ICD 08240

Amateur Radio

SERVING AMATEUR RADIO SINCE 1945
MAY 1979 $1.50

CQ

Including
modern electronics

"THE QTH IS JUPITER...QSL?"

VOYAGER 1 SPACECRAFT SHOWS US A NEW POTENTIAL "RARE" ONE...

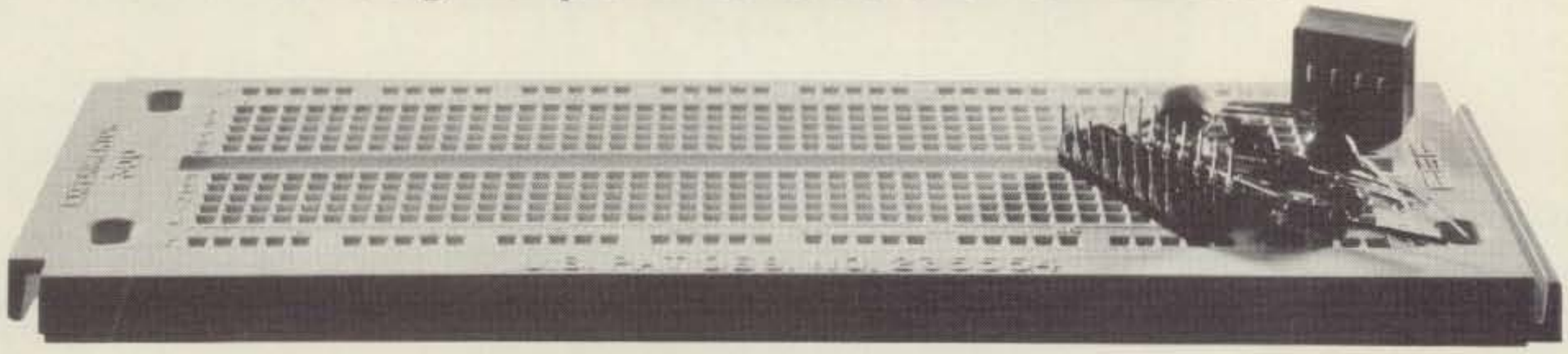
SEE PAGE 36

0 74820 08240 05

THE RADIO AMATEUR'S JOURNAL

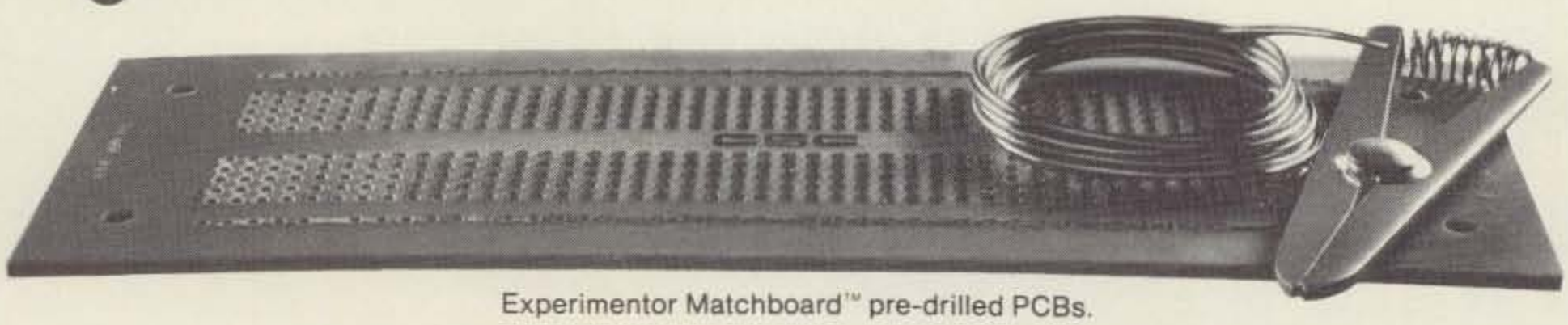
You can't beat The System.

The Experimentor System™ —a quicker transition from imagination through experimentation to realization.



Experimentor solderless breadboard.

Experimentor Scratchboard™ workpads.



Experimentor Matchboard™ pre-drilled PCBs.

When you have a circuit idea that you want to make happen, we have a system to make it happen quicker'n'slicker'n ever before: The Experimentor System.

You already know how big a help our Experimentor solderless breadboards can be. Now we've taken our good idea one step farther. Twice.

We've added Experimentor Scratchboard workpads, with our breadboard hole-and-connection pattern printed in light blue ink. To let you sketch up a layout you already have working so you can reproduce it later.

With Experimentor Matchboard you can go from breadboard to finished nonstop! We've matched our breadboard pattern again, this time on a printed circuit board, finished and ready to build on. All for about $2.69*

There's even a letter-and-number index for each hole, so you can move from breadboard (where they're molded) to Scratchboard™ (where they're printed) to Matchboard™ (where they're silkscreened onto the component side) and always know where you are.

When you want to save time and energy, you can't beat The Experimentor System.

CONTINENTAL SPECIALTIES CORPORATION

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

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

NEW MFJ-962 1.5 KW Versa Tuner III

For $159.95 you can run up to 1.5 KW PEP and match everything from 1.8 thru 30 MHz: coax, balanced line, random wire. Built-in balun. SWR, dual range forward and reflected power meter. Flexible six position antenna switch. Outstanding value.

FREE MFJ LOGBOOK . . .

Just ask your MFJ dealer to demonstrate these 1.5 KW Versa Tuner IIIs. Logbook quantities are limited.

$159.95

The NEW MFJ-962 1.5 KW Versa Tuner III lets you run up to 1.5 KW PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

This gives you maximum power transfer to your antenna for solid QSO's and attenuates harmonics to reduce TVI and out-of-band emission.

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

A flexible six position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.

A new all metal, low profile cabinet gives you RFI protection, rigid construction, and sleek styling. Black finish. Black front panel has reverse lettering. 5x14x14 inches. A flip down wire stand tilts tuner for easy viewing.

Efficient, encapsulated 4:1 ferrite balun. 500 pf, 6000 volt capacitors, 12 position inductor. Ceramic rotary switch. 2% meter.

Built-in quality. Every single unit is tested for performance and inspected for quality. Solid American construction, quality components. One year limited warranty.

For your nearest MFJ dealer, call toll-free 800-647-1800. Stop by your dealer. Compare it feature for feature with other tuners. Compare its value, its quality and its performance.

After a truly side by side comparison, you'll be convinced that its value, quality and features make it a truly outstanding value.

Why not visit your dealer today? If no dealer is available order direct from MFJ.

MFJ-961 1.5 KW VERSA TUNER III has balun, six position antenna switch. Matches coax, balanced line, random wire, from 1.8 to 30 MHz.

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

$139.95

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

Run 1.5 KW PEP. Match any feedline from 1.8 to 30 MHz: coax, balanced line, random wire.

Gives maximum power transfer. Harmonic attenuation reduces TVI, out of band emissions.

Black all metal cabinet. Black front panel has reverse lettering. Flip down wire stand tilts tuner. 5x14x14 inches.

Encapsulated 4:1 ferrite balun. 500 pf, 6000 volt capacitors, 12 position inductor, ceramic switches. SO-239s, ceramic feedthrus. One year limited warranty.

Every single unit is tested for performance and inspected for quality. Solid American construction, quality components.

For your nearest MFJ dealer, call toll-free 800-647-1800. Visit your dealer and compare. You'll find real value.

Why not see the NEW MFJ-961 1.5 KW Versa Tuner III at your dealer's today? If no dealer is available order direct from MFJ.

FOR YOUR NEAREST DEALER OR FOR ORDERS

CALL TOLL-FREE 800-647-1800

Order any product from MFJ and try it. If not delighted, return within 30 days for a prompt refund (less shipping).

Order today. Money back if not delighted. One year limited warranty. Add $8.00 shipping/handling.

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

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

MFJ ENTERPRISES, INC.

P. O. BOX 494
MISSISSIPPI STATE, MISSISSIPPI 39762

CIRCLE 38 ON READER SERVICE CARD

NOW...FREE PHONE!

800 854-6046

CALIF. CUSTOMERS PLEASE CALL OR VISIT STORES LISTED BELOW

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

SERVING HAMS *BETTER!*

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

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

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

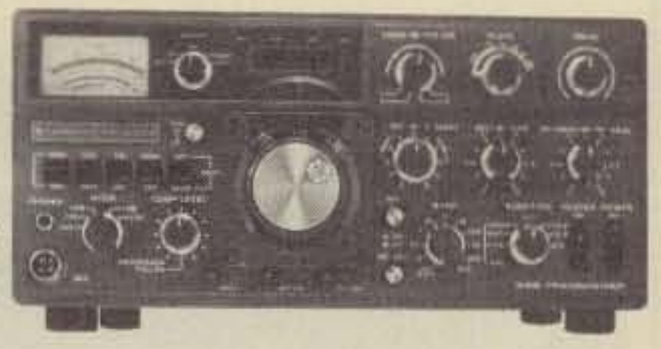
CALL FOR YOUR SPECIAL PRICE ON KENWOOD 520S AND OTHER KENWOOD EQUIPMENT

CALL ABOUT NEW 25W MODEL

TR-7400A

TR-7625

SPECIAL PRICING FOR APR.



TS-820S

ALLIANCE HD-73 ROTATOR

$109

HAM X ROTATOR

Reg. $349.95

$249

ALLIANCE U-100 ROTATOR

$39.95

(Regular $59.95)

HAM III ROTATOR

$129.95

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

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

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

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

NEW STORE!

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

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

HAM RADIO OUTLET™

VISA master charge

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

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

Please send all reader inquiries directly

Offices: 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050. Telephone: 516-883-6200. CQ (ISSN 0007-893X) is published monthly by Cowan Publishing Corp. Second Class Postage paid at Port Washington, N.Y. and other points. Subscription prices: one year $9.95, two years $16.95. **Allow six weeks for change of address. Printed in the United States of America.**
Postmaster: Please send form 3579 to CQ Magazine, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

MAY, 1979 VOL. 35, NO. 5

The Radio Amateur's Journal

FEATURES

DEPARTMENTS

OMNI HAS IT *ALL*. All the advantages and capabilities, all the new conveniences and new levels of performance you need, whatever your HF operating specialty. All built-in, ready to use.

***ALL* SOLID-STATE.** All the advantages of total solid-state from the pioneer of HF solid-state technology. Reliable, cool, stable — from receiver front-end to transmitter final.

***ALL* HF BANDS.** From 160 through 10 meters (and all the crystals) plus convertible 10 MHz and "AUX" band positions for possible future needs.

***ALL* BROADBAND.** Band changing without tuneup — without danger to the final amp.

***ALL* READOUTS.** Choose OMNI-A for analog dial (1 kHz markings) or OMNI-D for six 0.43" LED digits (100 Hz readability.)

***ALL* VOX AND PTT FACILITIES** built-in; 3 VOX controls plus PTT control at front and rear jacks for external PTT switch.

***ALL* SQUELCH NEEDS** for tuning and monitoring are built-in.

***ALL* FILTERS INCLUDED:** 4-position CW/SSB filter (150 Hz bandwidth with 3 selectable skirt contours) plus 8-pole Crystal filter (2.4 kHz bandwidth, 1.8 shape factor.)

***ALL* MODE SWITCH** puts all filters to work in any mode.

***ALL* BREAK-IN:** Instant or delayed receiver muting to fit any band condition or mobile operation.

***ALL*-VERSATILE OFFSET TUNING;** dual ranges, ±5 kHz range for off-frequency DX or ±0.5 kHz range for fine tuning.

***ALL*-SENSITIVE RECEIVER;** from 2 μV on 160 m to 0.3 μV on 10 m (10 dB S+N/N) for ideal balance between dynamic range and sensitivity.

***ALL* OVERLOADS HANDLED;** dynamic range typically exceeds 90 dB and PIN diode switched 18 dB attenuator also included for extra overload protection.

***ALL* LINEAR/ANTENNA BANDSWITCHING FROM FRONT PANEL;** auxiliary bandswitch terminals on back panel for external relays or circuits are controlled simultaneously by the OMNI bandswitch.

***ALL* INTERFACE JACKS FOR PHONE PATCH;** access to speaker and microphone signals.

***ALL*-LEVEL ADJUSTABLE ALC;** set output from low power to full, retain low distortion at desired drive to power amp.

***ALL* SIDETONE ADJUSTMENTS;** pitch and volume.

***ALL*-POWERFUL, *ALL*-WARRANTED FINAL AMPLIFIER.** 200 watts input to final. Proven design with full warranty for first year and pro-rata warranty for additional 5 years.

***ALL* 100% DUTY CYCLE.** For RTTY, SSTV or sustained hard usage.

***ALL*-MODE POWER:** basic 12 VDC for easy mobile use, external supplies for 117/220 VAC operation.

***ALL* FRONT PANEL MICROPHONE AND PHONE JACKS.** Convenient.

PLUS *ALL* THE OTHER HANDY BUILT-INS: "Timed" 25 kHz crystal calibrator in OMNI-A with automatic 5-10 sec. "on" time for easy 2-hand dial skirt adjustment . . . Zero-Beat switch for placing your signal exactly on CW listening frequencies . . . SWR bridge switches "S" meter to read SWR each time you transmit for continuous antenna monitoring . . . Separate receive antenna capability . . . Dual speakers for greater sound at lower distortion . . . Plug-in circuit boards for fast, easy field service.

***ALL*-FUNCTIONAL STYLING.** "Clamshell" aluminum case clad in textured black vinyl with complementary nonreflective warm dark metal front panel and extruded aluminum bezel and bail. Convenient controls. Complete shielding. And easier-to-use size: 5¾"h x4¼"w x 14"d.

AND *ALL* THE OPTIONS: Model 645 Keyer, Model 243 Remote VFO, Model 248 Noise Blanker, Model 252MO AC Power Supply.

Model 545 OMNI-A $899 Model 546 OMNI-D $1069

Experience the *all*-encompassing HF world of OMNI. See your TEN-TEC dealer or write for *all* the details.

Please send all reader inquiries directly

arma

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

TEN-TEC's "OMNI" FILLS *ALL* YOUR HF NEEDS

Zero Bias

an editorial

Looking at our cover photo this month and realizing that it is an extremely fine TV picture of a planet almost overshadows the technology that went into making that picture possible. The immediate impact of seeing Jupiter that close and that sharp is by itself a tremendous leap in imagination. The almost incomprehensible aspect, the technology, is way beyond what most people can relate to. I don't think I am unique in marvelling at this phenomenon nor at the same time taking the technological break-throughs and achievements for granted. In some ways, there seem to have been so many in recent years that extraordinary events and discoveries and possibilities run together and appear commonplace. The fundamental question of "can something be done?" has changed to in what "timeframe" (apologies to our Washington bretheren) *will* it be done?

May also marks the anniversary of another event that both awed and challenged the imaginations of those present. On Friday, May 24, 1844 at 8:45 AM Samuel F. B. Morse sent the first telegraph message to Alfred Vail over wires for a distance of forty miles. The technology for this event was also beyond the scope of most people and the event itself was probably viewed in much the same way as you or I react to pictures of Jupiter.

The principle seems to be the same; only the distances get greater. The technology expands outward to shorten the communicable distance. One hundred and thirty five years ago it was amazing to communicate between Washington D.C. and Baltimore. Today it's Jupiter and beyond.

Amateur radio in its short history has reduced our Earth to a predictable system or pattern of communication networks. We can plot the day, time, mode and frequency to reach any part of the globe. It's certainly a far cry from those "spark" days. Our technology too has increased to a point that some of us, to use the Jupiter analogy, accept the picture and leave the hardware to the experts. We accept satellites, computers, exotic solid-state transceivers, multimode video display gear, digital concepts, microprocessors and the like just by function now, not process. The fact is that they do work, and that's what's important.

As Dr. Pangloss, a character in Voltair's *Candide,* was so fond of saying "this is the best of all possible worlds." In his case, he thought that everything worth knowing or everything worth inventing had been done so that all one had to do was take it in. That ever-popular word *progress* had no meaning. Amateur radio has continually progressed despite the Dr. Panglosses in our ranks. We have faced drastic changes in technology and, for the most part, moved along with it. The few innovators among us continue to see challenges and needs to be answered. They develop and we harvest, always a few steps behind, nevertheless, moving.

The forte of amateur radio has thus become utilitarianism. We have, as a group, become far less technological developers and far greater technological consumers. We buy rather than build and concern ourselves with authorized repair sources and their reliability, rather than our own. I'm not making a judgement, just stating facts.

The fact is, many manufacturers of today's sophisticated amateur equipment would rather you didn't get your fingers into the inner recesses of their products. Manufacturers are beginning to pride themselves on their Customer Relations Departments and the ease and facility with which they can handle customer complaints or problems (which a customer may have caused). Tweaking some adjustment screws or tapping a "thing-em-abob" with a pencil doesn't quite mean anything anymore and 3 volts feels pretty much the same as 5 volts to a calloused finger tip.

Don't get me wrong. Building among amateurs is far from dead. What I am saying is the types of projects have changed and will continue to change. The premiss now is that "I don't have to know substantial amounts of theory in order to use the technology." Sale of parts is proliferating and amateurs are indeed building. At recent hamfests, fleamarkets which were once inundated with old equipment are now dividing their space equally with component dealers. The nature of the equipment now being offered is itself changing. More and more computer hardware is seen and taken for granted. Amateur radio is changing, slowly but surely. There exists now a clear division between what we buy and what we will attempt to build.

During the time it takes to produce this issue many of you will have seen more remarkable pictures of Jupiter. As each new picture is seen in the media, the overall effects will have been to increase attention to Jupiter and what that achievement possibly means. The technology will have been taken for granted, perhaps, until the next remarkable event takes place.

In this day and age remarkable events take place fairly often. Morse and Vail basked for about fifty years (figuratively) until Marconi did them one better by removing the wires. I'm sure that a few old timers at the time bemoaned the fact the newcomers would lose the joy and experience of wire and wouldn't make as good operators. Marconi would make things too easy for these "kids" and the industry would be ruined.

Somethings never change . . . perhaps someday future old timers will talk about how easy it is now to Work All Planets for these new "kids".

73, Alan, K2EEK

Instant recall.
(and with 10 or 25 watts of power)

MODEL NO. TR-7600

MODEL NO. TR-7625

Kenwood offers you a choice.
The TR-7600 (10-watt) or TR-7625 (25-watt) with optional RM-76 Microprocessor Control Unit.

TR-7600 and TR-7625...one of them is sure to fit the needs of today's Amateur Operator who's looking for optimum versatility in a 2-meter FM transceiver. And, when either rig is combined with the RM-76, a whole new dimension unfolds in channel memory and scanning capability. Here's what you get:

TR-7600 AND TR-7625 (ONLY)

- Memory channel...with simplex or repeater (±600 kHz transmitter offset) operation.
- Mode switch for operating simplex or for switching the transmit frequency up or down...or for switching the transmitter to the frequency you have stored in the TR-7600 or TR-7625's memory (while the receiver remains on the frequency you've selected).
- Digital frequency display (large, bright, orange LEDs).
- Dual concentric knobs for fast, easy selection of any 2-meter frequency, in 100-kHz and 10-kHz steps.
- Full 4-MHz coverage (144.000-147.995) on 2-meters; 800 channels; 5-kHz offset switch, and MHz selector switch...for desired band (144, 145, 146, or 147 MHz).
- UNLOCK indicator...an LED that indicates transceiver protection when the frequency selector switches are improperly positioned or the PLL is not locked.

TR-7600 AND TR-7625 WITH RM-76

- Store frequencies in six memories (simplex/repeater).
- Scan all memory channels.
- Automatically scan up the band in 5-kHz steps.
- Manually scan up or down in 5-kHz steps (or fast tune).
- Set lower and upper scan frequency limits.
- Clear scan (for transmitting).
- Stop scan (with HOLD button).
- Scan for busy or open channel.
- Select repeater mode (simplex, transmit frequency offset (±600 kHz or ±1 MHz), or one memory transmit frequency).
- Operates on 143.95 MHz simplex (MARS)
- Adaptable to all MARS frequencies.
- Display indicates frequency (even while scanning) and functions (such as auto-scan, lower scan frequency limit, upper scan limit, and error, i.e. transmitting out of band).

See the exciting TR-7600, TR-7625 and RM-76 now at any Authorized KENWOOD Dealer!

TS-120S...*A big little rig.*

NEW!

It's a compact, up to 200 watts PEP input, all solid-state HF transceiver with such standard features as built-in digital readout, IF shift, new PLL technology ...and requires no tuning!

Exciting and perfect for car or ham shack use! But, there's more to say about the TS-120S! This unique all solid-state HF, SSB/CW transceiver produces a hefty signal and also offers a lot of other great features in a very attractive, compact package.

FEATURES:

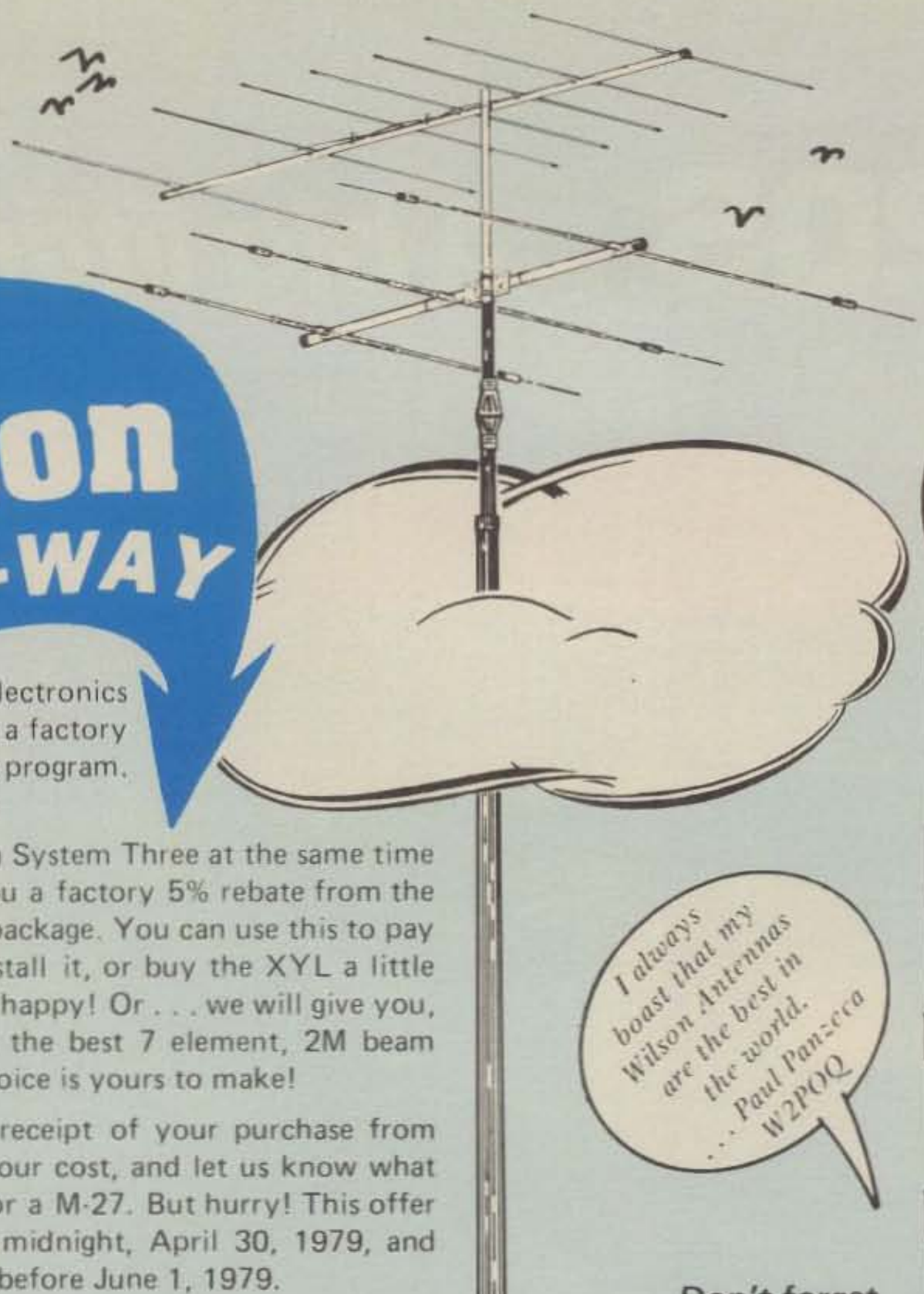
- All solid-state with wideband RF amplifier stages. No final dipping or loading, no transmit drive peaking, and no receive preselector tuning! *Just dial your frequency and operate!*
- Five bands, plus WWV. Transmits and receives on 80/75, 40, 20, 15, and all of 10 meters...and receives WWV on 15 MHz.
- 200 watts PEP (160 watts DC) input on 80-15 meters, 160 watts PEP (140 watts DC) input on 10 meters. LSB, USB, and CW.
- Digital frequency display (standard). 100-Hz resolution. Six digits. Special green fluorescent tubes eliminate viewing fatigue. Analog subdial, too, for backup display.
- IF shift (passband tuning), to remove adjacent-frequency interference and sideband splatter.
- Advanced PLL circuit, which eliminates need for heterodyne crystal element for each band. PLL lock frequency, CAL marker signal, and counter clock circuit use single reference frequency crystal. Simplifies circuitry, improves overall stability. Also improves transmit and receive spurious characteristics.
- Attractive, compact design. Measures only 3½" high X 9¼" wide X 13½" long, and weighs only 4.9 kg (11.7 lbs.). A perfect size for convenient mobile operation and rugged enough for either mobile or portable use. Also has all the desired features for optimum ham-shack operation at home.
- Noise blanker. You'll wonder where the ignition noise went.

See the big little TS-120S rig and matching accessories (VFO-120 remote VFO, SP-120 external speaker, PS-30 AC power supply, MB-100 mobile mounting bracket, AT-120 antenna tuner and YK-88C CW Filter) at your nearest Authorized Kenwood Dealer!

STILL AVAILABLE... KENWOOD TS-520S

KENWOOD
...pacesetter in amateur radio

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



THE Wilson GIVE-A-WAY

Wilson Electronics announces a factory authorized rebate program. Here's how it works:

Purchase a TT-45 and a System Three at the same time and Wilson will give you a factory 5% rebate from the price you paid for the package. You can use this to pay for the concrete to install it, or buy the XYL a little something to keep her happy! Or . . . we will give you, at no charge, a M-27, the best 7 element, 2M beam available today! The choice is yours to make!

Just send Wilson the receipt of your purchase from your dealer, showing your cost, and let us know what you want — 5% cash, or a M-27. But hurry! This offer starts April 1, expires midnight, April 30, 1979, and receipt must be mailed before June 1, 1979.

Don't wait! See your nearest dealer to take advantage of this great Give-A-Way!

SPECIFICATIONS

TT-45 TOWER

- Maximum height, 45'
- 800 lbs. winch with padlock feature
- 2800 lb. raising cable
- Totally freestanding with proper base
- Total weight, 189 lbs.

Recommended accessories:
RBRF-10, SBRF-10, CBRF-10.

The TT-45 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.

SY-3 TRI-BAND ANTENNA

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

M-27 - 7 ELEMENT 2M BEAM

Band MHz	144-148 MHz	Beam width @ 3 dB pt.	27 degrees
Gain	11 dB	Turning radius	37.13"
VSWR	1.2:1	Mast diameter (O.D.)	1" - 1⅛"
Impedance	50 ohms	Surface area	44 sq. ft.
Boom (O.D. x length)	1" x 64"	Wind loading @ 80 mph	5.5 lbs.
Number of elements	7	Shipping weight (approx)	6.5 lbs.
Longest element	40"	Assembled weight (approx)	3.5 lbs.

Consumer Products Division

Wilson Electronics Corp.

A Subsidiary of REGENCY ELECTRONICS, INC.

4288 South Polaris Avenue • P. O. Box 19000 • Las Vegas, Nevada 89119
Telephone (702) 739-1931 • TELEX 684-522

See what just some of the many satisfied Hams say about the Wilson Antennas.

My SY-3 performs like a Monobander, and loads up as easy as a dummy load!
. . . Jim Rafferty N6RJ

I always boast that my Wilson Antennas are the best in the world.
. . . Paul Panzeca W2POQ

Best move I've ever made in my Hamming career. Tnx for a great antenna!
. . . John Sklepkowycz VE3IPR

Don't forget the WV-1 for the best in vertical needs. The WV-1 is the 10-40m Antenna you should consider!

ACT NOW!

Buy the WV-1 and Wilson will treat you to the Radial Kit . . . FREE of charge!

WV-1 SPECIFICATIONS:

- Input impedance: 50 ohms
- Power handling capability: Legal limit
- Two High-Q traps with large diameter coils
- Low angle radiation omnidirectional performance
- Taper swaged aluminum tubing
- Automatic bandswitching
- Mast bracket furnished
- SWR: 1.1:1 on all bands
- 1½" O.D. heavy wall aluminum tubing
- Does not require guying
- Overall length: 19' 8".

Prices and specifications subject to change without notice

CIRCLE 50 ON READER SERVICE CARD

IC-701, Your Synthesized Passport

Enter the exciting world of HF DX with ICOM's outstanding, fully synthesized **IC-701**. Globe-spanning QSO's are as easy as hook-up and tune-in. Complete installation requires only a good 50 Ohm antenna and an AC power plug-in. Your **IC-701** comes with everything else you need for beginning DX transmissions, including the matching **IC-701PS** external speaker and power supply, the fine **SM-2** base microphone, and even two built-in VFO's.

Turn on the power, and the world's at your single fingertip. The **IC-701** lets you scan all the Amateur HF bands from 160M to 10M (plus some MARS coverage above and below some of the Ham bands) with one finger. No more fooling around with two or more tuning knobs, and no complicated retuning when you QSY.

When talking on your **IC-701**, you get a 200 watt PEP input signal whose punch is significantly increased by the high quality built-in RF speech processor. This makes your 200 watts sound like so much more that we recommend you leave the speech processor on all the time.

For adding on frequency memory and remote frequency control, the **IC-701**'s synthesizer is completely compatable with ICOM's **RM2** remote computer controller: and with ICOM's optional **EX1** extention, you can operate with the **RM2** and a linear amplifier at the same time.

Nothing else matches the value and ease of the **IC-701**. Plunge into the excitement of HF DX now, and get the whole HF world with ICOM's **IC-701** LSI system.

HF/VHF/UHF AMATEUR AND MARINE COMMUNICATION EQUIPMENT

DISTRIBUTED BY:

ICOM

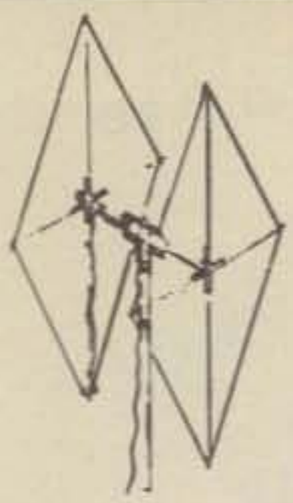
ICOM WEST, INC.
Suite 3
13256 Northrup Way
Bellevue, Wash. 98005
(206) 747-9020

ICOM EAST, INC.
Suite 307
3331 Towerwood Drive
Dallas, Texas 75234
(214) 620-2780

ICOM CANADA
7087 Victoria Drive
Vancouver B.C. V5P 3Y9
Canada
(604) 321-1833

All ICOM radios significantly exceed FCC regulations limiting spurious emissions.

CIRCLE 33 ON READER SERVICE CARD



SUPER-QUAD FIBERGLASS ANTENNAS

*

COMPLETE KITS INCLUDE HARDWARE, WIRE, ALL MOUNTS, BOOM

*

STRONGER AND LIGHTER THAN ALUMINUM

*

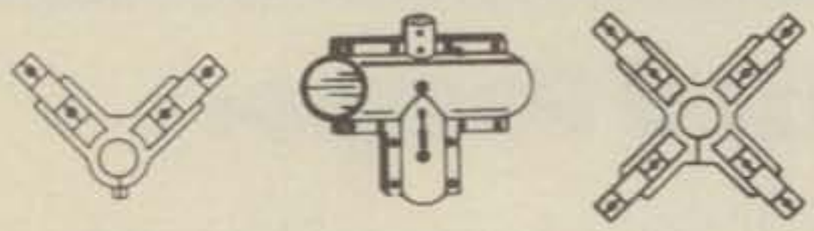
MAXIMUM GAIN

AVAILABLE IN A COMPLETE RANGE OF KITS

Special Instruction Manual on Kirk's "Super Quads" $2.75

- 2 3 4 ELEMENT TRI BAND
  10 15 20 METER ... AMATEUR NET FROM $213.90
- 2 3 4 ELEMENT DUAL BAND
  10 15 OR 10 6 METER AMATEUR NET FROM $125.35
- 2 ELEMENT 40 METER AMATEUR NET $436.25
- UHF 4 ELEMENT 2 OR 6 METER
  AMATEUR NET FROM $60.45

ANTENNA MOUNT KITS



COMPLETE PACKAGED KITS INCLUDING

SPIDERS OR V-SUPPORTS • BOOM TO MAST MOUNT

•ALL NECESSARY ASSEMBLY HARDWARE

•INSTRUCTION MANUAL

HEAVY DUTY CAST ALUMINUM

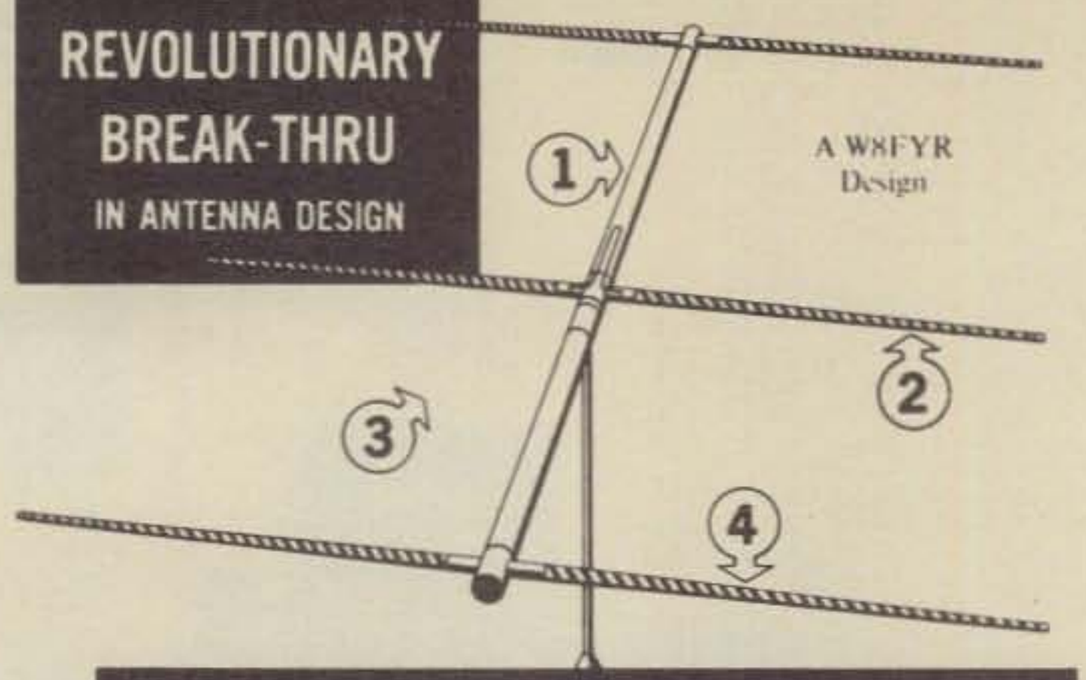
DELTA LOOP MOUNT KIT

DL-1	(2)	1½" Hub V-Supports (1) 1½" Boom to 1½" Mast T-Mount	$16.10
DL-2	(2)	2" Hub V-Supports (1) 2" Boom to 1½" Mast T-Mount	$24.69
DL-3	(2)	3" Hub V-Supports (1) 3" Boom to 2" Mast T-Mount	$40.64

QUAD MOUNT KIT

QM-1	(2)	1¼" Hub Spiders (Small Spider for VHF) (1) 1¼" Boom to 1¼" Mast T-Mount	$11.95
QM-2	(2)	1¼" Hub Spiders (Heavy Spider for 6M & 10M) (1) 1¼" Boom to 1¼" Mast T-Mount	$15.12
QM-3	(2)	1½" Hub Spiders (1) 1½" Boom to 1½" Mast T-Mount	$16.10
QM-4	(2)	2" Hub Spiders (1) 2" Boom to 1½" Mast T-Mount	$24.69
QM-5	(2)	3" Hub Spiders (1) 3" Boom to 2" Mast T-Mount	$40.64

REVOLUTIONARY BREAK-THRU IN ANTENNA DESIGN



A W8FYR Design

KIRK'S BRAND NEW ALL-FIBERGLASS HELICOIDAL BEAMS

AVAILABLE IN: 2 & 3 ELEMENT · 40 METER
2, 3, 4 & 5 ELEMENT · 10-15-20 METER

CHECK THESE OUTSTANDING

1. ALL FIBERGLASS ELEMENTS & BOOM
2. ELEMENT LENGTHS 25% TO 35% SHORTER THAN METALLIC ARRAYS
3. PRECISION CONSTRUCTION, MINIMUM ASSEMBLY TIME.
   NO TUNING
   NO ADJUSTING

AND EXCLUSIVE FEATURES:

4. COPPER TAPE, SPIRALLY WOUND ELEMENTS COATED WITH DURATHANE
5. VSWR LESS THAN 1.5 AT UPPER & LOWER BAND LIMITS
6. GREAT STRENGTH AND VERY LIGHT

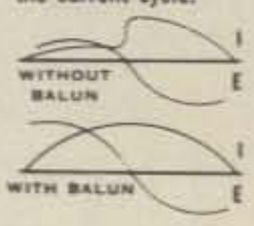
Example:

3 Element 40 M	46 Lbs.	$589.50
3 Element 20 M	17 Lbs.	$249.94
3 Element 15 M	9 Lbs.	$192.45
3 Element 10 M	8 Lbs.	$149.95

MODELS 5075-D & 5075-LF For Dipole Antennas Net Wt. 7 Oz.

WORLD'S FINEST BROAD BAND BALUNS 1:1 Or 1:4 RATIO

Kirk Broad Band Baluns are designed for matching an unbalanced line, such as coaxial cable, to a balanced antenna to produce a symmetrical wave form of equal intensity from the current cycle.



Kirk Baluns provide the greatest breakdown insurance by use of mylar insulation between the tough poly thermaleze winding and the Ferrite Core and a final dip coating of low dielectric impregnation. Handle peak power of 2000 watts provided ratio error is low.

Unique in design, Kirk Baluns are produced in two distinctive models. One for Dipoles and one for Beam Antennas.

NET PRICE **$14.25**

Application Frequency Coverage & Power Ratings For The Various Models Shown Below

MODEL	APPLICATION	F/MC.	POWER
5075-D	Dipole	3.4-52 mcs	2K PEP
5075-B	Beam	3.4-52 mcs	2K PEP
5075-LF	Dipole	1.7-10 mcs	2K PEP

MODEL 5075-B For Beam Antennas Net Wt. 7 Oz.

WRITE FOR FULL INFORMATION. PRICES DO NOT INCLUDE POSTAGE.
PRICES ARE SUBJECT TO CHANGE

KIRK ELECTRONICS DIVISION

VIKING INSTRUMENTS, INC.

73 Ferry Rd., Chester, CT 06412 •Telephone: (203) 526-5324

CIRCLE 37 ON READER SERVICE CARD

What every Amateur has been waiting for....
the new HF-200A Transceiver™

Build a complete station with DenTron®

DenTron Radio Company, Inc. / 2100 Enterprise Parkway / Twinsburg, Ohio 44087 / (216) 425-3173

CIRCLE 18 ON READER SERVICE CARD

The Height of Quality:

Hustler amateur fixed station antennas.

When you're transmitting and receiving around the globe, only the finest will do. Long distance communication demands the high quality you find in every Hustler antenna.

Hustler fixed station antennas have gained a world wide reputation of superior performance through advanced design, precision construction, all-weather durability plus quality components such as all stainless steel hardware and heat treated seamless aluminum tubing.

When a Hustler amateur fixed station antenna goes up, you can be sure the very height of quality is reached.

HUSTLER®

Clearly the choice of those who know quality.

CIRCLE 34 ON READER SERVICE CARD

new·tronics corporation
15800 Commerce Park Dr. • Brookpark, Ohio 44142

More than 15,000 Hams are on the air with the ATLAS 210x!

200 Watts • 5 Bands • All Solid State
3½" x 9½" x 9½" • 7 Pounds

It's a Proven Winner!

- ✓ **HF SSB/CW Transceiver**
- ✓ **No transmitter tuning**
- ✓ **Plug-in circuit boards**
- ✓ **Super selectivity with exclusive 8 pole crystal ladder filter**
- ✓ **Exceptional immunity to strong signal overload and cross modulation**
- ✓ **Slips in and out of special mobile mounting bracket or AC console in seconds**

For complete details see your Atlas dealer, or drop us a card and we'll mail you a brochure with dealer list.

Don't let its fingertip size fool you. The Atlas 210x transceiver has all the power and performance that you find in rigs twice as big and costing twice as much.

And with 15,000 hams on the air, you know you're getting a proven winner.

Model 210x or 215x Transceiver	**$765**
(With noise blanker installed add $45)	
Plug-in Mobile Kit	**$ 55**
Portable AC Supply 110/220V	**$105**
AC Console 110/220V	**$155**
(With VOX and semi-CW installed add $55)	
10XB Crystal Osc. less crystals	**$ 65**

ATLAS RADIO INC.
417 Via Del Monte, Oceanside, CA 92054
Phone (714) 433-1983

CIRCLE 2 ON READER SERVICE CARD

Announcing

• **DeKalb, IL** – The Kishwaukee Radio Club and the DeKalb Co. Amateur Repeater Club will be holding their 21st Annual indoor/outdoor Hamfest on Sunday, May 6, 1979, from 8 a.m. to 3 p.m., at the Notre Dame School. Tickets are $1.50 in advance and $2 at the door. Indoor tables will be available. Talk-in on 146.13/73 and 94 simplex. For tickets and directions, send SASE to: Howard, WA9TXW, Box 349, Sycamore, IL 60178. Requests received after April 27 will be held at the door.

• **Birmingham, AL** – The Birmingham Amateur Radio Club is pleased to announce "Birminghamfest '79" and the Alabama State Convention to be held on May 19, 1979. The fest will once again be held at the beautiful and spacious Birmingham-Jefferson Civic Center Exhibition Hall. There will be a huge indoor flea market, forums, and many other activities featured. There will also be a Saturday night banquet. For more info, contact: Birminghamfest '79, P.O. Box 603, Birmingham, AL 35201.

• **Cadillac, MI** – The Wexaukee A.R.A. will hold their 19th Annual Swap and Shop on Saturday, May 19, 1979, from 9 a.m. until 4 p.m., at the National Guard Armory. Tickets are $2.00. Free parking and lunches will be available. Talk-in on 146-37/97.

• **Logansport, IN** – The Cass County Amateur Radio Club's Second Annual Hamfest will be held on Sunday, May 6, 1979, from 7 a.m. to 4 p.m., at the 4-H Fairgrounds. Advanced tickets are $1.50 and $2 at the gate. Outside set up free, undercover-$1. Bring your own tables. Talk-in on 146.52 and Logansport Repeater: 147.78-18. For more info, write to: Dave Rothermel, K9DVL, RFD 4, Box 146G, Logansport, IN 46947.

• **Pittsburgh, PA** – The 25th Annual Breeze Shooters Hamfest will be held on Sunday, May 20, 1979, from noon to 5 p.m., at the White Swan Park. Flea market, ham and ladies' prizes, homebrew and LQF contests will be featured. Registration only at the gate will be $2 or 3 for $5. Talk-in on frequencies: 146.28/88 and 29 MHz. Under cover tables by advance reservation only. Contact: WA3LUM, Rick Evanuik, 311 Evergreen Ave., Pittsburgh, PA 15209.

• **Neenah, WI** – The 3-F Amateur Radio Club will be having the Annual Swapfest on Saturday, May 5, 1979, from 8 a.m. to 3 p.m., at the Neenah Labor Temple. Talk-in will be on 52/52. Admission is $1.50 in advance and $2 at the door. Tables are $1.50 in advance and $2 at the door. Send for reservations to: Mark Michel, W9OP, 339 Naymut St., Menasha, WI 54952.

• **Webster, MA** – The Eastern Connecticut Amateur Radio Club will sponsor an Electronic Flea Market from 9 a.m. until 6 p.m., on May 20, 1979, at the Point Breeze Restaurant. This Hamfest will be held rain or shine with an auction scheduled for 1 p.m. For more info and flyers, contact: K1SYI, Richard Spahl, Telephone (617) 943-4420 after 8 p.m.

• **Saline, MI** – The Arrow Repeater Association will hold its Annual Swap and Shop on Sunday, May 13, 1979, at the Saline Michigan Fairgrounds. There will be prizes and a covered area for trunk sales as well as indoor tables. Admission, including parking, will be $2 at the door or $1.50 in advance. Talk-in on 146.37/97, 223.18/224.78 and 448.5/443.5 MHz. For additional details, write: Arrow, P.O. Box 1572, Ann Arbor, MI 48106 or call George Raub, AD8X, (313) 485-3562.

• **Hamburg, PA** – The Annual Reading Radio Club Hamfest will be held rain or shine at the Hamburg Field House on Sunday, May 27, 1979. Doors will open at 9 a.m. Door prizes, food, tailgate sales, and dealer space will be available. Talk-in on 31/91 and 146.52. For more info, write to: The Reading Radio Club, Hamfest Committee, P.O. Box 124, Reading, PA 19603.

• **Durham, NC** – The Durham F.M. Association will hold its Annual Durhamfest on Saturday and Sunday, May 19 and 20, 1979, at the South Square Mall. There will be plenty of prizes, exhibits, and programs featured. There will be a $3 general admission fee—vendors and dealers included. Harmonics and unlicensed XYLs admitted free. Talk-in on frequencies: 147.825-.225, 146.34/.94, and 222.34-3.94. For more info, write: DFMA, Box 8651, Durham, NC 27707.

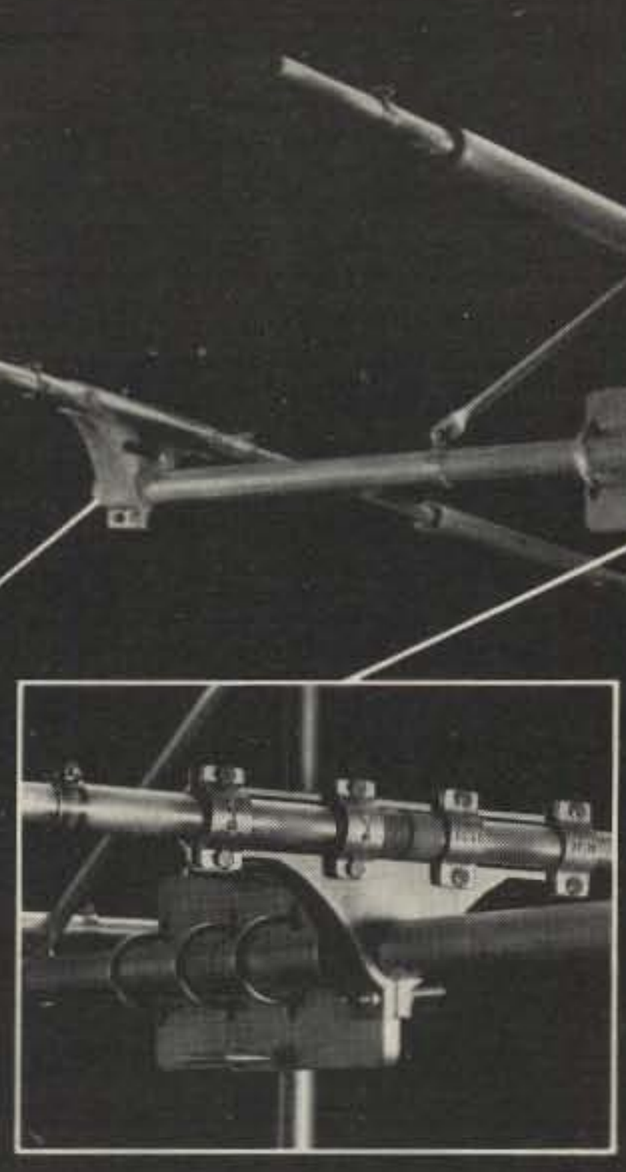
• **Portland, ME** – The Portland Amateur Wireless Association and the University of Southern Maine Radio Club will be holding a Tailgate Flea Market on the Campus of the University, on May 26, 1979, from 9 a.m. to 5 p.m. Food will be available. Admisssion will be $1. Talk-in on 146.73 and 146.52. For further details, call or write: John Taylor, N1SD, Telephone-(207) 773-2651.

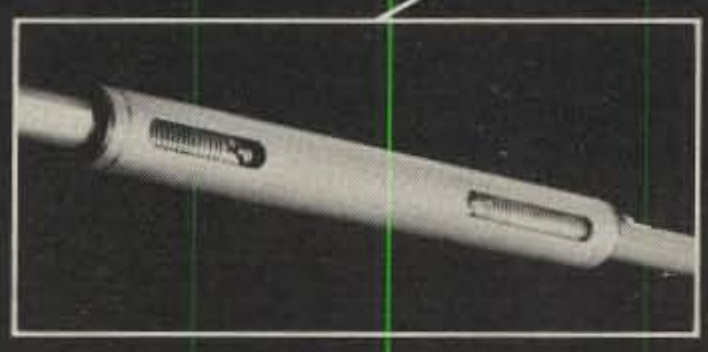
• **Easton, MD** – The Fifth Annual Easton Amateur Radio Society Hamfest will be held on May 20, 1979, rain or shine, from 10 a.m. to 4 p.m., at the Easton Senior High School Cafetorium. Talk-in on 52 simplex and 146.445/147.045 repeater in Easton. Plenty of indoor tables will be available. There will be a donation of $2 with an additional $2 for tables or tailgaters. For more info, write: Charles C. Walgren, WA3ZWX, Box 7, Trappe, MD 21673 or The Easton Amateur Radio Society, Inc., Box 781, Easton, MD 21601.

• **Binghamton, NY** – The Southern Tier N.Y. Amateur Radio Clubs would like to announce their 20th Annual Hamfest and Dinner, which will take place on May 5, 1979, at the Lutheran Fellowship Recreation Center. Ample free flea market parking, technical talks, prizes, displays and exhibits will be featured. Tickets are $2 for general admission. Banquet—$7 (including general admission). Inside tables at $5 each by reservation only. For tickets and info, write: S.T.A.R.C., P.O. Box 11, Endicott, NY 13760.

• Amateur Radio Operators in Sweden and the United States will attempt direct contact between Bishop Hill, Illinois and Biskopskulla, Uppland, Sweden on the weekend of May 26 and 27, 1979. Bishop Hill was a communal settlement established in the 1840s by Swedish migrants and is now an historical site. Led by DXers W9FKC and SM0FY, the groups will try to contact as many stations as possible over the scheduled weekend. Operation will occur on all bands, phone and c.w., full period. Special QSLs will be issued, s.a.s.e. or IRCs requested, all others via bureaus. The Biskopskulla team will use the call SK0MG, the Bishop Hill group will use W9FKC. QSL via WA9AQN.

TOO STRONG TO GIVE THE WIND A BREAK!





Braced against the elements as only Swan can do it! Even hurricane winds to 100 MPH can't lower the boom on your operations.

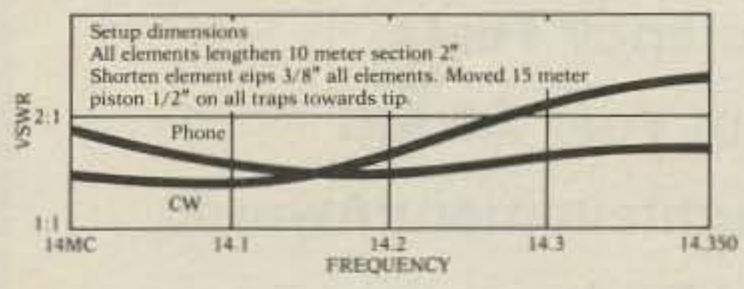
The Swan TB3HA Tri-Bander: a really heavy-duty 20-15-10 meter beam. 3 solid elements, all working on all bands. With a VSWR of 1.5:1 or better at resonance, plus a full 2000-watt PEP rating, our TB3HA is built to work up a storm!

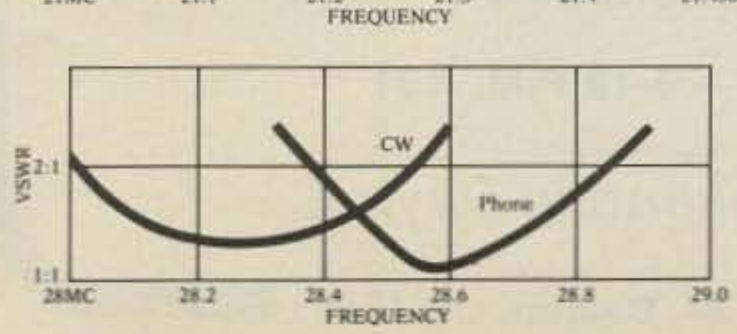
Strongest fittings available: this you've got to see. Exclusive cast-aluminum braces grasp tubes at every joint, spreading stress over an 11¾″ span. Compared to slipshod U-bolt plates—no contest!

Reinforced by super specs, TB3HA's one tough competitor:

- ☐ 20-22 dB front to back ratio.
- ☐ 16′ turning radius.
- ☐ longest element: 28′2″.
- ☐ 16′ boom, optimum spacing.
- ☐ direct 52 Ohm coaxial feed.
- ☐ wind load @ 80 mph: 110 lbs
- ☐ 44 lbs. net weight.
- ☐ Swan Credit Card accepted.

Available at your local Swan dealer, you can start operating tri-band from a position of real strength—because TB3HA is Swan-engineered to work under pressure!





Please rush full information on Swan's Heavy Duty Tri-Band Beam Antennas:

- ☐ 3-element TB3HA
- ☐ 4-element TB4HA

Name_____

Address_____

City_____

State_____ Zip_____

Write for free brochures on Swan's Vertical and Mobile Antennas.

SWAN ELECTRONICS
a subsidiary of Cubic Corporation

305 Airport Road, Oceanside, CA 92054
Phone: (714) 757-7525

Swan's continuing commitment to product improvement may affect specifications and prices without notice.

Our Readers Say

Q$Ls Do Cost

Editor, CQ:

As a QSL Manager in a very small way, I wonder if I might, through the courtesy of your correspondence column, reply to N2UN, whose letter appeared in the January 1979 issue.

The receipt of the so called "green stamp" is most appreciated by myself as it enables me to purchase items of American manufacture to ensure the continued servicing of my American equipment without going through the extra expense and time of obtaining International Money Orders.

Your correspondent is assured that the enclosure of currency in QSL card request does not offer any sort of priority of acknowledgement or dispatch. All requests, providing they include an SAE, IRC, or stamp are treated equally. N2UN might be surprised to know that many requests for direct replies are made in which one or all of the required bits of paper are lacking, and with continued inflation in most countries, it must be difficult for the average American DXer to keep fully abreast of the latest price increase, even if mint stamps are sent.

It is to be hoped that the leading amateur publications of American origin will not be persuaded to condemn this new trend. I do subscribe to all of them and it would be most pleasant to renew subscriptions directly in US currency rather than travel to the nearest town, go through the inquisitorial process of obtaining an IMO, returning at a later date to collect the vital bit of paper and so on!

In a lighter vein, it might amuse your readers to know that I recently received a letter requesting QSL confirmation which enclosed an envelope for my reply entirely addressed in Japanese characters! I was tempted to send it off and check months later with the station to ascertain if the British Postal Authority would cope, but resisted the temptation!

A.T. Cheesley, G4CHP
Norwich, England

A Basic Error

Editor, CQ:

As a long time subscriber to your magazine, I want to thank you very much for expanding your horizons in several areas. I particularly was interested in your recent articles showing some BASIC programming for computers on electronic or personally related topics. The January and February 1979 issues are both great. There is an error, however, in the January issue, page 103 on the Transistor Amplifier. Line 17 should read:

17 PRINT "Collector Current is"; (I_2 x 1000)-(I_1 x 1000); "Milliamperes"

Collector Current is not the same as Emitter Current. Collector Current is the Emitter Current minus the base current in common Emitter Amplifiers.

Mr. Rohr should have listed his line numbers in units of 10 to allow for other possible entries.

Dr. J.H. Robinson
Creston, IA

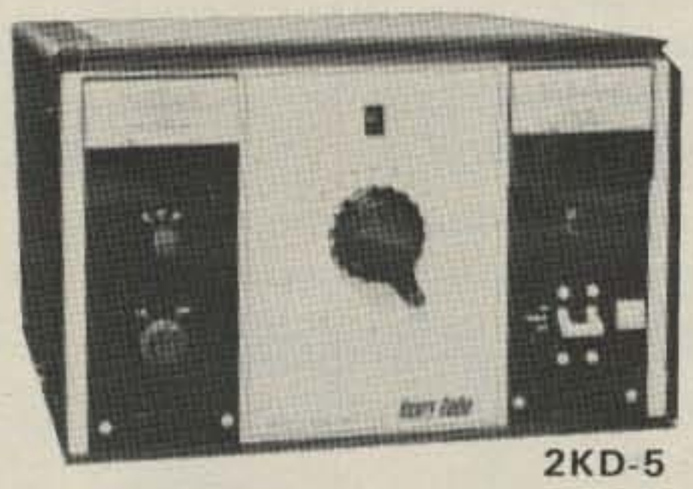
Henry Radio... because you demanded the best

HENRY RADIO'S "WORKHORSE" ... THE 2K-4A

Never has a linear amplifier racked up so many hours of dependable operation for amateurs worldwide ... operating at full legal power ... hour after hour ... under every type of condition imaginable. Because the 2K-4A is built with the very best, heavy duty components available, it can loaf along at full legal power. It offers engineering and features second to no other linear on the market. The 2K-4A will put your signal on the air with greater strength and clarity than you ever dreamed possible.

Operates on all amateur bands, 80 thru 15 meters (export models include 10 meters) • Features two rugged Eimac 3-500Z grounded grid triodes • Pi-L plate circuit with silver plated tank coil • Resonant cathode-pi input circuit for finest linearity & maximum drive (tuneable design permits operation on any frequency from 3.5 to 30 megacycles) • High efficiency torodial filament choke • Built-in SWR bridge and relative RF output meter • Electrical re-set overload relay • Double rugged band change switch with 20 amp contacts and solid straight-through mechanical linkage • Heavy duty bronze gear drive for resonance and load condensers • Conservative, heavy-duty 2800 volt DC supply • Resonant choke input filter for superb voltage regulation • Solid state rectifiers • Maximum legal input all modes: 2 KW PEP SSB, 1 KW CW-AM-FSK • Long life 50 amp mercury power relay • Feed around antenna relay • All aluminum cabinet to elminate magnetic resonance • Double RF shielding.

The 2K-4 is still available for export and military use. Price **$1195.**



2KD-5

Another superb linear from Henry Radio designed and built to perform at peak level month after month, year after year. Operates at full legal power continuous duty on all modes. The 2KD-5 is a 2000 watt PEP input (1200 watt PEP nominal output) desk model RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands. Features two Eimac 3-500Z glass envelope triodes operating in a grounded grid circuit • Pi-L plate circuit with a rotary silver plated tank coil for greatest efficiency and maximum attenuation of unwanted harmonics • Full legal input in all modes, 2000 watts PEP input for SSB, 1000 watts DC input for CW-RTTY-AM. Price **$945.**

1KD-5

A little less power, a little lighter, AND less expensive ... but the 1KD-5 is a true Henry Radio linear amplifier, offering superior quality and dependability. It is designed to greatly boost the strength and clarity of your signal. Its heavy duty components guarantee years of trouble free, dependable performance.

The 1KD-5 is a 1200 watt PEP input (700 watt PEP nominal output) RF linear amplifier, covering the 80, 40, 20, and 15 meter amateur bands (also 10 meters on units shipped outside the U.S.). Features an Eimac 3-500Z glass envelope triode • ALC circuit • DC relay system • Relative RF power meter • Pi-L plate circuit with a rotary silver plated tank coil • Cathode Pi input matching circuits • Conservative power supply with solid state rectifiers. Price $695.

3K-A COMMERCIAL/MILITARY AMPLIFIER*

A high quality linear amplifier designed for commercial and military uses. The 3K-A employs two rugged Eimac 3-500Z grounded grid triodes for superior linearity and provides a conservative three kilowatts PEP input on SSB with efficiencies in the range of 60%. This results in PEP output in excess of 2000 watts. It provides a heavy duty power supply capable of furnishing 2000 watts of continuous duty input for either RTTY or CW with 1200 watts output. 3.5-30 MHz. Price $1595.

4K-ULTRA*

Specifically designed for the most demanding commercial and military operation for SSB, CW, FSK or AM. Features general coverage operation from 3.0 to 30 MHz. Using the magnificent new Eimac 8877 grounded grid triodes, vacuum tune and load condensers, and a vacuum antenna relay, the 4K-ULTRA represents the last word in rugged, reliable, linear high power RF amplification. 100 watts drive delivers 4000 watts PEP input.

Price **$3450.**

*Not available for sale to amateurs in the U.S.

Export inquiries are invited.

Export models of Amateur units available for 10 meter operation also.

HENRY RADIO 51 YEARS OF SERVICE

11240 W. Olympic Blvd., Los Angeles, Calif. 90064 213/477-6701
931 N. Euclid, Anaheim, Calif. 92801 714/772-9200
Butler, Missouri 64730 816/679-3127

Henry Radio

Prices subject to change without notice

CIRCLE 31 ON READER SERVICE CARD

FROM THE COMPANY WITH A LONG LINE OF RTTY FIRSTS

1971

RVD-1002
1st RTTY
Video Generator

1972

DKB2010
1st RTTY & MORSE
Keyboard

1973

RVD-1005
Improved RTTY
Video Generator

1974

ST6000
High-performance
RTTY Demodulator

1975

DS3000 KSR Version 2
1st Microprocessor
Controlled Amateur Equipment
with Editing for Baudot & ASCII

1976

DS3000 KSR Version 3
1st 3-mode Amateur Send-Receive Terminal
for Baudot, ASCII, and MORSE

1977

1978

1979

ST5000
Low-cost, Big-performance
RTTY Demodulator

AND NOW...

DS3100 ASR

The FIRST Automatic Send-Receive Electronic Terminal for Baudot, ASCII, and MORSE

- Type and edit your message **while** receiving
- 200 line storage
- 24 line screen
- Non-volatile and programmable HERE-IS
- Internal real-time clock
- RTTY **and** CW ID
- WRU answer-back
- Upper **and** lower case ASCII

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

Please send all reader inquiries directly

In Europe contact:
Richter & Co.; Hannover
I.E.C. Interelco; Bissone

$1995.00
Call or write
for complete
new catalog

Introducing Kantronics' Field Day™
Morse Code/teletype reader and code speed display:

Kantronics' Field Day Morse Code/teletype reader and code-speed display reads code signals right off the air. Its powerful microcomputer system picks out signals, computes their speed, and reads even sloppy copy up to 80 words per minute!

1. Flys through the air with the greatest of ease.

Field Day is simple to use. You plug it into your station receiver just as you would a set of headphones.

Code and teletype conversations are converted from dots and dashes to standard alphanumeric text. The text advances across 10 big half-inch displays, and lab tests show that even the fastest CW is easily readable.

Field Day displays incoming or outgoing code speeds for you at the touch of a button. An accurate code speed-sampling program shows the speed right on the front panel. Everything is enclosed in a single, lightweight package that's small enough to fit in with the rest of your station.

2. Pay a little, get a lot.

In addition to a highly superior code-reading program and unique "on-board" speed display, **Field Day** has the specifications that make it a truly great code reader.

Modes: CW, RTTY and speed display. **Speed Range:** 3-80 WPM. **RTTY Speeds:** 60, 67, 75 and 100 baudot. **Code Display:** 10 alphanumeric displays. **Special Characters:** AS, AR, SK, BT, /, ?, (,), ", ', comma, period, colon, semicolon, "understood," "attention," and "error." **Filtering:** Active, 750 Hz center, 200 Hz bandwidth. **Input Impedance:** 1,000 ohms. **Power Requirements:** 117 Vac, 20 watts. **Dimensions:** HWD 3.44" by 8.50" by 9.25". **Warranty:** Limited, one year parts and labor. **Price:** $449.95 Shipments after 3/1/79.

3. C'mon, take a test drive.

Check with these Authorzed **Kantronics** dealers for more information on the **Field Day** Morse Code/teletype reader and code-speed display:

Associated Radio/Kansas City, **Barry**/New York, **Bill's**/Carbondale, IL, **Brodie**/Moore, OK, **Burghardt**/Watertown, SD, **Burstein-Applebee**/Kansas City, **Cohoon**/Trenton, KY and Austintown, OH, **Fontana Electronics**/Fontana, CA, **H-E-P**/Aurora, CO, **Hirsch**/Williamsville, NY, **Long's**/Birmingham, **Madison**/Houston, **MidCom**/St. Louis, **Omar**/Durand, MI, **Omaha Radio Center**/Omaha, **Queen City**/Cincinnati, **Radio World**/Oriskany, NY, **Spectronics**/Oak Park, IL, **Tracy**/Fort Worth.

Please send all reader inquiries directly

KANTRONICS
The Lightweight Champs.

(913) 842-7745
1202 East 23rd Street
Lawrence, Kansas 66044

Our Smart Machine™ reads sloppy copy.

COMPACT ENCLOSURE.
In inches, FIELD DAY is only 3.44 high by 8.50 wide by 9.25 deep!

SPEED DISPLAY.
Special program computes received and transmitted code speeds.

RTTY COPY.
Control functions in back for copying all the standard baudot speeds.

ON-BOARD CODE DISPLAY.
No need to tote around a TV set to copy code.

MOVABLE SUPPORT ARM.
Tilts to different viewing angles.

SMART CODE-EDITOR.
Copy sent by sloppy fists is edited before display. Reads good code too!

Everybody's making money selling microcomputers. Somebody's going to make money servicing them.

New NRI Home Study Course Shows You How to Make Money Servicing, Repairing, and Programming Personal and Small Business Computers

Seems like every time you turn around, somebody comes along with a new computer for home or business use. And they're being gobbled up to handle things like payrolls, billing, inventory, and other jobs for businesses of every size...to perform household functions like budgeting, environmental systems control, indexing recipes, even playing games.

Growing Demand for Computer Technicians... Learn in Your Spare Time

Even before the microprocessor burst upon the scene, the U.S. Department of Labor forecast over a 100% increase in job openings for the decade through 1985. Most of them *new* jobs created by the expanding world of the computer. NRI can train you at home to service both microcomputers and their big brothers. Train you at your convenience, with clearly written "bite-size" lessons that you do evenings or weekends without quitting your present job.

No Experience Needed

You don't need prior training in electronics or computers to take this exciting new course. NRI starts you with the basics, gives you a firm foundation to build on. And your personal counselor is always available, ready to help whenever you have questions.

Assemble Your Own Microcomputer

NRI training also includes plenty of practical experience. You perform meaningful experiments building and studying circuits on the NRI Discovery Lab.® Then you build your own test instruments like a transistorized volt-ohm meter, CMOS digital frequency counter... equipment you learn on, use later in your work.

And you build your own microcomputer, the only one designed for learning. It looks and operates like the finest of its kind, actually does

more than many commercial units. But NRI engineers have designed components and planned assembly so it demonstrates important principles, gives you working experience in detecting and correcting problems. It's the kind of "hands-on" training you need to repair and service units now on the market.

Mail Coupon for Free Catalog... No Salesman Will Call

Rush coupon today for our 100-page, full-color catalog. It describes NRI's new Microcomputer Technology Course in detail, shows all equipment, kits, and lesson plans. And it also tells about other NRI courses... Complete Communications with 2-meter transceiver...TV/Audio/Video Systems Servicing with training on the only designed-for-learning 25" diagonal color TV with state-of-the-art computer programming. With more than a million students since 1914, NRI knows how to give you the most in home training for new opportunity. If coupon has been removed, write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.

RUSH FOR FREE CATALOG

NRI SCHOOLS GROW!

NRI Schools
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016
Please check for one free catalog only.
NO SALESMAN WILL CALL

All career courses approved under GI Bill.
☐ Check for details.

- ☐ Computer Electronics Including Microcomputers
- ☐ TV/Audio/Video Systems Servicing
- ☐ Complete Communications Electronics with CB • FCC Licenses • Aircraft, Mobile, Marine Electronics
- ☐ CB Specialists Course
- ☐ Amateur Radio • Basic and Advanced
- ☐ Digital Electronics • Electronic Technology • Basic Electronics
- ☐ Small Engine Repair
- ☐ Electrical Appliance Servicing
- ☐ Automotive Mechanics
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Refrigeration, & Heating Including Solar Technology

Name (Please Print) Age

Street

City/State/Zip

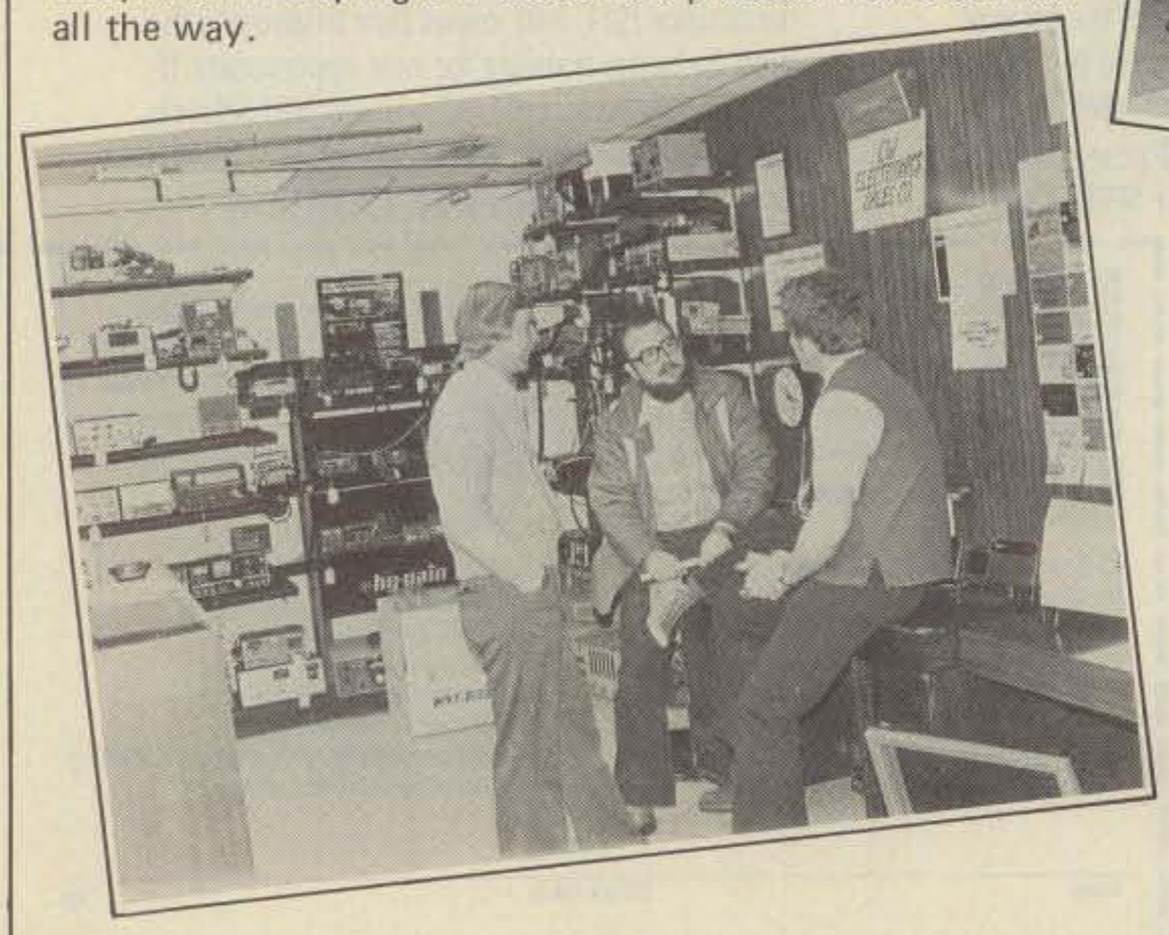
Accredited by the Accrediting Commission of the National Home Study Council

REMEMBER US? WE'RE THE CAPONE MOB!

We're the biggest ham equipment dealer in the Rockies, but we like to be a little different from those other dealers out there. The picture we used to introduce ourselves many months back took advantage of the fact that Big John (the little guy with the big gun and cigar) just happens to be named Capone. Although we must admit, there's no relation to that other Capone, we couldn't pass up an opportunity to deck out and play on the name similarity.

But where we really make a big blast is in the personal service we offer the hams that pay us a visit. Whether you shop us by phone or drop in for an eyeball, you'll get the same courteous treatment all the time. As you can see from the snaps below, we've got just about the best inventory of ham gear a guy could ask for. And we're not bashful about letting our customers twist knobs. That's what our store is here for. If you just want to gab ham radio, Al, K0BG or John, WA0ADV will be more than eager to shoot the breeze. We believe in service, and in keeping our customers pleased means service all the way.

So don't you be bashful either. Give us a holler on the wats line or drop in to browse. You'll find a personal touch at CW that's just a bit homier than elsewhere.



C W ELECTRONIC SALES CO.
1401 BLAKE ST. DENVER, CO. 80202
Call Toll Free 800-525-5098.

In this concluding episode M.S. Ash talks about v.h.f./u.h.f./microwave radiation and the effects on the human body.

R.F. Power Transistors and Amplifiers

Their Care and Feeding Part III

BY M.S. ASH*, W6RJO

Up until a few years ago, if one were to say that working near sources of microwave, and near microwave, radiation like radar dishes and high power microwave transmitters, was deletereous, one would be poohed with "baloney" or "you've been watching too may outer space serials on TV." Over the past 10 to 15 years a biotechnical literature has been emerging that purports to show that sustained exposure to such high power microwave sources of energy is deserving of further scrutiny insofar as its effects on the body are concerned. The Occupational Safety and Hazards Administration (OSHA) of the US Department of Labor has issued a set of regulations governing tolerance levels of exposure to such radiation for frequencies from 10MHz and up.

First, the collected data seem to indicate that any possible effects of this radiation occur mainly in the microwave region. The microwave region as defined in this context in agreement with most pundits is about from 300 MHz and up in frequency.

Second, are the OSHA tolerance levels something for the v.h.f./u.h.f. enthusiast to become concerned about? The remainder of this section addresses that question.

For some background, a brief historical introduction follows. About two decades ago, a Tri-Services program (Army, Navy, and Air Force) was launched in what amounted to be a major effort in the US to gather data on the effects of r.f. energy. However, much of that data are dated prior to 1960, and much of it is considered irrelevant nowadays for a number of reasons having to do with looking at the problem with a certain bias[5]. For example, their emphasis was on tissue heating which today is considered to be but one of the effects on the body.

For the past two decades, there has been much activity in this field in eastern European countries including the U.S.S.R., as witness the well publicized recent radiation of U.S. embassy personnel in Moscow by soviet gear from apartment houses across the street. Also, if one listens on 40 meters between 7.230 and 7.270 MHz during the evening hours a strong raucous jamming type of noise can be heard. This source, according to recent electronics literature, seems to be located roughly in the Minsk area of the southern Ukraine, as determined from DF measurements in western Europe. Its power must be tremendous judging from the S-9 plus 30 dB signals read in the western hemisphere. Some quarters feel that this noise is another form of experimentation along the lines under discussion.

Sensory effects from exposure to microwave and l.f. radiation have been experienced.[5] This includes tactile stimulation[6] and auditory effects at u.h.f.[7,8]. These effects can be induced under certain conditions on certain subjects at power densities as low as 100 microwatts per cm^2[9]. For example, certain people standing in the far side lobes of radar claim that they can hear the radar[10]. What is heard in these cases is the effect of

*455 21st Place, Santa Monica CA 90402

the radar pulse repetition frequency (PRF) which is directly exciting the auditory centers by penetration through the rearward portion of the head, similar to certain people hearing AM broadcasting stations through rectification by virtue of their dental fillings.

As mentioned, the literature on this subject is burgeoning. There is an easily accessible (local library) two-part article for the layman in the Dec. 13 and Dec. 20, 1976 issues of the *New Yorker* magazine[10]. These articles were recently expanded to book form[11]. A second reference is an excellent survey in 1971, with 67 references, written by A. H. Frey[5] whose work is discussed in the above magazine article. A third reference is an old but good summary written by W. W. Mumford in 1961[13]. He includes a simple nomograph for the design of a protective wire screen, extended here for v.h.f./u.h.f., in fig. 1. The use of the nomograph is simple and best explained by an example. Suppose that it is decided to use a mesh screen on a production bench for protection. A wire mesh, readily available from the hardware store is made of 30 mil wire on ¼ inch squares. How much attenuation will such a screen give at v.h.f. and u.h.f. frequencies? The nomograph requires two quanitities, namely a/r and a/λ, where a is the center to center mesh wire spacing, r is the wire radius, and λ is the wavelength of the radiation incident onto the experimenter which is to be attenuated by the screen. For the chicken wire above, a = 0.25 inches, r = 0.015 inches, and at v.h.f. of about 150 MHz, λ = 2 meters, which is about 80 inches, and at u.h.f. of about 450 MHz, λ = 2/3 meters, or about 80/3 inches. So that for:
(a) v.h.f.: a/r = 0.25/0.015≅17, and a/λ = 0.25/80≅0.0003. Finding the a/r and a/λ on the two outside scales, and spanning these values with a straight edge gives −45 dB, where the straight edge crosses the middle, transmitted power, scale.

(b) u.h.f.: a/r = 17 and a/λ ≅0.009. Again, spanning the two outside scales at these values gives −35 dB where the straight edge crosses the middle scale. So, if it is assumed that the r.f. power source is radiating about 1 watt per cm² onto the screen at (a) v.h.f., this radiation will be attenuated on the personnel side of the screen by 45 dB, to yield about 30 microwatts per cm², and (b) u.h.f., attenuation by about 35 db occurs to yield but 0.3 milliwatt per cm². As can be appreciated, this much attenuation is scarcely needed at these frequencies for this example, so that the wire mesh can be made more coarse, for this, example. The nomograph is claimed accurate to ±1 dB and can be used also for a horizontal or vertical parallel wire protective barrier type of screen.

W. W. Mumford[13] also provides a list of commercial power density measuring instruments. The list is probably somewhat outmoded by now, but the price class of instrumentation on his list typifies instruments today that cost in the hundreds or thousands of dollars. However, recently Cicoil Co. Chatsworth, CA[14] has come out with a belt attachable radiation monitoring device for personnel, that costs about 1-10 percent of those above.

Belt-attachable r.f. radiation monitoring device (Cicol Co., Chatsworth CA). If r.f. power density incident exceeds a factory set level, an audio alarm is actuated within the unit. Its dimensions are 4.2 x 2.2 x 0.84 inches.

It is set at the factory for a given power density specified by the customer if desired, which if exceeded actuates an audio oscillator alarm in the device.

The final part of this section is an attempt at an elucidation of the OSHA levels and what they mean in terms of the user. It should be realized that present state of this art is such that no responsible bio-engineer or other worker in this field is ready to make statements about what specific kinds of trouble can occur to those exposed, with what levels of power, and at what frequencies. They can be gotten to concur on safe statements like they don't recommend standing in the main lobe of a megawatt radar at 50 feet for a few hours, or induce their children to watch the daily supper cooking by constantly peering into the microwave oven door or window. Microwave oven frequencies are in the 2500 MHz range. There are also the usual potpourri of case histories that assert deleterious effects to individuals. These range from rendering them impotent, causing arrythmia (lack of sync in the heartbeat) headaches, nausea, early menopause, hallucinations, general irritability plus other personality changes.

In lieu of the above lack of agreement today, the OSHA has published a set of guidelines based on the hard core of what is known and agreed upon. These are contained in the U.S. Department of Labor (OSHA) document CFR (paragraph) 1910.97, "Nonionizing Radiation and Safety and Health Standards" eff. Aug. 1971. The specific tolerance levels are based on two American National Standards Institute documents, C95.1-1966, "Radio Frequency Radiation Hazard and Warning Signal." Quoting from paragraph 1910.97, part (2i), of the OSHA radiation protection guide: "For normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 GHz, the radiation protection guide is 10 milliwatts per cm² as averaged over any 0.1 hour (6 minute) period." This is expressed in two equivalent ways as follows: "Power Density: 10 milliwatts per cm² for periods of 0.1 hours or more." Or "Energy Density: 1 milliwatt hour per cm² during any 0.1 hour period." This guide applies whether the radiation is continuous or intermittent. (Part 2ii) "These formulated recommendations pertain to both whole body and partial body radiation. The latter is included since some parts of the body (e.g. testes, eyes) may be harmed if exposed to excessive levels of radiation induced heat, significantly in excess of the recommended values."

One main point of the above specification is that a person can endure 10 milliwatts of power on each cm² of his body for 0.1 hour (6 minutes) with apparently no ill effects. Two illustrative examples in practice are now given: (a) A radar technician measuring pulsed radar side lobes should be far enough away from the dish, so that the maximum power density per pulse shining on the portion of his body facing the radar, multiplied by the short duration time of the pulse, in turn multiplied by the number of radar pulses in 6 minutes, shall not exceed 10 milliwatts per cm².

(b) Assume that a very nearsighted amateur checking his 150 watt u.h.f. amplifier on his bench, knows through previous calibration measurements, that about 10 milliwatts is incident on each square centimeter of his forehead as his nose almost touches the output tank during his check. At the end of 0.1 hour (6 minutes) he should take another power density reading to see that he is still maintaining no more than 10 milliwatts per cm² × 0.1 hour = 1 milliwatt hour per cm² of radiation during that 6 minute period. If so, he can then continue checking for the next 6 minute interval, and the next, etc. Of course, most v.h.f./u.h.f. amateurs are sufficiently

sophisticated to rely on s.w.r. and other meter measurements to tune their gear. Further, their gear is usually behind a metal panel, or completely enclosed for t.v.i. reasons, if for little else.

References

1. J. Johnson, ed. "Solid Circuits", Mar. 1973, California Transistor Co. (CTC) 301 Industrial Way San Carlos CA 94070
2. "RF and Microwave Power Transistors Guide to Chip/Package Combinations" Nov. 1972, California Transistor Co.
3. "Amperex High Power RF Transistors", Hicksville Div. Hicksville NY 11802
4. "RF Communication Transistors", 1975, Solid State Scientific Inc. Montgomeryville, PA 18936
5. A.H. Frey, "Biological Function as Influenced by Low Power Modulated RF Energy", *IEEE Trans. Microwave Theory & Techn.* Vol MTT-19, No. 2, Feb. 1971.
6. _____"Human Response to VLF Electromagnetic Energy", *Naval Research Review*, 1963, pp. 1-8
7. _____"Auditory System Response to Radio Frequency Energy" *Aerospace Medicine*, Vol. 32, 1961 pp. 1140-1142
8. _____"Human Auditory System Response to Modulated Electromagnetic Energy", *J. Appl. Physiol.* Vol. 17, 1962 pp. 689-692.
9. _____reference (5)
10. P. Brodeur, "A Reporter at Large/ Microwaves I and II", *New Yorker* Magazine December 13 and 20, 1976
11. P. Brodeur, "The Zapping of America" Norton Press, NY, 1977, 343 pp.
12. _____reference (5)
13. W. W. Mumford, "Some Technical Aspects of Microwave Radiation Hazards", *Proc. IRE,* Vol 49. part 1, No. 2, Feb. 1961 pp 427-447.
14. A. Herschkowitz, Cicoll Co. 20945 Plummer St. Chatsworth CA 91311.

All in one; one in all! Here's a novel tri-band log periodic yagi—with a surprise.

A Multi-Mode Beam For CB and 10 Meters

With An Option For Two Meters

BY T.E. WHITE*, K3WBH

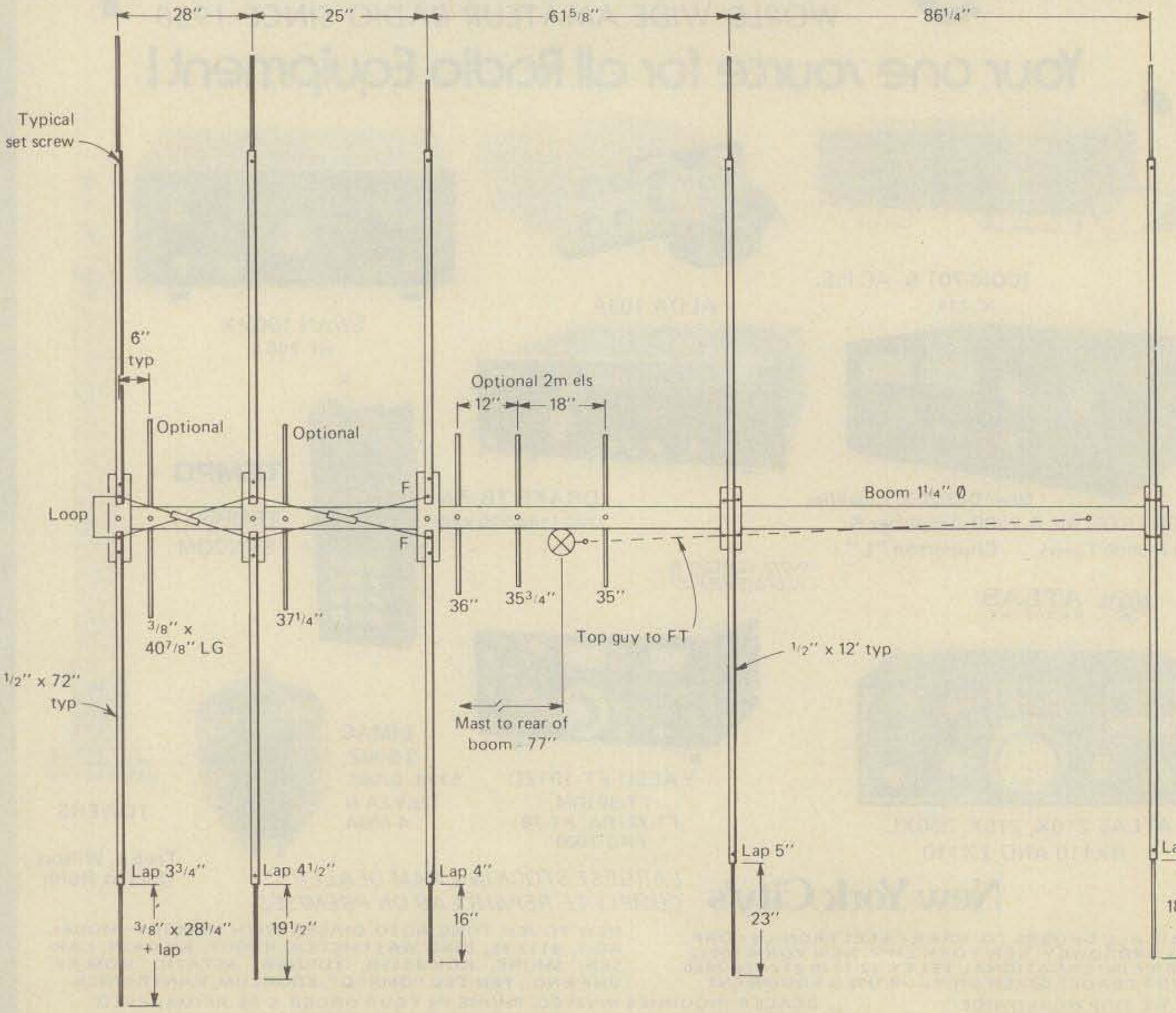
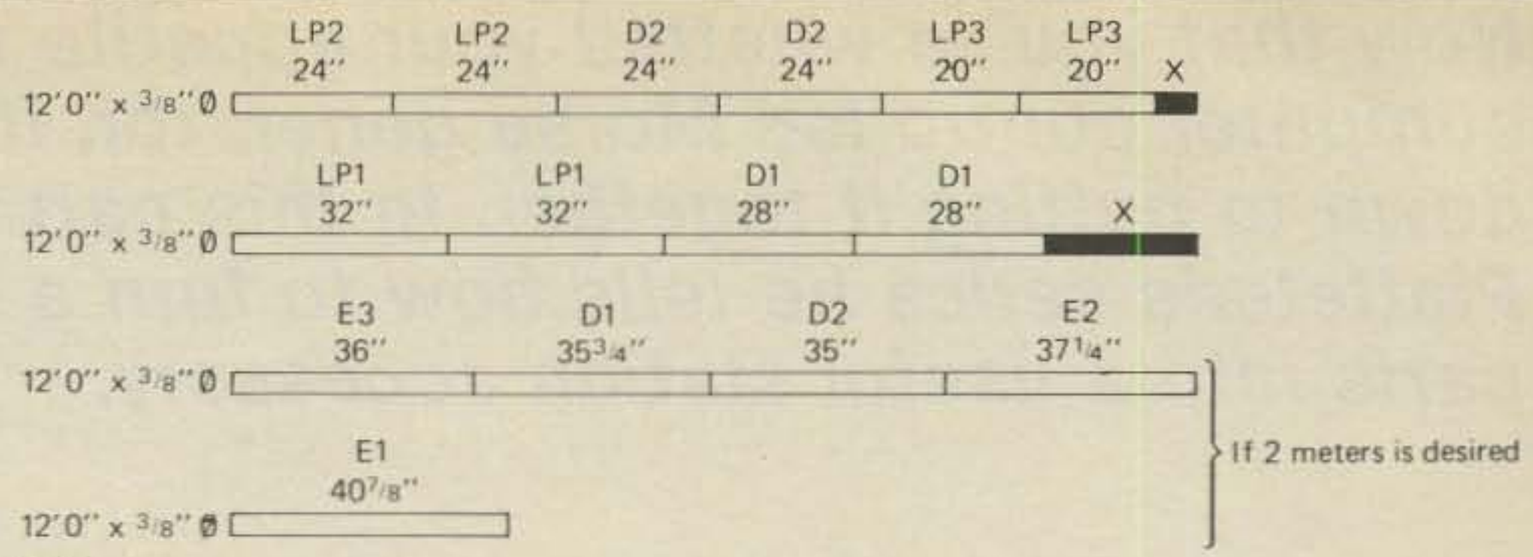


Fig. 1—The CB/10/2 log-periodic yagi.

The adjacency of CB and 10 meters, plus the 5th harmonic relationship of 2 meters, makes it possible to use the log periodic yagi concept to construct a single beam to serve all three bands and yet keep physical size within limits of one-man assembly capability. This design also uses readily-available standard tubing lengths.

The boom is made from 1¼" TV masting, 1- 10' and 2 to 5 foot sections of the swagged down or telescoping variety. Elements are needed in only two diameters: ½" and ⅜", from standard 12' lengths (the "orphan" #1 element for 2 meters can be scrounged from an old TV antenna). Mounting hardware has been kept straightforward to avoid the necessity for machining or lathe work.



NOTE:

(2) ½"Ø x 12'0" } (5) 12'0" lengths
(6) ½"Ø x 6'0" } 2 whole (directionals)
3 halved (LP elements)
(4) ⅜" x 24"
(2) ⅜" x 20"
(2) ⅜" x 28"
(2) ⅜" x 32"

Element material = 6061 T6 aluminum tubing.

Fig. 2—Bill of materials and cutting chart.

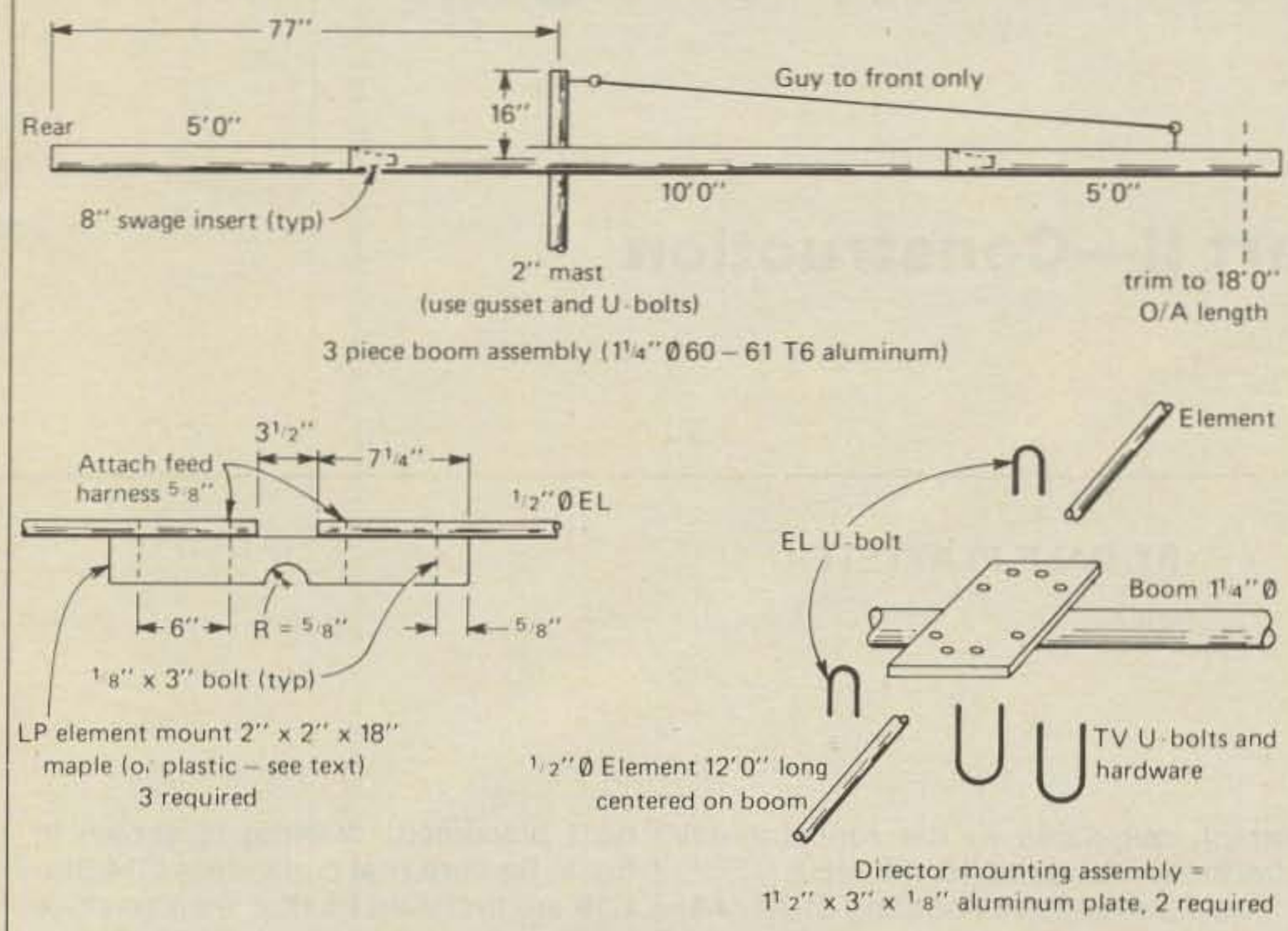


Fig. 3—Element mounting and boom assembly.

The beam consists of 3 sets of log periodic (LP) driven elements, and two directors. For those desiring it, inductively coupled 2 meter elements may be mounted below and close ahead of each LP pair, with a director string out in front. Realizable gain is 8 dB on CB and 10, and as much as 12 dB on 2, over a dipole, not isotropic. The antenna will radiate a useful signal across the entire CB/10 m spread, and all of 2 m, if desired.

Fig. 1 is the general arrangement drawing. Fig. 2 shows the bill of materials and cutting chart.

The LP elements are mounted on 2 x 2 x 18 maple blocks saddled to the boom. If you can get it, cycolac or lexan hi-impact plastic would be better, but the beam will work FB with hardwood. The directors are grounded to the boom with plates and U-bolts. Fig. 3 gives details. Two meter elements are mounted with small clips or pipe straps. The connecting harness is #8 aluminum wire, with insulating sleeves at crossing points. A 6½" loop terminates the harness and provides good front/back ratio without the necessity of a reflector.

This antenna should not be mounted for vertical polarization unless the top ten feet of mast is nonmetallic, and the feed line brought to the rear of the boom before dropping down.

For optional 2 meter operation, a d.p.d.t. relay and balun may be added as in fig. 4b

*36 Lake Ave., Fair Haven NJ 07701

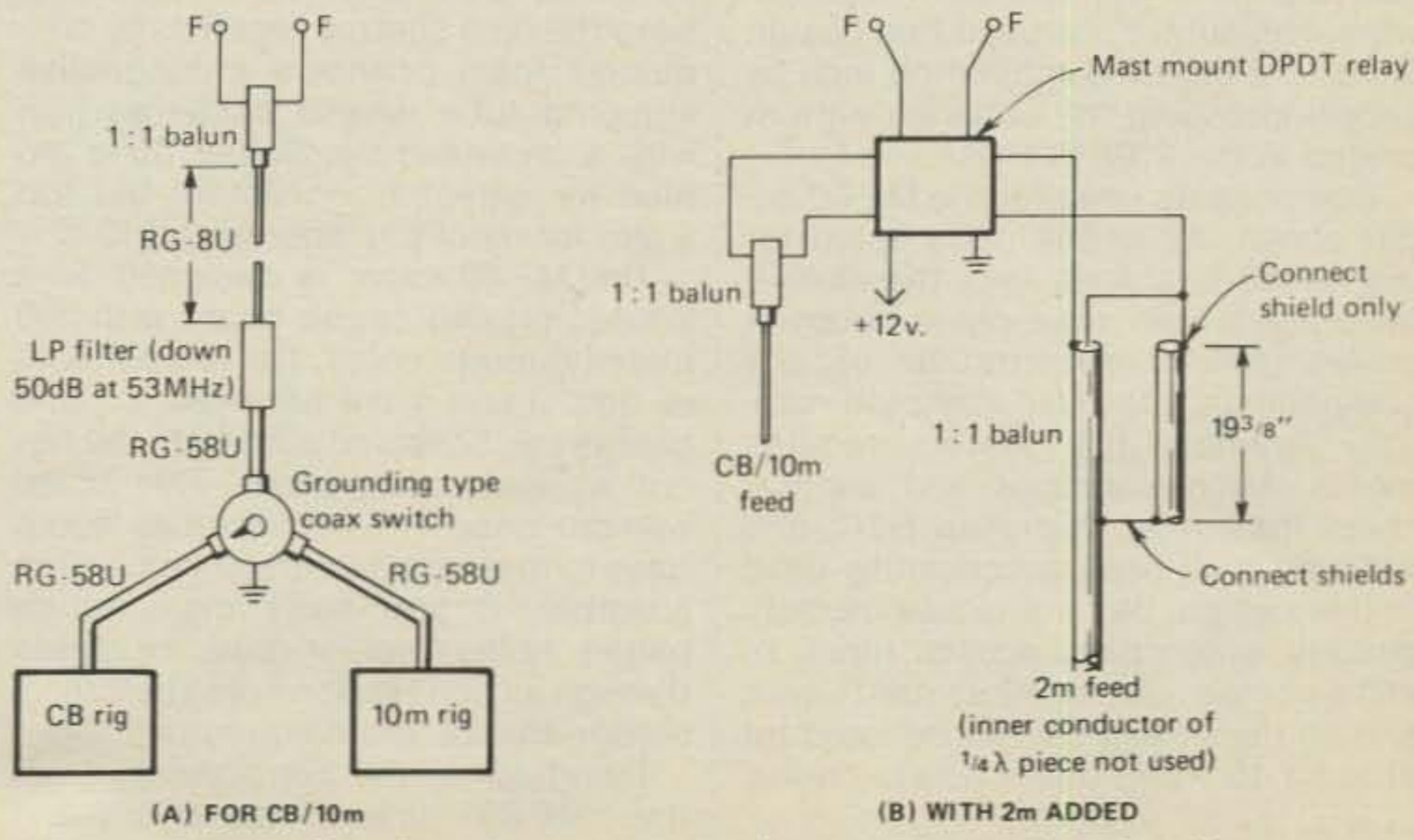


Fig. 4—Feeding the antenna and two meter option details.

Now that you've whetted your appetite for a micro-computer controlled Morse generator, it's time to get down to putting it together. In this part of Dale Platteter's series he tells how to turn a box full of parts into a useful station accessory.

Build Your Own MP-80 Morse Code Keyer

Part II—Construction

BY DALE PLATTETER*

The circuit schematic for the MP-80 keyer is illustrated in fig. 2. It contains all the features found in any 8080A system with the exception of a large memory. In fact, other products have been designed with this identical hardware. The author has used this design to build a digital combination lock by simply changing the software pattern loaded in the 2708 EPROM.

Components used for the MP-80 are dirt cheap. All of the parts listed for the MP-80 board are less than $49 if purchased from mail order hobbyist stores. Before substitution of any components, the builder should carefully examine the system requirements. Microprocessor and support chips from Intel, National, NEC, and AMD have all been successfully used in this design. Be sure to use memory circuits which have access times of 450 ns or less. All resistors are ¼ watt and all capacitors should be rated for at least 15 volts. Use a quartz crystal which resonates in the fundamental frequency mode at 18.432 MHz.

Avoid excessive handling of A1, A4, A8, and A9 as these are MOS integrated circuits which can be damaged by static electricity. When handling, keep the pins shorted together by conductive foam or inside a conductive shipping tube. Use a soldering iron with a grounded tip. Solder guns are nice for antenna connectors but too warm for most p.c. boards and IC's.

The MP-80 keyer is designed on a 2-sided printed circuit board with 360 plated-through holes. The foil patterns of figs. 3 and 4 are full scale so that boards can be reproduced from the layout without enlargement. This board was designed with conservative layout rules to make do-it-yourself fabrication possible. If you can't manufacture plated holes, solder pins or wires through all connection holes before inserting the integrated circuits.

Insert all of the components from the "MP-80" side of the board and solder on the back side. The component placement drawing is shown in fig. 5. Be sure that capacitors C14 thru C19 are installed so that their positive ends are positioned as shown in the drawing. The transistor tab must face the direction shown and A2 must be placed with its metal side flat against the p.c. board. Tie-down holes are provided on each side of the crystal (X1).

It is not necessary to socket all of the components. However, it is recommended that sockets be used on A7 and K1 as their pins leave the MP-80 board and could be inadvertently shorted or overstressed. Do socket the P1 connector which couples to the keyboard. A ribbon cable with a DIP plug is an excellent choice for an easily removable connector.

Insert and solder all the integrated circuits, being careful to position them with the polarity notches as shown. Even the slowest worker can complete the MP-80 board in less than two hours. Don't forget to use a programmed EPROM or the system will not work.

*1315 "Q" St., Bedford IN 47421

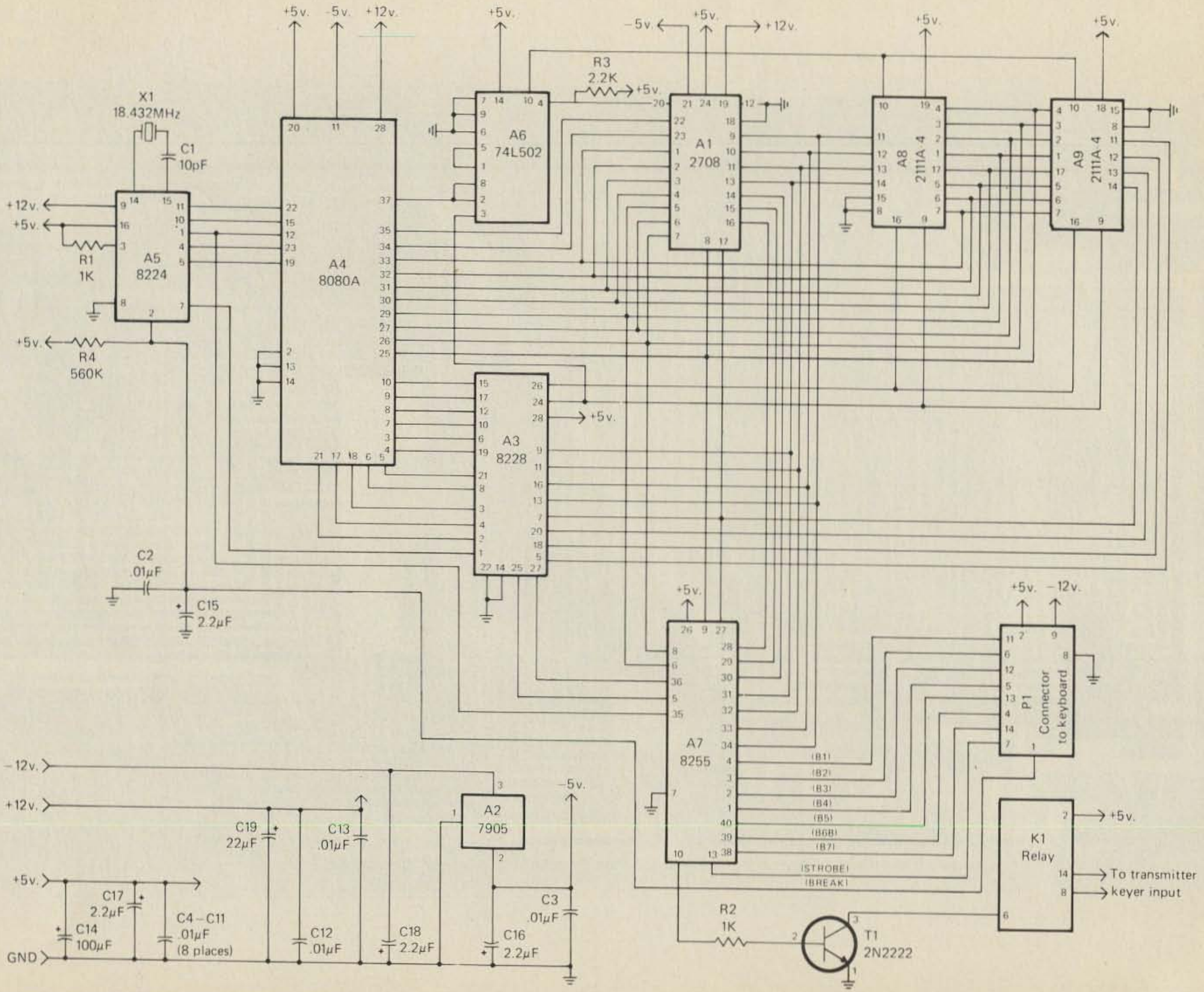
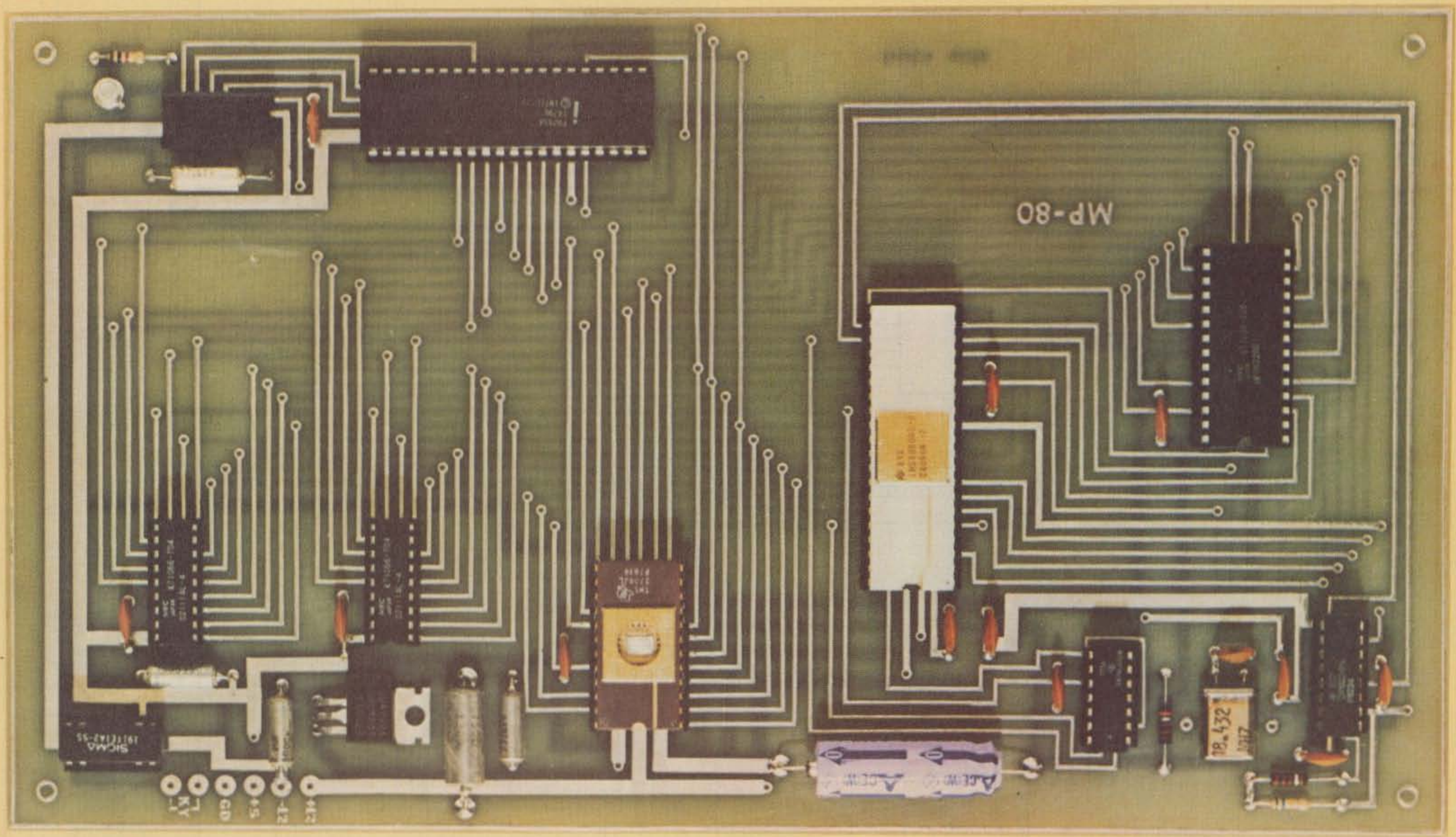


Fig. 2 - Schematic diagram for the MP-80 keyer.


MP-80

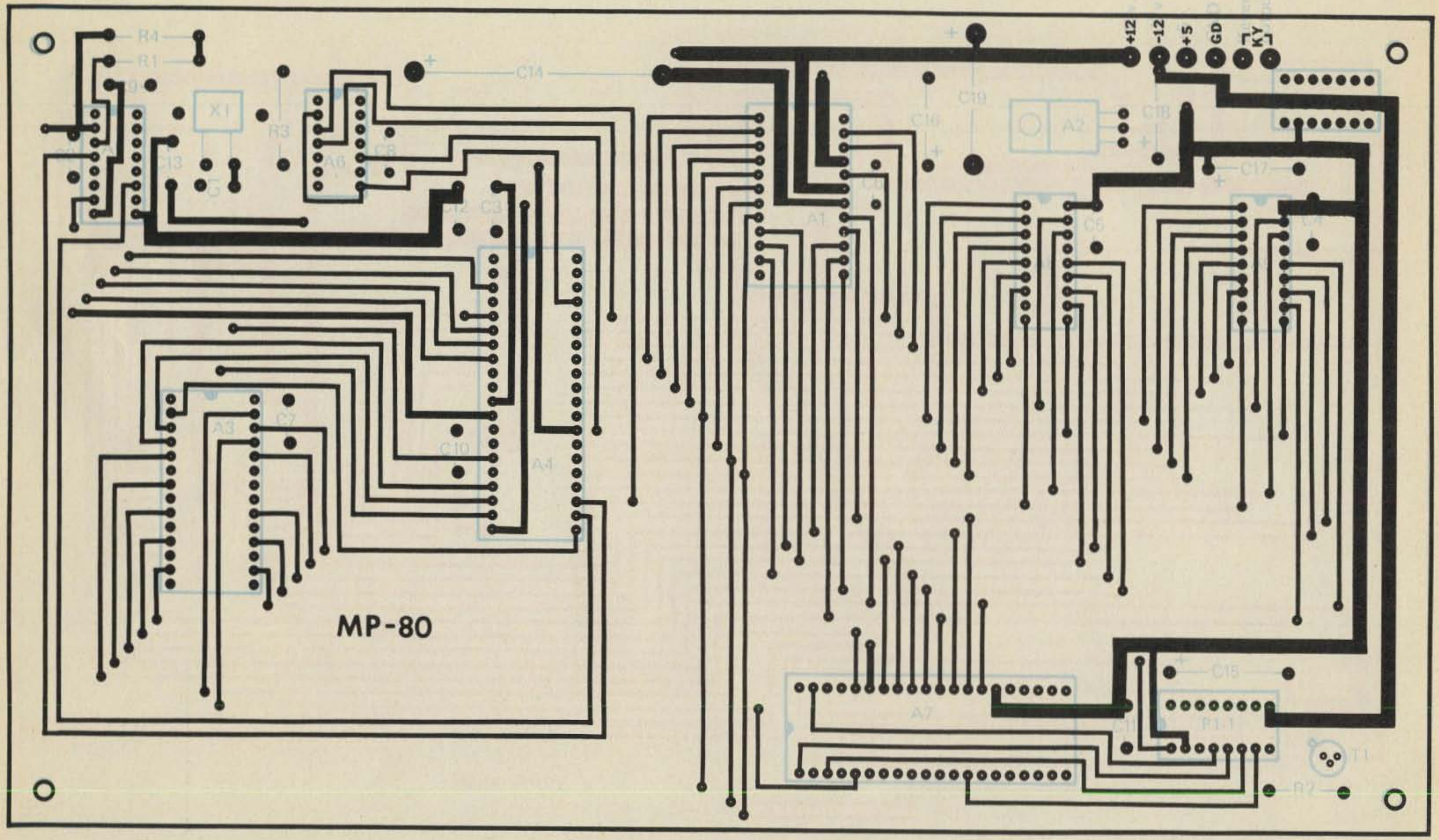


Fig. 3 - Foil pattern and component placement of the top circuit board. This illustration is full-sized. This board is lined up with fig. 4 on the next page.

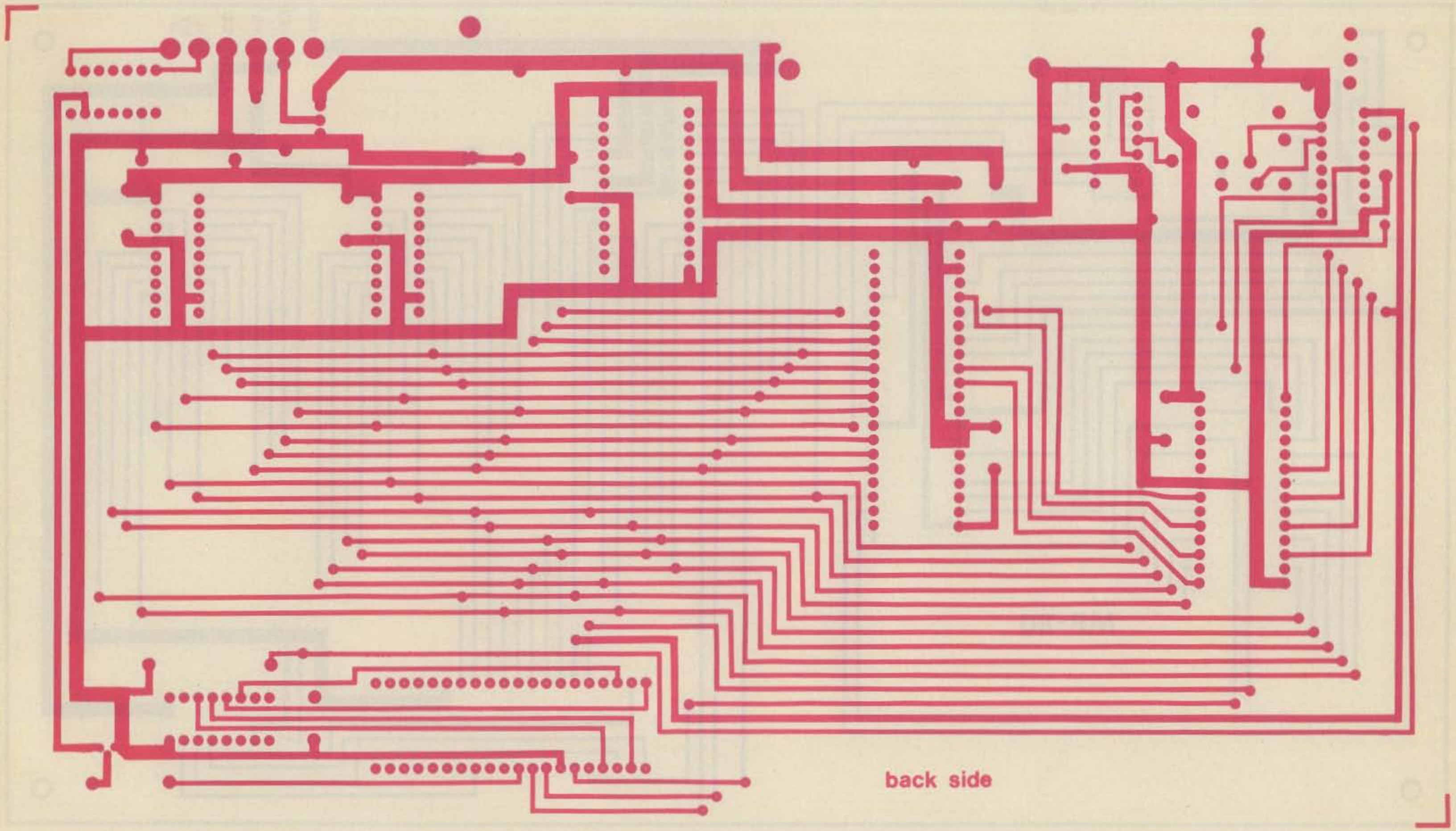


Fig. 4 - Foil pattern of the bottom circuit board. This pattern is full sized. This board is lined up with fig. 3 on the previous page.

MP-80 PARTS CHECK LIST

☐ A1	Programmed 2708 EPROM Memory (450 ns)	☐ X1	18.432 MHz Crystal (fundamental)
☐ A2	7905 Voltage Regulator	☐ P1	16-Pin Dual-in-Line Socket
☐ A3	8228 System Controller	☐ C1	10 pF Ceramic Capacitor (50 volts)
☐ A4	8080 Microprocessor (2μs)	☐ C2-13	0.01 μF Ceramic Capacitor (15 volts)
☐ A5	8224 Clock Generator	☐ C14	100 μF Electrolytic Capacitor (15 volts)
☐ A6	74LS02 Quad 2-Input NOR Gate	☐ C15-18	2.2 μF Solid Tantalum Capacitor (15 volts)
☐ A7	8255 Peripheral Interface	☐ C19	22 μF Solid Tantalum Capacitor (15 volts)
☐ A8, A9	2111A-4 Random Access Memory (450 ns)	☐ R1, R2	1000 ohm Resistor (¼ watt)
☐ T1	2N2222 Transistor	☐ R3	2200 ohm Resistor (¼ watt)
☐ K1	Sigma 191TE-1A2-5S DIP Reed Relay	☐ R4	560,000 ohm Resistor (¼ watt)

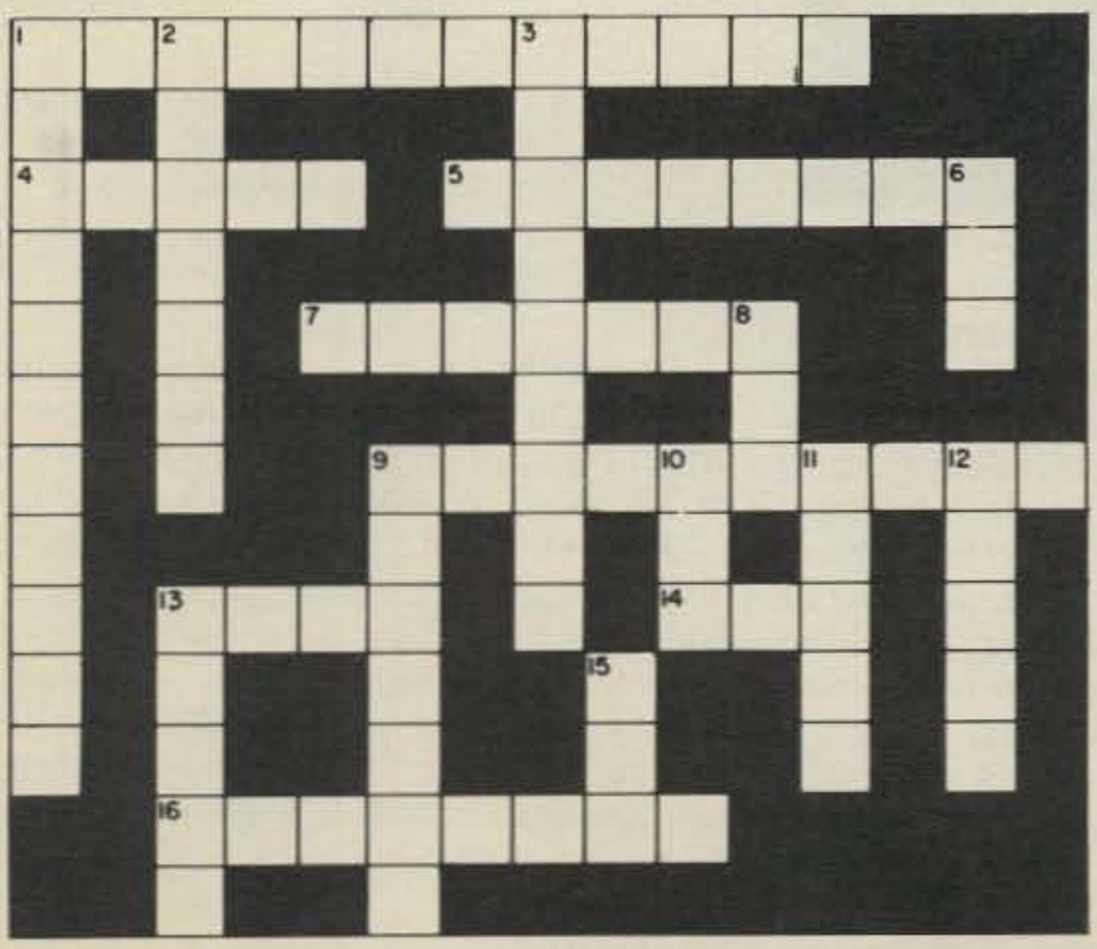
Misc. - These additional items are needed to complete a keyer system:
± 12 volt (200 mA), + 5 volt (900mA) regulated power supply.
ASCII encoded keyboard with suitable enclosure.
Flat ribbon cable with 16-pin DIP plug.

Note - The following items are available from Platteter Enterprises, P.O. Box 752, Bedford, Indiana 47421.

- Complete Kit of parts for the MP-80 board including an etched and drilled p.c. board with plated-through holes, all components and IC's, along with a programmed EPROM memory, No. MP-80K for $99.
- Assembled and tested MP-80K kit, No. MP-80A for $130.
- Etched and drilled p.c. board with plated-through holes, No. MP-80PCB for $30.
- Programmed and tested 2708 EPROM, No. P2708A for $19.95.
  All integrated circuits are fully tested. Please allow 4-6 weeks for delivery. Indiana residents add 4% sales tax. No shipping charges within continental U.S.

CRANIUM QUERIES

BY JOHN E. SHEPLER*



Across

1. Base Sixteen
4. Condition of computer
7. Stop
8. Tells how many
11. Read Only Memory
12. Has fusable-links
13. Type of pulse
14. Memory that needs constant supply of power.

Down

1. Computer equipment
2. Rotating memory
3. Breaks into normal program
5. Base Two
6. Another term for memory
9. Where information is stored
10. Computer instructions

(Solution next month)

*2404 Eastmoreland, #1B, Rockford IL 61108

No - 33 - 34

Norm Chalfin presents the exciting possibility of a new prefix.

JUMP 'N JUPITER

BY NORMAN L. CHALFIN*, K6PGX

The JPL Amateur Radio Club through its club station W6VIO (**V**oyager **I**n **O**uterspace) repeated its performance during the Viking Landings on the planet Mars by holding commemorative contacts during Voyager mission to the Planet Jupiter.

Revealing more detail than the very best groundbased telescopic photographs, this Voyager 1 image of Jupiter taken December 10 from 52 million miles shows the Great Red Spot (lower right) surrounded by a turbulent atmosphere. The entire visible surface of Jupiter is made up of multiple layers of clouds, composed primarily of ammonia ice crystals colored by small amounts of materials of unkown composition. Near the center is a bright convective cloud and an associated plume which has been swept westward (to the left) by local currents in the planet's equatorial wind system. This same atmospheric feature was seen prominently in the Pioneer 10 and 11 spacecraft pictures of Jupiter taken four and five years ago this month. Below and to the left of the Great Red Spot is a white oval cloud, one of three which formed nearly 40 years ago in the south temperate region. Largest of all of the planets, Jupiter's volume could contain more than 1200 Earths. Voyager 1 will fly past Jupiter on March 5, 1979, studying the planet and five of its 13 moons, and continue on to Saturn. An identical spacecraft, Voyager 2, arrives at Jupiter on July 9, 1979, and will proceed to Saturn and possibly Uranus. Both were launched in 1977. Among 11 science instruments, each spacecraft is equipped with two slow-scan TV cameras. This picture was taken with a camera equipped with a 1500 millimeter focal-length telescope.

Among the data being returned are pictures of the disc of Jupiter at various distances showing details of the planet not possible to see with any terrestrial telescope.

Slow-Scan TV pictures of these and others will be sent out for amateurs to see throughout the world.

According to Dick Piety, K6SVP, the project coordinator, the first contacts will be made beginning March First and will continue through March 11th, 1979. This coincides with the encounter phase of the first of the Voyagers to arrive near Jupiter. *A second encounter period for voyager II will bring on more amateur contacts from July 6th through 15th.*

The following frequencies will be used plus or minus QRM:

C.W.—30kHz above bottom edge of the bands, 80 through 10 meters.

SSTV	3845	**S.S.B.**	3930
	7220		7230
	14235		14285
	21340		21360
	28680		28680
Novice	3730	**OSCAR,** 2 meters	
	7130	and 220 MHz	
	21130	transmissions	
	28130	are planned as well.	

Presently, plans call for heavier operations on weekends and between the hours of 4:00 P.M. to 7:00 P.M. P.S.T. (0000 to 0300 Zulu).

The JPL Amateur Radio Club regrets that it does not have a special commemorative call such as the N6V used during the Viking Mission. However, W6VIO will issue a special QSL card for the Voyager Commemorative. An SASE is requested from U.S. stations. DX stations may QSL via their QSL Bureas.

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

THERE IS A DIFFERENCE IN QUARTZ CRYSTALS

For more than a quarter century, International Crystal Mfg. Co., Inc. has earned a reputation for design and capability in manufacturing and marketing precision electronic products.

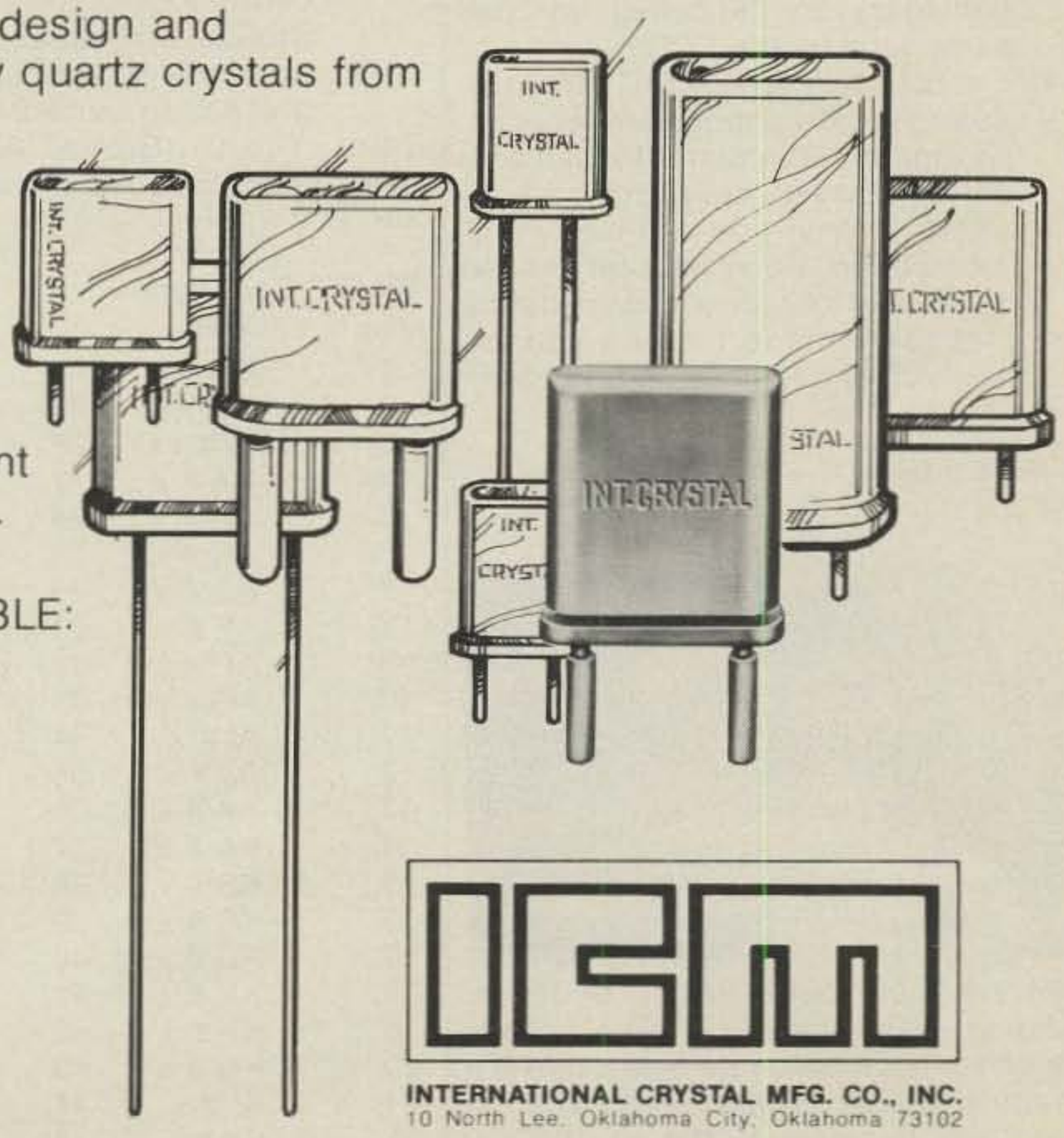
The market for International crystals is world wide. With a full range of types and frequencies available, International is a major supplier to the commercial and industrial crystal market.

International's leadership in crystal design and production is synonymous with quality quartz crystals from 70 KHz to 160 MHz. Accurately controlled calibration and a long list of tests are made on the finished crystal prior to shipment.

That is why we guarantee International crystals against defects, material and workmanship for an unlimited time when used in equipment for which they were specifically made.

Orders may be placed by Phone: 405/236-3741 • TELEX: 071-347 • CABLE: Incrystal • TWX: 910-831-3177 • Mail: International Crystal Mfg. Co., Inc., 10 North Lee, Oklahoma City, Oklahoma 73102.

Write for information.



ICM

INTERNATIONAL CRYSTAL MFG. CO., INC.
10 North Lee, Oklahoma City, Oklahoma 73102

CIRCLE 32 ON READER SERVICE CARD

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

This months column continues the two-part callsign article which began last month's column.

Phase I Changes, as Modified by Phase II Release

The following changes are in effect. Most of these changes are mentioned elsewhere in this article but they are summarized here for your convenience:

(1) No special callsigns are issued to individual amateurs requesting them.

(2) No special events (fairs, conventions, etc.) callsigns are issued.

(3) Personal secondary station licenses are not issued, modified or renewed. An amateur is allowed to transfer a secondary station callsign to his primary station and the less-desired callsign (or callsigns) is cancelled at the same time by the FCC.

(4) Callsigns are no longer automatically changed to reflect a change in radio district when one moves. Issued callsigns can be used anywhere under FCC jurisdiction. However, one can request and obtain a new callsign that conforms to the new district in which one resides. In this case, the format of the new callsign cannot be one applicable to amateurs with a higher class of license than the applicant who has moved holds.

(5) Extra class (Group A) licensees are issued callsigns as follows:
(a) One-by-two, such as A6AA
(b) Two-by-one, such as AA4A
(c) Two-by-two, such as AA9AA
(d) Since all contiguous U.S.A. one-by-one callsigns with A,K,N, and W beginning letters have been issued, Extra Class callsigns began at block 4 (AA6A, as an example) of the following assignment sequence and they will continue down through the indicated prefixes. Some callsign areas have already progressed to block 13 of this list. Non-contiguous U.S.A. (islands, territories, etc.) amateurs started at block 1 and already progressed to block 2 in Hawaii.

Extra Class (Group A) Callsign Assignment Sequence (see notes 1 and 2)

Block No.	Contiguous USA			Pacific Area	Alaska Area	Atlantic Area
1.	K # xx	24.	KM # x	AH # x	AL 7 x	KP # x
2.	N # x	25.	KN # x	KH # x	KL 7 x	NP # x
3.	W # xx	26.	KO # x	NH # x	NL 7 x	WP # x
4.	AA # x	27.	KQ # x	WH # x	WL 7 x	(Group B)
5.	AB # x	28.	KR # x	(Group B)	(Group B)	
6.	AC # x	29.	KS # x			
7.	AD # x	30.	KT # x			
8.	AE # x	31.	KU # x			
9.	AF # x	32.	KV # x			
10.	AG # x	33.	KW # x			
11.	AI # x	34.	KX # x			
12.	AJ # x	35.	KY # x			
13.	AK # x	36.	KZ # x			
14.	KA # x	37.	NA # x			
15.	KB # x	38.	NB # x			
16.	KC # x	39.	NC # x			
17.	KD # x	40.	ND # x			
18.	KE # x	41.	NE # x			
19.	KF # x	42.	NF # x			
20.	KG # x	43.	NG # x			
21.	KI # x	44.	NI # x			
22.	KJ # x	45.	NJ # x			
23.	KK # x	46.	NK # x			
47.	NM # x	71.	WN # x			
48.	NN # x	72.	WO # x			
49.	NO # x	73.	WQ # x			
50.	NQ # x	74.	WR # x			
51.	NR # x	75.	WS # x			
52.	NS # x	76.	WT # x			
53.	NT # x	77.	WU # x			
54.	NU # x	78.	WV # x			
55.	NV # x	79.	WW # x			
56.	NW # x	80.	WX # x			
57.	NX # x	81.	WY # x			
58.	NY # x	82.	WZ # x			
59.	NZ # x	83.	AA # xx			
60.	WA # x	84.	AB # xx			
61.	WB # x	85.	AC # xx			
62.	WC # x	86.	AD # xx			
63.	WD # x	87.	AE # xx			
64.	WE # x	88.	AF # xx			
65.	WF # x	89.	AG # xx			
66.	WG # x	90.	AI # xx			
67.	WI # x	91.	AJ # xx			
68.	WJ # x	92.	AK # xx			
69.	WK # x	93.	(Group 3)			
70.	WM # x					

Notes:
(1) # in the callsign indicates where the appropriate numeral (1 thru 0) is inserted
(2) x or xx in the callsign suffix indicates the letters A thru Z and AA thru ZZ, respectively.

(6) Advanced class (Group B) licensees are issued two-by-two callsigns, such as AM2AA. Advanced class licensees in the 48 contiguous states started receiving block 1 (KA8ABC, as an example) callsigns per the following assignment sequence and they

**2814 Empire Ave., Burbank, CA 91504*

This is Nana Ihara (JI1VLV) of Tokyo, Japan. Nana holds a Novice license with advance code privileges. She is a regular reader of this Novice column and she is active on the air. W6DDB worked her twice in recent weeks.

have already progressed almost to block 3. In non-contiguous U.S.A. (islands, territories, etc.), Advanced amateurs are still being issued block 1 callsigns.

Advanced Class (Group B) Callsign Assignment Sequence. *(see notes 1 and 2)*

Block No.	Contiguous USA		
1.	KA 1 xx	33.	NK # xx
	and KA 9 xx	34.	NM # xx
2.	KB # xx	35.	NN # xx
3.	KC # xx	36.	NO # xx
4.	KE # xx	37.	NQ # xx
6.	KF # xx	38.	NR # xx
7.	KG # xx	39.	NS # xx
	(except KG4, KG6R, KG6S)	40.	NT # xx
		41.	NU # xx
8.	KI # xx	42.	NV # xx
9.	KJ # xx	43.	NW # xx
10.	KK # xx	44.	NX # xx
11.	KM # xx	45.	NY # xx
12.	KN # xx	46.	NZ # xx
13.	KO # xx	47.	WA # xx
14.	KQ # xx	48.	WB # xx
15.	KR # xx	49.	WC # xx
	(except KR6)	50.	WD # xx
16.	KS # xx	51.	WE # xx
17.	KT # xx	52.	WF # xx
18.	KU # xx	53.	WG # xx
19.	KV # xx	54.	WI # xx
20.	KW # xx	55.	WJ # xx
21.	KX # xx	56.	WK # xx
	(except KX6)	57.	WM # xx
22.	KY # xx	58.	WN # xx
23.	KZ # xx	59.	WO # xx
	(except KZ5)	60.	WQ # xx
24.	NA # xx	61.	WR # xx
25.	NB # xx	62.	WS # xx
26.	NC # xx	63.	WT # xx
27.	ND # xx	64.	WU # xx
28.	NE # xx	65.	WV # xx
29.	NF # xx	66.	WW # xx
30.	NG # xx	67.	WX # xx
31.	NI # xx	68.	WY # xx
32.	NJ # xx	69.	WZ # xx
		70.	(Group C)

Pacific Area	Alaska Area	Atlantic Area
AH # xx	AL 7 xx	KP # xx
(Group C)	(Group C)	(Group C)

Notes:

(1) # in the callsign indicates where the appropriate numeral (1 thru 0) is inserted.

(2) xx in the callsign suffix indicates where the letters AA thru ZZ are inserted.

(7) General and Technician class (Group C) licensees are issued one-by-three callsigns, such as N5AAA. General and Technician class licensees in the 48 contiguous states used all the one-by-three callsigns starting with the letter K (block 1), so block 2 callsigns are being assigned per the following assignment sequence. In the non-contiguous U.S.A. areas (islands, territories, etc.), these licensees are still being issued block 1 callsigns.

General and Technician Classes (Group C) Callsign Assignment Sequence. (see notes 1 and 2)

Block No.	Contiguous USA		
1.	K # xxx	3.	W # xxx
2.	N # xxx	4.	(Group D)

Pacific Area	Alaska Area	Atlantic Area
KH # xx	KL 7 xx	NP # xx
NH # xx	NL 7 xx	WP # xx
WH # xx	WL 7 xx	(Group D)
(Group D)	Group D)	

Notes:

(1) # in the callsign indicates where the appropriate numeral (1 thru 0) is inserted.

(2) xx or xxx in the callsign suffix indicates where the letters AA thru ZZ or AAA thru ZZZ are inserted.

(8) Novice class (Group D) licensees are issued two-by-three callsigns, such as KA3AAA. Block 1 callsigns with the KA prefix are being issued to stateside Novices and block 2 callsigns are being issued to non-stateside Novicese per the following assignment sequence:

Block No.	Contiguous USA		
1.	KA # xxx	12.	KN # xxx
2.	KB # xxx	13.	KO # xxx
3.	KC # xxx	14.	KQ # xxx
Except	KC4AAA-AAF and KC4USA-USZ	15.	KR # xxx
		16.	KS # xxx
		17.	KT # xxx
4.	KD # xxx	18.	KU # xxx
5.	KE # xxx	19.	KV # xxx
6.	KF # xxx	20.	KW # xxx
7.	KG # xxx	21.	KX # xxx
8.	KI # xxx	22.	KY # xxx
9.	KJ # xxx	23.	KZ # xxx
10.	KK # xxx	24.	WA # xxx
11.	KM # xxx	25.	WB # xxx
26.	WD # xxx	34.	WQ # xxx
27.	WE # xxx	35.	WS # xxx
28.	WF # xxx	36.	WU # xxx
29.	WG # xxx	37.	WV # xxx
30.	WI # xxx	38.	WW # xxx
31.	WJ # xxx	39.	WX # xxx
32.	WN # xxx	40.	WY # xxx
33.	WO # xxx	41.	WZ # xxx

Non-Contiguous USA

Pacific Area	Alaska Area	Atlantic Area
KH # xxx	KL7 xxx	KP # xxx
WH # xxx	WL7 xxx	WP # xxx

Notes:

(1) # in the callsign indicates where the appropriate numeral (1 thru 0) is inserted.

(2) xxx in the callsign suffix indicates where the letters AAA thru ZZZ are inserted.

(9) When one upgrades his/her operating privileges, a request can be added (on line 13A of the form 610 application) to have a new callsign issued which is commensurate with the new group attained. In other words if one holds N6AVC as a General, he/she can request and obtain a callsign such as KB6IT when upgrading to Advanced privileges.

(10) Guantanamo Bay (KG4) licensing is not administered by the FCC and it remains unchanged.

(11) No new repeater (WR) prefix callsigns are issued or renewed but present ones (such as WR6ABC) are valid until they expire. Once a repeater license expires, users simply identify with their own callsigns followed by a repeater indicator, such as W6DDB/R or W6DDB/RPT during code contacts and W6DDB Repeater during voice contacts.

(12) All amateurs may continue to hold their existing primary station callsigns, regardless of the callsign format or the operator's class of license.

(13) Only one primary station callsign can be held by one amateur. If an amateur holds two primary station callsigns (due to a processing error), one was to have been selected for retention and all others were to have been submitted to the FCC by 1 October 1978 for cancellation.

(14) Callsign change requests are just accepted from the following:
- (a) Extra class licensees
- (b) Amateurs who upgrade operating privileges.
- (c) Amateurs who move to different callsign areas and request callsigns conforming to the new areas.

(d) Advanced class licensees desiring Group B two-by-two (only) callsigns in lieu of what they hold.

(15) Callsign change requests are expected to be accepted from General and Technician class licensees desiring Group C one-by-three callsigns in lieu of what they hold.

(16) An amateur requesting a callsign change can only request a callsign configuration that is consistent with his/her class of operating privileges. Callsign change requests are limited to just indicating the group (A, B, or C) in which a callsign is requested.

(17) Newly licensed amateurs are automatically assigned callsigns in accordance with the formats previously listed under items (5) thru (8) this list.

(18) When moving to a different callsign area and requesting a conforming new callsign, the following limitations are imposed:

(a) An Advanced class licensee holding an Extra class type of callsign will not be issued a new Extra class type of callsign for his/her new area. He/she is just eligible for a Group B type of callsign.

(b) A General or Technician class licensee holding an Extra or Advanced class type of callsign will not be issued a new Extra or Advanced class type of callsign for his/her new area. He/she is just eligible for a Group C (General and Technician) type of callsign.

(c) A Novice licensee holding a callsign of a configuration that is now just issued to Extra, Advanced, General, or Technician class licensees will not be issued a similar callsign for use in his/her new area. He/she is just eligible for a Group D (two-by-three) Novice type of callsign.

(d) Such callsign changes can only be requested upon renewal or upgrade; they are not accepted due to just a location change.

(19) If the station licensee does not request a callsign change at renewal, no change will be made. This means that amateurs can retain existing callsigns (one apiece) when renewing, upgrading, changing mailing address, and changing station location. The following table illustrates the callsign change situation.

Callsign Changes at a Glance

License class	Extra	Advanced	General/Technician	Novice
New Licensees	Only A	Only B	Only C	Only D
Licenses Upgrading to:	If no change is requested, the present callsign is retained; otherwise:			
	Only A	Only B	Only C	Not Applicable
Licensees moving to new districts:	If no change is requested, the present callsign is retained; otherwise:			
	Only A	Only B	Only C	Only D
Licensees requesting callsign changes.	Only A		Not Accepted	
Licensees wanting existing Secondary callsigns changed to their Primary licenses.	The change may be made any time during the term of the secondary license. In effect, the less desirable original primary station callsign is transferred to a new secondary station license which is cancelled without being issued.			

(20) As callsigns from earlier blocks become available (due to upgrading, moving, etc.), they will be added to lists of callsigns available for assignment.

(21) The following changes are being considered in regard to military recreation, RACES (Radio Amateur Civil Emergency Service), and club stations:

(a) Processing of these applications was stopped to help ease the processing load to enable FCC to catch up on issuing primary station and individual operator licenses.

(b) Any primary station callsign may be used at any military recreation, RACES, and club station.

(c) New military recreation stations will be issued callsigns with the WM prefix. As existing licenses are renewed, a WM prefix callsign will be issued to replace any callsign with a different prefix.

(d) All military recreation station licenses will expire 31 May of the fifth year of their term. This common expiration date will be reflected on existing licenses as they are renewed, and on new licenses as they are issued.

(e) New RACES stations will be issued callsigns with the WC prefix, but existing ones can retain their present callsigns.

(f) All RACES station licenses will expire 30 June of their fifth year. This common expiration date will be reflected on existing licenses as they are renewed, and on new licenses as they are issued.

(g) No more than one RACES station license is issued to a single Civil Defense group.

(h) New club stations will be issued callsigns with the WK prefixes. As existing licenses are renewed, a WK prefix callsign will be issued to replace any callsign with another prefix.

(i) Applications for new and renewed club station licenses must include a compelling statement of need for a club station license.

The existing amateur radio station callsign system operates under the following basic rules:

(1) All callsigns available for assignment to amateur radio stations by the FCC are arranged in alphabetized lists according to the sequences given in the preceding lists. Callsigns are selected for assignment in block prefix and alphabetical suffix sequences.

(2) When all callsigns within a block have been assigned, the next assignment is made from the next consecutive block within the group.

(3) The callsign format consists of the prefix, followed by the single digit, and followed by the suffix.

(4) The callsign prefix can be one or two letters. Single letters are either K, N, or W. Two-letter combinations are either AA thru AL, KA thru KZ, NA thru NZ, or WA thru WZ.

(5) Some two-letter prefixes are not listed. WT is used for temporary licenses. WC, WK, WM, WR are reserved, pending the outcome of on-going rulemaking. Additionally, some two-letter combinations are assigned by other United States Government authorities to amateur radio stations not under FCC jurisdiction. For instance, some callsigns in the KZ series are assigned to stations in the Canal Zone by Canal Zone authorities.

(6) The digit is a single number (1 thru Ø) indicating a geographical district, as shown early in this article.

(7) The suffix can be one, two, or three letters. Single letters are A thru Z. Two-letter combinations are AA thru ZZ. Three-letter combinations are AAA through ZZZ. As in the case of the prefix, and for the same reasons, some combinations are not used.

Summary

It is hoped that this 2-part article on callsigns has given you a better understanding of what has developed into a confusing situation. You could do your amateur acquaintances a favor by bringing this article to their attention. An attempt has been made to have each part of this article provide useful information by itself. However, the subject matter almost dictates that all two parts be very carefully read to understand the existing callsign system.

In case you had not considered it before, please recall that the FCC makes it very clear that the callsign is that of the station, and not the operator. Since this is so, it is difficult to understand how the callsign configuration can be required to reflect the operator's class of privileges? Either the callsign is assigned to a responsible operator at a known land location or it is tied to the class of operating privileges. The present attempt to identify operator's privileges by callsign configuration does not appear to me to be on a solid basis.

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

Some of the stations I've recently worked on the Novice bands are:

WB1ACP Larry @ Thetford Center, Vermont WD2ABC Bill @ Union, New Jersey WB3CXC Jeff @ Ridgway, Pennsylvania WD4KNS Bart @ Oak Ridge, Tennessee KA5ALN Gene @ Tulsa, Oklahoma KA6BCD Frank @ N. Hollywood, California WB7VOW Jeff @ Yakima, Washington WD8ODA Charles @ Wixom, Michigan WD9DUC Emil @ Williams Bay, Wisconsin WD0DBN Mike @ Arvada, Colorado WL7ACK Mamie @ Valdez, Alaska

73, Bill, W6DDB

CQ Reviews: Sabtronics' 2000DMM Digital Multimeter

BY ADRIAN WEISS*, K8EEG/WØRSP

The Sabtronics 2000DMM digital multimeter first caught my eye as I was scanning the magazine ads about two years ago. The styling of the unit, with its blue plastic cabinet, black front panel, and red LED display was attractive enough, but the thing that really made me give my attention to the full page ad was the headline "a professional 3½ digit DMM kit for less than $70." My first reaction was: "Who can produce something like this for seventy bucks?" So naturally, I checked out the specs and everything was in order there. Either this was a hoax, or it was the real thing, and if it was the real thing, Sabtronics had a real winner in the ring! After about two minutes of deliberation, I decided to go ahead and bite to see just what this DMM was worth. Well, the Sabtronics 2000DMM is for real, just as the ad claims, and my experience with it has been very favorable throughout. I still have difficulty in believing Sabtronics is actually producing and marketing this multimeter for $69.95!

*83 Suburban Estates, Vermillion SD 57069

General Description

The Sabronics 2000DMM is a fully portable, battery operated 3½ digit multimeter which boasts specifications and features of more expensive and sophisticated test instruments of the type. The unit provides 28 different ranges of measurements for d.c. and a.c. volts, d.c. and a.c. current, and ohms. In the a.c. and d.c. volts mode, voltages ranging from 100 microvolts to 1400 volts d.c. in the d.c. mode, and from 100 microvolts to 1000 volts a.c. in the a.c. mode. Both a.c. and d.c. current modes provide measurements from 10 nA to 2 amperes. The resistance mode measures from 0.1 ohm to 20 megohms. All ranges include overrange protection circuits that automatically shut down the meter when the input range is exceeded. D.c. input impedance of the unit is 10 megohms, and 10 megohms 25 pF on the a.c. voltage range. Accuracies claimed by Sabtronics are 0.1% on the 10 volts d.c. range and below, 0.1% on the 10 mA d.c. current range and below, 0.1% on the 100 kohm and below resistance ranges, with slightly poorer figures for a.c. voltage and current (to be expected), and the higher d.c. and resistance ranges.

The 3½ digit readout is by means of four 0.4" LED's which are very visible even in brightly lighted rooms. For those unfamiliar with the "3½" digit term, it simply means that three of the digits, beginning with the right end of the readout, display their basic information in numbers, while the fourth LED is digital, *i.e.*, either "on" or "off," indicating the number "1" in the on position, and "0" in the off position. The fourth LED never jumps, say, to "2." Hence, while the range switch may specify the range as "10V," this is actually half of the actual range which the unit will display. For example, 9.99 volts will read as 09.99. However, when the voltage moves to 10 and above, the fourth LED switches "on" and displays "1," so at, say 12.20 volts, the fourth digit is "on" to indicate that the 09.99 point has been passed, and the meter is now displaying a second round of counts beginning at 10.00. It's like a speedometer turning over at 099.9 miles. The new 0.1 mile moves the first "9" to "0" and so on down the line until the "1" count appears in the final left column. The new count range then goes to 19.99, at which point, the next count pulse would push all the "9's" to "0's" and display a "2" in the

The Sabronics 2000DMM Digital Multimeter

left hand column. But, the counter is only designed to count for three columns, not four, so the meter is then "overrange." this overrange condition is shown on the 2000DMM by turnoff off of the LED display.

Power for the unit is supplied either by four "C' cells (typical 25 hours of operation for the alkaline "heavy duty" types), or by the AC-115 a.c. adapter provided by Sabtronics as an accessory for the kit at $7.50. A 30KV hi-voltage probe is now available for $29.50, and test leads are included as a standard part of the kit. Likewise, the bench supply available in most ham shacks will power the unit, provided it delivers 4.5-6.5 volts d.c; but, Sabtronics cautions that a standard bench supply must not be used to power the unit when making measurements on equipment powered by the same 117 volt a.c. power line. This could cause internal damage to the 2000DMM which forfeits the warranty and any obligation on Sabtronics' part to repair a unit damaged in this manner.

2000DMM Circuit

Fig. 1 shows a simplified block diagram of the 2000DMM circuit. It utilizes eight IC's, including an LSI A/D Converter chip which is the heart of the unit. A brief description will give a general understanding of the circuit.

The unit is powered, as noted above, either by a battery or a.c. supply. The 2000DMM includes a power supply regulator circuit which maintains the stability of the + 6.5 and – 14.5 v.d.c. necessary for the operation of the circuitry. This internal precision regulator in early production units consisted of four bipolar transistors, but in more recent units it is an IC type regulator. It will tolerate input variations of from 4.5-6.5 v.d.c., so that batteries will be pretty well depleted before accuracy of the meter is affected.

Input to the 2000DMM is scaled to the level of input required for operation of the A/D Converter by four input circuits. The purpose of these four input circuits is to provide a proper level d.c. voltage which then is measured by the A/D Converter. The input voltage divide scales the input by factors of 1, 100, or 1000, providing three basic ranges which apply to all modes. These three basic ranges are expanded by the use of the multiplier switch which multiplies the basic range by a factor of 10. So, with the 100 mV and the X10 switches depressed, the meter range is actually 1 volt (readout to 1.999 volts). This range multiplier switch adds flexibility to the unit. Referring to fig. 1, input flow can be seen by the arrows. In the D.C. volts mode, the d.c. voltage to be measured

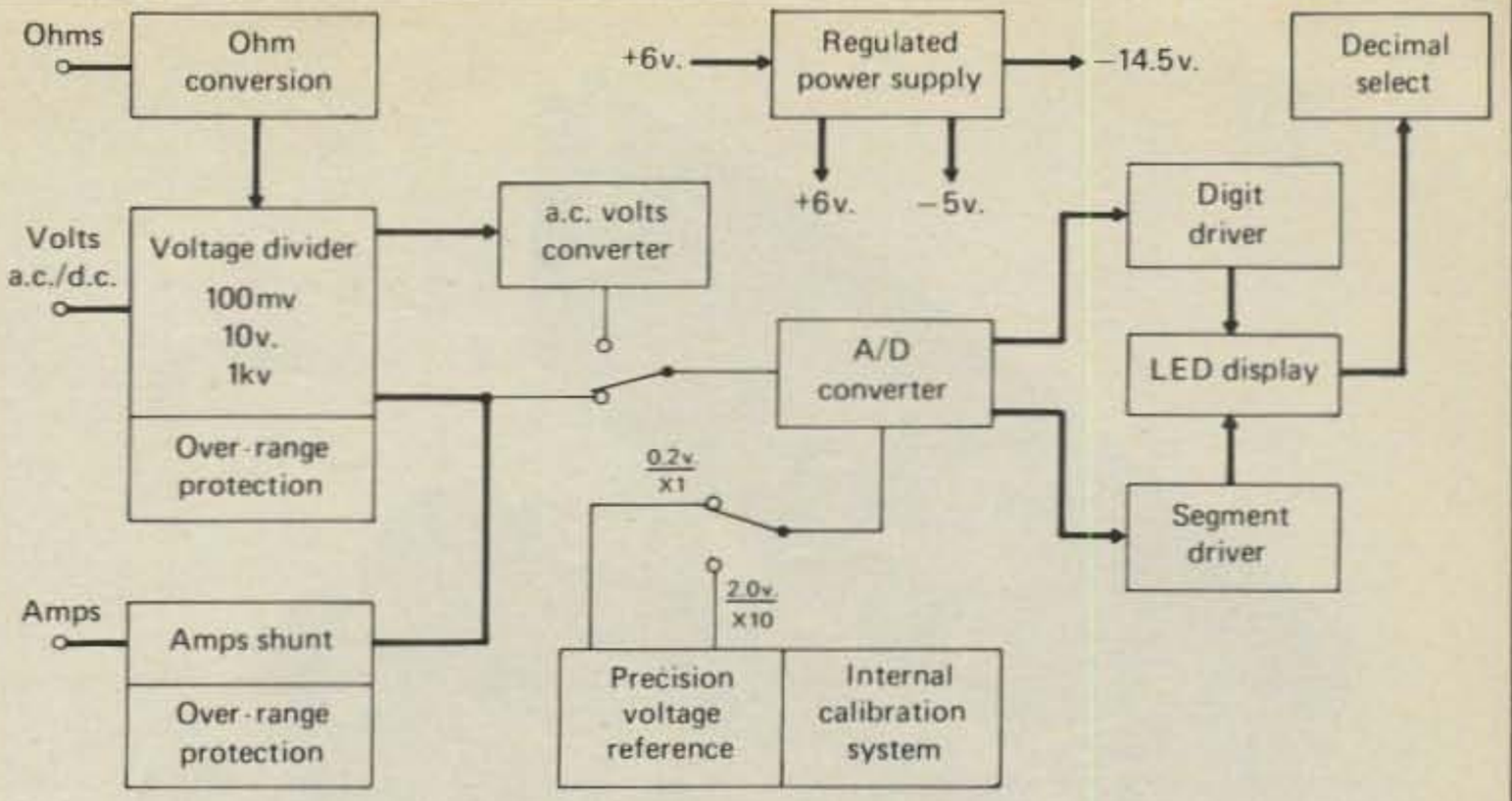


Fig. 1 - Block diagram of the Sabtronics 2000DMM.

is scaled across the precision input voltage divider (resistances measured to 0.1%), producing a d.c. voltage which the A/D converter then measures. In the A.C. Volts mode, the a.c. input voltage is scaled across the input voltage divider, producing an a.c. output to the a.c. converter, which consists of a precision rectifier circuit that produces an output scaled to the a.c. input, and d.c. output from the a.c. converter is passed on to the A/D converter and measured. In the Ohms mode, a regulated precision current source provided by the Ohm converter circuit is placed across the resistance to be measured, resulting in a voltage drop across the resistance which is measured by the A/D converter and displayed as ohms on the readout. Finally, current is measured by placing the input current across one of three precision resistances to produce a voltage drop which is measured by the A/D Converter and readout as amperes.

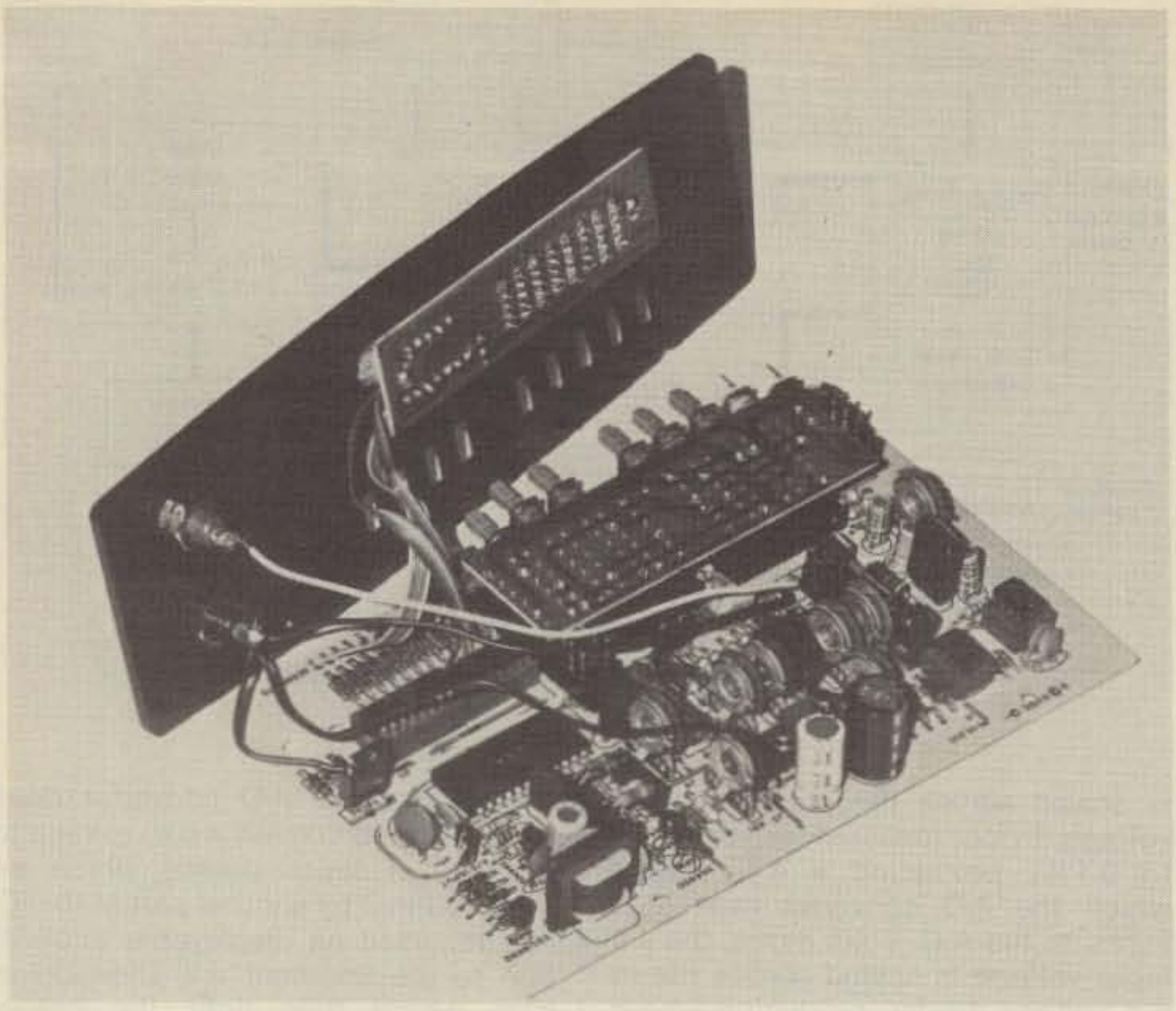
The heart of the unit is the A/D converter and the precision reference voltage supply included int he unit. The precision reference voltage supply, in addition to providing the 0.2 and 2.0 volt reference signals required for the operation of the A/D converter, includes a precision voltage divider system used to calibrate the 2000-DMM. The IC precision voltage regulator and the calibration resistances are provided with the kit as a set of parts measured at the factory to 0.1% of their actual values. Hence, accurate calibration of the unit is possible without the aid of sophisticated lab gear. The A/D converter chip is one of the marvels of space-age "large scale integration" technology. Its function required, just three years or so ago, board space of several square inches, plus a lot of high-density foils strips and nearly micro-soldering techniques. What the A/D converter does basically is to convert a d.c. voltage to a series of digital pulses, which are then counted by another part of the IC, and released as displayable information to the Segment and Digit Driver IC's, which then light the proper segments of the LED display. Quite ingenious.

Finally, the internal circuit includes protection against damage from application of excessive inputs. Input limits are 1400 volts peak on all ranges except for the 100 mV and 1000 mV a.c. ranges, where 350 volts peak is the limit. Unless some real carelessness occurs, these limits probably won't be exceeded.

Assembly of the 2000DMM Kit

Generally speaking, one should be wary of ordering kits which boast of pheonomenal specifications at a minimal price. However, I can happily report that such caution is totally unwarranted in regard to the 2000DMM kit. Anticipating a rather tedious and touchy assembly task based upon experience with the assembly of another DMM kit, I approached the assembly of the 2000DMM with some misgivings, but these were entirely unfounded and the assembly of the 2000DMM was smooth and uncomplicated. The following comments list both the strengths and weaknesses of the kit.

1. *Assembly Manual.* The assembly manual provided with the 2000DMM kit is 40 pages in length, is well-written with little or no ambiguity, clearly defines a step-by-step assembly procedure, includes tables of specifications and directions on calibration and operation of the unit, as well as pictorial illustrations for several steps. An



The completed circuit board and the front panel.

introductory page illustrates correct soldering procedure. Due to the completeness of the assembly instructions and illustrations, I believe that the kit could be assembled without difficulty by an individual with a very minimal experience and knowledge of electronics. The manual includes a two-tone X-ray view of parts placement on the p.c. board which lists parts by number rather than by value (*i.e.*, R37 instead of 1152 ohms). Parts are listed on the p.c. board itself by value rather than number, and this provides a built-in necessity for double-checking parts values against numbers as assembly proceeds. Assembly time was under 9 hours.

2. *P. C. Board.* I find the p.c. board one of the outstanding strengths of the kit. The p.c. stock is a light beige color, and all parts are printed on the p.c. board in black ink in outline form, with each part value specified within the part outline. This is the best printing job I've encountered on commercial p.c. boards thus far. It aids in correct assembly since the part value can be checked directly against the value printed on the p.c. board. The board is a medium-density type and presents no difficulty as far as soldering is concerned, so long as a conical tip soldering gun is used. Radio Shack carries two types of 40 watt irongs with such tips. Only the LED mounting board is high-density, and a conical tip is almost a necessity to soldering the LED's in place.

3. *Parts.* The kit was complete as delivered, with no parts missing or incorrect. Since precision resistors are used throughout, Sabtronics includes a color-code vs. part value list along with the packet of resistors, and repeats the same information in the assembly instructions. Hence, even the individual who does not know the color coding system will be able to locate the proper parts values by checking the color-code for each resistor given in the instructions.

4. *I.C. Sockets.* The most serious drawback of the kit is that Sabtronics does not include IC sockets along with it. I suspect that this strategy was followed in order to avoid an untidy final price figure such as $72.43. Actually, the IC's can be soldered directly in place if care is taken as suggested by the assembly instructions. I would advise the builder to order, at the time of sending for the kit, the following DIP IC sockets: (3) 8 pin, (1) 14 pin, (1) 16 pin, and (1) 24 pin. (Available for $1.18 + 50- handling from TRI-TEK Inc. 7808 N 27th Ave., Phoenix, AZ 85021, or elsewhere.)

5. *LED Board.* The LED display board is mounted to the front panel by means off two plastic spacers which must be glued to the front panel with epoxy or plastic glue (manual, p. 26); or, the red LED lens must be glued into the front panel. If the spacers must be glued into place, first thread the screws into the spacers, clean burrs from the spacer ends to insure a snug fit in the mounting holes, and then glue. Second, the mounting holes drilled in the LED display p.c. board did not provide a perfectly horizontal alignment with the display window. This is easily rectified by burring out the holes in the proper direction to allow horizontal alignment.

6. *18 Pin SIL Socket.* Assembly instructions suggest that the 18 pin single-in-line socket provided with the kit be cut with a sharp knife (p. 18). No way! Maybe with a hacksaw or laser! The sockets can be broken off at the correct point by carefully positioning a large plier tips at the appropriate point, and carefully snapping the things off. Caution is recommended, since damage to the end socket can occur.

7. *Not Included.* Several items generally are not supplied by the kit manufacturer, and Sabtronics is similar. These include: appropriate soldering unit, typically 30-40 watts, conical tip; about 12 ft. of resin core solder, small variety about .031" dia.; epoxy glue/plastic glue; wire cutters, pliers, screwdrivers, knife etc. For a.c. calibration procedure, an 1N4004 (or similar) rectifier diode and 10 mF/150 V electrolytic capacitor are needed. Also, see above about IC sockets.

Calibration

The assembly manual specifies two approaches to calibration: 1) use of lab-grade, accurately calibrated equipment; 2) use of internal precision calibration reference resistors. Most builders will follow the second procedure. The manual provides clear, step-by-step procedures on using the internal precision reference supply for accurate calibration. The calibration procedure is quite simple, the adjustments of potentiometers easy since they provide a spread centered at the desired range of adjustment, and in fact, it takes longer to read the directions than to perform the steps! No difficulty was encountered in adjusting for the exact calibration numbers supplied with the kit.

Readout Sampling Time

The digital circuitry of the 2000DMM requires approximately 0.25 seconds for each sampling period. Hence, the displayed readout shows an appropriate delay time after applying an input to the meter. On the d.c. ranges, readout time is about 0.5 second, the a.c. ranges may require

up to 5.0 seconds for stabilized readout, and resistances vary with the range from 0.5 to about 5 seconds. In practice, it is not possible to follow instantaneous change in input, but that's possible only with a scope anyhow.

R.F. Probe

An r.f. probe is in my opinion an essential adjunct to the 2000DMM for the homebrewer and experimenter. Sabtronics had promised the delivery of such a probe by late '77, but it has failed to materialize. Two sources for an r.f. probe are available. Heathkit offers the PK-3 r.f. probe kit at $6.95 (pluss shipping) and this unit works well with the 2000DMM if a 4.3 megohm resistor is substituted for the 4.7 megohm resistor supplied with the probe kit. The 4.3 megohm value provides the proper voltage ratio to produce r.m.s. readings across the 10 megohm input of the 2000DMM unit. Secondly, the ARRL *Handbook* include the theory and description of an r.f. probe unit. The basic idea is good, but the manner of constructing and housing the unit could be improved upon. We'll provide details of an r.f. probe in an upcoming issue.

Conclusions

I am very favorably impressed with the Sabtronics 2000DMM multimeter kit both as a kit and as a functional instrument. I would not hesitate to recommend it even to the beginner who has never assembled any electronic gear before. In such a case, of course, the beginner must devote whatever time necessary to master the techniques of soldering, to familiarising himself with different types of parts and color codes, and to extra care in assembly of the unit. However, the assembly manual and the p.c. board printing job are of such quality that the beginner with little or no knowledge of electronics will be able to successfully produce an operational unit. As a functional unit, the 2000DMM is both attractive and convenient. It takes a while to become accustomed to the 0.25 second sampling rate, but digital units do not show swinging voltages as well as meters, and that's just a fact of nature. Even so, the readout is stable. Lab quality calibrated gear was not available to measure the ultimate accuracy of the unit, but I am satisfied that it does approach specs claimed for internal calibration. The input scaling voltage divider produces readings which correspond on all ranges. In short, I'd give the 2000DMM an unqualified "high" rating on all counts. It's the real thing!

a regular feature by

THEODORE J. COHEN N4XX

dateline... Washington, D.C.

The ins and outs of the Washington scene

FCC Automates Processing of RFI Data

According to Mr. Jeffrey Young, Chief, Investigations Branch, FCC, the Commission is now automating the processing of data on radio frequency interference (RFI). Through the use of automated data processing, the Commission feels that it will better be able to develop the comprehensive data base it needs to evaluate services which are experiencing interference, and services which are alleged to cause interference. These data, in turn, will be used for analyses related to type acceptance, rule making, and frequency sharing.

At the same time that the data processing capability is being automated, the Commission is also switching to a better system for reporting RFI complaints. Among other things, considerably more attention will now be paid to identifying the source of interference in any given RFI incident.

Because of delays experienced in switching to automated methods for processing RFI data, RFI statistics for the 4th Quarter of 1978 and the 1st Quarter of 1979 will probably not be available until mid-1979.

FCC Raid Nets $200,000 Worth of Illegal CB Amplifiers

In late 1978, the FCC announced that a raid on Brewer Labs, Porter, Oklahoma, by U.S. Marshalls netted 440 illegal linear amplifiers with a retail value estimated at greater than $200,000. The U.S. Marshalls also seized all of the company's files. So great was the volume of equipment and files that the U.S. Attorney in charge of the raid was forced to use a private moving company to move the material seized into government warehouses.

A number of the linear amplifiers seized were apparently claimed to be for use by operators licensed in the Amateur service. However, modification instructions for converting these amplifiers to the 27 MHz Citizens Band were found in the files. Though it appears that the amplifiers where shipped without the modification instructions, there is some question whether the modification instructions were provided separately to the buyers after the amplifiers were shipped.

In an attempt to resolve some of the questions surrounding the operation of Brewer Labs, all employees of the company have subpoenaed to appear before a grand jury.

Guilty or Not Guilty?

Confusion as to whether a court has jurisdiction in cases involving alleged interference to home entertainment devices continues to plague Amateur and CB operators.

As reported in ADVANCE SHEET, journal of The Personal Communications Foundation, one CBer was recently sentenced to 15 days in jail for interfering with his neighbors' television receivers and stereo equipment. At the same time, and in another courtroom, another CBer had a criminal complaint on RFI problems dismissed; the dismissal was based on the fact that the local court had no jurisidiction over RFI phenomena.

As noted in ADVANCE SHEET: "The differing result in two virtually identical cases points up two important items. One is that not all courts currently recognize the statement set forth by the California Appellate Court in *City of Cerritos v. Schroeder* to the effect that there is no jurisdiction for these types of cases. The other is that it is important to have an attorney representing you if you have similar problems, as the lay person often does not know the proper way to present the issues involved to the court."

For more information on The Personal Communications Foundation, write:

PCC
10960 Wilshire Boulevard
Suite 1504
Los Angeles, CA 90024

Call for CCIR Papers

John J. (Jack) Kelleher, W4ZC, recently issued a call for papers on the Amateur (terrestrial) service which are to be submitted as contributions to the CCIR's fifteenth cycle. The CCIR is the technical arm of the International Telecommunications Union (ITU), and is responsible for advising the ITU on matters of a technical nature. Given that the ITU has called a Mobile Service WARC for late spring, 1982, and given that the deliberations of CCIR Cycle XV will form the basis for the Mobile WARC, it is important that Amateur interests be represented in the CCIR.

More specifically, Jack Kelleher, who is the Covenor of U.S. Study Group 8E (Amateur (terrestrial)) would appreciate receiving suggestions on the directions which should be taken in preparation for the Mobile WARC. Some areas already identified include the use of frequencies above 40 GHz and sharing possibilities between the Amateur (terrestrial) service and other services in the high-frequency (HF; 3-30 MHz) band.

If you would like to participate in CCIR Cycle XV, or if you would like to make suggestions regarding possible areas of study, contact:

Mr. John J. Kelleher, W4ZC
Convenor, U.S. Study Group 8E
3717 King Arthur Road
Annandale, VA 22003

The Editor and staff of **CQ** *join your Washington correspondent in extending our deepest sympathies to Jack Kelleher, W4ZC, on the loss of his wife, Charlotte, on January 23, 1979.*

*8603 Conover Place, Alexandria, VA 22308

New U.S. Amateur Callsigns Cause Confusion

The spate of new U.S. amateur callsigns (such as AH6I for a Hawaiian station) is causing much confusion at home and abroad. Most affected are the contest and DX operators who rely on the prefix as a quick indicator of a station's location. Since most stations no longer sign a portable indicator (indeed, the FCC no longer requires that this indicator be used), it is difficult to determine whether a KL7 is in Alaska or Texas, or whether a KG2 is in New York or on a Pacific Island.

The issuance of callsigns under the new plan resulted from the FCC's Report and Order for Docket No. 21135. In this Report and Order, the Commission stated that callsigns for Amateur stations should be issued on a systematic basis. Subsequently, authority for the development of a new procedure for issuing amateur callsigns was delegated to the Safety and Special Radio Service Bureau (headed at that time by Charles A. Higgenbotham), and more specifically, to the Personal Radio Division of that Bureau (headed then, as now, by John Johnston).

The intent of the new procedure for issuing callsigns was to automate the process to the maximum extent, and in doing so, to produce cost savings for the Commission. As noted by Carlos Roberts, Chief, Safety and Special Radio Service Bureau. "Amateur operators had long been the beneficiaries of a complex callsign assignment process, and many in the Commission were asking whether the costs involved were consistent with the benefits derived from such a process."

While the new assignment process has shortened the time required to process new licenses, and has significantly reduced the labor involved in sorting forms, it is still too early to determine the magnitude of the savings involved.

At this time, it does not appear likely that the procedures now used to issue callsigns will be changed. Accordingly, it would be in the best interest of the Amateur service if operators using the new, exotic callsigns would exercise some "self regulation," and would identify their locations using appropriate portable indicators and/or the location's proper name (e.g., This is KH2XX on Midway Island).

There are rumblings and grumblings among DXers these days. They revolve around list nets. Author Brockman offers his opinion in this article. What's yours?

The DX List Net - What A Mess!

BY LARRY BROCKMAN*, N6AR

I expect that Larry's article will cause as much of a stir as it did here in the CQ offices when it was first read. In fact a heated discussion arose within the office staff over various aspects of the article. Some felt that the ending was sort of negative and negated the article's arguments while others saw Larry's point in that list operating was as impossible to kill as the mighty Gorgon.

What this boils down to is what Larry presents is not a treatise on morality, nor an idealized unrealistic view of amateur radio. We can all point to things that "shouldn't" be and list the unethical (if not downright illegal) practises that shouldn't take place or be totally eliminated. In reality, it's not likely to happen even if a majority agree to it.

If list operation continues, which is a certainty, then the methods have to change. It's as simple as that. The ends do not justify the means no matter what the circumstances are. A certificate, an Honor Roll listing or a Big Gun label received through unearned efforts is really meaningless and cheapens it for everyone else.

—K2EEK

In the last several years, a new breed of DXer has been spawned by the burgeoning amateur radio fraternity. This new breed has exposed us all to a new fad in DXing—the "DX net" and/or "DX list" type of operation. To those of us who have been around a while, this new fad started out as a curiosity. However, of late it has developed into a seething turmoil—in short, a monumental mess. Lots of tempers are being lost; lots of unseemly manners are being heard over the air; and a lot of very poor operating practices are being established. Perhaps it's time we took a good hard look at the trend and reflected on where these operations are leading us.

*7164 Rockridge Terrace, Canoga Park CA 91307

What Are They?

Just what is a DX net? Some years ago "DX nets" such as the Pacific DX Next (on 14.260) and the Afrikaner Net (on 21.355) evolved. These nets all work about the same way. An "emcee" will check in both the DX and stateside or other DX hungry callers, and then, one by one, the guys contact the DX stations for "new countries." This all happens, if it goes according to plan, in a more or less QRM-free environment. Today there are lots of these DX nets. There's "The Family Hour" on 14.225 every morning for long path and/or Asian DX; there's the Afrikaner Net of 21.355, the Pacific DX Net on 14.260, the DX-to-DX Net on 21.280, the Arabian Knights on 14.250, etc.

Then, about a year ago, a new fad appeared all of a sudden. Why not establish "mini" DX nets on the really rare DX? Some well-meaning DXer would find a rare one, offer to act as an emcee and then set up a "list." The DXers would call in, get on the list, and then call in turn. Almost overnight the idea caught on en masse. YK1AA, 3B6DA, 3B9DA, YI1BGD, LU3ZY, XT2AV, FB8ZM, 601FG, D68AD, and many more have all participated in "list" type operations; the list (pardon the pun) is now endless.

Why a DX Net?

To the budding young DXer, these DX nets seem like a great idea. Here at last is the little guys' chance to work the rare ones. Just get on the list and you don't have to worry about QRM from the "California Kilowatts" or any of the big bruisers with seemingly inexhaustible lung power in the pileup. What is more, you don't even have to hear the DX all that well, you just need to QSL your report. But most important, we all know that the DX stations cannot handle the pile ups anyway; the list would be a so much more efficient way of handling the demand. Last, there is the obvious advantage of screening out the guy who works them every time they're on—that lousy W6 "blank blank" who has worked YK1AA 3 days a week over the last month. This list idea has got to be the only way to go, so why didn't we think of it all earlier, right. *Wrong.*

Why Not a DX Net?

Well, first of all, you devoted DXers out there, I'd like to give you a little feel for the reality of the DXing sport. The fun and challenge of DXing is not how many cards you've got on the wall, no matter how you get them. The real sport in DXing is the chase—its how you "find" the good rare DX on your own; how you bust through a pile up or manage to outmaneuver the big gun in a pile up. Its how you manage to work YK1AK on cw long path with his 5 watts to a dipole, while umpteen other guys, who only need YK, can't even hear him; its having 3Y5DQ (Bouvet) or VK4HG (Willis) come back to you Russian Roulette style; its having JT1KAA answer your CQ. There's some real sport in that, plus a little cunning and skill. On the other hand, there not much sport at all to sitting on a channel with a 20 over 9 K6 passing your call on to the YK, the 3Y5, the JT1, or the VK4 station for you; and

possibly even having your report passed to you (which you were not really sure you could read in the first place). A list is like shooting ducks in a barrel. Nearly all the competitive element of the game is gone. Today, however, it would seem that we are absolutely inundated with a total lack of intestinal fortitude in all aspects of our society. We crave the easy way out, and oh, how so much easier it is to just get on the list. I know, I've done it myself.

"Well," you say, "that DX chase stuff is fine for N6AR—he's probably running 5 kW to a 10 element yagi, and can smash the little guy who is being championed by the friendly net kingpins. In fact, N6AR must have worked that YK, the JT1, the 3Y5, and the VK4 that way." Hardly. For example, the 5 watt YK was worked back in 1964 (when YK was really rare) with an old Apache, barefoot to a TH4 antenna; N6AR has never run anything but legal power; the antennas are all homebrew and not all that spectacular; and the signal seldom cracks the middle of a big pileup. But the essence of my argument is not whether you can work them competitively if you have a good signal; it is that you can work them with almost any effort to field a decent station. What you need is a little time, skill, and patience. DXing is a sport that includes a lot of effort and a little of these other three ingredients. That sport is spoiled by list operations, and if you work them all in lists, guys, your just kidding yourself into thinking you're a DXer. Consider John, W6PQZ or Gene, N2AA, who are QRP DXers (less than 5 watts). John's got well over 200 countries worked and confirmed with just a tribander and some wire antennas. He didn't need lists to do it, either, just some good, old-fashioned effort. Think what a guy running 150 watts to that same tribander would do!

What about the DX Station?

Some argue that lists are the only way a DX station will (or can) work W's, and that the DX station says that, not the list taker. Well, it just doesn't have to be that way. I can recall an incident recently when the kingpins failed to show up for "The Family Hour." Three of their DX buddies (a 9K2, an ST and an HZ1) spread themselves out a few kHz from each other and worked their own pileups. It sure sounded like a faster QSO rate on each one of them than the list mode. Even at the same rate, it was a three times more efficient operation than the lists because they were all three operating simultaneously. In fact, I really believe that the DX station could run his own show more efficiently than the list in most circumstances. Even FB8X and JT1 stations have been heard here this week doing just fine on their own, and they usually hestitate to do it that way. Of course, they were constantly being pestered with "Why don't you come up on your net," or "Can I help with a list," etc. My hat comes off to ST2SA, who was heard twice this past week politely, but firmly, turning down these requests. You may say "What if the DX station doesn't want to run a pileup?" Fine, let him do it in other ways then. For example, he can tune around and answer someone. If he wants to really get a charge, he can answer one of the weaker guys. I can recall working A7XA last fall on 15 s.s.b with my little duoband yagi. Of course, I was carefully nestled in among the East Coast Curtain of 20 over signals—so it can be done fellows: A7XA did it and I've got the card to prove it.

How Well Has it All Worked Out?

The above arguments, of course, are directed at the list type DXers and DX stations; let me now press on with a few comments on the current practices of the list taker, and pose the question, "How well has it all worked out?."

What an egocentric bunch of overstuffed shirts we have for list takers today. It's no wonder that poor manners appear on the scene throughout these list operations. I hardly know where to begin—the W0, the W4, the K6, the WA4, the W7, the K5, the guys from down under, etc. Well, let's start with the Pacific DX Net. I'll bet a lot of our new DXers perked up when they heard about that one. Anxious to stuff the "DX chase" argument I offer under the rug, they are probably all set to dial in on 14.260 to catch some of the action for the FW8. Forget it, fellows. This one is a *closed* net! If you don't have a Pacific DX Net number and they won't issue any more numbers, you can rant, rave, scream, kick, threaten suicide, and whatever, but you'll never get on that list. You can just settle back and listen to K6 umpdeump work the FW8 for the third time so he can thank Felix for the QSL on 80 RTTY.

Well, surely that's just a one of a kind net—the others cannot be that bad, right? *Wrong*. There's also the DX-to-DX net on 21.280. This one is run by a WB8 with help from a K6. But, get this gentlemen, only DX stations are allowed to work the net; unless, of course, you are the WB8 or the K6. So, forget about that one also.

In fact, the situation is fast heading downhill on most of these nets. The "emcess" I've heard generally have a couple of very common traits. They're all on a tremendous ego trip and over what I'm not too sure. They really don't have all that great a signal to boast about. Further, most of them wouldn't know what to do in a pile up, and as a result, they are missing the trained ear of a real DXer. I heard one emcee blow the call of a DX check-in on four straight transmissions this morning; finally, the fellow checked in his own DXers up the band.

Then there's the other quality, the lack of fairness exhibited by the list takers, intentional or otherwise. There was a list taken for a XT2 a while back that's a classic example of this. The XT2 was 20 to 30 over 9 over the whole USA. The list taker's signal was S5. The only guys who got on the list at all were W4's, W8's, and a few W3's (probably all of which were within the list taker's beam heading). The rest of the districts (the 5's, 6's, 7's, 9's, 0's, 1's and 2's) simply couldn't hear the list taker. After a while the situation got very tense—all kinds of catcalls, profanity, complaining, and what not on the channel. It sounded just like a bad CB channel. I'll say one thing, at least getting on that list was a challenge.

What did the people in charge do? Well, they'd just repeat the same argument over and over. They didn't need to work any W's; they were doing it all out of the goodness of their hearts; and that if they didn't get cooperation, they'd quit and go home and wouldn't be back. Well fellows, there's a great deal of substance in their argument. They have a perfect right to run the show the way they please. But, if they are not giving everyone a fair shake, then they can expect the petty bickering to begin. The least they could have done was to listen to the complaints and have an open mind. Finally, it appeared that they did listen to some reason, and they started calling by district. What a mess it was. In ten minutes of listening for W6's, the keen ear of the list taker siphoned out all of two W6 calls—beat that for efficiency!

Then, of course, we have the buddy system. Now don't get me wrong. We all pretty much sympathize with an occasional pass on of our call. But some of the list takers, particularly some 0's and 4's seem to just thrive on rubbing salt into the wounds of the great sea of listing DXers while they interrupt the whole list to let they good buddy "Herkemer," who is QRP (150 watts to a 6 element yagi) in on the action. What about the one-half watt QRPp station who's been trying to get in on the list for an hour?

I just love some of the "advanced techniques" the list takers have found for compiling and passing on the lists. Like the phrase, "last letter only for all W6's south of Visalia, west of Tonopah, and north of San Clemente." Do those guys realize what that sounds like. The response is overwhelming, too. When the station ending with Z is asked to go ahead, there will typically be two or more guys who think they've been given the cue, and to top it all off, the emcee moans and groans about a lack of cooperation when he hears the double.

Our JA friends point to yet another problem with lists. You've probably heard, "Let's be fair to all districts and take five from each call area." Oh, wonderful! Just how many W6's do you guys think there are for every W8 or W1, not to mention the ratio of JA1's to JA5's. Then, of course, it must be great to be in the first call area where all lists begin. I know how frustrating it is to wait for the W6 call area to come up; but just imagine how the poor W0 must feel. Then, too, how does it feel when you, an N6, get told to "shut up" because they're only taking W6's.

I suspect the one area the list takers have taken into account is propagation differences. It seems that they pretty much arrange for W6's, at least, to be called just after the DX fades out; and while it's strong in W6, at least, to be called just after the DX fades out; and while it's strong in W6, the W1's are straining their ears. What really hurts is when the propagation effects the taking of the list. a list taken at 1200Z on 20 meters for a DX station that will show up at 1300Z is really kind of unfair to the West Coast. The same, of course, is true in reverse later in the day.

That brings us to another important comment on lists—the emphasis on receiving your report. Although I will admit that an exchange of reports is about all that is left to the sport during a list operation, I fail to see the importance of the exchange in establishing whether a QSO took place or not. I can recall working my first UJ8 on c.w. I never got his report, and I didn't care—I heard him come back to my call, heard his location, and heard his name, and that was all that mattered. But when big brother helps you on the list, the whole burden of whether a QSO occurred or not is placed on whether you heard the report. So, what has evolved is a fraternity of helpers who will pass on the report for you. They just love to do it. It spoils your QSO; spoils the DX net; and spoils them.

Let's not forget the "clear channel" issue. With all these lists, it's a wonder any part of the band is open to the rest of us. Normally, the list takers start clearing the channel a half hour or so beforehand—and it's got be clear within 5 kHz or so either side of "their" channel, too. Otherwise, their tender ears might miss the DX. No one owns that space, fellows, and with the bands as crowded as they are, no one is entitled to a 10 kHz window, period.

What Ought to Be Done

I wish it were as simple as the next statement I'm going to make, but I realize before the fact that it isn't. We ought to just eliminate list operations. There's no sport to them; the list operations are poorly conducted; the operating tactics they foster are sorely wanting; and they generate a lot of ill will. Further, the DX stations should be able to do all of the right things for themselves. At least as well as the list takers. On the other hand, when you work one the real way, you can feel a certain sense of satisfaction.

But, we've got to be realistic. Lists are not going to go away. So, what should be done? Well, we can avoid some of the pitfalls mentioned earlier. We can

1) Try to be fair to all districts; take into account relative numbers, propagation, don't take the first district first all of the time, etc.
2) Try to work split when taking the list. If the excuse for the list is that the DX station can't work split, doesn't it seem inane to take a list transceive?
3) Don't deviate from a well-running procedure, it just encourages breakers and complaints. On the other hand, don't assume your procedure is sound if there are a lot of complaints—it most definitely is not sound.
4) Try to stay away from the middle of the DX band—it just takes too much room and irritates to many of the other hams.
5) Don't operate in a closed net, or encourage it in any way. We're supposed to be a fraternity, not a bunch of snobs.
6) Get someone to take the list who is reasonably adept at it.
7) A list should only be used as a last resort.

Final Remarks

I'll let you be the judge on yourself of how effective list operations and DX nets are. As for me, I just hope that list takers don't spoil the whole DX game for me. Good luck in the pileups.

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

Pendergast kicked open the door to the shack and entered, carrying a bulky envelope in his hand. He handed it to me and sat down at the operating position.

"How are you and Rosie Radiator getting along?", I asked. Pendergast blushed slighted and replied, "Oh, just fine. Especially since she has given up CB radio and is studying for her ham ticket."

"Didn't you try to make a radio ham out of your old girlfriend, Bella Amtrak?", I asked as I opened the

Fig. 1 - The "Monster Quad" of W5MOK folded over for maintenance. This array has seven elements for 10, 15 and 20 meters on a 62 foot boom. A stepladder on the roof of the house allows easy maintenance.

envelope. A handful of photographs slid onto the table.

"Yes, I did", replied my friend. "But she seemed more interested in model railroads, so I gave up."

"Better luck with Rosie", I said. "Maybe you can get her to help you put up your new Quad antenna."

"Yes", said Pendergast eagerly. "I'm most anxious to see these photographs from the boys in Cow Town (Fort Worth) that Don, K5DUT sent you. Suppose you hand them over."

"Here's the first one. It shows the Monster Quad of W5MOK that has been folded down for maintenance. The Quad is built on a 62 foot boom (fig. 1) and has seven elements on 10, 15, and 20 meters. The tower is a reinforced Rohn job. And fig. 2 is a closeup showing how Bob does his work on the antenna, standing comfortably on his rooftop. Very neat, isn't it?"

"I like that", breathed Pendergast as he absorbed the pictures.

I handed Pendergast another photograph (fig. 3). "This is a very nice shot of the Quad at W5VGE. This is built on a 52 foot boom, two inches in diameter. The array has six elements on 10, 15, and 20 meters. It is top-guyed at four points because of the small diameter of the boom. It is an unusual design in that it has two reflectors and an average front-to-back ratio of better than 40 dB. It is mounted atop a 71 foot *Tristao* tower. As far as I know, this is the first Quad design having two reflectors, and it looks as if the idea is sound. Most Quads have a rather poor front-to-back ratio, averaging about 15 dB. Maybe 20 dB."

I passed another photograph to my friend (fig. 4). "This is a shot of the six element Quad at WB5NJK. More accurately, it is six elements on 10 and 15 and five elements on 20. Boom length is 48 feet and is constructed of 3" diameter aluminum tubing having an .09" wall thickness. It is top-guyed at two points along its length. The antenna is mounted on a 55 foot *Rohn* tower."

Pendergast sighed. "I'd hate to

Fig. 2 - W5MOK working at roof level on his "Monster Quad".

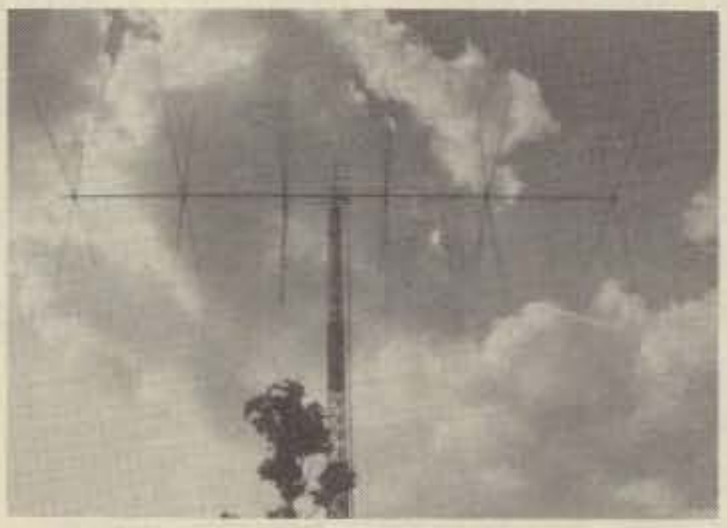


Fig. 3 - The "Monster Quad" of W5VGE. Six elements on a 52 foot boom atop a 71 foot crankup tower.

compete in a pile-up with those fellas."

"Here's a shot of the multi-element Quad at N5UN (fig. 5). He has it up at 80 feet. He's got 7 elements on 10 meters, 4 on 15 meters and 4 on 20 meters. He said this Monster Quad is 2 to 3 S-units better on 10 meter DX contacts as compared with his old 2 element Quad at the same height.

"And Don reports that WA5FWC now has two 120 foot towers up and is building Quads for them. And here's a picture of Gary holding one full-size 40 meter Quad element (fig. 6). He's shooting for four elements on 40 meters!"

"They're all mad in Fort Worth", asserted as he looked at the pictures with an envious eye.

I picked up Don's letter. "Don says that W5MOK has just finished an experimental 5 element Quad on a 60 foot boom and says it is as good, or better than, his older 6 element job on a 52 foot boom. That's on 20 meters. But on 15 and 10 meters, Bob reports that results are not as good as the old antenna, probably because the spacing between elements is too great. Bob also says the 64 foot boom is difficult to keep up and he's decided to go back to the 52 foot boom with six elements on it. He's found lots of mechanical problems with the longer boom and doesn't think the extra gain on 20 meters is worth the effort, not to mention the loss of gain on 15 and 10 meters.

"Here's a photograph of Bob on the

**48 Campbell Ln., Menlo Park, CA 94025*

tower (fig. 7). If your eyes are good and CQ's printing is clear, you can see the side guy wires on the boom and the arm on the tower that absorbs turning torque of the rotor and brake system."

Pendergast grabbed a picture out of my hand. "Hey, look at this", he shouted. "I always thought that K5DUT was a figment of your imagination. But here he is! Operating the Big Gun at N5UN!"

I looked at the photograph (fig. 8). "Where's the key?", I demanded.

"It must be a phone contest", replied Pendergast. "And look at *this*! Heresy!"

Pendergast handed me a photograph of a Yagi antenna (fig. 9).

"Don is building up an eight element Yagi on an 82 foot boom! He's going to try it out against one of the K5DUT Quads. The design will be for 20 meters. Then, if he likes that, he's going to shift over to *eleven elements* on 10 meters. That should bore a hole through the QRM. But I must admit that I'm surprised that K5DUT is going over to the enemy's camp and erecting a Yagi antenna".

"Them Oklahoma Dudes is full of a lot of tricks", observed my friend. "Don notes that W5VGE is putting up a new wide spaced, four element, triband Quad; Frank, WA5WRV, has just finished a wide spaced 20 meter Quad for his 120 foot tower; and K5LP is busy building a four element Quad. K5LP, Lanny, says there is no comparison between a trap, triband Yagi and a four element Quad. The Quad runs rings around the trapped Yagi. And, finally, Don says that most triband Yagis in the Fort Worth area are coming down and are being replaced with Monster Quads. He says that a tribander Yagi is a good beginner's antenna, but it can't compare to a BIG, Oklahoma-sized Quad antenna!"

I sighed. "It's tough to be loud on a small city lot", I replied. "But the Fort Worth gang certainly have proven the effectiveness of the big Quad. Don says that many DXers with big Yagis have been surprised by the ability of the Monster Quad to receive better and to transmit a stronger signal to a far away DX spot and to do it from a modest height."

I handed Pendergast another envelope. "All the news is not good. This letter tells me that W9LZX, Clarence Moore, the inventor of the Quad antenna has become a Silent Key. He passed away in early February. Clarence was a wonderful fellow. We have had many long, interesting QSO's on the air about Quads, and plenty of telephone calls and letters back and forth about some of his interesting antenna designs.

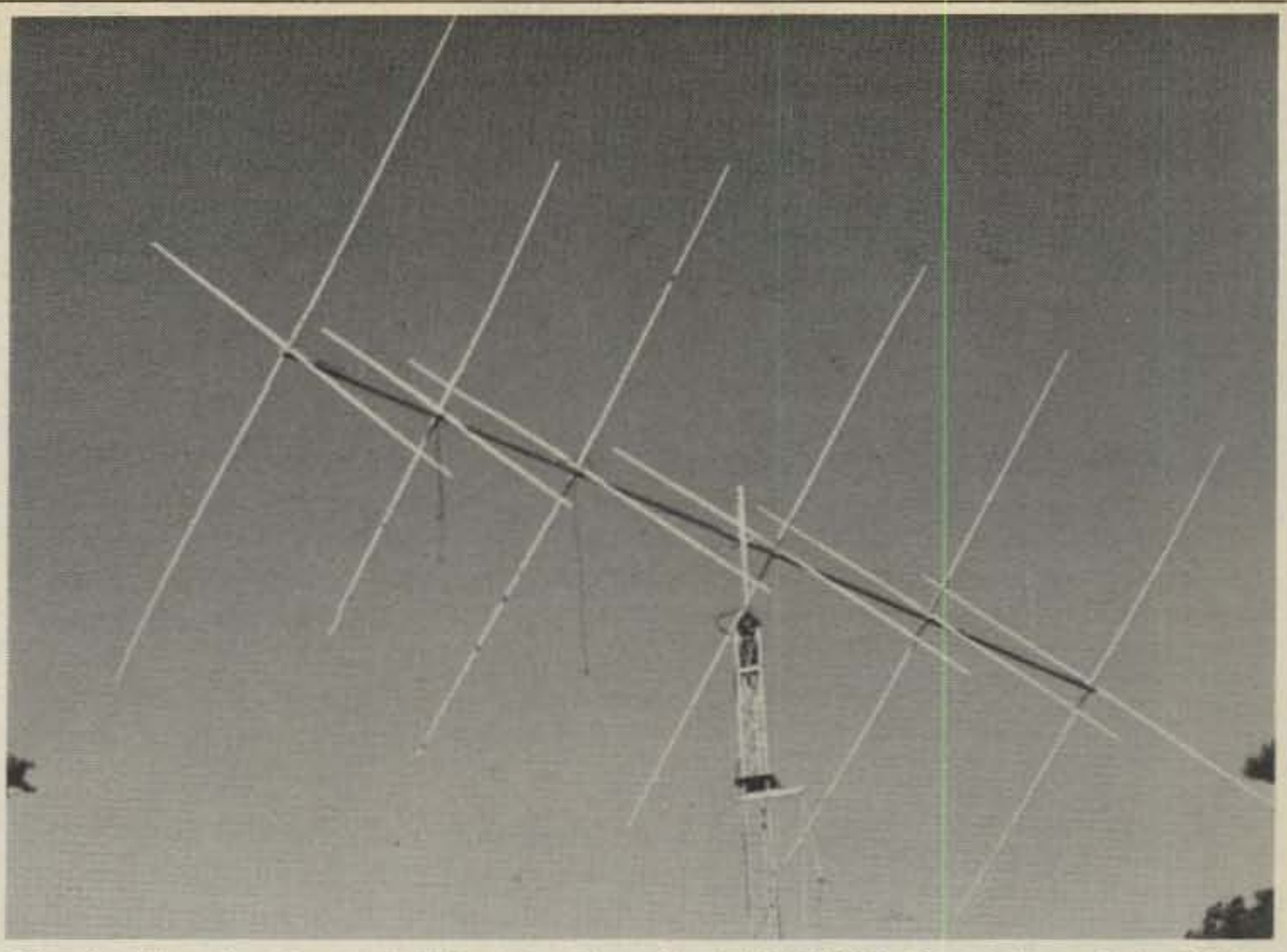


Fig. 4 - The six element "Monster Quad" at WB5NJK. Boom length is 48 feet supported 55 feet in the air.

Amateurs Radio has lost a close friend and enthusiastic operator.

"He was certainly a far-sighted antenna designer. Clarence pioneered the Monster Quad and, of course, was the original inventor of the Quad in the early "forties". Amateur radio will remember him for a long time."

"Yes", replied Pendergast. "The Quad was a truly original design and W9LZX was one in a million." He got up from the operating chair and prepared to leave.

"Before you push off, you might be interested in looking at a new top-band antenna that Mel, K6KBE, of *KLM Electronics* has just finished. It is a vertical for 160 and 80 meter work. The bottom of the tower is made of aluminum tubes, four inches in diameter, .093 wall thickness and 36 feet long. Cast aluminum ring clamps are used to attach the two-inch diameter cross-braces. All sections are cross-guyed with 1/8-inch aircraft cable.

"The center section is made of 3-inch diameter tubing, .050 wall thickness and 55 feet long. And the

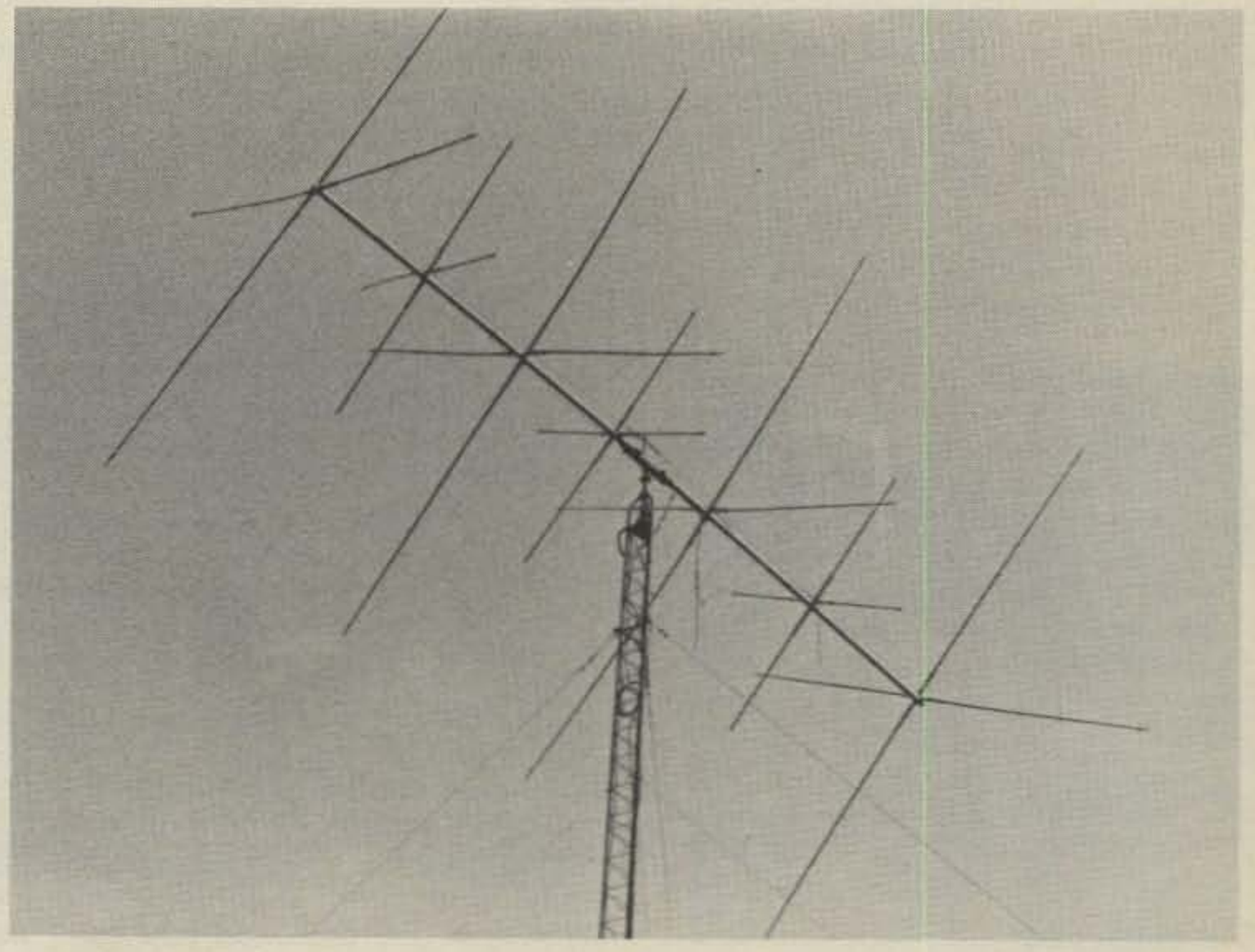


Fig. 5 - The multi-element Quad at N5UN. Seven elements on 10 meters, 4 on 15 and 4 on 20 meters.

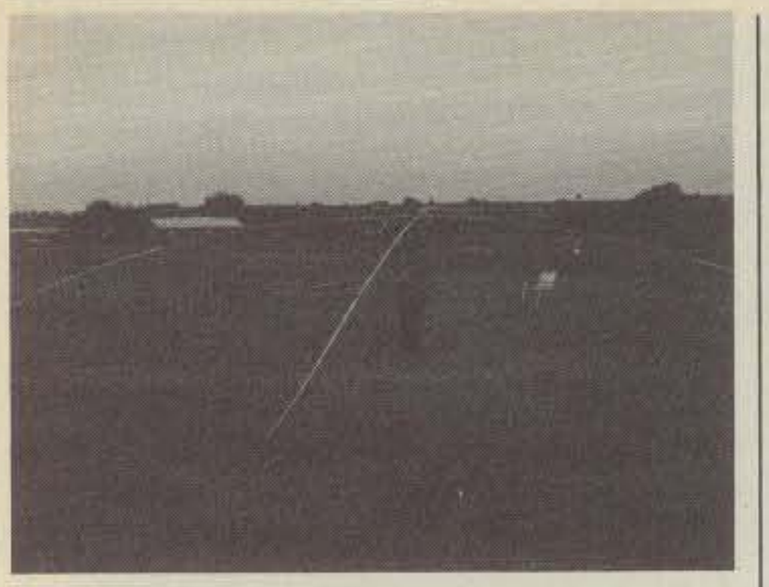


Fig. 6 - Gary, WA5FWC, supports a full-size 40 meter Quad element for his new beam.

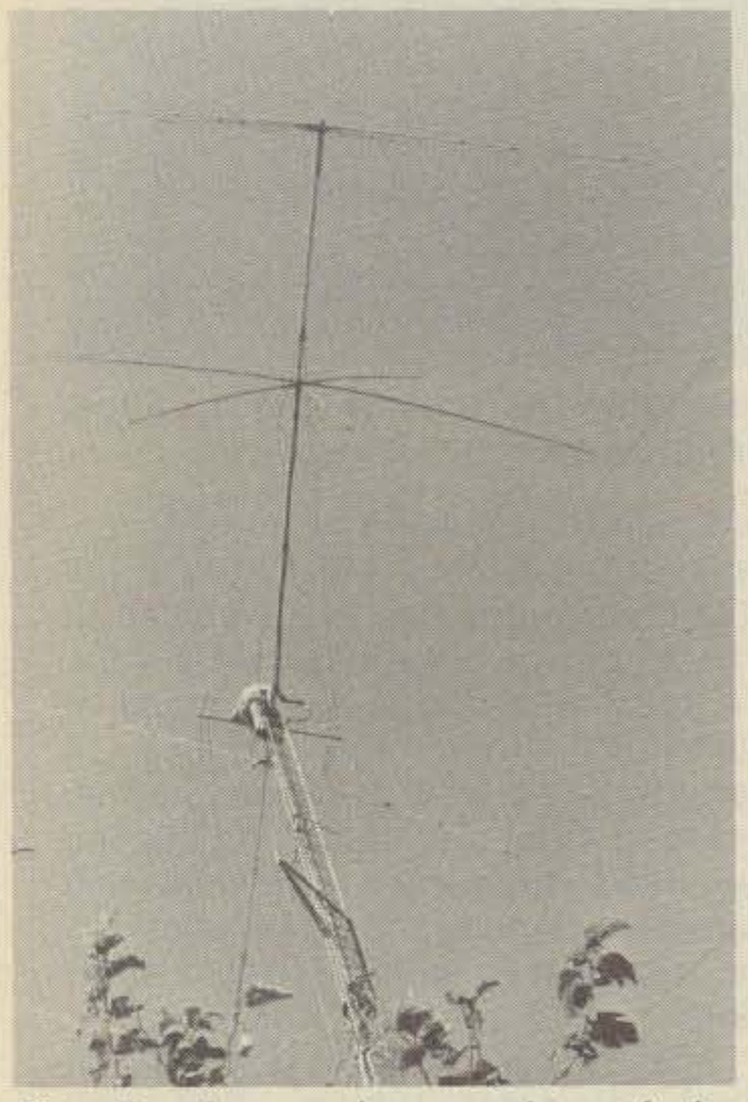


Fig. 7 - A worm's eye view of the "Monster Quad" at W5MOK. Bob is atop the tower. He's built Quads as big as will fit on a 64 foot boom but reports mechanical difficulties.

Fig. 8 - Don, himself! K5DUT operating at N5UN.

top section is telescoping, from 2-inches in diameter down to 1/2-inch in diameter. It is 55 feet long (fig. 11).

"The tower took about 80 hours to build and only 10 minutes to put up! It took a crew of four: one to supervise, one to drive a four-wheel truck which pulled the rope, and two on stabilizing ropes. A 36 foot gin pole was used, with a two point rope attachment to the tower, one at the 40 foot level and the second at the 88 foot level. A compound block and tackle did the job.

"The vertical antenna is insulated from the ground by fiberglass plates which fasten the tower to the base (fig 12). A yard of concrete is used and the mounting assembly is made of angle iron. The tower measures 12 feet across at the base and is 137 feet high.

"Antenna resonance with 23 radials is 1815 kHz. and covers up to 1900 kHz. with a very low value of s.w.r. The antenna can also be fed in series with a parallel tuned tank circuit at the base for 80 meter operation. And during the first few days of operation on 160 meters, very good reports have been received from New Zealand and the east coast. Figs. 11, 12, and 13 show closeups of the tower."

"Now, that's a *real* DX antenna for 160 meters. And no guy wires", exclaimed Pendergast. "It should be a blockbuster for the coming DX season!"

"Yes", I agreed. "And do you want to see another block-buster antenna? Well, here's a photograph of the array at JA1KSO in Japan (fig. 14). No details, but I see a tribander beam at the bottom, plus a six meter array. Then at the top is a 40 meter beam, plus two other arrays for 10 and 15 meters. And to top it all off, a 4-bay array for 144 MHz. That's quite an antenna farm."

"Yep", said Pendergast. "It makes me proud when I work DX with my ground plane to think of all the Big Guns that I beat out!"

"The ionosphere is a great leveller of signals", I replied as I gathered up the photographs. "The station with the big antenna has a lot going for him, but he's not always the loudest signal, nor the first one to win out in a pile-up. Operating skill still means a lot and being at the right place at the right time is very important. I've worked a lot of DX from exotic overseas locations and let me tell you it is very easy to pull an S-6 signal out of a pileup of S-9 signals. Of course, when everybody is piled up on a single frequency and the skip is good, everybody is S-9 plus and you can't understand anything. But, with the breaks, the fellows with small anten-

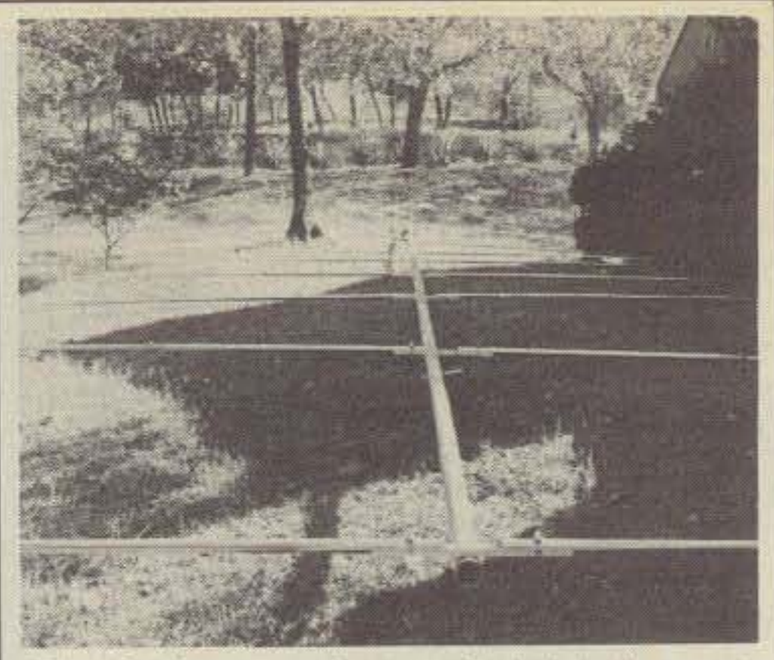


Fig. 9 - An experimental eight element Yagi on an 82 foot boom is ready to go up at K5DUT. Watch out for this one!

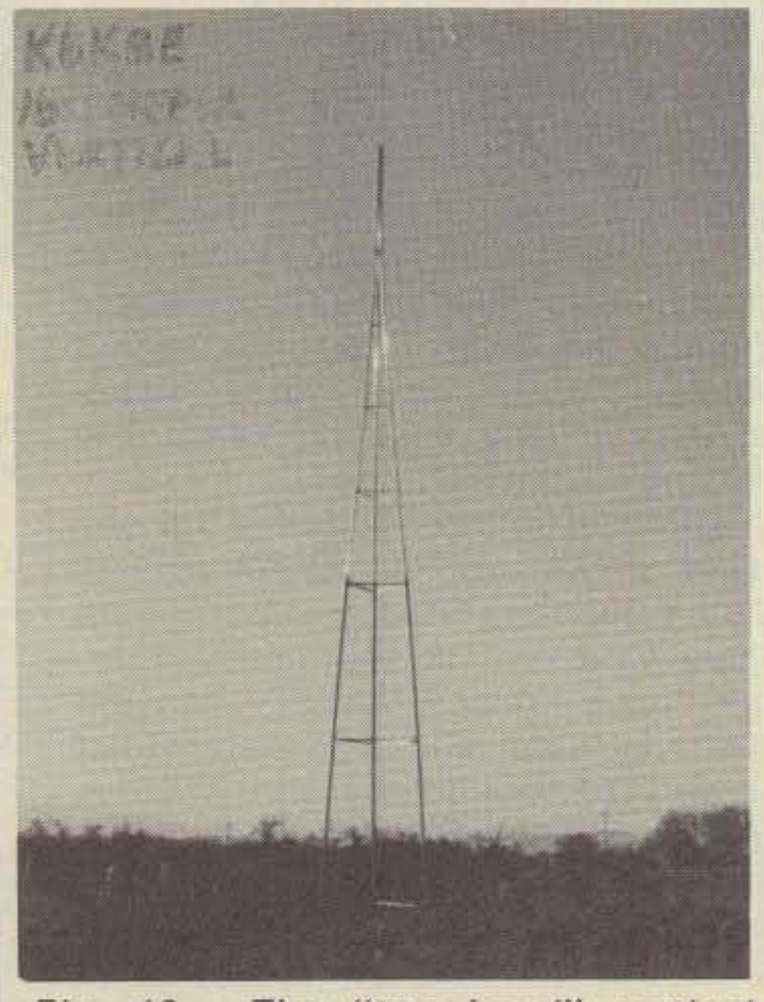


Fig. 10 - The "top band" vertical antenna at K6KBE works plenty of DX on 160 meters. Self-supporting tower can also be tuned for 80 meter operation.

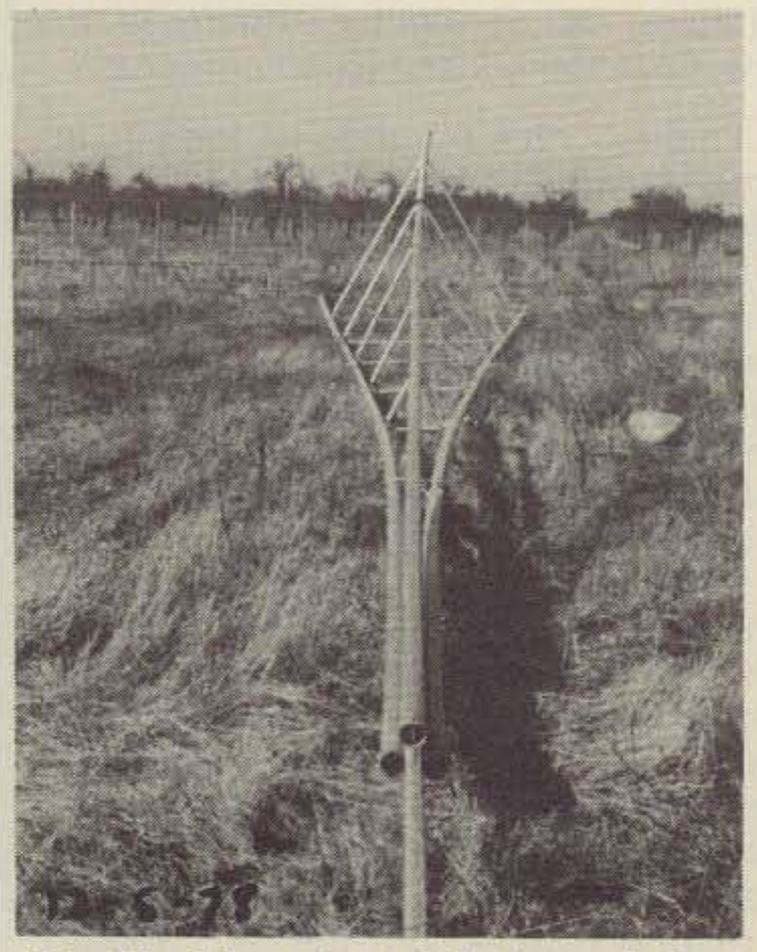


Fig. 11 - A top view of the tower before erection. Note the Eiffel-tower effect of tapering.

Fig. 12 - The tower at K6KBE is insulated from ground by means of fiberglass plates which hold tower to the mounting base.

nas still work plenty of DX. You can count on that. Especially now that 10 meters is booming. Power and big antennas don't mean so much on that band."

"I agree", said my friend. He went out the front door and then called back, "I'll see you next week. I need some ideas for my next Quad antenna project. But it won't be a Monster Quad. I don't have the room for that. And don't forget that Doctor Liv has just received his Advance Class License, so he's breathing hot and heavy for a new DX antenna."

"You two fellas have your summer vacation program all worked out", I laughed. "I'll see you on the low end."

Correction: The two-band loop antenna design described in the March, 1979 antenna column was erroneously attributed to W3GNQ. This antenna is an original design of George Badger, W6TC. George furnished the information concerning

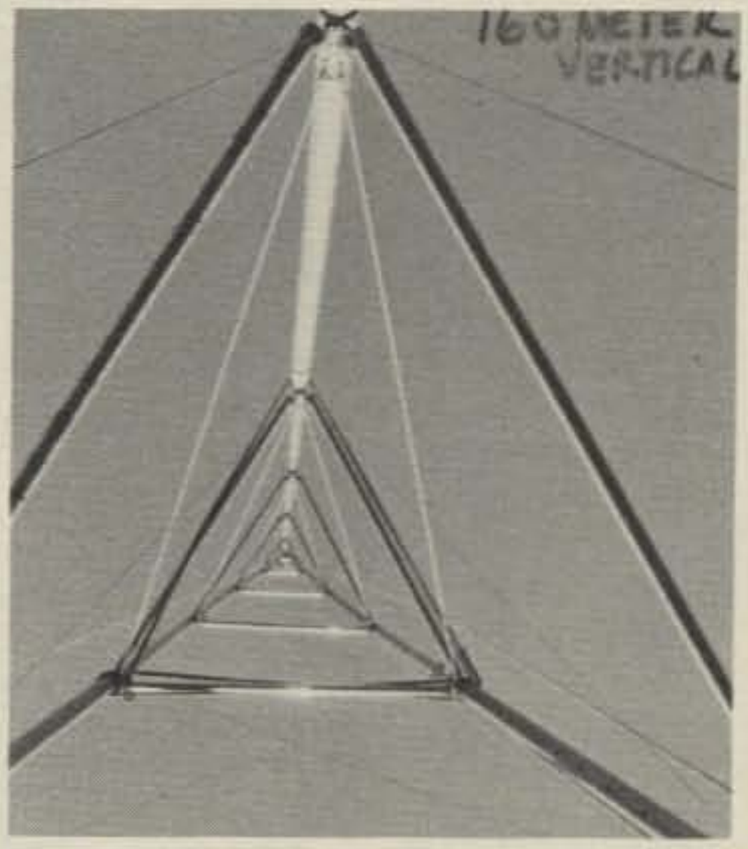


Fig. 13 - Looking up inside K6KBE's tower showing internal stressing.

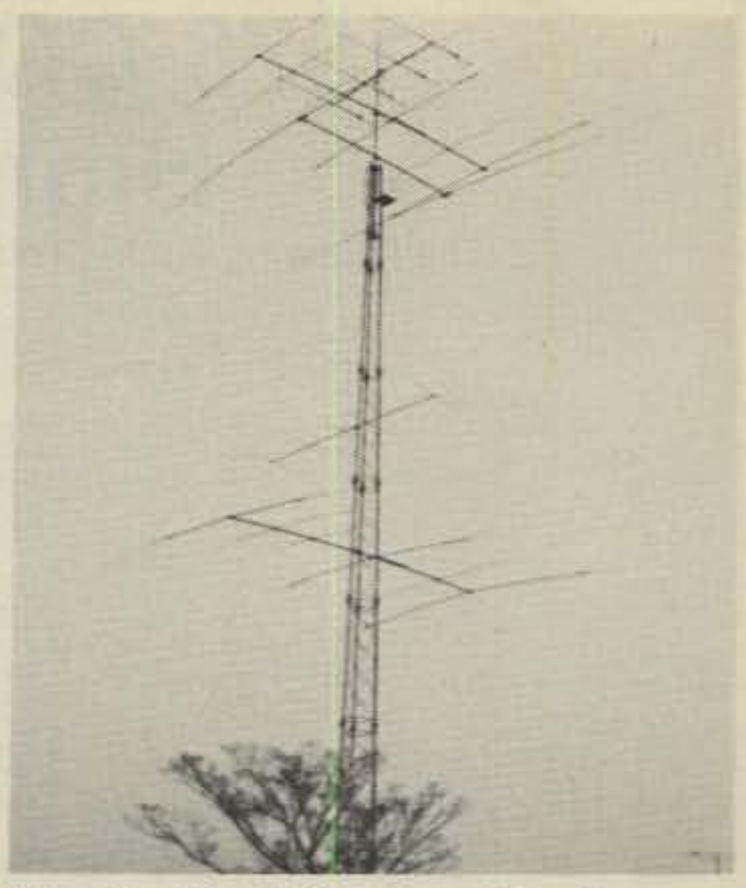


Fig. 14 - The "Christmas Tree" antenna installation at JA1KSO.

two-band operation to Dick, W3GNQ. My apologies to all concerned.

For additional information on beam antennas of all types, plus data on simple wire antennas, be sure to read "The Radio Amateur Antenna Handbook", by W6SAI and W2LX. Available from Radio Publications, Inc., Box 149, Wilton, CT 06897. Price: $6.95 plus 50¢ to cover handling and postage.

1978 CQ World Wide DX Contest
High Claimed CW Scores

The following are high claimed scores received *and processed* by February 8, 1979, So don't be alarmed if you don't see your score listed.

USA
Single Operator
All Band

W3RJ	2,246,108
W1ZM	1,808,850
N2LT	1,801,314
K9DX	1,709,964
W7KW	1,660,500
N9MM	1,585,080
N4RR	1,442,220
W2REH	1,390,311
K4PQL	1,317,444
W2IB	1,214,760
N4RV	1,144,902
N7XX	1,113,104
W2GD	1,099,947
K1VR	1,089,600
K2BU	1,046,843
K5GO	1,045,953
W7IR	1,029,105
K2LE	1,023,834
N6AR	945,308
AE2A	911,880
W5AC	906,675
N3DA	899,612
W3GRF	871,448
K0ZZ	857,406
W3FV	849,758
N6QR	849,400
N2RM	842,823
K1ZZ	832,284
K6RR	814,592
W2AEE	791,903
K5OA	781,722
N8SW	759,759

Single Band
1.8 MHz

K1PBW	6,045
K6SE	4,437
W8LRL	3,838
W1BB/1	2,716
N4PN	2,139
W5UR	1,296
W7XZ	1,180

3.5 MHz

W9LF	31,200
K5NU	19,536
N7RM	13,392
WB3AVN	11,772
N7DF	11,427

7 MHz

W5UN	139,500
N6AW	121,140
K6ZM	117,944
W4MJ	103,800
W5WMU	97,929
K9KU	81,016
W2ER	69,258
K2IGW	61,540

14 MHz

W6VPH	440,480
N4EA	312,750
K9AM	292,680
K8ZH	269,750
K3FN	249,625
W5FO	237,184
W2SUA	235,752
W1YN	224,523
K2VV	222,548
K9RF	204,750
W7MB	203,286

21 MHz

N6CW	302,211
K4RV	275,730
N5CR	246,384
K8CX	242,892
N6TV	223,808
N1GL	189,924
K9RN	182,665
N7ZZ	136,770
W8UA	103,200

28 MHz

K8MFO	151,440
N0DX	134,351
W1LK	123,384
K5TJ	120,087
K4BAI	114,798
W8WPC	108,391
K1SA	100,985
W0YK	95,400
W1NG	92,494

Multi-Single

N3RS	2,911,722
K1PR	2,381,350
N4AR	2,323,794
K5JA	2,258,410
W3BGN	2,206,905
N3DG	2,166,836
K4VX	1,985,277
W2YV	1,903,110
K0UK	1,428,000
K6XV	1,316,225
N1AC	1,120,688
W9LT	1,104,600
W1MX	1,009,656

Multi-Multi

W4BVV	4,959,904
W2PV	4,768,326
K3WW	4,610,464
K5RC	4,441,255
K0RF	3,548,934
W3FA	3,491,775
W3MM	3,432,134
K8LX	3,038,409
K3RL	2,809,436
W1RR	2,356,857

DX
Single Operator
All Band

CT3BZ	5,135,104
KP4RF	4,861,560
PJ6CG	4,458,267
ZS6WW	2,866,120
XE2MX	2,048,010
ZL1ADI	2,040,832
EA2IA	1,865,754
GU5CIA	1,650,350
KH6IJ	1,635,711
EP2IA	1,537,820
VC7WJ	1,463,708
VE3AKG	1,181,460
VE7CC	1,115,684
DJ5JH	1,080,772
VP2LGR	1,069,260
SM5AOE	1,026,716
CE3XV	1,014,699
KL7RA	903,312
YV1NX	860,794
TG7AA	856,989
XE1VV	839,965
KH6NO	830,522
VE1AIH	827,310
JA1BWA	750,233
OH2PM	737,044
EA8FO	721,468
VU2GO	703,638

1.8 MHz

VR3AH	20,310
YV1OB	12,879
YU3EF	8,294
DJ8WL	8,288
OK1ATP	7,890
OK1DFF/P	3,807
EI2CA	3,560

3.5 MHz

9K2EX	95,760
YU1ACS	86,009
DJ9CB/P	84,277
OK1DOK	70,956
G3XWZ/A	66,348
WA1RFM/VP9	52,687
DJ9MH	50,232
YU5FAA	49,436
OK3BDE	49,348
DK3GI	48,108
OH2BCI	43,724

7 MHz

YV4OY	175,857
I2FGP	172,809
JA2INO	161,160
ZL1AMO	156,914
G4FAM	95,744
KG6DX	84,864
OH8SR	73,760
VO1HP	72,996
JA1JIO	46,576
CF5RA	45,126

14 MHz

KV4FZ	940,230
K0AX/DU2	587,273
EL2AV	402,112
YU2CDS	387,933
JR1RNC	274,540
DK0TU	248,035
CG6KW	221,760
JA2GWF	220,335
VK3MR	215,200
JA2BY	207,854
JG1EEE	201,858
JA2EIV	200,640

21 MHz

LU8DQ	998,480
KH6XX	825,146
ST0RK	499,296
YU3ZV	493,816
KH6GMP	395,458
PY3CFD	385,575
OH8SW	285,253
JA2VUP	273,312
G3FXB	258,980
JA2NDQ	252,555
DJ0UJ	238,358
YU2RYU	227,745
I4JCC/5	226,440
OH4SL	216,720
I1FOX	209,776

FY7BC	581,973
ZE1BL	372,504
4X4UH	311,480
HI8MOG	295,295
DL1BU	210,018
DJ6RX	174,924
VE3KZ	164,528
I0HCJ	149,400
ZS6ME	132,230
9H1CH	132,066
VK4XA	125,520
YU3ER	111,435
YU1EFG	108,676
ZX2XB	108,288
IT9VDQ	105,336
VE1TG	100,854

Multi-Single

HH2CQ	5,277,526
XE1OW	4,924,362
YU3EY	2,653,807
LX0RL	2,389,965
N4UM/C6A	2,369,400
OH1VR	2,255,274
EI9CB	1,785,550
OK1KSO	1,520,263
OK1ALW	1,469,431
W6QL/6Y5	1,204,320
OH2AA	1,194,928
EI1AA	1,136,762
LZ7A	1,129,968
OK3VSZ	905,905

Multi-Multi

EA8CR	17,799,061
EX9A	8,772,808
HK0COP	8,291,661
OH1AA	4,270,332
SK2KW	4,129,076
JA3YBF	4,042,347
JA3YKC	3,525,739
4U1ITU	2,300,376
JA1ZLO	1,401,120

Along about the time that Arizona was admitted to the Union, a young boy in Hartford, Conn. began tinkering with notions of electricity and wireless. "Twisty" Ljongquist reflects over those fledgling days and to the chance meeting that brought him to amateur radio.

REFLECTIONS AND RECOLLECTIONS

BY E.W. "TWISTY" LJONGQUIST, *W4DWK

Several years ago, while rummaging through boxes of old books and papers in the attic of my sister's garage in Connecticut, I came upon something that I thought might be of interest to fellow hams. I had hoped that I might find my remembered store of old wireless magazines -*Radio News, QST,* and many that I had saved years ago, and left in a box in our old house in Hartford, before I left my boyhood home for working, adventure, and eventually, college. Also there had been a box of my carefully constructed gear, my first regenerative receiver, my trusted galena detector, the Ford spark coil, head set, and many parts now forgotten. But the family had discarded all that "rubbish" long ago, I found later. But I did find a note-book that I had forgotten, which I had carefully made, copying a few circuits, incorporating parts of a wireless manual which was distributed by Mesco.

The notebook itself is one that was used in high school in science classes to record experiments, and in those days we drew very carefully pictures of frogs and worms in biology, chemical apparatus in chemical experiments, and in physics classes the same diagrams pertaining to that subject. These notes and diagrams could add greatly to one's final mark in any of these subjects if neatly and accurately done. There would have been quite a bit of resistance to this today, if I had ever tried this discipline in class, even in college teaching.

The notebook is a loose-leaf affair, so it has not been too much of a chore to disassemble it and copy a few pages on a machine so that some old-timers can remember some of their bygone efforts. And much of the Mesco catalog's manual still pertains today. "The two principal requirements of an aerial are length and height. Up to certain limits, the higher and longer an aerial the better." Nothing was said about resonance, however. The dimensions are quite haphazard. "For all around amateur purposes an aerial should consist of about 4 No. 14 copper or phospher bronze wires, having a flat top of about 60 to 70 feet, but in no case should the total length, including the ground, be over 120 feet." This for 200 to 300 meters? Well, in those days you hung all the r.f. you could onto the antenna, and just splashed it far and as wide as possible. If you were rich enough to own a hot wire am-

*1655 Meridian Road, West Palm Beach, Florida 33508

A Simple Radiofone Operated on Six Volts

By ERNEST GRAUGER

FOLLOWING is a description of a simple radiofone made entirely from "junk" which may be found in any Radio experimenter's workshop. With this set, using a single Western Electric power tube surprising results have been obtained.

Litzendraht is employed in the winding of the inductance and consists of twenty strands of No. 38 enameled wire. The inductance is wound on a tube 4½" in diameter and 6" long, and consists of 100

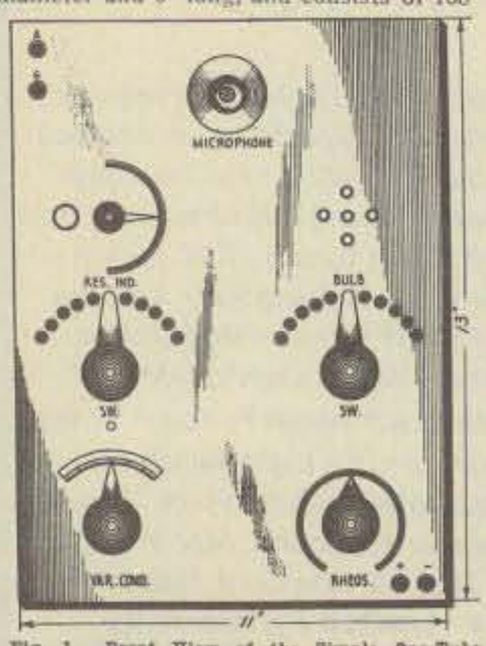
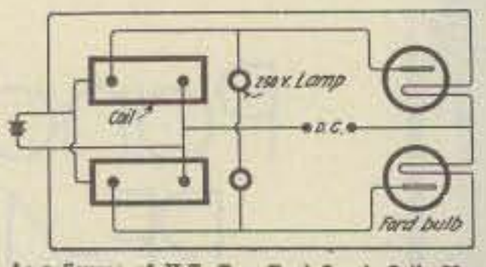


Fig. 1. Front View of the Simple One-Tube Radiofone.



As a Source of H.T. Two Ford Spark Coils May be Used With Rectifier Tubes.

turns of Litz. It has twelve taps taken off as follows: 5, 5, 5, 5, 10, 10, 10, 10, 10, 10, 10, 10. These are brot out to the contact points on the left hand switch in the panel layout, Fig. 1. The contact points on the left hand switch are connected in parallel to the ones on the right, as shown in Fig. 2.

The variable condenser used is a De-Forest type C. V. 500. As this condenser short circuits on 90°, a hard rubber stop should be used to prevent this, otherwise no signals would be transmitted.

The rheostat used to control the filament temperature is a Paragon, which is noted for its high insulating quality. The rheostat used should have an actual carrying capacity of two amperes, as a Western Electric tube takes approximately 1.3 amps.

The microfone was purchased from the Electro Importing Co. I tried many others with varying amounts of carbon, but found that the E. I. Co.'s worked as good as any of them. A six-volt battery is used in series with the primary of the modulation transformer and the microfone.

A Ford spark coil is used for modulation transformer, and works efficiently.

The resonance indicator is a very simple instrument and consists of a turn of copper wire shunted around a 2-volt bulb, as shown in Fig. 3. The amount of wire in the circuit is varied by the switch blade, Fig. 3.

There are many ways of obtaining the high tension for a wireless telefone. The most efficient is the 500 V. storage battery, the most practical is the motor-generator and rectified A. C. is the cheapest. I am going to give a very simple method for obtaining the D. C.. The necessary materials are as follows:

Two Ford spark coils,
Two Ford headlight bulbs,
Two 250 V. 16 C. P. bulbs,
Two lamp sockets,
One 6-volt battery.

(Continued on page 148)

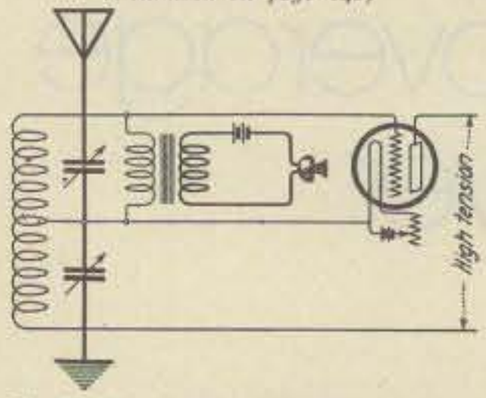


Fig. 5. Diagram of Connections of the Five-watt Radiofone Set.

Probably the most impractical circuit I have ever seen. It blew up on me, as I remember. Imagine 500 volts of storage batteries! The Ford coils burned out, the vibrators stuck and, in all, it was a grand fiasco.

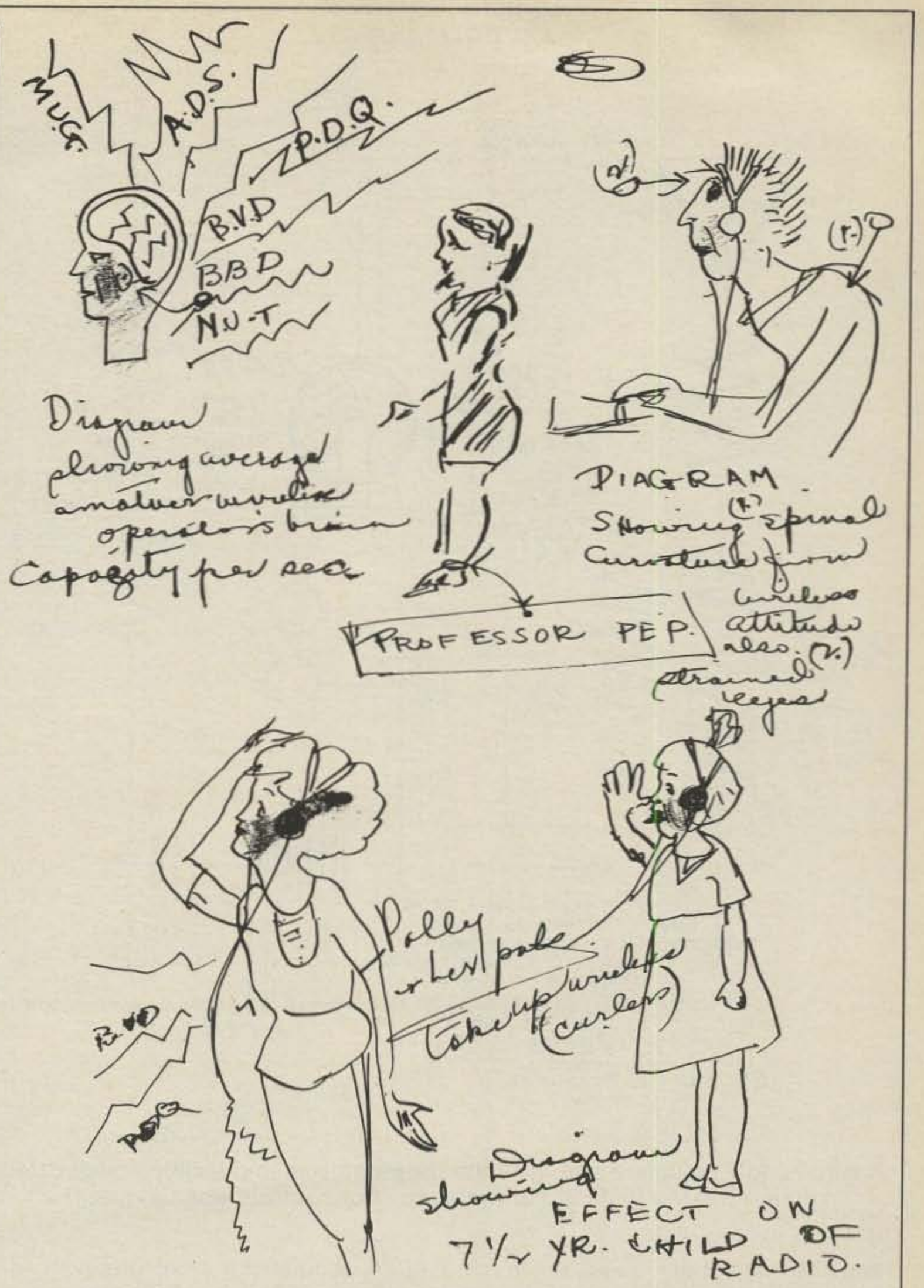
meter, you put it series with the aerial and soaked those wires up there with as much soup as you could. Sounds like the California and Texas boys of today, doesn't it? CBers also!

This was my first serious attempt at erecting antennas, copied faithfully from the diagrams. It surely was a ponderous affair, supported at the far end by a huge oak tree at the end of the lot, and the other at the eaves of a three-story house. The spreader were iron pipe, many huge insulators, and the down leads were gathered into a brass block with set-screws. The actual lead-in was at least #6 wire, which led to the slate-based knife switch, which was faithfully grounded after each session of operating to a thin rod in the ground, at least three feet long. It seems ludicrous now, but what did all this connect to? My poor little Ford spark coil. Guess it was over-engineered.

By the way, no sooner had I slung this contraption up into the air than a cop appeared at the front door, saying the neighbors were complaining that I was causing interference when they tried to hear KDKA! Sound familiar?

The "set" was fabricated in various ways. The spark gap, over which you hung your nose early in the winter mornings (they said it woke you up, and it did!), was made of sawed-off zinc battery rods, drilled and tapped for long screws, and mounted on binding posts and a wooden base. Soldering the leads to the buttons on the Ford coil was a chore, with a cumbersome tinners copper heated on the gas stove. No paste in those days, just resin. The condenser was made from photographic glass plates, soaked in water until the yellow goo could be scraped off. I was lucky to find an old China tea chest in the dump, and it furnished enough heavy lead foil for the condenser plates. I cut the coils for the helix for "tuning" the rig from roofing copper, with many a bloody finger and blister. Various boxes and frames were made of scraps of wood, and the condenser was in a cardboard box the right size, and immersed in paraffin. The last could easily have withstood a load of several kilowatts.

The receiving was shaky, at best. My loose coupler was of the classic oat and cornmeal cylinders, wound, tapped, and shellacked. I tapped both the primary and secondary, but one could receive anywhere on the thing, no matter where you switched it. The earphone was bought from a young crook who stole them from apartment house foyers, and no questions asked. You had to have an old doorbell with the bell removed, hooked up to a push-button to find a "sensitive" spot

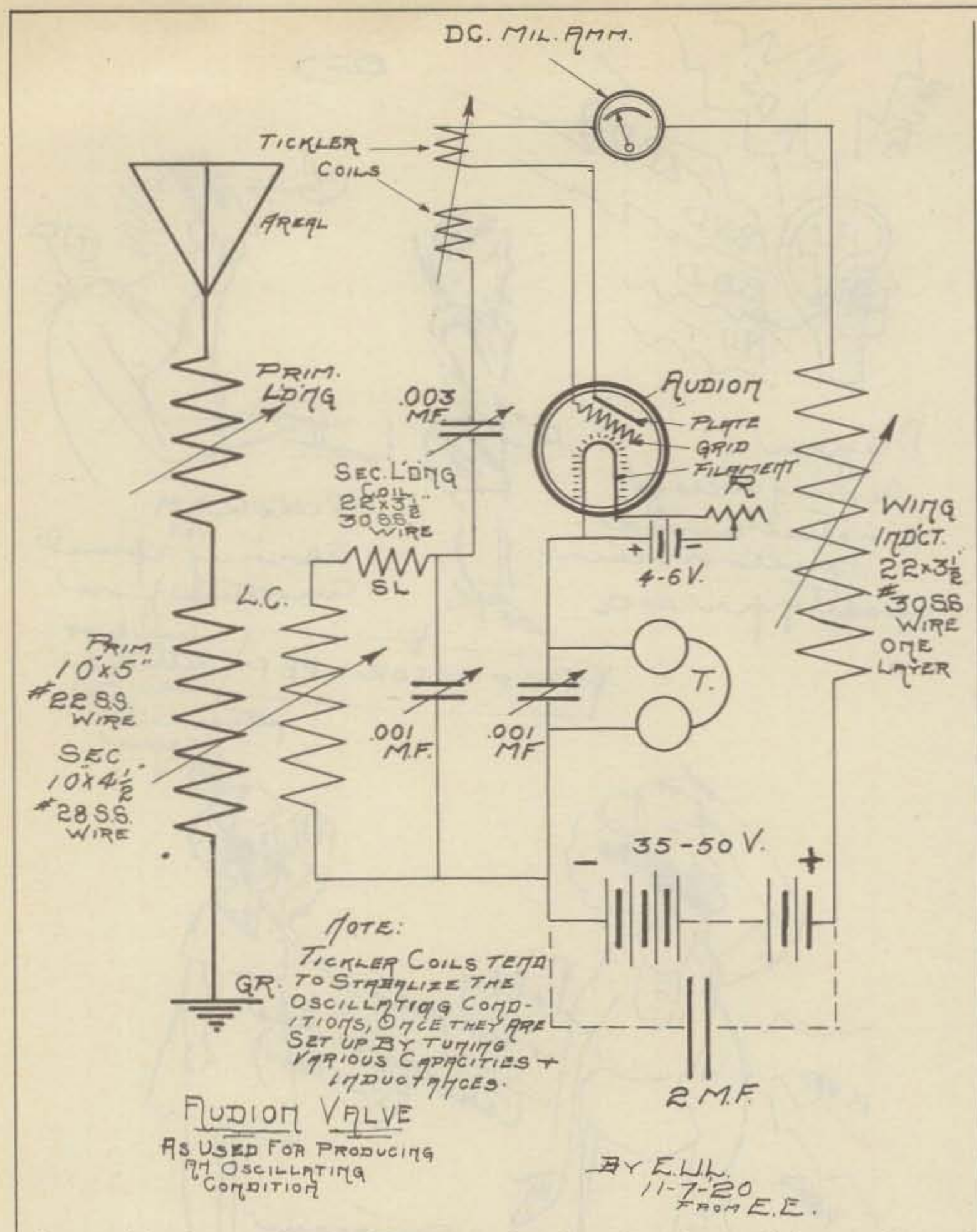


Never allow your notebook to get into the hands of your sisters. The illustration of the ham is a crude depiction of the average posture extant.

on the galena. A great technical breakthrough was drilling a small hole in the floor, and putting the buzzer in the cellar where it would not drown out the signal in the phone. Switching from send to receive was with a porcelain based double pole, double throw switch. For power, I found a garage several blocks away that would rent storage batteries for 50 cents a week, and I carried them back and forth in a little red wagon borrowed from the kid next door. Actually several contacts were made, rather precariously, but in those days if your toothpick fell out of the vibrator of your Ford coil, everyone let you know. Our squeaking notes were a futile try at imitating the whine of the Alexanderson alternator. We copied 1AW whenever Maxim was on, and a land line net warned us when that fine fist was on the air. He sent like a machine, at a steady, slow pace, and never an error. And so it went for a while.

How this all started to happen, and continue sporadically, for fifty seven years or more, is slowly coming back in memory. Mayhap the reader can also trace the growth and progress of his interest in ham radio in some fashion, and get pleasure in retrospect.

About, 1912, in the outskirts of a small town in Connecticut, the dirt road in front of our house was transformed into Macadam surface,



A surprisingly complete and accurate drawing of an impossibly complicated affair. I tried to build it, but the number of controls was too great!

and the machinery used, the huge, hot steamroller, the graders, the sweating laborers, and general excitement was a paradise of activity for an eight year old boy. Along with all the rest of the equipment there was a gasoline "one-lunger" pump, used to fill the sprinkler wagon from the brook down the road. Batteries, dry cells, seemed to be discarded quite frequently, and I begged the foreman for these, to him useless. I struggled home with an armload of these treasures, not knowing yet what to do with them, but I had an inkling that they might be valuable.

So I began to experiment with them. Some baled hay wire, a piece of copper wire, and some fence wire coated with zinc showed me how to hook them up so I could get a spark, and more surprisingly, the colors of the sparks changed when different metals were used at the sparking contacts; reddish for iron, greenish for copper, and bluish for the zinc. Little did I know that this principle was uses years later to analyze metals in laboratories.

My mother, seeing my interest in this sort of thing one great day gave me a copy of *The American Boys' Book of Electricity*, by Charles Sevier. The batteries had long worn out, and much else had happened. We had moved from the country to Hartford, I was in a new environment, full of contacts that boys crave and need. After reading the book several times, I remembered the country boy with his precious dry cells, and soon the basement was cluttered with an old table, several jars full of a sal ammoniac solution, in which hung a zinc and a carbon set of rods. These, hooked together, furnished me with sparks aplenty. In the manual training class the instructor was also interested in electricity, and soon we had a project going: making a key and a sounder, based on instructions in Mr. Sevier's book. It worked pretty well, but I had no one to talk to, and the American Morse, with all those dots and spaces, was quite boring after talking to myself for a while.

There was a little guy named Arnold who seemed to watch and follow all I was doing in the shop class, and as no one else noticed him, neither did I. But one day he approached me on the playground, and said "There's more fun in wireless."

"Well" I thought, "You little squirt. So what?"

He persisted, and the upshot was a side trip to his home on the way home from school.

His mother was baking cookies, and what a heavenly odor! But more interesting was a collection of wire and gadgets fastened and strewn on an old table in the corner of the kitchen. If complication makes things attractive, this surely did, in my unsophisticated eyes. Arnold sat down in front of this scramble, and pushed some things around, then held an earphone in my direction. Wow! Signals! Lots of them, all at once!

A few cookies, and lots of chatter later on, and I took my bemused way home. We had arranged to meet at my house right after supper to go over to some man's house and see a "real" station.

As we scuffed through the fallen leaves of late autumn in the early darkness, Arnold tried to explain to me some of the advantages and fun of wireless. I was quite skeptical, but was hardly prepared for what was to come. We finally arrived at 550 Prospect Avenue, and I hung back, a little timerous at Arnold's confidance when he rang the door-bell. I could not have been more mistaken! A tall man, with a grey pompadour, bright black eyes and a hearty, energetic manner welcomed us with a hearty "Come in, fellas!" I yanked off my cap, and stood entranced at the unexpected force of this man's personality. Things began to blur, but Hiram Maxim said, "Let's warm up Old Betsy."

It was quite an hour. I think we went upstairs, and there on a table stood a neat array of boxes, switches, wires and some small lamps which soon glowed. A few switches were thrown, and a rumble from somewhere else in the house (or was it outside?) started. On the table was a large (to me) marble-based key, which caught my eye. More of this later! Chatting all the while, explaining to me the unexplainable at this time, Maxim tapped the key a few times. Didit dit, didit dit.

Every time he pressed the key there was a muffled answer in angry crashes somewhere else. Wow, if noise was the name of the game, this guy had it! Then the key began to speak a language I knew somewhat. I heard some letters- "CQ CQ CQ" and made out 1AW sent several times. He turned one of his earphones around and in our direction and soon we could hear the same sort of crashes coming our way, but very much fainter. After fifty some odd years the picture and impressions are still with me, though details have faded, nut the impact of the demonstration surely started me on a path that I have seldom regretted through life.

Mrs. Maxim, a jolly person, soon brought in cocoa and cookies, and even at that time I marvelled at her forbearance at this unusual disruption of domestic quiet!

The walk home was a silent one for me. Arnold chattered away, but I was in a daze. I was *hooked!*

After the nine grades in grammer school, I was in my freshman year in high school, and I must say I was quite intemperate in my pursuit of the hobby. Study became sporadic at best, what with building the aforementioned station, staying up until early morning hours listening to far-off stations in New York and Maine, and building everything I could out of *QST, Radio News,* and the *Electrical Experimenter.* Finally disaster came, and a few F's on my report card, and falling asleep during the day brought this paradise to an abrupt end. My father, a direct acting burly Swede yelled "Out wit de Yunks! And you go to vork." I did, and as a blueprint boy and tracer at the old Hartford Rubber Works. Radio listening became intermittent, and my father ripped out the station and cut the ropes on my treasured antenna. My membership in the Radio Club of Hartford lapsed, and only once in a while did I listen to those beautiful dits and dahs. Girls, and love affairs with cars, a Jordan Blue-boy and a Lancia Lambda, a return to high school, college, marriage, kids, business, and all. You know the rest.

My few visits to the Maxim home, my wireless pals, the circuits and gear, were almost forgotten.

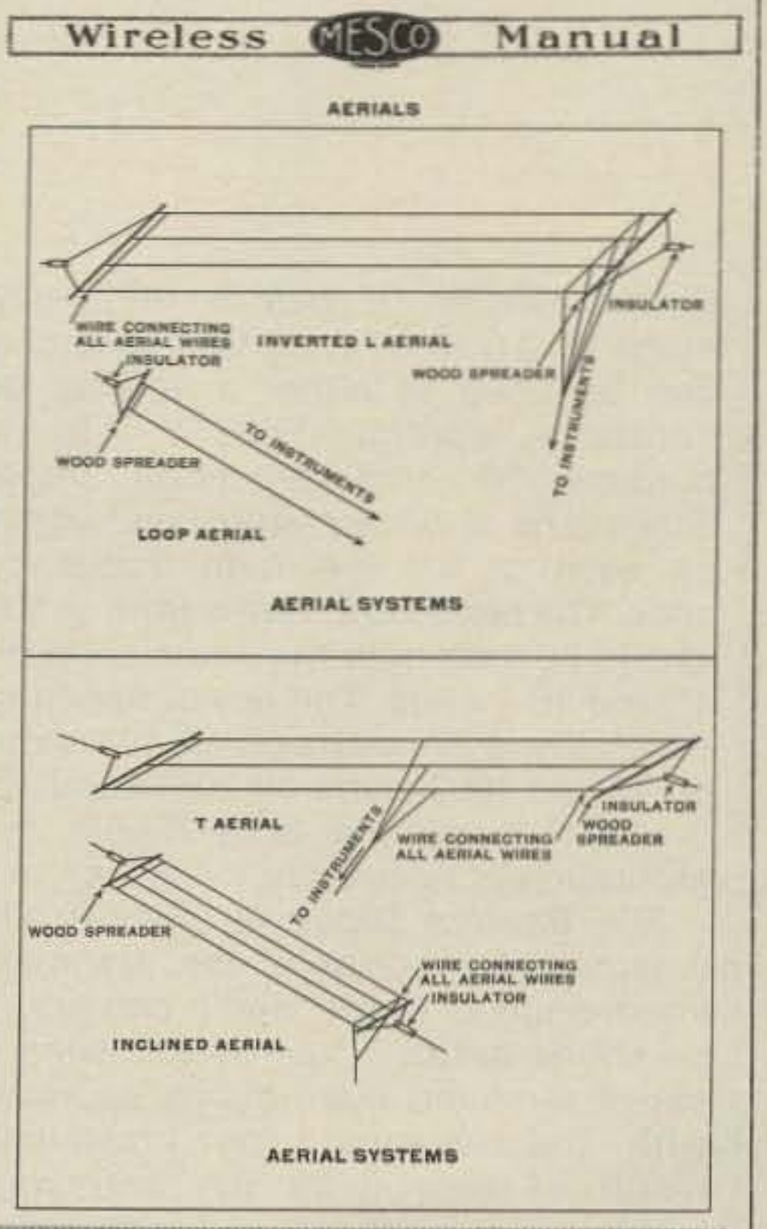
There is one note that I must add to this phase of my experiences in ham radio. After World War 2, Lew McCoy (W1ICP) moved to Granby, Connecticut, where I was living. He got me going again, but that is a separate story. But a ray of the far past came through. One day, while working on some experiment or something, I noticed, up on a shelf in Lew's shack, a familiar object I would never forget. It was a heavy, marble based key.

I said, "Where did you get that?"

"Do you know what it is" asked Lew.

"I sure do. That is Maxim's key. I saw it at his house on Prospect Avenue in Hartford."

It seems, while working with Ronald Bourne with the ARRL museum, W1ANA had told Lew of the key, and wanted to hand it on to someone who would take good care of it. W1ANA did not make a bad choice, for at the Rochester Hamfest last Spring, the key was presented to the Antique Wireless Museum, and accepted at the banquet by Mr. Kelly,



This illustration shows the great accuracy of the dimensions of antennas in 1919 or 1920.

and I spoke very shortly in confirming the story of that famous key.

A word should be said in respect to the two "Elmers" who started and then returned me to the great hobby of ham radio. Hiram P. Maxim was not only an enthusiastic ham, but a superb organizer, who saw in its infancy to the future of radio communications, but above all was a recruiter. Numberless hams were introduced to the hobby, catching his enthusiasm and forsight

The recruiting and shepherding of Lew McCoy can be cited also. Probably no ham alive has brought into the hobby more neophytes than W1ICP. Maxim was a great recruiter, and Lew still is.

CQ Reviews: Comm Center's Bantam Dipole

BY IRWIN SCHWARTZ*, K2VG

A large number of amateurs have neither the room nor the desire to erect a large antenna array. In fact, it is probable that multi-element antenna owners are in the minority of the amateur community. In addition, there is a growing number among us who take the hobby along on vacations (very often to our spouse's chagrin!). Furthermore, apartment dwellers have always considered themselves the runts of the litter (in many cases, justifiably so) when it comes to bagging that rare DX.

All of these amateurs - small lot owners, apartment dwellers, vacationers, etc., that is, the non-antenna farmers - may have an answer to their problems and prayers in a new antenna distributed by Comm Center of Laurel MD.

The new antenna, called the *Bantam Dipole,* is manufactured by Smithe Aluminum and is distributed through Comm Center. It has a frequency range of 3.5 to 54 (yes, 54!) MHz and can be used in either a vertical or horizontal configuration. It has a nominal 50 ohm feedpoint impedance and a respectable bandwitdth on each of the five high frequency ands. The bandwidth varies from ± 100 kHz to 80 meters to the entire band on 15 and 10 meters. The power handling capability is 200 watts on 80, 400 watts on 40 and 1000 watts on 20, 15 and 10. Since the antenna is a dipole, no grounding is necessary.

The *Bantam Dipole* is specifically designed for portable use. Its maximum span is 13 feet and it can easily be shortened to 7 feet by following a set of modified instructions supplied with the antenna. The immediate result of shortening the antenna's width is that it can be used in an apartment or in the attic of a house. The end elements have a spread of slightly over 6 feet.

The antenna, which comes unassembled in a plastic carry case, is put together and taken apart with a minimum of effort. With little practice it should take about five or so minutes to go each way. The dipole itself is mounted on a plastic mast which allows mounting of the whole assembly on a taller mast, or under very portable conditions, on a camera tripod (see photo).

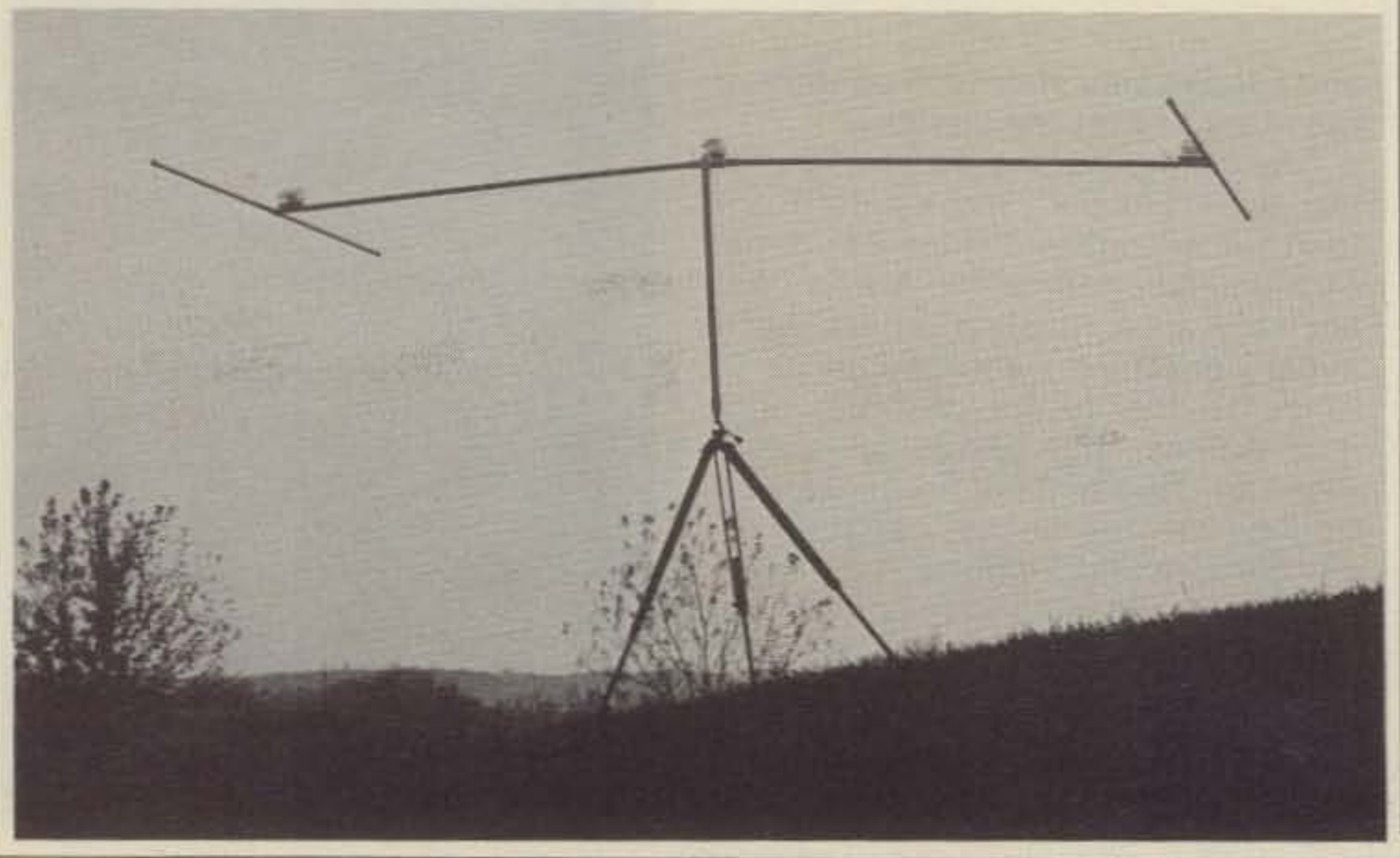
In addition to assembly instructions, Comm Center suggests specific tapping points on the loading coils which correspond to various operating frequencies across the five bands. Of course, as a result of variations in construction, ground effects, differences in transmitters, etc., it cannot be expected that Comm Center's suggestions for tapping will always be right on the money. A little experimentation may well be necessary for minimum s.w.r. on your particular frequency.

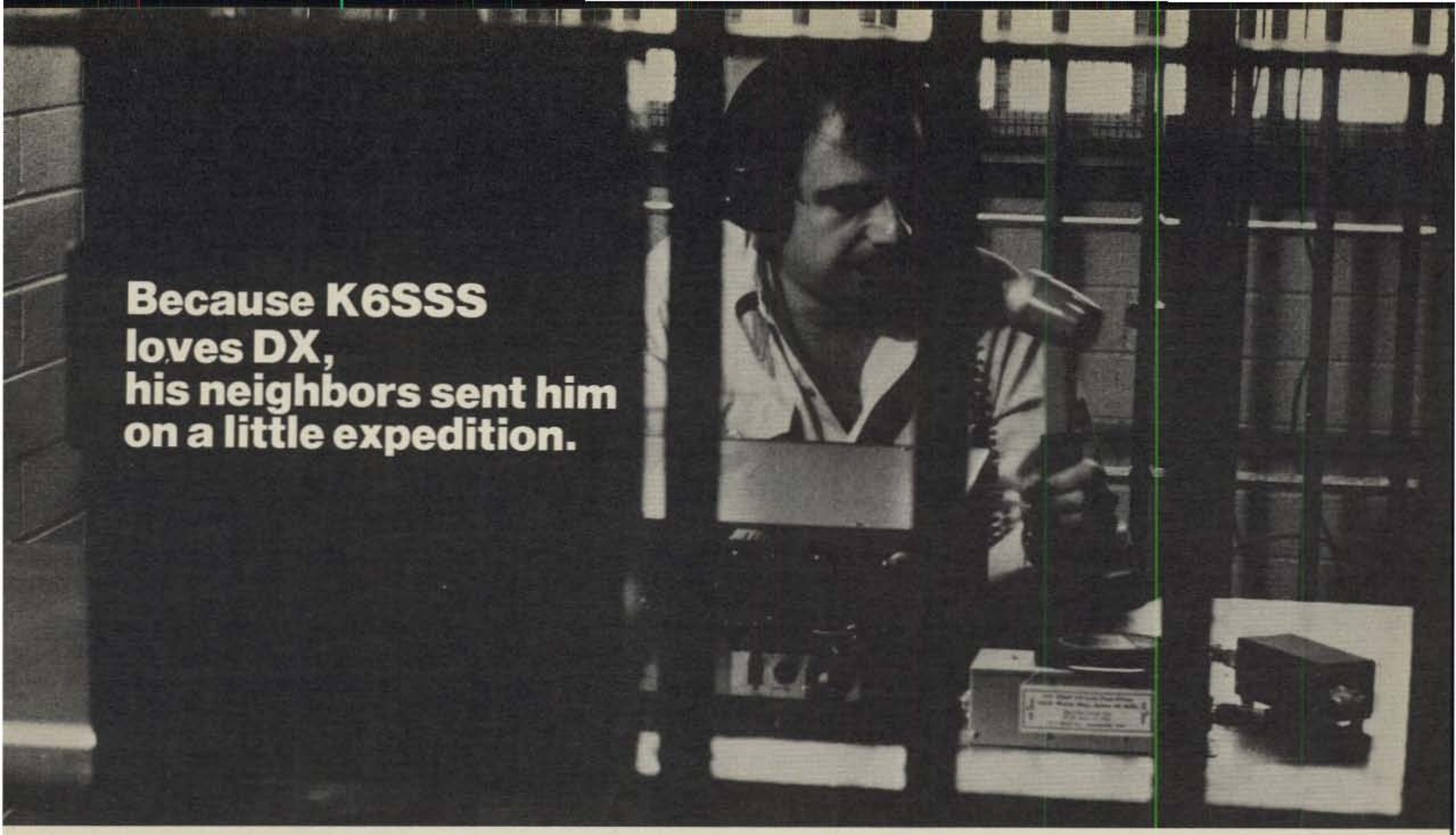
In all, the antenna performed admirably on each of the five h.f. bands. I used a Drake transceiver and was able to achieve a 1.5:1 or better s.w.r. wherever I tuned. With the use of a transmatch I was able to fool my transceiver into believing it was seeing a purely resistive load. The final result was unity s.w.r. everywhere.

On balance, the *Bantam Dipole* is a perfect mate for your transceiver while on your vacation, in your apartment, or on your small lot. It can handle the full legal power limit on three bands so that those of us who are deprived of large arrays can compensate somewhat by beefing up the power. All things considered, this little antenna would be a handy thing to have.

The *Bantam Dipole* sells for $59.95 and is available from Comm Center Distributiors, Inc., 9624 Fort Meade Rd., Laurel MD 20810. Write to them or circle number 60 on the reader service card.

*Technical Editor, *CQ*





One neighbor sued him for interfering with Lawrence Welk. Another filed a complaint about that "monstrosity" in his backyard—a tribander at 40 feet.

7,781 tangled with the law

The K6SSS case is an example of what can happen to you these days. No matter where you live. It is hypothetical. But real lawsuits are being fought right now by people like K50VC, W2LTP, WB7NOM, W8NRM and W6UFJ/N6QQ to name a few. Last year nearly 8,000 unsuspecting hams and CB'ers ran afoul of the law. Sure, they're taking their fight to court—but they're losing! Never mind that they've got building permits for their towers. Or that the FCC says their rigs are "clean." Judges are ruling against them. The alarming part is that every suit lost makes it that much easier to nail the next guy. Prosecuting attorneys love to cite recent adverse decisions during a trial.

Legal ammunition available

The tragedy is that suits are being lost that could have been won. But TVI/RFI and tower cases fall into a little-known area of the law. Unless your lawyer is a specialist, he could spend hundreds of hours researching court decisions. And still not be sure he's put together the strongest defense possible. It's expensive (expect to spend an average $4,000 to $8,000 if you're sued). And risky. Which is why we formed the non-profit Personal Communications Foundation.* To provide your lawyer with legal ammunition.

Who we are

We're a handful of ham lawyers, professors and judges (all volunteers) who wanted to help before it's too late. We're putting together the first research library of personal communications and zoning law. And having briefs written by the best legal brains. It's all available to your lawyer. For 10¢ a page. We can't guarantee you'll win. We can't try the case for you. But if you or your lawyer contacts us, we'll sure make sure you get a fighting chance.

(space donated by the publisher)

Give us a fighting chance

To be even more successful in future battles, we're building an arsenal of weapons to use in court. For example, we're commissioning a study by real estate experts on the effect of a backyard tower on neighborhood property values. The pricetag is a stiff $11,000. But without the study, more cases will be lost. And more dangerous precedents will be set.

We *are* winning. But it takes money to keep fighting. You can help us fight by sending a check. The ARRL did. Think of us as your insurance policy against a lawsuit. All checks are 100% tax-deductible.

Please act today. We've already got a late start.

*Non-profit Cal. membership corp. #788-085

Kenneth S. Widelitz, WA6PPZ, President
Personal Communications Foundation*
Suite 1504
10960 Wilshire Blvd.
Los Angeles, CA 90024 (213) 478-1749

I want to give you a fighting chance. Enclosed is my 100% tax-deductible membership application.

☐ Life member $250 ☐ Contributing member $100
☐ Full member $25 ☐ Associate member $10

All members receive our free legal kit and newsletter.

name call

address

city state zip

PCF Personal Communications Foundation

Defending the rights of hams

Here's a look at some little-known time and frequency stations below the equator and a look at world-wide standard broadcasts in general.

Time Signals From Down Under

BY KARL T. THURBER, JR.*, W8FX/4

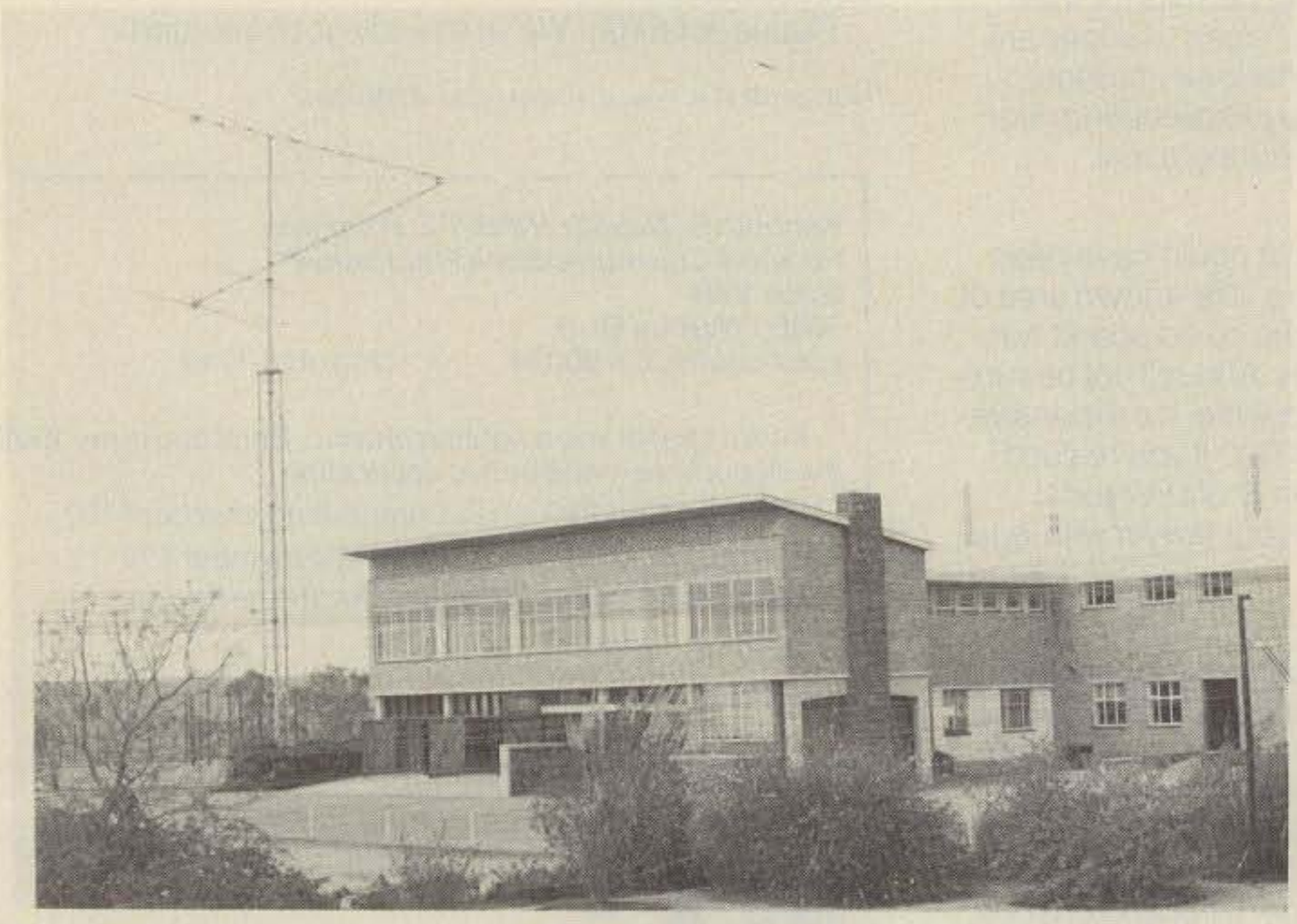
If you were to mention time and frequency stations, most amateurs and SWL's would immediately think of WWV, the National Bureau of Standards station in Fort Collins, Colorado. Indeed, WWV has been ticking away on 2.5, 5, 10, 15 and 20 MHz since its 1923 start in Greenbelt, Maryland. Some far-West listeners would certainly think of WWVH, WWV's Hawaiian sister station. And, Canadians would undoubtedly think of Ottawa's CHU, broadcasting similar information on 3.330, 7.335, and 14.670 MHz.

While these stations are fairly well-known to amateurs, SWL's, navigators, and "technical types" in the Northern Hemisphere, there is also a small group of lesser-known stations providing similar services in the southern latitudes. By and large, their standard frequencies, timing checks and technical information are of interest mostly to scientists, ship and aircraft navigators, laboratories, and other professional users. Still, each of these stations is very important in its own country, and each tells an interesting story.

These stations are infrequently logged in the U.S., for several reasons. Usually, WWV and WWVH dominate the standard frequency bands, obliterating reception of the "down under" stations. Some of the stations are on the air for but a few hours per week, while others have selected offbeat frequencies, making it very difficult to log them unless you know where to look. Still, each of these stations makes for good DXing, and can be used to some extent as "propagation beacons" to estimate m.u.f. (maximum usable frequency) and determine which frequencies are "open" to various parts of the world. Although none of these stations broadcast in the amateur bands, a little intuition and "educated guesswork" will help determine which bands may indeed be open for DX.*

Actually, there are but four such major stations below the equator:

*233 Newcastle Lane, Montgomery AL 36117



This photo shows the main ZUO station building at Olifantsfontein, South Africa, in the northeastern part of the country. Note the antenna array at the left. Surprisingly, in view of the number of people involved with the time transmissions, there are no amateurs working at either ZUO or at the laboratories.

*For example, reception of ZUO's 2.5 MHz transmission may well indicate that both 80 and 160 meter work is possible over the path. Good signals from the 7.5 MHz VNG outlet is a good bet that 40-meter DX is "in" to Australia, while hearing the 15 MHz JJY transmission underneath WWV indicates that 20 meters is probably open to Japan.

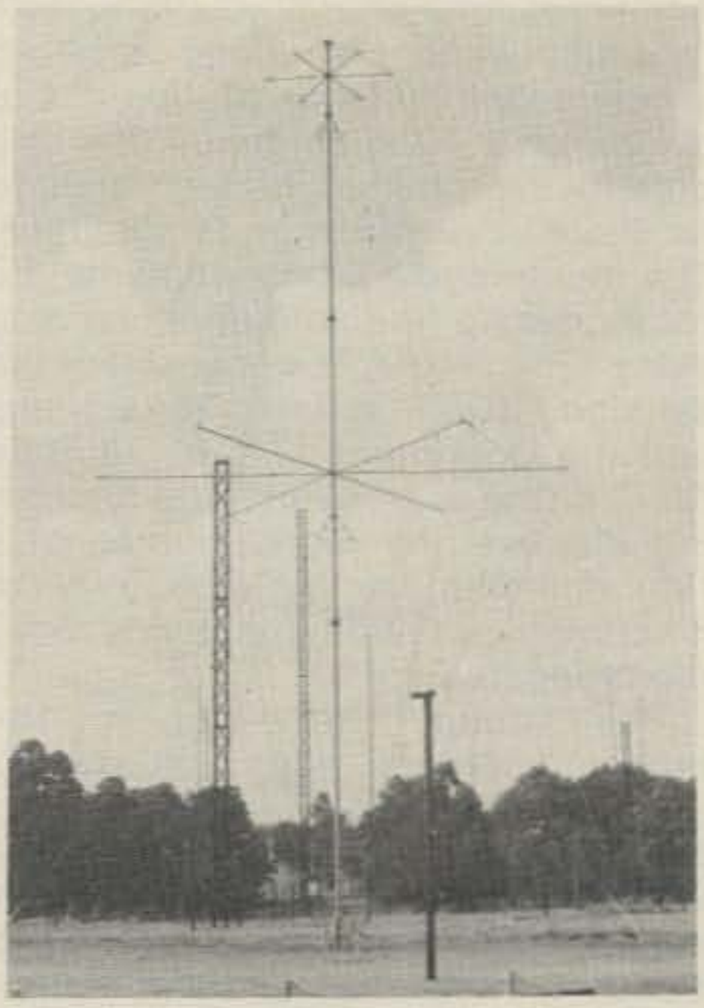
ZUO, South Africa; VNG, Lyndhurst, Australia; ZLFS, Lower Hutt, New Zealand; and LOL, Buenos Aires, Argentina. Of these, ZUO is probably the best known of the four, and has the most interesting history. Let's take a look at each in turn, starting with the latter.

Although relatively unknown to American and Canadian amateurs and SWL's, ZUO is one of the world's major time and frequency stations. It is one of a select group of four which operate continuously, 24 hours per day in the so-called "standard frequency bands" centered around 2.5, 5, 10, 15 and 20 MHz. The other three are WWV, WWVH, and JJY (Japan).

An interesting history of time-keeping predates ZUO in South Africa, which had developed accurate time standards in the early years of this century. Initially, the 1908-model Transvaal Observatory clocks were corrected by checking against long-wave radio signals broadcast from Bordeaux (France) and Rugby (England). In 1948, the first South African quartz crystal clock was built at the Union Observatory. Using it, South African Broadcasting Company and Post Office time signals were kept within a few milliseconds of our own WWV.

The ZUO transmission began in 1949 when the first radio time signals were transmitted from the Union Observatory in Johannesburg. These 2.5 MHz transmissions were very low-powered and were arranged for geophysicists who needed accurate time in the field—they could not depend on the signals from WWV, which had to travel halfway around the world.

A more powerful transmitter was later constructed, and when this went into operation and the frequency changed to 5 MHz, ZUO ('ZUO' standing for 'Union Observatory') became the first Southern Hemisphere standard time and frequency station operating in accordance with the international CCIR (Comite Consultatif International des Radio Communications) standards.* It was also the first such station in all of Africa. During the International Geophysical Year (IGY) in 1957, in order to upgrade services, the Post Office took over the 5 MHz signals from its transmitting site at Olifantsfontein, while the Observatory transmitter changed its frequency to 10 MHz. By 1960, ZUO signals were coordinated with the U.S. Naval Observatory and the Royal Greenwich Observatory in England so as to keep time differences within 1 millisecond and frequency within 1 part in 10^{10}. (1 part in 10,000,000,000)



The 5 MHz vertical "monopole" antenna in use at ZUO. A similar antenna is in use for the 2.5 MHz transmission. Interestingly, reception reports come in from all over the world, but the majority come in from the U.S. and Canada. Europe and Japan are also well represented. Less than 20% of their reports come from Africa (!) and so far (at least since 1968), only three reports have come from Australia and New Zealand. The ZUO signals are regularly received in Antarctica, and are frequently preferred due to the c.w. IDer.

In 1966, the first cesium atomic clock was installed. Stability then ran about 1 part in 10^{12}. Time differences were now measured in terms of *microseconds* by means of v.l.f. radio signal comparisons, and in *tenths* of microseconds by means of traveling cesium clocks, ZUO acting something akin to a satellite of Greenwich and Rugby. This is very similar to our own WWVH which is, in effect, a satellite of WWV and WWVB (the v.l.f.

*There are a number of organizations which play key roles in the coordination of frequency and time. The main international bodies dealing with radio transmission regulations are the 113-year old International Telecommunications Union (ITU) and its advisory arm on technical matters, the CCIR. The CCIR is sub-divided into 11 study groups, of which Study Group Seven is responsible for world-wide coordination of time and frequency broadcasting. The ITU is affiliated with, but is not a part of, the United Nations. It maintains a staff of about 300 people at its headquarters in Geneva, Switzerland. The ITU had its beginnings in the International Telegraph Union, formed in 1965 by a group of European countries.

Callsign	Location	Frequency (MHz)
RTZ	Irkutsk, USSR	50 (kHz)**
RBU	Moscow, USSR	66.67 (kHz)**
NBA	Canal Zone (Panama)	24 (kHz)**
GBR	Rugby, England	16 (kHz)**
HBG	Prangins, Switzerland	75 (kHz)**
JJF-2	Chiba, Japan	40 (kHz)**
WWWB	Fort Collins, Colorado	60 (kHz)**
DCF77	Mainflingen, Germany	77.5(kHz)**
JG2AS	Sanwa, Japan	40 (kHz)**
WWV	Fort Collins, Colorado	2.5, 5, 10, 15
WWVH	Kauai, Hawaii	2.5, 5, 10, 15
WWVL (Inactive)	Fort Collins, Colorado	20 (kHz)**
OLB5	Prague, Czechoslovakia	3.170
CHU	Ottawa, Canada	3,330, 7.335, 14.670
VPS/HKG	Hong Kong	500 (kHz), 95 MHz 38, 5519, 8903 kHz
ATA	New Delhi, India	5, 10, 15
YVTO	Caracas, Venezuela	6.1
FFH	Paris, France	2.5
BPV	Shanghai, China	5, 10, 15
IBF/IAM	Rome and Torino, Italy	5
BSF	Taipei, Taiwan	5, 15
JJY	Sanwa, Japan	2.5, 5, 10, 15
MSF	Rugby, England	60 (kHz)**, 2.5, 5, 10
OMA	Prague, Czechoslovakia	50 (kHz)**, 2.5
RTA	Novossibirsk, USSR	10, 15
RAT	Moscow, USSR	5
RWM	Moscow, USSR	10, 15
RCH	Tashkent, USSR	2.5
RIM	Tashkent, USSR	5, 10
JG2AE	Sanwa, Japan	8
DGI	Oranienburg, Germany	185

Fig 1 - Major time and frequency stations in the northern hemisphere. All stations use basic one-second pulses, but some have additional modulation such as Morse code or voice announcements, propagation forecasts and geophysical warnings, digitally-coded timing data, and other specialized services. A double-asterisk (**) denotes a v.l.f. station. R. f. carrier frequency is stated in kilohertz (kHz). These stations are rapidly replacing their h.f. counterparts for ultra-accurate applications. Sources: Annual Report *of the Bureau International de l'Heure, Paris, France, 1977 and* World Radio Handbook.

ZUO	Olifantsfontein & Johnnesburg, S.A.	2.5, 5, 100
VNG	Lyndhurst, Australia	4.5, 7.5, 12
ZLFS	Lower Hutt, New Zealand	2.5
LOL	Buenos Aires, Argentina	5, 10, 15

Fig. 2 - Major time and frequency stations in the southern hemisphere. Sources: Annual Report *for 1976 of the Bureau International de l'Heure, Paris, France, 1977 and author's direct communications with station managements listed above.*

station). In 1972, when the official Observatory clocks were transferred to the National Physical Research Laboratory in Pretoria, the 10 MHz transmission was curtailed, while an additional 2.5 MHz transmission was started up from Olifantsfontein for best coverage in southern Africa and the waters around the Cape.

Today, ZUO remains the *only* standard time and frequency station in Africa, and in the Southern Hemisphere it is the only station operating *continuously* in one of the "standard frequency bands." Of the three other Southern stations, LOL (Buenos Aires) only operates five hours per day and ZLFS (New Zealand) only three hours a week. While VNG (Australia) operates almost continuously, it operates outside the standard bands on 'oddball' frequencies (4.5, 7.5, and 12 MHz). ZUO is a unique operation in two other ways: (1) it is the only installation where the transmitter is located at a considerable distance from the cesium atomic clock which controls it (about 25 km), and (2) it has the somewhat "dubious" distinction of basing all emissions on a *single* cesium clock!

For those who would like to 'DX' ZUO, the 2.5 and 5 MHz transmitters run a respectable 4 kW from Olifantsfontein, while the 100 MHz local Johannesburg v.h.f. transmitter only runs 80 watts. The h.f. transmitters are amplitude modulated by the time signals, a special-purpose time difference code, and the Morse code announcements. The 100 MHz v.h.f. transmitter is phase-modulated. The time signals consist of one pulse per second, each pulse consisting of five cycles of a 1000 Hz tone. The first pulse in every minute is lengthened to facilitate identification of the time. The Morse code announcements are made during the minute preceding every fifth minute. They consist of the callsign "ZUO" repeated three times and the Coordinated Universal Time (UTC) at the next minute, the time being indicated by the beginning of a time pulse. Unlike WWV and WWVH, no continuous audio frequency tones are broadcast.

For those interested in the technical details, the time signals from ZUO are today transmitted in accordance with the Coordinated Universal Time Scale (UTC), maintained and coordinated by the International Time Bureau (BIH) in Paris.* The UTC time scale is based, on the one hand, on a large number of cesium clocks in some 30 collaborating laboratories, and on the other, on the rotation of the earth as calculated at some 46 astronomical observatories. Almost all of these are located in the Northern Hemisphere. Our own National Bureau of Standard (which operates WWV and WWVH), the Naval Research Laboratory, and the National Research Council of Canada (CHU) are among the many "contributors" to the UTC time scale, which effectively replaced Greenwich Mean Time (GMT) in 1972. ZUO's time signals are kept within 1 millisecond of the signals of other coordinated time stations; frequency is accurate to 1 part in 10^{11}. (1 part in 100,000,000,000)

The South African station covers a large area of the Earth's surface, and in the sub-Sahara region it provides a vital service taken for granted elsewhere. The station management points out that little feedback is received from the average user, and it's only when things go wrong that they are likely to identify themselves! Reception reports come mainly from amateurs and SWL's who are more interested in the technical aspects of signal reception than in the time signals themselves. Signal reports come in at the rate of only about two per month, considerably less than the QSL traffic experienced by WWV, WWVH, and CHY!

ZUO invites reception reports. Comments regarding the purposes for which their transmissions are being used are particularly appreciated. All reports should be addressed to:

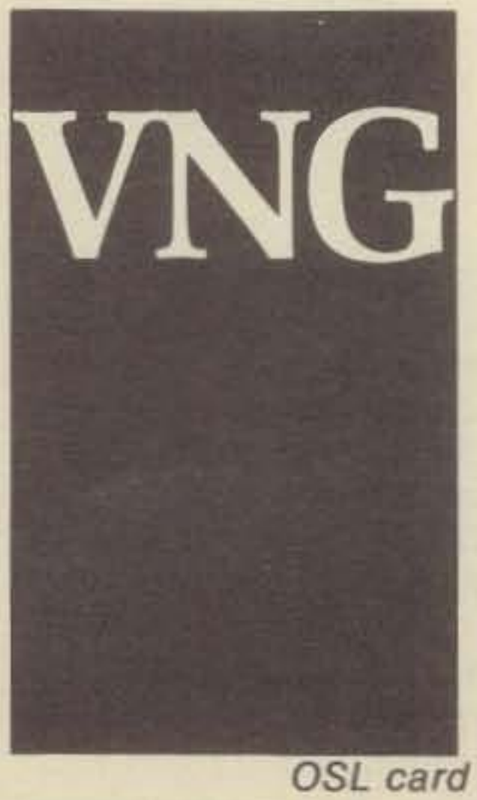
Time Standards Section
Precise Physical Measurements
Division
South Africa
0001

Incidentally, ZUO has been logged at least on the East Coast of the U.S. You might try the early evening hours, around 0300 UTC, when the South African's c.w. ID'er may be heard through WWV or 5 MHZ on occasion.

VNG, Australia

Halfway around the earth is VNG, the Australian time station. It was set up in September of 1964 to provide ac-

*While the ITU and its CCIR Study Group Seven are responsible for the *broadcast* dissemination of time data, the BIH, or Bureau International De L'Heure, is responsible for its exact *determination*. Its many functions include establishing the official international atomic time scale, world-wide synchronization of time-signals to Coordinated Universal Time (UTC), and performing scientific research as necessary for the further refinement of the precise measurement of time. The BIH isn't a governmental organization. Rather, it is a part of the Federation of Astronomical and Geophysical Services, which is in turn a member of the International Council of Scientific Unions. It works closely with the ITU and with bodies such as the International Civil Aviation Organization (ICAO), the General Conference of Weights and Measures, and the Inter-Governmental Maritime Consultative Organization, in matters relating to time.



OSL card sent to the author from station VNG.

curate time signals for the Woomera Rocket Range and for mapping and mineral exploration. Initially, VNG was operated by the Australian Post Office. It is located at Lyndhurst, in the state of Victoria, some 37 km (23 miles) southeast of the capital of Melbourne. The station was transferred to the Australian Telecommunications Commission (Telecome Australia) a few years ago, as part of a major reorganization.

Presently, *two* transmitters modulated by the same time signals feed horizontal half-wave dipole antennas for all *three* transmissions. This is possible since all three frequencies aren't on the air continuously. Instead, they are staggered so as to give approximately continuous Continental coverage, depending on the time of day. The schedule is as follows:

Time Frame GMT (UTC)	Frequency kHz	Power kW
0945-2130	4,500	10
2245-2230	7,500	10
2145-0930	12,000	10

The carrier frequencies and time signals both originate from the same frequency standard at Lyndhurst, which includes precision quartz oscillators, frequency synthesizers, time code generators, and the like. This equipment is in turn controlled by the primary Australian cesium beam standard which is located in Melbourne and run by the Telecom Australia Research Laboratories. This standard is very accurate, being maintained to a tolerance of 10^{12} (in both frequency and time) of the international BIH (International Time Bureau) time interval. Interestingly, the staff uses a 16 kHz v.l.f. signal sent via *landline* from the Melbourne labs to control the station's quartz oscillator to one part in 10^{11}. This is something akin to the way in which our own WWVH in Hawaii uses the NBS v.l.f. station in Fort Collins, Colorado, WWVB, as a cross-check on its own cesium standard—though the Aussies do it via *telephone* rather than by radio! Regular visits to the transmitter site are also made using a portable clock as a further cross-check on the transmitted signals.

Like most other international time and frequency stations, Telecom Australia's VNG cooperates actively with the International Time Bureau to ensure compatibility of its measurements and signals. Coordinated Universal Time is the time scale used for standard time transmissions (UTC plus 10 hours given Australian Eastern Standard Time). Much like most standard time and frequency stations elsewhere, VNG transmits time signals, a time coding, verbal announcements, and astronomical corrections.

Format-wise, the seconds markers consist of bursts of a 1000 Hz audio tone. The markers are normally 50 milliseconds long, with the 59th seconds marker of each minute being omitted. The station announcements give station identification, callsigns and frequencies, in English just before each quarter-hour.

The Australians are justifiably proud of the accuracy of their station. The r.f. carrier frequencies and 1000 Hz audio tone are kept within 1 part in 10^{10} of the Melbourne standard, although *received* accuracy may be degraded on the order of 1 part in 10^{7} due to variations in the ionosphere. Time-of-day is maintained within 100 microseconds, though the received signals may exhibit "jitter" on the order of 1 milisecond due to propagation path "anomalies". (These "reception errors" affect all h.f. time and frequency transmissions, and is a major reason v.l.f. is being used more and more to transmit ultra-accurate time and frequency information).

Like the South African station ZUO, Telcom Australia and VNG also make international cross-checks on their standards using the precisely-controlled and stabilized v.l.f. signals broadcast by a number of stations around the world. This region of the

No - 67-68

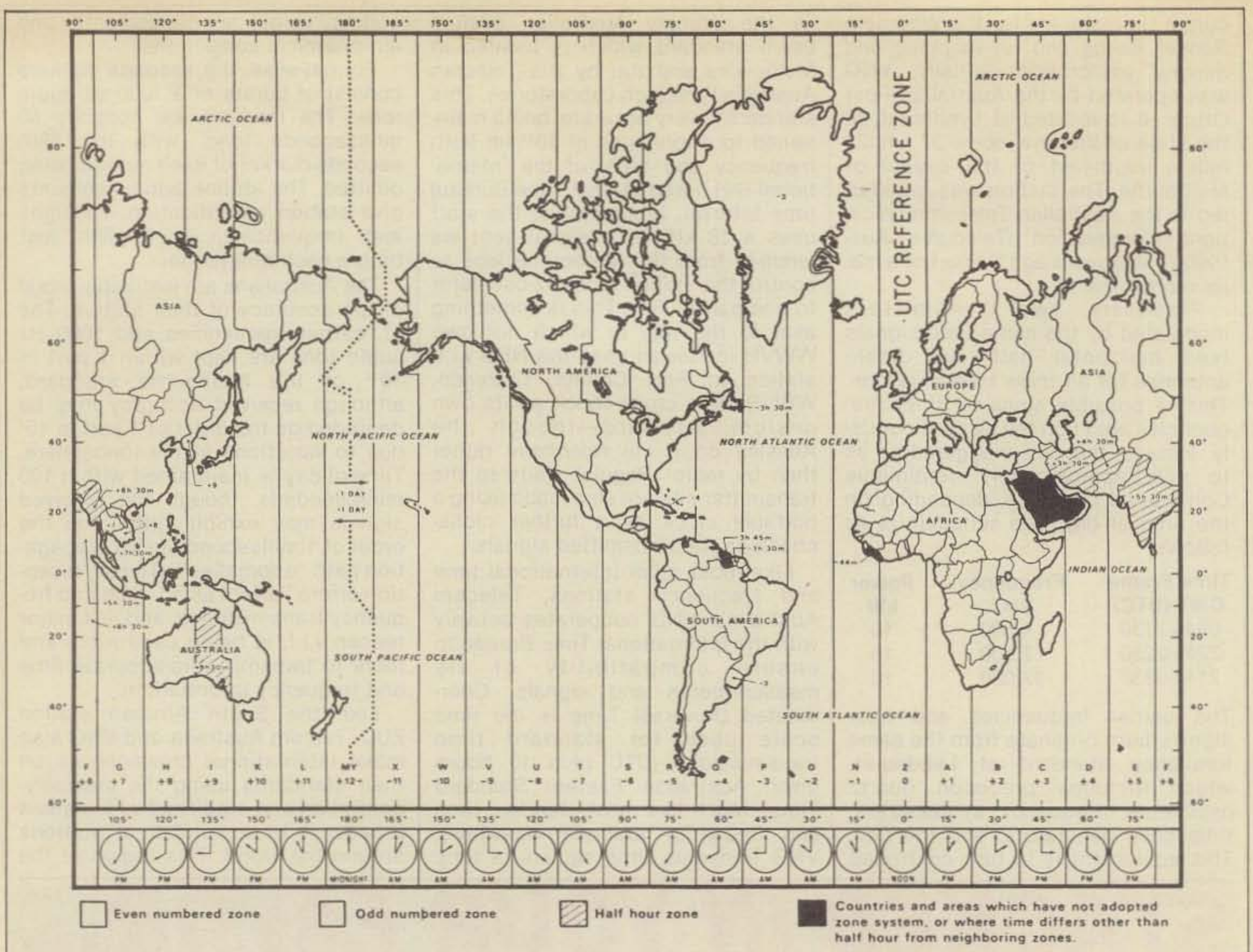


Fig. 3 - Time zones of the world. Source: NBS Special Publication 432.

radio spectrum, below about 100 kHz, is relatively free of the propagation "anomalies" that plague accurate *h.f.* time-keeping and frequency measurement. The Aussies use a special technique called "v.l.f. phase tracking" to enable it to make comparisons with the Royal Greenwich Observatory in England, the British National Physical Laboratory, the U.S. Naval Observatory, and our own National Bureau of Standards.

Telecom Australia also provides services such as time information to the general public via the telephone system in each state and standard audio tones via leased landlines. They are also experimenting with a system of accurate time-keeping using TV synchronizing pulses. In this system, each "user" laboratory tunes to a common network TV program and each measures the time difference between the local clock and the same field synchronization pulse using specially-developed procedures. A higher order of accuracy is possible using this technique than using regular h.f. radio transmission since propagation effects are practically eliminated.

VNG is often heard on the West Coast, particularly on the two higher frequencies. In many areas of the Western Pacific, it puts in a better signal than either WWV or WWVH, and doesn't suffer so badly from the severe co-channel interference caused by many stations sharing the same standard frequencies (JJY, BPV, ZUO, LOL, WWV, WWVH, and a raft of others). General information on the station, program schecules and QSL cards can be obtained from:

Station VNG
c/o Superintending Engineer
Broadcasting Branch
Telecom Australia
172 William Street
Melbourne, Victoria, 3000
Australia

As with most "down under" stations, listeners will usually find the early morning hours best for reception.

ZLFS, New Zealand

ZLFS, New Zealand's standard frequency station, is operated by the Physics and Engineering Laboratory, a division of the Department of Scientific and Industrial Research. It has the responsibility of maintaining the physical standards for the country. Standard time is the responsibility of the New Zealand Time Service, part of the Geophysics Division of the Department.

Station ZLFS first transmitted on 21 March 1955 on 2500 kHz with a power of about 300 watts. The transmitter was a Canadian R.C.A. Victor A.T. 3 (war surplus type) and the antenna a vertical about 70 feet high. Transmissions at that time were made every Tuesday from 0100 to 0400 UTC. The frequency accuracy was only a few parts in 10^8. Successive improvements have been made with better master oscillators

ARMADA ARGENTINA

OBSERVATORIO NAVAL

BUENOS AIRES

REPUBLICA ARGENTINA

SERVICIO DE FRECUENCIAS PATRONES DE L O L
Service of Radiofrequency Standards L O L St.

— Q S L —

Señor Karl T.Thurber.Jr.

Recibimos su informe sobre la recepción de nuestras señales de frecuencias patrones
We received your report on the reception of our standard frequency signals

y hora efectuado el dia _____. Agradecemos su atención y
and time received by you on _____. *We thank you for your courtesy and*

al felicitarlo por su eficiente recepción nos complacemos en saludarle muy atte.
congratulate you on the efficiency of your reception. Very truly yours.

Buenos Aires, Septiembre 6 de 1977.

Jefe del Observatorio Naval
Superintendent of the Naval Observatory
ROLANDO E. NAWRATIL
CAPITAN DE NAVIO
JEFE

Estación Emisora: LOL, Buenos Aires { φ: 34°37'19"S ; ω: 58°21'18"W
Transmitting Station

Horas de Emisión: 0800 a 0900, 1100 a 1200, 1400 a 1500, 1700 a 1800 y 2000 a
Transmitting Hours: From 0800 to 0900, 1100 to 1200, 1400 to 1500, 1700 to 1800 and 2000 to
2100 hora oficial Argentina (Huso 3 horas W)
2100 Argentine official time (Time Zone 3 hours W)

Radiofrecuencias Patrónes: 5, 10, 15 Mc/s.
Radiofrequency Standards

Audiofrecuencias Patrones: 1000 y 440 c/s. alternativamente.
Audiofrequency Standards: 1000 and 440 c/s. alternatively.

Potencia de Antena: 2 Kw. Dipolo trifilar horizontal.
Power in Antena: 2 Kw. Two poles, triple wire, horizontal.

Intervalos de Modulación: 3 sobre 5 minutos, excepto de 55 a 59 minutos, intervalo
Modulation Intervals: 3 on 5 minutes except from 55 to 59 minutes, interval
destinado a señal horaria.
destined to the time signal.

Exactitud de las Frecuencias: Dos partes en 10^{-10}.
Precision of the Frequencies: Two parts in 10^{-10}.

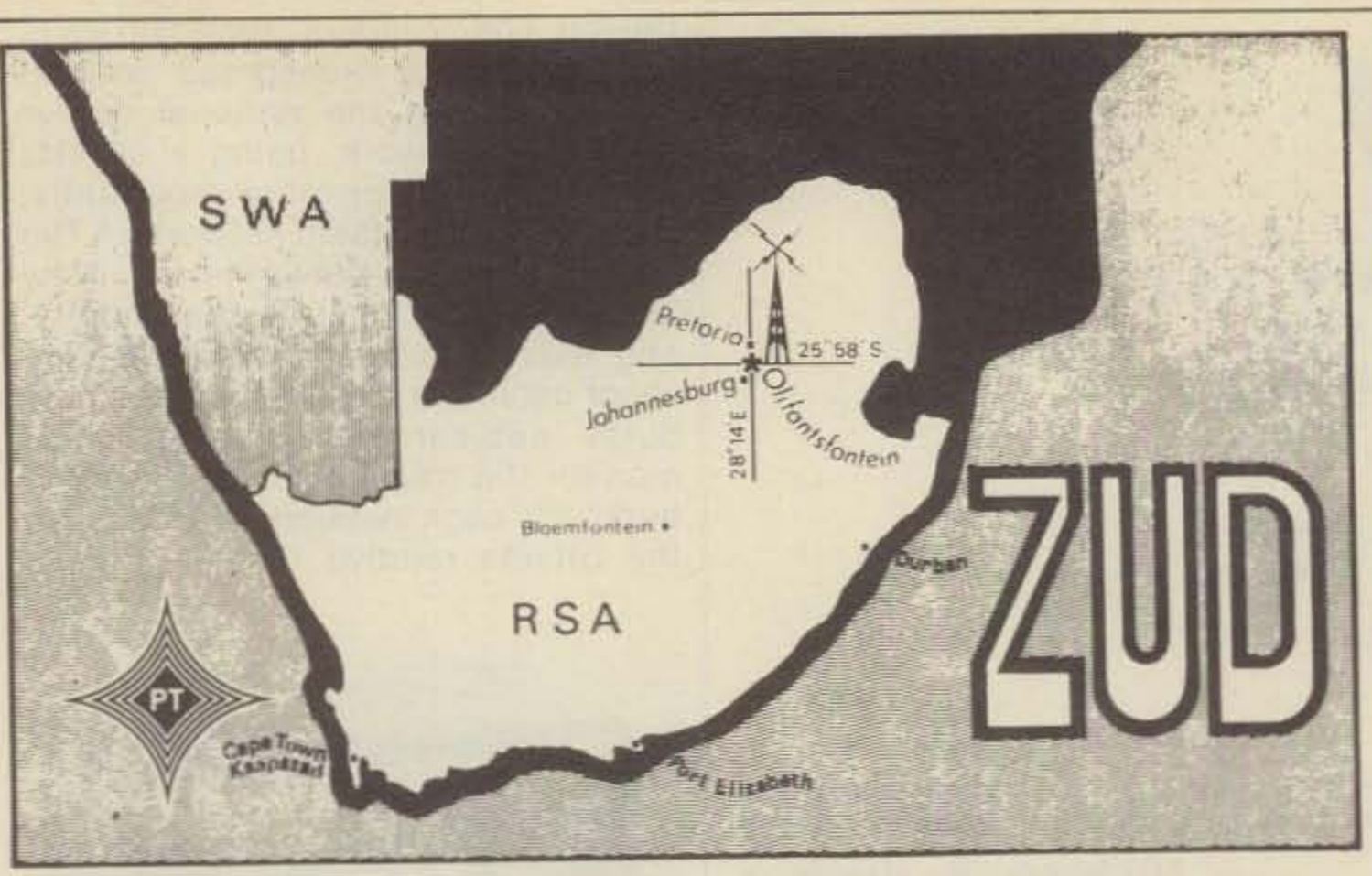
Señal Horaria de Precisión: Durante toda la señal se emite un pulso de 5 milisegundos.
Signal Time of Precision: During the entire signal a pulse of 5 miliseconds is emitted
Los intervalos de tiempo son exactos dentro de los 2 microsegundos y las señales
The intervals of time are exact within 2 microseconds and the time signals
horarias tienen un error normal menor que ± 0s.01.
have a normal error of less than ± 0s.01.

QSL from Observatorio Naval, *Buenos Aires, Argentina.*

and since early 1972, the transmitter has been controlled directly from one of the cesium beam oscillators of the national standard. Since then, the frequency accuracy and stability has been better than one part in 10^{11}.

The present transmitter is solid-state, and was designed and built in the laboratory. It has a power output to the antenna of 100 watts. It transmits each Wednesday from 0100 to 0400 UTC and occasionally at other times on request. This service is intended for very local use, however. In order to provide a nationwide service, because of the mountainous nature of New Zealand, it would require something like the U.S.'s WWVB to do the job. The "Zedders" have two ways of providing a widespread service: one if through the national carrier telephone network, using a 60 kHz signal, but perhaps more importantly, through the television networks.* The two television networks in New Zealand cover most of the country, and each network uses a rubidium vapor oscillator to generate the color-burst sub-carrier. The lab staff monitor the frequencies of the color-burst for each network, and publish the offsets relative to the national

If your equipment doesn't sport an internal frequency standard, you should consider an external unit for accurately determining frequency. It will be useful not only for checking band edges on your transmitting and receiving gear, but can also be used to check the calibration of signal generators, oscilloscopes, and grid-dip meters. The Palomar Engineers unit shown has an access hold for precise setting to a primary frequency standard such as one of those listed in fig. 1 or fig. 2.



QSL card sent to the author from station ZUD.

standard. Thus, the color-burst transmission can be used as a standard frequency reference. Since the inception of this service, the offsets have never exceeded one part in 10^{10} and are currently both less than one or two parts in 10^{11}.

To insure reliability, the atomic oscillators are checked on a long-term basis using the American and U.K. v.l.f. stations such as Fort Collins' WWVB on 60 kHz and the British station GRB on 16 kHz. Cross-checks are also made against the Omega international navigation stations. They also rate their equipment when a "timation team" from Washington visits, and by "flying clock" from their counterparts at Telecom Australia. The ZLFS staff maintains close liaison with NBS at Fort Collins, the U.S. Naval Observatory, Washington, as well as with the National Physical Laboratory in the U.K. and the National Mapping Service in Australia.

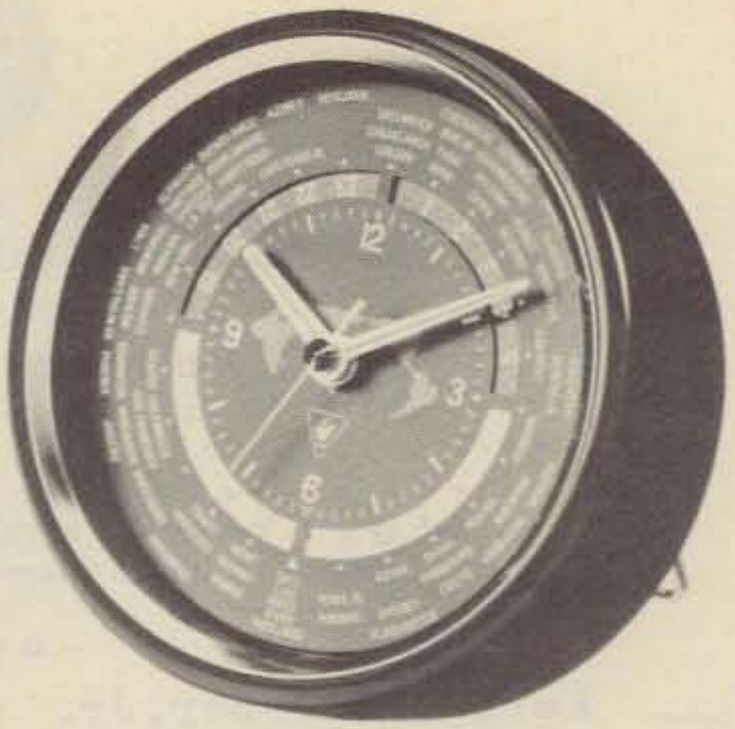
There are a number of amateurs in the lab, which has a staff of about 260. Some of these are not active at present, but two who are active are:

Mr. A.C. Corney, ZL2BBJ and
Mr. J.M. Shanks, ZL2NA

Since the laboratory is primarily concerned with *frequency* and not time, they do not send out *time* signals as such. Apart from the identification by call sign they only transmit an unmodulated carrier. The New Zealand Time Service sends out its time signals using the national broadcasting network, and through the maritime coastal transmitting stations.

ZLFS would, admittedly, be a "rare catch" in the U.S., although Hawaiians might log it whenever WWVH is off the air. If you're lucky enough to catch their 2500 kHz, 100-watt signal, send your report to:

The Director
Physics and Engineering Laboratory
Department of Scientific and
Industrial Research
Private Bag
Lower Hutt, New Zealand



What time is it there? This unique timepiece features direct world time readout. At a glance, the time in any principal city or time zone can be simultaneously coordinated with local time on a 24-hour basis. This is particularly useful in logging and in filling in QSL cards, avoiding the necessity of doing mental time calculations or consulting a time-conversion chart. (Photo courtesy Yaesu Electronics Corp.

LOL, Argentina

Another below-the-equator "time ticker" that can occasionally be heard in the United States is Station LOL, operated by the Argentine Naval Observatory in Buenos Aires. LOL runs 2 kW on 5, 10, and 15 MHz. It is occasionally heard right through WWV by listeners in the Southern part of the United States around 0000-0100 UTC on the 5 MHz frequency. It's easily recognized by the callsign "LOL" given in Morse code every 5 minutes. Its format, if you want to search for it, consists of seconds pulses of 5 cycles of 1000 Hz modulation. Following each announcement are 3 minutes of 1000 Hz or 440 Hz modulation. Unlike ZUO and VNG, it operates on a limited schedule, about 5 hours a day. Its accuracy is good, however. Time errors are measured in microseconds, and the r.f. carrier is good to within two parts in 10^{10}.

LOL and the Observatory are also participants in the International Time

*A very similar nation-wide, ultra-stable TV-linked service is provided by our own National Bureau of Standards, which also operates WWV, WWVH, and WWVB. This service was inaugurated in the U.S. in 1975, and makes use of the 3.58 MHz color TV sub-carrier frequency as a national standard. (If you're interested in this technique, NBS Special Publication 432, "NBS Time & Frequency Dissemination Services" has the details. It's available from the Superintendent of Documents, Washington, DC 20402).

Remember that many of the h.f. stations listed are close enough to the amateur bands to be useful propagation-path indicators. And, you'll find that chasing the v.l.f. stations listed in fig. 1 opens up a new and fascinating world in a near-forgotten part of the radio spectrum.

Special thanks are due to Mr. R. Lake of South Africa's National Physical Research Laboratory, Mr. R. Trainor of Telecom Australia, and Mr. G.J. Burtt of the New Zealand Physics and Engineering Laboratory for their assistance in providing much of the special information needed to complete this article.

See you—below the Equator!

Summary

For those looking to 'DX' the world's time and standard frequency stations, figs. 1 and 2 list the major stations. For additional information on specific stations, such as operating hours and mailing addresses, refer to a current edition of the *World Radio and TV Handbook*. It lists basic data on most of the stations. Bear in mind that they may change their broadcast format, schedules, and occasionally, even their frequencies of operation. Bureau's world-wide time standardization efforts, along with their Australian and South African Counterparts.

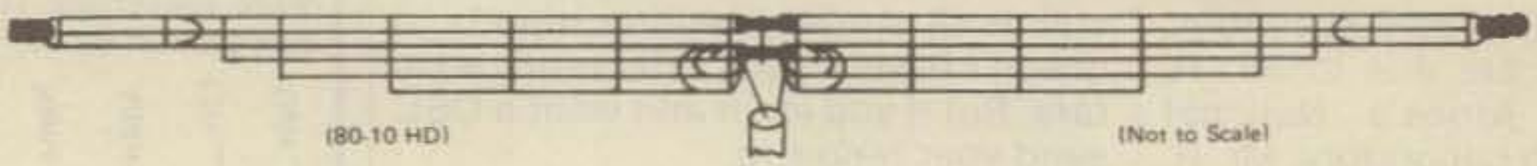
While most of the standard frequency stations are good verifiers, DXers lament that although the staff claims it wants reception reports, it doesn't have a good QSL verification rate. But if you log it and want a QSL, send your report to:

Director
Observatorio Naval
Avenida Costanera Sur, 2099
Buenos-Aires
Republica Argentina

Good luck!

A VERY IMPORTANT ANNOUNCEMENT FROM MOR-GAIN

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



(80-10 HD) (Not to Scale)

multi-band HF communications antennas – half size · full performance

We're Pleased to Introduce Two New Models Specifically Designed for the Novice or Technician

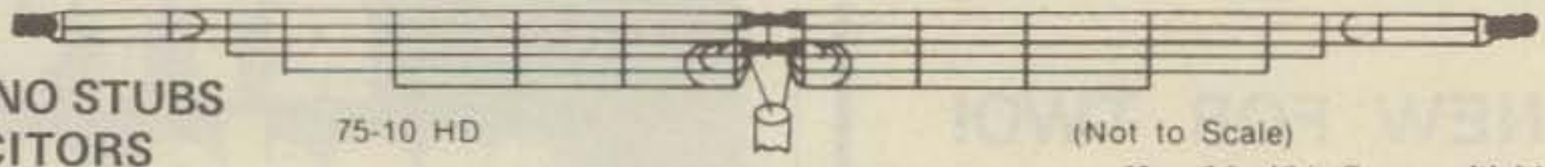
80-10HD (N/T) ... 69' overall length for 80/40/20/15/10 meter coverage $84.50

80-40HD (N/T) ..... 69' overall length for 80/40 meter coverage $63.75

No antenna tuner required. Completely factory assembled and tuned specifically for the novice/technician bands. Both models can be easily re-tuned for higher license class allocations in just a few minutes.

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

NO TRAPS, NO COILS, NO STUBS NO CAPACITORS



75-10 HD (Not to Scale)

MOR-GAIN HD DIPOLES . . . ● One half the length of conventional half-wave dipoles. ● Multi-band, Multi-frequency ● Maximum efficiency - no traps, loading coils, or stubs. Fully assembled and pre-tuned - no measuring. no cutting. ● All weather rated - 1 KW AM, 2.5 KW CW or PEP SSB. ● Proven performance - more than 15,000 have been delivered. ● Permit use of the full capabilities of today's 5-band xcvrs. ● One feedline for operation on all bands. ● Lowest cost/benefit antenna on the market today. ● Fast QSY - no feedline switching. ● Highest performance for the Novice as well as the extra-class op.

EXCLUSIVE 66 FOOT, 75-10 METER DIPOLES

● All models above are furnished with crimp/solder lugs. ● All models can be furnished with a SO-239 female coaxial connector at additional cost. The SO-239 male coaxial cable connector. To order this factory installed option, add the letter 'A' after the model number. Example: 40-20 HD/A. ● 75 meter models are factory tuned to resonate at 3950 kHz. (SP) models are factory tuned to resonate at 3650 kHz. See VSWR curves for other resonance data.

No. 16 40† Copper Weld wire annealed so it handles like soft Copper wire - Rated for better than full legal power AM/CW or SSB-Coaxial or Balanced 50 to 75 ohm feed line - VSWR under 1.5 to 1 at most heights - Stainless Steel hardware - Drop Proof Insulators - Terrific Performance - No coils or traps to break down or change under weather conditions - Completely Assembled ready to put up - Guaranteed 1 year ONE DESIGN DOES IT ALL; 75-10HD - Only $12.00 a band!

Model	Bands (Meters)	Price	Weight (Oz/Kg)	Length (Ft/Mtrs.)
40-20 HD	40/20	$49.50	26/.73	36/10.9
80-40 HD	80/40 ⅓ 15	57.50	41/1.15	69/21.0
75-40 HD	75/40	55.00	40/1.12	66/20.1
75-40 HD (SP)	75/40	57.50	40/1.12	66/20.1
75-20 HD	75/40/20	66.50	44/1.23	66/20.1
75-20 HD (SP)	75/40/20	66.50	44/1.23	66/20.1
75-10 HD	75/40/20/15/10	74.50	48/1.34	66/20.1
75-10 HD (SP)	75/40/20/15/10	74.50	48/1.34	66/20.1
80-10 HD	80/40/20/15/10	76.50	50/1.40	69/21.0

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

LEAST COST. Dollar for dollar, the HD dipoles are the highest performance, least cost multi-band antennas on the market today. For example: the 5-band 75-10 HD dipole costs less than $15.00 per band - an unbeatable low cost.

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

Above Models furnished with lug terminations. Cap-female SO-239 connector assembly – $3.75 additional. Include $2.50 for Shipping & Insurance with your order.

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

MOR-GAIN

BankAmericard, Visa, and Mastercharge are available.

BANKAMERICARD master charge VISA

Please write for fully descriptive 6-page brochure. Contact your favorite dealer or order direct from Mor-Gain.

This month by
ROD LINKOUS, W7OM

DX

News of communications around the world

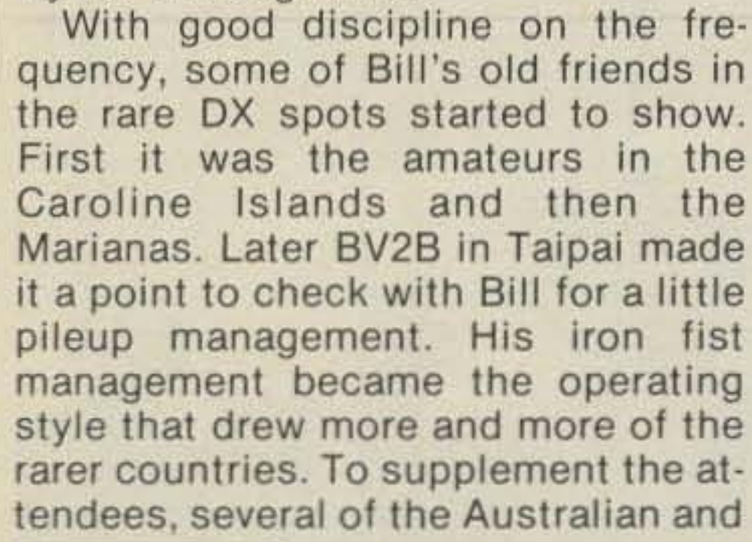
Recently a new rig went on the air from a remote spot in East Malaysia. In this modern time of DXpeditions and avid dedication to the amateur hobby, it would seem to be a normal event of the time. But the amateurs and circumstances make it truly a unique event.

The Family Hour · 14.225 MHz.

One of the most active DX spots, providing more rare DX for deserving DXers, is the watering hole at 14.225 MHz. Originally it started as the Asian and Pacific gathering spot to meet Bill Bennett, W7PHO. To get word from home for the Americans operating from overseas was a real treat and everyone knew that Bill was a sports fan who could give them the latest scores and often the details. So the group slowly grew. It became a daily event with Bill's retirement and with the aid of several friends like Jim Matuska, WA7ZTL, it became a reliable spot to work a new DX country for the beginners.

With good discipline on the frequency, some of Bill's old friends in the rare DX spots started to show. First it was the amateurs in the Caroline Islands and then the Marianas. Later BV2B in Taipai made it a point to check with Bill for a little pileup management. His iron fist management became the operating style that drew more and more of the rarer countries. To supplement the attendees, several of the Australian and New Zealand crew rounded up other stations for check-in. Today, it is not uncommon to find every active country in Asia and most of the Pacific Islands on the frequency at least once a week; sometimes, the selection reads like Who's Who of the DX world (BV2B, JT1AN, KG6SW, KC6MJ, UV0EX, 9V1SH, YB7AAU, 9N1MM, 9M8HG, WB5LBJ/DU6 et al).

5632 47th Ave., SW, Seattle, WA 98136



Shown here is a much younger old timer at age 19 a span of 64 years for 9M8HG (Photo via Jack, W2LZX)

9M8HG, Horace, fondly referred to by the DX community as "Mr. Gray", shown here at his operating position. Outside the window you can see the rubber "jungle". In spite of his recent illness, he makes a concerted effort to provide those needing this very rare country with a memorable contact and a very quick QSL. (Photo via Jack, W2LZX).

Among the first of the rarer countries showing up on the frequency was East Malaysia. Horace Gray, 9M8HG, operating from Kuching, Sarawak, gave many their first East Malaysia contact. Most gave no real thought to the contact except for their glee in getting a new one. But it was not only a contact with a rare country, it was also a contact with a rare amateur.

Horace G. Gray is by no means a newcomer to DX. For those with a good *QST* collection, pull out the July 1933 copy and turn to page 60. You will find the photograph of a younger man with the following caption:

> *"OB2SK, The Thousand-Mile-Per-Watt Station of Horace G. Gray at Sarawak. With seven watts maximum input, the world was worked from the wilds of Borneo."*

This was the station of the Winner of the World DX Contest in April, 1932. Horace was first licensed as OB2SK. He operated from the Sarawak location until 1936 when he moved and operated as VS5AC. In 1942 his DXing stopped as he was INTERNED for the duration of the war. He spent the years after the war recuperating/rehabilitating until he took up SWLing in 1963. Like all DXers, the dormant DX bug bit and he returned to the air as 9M8HG on August 23, 1974.

Several DXers caught Horace as he roamed the bands. But large numbers of DXers didn't know of his activity until he joined the Family Hour on the 14.225 MHz. spot. Bill encouraged Horace to join him when he could, which turned out to be very regular. Now East Malaysia became a mainstay and the signal from the modified TS-510, running 80 watts to a dipole at 30 feet was workable. Mostly due to the strict discipline on the 14.225 MHz. spot. It might take several days, before a DXer got a chance to work him, but many made a contact every time Horace got on. Those who had worked East Malaysia

Mr. Gray was unable to get on the air between the years of 1963 and 1974 due to various reasons. At that time he maintained his interest in radio as a monitoring station as shown above. (Photo via Jack, W2LZX).

Barbecue New Zealand style. The local DX gang got together gathered to relax between the pileups. (l to r) Tony, ZL1AZV; Derek, ZL1BOQ; Ivor, ZL1AGO; and Skip, AH6AN. Derek hosted the event on Skip's visit from Hawaii. (Photo by ZL1BOQ)

were encouraged not to work Horace until those who needed him had a chance. So most of Horace's contacts meant a new country.

Among the many listeners on the frequency was another DXer, Jim Plack, W9NWE. He noted the way things were going on the busy DX spot and admired the way the new comers had a chance at the rare DX. Wanting to help the multitude, he called Bill, W7PHO, on the telephone. It seems he had a TS-900 that was almost new with accessories that he wanted to donate to a deserving DXer who would put it to good use. After a long chat, they decided that Horace was a most deserving candidate as his signal needed help. So with the help of other DXers along the shipping route, the transceiver was on its way.

Today the signal from Kuching has new crispness and more strength. With the dedication of the radio pioneer of Sarawak the rig is responsible for giving many another new one.

The following letter from Horace says it best:

"9M8HG (Horace) wishes to record his deep sincere gratitude for the many 'Get Well' wish cards, Season Greeting cards and letters of sympathy he received from Hams both QSO'd and non-QSO'd right throughout the length and breadth of the United States during his recent illness both in the Kuching and Kuala Lumpur General Hospitals. Although he did his best to acknowledge every card individually, there may have been a few inadvertently omitted. To these few he sends his apologies. Needless to say these cards played an important part psychologically towards his recovery.

More important still he wishes to extend a warm hand-shake and a pat on the back to that great stalwart Bill Bennett W7PHO for his unswerving ham spirit in QSPing news on 9M8HG's illness. God bless him."

14.225 MHz. is more than a managed frequency it is a Family gathering where all are welcome and people care. (The TS-900 story is only one of the shipments. Other gear including: beams, coax, control cable, rotators, tubes, QSL cards and other DX items went to others. So 14.225 MHz. became a place to generate DX operations, schedules and to work the rare ones.)

Now the morning segment, with the help of K6AXC and WA6YQW, covers Africa, the Indian Ocean, the Near East (Persian Gulf) and Southern Europe.

From the Pileup

The 5 band WAZ program is great. Nice challenge and lots of fun. Hope to get a low number certificate. Working first hundred took less than three weeks. (W1NG) Marion Island, ZS2MI is very elusive but is reported to hang out around 14300 from 1300Z. He apparently will call people when they are finished, QSOs and then QSYs when he's finished, apparently to repeat the process. He won't answer people who call him while he's in a QSO, so it is advised you don't bother him, if you hear him. (*Long Skip*) Southern Suda, ST0RK is a regular attendee on the 14225 Family Hour, long path after 1500Z. (K7UU) Mac's operating as VP8PL on South Georgia

The recent Institute of Electrical and Electronics Engineers delegation to a USSR hosted conference included several U.S. DXers of note. Shown at the Central Radio Club headquarters in Moscow are: (l to r) Bob Duggan, N4IA; George Jacobs, W3ASK; Pat West, W7EA; Mr. Bondarenko, Central Radio Club President; John Gayer, Radio Colorado; and Mr. Kaganski, USSR Sport Federation President. (Photo via W7EA)

CQ DX Honor Roll

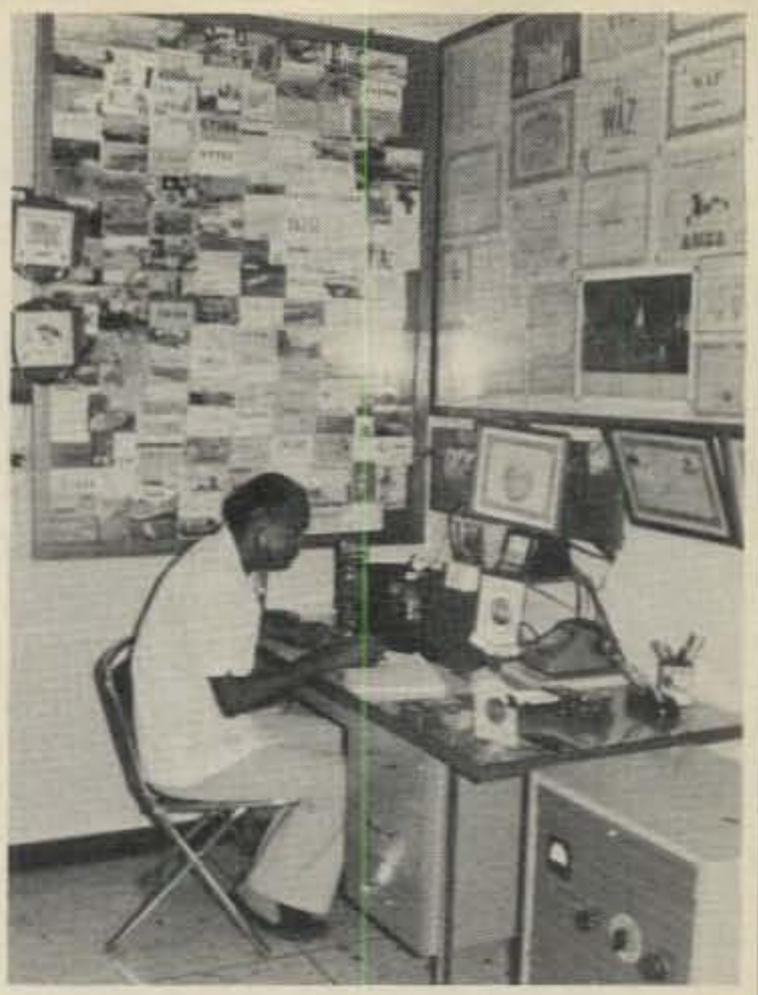
The *CQ* DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more countries for the mode indicated. The top SSTV DXers are also listed. The ARRL DXCC Country List, LESS DELETED COUNTRIES, is used as the country standard. Total number of countries currently on the DXCC list as of this listing is 319. Honor Roll listing is automatic when submitting application or endorsement for 275 or more countries. To remain on the CQ DX Honor Roll, annual updates are required. Honor Roll updates may be submitted any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement.

C.W.

W6PT	319	N4PN	309	N6AV	305	K9MM	300	K4CEB	287
K6EC	315	W8KPL	309	W2GT	305	DL3RK	295	DJ7CX	280
ON4QX	315	K6JG	307	W4BQY	301	N6CW	292	W4OEL	275
W6ID	314	W9DWQ	306						

S.S.B.

WA2RAU	319	W9KRU	314	WA2EOQ	309	N6AV	300	OE3WWB	228
DL9OH	318	I8YRK	313	YV1KZ	309	W9SS	300	I6PLN	287
I@AMU	318	K6JG	313	F2MO	308	HP1JC	299	N6AW	287
W2TP	318	F9RM	312	W4DPS	308	K6XP	299	OK1MP	286
K2FL	317	W3AZD	312	OZ3SK	307	F9MS	295	W7OM	286
W4EEE	317	W6RKP	312	W6YMV	307	W9QO	295	WA4WTG	286
W6EUF	317	I@ZV	311	XE1KS	307	K8PYD	294	YS1O	286
XE1AE	317	OE2EGL	311	VE2WY	306	N2SS	294	W4MWT	285
K6YRA	316	VE3GMT	311	N4MM	305	DK6KG	293	W8ILC	285
W3NKM	316	W9QLD	311	W3GG	305	VE7WJ	293	I3LLD	283
I8AA	315	DJ9ZB	310	K5OVC	304	K4LSP	292	W7JYX	281
I8KDB	315	K6EC	310	W@SD	304	K9RF	291	K8LJG	280
K4MQG	315	K9MM	310	ZL1AGO	303	9H4G	291	WB2RLK	280
VE3MJ	315	SM6CKS	310	DK2BL	302	VE7CE	290	JA6GDG	277
W9DWQ	315	W4UG	310	W@SFU	302	VE7HP	289	DJ2AA	276
W9JT	315	ZS6LW	310	WB6DXU	302	DJ7CX	288	K9PPY	276
G3FKM	314	I4ZSQ	309	EA4LH	301	JH1VRQ	288	VE3FJE	276
VE3MR	314	K6WR	309	I5WT	300				



Julian Coello, YV1KZ, one of Venezuela's top DXers. See DX Extras. (Photo via YV5BX)

is erratic due to his work schedule but we understand he usually gets on about three days after his previous day of activity. You just have to find him to get a line on it. VE3BX notes Mac's excellent signal and says he was able to get him up on s.s.b. after a c.w. contact. He is using a dipole at 100 feet and pileups are usually rather dense. Mac will QRT in early 1979 (*Long Skip*) Giampaolo Forte, I2FGP, has his plans set for a return to Somalia and more activity from the 601FG callsign. He wants to work as many as possible, so no repeats please. (WCDXB). If you listen and hear someone calling blindly for 3Y1VC Bouvet, this usually is around 14030. Usually around 2300Z. If you persist, you will suddenly be dazzled to hear 3Y1VC answer and the activity is off and running. The signal is definitely improved. The station is showing frequently and the location on the band is fairly set. Generally after the initial burst, 3Y1VC goes to split operation and will operate for an hour. That usually finishes up the day's activity and you can listen for him the following day (WCDXB) Beata Island was on the air for the first time, thanks to a Dominican Republic DXpedition. The all band operation used the call HI1RCD. Although not a new country, it was a rare prefix. (*HR Report*) W6EYY and K6DC were elected to the Board of Directors for the Northern California DX Club. (*The DXer*) On Mayotte cards. The D68AD QSL manager reports long mail

Herb "Andy" Anderson, K7GEX, sits at the home rig relaxing after a very active DXpedition to the Caribbean. Andy and Warren Howard, WB7BNP, piloted FG@EID/FS from Saint Martin during the 1978 World Wide SSB contest.

delays in getting logs to UK. Patience! (*VERNONA*) *Bahrein, A9XBD is on 15 and 20 meters irregularly but he is punctual on Saturdays near 14235 from 1200Z. Jeff used special* special callsign A9ZBD last December. QSL to Box 14, Bahrein. (*Long Island DXB*) The Delta DX Association (W5RU) has logs for KM6FC, KM6FD, KM6BI (July 1, 1978 and on), OY8KH, FG7TD, WD4CEM/KH4, TR8AC, TR8GDC, (December 1, 1978 and on) VU2DUE and VP2LGR. (WA4OUF) 1979 should be a *great* year for propagation conditions on the Amateur bands. As good as conditions seemed to be in 1978. They are going to be even a lot better in 1979. This will be due, of course, to the rapid increase taking place in the activity of sunspot cycle 21. It is estimated that the cycle rose considerably above the 100 mark at the start of 1979, and it now appears very likely that it will climb above 150 during the year. (*Mail-A-Prop*) JX4GN, Jan Mayer wasted no time after his arrival in arranging for daily schedules from 2130Z on 14231 or 14240. Usually in the company of LA7JO. JX9WT is regularly near 14270 from 2330Z. (*LIDXB*) Laccadives DXpedition didn't happen. (*Totem Tabloid*) Kurt HB9MX, QSL Manager for the Clippertan DXpedition, says that to date he has

Steve Chrismas, A4XFE shown at the controls of his Sultanate of Oman station has given many a new country. Despite the modest station and antenna, Steve puts out a good signal. (ed. Must be the call.) He is not a newcomer to DX having held ZC4MO and HS3AKI before. (Photo via W7PHO)

Bill Bennett, W7PHO, holds one of two recent plaques received for his efforts to promote international good will through amateur radio. The Santa Barbara DX Association and the South Eastern DX Association cited the well known DXer for his support and willingness to provide a helping hand. (Photo by K7GEX)

mailed 16,652 QSLs direct, 3,998 via bureau; 883 refused for check/not in log. (*G Watts DX-News-Sheet*) If any DX stations are looking for a stateside QSL Manager. I am available (WD9GSO) Tidbits: EI7H who works a lot of c.w. is a grandnephew of Marconi. SV0WTT is looking for WAZ Zones 1, 2 and 3. The HB7 prefix is to make note of the 50th Anniversary of the USKA, the Swiss Group. VK9ZR cards are out. On KZ0DX cards, Jim Miller KZ5JM is shipping the logs and QSL cards to K7SFN, 225 West Coyote Drive, Carson City, Nevada 89701. YI1BDG should now have the FDX-500 on. (WCDXB) Peter Island operation by Willy de Roos, ON5RP, will use the callsign 3Y0BZ. This looks very good for new country status. Unless the logs are handled on the air, do not expect cards until mid-1980. Patience!

Paulo Astuto, PP8DD, is shown at his Manaus, Brasil, station. The neat appearance of the shack is between DX pursuits. Paulo is a recent CQ DX Award recipient.

(*LIDXB*) 4Z4TT was on Wallis Island as FW0TT. He supplemented the activity of FW8AC who continues to show around 14293 at 0700Z. (*VERONA*) Rich, KA1MI and Bill KA1NC take turns handing out Marcus Island QSOs. Rich handles c.w. while Bill does the SSB chores. They are both on all bands and seem like at all times when not handling their Coast Guard duties. (*Totem Tabloid*)

The 1978 Needed Country Survey

Over 700 U.S. amateurs responded in the 1978 WCDXB Need Country Poll. Some interesting changes since last year. This year's top ten:

1. Bouvet - 3Y
2. China - BY
3. Sandia Arabia/Iraq Neutral Zone - 8Z4
4. Kamaran - VS9
5. Burma - XZ
6. Albania - ZA
7. Heard - VK0
8. Laccadives - VU
9. Spratly - 1S
10. Red Sea Islands (Abu Ail; Jabal at Tair)

The Central Radio Club bureau, better known as Box 88 Moscow is busy working to handle the large volume of cards. The bureau handles almost every incoming and outgoing QSL from the USSR. With the ARRL outgoing bureau, the volume has dramatically increased. The backlog did not seem to be excessive. So have PATIENCE!! (Photo W7EA)

Clipperton and Iraq are obvious by their absence. With this year's DX-peditions in the planning we might see Bouvet, Spratly and the Red Sea Islands deleted from the list next year. With the change in the China scene there is lots of hope for BY operation before the year's end. DX-ing is not only a great part of our radio hobby but also a dynamic part. Another interesting observation on the great survey conducted by W1AM is the elevation of some countries. The American Pacific Islands, once common place, are rapidly climbing towards the top ten. Wake, Samoa and the Baker group will enjoy that rare rank sooner than most think.

The WPX Program

Mixed

704	VE4VV	711	YU2DCL
705	YU1OCQ	712	JH3JEX
706	UK5MAF	713	JE1CTA
707	UQ2GCN	714	K9ARZ
708	YU3TKT	715	YU1GMN
709	I8RHZ	716	TF3CW
710	W9QWM	717	N4WX

S.S.B.

1116	K5GOE	1125	WA6WZO
1117	KH6WF	1126	W9QWM
1118	UA2FBZ	1127	W6BCQ
1119	UA6DL	1128	CN8AK
1120	UA9FBM	1129	VE1DI
1121	UK3VAA	1130	I8YZP
1122	UW1AE	1131	G4EZT
1123	UW0MF	1132	I6ZJC
1124	N7SW	1133	XE1GBM

C.W.

1755	K0MT	1776	UK2TAD
1756	JA3HCN	1777	UK2WAJ
1757	UA1ACO	1778	UB5GBN
1758	UA1ADK	1779	UB5ZAT
1759	UA1ZBW	1780	UB5ZEL
1760	UA1ZZ	1781	UL7CT
1761	UA2FBG	1782	UM8MBA
1762	UA3DCY	1783	UT5NF
1763	UA3PBY	1784	UV9DU
1764	UA3SX	1785	UV9EI
1765	UA4LD	1786	UW9YS
1766	UA6AJF	1787	UQ2CR
1767	UA9HAN	1788	I8RHZ
1768	UA9HAO	1789	JR3COZ
1769	UA9HBA	1790	W9QWM
1770	UA9SCD	1791	AG0A
1771	UA9SCH	1792	VE4VV
1772	UA9WBD	1793	TF3CW
1773	UA0JAW	1794	WA6KCX
1774	UA0ML	1795	K7PJO
1775	UK1ZAB	1796	AF5M

VPX

150	UA1-169-185	154	UA0-103-25
151	UA3-142-800	155	UB5-O64-297
152	UA3-170-223	156	UK3-170-903
153	UA4-148-227	157	UP2-038-176

WPNX

136 . . . WD4NMD

Endorsements

Mixed: 400 YU3TKT, TF3JB, TF3CW. 450 K5GOE, VE4VV, I8RHZ, WA4QMQ, K9ARZ, JH3JEX. 500 YU1OCQ, JH3XCU, JE1CTA, KL7AF. 600 OK3IF. 650 YU2AAU, YU2CDL, N4WX. 700 K2SX. 750 N6UW. 800 YU1GMN. 900 JA1BN, ON4XG. 950 YU2CBM, N4UH. 1100 W9QWM. 1150 DL7AA, OK3EA. 1200 N2AC. 1450 ON4QX. 1500 N4MM.

SSB: 300 K5GOE, KH6WF, G4EZT, XE1GBM. 350 YU3TKT, N6UW, DK6WA, W4MNZ. 400 JH3XCU, UA6DL, W6BCQ, CN8AK, VE1DI. 450 I6ICD, I6ZJC, I20MF. 500 IS0MVE, W9QWM. 600 I8YZP, N4CQ, ON4XG. 650 W5ILR, WA6WZO. 700 WA4QMQ. 800 WA1JMP, W2CC. 850 DL7AA. 900 OK3EA. 1150 I8AA. 1300 N4MM, K2POA. 1350 I8KDB.

CW: 300 K0MT, JA3HCN, JR3COZ, AG0A, TF3CW, K7PJO, AF5M. 350 UV9DU, UB5MAR, I8RHZ, VE4VV, WA6KCX. 400 UA3DCY, UA9YAQ, I8KCI. 450 UK1ZAB, UZ3ER, YU5FAM. 500 W3OGY. 600 N4WX, I0ZQ, K8LJG. 650 K2SX, N6UW. 700 PI1PT, ON4XG. 750 UA3GO. 800 UY5OQ. 850 PA0SNG. 900 UC2BF, K4RDU, OK3EA, OK2BLG. 950 W9QWM. 100 DL7AA. 1050 N4MM, WA2HZR. 1300 ON4QX. 1350 DL1QT.

10 meters: UK5MAF, W9QWM, N4WX, ON4XG.
15 meters: UK5MAF, UA3RH, JH1VRO, W9QWM, YU1GMN, N4WX, ON4XG.
20 meters: VE4VV, YU1OCQ, UK5MAF, UA1ZBW, UA0ML, UV9DU, UC2AW, UA6APP, W9QWM, YU1GMN, N4WX, ON4XG.
40 meters: UK5MAF, UK5WAZ, UA3RH, YU1GMN, N4WX, ON4XG.
80 meters: UC2AS, UK5MAF, UQ2CR, UZ3ER, W9QWM, YU1GMN, W2NC, DK6WA, N4WX.
Africa: UK5MAF.
Asia: UK5WAZ, UK5MAF, UC2AW, UA6APP, UK6AAJ, W9QWM, YU1GMN, I0ZQ, N4WX.
Europe: UK5MAF, UA1ZBW, UC2CZ, UQ2CR, UZ3ER, UA1ARQ, UA6APP, UA9FAR, UK6AAJ, TF3JB, W9QWM, VE1DI, YU1GMN, TF3CW, N4WX.
No. Amer.: VE4VV, K0MT, UK5MAF, UA3GO, UC2BF, UY5OQ, W9QWM, VE1DI, YU1GMN, I0ZQ, N4WX, K7PJO.
Oceania: UK5MAF, N4WX.
So. Amer.: UK5MAF, DJ7CX, W9QWM.

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, USA.

The Worked All Zones Program
Single Band WAZ

20 Meter Phone

195...K5GZ
196...UW0MF
197...UR2QD
198...W8KNH
199...W5ISF
200...DK9KD
201...GM3MBP
202...K5GKC
203...K6EDA
204...KG6RT
205...K4UEE

20 Meter C.W.

63...UR2RCU
64...UA3DEA
65...UB5GBD
66...G4BUE
67...W6TFO
68...JE1CTA
69...W5LFS

15 Meter C.W.

8...JG1ESQ

All Band S.S.B.

1569...N4MM
1570...JI1WRM
1571...K8SD
1572...W2CC
1573...UL7NW
1574...UA9FU
1575...UA9VH/JT1
1576...I2RVW
1577...K0ILI/KG6
1578...W0PVW
1579...KL7AF
1580...K8LJG
1581...K4PQV
1582...OE1SKC
1583...WA6EKL
1584...W9TLU
1585...N6JJ
1586...G3YOG
1587...K3DH
1588...W7DSZ
1589...JE1CTA
1590...W0SR
1591...W8SY
1592...WA7UFS
1593...W0JKJ
1594...I8ACB
1595...ZP5CD
1596...W6PVE
1597...I8IGS
1598...JY5US

C.W. Phone

4429...K9IW
4430...N1DL
4431...UA0PY
4432...UR2RCU
4433...UK4ANI
4434...UW0LT
4435...UK6AAJ
4436...UA3LAC
4437...UB5RS
4438...UW0LI
4439...UA0LS
4440...WB0NAA
4441...N8II
4442...W4ZWZ
4443...W7XN
4444...W4OUF
4445...YU3AT
4446...YU3UXB
4447...PA0ALO
4448...GM3KLA
4449...VE5RA
4450...5T5CJ
4451...F6DCQ
4452...DL3JR
4453...K5VRX
4454...VE3HLC
4455...VE3FRA
4456...AB4Z
4457...PA0AAC
4458...OE1ZL
4459...K5GKC
4460...JA1KFN
4461...PI1PT
4462...YU2CCB
4463...YU2RJU
4464...SM7FYM

The complete rules for WAZ are found in the May 1976 issus of *CQ* application blanks and reprints of the rules may be obtained by sending a self-addressed stamped envelope, size 4¼ X 9½, to the WAZ manager: Leo Haijsman, 1044 S.E. 43 Street Cape Coral, Florida, 33904. Applicants forwarding QSL cards direct to the WAZ manager should include sufficient postage for the safe return of the QSL cards.

DX Extras

DE YV5BZ BT Have you ever worked YV1KZ? Julian is a very consistent DX man. He began DXing at the end of 1965 on s.s.b. His rig was a Swan transceiver. He had no remote v.f.o., yet he already has 313 countries confirmed in his DXCC and 304 on s.s.b. His ability to operate and work those rare ones working split frequency is just unbelievable. When the other guy says he is tuning 60 or 70 kHz. up from his frequency, Julian has to develop a great amount of wrist work to get that one, and he usually does. He still uses the same rig and linear since 1965. He had a cubical quad once and later a monobander. For 40 and 80 he uses dipoles. He is very proud of his collection of Diplomas which include: WPW, AHC, WAVKCA, WAC, DLD, WAP, ONU, DUR, WAPY, WAS, 5BWAS, 5BDXCC just to name a few.

I think it is wonderful how Julian has achieved such remarkable work in only 13 years of DXing with a lot of odds against him. His skill, patience, constance and courage to do his DX work have overcome all his difficulties and he is well rewarded, because his record is one of the best. AR The nice writeup from Lou Alegrett, YV5BZ, was used as submitted so that I might share with you the sincere respect of one DXer to another.

CQ DX Honor Roll

We received a nice letter from a *past* member of the *CQ* DX Honor Roll asking why he was no longer listed. The answer was he has *not* submitted an update in the last year (twelve months). The DX awards rules require an annual update, even if there is no change in the country total. This allows the Honor Roll to reflect status of the *active* DXers. Granted a DXer who is no longer chasing DX can retain his position. However, the inactive DXer does not usually pursue the paperwork either.

So if you were once on the *CQ* DX Honor Roll and you're not listed, it is probably because you didn't write us. If there is no change in your country total, drop us a postcard and let us know and you will be back on the Honor Roll for another year.

73, Rod W7OM

QSL Information

A2CBT - to DJ0FZ
A4A - to G3AAN
A35BD - to ZL1BD
C5AAQ - to WA1SQB
C5AAR - to G3LQP
C5ABB - to LA7GV
C31IS - to F6CXF
C31OE - to F6ECX
C31PP - to DJ2ML
C31QR - to PE0MOT
C31RF - to DJ6ZT
C31RN - to F6EZV
CP2QN - to W2KF
CT1FL - to W3HNK
CT3BX - to EA8IS
CT4IM - to WB5UPZ
DA2QE - Via Robert L. Chilcote, USAFSB Box #14, APO New York, NY 09742
DK6AH/3A - to DK8AG
DT8IKP - to DM2CUO
DU1MEL - to K9MD
EA6EU - to WD5BIF
EA9FD - to Rafael, P.O. Box 326, Melilla, Spanish North Africa
EL1I - to VE1RY
EL2A - to WB3CQM
EL2AE - to WB3CQM
EL2AV - to N6FL
EL2EV - to W3HNK
EP2HA - to WA6CDH
EP2PY - G8MUM
EP2SL - to G3CXS
EP2WR - to K9MKX
EX9A - to UK9AAN
F0AHY/FG - to DJ0UP
FG0EID/FS - to K7GEX
FG0EUU/FS to F6CTK
FG0MM - to K1MM
FM0UM - to F2VT
FP0AG - to N8AG
FP0EE - to W1PFA
FP0MM - to K1MM
G5CRF - c/o Ron, W6TWT, P.O. Box 99, Trinidad, CA 95570
GB3CSC - to GI3HXV
GB3DSG - to GI3HXV
GU5CAA - to K3RV
GU5CKW - to DK9KX
H5RAC - to WA4HNL
HD0E - to K8LJG
HH2CQ (78 CQ WW CW) - to W4ORT
HH2CQ (78 CQ WW SSB) - to K4UTE
HH2DX - Via W4ORT
HH5HR - to K4UTE
HH5RB - c/o K4UTE
HH5TW - Via W4ORT
HL9WH - to W7WQR
HP1XYA - to W3HNK
HP3XWB - to DL1HH
HS1ABD - to K3EST
HS1AIV - to W1YRC
HW7G - to FG7AS
HZ1HZ - to RSGB
HZ1JB - to W4LZZ
HZ1MJ - to WA6LFF
HZ1TC - Via Ahmed Nasser Al-Mashjari, Box 3366, Jedda, Saudi Arabia
IA5DMK - to I2DMK
IZ2ZZV - to IT9RAN
J20BL - to F6BFN
JY4MB - to WA4HNL
K4IIF/TF3 - to W4KA
KG6JIH - to K6TBQ
KG6RE - to K7ZA
KG6RI - to K7NF
KX6MP - to WA5FWG
KZ5GXT - to K3SXA
KZ5NO - to K1MM
KZ5RO - to WB2DCP
LU3ZY - to LU2CN
OX5AF - to AB1Q
OY7ML - to W2GHK
P29BL - to JA2KLT
P29NKV - to WA7ILC
PJ8NA - to K1MM
PJ9CG - to WA1AHQ
PJ9JR - to N4MM
PJ9NA - to K1MM
PY7CC - to W4TAJ
PY0EG - to PY5AA
PY0GA - to PY5AA
PY0MAG - to PY1MAG
PY0RO - to W1DA
PZ2AC - to WB4RRK
S8GEH - to WA4HNL
SM2ALH/4U - to SM2DLZ
SV1KJ - c/o George, P.O. Box 1504, Athens, Greece
TA1DKF - to WB3KUX
TF3YH - to WA8AEE
TU2HS - to DJ9HD
TU2IE - to DK3UW
TU2IF - to HB9APF
VE3BWK/4U to WA3HUP
VK7AE - to W5ACE
VK0JC - to OZ8AE
VK0SW - to VK3ATS
VP1EW - to WA6UZB
VP1RX - to W4SME
VP2ECW - to WB4BQZ
VP2DAY - to WA4DWN
VP2LEX - to K7GEX
VP2LFZ - to WB1CRG
VP2MAR - to PY2DFR
VP2MT - to WB8LDH
VP2VEH - to N6RA
VP2VES - to K7MKS
VP2VJ - to VE3MJ
VP9WB - to K3QMX
VS6HK - to W6EL
WA1RFN/VP9 - to W4EV
WA7RKJ/OZ - to K7OEW
WD4ECM/KH4 - to W5RU
YB9ADA - to W5SWN
YN1Z - to WA4ZXC
ZB2EI - to G4GVF
ZB2EM - to WA2CBU
ZD8TM - to K1DRN
ZD8TW - to K8NOQ
ZF2CI - to YASME
ZK1BD - to ZL1SZ
ZL3HI/c to N2CW
ZS3AG - to WA2JUQ
ZS4PB - to N7RO
ZS6BOK/H5 - to ZS6BOK
ZS6N - to WA1UVX
3D6AX - to WA5IEV
3Y1VC - to LA1VC
3Y5DQ - to LA5DQ
3Y0BZ - to VE7ZQ
4D80UT - to JA1UT
4K1AB - to UA0BAE
4N1Z - to YU1JRS
4N2EC - to YU1JRS
4N0D - to YU2CQ
4S7JW - to DK8KL
4S7QC - to DK8KL
4S7VZ - to DK8KL
4S7WV - to DK8KL
4Z4MB - to K2UVV
5N2AUX to G3IQM
5Z4NA - to W2PPG
5Z4QS - to WB1ASW
7P8BH - to WB9ZZK
8P6JD - to K5MK
9G1KH - to WD5GGX
9G1RU - to HB9BFN
9K2EZ to WA1ZGR
9K2JN - to WB2IZN
9X5AL - to SM5HHJ
9Y4CRV - to WA4RYN

Volunteering services as a QSL Manager: Harry, W6TPC

The CQ DX Awards Program
S.S.B.

641...UK5MAF
642...UW3RR
643...UA6DL
644...UA1MU
645...UK6AAJ
646...UK3DAH
647...UW1AE
648...UP2OU
649...UK5QAV
650...UA9FBM
651...VK3OT
652...K7JXR
653...WA4QMQ
654...ON4XG
655...WA6VHZ
656...K0JSY
657...I5EFO

C.W.

332...UB5ZAT
333...UB5ZA
334...UB5WK
335...UA9OBJ
336...UD6DHU
337...UA0ML
338...UL7CT
339...UP2BAE
340...UB5ZEL
341...UP2OU
342...UB5KAK
343...UA3DEA
344...UA3DCY
345...UA3ABD
346...UA3WZ
347...UZ3ER
348...UV9SA
349...ON4XG
350...K0LST
351...WB0SEL
352...WB0YUI
353...K2PF

S.S.B. Endorsements

310...DL9OH/318
310...I0AMU/318
310...W4EEE/317
310...W6EUF/317
310...K4MQG/315
310...W6RKP/314
310...K6JG/313
300...K5OVC/304
300...N6AV/300
275...W9QQ/295
275...9H4G/291
275...I6PLN/287
275...N6AW/287
275...OK1MP/286
200...VK3OT/204
200...UA1MU/201
150...UP2OU/178
150...ON4XG/173
3.5/7 MHz...K5OVC/102
28 MHz...K5OVC/152

C.W. Endorsements

300...K6JG/307
300...N6AV/305
275...W4OEL/275
150...K0LST/153

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", 5632 47th Avenue S.W., Seattle, Washington 98136 U.S.A.

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

The subject matter covered in my column last month brought an answer from Guinness Superlatives that they are indeed interested in considering Amateur Radio as a possible subject for their "Book of World Records."

My initial inquiry was regarding Dick Spenceley's KV4AA's record of 48,100 QSOs in 1978. Now that we have a foot in the door how about additional claims from some of you "hot shot" contesters.

Just making a claim is not enough however, it must be authenticated in a way that is acceptable to the Guiness publishers. It would seem to be that your station or contest log would be acceptable, especially if it passes the scrutiny of a Contest Committee and is eventually published in a national publication like *CQ*, *QST* or other recognized amateur magazines.

So, if you are going to claim a record be prepared to be able to back it up with acceptable documentation. As a starter you can send your claims to me and I in turn will forward them to Guiness Superlatives for consideration.

If and when they accept Amateur Radio as a subject for their "Book of World Records" and give me the required procedure, I will keep you informed in this Column.

The Palm Garden Contest Club of the Japan DX Association is going into contest competition in a big way.

Nobuyasu Itoh, JA1KSO, secretary of the club has informed me that they are now located in their own club house and have already erected 3 towers and an assortment of 14 antennas for all bands. Operation will be a multi-multi effort using the calls JH1YMC and JH1ZLA. Visiting contesters from other countries will be included in the operating staff.

The Club is donating four plaques for the winning stations in Japan in each of the four *CQ* Contests. Single operator, all band in the WPX SSB and CW and World Wide Phone and CW.

73 for now, Frank, W1WY

14 Sherwood Ln., Stanford, CT 06905

Calendar of Events

Apr.	28-29	YL Int. SSBers Phone Party
May	5-6	Florida QSO Party
May	5-6	New York State QSO Party
May	5-6	10X Net QSO Party
May	5-7	Vermont QSO Party
†May	12-13	USSR "CQ—M" Contest
May	19-20	Massachussetts QSO Party
May	19-21	Michigan QSO Party
May	26-27	CQ WW WPX C.W. Contest
June	3	Pennyroyal QSO Party
June	2-3	Minnesota QSO Party
June	1-4	CHC/FHC/HTH QSO Party
June	9-10	ARRL VHF QSO Party
June	16-17	All Asian Phone Contest
June	23-24	ARRL Field Day
July	14-15	IARU Radiosport Champ.

† Not Official

Florida QSO Party
Starts: 1500 GMT Saturday, May 5
Ends: 2359 GMT Sunday, May 6

This is the 14th annual QSO Party sponsored by *Florida Skip* which has been serving Floridians for over 20 years.

The same station may be worked once on each band and each mode. Separate logs are required for phone and c.w. Florida stations may work other Florida stations but for QSO points only.

Classes: Florida stations are divided into two classes. Class A are portables and mobiles operating on emergency power running 200 watts or less, inside Fla. but outside their own county. Class B are all others.

Exchange: RS(T) and QTH. County for Fla. stations, state, province or country for others. Out-of-state mobiles not within the jurisdiction of any country will indicate their ITU region. (1, 2, or 3)

Scoring: *For Florida* - One point per QSO. Multiply total by sum of states (49), provinces (12), DX countries (max. of 15) and regions (3) worked. Class A stations multiply final score by 1.5 factor.

Out-of-state - Two points for each Fla. contact. Multiply total by Fla. counties worked. (max of 67)

Frequencies: CW - 3555, 7055, 14055, 21055, 28055. SSB - 3945, 7279, 14319, 21379, 28579.

Awards: Certificates, phone and c.w., to the top single operator score in each state, province, DX country and Fla. county. There are also five plaques to be awarded as follows: Top single operator in Fla. and out-of-state, both phone and c.w., and to the Fla. Club with the highest aggregate score.

There is a disqualification clause for excessive dupes, multipliers and other obvious reasons. Disqualified stations will be barred from next year's party.

Include a summary sheet and the usual signed declaration, stamp for the *Florida Skip* issue with the results.

All entries must be received before May 31st and go to: Florida Skip, P.O. Box 660501, Miami Springs, FL 33166

New York State QSO Party
1700 GMT Sat. May 5 to 0500 Sun. May 6,
and 1200 GMT to 2359 Sun. May 6

This year's party is being sponsored by the Univ. of Buffalo A.R.C., WA2NPQ.

The same station may be worked on each band and mode, and for the first time NY stations may contact other NY stations for QSO and multiplier credit. Mobiles and portables may be worked in each county change.

Exchange: QSO no., RS(T) and QTH. County for NY, state or province for others.

Scoring: One point per QSO. NY stations multiply total by the number of states, provinces, DX counties and NY counties worked. Out-of-state stations use NY counties for their multiplier. (max. of 62)

No frequencies were given but I would suggest a spot in the General portion of each band between the frequencies being used by the other two state QSO parties on this weekend.

Awards: Certificates to the top scorers in each state, province, DX country and NY state county.

Indicate each new multiplier in a separate column as it is worked. A check sheet is required for stations

making 100 or more contacts. And of course the usual summary sheet with all the essential information. Include a large s.a.s.e. if you desire a copy of the results.

Logs must be received by June 16th and go to: Michael Bergman, WD2AJS, 45 Swartson Ct., Albany, N.Y. 12209.

10-X Net QSO Party

Starts: 0001 GMT Saturday, May 5
Ends: 2359 GMT Sunday, May 6

The Long Island Amateur Radio Service Chapter of the 10-X International Net is sponsoring this one.

Exchange: Name, QTH, 10-X number and L.I. Chapter membership for L.I. members.

Scoring: One point for each QSO, add another point for each 10-X number worked, and another point for each L.I. number.

Frequencies: On 10 meters only of course, between 28.9 and 29.2 kHz.

Awards: 1st and 2nd place certificates to winners in each state, province and DX country. A Trophy to the highest scoring L.I. Chapter member. Only 10-X members are eligible for awards.

Logs must be received by June 15th and go to: Robert Watson, WA2MHL, 2 Suffolk Court, Oceanside, N.Y. 11572. Include a large s.a.s.e. if you desire a copy of the results.

Vermont QSO Party

Starts: 2100 GMT Saturday, May 5
Ends: 0100 GMT Monday, May 7

Sponsored by the Central Vermont ARC this activity offers a good opportunity to work this comparatively rare state.

The same station may be worked on each band and mode for QSO and multiplier credit, and mobiles in each county change.

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

Scoring: Vermont stations score 1 point for each contact and multiply total by number of ARRL sections and countries worked. All others score 3 points for each Vermont station worked and multiply total by sum of Vermont counties worked *on each band.* (14 per band possible)

Frequencies: 3565, 3909, 3932, 7065, 7290, 14065, 14325, 21065, 21375, 28160, 28600, 50260, 144-144.5, 145.8 (Try c.w. on odd hours, phone on even hours GMT)

Awards: Certificates to the top scoring station in each ARRL section, DX country, and 2nd, 3rd and 4th places in Vermont. (min. of 3 QSOs) Also multi-operator and mobile stations operating in Vermont. There are Trophies for the top scoring single operator station in Vermont and out-of-state.

Contacts made in the Party may be credited for the W-VT Award for working 13 out of the 14 Vermont counties.

Mailing deadline is June 15th to: Peter Kragh, W1AYK/K2UPD, 170 Summit Ave., Ramsey, N.J. 07446, Include a s.a.s.e. with your entry.

1978 Results "H-22" Contest U.S.A. & Canada

*CK1AW	8856	*N4OL	12642
		W4OEL	12201
*VE2JR	1233	K4PDV	3870
		K4JRB	2622
*CG3GCO	8436	W4LCL	1620
VE3UOT	6048	W4YN	1126
VE3DLR	2475	N4MM	756
		W4KO	510
*VE4SW	480		
		*W5SOD	396
		W5EIJ	36
*K1EM	14078		
W1CNU	6498	*N6ZX	1152
N1NA	5394	K6OC	972
W1DMD	960	N6IQ	390
W1OPJ	648		
K1UZ	432	*HB9XC/W7	8
*K2XA	21924	*W8WT	1953
K2PL	20034	W8DA	741
W2EUO	14580	WB8TGS	405
W2KHT	5754		
W2FVS	5724	*K9BG	8694
WB2KTM	5130	W9QWM	3915
W2OB	2442	W9OA	3072
WA2IFS	1170	HB9ALZ/W9	2376
WA2HCV	1080	W9CG	780
K2TV	576	WB9NXT	480
WA2MHL	432	K9IL	450
		W9SS	3
*W3ARK	8118		
LU1BAR/W3	5208	*W0GNX	2520
WB3JWK	2325	WB0UCP	264
N3AX	741		
WB3ICL	450		
W3CM	264	*= Country Leader	

USSR "CQ—M" Contest

Starts: 2100 GMT Saturday, May 12
Ends: 2100 GMT Sunday, May 13

This contest generates a lot of USSR activity but it would get a lot more state-side returns if they would only get the announcement out in time. Written requests to Box 88 takes months for a reply, and we have yet to get the official USSR country list.

However over the air information confirms the dates and that the rules are the same as last year. So here they are for what they are worth, but they are *not* official.

It's a world wide type contest so don't concentrate on working USSR stations only. Contacts may be made on c.w. or s.s.b., 3.5 thru 28 MHz. The same station may be worked on each band but c.w. or s.s.b., not both modes, for QSO and multiplier credit.

Categories: There are four classes. Single operator (a) single band, (b) all band, (c) multi-operator single transmitter, all band, and (d) s.w.l.

Exchange: RS(T) plus a 3 figure QSO number. The USSR boys RS(T) plus the number of their region. (Oblast)

Points: Contacts between stations on the same continent 1 point, between different continents 3 points. Own country may be worked for multiplier credit but no QSO points.

Multiplier: Is determined by the number of countries worked on *each band*. The USSR "R-150-S" list is the standard, which essentially is the same as the DXCC plus a few USSR regions.

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

The s.w.l.'s get 1 point for reporting one station exchange, 3 points if both stations and their exchange are reported. There is no multiplier.

Awards: Certificates and badges in each category to the Top scorers in each continent, and each country. A special badge to all participants who contact 10 or more Soviet stations.

Contest contacts may be credited for the many USSR awards in lieu of QSL cards if the request is made with your log entry. (R-150-S, R-100-O, W-100-U, R-15-R, R-10-R, R-6-K)

All entries must be postmarked no later than July 1st and go to: Krenkel Central Radio Club, "CQ—M" Contest Committee, P.O. Box 88, Moscow, USSR.

Massachussetts QSO Party

Starts: 1200 GMT Saturday, May 19
Ends: 2200 GMT Sunday, May 20

This year's party is being run by the Greater New Bedford Contesters, W1FJI, N1AS and K1KJT as sponsors.

The same station may be worked on each band and mode. Cross-band and repeater contacts not permitted. Mass. stations may work each other for QSO points and county multiplier. Mobiles and portables in each county change.

Exchange: RS(T) and QTH. County for Mass., state or VE province for others.

Scoring: Two points for each s.s.b. contact, 4 points for each c.w.

Mass. stations multiply total QSO points by (Mass. counties + states and provinces) worked.

Out-of-state stations multiply total QSO points by different Mass. counties worked. (max. of 14)

Add 5 bonus points to your total

score for each of the 3 sponsors worked. (once only)

DX contacts count for QSO points only, no multiplier.

Frequencies: CW - 1810, 3560, 7060, 14060, 21060, 28060. SSB - 1820, 3960, 7260, 14290, 21390, 28590, 50.110. Novice - 3720, 7120, 21120, 28120.

Awards: Certificates to lst, 2nd & 3rd place winners in each Mass. county and in each state. Two special awards to the highest aggregate Club score in Mass., and to the Mass. station submitting the all time highest number of QSO's. (Record now held by N1YY with 664 in 1978.) Stations working all 3 sponsoring stations will also receive an award.

Include a summary sheet with all essential information with your entry and a large s.a.s.e. for copy of results and awards.

Mailing deadline is June 30th and they go to: Arthur Marshall, W1FJI, 60 Meadow Road, Westport, Mass. 02790.

Michigan QSO Party

1800 Sat. May 19 to 0300 Sun. May 20
1100 Sun. May 20 to 0200 Mon. May 21

This year's party is again sponsored by the Oak Park ARC. The same station may be worked on each band and mode, protable/mobile in each county change. Contacts between Mich. counties are permitted for multiplier credit.

Exchange: RS(T), QSO no. and QTH. County for Mich., State or country for others.

Scoring: For Mich. - One point for phone contacts, 2 points if on c.w. Multiply total by (states + countries + Mich. counties) worked. KH6 and KL7 count as states, VE as a country.

Out-of-state - One point for phone, 2 points on c.w., 5 points if it's with Club station W8MB. Multiply total by Mich. counties worked. (max. 83)

VHF scoring same as above but add multiplier from each band for total multiplier. Oscar contacts are worth 5 points. Repeater contacts not allowed.

Frequencies: CW - 1810, 3540, 3725, 7035, 7125, 14035, 21035, 21125, 28035, 28125. SSB - 1815, 3905, 7280, 14280, 21380, 28580, VHF - 50.125 and 145.025.

Awards: Certificates to top scorers in each state, country and Mich. county. There are also plaques and trophies for high Mich. score, out-of-state, VHF and aggregate club score in Mich. (Single op. only)

Party contacts do not count toward the Mich. Achievement Award unless one fact about Mich. is communicated.

A summary sheet is requested, showing the scoring and other pertinent information, and a signed declaration that rules and regulations have been observed.

Results will be mailed to all entries. mailing deadling is June 30th to: Mark Shaw, K8ED, 3810 Woodman, Troy, Mich. 48084.

1978 All Asian Phone North America Results

All Band		14 MHz.	
*N7XX	157,675	WB5TAP	8,100
*K6HNZ	76,640	W9SS	476
K6NA	74,880	LU1BAR/W2	378
N6AW	49,764	WA2OJK	117
*K5RC	14,014	*HI8LC	3,888
W7JYW	8,229	KG4MM	17,250
N7AM	2,256	7 MHZ.	
*N4MM	1,056	*AA6UO	7,557
WA4QMQ	608	3.5 MHz	
*WA2ZWH	308	*K7JCA	592
*KZ5FR	8,815	Multi-Opr.	
21 MHz		*N6TU	222,870
*N6ZV	36,799	N6ID	159,250
N6OP	5,332	K2SS	43,985
K7NF	4,930	WA6JUD	30,060
14 MHz		*CG2UN	8,815
*N6BV	41,976	*Certificates Winners	
K7SS	9,728		

Michigan Achievement Award

All contacts with Michigan stations made during Michigan Week, May 19 - 26, as well as Party QSOs, may be used for this award if the following requirements are fulfilled.

1. Michigan stations - Submit a log with information, name and address of station worked if possible, of 15 or more QSOs with out-of-state or DX stations, with information about Michigan.

2. Out-of-state stations including Canada- Submit a log with information, name and address if possible, of at least 5 Mich. stations worked who related a fact about Michigan.

3. DX stations - Work at least one Mich. station, with log information, name and address, and relate a fact about Michigan given him by the station worked.

4. Only contacts made during Michigan Week, May 19 -26 are valid for this award.

Applications for certificates must be post-marked no later than July 1st 1979 and mailed to: Governor William Milliken, Lansing, Mich. 48902.

Facts about Michigan: State Bird - Ribon, Fish - Trout, Flower - Apple Blossom, Tree -White Pine, Stone - Petoskey. Or any local fact.

CQ WPX C.W. Contest

Starts: 0000 GMT Saturday, May 26
Ends: 2400 GMT Sunday, May 27

Just a reminder of the coming *new* WPX C.W. Contest at the end of the month. Rules are the same as the well known SSB Contest in March and were given in detail in the January issue.

Four additional Trophies have been added to the c.w. section since the publication of the rules.

Following is a complete up-dated list.

1. WORLD—Single Operator, Single Band. ***(Pedro Piza, Jr., KP4RF)***
2. WORLD—Single Operator, All Band. ***(Canadian DX Association)***
3. WORLD—Multi-Opr., Single Xmtr. ***(Ron Blake, N4KE)***
4. WORLD—Multi-Opr., Multi Xmtr. ***(North Florida DX Association)***
5. U.S.A.—Single Operator, Single Band. ***(Kansas City DX Club)***
6. U.S.A.—Single Operator, All Band. (The Charles Rhines, W7VIU Memorial by ***Corker A. Rhines, W8EAO)***
7. CANADA—Single Operator, All Band ***(Canadian Amateur Radio Federation)***
8. CANADA—Multi-Opr., Single Xmtr. ***(Tehrahedral Contest Circle)***
9. EUROPE—Single Operator, All Band. ***(Sigurdur Jakobsson, TF3CW)***
10. EUROPE—Multi-Opr., Single Xmtr. ***(Jonas Bjarnason, TF3JB)***
11. JAPAN—Single Operator, All Band. ***(Palm Garden Contest Club)***
12. WORLD—Contest Expedition. ***(Bernie Welch, W8IMZ)***

(The Palm Garden Contest Club is also donating a plaque in the SSB section of the WPX Contest to the winning single operator all band score in Japan.)

Mailing deadline for your c.w. entries is July 10th. Late arrival of logs from distant and isolated areas will be given proper consideration. Indicate WPX C.W. Contest on the envelope, and please do not include any other material in your contest envelope.

YL Int'l SSB'ers QSO Party

This activity is usually held in May, however the dates were changed this year to March 31/April 1 for c.w. and April 28/29 for s.s.b. Unfortunately the announcement was received much too late to include in the April issue.

In case you did participate your c.w. log must be received before April 29th, and your s.s.b. log before May 31st. They go to: Lyle Shaw, W9USW, 52340 Tallyho Drive, South Bend, Ind. 46635

Pioneer Days Celebration

This one was also a late arrival. The Simi Settlers A.R.C. celebrated "1849 That Golden Year" on April 21/22.

If you contacted a Simi Valley club member during the above period you have a beautiful parchment certificate coming. Send your QSL card and four 15¢ stamps to:

Simi Valley Amateur Radio, Att: Bill Wyatt, WA6GUT, P.O. Box 3035, Simi Valley, Calif. 93063

BUILD YOUR DREAM ANTENNA!

WE SUPPLY THE MATERIALS

YOU HAVE THE FUN

Tell us what you need
Ask us about our custom antenna packages

6061-T6 DRAWN ALUMINUM TUBING

AIRCRAFT* GRADE PLATED HARDWARE

HIGH* STRENGTH FIBERGLASS SPREADERS

STAINLESS* STEEL ELEMENT CLAMPS

CALL OR WRITE FOR **FREE** INFORMATION

GL ENTERPRISES

GL ENTERPRISES
ROUTE 1, BOX 10
BROWNSVILLE, WIS.
53006, PH (414) 583-4001

CIRCLE 26 ON READER SERVICE CARD

VERTICAL ANTENNA HANDBOOK

Compiles 22-years worth of material from the pages of *CQ* on vertical antenna theory, design installation, construction. Covers verticals arrays, feeding and matching, short verticals, ground effects, multi-band and single-band verticals, answers the most common questions about vertical antennas. 6" X 9" 136 pages. **$5.00**

Please send me _____ copies.

Name _____ **Call** _____

Address _____

City _____

State _____ **Zip Code** _____

CQ Magazine
14 Vanderventer Avenue
Port Washington, N.Y. 11050

FREQUENCY COUNTERS

COMPLETE KITS: CONSISTING OF EVERY ESSENTIAL PART NEEDED TO MAKE YOUR COUNTER COMPLETE. **HAL-600A** 7-DIGIT COUNTER WITH FREQUENCY RANGE OF ZERO TO 600 MHz. FEATURES TWO INPUTS: ONE FOR LOW FREQUENCY AND ONE FOR HIGH FREQUENCY; AUTOMATIC ZERO SUPPRESSION. TIME BASE IS 1.0 SEC OR .1 SEC GATE WITH OPTIONAL 10 SEC GATE AVAILABLE. ACCURACY ±.001%, UTILIZES 10-MHz CRYSTAL 5 PPM.
COMPLETE KIT.....~~$149~~.....**$129**

HAL-300A 7-DIGIT COUNTER WITH FREQUENCY RANGE OF ZERO TO 300 MHz. FEATURES TWO INPUTS: ONE FOR LOW FREQUENCY AND ONE FOR HIGH FREQUENCY; AUTOMATIC ZERO SUPPRESSION. TIME BASE IS 1.0 SEC OR .1 SEC GATE WITH OPTIONAL 10 SEC GATE AVAILABLE. ACCURACY ±.001%, UTILIZES 10-MHz CRYSTAL 5 PPM.
COMPLETE KIT.....~~$124~~.....**$109**

HAL-50A 8-DIGIT COUNTER WITH FREQUENCY RANGE OF ZERO TO 50 MHz OR BETTER. AUTOMATIC DECIMAL POINT, ZERO SUPPRESSION UPON DEMAND. FEATURES TWO INPUTS: ONE FOR LOW FREQUENCY INPUT, AND ONE ON PANEL FOR USE WITH ANY INTERNALLY MOUNTED HALTRONIX PRE-SCALER FOR WHICH PROVISIONS HAVE ALREADY BEEN MADE. 1.0 SEC AND .1 SEC TIME GATES. ACCURACY ±.001%. UTILIZES 10-MHz CRYSTAL 5 PPM.
COMPLETE KIT.....~~$124~~.....**$109**

PRE-SCALER KITS

HAL 300 PRE.....**$19.95**
(Pre-drilled G10 board and all components)

HAL 300 A/PRE.....**$24.95**
(Same as above with preamp)

HAL 600 PRE.....**$34.95**
(Pre-drilled G10 board and all components)

HAL 600 A/PRE.....**$39.95**
(Same as above but with preamp)

TOUCH TONE DECODER KIT

HIGHLY STABLE DECODER KIT. COMES WITH 2 SIDED, PLATED THRU AND SOLDER FLOWED G-10 PC BOARD, 7-567's, 2-7402, AND ALL ELECTRONIC COMPONENTS. BOARD MEASURES 3½ x 5½ INCHES. HAS 12 LINES OUT. ONLY **$39.95**

DELUXE 12-BUTTON TOUCHTONE ENCODER KIT utilizing the new ICM 7206 chip. Provides both VISUAL AND AUDIO indications! Comes with its own two-tone anodized aluminum cabinet. Measures only 2 3/4 × 3 3/4". Complete with Touch-Tone pad, board, crystal, chip and all necessary components to finish the kit.
PRICED AT.....**$29.95**

For those who wish to mount the encoder in a hand-held unit, the PC board measures only 9/16" × 1 3/4". This partial kit with PC board, crystal, chip and components.
PRICED AT.....**$14.95**

ACCUKEYER (KIT) THIS ACCUKEYER IS A REVISED VERSION OF THE VERY POPULAR WB4VVF ACCUKEYER ORIGINALLY DESCRIBED BY JAMES GARRETT, IN QST MAGAZINE AND THE 1975 RADIO AMATEURS HANDBOOK. **$16.95**

ACCUKEYER—MEMORY OPTION KIT THIS ACCUKEYER MEMORY KIT PROVIDES A SIMPLE, LOW COST METHOD OF ADDING MEMORY CAPABILITY TO THE WB4VVF ACCUKEYER. WHILE DESIGNED FOR DIRECT ATTACHMENT TO THE ABOVE ACCUKEYER, IT CAN ALSO BE ATTACHED TO ANY STANDARD ACCUKEYER BOARD WITH LITTLE DIFFICULTY. **$16.95**

6-DIGIT CLOCK • 12/24 HOUR

COMPLETE KIT CONSISTING OF 2 PC G10 PRE-DRILLED PC BOARDS, 1 CLOCK CHIP, 6 FND 359 READOUTS, 13 TRANSISTORS, 3 CAPS, 9 RESISTORS, 5 DIODES, 3 PUSH-BUTTON SWITCHES, POWER TRANSFORMER AND INSTRUCTIONS.
DON'T BE FOOLED BY PARTIAL KITS WHERE YOU HAVE TO BUY EVERYTHING EXTRA.
PRICED AT.....**$12.95**

CLOCK CASE Available and will fit any one of the above clocks. Regular Price . . . $6.50 **But Only $4.50 when bought with clock**

SIX-DIGIT ALARM CLOCK KIT for home, camper, RV, or field-day use. Operates on 12-volt AC or DC, and has its own 60-Hz time base on the board. Complete with all electronic components and two-piece, pre-drilled PC boards. Board size 4" x 3". Complete with speaker and switches. If operated on DC, there is nothing more to buy.*
PRICED AT.....**$16.95**
Twelve-volt AC line cord for those who wish to operate the clock from 110-volt AC. $2.50
*Fits clock case advertised below.

SHIPPING INFORMATION
ORDERS OVER $15.00 WILL BE SHIPPED POSTPAID EXCEPT ON ITEMS WHERE ADDITIONAL CHARGES ARE REQUESTED. ON ORDERS LESS THAN $15.00 PLEASE INCLUDE ADDITIONAL $1.00 FOR HANDLING AND MAILING CHARGES. SEND SASE FOR FREE FLYER.

"HAL" HAROLD C. NOWLAND
W8ZXH

HAL-TRONIX H24
P. O. BOX 1101
SOUTHGATE, MICH. 48195
PHONE (313) 285-1782

CIRCLE 29 ON READER SERVICE CARD

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

The Swiss Federal Observatory at Zurich reports a monthly mean sunspot number of 165.8 for January, 1979. This is the highest level of solar activity recorded for any month since June, 1959. Daily values ranged from a low of 130 on January 31st to a high of 209 recorded on the 24th and 25th. This monthly value results in a 12-month running *smoothed sunspot* number of 95, centered on July, 1978. The Zurich Observatory predicts a smoothed sunspot number of 145 for May, 1979, as the present cycle continues to soar upwards.

The high level of solar activity expected this month should bring generally excellent conditions on most of the h.f. amateur bands. Expect world-wide DX openings on the *10, 15* and *20* meter bands during the daylight hours. From sundown to Midnight, the best DX bands should be *20* and *40* meters, with excellent DX also possible on *15* meters towards southern and western areas. Some DX should also be possible on the *80* and *160* meter bands. From Midnight to sunrise look for openings to most areas of the world on *20* and *40* meters, with some DX possible on *80* and *160* meters as well. All-in-all, May should be a really good month for propagation conditions on most of the h.f. bands.

For specific times of DX openings, refer to the *DX Propagation Charts* which appeared in last month's column. This month's column contains a *Short-Skip Propagation Chart* valid for both May and June, as well as Charts centered on Alaska and Hawaii. The Short-Skip Chart contains propagation forecasts for openings varying in distance between 50 and 2300 miles. For day-to-day variations expected in propagation conditions during May, see the "Last Minute Forecast", which appears at the beginning of this column.

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

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for May 1979

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 2, 22, 29	A	A	B	C
High Normal: 1, 3, 6, 8, 16-17, 21, 27, 30	A	B	C	C-D
Low Normal: 5, 7, 9-10, 14-15, 18, 20, 23, 26, 28	B	C	D	D-E
Below Normal: 4, 11-13, 19, 24-25, 31	C	D	D-E	E
Disturbed: None	C-E	D-E	E	E

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9 + 30 dB.

B—Good opening, moderately strong signals varying between S9 and S9 + 30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for and day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on May 1st, excellent (A) on the 2nd, good (B) on the 3rd, poor (D) on the 4th, fair (C) on the 5th, etc.

For updated information dial Area Code 515-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 1714, Silver Spring, MD 20902.

V.h.f. Ionospheric Openings

May should also be a good month for ionospheric openings on the v.h.f. bands resulting from the high level of solar activity, increased sporadic-E propagation, meteor showers, trans-equatorial propagation and auroral activity.

Solar activity is now high enough that some F-layer DX openings should be possible on the *6* meter band during the daylight hours. Conditions are best for trans-continental openings, openings between the western states and Hawaii, and openings towards the Caribbean and Central and South America. Best time to look for these openings is during the afternoon hours, particularly when conditions are HIGH NORMAL or better.

Sporadic-E ionization is expected to increase considerably during May, and fairly frequent *6* meter short-skip openings should be possible. These are most likely to occur over distances of approximately 1000 to 1400 miles. Although sporadic-E openings can take place at just about any time, the best time to check is between 10 a.m. and 2 p.m., and again between 6 and 10 p.m., local daylight time.

During periods of intense and widespread sporadic-E ionization, two-hop openings considerably beyond 1400 miles should be possible on *6* meters, and short-skip openings between approximately 1200 and 1400 miles may also be possible on *2* meters.

Some trans-equatorial propagation (TE) should be possible during May on *6* meters, and perhaps on *2* meters as well. TE openings are most likely to occur between 9 and 11 p.m., local daylight time, on long north-south paths which cross the geomagnetic equator at approximately a right angle. TE openings favor locations in the southern states, but openings are also possible to more northern areas.

The *Eta Aquarids,* a major meteor shower, is expected from May 4 to 6. It should peak with a count of approximately 20 meters an hour during the afternoon of May 5. Meteor activity should be intense enough during this shower to support meteor burst short-skip openings on the *6* and *2* meter bands.

Check the "Last Minute Forecast" appearing at the beginning of this column for those days during May that are expected to be BELOW NORMAL or DISTURBED. These are the days on which there is a chance for auroral activity to take place. Ionization associated with auroral displays can result in auroral-type short-skip openings on the v.h.f. bands.

HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip chart, the predicted times of openings can be found under the appropriate distances column of a particular Meter band (10 through 160 Meters) as shown in the left hand column of the Chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate Meter band column (10 through 80 Meters) for a particular geographical region of the continental USA as shown in the left hand column of the Charts. An * indicates the best time to listen for 80 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. On the Short-Skip Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occurr on more than 22 days
(3) " " " between 14 and 22 days
(2) " " " between 7 and 13 days
(1) " " " on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual *dates* on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M. etc. On the Short-Skip Chart appropriate *standard time* is used at the *path midpoint*. For example on a circuit between Maine and Florida, the time shown would be EST, on a circuit between N.Y. and Texas, the time at the midpoint would be CST, etc. Times shown in the Hawaii Chart are HST. To convert to standard time in other USA time zones *add* 2 hours in the PST zone; 3 hours in the MST zone; 4 hours in the CST zone, and 5 hours in the EST zone. *Add* 10 hours to covert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *standard* time in other areas of the USA *subtract* 8 hours in the PST zone; 7 hours in the MST zone, 6 hours in the CST zone and 5 hours in the EST zone. For example, at 20 GMT it is 15 or 3 P.M. in N.Y.C.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts c.w. or 300 watts p.e.p. on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts c.w. or 1 kw p.e.p. on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave length above ground on 40 and 20 meters, and a wave-length above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level for each 10dB loss, it will lower by one level.

5. Propagation data contained in the Charts has been prepared from basic data published by the Institute for Telecommunication Science of the U.S. Department of Commerce, Boulder, Colorado, 80302.

CQ Short-Skip Propagation Chart
May & June, 1979
Local Daylight Time At Path Mid-Point

Band Meter	Distance Between Stations (Miles)			
	50-250	250-750	750-1300	1300-2300
10	Nil	08-10 (0-1) 10-14 (0-2) 14-18 (0-1) 18-22 (0-2) 22-00 (0-1)	08-10 (1-2) 10-14 (2-3) 14-18 (1-2) 18-22 (2) 22-00 (1) 00-08 (0-1)	08-10 (2-0) 10-14 (3-1) 14-16 (2-1) 16-19 (2) 19-22 (2-0) 22-08 (1-0)
15	Nil	07-10 (0-2) 10-14 (0-3) 14-18 (0-2) 18-20 (0-3) 20-00 (0-2) 00-07 (0-1)	07-10 (2) 10-14 (3) 14-18 (2-4) 18-20 (3-4) 20-22 (2-3) 22-00 (2) 00-07 (1)	07-10 (2-1) 10-14 (3-2) 14-16 (4-3) 16-20 (4) 20-23 (3-2) 22-00 (2) 00-07 (1-0)
20	10-13 (0-1) 13-19 (0-2) 19-01 (0-1)	07-10 (0-2) 10-13 (1-3) 13-19 (2-4) 19-21 (1-3) 21-01 (1-2) 01-07 (0-2)	07-10 (2-3) 10-13 (3-4) 13-19 (4) 19-21 (3-4) 21-23 (2-4) 23-01 (2-3) 01-07 (2)	07-10 (3) 10-16 (4-3) 16-23 (4) 23-01 (3-4) 01-03 (2-3) 03-07 (2)
40	07-09 (1-2) 09-12 (2-4) 12-20 (3-4) 20-22 (2-3) 22-01 (1-2) 01-07 (0-1)	07-09 (2-4) 09-10 (4-3) 10-16 (4-2) 16-18 (4-3) 18-22 (4) 22-01 (2-3) 01-07 (1-3)	07-09 (4-3) 09-10 (3) 10-16 (2-1) 16-18 (3-1) 18-20 (4-2) 20-22 (4) 22-07 (3-4)	08-10 (3-1) 10-18 (1-0) 18-20 (2-1) 20-22 (4-3) 22-06 (4) 06-07 (4-3) 07-08 (3)
80	08-11 (4) 11-19 (4-3) 19-23 (4) 23-08 (3-4)	08-11 (4-1) 11-17 (3-0) 17-19 (3-1) 19-21 (4-2) 21-06 (4) 06-08 (4-3)	08-09 (1) 09-11 (1-0) 11-17 (0) 17-19 (1-0) 19-21 (2-1) 21-23 (4-3) 23-06 (4) 06-08 (3-2)	08-09 (1-0) 09-19 (0) 19-21 (1-0) 21-23 (3-2) 23-04 (4-3) 04-06 (4-2) 06-08 (2-1)
160	06-09 (4-1) 09-10 (2-0) 10-19 (1-0) 19-21 (3-1) 21-23 (4-2) 23-06 (4-3)	06-09 (1) 09-19 (0) 19-21 (1-0) 21-23 (2-1) 23-01 (3-2) 01-04 (3) 04-06 (3-2)	08-09 (1-0) 09-21 (0) 21-23 (1) 23-01 (2-1) 01-04 (3-2) 04-06 (2) 06-08 (1)	08-21 (0) 21-01 (1) 01-04 (2) 04-06 (2-1) 06-07 (1) 07-08 (1-0)

HAWAII
May & June, 1979
Openings Given In Hawaiian Standard Time

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	15-17 (1)	07-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-15 (1) 15-18 (2) 18-20 (3) 20-22 (4) 22-00 (3) 00-02 (2) 02-04 (3) 04-07 (2)	19-20 (1) 20-23 (3) 23-02 (1) 20-21 (1)* 21-23 (2)* 23-01 (1)*
Central USA	12-15 (1) 15-17 (2) 17-18 (1)	05-07 (1) 07-12 (2) 12-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	08-12 (1) 12-16 (2) 16-18 (2) 18-22 (4) 22-00 (3) 00-02 (2) 02-06 (3) 06-08 (2)	19-20 (1) 20-21 (2) 21-01 (4) 01-02 (2) 02-04 (1) 20-21 (1)* 21-00 (2)* 00-03 (1)*
Western USA	09-12 (1) 12-17 (2) 17-19 (1)	06-08 (1) 08-10 (2) 10-12 (3) 12-17 (4) 17-19 (3) 19-22 (2) 22-00 (1)	06-08 (4) 08-16 (3) 16-22 (4) 22-02 (3) 02-06 (2)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-07 (1) 19-20 (1)* 20-21 (2)* 21-03 (3)* 03-04 (2)* 04-05 (1)*

ALASKA
May & June, 1979
Openings Given in GMT

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	Nil 20-22 (2)	18-20 (1) 22-02 (2) 22-01 (1) 01-03 (2) 03-05 (1)	20-22 (1) 22-02 (2) 02-06 (3) 06-08 (2) 08-10 (1) 10-14 (2) 14-16 (1)	05-10 (1)
Central USA	Nil	18-21 (1) 21-23 (2) 23-01 (1) 01-04 (1)	02-08 (3) 08-14 (2) 14-22 (1) 22-02 (2)	05-07 (1) 07-10 (2) 10-12 (1)
Western USA	00-03 (1)	18-20 (1) 20-23 (2) 23-02 (3) 02-05 (2) 05-07 (1)	02-04 (3) 04-08 (4) 08-14 (3) 14-18 (4) 18-20 (3) 20-02 (2)	04-06 (1) 06-08 (2) 08-12 (3) 12-15 (2) 15-16 (1) 08-12 (1)*

See explanation in "How To Use Short-Skip Charts" in box at the beginning of this column.

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

Note: The Alaska and Hawaii Propagation Charts are intended for distances *greater* than 2300 miles. For shorter distances, use the preceding Short-Skip Propagation Chart.

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The May, "Story of The Month" as told by Barry is:

Barry Kutner, W2UP/WB2LYB
All Counties #205, 11-25-78

"I was born in Brooklyn, N.Y. on February 24, 1957, and lived there until age 10 at which time we moved to Westbury, Long Island. I became interested in radio at about age 10, but not interested enough to get a ticket until 1969 at age 12 (Novice). I earned my General/Advanced in 1970 at age 13, and my Extra in late 1972 at age 15. My early equipment consisted of a Heath HW-16, which I used for about 2½ years due to lack of funds. After many years of delivering newspapers, I saved some money and bought a Drake T4XB/R4B, which I still have, but don't get much time to use these days.

"One thing that developed thru the use of the HW-16 was my c.w. ability, which consumes about 60% of my operation on the air. My present code speed is about 70 w.p.m. down from about 80/85 during my active high school days.

"One of my favorite activities (when I had time) was contests. My favorite being the CW Sweepstakes. From 1974 to 1978 I operated from W2SZ, the Rensselaer Polytechnic Institute Radio Club, and I made a stab at a CW ARRL DX Contest from W2PV last year. Other activities include general rag chewing, have homebrewed several CW keyers, (4 to be exact), including a CW keyboard, for that QRQ, that has such nice features as 128 character buffer, etc.

"Educationally, after high school, I attended the Rensselaer Polytechnic Institute, in Troy, N.Y. and got a BS-cum laude in Biomedical Engineering. Subsequently, I am now a medical student at the State University of N.Y. (Upstate Medical College), and am presently in my first year.

"I've had little time for radio this past year, due to an extremely heavy workload.

"I started County Hunting at age 13 and really became active in 1971-1973. I started on c.w. from which I got my first 500 contacts (still on the HW-16) and eventually proceeded to phone. On the c.w. Nets, WA5KQD must have given me half of 5-land. I had hoped to finish them all before graduating from high school, but needed about 15 more at that time. It took me another 4 years to finish them off, and that was a month before college graduation. The last was Moffat, Colorado from a fixed station. But, out of those 15 I needed, the last 3 came in two day stretch. In April 1978 (I believe it was), when KH6JIB went to Kalawao, I was tuneing around for him when I heard a KL7 in the first Judicial District. I worked him, leaving 2 to go. At 3 AM I got a phone call from K5RPC telling me Kalawao was on, worked him, leaving 1. I started looking through the callbook to see if there were any fixed stations in Moffat, Colorado, found one, called him on the telephone and worked him. *All Done.* It took about 8 years, the last 4 were rather slow....

"As stated, the home rig is Drake T4XB/R4B and dipoles. I had a Quad in 1972-1973, but it died after a while.

"My family lives in Westbury, Long Island. I have 2 younger brothers, neither is involved with radio, nor are my parents. I am presently in Syracuse, N.Y. in school where I will be for a few more years. Some of the sports I enjoy include skiing, tennis, and paddleball.

"Many thanks to all for the help, the QSOs and QSLs".

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

Barry Kutner, W2UP/WB2LYB.

Special Honor Roll
All Counties
#211 Robert Fuss, W4OWY 1-12-79
#212 Gerald L. Corning, K0MT 1-19-79.
#213 Frank N. Winn, WB4UPW 1-22-79.
#214 Stanley Smith, K8WXJ 1-31-79

USA-CA Honor Roll

3000		2000		1000	
W4OWY	231	K0MT	344	K0MT	515
K0MT	232	W7ULA	345	WB4ZXP	517
WB4UPW	233	WB4ZXP	346	WB9YZE	517
W4MNZ	234	K8WXJ	347	K1YRP	518
WB7AYN	235	W5VNW	348	K8WXJC	519
K8WXJ	236	**1500**		W5VNW	520
W5VNW	237	SM4BNZ	396	**500**	
2500		K0MT	397	VE1ASJ	1308
W4OWY	289	WB4ZXP	398	WA4NEU	1309
K0MT	290	K8WXJ	399	WB3EDB	1310
K7SE	291	W5VNW	400	GW3CDH	1311
WB4UPW	292			WB4ZXP	1312
WB4ZXP	293			KL7JFV	1313
K8WXJ	294			WB7QEL	1314
AC2J	295			K8VSH	1315
W5VNW	296			K8WXJ	1316
				W2EZ	1317
				WD9GRL	1318
				K4CKS	1319
				W5VNW	1320

Awards Issued

Bob Fuss, W4OWY (ex-W2HIH) obtained USA-CA-2500, 3000, and All Counties endorsed All s.s.b., All Mobiles.

Jerry Corning, K0MT (ex K0QIX) claimed USA-CA-1000 through All Counties endorsed Mixed.

Frank Winn, WB4UPW was issued USA-CA-2500, 3000, and All Counties endorsed Mixed.

Stanley Smith, K8WXJ waited until he had them all and acquired USA-CA-500 through All Counties, endorsed All s.s.b.

The Worked Simi Valley Award.

Ron Toller, W4MNZ picked up USA-CA-3000 endorsed all 2XSSB.

Larry Sitton, WB7AYN added to his collection, USA-CA-3000.

Rex Woodford, W5VNW did a lot of paper work to get USA-CA-500 through 2500, endorsed all s.s.b., all 14, all mobiles; and USA-CA-3000, endorsed all s.s.b. All 14.

John Irwin, K7SE (ex K6SE, K6SE/2) that friend who really gets around, found time between trips to apply for USA-CA-2500 endorsed all s.s.b., all 20, all mobiles. John attended two astronomy meetings in New Zealand and one in Mexico. He was unable to break into the 14336 Net from ZL1ADD (operating as K7SE/ZL1BSK) but he did work a little DX later with the world's longest call, K7SE/ZL1BSK/ZL4 when he operated from ZL4HP.

Virgil Wright, WB4ZXP qualified for USA-CA-500 through 2500, endorsed all s.s.b.

Larry Taylor, AC2J (ex-WB2PMO) increased his collection with USA-CA-2500, endorsed all s.s.b.

Don Skaife, W7ULA collected USA-CA-2000, Mixed.

Rolf Arvidsson, SM4BNZ gained USA-CA-1500. This is #2 to Sweden.

Fred Zurbriggen, WB9YZE got USA-CA-1000, Mixed.

Bob Garceau, K1YRP received USA-CA-1000, Mixed.

Andy McLellan, VE1ASJ won USA-

The Worked Columbia and Greene Counties Award.

The West Virginia WB8SNO Mobile Award

CA-500, endorsed all 50 MHz, all s.s.b. The second Award so endorsed.

Ellis Evans, GW3CDH qualified for USA-CA-500 endorsed all s.s.b. #2 Award to Wales.

USA-CA-500 Certificates, endorsed all A-1 went to:

Bud Roberts, WA4NEU.
George Baker, WB3EDB.
Lonnie Tennant, WB7QEL.
Tom Campbell, W2EZ.

USA-CA-500 Certificates, endorsed Mixed were sent to:

Greg Nightingale, KL7JFV. #3 Award to Alaska.

Joseph Walters, K8VSH.
Pauline Cleveland, WD9GRL.
Al Squires, K4CKS.

Awards

Worked Simi Valley Award: Issued by The Simi Valley Radio Club who thank the local Chamber of Commerce for furnishing the Awards. U.S. stations (this includes KL7 & KH6) required to work *two* Simi Valley Club Members, DX Stations required to work *one* Simi Valley Club Member. Send QSL cards and 30¢ in stamps to cover postage (no envelope required) to: Bill Wyatt, WA6GUT, 4206 Ish Drive, Simi Valley, California 93063.

The Worked Columbia and Greene Counties Certificate: The Rip Van Winkle Amateur Radio Society of Columbia and Greene Counties, New York are happy to offer this Award. Applicants must have made two-way

The Guilford Diamond Jubilee Radio Award

contact by Amateur Radio with two (2) stations in each of Greene and Columbia Counties, New York. Any band or mode may be used, except Repeaters. Send log information and one dollar ($1.00) to: Rip Van Winkle Amateur Radio Society, P.O. Box 1028, Hudson, N.Y. 12534.

West Virginia WB8SNO Mobile Award: The basic Award is available for working Les, WB8SNO, while he (WB8SNO) is mobile in the 25 West Virginia Counties. Special seal and ribbon endorsements are awarded as follows: Red seal and ribbons for 35 counties, blue seal and ribbons for 45 counties, and gold seal and ribbons for all 55 West Virginia counties.

Please send all requests for this award to: Lesley L. Shockey, WB8SNO, Rt. 2 Box 36A, Sandyville, W. VA. 25275. Send full log data including date, time, report, band and counties worked and $1.00.

The award is free to anyone who has sent a last county award to WB8SNO for any West Virginia County or anyone giving WB8SNO a last county in any state.

Congratulations to Earl, W7KOI for receiving award #1 for working WB8SNO in all 55 counties. Fred, W5FS is second with 46 counties, as this is being written. Oh yes, as of now, Earl, W7KOI is #1 to make All Counties the 3rd time around, which is sponsored by Dave, W6CCM.

The Guilford Diamond Jubilee Radio Award: To highlight the 60th year of the Guilford & District Radio Society/a new Award is available in 1979 for both h.f. and v.h.f. contacts with society members. Handsomely printed in 1919 styling, with an illustration of Guilford's famous High Street, the Diamond Jubilee Award should prove attractive to certificate hunters in the UK and worldwide.

Conditions: Claimants must work not less than 4 G&DRS members during the period of March 1 - August 31, 1979. Contacts must include the use of not less than *two* bands (i.e. if 4 QSOs are on one band, the 5th must be on a different band). Except on 23 cms, where there are no restrictions. Claimants must have worked from outside a 50km radius of Guilford. There are no mode or band restrictions. Field Day and contest QSOs count.

Claims: Log information (no QSLs) plus 20p in stamps (2 IRCs outside the British Isles) to: Mike Birch, G3KMO, "Sorrento", While Lane, Ash, Aldershot, Hants., GU12 6HN, England.

Activities: Special activity QRGs (+/– QRM) DAILY at 2000Z (and other times) 1835, 1935, 3535, 3735, 7035, 7055, 14035, 14235, 21035, 21235, 28035, 28535 (Club Net Mondays) and 145.525 (S21 Club Net Fridays).

Endorsements: Special merit endorsements will appear on awards for single mode working, /M, /P, /MM etc...

Club Stations: Society members will call CQ "For Jubilee Award" (CQ for GJA on CW). G5OD, G5WP, G6GS, G6NK, G8GS, G8MY, G2s BBX, DBH; G3s ARM, GJX, HTO, IAF, KMO, OLM, PGT, PJX, SYM, WAF, WHM, WJT, XON, XRP, ZDD; G4s AWY, BCY, BCZ, BHQ, CMG, CWP, CXY, DWE, ECF, EEC; G8s ACJ, DTH, EGG, FSZ, FUL, IBO, IQL, JMP.

Notes

May I again mention what a shock to hear about Jack, WØSJE, we will all miss him a lot!

THe County Hunters '79 convention will be held on July 5-8, 1979 at the beautiful Raddison Inn in Atlanta, Georgia. For full information write to: Bob Fuss, W4OWY, Chairman, 2936 Gant Quarters Circle , Marietta, GA. 30068.

Recent letters reflect that unfortunately at times, perhaps "NET Conveniences" are saving time by lowering operating integrity.

Arnie, K9DCJ had a full page of excellent rules in the January issue of the MARAC Newsletter, titled, "My Responsibilities as a Mobile Operator". I do not have room to list all the items, but here are some:

Before I check into the Net, I will know my exact/correct location.

I will show patience and restraint.

I will frequently mention my call and county.

When I announce that I am on a county, three or four county point, I *am* at that spot.

Excellent items Arnie, and I hope all mobiles read the January 1979 *MARAC Newsletter.*

Unfortunately, mobiles have been heard giving out a 2, 3, or 4 county line when some of the counties *are separated* by a strip of land or water. Could I stand on the north side of the Rio Grande River and claim to be in Mexico? *No Way!*

Then there is the problem of "double" logging. My understanding of the FCC rules are that if any license operator should happen to be with me in my shack or be *with* me in my car, they could sign W2GT - as long as I am there and able to control my rig. And under the new regulations (or should I say de-regulations?) a W6 could be with me and sign W2GT or W6---and not even have to say W6---/W2 or /M, but most would be happy to hear *both* voices during QSOs - to be sure everything was legal and ethical.

Another item is about the definition of mobile. This item has been raised on and off during the years and it has been assumed that a mobile is operating In such a way that he/she really is or can be mobile with out changing anything - such as antenna, power supply, etc...

I do not want to pick on the mobiles, as they have really made County Hunting easier and perhaps more fun, and they do spend much time, effort and money, helping us- but.....

To try to clear up a few items about applying for USA-CA:

Don't be afraid of having any extra ones listed, to play safe, I do keep your applications and you will get full credit for the extras when you send for additional classes.

And although all 50 states must be listed for classes 2000 and on up, it is safe to list 50 states on your first application, contrary to advice given by some County Hunters.

How was your month?

73, Ed., W2GT.

CQ Showcase

HAL Communications Corp.'s DS3100 ASR RTTY Terminal Unit

HAL Communications Corp. has just announced a new electronic RTTY terminal unit - the DS3100 ASR. The new terminal features full buffering of both received and transmitted data, thus permitting preparation of transmit text while receiving, as well as storage of up to 150 lines of received text and 50 lines of text to be transmitted. The new terminal also features a new screen format with 24-72 character lines split to show both receive and transmit buffers, line numbering for each buffer area, on-screen status indicators to show terminal code, rate, mode, etc., and a new high-contrast green P31 phosphor screen for easier viewing. The screen also uses bright/dim intensity changes to differentiate between keyboard and received data.

The DS3100 ASR will send and receive in all three data modes (ASCII, Baudot and Morse), allows use of continuous line or word transmitting and modes and has synchronous idle, unshift-on-space and word wraparound.

Both the electrical and mechanical features of the terminal have been completely redesigned to use a Z80 microprocessor, plug-in circuit boards and allow easy service.

The cost of the DS3100 ASR is $1995, including shipping.

To order yours, or to get more information, contact HAL Communications Corp., Box 365, Urbana IL 61801, or circle number 61 on the reader service card.

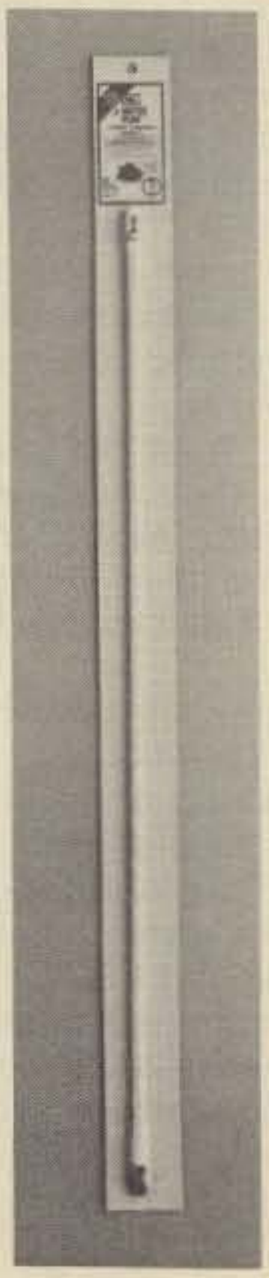
PAL Antenna Corp.'s 2 Meter Plus *Amateur Antenna*

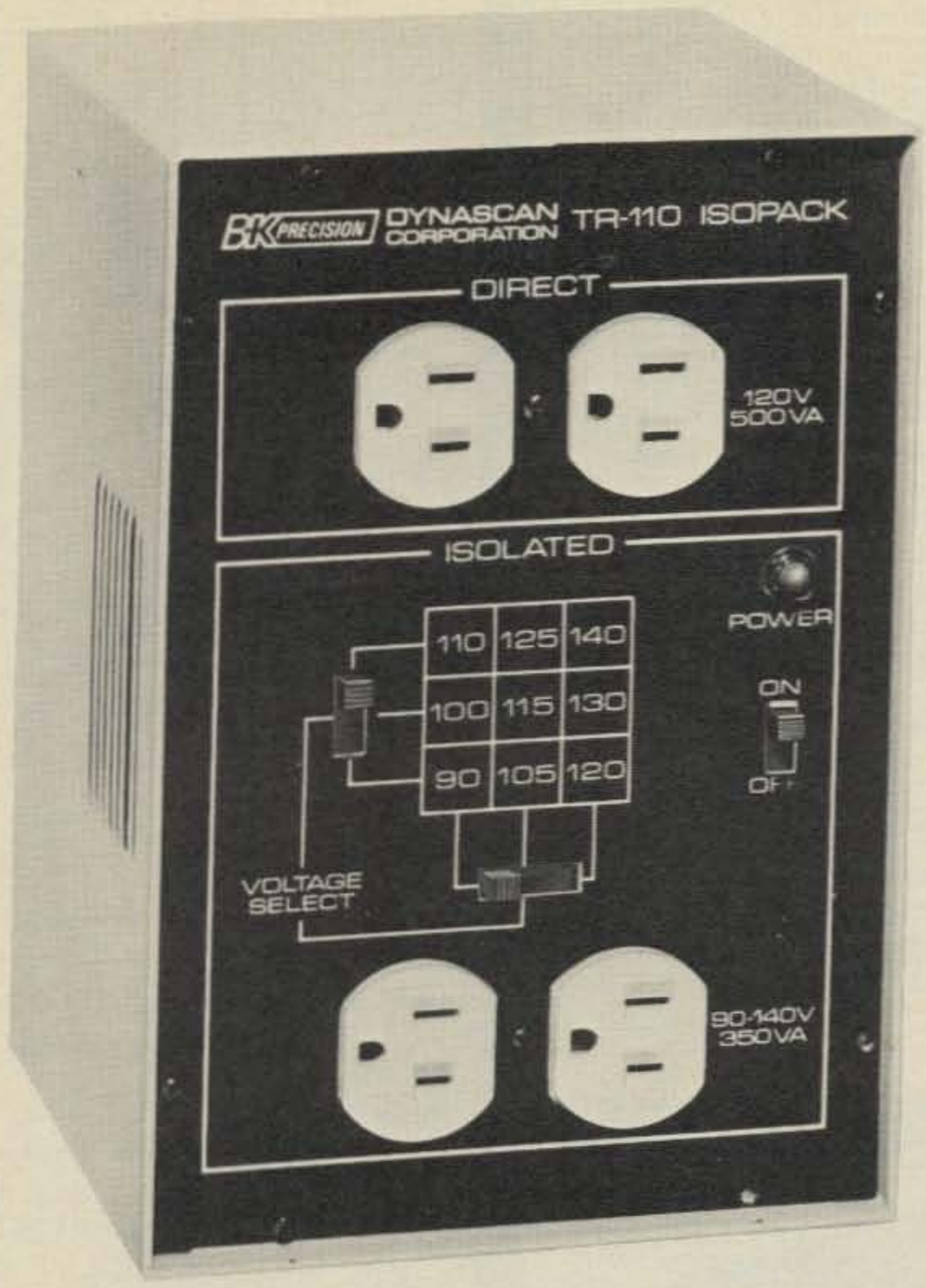
PAL Antenna Corp. has introduced a new top-loaded shatterproof fiberglass two meter whip, designated Model 2MP-3.

The whip is wound with heavy gauge copper wire to 5/4 wavelengths. It is factory tuned to 145 MHz to accomodate the 144-146 MHz segment and can easily be tuned for 146-148 MHz.

The *2 Meter Plus* whip has a noise limiting cover to reduce static up to 50% and is topped off with a high capacity "super tip" to aid in expanding the bandwidth.

For more information write to PAL Antenna Corp., 2614 E. Adams, Phoenix AZ 85034, or circle number 62 on the reader service card.





B & K-Precision's TR-110 Isopack Isolation Transformer

The TR-110 Isopack isolation transformer, which eliminates hazard in the testing of transformerless equipment, is now available from B & K-Precision Dynascan Corp.

The unit features both direct voltage and dual isolated outputs. In addition, the unit also reduces the possibility of damage to a.c. powered test instruments due to improper ground connections.

The Isopack is adjustable for isolated a.c. output from 90 to 140 volts in nine steps, which allows the user to select a specific line voltage.

The isolated output function has a power rating of 350 V-A continuous and 500 V-A intermittent. The unit measures 5.5" × 5.125" × 8" and features all-metal case construction and three wire grounded a.c. outlets and line cord.

It costs $75.

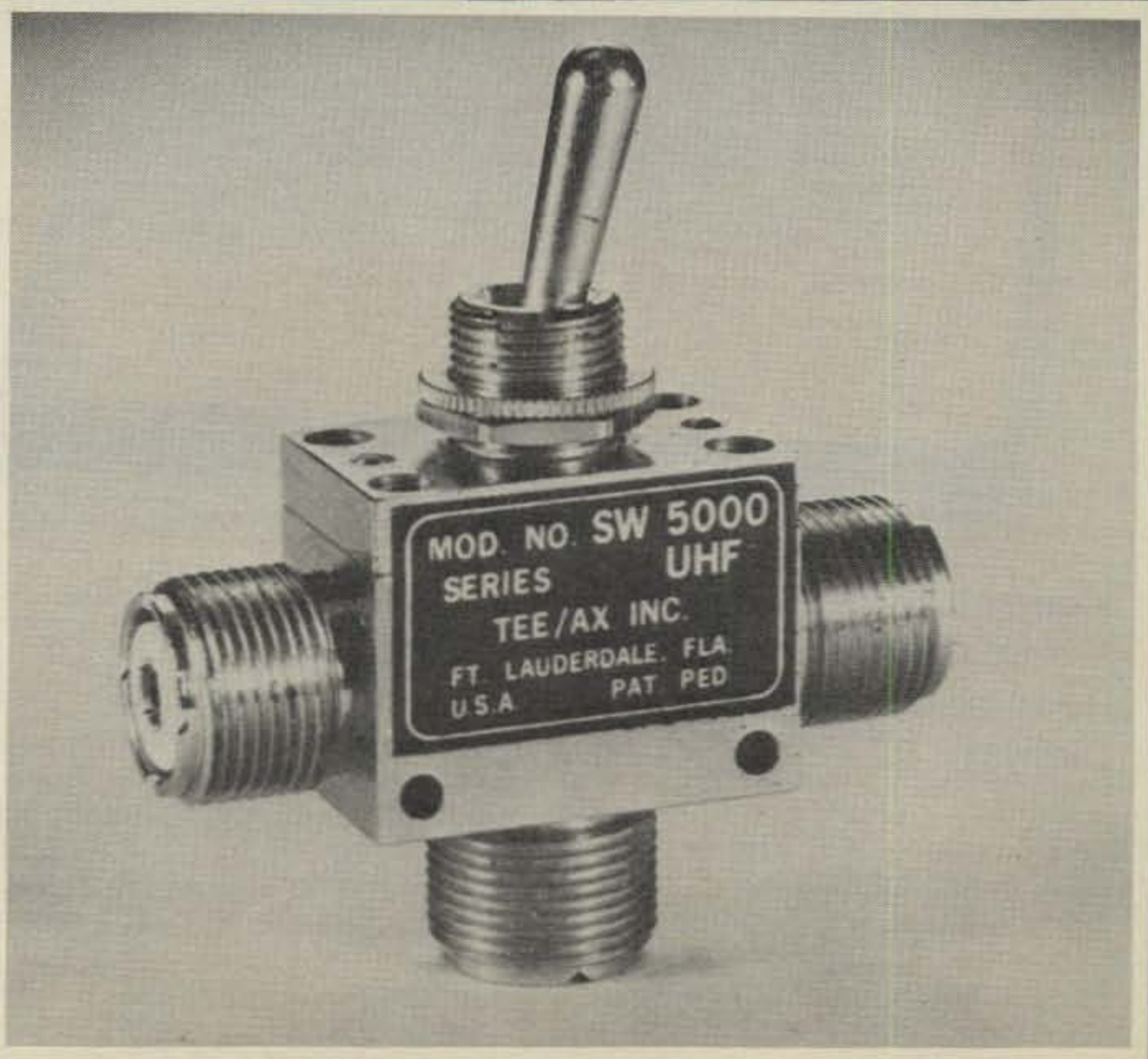
For more information contact B & K at 6460 W. Cortland St., Chicago Il 60635, or circle number 64 on the reader service card.

Tee/Ax's New Coaxial Toggle Switch

Tee/Ax offers the first coaxial toggle switch to reach the market.

Features of the switch include: anti-vibration, anti-shock and exceptional cross-talk features. The Tee/Ax switch is designed so that it is an erector set concept permitting stacking .of each individual switch together to make single pole, double pole, triple pole, four pole...or as many poles as desired. It also allows an intermix coaxial series to make a u.h.f., BNC, N combination in a triple pole, double throw switch (patent pending).

There are many, many variations on the theme which Tee/Ax would be very happy to tell you about. For further information contact Tee/Ax, Inc. at 5701 N.W. 31 Ave., Fort Lauderdale FL 33309, or circle number 66 on the reader service card.



Radio Shack's TRS-80 Technical Reference Handbook

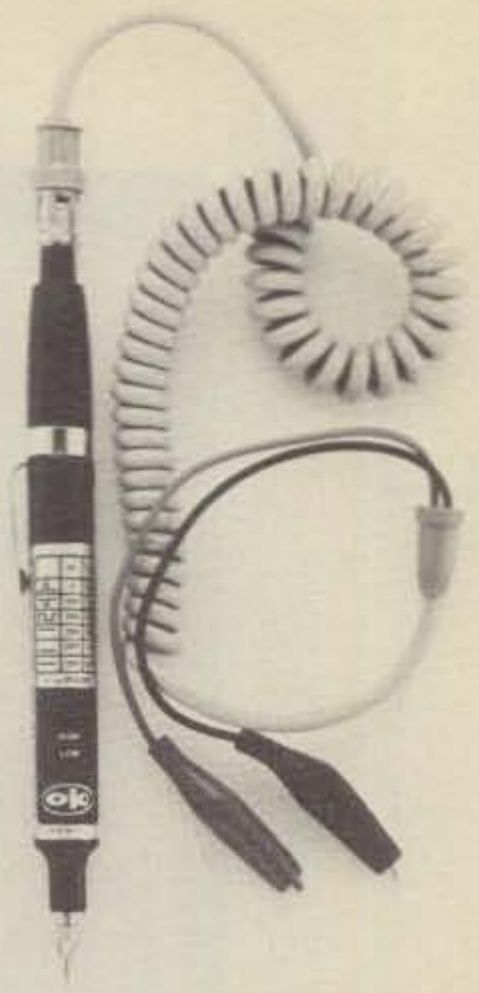
Radio Shack has published a technical reference handbook for their TRS-80 Microcomputer System. The illustrated, 108-page book is intended primarily for technically oriented persons with a good working knowledge of digital logic circuits.

Written in the straightforward, informal manner that has become a hallmark of Radio Shack publications, the TRS-80 Microcomputer Technical Reference Handbook includes technical information and schematic diagrams for both Level-I and Level-II TRS-80 systems.

Topics covered in the book are: Theory of Operation, Adjustments and Troubleshooting, The Outside World (connections to external devices), Parts List and fold-out schematics.

The TRS-80 Microcomputer Technical Reference Handbook is priced at $9.95. The 8½ × 11" softbound book is available from participating Radio Shack Stores and dealers. For more information contact Radio Shack or circle number 63 on the reader service card.

PRB-1 DIGITAL LOGIC PROBE



OK MACHINE & TOOL CORPORATION

OK Machine and Tool Corp.'s PRB-1 Digital Logic Probe

OK Machine and Tool Corp. has just introduced a new digital logic probe. It sells for $36.95.

The probe detects pulses as short as 10 ns and the frequency response exceeds 50 MHz.

Other features include automatic pulse stretching to 50 ns (+ and −), full compatability with all RTL, DTL, TTL, MOS, CMOS and microprocessor families. Also featured are 120 kilohm impedance, power lead reversal protection and over-voltage protection to + 70 v.d.c.

For more information on the PRB-1 contact OK Machine and Tool Corp., 3455 Conner St., Bronx NY 10475, or circle number 70 on the reader service card.

Kantronics' Field Day™ Morse Code/Teletype™ Reader and Code Speed Display

Kantronic' Field Day™ is a tri-mode microcomputer system that reads and displays Morse Code signals, RTTY signals and computes Morse Code speeds. It is a complete unit that does not require peripheral equipment or television monitors for use.

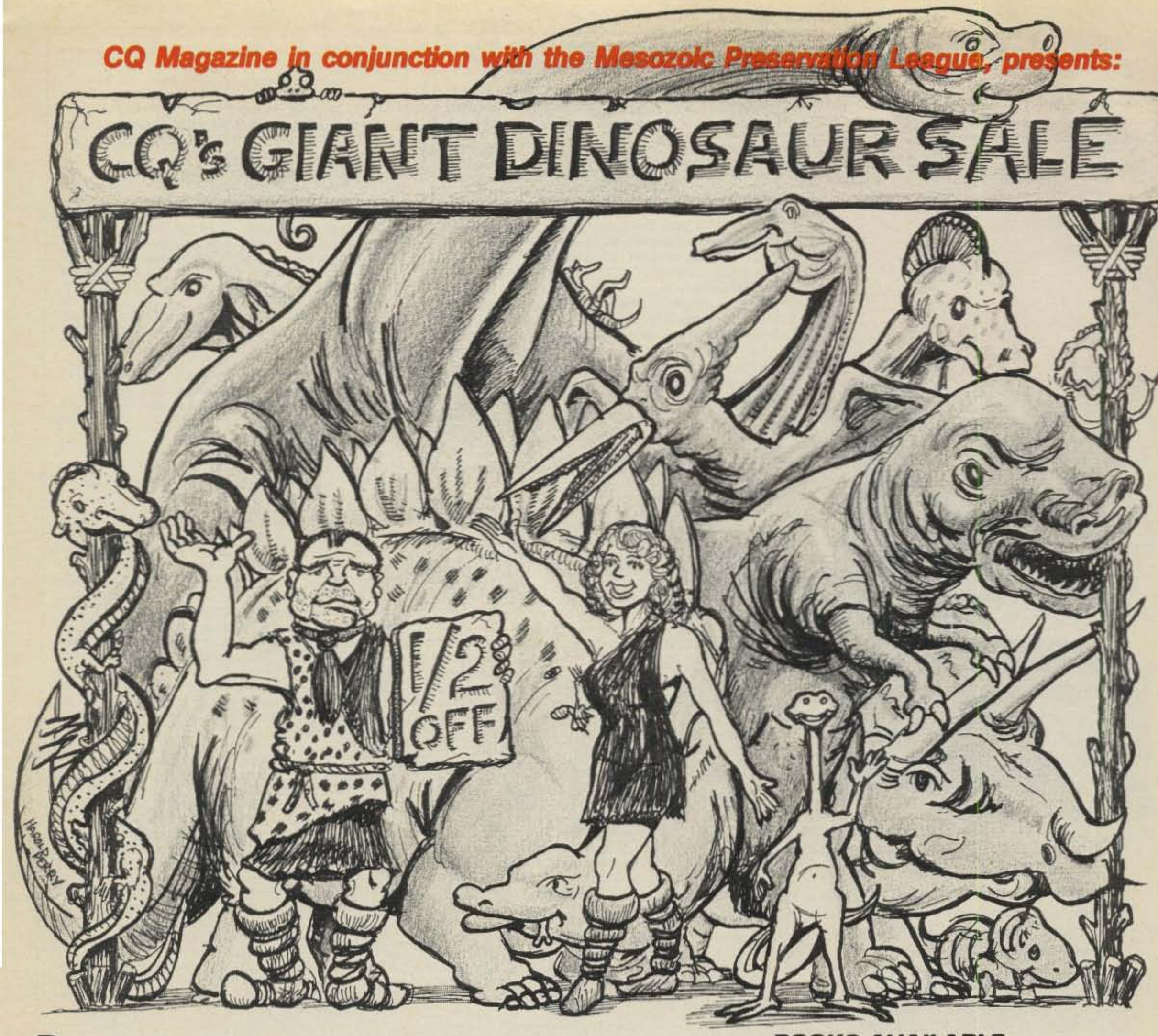
The unit measures 3.44"H × 8.5"W × 9.25D. Front panel controls includes: on/off, speed (display), edit, (word) space, and reset.

Field Day™ copies incoming or outgoing signals through the audio output of a receiver. An internal speaker is enclosed and volume is adjusted through the receiver a.f. gain pot. If Morse Code is being copied, Field Day™ screens out unwanted signals with an active 200 Hz bandwidth filter. The 750 Hz center frequency signals are then entered into the microcomputer system, which revolves around a 8035 chip.

For a further description of the unit and purchase information, contact Kantronics, Inc., 1202 E. 23 St., Lawrence KS 66044, or circle number 65 on the reader service card.

CQ Magazine in conjunction with the Mesozoic Preservation League, presents:

CQ's GIANT DINOSAUR SALE



Do you have any idea how much food a dinosaur can eat? Multiply that out by hundreds and you've got a real problem. We're looking for a few good homes and attentive owners to take some of our surplus dinosaurs off our hands. Some of these gems have been around since the last glaciation, but they still have lots of life left in them. Take one or two into your home soon . . . you'll be a better person for it.

BOOKS AVAILABLE

Title	Price	Now
Short Wave Listeners Handbook	~~$5.00~~	$2.50
Shop & Shack Shortcuts	~~$3.95~~	$2.00
Antenna Handbook	~~$4.00~~	$2.00
Electronic Circuits Handbook, Vol. I	~~$3.00~~	$1.50
Electronic Circuits Handbook, Vol. II	~~$3.00~~	$1.50
The DX Handbook	~~$5.00~~	$2.50
Surplus Conversion Handbook	~~$4.50~~	$2.25
Antenna Roundup, Vol. I	~~$4.00~~	$2.00

CQ Magazine 14 Vanderventer Ave., Port Washington, NY 11050

Please send me the following books:

_____

_____

_____

_____

_____

Name _____

Address _____

City _____ State _____ Zip _____

I am enclosing Total $ _____ Check ☐ Money Order ☐

HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non-subscriber) will be printed unless accompanied by full remittance. Free to CQ subscribers (maximum 3 lines per month). Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 14 Vanderventer Ave., Port Washington, New York 11050.

WWVB RECEIVER. The Elemek Model LXK receiver receives the 60kHz WWVB signal and provides the following outputs: 60 kHz and 100 kHz, phase locked to WWVB carrier, and the demodulated WWVB time code. Send for brochure describing the receiver to Elemek, Inc., Dept, C, 6500 Joy Rd., East Syracuse, N.Y. 13057.

VP5 PROVIDENCIALES. Your fam. won't mind your DXing. They will also have the time of their lives with swimming, snorkeling, fishing, beachcombing, etc. Our new home is completely furnished, including transceiver and antenna. Refer to June '77 issue of CQ. Info-Rene Weber, 2600 Douglas Road, Suite 1100, Coral Gables, FL 33134.

TRAVEL-PAK QSL KIT-Send call and 25 cents; receive your call sample kit in return. Samco, Box 203, Wynantskill, N.Y. 12198.

QUICKLY buy/sell used amateur gear. Nationwide-we match buyers with sellers. Send make, model number, price, name, address, telephone, $1. fee, S.A.S.E.-Write: Amateurs Buy/Sell Exchange, Box 374-C, Visalia, CA 93279.

MOBILE IGNITION SHIELDING provides more range with no noise. Available most USA engines, some imports. Free literature. Bonding straps on sale now. Estes Engineering, 930 Marine Drive, Port Angeles, WA 98362.

QSL CARDS-500/$10. 400 illustrations. Samples: Bowman Printing, Dept. CQ, 743 Harvard, St. Louis, Missouri 63130.

FREE ELECTRONICS SURPLUS Catalog. Bargain Packed. Fascinating items, many never before advertised. ETCO-003, Box 762, Plattsburgh, N.Y. 12901. Surplus Wanted.

CUSTOM EMBROIDERED EMBLEMS, your design, low minimum, Emblems, Dept. 10, Littleton, New Hampshire 03561.

EZ DEALS are hard to beat. Try me and see for new or used ICOM, Cushcraft, KLM, Yaesu, Drake, Wilson, VHF Eng., Ten-Tec, Swan, DenTron, CDE, Hustler, Larsen, and more. W0EZ, Bob Smith Electronics, RFD 3, Fort Dodge, Iowa 50501, (515) 576-3886.

WANTED: Hallicrafters S-1 through S-7, H8PA, 5-T, SX-10, SX-12, and other early Hallicrafter gear, parts, and manuals-any condition-for private collection. Price and condition first letter. C. Dachis, WD5EOG, 4500 Russell Drive, Austin, Texas 78745.

QSLs with Class! Unbeatable quality, reasonable price. Samples: 50 cents refundable. QSLs Unlimited, 1472 SW 13th Street, Boca Raton, FL 33432.

ELECTRONICS Parts Lowest Prices Anywhere. Catalog Free-Knapp, 4750 96th St., N., Dept. CQ, St. Petersburg, Fla. 33708.

COMMERICAL quality weatherproof wooden lawn furniture in unassembled form. York Mfg., 401 W. Superior, Chicago, IL 60610.

FREQUENCY ALLOCATION CHART. See how the entire radio spectrum is used. 2 Khz to 200 Ghz. Send $3.00 Collins Chart Co., Box 935, Coronado, CA 92118.

RTTY PARTS AND MACHINES: Model 28 RO's, KSR's, ASR's, typing reperfs, TD's. Gears-all machines. Underdome reperf for 28ASR, single-speed, $285.00 PP. Auto CR-LF non-overline kits for M28, $12.75 PP. M28 stand-alone TD, single-speed, $170.00 PP. Model 15 covers, gears, etc. 14TD, $50.00 PP. M14 keyboard typing reperf, $95.00 PP. Much more. Send SASE for complete list machines and parts. Lawrence R. Pfleger, K9WJB, 1715 E. McPherson St., Kirksville, MO 63501.

WANTED: McMurdo Silver Materpiece IV and VI receivers. State price and condition, first letter. Have Masterpiece V for trade only. Hardy W. Trolander, 1475 President, Yellow Springs, OH 45387.

MCARA Hamfest 6-3-79 at U.A.W. No. 662 Union Hall, 109 By-Pass and Hilcrest Drive, Anderson, IN 8:00-3:30. WB9QDO.

WANTED: Pre-1925 wireless gear, books, magazines, spark transmitters and tubes. Jim Kreuzer, 1428 Main, Corfu, NY 14036.

MUSEUM for radio historians and collectors now open. Free admission. Old time amateur (W2AN) and commerical station exhibits, 1925 store and telegraph displays, 15,000 items. Write for details. Antique Wireless Assn., Holcomb, N.Y. 14469.

BUILD your own INDOOR CB ANTENNA for $5.00 or less. Guaranteed. Send $2.00 for Complete plans, to LJB, 116 Ridge Rd., Marion, N.C. 28752.

ROHN TOWERS—Buy wholesale direct from distributor 20G sections, $28.82 each, 25G sections $37.62 each, 45G section $57.20 each, 100 foot tower kit complete $646.02, 40 foot free standing BX tower $179.45, 48 foot 25G foldover freight paid $565.00. Hill Radio, 2503 G.E. Road, Bloomington, IL 61701, (309) 663-2141.

KITS FOR SCANNER USERS. Preamplifiers, tone decoders, others. Free catalog. Capri Electronics, Route 1A, Canon, Georgia 30520.

REPLACE RUSTED ANTENNA BOLTS with stainless steel bolts. Small quantities. Free catalog. Elwick, Dept. 326, 230 Woods Lane, Somerdale, N.J. 08083.

MONO BEAMS: Factory direct, low prices. Specs and price list on request. C.A.P., Box 226, Eastport, Idaho 83826.

SCANNERS, HOME VIDEO RECORDERS, G.M.R.S. Wilson Towers/Radios. Bearcat 250 $279.95. Regency K-500 $299.95. J.I.L. SX-100 $219.95. Others. SASE (large) speeds special prices. Visa/Master. McDonald Electronics, Box 1385(C), Rohnert Park, CA 94928, (707) 544-4388.

WANTED: Instructor Ham Radio N.Y.S. Co-ed Children's Sleep Away Camp. Write Camp Kinder Ring, 45 East 33rd St., New York, N.Y. 10016.

ANTIQUE RADIO COLLECTORS, HAMS, EXPERIMENTERS: Bargains galore in nationwide swap sheet. Four monthly 10-page issues only $2. Electronics Trader, Box C, Darwin, CA 93522.

WANTED: Heath SB-104 transceiver. Am only interested in unit that has series number 0427, 0450, 01505, or 02514, and must not contain any update modifications. The unit does not have to operate, but must be clean and include all circuit boards in repairable condition. If possible, please send clear photograph of unit's chassis and boards along with series number. Will pay shipping. Telephone 1-(616) 471-4961. D. Kechkaylo, 600 Riverside Trl., Berrien Springs, Michigan 49103.

STARVED ROCK RADIO CLUB HAMFEST: June 3 SASE for information. SSRC/W9MKS/WR9AFG, RFD No. 1, Box 171, Oglesby, IL 61348.

WILSON ANTENNAS and Hand-helds Big Discounts! Bearcat 250 Scanners 266.88! KDK FM2016A 314.00! Alda 103 Discounted! SASE brings more super specials! Ben Franklin Electronics, Box H, Hillsboro, KS 67063, (316) 947-5751.

WANTED: Heathkit HW-18 transceiver with or without HP-13 power supply & schematic for Canadian Marconi Corporation Model D+34 FM Radio. John E. Bell, 214 E. 18th St., Scottsbluff, NE 69361.

TRS-80 HAM PROGRAMS Dup search and log contests . . . DXCC, WAS tracking, Antenna Math, much more. $1.00 brings list, refundable, WA4PYF, Box 145-C, Lithonia, GA 30058.

FOR SALE: Complete set of Time-Life camera books, 17 volumes plus master index and Photographers Handbook, $125. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

QSL—QSL—QSL: Please send QSL Cards to: Philip Steven Kurland, Post Office Box 1686, New Haven, CT 06507.

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 to cover the 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, or a gift copy from W5RZJ, $3.50 postpaid.

FOR SALE: Cushcraft A147-22, stacked 11 element 2 meter beam. New in carton, $70.00. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

SSTV AND PHOTOGRAPHERS: Make offer-1 each, like new, Fujitar lenses, 135 mm, f 4.5 telephoto, 35 mm, f 3.5 wide angle. Cary Cowan, c/o CQ Magazine, or call (516) 883-6200.

The Rochester Hamfest and NY State ARRL Convention will be held on May 25-27, 1979, Add your name to mailing list. Send QSL to: Rochester Hamfest, Box 1388, Rochester, NY 14603. Phone (716) 424-1100.

SELL: 2 mtr FM Sonar transceiver, AC P/S, mobile bracket $150. George Pataki, WB2AQC, 34-24 76th St., Jackson Hgts., NY 11372.

WANTED: Pre-war issues of Short Wave Craft Magazine. Bill Orr, W6SAI, c/o Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Collins 51-R receiver (VHF). Bill Orr, W6SAI, 301 Industrial Way, San Carlos, CA 94070.

SELL: Panasonic RF-2800 AC/Battery 5-band portable with digital freq. display, mint $199. KD4R, David Mitchell, 1620 Young Rd., Lithonia, GA 30058.

SRYSTALS: SASE my list. K8LJQ, 355 Mower Rd., Pinckney, MI 48169.

ELECTROSTATIC training kits, 110V, 60 cyl. Other Gov't surplus low cost; (500) Ret. address Label on Gold stock with call $2 postpaid. Beautiful. D. Testa, Box 9064-CQ, Newark, NJ 07104.

SP600 with JX modifications, $400 or trade for like new TR7400A. Basham, 735 Caves Hwy., Pick-up or local. Cave Juntion, OR 97523.

WANTED: Antique glass-Looking for old milkglass-purple, slag, carmel, and greentown. Tell me what you have. I pay the highest prices. Write: Jack Schneider, c/o Cowan Publishing Corp., 14 Vanderventer Ave., Port Washington, NY 11050.

SALE: Heath IM-28 VTVM kit. New, perfect. Ordered by mistake. $40. John Schultz, Box "L", FPO NY 09544.

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.

LOOKING FOR old Lionel trains. Interested only in "O" Guage, 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. Write: Dick Cowan c/o CQ Magazine, or call (516) 883-6200.

FOR SALE: Old issues of Ham Radio, 73, CQ, QST. Some complete runs. Send s.a.s.e. for lists and prices. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

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

SALE: Sony ICF-5900W multi-band receiver designed for SWLs. Like new condition w/ manuals. $100. Schultz, W4FA, Box "L", FPO NY 09544.

FOR SALE: Tektronix 535 oscilloscope with dual trace and fast rise-time plug-ins. Very good condition. $425. Prefer local pick-up. Irwin Schwartz, K2VG c/o CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

FOR SALE: Collins mobile mount with cables and 516E-1 mobile power supply for KWM-2, $125. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

CQ AND QST 1950-1975 issues for sale. Send s.a.s.e. if ordering 73, Ham Radio, or other CQ and QST issues. One dollar minimum order and all issues cost 25 cents each, including USA shipping. Send chronological list and full payment to W6LS, 2814 Empire Ave., Burbank, CA 91504. Available issues and refund sent within one month.

CERTIFICATE FOR PROVEN Two-Way Radio Contact with Amateurs in all ten (10) USA call areas. Award suitable to frame and proven achievements added on request. SASE brings TAD data sheet from W6LS, 2814 Empire Ave., Burbank, CA 91504.

BE FIRST TO KNOW precisely when and where to work all the choice DX. Bi-weekly LI DX Bulletin has: Hot DX News- Time and Frequency of each goodie-QSL Info-Propagation Forecast-and more...Send business size s.a.s.e. for free sample or $10 for 1-year domestic subscription to: Long Island DX Bulletin, PO Box 173, Huntington, NY 11743.

FOR SALE: Ham gear, test equipment, books, magazines. Cleaning house. Send SASE for list. I. Schwartz, K2VG, CQ Magazine, 14 Vanderventer Ave., Port Washington, NY 11050.

SCANNER OWNERS! It's here! "Top Secret" registry of U.S. Government radio frequencies 25 to 470 MHz, by K2AES. First and only book of its kind ever published! Lists 2,250+ freqs. of Military, FBI, Treasury, FCC, Border Patrol, Customs, Secret Service, NASA, FAA, CIA, Federal Prisons, U.S. Marshals, satellites, National Park Service, Fish/Wildlife, and much more! Only $4.95 postpaid (USA, APO, FPO order only, please); from CRB Research, P.O. Box 56-CQ, Commack, NY 11725.

Message from the Publisher

There's a move on within the CB ranks that could greatly benefit us amateurs. It's a campaign to establish a tax rebate for using radios effectively to save gasoline consumption. The man behind the program is Bennie Naunczek of Bennie's Distributor Warehouse, one of the largest CB two-step wholesalers in the country. Bennie is actively petitioning the congress to force IRS to grant the rebate on the same basis that a rebate is granted on home insulation that cuts down on fuel consumption.

If amateurs use their mobile rigs to communicate with their homes on a daily basis, and by so doing, they save extra trips to the store, then they are, in effect, using their radios to save gasoline consumption. If saving fuel oil in the home is vital to the country's interests, then saving gasoline should be just as important. And it should earn the operator a rebate equivelant to the one he'd get for putting siding on his house, or adding extra insulation to cut oil usage.

Bennie's idea was originated for owners of CB radios, but it makes just as much sense for us hams. Perhaps even more, because we've been using the radios very effectively in that direction for years. Now that the government is so concerned with the potential oil shortage that seems to be taking place, this idea should be followed through.

Let's all write our congressmen, urging that a tax rebate be allowed on our radios wherever a combination mobile and home station are in use. It certainly can't hurt, and it just might go through. With millions of CBers also making the same pitch, our small effort will have a lot of outside support. How about it guys, any ideas on this subject?

73, Richard A. Cowan, WA2LRO

CIRCLE 27 ON READER SERVICE CARD

CIRCLE 28 ON READER SERVICE CARD

CIRCLE 9 ON READER SERVICE CARD

Please send all reader inquiries directly

CIRCLE 25 ON READER SERVICE CARD

CIRCLE 44 ON READER SERVICE CARD

Please send all reader inquiries directly

WANTED: Tektronix Scope, good condition, fairly priced with manual. Cash buyer. Box 1514, Arcadia, FL (813) 494-3118.

HAMMARLUND HQ-180 w/clock gen. cov. rec. Xerox manual, excellent condx, $300. WA8NTP, Rt. 2, Box 552, Watervliet, MI 49098.

FOR SALE: FT-101 in excellent condx, $450. W7CSD, 3740 Summers Lane, Klamath Falls, OR 97601, (503) 882-5285.

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

EARLY HRO, 6 coils w/rack cabinet mint condx, $150. S-27 good condx, $125. W. Persans, 135 Roe St., Staten Island, NY 10310, (212) 720-8192.

FOR SALE: QST 1936 thru 1965, CQ 1948 thru 1965. L. Lustyk, W2PZU, 50 Cinnabar Rd., Rochester, NY 14617.

MOTOROLA HT220 Slimline with 6 freq. kit, $375. Hal, DKB2010, $300. WB9TNZ, 4907 N. Idlewild. Milwaukee, WI 53217.

TRADE: My Ham Gear for your Elf, Motorola, Similar Microcomputer. Savage, POB 351, New Castle, VA 24127.

FOR SALE: Collins KWM-2 Transceiver, 516F-2 AC power supply, 312B-4 station control. All in mint condition and with all 3 manuals. $1000. George Norton, 250 Milledge Terrace, Athens, GA 30606.

WANTED: Hallicrafters HA-10 preselector, any National receiver, working or not. T.N. Colbert, 1800 Rhodes No. 612, Kent, OH 44240.

SELL: 25 years of Ham parts and gear. Send s.a.s.e. for list. C. Klawitter, 4627 N. Bartlett, Milwaukee, WI 53211.

HT40 Xmtr and SX140. Manual with xmtr. $125 good novice rig. WB9GLE, 1705 E. Decatur St., Decatur, IL 62521. No collect calls please (217) 428-9001.

FOR SALE: Gonset GSB-100 SSB xmtr, mint condx/manual $119 plus shipping. W4LRR, 234 Elden Dr., NE, Atlanta, GA 30342.

CW SPECIAL FILTERS for TS-520 or TS-820 only 250Hz wide. $45 postpaid, only 1 each. K8AQ, 949 Havensport, Cincinnati, OH 45240.

SALE: DS-3000 KSR(Version 3) with ST-6000 video monitor. Send s.a.s.e. to: 7602 Timberwood Dr., Jacksonville, FL 32224.

WANTED: Drake C4 console. Collins "S" line, recent vintage, no conversions please. For sale: Brand new Yaesu FT-7 transceiver, $449. ICOM IC-60 brand new, 6 meter crystal controlled transceiver-$250. Yaesu FT101, SP 101, FV101 used but in good condx, $650. Tony, K3UKW, (215) 271-8898.

FOR SALE: Transmitters, receivers, test equipment, cleaning out shack. SASE to: Joseph Schwartz, K2VGV, 43-34 Union St., Flushing, NY 11355, (212) 461-5933.

DXers! Ham sentences in 54 languages on your outgoing DX QSL cards get returns. K3CHP's DX QSL Guide, $3.95. Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

FINCO M-111 VHF strip amplifier with 40 dB gain, tested and aligned, and in good condition, $32. G. Alfred Dodds, 874 Pepperwood Lane, Brunswick, OH 44212.

FOR SALE: Cushcraft 7-element 2-meter beam, nearly new, $15. Teknik FC-106 combination frequency counter/clock, needs repair, $35. W8FX/4, Karl Thurber, 631 N. Overbrook Dr., Ft. Walton Beach, FL 32548.

COMPLETE SSTV by Robot. 70C monitor, 80A camera with Macro lense, 61A camera monitor, all mint, $550. Bill Gosney, WB7BFK, 2665 N. 1250 East, Oak Harbor, WA 98277, (206) 675-6143.

ADVERTISER'S INDEX

To speed information to you on products shown in CQ advertising, a new computerized Reader Service System has been designed. For additional information on a particular ad in this issue, tear out the Reader Service postcard bound in this issue and circle the numbers on the card which correspond with the Reader Service numbers listed on the INDIVIDUAL ADS. DON'T CIRCLE THE PAGE NUMBERS! Fill in your name and address, and mail. We'll have your information on the way in short order.

Please send all reader inquiries directly

ALL NEW

FT-101ZD

HIGH-PERFORMANCE HF TRANSCEIVER

Today's technology, backed by a proud tradition, is yours to enjoy in the all-new FT-101ZD transceiver from YAESU. A host of new features are teamed with the FT-101 heritage to bring you a top-dollar value. See your dealer today for a "hands on" demonstration of the performance-packed FT-101ZD.

SPECIFICATIONS

TRANSMITTER

PA Input Power:
180 watts DC
Carrier Suppression:
Better than 40 dB
Unwanted Sideband Suppression:
Better than 40 dB @ 1000 Hz, 14 MHz
Spurious Radiation:
Better than 40 dB below rated output
Third Order Distortion Products:
Better than −31 dB
Transmitter Frequency Response:
300-2700 Hz (−6 dB)
Stability:
Less than 300 Hz in first 30 minutes after 10 min. warmup; less than 100 Hz after 30 minutes over any 30 min. period
Negative Feedback: 6 dB @ 14 MHz
Antenna Output Impedance:
50-75 ohms, unbalanced

GENERAL

Frequency Coverage:
Amateur bands from 1.8-29.9 MHz, plus WWV/JJY (receive only)
Operating Modes:
LSB, USB, CW
Power Requirements:
100/110/117/200/220/234 volts AC, 50/60 Hz; 13.5 volts DC (with optional DC-DC converter)
Power Consumption:
AC 117V: 75 VA receive (65 VA HEATER OFF) 285 VA transmit; DC 13.5V: 5.5 amps receive (1.1 amps HEATER OFF), 21 amps transmit
Size:
345 (W) × 157 (H) × 326 (D) mm
Weight:
Approximately 15 kg.

COMPATIBLE WITH FT-901DM ACCESSORIES

RECEIVER

Sensitivity:
0.25 uV for S/N 10 dB
Selectivity:
2.4 KHz at 6 dB down, 4.0 KHz at 60 dB down (1.66 shape factor); Continuously variable between 300 and 2400 Hz (−6 dB); CW (with optional CW filter installed): 600 Hz at 6 dB down, 1.2 KHz at 60 dB down (2:1 shape factor)
Image Rejection:
Better than 60 dB (160-15 meters); Better than 50 dB (10 meters)
IF Rejection:
Better than 70 dB (160, 80, 20-10 m); Better than 60 dB (40 m)
Audio Output Impedance:
4-16 ohms
Audio Output Power:
3 watts @10% THD (into 4 ohms)

CIRCLE 51 ON READER SERVICE CARD

arma
amateur radio manufacturer's association

Price And Specifications Subject To Change Without Notice Or Obligation

YAESU
The radio.

379X

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

YAESU'S NEW FT-101ZD

HIGH-PERFORMANCE HF TRANSCEIVER

The all-new FT-101ZD has many features of the FT-901DM including compatibility with the FT-901DM accessories.

XTERNAL VFO

e FV-901DM provides scanning and memory pability for your FT-101ZD transceiver. Using L synthesis in 100 Hz steps, the FV-901DM tures an auto scan mode, which will search the nd until it finds a signal—perfect for watching openings. The manual scanner will scan at one three rates, while you just flick a switch.

ty frequencies may be stored into memory, for ntrol of the transmit, receive, or transceive quency. And a clarifier allows fine tuning be- en the 100 Hz steps, as well as tracking of a ting memorized signal. In DX or contest situa- s, you'll be seconds ahead of the competition the FV-901DM.

-901
TENNA COUPLER (not shown)

FC-901 is a compact, efficient antenna tuner. FC-901 features an in-line wattmeter, SWR er, and provision for selection of three coax- antennas and one single wire antenna. Pre- t a 50 ohm load for your FT-101ZD all across band with the FC-901 antenna coupler.

FTV-901R
VHF/UHF/OSCAR TRANSVERTER

In another industry first, YAESU brings you a three-band VHF/UHF transverter for your FT-101ZD station. The basic unit comes equipped with 144 MHz capability, and you may add our plug-in modules for 50 or 430 MHz as options. Repeater offset is provided for 6 and 2 meters, and full duplex operation on OSCAR modes A/B/J is possible with an external receiver.

When the HF bands are flat, switch to the "very highs", with the amazing FTV-901R VHF/UHF/OSCAR transverter. You're years ahead with YAESU.

PHONE PATCH/SPEAKER (not shown)

Round out your FT-101ZD station with the SP-901P combination hybrid phone patch/speaker. Like the other 901 series components, its styling and size are fully compatible with your FT-101ZD.

YO-901
MULTISCOPE

Unsurpassed monitoring capability is yours with the YO-901 Multiscope. Featuring a high performance oscilloscope, useful for countless station adjustments, the YO-901 also includes a two-tone generator, as well as an optional band scope for instant determination of band conditions and activity.

Narrow-band IF signal observation is not possible with the FT-101ZD and YO-901.

Price And Specifications Subject To Change Without Notice Or Obligation

CIRCLE 52 ON READER SERVICE CARD

arma
amateur radio manufacturer's association

YAESU
The radio.

479X

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

Two EIMAC 3-500Zs provide the punch in Kenwood's new amplifier.

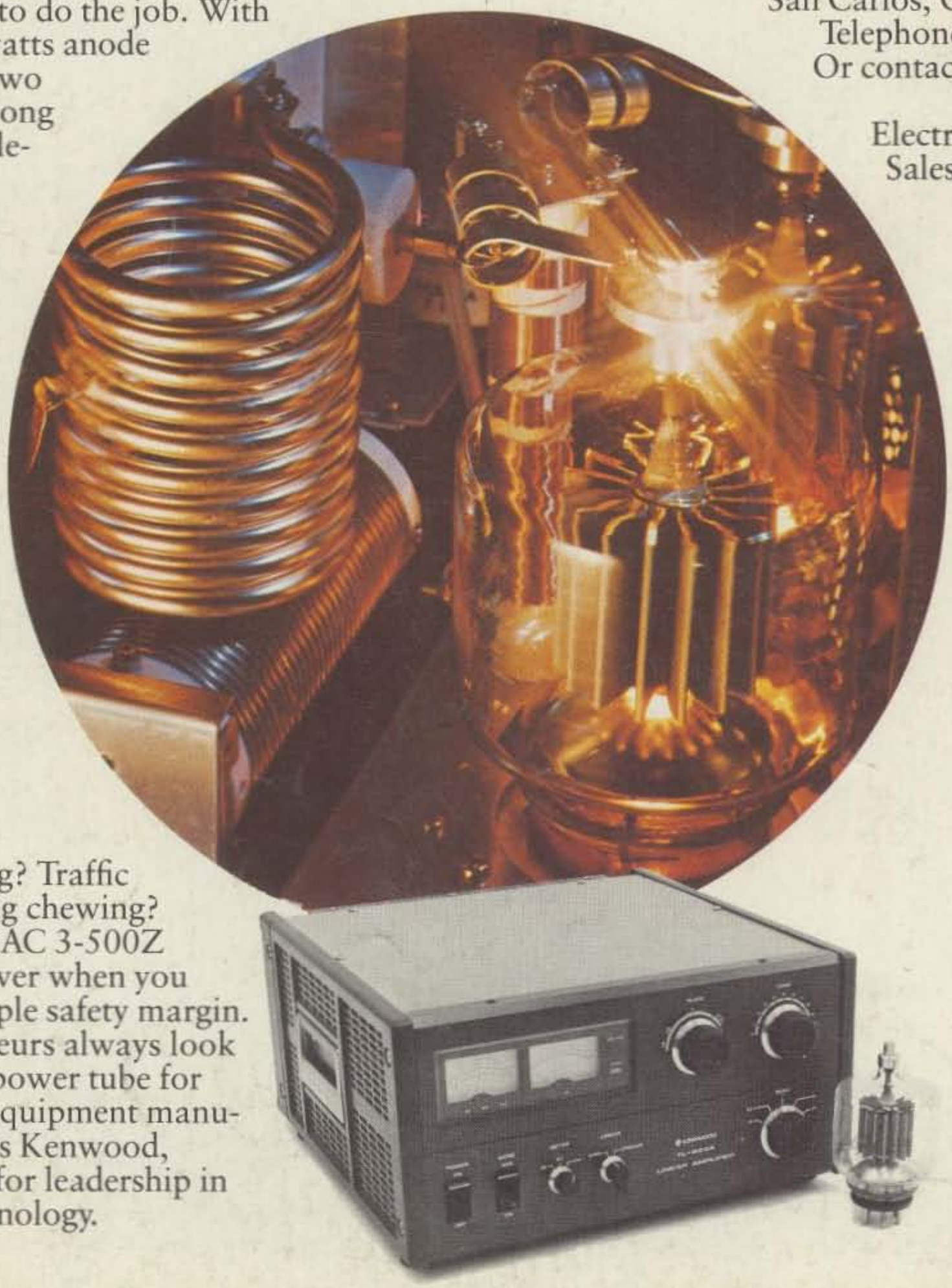
Kenwood chooses EIMAC for trouble-free service.

The new heavy-duty Kenwood TL-922A linear amplifier provides 2 kW PEP input for SSB service and 1 kW input for CW, RTTY, and SSTV operation.

Kenwood chose two EIMAC 3-500Z high-mu triodes to do the job. With a total of 1000 watts anode dissipation, the two 3-500Zs coast along to provide trouble-free, long-life service.

For more information

Send for the EIMAC Quick Reference catalog covering the complete line of EIMAC products and for the 3-500Z Data Sheet. Learn why the important manufacturers of communication equipment choose EIMAC. Varian, EIMAC Division, 301 Industrial Way, San Carlos, California 94070. Telephone (415) 592-1221. Or contact any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.



What's your pleasure?

DX chasing? Traffic nets? RTTY? Rag chewing? SSTV? The EIMAC 3-500Z provides the power when you need it, with ample safety margin. Value wise amateurs always look for the EIMAC power tube for reliability. And equipment manufacturers, such as Kenwood, choose EIMAC for leadership in power tube technology.

varian

CIRCLE 13 ON READER SERVICE CARD