recently in his home in Bonita, California. I think it appropriate to place in these pages a memorial note. New county hunters will not remember, but some of us older types will recall that this pursuit of ours, in which so many of us have found so much pleasure, was given us by Clif. County hunting, in the sense we now understand it, was Clif's creation, and we should not forget that. K6BX was a man of vision and energy, though possessed of handicaps that would have driven most of us into despair.

He was a crusty autocrat, to be sure. One of his greatest gifts was that of creating enemies, a craft at which he excelled. But he also created an organization that, for a time, brought together a very large number of amateurs in happy pursuit of a wide spectrum of awards.

But it was not to endure. Clif alienated devoted friends with the abandon of a sailor on leave. In recent years his stateside operations became relatively inactive, but at the time of his death he was busily keeping his activities going through DX participation.

Clif's later years were burdened by both visual and hearing handicaps that would have turned many of us into basket cases, but he carried on with high courage. He conducted this column for a time, but that was not to last either. The Commander wasn't one to take orders, except from those senior to him in the Navy hierarchy, and then only sometimes.

Clif and I fought many a battle, but we remained friends, and I have always been proud of that friendship. He was the father of county hunting as we know it today. It is fitting, on these pages, to say farewell and bid him a last seventy-three.

Ernest H. Taves, M.D., K1KPS
CHC #446 MARAC #R-812

Fair Exchange

Dear Fellow Contest Workers:

I wonder if you would please check your logs, and your mailboxes, for cards that people like myself have sent to you after giving you a contact in the contests. When you call QRZ you are asking for someone to contact you so that you might add to your total points, which is what contests are all about. But, please, have the courtesy of at least answering the confirming QSL's that are sent to you. You will be making sure of another contact in the next contest, because I for one will not QSO a contestant that has ignored my QSL.

Good Contesting
Lee Thompson, WD8QOM

Beautiful weather . . . Beautiful terrain . . . Beautiful people . . . And amateur radio.

DXing From The Western Admiralty Islands

BY LEWIS H. STRAUSS*, AH6I

Amateur Radio offers hams a choice: the fun of DXing, competing in contests or chewing the rag. But if you are in the middle of the Pacific Ocean, 300 miles from anything that pretends to be civilization, amateur radio offers that vital link with the outside world upon which you depend for news of approaching storms, Stateside events and a general sense of security. Such was the case during our recent expedition to the Admiralty Islands in search of rare and exotic fishes for the Smithsonian Institution.

We first used amateur radio in the Spring of 1976 on a Smithsonian expedition to the Cargados Carajos Shoals (a 50 km long reef located 1200 km south of the Seychelles Islands in the Indian Ocean). As expected, amateur radio proved to be our only connection with the civilized world, and on more than one occasion we used it to resolve problems which might otherwise have scuttled the expedition. That we worked tremendous pileups on 20 meters from Agalega Island, signing VQ9HS/3B6 from this previously inactive spot, was an exciting sidelight to the trip! (see *CQ* Oct/Nov 1976)

In late 1978, we again set out to collect fish for the Smithsonian, this time in the Bismark Archipelago, (north of Papua New Guinea). The two years we had spent preparing for this

Ninigo natives rush to the water's edge to greet us.

expedition were the key to its success. After all, the barriers to transporting divers, compressors, tanks, medical supplies, a ton of fish-preservation chemicals and gear, not to mention food, fuel and water, into the Western Admiralty Islands (145°E, 2°S) for a month's stay were indeed difficult ones to hurdle.

Securing a Papua-New Guinea amateur license was but another large hurdle that had to be jumped. But jump it we did, and after applying both by mail and in person, I was finally issued a license carrying the call P29HS. In all it only took 18 months (!) from application to issuance. In this case, as in many others, our efforts to obtain permits, to resolve shipping problems and to attend to other important matters, were furthered by the weekly radio contacts we maintained from Washington, D.C. with Phil Nantes, P29PN, of Port Moresby. Phil was a real mainstay of our expedition's communications, and without his assistance, the expedition would clearly not have been

*1250 Connecticut Ave. N.W., Washington D.C. 20036

the success that it was. Finally, after nearly two years' preparation, eight divers and scientists loaded the 86 ft. converted coastal cargo freighter *Seang* in mid-October, 1978, and shortly thereafter, sailed north from Madang, on October 19th. My Atlas 350XL and associated communications equipment was safely secured on the top deck, while a 20 ft. bamboo stake, which was lashed to the safety rails alongside the pilot house, supported a Hy-Gain reel-type dipole.

Although "portable" equipment is supposed to work on 12 volts, previous experience with the "350" indicated that it much prefers 13.8 volts. It seems that "portable" means "in the car" to most U.S. amateurs where the alternator provides 13.8 volts. Our solution to this problem was to use two old-fashioned 12 volt automobile batteries which had the jump wires between cells exposed. In this way, we were able to pick off 2 volts from the second battery, and to add it to the 12 volts from the first battery. Believe it or not, a two volt increase made at least a 100 watt difference in the input power level! Initial tests on 10 meters from Madang harbour found the band wide open to the U.S. at 2200Z, and it was not long before we were chatting with Pete Hoover, W6ZH, an old friend. Believe me, after taking tuner and all the necessary components (not to mention the transceiver itself) half-way across the world and into a severe, tropical marine climate, it is always a great relief to get an answer to one's first call.

Most amateurs, snug in their shacks, have little appreciation for the hazards of operating from the open deck of a rolling ship. Our equipment bench was a packing drum, and could only be protected against rain and salt spray by inverting a large plastic garbage bag over everything. In addition, the DenTron tuner, and the mike and key, were taped to the "350" case in order to keep everything together. A separate plastic bag was used to store the log.

Amateur operations aboard the *Seang* went well for several days as we moved northwestward from Madang toward the Western Admiralty Islands and stations from all over the world were "worked" with ease. However, one night, heavy winds and a high swell caused the bamboo "tower" to split in two, reminding us that one can never use too much safety lashing. Then, after several weeks of working in the wind, the stainless steel tape antenna also snapped and we finally consigned the whole device to Davy Jones' locker. A lightweight dipole made from a Kaufman balun and plain bell-wire elements was substituted in its place and it, too proved to work well.

Eager hands carry our batteries ashore.

By October 21st, we had reached, and were anchored in the main lagoon of Ninigo Atoll (144° 35′ E, 1° 30′ S), in the Western Admiralty Islands. Confining our operations to the 20 meter band, we established numerous contacts; nightly, also checking in with the Pacific Interisland Traffic Net (14,315 at 0800Z) which was run by Father Dan (P29CC) or, on occasion, by Dixie (KG6JIO). Through these contacts we were able to keep in touch with such things as the Nobel Peace Prize awards and the NFL scores, not to mention a super typhoon with 175 knot winds which passed between us and Guam about October 24th.

On the weekends, we were happy to establish contact with our Washington, D.C. friends: Ted N4XX, Dave W4VA, Steve K4FJ, and Mort K3EH. With a P29 call, I was, of course, free to roam the phone band down to 14,100 kHz, and so, to minimize the effects of interference during s.s.b. contacts with east coast amateurs (especially Mort, who was only using a trap vertical) we operated split, with my transmissions made down at 14,140 kHz. On most of these weekend QSO's, Phil, P29PN, stood by in Port Moresby and helped us get together. The extra v.f.o. on the Atlas made switching back and forth between frequencies used very easy, and I was able to work simplex with P29PN and split with Stateside, on

P29HS and friends at the operating table.

three-way contacts, with no trouble at all.

During our stay at Ninigo Atoll, our underwater fish-gathering operation proceeded according to plan. We usually dove in teams to depths of up to 40 meters on the coral atoll faces during the mid-day hours, gathering the many species of fish which were native to these waters. Then, after drying out and having chow, I would work the world for an hour or so. Since our underwater activities were not without risk, all of our families at home were eager to learn of our progress and of the success we were enjoying (although no messages could be passed, they could easily tell by our transmissions that all was going well).

These fish-collecting expeditions are planned years in advance with great emphasis placed on tide and monsoon predictions. Therefore, it was only by mere chance—I will swear that this is true on a stack of rectifier plates—that we just happened to put ashore on Heina Atoll on Saturday, October 28, 1978, the first day of the *CQ* Worldwide DX Phone Contest!

Heina is a small atoll which encloses a lagoon about three miles in diameter, it lies 65 miles south of the equator. The islands, (or "motus" as they are called) which ring the lagoon were planted in coconut trees by the Germans prior to World War I. A narrow passage, just large enough for a vessel of *Seang's* size, permits entrance at the southwest side, with anchorage close to the shores of Kat, the only inhabited motu.

The population of Kat, who are mostly Melanesian, numbers perhaps 30 souls whose livelihood comes almost exclusively from collecting and drying copra, the meat of the coconut. In this, they are directed by a fascinating patriarch, one Wilhelm Franz Moeder, age about 65, son of a Melanesian mother and a German father, the latter having been a pensioned soldier in the army of Kaiser Wilhelm.

As soon as we had anchored, an inflatable boat was sent to fetch Franz and his young wife aboard and, thereupon, began an almost non-stop social event and talkathon, and subsequently, a DXpedition to Kat.

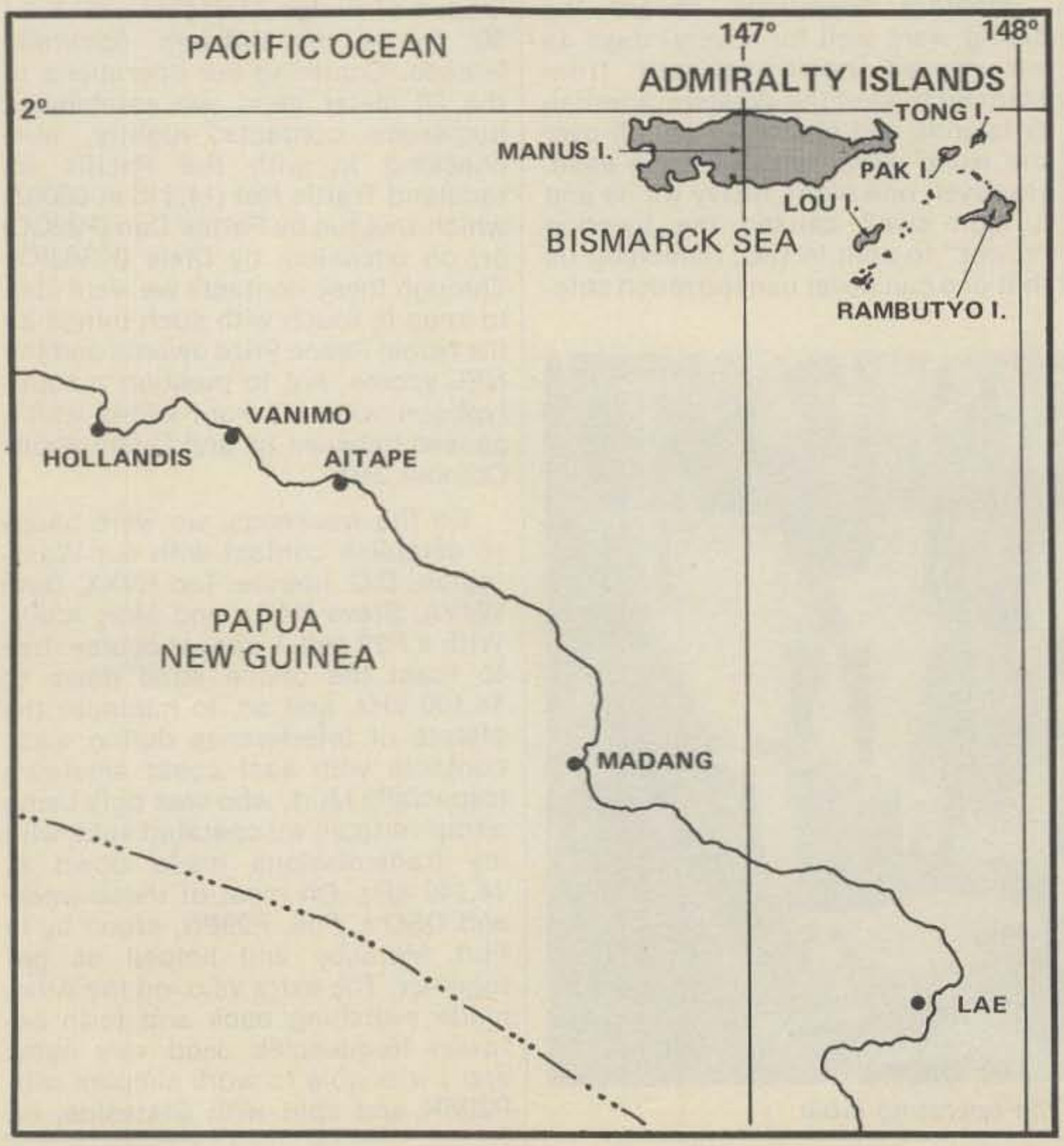
When advised that we would like to operate "portable Heina Atoll," for the DX contest, Franz eagerly offered us his "rest place." So, benefiting from past experience, we took our gear apart and stashed it in plastic bags. The Atlas itself was gingerly handed down to us in the small in-

P29HS working the CQ WW DX contest.

flatable rubber boat and was swaddled like a baby; once near Kat, I waded ashore with it and was surely the first amateur ever to set foot on this island.

Eager hands carried our two 90 AH batteries to Franz's "guest room," an open, raised platform which was nestled in the Casuarina trees in front of his house. The room boasted a necklace of seashells and a partially water-resistant roof of coconut fronds. Several dozen natives stared at us with what may pass in that part of the world for awe, amusement, or curiousity—it is hard to tell which—as we "pulled our rabbits out of the hat." The "rabbits" were all wrapped in the ubiquitous plastic bags: flashlight, balun, wire, hammock, r.f. cable, mosquito repellant, pulley, log, and even a slingshot. The latter turned out to be unnecessary, as Franz directed a barefoot boy (everyone, of course, was barefoot) to scramble up a nearby tree and to attach the pulley at such a height that the balun could be drawn about 25 ft. above sea-level. The inverted-V dipole which resulted would not win any prizes. It was low and slow, enmeshed in tree branches and about the only things I could be sure about the impedance was that it was positive and less than virgin pure resistance. At about 0600Z, (1600 local) after no more than 45 minutes of easy assembly, we were ready to flip the switch and to jump—with some justified trepidation—into the contest. It didn't take long to find out the band was open...and full.

Franz, meanwhile, had invited the whole scientific expedition and crew to a feast which began near sundown alongside the guest house. Everyone (we were eleven from the ship) was milling around eating raw fish which had been marinated in coconut oil while I casually sat at the edge of the activity, "space cans" on my head,



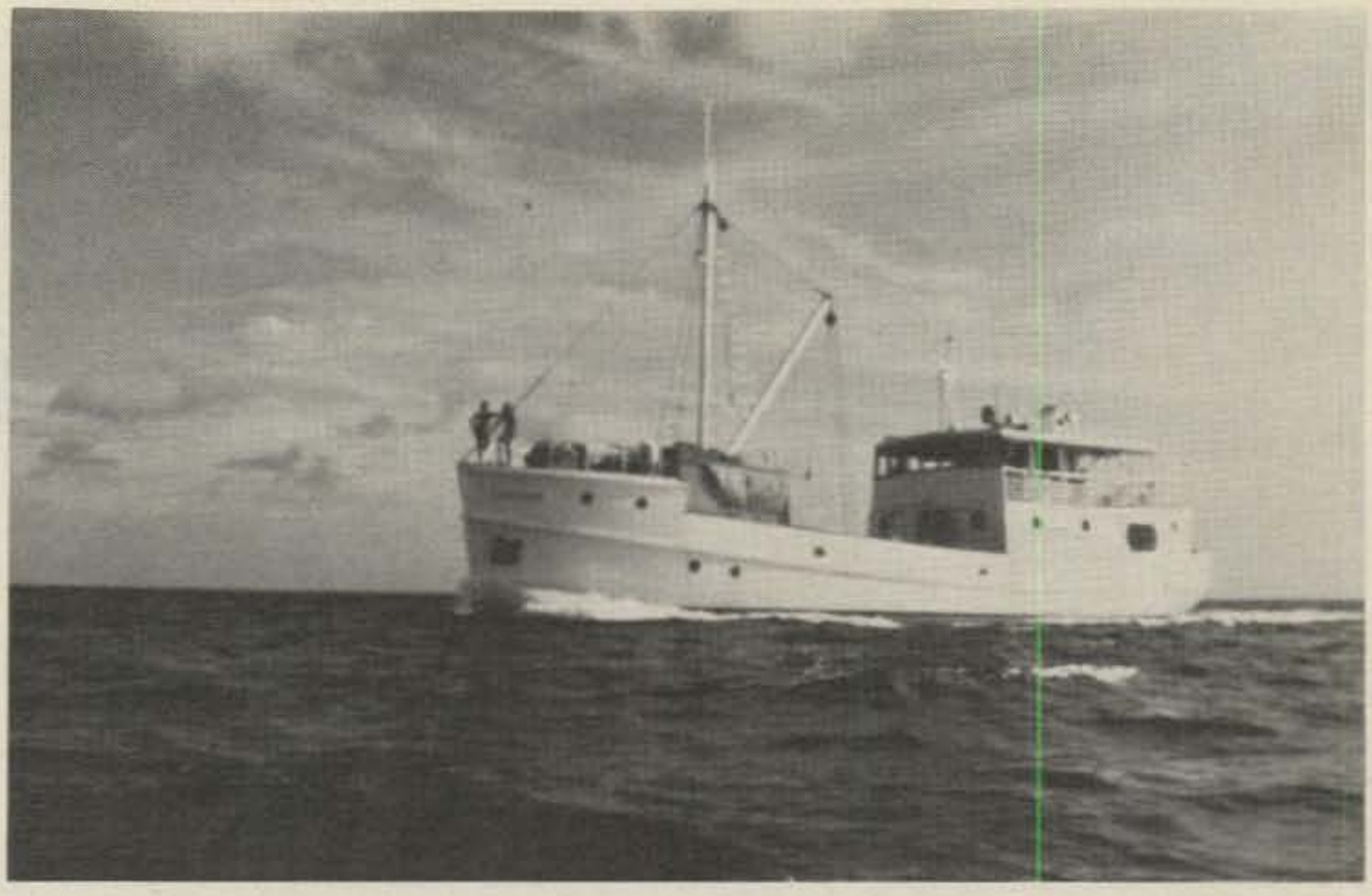
trying to listen the "cocktail party" conversation and to the DX contest simultaneously.

In this casual manner, and by the light of a kerosene lamp, we interspersed genial party conversation with "5928" as contacts were made with amateurs around the world. We have never engaged in contests, *per se*; nor did we have the power or physical stamina to do so here. But it was a pleasure to work this contest, and our log shortly showed contacts with ZL/C, H44, VU2, DU2, D68, and A2, as well as many other prefixes not commonly heard on the U.S. East Coast! As a matter of fact, it felt pretty good, considering the operating conditions, to have the Botswana operator say, "And thanks for a new country!" As for J and VK, I think I could have spent the entire night working them.

After a two-hour break for dinner of turtle steak, whipped taro and more coconut, the party broke up, and most expedition members returned to *Seang*. Franz, however, wanted to talk through the night, and so, we moved back to the rest spot (i.e., ham shack) where Chris, the expedition reporter and photographer, was now taking copious notes on the history of the Archipelago, and, especially on the events which had transpired since "the white man brought his axe." We sat together until about 2:00 a.m. local time, alternately joining the conversation and sporadically responding to the desperate calls of contesters. We must confess a certain amount of amusement in replying to "CQ Contest" with "How about P29HS, portable Admiralty Islands?" You could almost hear "the teeth drop out." By 3 a.m., however, everyone went to sleep, and the 20 meter band was left to the "professionals."

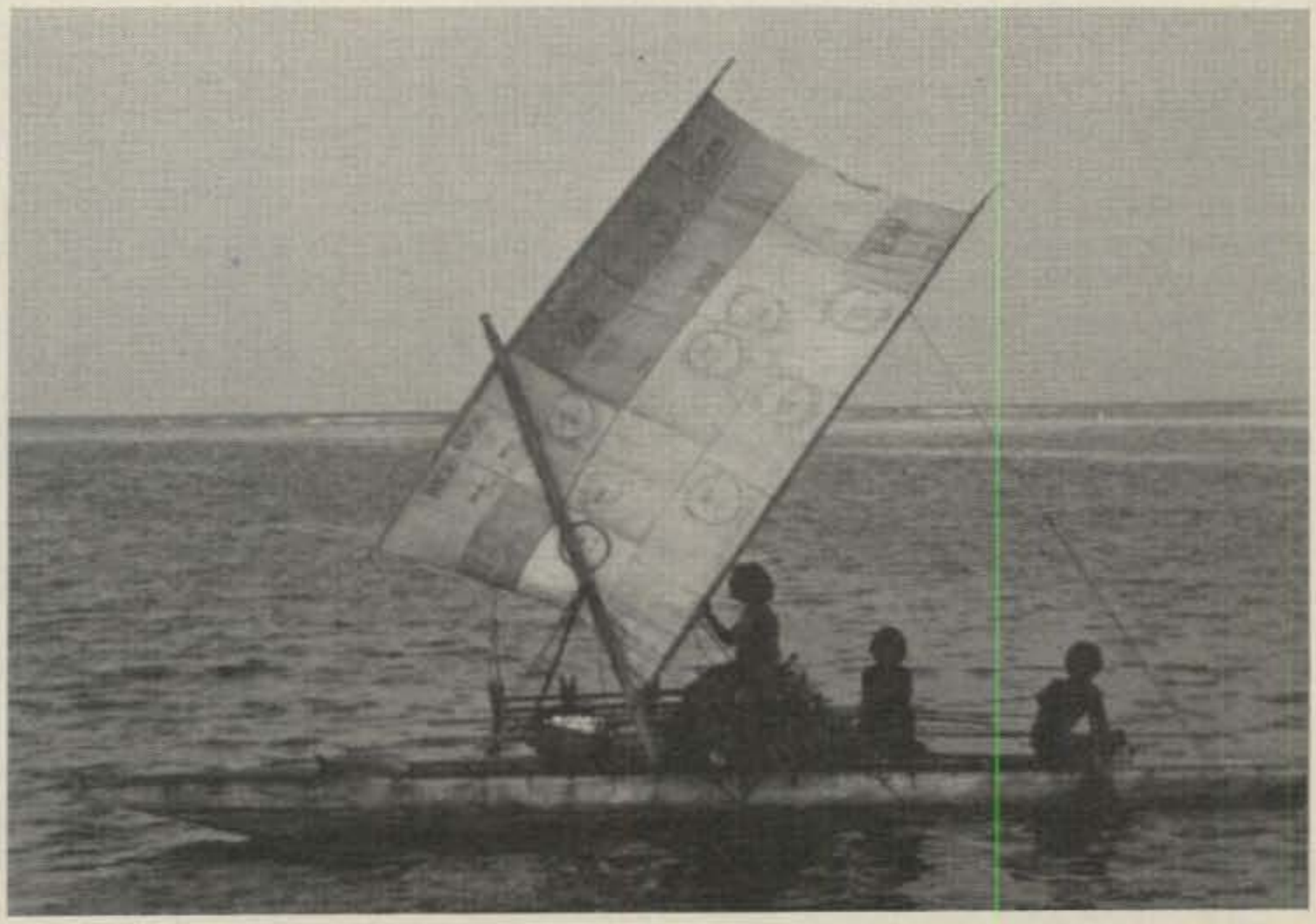
After a few hours of fitful sleep, punctuated by the continual crowing of an oversexed rooster, we were awakened at daybreak by a torrential, tropical squall. Chris and I fled to drier shelter, and I sent up a small prayer of thanks for the manufacturer of our waterproof garbage bags. After breakfast, we disassembled the radio equipment, and we returned to the ship for ten more days of scuba diving (and P29HS/MM operation).

Our expedition returned to Madang, Papua New Guinea, on November 6th with some 10,000 preserved fish specimens which were flown immediately to the Smithsonian Institution in Washington, D.C. Old P29HS has been retired, but you can still hear his voice (or his key) by listening for AH6I on the Kona Coast of the Big Island of Hawaii.



The M.V. Seang.

The radio shack on Kat Island.



Transportation in Ninigos. The sails are made from rice bags.

Results of the: 20th Annual CQ 160 Meter DX Contest

By DONALD McCLENON, N4IN*

How does *CQ* manage to hit the only good opening in weeks, almost every year?, asks the Dean of 160 Meter operators, W1BB. We did it again this time, but even with our traditional good luck, conditions and participation were down from last year. You just can't change those sunspots.

There was activity in all states but Alaska, although many found North Dakota much too scarce. In Canada, there was no P.E.I. or VE8 activity, and VE6 was even rarer than North Dakota. A total of 49 countries was represented, with some logs showing three others that did not check out. Spain was licensed for the Contest, but produced very few contacts from only 3 stations. Good catches included CO, DU, EA, GJ, HI, JD, KP4, SP, TG, VK, VR3, ZF, ZL, ZS, 3A2, 4X4, 5W1, 9H1.

Highest worldwide scores were KV4FZ 222,984, K1PBW 167,940, WA1RFM/VP9 113,204, GD4BEG 110,935, N4EA 101,924, GM4GRC 98,200, and G3SZA 96,152. Top Ten scores in the Single Operator W/VE, Single Operator DX, and worldwide Multiop categories, are shown in the score boxes.

A new record multiplier of 90 was set by K1PBW, followed by N4EA 83, KV4FZ 76, N4PN 73, W2IB 72, AA4V 70. Six others exceeded 65. DX station leaders in multipliers were KV4FZ 76, G3SZA 56, GD4BEG 55, WA1RFM/VP9 52, GM4GRC 50, PZ0AA 43, YV1OB 43, GU5CIA 41. Last year's DX multiplier leaders did not do this well.

Countries worked totals were also up. Leaders were K1PBW 38, N4EA 30, KV4FZ 30, GD4BEG 29, G3SZA 28, GM4GRC 26, OL8CGS 26. 27 others exceeded 20 countries.

Total QSOs were far below the last year's figures. Higher ones were K1PBW 453, AA4V 409, N4EZ 398, K5GO 352, W4TMR 347, GM4GRC 339, W2IB 339, W4PRO 332. Nine others were above 300. High Europeans in QSOs were GM4GRC 339, GD4BEG 323, YU3EF 271, OK5TLG/P 252, G3SZA 248, OK1KSO 225, GU5CIA 223, SP3DOI 212, DK6AS 205. Outside Europe and W/VE, the following made over 40 contacts: KV4FZ 324, WA1RFM/VP9 223, PZ0AA 116, YV1OB 88, JA1CUW 72, JA7NI 67, KH6IJ 60, 4X4NJ 50.

The high 10-point W/VE stations were K1PBW 120, N4EA 54, W1MX 50, W1BB 49, W3BGN 47, VO1HP 41, W2IB 40, K6SE 37, W4PRO 31, N4PN 30, N4WW 29. DX station leaders in making 10-point W/VE contacts were KV4FZ 264, WA1RFM/VP9 213, G3SZA 108, PZ0AA 91, GD4BEG 81, YV1OB 74, GM4GRC 67, KH6IJ 45, OK5TLG/P 44, GU5CIA 40.

Things were especially grim in the Pacific area, where a high percentage of the 120 JAs reported active could only work each other, the highest scorers logged only 3 W/VEs, and the top multiplier was 7. It takes real dedication to work under conditions like that!

The three top World, U.S.A. and European scorers were KV4FZ, K1PBW and GD4BEG respectively. However of the three only KV4FZ is eligible for a Trophy. The other

*3075 Florida Ave, Melbourne FL 32901

Top 10 DX Single Op

KV4FZ	222,984	GU5CIA	53,792
WA1RFM/VP9	113,204	YV1OB	34,830
GD4BEG	110,935	OK2KUB	33,252
G3SZA	96,152	DK6AS	32,426
YU3EF	58,360	DJ8FR	31,850

Top 10 W/VE Single Op

K1PBW	167,940	N4WW	54,234
N4EA	101,924	K6SE	49,800
W2IB	71,856	K0ZZ	48,256
N4PN	64,094	K3ZZ	46,020
W4TMR	54,780	K5NA	44,640

DJ8FR was just edged out of first place in Germany Worked 20 W/VE on a 50M vertical and receiving loop.

Top 10 Multi Op

GM4GRC	98,200	OK5TLG/P	49,360
AA4V	69,580	PZ0AA	44,720
W1MX	62,832	OK1KSO	42,240
W4PRO	62,016	W8UM	40,356
K5GO	55,744	VE3FAC	37,642

two, K1PBW and GD4BEG were winners last year and therefore not eligible under the 3 year eligibility rule.

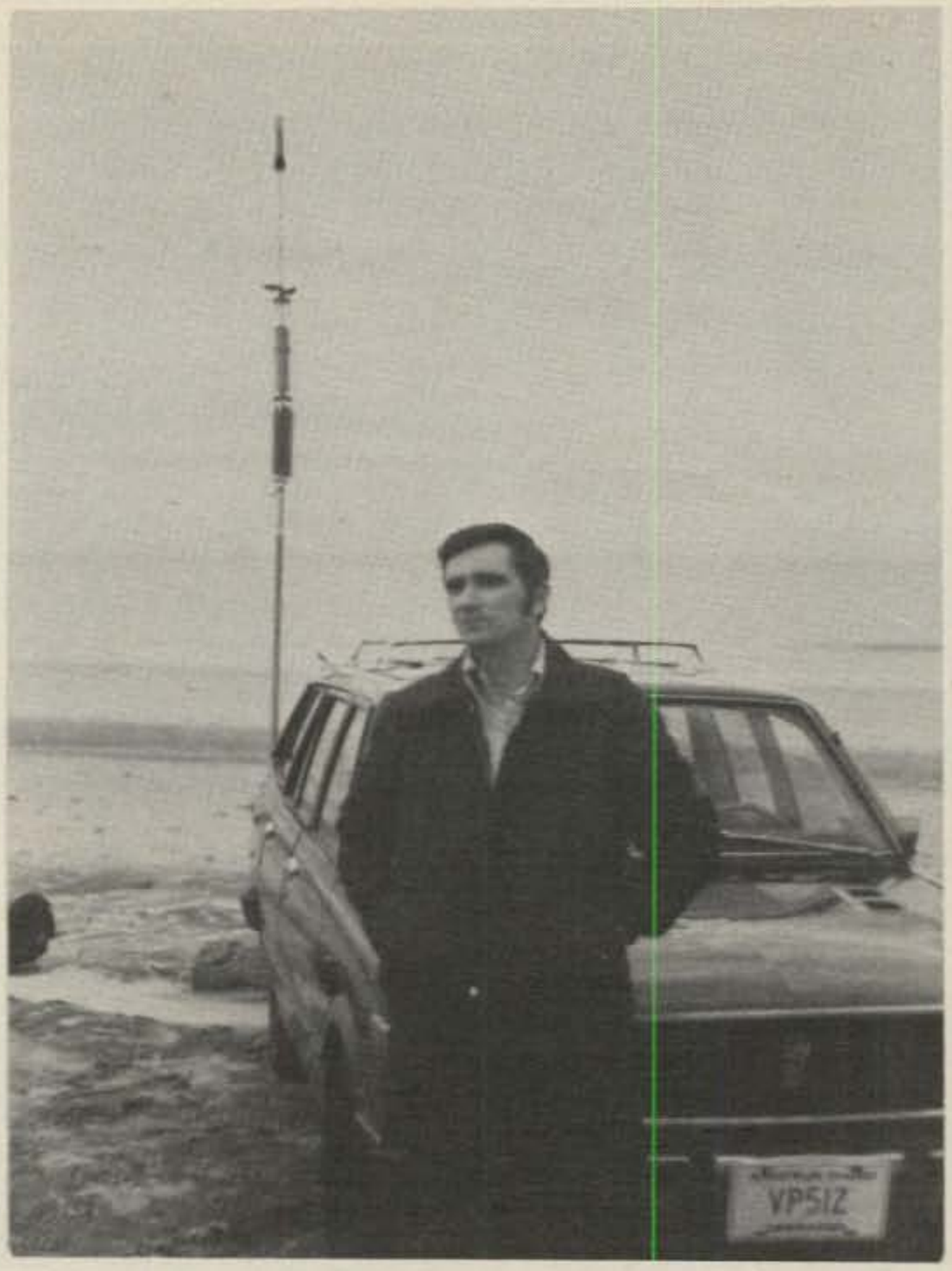
The two Plaques donated by the West Gulf A.R.C. go to the runner-ups, N4EA for the U.S.A. and G3SZA for Europe. The World top scorer, KV4FZ will be presented with a new award made available by the Nothern California Contest Club and "Friends of W0AW." The John Doremus, W0AW Memorial Trophy will be a permanent yearly award. John always was a 160 Meter enthusiast and it's quite fitting that he should be remembered by his friends.

(Donations to this fund may be made to the Secretary of the NCCC, Richard Tavan, N6XI, 1146 Pomegranate Court, Sunnyvale, CA 94087)

Certificates are being sent to the single and multiop winner in each State, Province, and Country for this 20th Annual Contest. If you scored higher than the listed winner in your area, and didn't send in your log, you just did yourself out of a nice certificate! Next time, *send it in.* Also next time, we need more photos sent in.

You still have time to improve your station and get ready for the next *CQ* 160 Meter Contest the last full weekend of January 1980 (Jan 25, 26, 27). Send SASE to *CQ* Magazine for log and summary sheets, and invite your contacts on the band to participate.

73 Don, N4IN



WA4SGF/M4 has 54 countries and 49 states with this center and top loaded 18 foot car whip.

***Soapbox* DX:**

Good openings to USA both nites. Made WAC in one day-DJ8FR. Two hours into contest, found my borrowed digital clock was jumping several minutes every time I pressed the key!-G3SZA. First licensed in Spain especially for Test on 1.8 MHz-EA1SQ. Low score, but the importance is to participate. 73 to the CQ gang- F8EX. Will be back in Scotland as GM3IGW/A next year- G3IGW. First ever contest. Entered to give out a few points, and got involved. Will improve antenna next year- GW4CZK. Must we wait til next sunspot cycle for good conditions?- VP2DD. I get lonelier than the Maytag repair man down here on 160. Am building a *real* antenna for next year- ZL1AZV. Missed some good DX, but a pleasure again to meet so many friends on top band- DK6AS. High winds blew down 2-el array first nite, but had a lot of fun. Last contest from Bermuda: moving back to Conn.- WA1RFM/VP9.

Hope WARC results in more worldwide interest in 160. Will be on each year as long as I can get permission-4X4NJ. Lots of EU activity, but DX was behind the magnetic attenuating wall. Still got 5 new countries-OH3XZ. Very poor condx in this contest. Could not work EU even with a Beverage on them- JA1CUW. Pleased to work VK6HD after calling him for 2 weeks before the contest-GU5CIA. Only one EU QSO possible-YV1OB. Brand new 160 M license, lots of fun in the short time available-DJ7CX. Condx to USA very poor- EI9J. We expected more from the big rhombic antenna- PZ0AA. Best conditions this season, but sunspots made them inferior to several years ago- OH2BO. First Guernsey -Australia QSO on 160-GU3HFN. Too much power line noise-G3XWZ/A. Condx poor on 160-OH3XT.

W/VE:

Once again, we had by far the best weekend in January- K1PBW. I very much enjoyed working my first DX on 160. A fine sporting bunch on this band- VE3INQ. Last minute decision to enter and provide rare South Dakota multiplier. Big thrill VK6HD answer my CQ- K0ZZ. Great fun, as usual- W3RR. Just retired and moved to Maine from NH. Conditions below last year, but a good contest- K1NBN (ex W6MZW/1). Got 2 new countries, 5 new states, and met some old friends again- VE7CRU. Got my WAS total up to 48- K2FL. Glad to work several old friends each year- W5GWD. DX stations could work more W/VE if they would indicate where they are listening- W1WY. Blew a fuse while working GD4BEG. Got going again in 2 minutes, and was able to confirm his exchange- K8OQL. Still a gentleman's band, with a bunch of good ops- VE3DWX. Most enjoyable, and got my last needed state-WA0TKJ. Could have slept thru Sat nite without much harm to score, but still had great fun- WA7GCI. Didn't know lots of old friends with new calls- K9IFO. Big drop in participation. Spectacular east-west path first nite, but no JA opening either morning. Loop ant great for receiving. See you next year- W7XZ. I'll bet I'm the oldest one in the contest. Just hit 80-W4ZM. Enjoyed my first 160 contest. Quite a challenge pulling those signals out of QRN and QSB- W5SOD. Worked new country- 5W1BZ-W7BYK. Excellent EU opening first nite; second nite activity down-W0AIH/9. Loaded up one of the Broadcast station towers, which worked fine, but band conditions very poor at times. Next year will try two towers in a directional pattern-W7IXZ. Best contest of the entire year- N4PN. First contest I have ever entered, and lots of fun. Will do it again next year-N6TD. This is lots of fun for a 65 year

Second World High Multi ops. L-R K4CNW, W4MBD, AA4V, using AA4V made S.C. easy to get this time.

Highest scoring South American station, Multi op. PZ0AA, with PZ1AP driving. PZ1AC and JA1PIG were also on the team.

Number groups after calls denote score, total QSOs, 10-point QSOs, multiplier, and DXCC countries worked. Multi-op scores follow single op listings.

Connecticut

AA1K	40,068	234	21	63	19
W1WY	17,280	128	16	45	12
K1KI	6,696	100	2	31	4
WA1STO	2,160	50	1	20	3

Maine

K1NBN	17,480	146	11	46	12

Massachusetts

K1PBW	167,940	453	120	90	38
W1PL	38,164	253	19	58	14
W1BB	19,110	77	49	35	20
W1JR	3,472	42	5	28	6
K1VV	2,204	58	0	19	2
K1MEM	952	26	2	14	4

New Jersey

W2FJ	42,720	248	27	60	17
K2FL	12,684	131	5	42	6
W2CVW	5,280	80	2	30	4
N2IN	1,792	48	2	16	3

New York

W2IB	71,856	339	40	72	21
K2IGW	37,510	313	7	55	8
K2MN	2,436	54	1	21	3
W2DW	1,980	41	1	22	3
W2IP	700	21	1	14	3

Maryland

K3ZZ	46,020	262	23	65	18
K3TW	41,540	255	20	62	16
K3ZJ	29,376	224	12	54	11
W3RR	28,500	241	11	50	10
WB3AZN	23,500	222	7	48	8
W3GN	20,792	210	4	46	5

Pennsylvania

W3BGN	39,066	195	47	51	17
W3BUR	35,616	242	19	56	14
W3AJS	29,260	214	13	55	13
K3BSY	28,512	200	16	54	14
W3UHP	16,856	180	4	43	5
K3UA	15,352	190	3	38	4
W3AP	4,928	64	6	28	8

Alabama

K4TO	39,060	247	17	62	17

Florida

N4WW	54,234	277	29	69	21
N4IN	36,952	222	19	62	17
W4BV	10,086	95	7	41	8
WA4SGF/M	9,984	108	5	39	6
WB5YLT	1,900	38	0	25	2

Georgia

N4PN	**64,094**	**319**	**30**	**73**	**22**

North Carolina

W4TMR	54,780	347	17	66	15
W4OMW	4,588	70	1	31	3
AA4VV	3,796	65	2	26	4

Virginia

N4EA	101,924	398	54	83	30
W4DHZ	17,444	150	7	49	8
W4NVN	12,320	142	3	40	5
K4RS	7,616	76	9	34	10
W4KMS	3,128	60	2	23	4

Arkansas

W5KL	6,512	84	1	37	3

Louisiana

W5KLA	7,280	96	2	35	4

Mississippi

W5GWD	7,272	93	2	36	4
AE5H	4,402	63	2	31	4

Oklahoma

K0JPX/5	19,552	176	3	52	5

Texas

K5NA (KA5CHW opr)	44,640	312	12	62	13
N5XU	11,070	111	3	45	5
N5JB	9,398	119	2	37	4
W5QF	8,000	96	1	40	3
W5SOD	5,772	74	1	37	3

California

K6SE	49,800	267	37	60	11
N6JV	20,900	185	6	50	5
AE6U	20,090	185	5	49	4
W6PM	13,152	121	4	48	5
K6MO	7,840	108	1	35	3
AD6D	6,930	87	3	35	4
N6VR	5,488	86	3	28	4
N6TD	3,960	86	1	22	3
W6TVP	2,210	65	0	17	2
N6TW	666	37	0	9	2
N6IH	500	21	1	10	2
N6PE	144	12	0	6	1

Idaho

N7SU	6,720	68	2	35	4
W7IWU	80	8	0	5	1

Montana

W6BYB/7	16,128	152	4	48	6

Nevada

W7XZ	25,334	207	8	53	7

Oregon

W7IXZ	14,792	152	5	43	5

Washington

N7AM	20,928	174	11	48	7
WA7OFH	11,782	109	7	43	7
WA7GCI	11,152	116	5	41	6
W7BYK	7,992	95	4	36	5
K7IDX/7	1,800	45	0	20	2

Wyoming

W7TO	1,932	46	0	21	2

Michigan

N8EA	29,526	207	13	57	12
K8NS	28,496	254	5	52	7
W8VSK	15,222	161	4	43	5
K8LJG	1,680	40	0	21	2

Ohio

K8US	35,454	263	12	57	12
K8MR	1,976	52	0	19	2

West Virginia

W8OQL	23,226	185	13	49	13

Indiana

W9LT	42,000	306	11	60	11
W9RE	19,176	176	7	47	8
W9MDW	8,892	109	2	38	4
N9RC	5,952	89	1	32	3

Illinois

K9DX	33,402	253	10	57	10
K9RF (K9GS opr)	27,538	265	4	49	6
K9BGL	25,688	223	6	52	7
WA9PFB	18,860	197	2	46	4
K9IFO	18,048	184	2	47	4
K9BG	15,288	140	4	49	6
WD9GGY	6,144	92	1	32	3
W9ABA	1,760	40	0	22	2
W9PNE	666	9	7	9	8
W9FSD	12	3	0	2	1

Wisconsin

W0AIH/9	44,100	302	12	63	12

Iowa

K0GVB	21,800	210	2	50	4
WB0ZXU	10,906	129	1	41	3

Kansas

WA0TKJ	37,734	311	5	57	7
N0UU	7,200	88	3	36	5

Missouri

K0JPL	**5,504**	**82**	**1**	**32**	**3**

South Dakota

K0ZZ	48,256	325	13	64	13

Canada

Newfoundland

VO1HP	19,608	94	41	38	18

Quebec

VE2WA	4,264	78	1	26	3

Ontario

VE3ABG	27,776	208	10	56	10
VE3INQ	8,352	104	3	36	5
VE3DWX	6,120	78	3	34	4

British Columbia

VE7CRU	13,244	146	2	43	4

DX

Austria

OE1KU	3,880	81	0	10	10
OE1ZGA	3,855	51	1	15	15

Bahama Is

C6ANY	7,030	38	36	19	4

Bermuda

WA1RFM/VP9	113,204	223	213	52	12

Costa Rica

W6KG/TI	10,125	40	35	27	7

Czechoslovakia

OK2KUB (OK2PGF opr)	33,252	223	18	34	25
OK1DIJ	22,272	185	10	29	23
OK2BTW	22,010	171	13	31	23
OK1KPU	18,408	177	13	24	19
OL8CGS	15,552	150	3	27	26
OK3YDZ	15,540	140	8	28	22
OK3CXF	13,178	162	1	22	22
OK1MGW	12,180	156	2	21	20
OL8CKB	11,856	132	7	24	18
OK1AXD	11,088	141	3	21	19
OK1DWC	9,526	118	4	22	19
OL5AUY	8,759	126	1	19	19
OK1JEN	8,398	142	0	17	17
OK2HI	8,227	121	1	19	19
OL5AWJ	7,973	139	0	17	17
OK1MNW	7,718	131	0	17	17
OK2PGU	7,375	71	6	25	23
OK3CPY	5,520	64	5	20	17
OK2YN	5,120	91	0	16	16
OK1OPT	4,928	96	1	16	16
OL3AXS	4,270	97	0	14	14
OK2PAW	4,035	85	0	15	15
OK1DJK	3,740	58	1	17	17
OL8CJN	3,416	75	0	14	14
OL6AVY	3,336	91	0	12	12
OL9CHZ	3,322	100	0	11	11
OK3KFO	3,156	85	0	12	12
OK3CSM/P	3,024	55	2	14	14
OK1DFP	2,988	78	0	12	12
OK1DRY	2,952	78	0	12	12
OK3KYG	2,739	87	0	11	11
OK2KLD (OK2BHT opr)	2,376	69	0	11	11
OL5AVA	2,337	26	1	19	19
OK2QX	2,282	44	0	14	14
OK2BMU	2,277	72	0	11	11
OL9CJB	1,947	54	2	11	10
OK1MSB	1,860	52	0	12	12
OK3TPL	1,692	67	0	9	9
OK1AIA	1,547	34	0	13	13
OL8CLI	1,530	58	0	9	9
OK1AAA	996	22	0	12	12
OL4AXM	798	39	0	7	7
OK1FBH	770	40	0	7	7
OL5AXK	686	34	0	7	7
OL9CJD	678	43	0	6	6
OK2BPL	624	24	0	8	8
OK1MAW	536	20	0	8	8
OK3CWU	329	12	1	7	7
OL1AUX	325	25	0	5	5
OL8CKK	237	35	0	3	3
OK3FON	224	22	0	4	4
OL9CJG	128	29	0	2	2
OK1KTW	123	16	0	3	3
OK3CMZ	116	10	0	4	4
OK2BQU	68	4	0	4	4
OL6AUL	46	10	0	2	2

Domonica

VP2DD	4,620	25	17	22	10

England

G3SZA	96,152	248	108	56	28
G3XWZ/A	28,320	199	15	30	22
G3XTT	17,082	137	10	26	22
G3IGW	9,367	57	13	29	20
G4BUO	6,426	86	1	17	17

Finland

OH3XZ	23,592	200	2	24	23
OH2BNP	9,600	123	0	16	16
OH2BO	9,324	87	3	21	19
OH3XT	7,420	76	0	20	20
OH2VQ	1,888	49	0	8	8

France

F3AT	3,240	53	4	12	11
F8VJ	3,122	43	4	14	14
F9RO	2,002	39	1	11	11
F8EX	1,360	27	2	10	10

Germany, Fed. Rep.

DK6AS	32,426	205	18	31	21
DJ8FR	31,850	174	20	35	23
DJ3XK	7,939	103	0	17	17
DJ5GW	4,690	73	0	14	14
DF2HL	2,097	52	0	9	9

Guernsey

GU5CIA	53,792	223	40	41	2

Hawaii

KH6IJ	13,416	60	45	26	6

Ireland

EI9J	18,634	162	8	22	19

Isle of Man

GD4BEG	110,935	323	81	55	29

Israel

4X4NJ	4,505	50	3	17	16

Japan

JA1CUW	1,239	72	3	7	5
JA0YAN	530	38	3	5	3
JA7NI	453	67	1	3	3
JA4ZQA	348	35	1	4	4
JH1LKH	243	35	1	3	3
JA7FFN/1	152	34	1	2	2
JK1AJX	12	6	0	1	1
JA3MFE	4	2	0	1	1

Netherlands

PA0LOU	18,798	136	11	26	20
PA0MRM	3,735	51	0	15	15

New Zealand

ZL1AZV	539	20	2	7	6

Poland

SP3DOI	25,728	212	3	24	22

Spain

EA1SQ	75	5	0	3	3

Switzerland

HB7BLQ	5,018	79	0	13	13
HB9BNB	1,650	30	0	11	11

Venezuela

YV1OB	34,830	88	74	43	13

Virgin Is

KV4FZ	222,984	324	264	76	30

Wales

GW4CZK	13,300	133	3	20	19
GW3GWX	2,453	47	0	11	11

Yugoslavia

YU3EF	58,360	271	34	40	23
YU3DTN	4,056	66	0	13	13

Multi Operators

Massachusetts

W1MX	62,832	276	50	66	23

Georgia

N4RJ	29,928	190	17	58	15
W4YOK	22,440	208	3	51	5

South Carolina

AA4V	69,580	409	22	70	19

Virginia

W4PRO	62,016	332	31	68	19

Arkansas

K5GO	55,744	352	16	67	16

California

N6RZ	26,208	194	10	56	7
W6BA	22,050	197	7	49	6

Michigan

W8UM	40,356	286	14	59	13

Canada

Ontario

VE3FAC	37,642	267	13	59	12
VE3SC	5,432	89	2	28	4

Czechoslovakia

OK5TLG/P	49,360	252	44	40	22
OK1KSO	42,240	225	30	40	24
OK3KAP	9,424	138	2	19	19
OK1KKH/P	5,385	105	1	15	15
OK1KOK/P	4,981	85	0	17	17
OK1KQH	4,960	99	0	16	16
OK3KTY	2,142	86	0	9	9
OK2KTE	1,674	63	0	9	9
OK1KCI	1,440	51	0	10	10
OK2KNP	1,300	41	0	10	10

Germany, Fed. Rep.

DL0KF	25,770	176	9	30	24
DL0FJ/P	13,452	153	3	19	17

Guernesy

GU3HFN	12,008	126	1	19	19

Scotland

GM4GRC	98,200	339	67	50	26

Surinam

PZ0AA	44,720	116	91	43	13

Yugoslavia

YU3DOX	25,662	196	8	26	22
YU3EIJ	7,470	105	0	15	15

Check logs are gratefully acknowledged from the following:
K1DW, DJ7CX, OK1DKW, OK2BOB, OK3CFT, OL6AWY, OL8CJO.

Multi Op Station Crews

W1MX: K1MK, W2QHQ, WA4TTG. **N4RJ**: N4RJ, N4HI, K4LRJ, N4SV. **W4YOK**: W4YOK, WA4AIJ, WB4ZGN. **AA4V**: AA4V, K4CNW, W4MBD. **W4PRO**: W4PRO, W4HBK, N4DJ. **K5GO**: K5GO, K8CC. **N6RZ**: N6RZ, WB6SHD. **W6BA**: W6BA, K6OS. **W8UM**: K8CN, K8MU, K8QKY, W8LVN, WA8YVR, WB8SKY, WA9OWI. **VE3FAC**: VE3FAC, VE3DSS. **VE3SC**: VE2SD, VE3HJV. **OK5TLG/P**: OK1DFW, OK1FCW, OK1MMW. **OK1KSO**: OK1AEZ, OK1DOK, OK1JCW. **OK3KAP**: OK3TPV, OL8CGI. **OK1KKH/P**: OK1VY, others. **OK1KOK**: Not shown. **OK1KQH**: 3 oprs. **OK3KTY**: Not shown. **OK2KTE**: Not shown. **OK1KCI**: OK1AIA, others. **OK2KNP**: Not shown. **DL0KF**: DF3LP, DJ4FZ, DK8LE. **DL0FJ/P**: DJ2EA, DL3UR, DC3CB, DK4VP, DF5LA, DF5LK, Jebsen, Klose. **GU3HFN**: GU3MBS, GU4EON. **GM4GRC**: GM3OLK, GM3YOR, GM4BRM. **PZ0AA**: PZ1AC, PZ1AP, JA1PIG. **YU3DOX**: 4 oprs. **YU3EIJ**: YU3TUW, YU3TUX, YU3RS921.

old retiree- W3BUR. Was having trouble copying anything east of Ohio, and WA1RFM/VP9 answered my CQ with a booming signal!- KØJPX/5. Too many W/K stations in the DX window. Difficult to break thru W QRM to get those elusive multipliers- VO1HP. Ice storm pulled half of dipole loose from feedline. Too risky to climb up and fix, so ran it that way- W5KL. Again tuned up the antenna in the dark. Finally got it the second evening- N6VR. Conditions excellent compared to ARRL Test. Got two new ones and 3 got away- N4EA. After contest, found my amplifier put out less than Ranger driver. 13 radials was asking for bad luck- W6TVP. FB police action by several in window was really appreciated- W3AJS. Lots of "worked B4" confusion between AA4V and AA4VV- AA4VV. Biggest thrill was EA8CR answering CQ for first Africa after all these years- K5NA. No JA opening first morning hurt my score. Will be moved to Texas for 1980 Contest. Hope to put up 4 elements there- K6SE. Wish I could have worked all I heard!- K1KI. Got one new state; missed two others- AE5H. This was my 10th 160 meter contest, and by far my best score- W4TMR. Big thrill to work KV4FZ- N6IH. Cold sitting in car. Couldn't run motor for heat all the time- WA4SGF/M4. Temporary dipole collapsed in snowstorm second night, so had to quit- K3ZJ. Conditions better than expected, but nothing in the Pacific. Keep up the good work- W4PRO. With limited time, I concentrated on DX-W9PNE. Why do kids keep stealing my Beverages?- VE3FAC. First CW contest ever entered. Sure different from UHF/VHF- WB0ZXU. Same setup as last year produced less score this time- N4IN. Next year, a remote VFO to catch the DX- N5XU. Thanks for holding the Test- W8VSK. Heavy snow static on Saturday- K9RF. Guess we must expect poor conditions now for a few more years-W6BYB/7. Great fun the few hours I could be on- K9DX. Conditions good Fri, poor Sat- K7IDX/7. Storm static charges shut me down- K4RS. Sure miss the Beverage. It's back to the farm again next year- WA9PFB. Conditions good Fri nite, lousy Sat nite. Used 3-el vert array pointing SE-N7AM. Fun while it lasted, til my old BC348 blew a capacitor- W9FSD. Enjoyed contest, even with limited time-KØJPL.

A big signal on a small lot.

A Two-Band Vertical Monopole Antenna

BY GEORGE F. MOYNAHAN, JR., Ph.D*, W6AXT

Some time before the publication of the September 1978 issue of *CQ Magazine*, which carried the excellent article by Russ Rennaker, W9CRC, entitled "An Effective 40 & 75 Meter Antenna," we had designed and built a vertical monopole to operate on those two bands and had begun to write an account of how it came to be made as well as a description of its construction. When the Rennaker paper appeared we nearly put aside the idea of writing about our antenna, for the two are certainly similar in several respects. However, there are also important electrical and mechanical differences between the two, and it seems that we studied some aspects of design not covered in the other article. Consequently, we decided to go ahead with our write-up.

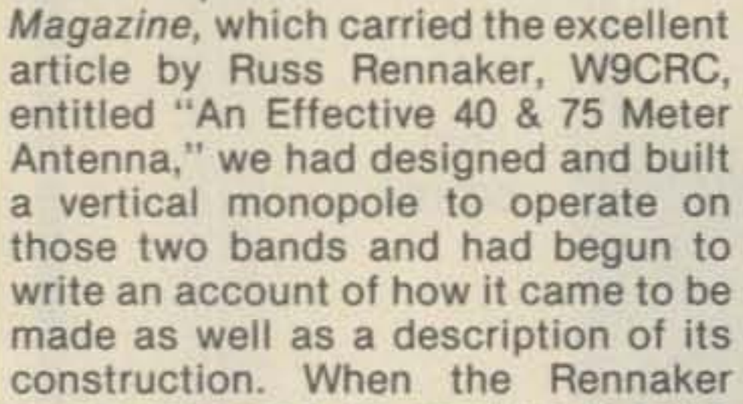


Fig. 1 - T_1 is a bifilar 4:1 transformer wound on an iron powder toroidal core. L_1 is the loading inductor (10.47 μH). The inductive reactance of L_1 is 250 ohms at 3.8 MHz.

Our requirement for a two-band vertical monopole antenna emerged from discussion of plans for a new home. We wanted to have effective radiators on all the high frequency bands but agreed that this should be accomplished without making the place look like the antenna farm of a commercial gateway radio station. The compromise on which we agreed was to limit the installation to two antennas. For the 14, 21, and 28 MHz bands there would be a conventional tri-band beam, supported by a free-standing, crank-up, tubular mast and for the 3.5 and 7.0 MHz bands we would get along with a single, slender whip-like vertical.

Recognizing that the performance of a short vertical radiator would depend to a large degree upon the characteristics of the associated ground-plane, we took special care to establish an effective radio-frequency ground. Since we were building a new home and since a lawn sprinkler systems are needed in this area the task was not too difficult. As trenches were dug to accomodate plastic water pipe, we laid in heavy copper wire parallel to the pipe and then interconnected the copper to form a rather extensive ground-plane mesh. In the center we imbedded, in concrete, an angle iron fixture arranged for attachment to insulated clamps designed to grip and hold the bottom of our vertical antenna. The outstanding results obtained later, when different vertical antennas were used with our ground system, indicated clearly that we had succeeded in reducing ground losses to a minimum and justified the time and effort spent on that part of the installation.

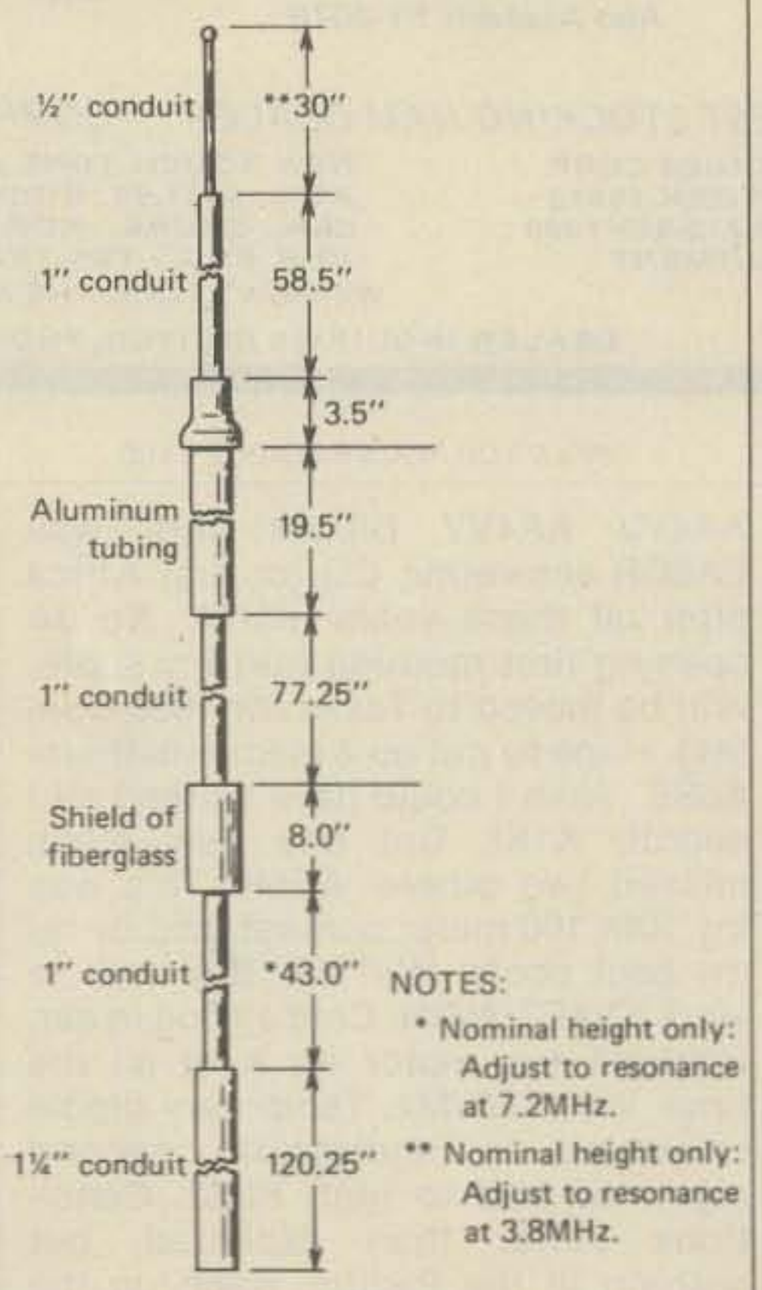


Fig. 2 - A dimensional sketch of the W6AXT monopole. This illustration is not drawn to scale.

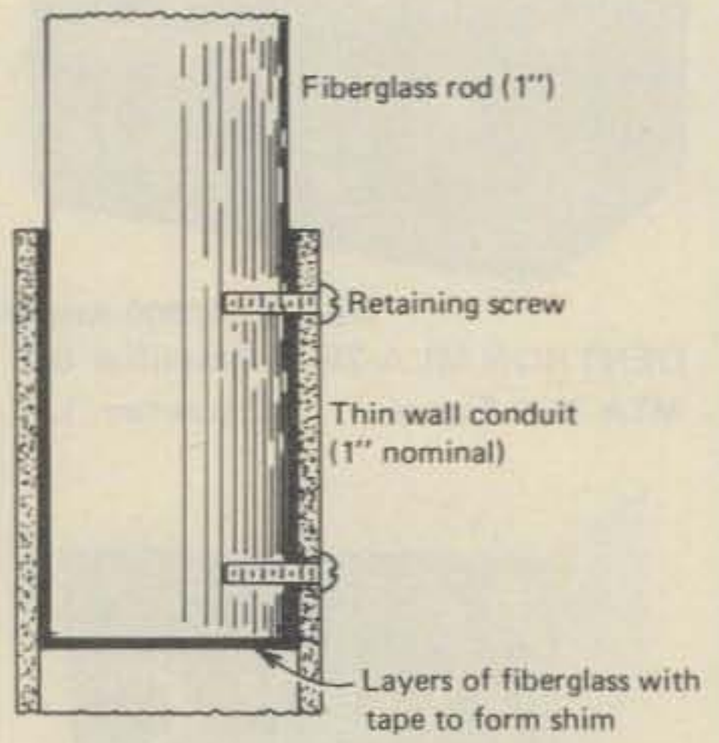


Fig. 3 - Splicing the fiberglass rod to the thin wall conduit.

For two or three years the antenna that we used with this ground system was a simple 33-foot vertical which was resonant as a quarter-wave at approximately 7.2 MHz. It was constructed of thin-wall, galvanized, steel tubing (actually electrical conduit) and was tapered in steps from one and a quarter inch nominal size at the bottom to one-half inch at the top. It was mechanically strong, electrically effective and inexpensive, but without modification it was a single-band radiator, limited to use on the 7.0 MHz band. The difficulty in trying to use an antenna of this type, at frequencies where it is considerably less than a quarter-wave, is that it becomes highly reactive and so difficult to excite. In this case the driv-

*133 Piazza Way, San Jose CA 95127

ing point impedance changed from a pure resistance of about 35 ohms at 7.2 MHz to approximately (10 - j250) ohms at 3.8 MHz. Consequently, when we decided to extend our activity to include the 3.5-4.0 MHz band and still retain the capability to operate in the 7.0 MHz range, some major changes were in order.

The first remedy that came to mind was to devise a corrective network which would cancel the high reactive component of the driving point impedance and raise the resistive component to something near 50 ohms so that it would be a suitable termination for a 50 ohm line. Of course, there are many ways to do this; the method we chose and which is probably as simple and straight-forward as any is illustrated in fig. 1. A series loading coil with 10.47 μH inductance (and so +250 ohms reactance at 3.8 MHz) cancels the reactance of the

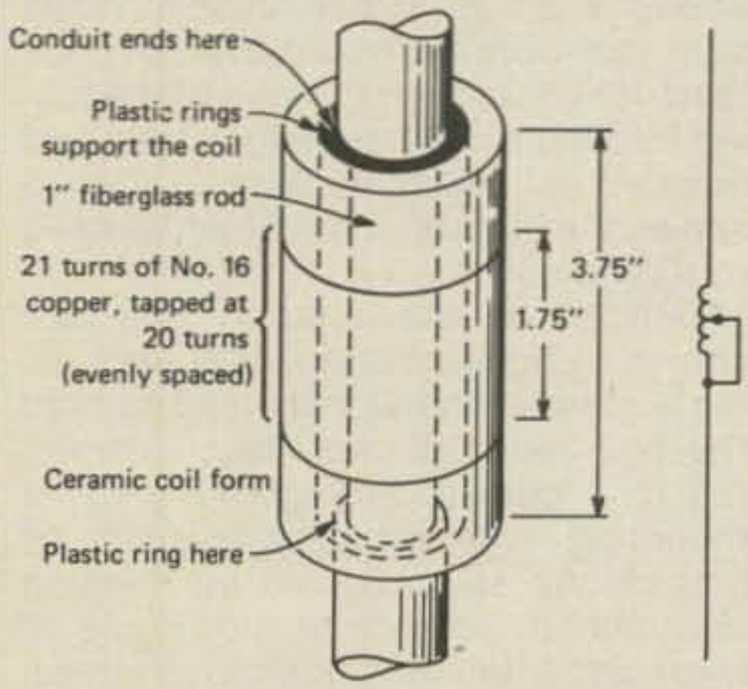
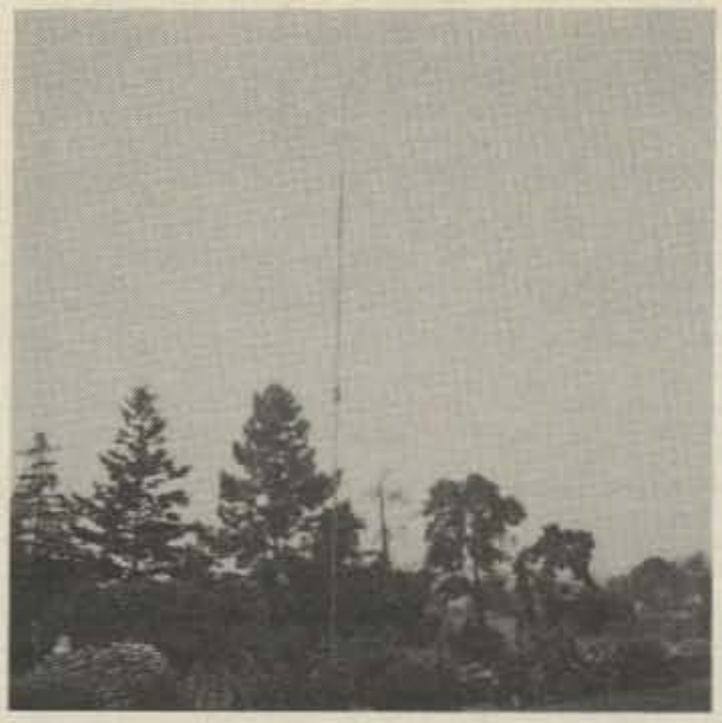


Fig. 4 - Loading coil arrangement and mounting.

antenna leaving the 10 ohm resistive component. This resistance is then raised to 40 ohms by an auto-transformer which was made with a bifilar winding on an iron powder toroidal core. This base-loading arrangement functioned very well electrically but introduced two disadvantageous features that are typical of schemes that use electrically short, base-loaded radiators. First and most obvious of these shortcomings is the inconvenience of having to switch the matching network in or out of the circuit when changing from one band to the other. Second, and far more objectionable, is the danger that such an arrangement generates in the form of high-voltage, radio-frequency emf, at the base of the antenna, right where there is the greatest likelihood of accidental personal contact. To illustrate the extent of this hazard, consider that a peak current of 10 amperes is needed to deliver one kilowatt p.e.p. to a resistance of 10 ohms and that this current, flowing



The W6AXT two-band vertical monopole antenna.

through 250 ohms reactance produces a peak radio-frequency emf of 2,500 volts, a potential source of injury.

The disadvantages of base-loading the short radiator, as described above, and the desire to continue operation on both the 3.5 and 7.0 MHz bands led us to consider design objectives for an antenna that would be safe and convenient and still meet our requirements. Specifically, the required characteristics were as follows:

1. **Safety,** to be improved by removal of dangerously high voltage from the base and from any other touchable part of the antenna.
2. **Convenience,** to be increased by elimination of any need to switch a network in or out of the system when changing bands,

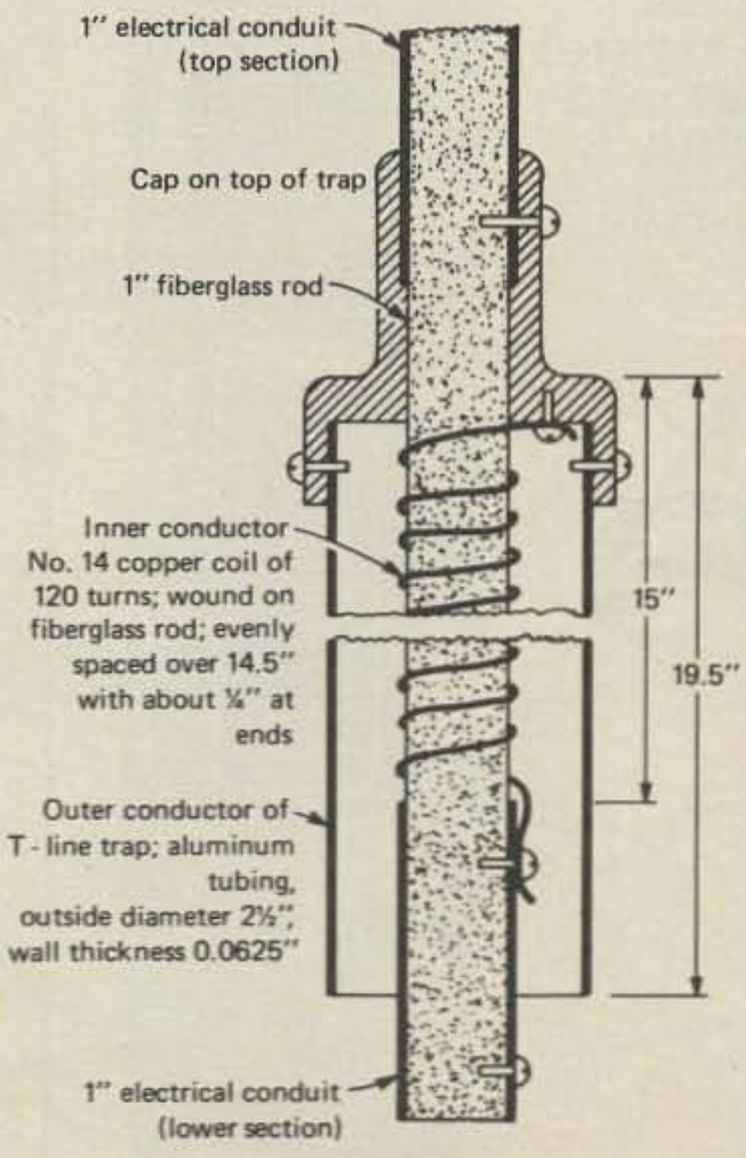


Fig. 5 - Transmission-line type trap for 7.2 MHz. This illustration is not drawn to scale.

3. **Electrical performance,** including radiation pattern, driving point impedance and efficiency to approximate closely those of two individual quarter-wave antennas cut to frequency for the respective bands.
4. **Mechanical characteristics**, including size and configuration to be about the same as those of the single-band 7 MHz antenna, with a maximum height no greater than 30 feet. Material for construction should be mainly the same inexpensive steel conduit as that used for the single-band job.

Preliminary study indicated that the most practical way of meeting these design goals would be to build a mid-loaded trap antenna and our later practical experience justified this conclusion. The antenna that we visualized was to have its 7.0 MHz element limited to about 20 feet in height, but with this section divided and loaded at a point above its middle so that it would behave as a quarter-wave at 7.2 MHz. At this frequency, it would be isolated at the top, from a remaining extension, by means of a shortened quarter-wave transmission-line type trap. When

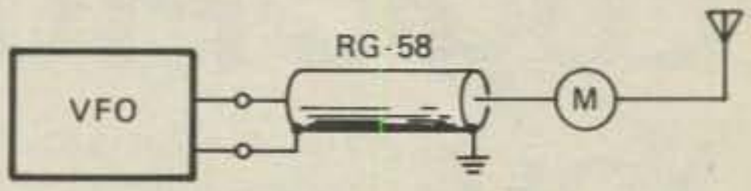


Fig. 6 - Method of determination of resonance frequency. M represents an r.f. milliammeter.

operated at 3.8 MHz, this trap, as well as the loading coil would add to the electrical length so that only a short section above the trap would be required to bring it to resonance at the lower frequency. A dimensional sketch of the arrangement is shown in fig. 2. It should be noted that we hedged some by providing two sliding joints so that the device can be fine-tuned on both bands. This provision for adjustment worked out very well and made construction of both the loading coil and the trap less critical than would otherwise have been the case. The reason for this can be understood best by thinking of the lower section, that is the loaded 7.2 MHz part as a short transmission line and the trap above it as another short line section. Resonance of the two, connected in this manner, takes place when the combination of the two represents a shorted half-wavelength transmission line and does not require that each, individually represent a quarter-wavelength. This is fortunate, for it means that the desired resonant condition in the 7 MHz region can be obtained merely by adjusting the height of the lower

section, by means if the sliding joint, without any trimming of either the loading coil or the trap.

After considering the electrical and mechanical properties of available insulating material, which could be used to isolate sections of the tubing at the loading coil and trap positions we decided to use fiberglass rod. Both splices were to be located in nominal one-inch sections of the tubing, which turned out to be somewhat larger than an inch in internal diameter, and so when we found that the largest fiberglass rod obtainable in this area was precisely one inch in diameter it looked as though we had a problem. Fortunately, what appeared to be a hurdle actually proved to be an advantage for, by simply laying a few layers of readily available fiberglass tape parallel to the axis of the rod, we were able to shim it so well that it had to be forced into the tubing and so formed a strong and tight splice. Just to make sure that nothing would ever slip, we then drilled through the wall of the tubing into the rod, threaded the hole and inserted a machine screw. Fig. 3 shows the details of the fiberglass rod to tubing splice.

Details of the loading coil are shown in fig. 4. We mounted ours using a plastic ring at each end to hold the coil centered over the insulating rod in a coaxial arrangement. Other mounting schemes may be used, of course. We also covered our loading coil with a weather shield, made of three and a half inch fiberglass tubing, which we happened to have, but this was probably not necessary.

Probably the most interesting component of our antenna is the shortened quarter-wave coaxial line used as a resonant trap. By winding the center conductor of this trap on the fiberglass insulating rod, as a solenoid, the phase velocity of propagation was decreased to such an extent that the quarter-trap, at 7.2 MHz is only about 20 inches long. The construction of this trap is outlined in fig. 5.

Our method of tuning the antenna was very straight-forward as can be seen in fig. 6. We simply link-coupled the driving point terminals (base of the antenna and ground) to a small oscillator and observed antenna current as indicated by a sensitive radio-frequency milliammeter. The first step was to adjust the system to resonance at 7.2 MHz by means of the lower sliding joint. Adjustment must be made in this order because while the adjustment for resonance at the higher frequency effects the behavior of the antenna when operated at 3.5-4.0 MHz, the length of the extension above the trap has virtually no effect on the ant's 7 MHz behavior. ED

How many times have you asked yourself in frustration: "How could that just-bought battery die so soon?" W4FA's novel accessory will extend is life.

A Battery Saving Blinker

BY JOHN J. SCHULTZ*, W4FA

How often have you turned on some battery operated piece of equipment and then forgot to turn it off? The result, of course, is dead batteries or at least the waste of some of the useful battery life. Adding a pilot lamp doesn't help because incandescent lamps usually draw more current than simple battery operated circuits. Even a LED pilot lamp doesn't help since it can draw up to 20 mA. The solution is to add a LED blinker circuit to act as a pilot lamp. The blinking action drastically reduces the average current drain from a battery supply. Circuits for doing this have been around for some time and some special IC's were developed for the purpose. Probably the best known of the IC's is the LM3909 which is readily available and costs between seventy cents and a dollar. The use of the IC is a big improvement over previous types of LED blinker circuits which used a unijunction transistor and a transistor switch. Such circuits did work well but the sharp pulse produced by the unijunction circuit could also produce interference in some equipment.

The purpose of this article is to note some of the simple, practical aspects of using the LM3909 IC. The article is concerned only with one simple LED blinker circuit for use as a battery "on" indicator for a wide range of battery supply voltages. The circuit is slightly different from the standard LM3909 blinker circuit and was developed by experimentation. It seems to provide the best of both worlds - a good, obvious LED blinking action and very low current drain.

*c/o CQ

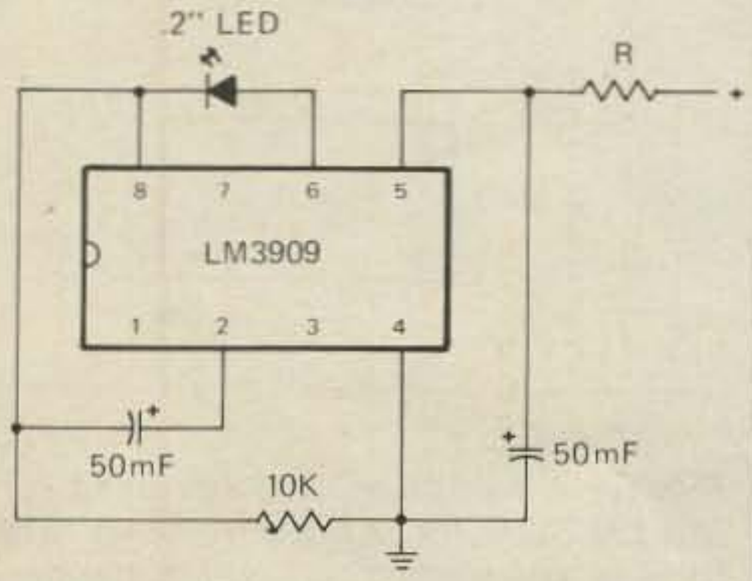


Fig. 1 - LED blinker circuit using a LM 3909 IC. Resistor R is found from fig. 2.

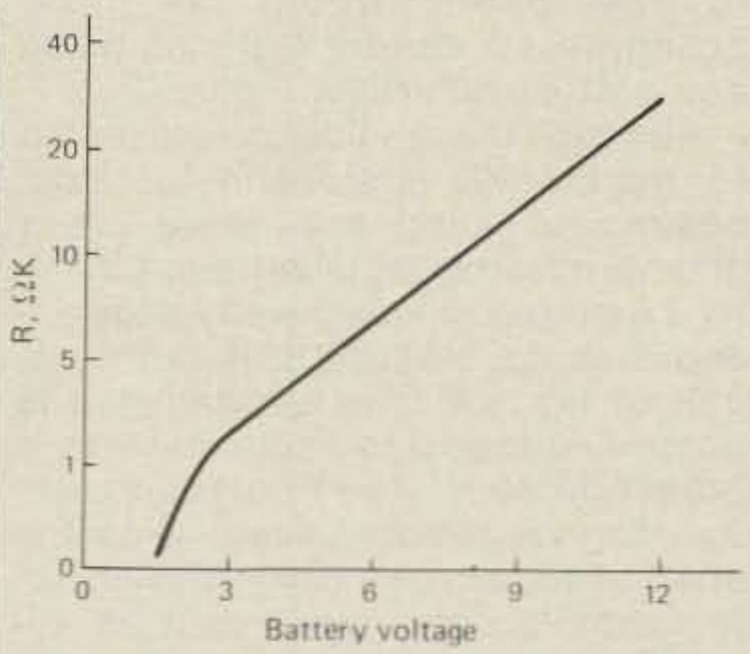


Fig. 2 - Suggested values for resistor R in fig. 1 for different values of battery voltage.

The LM3909 blinker circuit is shown in fig. 1. There are very few components involved as can be seen. The resistor R is determined by the nominal value of the battery voltage using the chart of fig. 2. The resistance values need not be exact at all. The values shown in fig. 2 were experimentally found to give a sharp, obvious blinking rate of slightly over 1 Hz. The blinking rate will vary from its nominal rate depending on the state of charge of a battery; blinking faster when the voltage is above its nominal value and slower when the battery voltage is lower. So, once one gets used to the normal blinking rate one can also obtain an approximate indication of the state of charge of a battery.

Fig. 3 shows the approximate current drawn by the circuit of fig, 1. For battery voltages of 3 to 12 volts (or more), the average current drawn is less than 1 milliampere. So, the current drain should be insignificant for almost any battery operated circuit. If one wanted to reduce the current drain even further, the value of the series resistor R can be increased to the point where any battery used will approach its shelf life with the LED blinking circuit left in continuous operation. Of course, the blinking rate will also be reduced to a fraction of a Hertz. The blinker circuit will operate with a single cell battery source as low as 1.5 volts. The average current drawn then will depend primarily on the type of LED used. The 7.5 milliamperes shown in fig. 3 is an average value. By careful selection of LED's the lowest average current that could be achieved was approximately 5.0 milliamperes. Again, however, this was with a blinking rate considered to be very attention catching. If one is willing to accept a less obvious blinking rate, the average current drain even with a 1.5 volt battery source can be reduced to a milliampere or less.

There is nothing special to note in the wiring of the LM3909 circuit. Fig. 4 does, however, show a convenient way to group the components around the LM3909 which evolved after using a few of the units. The IC is shown pin side coming out of the page and the

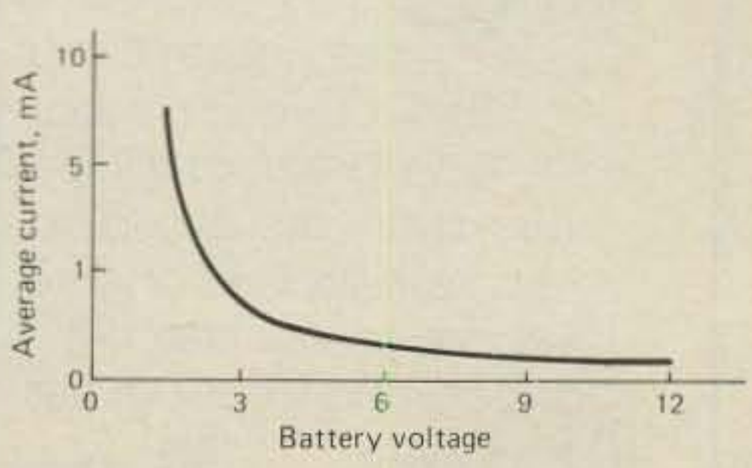


Fig. 3 - Average current drawn by the circuit in fig. 1 for different battery voltages.

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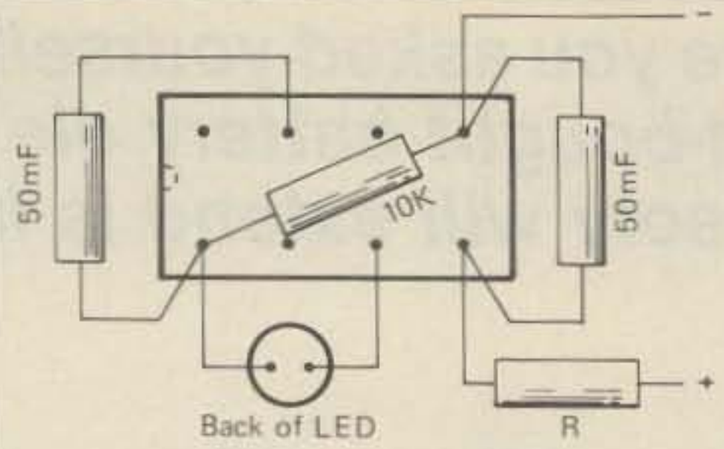

Fig. 4 - The IC is shown pin-side up. By using miniature components, one can wire the circuit of fig. 1 directly on the IC in an extremely small space.

R/C components are wired directly to the pins of the IC. The flat side of the IC package is fastened to the inside of the panel which the LED penatrates. It can be fastened using any sort of adhesive.

Although the application presented for the LM3909 is probably the most commonly useful one, there are a number of other applications for the IC. Two more or less novelty ones are shown in fig. 5(A) and 5(B). In the circuit of fig. 5(A), the blinking rate is controlled from 0 to about 20 Hz by a potentiometer. The potentiometer arm can be remotely located on the shaft of some motor driven device, for instance, so one can obtain an approximate indication of shaft position. The circuit of fig. 5(B) shows two LED's used which will blink alternately. More LED's can be paralleled together with each LED and by using LED's of different colors and in different arrangements, various novelty displays can be created. If banks of LED's are paralleled, there may be some difficulty in achieving more or less equal brightness from all of the diodes. Small series resistors of from 10 to 47 ohms may have to be added to certain LED's to equalize the overall light output of a bank. Finally, the circuit of fig. 5(C) is a form of aural ohmmeter using the LM3909. It is not the most universally useful of such circuits but it is particularly good in distinguishing between very low values of resistances. So, if one has need to check low resistance wiring or switches where heavy currents are involved, the circuit will provide an aural indication of the relative quality of the connections achieved with more resolution than can be provided by an ordinary ohmmeter.

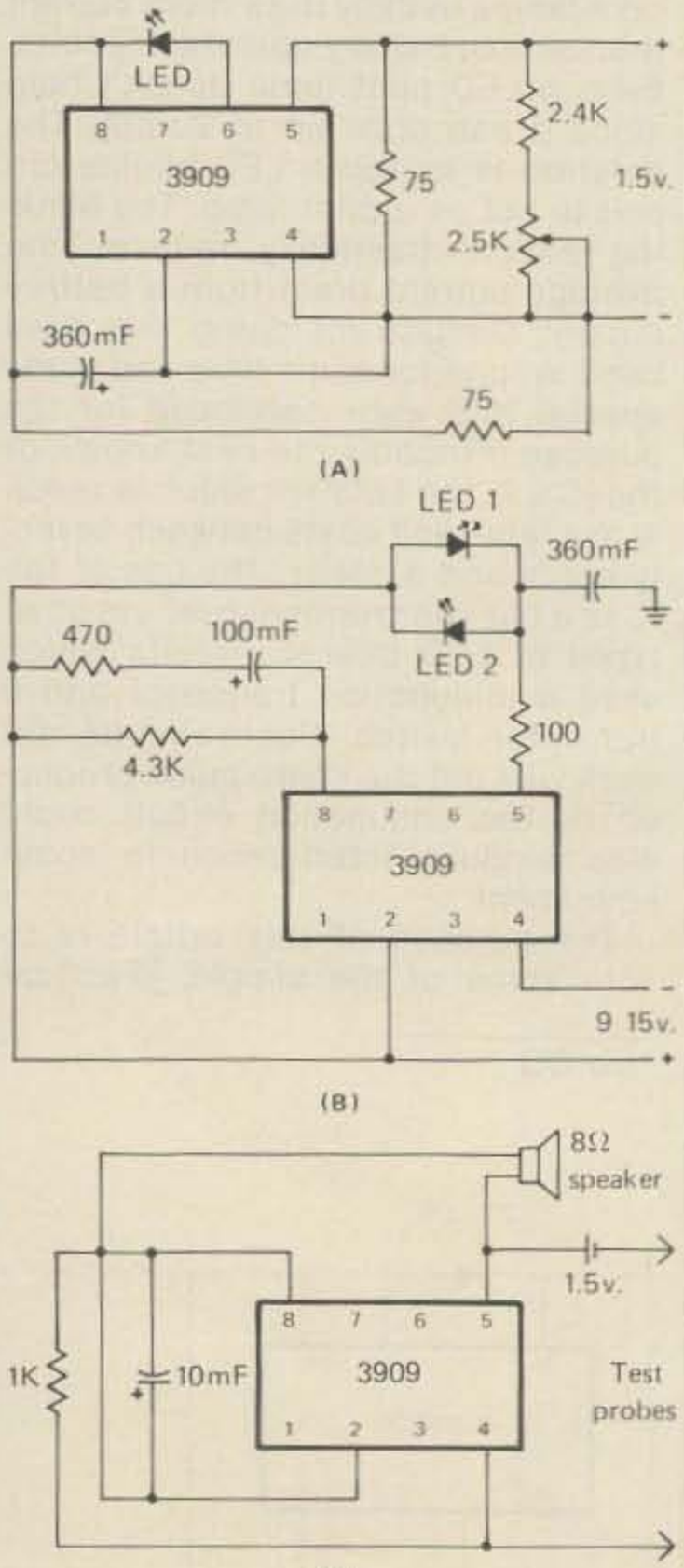

Fig. 5 - A sampling of other uses for the LM 3909 IC. (A) is a variable rate blinker; (B) is a circuit which flashes the two LED's alternately; (C) is an audible ohmmeter.

a regular feature by

THEODORE J. COHEN N4XX

dateline... Washington, D.C.

The ins and outs of the Washington scene

FCC Poorly Managed

A 143-page report prepared by the General Accounting Office (GAO) earlier this year stated that the Federal Communications Commission (FCC) is poorly managed and has severe staff morale problems. The report, prepared following a 10-month investigation, noted that "structural, organizational and procedural changes" were needed to bolster the beleagured agency."

The GAO report also charged the FCC with failure to keep up to date on technological changes in the communications industry.

To some extent, almost all of the problems cited in the GAO document stemmed from the failure of the Commission to plan its activities and programs on a comprehensive basis. This lack of planning, in turn, weakened the overall effectiveness of Commission management.

FCC Chairman Charles Ferris agreed, for the most part, with GAO's findings. As quoted by *The Washington Post,* Ferris said: "The problems the GAO identified are the same problems our staff has identified and has been working to correct the past 21 months since I became chairman."

Congressman Lionel Van Deerlin (D-CA), chairman of the House Communications Subcommittee, showed a bit more concern, however. "The FCC is in trouble," said Van Deerlin. The House Communications Subcommittee will launch a new series of oversight hearings this fall to make sure that the taxpayers' dollars are used the way they should be - for more efficient and effective regulation."

The bottom line? Just this...expect considerably more Congressional oversight of FCC activities in the months ahead.

**8603 Conover Place, Alexandria VA 22308*

Amateur Numbers Declining

For the first time in about five years, the Amateur Radio service has experienced a net loss in its numbers. While the actual number of licensees involved is small - 100, to be exact -the losses, if they continue, could weaken Amateur Radio's hand in its dealings with the Federal Government.

That growth problems may loom on the horizon is also evident from data on the annual growth rate of the Amateur service. Here, the number of licensees of record at the end of any given month is compared with the number for the same month one year earlier. While the rate of growth was better than 8% earlier this year, it is now running at an annual rate of about 5.5%.

Court Upholds Restrictive Covenants

As reported in *Advance Sheet,* newsletter of The Personal Communications Foundation, the Missouri Court of Appeals, Western District, declared that "state and local governing agencies do have authority over local zoning and property restrictions, inclusive of restrictive covenants running with the land..." (Fairwood Homes Association v. Pierce, 578 S.W. 2d 343). The isue decided upon by the Court involved homeowners who had erected citizens band radio antennas in violation of restrictive covenants on their property.

The Court of Appeals held that the Federal Communications Commission had not preempted the authority of the homeowners' assocaited by the mere granting of a CB license, and so, the Court ordered the home owners involved to remove their antennas or, as an alternative, to modify the design of the antennas so that they did not exceed the five-foot requirements in the applicable restrictive covenant.

It should be noted that none of the Appellants nor the Respondent provided the Court with material pertaining to the question of the validity of the covenants running with the land in question.

For more information on this and other matters pertaining to legal issues in personal communications, contact:

The Personal Communications Foundation
10960 Wilshire Boulevard, Suite 1504
Los Angeles, CA 90024

Coast Guard Vacates 160 Meters in Certain Areas

According to Mr. Earl Holliman, Chief, Frequency Management Staff, U.S. Coast Guard, operation of the LORAN A radiolocation chains in the Hawaiian Islands and in the Aleutian Islands were phased out on 30 June 1979. Further, the Coast Guard has served notice that its LORAN A chains in the Gulf of Alaska and on the U.S. West Coast will be phased out on 31 December 1979. A bill has been introduced into the House of Representatives, however, which demands that the Gulf of Alaska and West Coast operations be continued in the interest of fishermen who now use these chains. Regardless, that the Coast Guard is vacating frequencies in the 160 meter band in certain areas (such as the Hawaiian and the Aleutian Islands) suggests that that FCC should move at an early date to relax power restrictions for 160 meter amateur operations in these areas. Cognizance mut be taken, of course, of LORAN A operations by other governments and of the potential for interference to these chains by amateur operations.

FCC Releases RFI Projections

Recently released projections for radi-frequency interference (RFI) com-

plaints by the FCC suggest that the number of complaints will average about 80,000 for fiscal year (FY) 1980. In addition, the trend in the projections is up, with the number of complaints to the Commission expected to increase by over 4000 complaints per year. While the number of currently received and projected complaints is lower than the number of complaints received annually in FY 76 and FY 77 —— when the number of complaints received by the Commission topped 100,000 —— the fact that the projections are trending up is of great concern to the Commission.

It is also of interest to note that the annual number of RFI complaints to the Congress, after dropping for the past four years from a high of 1500 complaints in FY 76, has now leveled off at around 700 complaints per year. it is too early to say, however, whether these complaints, too, are increasing with time.

There should be no question, given the above, that RFI is still one of the greatest threats to amateur and CB operations.

Sing of the Times

In a recent article on tubes *(Electronic Engineering Times,* August 1979), a tube was described as "a hot-electron FET." Unbelieveable as it may be, there is a whole generation on engineers in the field who have never worked with tubes!

Your Washington editor thanks Mr. Jeffrey Young, FCC, for his contribution to this month's column.

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

Phillips - 100 Years Young Part II of II

This month's column completes the two part article about our amateur radio service version of the Phillips Code. The first part provided some explanation of differences between the real Phillips Code and the system used by amateurs. Both parts of this article should be retained as an operating aid. If enough people bother to send in suggested additions and changes, the list will be updated and reprinted.

The previous part of this article provided a list arranged in word-to-abbreviation (sending) sequence. This month's column provides the same list arranged in abbreviation-to-word (receiving) sequence.

*2814 Empire Ave., Burbank, CA 91504

Bill Brown (W6ZUM) sent this photograph of his wife, Pat, who received her Novice license 3 March 1979 and passed the General test 11 May. Pat completed working all states as KA6EUH on 25 April and acquired the Rag Chewer's Certificate 5 March. She worked 16 countries while a Novice and has now contacted 52 countries as N6BTY. Pat had worked all continets by 1 July with a Heath HW-100 Transceiver, Hy-Gain TH-6 triband beam, and an 80½40 meter inverted vee antenna. Pat and Bill live in La Mesa, California. We can understand Bill's pride in his wife's excellent progress and it is hoped that a few readers will try to duplicate her operating achievements.

AA	All After	BCN	Beacon	CB	Circuit Breaker, or Citizens Band	CNSRV	Conserve	DA	Day
AB	All Before	BCNU	Be Seeing You			CNSTRCT	Construct	DAT	That
ABL	Able	BCUM	Become			CNSTTNL	Constitutional	DBL	Double
ABT	About	BD	Bad	CBL	Cable	CNT	Count	DBT	Doubt
ABVTN	Abbreviation	BDCST	Broadcast	CD	Civil Defense, or Communications Department	CNTCT	Contact	DCD	Decide
ACCY	Accessory	BFO	Beat Frequency Oscillator			CNTN	Contain	DCLR	Declare
ACFT	Aircraft					CNTNU	Continue	DCMNT	Document
ACNT	Account	BGN	Begin			CNTRBT	Contribute	DCRS	Decrease
ACPT	Accept	BIZ	Business	CHF	Chief	CNTRL	Control	DE	From or The
ADR	Address	BKFST	Breakfast	CHMN	Chairman	CNTST	Contest	DEC	December
ACHV	Achieve	BKWD	Backward	CHNC	Chance	CNVNC	Convince	DEM	Them
ADVNC	Advance	BLDG	Building	CHNG	Change	CNVNTN	Convention	DEN	Then
ADVZ	Advise	BLK	Black	CHRG	Charge	CNVRS	Converse	DERE	There
AFR	Africa	BLO	Blow	CHUZ	Choose	CNVRT	Convert	DESE	These
AFTRNN	Afternoon	BLU	Blue	CK	Check	COAX	Coaxial Cable	DEY	They
AGN	Again	BLV	Believe	CKT	Circuit	COMM	Communication	DFCLT	Difficult
AGNST	Against	BLVD	Boulevard	CL	Closing Station	CONDX	Conditions	DFR	Differ
AGRD	Agreed	BN	Been	CLCT	Collect	CONFM	Confirm	DFRNC	Difference
AHD	Ahead	BND	Bound	CLCTR	Collector	CPI	Copy	DGTR	Daughter
ALNG	Along	BNFT	Benefit	CLD	Called	CPL	Couple	DIS	This
AM	Amplitude Modulation	BNTH	Beneath	CLDI	Cloudy	CPTN	Captain	DRL	Dollar or Dealer
		BOT	Bought	CLG	Calling	CQ	General Call to All Stations, and Best Amateur Radio Magazine		
AMG	Among	BRF	Brief	CLIDE	Collide			DLVR	Deliver
AMT	Amount	BRKN	Broken	CLR	Clear			DLY	Delay
ANI	Any	BRLNT	Brilliant	CMCL	Commercial			DMND	Demand
ANSR	Answer	BRN	Burn, Brown, or Born	CMFT	Comfort			DNR	Dinner
ANT	Antenna			CMG	Coming			DOSE	Those
APP	Appreciate	BRNG	Bring	CMN	Common	CRCL	Circle	DPLCT	Duplicate
APR	April	BROT	Brought	CMPLT	Complete	CRCT	Correct	DPRT	Depart
AR	End of Message	BRTHR	Brother	CMPR	Compare	CRDT	Credit	DRCTN	Direction
		BRZ	Breeze	CMPT	Compete	CRFL	Careful	DRG	During
ARND	Around	BST	Best	CMPTR	Computer	CRTNLI	Certainly	DRV	Derive or Drive
AS	Wait	BAT	Break or Paragraph	CMPZ	Compose	CRUZ	Cruise	DSCHG	Discharge
ASAP	As Soon As Possible			CNCR	Concur	CS	Callsign	DSCRB	Describe
		BTH	Both	CNCRN	Concern	CSTM	Custom	DSNT	Does Not
AU	Fraction Follows	BTHR	Better	CNCNTRT	Concentrate	CUD	Could	DSR	Desire
		BUK	Book	CNDCT	Conduct	CUK	Cook	DSRV	Deserve
AUG	August	BURO	Bureau	CNFOM	Conform	CUL	See You Later	DUNNO	Do Not Know
AVE	Avenue	B4	Before	CNFN	Confine	CUM	Come	DUZ	Does
AVG	Average			CNFR	Confer	CUZ	Cause	DVC	Device
				CNGRTS	Congratulations	CVL	Civil	DVD	Divide
B	Be	C	Celius, Centigrade, See or Yes			CVR	Cover	DVLP	Develop
BCL	Broadcast Listener			CNSDR	Consider	CW	Continuous Waves (A0	DWN	Down
				CNSLT	Consult			DX	Distant Station

This is 13-year old Jim Thomas (KA6DAJ) of Elk Grove, California. Jim has been licensed since September 1978. He just operates on the 15 meter Novice band where he has worked all states with his Swan 500 Transceiver and a beam antenna. Jim thanks Bob Babigian (WD6BOX) and Earle Smith (WD6FVR) for helping him get his Novice license.

E	East
ECH	Each
EFCT	Effect
EFRT	Effort
EGR	Eager
EL	Element
EMGNCY	Emergency
EMPLD	Employed
EMTR	Emitter
ENTRG	Encourage
ENDVR	Endeavor
ENGR	Engineer
ENUF	Enough
EQL	Equal
EQPMT	Equipment
EQVLNT	Equivalent
ES	And
ESNTL	Essential
ESTMTD	Estimated
ETA	Estimated Time of Arrival
ETC	Etcetera
ETD	Estimated Time of Departure
EU	Europe
EVDNT	Evident
EVE	Evening
EVR	Ever
F	Fahrenheit
FABLUS	Fabulous
FAX	Facts
FB	Fine Business
FCC	Federal Communications Commission
FCT	Fact
FCTN	Faction
FCTR	Factor
FD	Field Day (Contest)
FDRL	Federal
FEB	February
FELG	Feeling
FER	For
FETR	Feature
FIGR	Figure
FL	Feel
FLD	Failed or Field
FLI	Fully or Fly
FLNG	Fling
FLO	Flow
FLR	Floor
FM	Frequency Modulation
FND	Found
FNDMNTL	Fundamental
FOLO	Follow
FONE	Telephone
FOTO	Photograph
FONT	Frequent
FRC	Force
FRD	Fired
FREQ	Frequency
FRI	Friday
FRMD	Formed
FRND	Friend
FRNT	Front
FRST	First
FRVR	Forever
FRZ	Freeze
FSCL	Fiscal
FU	Few
FUNI	Funny
FUTR	Future
FVR	Favor
FVRBL	Favorable
FWD	Forward
FXD	Fixed
GA	Good Afternoon or Go Ahead
GAL	Gallon
GE	Good Evening
GESS	Guess
GG	Going
GLD	Glad
GLM	Gleam
GLNC	Glance
GM	Good Morning
GMT	Greenwich Mean Time (Obsolete)
GN	Good Night or Gone
GND	Ground
GNRL	General
GP	Ground Plane
GRF	Grief
GRL	Girl
GRNTD	Guaranteed or Granted
GRO	Grow
GRP	Group
GRT	Great or Greet
GRTNGS	Greetings
GUD	Good
GUD LUK	Good Luck
GV	Give
GVNR	Govenor
HAF	Half
HAPI	Happy
HD	Had
HDG	Heading
HED	Head
HI	High or Laughter
HLDS	Holds
HLTH	Health
HPE	Hope
HPN	Happen
HQ	Headquarters
HR	Here
HRD	Heard
HRI	Hurry
HRS	Hours
HTL	Hotel
HUK	Hook
HV	Have
HVG	Having
HVI	Heavy
HW	How
HW?	How Do You Copy?
HWY	Highway
IARU	International Amateur Radio Union
IAW	In Accordance With
ID	Identification
IDNTFI	Identify
IGNRNT	Ignorant
ILSTRT	Illustrate
IMDT	Immediate
IMGN	Imagine
IMPRV	Improve
IMPTNT	Important or Impatient
INCLD	Include
INCM	Income
INCRS	Increase
INDCT	Indicate
INDVDL	Individual
INFO	Information
INJR	Injure
INPT	Input
INQR	Inquire
INSPCT	Inspect
INSTNT	Instant
INTND	Intend
INTRDC	Introduce
INTRFR	Interfere
INTRPT	Interrupt
INTRR	Interior
INTRST	Interest
INTRVW	Interview
INVLV	Involve
INVSTGTN	Investigation
ISU	Issue
ITU	International Telecommunications Union
JAN	January
JDG	Judge
JND	Joined
JNT	Joint
JR	Junior
JRNY	Journey
JST	Just
JSTFI	Justify
JUL	July
JUN	June
KA	Attention
KLIX	Clicks
KMPH	Kilometers Per Hour
KND	Kind
KNO	Know
KP	Keep
KW	Kilowatt
LAF	Laugh
LAT	Latitude
LB	Pound
LBR	Labor
LCTN	Location
LDR	Leader
LEDNG	Leading
LFT	Left
LIBL	Liable
LIC	License
LID	Poor Operator
LITR	Liter
LKLY	Likely
LL	Landline (Telephone)
LMT	Limit
LN	Lane
LNGR	Longer
LO	Low
LODNG	Loading
LONG	Longitude
LOSSI	Lossey
LP	Long Path
LRG	Large
LRN	Learn
LSN	Listen
LTL	Little
LTR	Letter
LUK	Look
LUV	Love
LV	Leave
LVG	Leaving
LW	Longwire (Antenna)
LWR	Lower
M	Meter
MANI	Many
MAR	March
MAX	Maximum
MBR	Member
MCH	Much
MCHRY	Machinery
MDFI	Modify
MECH	Mechanic
MED	Medium
MEMO	Memorandum
MFR	Manufacture
MGR	Manager
MID	Middle
MI	My
MIN	Minimum or Minute
MITE	Might
MK	Mark or Make
MKG	Marking or Making
MKT	Market
MNG	Manage or Meaning
MNL	Manual
MNR	Manner
MNTN	Maintain
MOD	Modify or Modification
MODRT	Moderate
MOM	Moment
MON	Monday
MPH	Miles Per Hour
MR	Mister
MRCHNDZ	Merchandise
MRNG	Morning
MSD	Missed
MSG	Message
MSN	Mission
MSR	Measure
MT	Empty
MTG	Meeting
MTL	Material
MTN	Mountain
MVD	Moved
N	No or North
NATRL	Natural
ND	Need
NG	No Good
NIL	Nothing
NMBR	Number
NORM	Normal
NOV	November
NR	Near or Novice Roundup (Contest)
NTFDs	Notified
NTRNG	Entering
NU	New
NUK	Nook
NUTRL	Neutral
NVR	Never
NW	Now
OBTN	Obtain
OCR	Occur
OCSN	Occasion
OCT	October
OFC	Office
OFCL	Official
OFCLI	Officially
OFN	Often
OFR	Offer
OM	Old Man (Male Operator)
OMSN	Omission
OMTD	Omitted
ONLI	Only
OPOZ	Oppose
OPR	Operator
OPRT	Operate
OPRTN	Operation
OPTN	Option
OPTNTI	Opportunity
ORDNRY	Ordinary
ORDRD	Ordered
ORGNL	Original
ORGNZ	Organize
ORGNZN	Organization
OT	Old Timer
OVR	Over
OWD	Owedd
OZ	Ounce
PA	Power Amplifier or Public Address
PAMNT	Payment
PASD	Passed
PBLCN	Publication
PBLCTI	Publicity
PBLSHD	Published
PC	Printed Circuit
PCB	Printed Circuit Board
PCPTN	Precipitation
PCS	Pieces
PCTCL	Practical
PCATCLI	Practically
PD	Paid or Period
PEPL	People
PFCT	Perfect
PFR	Prefer
PFRM	Perform
PHPS	Perhaps
PKG	Package
PLSNT	Pleasant
PLSR	Pleasure
PLTFM	Platform
PMSN	Permission
PNDG	Pending
PO	Post Office
POB	Post Office Box
PPLR	Popular
PRBLI	Probably
PRCD	Proceed
PRCDR	Procedure
PRCHS	Purchase
PRCV	Perceive
PRDC	Produce
PRDCT	Product
PRDCTN	Producation
PRES	President
PRGRM	Program
PRGRS	Progress
PRHBT	Prohibit
PRLMNRI	Preliminary
PRNCPL	Principal or Principle
PRO	Professional
PRPGTN	Propagation
PRPR	Prepare
PRPSTN	Proposition
PRSR	Pressure
PRSNT	Present
PRSNTLI	Presently
PRT	Part
PRTCT	Protect
PRTI	Party
PRVL	Prevail
PRVLG	Privilege
PRVD	Provide
PRVNT	Prevent
PRVSN	Provision
PRZ	Prize
PSBL	Possible
PSE	Please
PSG	Passage
PSNGR	Passenger
PSTN	Position
PSTNT	Persistent
PSTPN	Postpone
PTBL	Portable
PTCLR	Particular
PTCPT	Participate
PVT	Private
PWR	Power
PX	Press Report
QCK	Quick
QLFI	Qualify
QKTI	Quality
QRL	Quarrel or Busy
QRTR	Quarter
QSO	Contact
QSTN	Question
QT	Quite or Quiet
QTI	Quantity

R	Are, Period, or Received Okay
RADCL	Radical
RBD	Robbed
RCC	Rag Chewers Club (Award)
RCGNZ	Recognize
RCH	Reach
RCMND	Recommend
RCOVR	Recover
RCRD	Recover
RCRT	Recruit
RCV	Receive
RCVD	Received
RCVG	Receiving
RCVR	Receiver
RD	Road
RDC	Reduce
RDI	Ready
REALI	Really
RELI	Rely
RENU	Renew
REPLI	Reply
RFLCT	Reflect
RFR	Refer
RFRM	Reform
RFZ	Refuse
RGLR	Regular
RGLTN	Regulation
RGRD	Regard
RGSTR	REGISTER
RIDCL	Ridicule
RITE	Right or Write
RJCT	Reject
RKG	Wreckage
RLF	Relief
RLT	Relate
RLTD	Related
RLTN	Relation
RLV	Relieve or Relive
RLWY	Railway
RLZ	Realize
RM	Room
RMBR	Remember
RMN	Remain
RMR	Rumor
RMRK	Remark
RMV	Remove
RNG	Running
RPR	Repair
RPRSNT	Represent
RPRT	Report
RPT	Repeat
RQR	Require
RQST	Request
RR	Railroad
RSD	Raised
RSDNC	Residence
RSLV	Resolve
RNSBL	Reasonable
RSPCT	Respect
RSRV	Reserve
RSTNC	REsistance
RTHR	Rather
RTR	Rotor or Retire
RTRN	Return
RUF	Rough
RUKD	Rooked
RVLV	Revolve
RVR	River
RVW	Review
RWRD	Reward
S	South
SA	South America
SASE	Self-Addressed, Stamped Envelope
SAT	Saturday
SBMT	Submit
SBSQNC	Subsequence
SBSQNT	Subsequent
SBSTNTL	Substantial
SCH	Such
SCLD	Seclude
SCRC	Scarce
SCTI	Society
SCTN	Section
SCTRI	Secretary
SDN	Sudden
SEC	Second
SED	Said
SEPT	September
SEZ	Says
SFCNT	Sufficient
SGNFCNT	Significant
SGNFI	Signify
SGST	Suggest
SHK	Shake
SHL	Shall
SHPD	Shipped
SHPMNT	Shipment
SHUD	Should
SHUK	Shook
SIG	Signature
SIGS	Signals
SIS	Sister
SITN	Situation
SK	End of Work
SKED	Schedule
SLRI	Salary
SLVR	Silver
SM	Seem
SML	Small
SMLR	Similar or Smaller
SN	Soon
SNTNC	Sentence
SP	Short Path
SPCFI	Specify
SPCL	Special
SPKN	Spoken
SPR	Spare
SPRT	Sport
SR	Senior
SRI	Sorry
SRND	Surround
SRVD	Served
SRVNT	Servant
SS	Steamship or Sweepstakes (Contest)
SSB	Single Side-band
SSN	Season
ST	Street
STAT	Statistic
STBL	Stable
STBLSH	Establish
STD	Standard
STEDI	Steady
STN	Station
STSFCTRI	Satisfactory
STTMNT	Statement
STUDI	Study
STWD	Stowed
SUM	Some
SUN	Sunday
SVC	Service
SVR	Severe
SVRL	Several
SW	Swear
SZ	Seize
SZR	Seizure
T	Zero
TCH	Touch
TDY	Today
TECH	Technician
TEMP	Temperature
TFC	Traffic
THRU	Through
THUR	Thursday
TIL	Until
TK	Take
TMRW	Tomorrow
TNG	Thing
TNITE	Tonight
TNX	Thanks
TRBL	Trouble
TRFC	Terrific
TRN	Train
TSTFI	Testify
TT	That
TTL	Total
TU	Thank You
TUE	Tuesday
TUF	Tough
TUK	Took
TWD	Towed
TWRD	Toward
TX	Time Tick
TXT	Text
U	You
UNACPTBL	Unacceptable
UNAUTHRZD	unauthorized
UNAVDBL	Unavoidable
UNCHNGD	Unchanged
UNCMN	Uncommon
UNCSRI	Unnecessary
UNDLVRD	Undelivered
UNDRSTND	Understand
UNFNDD	Unfounded
UNFRM	Uniform
UNFRTNT	Unfortunately
UNFRTNTLI	Unfortunately
UNFVRBL	Unfavorable
UNGRDD	Unguarded
UNHRD	Unheard
UNIDNTFD	Unidentified
UNIMPTNT	Unimportant
UNON	Unknown
UNSTSFCTRI	Unsatisfactory
UNTD	United
UNVRSL	Universal
UNXPCTD	Unexpected
UPR	Upper
UPWD	Upward
UR	Your
URGNTLI	Urgently
USLI	Usually
UTC	Universal Time Coordinated
UTR	Utter
UTRD	Uttered
UTRLI	Utterly
VALU	Value
VCNT	Vacant
VCNTI	Vicinity
VCT	Vacate
VCTM	Victim
VCTN	Vacation
VCTR	Victor
VCTRI	Victory
VERI	Very
VFO	Variable Frequency Oscillator
VGRS	Vigorous
VLBL	Valuable
VLG	Village
VLGR	Vulgar
VLNT	Violent
VLNTR	Volunteer
VLTN	Violation
VOL	Volume
VRS	Various
VRTCL	Vertical
VRTI	Variety
VRTLI	Virtually
VRTU	Virtue
VSBL	Visible
VSBLTI	Visibility
VSL	Vessel
VSN	Vision
VSTG	Visiting
VTD	Voted
VW	View
VYG	Voyage
W	West or Watts
WA	Word After
WAT	What
WB	Word Before
WED	Wednesday
WGN	Wagon
WID	With
WK	Week
WL	Welcome
WNDRFL	Wonderful
WNG	Winning
WPN	Weapon
WR	Were or Where
WRG	Wiring
WRI	Worry
WRK	Work
WRLD	World
WRNG	Warning
WRNT	Warrant or Were Not
WT	Weight
WTHR	Whether
WTR	Water
WUD	Would
WUND	Wound
WX	Weather Report
XCD	Exceed
XCHNG	Exchange
XCL	Excel
XCLSV	Exclusive
XCLUDE	Exclude
XCPT	Except
XCT	Exact
XCTG	Exciting
XCTLI	Exactly
XCTR	Exciter
XCVR	Transceiver
XFR	Transfer
XFRM	Transform
XHBT	Exhibit
XMPT	Exempt
XMSN	Transmission
XMT	Transmit
XMTG	Transmitting
XMTR	Transmitter
XPDT	Expedite
XPDTN	Expedition
XPERT	Expert
XPLN	Explain
XPLODE	Explode
XPND	Expend
XPNDTR	Expenditure
XPNS	Expense
XPNSV	Expensive
XPORT	Export
XPOZ	Expose
XPRMNT	Experiment
XPRNC	Experience
XRCISE	Exercise
XRT	Exert
XSTS	Exists
XTAL	Crystal
XTND	Extend
XTNGSH	Extinguish
XTNSV	Extensive
XTNT	Extent
XTRA	Extra
XTRM	Extreme
XTRNL	External
XYL	Married Female
Y	Why
YF	Wife
YL	Unmarried Female
YLD	Yield
YR	Year
YSTDY	Yesterday
2	To
4	For
33	Fondest Regards (Between Females)
73	Best Regards
88	Love and Kisses
99	Keep Out

This is Oni Rojas (KA4GNW) of Miami, Florida. Oni has been licensed less than a year. She has contacted amateurs in 37 states and 5 countries with a Collins KWM-2 Transceiver, Mosley CL-33 tri-band beam, and dipoles on both 40 and 80 meters. Oni and her husband (Ed, WA2VXQ/4) are expecting their first child about the time this issue is printed. Congratulations from the father of 2 daughters and 5 sons!

This concludes the two part series on the amateur's version of the Phillips Code. Some abbreviations are phonetic, others are telegraph work signs, and a few are simply recognized abbreviations frequently seen in print. In addition to all of these telegraph shortcuts, we also use three-letter Q signals to ask questions and make statements. Our shortcuts are easy to understand and they enable us to exchange information with minimum effort and in less time than would be required if we spelled out each word and phrase. Remember to take it easy on new operators; do not confuse them with shortcuts they do not yet know. Suggested changed and additions are welcome, of course.

Bill, 73, W6DDB

a monthly feature by

IRWIN MATH, WA2NDM

Math's Notes

A look at the technical side of things

Before beginning our discussion this month, I would like to express my best wishes to the new staff of *CQ* Magazine. I have known Dick Ross and Al Dorhoffer for many years and am certain that *CQ* will prosper as well as continue to fill its role as the "Amateur Radio Operator's Journal" under their very capable leadership.

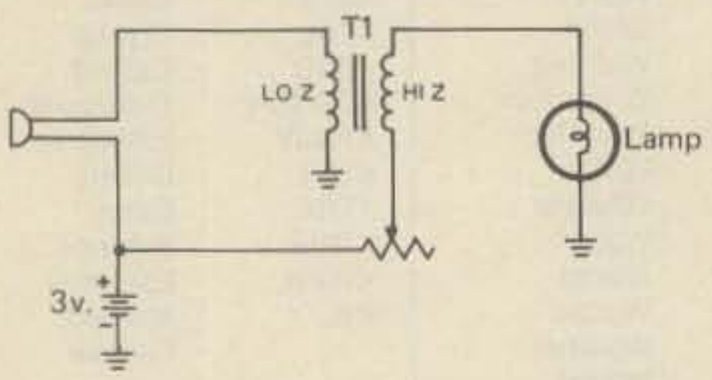

Fig. 1- A simple a.m. light transmitter. T_1 can be a 24 v./115 v. filament transformer, audio, audio output, etc. Just be certain it can carry the lamp current.

Several months ago, we did a couple of articles on fiber optic communications sytems and received a number of letters from interested readers who were looking for a way to eliminate the fibers and transmit signals, via light, directly through the air.

Although transmitting signal by means of light goes back to the simplest use of a mirror to reflect sunlight in a coded manner, the first "electronic" systems made their appearance in the 1930's and early 40's. The scheme was quite simple and, can be easily duplicated today. Fig. 1 is the transmitter. As you can see, only a carbon microphone, battery, variable resistor, audio output transformer and flashlight lamp are necessary. To "tune up" the transmitter, set the variable resistor to the point where the lamp glows at half brightness and talk into the microphone. The lamp will now flicker in direct relationship to your voice. The loudness of your voice should be just enough to not blow out the lamp on peaks. If there is too much sensitivity, reconnect the lamp to a lower voltage point on the supply. By experimenting with different lamps, battery voltages and transformer, turns-ratios, excellent "phone" transmitters can be built. If you will be attempting long range operation a good optical "antenna" will be necessary. Such an "antenna" can be as simple as a #222 lamp with a built in lens, or as elaborate as telescope used in reverse with the lamp mounted at the eyepiece. An excellent and inexpensive in-between choice is the reflector and lamp assembly from a hand-held battery operated lantern of the 6 volt style. Such a system will allow ¼ to ½ mile ranges to be easily achieved. Incidently, the mode of transmission is pure a.m.!

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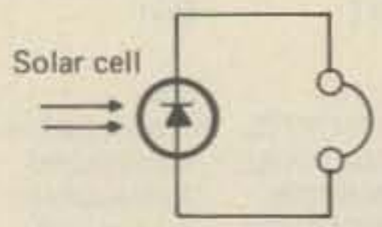

Fig. 2- By connecting a pair of earphones to a solar cell, a quick optical receiver can be fabricated for testing purposes.

On the receiving side, things are not much more complicated. For quick testing purposes, a simple silicon solar cell connected to earphones will work as show in fig. 2. To get a bit more elaborate, you can couple the solar cell to an amplifier as shown in fig. 3 and add a 2-3 inch diameter magnifying lens in front of the cell as an "antenna." By carefully adjusting the spacing between the lens and the photocell the most sensitive point can be determined. Then the system is ready for operation.

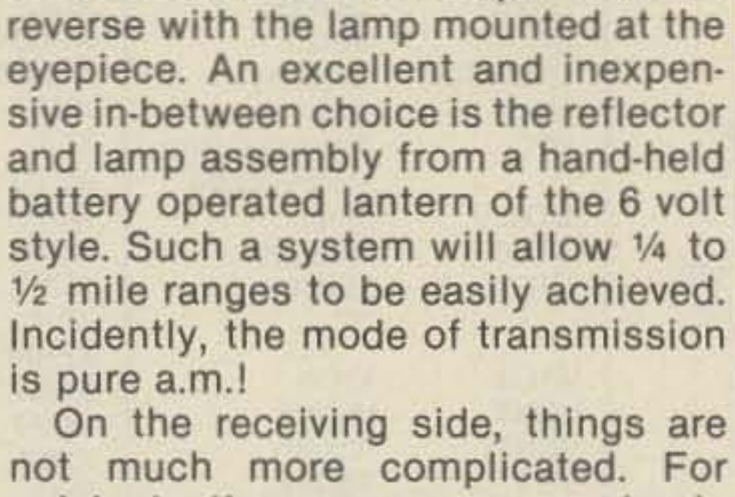

Fig. 3- Here an amplifier has been connected to the solar cell for a more sensitive receiver.

By using the circuit shown you can transmit voice signals. If you would like to employ c.w., the circuit of fig. 4 is necessary. Here the transmitting lamp is placed across the coil of a buzzer and blinks on and off at the same frequency as the buzzer. As in normal radio communications, overall range of this system is quite a bit more than the simple phone system. When experimenting with such a setup for the author's book *Morse, Marconi and You*[1] a range of 1 mile was achieved in an open field after careful adjustment.

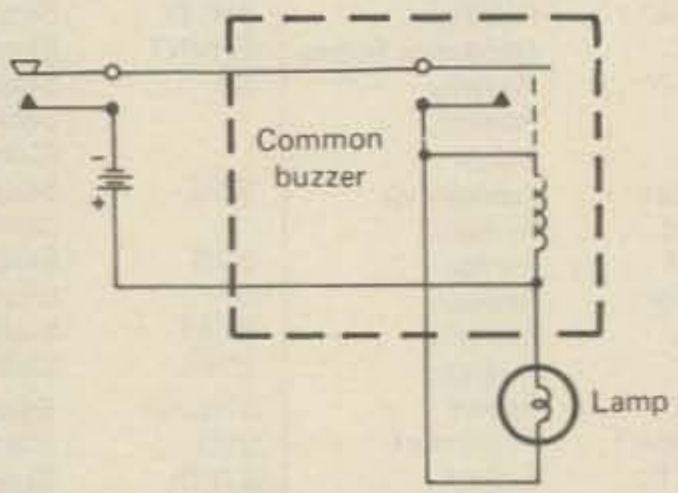

Fig. 4-By modifying a common doorbell buzzer, a simple c.w. transmitter can be fabricated.

In all of the circuits mentioned, the best choice for lamps are the 1-4 cell flashlight varieties. These all have short, fast reacting filaments that easily respond to audio signals or buzzer interuptions. Higher power lamps suffer from long response times and just do not operate properly. As in most cases, experimenters will yield the proper combinations to allow really long range communications to be achieved. Finally like all very and super-high frequencies work, everything is strictly line-of sight (but you can use mirrors).

Until then, have a very Merry Christmas, Happy Chanukah, and a multiple of projects that work—the first time around! 73, Irwin, WA2NDM

[1] *Published by Charles Scribners Sons, New York, New York 1979 and available in most bookstores.*

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

"This place has been like a morgue", I said, glancing at Pendergast who has stopped by for a chat on his way home. "Where are Doctor Liv and Johnathan Cadaver?"

"They went to the Ham Convention", replied Pendergast with a sigh. "Personally, I'm pooped out on conventions."

I did not reply, so he continued," Want to know what Fukui Makota said about conventions?"

"Who's he?", I rejoined. "Never heard of him."

"Well, Fukui Makota was the Japanese Commissioner to the Philadelphia Exposition of 1876. After visiting the Exposition, he said, 'The crowds come like sheep, run here, run there, run everywhere. One man start, one thousand follow. Nobody can see anything, nobody can do anything. All rush, push, tear, shout, make plenty noise, say damn great many times, get very tired, and go home'. That's what the Ham Convention was like."

I sighed." I agree. Guess I am getting old. However, something good often comes out of Conventions. Especially the Technical Symposiums. I remember there was a very interesting paper presented at the 1975 ARRL National Convention by Ralph Robinson, W3IOA, who is at the Applied Physics Laboratory of John Hopkins University. Ralph holds the patents on several interesting aircraft antennas, and has developed a method of feeding a ham tower on various low frequency bands. Ralph Ladd, W3KA, was kind enough to send me a copy of the W3IOA presentation. It may be of interest to you."

I tossed Pendergast a impressive booklet that had been distributed at the Convention. "W3IOA has had this antenna design up for about 3 years now and has had good DX results on 80 meters. In essence, the installation is an elevated vertical dipole which does not require a ground plane or radial wires.

"The basic antenna installation at W3IOA is a triband Yagi for 20-15-10 meters mounted atop a freestanding *Rohn-Spaulding HDX-48* tower (fig. 1). Atop the tribander is a *Ringo Ranger* 2 meter antenna, and both antennas are mounted atop a 5 foot mast extending above the tower. The overall height of the installation is 61 feet.

"The idea is to transform the tower and high frequency antennas into a vertical dipole by the use of attachments called "isolators" and "exciters" which are shortened quarter-wave sections attached to the tower (fig. 2). The isolator elements control the flow of rf current in the tower legs and thus isolate the tower from ground on 80 meters. One isolator is used for each leg of the tower and is tuned to a specific spot in the 80 meter band.

"The elevated vertical antenna is excited in its central portion by another shortened quarter-wave section attached to the tower. This device is the exciter. A 50 ohm transmission line is tapped on the isolator element.

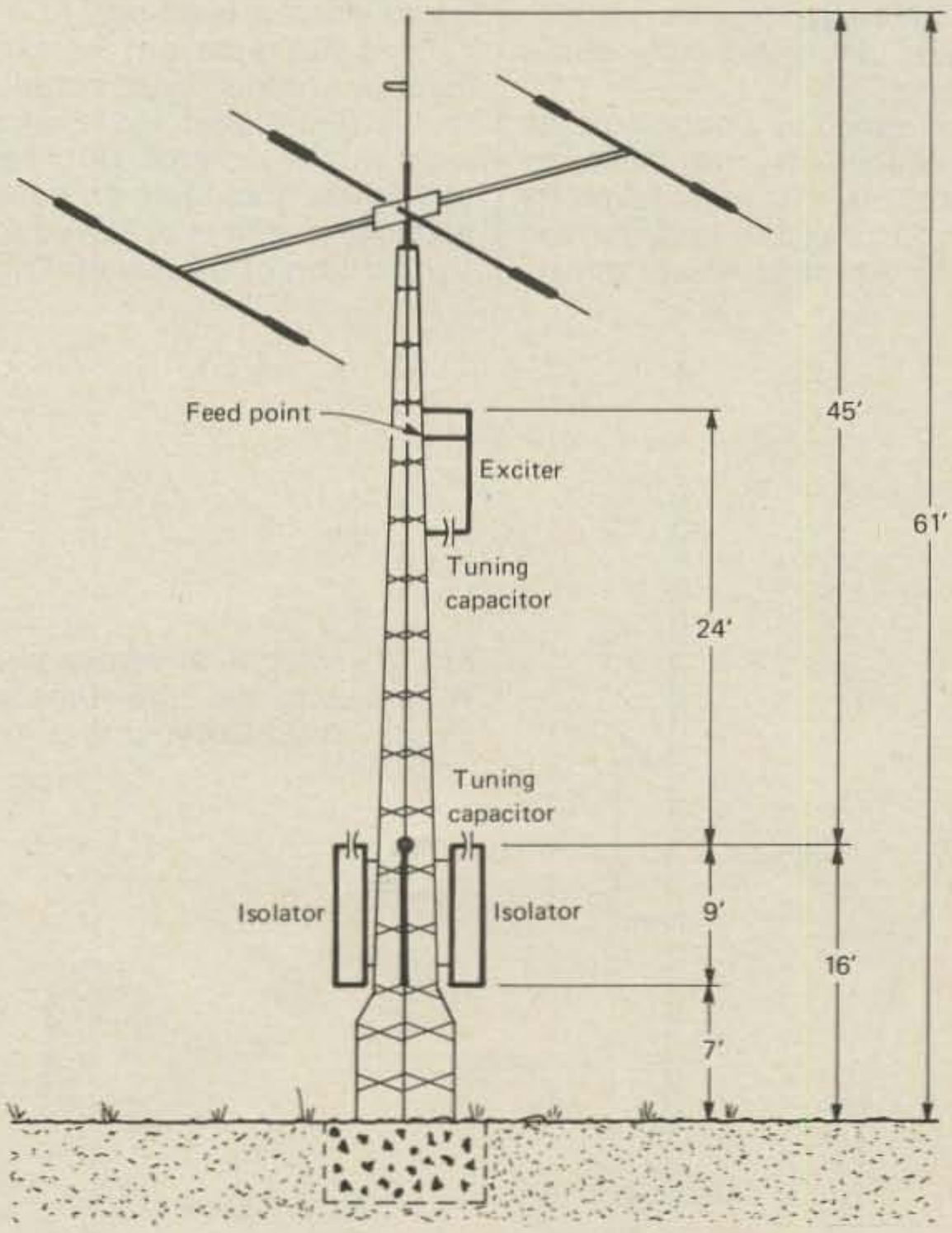

Fig. 1 - The multiband antenna installation at W3IOA. A tribander beam covers 20, 15 and 10 meters, with a 2 meter vertical antenna mounted atop it. The tower is used as a half-wave vertical antenna for either 40 or 80 meters by the addition of "isolators" (one for each tower leg and and "exciter". The exciter is a modified gamma match that provides a transformation from the tower impedance to a 50 ohm transmission line. (Drawing courtesy of W3IOA and W3KA).

48 Campbell Ln., Menlo Park, CA 94025

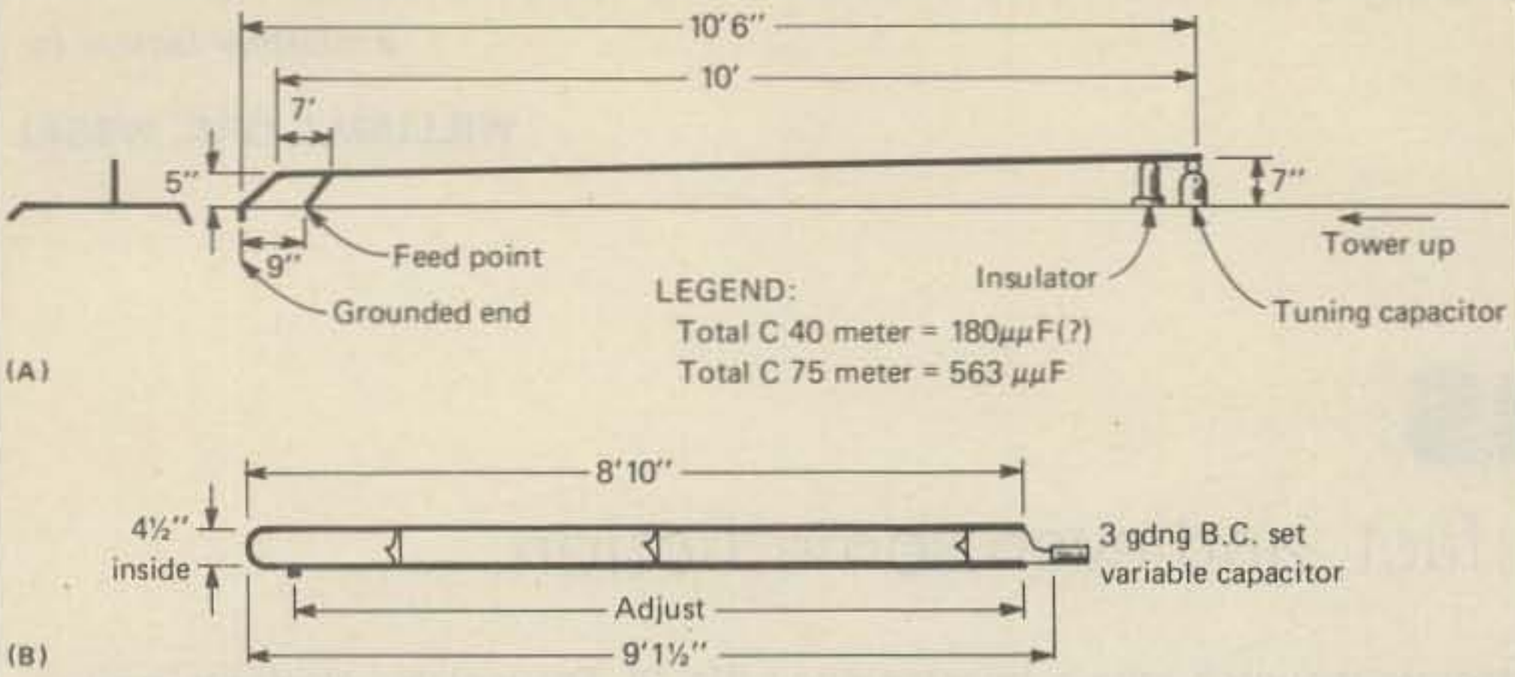

Fig. 2 - Drawing of shunt-fed exciter and isolator elements. Although shown in a horizontal position, devices are mounted vertically on the tower legs, as shown in fig. 1. Length of devices was determined by experiment. Exciter device is attached to the tower at its upper end and held away from the tower by a 7" insulator at the bottom end. A vacuum variable tuning capacitor was used on the exciter element. (Drawing courtesy of W3IOA and W3KA).

"And electrical representation of the W3IOA antenna is shown in fig. 3. The isolator is represented by a parallel resonant circuit (a trap, if you wish to call it that) which presents a high impedance to r.f. energy at its resonant frequency. The isolator is quite short in relation to a wavelength at 80 meters, being typically about nine feet long.

"The dipole formed by a portion of the tower is raised off the earth by distance *d*. This distance is pretty much the choice of the installer and depends somewhat on tower dimensions. In any event, it helps to remove the antenna from the vicinity of the ground and thus reduces ground losses."

"How is the antenna excited?", asked my friend as he looked at the diagrams." You can't break a tower leg to insert a feedline."

"You can represent the exciter element by another tuned circuit. It is, in fact a distributed inductance, as is used in the isolator. But the tapped coil gives the idea of how an impedance match is achieved to the active portion of the tower. This device is very short, compared to the wavelength at 80 meters, being about ten feet long".

Pendergast frowned. "The exciter element looks like a gamma matching section to me", he observed.

"Not quite", I replied. "But you have the right idea. Notice that both the exciter and the isolator are tuned to frequency by means of a variable capacitor at the 'hot' end of the assembly. W3IOA used variable vacuum capacitors in his installation. He adjusted the devices before he put them on the tower."

"How did he do that?", demanded Pendergast, as he began to make notes and drawings in his ever-present notebook.

"The devices are constructed of half-inch diameter copper tubing, right-angle joints and T-joints purchased from a plumbing store. For starters, the resonator is suspended in the clear, about eye level and is resonated by a 3-gang broadcast tuning capacitor. To get the reasonator on frequency, it was excited by a signal generator coupled by a link coupled to the shorted end of the device. A high impedance pick-up rf volmeter is coupled to the 'hot end,' and the capacitor is tuned for maximum voltage. Once the required capacitance is found, the value is logged for future use. The exciter is attached to a tower leg by means of a cross bar whose flattened ends have holes drilled to match the bolt holes used to assemble the tower. Both are tinned before assembly so that similar metals are in contact with each other. The 'hot' end of the isolator is supported by a long ceramic insulator. The variable vacuum capacitor—a fragile item—is connected across the insulator to protect it from mechanical stress. The capacitor is pre-set to the capacitance determined in the test just completed.

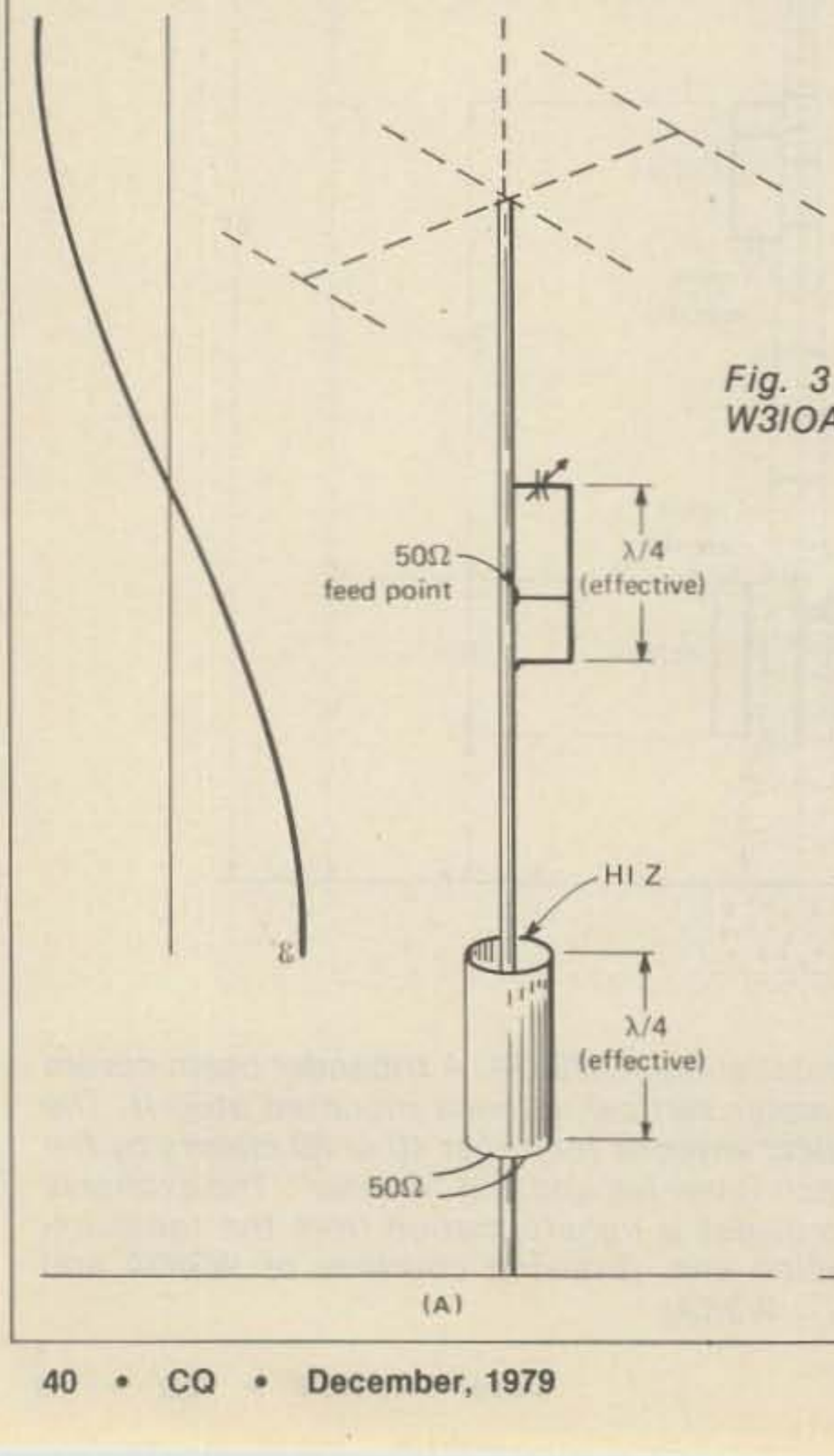

Fig. 3 - Electrical representation of W3IOA antenna. (Drawings courtesy of W3IOA and W4KA).

"The isolator is placed at a location estimated, by eyeball, to be near the mid-point of the 80 meter dipole. Ralph put it where it is because there were some pre-drilled bolt holes in the tower at about the right point.

"The isolator is attached to the tower at its upper end using a copper T. The rod is held away from the tower at the lower end by a 7-inch long insulator. The spacing of this isolator section, incidentally, bears an inverse relationship to the value of capacitance required for resonance.

"Gosh", said Pendergast. "Does this idea work on any tower?"

"Well, Ralph states that it would be a rare coincidence if all, or even a few, of the physical dimensions selected for his installation were the ultimate

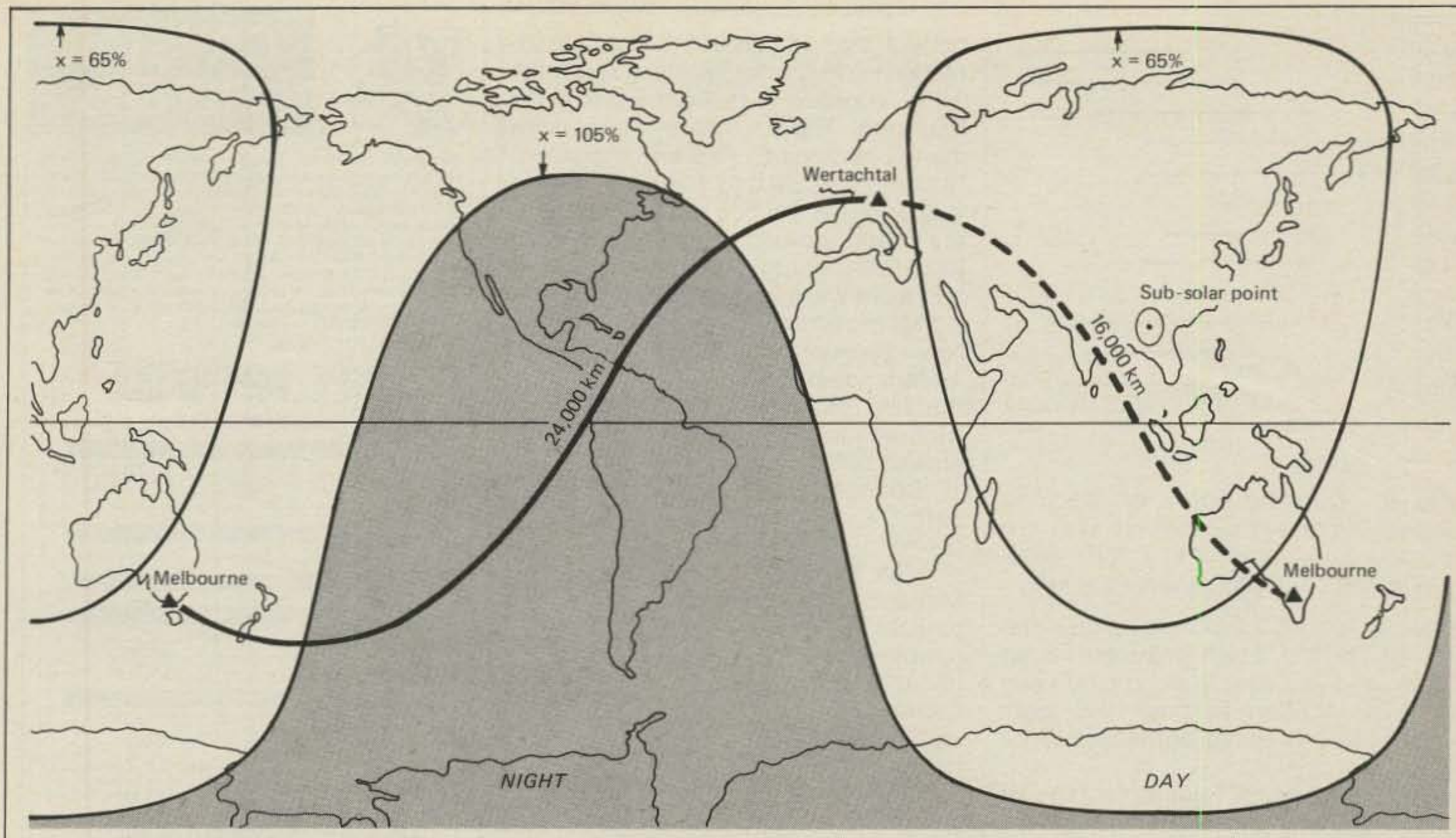

Fig. 4 - Short and long Great Circle paths between Germany and Australia with day and night zones indicated. X is the sun's Zenith angle. (Drawing courtesy of Telecommunications Journal.

of optimizations. But the important consideration is that, taken as a whole, the system works!"

"Are there any adjustments after the units are on the tower?", asked Pendergast, as he scribbled away.

"Yes, you have to fine-tune the isolators. You couple a signal generator to the "cold" end and tune the isolator for maximum voltage in a r.f. voltmeter coupled to the 'hot' end. The last adjustment is tune the exciter element for low s.w.r. on the feedline. Of course, this is only a quick run-down, and if you want more information about the system you might write to either W3KA or W3IOA, inclosing a stamped, self-addressed envelope. They might be able to provide more details.

"Right", declared my friend. "I might just do that."

I tossed a magazine to Pendergast who caught it deftly without missing a word he was inscribing in his notebook.

"This is a recent copy of the *Telecommunication Journal,* published by the International Telecommunications Union in Geneva, Switzerland, I said. "There's a very interesting aricle in the propagation of the long distance signals between Germnay and Australia via the short and long paths on 9 MHz and 21 MHz. It concerns itself with reception of shortwave broadcast signals, but the information applies equally to amateur transmissions. The great circle and long path are shown in fig. 4. Note that the long path travels through a zone of darkness (the shaded area) while the short path travels through sunlight. Here is a condensation of what the article says.

"In order to reach listeners in Australia during the evening hours it is necessary to broadcast during the European morning time. The short cicle path is illuminated by the sun which implies high ionospheric absorption in addition to the path attenuation. On the other hand, the long great circle path in its major parts passes through the dark hemisphere so that considerably less signal absorption is encountered. Morover, the maximum usable frequency (MUF), which also depends upon the position of the sun, is lower for the long path than for the short path. On the 9 MHz band, this path was successful for the year and the results found on the two frequencies, expressed as a percentage of satisfactory reception are shown in fig. 5.

"The authors of the article state that they were originally encouraged to try these tests because of the experience of radio amateurs in using long path circuits successfully.

"Opening hours of the long path at 7 MHz and 9 MHz during all months of 1958 are shown in fig. 6. It looks as if the spring months are the best for the DL-VK path, with May showing a long path opening of nearly four hours, starting about 0425 Zulu and running to 0800 Zulu. Notice that as summer and fall approached, the open period for long path transmission grew progressively shorter and the openings appeared later each month. The shortest long path opening occurred in December for a period of about two hours from 0715 Zulu to 0915 Zulu.

"There are more long path openings than one might think. For example, there's a West Coast (W6) opening just at sunrise during the winter months (about 1530 Zulu) via the long path to Europe on 80 meters. You can

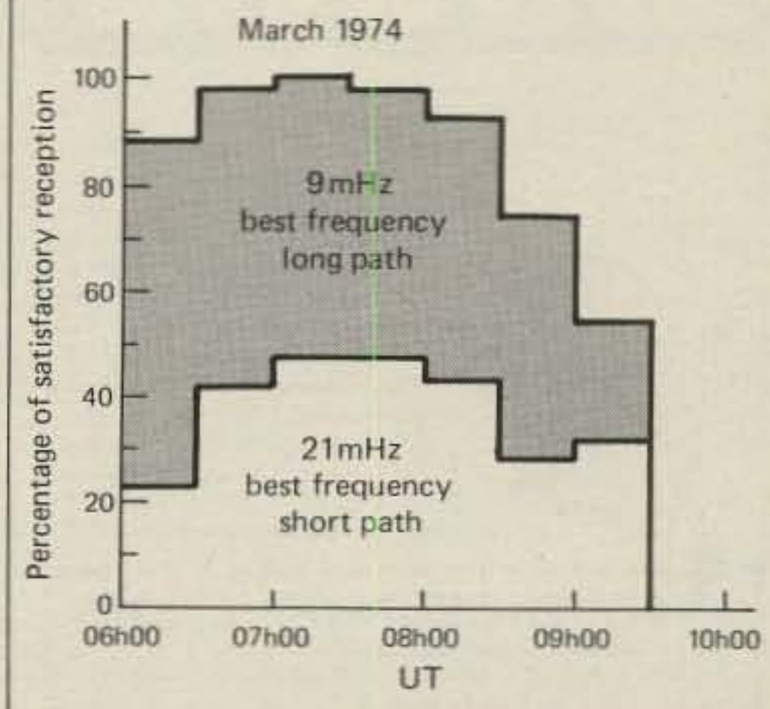

Fig. 5 - Percentage of satisfactory reception via the short and long great Circle paths (from the Telecommunications Journal).

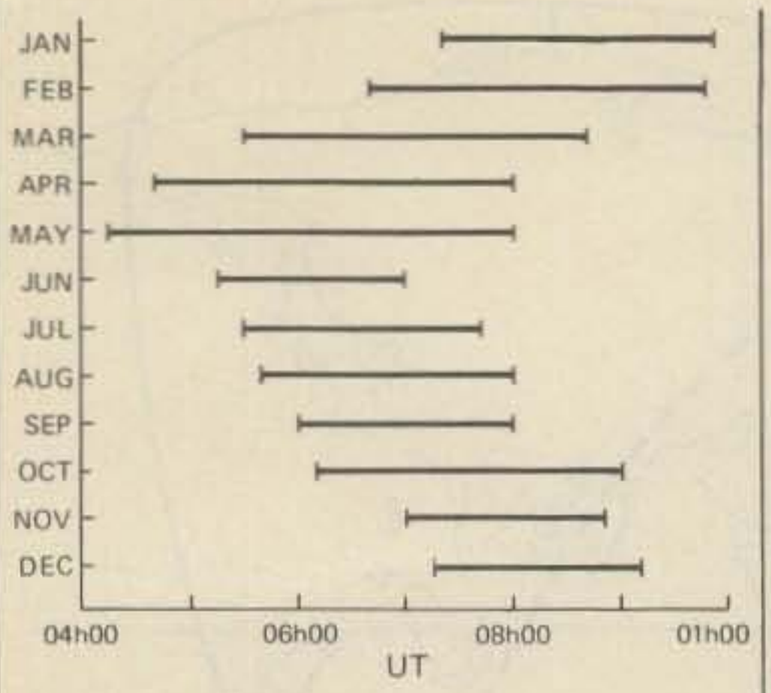

Fig. 6 - Opening hours of the long Great Circle path between Western Europe and Australia at 7 MHz (from the Telecommunication Journal).

hear a lot of European s.s.b. just below 3.8 MHz. The signals are rather weak, and you need a good beam and a quiet location to hear and work them, but it is being done by a lot of DX'ers.

"Too few hams take advantage of the long path. Some of them do, and they work a lot of DX. I just received a letter from a DX'er in New Jersey who reports good 10 meter long path openings during last spring. The openings were to Japan, Australia, Indonesia and Siberia. In March there was an excellent opening about 0345 Zulu to Malaysia (9M2) and Western Australia (VK6). Very few W stations were on for that one. Then in April there were many openings to VK6 and Japan between 1100 Zulu and 1330 Zulu. There was an excellent one on April 17 when my friend worked VK6 on s.s.b. the long path, using a converted CB rig and a 5/8-wave vertical antenna.

"More recently, the long path from New Jersey to the Far East on 10 meters has been closed, but he noted that EA7PW in Spain was able to work Australia long path (through the USA) around 0500 Zulu. That was in July."

"Sounds as there's a lot of long path DX on all bands", observed my friend.

"Yes. Some years ago I operated in Monaco (3A-land). I found the long path to California opened within five minutes of 1715 Zulu each day. It was uncanny. I knew that I could hear California and could almost set my watch by the long path opening. At first I would hear Southern California. San Diego would come in, followed in 10 minutes or so by Los Angeles. The skip would move up the West Coast, the Los Angeles fellows dropping out as I started to work the San Francisco gang. Then I would hear Portland, Oregon, and finally Washington and British Columbia.

"If conditions were exceptionally good, the long path skip would then swing about and turn down south once again, only it would be inland: I would work Salt Lake City and then finally, just before the band dropped out, I could work Tucson, Arizon. The long skip seemed to follow an elliptical path—south to north then back down south again. The whole cycle seemed to take about 30 to 45 minutes.

"DX'ers would be wise to keep notes of long path openings in their area. As you can see, it's sometimes easier to work DX via the long path than it is by the conventional, short Great Circle path."

Pendergast executed an earsplitting yawn. "It's about time I went home", he admitted. "Anything else new?"

"I think I hold the world's record for a delayed QSL card", I said." In the fall of 1938 I worked XX2JQ, a maritime-mobile station enroute from Calcutta to Europe. He was in the Mediterranean at the time. I just got the QSL card a few months ago. I met Johnny, ZL2AM, a few months ago and found to my surprise that he was old ZL2JQ and worked clandestine XX2JQ on the *City of Marseilles* in '38. The ship was later sunk in Ceylon harbor in 1942. In any event, John confirmed the contact and dug up an old XX2JQ QSL card for me. It is now one of my prized confirmations—forty one years after the QSO. Can you beat that?"

"No", admitted my friend." But I'm still trying to get a QSL card from the first station I worked as a Novice".

Note- Interested in DX antennas that work? Suggested reading is the new *Radio Amateur Antenna Handbook*, by W6SAI and W2LX. Latest information and dimensions on all types of antennas that you can build. Write to Box 149, Wilton, CT 06897 for full details.

CIRCLE 18 ON READER SERVICE CARD

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- Continuous coverage 160-10 meters.
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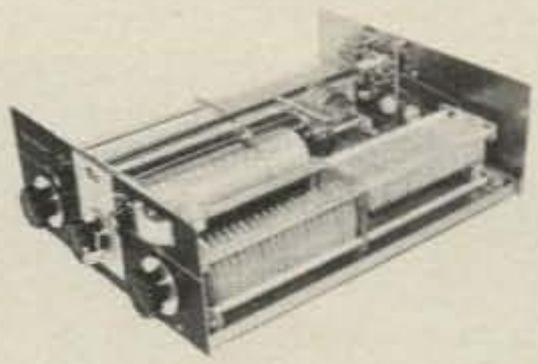
- 12"W x 15½"D x 5"H, 13 lbs. shipping wt. $218.50 + shipping.

Internal Construction Of UT-2000B



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MODEL UT-2000A ULTIMATE TRANSMATCH

Similar to the one in Lew McCoy's article July 1970 QST also 1976 Handbook

- Use with any coax or end fed random wire antenna, ideal for apartment dwellers
- 80-10 continuous, including MARS
- Rotary inductor with turns counter for precise and rapid tuning
  12"Wx12"Dx5½" H, 12 lbs. shipping wt.
  $139.95 + shipping

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- With all the features of the popular UT-2000A.
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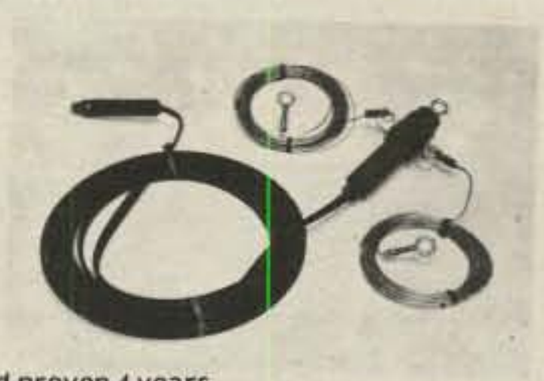
- No external meter required.
- 12"W x 12"D x 5½"H, 12 lbs. shipping wt. $168. + shipping.

MODEL 68A MULTIBAND ANTENNA 10-80M



- Field proven 4 years
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- Coax fitting to connect twin lead to 52 ohm transmission line (68 feet or more, not included)
- Ready to use. Great on all bands when used with the Ultimate Transmatch
- 2000 w P.E.P.
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- Use these Transmatches with any antenna—dipoles, random wires, verticals, whips, beams
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- Provides SWR of 1 to 1 to the transmitter
- Full legal power on all bands 160 to 10 meters (UT-2000A 80 to 10)
- Outputs for coax, random wire, balanced line
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- Use with any watt meter, SWR bridge
- Changing frequency by a few kilocycles normally requires only a slight adjustment

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CIRCLE 50 ON READER SERVICE CARD

CQ Showcase

ICM's Ground Station Satellite Receiver

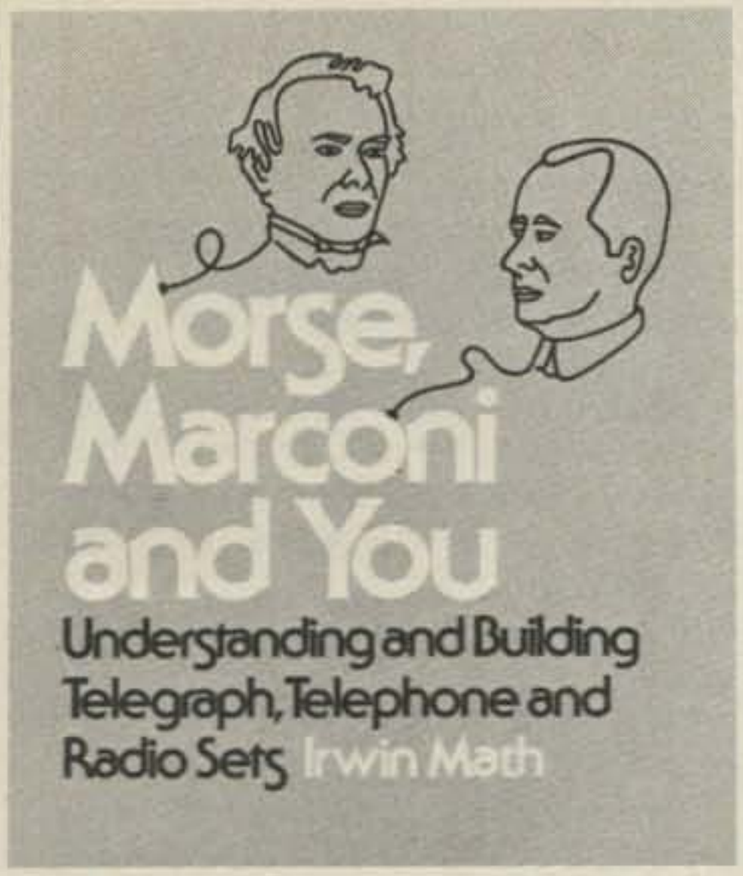
A new low cost satellite receiver covering all channels from 3.7 to 4 GHz is now being manufactured by International Crystal Manufacturing Company. The TV 4200 receiver is fully tunable and provides standard dual audio outputs of 6.2 and 6.8 MHz, with other outputs available. The receiver has a built-in LNA power supply and output levels are compatible with video monitor or VTR input.

The 4200 is priced at $1,995 in quantities of 1-9 units. For more information, contact International Crystal Manufacturing Company, Inc., 10 North Lee, Oklahoma City, OK 73102, or circle number 82 on the reader service card.

Turnex International's Shaft Shear

Turnex International has announced the availability of the Shaft Shear, which will cut shafts of potentiometers, variable capacitors and rotary switches. Even delicate helical potentiometers can be safely worked on. Manufactured of Swedish hardened tool steel, it will cut copper, brass, aluminum, mild and stainless steel and plastic rods of diameters 1/16, 1/8, 1/4 inch and 3, 4, 5 and 6 millimeters.

Additional finishing operations are not necessary. Price is $120. The Shaft Shear can be obtained from Turnex International, 1800 16th St., Newport Beach, CA 92663. For more information, circle number 77 on the reader service card.

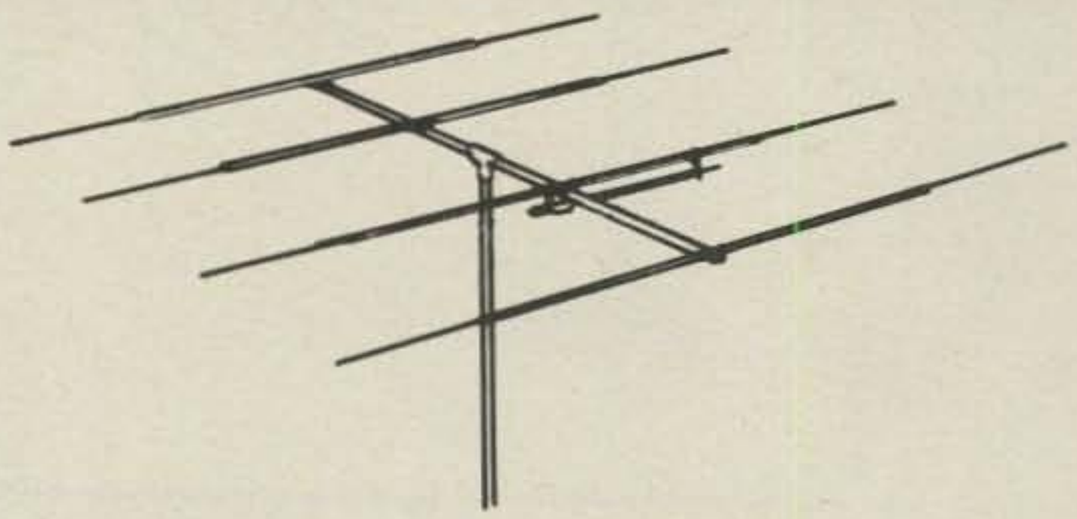


Morse, Marconi And You
For The Experimenter

Morse, Marconi and You by Irwin Math, author of *CQ*'s monthly feature "Math Notes," has been published by Charles Scribner's Sons. This clear, step-by-step guide to building the revolutionary communications devices built by Morse and Marconi shows how the reader, using many of the same materials the inventors used, can build telegraph, telephone and radio sets.

Proceeding from a basic understanding of the nature of electricity, the young scientist works with wood, tin-can metal, bell wire and common hardware store items, together with inexpensive commercial components, to build functioning devices. One project leads logically to the next, often utilizing components built for earlier projects.

Morse, Marconi and You is priced at $8.95 and can be obtained from Charles Scribner's Sons, 597 Fifth Avenue, New York, NY 10017, or for more information, circle number 83 on the reader service card.



Hustler's 10-Meter Yagi Antenna

Hustler's new 10-meter yagi antenna is designated the 10-MB-4. This 4-element yagi has been designed for best directivity, optimum front to back ratio and maximum gain through selective element spacing and precisely resonated element length.

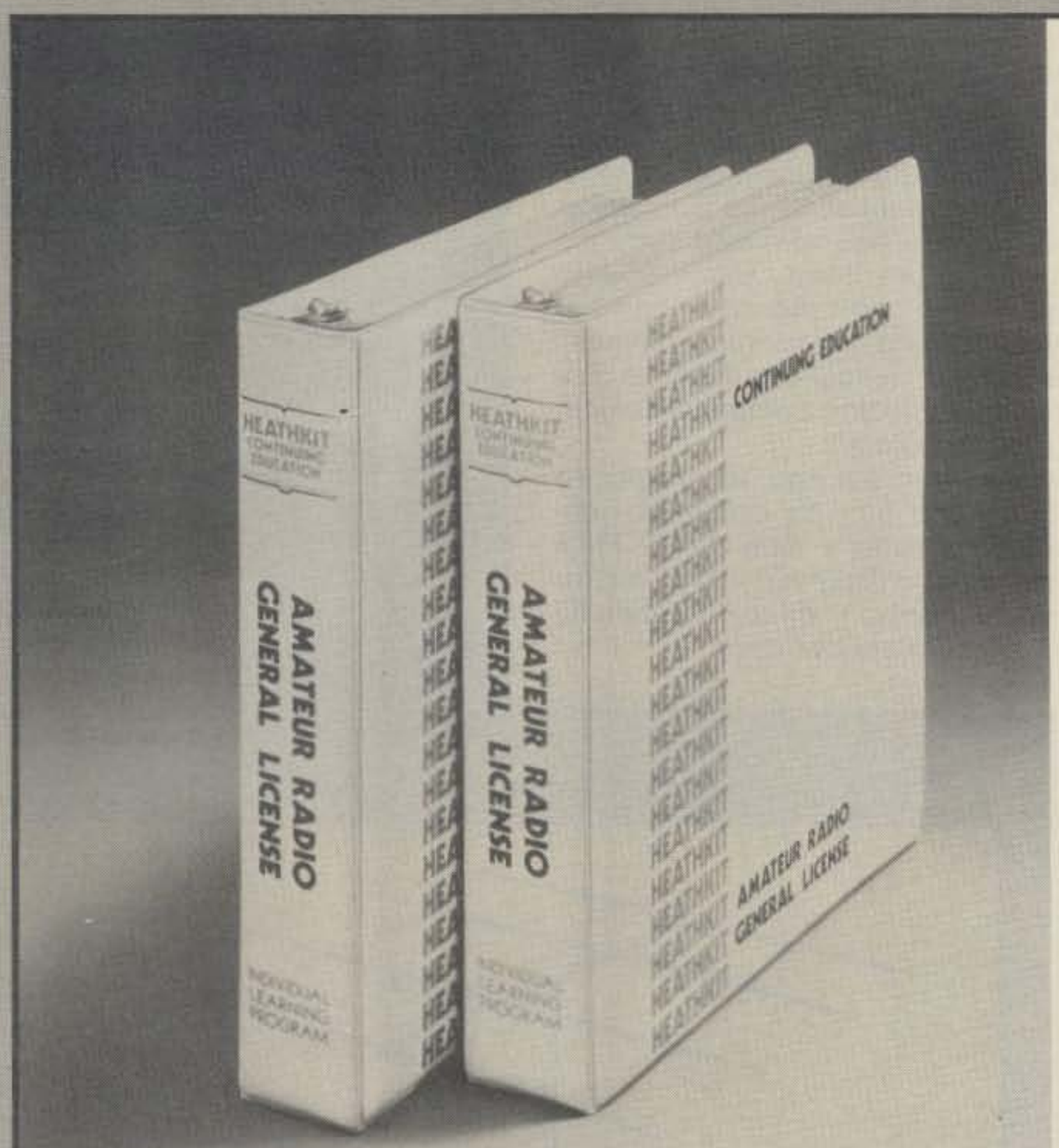
The 10-MB-4 employs a gamma match feed system and is fully adjustable for a 1.2:1 or better SWR at resonance. It has been constructed to withstand severe weather yet is light enough to be accommodated by a TV antenna rotator. Constructed of high-strength aluminum tubing, the antenna can be easily grounded for lightning protection.

Suggested list price is $109.95. For further information, contact Hustler Inc., 3275 North B Avenue, Kissimmee, FL 32741, or circle number 79 on the reader service card.

Russell's Hand-Held Pocket Scanner DIGI-10

Russell Industries has introduced a new hand-held pocket scanner for high-low VHF bands. The DIGI-10 is lightweight with 10 channels and a scan rate of 15 channels per second, giving you instant access to police, fire, weather and other special-interest broadcasts on high and low VHF bands.

Also featured are LED display readout, manual/automatic pushbutton stepping from channel to channel, over-passing switches to lock out unwarranted monitoring, one-second delay switch to hold desired channel position, squelch control, rechargeable nickel cadmium batteries and AC battery charger. Dimensions are 2-3/4 × 5-5/8 × 1-1/4 inches, and the unit weighs 8.8 ounces. For more information, contact Russell Industries, Inc., 3069 Lawson Blvd., Oceanside, NY 11572, or circle number 84 on the reader service card.



Heath's Amateur Radio License Program

Heath Company has introduced a self-instruction program for passing FCC Technician and General Class Amateur Radio License exams. The program, divided into 15 units, covers the materials FCC exams are based on. Unit exams check the student's progress while giving practice at exam taking. Also included are cassett practice tapes said to prepare the individual to send and receive Morse code up to 15 words per minute, two words per minute above the FCC General Class requirement.

The program includes a code practice workbook, a world map of call areas, a booklet on solving radio and TV interference problems, log book, a copy of FCC amateur radio rules and regulations, FCC Form 610 required to apply for the exam and a schedule of exam dates and locations.

Mail-order priced at $49.95, the program carries a money-back guarantee should the purchaser fail the Technician or General Class FCC exam. It can be obtained from Heath Company, Benton Harbor, MI 49022, or circle number 80 on the reader service card for more information.

Continental Specialties' Digital Capacitance Meter

Continental Specialties Corp. has introduced a professional, bench-style Digital Capacitance Meter, Model 3001, which displays a 3½-digit capacitance measurement with 0.1% accuracy. The 3001 measures from picoFarads to 0.1999 Farad.

The instrument offers nine measurement ranges, with automatic underrange and overrange indications. The basic accuracy of the unit is enhanced by a zero calibration control. The 3001 performs charging curve integration for an RC circuit and uses two thresholds.

The unit is AC powered, eliminating the accuracy and dependability problems associated with battery-powered equipment. Suggested U.S. resale price is $190, and the 3001 comes with a 40-page manual that describes applications. A number of production-oriented accessories are also available. For more information contact Continental Specialties Corp., 70 Fulton Terrace, New Haven, CT 06509 (West Coast Office—351 California St., San Francisco, CA 94101), or circle number 78 on the reader service card.

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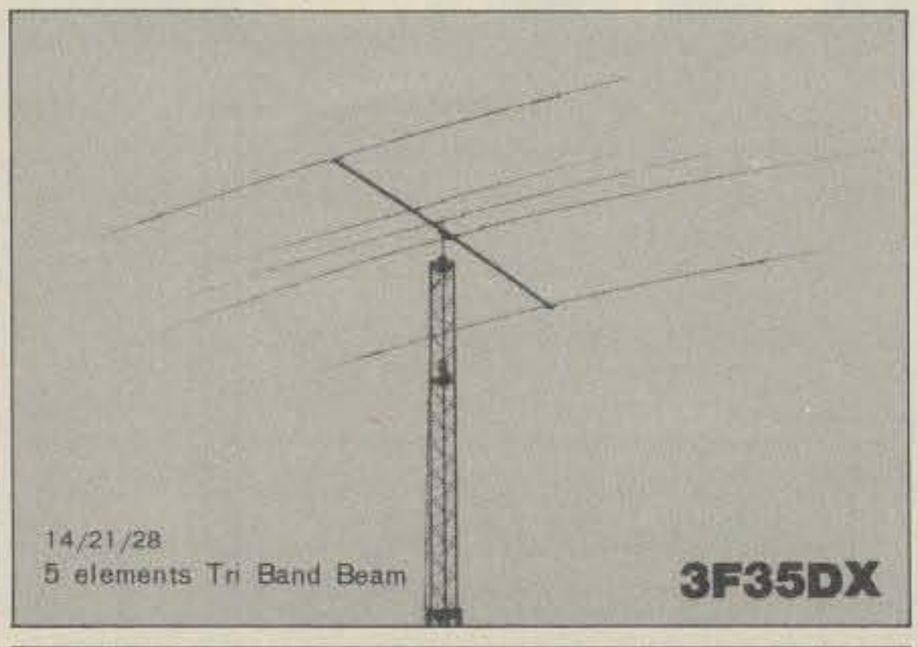

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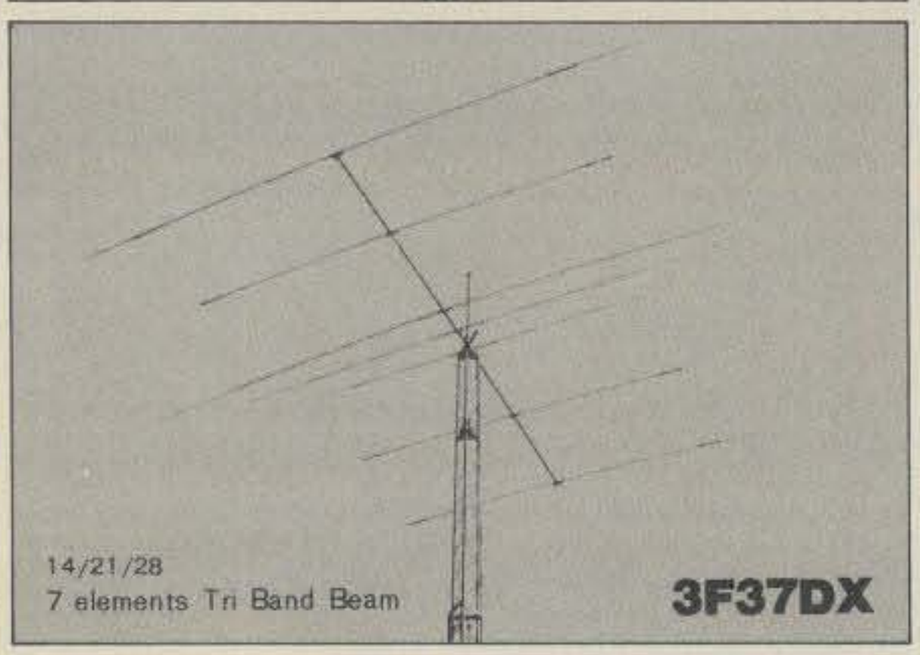

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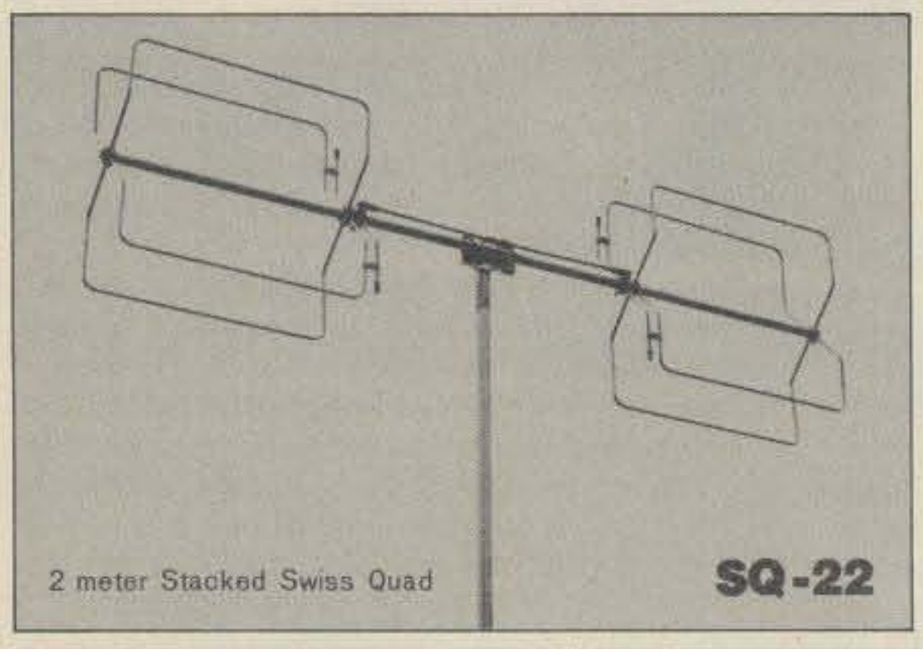

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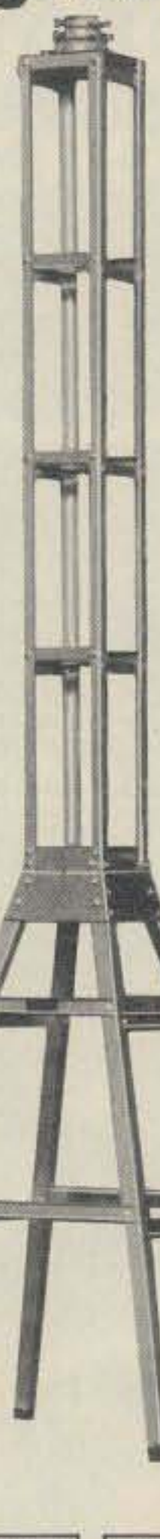

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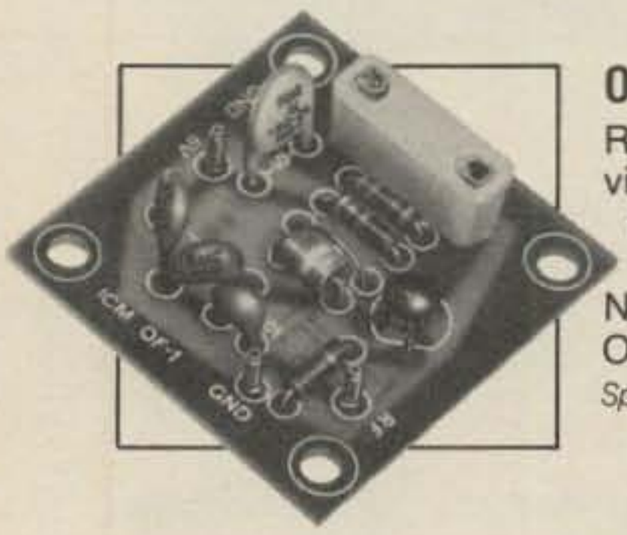
Specify when ordering. $5.22 ea.

MXX-1 TRANSISTOR RF MIXER

A single tuned circuit intended for signal conversion in the 3 to 170 MHz range. Harmonics of the OX or OF-1 oscillator are used for injection in the 60 to 179 MHz range. 3 to 20 MHz, Lo Kit, Cat. No. 035105. 20 to 170 MHz, Hi Kit, Cat. No. 035106.

Specify when ordering. $5.80 ea.



OF-1 OSCILLATOR

Resistor/capacitor circuit provides osc over a range of freq with the desired crystal. 2 to 22 MHz, OF-1 LO, Cat. No. 035108, 18 to 60 MHz, OF-1 H Cat. No. 035109.

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PAX-1 TRANSISTOR RF POWER AMP

A single tuned output amplifier designed to follow the OX or OF-1 oscillator. Outputs up to 200 mw, depending on frequency and voltage. Amplifier can be amplitude modulated 3 to 30 MHz, Cat. No. 035104.

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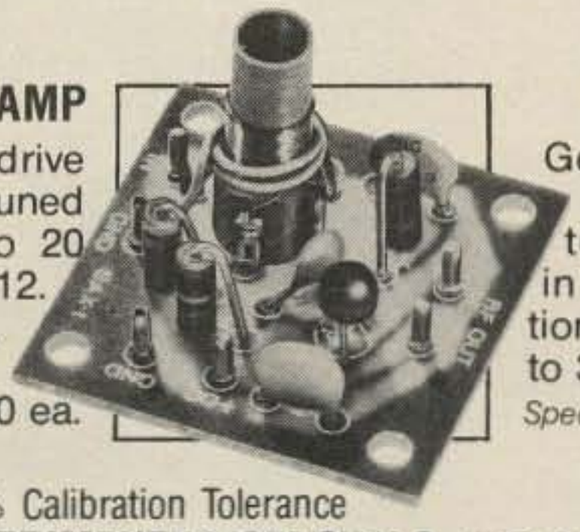
SAX-1 TRANSISTOR RF AMP



A small signal amplifier to drive the MXX-1 Mixer, Single tuned input and link output. 3 to 20 MHz, Lo Kit, Cat. No. 03512. 20 to 170 MHz, Hi Kit, Cat. No. 035103.

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BAX-1 BROADBAND AMP

General purpose amplifier which may be used as a tuned or untuned unit in RF and audio applications. 20 Hz to 150 MHz with 6 to 30 db gain. Cat. No. 035107.

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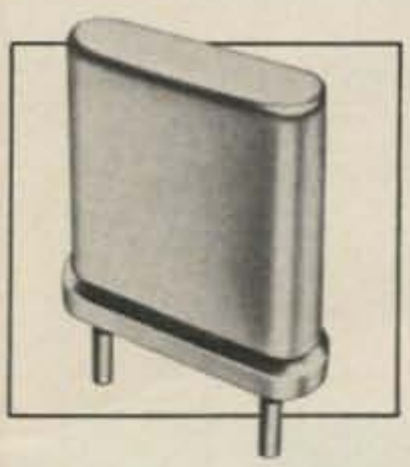

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The TS-180S with DFC (Digital Frequency Control) is Kenwood's top-of-the-line all solid-state HF SSB/CW/FSK transceiver covering 160 through 10 meters, with outstanding performance and many advanced functions, including four tunable memories to provide more operating flexibility than any other rig!

TS-180S FEATURES:

- Digital Frequency Control (DFC), including four memories and digital up/down paddle-switch tuning. Memories are usable in transceiver or split modes, and can be tuned in 20-Hz steps up or down, slow or fast, with recall of the original stored frequency. (Also available without DFC.)
- All solid-state; 200 W PEP/160 W DC input on 160-15 meters, and 160 W PEP/140 W DC on 10 meters.
- Improved dynamic range, with improved circuit design and RF AGC ("RGC"), which activates as an automatic RF attenuator to prevent receiver overload.
- Adaptable to three new bands, and VFO covers more than 50 kHz and DFC 100 kHz above and below each band.
- Built-in microprocessor-controlled digital display. Shows actual frequency and switches to show the difference between the VFO and "M1" memory frequencies. Blinking decimal points indicate "out of band." (An analog monoscale dial is also included.)
- IF shift (passband dialing to eliminate QRM).
- Dual SSB filter system (second filter is optional) to provide very sharp receiver selectivity, improved S/N, and 30 dB compression with RF speech processor on transmit.
- Tunable noise blanker, to eliminate cross modulation from strong signals when noise blanker is on.
- Selectable wide and narrow CW bandwidth on receive (500-Hz CW filter is optional).
- SSB normal/reverse switch (proper sideband is automatically selected with band switch).
- Dual RIT (VFO and memory/fix).
- Available without DFC. Digital frequency display still included, with differential function showing difference between VFO and "digital hold" frequencies.

OPTIONAL ACCESSORIES:

- DF-180 digital frequency control (for TS-180S without DFC).
- YK-88CW 500-Hz CW filter.
- YK-88SSB second filter for dual-filter system.

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TS-120S

Truly a "big little rig," the TS-120S has created a new excitement in HF communications for highly versatile Amateur operation. The compact, all solid-state 80-10 meter transceiver, with up to 200 watts PEP input, requires no tuning and includes a large digital readout, making it ideal for mobile operation. IF shift and other important features make it a high-quality rig for the ham shack as well.

TS-120S FEATURES:

- All solid-state with wideband amplifier stages. No final dipping or loading, no transmit drive peaking, and no receive preselector tuning.
- Transceives on 80 through all of 10 meters, and receives WWV on 15 MHz.
- 200 W PEP/160 W DC input on 160-15 meters, and 160 W PEP/140 W DC on 10 meters. LSB, USB, and CW.
- Digital frequency display (standard) shows actual frequency. Backup analog subdial also included.
- IF shift (passband tuning) to eliminate QRM.
- Advanced PLL circuit, with improved stability and spurious characteristics on transmit and receive.
- Effective noise blanker.
- Built-in cooling fan, which activates automatically when final-amplifier heatsink temperature rises to 90° C.
- Protection circuit for final transistors.
- VOX.

OPTIONAL ACCESSORIES:

- YK-88CW 500-Hz filter.
- MB-100 mobile mount.

AT-120

AT-120 antenna tuner with mobile mounting bracket included. Features SWR meter and matches 50-ohm input to 20-300 ohms unbalanced output. Handles 150 watts (120 watts on 80 meters).

TS-520SE

The TS-520SE is an economical version of the TS-520S...the world's most popular 160-10 meter Amateur transceiver. Now, any Amateur can afford a high-quality HF transceiver for his ham shack.

TS-520SE FEATURES:

- Covers 160-10 meters and receives WWV on 15 MHz.
- 200 W PEP input on SSB and 160 W DC on CW.
- CW WIDE/NARROW bandwidth switch, for use with the optional CW-520 500-Hz CW filter.
- Digital display with optional DG-5, showing actual frequency.
- Speech processor, effective in DX pileups.
- VOX and semi-break-in CW with sidetone.
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The TS-520S is still available, with DC (mobile) operating capability (with the optional DS-1A DC-DC converter) and transverter terminals, which were eliminated from the TS-520SE.

OPTIONAL ACCESSORIES:

- CW-520 500-Hz CW filter.
- AT-200 antenna tuner.

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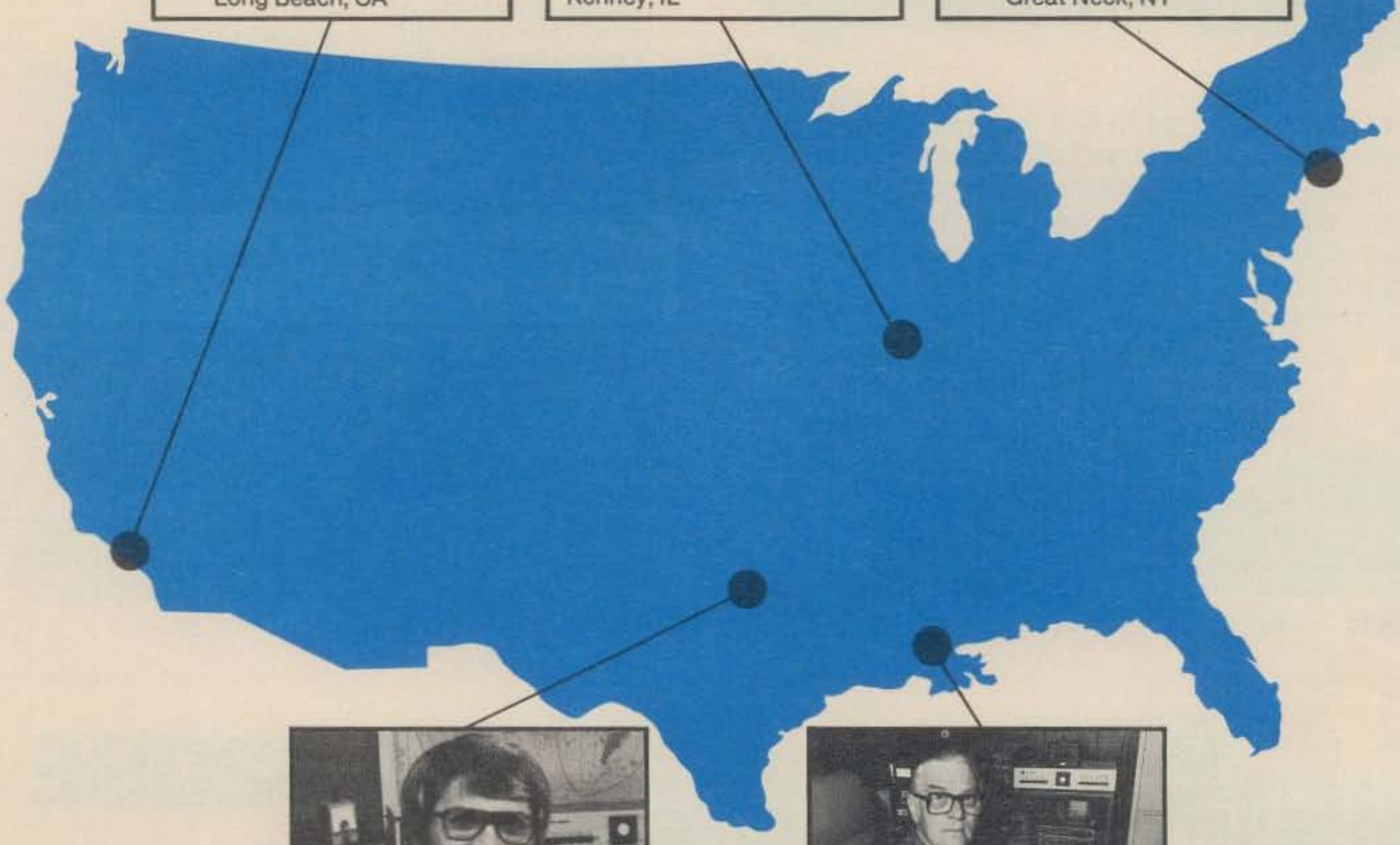

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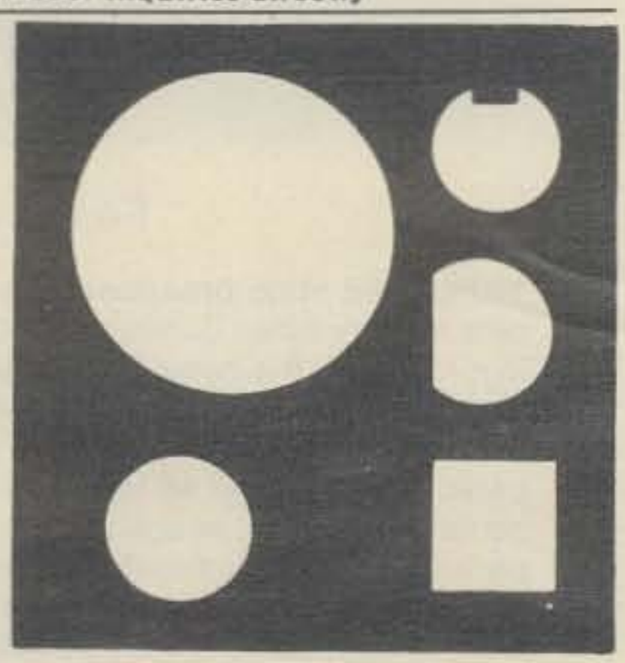

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CIRCLE 69 ON READER SERVICE CARD

CQ Reviews: The Atlas 110-S QRP Transceiver

BY ADRIAN WEISS*, K8EEG

Atlas Radio Inc. has produced a rather innovative design in its recently introduced 110-S transceiver unit. The innovation is apparent both in terms of the modular approach chosen, and the impact of that approach upon circuitry. The basic unit consists of the RX-110-S receiver unit, to which can be added the TX-110 QRP module capable of putting out the generally accepted 5 watt QRPp limit, and if the owner wishes to try QRO operation, a final amplifier capable of about 100 watts output may be mounted in the transmitter module. This "add as you go" approach makes the unit especially attractive to the newcomer to amateur radio, since the cash outlay at each stage of building a complete QRO transceiver is quite reasonable. If the newcomer wishes to limit himself at the QRPp level, the price of the unit compares favorably with the price of the established QRPp transceiver, the Argonaut. In terms of comparing the two tranceivers, I can only note that both perform well, and that beyond that, they are considerably different in every respect.

*83 Suburban Estates, Vermillion SD 57069

General Description

Fig. 1 provides the block diagram of the 110-S transceiver. The unit is designed for operation in the 80-10 meter amateur bands, with coverage of 100 kHz on the lower four, and 28-29 MHz on 10 meters. The unit provides about five watts output in either the c.w. or s.s.b. mode with PTT control on s.s.b. and semi-break-in on c.w. Power output level is variable from the front panel drive control labeled *Mic Gain*. Both the receiver and transmitter units are completely broadbanded and no tuning is required in bandswitching. The receiver section features an automatic shift to zero frequency when the key or PTT switch is depressed. The RIT makes operation of the unit highly flexible. Selectivity can be switched between the normal 2700 Hz bandwidth for s.s.b. and an 800 Hz bandwidth for c.w. operation. *R.f.* and *a.f.* gain controls complete the front-panel receiver layout. Due to the modular approach, the bandswitch is duplicated on the TX-110 unit, so that both the receiver and transmitter must be bandswitched. This is a minor inconvenience. The transmitter is rounded out with a *Mic Gain* gain control and a relative power output meter which allows the operator to adjust the drive to proper maximum levels.

Combining the receiver and transmitter modules to form a transceiver is relatively simple, consisting of mounting both units on the mounting bracket provided, and hooking up the antenna and power cables emanating from the rear panel of the TX-110 unit. A definite advantage of Atlas's approach is that the result is a self-contained transceiver, including

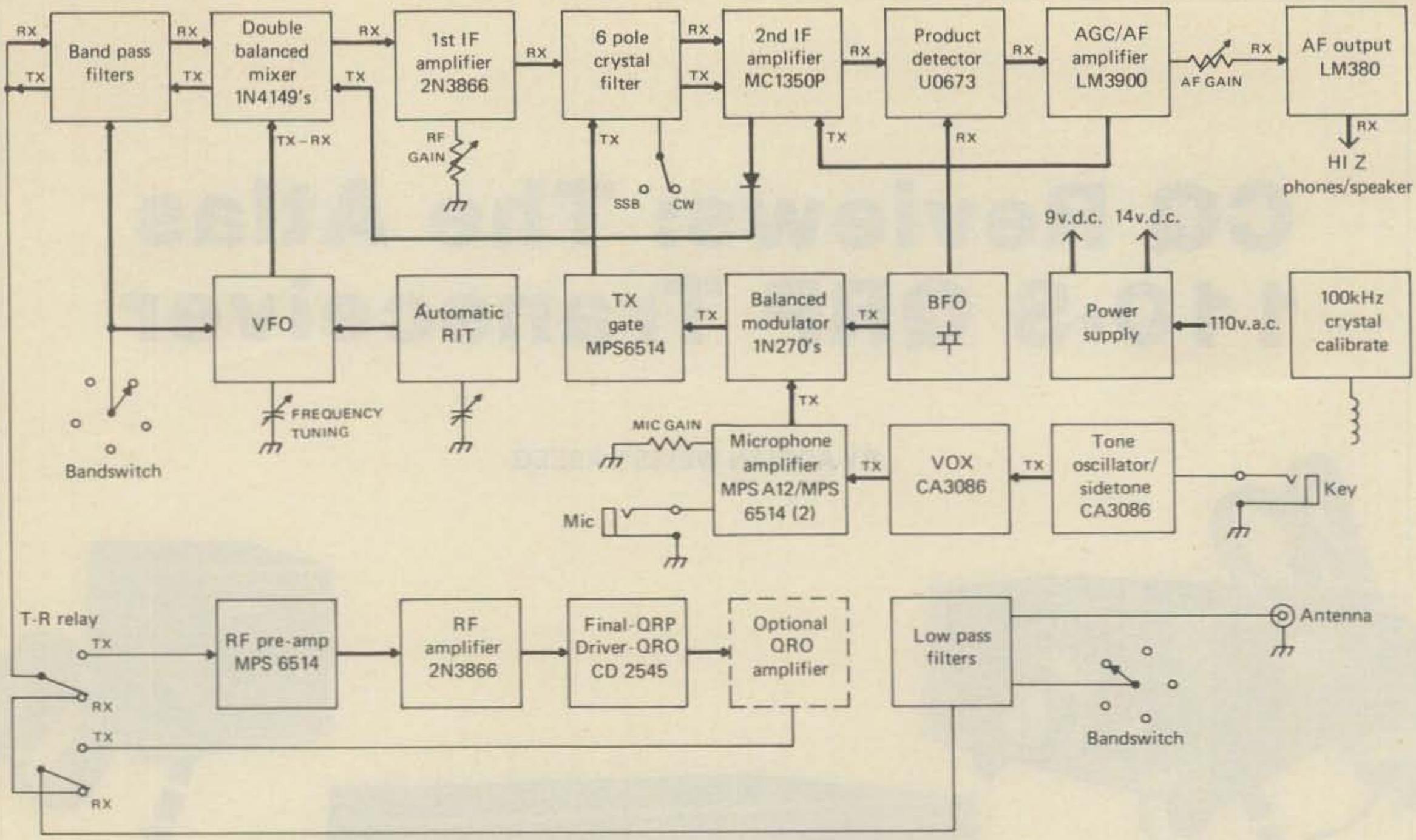


Fig. 1- Block diagram of the Atlas 110-S 80 through 10 meter QRP transceiver.

power supply for both units, so that the only external accessories required are key, mike, and antenna. For mobile operation, the internal supply is disabled, and the unit is powered directly from the vehicle supply. A mobile mounting bracket for the two units is available for about $50, as well as a d.c. battery cable.

RX-110-S Circuit

The RX-110-S receiver circuit is a single conversion type similar to the design employed in the Atlas 210X and 350XL. The receiver is a complete unit in itself, but the circuit includes a system of electronic switching which allows seven of its stages to operate in conjunction with the TX-110 circuit to produce transceive operation. A glance at the signal flow arrows of fig. 1 will reveal the manner in which these stages are switched to operate in both directions, permitting either receive or transmit functions. The unit utilizes 25 diodes, 8 transistors, and 4 IC's, and will operate directly from a battery (12-14 v.d.c.) power supply for a considerable amount of time, since current requirements are 150-200ma.

V.F.O.

The frequency generating system uses a pair of FET's and a bipolar device in a Seiler configuration, and is relatively straightforward. The v.f.o. inductance is tapped down for the higher frequency bands to produce injection signals from 8.4 MHz to 23.4 MHz. Each range is adjusted by means of its separate set of fixed/variable trimmer capaciators paralleled with the main v.f.o. inductance and tuning capacitor. Temperature compensation and B+ regulation results in excellent unit frequency stability. Atlas modestly claims less than 2kHz drift 30 minutes after turn-on, and 500 Hz/hr thereafter. The unit tested was considerably more stable than this—it generally stayed right where it was at turn-on. Likewise, mechanical stability is excellent. Banging the unit around failed to affect the frequency. Frequency readout is by means of a large diameter drum (about six inches) with a velvet-smooth frequency control. One turn of the 2.5 inch knob results in about 22 kHz spread (44 kHz on 10 meters). Accuracy of readout reflects the non-linearity of the capacitor-inductor used as the heart of the oscillator. At worst, the unit tested was about 5 kHz off when tuning thru 10 kHz markers. The flexibility of the RX-110-S is greatly enhanced by the automatic RIT circuit which permits excursions of about 5 kHz from zero frequency. Turn-on of the transmitter section either with the key or mike PTT switch pulls the v.f.o. back to zero frequency automatically, and contest operation, as well as operation in QRM situations, is rendered effortless as a result. Finally, the built-in 100 kHz crystal calibrator, controlled from the v.f.o. buffer is fed to the first mixer to produce an i.f. frequency of 5595 kHz.

Front-end/1st I.F.

Unlike most designs on the market today which use active front-ends in the form of r.f. amplifiers and IC mixers, the RX-110-S uses a passive front-end consisting of a set of triple-tuned bandpass filters feeding a double-balanced diode ring mixer (see fig. 2), resulting in a high dynamic range of at least 80 dB above the noise floor of 130 dBm. Immunity to overload from strong off-frequency signals is excellent. The incoming signal is passed first thru the triple-tuned front-end filter (one for each band) which is stagger-tuned to permit band-wide uniformity of operation, and coupled to the double-balanced diode ring mixer through standard trifilar toroid transformers. After mixing with the v.f.o. injection signal, the i.f. product at 5595 kHz is amplified by a single bipolar i.f. 6-pole crystal ladder filter. amplifier, and passband exhibits extremely steep skirts with a bandwidth of 2700 Hz at the 6 dB points, and 5900 Hz at the 60 dB points. With the

b.f.o. properly adjusted with respect to the center of the filter passband, the filter passes signals between 300 Hz and 3000 Hz with less than 0.5 dB variation in amplitude. For c.w. operation, the filter can be switched to the narrow position, which exhibits a bandwidth of 800 Hz at the 6 dB points. Switching of the filter into the c.w. mode is accomplished by a loss of about 3 dB, but in practice, this loss is negligible. The filter is superb in c.w. contest operation, since the bandwidth is only about 1 kHz wide at the 13 dB points. Switching from the wide/to narrow position in the midst of a high QRM contest situation produces a remarkable effect—it seems that the contest has ended suddenly! In my estimation, the c.w. filter is one of the unit's strongest features. In practice, the sharpness of the filter passband is readily apparent, for, when tuning across an incoming signal, it very rapidly appears out of nowhere, and at the other end of the passband, it disappears quickly. In the unit tested, either aging or shipping vibration had caused the b.f.o. frequency to slide upward about 800 Hz into the filter passband. The unit then functioned like a direct conversion receiver, allowing nearly equal passage of both sidebands. Once the b.f.o. was realigned, however, unwanted sidebands disappeared. I ultimately settled for locating the b.f.o. at about 800 Hz below the center frequency of the filter, which corresponds roughly to the -14 dB point on the passband skirt. At this setting, separating U.S. KW's on the unwanted sideband from weak DX stations in the passband posed no difficulty. Adjustment merely involved resetting C311-20 to the desired point. The transmit control voltage automatically returns the b.f.o. to the proper frequency in the c.w. mode for generation of the c.w. carrier.

Second I.F.-Audio

The filtered signal is then amplified by an MC1350P IC, and mixed with the local oscillator in a 40673 product detector, with audio output being amplified by one section of an LM3900 and then fed to the a.g.c. loop consisting of the other section of the LM3900 and an MPS-A12 a.g.c. amplifier, the output of which is used to control the gain of the second i.f. amplifier. An LM380N IC can provide up to 2 watts output either to the internal speaker, or an external set of Hi-Z phones.

One difficulty encountered that proved very annoying was the fact that, when transmitting c.w., each initiation and completion of a character would be accompanied by a rather

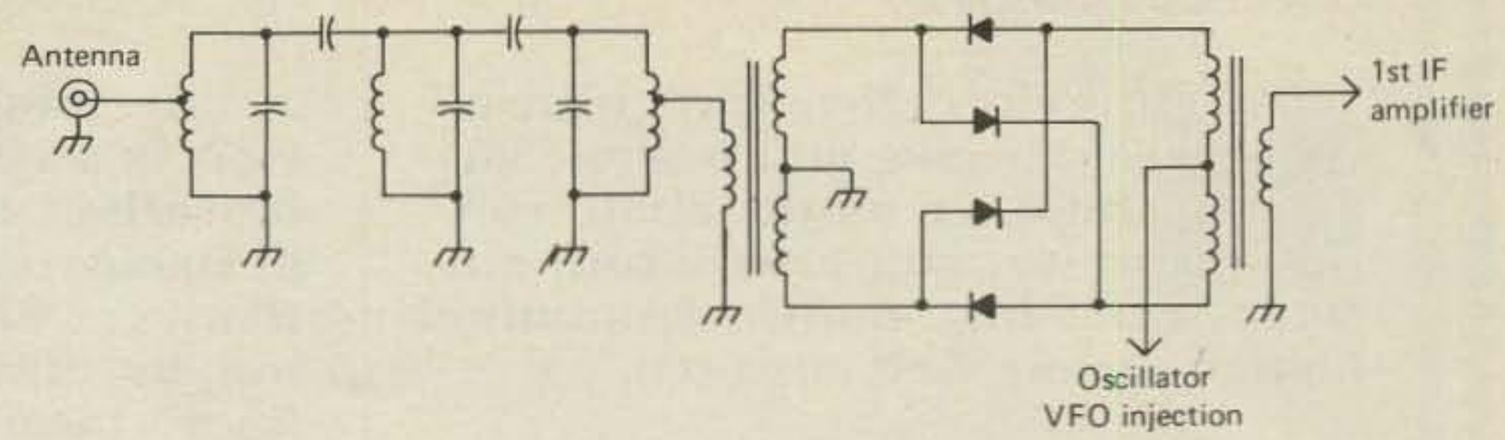
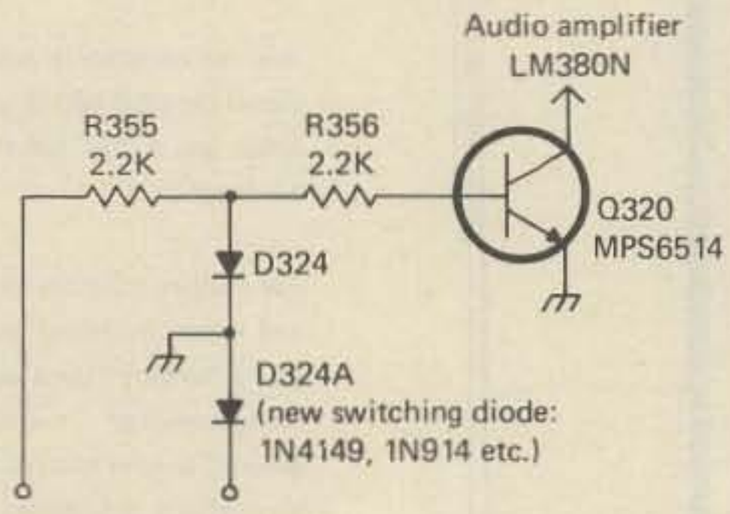


Fig. 2- The RX-110-S front-end.

high volume "thump" of about the same aplitude as the c.w. sidetone note. The "thumping" was less noticeable when phones were used. Considerable time was spent trying to debug this aspect of the unit. It was noticed that the steel chassis box greatly enhanced the thumping effect, although the basic problem was in the circuit itself, since the a.f. muting switch (Q320) was not biased to the cut-off point by the transmit control voltage. Rebiasing proved ineffective because that cut out not only the thumping, but the sidetone as well. Just by sheer chance, it was found that the addition of a diode in series with D324, with their common junction grounded, eliminated the thump while dropping the sidetone volume several dB (see fig. 3). This slight modification rendered the unit unobjectionable, and rapid-fire contest operation became much more relaxing. I hesitate to hypothesize any reason for this change in operation due to the modification, although I suspect r.f. groundpath return has something to do with it. Atlas is investigating the matter with reference to future production.

Overall, receiver sensitivity is claimed as 0.25uv for a 10 dB S ± N/N ratio on 80-15 meters, and 0.4uv on 10



LEGEND:
1. Locate D324, remove lead from p.c.b.
2. Insert lead of D324A into hole from which D324 was removed, solder.
3. Tie free ends of D324 and D324A together, solder.
4. Solder ground lead to D324 and D324A common lead; solder ground lead to p.c.b. ground foil.

Fig. 3- The a.f. mute circuit modification to reduce "thumping".

meters. A 2uv input signal will produce an 0.5 watt audio output. In practice, the a.f. control remains at near-minimum setting to provide room-filling audio output. The r.f. gain control, which regulates the first i.f. amplifier gain, rarely needs to be increased to maximum gain, and more typically is backed off considerably from maximum gain. The a.g.c. system shows less than 10 dB audio output variation with 5uv to 3 volt input variation. A.g.c. action can be largely nullified by decreasing r.f. gain manually for certain operating situations. During several months of testing, the receiver was never overloaded by locals running high power a block or two away.

TX-110 Transmitter Module

The TX-110 module is designed to work in conjunction with the RX-110-S receiver, and indeed, cannot function as a self-contained transmitting unit without the RX-110-S. As a glance at fig. 1 will reveal, the transmitter module contains only the audio generating section (amplification of voice input on s.s.b. generation of carrier tone on c.w.) and the transmitter r.f. amplifer chain. The entire "middle" section of the unit in the transmit mode is provided by the

seven sections of the receiver included in fig. 1 as part of the transmitter signal flow (b.f.o., Balanced Modulator, Crystal Filter, i.f. Amplifier, Diode Ring Mixer, v.f.o., and Bandpass Filters). It is conceivable that the TX-110 could be used alone as a c.w. transmitter, but considerable conversion would be required. The TX-110 interfaces with the RX-110-S simply by the connection of a twelve-prong plug, which interconnects all circuitry as well as power supply, and a short coax antenna lead. Maximum current drawn is in the 2 amp range. While Atlas claims a 20 watt input figure, and suggests output to be half that figure, the unit tested showed outputs ranging from about 5 watts to 10 watts. The r.f. output level is continuously variable down to under one watt. Hence, the unit permits operation at the full QRPp 5 watt limit, and flexibility for dropping power to lower levels.

The audio generating section of the TX-110 uses seven diodes, four transistors, and one IC. One section of the CA3086 is used to generate an audio signal at about 800 Hz, which is then fed to the audio amplifier chain and mixed with the b.f.o. signal to produce a carrier for c.w. operation. The tone oscillator also provides the sidetone signal. Four sections of the CA3086 are used to provide semi-break-in switching. Break-in time delay is controlled by a fixed resistor installed at the factory, and hence, is not readily adjustable. In the unit tested, the time-delay was rather lengthy—about 3/4 second—and made contest operation nearly impossible. The simple remedy was simply to parallel a 1000 ohm resistor with the 4.7 K ohm R613 that came with the unit. This resulted in a much quicker release time. Ideally, a miniature trimpot could be installed for easy adjustment.

The r.f. chain of the TX-110 consists of a broadband circuit employing three bipolar transistors. The receiver triple-tuned input filters serve double-duty as input filters to the r.f. amplifier chain, providing a generally flat response across an entire band if adjusted properly, as well as offering a high degree of attenuation to unwanted spurious products of the mixing process. Output from the r.f. chain is passed thru separate double-pi low-pass filters for each band which are factory tuned for maximum harmonic refection and signal purity. R.f. output is sampled at the antenna and displayed on a front-panel meter which isn't the unit's finest feature. While the output from the TX-110 meets F.C.C. requirements for signal purity, a very slight distortion in output waveform was detectable on c.w. as output was increased beyond a certain point, varying between 1-2.5 watts, on various bands. It is neglible.

Mechanical Considerations

The 110-S combo is mechanically solid. Circuitry is mounted on both sides of the chasis and front and rear panels, and steel shells are screwed in place to form a really solid enclosure. Two steel brackets are required to join the RX-110-S and TX-110, and the operation takes a few minutes. The front feet of the enclosure are longer than the rear feet, so that the front panel slants back to the operator. All controls are on the front panel, although the key jack is mounted on the rear apron of the TX-110. The phone jack on the RX-110-S is front-panel mounted, but is not the standard 1/4 inch diameter size, so a minature plug is required. The units measure 3.75″ high by 9.75″ deep, and the receiver and transmitter widths are 8.5″ and 4.12″ respectively. The size of the combo is a definite drawback in regard to the feasibility of portable or mobile operation. High impedance phones and mike are required by the circuitry. A rear apron jack is available to monitor current to the final amplifier if this is desired.

Conclusions

Overall, I find the 110-S combo an excellent performer for the pricetag of under $500 ($478 at the time of this writing). The units may be purchased separately (RX-110-S at $299, the TX-110 at $179; if the QRO amp is desired, the QRO TX-110 runs $279, plus the QRO power supply at $98). If the owner desires to first purchase the QRP TX-110, the factory will install the QRO amp at a later date for about $100. For the initial outlay, the newcomer will have a superb receiver whose sensitivity, selectivity, and dynamic range equal units costing considerably more.

In terms of operation of the unit in various situations, I found that, after the aforementioned modifications and adjustments were made, the unit was a breeze to work with during routine operations and gruelling contest situations. The strongest features are the switchable crystal filter with its steep skirts, the automatic RIT, and the frequency tuning mechanism's velvet smoothness. The audio is a bit crisp through the internal speaker, but clarity is excellent. The only drawbacks of the unit were the "thumping" during c.w. operation and the time-delay of the VOX circuit. By the time this appears, the factory will probably have cleared up these two bugs.

During testing of the unit, I found myself continually comparing it with the Argonaut 509, and I suspect that, inevitably, I will receive queries as to which unit I would recommend purchasing after all things are taken into consideration. I tried to figure out a way to divert these queries thru things like a checklist of specs and other detains. I realized that I'd still get the queries. So, I can only say that each prospective purchaser will have to make up his own mind. The two units are very distinct entities, and aside from the size advantage the Argonaut holds over the 110-S for portable and mobile operation, each unit has its strong and weak points, and only an individual's personal taste will determine which unit will satisfy his needs. They will both perform excellently on-the-air and neither will be a disappointment. The important thing is that now the QRPp operator has a choice of sophisticated commercial gear. It is unfortunate that Yaesu discontinued its highly unpublicized FT-7 unit, for its continuation would provide an even wider range of choice and some friendly competition. Manufacturer's take note! QRPp is here, and with the numbers of amateurs being attracted to it, it is definitely a small but continually growing segment.

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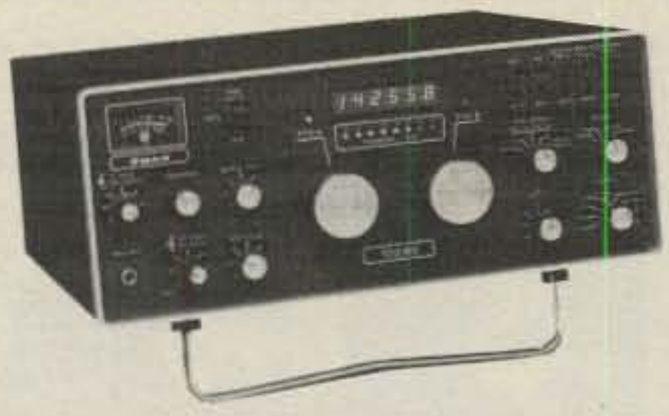

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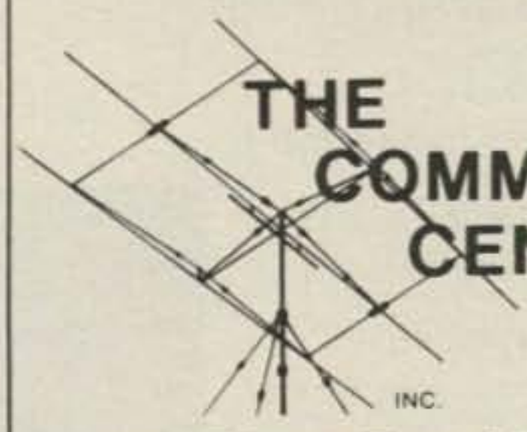

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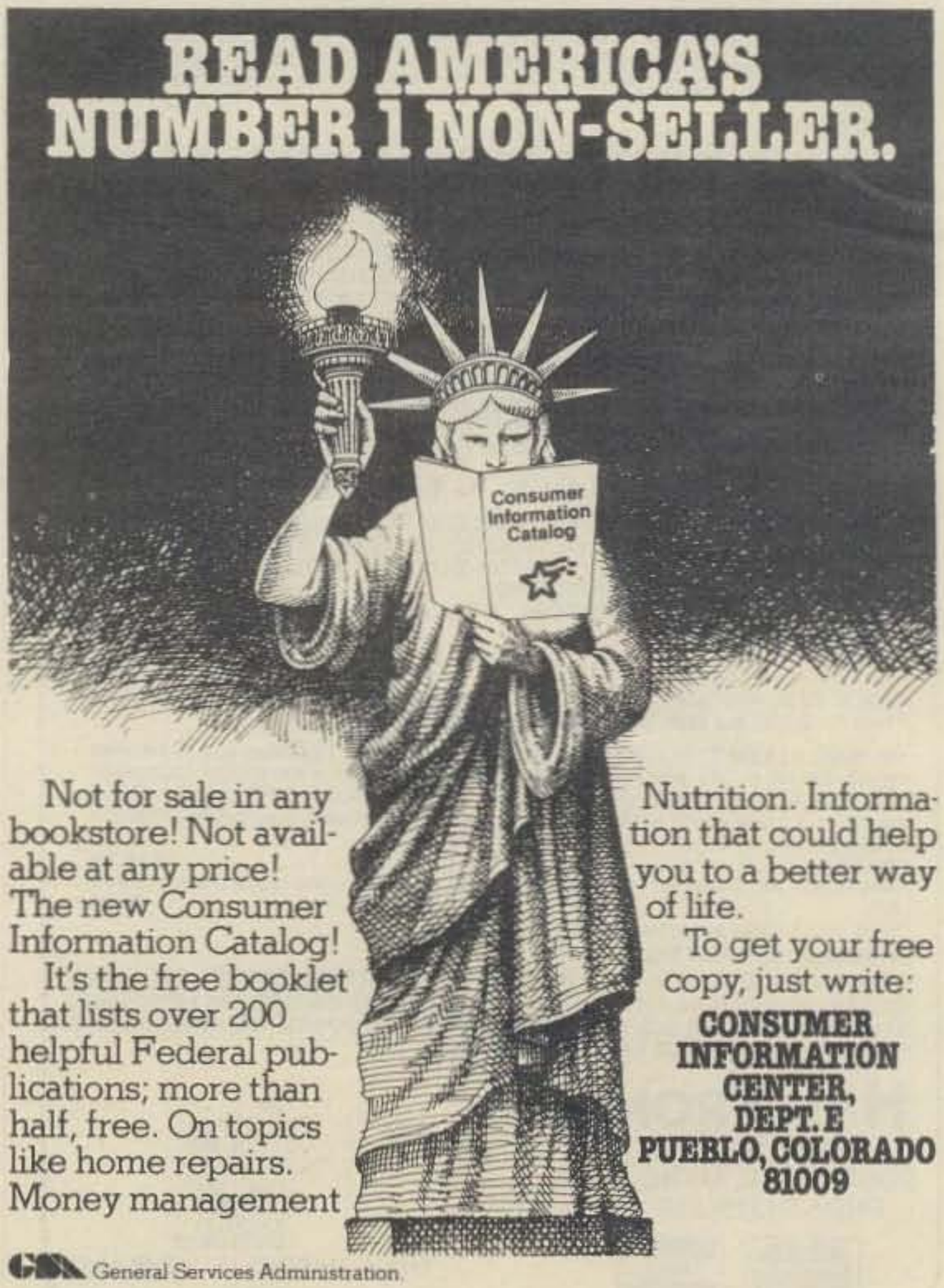

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More on space communications.

Amateurs In Space Communications

BY NORM CHALFIN*, K6PGX

Mike Griffin, N6WU, operates s.s.t.v. On the left is the JPL Voyager *monitor; on the right the s.s.t.v. monitor.*

From time to time during the year we expect to bring to your attention matters relating to amateur radio spacecraft and amateurs involved in space communications activities.

As most of you no doubt are aware, at the present time there are at least three *active* amateur radio communications satellites circling the globe in circumpolar orbit. These are AMSAT/OSCAR 7, ARRL/AMSAT OSCAR-8 and RS-1. The latter is one of the two spacecraft launched simultaneously last October by the Radio Sport Federation in Moscow.

OSCAR-7 was launched on November 15, 1974 from Vandenberg Airforce Base on a NASA Delta Rocket as one of the secondary payloads on NASA's first triple spacecraft launch. The prime payload was ITOS-G which became NOAA-4, a weather satellite of the National Oceanographic and Atmospheric Administration. The other secondary payload was INTASAT, the first entry of Spain into the arena or research satellites.

OSCAR 7 is presently operational but somewhat crotchety in its response to commands. It is usually okay in mode A but erratic in mode B.

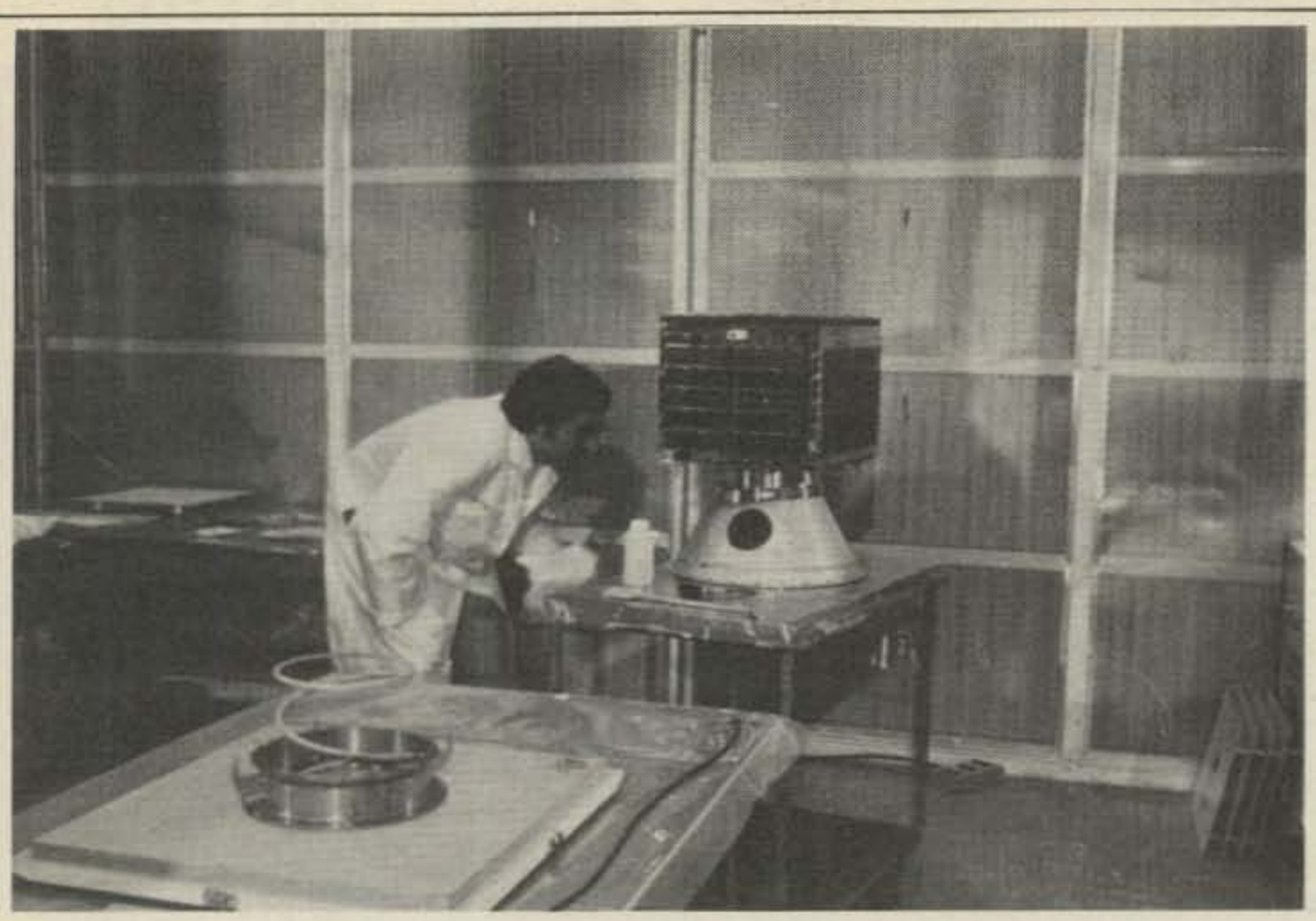
Mode A provides for an input in the band from 145.85-145.95 MHz (uplink) and a downlink band of from 29.4 -29.5 MHz. There is a beacon on 29.502 MHz which transmits Morse Code telemetry in the form of a 5 digit block of numerals in six rows which provide spacecraft data as to its condition, temperature, voltages, currents, etc. The decoding matrices can be found in the orbital prediction data books available from W6PAJ, Skip Reymann, Box 374, San Dimas, CA 91773. The booklet contains both OSCAR-7 and OSCAR-8 predicts. The cost of the Orbit Prediction chart booklet is $5.00 postpaid or 40 IRC's. (AMSAT members pay only $3.00 or 20 IRC's).

The mode B operation of AMSAT/OSCAR-7 provides for an uplink band from 432.125 - 432.175 MHz with down link frequencies 145.975-145.925 MHz. There is a beacon at 145.972 MHz.

OSCAR-7 is nearing its fifth birthday. It was designed for a three year lifetime. Part of the problem is more than likely the fact that too many amateurs users of the spacecraft ignore the constantly issued warnings that a maximum of 100W e.r.p. must not be exceeded on uplink transmissions to the amateur satellite. It was the selfishness of those who failed to follow this admonition that led to the premature demise of AMSAT/OSCAR-6 after 4-3/4 years of service. OSCAR-design lifetime was only one year.

What happens is that the pass band is shared among all users. If a very strong signal appears at the OSCAR receiver input it hogs the output power and signals of lower input power level are wiped out or reduced to a proportionally lower output level.

JPL Amateur Radio Club, 4800 Oak Grove Dr., MS 180-302, Pasadena CA 91103



Jan King examines the OSCAR-8 spacecraft during preparation for launch. The release spring is in the foreground.

Any amateur should certainly be aware that this defeats the intent of the high power culprit. He wants to guarantee that he will be heard. But, if he wipes out every one else in the pass band who will he hear? If you use the OSCAR spacecraft, *play fair*! Use only the recommended input power not to exceed 100W e.r.p. or lower. It should be remembered that a signal transmitted into space has no obstacles such as there are on the surface. QRP signals are very successfully used for solid OSCAR QSO's. The Soviet R-S spacecraft took care of this problem very neatly by providing a circuit which shuts down the pass band portion of the system in the presence of an excessively strong signal. For the R-S satellite a strong signal will be anything over about 10W e.r.p! When R-S shuts down it cannot be used again until it can be turned on by the Radio Sport Federation Controllers in the Soviet Union.

OSCAR-8 was launched on March 5th, 1978 with the NASA LANDSAT-C and PIX missions. PIX is an experiment devised by the NASA Lewis Research Center Scientists to study the effect of the space environment on high voltage power systems for ion propulsion engines for spacecraft.

The uplink frequencies for the Mode A operation of OSCAR-8 are the same as for Mode A of OSCAR-7. The Beacon for OSCAR-8 is 29.402 MHz. OSCAR-8 is also operated in what is known as Mode J. The uplink mode J frequencies are 145.9-146.0 MHz. The downlink on Mode J is from 435.1 to 435.2 MHz. There is a beacon at 435.095 MHz. The OSCAR 8 Beacon telemetry transmissions are similar to those of OSCAR-7 but use four digit Morse Code numerals in each line.

The Soviet satellite R-S 1 has only a mode A capability with an uplink frequency from 145.88 to 145.92 MHz and a downlink from 29.36-29.40 MHz with a beacon at 29.401 MHz. Listening for the beacon is the only way you'll know when it is on. Even then the beacon may be operational with the pass-band for receiving two meter signals turned off as a result of an unwary character with high power spiting himself.

Merv Macmedan, N6NO, working 15 meters.

In summary form is a chart of the currently operating amateur communications satellites.

OSCAR Satellite Information Summary
(Northern Hemisphere) *

MODE	UPLINK Freq.	Polar.	Mod.	DOWNLINK Freq.	Polar.	Mod.	BEACON Freq.	Polar.	DOWNLINK OFFSET-kHz
7A	145.85 -145.95	LHC	USB	29.4-29.5	L	USB	29.502	L	-
B	432.125-432.175	RHC	USB	145.975-145.925	RHC	LSB	145.972	RHC	-
8A	145.85-145.95	LHC	USB	29.4-29.5	L	USB	29.402	L	-8
J	145.9-146.0	RHC	USB	435.1-435.2	L	LSB	435.095	L	-6
RS	145.8-145.92		USB	29.36-29.40		USB	29.401		

From AMST Newsletter December 1978

* Note: there is a polavization reversal in the Southern Hemisphere in the 2M and 432/435 MHz ranges due to the tamstile antenna configuration of OSCAR-7 and OSCAR-8

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CIRCLE 24 ON READER SERVICE CARD

The loudspeaker you have on your shelf didn't suddenly appear from nowhere. Author Paul describes one stage in the evolution of speakers in this informative article.

Horn Speakers

BY FLOYD A. PAUL*, W6THU

The **horn speaker** is a device used to reproduce audio sound waves from electrical energy and distribute the acoustical energy through a horn shaped element. Horn loudspeakers contain two elements, a **signal reproducer** and a horn shaped **acoustical coupler.** When the signal reproducer (phone or loudspeaker unit) is driven by electrical energy, a **diaphragm** is vibrated by a magnetic field (directly or indirectly) and an acoustical sound energy is delivered from the diaphragm. The column of air in the open horn tube is displaced, creating amplified audible sounds. Neglecting other parameters, the acoustical volume will be somewhat in proportion to the size of the horn and the amount of air displaced by the diaphragm.

Background Material

Rather than reprint much of the already published literature on horn speakers, this article will reference a few significant articles on the subject, touch on some highlights of horn speakers, describe the author's collection, show some frequency characteristics of horn speakers and list known manufacturers. The reader may know of other good reference material but the author recommends the following three articles for preferred reading: (1) "Early Horn Speaker Development," *Old Timer's Bulletin,* Dec. 1976, Vol 17, No. 3 (2) "What Is A Good Loud Speaker," Fred Canfield, *Radio News,* Aug. 1928 (3) "Loud Talkers," Walt Sanders, *Radio Age,* Jan. 1978.

Horn Speaker Popularity and Evolution of Design

The era for the popularity of horn speakers was 1922 to 1926. Before 1922 earphones were the common listening 'device. During 1926 the **paper cone reproducer** became popular and by 1927 it was difficult to find horn speaker advertisements in radio magazines. Early horn speaker designs were trial and error oriented. Early horn speakers tended to be straight line vertical cone shaped tubes with a right angle turn to a bell opening. Inprovements occurred by curving the cone shape tube of the horn into a continuous curve. This design improvement was to become the basic shape of most horn speakers. Two benefits occurred from this continuous curving: (1) The curved shape created a longer air column and a larger air column (more volume) and (2) It was possible to move all masses of the mechanical design toward or over the center of gravity and hence greatly improve the physical stability of top heavy horn speaker designs.

Designs were copied and many innovations occurred during the first few design years. New materials were continually being experimented with in the construction and fabrication of horn speakers and advertisements exaggerated all types of benefits from these modified designs. Some manufacturers made all parts of their horn speakers, e.g., Western Electric and Magnavox, while others made some parts and bought from others, such as RCA.

Horns were fabricated from wood, laminated wood, pressed wood, bakelite, plastic, aluminum, cast iron, brass, copper, paper mache, and sheet iron. The following design features and attendant benefits became guidelines to good horn speaker design.

1. In general, horn materials should be made of fiber or non-metalic substances which have no natural period of vibration in the audio range. These materials do not exhibit a ring or resonance which many metal horns had.

2. Horns should have roughened interior surfaces such as wrinkled paint on metal surfaces which tend to diffuse the sound and reduce metallic ringing.

3. The shape of the horn should be exponential rather than straight line (megaphone) shape for optimum reproduction of sounds.

4. A longest column of air in the horn (longer horn) gives a better low frequency response. Short horns have higher cut-off frequencies.

5. A largest volume of air in the horn design gives a greater volume of sound.

Horn Speaker Driver Mechanisms

There were three basic driver mechanisms by which most designs

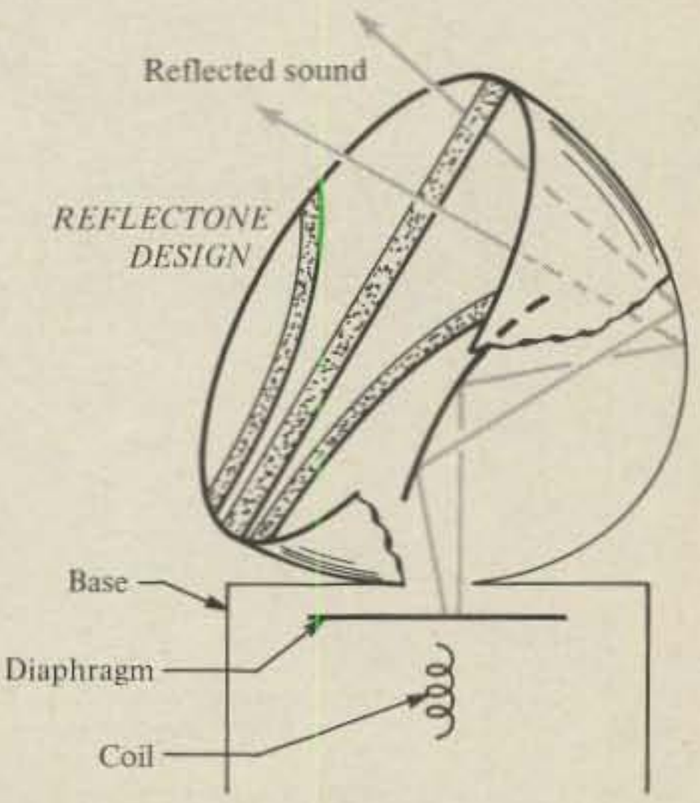


Fig. 1 - This sketch shows how sound energy from a diaphragm is reflected off the inner half shell onto the outer shell and then through the grating to the listener.

*1545 Raymond, Glendale CA 91201

Mfgr.-Model	Type of Driver	Bell Dia. in ins.	(Ohms) D.C. Resistance	A.C. Imp. (ohms) at 1 kHz
Atwater Kent, "H"	earphone	14	2,000	10k
British Thomas-Houston, BTH	earphone	14	2,000	12k
Dictograph Prod., Dictogrand	earphone	10	4,000	40k
Magnavox, M-1	driver arm	14	400	3k
Magnavox, M-20 Mod. A	driver arm	8 × 14	1,800	7k
Magnavox, R-3,Mod.B	voice coil	14	1,400	6k
Music Master, 14D	earphone	14	1,200	13k
Music Master, 22D	earphone	22	1,400	6k
RCA, Radiola UZ-1325	earphone	12	1,800	16k
Rice & Hochster, Reflectone	earphone	3	1,100	12k
Rola, Re-Creator	driver arm	14	2,000	16k
Sears, Silvertone	driver arm	11	800	5k
Western Elect. 10D	driver arm	14	1,000	24k

Table 1 Listing Of Author's Horn Speakers

can be classified. The benefits, limitations and characteristics of these three types are described here.

1. **Earphone** - Simple design, seldom if ever need adjustment, magnetic drive to an iron diaphragm, fairly rugged and not easily damaged, limited frequency response from the diaphragm, limited volume, volume control (when used) is an adjustment which moves the coils and magnet closer to and further from the diaphragm but when moved closer increases the volume of the lower audio levels but may limit the louder audio signals because increase diaphragm movement may cause the diaphragm to chatter against the magnetic poles.

2. **Driver Arm** - Somewhat more complex than earphones, fairly rugged, magnetic drive of an armature which is coupled mechanically to a diaphragm, diaphragm of mica or aluminum or bakelite, coupling is a rod or pole, subject to misalignment with use and aging and may result in possible pole chatter, difficult to clean out magnetic particles that accumulate inmagnetic field areas, no simple mechanical volume control can be used, higher volume, fair efficiency, mechanical linkage can be resonant.

3. **Voice Coil Driver** - Somewhat complex, alignment of dynamic parts important, hollow coil suspended in a magnetic field, coil coupled mechanically to a diaphragm, mica is the typical diaphragm material, subject to magnetic and non-magnetic particles lodging between moving coil form and pole pieces, better frequency response than drivers and earphone, higher volume.

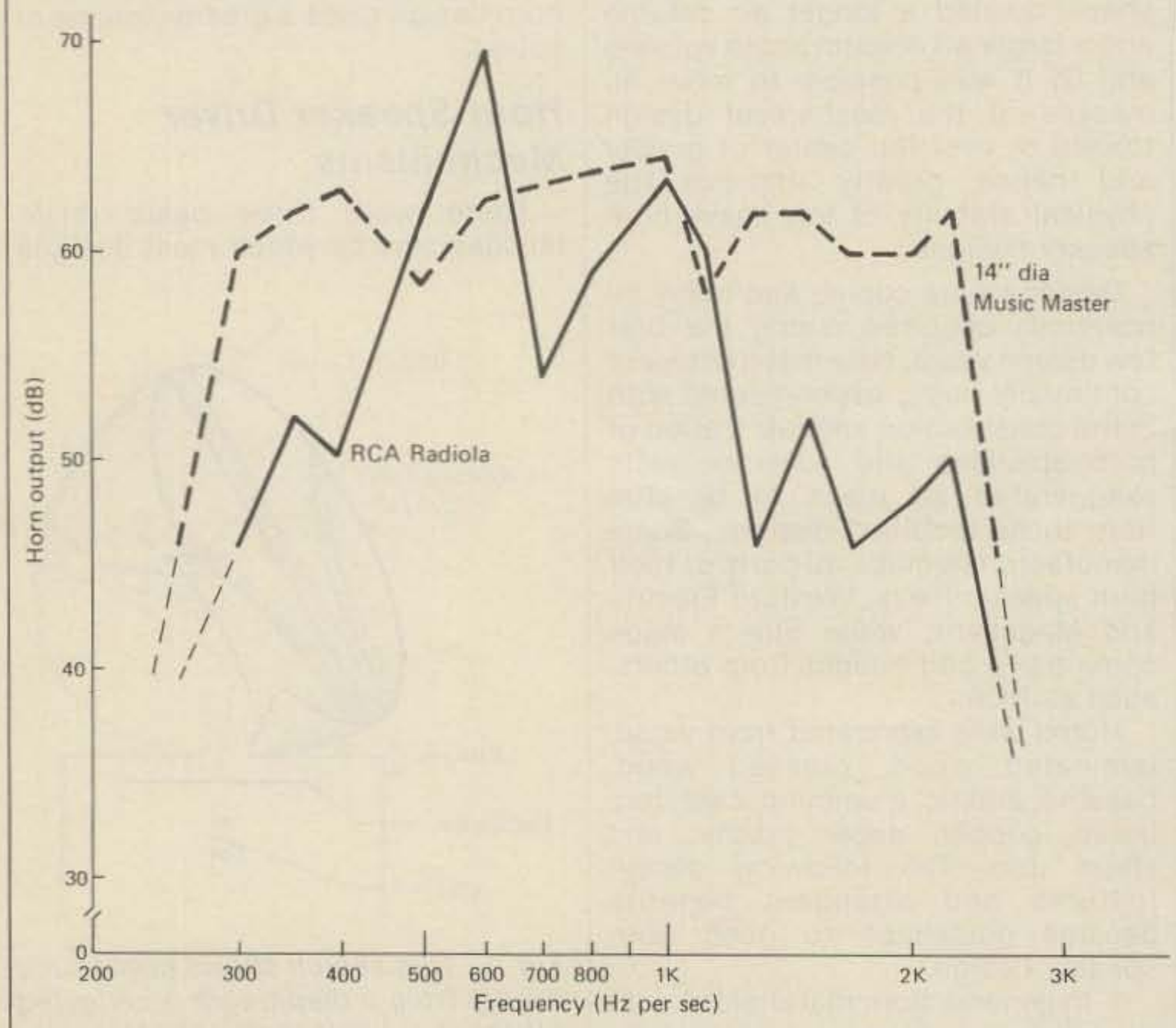


Fig. 2 - Frequency response curve of the RCA Radiola *and the 14"* Music Master.

Author's Collection

The author has a collection of twelve horn speakers and one additional speaker which may barely qualify as a horn speaker. The *Reflectone* speaker is a bit of a maverick but its possible qualification is based upon the horn speaker design concept of an air column driven by a driver unit. See figure 1 for a sketch of the *Reflectone* design. The cross section shows how the sound from the earphone located in the base facing upward impinges upon the internal surface of a 1½" diameter reflector cup, then is reflected backward onto the inside surface of a larger 3" diameter cup wrapped completed around the smaller internal cup opening and reflecting sound outward through a grating to the listener. There is an air column, small as it is, with a definable length (about 4") and the speaker's design is to move a column of air into two reflectors which in effect simulates an air column of a horn speaker.

The author's collection of horn type speakers is summarized in Table 1. Useful information is supplied in this table to help in describing some of the pertinent characteristics of these speakers. The column titles are listed as follows: The **type of driver** column identifies each speaker as having one of the three driver mechanisms described earlier in this paper namely, earphone, driver arm or voice coil. The **bell diameter** column gives diameter to the next closer whole smaller inch. The **d.c. resistance** is accurate to about 10% as is the **a.c. impedance** measurement, which was made by using a 4V a.c. signal at 1k Hz and driving a General Radio

decade resistance box, type 602L in series with each speaker's driver coil. The decade box resistance taps were adjusted until the voltage across the decade box equalled the voltage across the driver coil and the resistance value was noted. A Micronta 22-204 multimeter with a 10V a.c. scale was used to make voltage measurements. It can be seen from the measurements that a.c. impedances of the various horn speakers varied considerably (3k ohms to 40k ohms) The table shows that most of the speakers have an a.c. impedance to d.c. resistance ratio of between 5:1 and 10:1 at 1K Hz.

Evaluation and Performance Test

To get some comparative performance evaluations of the author's horn speakers a test was designed and performed by putting a known frequency of a known intensity into each speaker and making an intensity sound level reading at a given distance from each speaker. The test equipment consisted of an audio generator, AG-3, made by Measurement Engr. Ltd of Canada, a General Radio audio frequency microvolter, Type 546-C and a Hermon Hosmer Scott Inc. sound level meter, Type 410-A. The sound meter is a commercial device for testing sound levels and has a flat frequency response of 1 dB throughout the audio range. It reads directly in dB from 35 dB (a very low whisper) to 140 dB (which is above the threshold of pain for most people). The audio oscillator supplied a 2.2V a.c. signal at all audio frequencies into the General Radio Type 546-C microvolter. The Microvolter was adjusted to provide a 1 volt a.c. signal output at all frequencies into each speaker in this test. Two frequencies were chosen and all speakers were tested at 350 Hz and 1kHz. Any very pronounced resonances and nulls (anti-resonances) were looked for between 350 and 1kHz and noted. The sound level meter was located 2 feet directly in front of the horn bell openings. The results of the test are given in Table 2. Background noises from the street and dogs barking interfered with measurements below 45 dB. Therefore, low level measurements should be considered marginal in accuracy.

There was a vast difference in efficiencies of these speakers as can be seen by the dB measurements. A statistician will also advise against quoting data based upon one sample size in a test and particularly when the tested devices are over 50 years of age. However, the data should be at least considered as a qualitative result if not quantitative. Two speakers were chosen for an overall frequency response measurement and the test results are shown in figure 2. It can be seen there are many peaks and dips in the response curves. The frequency response between 250 Hz and 2.5 kHz is anything but linear. It should also be pointed out that this test which selects a standard testing condition for all speakers doesn't necessarily give results that might not be altered when a speaker is coupled to a battery set final output circuit. Let the reader be reminded that the impedance coupling characteristics of the final driver tube would also effect the volume output of the speaker so that for a given driver tube, with a given Ep/Ip condition and a given speaker's non linear impedance response there would be a different audio output reproduced for the listener.

Name	Decibel level at 350 kHz	Resonances Freq.	dB.	Anti Resonances Freq.	dB.
AK "H"	40	40	-		-
BTH	64	57	640	74	
			360	68	-
Dictograph	52	59	540	68	
			380	64	-
Magnavox M-1	55	7	650	80	-
Magnavox M20	44	57	700	50	-
Magnavox R-3	50	72	750	74	
			650	74	-
Music Master 14"	62	67	700	70	-
Music Master 22"	59	63	950	67	
			700	67	
			450	67	-
RCA UZ-1325	55	54	600	70	-
Reflectone	40	62	-		-
Rola	58	72	-		380 45
Silvertone	49	62	540	58	400 46
Western Elect. 10D	48	60	-		-

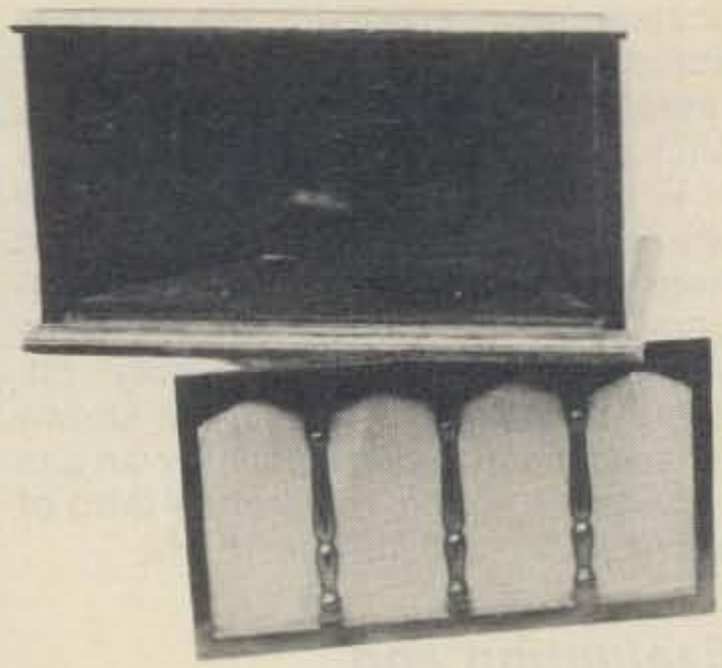
Table 2 Decibel Levels Of Horn Speakers With Resonances And Anti-resonance Points

Observations

A few observations are in order about the testing of these various speakers. The AK "H" horn speaker did not respond anywhere near the dB level of the other speakers but the AK could not be restored or adjusted as some others were since the pot metal parts in the base of the speaker had expanded and seized and no adjustments could be made. Therefore the AK speaker response should not be considered as typical of a good AK speaker. Most of the horn speakers had a frequency response that dropped off rapidly below 250 Hz on the low end and about 2.5 kHz on the high end. One horn speaker, the *Rola*, responded well at up to 4.5 kHz. Three of the speakers with earphone drivers had volume controls which varied the spacing between the magnetic poles and the iron diaphragm of the driver unit. The *Radiola* volume control gave a 3 dB delta in volume. The speaker control gave a 15 dB range adjustment. The WE 10D had no significant resonances. The *Silvertone* speaker had a generally increasing dB response slope from 350 to 1 kHz (smoother than most speakers) Two of the speakers had a very pronounced dip (anti-resonance) and these are so noted in the table. The *Radiola* UZ 1325 could not be adjusted for a maximum output. It was not possible to turn the earphone mechanism extremely close to the diaphragm so as to achieve maximum volume. Some parts may have aged and caused mechanical binding. The *Magnavox* R-3 speaker was operated in this test with 6 volts applied to the field coil. The amperage was 1 amp at the voltage. To test the effectiveness of the field coil a decreasing field voltage was applied to the R-3 field with a 700 Hz signal applied to the reproducers voice coil. The frequency of 700 Hz was chosen because the R-3 peaked and responded well at the frequency region. As the field voltage was reduced (and hence current) no noticeable decrease in sound volume was discernable down to the half voltage point (3V) but as voltage was reduced further very noticeable sound level changes were noted. With 2V applied to the field coil greater than 6 dB reduction was noted. Below 2V the drop off in sound level continued to the pronounced.

(1)

(2)



(3)

Photographs

The photographs of the horn speakers are shown and referenced as pictures 1 through 14. Descriptive comments are included about the various speakers in the following paragraphs. Pictures 1 and 2 show the smallest and largest horn speakers in the author's collection.

Speaker 1 - Reflectone 3″ diameter speaker (which the author describes as barely qualifying as a horn speaker) is at least an oddity. Being extremely small, using an earphone as a driver unit, it has very low audible output. It is made of simulated tortoise shell and was advertized in *Radio News* magazines of 1925. This speaker weighs less than 1 pound.

Speakers 2 and 7 - The Music Master horn speakers (14″ and 22″ diameter bells) have near identical goose neck cast iron, bell support tubes but the two earphone driver units gave quite different a.c. impedance responses at 1 kHz. The 14″ bell is made of light tan spruce wood (laminated) and is original. The 22″ diameter oak bell is a Victor phonograph bell made of cross banded oak veneers (Victor #31) that had several inches cut off the small diameter part of the bell and was customed fitted to the goose neck part with a Music Master adapter ring. Since the 22″ diameter bell seemed to closely match the shape and size of the original 21″ diameter Music Master bell it was included in these tests for comparison and tests.

Speakers 3 and 6 - The Magnavox M-20, Mod. A., is a unique construction shape being best described as a driver arm reproducer coupled into a U shape cone-tube. The horn is totally encased in a walnut rectangular box cabinet with a cloth door cover.

Speaker 4 - The Magnavox R-3 is an electro-dynamic speaker with a movable voice coil anchored to a metal diaphragm. The movement of the coil is limited only by the elastic limit of the diaphragm. The impedance of the coil is very low so that a step down transformer needs to be used from the output of an amplifier. The electromagnetic field consumes 1A at 6V. Resonance of the diaphragm is near 4700 Hz. This speaker is the heaviest of all the author's speakers and weighs 13 pounds.

Speaker 5 - The Magnavox M-1 has a driver coil resistance of 400 ohms and impedance at 1 kHz of 3k ohms, the lowest of all speakers tested. The steel bell is painted gold, one of two colors available with this early Magnavox horn. It is one of the prettier horns in the author's collection.

Speaker 8 - The RCA Radiola UZ-1325

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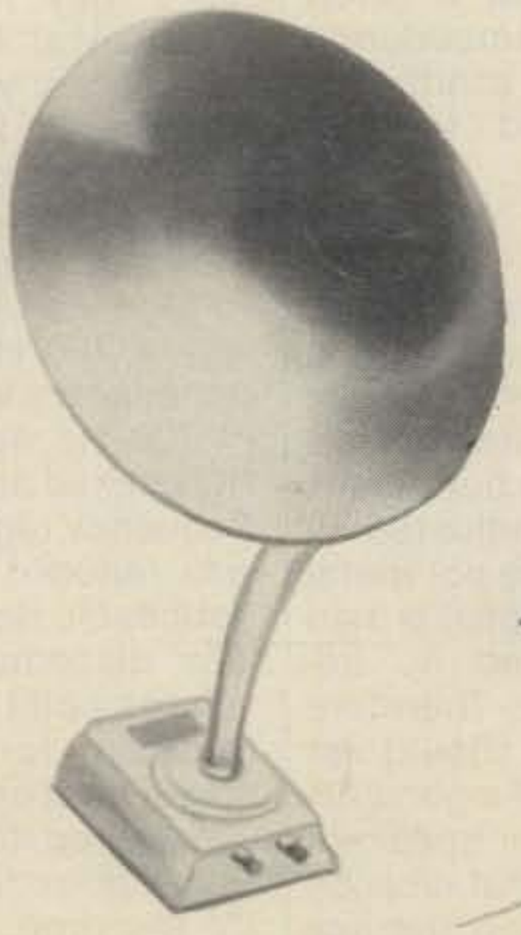

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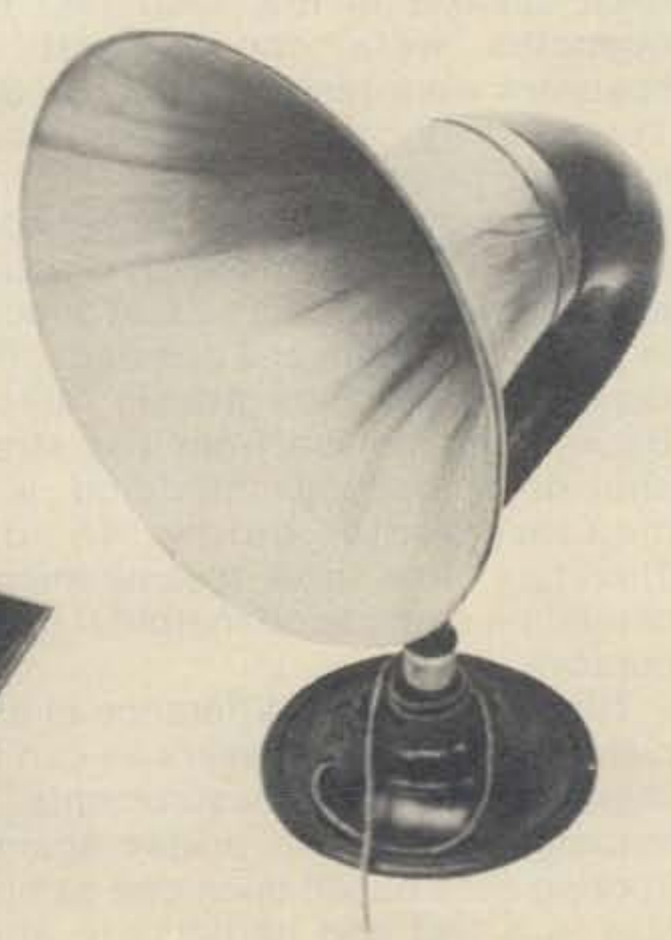

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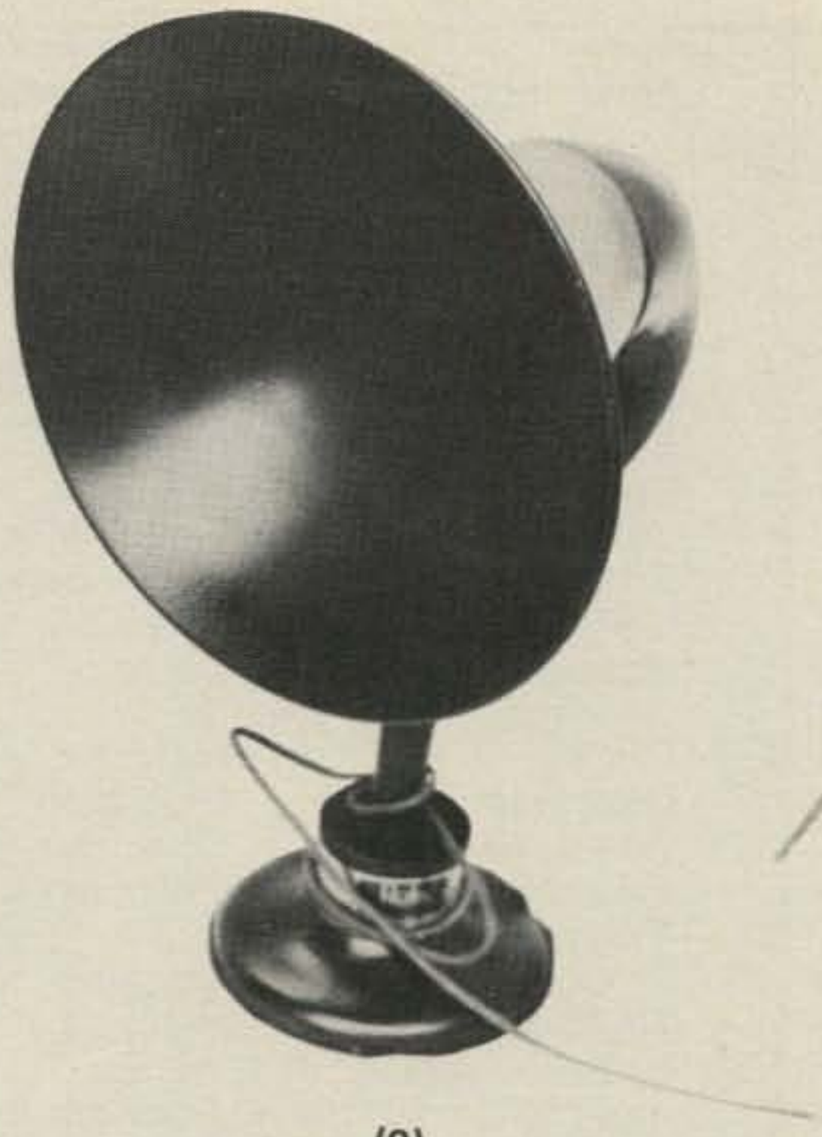

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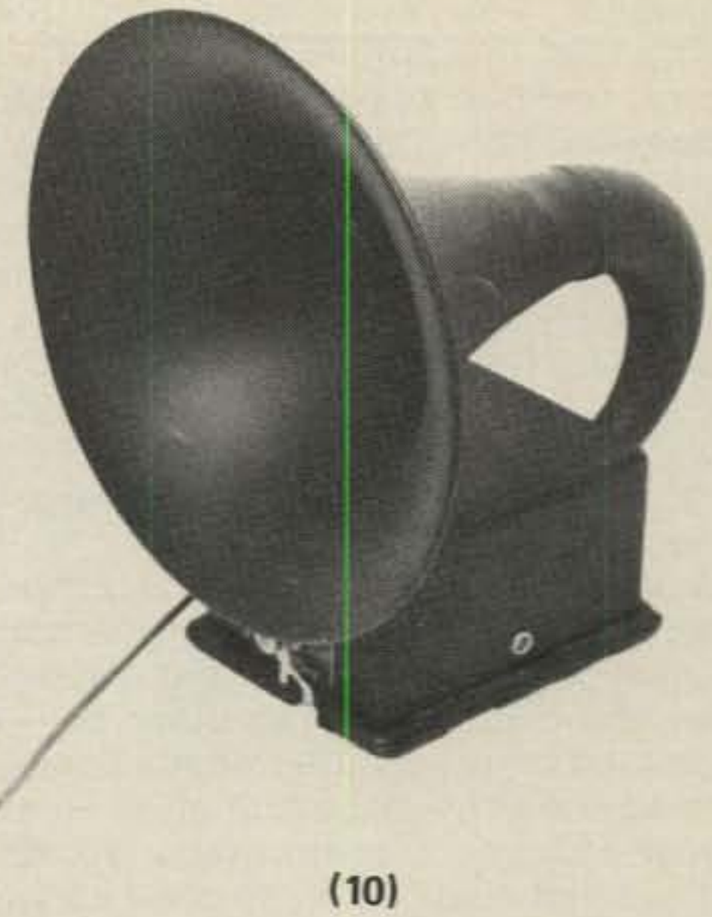

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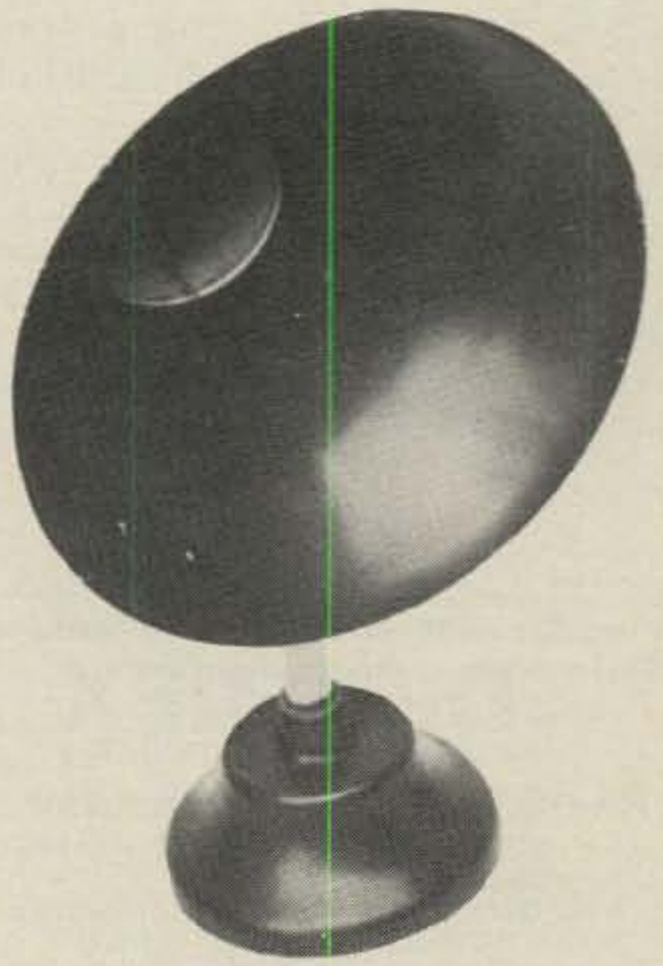

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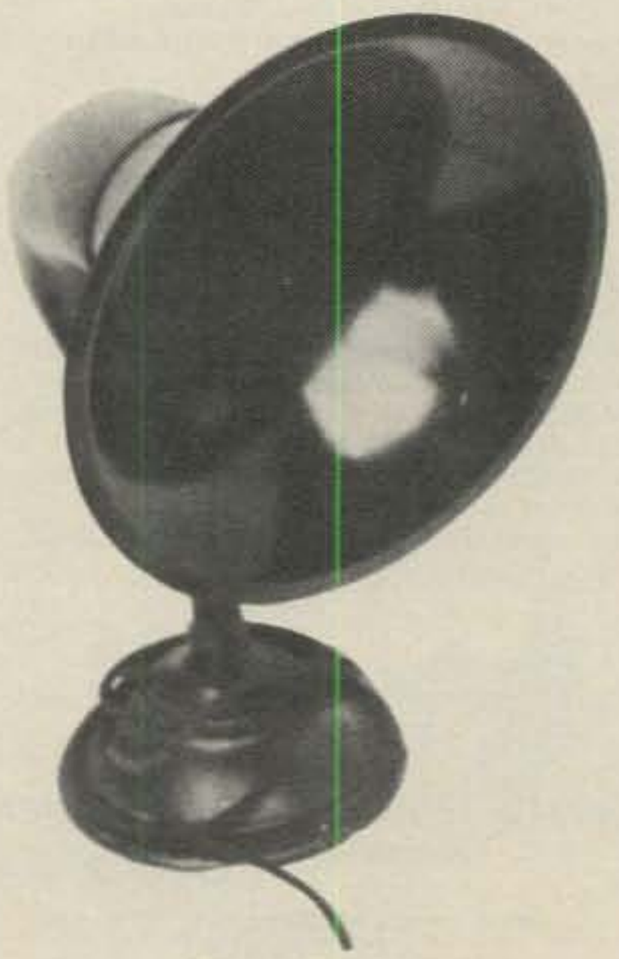

(14)

has a molded rubber horn and a volume control. It has a more upright shape than most other speakers.

Speaker 9 - The Rola, Re-Creator, has an aluminum horn and was in fact one of the better sounding horn speakers of the collection. The frequency tests of Table 2 shows the horn had better volume at 350 and 1 kHz than most speakers.

Speaker 10 - The Dictogrand is an earphone type horn speaker with an adjustable volume control. The numbered dial on the front of the chassis box when turned varies the air gap between he magnetic poles and the diaphragm thereby increasing and decreasing the pull of the magnetic field upon the diaphragm and hence it's adjustment varies the volume.

Speaker 11 - The AK "H" is a very ruggedly constructed steel horn speaker with brown crackled paint. The type of driver is an earphone. The aesthetic shape of this speaker is most pleasing. Unfortunately the driver parts (made of pot metal) had seized up and made adjustment impossible. (Note; a second AD "H"

No - 71-72

speaker was acquired during the writing of this article, also had seized parts and did not perform adequately)

Speaker 12 - The Western Electric, 10D, has a heavy metal base which contains a step down transformer to drive the low impedance driver arm assembly. The papier mache 14″ diameter horn is a bit distorted on the edges because of time aging and wear. The horn is one of the earliest of all shown in Table 1. It weighs 9 pounds.

Speaker 13 - The British Thomas-Houston (BTH) is a British make horn speaker with an earphone driver and an aluminum horn. The outer bell is painted brown and the volume control is a knob in the base that gives an extreme range of control (over 20 dB). The tonal quality was as good as any US make earphone horn.

Speaker 14 - The Sears Silvertone WLS horn is one of the smaller horns having an 11″ diameter bell. The horn is molded bakelite, brown colored with a very low driver dc resistance and ac impedance.

In conclusion, the author has made a listing of horn speaker manufacturers and model identifications of the 1920's and lists 65 such manufacturers in Table 3. DC

Table 3 ⟶

Manufacturer	Model-Name-Style
Ackerman	Aristocrat 21, 25
Ajax Elect. Spec.	-
Aldine Radio & Mfg.	Microphone
American Art Mache	Madera
Amplion	AR 102, 111, 114, Dragonfly, Jr., Jr. deluxe (also identified as AR 15, 19, 35, 45)
Arkay	-
American Elect.	Burns 205B, D
Atwater Kent	H, L, M. R
Baldwin	Nathaniel
Bel Canto	-
Brandes	Table Talker
Bristol	Audiophone "S", "J", Baby Grand, Baby
Callophone	R 1202
Cannon & Miller	Camco
Chanson	-
Davis	Majestic
Dictograph/Grand	Dictogran Portable, Upright
Dual L. S. Col	Charmitone H-8, J-10
Federal	Pleiophone
Florentine	-
Frost	Musette
Hardsocg	-
Holtzer-Cabot	Herald
Jewett Radio & Phono	Superspeaker
Jodra Mfg. Co.	The Enchanter
Kilbourne & Clark	K & C
Kirkman Engr. Corp.	K-E
Liberty Metal Prod.	-
Madera	Madera
Magnavox	M1, M4, R2, R3, A1-R, A2-R, TS2
Manhattan	Jr.
Metro Elect. Co.	Metro L. S. 10
Mozart-Grand	Baby Grand
Multiple Elect. Prod.	Atlas Amplitone 101, 102
Murdock	500
Music Master	-
O'Neil	Audiophone
Orchestrion	-
Ovenshire	-
Radialamp	Lamp speaker
Radio Cabinet Co.	-
Radio Industries	Rico 120
RCA	Radiola 1320, 1325
Reichmann	Thorola
Rhamstine	Adapt-O-Phone
Rice & Hochster	Reflectone
Rola	Re-Creator
Rollersmith -	Universal
Saal	Soft Speaker, Jr.
Sadler	Trutone, Sr., Little Sr.
Sanford Bros	Timbretone
Standard Metal	15, 17, 114, Gem
Stewart Warner	400
Stromberg Carlson	1A, 2A
Telephone Maint. Div.	Telmalco
Thompson	Magnaphone
Tower	Little spitfire, Scientific
Triangle Electro Trad.	Berwick
Trimm	Acousticola, 80
Trinity	A-1
United Radio Peerless	-
Utah	Super flex 18
Vocarola	-
Vogue Products	-
Westinghouse	FL
Western Elect.	10D
Winkler-Reichmann	Thorophone S5
Work Rite Mfg.	Sr., Jr.

NO-71-72

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

It looks almost certain that 1979 will go into the record book as a year of peak sunspot activity and correspondingly good conditions on the h.f. bands. While it will be several months yet before we know for sure, in all probability the present sunspot cycle, Cycle 21, reached its level of peak intensity during late summer or early fall, with a smoothed sunspot number close to, if not slightly more than, 150. This would rank the present cycle among the most intense recorded since sunspot observations began more than 200 years ago. In the 20 complete cycles observed since 1755, only three have exceeded a smoothed sunspot number of 150; cycle 3 with a peak of 159 in May, 1778; cycle 18 with a peak of 152 in June, 1947 and cycle 19 which reached a breaking level of 201 in November, 1957.

It is estimated that solar activity during 1979 began with a smoothed sunspot count of 124, reached a peak of approximately 150 during August or September, and declined to the mid-140s by December.

December Band Openings

Although solar activity may now be on the decline, the level expected this December should be higher than observed during any previous December since 1958! This, coupled with the fact that F-2 layer ionization is usually at seasonally peak levels in the northern hemisphere during December, should result in continuing good-to-excellent DX propagation conditions on all of the amateur h.f. bands.

Excellent *daytime* DX openings to all areas of the world should be possible on the *10, 15* and *20* meter bands. Also expect exceptional conditions on the *6* meter band, with peak conditions likely towards Europe, Africa and in a generally easterly direction an hour or two before Noon, towards Central and South America and the Caribbean area from an hour or two before, to about an hour after Noon, and towards the Pacific, Australasia and the Far East during the late afternoon and into the sunset period. The best days to look for DX openings on *6* meters are those expected to be HIGH or ABOVE NORMAL.

From *sundown* to *Midnight,* look for DX openings towards the south and west on both *15* and *20* meters, and to most other areas of the world on *40* and *80* meters. Fairly good DX openings on the *160* meter band should be possible from the eastern half of the country towards the north, east and south.

From *Midnight* to *sunrise,* the best DX bands should be *40* and *80* meters, with openings also possible to many area of the world on *20* and *160* meters.

DX propagation conditions on the *160* meter band are usually at their seasonal peak during December. The band should open towards Europe and in an easterly direction beginning about 8 p.m. in all time zones, and continuing until 3 a.m. in the EST zone; 1 a.m. in CST; Midnight in MST and 11 p.m. in PST. These openings favor locations in the eastern half of the USA. Openings towards the south, particularly to Central America, the Carribbean area and the northern countries of South America, should be possible from about 10 p.m. to 3 a.m. in all time zones. Openings towards the Pacific, Australasia and the Far East will favor stations in the western half of the country, but it may be worth the time to check for these openings in other areas as well, between 4 a.m. and local sunrise.

Remember the old rule that applies to *160* meter DX openings, and to *40* and *80* meters as well, optimum conditions occur about the time that the sun begins to *rise* at the *eastermost* terminal of the path.

For *short-skip* openings during December try the *80* and *40* bands during the day for paths less than 250 miles, and *80* and *160* meters at night over these distances. For openings between 250 and 750 miles, *40* meters should be best during the day, and both *80* and *160* meters at night. Between 750 and 1300 miles, try *20* during the day, *40* and *80* meters from sunset to Midnight, and *80* meters later int he evening and until sunrise. Try *40* meters again for about an hour or so after sunrise. For openings between 1300 and 2300 miles, it should be a toss-up between *20* and *15* meters during the day, with *10* meters running close behind. Try *20* and *40* meters from sundown to Midnight, then check *40* and *80* meters until sunrise. Try *40* meters again for an hour or so after sunrise.

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for December 1979

	Expected Signal Quality			
Propagation Index	(4)	(3)	(2)	(1)
Above Normal: 20, 26	A	A	B	C
High Normal: 3-4, 10, 14, 21, 25, 30-31	A	B	C	C-D
Low Normal: 2, 5, 9, 11-13 17-19, 22-23, 27, 29	B	C	C-D	D-E
Below Normal: 1, 6, 8, 15-16 24, 28	C	C-D	D	E
Disturbed: 7	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 to poor (C-D) on Dec. 1st, fair (C) on the 2nd, good (B) on the 3rd and 4th, etc.

For updated information, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 1714, Silver Spring, MD 20902.

**11307 Clara St., Silver Spring, MD 20902*

This month's column contains *DX Propagation Charts* valid through mid-February. *Short-Skip Propagation Charts* for December appeared in last month's column.

V.h.f. Ionospheric Openings

The best times to check for worldwide *6* meter openings on this band have been given earlier in this column. They are also indicated by ** in the *DX Propagation Charts.* The combination of high solar activity and seasonally high ionization in the F-2 layer may produce some record breaking DX openings on *6* meters this month. /A secondary seasonal peak in sporadic-E ionization should also result in some short-skip openings on this band between distances of approximately 800 and 1300 miles.

The possibility for trans-equatorial, or TE, openings on *6* meters usually decreases considerably during December, but some openings should still be possible between the southern states and countries in deep South America. TE openings generally take place during the evening hours, and they usually peak between approximately 8 and 11 p.m.

The *Geminids,* a major meteor shower, should begin on December 13 and last for about three days. Maximum intensity is expected at about 10 a.m. EST on December 14, with an estimated meteor rate of about one a minute. This should make possible fairly good meteor-type communications on both *6* and *2* meters. **Ursids,** a considerably less intense shower, is expected to take place on December 22 and 23. It's peak should occur at approximately 1 a.m. EST on December 23, with a meteor rate of approximately 15 an hour.

There is a good possibility for some unusual short-skip openings on both *6* and *2* meters during periods of auroral activity, which are likely to occur during December when h.f. conditions are DISTURBED or BELOW NORMAL. Check the "Last Minute Forecast" at the beginning of this column for those days during December that are expected to be in these categories.

Shortwave Propagation Handbook

There are still available a limited number of personalized copies of *The Shortwave Propagation Handbook* signed by both authors, George Jacobs, W3ASK and T.J. Cohen, N4XX. This book explains the many facets of shortwave propagation in simple language, and it is full of do-it-yourself data for predicting propagation openings to all areas of the world on the shortwave bands, as well as forecasting day-to-day conditions. The book is the first of its kind for the radio amateur, shortwave listener, commercial user and all others who make use of the shortwave spectrume. Personalized copies can be obtained directly from the authors by sending $7.50 (postpaid) to:

MAIL-A-PROP
P.O. BOX 1714
Silver Spring, MD 20902

When ordering for delivery outside of the USA, please remit $8.50 in US funds for surface deliver, $10 for airmail delivery.

The Editor of this column would like to take this opportunity to extend his warmest wishes to readers everywhere, for a Merry Christmas and a very Happy New Year and holiday season.

73, George, W3ASK

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be use 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 (15 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 Propagation column for the actual *dates* on which an opening with specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 P.M., etc. Appropriate *daylight* time is used *not* GMT. To 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 transmitter 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-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level; for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

December 15, 1979-February 15, 1980
Time Zone: EST (24-Hour Time)
EASTERN USA TO:

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Central Europe & North Africa	07-08 (1) 08-09 (2) 09-13 (4) 13-14 (2) 14-15 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-14 (4) 14-15 (2) 15-16 (1)	03-06 (2) 06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-16 (4) 16-18 (3) 18-21 (2) 21-23 (1) 23-01 (2) 01-03 (3)	14-16 (1) 16-17 (2) 17-19 (3) 19-02 (4) 02-03 (3) 03-04 (2) 04-05 (1) 17-19 (1)* 19-20 (2)* 20-02 (3)* 02-03 (2)* 03-04 (1)*
Northern Europe & European USSR	07-08 (1) 08-09 (3) 09-10 (4) 10-11 (2) 11-12 (1) 08-10 (1)**	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-23 (2) 23-02 (1)	17-19 (1) 19-01 (2) 01-03 (1) 19-02 (1)*
Eastern Mediterranean & Middle East	07-08 (1) 08-09 (3) 09-11 (4) 11-12 (3) 12-13 (2) 13-14 (1) 09-11 (1)**	07-08 (1) 08-09 (2) 09-11 (4) 11-14 (3) 14-15 (2) 15-16 (1)	07-10 (1) 10-13 (2) 13-16 (3) 16-18 (4) 18-22 (3) 22-01 (2) 01-03 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-01 (2) 01-02 (1) 20-00 (1)*
Western Africa	07-08 (1) 08-09 (2) 09-12 (3) 12-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 08-10 (1)**	05-06 (1) 06-08 (2) 08-14 (3) 14-19 (4) 19-20 (3) 20-22 (2) 22-23 (1)	03-04 (3) 04-06 (2) 06-13 (1) 13-15 (2) 15-17 (3) 17-00 (4) 00-01 (3) 01-03 (2)	18-20 (1) 20-23 (2) 23-01 (3) 01-03 (2) 03-04 (1) 22-03 (1)*
Eastern & Central Africa	08-09 (1) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1) 08-10 (1)**	06-08 (1) 08-12 (2) 12-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	01-04 (2) 04-06 (1) 06-08 (2) 08-14 (1) 14-16 (2) 16-17 (3) 17-23 (4) 23-01 (3)	18-21 (1) 21-23 (2) 23-01 (1) 21-00 (1)*
Southern Africa	07-08 (1) 08-11 (3) 11-14 (4) 14-15 (3) 15-16 (2) 16-17 (1) 08-10 (1)**	06-08 (1) 08-11 (2) 11-13 (3) 13-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	06-08 (1) 12-14 (1) 14-15 (2) 15-17 (3) 17-20 (4) 20-00 (3) 00-02 (1) 02-04 (1)	18-19 (1) 19-22 (2) 22-00 (1) 19-22 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 17-19 (1)	07-08 (1) 08-10 (2) 10-11 (1) 17-19 (1)	06-07 (1) 07-09 (3) 09-10 (2) 10-11 (1) 17-19 (1) 22-23 (1) 23-00 (2) 00-01 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-11 (1) 11-14 (2) 14-15 (1) 18-19 (1) 19-20 (2) 20-21 (1)	09-10 (1) 10-12 (2) 12-13 (1) 18-19 (1) 19-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-21 (1) 21-23 (1)	05-07 (1) 17-19 (1)
Far East	17-18 (1) 18-19 (3) 19-20 (2) 20-21 (1)	09-11 (1) 16-17 (1) 17-18 (2) 18-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-04 (2) 04-07 (1) 07-09 (2) 09-11 (1) 1-18 (1) 18-19 (2) 19-22 (3) 22-00 (1)	04-05 (1) 05-07 (1) 07-08 (1) 05-07 (1)*
South Pacific & New Zealand	10-13 (1) 13-15 (2) 15-16 (3) 16-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)**	08-09 (1) 09-11 (2) 11-15 (1) 15-17 (2) 17-18 (3) 18-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	12-19 (1) 19-21 (2) 21-22 (3) 22-02 (4) 02-04 (3) 04-05 (2) 07-10 (3) 10-12 (2)	00-02 (1) 02-03 (2) 03-07 (3) 07-08 (2) 08-09 (1) 03-05 (1)* 05-07 (2) 07-08 (1)*
Australasia	08-10 (1) 10-11 (2) 11-12 (1) 15-16 (1) 16-17 (2) 17-18 (3) 18-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)**	09-10 (1) 10-12 (2) 12-15 (1) 15-18 (2) 18-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	07-09 (3) 09-11 (2) 11-14 (1) 16-18 (2) 20-22 (1) 22-00 (2) 00-05 (3) 05-07 (2)	03-05 (1) 05-08 (2) 08-09 (1) 05-08 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-00 (4) 00-02 (3) 02-06 (2) 06-07 (3)	17-18 (1) 18-19 (2) 19-20 (3) 20-04 (4) 04-05 (3) 05-06 (2) 06-07 (1) 19-20 (1)* 20-22 (2)* 22-02 (3)* 02-04 (2)* 04-06 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 10-12 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-11 (3) 11-13 (2) 14-16 (3) 16-20 (4) 20-21 (2) 21-22 (1)	07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3) 02-04 (2) 04-07 (3)	19-21 (1) 21-04 (2) 04-05 (1) 21-04 (1)*
McMurdo Sound, Antarctica	08-10 (1) 17-19 (1)	06-09)1) 15-17 (1) 17-18 (2) 18-20 (3) 20-22 (2) 22-23 (1)	17-20 (1) 20-21 (2) 21-00 (3) 00-02 (2) 02-04 (3) 04-05 (2) 05-06 (1) 06-08 (2) 08-09 (1)	00-06 (1)

Time Zones: CST & MST (24-Hour Time)
CENTRAL USA TO:

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	07-08 (1) 08-09 (3) 09-11 (4) 11-12)2) 12-13 (1) 08-10 (1)**	06-07 (1) 07-08 (2) 08-12 (4) 12-13 (2) 13-14 (1)	02-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-13 (3) 13-15 (4) 15-17 (3) 17-19 (2) 19-23 (1) 23-02 (2)	15-17 (1) 17-18 (1) 18-01 (3) 01-02 (2) 02-03 (1) 17-20 (1)* 20-01 (2)* 01-02 (1)*
Northern & Central Europe & European USSR	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-12 (2) 12-13 (1)	04-07 (1) 07-09 (3) 09-13 (2) 13-15 (3) 15-16 (4) 16-18 (3) 18-20 (2) 20-22 (1) 22-01 (2) 01-02 (1)	17-19 (1) 19-22 (2) 22-01 (1) 19-00 (1)*
Eastern Mediter-ranean & Middle East	08-09 (1) 09-10 (2) 10-11 (3) 11-12 (2) 12-13 (1)	07-08 (1) 08-10 (3) 10-11 (4) 11-12 (2) 12-13 (1)	07-10 (1) 10-13 (2) 13-15 (3) 15-17 (4) 17-18 (3) 18-19 (2) 19-21 (1) 21-23 (2) 23-01 (1)	18-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Western Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-14 (4) 14-16 (3) 15-17 (2) 17-18 (1) 09-11 (1)*	06-08 (1) 08-10 (2) 10-14 (3) 14-17 (4) 17-18 (3) 18-20 (2) 20-21 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-21 (4) 21-23 (3) 23-01 (2) 01-03 (1) 03-06 (2)	18-20 (1) 20-23 (2) 23-02 (1) 20-23 (1)*
Eastern & Central Africa	07-08 (1) 08-09 (2) 09-13 (3) 13-14 (4) 14-15 (3) 15-16 (2) 16-17 (1) 10-12 (1)**	06-08 (1) 08-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	07-14 (1) 14-16 (2) 16-17 (3) 17-20 (4) 20-22 (3) 2200 (2) 00-02 (1)	19-00 (1) 20-22 (1)*
Southern Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-13 (4) 13-14 (3) 14-15 (2) 15-16 (1) 08-10 (1)**	07-09 (1) 09-11 (2) 11-12 (3) 12-15 (4) 15-17 (3) 17-18 (2) 18-19 (1)	06-13 (1) 13-15 (2) 15-17 (3) 17-19 (4) 19-22 (3) 22-01 (2) 01-03 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Central & South Asia	08-09 (1) 09-10 (2) 10-11 (1) 18-19 (1) 19-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-11 (1) 18-19 (1) 19-21 (2) 21-22 (1)	04-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 17-18 (1) 18-19 (2) 19-21 (3) 21-23 (2) 23-02 (1)	06-08 (1) 18-20 (1)
Southeast Asia	09-10 (1) 10-13 (2) 13-14 (1) 16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	08-09 (1) 09-10 (2) 10-12 (3) 12-13 (2) 13-14 (1) 16-18 (1) 18-20 (3) 20-21 (2) 21-22 (1)	06-07 (1) 07-09 (2) 09-10 (3) 10-12 (2) 12-14 (1) 16-18 (1) 18-20 (2) 20-21 (3) 21-22 (2) 22-23 (1)	04-07 (1) 17-19 (1)
Far East	15-16 (1) 16-17 (2) 17-19 (4) 19-20 (2) 20-21 (1) 17-19 (1)*	08-10 (1) 15-16 (1) 16-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	02-03 (2) 03-06 (1) 06-07 (2) 07-09 (3) 09-10 (2) 10-11 (1) 15-18 (1) 18-20 (2) 20-22 (3)	02-03 (1) 03-07 (2) 07-09 (1) 03-07 (1)*
South Pacific & New Zealand	09-11 (1) 11-14 (2) 14-15 (3) 15-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 16-18 (1)**	07-09 (1) 09-11 (2) 11-13 (3) 13-16 (2) 16-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-23 (1)	10-17 (1) 17-19 (2) 19-20 (3) 20-00 (4) 00-04 (3) 04-06 (2) 06-07 (3) 07-08 (4) 08-09 (3) 09-10 (2)	23-01 (1) 01-02 (2) 02-07 (3) 07-08 (2) 08-09 (1) 00-02 (1)* 02-07 (2)* 07-08 (1)*
Australasia	08-09 (1) 09-11 (2) 11-14 (1) 14-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1) 17-19 (1)**	07-08 (1) 08-09 (2) 09-10 (3) 10-11 (2) 11-13 (1) 13-17 (2) 17-19 (3) 19-21 (4) 21-22 (2) 22-23 (1)	04-07 (2) 07-09 (4) 09-10 (3) 10-11 (2) 11-15 (1) 15-17 (2) 17-20 (1) 20-23 (2) 23-04 (3)	02-04 (1) 04-07 (2) 07-09 (1) 03-06 (1)*
Caribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-11 (4) 11-13 (3) 13-16 (4) 16-17 (3) 16-17 (3) 17-18 (2) 18-19 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-11 (4) 11-13 (3) 13-18 (4) 18-19 (3) 18-19 (3) 19-21 (2) 21-22 (1)	06-07 (3) 07-09 (4) 09-11 (3) 11-14 (2) 14-16 (3) 16-23 (4) 16-23 (4) 23-02 (3) 02-06 (2)	17-18 (1) 18-19 (2) 19-21 (3) 21-04 (4) 04-03 (2) 05-07 (1) 05-07 (1) 19-20 (1)* 20-22 (2)* 22-01 (3)* 01-02 (2)* 02-04 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-10 (4) 10-11 (3) 11-13 (2) 13-14 (3) 14-17 (4) 17-18 (3) 18-19 (2) 19-20 (1) 09-11 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-11 (3) 11-13 (2) 13-15 (3) 15-20 (4) 20-21 (3) 21-22 (2) 22-23 (1)	02-06 (2) 06-07 (3) 07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-02 (3)	19-21 (1) 21-04 (2) 04-06 (1) 21-05 (1)*
McMurdo Sound, Antarctica	08-10 (1)	06-08 (1) 08-10 (2) 10-12 (1) 15-17 (1) 17-18 (2) 18-22 (3) 22-23 (2) 23-00 (1)	16-18 (1) 18-20 (2) 20-02 (3) 02-04 (2) 04-06 (1) 06-08 (2) 08-09 (1)	23-05 (1)

Time Zone: PST (24-Hour Time)
WESTERN USA TO:

	10/6 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western & Southern Europe & North Africa	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-11 (4) 11-12 (2) 12-13 (1)	05-06 (1) 06-09 (2) 09-12 (3) 12-14 (4) 14-15 (3) 15-17 (2) 17-19 (1) 22-01 (2)	18-20 (1) 21-00 (2) 00-01 (1) 19-23 (1)*
Central & Northern European USSR	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	05-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-14 (1) 14-16 (3) 16-18 (2) 18-21 (1) 21-00 (2)	18-20 (1) 20-23 (2) 23-00 (1) 19-22 (1)*
Eastern Mediter-ranean & Middle East	07-08 (1) 08-10 (2) 10-11 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1)	06-07 (1) 07-10 (2) 10-14 (1) 14-16 (3) 16-17 (2) 17-20 (1) 20-23 (2)	07-09 (1) 18-22 (1)
Western Africa	07-08 (1) 08-09 (2) 09-11 (3) 11-12 (4) 13-15 (3) 15-16 (2) 16-17 (1) 09-11 (1)**	06-07 (1) 07-08 (2) 08-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-12 (1) 12-14 (2) 14-16 (3) 16-19 (4) 19-22 (3) 22-00 (2) 00-02 (1)	18-19 (1) 19-21 (2) 21-22 (1) 19-21 (1)*
Eastern & Central Africa	07-08 (1) 08-10 (2) 10-13 (3) 13-14 (2) 14-15 (1) 09-11 (1)**	06-08 (1) 08-12 (2) 12-15 (3) 15-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-21 (3) 21-23 (2) 23-00 (1)	18-22 (1) 07-09 (1)
Southern Africa	07-08 (1) 08-10 (3) 10-12 (4) 12-13 (3) 13-14 (2) 14-15 (1) 08-10 (1)**	07-09 (1) 09-12 (2) 12-13 (3) 13-15 (4) 15-17 (2) 17-18 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (3) 16-18 (4) 18-20 (3) 20-00 (2) 00-02 (1)	18-19 (1) 19-20 (2) 20-21 (1) 18-19 (1)*
Central & South Asia	06-09 (1) 17-18 (1) 18-19 (3) 19-20 (1)	06-09 (1) 16-17 (1) 17-19 (3) 19-20 (2) 20-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-17 (1) 17-18 (2) 18-19 (3) 19-21 (2) 21-23 (1)	04-09 (1) 17-19 (1)
Southeast Asia	08-09 (1) 09-11 (2) 11-12 (1) 14-15 (1) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 15-17 (1)**	07-08 (1) 08-10 (3) 10-11 (2) 11-14 (1) 14-15 (2) 15-18 (3) 18-20 (2) 20-21 (3) 21-22 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-12 (1) 15-17 (1) 19-20 (1) 20-22 (2) 22-00 (1)	02-04 (1) 04-07 (2) 07-08 (1) 04-06 (1)*
Far East	13-14 (1) 14-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1) 15-18 (1)**	12-14 (1) 14-15 (3) 15-17 (2) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1)	00-06 (2) 06-08 (3) 08-09 (2) 09-12 (1) 12-18 (2) 18-21 (4) 21-22 (3) 22-00 (2)	00-01 (1) 01-04 (2) 04-07 (3) 07-08 (1) 01-05 (1)* 05-06 (2)* 06-07 (1)*
South Pacific & New Zealand	09-10 (1) 10-11 (2) 11-13 (4) 13-16 (3) 16-19 (4) 19-20 (2) 20-21 (1) 15-18 (1)**	07-08 (1) 08-09 (2) 09-11 (4) 11-15 (2) 15-17 (3) 17-22 (4) 22-23 (3) 23-00 (2) 00-01 (1)	04-07 (1) 07-09 (4) 09-10 (3) 10-11 (2) 11-18 (1) 18-19 (2) 19-20 (3) 20-00 (4) 00-02 (3) 02-04 (2)	21-22 (1) 22-00 (2) 00-07 (3) 08-08 (2) 08-09 (1) 22-00 (1)* 00-06 (2)* 06-07 (1)*
Australasia	10-13 (1) 13-15 (2) 15-16 (3) 17-19 (4) 19-20 (3) 20-21 (2) 21-22 (1) 17-19 (1)**	08-09 (1) 09-11 (3) 11-12 (2) 12-14 (3) 14-15 (2) 15-17 (1) 17-19 (2) 19-21 (4) 21-22 (2) 22-23 (1)	06-07 (3) 07-09 (4) 09-10 (3) 10-12 (2) 12-14 (1) 18-20 (1) 20-21 (2) 21-23 (3) 23-01 (4) 01-03 (3) 03-04 (2) 04-06 (1)	01-03 (1) 03-04 (2) 04-07 (3) 07-08 (1) 03-04 (1)* 04-06 (2)* 06-07 (1)*
Carribbean, Central America & Northern Countries of South America	07-08 (1) 08-09 (3) 09-10 (4) 10-12 (3) 12-15 (4) 15-16 (3) 16-17 (2) 17-18 (1) 08-10 (1)**	06-07 (1) 07-08 (3) 08-10 (4) 10-13 (3) 13-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	06-08 (4) 08-10 (3) 10-13 (2) 13-15 (3) 15-22 (4) 22-00 (3) 00-06 (2)	17-18 (1) 18-19 (2) 19-20 (3) 20-04 (4) 04-05 (2) 05-06 (1) 19-20 (1)* 20-22 (2)* 22-00 (3)* 00-03 (2)* 03-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	06-07 (1) 07-08 (2) 08-09 (4) 09-10 (3) 10-12 (2) 12-13 (3) 13-16 (4) 16-17 (3) 17-18 (2) 18-19 (1) 08-11 (1)**	06-07 (1) 07-08 (3) 08-09 (4) 09-11 (3) 11-13 (2) 13-15 (3) 15-19 (4) 19-20 (3) 20-21 (2) 21-11 (1)	05-06 (2) 06-07 (3) 07-08 (2) 08-14 (1) 14-16 (2) 16-18 (3) 18-00 (4) 00-01 (3) 01-03 (2) 03-05 (1)	19-20 (1) 20-22 (2) 22-00 (1) 00-04 (2) 04-05 (1) 20-03 (1)*
McMurdo Sound, Antarctica	07-08 (1) 08-09 (2) 09-10 (1) 19-20 (1) 20-21)2) 21-22 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-20 (2) 20-22 (3) 22-01 (2) 01-02 (2)	16-18 (1) 18-20 (2) 20-03 (3) 03-04 (2) 04-05 (1) 06-07 (1) 07-08 (2) 08-10 (1)	00-05 (1)

*Indicates best times to listen for 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a Propagation Index of (2), or higher.

**Indicates best times to listen for F-2 layer openings on 6 Meters.

a monthly feature by

JOHN A. ATTAWAY, K4IIF

DX

News of communications around the world

One of the first suggestions approved by the *CQ* DX Awards Committee, when it was created 12 years ago, was the DX Hall of Fame as an honor for those very few amateurs who have made exceptional contributions to the DXing hobby. The Committee stipulated that this honor would be reserved for those who have served DX over a long period of time at a considerable personal sacrifice, those who have given their time, energy and resources with no thought of personal gain.

The first DXer elected to the Hall of Fame was Gus M. Browing, W4BPD, the greatest of the worldwide DXpedition operators, who received the honor in November, 1967. The second recipient was the immortal Jack Cummings, W2CTN, the world's premier QSL Manager, in March, 1968. During the past 11 years an additional 12 outstanding DXers have been elected to the Hall of Fame.

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

Today it is an immense pleasure to honor a man viewed by many as Jack Cumming's successor, Mr. Joe Arcure, Jr., W3HNK. Joe Arcure stands unchallenged as the greatest QSL Manager of the 1970's. At the present time he handles the cards for no fewer than 200 DX calls. The full list of the stations who say QSL via W3HNK is provided in this month's QSL Information section.

W3HNK began his career as a QSL Manager in 1963, steadily adding on new callsigns until he passed the 150 mark in mid-1977, at which time it was estimated that he had filled out over 1 million cards for eager DXers. He is now working on his second million.

Joe is not only a world-class, champion QSL Manager, but a first class operator and DXer in his own right. How he finds the time we don't know, but he holds WAZ, WAC, WAS and has 318 countries confirmed... despite the fact that, except for an assist from his XYL Esther, he handles all the cards personally for the stations in his charge. His own station includes an FT-101B, SB-220, homebrew quad and inverted vees.

Joe Arcure, Jr. will celebrate his 46th birthday on Christmas Day, 1979. He and Esther have been married 24 years and have 2 sons, Joey - 23 and Paul - 21. He belongs to the Masonic Order and is employed by the Sun Oil Company (Sunoco).

Congratulations to Joseph L. Arcure, Jr., W3HNK.

Joe Arcure, Jr., W3HNK, newest member of the DX Hall of Fame. Joe has been King of the QSL Managers for over 10 years and presently handles cards for 200 DX stations. See the QSL Information section at the end of this column for a complete list of the stations under Joe's superb management. The enormous stack of incoming mail is a daily occurence in the shack of this one man QSLing machine.

And Some Changes In The WPX Requirements

The prefix requirements for WPX Band and Continental endorsements have remained virtually since the 1950's when the WPX Award was introduced by Dick Spenceley, KV4AA, *CQ*'s DX Editor during that exciting era. Needless to say, the many prefix changes, and new prefix additions, in the past 20 years have substantially affected the degree of difficulty in at-

THE CQ DX Awards Program

SSB

773 . . . . . AB5G	740 . . . . . K8HV
734 . . . . . VE7BTV	741 . . . . . EI9CB
735 . . . . . WB1DQC	742 . . . . . YV5DFI
736 . . . . . N8II	743 . . . . . K5GKC
737 . . . . . W5LBT	744 . . . . . WB2BTC
738 . . . . . AA6AA	745 . . . . . YU2RTW
739 . . . . . K4KKJ	

C.W.

386 . . . . . KB8EC	387 . . . . . G3KDB

S.S.B. Endorsements

320 . WA2RAU/320	200 . . . AA4TP/200
310 . . . . . K2FL/318	150 . . . K9QVB/183
310 . . . K6YRA/317	150 . WD8LVQ/166
310 . . . W4SSU/317	150 . . . . AB5G/157
310 . . . ZS6LW/313	150 . . . . K4KKJ/154
310 . . . K8LJG/300	150 . . . . . N8II/151
275 . . . . N6AW/291	3.5/7 mHz . AA6AA
275 . . . OK1MP/290	3.5/7 mHz . . N5FG
275 . . . YV5DFI/289	28 mHz N8II
275 . . . VK4VC/282	28 mHz . . . AA6AA
275 . . . . N5FG/275	28 mHz AB5G
250 . . . W2FGY/256	28 mHz K8HV
200 . . YU2RTW/230	28 mHz N5FG

C.W. Endorsements

250 . . W1WLW/250	200 . . . K8LJG/200
200 . . . G3KDB/210	150 . . . KB8KW/151
200 . . . K9QVB/206	150 . . IT9XNM/150

Complete rules and application forms for the *CQ* DX Awards Program can be obtained by sending a business size, No. 10, envelope, self-addressed and stamped to: "CQ DX Awards", 911 Rio St. John Drive, Jacksonville, Florida 32211 U.S.A.

taining these endorsements. The large increase in U.S. prefixes since the days when everyone was either a plain W or K is an excellent example. Worldwide activity is also at a much higher level.

As a result, the following changes are effective immediately:

160 Meters - Band endorsement requirement increased from 35 to 50 prefixes.

80 Meters - Requirement increased from 150 to 175 prefixes.

10 Meters - Increased from 250 to 300 prefixes.

The 40 meter requirement remains at 250 prefixes and the 20 and 15 meter requirements remain at 300 prefixes.

North America - Continental endorsement requirement increased from 126 to 160 prefixes.

South America - Requirement increased from 88 to 95 prefixes.

Europe - Increased from 146 to 160 prefixes.

Africa - Increased from 80 to 90 prefixes.

Asia - Increased from 68 to 75 prefixes.

Oceania - Increased from 51 to 60 prefixes.

The requirements for the *CQ* WPX Award of Excellence remain the same. If you have questions regarding any of the prefix awards, please direct them to the WPX Award Manager, Mr. Bob Huntington, K6XP, 5014 Mindora Drive, Torrance, CA 90505

The Radio Amateur's Conversation Guide

One of the most important facets of amateur radio is our ability to contribute to understanding between different countries and cultures, to enhance international good will. There are few better ways to contribute than the ability to speak to amateurs of other countries in their own languages. Consequently, we are pleased and impressed by *The Radio Amateur's Conversation Guide* compiled by Jukka, OH2BR, and Miika, OH2BAD. This book lists 150 phases commonly used in amateur radio, plus 450 words and numerals, in 8 languages, English, German, French, Italian, Spanish, Portuguese, Russian and Japanese. In addition, there will be supplements for other less widely used languages and every major language will also be available on C-Cassettes. The estimated price of this guide is $5.00 (U.S.) plus the cost of mailing.

Translations for each of the major languages was provided by an appropriate amateur or amateur group. For example, English by G3UML, German-DJ1YE, French - The Clipperton DX Club, Italian - I2CBM and I0JX, Spanish - EA4LH, Portuguese - PY1APS and PY7BXC, Russian - UA1CK and Japanese - JA1KSO and JH1VRQ.

Left to right are Lucio, IX1LOX and Ric, IX1OAR, operating their special event station in the Aosta Valley of Italy.

Interested amateurs may obtain full particulars by sending an IRC to Transslavica, Sampsantie 46, SF-00610 Helsinki 61, Finland.

Both Jukka and Miika are distinguished DX and Contest operators. OH2BR was licensed in 1960 at the age of 15 and has been continuously active on all bands and modes. His country count is 321 confirmed and he is a member of the OH2AW contest team. As a professional translater of Russian with a B.A. degree he is coauthor of the *Finnish-Russian Conversation Guide For Tourists* published by Russkij Jazyk in 1978 for use at the 1980 Olympic Games in Moscow.

OH2BAD was licensed in 1961 at the age of 12 and is also active on all bands and modes with a country count of 320. He is well-known as a

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ITU Operational Bulletins indicate that the following changes have been made in the ITU official call sign series from January 1977 through July 1979. The listing is by alphabetical order according to new prefixes:

New Prefix	Country	Effective Date
H2A - H2Z	Cyprus	Dec. 28, 1978
H4A - H4Z	Solomon Is.	Apr. 23, 1977
H5A - H5Z	Bophuthatswana	Dec. 15, 1977
H6A - H7Z	Nicaragua	Mar. 8, 1979
H8A - H9Z	Rep. Of Panama	June 14, 1979
J2A - J2Z	Djibouti	Jan. 26, 1978
J3A - J3Z	Grenada	July 13, 1977
J4A - J4Z	Greece	Mar. 9, 1978
J5A - J5Z	Guinea-Bissau	Mar. 23, 1978
J6A - J6Z	Ste Lucia	Mar. 8, 1979
J7A - J7Z	Dominica	Mar. 22, 1979
P3A - P3Z	Cyprus	June 13, 1977
P4A - P4Z	Netherlands Antilies	Aug. 13, 1977
P9A - P5Z	Korea	Dec. 1, 1977
T2A - T2Z	Tuvalu	Oct. 19, 1978
T3A - T3Z	Kiribati Rep. ex Gilbert Islands	July 26, 1979
Y2A - Y9Z	German Dem. Republic	Nov. 30, 1978

Many thanks to Gerard de Buren, HB9AW, for compiling this information for us.

Rodrigo "Rod" Alea, CO8RA, of Santiago, Cuba. Rod has been in radio since 1934 and is one of only a few hams active from Cuba. QSLs go to his son Ray Alea, KA8BAC.

The WPX Program

Mixed

775	I8WY	778	K9RN
776	KC4B	779	N4IB
777	JH7FQK		

S.S.B.

1187	W3GXK	1191	LA2ZN
1188	DK9XD	1192	WB0OQV
1189	AD1S	1193	CE4EM
1190	JH0BQU	1194	W0ULU

C.W.

1855	I8WY	1859	WB8HOG
1856	JA7AMA	1860	WB3JUK
1857	N5TV	1861	JH7BRG
1858	DK3EP	1962	N6PV

WPNX

163...WD6GUS

VPX

165	I1-61.999	166	ONL-3052

Endorsements

Mixed: 400 KC4B, JH7FQK. 500 N4IB. 600 W4CZU. 650 K2OLG, K9RN. 750 K2SX, W2HAZ. 800 YU2CAL, VE7IG. 850 WA4QMQ. 1150 K4IEX, W9QWM. 1500 W4BQY.

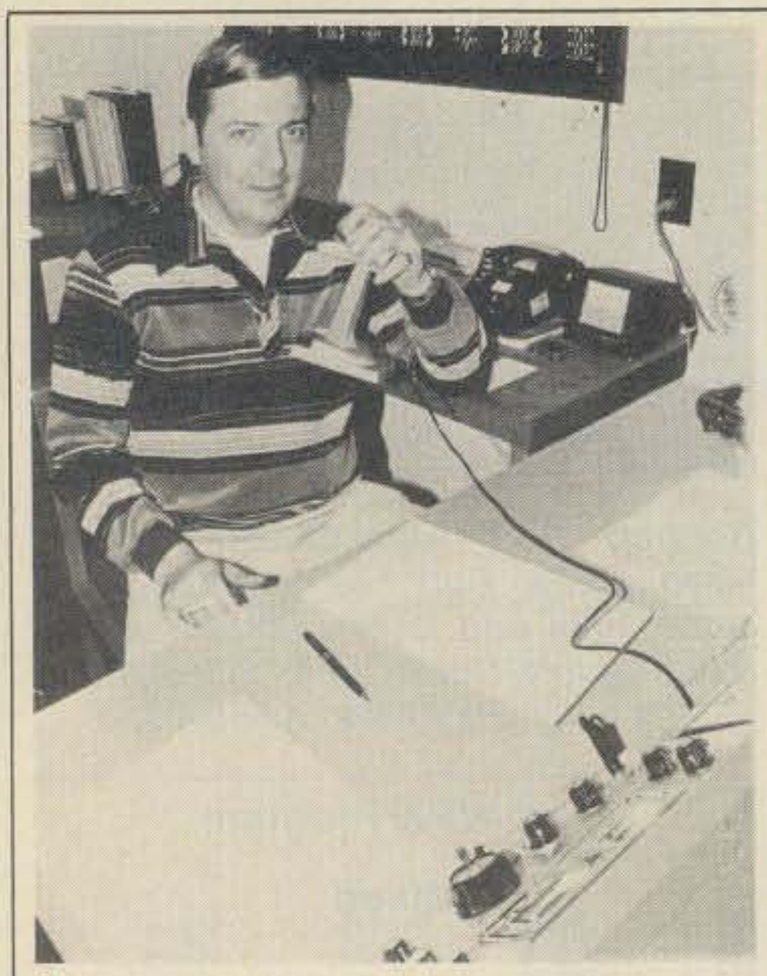
SSB: 300 W3GXK, DK9XD, AD1S, WB0OQV, W0ULU. 350 W9NO, CE4EM. 450 PA0RRS, WA6CPP, KL7AF. 550 LA2ZN. 650 WB2RLK/VE1. 700 VE7IG. 750 W2IOZ. 850 W2CC.

CW: 300 I8WY, N5TV, DK3EP, WB8HOG, WB3JUK, N6PV. 350 WA4QMQ. 450 W0JIE. 500 JH7BRG. 650 W1WLW, OK1DKR, K8LJG. 700 K2SX, W1DMD. 750 VE7CNE, PI1PT.

10 Meters: K2SX.
15 Meters: W4BQY, KL7AF, K8LJG.
20 Meters: K9RN.
40 Meters: WA2AUB.
80 Meters: PA0RRS, K2SX, JH0BQU, WA0TKJ.
160 Meters: K8LJG.
Africa: N6JV.
Asia: JH7FQK.
Europe: K8LJG, K9RN, KL7AF.
No. America: W3GXK, K8LJG, W2HAZ.
Oceania: W4BQY, K8LJG, W9QWM.
So. America: VE3DMC

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

Stan Davies, net control at the Seanet Convention in Singapore. Stan has gone back to the U.K. and is no longer a member of the Seanet group.



Major John P. Allen, HL9KE, operating from his QTH atop 4000 ft. Yongmun San, the 3rd. highest mountain in the Republic of Korea. John uses an FTDX-400, SB-610 and a SB-200 linear into a TH6DXX beam on a 35 ft. telephone pole. He makes most of his stateside contacts on Fridays and Saturdays 2200-0400 GMT around 28510 kHz. He then moves down to 14202-300 from 0400-0700 GMT. He works Europe most nights on 28510 from 1000-1200 GMT, then to 14210 until 1500 GMT. He will be active from Korea until 1981. QSL to Jack Hartley, K4WSB, 512 Severn, Tampa, FL 33606.

member of the OH2AW contest team and more recently as the 10 meter operator for the world record breaking EA8CR team during the 1977 *CQ* Worldwide Phone DX Contest. He is QSL Manager for the OH-DXpeditions. Miika is a student of theology and a guide at the famous stone church in downtown Helsinki.

Here and There

The DX Bulletin is a new publication succeeding the *West Coast DX Bulletin.* Don Busick, K5AAD, 31, formerly with the old West Gulf DX Bulletin is Publisher and Jim Cain, K1TN, 30, is Editor. Correspondence should be addressed to Jim at 306 Vernon Ave., Vernon, CT 06066. Their rates are $22.00/year for U.S., Canadian and XE amateurs and $30.00/year for all others. Good luck fellows!

Other Top Bulletins include the *Long Island DX Bulletin,* under the management of Harvey McCoy, W2IYX. Harvey and W4UL are doing a great job providing up to the minute information biweekly from 109 Willow Ave., Huntington, NY 11743, at a cost of $10.00/year for subscribers in W/K/N, VE/VO and XE; the *DX News Sheet,* edited by Geoff Watts and published weekly by the Radio Society of Great Britain, 35 Doughty St., London WC1N 2AE England, which is a concise source of DX and Contest information at a rate of 10 pounds sterling/year for all subscribers; and

Left to right are Robert D. Carter of the Florida Citrus Commission and Armas Valste, OH2NB, at the OH2NB rig in Helsinki. Armas is a past president of the Finnish Radio Amateur League (1968-71) and also one of Finland's most distinguished athletes, winning 11 national championships in track and field events and serving as Finland's Head Coach from 1935-1960. He is presently a Member of the European Athletic Council. Mr. Carter is from Winter Haven, FL and a colleague of DX Editor K4IIF.

The DXers Magazine published twice monthly by Gus Browning, W4BPD, P.O. Drawer "DX", Cordova, S.C. 29039 for $14.00/year.

The DX Club of Puerto Rico elected the following new Board at its annual convention: Dave Novoa, KP4AM, President; Alvin Toro, KP4D, V.P.; Robert Jimenez, KP4CLB, Sec./Treas.; and Pedro Piza, KP4Q/KP4RF/KP4AST, Alicia Rodriguez, KP4CL, Luis De La Vega, KP4WI and Jose M. Alicea, KP4BRI, Directors. Alex Mootoo, 3B8DA, was elected the club's first honorary member in recognition of his Indian Ocean DXpeditions.

A Novice DX Net has been organized for Dec. 1 kickoff on 28105 KHz at 1500 GMT by Chris, KA9AZZ. For further information write Chris at 120 Harlem, Glenview, IL 60025.

The Russian Woodpecker is still riding the maximum usable frequency and thoroughly interfering with DX on a worldwide basis. Many countries have filed official protests with Moscow to no avail. Advise your congressional representatives to press for stronger action.

Taiwan - Tim, BV2B, operates on 28030, 28530, 21320, 14025, 14218 and 14225. He uses 14218 most Wednesday from 1200 - 1300 and then joins the W7PHO group at 1400 GMT.

U.N. - 4U1UN is a private club station operated mostly by UN personnel. QSL to U.N. Recreational Council, Amateur Radio Club, U.N., Box 20, New York, NY 10017

Iraq - Majid, YI1BGD, frequently appears on 14235 KHz from 0430 - 0600 GMT.

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:

1805 W4WV	1450 K2VV	1150 W0AUB	1016 SM7TV	831 JA1AG
1786 K6JG	1433 W9DWQ	1146 DL1MD	1015 W0SFU	830 W0IUB
1760 K6XP	1415 DJ7CX	1123 I2PHN	1000 SM6DHU	811 W9WHM
1751 F9RM	1401 PA0SNG	1121 YU1AG	952 WA2AUB	811 YU3EY
1703 YU2DX	1387 K5UR	1120 YU2OB	950 JH1VRQ	782 YU4EBL
1609 VE3GCO	1368 W8LY	1120 N4NO	949 WA6TAX	775 YU2CBK
1557 W3PVZ	1350 KE4I	1112 K6ZDL	938 W0SD	668 N8II
1536 N4UU	1297 N6CW	1109 I6SF	902 K7NHG	605 I4BFY
1526 W2NC	1286 AA4A	1095 I0JX	902 K6DT	600 WB9CGL
1525 W2NUT	1254 W9FD	1094 WA0KDI	900 K8LJG	600 I2MQP
1525 ON4QX	1250 N6AV	1066 WA1JMP	860 PY4OD	
1502 W7LLC	1245 N2AC	1065 K5DB	848 W6ANB	
1477 YU1BCD	1236 N6JV	1063 W8CNL	844 K8CH	
1455 W4BQY	1200 N9AF	1023 YU1ODS	835 PA2TMS	

S.S.B.

1650 F9RM	1300 I8YRK	1136 HP1JC	938 OE2EGL	802 PA2TMS
1621 I0AMU	1200 I4ZSQ	1054 N4UU	909 PY3BXW	801 W2NC
1600 W4UG	1193 PA0SNG	1051 WB2NYM	908 I0MBX	800 JH1VRQ
1547 K6XP	1182 YU1BCD	1017 F2MO	900 WB4KZG	730 N2AC
1530 I0ZV	1171 K5UR	1017 DL1MD	896 DJ7CX	722 WA2AUB
1520 K6JG	1170 ZL3NS	1000 N2SS	825 YU1ODS	709 ZP5RS
1372 I8KDB	1150 K2VV	975 WA6TAX	809 YU1AG	702 N4NO
1352 K2POA	1142 W9DWQ	967 I2PHN	808 OZ5EV	600 I2MQP
1303 N4MM	1102 AA4A	957 W6RKP	805 W4BQY	

C.W.

1482 W8KPL	1201 N6JV	1012 VO1AW	802 KH6HC	658 EA2OP
1395 ON4QX	1158 W9FD	1000 K2VV	788 YU1ODS	650 JH1VRQ
1382 DL1QT	1113 G2GM	989 K6ZDL	756 SM0GMG	650 K8LJG
1368 K6JG	1090 W3ARK	986 N4NO	729 PY4OD	647 W9OYZ
1350 W8LY	1087 W4BQY	976 WA0KDI	728 I5IZ	623 JE1JKL
1343 W2NC	1086 N2AC	936 IT9AGA	709 DL1MD	612 WA2AUB
1302 K6XP	1075 K5UR	916 YU1AG	700 WB4KZG	607 I1TLA
1264 N4UU	1056 WA2HZR	905 N4MM	698 OK2BLG	
1202 YU1BCD	1031 DJ7CX	877 I6SF	668 LZ1XL	

The WAZ Program

10 Meter Phone

22...N6SA
23...I1POR
24...K6SVL
24...JA4JVX

15 Meter Phone

20...KØCD
21...WA4DWN
22...JR6AFV
23...JA1TII
24...W3KHQ
25...WA4JTI

20 Meter Phone

242...JA9ESZ
243...W6AED/7
244...WB2MIY
245...YU2RTW
246...WB2KTM
247...KL7ITW
248...WA8AEE
249...JH7AEP
250...K7OXB
251...W2JGR

10 Meter C.W.

5...JA1MRM

15 Meter C.W.

17...JJ1BBQ
18...EA2OP

20 Meter C.W.

85...N6VH
86...W7KVV
87...W8UVZ

All Band WAZ S.S.B.

1718.....VE4SL
1719.....K8HV
1720....WA5SUE
1721....WB4NDX
1722....WA4INQ
1723....WA4VDE
1724.....VE3IPR
1725....WB8ZRL
1726.....K4LQ
1727.....WØIDK
1728.....N6MB
1729.....KB8KW
1730.....AI5B
1731.....JA1BVL
1732.....OZ4PA
1733.....N8II
1734.....AI8M
1735.....W5HEZ
1736.....K9WG
1737.....W8PNC
1738.....W8PCA
1739...WB7OHW
1740....WB7FOB
1741.....VE3CP
1742....W5DMM
1743.....JA1KPA
1744.....AI8M

C.W. Phone

4609.....JR6FC
4610.....JH1KYY
4611.....K1MEM
4612....JA1QOP
4613.....W7IIT
4614.....N6WK
4615....WA3WIX
4616.....JR6AG
4617....YU2RJG
4618....WA4JJW
4619....JA9AQE
4620.....JA1GO
4621....WA4NIB
4622.....JT1AN
4623....WA1LJB
4624.....N6MA
4625.....N6OZ
4626....WA2JOC
4627.....K4KKJ
4628.....WØBWJ
4629.....N2MM
4630....SM3DXC
4631....JH6KXG
4632....WB8JDA
4633.....W3FM
4634.....K5EDA

The complete rules for WAZ are found in the May 1976 issue of C.Q. Magazine. Application blanks and reprints of the rules may be obtained by sending a self addressed stamped envelope, size 4-1/2 inches by 9-1/2 inches 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 a check point, should include sufficient postage for the safe return of their QSL cards. Please note that effective June 1, 1979 the processing fee for all C.Q. certificates was raised to $5.00. This fee must accompany all applications.

Monaco - From Dec. 22 - Jan. 6, Bob, ON4QX and his son Ron, ON6QX, will be active as 3A2CZ or 3AØCZ on 14025, 21025 and 28025. c.w. only. QSL to P.O. Box 331, Antwerp 2000, Belgium.

Isle of Man - QSLs for the October Contest DXpedition stations GD3YBH and GD4CVZ go to Phil, G3YBH, and Al, G4CVZ, respectively.

Another view of John Allen, HL9KE, atop the antenna pole 4,035 ft. above the Korean countryside. (Tks K4WSB)

Malta - In celebration of the closure of British military bases on the island, Maltese amateurs used the special prefix 9H79 during the last half of 1979.

Guyana - Woody Minar, K9EF, will be operating /8R1 on 80 - 10 meters for the next 2 years. Look for him near the 025 mark on c.w. QSL c/o American Embassy Georgetown, Department of State, Washington, D.C. 20520.

HH2A - We heard Art on network news during Hurricane David. He was also very active on the Hurricane Net during the storm.

QSL Information

QSL cards for the following 200 stations *all* go via Joe Arcure, Jr., W3HNK, P.O. Box 73, Edgemont, PA 19028. Mr Arcure has been elected to the DX Hall of Fame.

1. CN8BG
2. CQ6LF
3. CR6KT
4. CR6LF
5. CR7GJ
6. CT1BT
7. CT1FL
8. CT1MZ
9. CT1RM
10. CT1TZ
11. CT1UA
12. CT1UD
13. CT1UE
14. CT1ZW
15. CT2AK
16. CT2JAM
17. CT2SH
18. CT3AF
19. CT6UA
20. CT7RM
21. CT7UA
22. CWØA
23. CX3BR
24. DA2DX
25. DA2DX/HB
26. DA2DX/HBØ
27. DA2DX/LX
28. EA2CR
29. EA8GZ
30. EA8JJ
31. EA8QR
32. EL2BI
33. EL2CB
34. EL2EN
35. EL2ET
36. EL2EU
37. EL2EV
38. EL2X
39. EP2DX
40. EP2KB
41. EP2RL
42. EQ2DX
43. FØAZC
44. FGØAFC/FS7
45. FGØDDB/FS7
46. FGØDYM/FS7
47. FL8KP
48. FY7AX
49. G5CTB
50. GW3DZJ
51. HC8GI
52. HH2V
53. HH2WF
54. HI8LAP
55. HI8MOG
56. HI8XRG
57. HM1EJ
58. HP1XYA
59. JA1IVV
60. JA6BEE
61. JY9DX
62. J28AI
63. KG6JCZ
64. KG6JIQ
65. KH6GI
66. KH6XX
67. KL7NA
68. KP4AST
69. KP4D
70. KP4DIW
71. KP4KD
72. KP4Q
73. KP4RF
74. KR6HR
75. KV4EN
76. KV4EY
77. LX1BW
78. N7DC/YV5
79. OD5CS
80. OD5JJ
81. ON8UH
82. OX5AP
83. OX5AU
84. OY3H
85. OY5NS
86. OY7BD
87. OY7JD
88. OY9LV
89. PAØCOE
90. PAØHVM
91. PJ8AR
92. PJ8UQ
93. PJ8YL
94. PY1CZL
95. PY1DBE
96. PY1MO
97. PY1PY
98. PY4AKL
99. PZ1CF
100. P29BS
101. SM5BUT
102. SMØCER
103. SP9PT
104. SU1IM
105. SU1MI
106. SVØWC
107. SVØWEE (70-72 ONLY)
108. SVØWUU
109. SVØWXX (71 ONLY)
110. TG8DX
111. TG9DX
112. TI2JCC
113. TR8LE
114. TU2HJ
115. UA3FF

116. VE1BFV (SABLE IS.)	158. ZP5CD
117. VK9BS	159. ZP5CF
118. VP2ABA	160. ZP5EC
119. VP2EEG	161. ZP5EF
120. VP2EY	162. ZP5GLS
121. VP2KAA	163. ZP5KB
122. VP2KAB	164. ZP5LX
123. VP2KK	165. ZP5PT
124. VP2KX	166. ZP5PX
125. VP2LAO	167. ZP5RL
126. VP2LDI	168. ZP5WU
127. VP2VDQ	169. ZP5YD
128. VP2VY	170. 4S7DA
129. VP8HA	171. 4W1GM
130. VP8LC	172. 4X4RD
131. VP8OD	173. 4X4UH
132. VQ9TC	174. 4Z4PG
133. VS6AI	175. 5A3TX
134. VS6DD	176. 5A5TR
135. WA5UKR/YV5	177. 5U7AG
136. WA5VKJ/HB0	178. 5Z4PI
137. WA5VKJ/LX	179. 5Z4PP
138. WA7SIN/4X	180. 8P6BU
139. XP1AA	181. 8P6FU
140. XW8EO	182. 8P6FV
141. XW8FN	183. 8P6IJ
142. XW8GV	184. 9C9DX
143. YA1VKJ	185. 9G1JN
144. YS1ESH	186. 9G1SM
145. YS1GDD	187. 9H4L
146. YS1GMV	188. 9J2AB
147. YS1JWD	189. 9J2US
148. YS1RRD	190. 9J2YL
149. YV4CB	191. 9K2DC
150. YV5CEY	192. 9L1JT
151. ZE4JS	193. 9Y4NP
152. ZS3CJ	194. KL7H
153. ZS3R	195. HC2RM
154. ZP5AL	196. AI5P/C6A
155. ZP5AN	197. VP5PX
156. ZP5AO	198. 9G1LS
157. ZP5CBL	199. 5L2EV
	200. 5B4AI

Additional QSL Information

FK0XR, FW0XR, FO0HR, & YJ8XR - Via DK6XR
HK0AI - c/o W9WHM
J6LIR - Via WB6FCR
KV4AA - To K6PBT
PZ1CZ - To Jerry F. Mowrey, Sr., WA5BYG, 1409 N. Hospital St., Rusk, Tx 75785
VE1CF/VE1 (Sable Island) - c/o Noel Fungi, 30 Mackie Place, Winnipeg, Manitoba, Canada R2Y 1V7
VP2EAL - Via WA7IRD
VP2MFL - To K5BDX
VP2MFY - c/o W5FBM
VP2VFD - Via Jim Walter, WA4GWD, 249 Clearlake Drive West, Nashville, TN 37217
VP2VFE - To WB6FCR
VR3AH (Before June 1, 1978 to July 19, 1979) - c/o K2BT
VR3AH (From June 1, 1978 to July 19, 1979) - Via WB4PRU
WA1GXE/KG6 and **/KH6** - To P.O. Box 1003, Fairfield, CT 06430
3D6BW - c/o K2IJL
3D6CD - Via WD5BIF
9H1ED, 9H1FN, 9H79ED & 9H79FN - To Jerry Jordan, WA1YYX, RFD #1, Route 138, West Kingston, RI 02892
73, John, K4IIF

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The "Story of The Month" for December, as told by Hank is:

Henry L. Timme, WB9SPD All Counties-#220, 3-23-79

"About two-thirds of my amateur radio experience was spent county hunting. Two years, four months and thirteen days, to be exact. It was educational, exciting, entertaining, but often frustrating. Perhaps I had better start at the beginning.

"I was born 58 years ago in Kenosha, Wisconsin. My first 18 years were the usual experienced by most kids growing up in a family of seven children, 5 girls and 2 boys. The big depression was an experience, to say the least. Earning money was a must, if it meant 14 miles a day on a bicycle and 10 hours on a farm. Later, a second job in a supermarket on Friday and Saturday, sure helped.

"Out of High School in 1939 and while trying to figure a future course, a good friend of the family offered me a job in Madison, Wisconsin. I packed my bag and took off with him that very same day. It proved to be the best decision I ever made. The job was as a shipping clerk in the Cuna Supply Co-op, which was one of the three organizations which made up the National Credit Union Movement. For the next 33 years I worked for this movement with one exception of a period of five years spend with the Army Air Force during World War II.

"When the war started, I enlisted as an Aviation Cadet. As a Cadet I convinced my home-town girl friend, Elaine, we should get married. So she came to Texas and we did just that. I received my Wings in February 1943 and was sent to Austin, Texas. There I started my four and one-half years as a Troop Carrier Pilot Instructor for Replacement Training Crews in C-47, C-46 and C-82 type aircraft. Much time was spent dropping paratroopers, parapacks, towing gliders and flying formation. Toward the end of the war, I even qualified as a glider pilot. Our first son, George was born in Columbus, Georgia during January 1944.

"Back to work in the Credit Union Movement in late 1945. I became a Field Representative for the Credit Union National Association (CUNA) and for several years organized and serviced credit unions. In 1948 I was transferred to the third credit union organizaton, The Cuna Mutual Insurance Society. Our second son, Lloyd was born in Massachusetts, May 1950.

"In 1952 I was transferred back to Madison. Here I held many positions involving the operations of an insurance company. The last of which was as Executive Vice President.

"During my involvement with Cuna Mutual, we hired an amateur radio type person, K9EYY and we became very close friends. As time permitted I used to help him or rather he would help and teach me about electronics and radio. I started building kits, home-brewing and troubleshooting with him. We also took up private flying and joined a local flying club. My work involved a vast amount of travel so I didn't have much time to devote to radio or flying.

"It was 1970 when my personal bomb dropped. On waking one morning in Phoenix, Arizona, where I was attending a meeting, the left side of my face was numb and I had difficulty walking straight. I made it home and then spent nine days in the hospital. Eighteen months later I had a second attack and this time the problem was diagnosed as MS-Multiple Sclerosis. I started reading everything I could about this disease and learned it was progressively deteriorating. Sure enough, it became apparent that retirement was going to become a fact of life. On July 1, 1973, I did retire and then what about the future. My ham friend, K9EYY suggested I join the local Amateur Radio Club and get a ham ticket. So, I did join and attended the course they offered. I was able to pass the General Theory Examination but failed the code test twice (numb and spastic jumping hands, didn't help) before passing in September 1975. My General ticket was issued effective October 30, 1975.

"My friend and several others helped in setting-up a station and antennas. About a year later, while tuning across the bands I channeled on the County Hunters Net, got interested and wrote for information. I joined and went to work to contact all the counties, which was accomplished March 23, 1979.

"The County Hunters are a wonderful bunch and I thank them all for the remarkable job they do. My only regret is my inability to act as Net Control or relay station".

*P.O. Box 73, Rochelle Park, NJ 07662

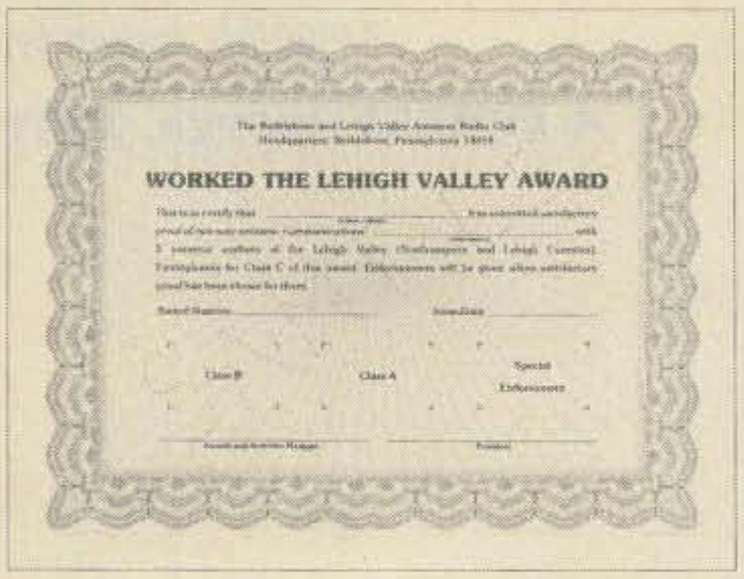
Special Honor Roll (All Counties)

-235 Ira Clay Crowder, WD4HRN 8-7-79
-236 Walter L. Allen, W0DG 8-13-79
-237 Floyd L. Bowman, WA0UHC 8-13-79
-238 Eugenia J. Horton, WA6JJC 8-14-79
-239 Arthur D. Horton, N6QS 8-14-79
-240 Carol Kimber, K7WUR, 8-24-79
-241 William E. Gregory, WB4BWN 8-24-79
-242 Charles L. Henry, W9LMT 8-24-79
-243 Donald W. Hussey, WA6LBO 8-28-79
-244 John R. De Graff, W4ISF 8-28-79
01-245 Harry L. Brundridge,WD0EWO 8-28-79

Awards Issued

WOW! Eleven (11) All Counties Awards issued!

Hank Timme, WB9SPD at his nice array of equipment


WORKED THE LEHIGH VALLEY AWARD

Worked The Lehigh Valley Award.

Ira Crowder, WD4HRN (ex WA4RMX, DL5HH) who on occasion I tried to call WD4HRH (inside joke) waited until he had them *all* and received USA-CA-500 through USA-CA-3000 endorsed All S.S.B., All Mobiles, All 14 MHz; and All Counties endorsed Mixed.

Walter Allen, W0DG also waited until he had them all and was issued USA-CA-500 through USA-CA-3000 endorsed All S.S.B., All Mobiles; and All Counties endorsed All S.S.B. See item under Notes on how to get some helpful data.

Floyd L. Bowman, WA0UHC collected All Counties endorsed Mixed.

Gene Horton, WA6JJC also waited until she had them *all* and requested USA-CA-500-through USA-CA-2500 endorsed All S.S.B., All 14 MHz. USA-CA-3000 and All Counties endorsed All S.S.B.

Arthur Horton, N6QS waited until he had them *all* and had me send him USA-CA-500 through USA-CA-2500 endorsed All S.S.B., All Mobiles. USA-CA-3000 and All Counties endorsed All S.S.B.

Carol Kimber, K7WUR, that busy Head Nurse, claimed All Counties endorsed All S.S.B.

Bill Gregory, WB4BWN (ex WA9ZCG) got USA-CA-500 through All Counties endorsed All S.S.B.

Chuck Henry, W9LMT added to his collection USA-CA-3000 and All Counties endorsed All 2 × S.S.B., All Mobiles.

Don Hussey, WA6LBO, just before the fishing season started, found time for his paper work to reel in USA-CA-500 through All Counties endorsed All S.S.B.

John De Graff, W4ISF improved his collection with USA-CA-2500 through All Counties endorsed All S.S.B.

Harry Brundridge, WD0EWO qualified for USA-CA-500 through USA-CA-2500 endorsed All S.S.B., All 20, All Mobiles. USA-CA-3000 endorsed All S.S.B., All 20; and All Counties endorsed Mixed.

Les Jeffery, W8WT who has All Counties -92 as of January 3, 1973, added endorsement "All OMs".

Ken Distel, WA4AUL increased his collection with USA-CA-3000 endorsed Mixed.

Dick Peterson, W4KFA picked up USA-CA-2500 endorsed All S.S.B.

George Wells, WB0ODS, to prove that C.W. is *not* dead acquired USA-CA-500 through USA-CA-2500 endorsed all C.W.

Larry Moore, K6SLP obtained USA-CA-2500 endorsed All A-3.

Malkiel Webman, 4X4JU claimed USA-CA-500 through USA-CA-2000 endorsed All S.S.B. 1 Award to Israel.

Dr. Hugo Unger, WB4UHN applied for USA-CA-2000 endorsed All S.S.B., All 14 MHz.

Steve Scott, WD0EPE won USA-CA-1000 endorsed Mixed.

James Fisk, W1HR, that venerable Editor of *Ham Radio,* while recouperating found time to send for USA-CA-500 endorsed All S.S.B. Hope he continues to follow doctors orders.

Herbert Werry, DJ3OE made USA-CA-500 endorsed All 2 × C.W.

USA-CA Honor Roll

3000		2000		1000	
WD4HRN	265	4X4JU	375	4X4JU	550
W0DG	266	WD4HRN	376	WD4HRN	551
WA6JJC	267	W0DG	377	WD0EPE	552
N6QS	268	WB0ODS	378	W0DG	553
WB4BWN	269	WA6JJC	379	WB0ODS	554
W9LMT	270	N6QS	380	WA6JJC	555
WA4AUL	271	WB4UHN	381	N6QS	556
WA6LBO	272	WB4BWN	382	WB4BN	557
W4ISF	273	WA6LBO	383	WA6LBO	558
WD0EWO	274	WD0EWO	384	WD0EWO	559
2500		**1500**		**500**	
WD4HRN	328	4X4JU	431	4X4JU	1371
W0DG	329	WD4HRN	432	WD4HRN	1372
W4KFA	330	W0DG	433	W1HR	1373
WB0ODS	331	WB0ODS	434	DJ3OE	1374
WA6JJC	332	WA6JJC	435	W0DG	1375
N6QS	333	N6QS	436	W7YS	1376
K6SLP	334	WB4BWN	437	WB0ODS	1377
WA4BWN	335	WA6LBO	438	WA6JJC	1378
WA6LBO	336	WD0EWO	439	N6QS	1379
W4ISF	337			I5IRM	1380
WD0EWO	338			WB3HPJ	1381
				K7GNC	1382
				WB4BWN	1383
				WA6LBO	1384
				WD0EWO	1385

William Schuchman, W7YS was sent USA-CA-500 endorsed All C.W.

Roberto Mascelli, I5IRM had me mail him USA-CA-500 endorsed All C.W.

Dick Jenkins, WB3HPJ got interested in getting USA-CA-500 endorsed Mixed.

Charles Brenner, K7GNC now has USA-CA-500 endorsed All S.S.B.

Awards

Worked Ontario Counties Awards: Since 1957, The Metro Amateur Radio Club, Inc. (Ontario, Canada) has sponsored the WOC-30 and WOC-50 Awards to encourage amateurs outside as well as within Ontario to contact amateurs in Ontario Counties and Districts.

However, over the past several years, various changes have been made in the arrangement of Counties and Districts in the Province of Ontario.

Some former Counties are now known as Regional Municipalities.

Some Counties have been absorbed and the enlarged area now is called a Regional Municipality.

Metro Toronto used to be part of York County. Now, the Municipality of Metropolitan · Toronto is separate from the Regional Municipality of York, to the North.

For the purposes of the WOC Awards, the revised rules and list of "Counties" will become effective September 1, 1979.

The WOC-30 Award will be awarded to each applicant submitting QSLs representing 30 of the Counties in Ontario.

The WOC-50 Award will be awarded to each applicant submitting QSLs representing 50 of the Counties or by submitting 20 valid QSL cards if the applicant already holds a WOC-30 certificate.

For the purpose of these Awards, the Province of Ontario is divided into 52 Counties, Districts, and Municipalities (Regional or District). The word "County" as used in connection with these WOC Awards will be understood to mean County, District or Municipality.

Contacts must be made using your own equipment, from the home location or within 20 miles of it, and within the same county. Counties contacted from mobile stations more than 20 miles from the home location or outside the home county will not count.

If possible, each QSL card should indicate the county in which the issuing station was located at the time of the QSO.

Each station must work the other directly with no relaying of information by way of intermediate stations or repeaters.

Any contact made on or after January 1, 1957 will be eligible.

Contacts may be made on any band and any mode or combination of modes may be used. All stations must observe the rules of their country which apply to amateur radio.

Send application and QSLs with sufficient postage to cover return of your cards by the method you specify, first class or parcel post, registered or not registered. There is no other charge for the Awards. Send to: WOC Awards Co-Ordinator, Metro Amateur Radio Club, Inc., P.O. Box 352, *Doensview,* Ontario, Canada M3M 3A6. A copy of the rules plus a list of the 52 "Counties" may be obtained upon request to Metro ARC.

Worked The Lehigh Valley Award: This Award is available to all radio amateurs and amateur radio clubs.

The achievement levels are:

a. Class C - Requires 3 confirmed contacts with stations in Lehigh Valley.

b. Class B - Requires 5 confirmed contacts.
c. Class A - Requires 10 confirmed contacts.
d. Special Endorsement - Requires a confirmed contact with amateur radio club WB3KCV or WB3KCV/3. The Class A Award is needed to get this endorsement. The club station WB3KCV may not be counted for the other classes of this award.

Endorsements will be added for any operating distinctions feasible. If no endorsement is requested, the mixed endorsement will be issued. If a higher class is requested and the cards do not match the endorsement previously issued, no higher class will be issued.

All applicants must submit QSL cards (no postmark needed) as proof of two-way contacts with amateurs in the Lehigh Valley (Lehigh and Northampton Counties) Pennsylvania. No logs will be accepted. If you apply for higher class, be sure to enclose the award number of the original Class C Award.

All contacts must be made from the same callsign area, the contacts may be made from different locations within the same callsign area.

Contacts can be made to or from fixed, mobile, or portable stations. Contacts count for the callsign area in which they are made.

If your callsign has changed, your previous contacts still count if they were made from your present callsign area.

Send application, QSLs and $1.00 in cash (U.S.) or 7 IRCs to: Daniel Kreithen, AE3E, WLV Awards Manager, 3948 Lincoln Parkway W., Allentown, PA. 18104.

Notes

Sad to report the loss on Duane Walters, WA4CFI (ex WA6KHN, WB0CQE) on August 22, 1979. He had All Counties -155, dated October 4, 1976. Information via Howy, WA2WCW.

The Mobile Amateur Radio Awards Club issue a monthly newsletter of great interest to s.s.b. county hunters. For information on this, special County Hunter QSL Bureaus, special reply QSLs, and much more data, send 54¢ in stamps (no envelope required) to: Walter Allen, W0DG, 10310 W. 170th Terrace, Olathe, Kansas 66061.

The CW County Hunters also put out a brief monthly newsletter and have their QSL Bureau, for data on these write: Jim Hoffman, K1ZFQ, 42 Gresham St., Milford, Conn. 06460.

All *CQ* Awards have increased costs as of September 1, 1979- if you do not have the data, write and request it, be sure to send s.a.s.e. to:

WAZ Awards, Leo Haijsman, W4KA, 1044 Southwest 43rd St., Cape Coral, Florida 33904.

WPX, VPX, WPNX, Robert Huntington, K6XP, 5014 Mindora Drive, Torrance, California 90505.

CQ DX Award, Billy F. Williams, Jr., N4UF, 911 R 10 St. Johns Drive, Jacksonville, Florida 32211.

USA-CA, Ed. Hopper, W2GT, P.O. Box 73, Rochelle Park, N.J. 07662.

By the time you read this column, great things will have happened at *CQ*, so your full support and help and co-operation will be expected.

And as the year ends, All The Very Best Wishes, Greetings to *ALL*,

73, Ed., W2GT

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

There will be no changes in the rules of our *CQ* World Wide 160 Meter Contest coming up the last weekend next month. Rules will be included in next month's Calendar for those who are not familiar with them.

We are aware of the inequity in the scoring system which gives stations in certain areas a distinct advantage over other areas. However we see no way that the scoring can be changed so that all areas would be on an equal basis. It's the nature of the band. Competition can only be judged on a local basis.

Realizing this the West Gulf A. R. C. will continue to award Plaques for the U.S. and for Europe, areas of the highest activity. To make it more interesting for the "hot shots" in world competition, the new John Doremus, W0AW Memorial Plaque will be donated by "Friends of John Doremus," to the 160 World Champion.

These awards can be won once only within a three year period by the same station.

On another subject. In the past I have sometimes been unduely critical when two or more stateside activities have been scheduled on the same weekend. With only a limited number of weekends available these conflicts cannot be avoided. It occured to me however that much of the confusion and QRM can be avoided by a better selection of operating frequencies.

A good example of this can be seen in the Connecticut and North Carolina QSO Parties scheduled on the same weekend this month. I am sure that the separation between the suggested operating frequencies is only a coincidence, but consider how this could be made even more acceptable by planning ahead.

I would suggest a minimum separation of at least 20 kHz between suggested operating spots on the same band.

73 for now, Frank, W1WY

**14 Sherwood Road, Stamford, CT 06905*

Calendar of Events

†Dec. 1-2	Spanish Phone Contest
Dec. 1-2	ARRL 160 Meter Contest
Dec. 1-3	Connecticut QSO Party
Dec. 1-3	N. Carolina QSO Party
†Dec. 8-9	Spanish C.W. Contest
Dec. 8-9	ARRL 10 Meter Contest
†Dec. 8-9	Hungarian Contest
Dec. 15-16	VHF Space Net Contest
Dec. 22-23	Teenage QSO Party
Jan. 5-6	QSL Exchange Contest
Jan. 12-13	ARRL VHF Sweepstakes
Jan. 12-13	YU 80 M. CW Contest
Jan. 12-13	DL QRP CW Contest
Jan. 12-13	Int. Island DX Contest
Jan. 19-20	N. & S. America RTTY
Jan. 25-27	**CQ WW 160 Meter Contest**
Jan. 26-27	French C.W. Contest
Feb. 2-3	S. Carolina QSO Party
Feb. 9-10	QCWA C.W. QSO Party
Feb. 9-10	TWO Land QSO Party
Feb. 16-17	ARRL DX C.W. Contest
Feb. 16-17	YL-OM Phone Contest
Feb. 23-24	French Phone Contest
Mar. 1-2	ARRL DX Phone Contest
Mar. 8-9	QCWA Phone QSO Party
Mar. 8-9	YL-OM C.W. Contest
Mar. 29-30	**CQ WW WPX SSB Contest**

† Not Official.

Spanish DX Contest

Phone: Dec. 1-2 C.W.: 9-9
Starts: 2000 GMT Saturday
Ends: 2000 GMT Sunday

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

Exchange: RS(T) plus a three figure QSO number starting with 001.

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

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

Between EA and Europeans 1 point. (WAE boundries)

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

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

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

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

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

ARRL 160 C.W. Contest

Starts: 2200 GMT Fri. November 30
Ends: 1600 GMT Sun. December 2

This is the 10th year for this activity organized by the ARRL. Activity will be between state-side stations, VE's and also DX. DX to DX however does not count.

Exchange: RST and your ARRL section or country if it's a DX station.

Scoring: Contacts between stations in ARRL sections count 2 points, with other areas 5 points. The multiplier is determined by the number of ARRL sections worked, (74 possible) plus VE8 and each DX country.

Awards: Certificates to top scorers in each section and each DX country.

Please keep the DX Window (1825-1830) clear of state-side and VE operation, that's where you will find the DX stations calling. They will be listening 1800-1805 or on a frequency they specify. Look for KH6's at the top of the band 1990-2000. They will be listening down at the low end.

Don't overlook the 1830-1850 portion of the band, activity there is

usually much lighter than the bottom 25 kHz. (Check U.S. 160 Regs. for availability and restrictions.)

The usual grounds for disqualification; violation of rules, excessive duplicate contacts and etc. will prevail. A large s.a.s.e. to ARRL will get you the necessary forms to make log keeping easier.

All entries must be postmarked no later than Dec. 29th and go to: ARRL Communications Dept., 160 Contest, 225 Main St., Newington Conn. 0611

Connecticut QSO Party

Starts: 2000 GMT Sat. December 1
Ends: 0200 GMT Mon. December 3

The Candlewood A. R. A. is again the sponsor of this party. Their club station W1QI will operate c.w. on odd hours and s.s.b. on even hours.

The same station may be worked on each band and mode, including Oscar as a separate mode. Mobiles in each county change.

Novices should identify by /N as part of their call. Mobiles should also identify their county of operation.

Exchange: QSO no., RS(T) and QTH. County for Conn. stations, ARRL section for others.

Scoring: One point per QSO, 2 points if it's with a Novice, 3 points for Oscar contacts, and 5 points for club station W1QI contacts.

Multiplier: ARRL sections for Conn. Out-of-state stations use Conn. counties. (max. of 8) DX stations may be worked for QSO points but used only *once* as a multiplier.

Frequencies: CW - 40 kHz up from bottom of each band. SSB - 3927, 7250, 14295, 21370, 28540. Novice - 3725, 7125, 21125, 28125.

Awards: Certificates to top scoring single and multi-operator stations in each Conn. country, and each ARRL section. (min. of 5 QSOs) Special certificates for Conn. mobiles operating outside their home county. (min. of 20 out-of-state QSOs)

A Worked All Conn. Counties certificate will be awarded for working all 8 counties.

Include a large s.a.s.e. for a copy of the results and mail your log by January 2nd to: Skip Paulsen, W1PV, 2 Ryder Lane, Danbury, CT 06810

North Carolina QSO Party

Starts: 1900 GMT Sat. December 1
Ends: 0100 GMT Mon. December 3

The Alamance A. R. C. is sponsoring this one. The same station may be worked on each band and mode, mobiles in each county change.

Exchange: RS(T) and county for NC stations, RS(T) and state, province or country for others.

Scoring: One point for each contact. NC stations multiply total by number of states, provinces and DX countries worked. Out-of-state stations use NC counties for their multiplier. (max. of 100) NC mobiles get an additional multiplier for each county from which they operate.

Frequencies: CW - 60 kHz up from bottom of each band. SSB - 3900, 7270, 14290, 21390, 28590. Novice -3720, 7120, 21120, 28120.

There will be appropriate awards for all winners.

Include a summary sheet with your entry, showing the scoring and etc. Multi-operator stations should include a list of operators.

Mailing deadline is January 10th to: Almance A.R.C., 2822 Westchester Drive, Burlington, NC 27215

ARRL 10 Meter Contest

Starts: 0000 GMT Sat. December 8
Ends: 2359 GMT Sun. December 9

This the 7th annual 10 meter contest organized by the ARRL has become very popular especially with the improvement in propagation.

It's a worldwide activity in which DX stations are permitted to work other DX. You are not limited to working W/Ks and VEs only.

The same station may be worked once on phone and again on c.w. No cross mode however. And a maximum of 36 hours operating time is permitted out of the 48 hour contest period.

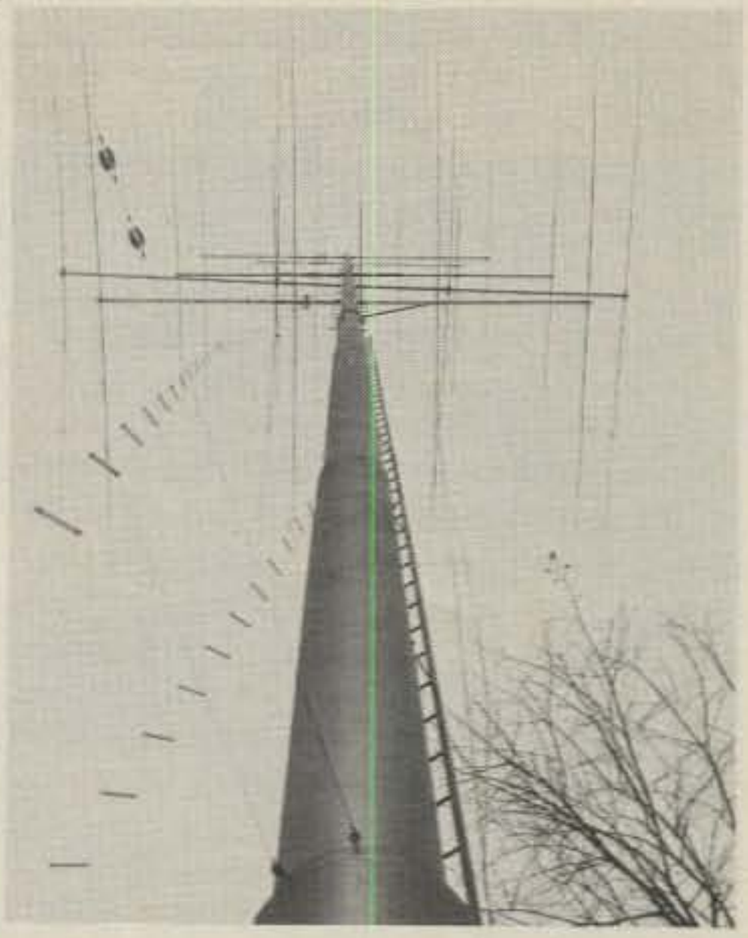
Exchange: Stations in the 50 U.S. states and Canada send RS(T) and their state or province. Others (including KP4, KV4, and etc.) will send RS(T) and a consecutive contact number starting with 001. Stations not land-based will send RS(T) and their ITU region.

Scoring: Each completed QSO is worth 2 points, 4 points if it's with a Novice or Technician. The multiplier is determined by the US states, VE call areas, DXCC countries and ITU regions worked. (as sent by non-landbased stations.) (U.S. and Canada not counted as a country.)

Activity will take place in that portion of the 10 meter band normally used for c.w. and for phone operation. Oscar contacts also permitted.

Awards: Certificates to the highest scoring single operator station in each ARRL section, VE call area and DX country. Multi-operator, Novice and Tech. awards will be issued depending on entries received from respective areas. Also for non-landbased stations.

As for all ARRL activities it is recommended that you send a large s.a.s.e. for appropriate log forms and instruction sheets.



This is the Finnish version of the well known "Big Bertha" antenna complex. As described by the owner OH2OI, the free standing 120 ft. tube construction weighs 2400 lbs. and stands on a 50,000 lbs. concrete basement which also houses the rotor. The diameter of the tube is 20" at the base and narrows down to 2" at the top. The stacked 4 el. 20 meter beams are spaced 0.75 waves apart. The rest of the array consists of a 5 el. KLM on 10, a 5 el.TELREX on 15, and a 4 el. KLM on 40. (Quoting OH2BH, "it works!")

Mailing deadline for logs is Jan. 5th to: ARRL Communications Dept., 10 Meter Contest, 225 main St., Newington, Conn. 06111

Hungarian C.W. Contest

Starts: 1600 GMT Sat. December 8
Ends: 1600 GMT Sun. December 9

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

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

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

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

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

Awards: Certificates to the first

place winners in each class in each country.

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

VHF Space Net Contest

From 6 PM Sat. December 15 to 9 PM Sun. December 16. (Local Time)

Like previous VHF Space Net activities this one is in commemoration of an event in the Space program. This one welcomes the Space Shuttle.

Activity will be on all v.h.f. and u.h.f. bands, all modes but no repeater contacts.

Exchange: Signal report and Zip code, P.O. location for out of country contacts.

Points: Each contact is worth 2 points. The same station may be reworked in a different mode for 2 additional points. And 2 more points if worked on a different band.

Multiplier: Each different Zip code and/or P.O. location worked. (Counted once only)

Final Score: total QSO points multiplied by the number of Zip code and/or P.O. locations.

Awards: Plaques to each of the following:

I. Stations using over 100 watts.
II. 25 to 100 watts input.
III. 5 to 25 watts input.
IV. Less than 5 watts input
V. YL's only, any power.
Certificates to runner-ups.

There is a special certificate for all stations working contest organizer K4AWS. (Tony had indicated that the July contest would probably be the last of the Space Net series but was persuaded to continue the program.)

Mailing deadline for all entries is December 31st to: VHF Space Center, Att: A.W. Slapkowski, K4AWS, P.O. Box 15, Sumterville, FL 33585

Teenage Radio Amateur Contest

Starts: 0000 GMT Sat. December 22
Ends: 2400 GMT Sun. December 23

This one was organized by the Twin City Teenage DX Club. The objective to promote contest activity among teenagers, the future contesters.

The contest is open to all but only contacts with teenagers will count. The same station may be worked on each band and mode for QSO and multiplier credit.

Teenagers (under 21) may work all stations, but operators over 21 years old may work teenagers only.

Exchange: RS(T) and age.

Points: three points for contacts within ones own country, 5 points if with another country, doubel above points if QSO is on 40, 80 or 160.

Multiplier: Total of different prefixes worked on each band and each mode.

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

Frequencies: C.W. - 40 to 60 kHz up from bottom of each band. Phone -approx. 3975, 7275, 14275, 21375, 28575. Novice - 10 kHz inside Novice bands. Also 160 and 2 meter bands.

Awards: Appropriate awards will be given to single operator, multi-single, multi-multi and Novice winners, both phone and c.w. and mixed modes, depending on participation.

Include a summary sheet with your log showing the scoring, indicate date of your birth, and other essential information.

Mailing deadline for your entry is February 12th to: Twin City Teenage DX Club, Att: Greg Deuhs, KBØCV, 1945 Ashland Ave., St. Paul, MN 55104. Include a large s.a.s.e. for contest results.

Field Day™ is ready to go

The best code / radioteletype reader and speed-display package available!

$449.95
Plus shipping

We've designed a special **Field Day,** model "B," that is in stock and ready to ship. Right now. Some of the parts designed into the original **Field Day** just couldn't meet your ordering demand.

The **Field Day-B** has a special, high-reliability, 8 character display that costs us about $40 more than the original displays! But we've still held the original price. We've added a "tuning eye" to make tuning easier and faster. Slow-arrival parts have been designed out, and an improved demodulator circuit has been designed in.

But the best part is they're ready to go now. Get 'um while they're hot.

Alabama - Long's; **California** - Electronics Emporium, Fontana; **Colorado** - H-E-P Enterprises; **Delaware** - Amateur & Advanced Communications; **Florida** - Amateur Electronic Supply, Amateur Radio Center, N & G Distributors, Ray's Amateur Radio; **Georgia** - ZZZ; **Idaho** - Ross Distributing; **Illinois** - Spectronics; **Indiana** - Ham Shack; **Kansas** - Associated Radio; **Kentucky** - Cohoon; **Massachusetts** - Tufts; **Michigan** - Omar; **Minneapolis** - PAL; **Missouri** - Burstein-Applebee, MidCom; **North Carolina** - Bob's Amateur Center; **Nebraska** - Heinrich's Communication; **New Hampshire** - Metz Communication; **New York** - Amerisil Overseas, Barry, Communications Technology, Ham Shack, Hirsch, Kelper, Radio World; **Ohio** - Queen City; **Oklahoma** - Brodie; **South Dakota** - Burghardt; **Texas** - Kennedy Associates, Madison, Tracy; **Virginia** - Tuned Circuit; **Washington** - Northwest Radio; **Wisconsin** - Amateur Electronic Supply; **Ontario** - Metro Ham Shack; **West Germany** - Richter & Company

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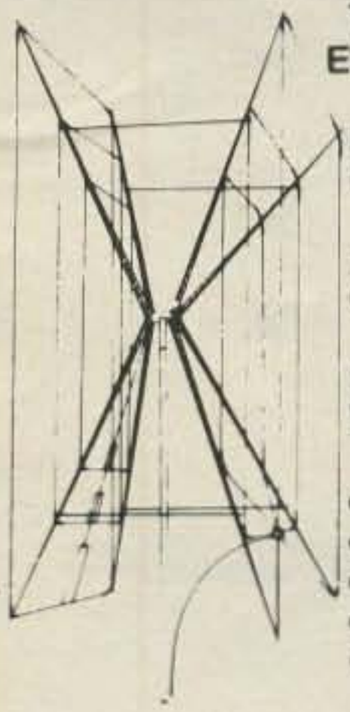
GEM-QUAD FIBRE-GLASS ANTENNA FOR 10, 15, and 20 METERS



Two Elements $159
Extra Elements $113

Price is
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KIT COMPLETE WITH

- **SPIDER**
- **ARMS**
- **WIRE**
- **BALUN KIT**
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Buy two elements now — a third and fourth may be added later with little effort.

Get a maximum structural strength with low weight, using our "Tridetic" arms.

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CoaxProbe*

Coaxial RF Probe for Frequency Counters and Oscilloscopes That Lets You Monitor Your Transmitted Signal Directly From the Coax Line.

Only **$6.95**
Kit $9.95 Assembled
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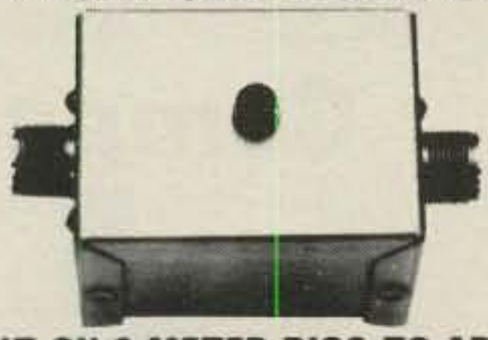

FINALLY! A RF PROBE that lets you connect into your coax cable for frequency measurements and modulation waveform checks directly from the transmitter.

JUST CONNECT THE CoaxProbe* into your transmission line and plug the output into the frequency counter or oscilloscope. Insertion loss is less than .2db so you can leave it in while you operate.

A NECESSITY IN ANY WELL-ORGANIZED HAM SHACK, the CoaxProbe* eliminates "jerry-rigging" and hassles when tapping into the coax line is desired.

A SPECIAL METHOD OF SAMPLING keeps output relatively constant with a wide variation of power. Power output of 8 watts gives .31v out, while 800 watts will give 1.8v out. (rms 3-30 mhz.) 2000 watts PEP rating too!

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USE IT ON 2 METER RIGS TO ADJUST FREQUENCY. The CoaxProbe* has a range of 1.8 to 150 mhz.

MONITOR YOUR MODULATION WAVEFORM. With an oscilloscope of proper bandwidth, you can check your modulation for flat-topping, etc. Ideal for adjusting the speech processor.

NOW YOU CAN MONITOR SIGNALS when connected to the dummy load, eliminating unnecessary on-the-air radiation.

AVAILABLE FOR THE FIRST TIME TO AMATEURS. Try it for 10 days. If not satisfied, send it back for refund (minus shipping charges).

Order today from:

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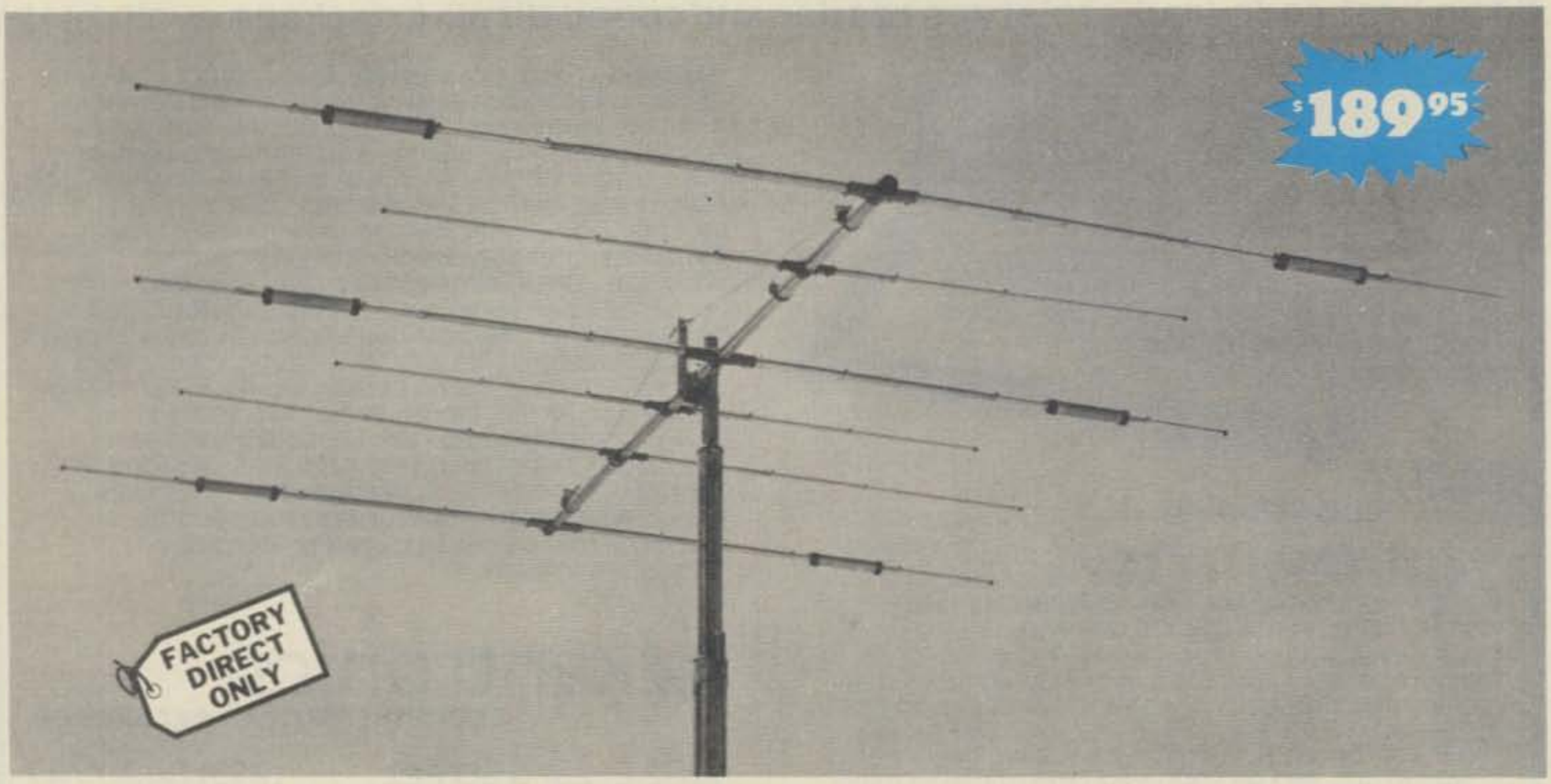
CIRCLE 59 ON READER SERVICE CARD

WILSON SYSTEMS, INC. presents the SYSTEM 36

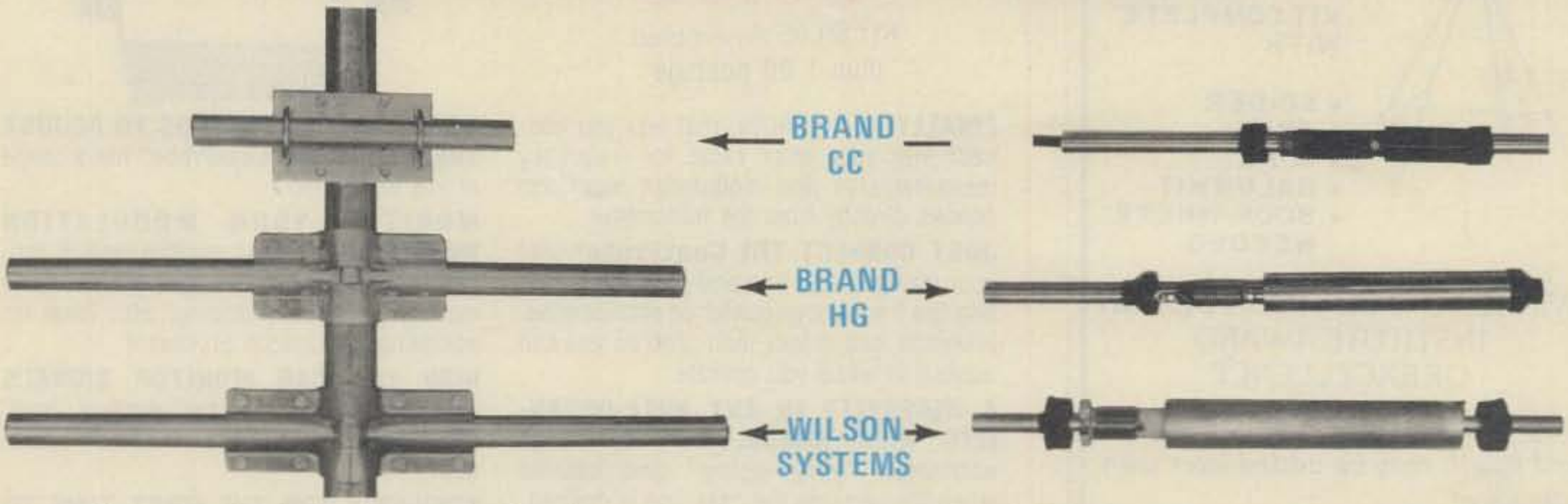


A trap loaded antenna that performs like a monobander! That's the characteristic of this six element three band beam. Through the use of wide spacing and interlacing of elements, the following is possible: three active elements on 20, three active elements on 15, and four active elements on 10 meters. No need to run separate coax feed lines for each band, as the bandswitching is automatically made via the High-Q Wilson traps. Designed to handle the maximum legal power, the traps are capped at each end to provide a weather-proof seal against rain and dust. The special High-Q traps are the strongest available in the industry today.

SPECIFICATIONS

Band MHz 14-21-28	**Boom (O.D. x Length)** . . 2" x 24'2½"	**Wind loading @ 80 mph** . . 215 lbs.
Maximum power input . Legal limit	**No. of elements.** 6	**Maximum wind survival** . . 100 mph
Gain (dBd). . . . . Up to 9 dB	**Longest element** . . . . . 28'2½"	**Feed method** . . . . . Coaxial Balun
VSWR @ resonance . . . 1.3:1	**Turning radius** . . . . . 18'6"	**Assembled weight (approx.** 53 lbs.
Impedance . . . . . 50 Ω	**Maximum mast diameter.** 2"	**Shipping weight (approx.)**. 62 lbs.
F/B ratio . . . . . 20 dB or better	**Surface area** . . . . . 8.6 sq. ft.	

Compare the SY-36 with others . . .



Compare the size and strength of the boom to element clamps. See who offers the largest and heaviest duty. Which would you prefer?

Wilson Systems traps offer a larger diameter trap coil and a larger outside housing, giving excellent Q and power capabilities.

CALL FACTORY DIRECT 1-800-634-6898

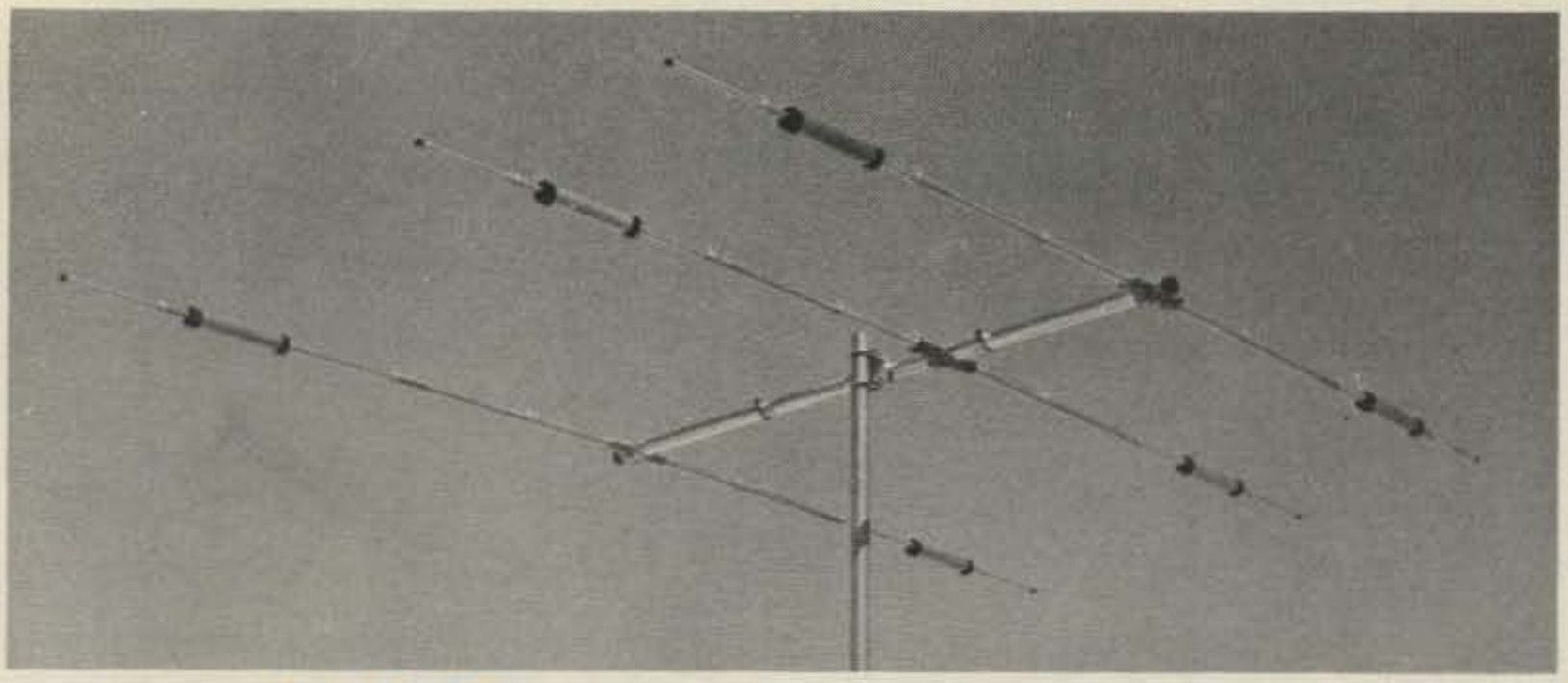
WSI WILSON SYSTEMS, INC.

4286 S. Polaris Ave., Las Vegas, Nevada 89103

Prices and specifications subject to change without notice

CIRCLE 85 ON READER SERVICE CARD

WILSON SYSTEMS INC. MULTI-BAND ANTENNAS



$139.95

SYSTEM 33

(FORMERLY SYSTEM THREE)

FACTORY DIRECT ONLY

Capable of handling the Legal Limit, the "SYSTEM 33" is the finest compact tri-bander available to the amateur.

Designed and produced by one of the world's largest antenna manufacturers, the traditional quality of workmanship and materials excells with the "SYSTEM 33".

New boom-to-element mount consists of two 1/8" thick formed aluminum plates that will provide more clamping and holding strength to prevent element misalignment.

Superior clamping power is obtained with the use of a rugged 1/4" thick aluminum plate for boom to mast mounting.

The use of large diameter High-Q traps in the "SYSTEM 33" makes it a high performing tri-bander and at a very economical price.

A complete step-by-step illustrated instruction manual guides you to easy assembly and the lighweight antenna makes installation of the "SYSTEM 33" quick and simple.

The same quality traps are used in the SY33 that are used in the SY36.

SPECIFICATIONS

Band MHz	14-21-28	**Turning radius**	15'9"
Maximum power input	Legal limit	**Maximum mast diameter**	2" O.D.
Gain (dbd)	Up to 8 dB	**Surface area**	5.7 sq. ft.
VSWR at resonance	1.3:1	**Wind loading at 80 mph**	114 lbs.
Impedance	50 ohms	**Assembled weight (approx.)**	37 lbs.
F/B ratio	20 dB or better	**Shipping weight (approx.)**	42 lbs.
Boom (O.D. x length)	2" x 14'4"	**Direct 52 ohm feed—no balun required**	
No. elements	3	**maximum wind survival**	100 mph
Longest element	27'4"		

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4286 S. Polaris Ave., Las Vegas, Nevada 89103

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CIRCLE 86 ON READER SERVICE CARD

$44.95

WV-1A

4 BAND TRAP VERTICAL (10 - 40 METERS)

No bandswitching necessary with this vertical. An excellent low cost DX antenna with an electrical quarter wavelength on each band and low angle radiation. Advanced design provides low SWR and exceptionally flat response across the full width of each band.

Featured is the Wilson large diameter High-Q traps which will maintain resonant points with varying temperatures and humidity.

Easily assembled, the WV-1A is supplied with a hot dipped galvanized base mount bracket to attach to vent pipe or to a mast driven in the ground.

Note:
Radials are required for peak operation.
(See GR-1 below).

SPECIFICATIONS:

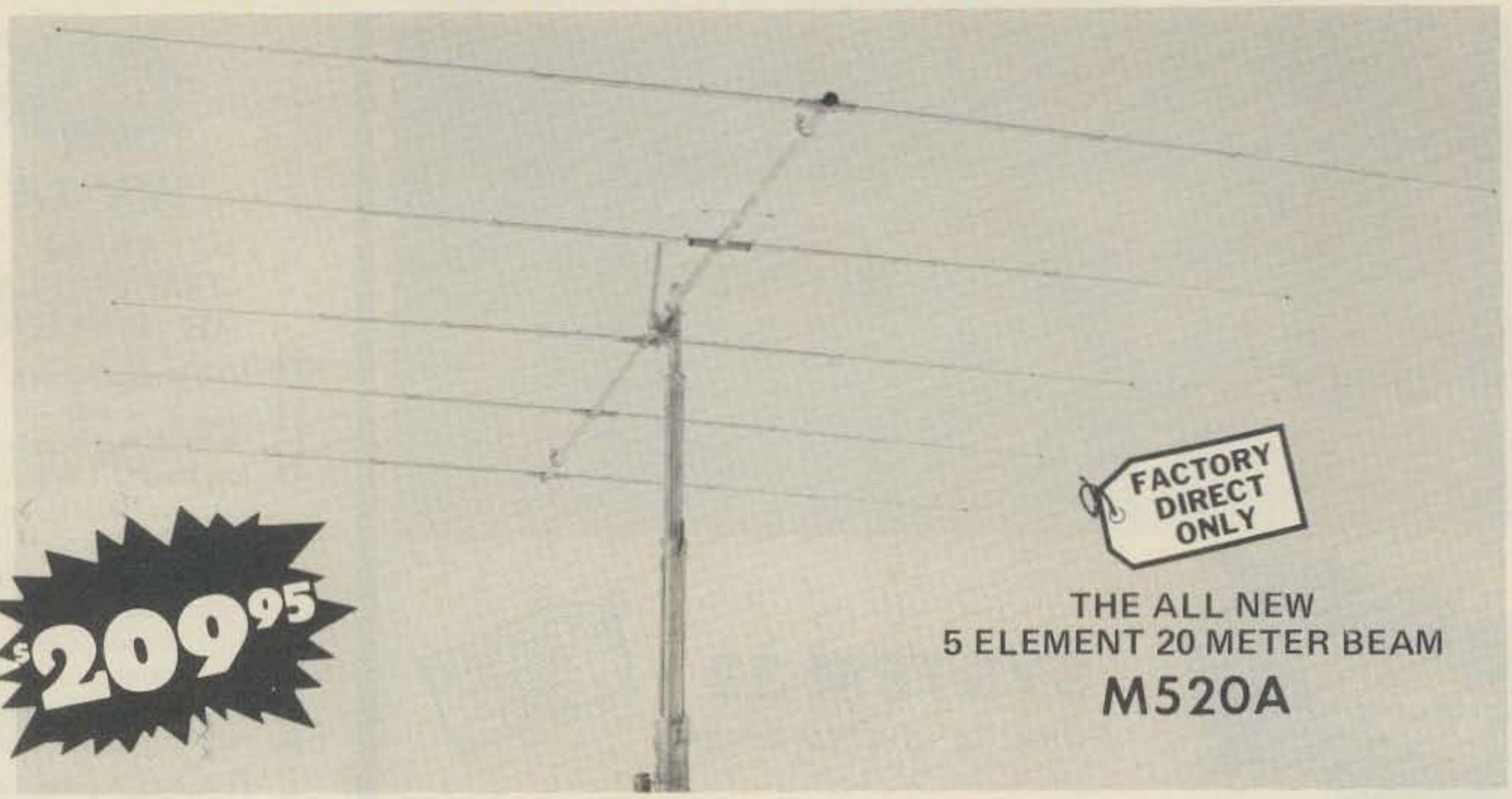
- Self supporting—no guys required.
- Input Impedance: 50 Ω
- Powerhandling capability: Legal Limit
- Two High-Q Traps with large diamater coils
- Low Angle Radiation
- Omnidirectional performance
- Taper Swaged Aluminum Tubing
- Automatic Bandswitching
- Mast Bracket furnished
- SWR: 1.1:1 or less on all Bands

GR-1

$9.95

The GR-1 is the complete ground radial kit for the WV-1A. It consists of: 150' of 7/14 stranded copper wire and heavy duty egg insulators, instructions. The GR-1 will increase the efficiency of the GR-1 by providing the correct counterpoise.

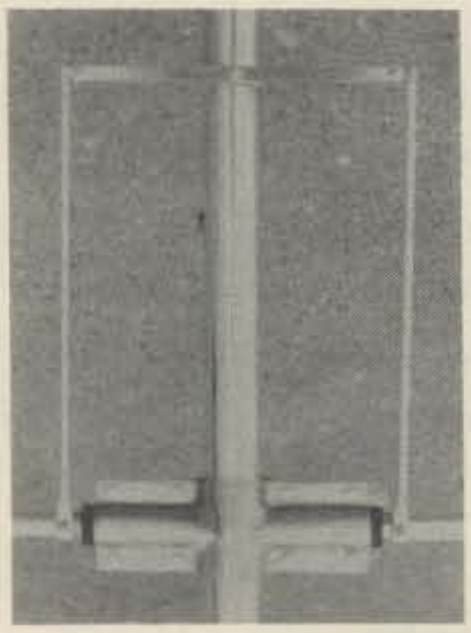
WILSON MONO-BAND BEAMS



At last, the antennas that you have been waiting for are here! The top quality, optimum spaced, and newest designed monobanders. The Wilson Systems' new Monoband beams are the latest in modern design and incorporate the latest in design principles utilizing some of the strongest materials available. Through the select use of the current production of aluminum and the new boom to element plates, the Wilson Systems' antennas will stay up when others are falling down due to heavy ice loading or strong winds. Note the following features:

1. Taper Swaged Elements – The taper swaged elements provide strength where it counts and lowers the wind loading more efficiently than the conventional method of telescoping elements of different sizes.
2. Mounting Plates – Element to Boom – The new formed aluminum plates provide the strongest method of mounting the elements to the boom that is available in the entire market today. No longer will the elements tilt out of line if a bird should land on one end of the element.
3. Mounting Plates – Boom to Mast – Rugged 1/4" thick aluminum plates are used in combination with sturdy U-bolts and saddles for superior clamping power.
4. Holes– There are no holes drilled in the elements of the Wilson HF Monobanders. The careful attention given to the design has made it possible to eliminate this requirement as the use of holes adds an unneccessary weak point to the antenna boom.

With the Wilson Beta-match method, it is a "set it and forget it" process. You can now assemble the antenna on the ground, and using the guidelines from the detailed instruction manual, adjust the tuning of the Beta-match so that it will remain set when raised to the top of the tower.



Wilson's Beta match offers maximum power transfer.

The Wilson Beta-match offers the ability to adjust the terminating impedance that is far superior to the other matching methods including the Gamma match and other Beta-matches. As this method of matching requires a balanced line it will be necessary to use a 1:1 balun, or RF choke, for the most efficient use of the HF Monobanders.

The Wilson Monobanders are the perfect answer to the Ham who wants to stack antennas for maximum utilization of space and gain. They offer the most economical method to have more antenna for less money with better gain and maximum strength. Order yours today and see why the serious DXers are running up that impressive score in contests and number of countries worked.

SPECIFICATIONS

Model	Band Mtrs	Gain dBd	F/B Ratio	Bandwidth @ Resonance 2:1 VSWR Limits	VSWR @ Resonance	Impedance	Matching	Elements	Longest Element	Boom O.D.	Boom Length	Turning Radius	Surface Area (Sq.Ft.)	Windload @ 80 mph (Lbs.)	Maximum Mast	Assembled Weight (Lbs.)
M520A	20	11.5	25 dB	500 KHz	1.1:1	50 Ω	Beta	5	36'6"	2"	34'2½"	25'1"	8.9	227	2"	68
M420A	20	10.0	25 dB	500 KHz	1.1:1	50 Ω	Beta	4	36'6"	2"	26'0"	22'6"	7.6	189	2"	50
M515A	15	12.0	25 dB	400 KHz	1.1:1	50 Ω	Beta	5	25'3"	2"	26'0"	17'6"	4.2	107	2"	41
M415A	15	10.0	25 dB	400 KHz	1.1:1	50 Ω	Beta	4	24'2½"	2"	17'0"	14'11"	3.1	54	2"	25
M510A	10	12.0	25 dB	1.5 MHz	1.1:1	50 Ω	Beta	5	18'6"	2"	26'0"	16'0"	2.8	72	2"	36
M410A	10	10.0	25 dB	1.5 MHz	1.1:1	50 Ω	Beta	4	18'3"	2"	12'11"	11'3"	1.4	36	2"	20

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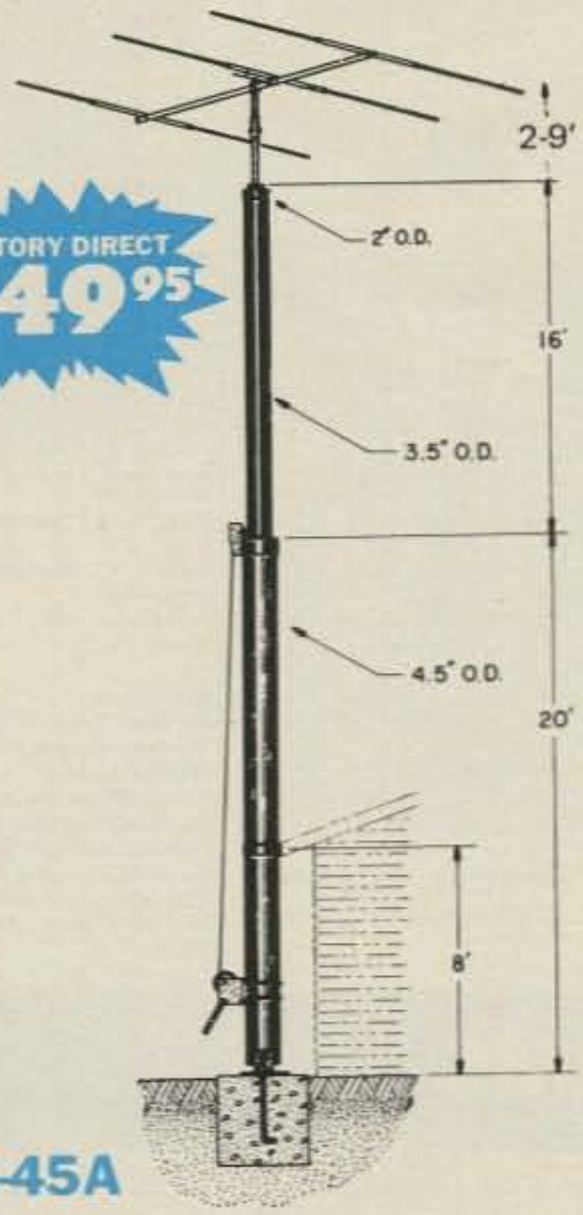
CIRCLE 87 ON READER SERVICE CARD

New, Improved Wilson Towers

Hinged Base Plate - Concrete Pad, Heavy Duty Winch

Mounting the House Bracket

The Hinged Base Plate allows tower to be tilted over for access to antenna and rotor from the ground.



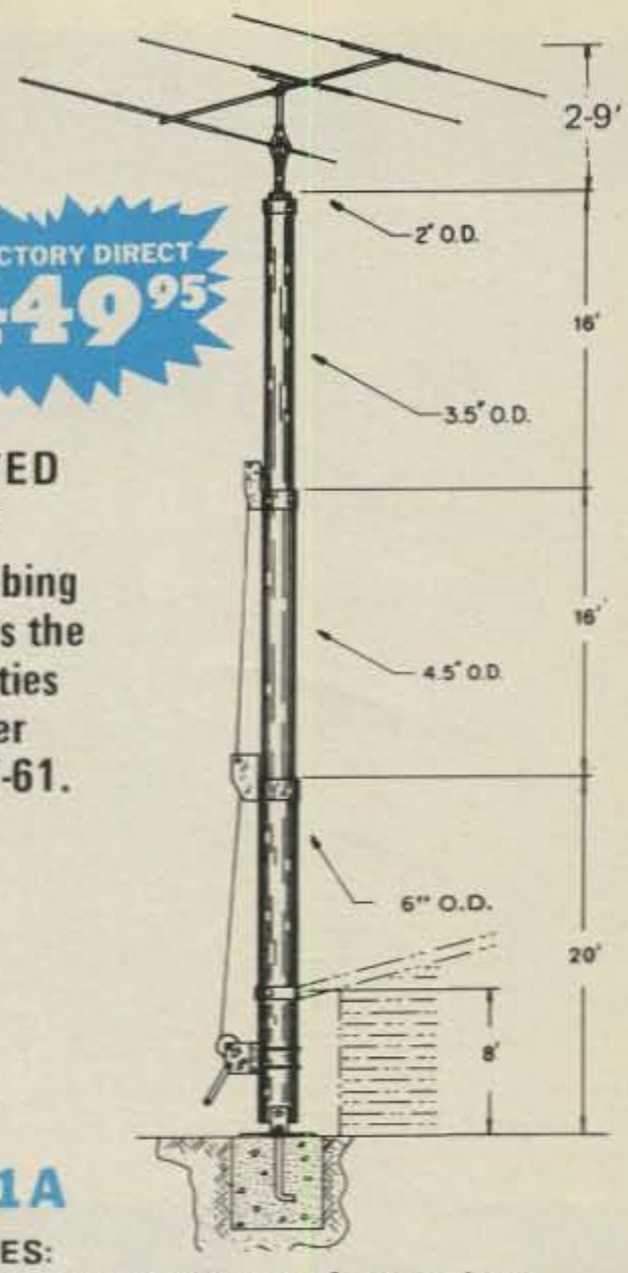
FACTORY DIRECT $249.95

TT-45A

FEATURES:

- Maximum Height 45' (will handle 12 sq. ft. at 38') @ 50 mph
- 1200 lb. winch
- Totally freestanding with proper base
- Total Weight, 243 lbs.

The TT-45A is a freestanding tower, ideal for installations where guys cannot be used. If the tower is not being supported against the house, the proper base fixture accessory must be selected. (Requires 12"x12"x36" of concrete.)



FACTORY DIRECT $449.95

NEW IMPROVED FEATURE

Heavier wall tubing greatly increases the stress capabilities over the older TT-45 and MT-61.

MT-61A

FEATURES:

- Is freestanding with use of proper base
- Maximum Height is 61' (will handle 12 sq. ft. at 53') @ 50 mph
- 1200 lb. brake winch
- 4200 lb. raising cable
- Total Weight, 400 lbs.

Recommended base accessory: RB-61A, FB-61A.

The MT-61A is our largest and tallest freestanding tower. By using the RB-61A rotating base fixture the MT-61A is ideally suited for the SY33 or SY-36. If you plan to mount the tower to your house, caution should be taken to make certain the eave is properly reinforced to handle the tower. If not, one of the base accessory fixtures should be used. (Requires 18"x18"x48" concrete.)

GENERAL FEATURES

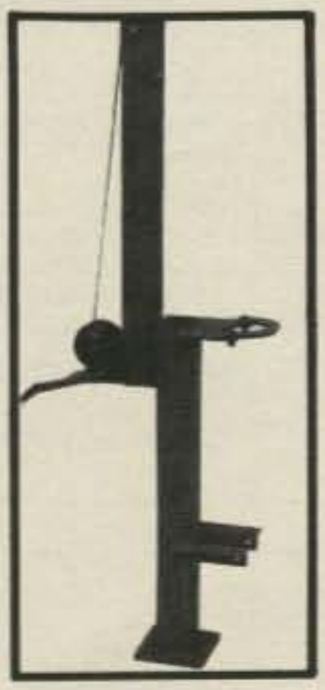
All towers use high strength heavy galvanized steel tubing that conforms to ASTM specifications for years of maintenance-free service. The large diameters provide unexcelled strength. All welding is performed with state-of-the-art equipment. Top sections are 2" O.D. for proper antenna/rotor mounting. A 10' push-up mast is included in the top section of each tower. Hinge-over base plates are standard with each tower. The high loads of today's antennas make Wilson crank-ups a logical choice.

TILT-OVER BASES FOR TOWERS

FIXED BASE

The FB Series was designed to provide an economical method of moving the tower away from the house. It will support the tower in a completely free-standing vertical position, while also having the capabilities of tilting the tower over to provide an easy access to the antenna. The rotor mounts at the top of the tower in the conventional manner, and will not rotate the complete tower. (Requires 3'x3'x5½' of concrete.)

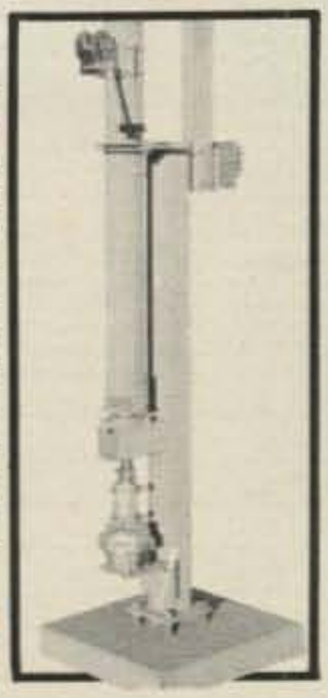
FB-45A . . . $ 99.95
FB-61A . . . 129.95



ROTATING BASE

The RB Series was designed for the Amateur who wants the added convenience of being able to work on the rotor from the ground position. This series of bases will give that ease plus rotate the complete tower and antenna system by the use of a heavy duty thrust bearing at the base of the tower mounting position, while still being able to tilt the tower over when desiring to make changes on the antenna system. (Requires 3'x3'x6' of concrete.)

RB-45A . . . $139.95
RB-61A . . . 199.95



Tilting the tower over is a one-man task with the Wilson bases. (Shown above is the RB-61A.) (Rotor not included)

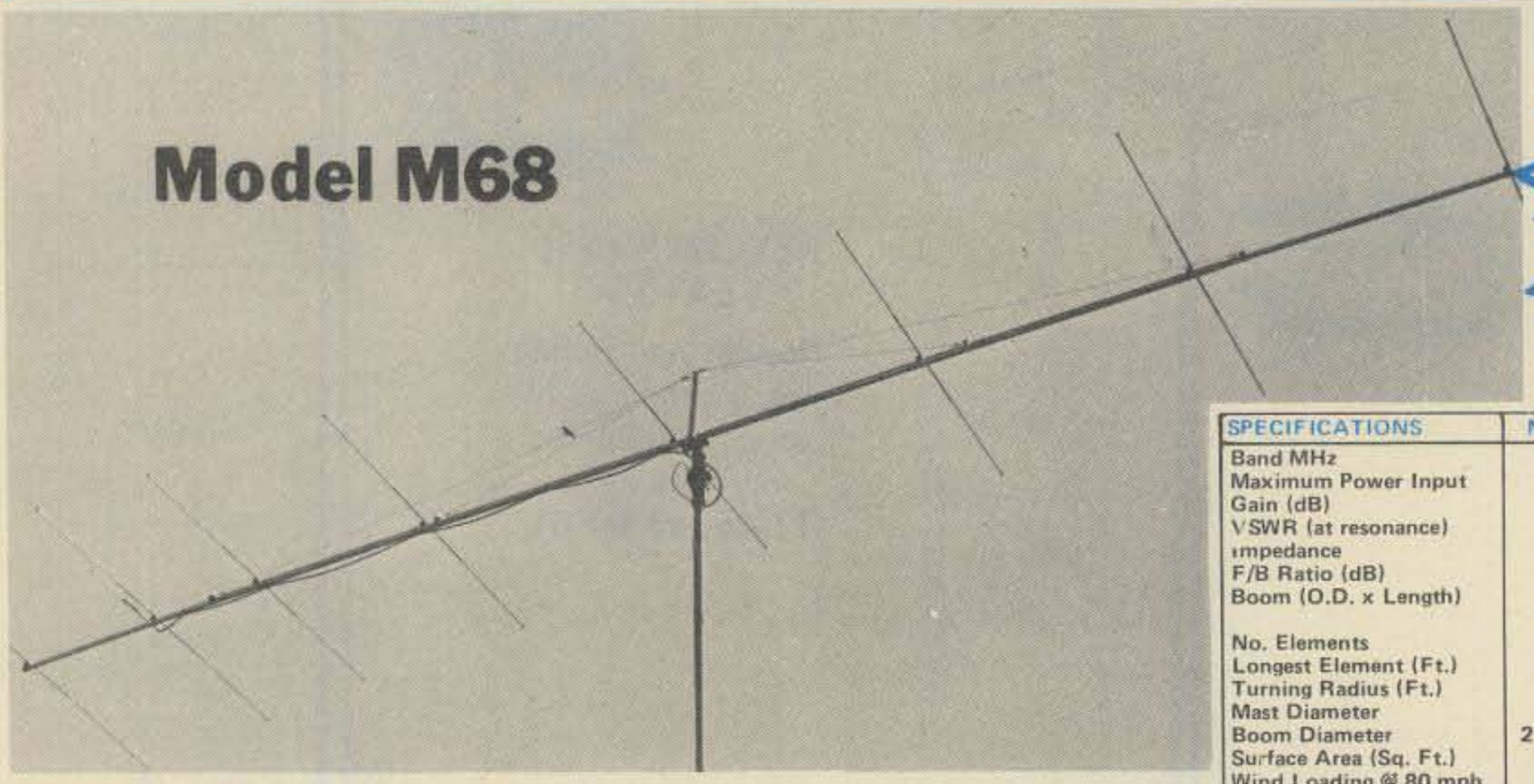
WSI WILSON SYSTEMS, INC.

4286 S. Polaris Avenue
Las Vegas, Nevada 89103
(702) 739-7401
Toll-Free Order Number 800-634-6898

Prices and specifications subject to change without notice.

CIRCLE 88 ON READER SERVICE CARD

6 METER BEAMS



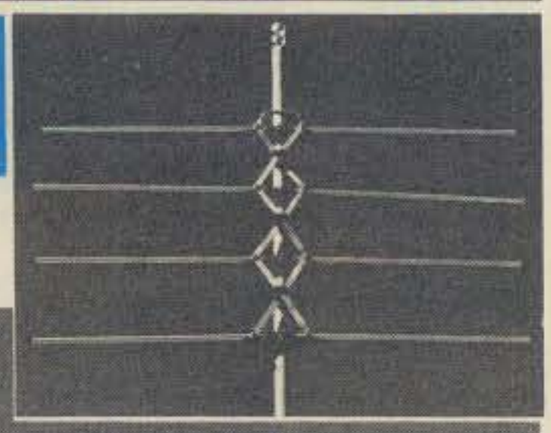
As low as $27.95

SPECIFICATIONS	MODEL M68	MODEL M66	MODEL M64
Band MHz	50	50	50
Maximum Power Input	4 Kw	4 Kw	4 Kw
Gain (dB)	13.5	13.0	10.0
VSWR (at resonance)	1.1:1	1.1:1	1.1:1
Impedance	50 ohms	50 ohms	50 ohms
F/B Ratio (dB)	26	26	25
Boom (O.D. x Length)	2" to 1½" x 36'10"	2" x 25'8"	1½" x 11'6"
No. Elements	8	6	4
Longest Element (Ft.)	9'8"	9'8"	9'8"
Turning Radius (Ft.)	19'0"	13'10"	7'6"
Mast Diameter	2" O.D.	2" O.D.	1½" O.D.
Boom Diameter	2" to 1½" O.D.	2" O.D.	1½" O.D.
Surface Area (Sq. Ft.)	5.8	4.5	1.5
Wind Loading @ 80 mph	145	112	37
Assembled wght. Approx.	34 lbs.	26 lbs.	11 lbs.
Shipping wght. Approx.	39 lbs.	31 lbs.	13 lbs.
Matching Method	Gamma	Gamma	Gamma
PRICE	$84.95	$54.95	$27.95

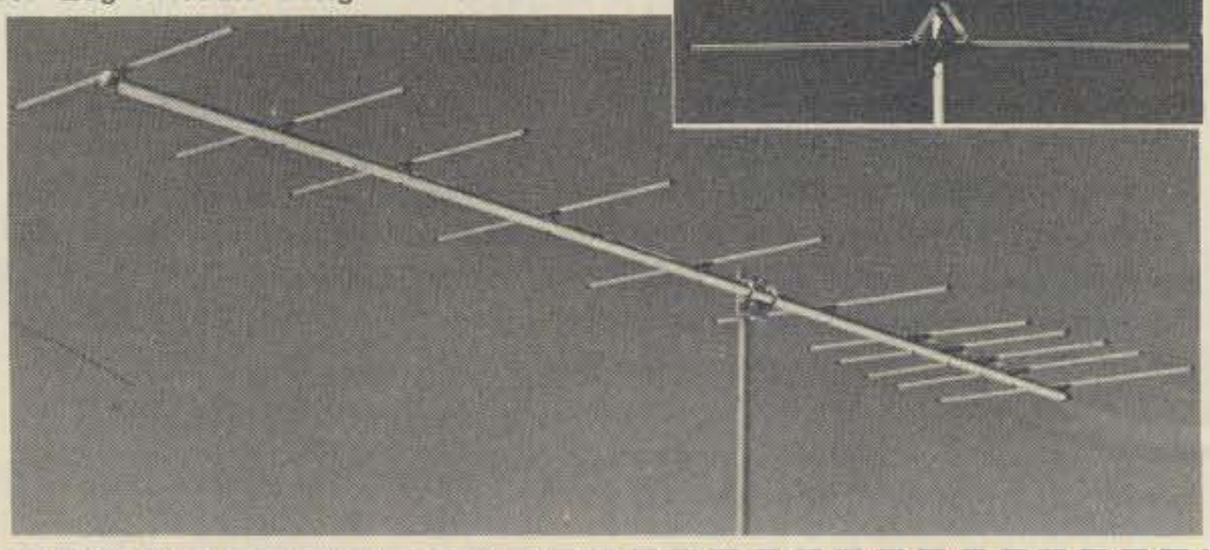
8 elements W - I - D - E spaced on a L - O - N - G 37' boom . . . for those long hauls to JA and VK land! Choose 4, 6 or 8 elements to put you in the action on six meters.

Starting at $19.95

2 METER BEAMS



Wilson's new 2 meter series combines the ultimate in design and quality materials. These top performing beams feature 7, 9 or 11 aluminum elements held to the heavy walled boom with the exclusive molded Lexan® boom to element mounting. The four driven elements use Log Periodic design for broad band characteristics providing full 144-148 MHz coverage with less than 1.2 to 1 VSWR across the band. Universal mounting is provided for vertical or horizontal polarization.



SPECIFICATIONS	M-72	M-92	M-112
Band MHz	144-148 MHz	144-148 MHz	144-148 MHz
Gain (dB)	11 dB	13.7 dB	14.5 dB
VSWR	Less than 1.2:1 across band	Less than 1.2:1 across band	Less than 1.2:1 across band
Impedance	50 ohms balanced	50 ohms balanced	50 ohms balanced
Number of Elements	7	9	11
Boom (O.D. x Length)	1" O.D. x 5'4"L.	1" O.D. x 10'0"L.	1½" O.D. x 12'6"
Longest Element	40"	40"	40"
Surface Area (Sq. Ft.)	.8	1.5	2.8
Assembled wght Approx.	3.5 lbs.	5 lbs.	6 lbs.
Shipping wght. Approx.	6.5 lbs.	8 lbs.	9 lbs.
Turning Radius	38"	64"	78"
PRICE	$19.95	$24.95	$29.95

WILSON SYSTEMS, INC. – 4286 S. Polaris
Las Vegas, NV 89103 – (702) 739-7401

FACTORY DIRECT ORDER BLANK

Toll-Free Order Number
1-800-634-6898

WILSON SYSTEMS ANTENNAS

Qty	Model	Description	Shipping	Price
	SY33	3 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	$139.95
	SY36	6 Ele. Tribander for 10, 15, 20 Mtrs.	UPS	189.95
	WV-1A	Trap Vertical for 10, 15, 20, 40 Mtrs.	UPS	44.95
	GR-1	Ground Radials for WV-1A	UPS	9.95
	M-520A	5 Elements on 20 Mtrs.	TRUCK	209.95
	M-420A	4 Elements on 20 Mtrs.	UPS	139.95
	M-515A	5 Elements on 15 Mtrs.	UPS	119.95
	M-415A	4 Elements on 15 Mtrs.	UPS	79.95
	M-510A	5 Elements on 10 Mtrs.	UPS	84.95
	M-410A	4 Elements on 10 Mtrs.	UPS	64.95
	WM-62A	Mobile Antenna: 5/8 λ on 2, 1/4 λ on 6	UPS	19.95
	M-86	8 Elements on 6 Mtrs.	UPS	84.95
	M-66A	6 Elements on 6 Mtrs.	UPS	54.95
	M-46	4 Elements on 6 Mtrs.	UPS	27.95
	M-112	11 Elements on 2 Mtrs.	UPS	29.95
	M-92	9 Elements on 2 Mtrs.	UPS	24.95
	M-72	7 Elements on 2 Mtrs.	UPS	19.95
		ACCESSORIES		
	HD-73	Alliance Heavy Duty Rotor	UPS	109.95
	RC-8C	8/C Rotor Cable	UPS	.12/ft.
	RG-8U	RG-8U Foam-Ultra Flexible Coaxial Cable. 38 strand center conductor, 11 guage	UPS	.21/ft.

WILSON SYSTEMS TOWERS

Qty.	Model	Description	Shipping	Price
	TT-45A	Freestanding 45' Tubular Tower	TRUCK	$249.95
	RB-45A	Rotating Base for TT-45A w/tilt over feature	TRUCK	139.95
	FB-45A	Fixed Base for TT-45A w/tilt over feature	TRUCK	99.95
	MT-61A	Freestanding 61' Tubular Tower	TRUCK	449.95
	RB-61A	Rotating Base for MT-61A w/tilt over feature	TRUCK	199.95
	FB-61A	Fixed Base for MT-61A w/tilt over feature	TRUCK	129.95

NOTE:
On Coaxial and Rotor Cable, minimum order is 100 ft. and in 50' multiples.
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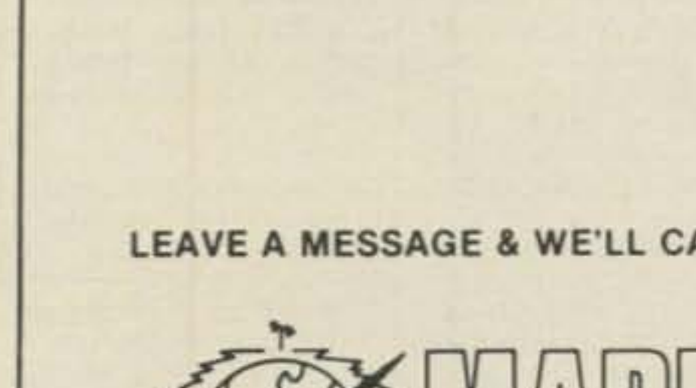

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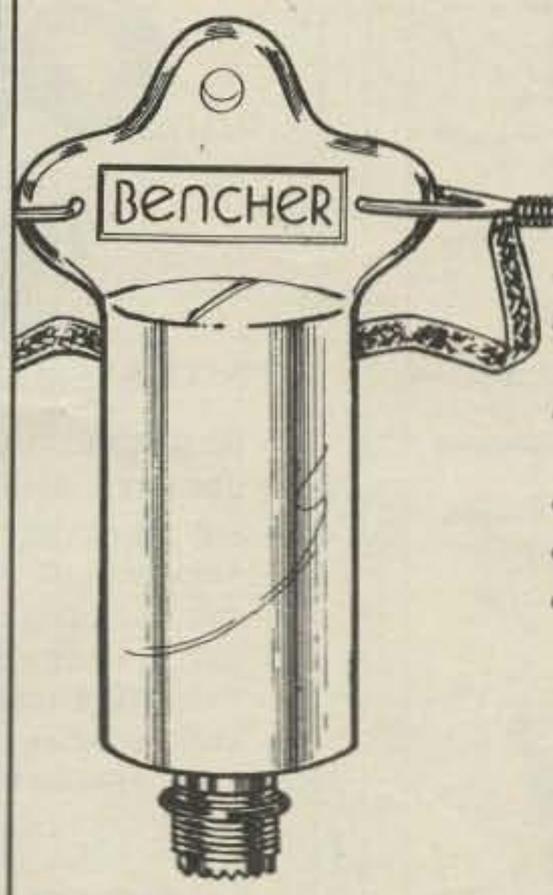

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WANTED: Hallicrafter S-1 through S-7, DD-1, 8HPA, SX-10, SX-12, and other early Hallicrafter gear, parts, manuals, and accessories. Any condition. For my collection, please write, even if in doubt on Model No. Chuck Dachis, WD5EDG, 4500 Russell Dr., Austin, TX 78745.

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CIRCLE 27 ON READER SERVICE CARD

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MERRY CHRISTMAS DXers from Skip, WB8OWM.

ROHN TOWER - Buy Wholesale from Worldwide Distributor. 20G $27.06 section; 25G $37.62 section. 45G - $67.76 section. 48 ft. foldover tower, $605.00; 48 foot BX free standing, $213.40. HILL RADIO, 2503 GE Rd., Bloomington, IL 61701. 309/663-2141.

WANTED: Old Radio Transcription Discs, any size, speed. Larry, W7FIZ, Box 724, Redmond, WA 98052.

"OHM SWEET OHM" Placard with appropriate symbol (conversation piece) Suitable for framing, postpaid, $1.00. Stanley Patla, WB9YMK, Honey Lane, Route 3, Lake Geneva, WI 53147.

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LOOKING FOR old Lionel Trains. Interested only in "0" gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952, but will consider complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Dick Cowan, WA2LRO, c/o CQ Magazine, or call 516/883-6200.

FOR SALE: Old issues of Ham Radio, 73, CQ, QST. Some complete runs. Send SASE for lists and prices. A. Dorhoffer, K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, New York 11801.

WANTED: Extra coils for SW-3 receiver. I have odd-ball coils and need your single extras to make up complete set. Buy or trade. Bill Orr, W6SAI, c/o Eimac, 301 Industrial Way, San Carlos, CA 94070.

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The book, "CQ YL", has been updated again with a new supplement bringing the YLRL Officers section up to date through 1977, plus a report on the 7th International YLRL Convention held in Houston in June, 1976. If you have a copy of "CQ YL" and would like to add the new supplement (the pages are "slotted" so they can be inserted directly into the book's spiral backbone), drop a note with your request to author/publisher, W5RZJ, Louisa Sando, 9412 Rio Grande Blvd. NW, Albuquerque, NM 87114. Please enclose $1.00 to cover cost of printing and mailing. The one and only book about YLs in ham radio, "CQ YL" contains 23 chapters, over 600 photographs. Order your autographed copy from W5RZJ, $3.50 postpaid.

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WANTED: Pre-War issues of Short Wave Craft magazine. Bill Orr, W6SAI. Eimac, 301 Industrial Way, San Carlos, CA 94070.

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MEDICAL: Any licensed amateur radio operator in the medical or paramedical field should join MARCO (Medical Radio Council). Contact Stan Carp, M.D., K1EEG, 44 Main St., Saugus, MA 01906. 617/233-1234.

WANTED: Heathkit HW-101, SB-102, HW-104, Kenwood 520, Yaesu 101 or similar rigs. Frank Varano, 37 S. Market St., Shamokin, PA 17872.

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GOVT. SURPLUS SIG. GENERATORS AN/USM27B and other electronics, RTTY, for SALE cheap; RTTY spools at 50 cents plus postage. Details/list, SASE to: D. Testa, Box 9064-CQ, Newark, NJ 07104.

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HI GAIN 6 MTR Ground Plane Antenna, $20; Mark 6 Mtr Fiberglass Mobile Whip, $5; DR-200 Montiradio 30-50 and 152-174 MH. Rcvr $45.00. Universal Bumper mount with Stainless Steel Spring, $5.00. All prices, FOB. T.K. Brown, RD 1, Box 102, Forksville, PA 18616.

WANTED: Vibrokeyer; Skip WB8OWM, 1309 — 24th Street N.W., Canton, OH 44709.

TEKTRONIX 535 dual trace scope $250. RCA-WR-50B signal generator, $35.00. UHF multicoupler $85.00. Sierra 164 thruline $150.00. J.L. Orysen, 2025 Sunkist, Waukesha, WI 53186.

WANTED: Used amateur equipment. State condition, make, model and price. H.F. Schnur, 115 Intercept Ave., North Charleston SC 29405.

WANTED: Microcomputers: TRS-80, PET, APPLE, and related peripherals. Any condition, any quantity. Immediate cash available or trade for DEC PDP8e, f, m computers, teletypes, etc. PORTACOM briefcase ASCII terminals/modems $595. K2DCY, Box 632, W. Caldwell, NJ 07006. 201/226-9185.

Please send all reader inquiries directly.

SELL: Dentron KW wiretuner $40; Genave GTX2 w/12 xtal PRS $100. Wanted: 20 mtr monoband ant., DCPS /4 Ext VFO for Tempo One. Will Roberts, P.O. Box 907, Roseboro, NC 28382.

YL's, I'm Desperate! Badly need YL CW sked with Utah and Wyoming for WAS/YL. Can anyone help? Alley, W1DMD, 48 Judson St., Raynham, MA 02767.

SELL: Prec. 100 Kc. Xtl. Standards in W.E. type holder. Bliley AR23W. $5.00 plus shipping. W4JGO, 643 Diamond, Salem, W. VA. 24153.

NCX-3 and HP-23B supply. Good condx, $150. George Briggs, K2DM.

SELL: Ameco 62, $25; Clegg 22 Mark II, $85 CRX 2 rcvr-$25; Dow relay 12VAC-$10; Yashica 8 mm Zoom, $25. Joseph Schwartz, 43-34 Union St., Flushing, NY. 212/461-5933.

FOR SALE: Sony Video Cameras. SASE for list. W4OWY, 2936 Gant Qtrs. Cir., Marietta, GA 30067.

WARGAMERS: WWII and Sci-Fi Games over the air. I need opponents. AH, 6DW, and M6C games. WD8DAS, Steve, 823 Irvington NE, Massillon, OH 44646.

FOR SALE: Sigma 2KW Amplifier, new $675. — 75A4 S/N 2400 2 filters, $375. — KWMII Flag Model 516F2, $675. Parts SASE. Bruscella, 60 Willow, Shrewsbury, NJ 07701. 201/741-6425.

WANT: Coaxial bulkhead lighting arrestors, DPDT, and Transfer relays w/"N" conn.; C.T. Huth, 146 Schonhardt St., Tiffin, OH 44883.

CALL PINS — 2 lines $1.25; 3 lines $1.50; 4 lines $1.75; Assorted colors. AC2P Richard Tygar, 5 Chelmsford Dr., Wheatley Hts., NY 11798.

SELL: Tempo FMH HT complete $180; GLB 300A $80; EICO 955 CAP. CKR. $45. W7MAF Neil, 1815-17th Ave So., Great Falls, MT 59405.

GOOD WORKING ART 13 Collins Autotune with P.S., $195.00. K9BSL, 122 Country Club, LaPorte, IN 46350.

RCA MODEL TK-60A studio B/W television camera system refurbished to like-new operating condition with lenses, $1000. G. Alfred Dodds, 874 Pepperwood Ln., Brunswick, OH 44212.

GALAXY "V" MK3 500 Watt, 5 Band Transceiver w/AC and DC Power Supply. All accessories including Mobile Mount and manuals, $350.00. Guz Guzenski, WB2EZU, 5084 Chapman Pkwy., Hamburg, NY 14075 (716) 627-3724.

HEATH AT-1 MANUAL, Pages 26 and 27, and Heath VF-1 VFO Manual wanted. RW Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

SB200 with 10 meters, assembled, 10 hours use. $330. WD4NSF, 3308 Curtis Dr., Apopka, FL 32703. 305/862-4820.

MOTOROLA 150 MC Desk top FM Rec. $20, G.E. 30-50 MC mobile FM rec, $8; G.E. 2 frequency remote control unit $20. K6KZT, 2255 Alexander, Los Osos, CA 93402.

SELL or TRADE for HAM gear of comparable value. BallyArcade, video entertainment home computer system. $200 price range. Mel. Breyfogle, W0MDM, 18 N. 12th St., Estherville, IA 51334.

FOR SALE: Popular Electronics, Radio-TV Experimenter, Electronics Illustrated, Radio, R/9, Radio News. Bell, Box 562, Deming, NM 88030.

SELL: Autek IC Active Filter QF1, never used, $40. Erwin Donadt, 168 Cedar St., Cliffside Pk., NJ 07010.

WANTED: Hallicrafters SX-28. State condx, and price. J. Parrish Jr., KA8DYT, St. Clair, MI 48079.

SELL: Nat. NCX3 $175.00, Nat. NC303, $180.00. Gonset GSB100 SSB transmitter $85.00. All mint condition. W2KZ 103 Lou Dr. Depew, NY 14043.

FOR SALE: Pair of 7094 Final Tubes. Best offer. K9IL, Box 73R, Romeoville, IL 60441.

HELP! Need manual for Sky Champion—Model S-20-R. Photo Cpi acceptable. WA4-TKG, Jacksonville, FL. (Hallicrafters).

WANTED: Pre-War Issues of Amateur Radio Defense, Callbooks and Hand Keys. Bob Brown, 509 Franklin St., Toronto, OH 43964.

KWM-2 DX-Eng, 516F2, 516E1, 351D2 $750. 312B4 $200. 30L1 $500. HRO 500 $850. R220 Rcvr $250. VX501 $75. R390 A, $300. IC230 $225. FRG-7, $225. CW-520 $45. IC402, $295. J.W. Craig, W1-FBG, Box 615, Portsmouth, NH 03801.

SELL: Hammarlund HQ-215 $225. Want KIM-1. K9UKX, 51625 Chestnut Rd., Granger, IN 46530.

FOR SALE OR TRADE: Sonar 50W AM and FM linear base. Mint Cond. Covers 6-10-11 meter and 32-52 MHz F.M. $100.00. You ship. A. Jones, 5-16 R Menendez Pidal El Senorial R.P., P.R. 00926.

NOVICE ALL-AMERICAN CERTIFICATE: Work a Novice in all 10 Call Areas. Send list and $1. K6ASI, 25 Rudnick Ave., Novato, CA 94947.

WANTED: Manual/Schematic for Federal UHF Frequency Generator Model 804, Freq. 8 — 330 MHz. A.S. Bielenda, W2IDA, 43 Chestnut Ridge Rd., Saddle River, NJ 07458

SELL: Hammarlund BC-779B, restored as per my Article August '77 in 73 Magazine. $125, you ship. C. Klawitter, 4627 N. Bartlett, Milwaukee, WI 53211.

FOR SALE: Ideal vaction or retirement lot for some Ham. High location for good antenna site. Good fishing in several surrounding lakes, country club, and town nearby. Near Eureka Springs, Ark. and Silver Dollar City, MO., in the beautiful Ozark Mts. of Northwest Arkansas. Send SASE for inquiry to: WA5CNG, Al Springer, 411 E. Highland Dr., Kilgore, TX 75662.

MAGAZINES: CQ, Ham Radio, QST and 73 issues full years, and single issues. SASE for list. Clem, W8VO, 33727 Brownlea, Sterling Hts., MI 48077.

HEATHKIT Model AR-3 Shortwave rcvr $35 postpaid. H. Anderson, 816 No. Cedar, Colo. Springs, CO 80903.

SWAN 300B/14 Adapter mint $375. 410 VFO $50. Wanted Collins 399C-1. WA4-LTG, 205/767-0441.

SELL: "FACSIMILE" Recorders- MUFAX 18 inch - Have Two. Appear to be in good working cond. Original cost over $3500. $200 ea. or best offer. Shipping extra. H.F. Dove, WD6CRM, 110-3 Norfolk Rd., Alameda, CA 94501. 415/865-3477.

ADVERTISER'S INDEX

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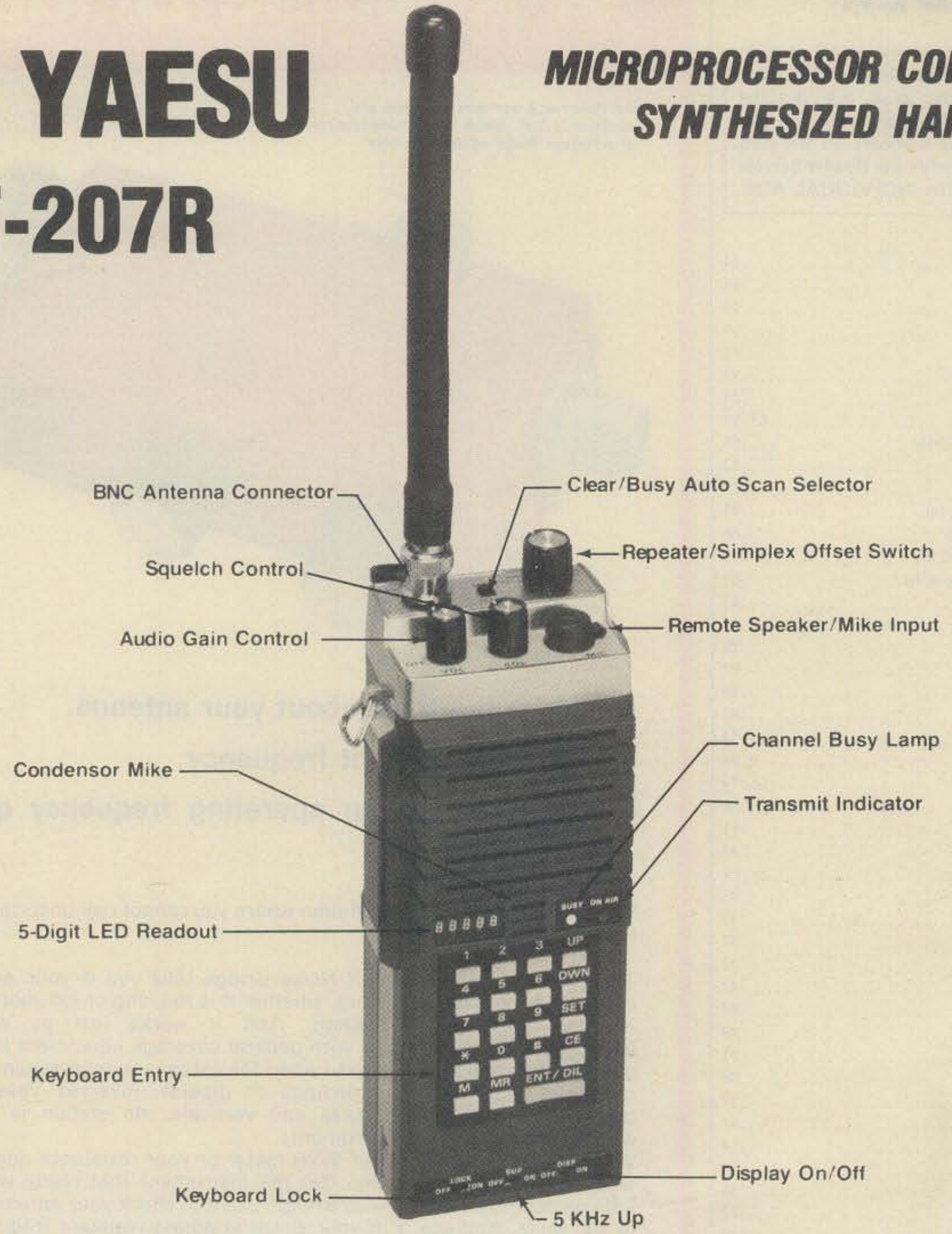
A Breakthrough In Technology!

THE YAESU FT-207R

MICROPROCESSOR CONTROLLED SYNTHESIZED HANDIE



The Yaesu FT-207R Synthesized Handie has all the features you could want in a very compact package

- 144-148 MHz Range
- 10 KHz Steps
- 3 Watts Output
- 4 Memories plus Programmable Offset
- Priority Channel
- Memory and Band Auto Scan
- Keyboard Encoded Frequency Entry
- 2 Tone (Touchtone®) Input from Keyboard
- Keyboard Lock guards against accidental frequency change
- Odd Splits Can Be Programmed from Keyboard
- Automatic Battery Saver Feature for LED Display
- Rubber Flex Antenna

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CIRCLE 40 ON READER SERVICE CARD

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The radio.

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679X

YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

SOMETHING DIFFERENT
The FT-107 Series with "DMS"*
"It's A Cut Above The Rest"

*** OPTIONAL DIGITAL MEMORY SHIFT ("DMS")**
12 discrete memories. Stores individual frequencies or use as 12 full coverage VFOs (500 kHz each)

- **Solid State**
- **240 watts DC SSB/CW**
- **160-10 meters, WWV**
  (2 auxiliary band positions are available for future expansion)
- **RF Speech Processor**
- **SSB, CW, AM, FSK**
- **Built-in SWR Meter**
- **Excellent Dynamic Range**
- **Audio Peak/Notch Filter**
- **Variable Bandwidth**
- **Full Line of Accessories**

The FT-107 has been created as a result of a blending of technologies — computer, solid state and RF design. By careful utilization of these disciplines and the experience gained from our FT-301 series, YAESU has achieved an HF transceiver which offers unique features (e. g. "Digital Memory Shift"), efficient operation and a level of performance that has been previously unattainable.

RECEIVER:

Sensitivity: 0.25 uV for 10dB S/N, CW/SSB, FSK
1.0 uV for 10dB S/N, AM
Image Rejection: 60dB except 10 meters (50dB)
IF Rejection: 70dB
Selectivity: SSB 2.4 kHz at −6dB, 4.0 kHz at −60dB.
CW 0.6 kHz at −6dB, 1.2 kHz at −60dB.
AM 6 kHz at −6dB, 12 kHz at −60dB
Variable IF Bandwidth
20dB RF Attenuator
Peak/Notch Audio Filter
Audio Output: 3 watts (4-16 ohms)
Accessories: FV-107 VFO (standard not synethized)
FTV-107 VHF (UHF Transverter)
FC-107 Antenna Tuner
SP-107 Matching Speaker
FP-107 AC Power Supply

TRANSMITTER

Power Input: 240 watts DC SSB/CW
80 watts DC AM/FSK
Opposite Sideband Suppression: Better than 50dB
Spurious Radiation: −50dB.
Transmitter Bandwidth 350-2700 hz (−6dB)
Transmitter: 3rd IMD −31dB neg feedback 6dB
Transmitter Stability: 30 hz after 10 min. warmup
less than 100 hz after 30 min.
Antenna Input Impedance: 50 ohms
Microphone Impedance: 500 ohms
Power Required: 13.5V DC at 20 amps
100/110/117/200/220/234V AC at 650 VA

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The radio.

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CIRCLE 48 ON READER SERVICE CARD

1179

YAESU ELECTRONICS CORP., 15954 Downey Ave., Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

Heathkit SB-221 linear amplifier uses EIMAC 3-500Zs for efficiency, economy and performance.

Designed for rugged service.

The new desktop Heathkit SB-221 linear amplifier provides up to 2000 watts PEP input for SSB and 1000 watts input for CW service. Only 100 watts drive power is required to achieve these power levels.

Designed for rugged contest and traffic service, the SB-221 uses the highest grade components including two EIMAC 3-500Z high gain power triodes, well-known for their reliable, efficient performance. One thousand watts of plate dissipation is available from the two tubes, providing ample safety factor for long life service.

The designer's choice.

Top-notch equipment designers, such as Heathkit, choose EIMAC power tubes for commercial as well as amateur products. The 3-500Z power tube used in the SB-221 also serves in many commercial broadcast, FM and point-to-point radio systems where reliability and long life are paramount.

varian

Make sure this fine EIMAC 3-500Z is in your equipment. For full details and a data sheet on the 3-500Z, write Varian, EIMAC Division, 301 Industrial Way, San Carlos, CA 94070. Or contact any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.

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