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CQ

WAZ Worked All Zones Complete Rules Updated Zone List

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Kilowatt in a Shoebox

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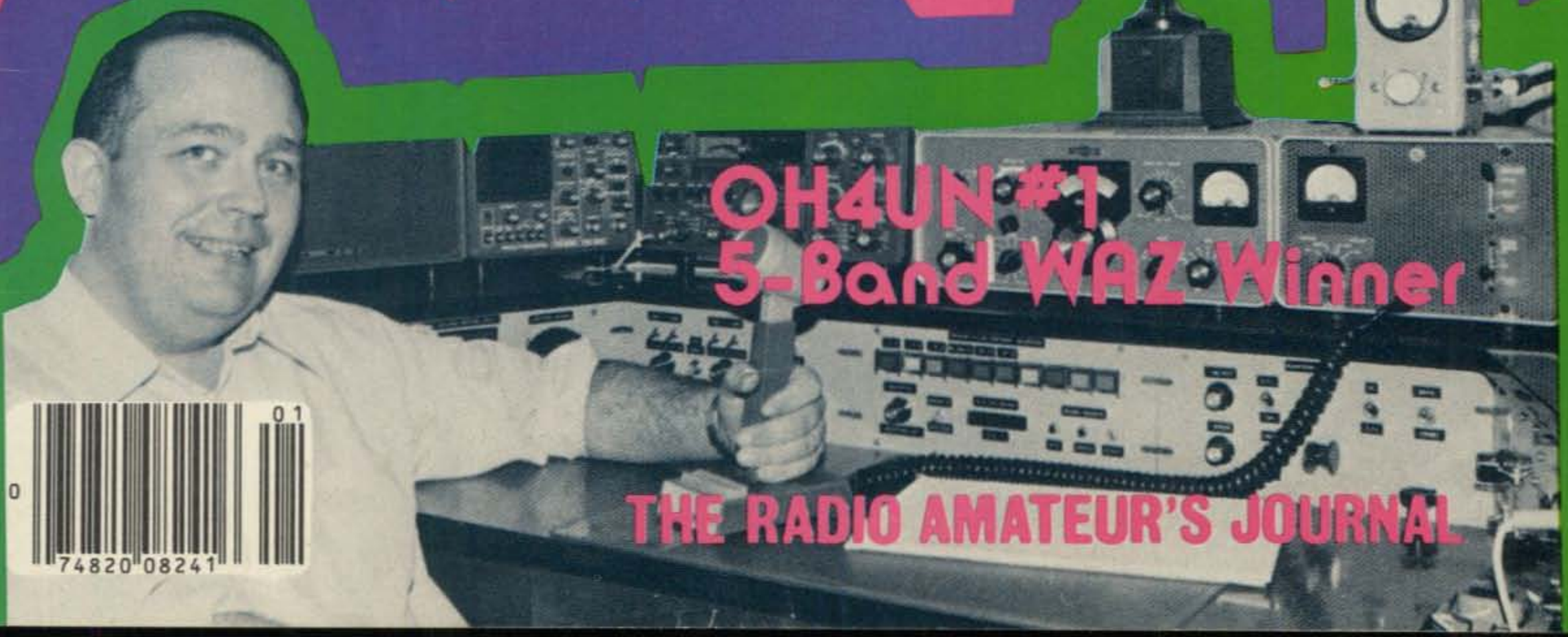
Basic BASIC

...page 18

Stacked Yagis for 432 MHz

...page 27



OH4UN #1 5-Band WAZ Winner

THE RADIO AMATEUR'S JOURNAL

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Specifications†

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

†Subject to change without notice.

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

TRANSMIT PERFORMANCE
Output impedance: 50 ohms nominal.
Power output: 100 W PEP nominal from 1.6-30 MHz. In CW or RTTY, there is automatic turndown to 50 W after 10 seconds, 50% duty cycle, key down 15 minutes max.

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

Unwanted signal suppression: (minimum values below)

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

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

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

RECEIVER PERFORMANCE

Antenna impedance: 50 ohms

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

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

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

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

*optional

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

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

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

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

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

Weight: 50 lbs. (22.7 kg).

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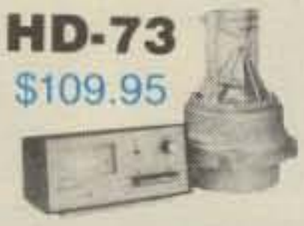

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FEATURES

DEPARTMENTS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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OMNI OWNERS SAY:

Zero Bias

an editorial

It's not so much eating crow as spitting out the feathers. The last few months have seen a tremendous amount of mail reaching *CQ* concerning the 5 Band WAZ Award and program. I've been approached at the few Conventions and Hamfests we attended with a mixed bag of reactions to our position. Most of the response has been negative to the changes and I expected that. A minority saw the situation for what it was and could appreciate the problems. A few responses bordered on open hostility. Where we stand now is the other extreme from whence we started, namely that an applicant must have all 200 zones confirmed before the award can be issued. This admittedly is really a difficult and almost impossible task for all but the extremely dedicated. We know it can be done since it already has been.

What has become more apparent over this whole situation is the enthusiasm shown by those who were working towards the original award and the personal affront felt by them and others who were only peripherally involved. Well, no matter how righteous you are or how convinced you are about the validity of your arguments, you do have to weigh and evaluate this sort of response. I'm not talking about simple vacillation or a capitulation to pressure, but a long hard look at what this achievement would mean and the means of achieving it. The basic award as originally proposed was, as most admit, too easy. With a little bit of effort you could have a new certificate on your wall, which in big letters would proclaim that the recipient held the 5 Band WAZ Award. Your neighbors might be impressed, casual visitors to your QTH might have a better opinion of you, and it certainly would look good if a picture of you and your shack (with the certificate shown discretely in the background) were to be published in *CQ* or any of the other amateur magazines.

For the most part, this sort of award didn't prove anything. It didn't prove that you could work the really hard ones or that you were even in the same league as anyone who had achieved our regular WAZ award. In a lot of ways it would seem that on "paper" at least you would appear to be a cut above the WAZ holder. Nothing could be further from the truth. Having Leo Haijsman, W4KA, our WAZ Manager, reinforce this impression with a series of seals and ribbons is to me a discredit to the long tradition of WAZ. I am fully aware that Leo was and is willing to perform this arduous task, but it comes down in the end to a piece of meaningless

On the other hand, I am faced with and realize that there is a definite interest in this type of of award program. Currently, we, and that is a collective rather than an editorial we, are gathering inputs and ideas to reinstitute some form of plateau system. Some of the ideas are in the entrance level, 140, 150, 160 zones, etc., and various other parameters are being discussed. One proviso for the basic awards that is in favor and would add meaning would be that the applicant would already be a holder of at least one variation of the WAZ Award. This would overcome the argument that an applicant could have 150 zones and still not qualify for WAZ but could qualify for 5 Band WAZ. Various methods of record keeping, physical handling of certificates, endorsements, and such are also under consideration.

So, while I'm not exactly eating crow, I am spitting out a few feathers. When I'm satisfied that this program can be handled with a minimum of bureaucracy, can be self-sustaining, and can be a meaningful achievement in amateur radio then I'll go ahead with it. Your letters, phone calls, and personal confrontations have definitely proved that you want a form of ultimate achievement award. We are prepared to sponsor just that, an ultimate achievement award. It boils down to a few simple criteria: to define the desired achievement, to be fair and equitable, and to insure that the award earned is actually the culmination of the desired achievement.

One criteria that was discussed and discarded was that applicants must be subscribers to *CQ*. Unlike the membership policy put forth by the ARRL, all awards and contests sponsored by *CQ* are open to *all* readers, subscribers or not. We would hope that participants in our activities would support *CQ* through subscriptions, remembering that *CQ* sponsors the largest contests in amateur radio plus the biggest and best award programs anywhere. These contest and award programs have provided countless hours of enjoyment and a few hours of frustration in fulfilling the active amateur's need to compete and achieve while at the same time improving and sharpening his operating skills. Obviously, *CQ* is far more than contests and award programs. We'd like to encourage and suggest to those people who take part in those activities to take a look at what else we have to offer. When you come right down to it, it's quite a lot for the price of a subscription.

CQ Odyssey

This past October, Jack W2LZX, and I took a trip down to Starkville Mississippi to visit Martin Jue of MFJ and see how his products are put together. I've known Martin about six or seven years and back when he got started with MFJ in a little rented hotel room. We got the royal treatment when we arrived and a tour through the plant, and it really is a plant with assembly lines. We got a chance to see some of the future products that MFJ plans to market and to meet the folks who work hard to make the products that sit on our operating desks.

Making return connections, Jack and I decided to go up to Cedar Rapids to take in the Midwest ARRL Convention plus get a "hands-on" look at the new Collins rig being unveiled there. You probably have seen the ad in our December issue and I must say that the rig is quite impressive in real life. Dealer delivery is supposed to take place starting this month, so if you're near one, plan to drop in and get a first hand look. It's still hard for me to say Rockwell-Collins, and not Collins... but that's my problem.

It was a total of three days and eleven airplane flights to cover the whole thing and it was certainly worth it. I plan to make several more trips like that during this year in addition to the Convention and Hamfest schedule we have planned. It gives us all a chance to exchange ideas and to see where it all happens.

Hide And Seek

Further searching revealed absolutely nothing. We are faced with a Cranium Quandry over what happened to the Cranium Querie folder during the move to Hicksville. We haven't given up, but to date we still can't find it. In checking with Marty Weinstein, the author, we found that in the best "Murphy" tradition, he didn't make a copy for his files nor did our artist. We did find out, however, that the error in the November issue was in the wiring of the 1N4148 diode (*November 1979 CQ, page 69*). The diode is wired in backwards. We'll keep you posted on the search and subsequent developments.

73, Alan, K2EEK

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• **ICOM-701 International Users Club** -Now Operational. Send s.a.s.e. for details to Rob Pohorence, N8RT, 9600 Kickapoo Pass, Streetsboro, Ohio 44240.

• **The Richmond Frostfest III** - Sponsored by the Richmond Amateur Telecommunications Society, it will be held Sunday, January 13, at the Bon Air Community Center. Homebrew contest with four awards: Most Original Idea, Best Electrical Work, Best Mechanical Work and Most Deserving Work. Prizes. FCC Exams start at 10 a.m. and completed Forms 610 must be received in the Norfolk Office of the FCC at 870 North Military Highway, Bank of Virginia Bldg., Norfolk, Va. 23502 no later than January 9th. Admission is $3.00, indoor Flea Market tables $3.00, tailgaters $2.00. Talk In 28/88 and 34/94. Richmond Amateur Telecommunications Society, P.O. Box 1070, Richmond, Virginia 23208.

• **The Third Annual Mercer County Amateur Radio Club Seminar** -January 19, Sharon, Pa. Get rid of your post-Christmas blues! Attend the Third Annual Mercer County Amateur Radio Club Seminar to be held at the Holiday Inn of West Middlesex, Pa. off I-80. 9:00 a.m. to 5:00 p.m. Come to hear speakers on your favorite amateur radio topics. Door prizes. $2.00 advance registration. $3.00 after January 11. For further details write: K3LA, P.O. Box 673, Sharon, Pa. 16146.

• **Wheaton Community Radio Amateurs Club** - Get rid of your winter doldrums! Attend Wheaton Hamfest Portable Nine sponsored by the Wheaton Community Radio Amateurs Club, on Sunday, January 27, at the Arlington Park EXPO Center at the Arlington Heights Race Track, Arlington Heights, IL. 300 free flea market tables will be available; 100 commercial booths (for booth info call WB9TTE 312/766-1684). Acres of clear paved parking (the EXPO center has its own snow removal equipment!!). Hourly door prizes! Tickets $3 at door; $2 advanced. Send s.a.s.e. to W.C.R.A., Box QSL, Wheaton, IL 60187. Doors open at 8:00 a.m. sharp!

• **Metroplex** - The New York City metropolitan area has one of the most sophisticated systems of inter-linked repeaters in the United States. Metroplex was conceived in January 1978 by K2KLN and WB2MGB to establish repeaters on *all* allocated FCC frequencies, using all available modes, to provide 24-hour emergency communications and to provide a forum for east coast and world wide (via 10 meter-link) amateur radio operators. All frequencies are coordinated by T-SARC and the FCC. Autopatch facilities are completely computerized and are part of a large long-distance network. Club meetings are held the second Wednesday each month at 8 p.m. at Firehouse No. 4, Fort Lee, New Jersey. Listen to Metroplex FM everywhere on 29.640 MHz, (29.540 1n) and on 145.45 (144.850), 223.720, 443.950, or write P.O. Box 237, Leonia, NJ 07605 for more information. Club Phone 201/592-1579.

• **Gabfest '80** - Gabfest '80, a 24-hour period from 2000z January 26, is sponsored by the Skokie Aviation Enthusiasts. Participate in this unique event to promote good old interesting gab on the hambands. Open to all hams of the world. Scoring: 1 point for every QSO that lasts at least 5 minutes; 1 point per 5 minutes additional; multiplier is 5 points for each contact lasting more than half an hour; limit QSOs to 45 minutes; keep track of each topic discussed and score 1 point per subject. Call up is CQ Gabfest '80 (only). Suggested frequencies-c.w.: 50 kHz from bottom of band; phone: 3.975, 7.275, 14.280, 21.375, 28.550, 50.105 MHz; novice: 3.725, 7.125, 21.125, 28.125 MHz; FM: all simplex frequencies (no repeaters). Net contacts do not count. Awards: Postmark entry by March 1, 1980, to Lawrence I. Cotariu-KA6GVI, 8041 N. Hamlin Ave., Skokie, Illinois 60076.

• **Lancaster Hamfest** - To be held 24 Feb., at the Guernsey Pavilion located on Rt. #30 East of Lancaster at the intersection with Rt. -896. Gen. admission is $3.00 except for children and XYL's. Doors open at 0800. All inside spaces by advance registration only. $3.00 each 8 ft. space, which includes table. Deadline 15 Feb. All vendors must set up between 0600-0800 Sunday. Reservations will not be held past 1000 hrs. Free tailgating in specified area outside if weather permits. Two-hour Dutch Country Tour by advance registration is $4.00. Deadline 15 Feb. Tour tickets returned by mail on 20 Feb. Food served at Hamfest. Excellent restaurants and accommodations in area. Contact Hamfest Committee for motel reservations. $17.00 DBL. Talk in 01/61. Airport pick-up by advance request. Write: Sercom, Box, 6082, Rohrerstown, PA 17603.

• **Washington, DC** - AFCEA appoints new regional vice president at-large for amateur radio. The Armed Forces Communications and Electronics Association (AFCEA) announces the appointment of Dr. Theodore Jerome Cohen N4XX as the new Regional Vice President at-Large for Amateur Radio. In the position of Amateur Radio RVP Dr. Cohen will author the monthly column "Ham Radio & MARS News" for AFCEA's official journal, *SIGNAL*, and will maintain liaison with military services and provide interface with AFCEA functions in matters related to MARS and Amateur Radio Service. He takes over the position from Peter Hurd, who recently resigned as the RVP at the same time he retired from active military service. Dr. Cohen is Program Manager, Defense Group, ENSCO, Inc. and has recently published a book with George Jacobs, W3ASK, entitled *The Shortwave Propagation Handbook*. He has written numerous articles on science, including solar activity, radio propatation, radio frequency interference and slow scan television. He authors a regular feature in *CQ* Magazine and is also in the process of writing a book for children, "What is a Computer, Anyway?" After receiving his PH.D. in Geophysics from the University of Wisconsin, Dr. Cohen worked as a Research Assistant at the University's Geographical and Polar Research Center. In 1966, he entered the U.S. Army and served as a Miliatry Assistant to the Chief, Gravity, Division, Army Map Service. Upon completing his active military service, Dr. Cohen became a Senior Research Scientist, Seismic Data Analysis Center, Teledyne, Geotech. He later became the Manager, Product Development Group. Prior to joining ENSCO in 1976, Dr. Cohen was a Senior Scientist and Director, Advanced Technologies Branch, Special Projects Department, Tracor, Inc.

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In this concluding part of W4FA's article, he describes the construction of a kilowatt linear amplifier that uses the 8875 tube.

An Updated "Shoebox" Linear Amplifier

PART II

BY JOHN J. SCHULTZ*, W4FA

Part I of this article described a relatively inexpensive linear for the h.f. bands which featured a particularly simple method of construction. This part of the article describes a similarly constructed amplifier using a modern 8875 tube.

The 8875 is one of a family of three Eimac tubes that were developed for low distortion s.s.b. service. The three types differ only in the method of cooling required and in anode dissipation. The 8873 is designed for conduction cooling and has a 200 watt dissipation rating. The lack of a fan makes an amplifier using this tube particularly quiet but one has to handle a beryllium oxide thermal block when installing the tube. The possible dangers associated with this material have received quite some publicity lately. The 8874 is rated at 400 watts dissipation and requires axial-flow forced-air cooling. This method of cooling requires somewhat more complicated construction in that a pressurized anode compartment is necessary with air passing vertically through the anode cooler. The 8875 has a 300 watt dissipation rating and has a transverse cooler on its anode requiring only forced air directed horizontally across it (when the tube is mounted vertically). The 8875 was chosen by the author as the best compromise between dissipation and still retain a very low driving power requirement.

Before going on to discuss the details of the amplifier's circuitry and construction, it might be worthwhile to digress a moment and discuss the general feasibility of constructing a home-brew linear. As was mentioned in Part I, the method of construction used first involves preparation of a small chassis which is then mounted in a metal utility box. Almost all of the circuitry is mounted on the chassis except for the power supply components. The chassis is then mounted in the box with the tube socket and the input tuning components on the front panel. The output tuning components are mounted on the rear panel. The power supply components are mounted on the bottom of the box.

The 8875 is a ceramic tube and is relatively small. Its maximum plate dissipation rating and relatively easy to meet cooling requirements. However, the amplifier can be modified to use any one of the three tubes.

A particular advantage of all three tubes is their high power gain when used in a grounded-grid circuit. An input power of 1 kW p.e.p. (or 1 kW c.w.) is achieved with only about 25 watts p.e.p. drive. A single tube amplifier can, therefore, be driven by many low power exciters or one can even use two tubes in parallel for 2 kW p.e.p. in-

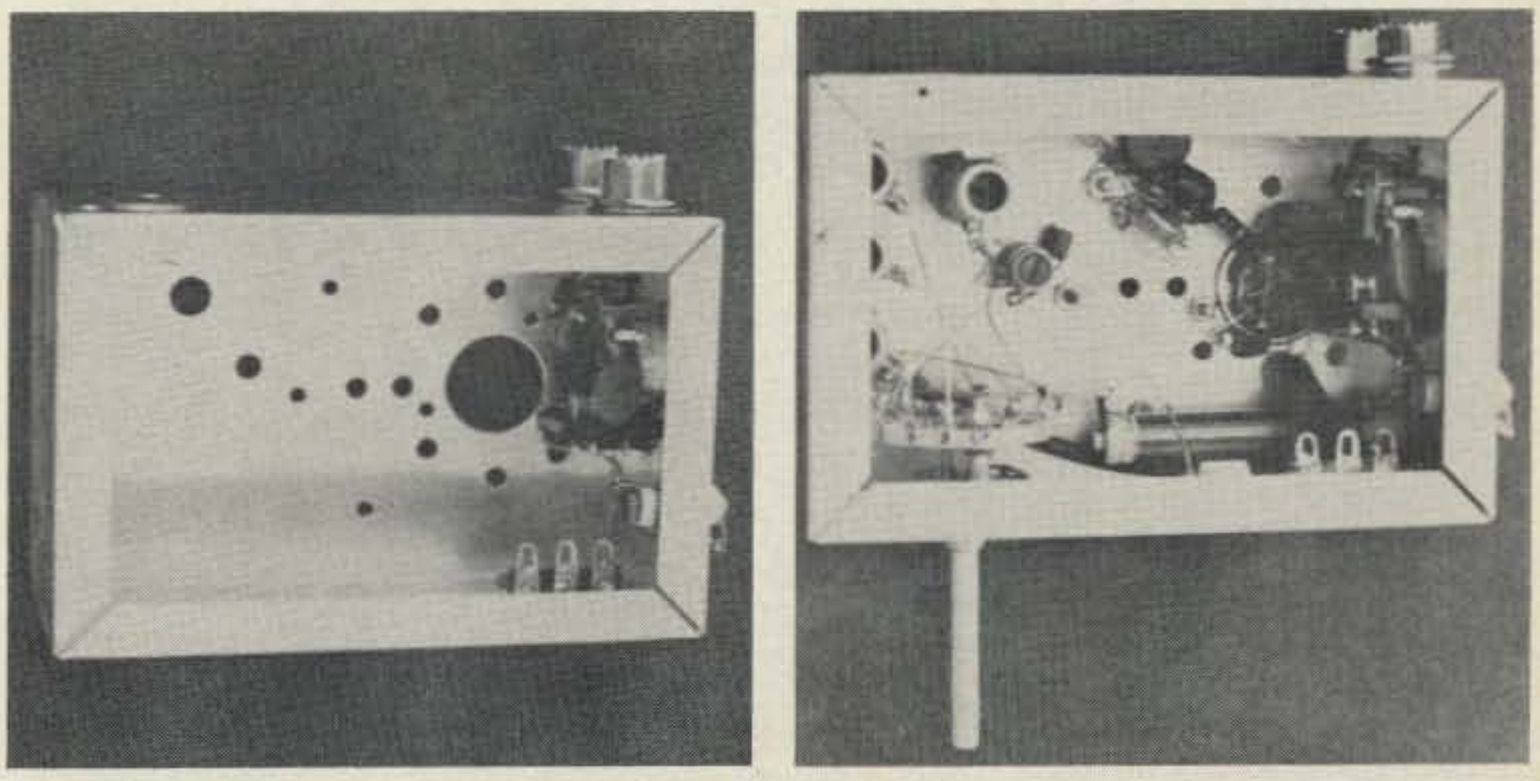
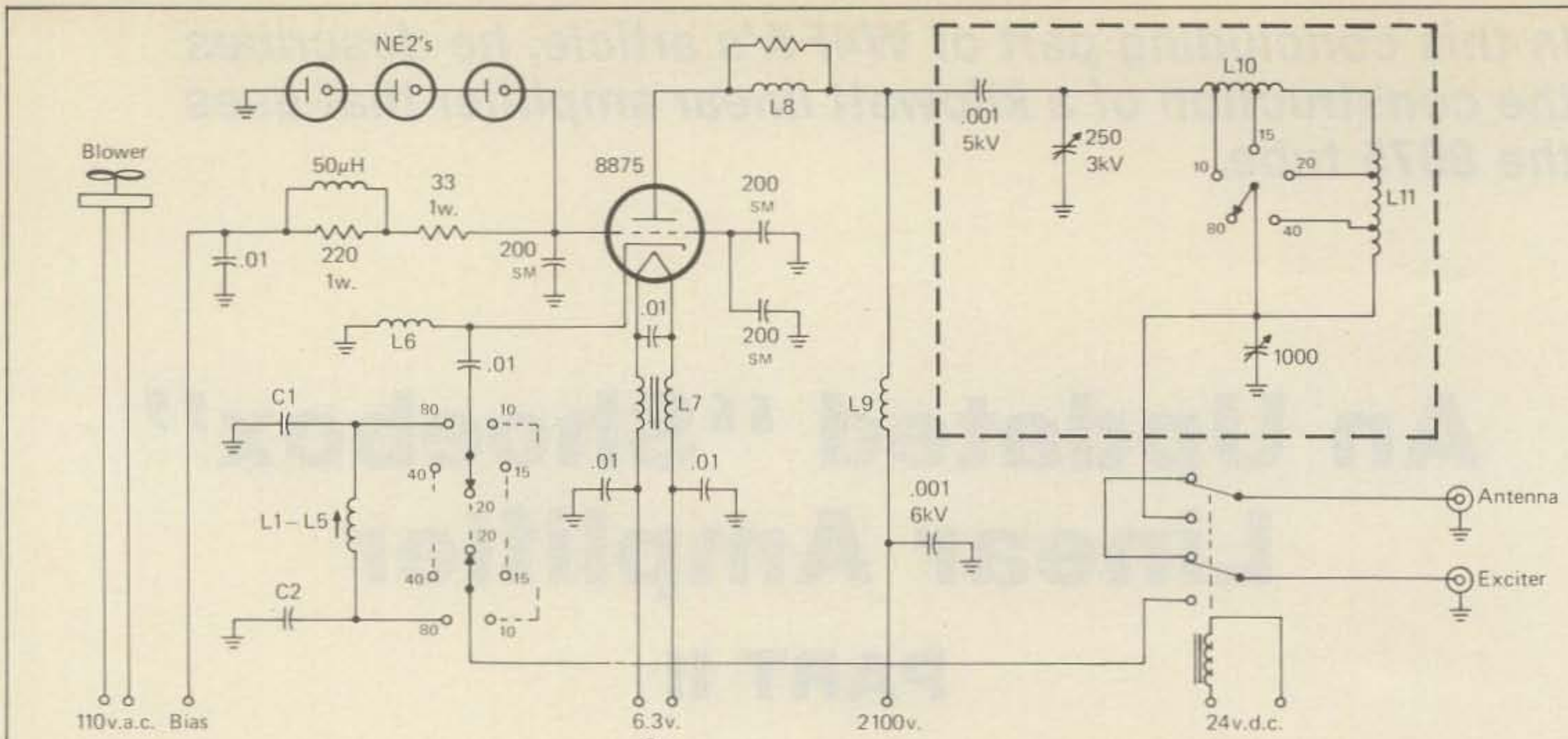


Photo 1 and 1A - Two stages in the construction of the small chassis. One photo shows the chassis just being started with only the antenna relay mounted. The other photo shows the chassis nearly finished with the tube socket on the left and the bandswitch for the input coils on the right.

*c/o CQ



NOTES:

All .01 capacitors are 1kV ceramic disc.

L1–L5 = 3/8", slug-tuned forms wound with No. 18 enamel.

Band	C1	L	C2
80	470	24t	–
40	310	16t	510
20	200	9½t	360
15	75	4½t	–
10	68	3½t	–

L6 = No. 18 close wound for 3" on plain 3/8" form (no slug).

L7 = No. 18 close wound (two windings side by side) on ferrite form approximately ½" x 2" long.

L8 = 4½t, No. 16 on 47Ω, 2w. resistor or two large ferrite beads.

L9 = Ohmite Z-14 in series with Z-50 or equivalent.

L10 = 9t, No. 10, 1 1/8" I.D., 2¼" long, tap 4t from plate end.

L11 = B & W No. 3059 coil, 4" long. Tap at 4t from plate for 20m and at 11t for 40m.

Fig. 1 - Schematic diagram of the 8875 linear amplifier. All components except those in dotted lines and the blower mount on one small chassis. Under some circumstances, as discussed in the text, L1-L5 and L7 may not be necessary.

cept for the pi-network output circuit components. Still, one might imagine that a lot of hard metal work is necessary. But, this is not true. In fact, except for the one-time use of a drill press, the amplifier was constructed by the author on a simple work table in an apartment situation where the use of power tools would not have been possible. The work needed is greatly simplified by the use of chassis punches and a hand reamer to produce various size holes, especially the larger ones, rather than trying to drill them. Also, many amateurs don't realize the drilling capability of the small battery powered drills available (the ones designed for p.c. board work). Using a small, 1 mm drill, for instance, one can drill through a steel utility enclosure. Then, using this "starter" hole, a 3.5 mm drill in a hand holder easily enlarges the hole to a size where a reamer can be used, if required, to further enlarge the hole. The process may sound a bit tedious but it really can proceed quickly, especially on an aluminum chassis.

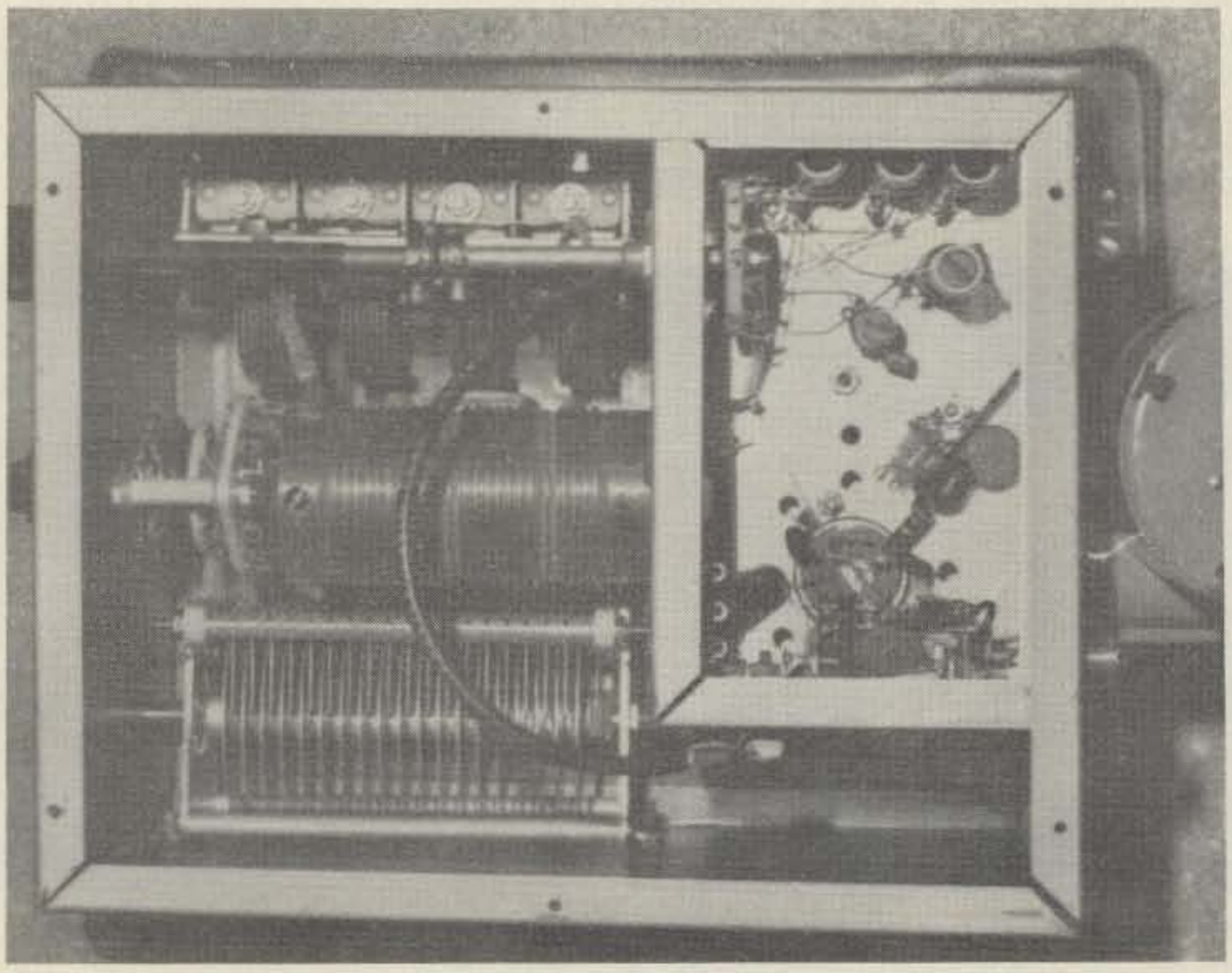


Photo 2 - A bottom view of the linear showing the small chassis mounted inside the utility box.

The circuit for the amplifier is shown in fig. 1. The 8875 is used in a grounded-grid, cathode driven circuit with matching networks for each band in the cathode circuit. These networks are not absolutely necessary; however, their usage does improve the linearity somewhat and helps to keep the driving power required at a minimum. However, if one has an exciter with driving power to spare, one might want to forget these networks. In such a case, only a 100 ohm/30 watt resistor is connected from the exciter side of the .01 coupling capacitor in the cathode circuit to ground. This resistor has to be non-inductive and

can be formed by paralleling 15 1500 ohm/2 watt resistors. This is the approach Heath Co. uses in their SB-230 linear which uses a 8873 tube. The driving power required is then in the order of 50-80 watts p.e.p.

The grid is not completely r.f. grounded by the 200 pF capacitors. The result is that the circuit has a bit of inherent r.f. negative feedback which improves the linearity. If one were aiming for the lowest possible driving power, these capacitors could be replaced by .001 mF units. Also in the grid circuit, three NE-2 neons are connected in series to form a voltage surge protector. It is unlikely that a surge would ever be developed that would damage a tube. However, since the grid is not at absolute r.f. ground with the 200 pF bypass capacitors, the surge protector is cheap enough insurance. The filament is kept above r.f. ground by the filament choke which is a simple unit wound on a ferrite rod. However, the choke is not absolutely necessary in the h.f. range. If again, one had driving power to spare and wanted to further simplify the circuit, the choke could be eliminated. However, the bypass capacitor between the filament terminals and the bypass capacitor from each filament terminal to ground must be retained.

A small amount of operating bias is necessary and this can be supplied by the typical power supply circuit shown in fig. 2. The bias supply is arranged so when the linear is operating the 100 ohm potentiometer in the bias supply is adjusted to supply operating bias. During standby the full bias supply voltage is applied to the grid to cut-off the tube. This cut-off voltage is necessary not only to prevent tube noise generation during receive periods but also to allow sufficient heat-up time for the tube. Initially, when turning on the linear, the tube

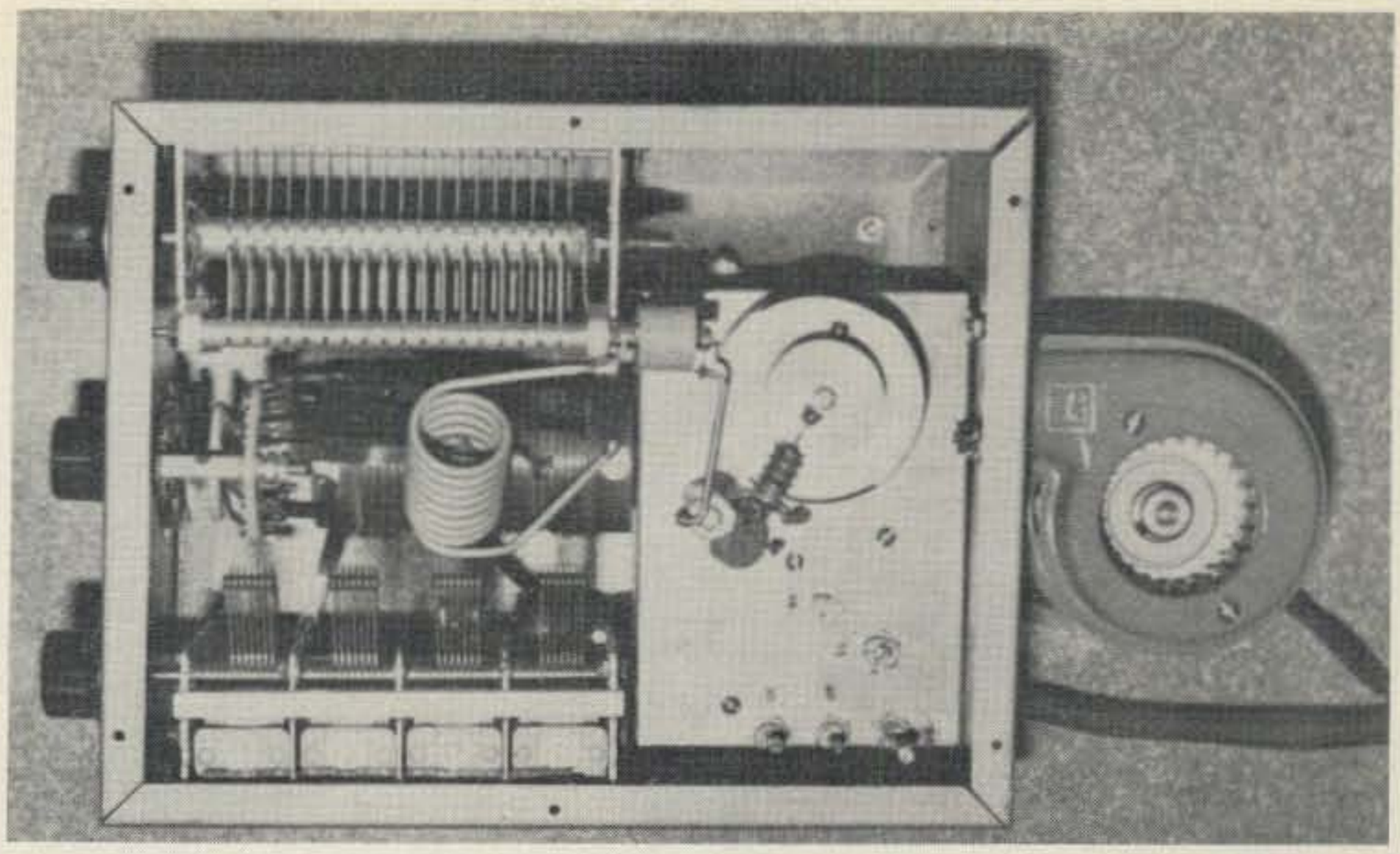
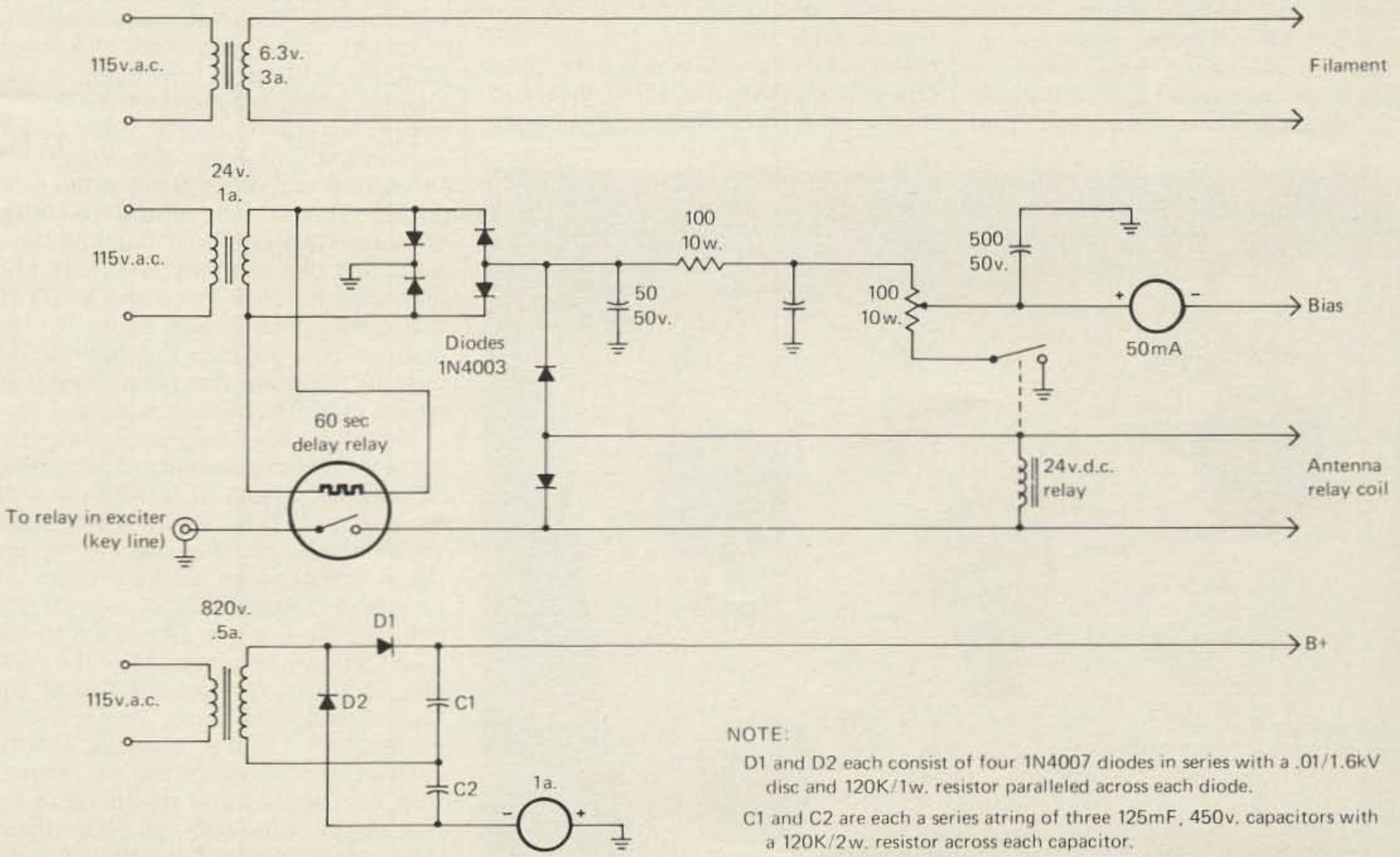


Photo 3 - A top view of the linear. The coil in the center is the 10/15 meter pi-network inductor and the 20/40/80 inductor is below it. The 8875 tube is shown with a radiator type plate cap but a simple spring clip connector is perfectly satisfactory. Note that the blower orifice must be carefully positioned in relation to the height of the socketed tube so air goes directly across the anode fins on the tube.



NOTE:

D1 and D2 each consist of four 1N4007 diodes in series with a .01/1.6kV disc and 120K/1w. resistor paralleled across each diode.

C1 and C2 are each a series atring of three 125mF, 450v. capacitors with a 120K/2w. resistor across each capacitor.

Fig. 2 - A typical power supply arrangement. The primary leads (X-X leads) of each transformer are paralleled and connected to the 110 volt line via an on/off switch and a 10 amp fuse. Placing the meters in the power supply enclosure avoids problems of having to shield them. Although not shown, some provision should also be made to measure the B+ voltage so the power input can be calculated.

Photo 4 - A rear view showing the mounting of the blower. Note also the umbilical cord in the lower left which goes to the power supply.

must remain cut-off for 60 seconds in order to provide a cathode warm-up period for maximum tube life. The time delay relay in the power supply prevents the initial keying of the linear for 60 seconds. Another approach would be to have separate power line switches for the filament and plate transformers and just manually time the turning on of the plate supply. The antenna relay is a 24 v.d.c. unit and also utilizes the bias supply voltage for operation. The pi-network output circuit is conventional. The inductor for 80/40/20 meters can be easily cut from B&W coil stock while the 15/10 meter inductor is formed from heavy gauge, tinned wire. A good source of parts for the pi-network components is G.R. Whitehouse Co., Newbury Dr., Amherst, N.H. 03031. They also handle the Eimac line of power tubes and sockets.

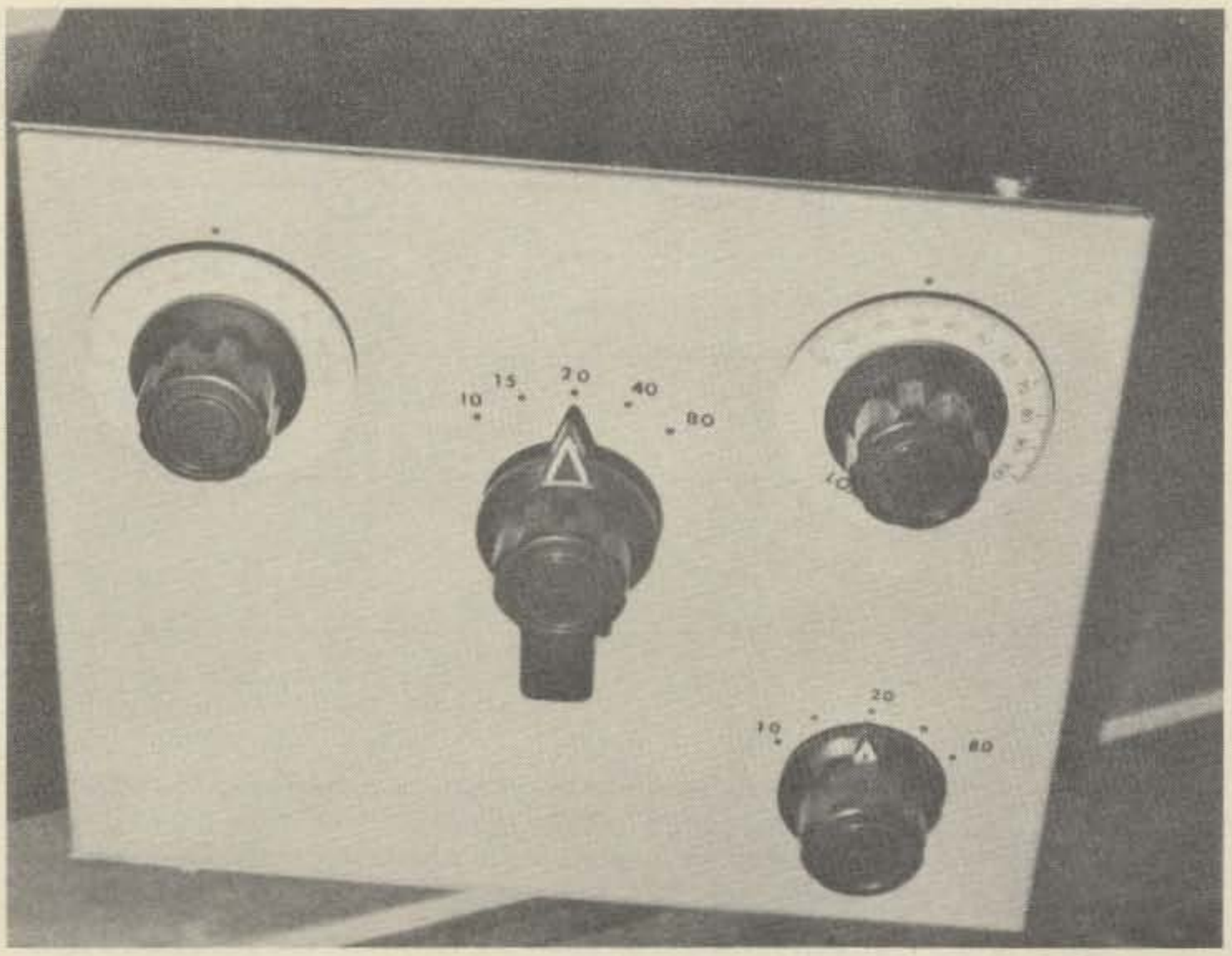
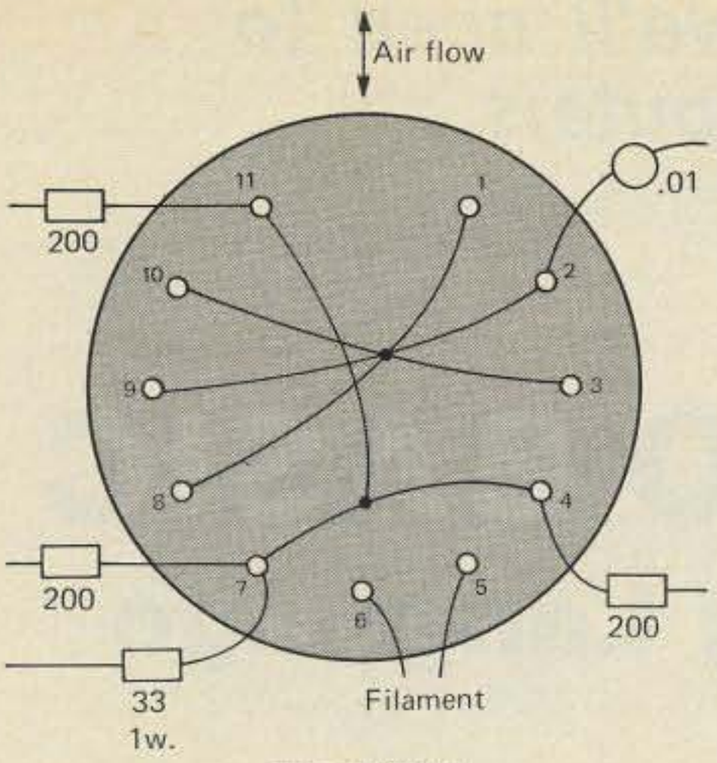


Photo 5 - Front view of the linear. Some old General Radio knobs were used although some more modern knobs could be used to better dress up the appearance of the unit.

Photos 1 and 2 show the 3″ × 6″ × 3″ chassis, on which all the components of fig. 1 are mounted (except the pi-network circuit), in an initial construction phase and then installed in the overall enclosure. There is nothing critical about the placement of the components so exact dimensional data are not given. There are only a few areas, however, that one should plan out in advance before the chassis is drilled. One relates to the placement of the tube on the chassis in relation to the placement of the blower on the utility cabinet. The blower must be positioned so air from it is directed across the center of the cooling fins on the tube. One can do this with the tube in hand or from dimensional data on the tube in its technical data sheet (free from Eimac, 301 Industrial Way, San Carlos, Calif. 94070). Also, the tube socket must be positioned correctly so the air flow is directed on a center line between pins 1 and 11. This orientation is necessary since the fins on the tube are joined on two opposite sides. Therefore, if the tube socket is not oriented correctly, the air flow will be blocked. These items are readily apparent once one has the components in hand. A few holes should also be drilled around the tube socket perimeter to enhance circulation around the tube base. Fig. 3 presents the wiring and orientation of the tube socket. The cathode pins are all interconnected and r.f. drive can be coupled to any one of them. The three grid pins are interconnected and a 200 pF capacitor goes from each to the nearest ground lug; the lugs being held in place by the same hardware which mounts the tube socket.

The chassis is held in place in the 10″ × 8″ × 7″ metal utility cabinet (Bud CU-879) by means of two single hole mounting u.h.f. connectors and some 10-32 hardware. One has to mount these components so they clear the blower mounted on the rear of the cabinet. This is not difficult with the small blower unit needed but the parts should be tried in place before the final drilling is done. To ensure a perfect fit of the chassis in the cabinet, the holes for the r.f. connectors, etc. should first be drilled in the rear panel of the *cabinet*. Then, these holes are marked off and drilled in the *chassis*. If one does it the other way around, it is unlikely one will get the holes lined up exactly. The blower can be any small unit that moves about 15



BOTTOM VIEW

NOTE:
Cathode: 1, 2, 3, 8, 9, 10
Grid: 4, 7, 11
Heater: 5, 6

Fig. 3 - The tube socket is shown enlarged here to illustrate some features about its wiring. Note particularly the placement of the 200 pF grid bypass capacitors. The tube socket itself is an Elevenar 11-pin type (E.F. Johnson #124-311-100 or Eimac part number 154353).

c.f.m. of air as shown in photo 3. The unit shown was purchased from Burstein-Applebee, 3199 Mercier St., St. Louis, Mo. 64111, as their part no. 41A4002-3.

The pi-network capacitors and the coil switch are mounted directly on the front wall of the cabinet as shown in photo 4. Since nothing is mounted on either the top or bottom cover of the cabinet, these covers can be removed for servicing and one has *complete* access to all parts of the amplifier. The only thing the top cover contains is an exhaust screen. A series of 1" holes were punched in the top cover approximately over the 8875 and covered with a surplus exhaust screen. Close mesh copper screening placed inside the top cover could be used as well.

The interconnections between the amplifier unit and the power supply are made with a simple umbilical made by placing the conductors in a section of shielding removed from RG-8 coax and then covering the shielding, once it has been stretched out over the conductors, with heat-shrink tubing.

The power supply used should first be checked for proper operation. Then, with the amplifier keyed but with no excitation applied, the bias voltage is adjusted to produce 20 mA resting plate current. A small amount of excitation is then applied to produce 150 mA plate current on each band to check the tuning of the pi-network. With full excitation, the amplifier should load to 450 mA plate current (c.w.) and show approximately 30 mA grid current. The cathode input circuits, if used, are peaked on each band for maximum plate current, using reduced excitation to avoid prolonged heating of the tube. Under s.s.b. voice conditions, the plate current will read about 210 mA on peaks although, of course, a full 1 kW p.e.p. input is being achieved.

The amplifier described is not a one-evening project. But, neither is it a difficult project if one plans it out in advance and proceeds in the simple sequence of completing the small chassis, mounting the chassis in the cabinet, mounting the pi-network output circuit components and blower on the cabinet and then making up the interconnection cable to the power supply. One will be rewarded with a fine linear at a reasonable price.

Editor's Note

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K8BG starts to program us with what we'll need to know to program and use our home computers.

INTRODUCTION TO BASIC

A Computer Programming Language

Part I

BY BUZZ GORSKY*, K8BG

BASIC is a programming language which is common to many of today's home computers. While the details of the language will vary from one system to another the "basics" are the same. This series of articles will explore the language, explain how the various commands are executed, and discuss the techniques for writing, debugging, and testing programs. I will use short programs to illustrate each of the commands discussed. Since my computer is a Radio Shack TRS-80 (level II, 16K) program statements will be correct for that machine. If you wish to use these little programs on your machine, you may have to change some of the details, such as punctuation and spacing, as appropriate. The user's manual for every system indicates correct syntax for every command which the system understands.

Before we get into the details let me explain why we are interested in programming in the first place, and what you DO NOT need to know to be a successful programmer. When you buy a computer and eventually turn it on, the results are disappointing. The output display will show some kind of "prompt" to demonstrate that the machine is ready, but it won't "do" anything. The machine needs a program, that is a set of instructions, in order to accomplish a task. The programmer must understand the task to be done, break the task down into very small steps, then give the machine the list of steps in the form of a program.

*2449 Derbyshire Road, Cleveland, Ohio 44106

So my TRS-80, which at first only sat on the operating table showing "Memory Size?" (that's what appears on the screen at power up), will now send and receive morse code or Baudot RTTY. It will determine which orbit of any of the amateur satellites can be accessed from my QTH and will then display the timetable of antenna azimuths and elevations for a pass, or (if I choose) it will do the antenna pointing itself. Others use computers for dx work, log keeping, QSL writing, or other bookkeeping tasks. A few amateurs have completely computer controlled stations. All of these jobs are accomplished through programming.

The "number cruncher" or "brains" in the computer is called the **microprocessor.** The *processor* takes commands in the form of binary numbers. So one can control the processor by feeding the proper sequence of ones and zeros. In fact some tasks are best accomplished that way, that is, some programming is done in "machine language." Machine language programming can also be done by writing in what is called "assembler language." Assembler uses a system of codes which are easier to remember than the myraid binary commands, and an assembler program translates the code into the correct binary sequence.

While machine and assembler language programs are fast and efficient they are difficult to write and require that the programmer know a great deal about the processor and the memory and peripheral devices employed. As BASIC programmers we do not have to be concerned about any of those things. We don't have to worry about binary or hexadecimal numbers, memory locations, bits or bytes. The program which we write in basic will be translated into binary code in the machine, and it will take care of all of those details. We really don't have to know anything about how the computer does what it does, but we DO need to know the precise meaning of every command and symbol that we will use in our programs.

In this segment of our introduction to basic, we will look at how to get the machine to do arithmetic. We will also make use of the PRINT and END statements, though we'll find out more about those statements later. For now we just need to know that END tells the computer to stop execution, and that PRINT will print on the screen the symbols enclosed in quotes after the word PRINT, or the value of a variable which appears after the PRINT command. PRINT has many options which we will discuss when we consider input/output commands in general.

BASIC recognizes four types of variables, three of which can be employed in arithmetic statements. "String" variables are composed of letters, numbers, and symbols, and

PRINT	+
LET	–
=	*
(	)
/	*END*

Table I - BASIC arithmetic as expressed in LET statements.

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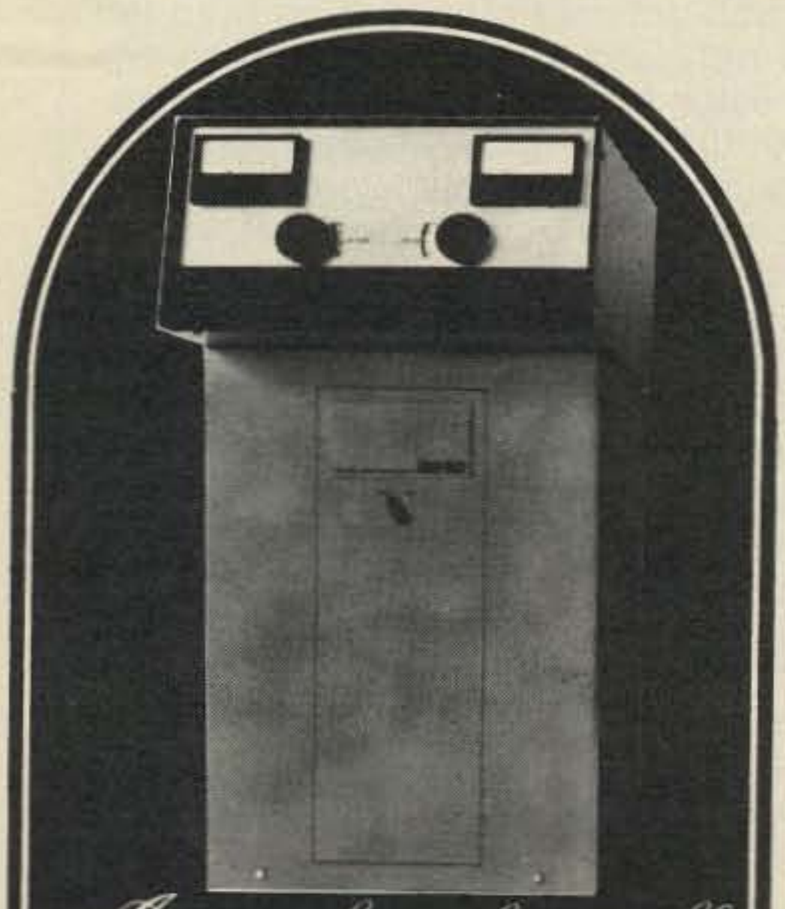

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they are manipulated by a separate set of string operations—also subject of a future article. Now we will be concerned with integers, single precision variables, and double precision variables. Integers are whole numbers like 0, 1, -359, or 1,075,386. Single and double precision numbers have a decimal point so that fractional values can be expressed. The double precision values are carried out to more significant figures than are the single precision values so that more precise computations can be performed. If the computer is given a variable it will assume that that variable is single precision unless it is told otherwise. For example, if we have a variable X, X will be assumed to represent a single precision number. However, X% must represent an integer (at least in TRS-80 Level II) and X$ represents a string. While we are dealing with numbers we don't have to worry much about these distinctions though. If we do not specify the variables we use, everything will work out. That is we can use X as a variable for any number. If the number is more precise than single precision allows, the machine will simply ignore the extra data. If the number is really an integer, say 10, the machine will simply store it as 10.0 and think of it as single precision. As long as we don't tell the machine that X is supposed to represent the string "yes5##" all will go well.

In BASIC most arithmetic is done in LET statements. The LET statement essentially says, let something equal something else. The plus sign (+) indicates addition, the minus (−) subtraction, the slash (/) division, and the asterisk (*) multiplication. Parentheses are often used in LET statements to control the order of operations as we'll see in a minute. While a LET statement such as

LET X=10

appears like a normal arithmetic statement, it is not. This statement tells the computer to take the numerical value on the right of the equal sign and store it in the memory site reserved for the variable on the left of the equation. For the example above then, the machine will store 10 in the memory location reserved for X. When X is used later in the program, the machine will look in that site and see that a 10 is stored there and use 10 in place of X. Therefore, while the statement shown above is a valid basic statement, LET 10=X is not valid. Since 10 is a constant, not a variable (variables must begin with letters and cannot begin with numerals), the machine cannot carry out the statement, and if such a statement were written (try it) the machine will give an appropriate error message.

Here's another example. If we say

```
10  LET X=1+2/3+4+5*6
20  PRINT X
30  END
40  X=(1+2)/(3+4)+5*6
50  PRINT X
60  END
70  X=(1+2)/(3+4+5)*6
80  PRINT X
90  END
100 X=((1+2)/(3+4)+5)*6
110 PRINT X
120 PRINT "PARENTHESES ARE
    IMPORTANT"
```

Table II - A BASIC program. This shows how important the placement of the parenthesis is.

LET X=Y, the machine will look in memory location reserved for Y and take the value stored there and place that value in memory location reserved for X. The same value will still be in Y's location also. So when this statement is encountered, if there had been a previous set of statements: LET X=5 and LET Y=4.37, then after execution of LET X=Y, the memory locations for both X and Y will have 4.37 in them. X's previous value of 5 is simply forgotten. If we had written LET Y=X then both locations would have a 5 and the 4.37 would be forgotten.

Now that we know what LET does, we'll consider arithmetic operations which are usually performed on the right side of LET statements. With the exception of parentheses, which we'll look at in a moment, the computer performs arithmetic by looking from left to right and doing multiplication and division followed by addition and subtraction. If parentheses are encountered, the machine does whatever is inside the parentheses first. Within the parentheses operations are done from left to right also. Some examples will make this clear(er). Consider the program in Table II. (In fact if you have a computer, you can type this program in and see the results.) Consider the first statement, #10. The expression on the right is to be evaluated, and the result is to be stored in X's location. The computer will begin looking from left to right. First it determines that no parentheses are present, so it can proceed from left to right in normal fashion. On it's first pass it will execute * and / only. Then it will do + and −. So the first time through it sees the / between the 2 and 3 and evaluates that—2/3=0.666667. It now proceeds to the right and encounters the * between the 5 and 6. It then does that step. 5*6=30. The computer has now reduced the statement to X=1+0.666667+4+30. Now it proceeds from left to right and does the rest of the addition:

1 + 0.666667 = 1.66667,
1.66666666 + 4 = 5.66667.

Finally,

5.66666666 + 30 = 35.6667,

and that value is stored in memory location X.

The machine will now look at the next statement (20). Since a variable follows the PRINT statement, the machine will look in the location reserved for X, fetch the value stored there, and display it on the screen. So 35.66666666 will appear on the screen (the number of 6s will depend on how many significant figures your machine maintains for single precision variables). Now you might well ask, why the machine went to the trouble of storing that 35.6667 if it was just going to have to look for it right away. The answer is simple—the machine is very fast, but it's not too bright! In BASIC the machine does one step at a time and when it was doing the LET it had no way of knowing what the next statement was going to be. You may recall that I said that machine and assembler languages were efficient. Well, in this case, the programmer could save machine time by holding the variable's value right in the spot where it's needed to be displayed on the screen, and many machine steps would be saved. So BASIC is somewhat wasteful of the machine's time, but it certainly saves a lot of our programming time!

Now that we've been through that example in very great detail, let's look at the rest of the program. After printing X in line 20 the machine would see the END and execution would stop. My machine would display READY to show that no program was being executed. To get it to do the next bit I would type RUN 40, and execution would begin with line 40. Here we have the same statement as 10—almost! First there is no LET. It happens that in Level II BASIC on the TRS-80 you can omit the word LET if you wish, and the machine will understand that this is a LET statement. Your machine may or may not provide this convenience. The other difference between 40 and 10 is the parentheses. Now when the machine begins its scan, it will see two sets of parentheses, each containing one +. It will execute these first, so the line is transformed into X = 3/7 + 5*6. It will now do the division, then the multiplication, and finally the remaining addition to obtain 30.4286. This value will be displayed, and execution will stop. Notice that this is clearly a different value from that obtained before, yet only the parentheses were added. Line 70 shows how important placement of the parentheses is. Here again there are two sets and these are evaluated first. The expression becomes X = 3/12*6. This is then evaluated from left to right. 3/12 = 0.25, and 0.25*6 = 1.5. So this time X = 1.5. Finally, if we look at line 100 the situation is even more complex. Here there are parentheses inside of parentheses. The machine will evaluate these from inside to outside. First it sees the outside set enclosing (1 + 2)/(3 + 4) + 5, so it begins by evaluating what is inside of that. So that much is evaluated to be 3/7 + 5 or 5.42857. Now that value is multiplied by 6 to obtain 32.5714. As you can see this answer is different from all of the others we have obtained! Once the computer has this result, it will print it (line 110) and then it will print everything between the quote marks in line 120. If you have run this program on your computer the screen should look something like what is shown in Table III.

With these few statements, we can have the machine do all of the arithmetic we want and show us the results. But most of the power of the machine comes from the rapidity with which it can do repetitive operations and its ability to make (simple) logical decisions. Part II of this series will take a look at the statements for these two types of operations.

(to be continued)

```
READY
RUN
35.667
READY
RUN 40
30.4286
READY
RUN 70
1.5
READY
RUN 100
32.5714
PARENTHESES ARE IMPORTANT
READY
```

Table III - What your screen will look like after the program in Table II is run.

The Queen Mary may not sail anymore, but it's home to the Associated Radio Amateurs of Long Beach, with antique radio exhibits.

"This Is W6RO Aboard The Queen Mary Calling!"

BY NORMAN L. CHALFIN, K6PGX*

In Long Beach Harbor (CA) aboard the R.M.S. Queen Mary, W6RO, the club station of the Associated Radio Amateurs of Long Beach, is in operation and open to the Queen Mary Tour visitors as part of the tour.

At an opening ceremony on April 22nd there were nearly 600 guests who toured the Queen Mary exhibits and then were treated to "refreshments." There were so many in the area of the radio room that one couldn't push an elbow in even if it was akimbo.

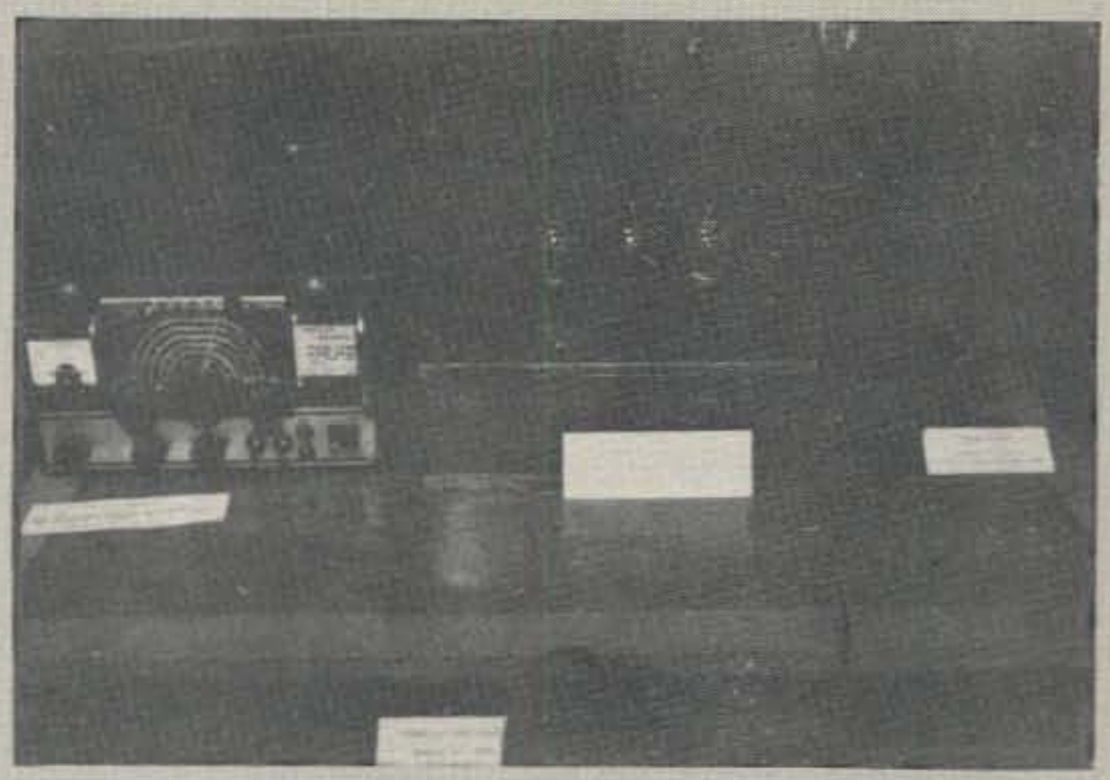
It is 12 years since Queen Mary's "CQ" crackled over the air waves. Now its signals will be heard from an Atlas 210X, Kenwood TS820S, Swan 100 MX or Yaesu 227RB, radiated from a Cushcraft ATB 34 or Ringo Ranger ARX-2 or a dipole. An Alliance Rotator HD73 will be likely to be directing some of those signals your way.

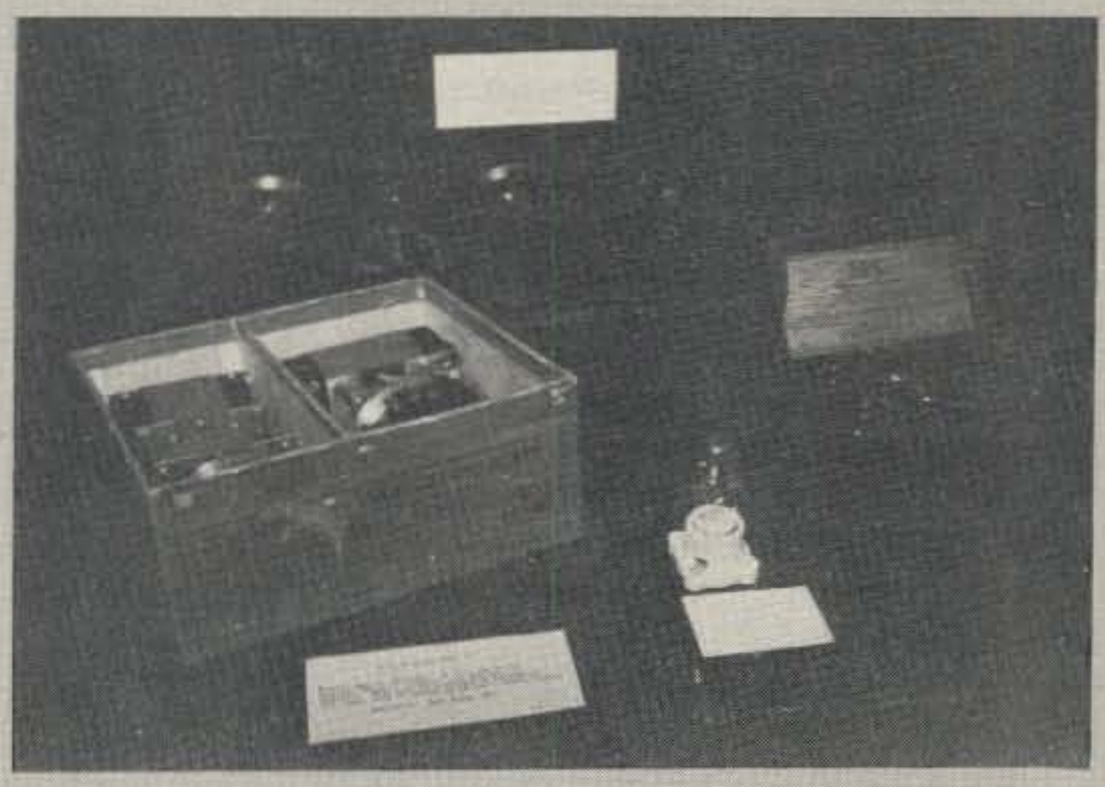
The W6RO hamshack is a part of a new exhibit of the Queen Mary Tour. It occupies a reconstruction of the Cunard Liner's Wireless Room. What

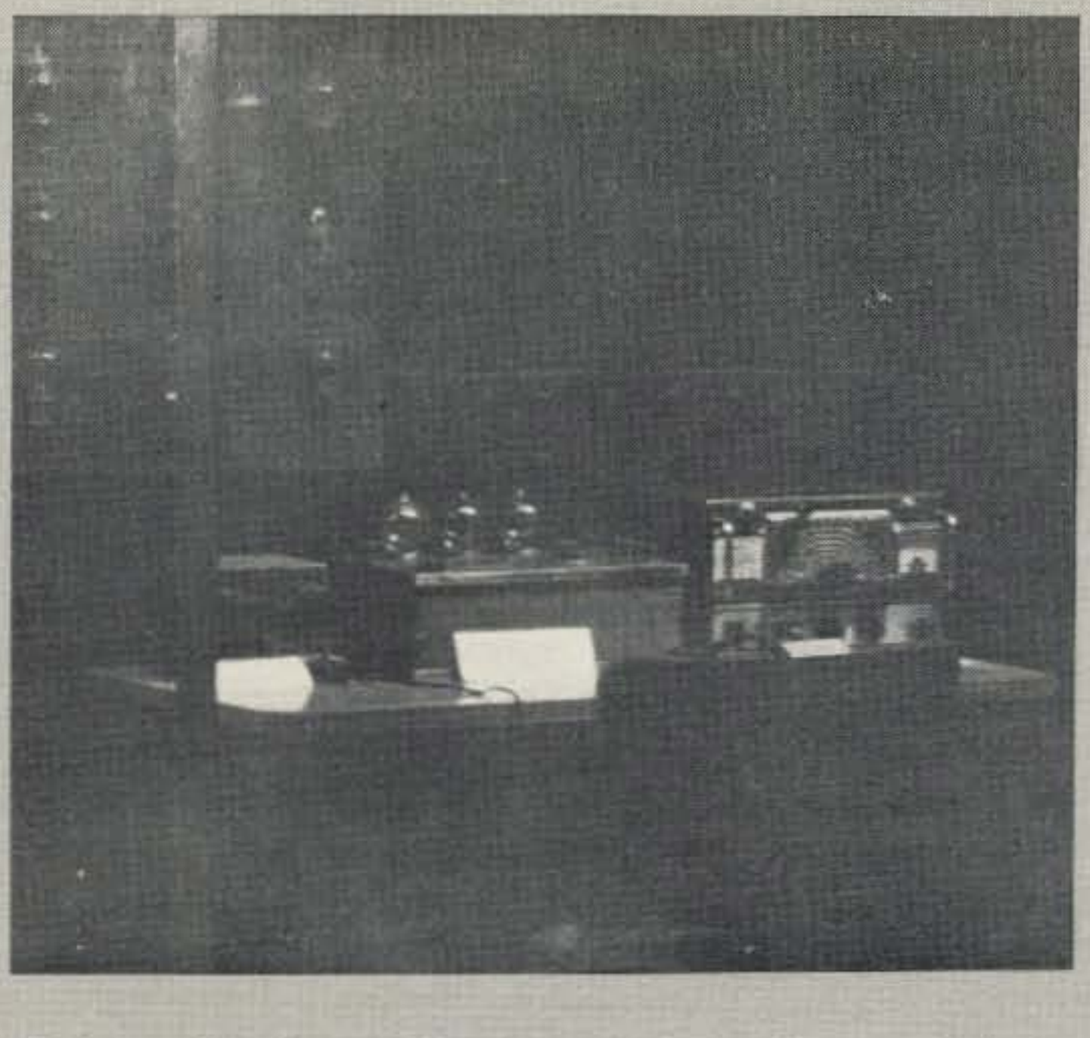
*JPL Amateur Radio Club,
4800 Oak Grove Dr.,
Pasadena, CA 91103

The Queen Mary, base for the Associated Radio Amateurs of Long Beach.

The Radio Room of the Cunard Liner Queen Mary was reconstructed by the Associated Radio Amateurs of Long Beach (CA). Much of the original equipment used by the Queen's radio officers has been retained. Amateur radio gear has been added and is operated as the Long Beach group's amateur radio station W6RO. Here, Ron Carpenter, WB6YID is operating the two-meter rig. (Photo by Norm Chalfin K6PGX)







What was the Queen Mary's squash court, several decks above the original location, has been remodeled to house the antique radio exhibits. Equipment such as is shown on this page may be seen as part of the tour of the ship.

was the Queen Mary's squash court, several decks above the original location, have been remodeled to house the radio room and ancient radio exhibits. Except for the ham gear, it's authentic. In an area adjacent to the shack there is an exhibit of historic radio equipment donated by amateurs and others.

The hamshack will be manned by volunteer licensed amateurs on a regular schedule from 10 a.m. to 6 p.m. (Local Long Beach Time) every day. Their communications throughout the world can be heard by persons who are on the Queen Mary Tour. If you should visit, you may get a chance to operate the radios in the hamshack.

One aspect of the W6RO operation is that in an emergency it will be unaffected by a loss of power because the ship's generators can be operated to provide power when needed. It is not expected that the station would be affected by earthquakes, floods, or other land based catastrophes, because it is in the water.

Look for W6RO on all of the popular ham bands, including 2 meters. The club has a very attractive QSL card illustrating the ship and the radio room and including a listing of Queen Mary facts.

Did you know, for example, that GB5QM was the only amateur radio station licensed for operation aboard the Queen Mary? This was for its last voyage. W6RO was operated February 21st, 1971 as the ship was moved from dockside to its present location.

The ATB34 Tribander antenna beam is about 160 feet above the water's surface atop one of the ship's funnels. Above the beam is the Ringo Ranger for 2 meters.

What used to be the passenger's quarters (cabins) are now the rooms for guests of the Hyatt Queen Mary Hotel.

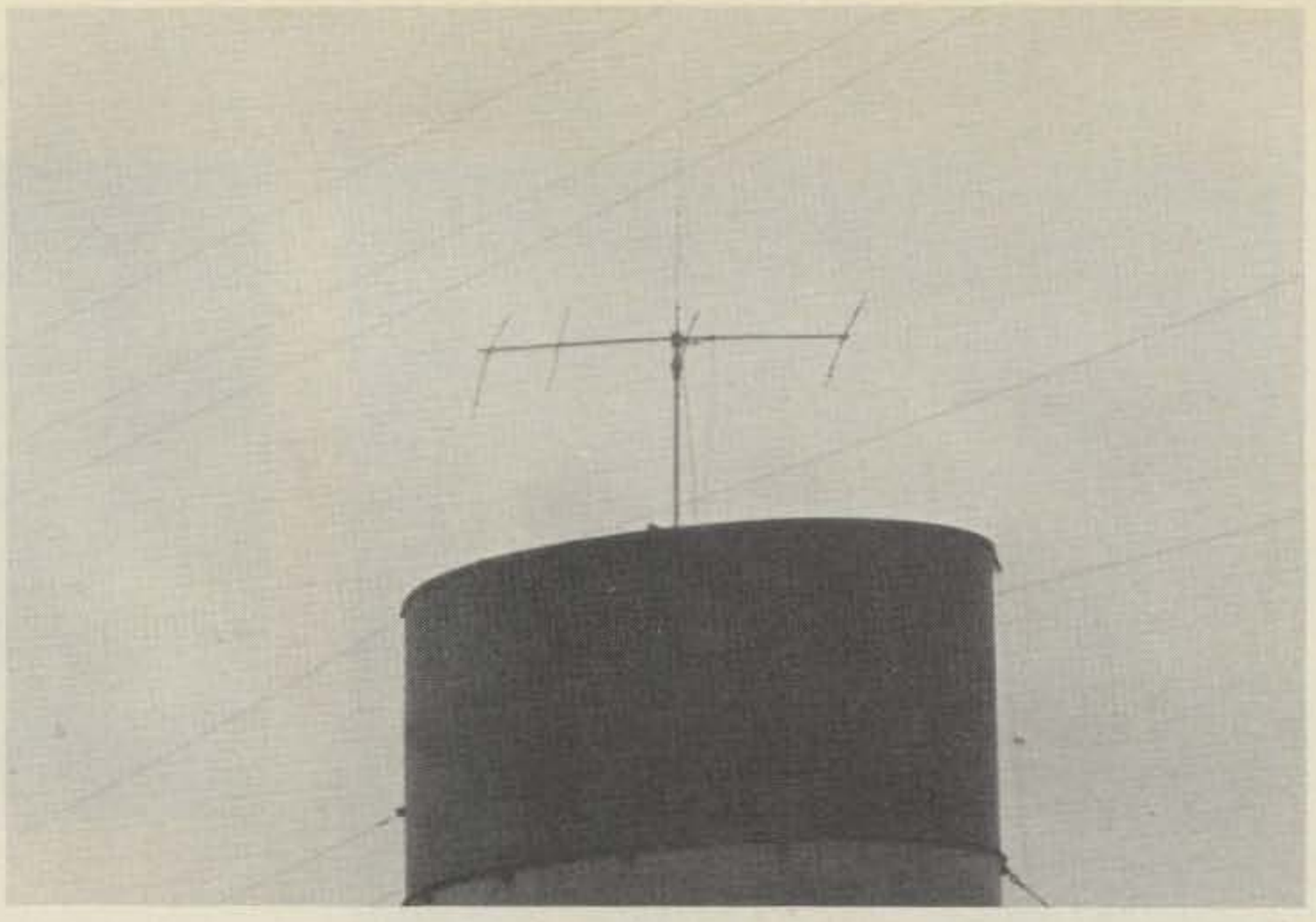
While we were there a few days after the dedication, several movie and TV companies were preparing to film sequences aboard the Queen Mary. We were told by a tour guide that the "Poseidon Adventure" had many sequences filmed there.

Volunteers are being sought for operating the W6RO Station aboard the Queen Mary. For information contact Nate Brightman K6OSC at (213) 427-5123. This will be an opportunity for Ham Landlubbers to become Arm Chair seagoing radio ops. With all of the air conditioning and generating equipment going aboard the Queen Mary, you will feel as if the ship is at sea, however becalmed.

Nate Brightman, by the way, is the special projects chairman of the Associated Radio Amateurs of Long Beach. He was one of the operators of W6RO during that trip from the dock to its present location. With him were Al Lee, W6KQI and Nate's son Howard Brightman K6OCD.

Nate worked for 12 years to get the Queen Mary radio room set up as a hamshack. His first proposal to the Long Beach City fathers was in 1970. In 1974 it was updated and presented to the operators of the Queen Mary Museum. Work was begun to reconstruct the radio room in July 1978.

Now that it is going, we were told that Nate is in the shack operating W6RO at 8:00 in the morning until time to go to his place of work. 73



The antennas being used by W6RO, the Club Station of the Associated Radio Amateurs of Long Beach, aboard the Queen Mary extend from one of its central smoke stacks. The "Tribander" beam is rotatable. Its mast extends to a Ringo Ranger for 2 meters. (Photos by Norm Chalfin K6PGX)

The installation of the amateur radio station W6RO on the Queen Mary. At left, a real old timer, Dick Brown, K6TRS and Ron Carpenter WB6YID are two of the many volunteer operators who man the station during the Queen Mary Tours. Dick is a former ship's operator himself. (Photo by N.L. Chalfin, K6PGX)

The Sangre de Cristo Mountains - ETO'S backyard

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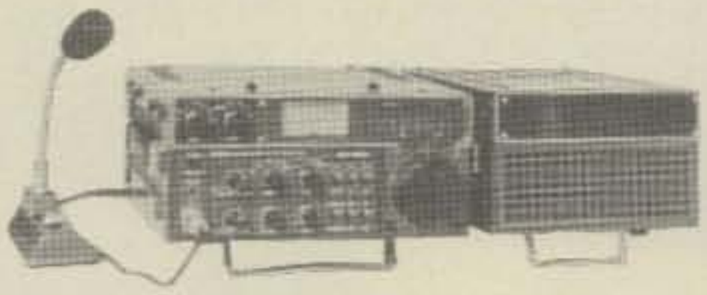

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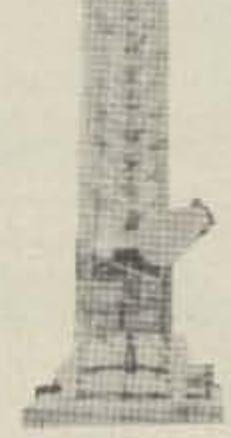

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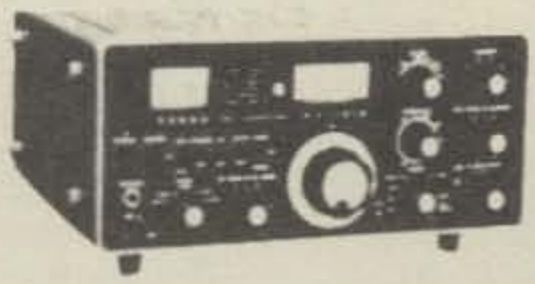

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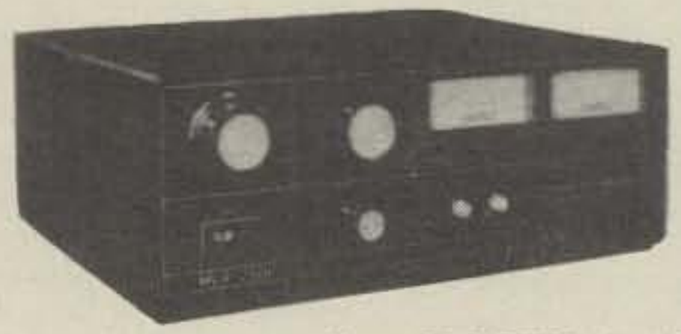

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CIRCLE 3 ON READER SERVICE CARD

K3WBH has come up with another interesting antenna project, this one for 432 MHz. This one is ideal for restricted coverage and a restricted wallet. A matching device for use on 2 is also thrown in. It also gives our illustrator a chance to show off.

A 432 MHz Beam For Restricted Coverage Areas

BY T.E. WHITE*, K3WBH

It frequently happens that an amateur interested in working u.h.f. is so situated that he either cannot or does not need to cover every point of the compass. For example, an amateur on the seacoast or at the foot of an escarpment may need to cover only 180 degrees. Or in rural areas he may wish only to work several metro areas in an arc less than 180 from his QTH.

Here is a 432 beam with deliberately limited rotation which may be cantilevered from the side of an existing antenna tower, silo or tall barn. It may be used up to a 15 degree angle off the supporting structure in either direction from "straight out.," or an arc of 150 degrees.

Four bays of 7 element yagis are stacked vertically for lowest wave angle. A symmetrical feed system and judicious choice of stacking distances keeps line losses down (the main feeder should not exceed 50′ if possible). With the 435 MHz design center, the beam will work well over a span 2 MHz up or down. To change the center frequency to 439, subtract 1/8″ from all elements; for 443, ¼″.

Obviously it is not practical to make a vertically polarized version. Nor would this arrangement be compact enough at 220 or 144 MHz dimensions. However some repeater groups are going to horizontal omnidirection, using phased dipole stacks facing the four cardinal points. This reduces QRN considerably.

Construction is straightforward and material is light-weight. The common

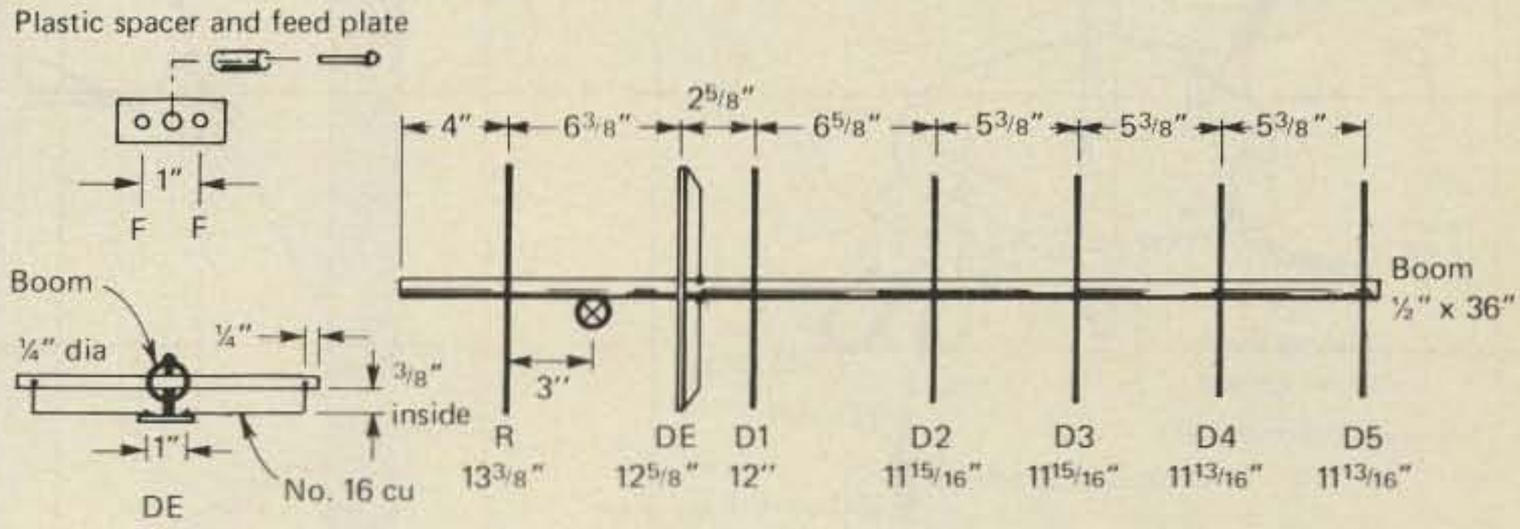


Fig. 1- Details of a typical bay for the stacked beam.

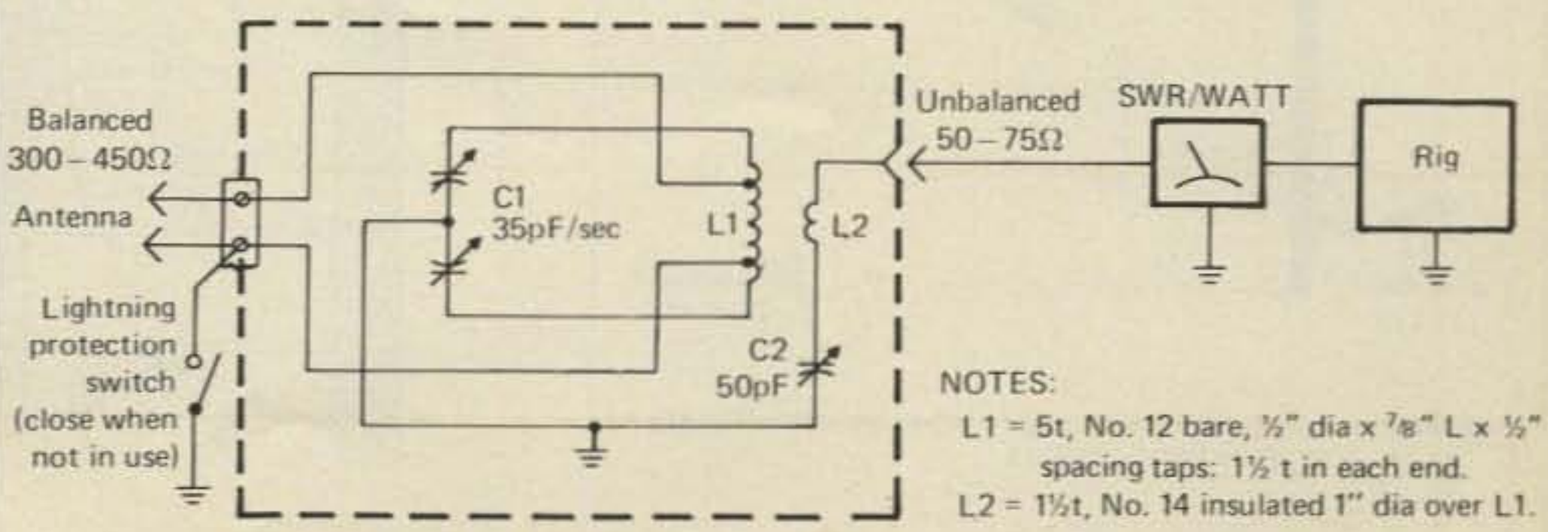
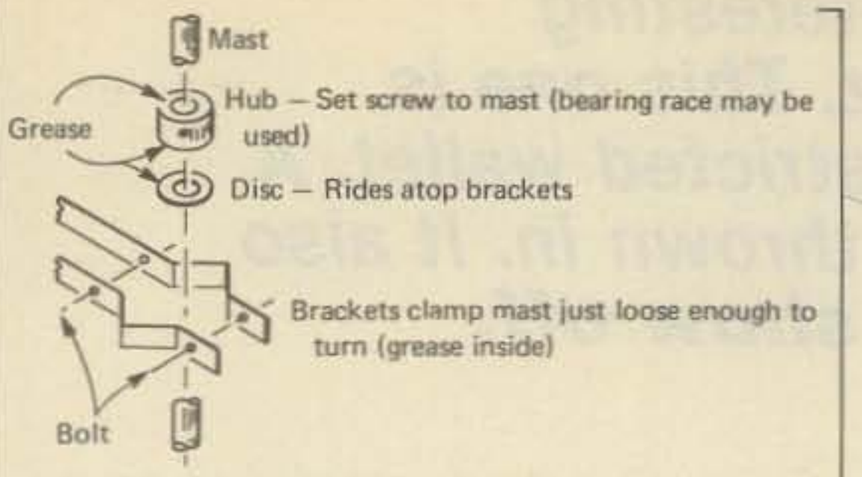
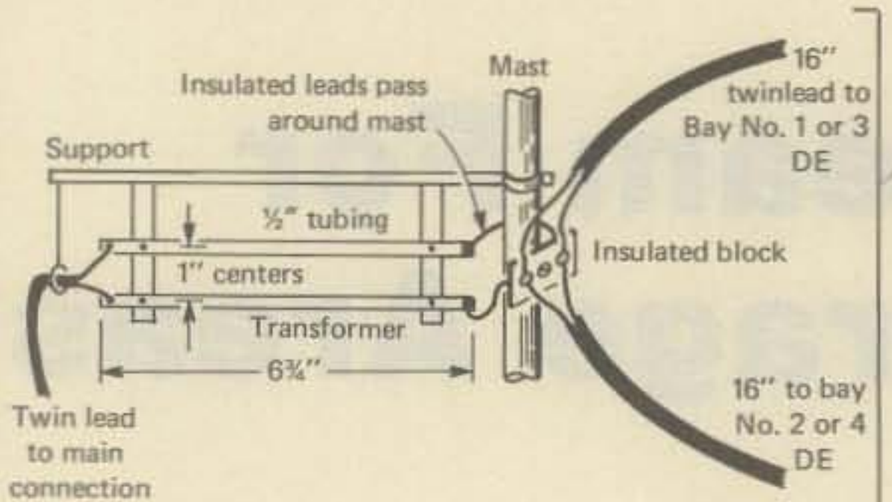


Fig. 2- A simple matching device for use on 2 meters.

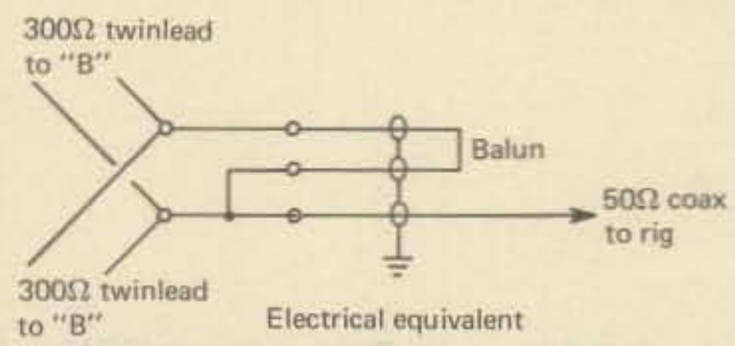
*36 Lake Ave., Fair Haven, N.J. 07701

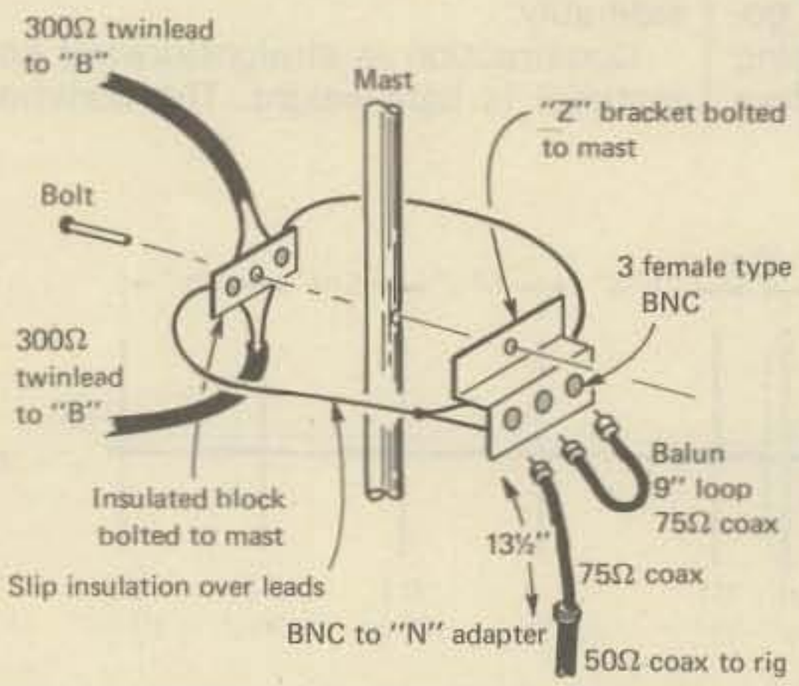


DETAIL A — THRUST BEARINGS (2 REQUIRED)

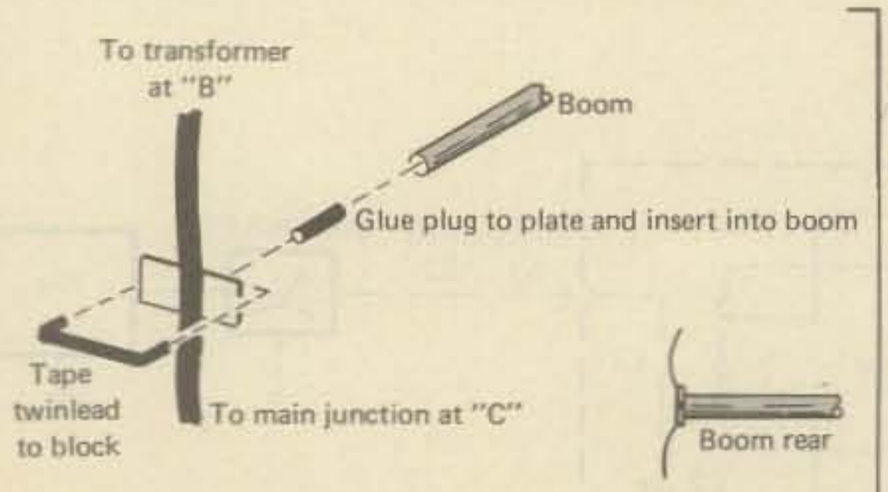


DETAIL "B" JUNCTION AND TRANSFORMER (2 REQUIRED)





DETAIL "C" MAIN JUNCTION CENTERED BETWEEN BOOMS 2 AND 3



DETAIL "D" PLASTIC PLUG ASSEMBLY AND HARNESS FASTENING AT REAR OF BOOMS 2 AND 3

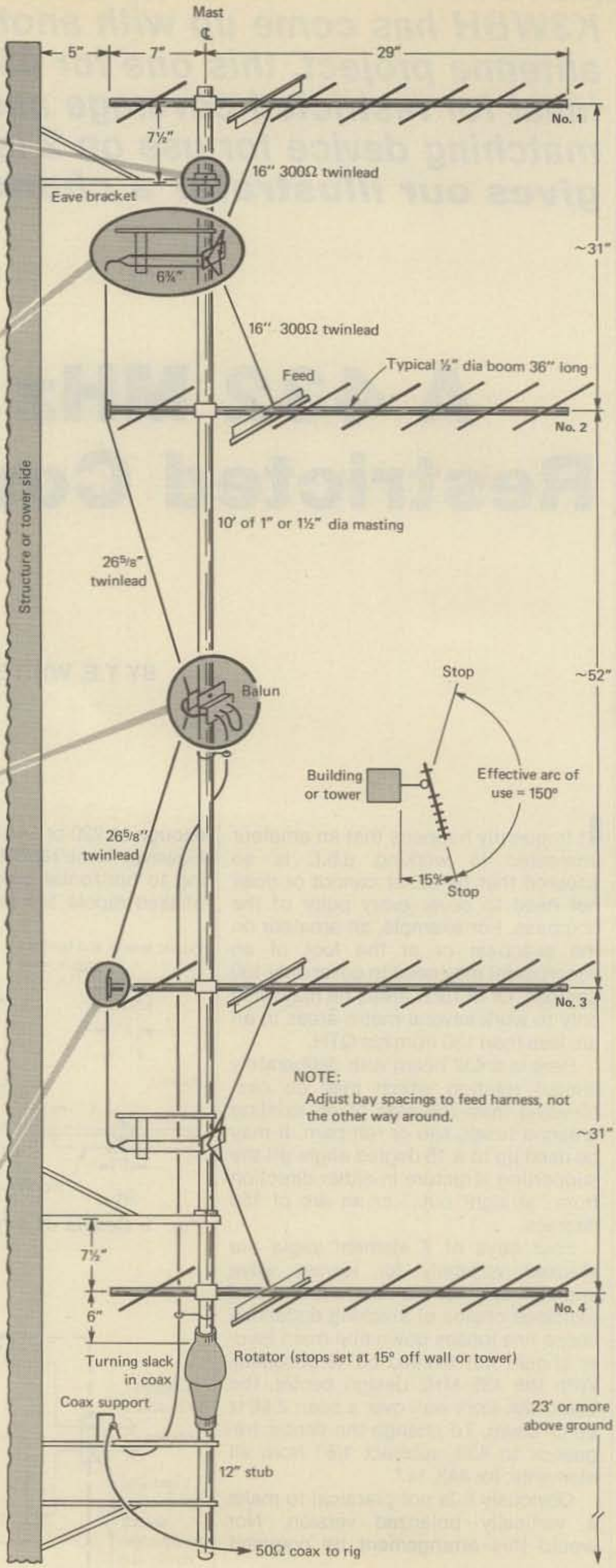


Fig. 3- Complete details for the 4 bay stacked 432 MHZ antenna.

type of TV eave bracket (the 3-legged kind, used upside down) supports the array. A rotator may be modified with limit switches, or an armstrong turning system devised.

To ensure a "free flow" of power, simple tubular matching transformers are placed at the points where each pair of bays is fed. From there the feed is paralleled to the main junction, where a balun and section of 75 ohm coax are used to match a 50 ohm line to the rig. This latter should be no longer than absolutely necessary to reach the shack. If it is more than 50', an in-line booster amp with an r.f. sensing circuit to bypass it during transmission should be inserted midway.

The DE's are folded dipoles ratioed for the proper impedance, so no individual bay matching is needed. A paper gain of 17 dB is indicated for this array, and in practice a power multiple of 32 over a dipole (10 w becomes 320 effective radiated power) will be obtained.

The dipoles and directors are out ahead of the supports and the feeders lead well to the rear, to preserve a clean pattern. The beam should not be aimed closer than 15 degrees in to the supporting structure, as pattern distortion and loss of gain will result.

The author has had several requests for a 2 meter matcher-balun, in order to use the balanced feed line called for in most of his antennas with common 50 ohm unbalanced rigs. Fig. 2 shows one which will do the job nicely. ▣

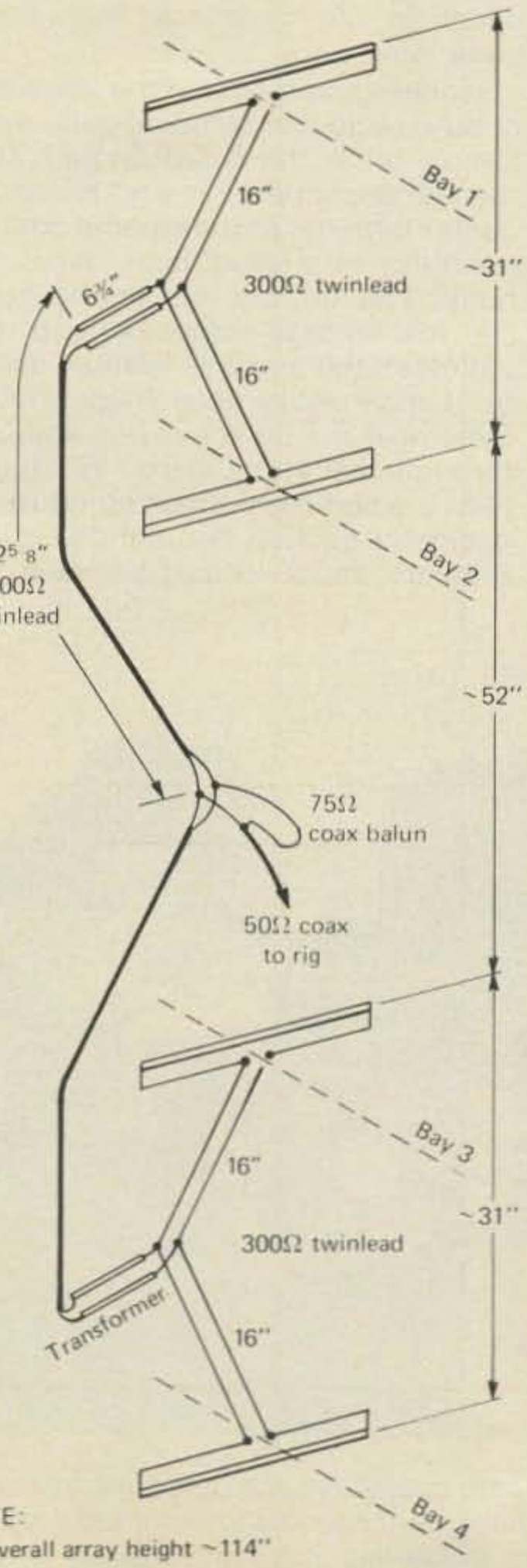


Fig. 4- Feeding the stacked array.

No -29-30

This month CQ begins a two-part course in transistor troubleshooting and replacement.

12 Steps In Transistor Replacement

Part I

BY HOMER L. DAVIDSON*

Transistor replacement is just as important as rising each morning to go to school or work. There are certain things you must do each morning to make yourself presentable, efficient and have a good day. The same applies to removing and replacing a defective transistor. You must do things methodically, just and correct or the unit will not perform. In this article we show you how to remove, test and replace the defective transistor in minutes.

Step Number 1 - The Beginning

Before the defective transistor can be replaced, we must locate the correct one. It's best not to dig into the chassis before we know where we are going. The defective transistor may be located with logic, reasoning, correct test equipment and a schematic diagram (Photo 1). After isolating the defective transistor we must remove and test it out of the circuit. Now, before replacement, we must obtain the original or a universal replacement. When replacing, extra care must be exercised in locating the correct terminal holes and soldering. So let's get started.

Step Number 2 -Isolating The Defective Transistor

It doesn't matter if the unit is a TV, radio, auto radio, stereo 8 player or cassette player. A schematic diagram is a must in transistor replacement. Today, most manufacturers enclose a schematic with the operation literature. For transistor replacement in the TV chassis, the schematic of the correct chassis may be seen in *Sams Photofacts* and the Tab *TV Book Series* (Photo 2). If not, try to secure one from the manufacturer.

To locate the defective transistor, we must isolate in what stage or section the transistor may be found. For instance, in a TV receiver, if the symptoms are no sound - but a good picture, we know all stages are functioning except the sound section. When the symptoms are good sound - a raster and no picture, the trouble lies in the video stages. Why the video stages? Because the sound taps off at the first video stage. If the TV chassis has no sound or raster, we may assume the trouble is in the low voltage or horizontal output stages. Since eighty percent of TV problems occur in the horizontal output circuits, start here.

Isolating problems in the transistor or auto radio can be made quite easy. Simply break the circuit in half. Turn the volume wide open and touch the center terminal of the volume control, resulting in a loud hum. What, no hum? The trouble lies in the audio and low voltage stages. A loud hum indicates the audio is normal, so the front end must be dead. Place another radio near the defective one and tune through the entire band. When you hear a whistling noise, you know the oscillator section is functioning. The problem must occur between the

Photo 1 - Before the unit can be placed into operation, the defective transistor must be located, removed, tested, a replacement found and installed properly. Here, we find an electronic technician soldering in a transistor of a radio chassis.

*2821 5th Avenue S., Fort Dodge IA 50501

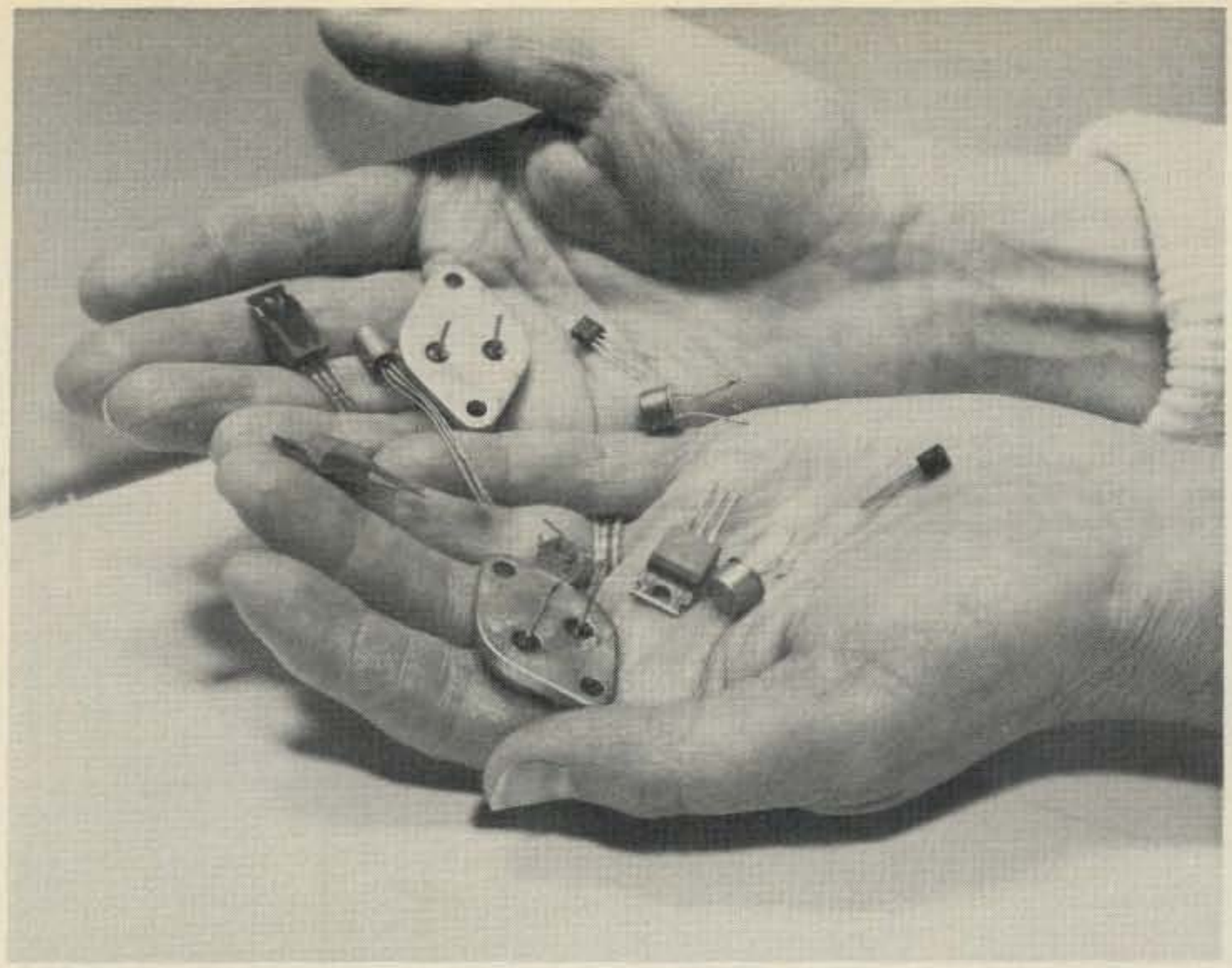


Photo 2 - In the consumer electronic products, transistors come in all sizes and shapes.

oscillator and audio stages.

In an AM-FM MPX stero compact player, a dead unit may be caused in the power supply or amplifier sections. When the AM stations are normal and no FM, check the FM stages or vice-versa. If the radio and stereo 8 player performs with a dead or weak record player, check the phono cartridge. When the stereo 8 and cassette player will play correctly, but not record, go directly to the recording circuits as the amplifier circuits are used in both play and record functions.

First, we must isolate the probable symptom on the schematic and then proceed to the suspected stage. You

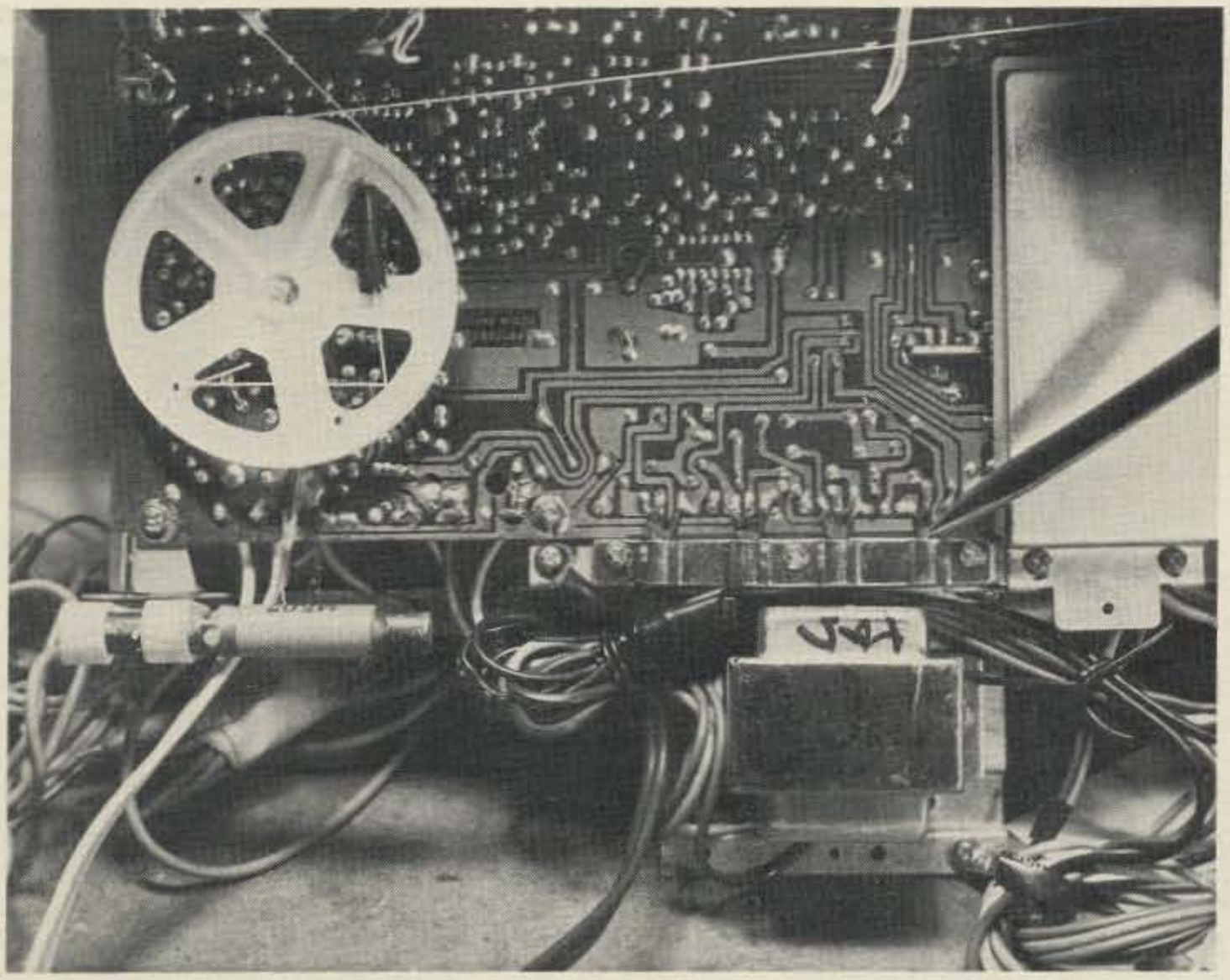


Photo 3 - In audio stereo components you can compare the voltage of the good channel with the defective one to locate the defective transistor. The pencil points at one defective audio push-pull output transistor under the metal heat sink.

may locate the defective transistor with a v.o.m., v.t.v.m. or d.v.m. meter. The defective transistor may be located with an incircuit transistor tester. You may want to use signal tracing methods to help locate the defective transistor or a combination of all three methods.

Step Number 3 -Locating the Defective Transistor With A V.T.V.M. Or D.V.M.

A defective transistor may be located with the v.t.v.m. or d.v.m. You may locate the defective transistor with a v.o.m. but since the v.o.m. may load down the circuits and with very low voltages to be measured, it's best to use a more accurate voltmeter. Voltage measurements may be taken from transistor terminals to common ground or bias voltage measurements.

Measure the voltage between base and emitter terminals. Correct bias voltage will indicate the transistor is good. Although, the applied voltage may be either positive or negative, you will find the base terminal is more positive with respect to the emitter terminal. If the voltage measured across the two terminals is close to .6 volts, you know the transistor is functioning and is a silicon type. A voltage measurement of .3 volts, between the base and emitter terminals, indicates the transistor is normal and is a germanium type. No bias voltage indicates an open transistor. Real low bias voltage may indicate a leaky or shorted transistor.

Always use a schematic when measuring voltage from transistor terminals to common ground. A higher than normal collector voltage may indicate an open transistor. Also, no emitter voltage indicates an open transistor. Lower than normal collector voltage may turn up a leaky transistor. Very close and lower voltages on all terminals, may indicate a leaky transistor. Obviously, in some directly-coupled (d.c.) circuits this close-near-normal voltage on all terminals may not be entirely true (Photo 3).

The collector voltage of an NPN transistor (silicon type) is higher than the base and emitter terminals. This voltage is always positive. A germanium type transistor (PNP) has a higher negative collector voltage than the other terminals. Right away, you may determine if the transistor is defective with voltage measurement and know what type of transistor is in the circuit (NPN or PNP). Today, most circuits in the consumer electronic field, employ NPN transistors. In the

earlier units, you may find PNP germanium type transistors.

Step Number 4 - Locating Defective Transistors With Signal Tracing

You may quickly isolate a defective stage or section with signal tracing methods. The r.f. signal generator may be used in servicing the front end of a TV or in radio circuits. A signal from the audio generator may be injected in the sound stages to locate a dead or weak audio circuit. The pencil-type noise generator may be injected from stage to stage in the radio circuits to locate the defective section. Also, you may find a separate amplifier or audio analyzer very helpful in locating a defective audio stage (Photo 4). The scope is a *must* test instrument in TV servicing and for locating distorted audio stages. Sometimes, signal tracing the intermittent chassis, with any test instrument, besides the scope, may cause the defective transistor to "pop" on.

To locate a defective stage in the radio chassis, break the r.f. and audio circuits in half at the volume control. You may hear a loud hum when touching a metal screw driver blade at the center terminal of the volume control, indicating the audio circuits are normal. A low hum noise indicate weak audio circuits. If the audio channels are normal, proceed to the r.f. circuits.

Inject a 455 KHz signal at the base of each i.f. transistor to locate a possible defective stage in the a.m. radio. Use a 10.7 MHz signal from the r.f. generator and inject in each base terminal of the FM i.f. stages. If the speaker is used as signal indicators, the r.f. signal will increase as you proceed from the 3rd and 4th i.f. amp towards the converter stage. The r.f. stages may be checked with signal injection at the base terminal of the converter, mixer and r.f. stages. You may want to check the i.f. receiver alignment as you proceed from the base of the converter stage. A pencil-type noise generator is effective in locating weak or dead stages up to the converter transistor.

An r.f. signal generator and tuner-sub instrument may be used to isolate a defective stage in the TV chassis. Use the TV screen or scope as indicator. Now, a tuner-sub generator not only checks the condition of the TV tuner, but may signal trace the i.f. stages up to the video section. Simply inject the tuner-sub signal to the base of each i.f. stage. When the signal appears you have located the defective stage.

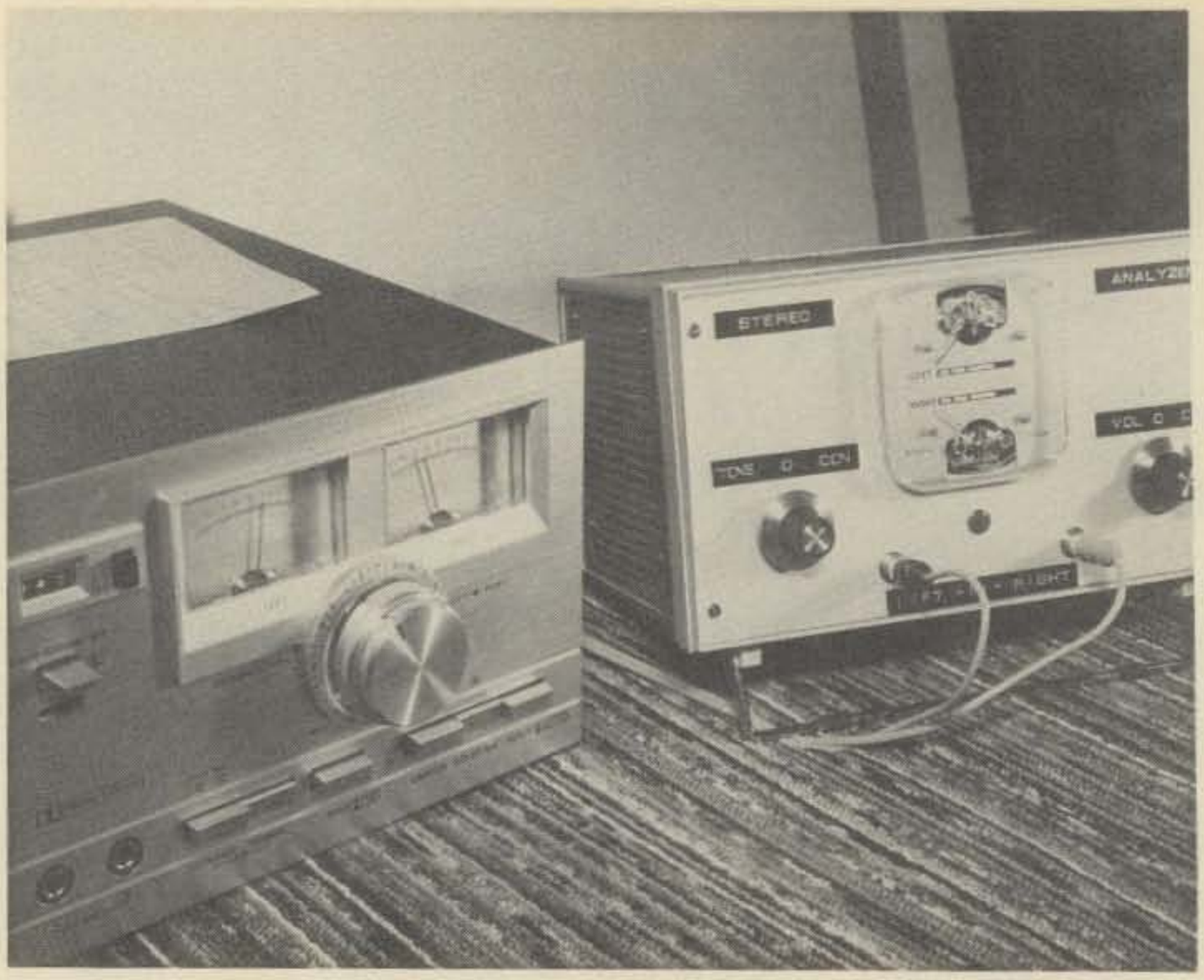


Photo 4 - Besides regular test equipment a stereo or separate amplifier may be used to locate a defective audio transistor stage.

The audio stages may be checked with an audio signal and noise generator. Start at the volume control, then go to the base of each audio transistor. When the signal appears, you are close to the defective stage. If no signal is noted at the base or collector of the audio driver stage, suspect problems in the audio output circuits. A weak and distorted stage may be signal traced with the audio signal generator and scope. A separate audio amplifier or analyzer may be used as indicator to locate a defective stage with the radio station or with a TV channel tuned in.

The scope may quickly locate a defective transistor in the TV chassis. Simply follow the correct waveforms upon the schematic. The i.f. and video stages may be signal traced with a demodulator probe attached to the scope input with a tuned-in local station. Waveforms in the vertical and horizontal sections are easily followed with the scope.

Step Number 5 - Locating The Defective Transistor With The In-circuit Transistor Tester And Other Means

Simply connect the small clips of the in-circuit tester to each transistor terminal of the suspected transistor. Most in-circuit transistor testers will accurately check the open condition of a transistor. But, only a few are accurate in leakage tests. Then, the transistor should be removed from the circuit for correct leakage tests.

You may find the transistor leads are too short and cannot be clipped to the transistor tester. Turn the chassis over and solder a short piece of hookup wire to each transistor terminal. Now, you can effectively clip to the suspected transistor. Double check each terminal lead and make sure they connect to the correct terminals. .Sometimes when the in-circuit transistor is connected to the suspected transistor, it may shock the transistor into operation. When this occurs, always replace the suspected transistor.

Cold or hot treatment of the suspected transistor may "pop" the transistor into operation. Especially under intermittent conditions, a few coats of cold spray may turn the intermittent transistor on. If the unit is intermittent when its's first turned on, several coats of cold spray should be applied. You may find a can of cold spray is most effective under intermittent transistor conditions.

If the unit plays for several hours before becoming intermittent, a hot treatment from a special heat sprayer or hair dryer may speed up the intermittent condition (Photo 5). The hot air nozzle should be applied right over

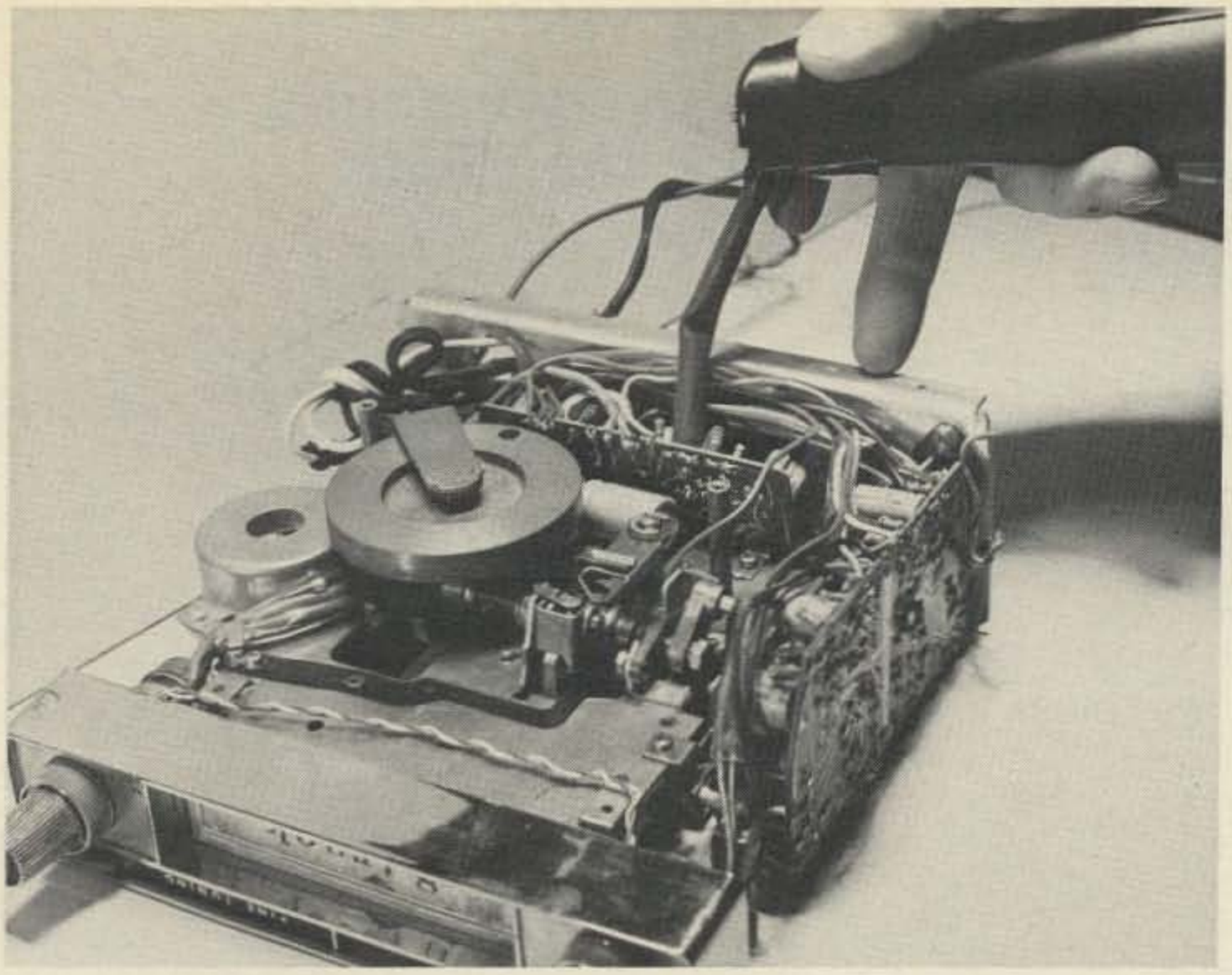


Photo 5 - Here heat is applied to the top of a transistor to make it act up in an intermittent auto radio chassis.

the body of the suspected transistor. If in doubt, you may give the suspected transistor several coats of cold spray and heat to get it to act up. A lot of intermittent transistors are located with a cold or hot treatment to show up poor internal-bonded transistor connections.

When required, test instruments are not available, and the suspected transistor is logically located you may replace the transistor with a new one. This method is like replacing a new tube to locate the defective one. Although this method may take longer, sometimes it's the only solution to locating an intermittent transistor. Be careful not to damage a good transistor with too much heat from the soldering iron. Only use the replacement method when correct test instruments are not obtainable and all other locating methods have failed.

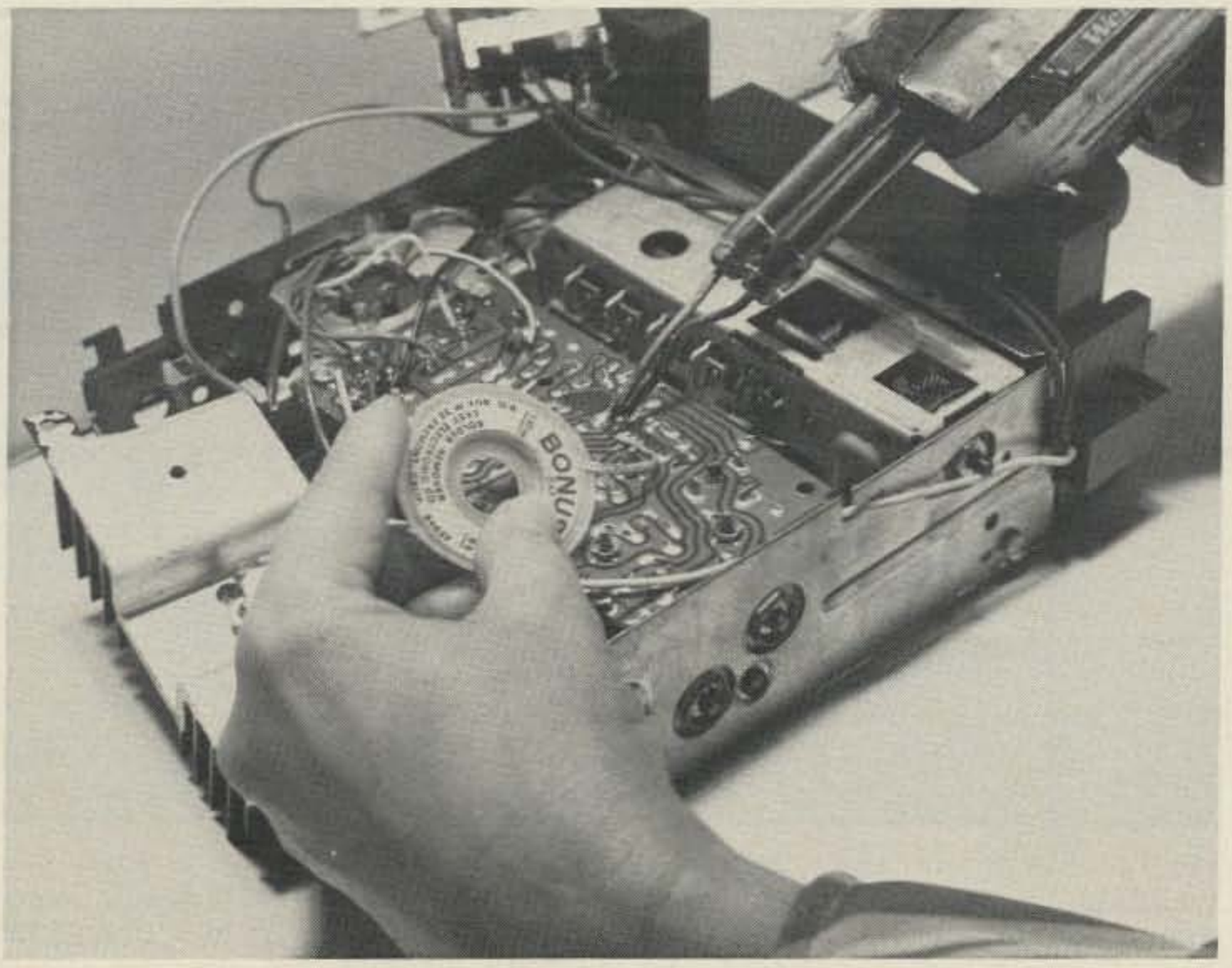


Photo 6 - Excessive solder may be removed from the transistor terminal with solder-wik. Simply apply the gun tip to the braided material and the excess solder is sucked and picked up.

Step Number 6 -Removing The Suspected Transistor

Before removing the suspected transistor check the position of the transistor and mark each terminal. If the terminal leads are marked on either side of the p.c. board, transistor replacement is easy. But when the terminals are not marked, do not take for granted the transistor elements will fall in the correct hole. In some Japanese chassis you may have to mark each terminal by tracing the components tied to the circuitry.

Here's where the schematic comes in handy. For instance, locate the emitter bias resistor to ground and mark it with and (E). Locate components which tie to the base terminal and mark with a (B). The remaining terminal has to be the collector terminal (C). Draw a picture, if you have to, of the transistor position and terminal leads. This should be done from the top view of the chassis. Some schematics may have a separate drawing of each transistor with correct terminal leads. Remove the suspected transistor after the correct transistor terminals are found and marked. There are several tools designed to suck up the solder for easy transistor removal. One of the best and least expensive items is called *Solder-wik* (Photo 6). It's nothing more than a stranded braided wire saturated with rosin paste. You may find the same product comes under various names. It does a good job of removing excess solder from component terminals. Simply place the braided material over the soldered area and apply the tip of the soldering iron. Right away the solder is sucked up into the braided area. Be careful, not to dislodge other soldered components to these same connections.

Large audio and output transistors are easily removed by two bolts or screws in each corner. Check for a piece of insulation between transistor and heat sink. Some transistors are bonded directly to the heat sink and others are insulated with a piece of plastic or mica insulation. In some instances you may have to unsolder the emitter and base terminals soldered to the p.c. wiring. Some of the large transistors plug into a position with two metal screws. Be real careful not to damage the transistor during removal, or other components close by.

(to be continued)

Held in the City of Brotherly Love, The YLRL's 40th Anniversary Convention was such an overwhelming success that they are already planning their 50th Anniversary Convention!

8th International YLRL Convention

By LOUISA B. SANDO*, W5RZJ

June 29 through July 4, 1979, Independence Week in Philadelphia, the City of Brotherly Love—what better time or place for members of the Young Ladies Radio League to convene to celebrate YLRL's 40th Anniversary! And what a birthday party it was, with 115 YLs from all over the U.S. and from Canada, England, Germany, Luxembourg, and Japan.

Many YLs arrived on June 28 to spend Friday touring the historic sites of Philadelphia—Independence Hall, where the Declaration of Independence was signed over 200 years ago, the famous Liberty Bell, Betsy Ross Flag House, and many more.

Registration, beginning mid-afternoon Friday, included a sack of "goodies" which were soon augmented by dozens of swap items. "Swaps" have become a traditional part of YLRL conventions. Necessarily small, they are as varied as a YL's imagination or the region of her QTH. On this occasion they ranged from lapel pins to tiny scales (W7NJS), baby dolls (one-inch jobs from who else but W6Baby Doll Esther!), and vials of real maple syrup (WA1WQM).

Friday evening the Penn-Jersey YL Club hosted an Open House in the Hospitality Room. Some decided instead to take in the Independence Week Mummers Parade, a customary event of the city traditionally staged on New Year's.

Saturday, June 30, found the convention in full swing, opening with a welcome by WB2YBA, Christine Haycock, Convention Chairwoman and ex-president of YLRL (1975). It was her comment at the '76 Houston convention that we might be able to hold the 40th Anniversary one on the East Coast that led to the selection of Philadelphia. Ethel, K4LMB (ex-W7FWB, first president, '39-'40) told about the beginning of YLRL, declaring that if she were to be considered the *founder* of YLRL, then W1CBD, Clint DeSoto, should be considered the *father* of YLRL. It was his lace-trimmed ad in QST for May '39, to which Ethel responded asking the YLs

Past presidents of YLRL gather at the convention banquet. L. to r., back: WA4BVD, Carrie (1973); WB2JCE, Jan (1971); K5BNQ, Doris (1961); K1IZT, Blanche (1964); WA6ISY, Myrtle (1976); W6OSL (W3OLY), Helen (1949-50); WB2YBA, Christine (1975). Front: W1ZEN, Onie (1962); W3CDQ, Liz (1944-45); W7NJS-KH6GDS, Beth (1958); W6QYL, Martha (1965); WA7FGG, Beth (1977); WA8EBS, Eila (1974, 1978); K4LMB (W7FWB) (1939-40). W3CDQ has been hamming for 57 years and began in radio in 1917 with a commercial ticket. WB2YBA photo.

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W2GLB, Phyllis, 1979 YLRL President (l) with W3WRE, Louise, guest speaker at the banquet.

JA1AEQ, Fumi, and JF1WMY, Toshiko, enjoy the banquet. Fumi, president of JRLS, was the second YL to be licensed in Japan.

LX1TL, Lea, brought greetings from the YLs in Luxembourg. WB2YBA photo.

to stand up and be counted, that led the nucleus of 13 YLs to organize the League.

Amy, WA2QYZ, chaired a series of short talks by this correspondent, W5RZJ, and by Eila, WA8ERS (president '78); Eleanor, W3BIW; and DX member Valerie, G4BML. Other DX YLs introduced were Ella, DK9ZL; Lea, LX1TL; Fumi, JA1AEQ; Toshiko, JF1WMY; and Jerri, 3DAG, S8AYL. Lia, WA2NFY, formerly from Switzerland, assisted Ella, while Madeline, W2EEO, who had visited the Japanese YLs, helped with their messages of greeting. Fumi is president of JLRS. Her OM and daughters are all licensed hams. Lea has the largest ham family in Luxembourg, with four licensees. Formation of the newest YL club was announced—SALARC, Second Area Ladies Amateur Radio Club.

Christine broached the possibility of another supplement to "CQ YL" to include this convention and an update of YLRL officers. The YLs promptly responded with donations, which by the end of the convention reached $241 for the project. (Hopefully, copies will be ready by December '79.)

To remind us of the technical aspects of hamming, Art Greenberg, W2LH, and Madeline gave a presentation of the easiest ways to put up antennas.

Presiding over the luncheon program was Sylvia, W3SLF, Convention Co-chairwoman and president of Penn-Jersey YLs. Rose Ellen, N2RE, gave the invocation, followed by introductions by Christine. Each table was decorated with a wire globe filled with flowers, and seated on top of it was a colorfully attired doll—our YLRL "girl-on-the-globe" emblem. Many prizes were drawn following the luncheon.

Phyllis, W2GLB, 1979 YLRL president, presided over the YL Forum. Eila, WA8ERS, announced that YLRL had finally been able to obtain the educational, scientific, charitable rating, which will be very beneficial. Ethel, K4LMB, declared that YLRL will enthusiastically pursue its scholarship program with any and all donations gratefully accepted. With YLRL's ESC rating, such donations are deductable when filing income tax returns. Checks should be sent to the Disbursing Treasurer, Sandra Heyn, WA6WZN, and marked for the scholarship fund. Currently the program is handled by the Washington Foundation of Scholarships. (N7IT, Liz Riemer, was the recipient of the $300 award for 1978.) It is hoped the fund can be built up so that it will become self-sustaining.

A total membership of over 1400 was confirmed by Carrie, WA4BVD, Receiving Treasurer ('73 president and 4-time editor of *YL Harmonics*). A far cry from tne original 13 members! As several speakers commented of YLRL, "You've come a long way, baby!"

K1WLX, Andrea, president of YLSSB, was introduced. Originally a YL net/club, it was opened to the OMs who now represent the largest membership.

A discussion of when another large YLRL Directory should be published led to the appointment of K1IZT, Blanche (president in '64 and '80), as the chairwoman for the project, and a target date was set for *Harmonics* issue No. 4 in 1980.

Martha, W6QYL (president '65), surprised us with the suggestion of producing a directory of YLs throughout the world. She volunteered to serve as collection agent for the directory. Send info to Martha Edwards, W6QYL, P.O. Box 716, Twenty-nine Palms, CA 92277. This is for *all* licensed YLs, not only YLRL members, and will be published entirely separate from the YLRL Directory.

Christine invited suggestions for the next conventions, keeping in mind that YLRL's 50th anniversary is only ten years down the line. It was overwhelmingly agreed that the next conventions be on a 3, 3, and 4 year schedule—1982, 1985, and 1989. Of course, no decision could be made as to locations, but the hope was expressed that the 1982 convention might be held in the Northwest. So how about it 7-land YLs? It seems the Seattle area would be an excellent location for facilities and provide an opportunity for many to combine the convention with a family vacation in the beautiful U.S. Northwest and Canada.

MC for the YL/OM Banquet was Christine. Guests of honor were Councilman and Mrs. Melvin Greenberg. The Councilman read a Resolution adopted by the City of Philadelphia on May 3, 1979 congratulating YLRL on its 40th anniversary of serving the public and welcoming members to the city. The City of Philadelphia also had issued a proclamation designating the week of June 24 as Young Ladies Radio League Week. Another proclamation, signed by Governor Dick Thornburgh, also designated the week of June 24 as Young Ladies Amateur Radio Week and noted Pennsylvania was honored to be the host state for YLRL's 40th Anniversary.

Guest speaker was Louise Moreau, W3WRE. She traced the activities of YLs from the very first one, in 1909, Lillian Todd. She stated that the Radio Amateurs Handbook for 1926 listed "YL" for Young Lady, and she went even further back to 1853 at which time "73" meant "my love to you."

Many more prizes were drawn, including $50 (won by LX1TL) and $25 (won by W6HHD) donated by MINOW.

G4BLM, Valerie, spoke to the group Saturday morning. WB2YBA photo.

Other prizes included one of WRONE's familiar silver bowls, several afghans, jewelry, digital clocks, needlepoint, macrame, books, scarfs, pocketbooks, ceramics, shawls, etc. A number of gifts came from ZL, VK, Germany and Japan. Every YL attending received at least one prize. There also were prizes for the OMs. Top prizes for the raffle were a 24-hour clock and a food processor.

Convention activities continued through Sunday morning with a breakfast at 9 a.m., a talk by Beth, W7NJS (president '58), on getting a ham license with a handicap, and a speech by guest speaker Beverly Williams on how she became news anchorwoman on KYW-TV. Liz, W3CDQ (president '44-'45), told of YLs she has met through travel and ham radio, and Claire, W6TDN, displayed and described her bell collection, many of unusual design from throughout the world.

The convention station, W3YL, was in operation throughout the weekend. Actually, it is the call of Sandy Rutiser who allowed its use for the special occasion. Equipment was furnished by Jan, WB2JCE, and Mollie, K3FYS.

In addition to Christine, WB2YBA, and Sylvia, W3SLF, convention committee members included Jan, WB2-JCE, recording secretary; Dorothy, K3YPH, treasurer; Ruth, WA2RIX, prize chairwoman (with W3SLF); Rose Ellen, N2RE, program coordinator; Edith, W3AAU, luncheon and banquet chairwoman. Others serving included Bert, W3TNP; Edna, WA3NGV; Carolyn, W3GTC; Mollie, K3FYS; Amy, WA2-QYZ; and Jane, K3ZDN.

Thanks to you, Dr. Christine, WB2YBA, from all of us for a most interesting and timely site selection, and to you and all the other hard working YLs for a super convention! 73

DK9ZL, Ella; (center) presents WB2YBA, Christine, Convention Chairwoman (right), with a banner from the German YLs, while WA2NFY, Lia, assists in translating. W2BM photo.

a monthly feature by

ADRIAN WEISS, K8EEG

QRP

The art of very low power operating

Well, the mailbag is once again stuffed with a good collection of interesting reports from our readers. And I'm really pleased with the response to my request for such material earlier this year. We even have some pictures this month! First off, we'll get into the reports.

de...**WB2JII**, Mario Filippi, 651 Boulevard W., Pelham, NY 10803: "I was just reading your column in March, 1979 *CQ*. It's nice to have you back in the country, and I'm glad to hear your stay in England was pleasant. I haven't written to you in over a year, and I'd like to tell you how I've been doing with QRP. I have an Argonaut 509, Drake MN4 matching network, and a HyGain 18AVT vertical up about 40ft on top of an apartment house. I only have 3 radials for it. So, as you can see, it is not a very elaborate setup. However, it is elaborate enough to have worked 18 states and 15 countries. Many of these states and countries have been worked several times. For example, I have worked CA at least 5 times with s.s.b. and c.w. Have worked Germany and Italy at least four times each on both modes. I'd like you to know that I am now 100% QRPp. Several months ago, I moved to an apartment building. In order to keep "indians" out of my neighbors' TV sets, I have resorted to QRPp-only operation. I do not run more than two watts output on any contact. That doesn't stop me, however. As a matter of fact, I have not noticed any difference in operating QRP vs QRO, except that maybe my electric bill is higher! The contacts are coming just as easily with QRP as with QRO. I have also run QRP/mobile on occasion. I have worked AZ, NEV , and Montserrat with 2 watt s.s.b. while mobile. The antenna was a Hustler whip. Not much power and equipment, but it still gets out. In regard to DX, I've worked the following prefixes: DL, VE, EI, KV4, VP2, PY, I, 8P6, YU, IS, SM, G, GM, YV, and finally, the other night I snagged my first JA while on 10 meters. What helped me in that contact was signing/QRP after my call letters. That was with 1 watt c.w., and believe me, there were a lot of other hams calling him also. It just takes patience. If you don't have patience, buy a linear and beam—unfortunately, too many hams are going this route. Before I close, I'd just like to mention my most memorable contact. That was last summer, while on a weekend vacation. I was working my 509 with the Hustler mobile antenna from the trunk of my car. I hear a W7 calling CQ on 15 meters. I called him, and he answered! I received a 559 report (not bad, considering the equipment) from Death Valley, NEV. The funny thing was that I could never work NEV before, even when I had my QRO (120 watts) rig! I have enclosed a picture of my station. You notice the linear—well, I bought the thing three months ago, and have used it twice. So there was only one thing to do—I sold it! I have no use for it. Keep up the good work. 73's"

de...**G5CSU**, Richard H. Arland, PSC Box 1454, APO NY 09127: "Just to let you know that QRP is still alive and well here in England, I decided to drop you a line. In the January, 1979, issue of *CQ*, I noted with interest that you were back from England and writing again for the magazine. Sure is good to know you're back in the saddle again. It has been quite a while since I've written. Last time was back in '77 about the visit to MFJ in MS. I am now stationed at RAF Mildenhall, Suffolk

Here is a shot of WB2JII's neat QRPp station. Atop the Argonaut are a straight-key for c.w., a mike and MFJ speech processor for s.s.b., and the shack mascot. The Drake MN4 matchbox is topped by the TenTec power supply and 405 linear. A couple of CQ bumper stickers are on the back wall. The console should be of interest to those of you with problems with a decor-minded XYL who objects to "all that radio junk in my living room." The complete station is located inside a wooden cabinet, and the front panel of the cabinet is lowered to form a desk top when operating, closed to simulate furniture when not operating. Slick!!

**83 Suburban Estates, Vermillion SD 57069*

W2JEK was also faced with the space and decor problem, and his solution is shown here. Some carpentry was involved. The desk top is cut from plywood stock, and the legs are "ready-made" types available at many building supply houses. A shelf about five inches high and deep enough to accommodate the HW-8 were added, and molding run around all exposed edges, with a stain and varnish job completing the setup. Very neat and just the right size for the space and gear. Located in an apartment, Don has managed to work 22 countries and 15 states with the setup.

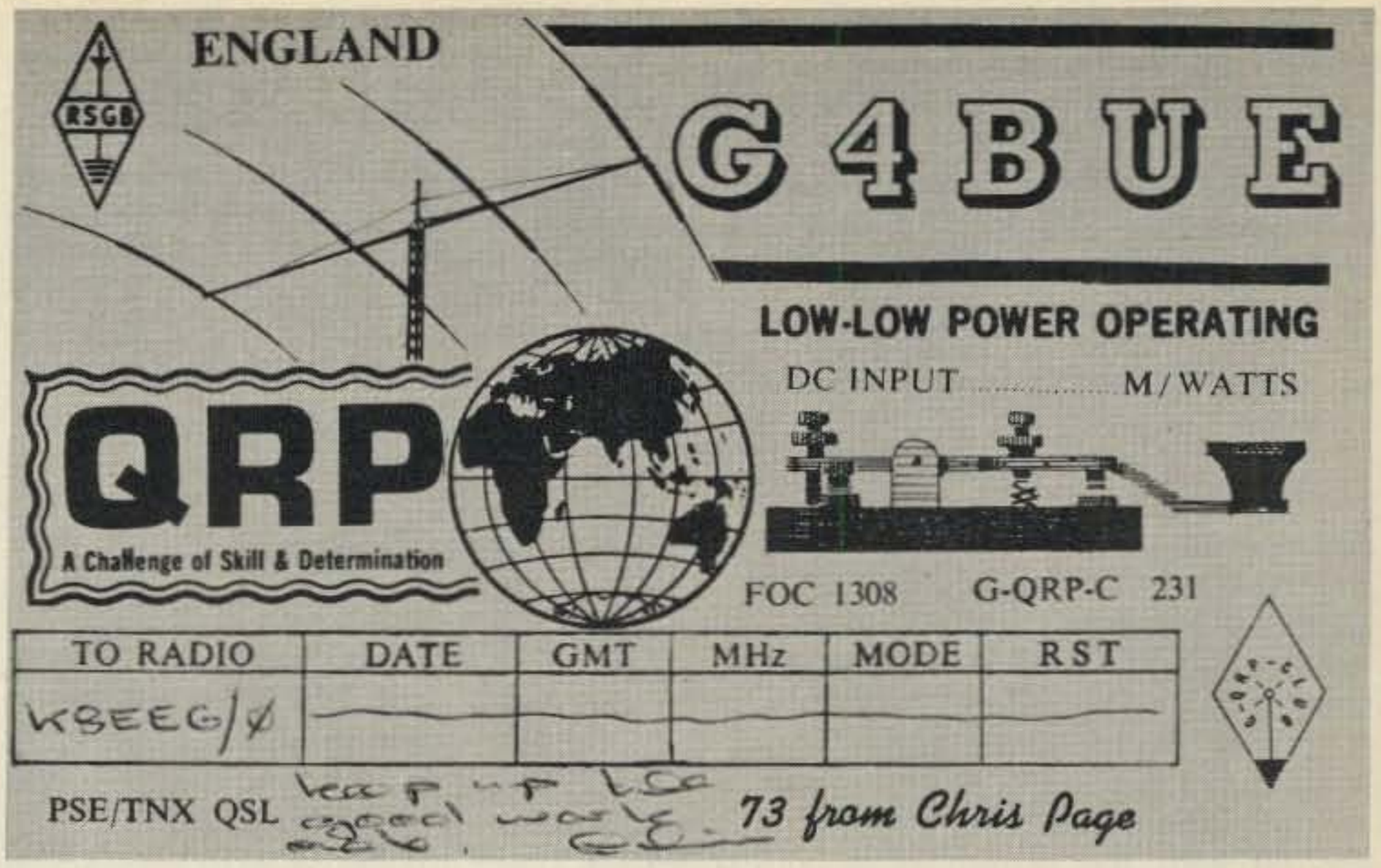
county. Currently I'm living in Bury St. Edmunds and commuting 30 miles per day to and from work. Haven't received the household goods shipment with all my radio gear yet, but as soon as I do I'll have the PM2-B on the air over here. My recip-call is G5CSU. I already have the long wire antenna up but am thinking about obtaining a "Joy Stick" antenna and tuner. You might comment about this combo as I have never had any experience with it. *(ED: sorry, neither have I.)* I was able to get ahold of a TenTec AC-5 tuner while on leave. All I need now is that AC-4 s.w.r. meter to complete the TenTec station. If you know of anyone who has an AC-4 for sale at reasonable cost, pass along my name. It sure will be good to get back on the air QRP style after a lay-off in Japan. QRP operation was exceptionally frustrating while in Japan due to a lot of 'little things' that mounted up to a whole lot of frustration. Had a lot of SW BCI on 40. The JA stations seem to be ignorant of the fact that I, as a "KA," could not talk to them. They would call and call me, making reception of DX stations very difficult. 20 meters fared a little better. Tried several different antenna systems at the Yokota QTH but was unable to achieve much success. All in all, I worked over 20 countries, but that was over a two-year period and with little enthusiasm behind the effort. The aforementioned obstacles, coupled with a lot of 'adverse politicking' involving the local military amateurs (AMRS) and the formation of the usual 'clicks' which seem to evolve within the different political circles did nothing but turn me off, literally and figuratively. It is with great enthusiasm that I'm looking forward to getting on the air from the U.K. Thank God there is not AMRS over here. That's all for now. Good luck with future articles."

de...**N0AKJ**, John Sweitzer, 5555 Baltimore Ct., Denver, CO 80239: "Just a note to let you know that QRP is still going strong out here. I've been using low power here in Denver and having a ball! I'm working with less than one watt and all s.s.b. At the present time I have 42 states and 18 countries worked using a dipole antenna. Next summer, I plan on putting up a large quad, and then I will be devoting an all-out effort for the 1 watt *DXCC MILLIWATT* trophy, all s.s.b. "Can't wait!!" Also, I've been experimenting with extremely low power, such as making a trans-state contact with 1 milliwatt. It has a nice ring to it. That's it for now. Will let you know when I complete my one watt s.s.b. WAS. 73's"

de...**K2JF**, John M. Fisher, 538 Wesley Ave., Pitnam, NJ 08071: "I'm an 'ole-timer' and I have paid my dues in most of the various ham activities. But, this QRPp/mobile business is about the best thing yet. I have only been QRP for about a year running 8 watts PEP on 10 meters using a con-

verted RCA 40 channel CB set and a top-loaded ¼ wave antenna mounted on the car trunk. So far, I have worked 64 countries/32 confirmed!! I am attempting to do WAS on 10 meters with this QRP rig and it is rather difficult to get the W1, W2, W4, W8, and W9 areas, as the skip just jumps over them. At this writing, I need MS and NEV to finish my western area states. I figure that hams in MS must be "crawdah" fishing and the bunch in NEV hocked their rigs to play the tables at Las Vegas. A request from the East coast QRP gang: try to hear us 'lil fellows' with those 3 and 6 element beams. You can give a listen and help us try for QRP WAS on 10 meters!! One other request I would like to make to QRO stations in a pile-up on DX stations. Can you give us QRP fellows 5 minutes out of the hour to get thru? Say, like 2.5 minutes at the hour, and 2.5 minutes at the half-hour, and after that, you Big Guns can go at it. What say? Finally, I'd like to point out that there are two things about 10 meter QRP activity that make it fun: 1) it *is* a lot of fun; and 2) The QRP power level helps make it fun, as I get very little or no TVI at all when I hook-up my QRP rig to my HQ-1 miniquad at home. That's it. Hope to hear more QRP activity on 10!"

de...**WD4LMJ**, David Tucker, 2144 Whiting Rd., Birmingham, ALA 35216: "I've been following your QRPp section in *CQ* for the past year or so and I got really interested in QRPp operation and decided to give it a try. So far I've had a great time and enjoyed every QSO. Saturday, Dec. 16th, I purchased an HW-8 from a guy who didn't really get the goodies out of it! He had only made one contact in two months and was getting very disgusted. So, for $80 I picked it up including the power supply and started out. At 2155UTC I made my first contact with a gent in WIS. From that time on, the QSO's kept piling up, so in about two days of operation, I've made 13 contacts—12 in the U.S., and one VE with a 599! Fortunately, each of these contacts was in a different state, so I guess I'll try for QRPp WAS. I just finished my QRO 5BWAS two days before I got the HW-8. My signal reports have ranged from 539-599+10, and I'm really hooked on QRP now. My SB200 will just have to collect dust until I get this QRP WAS on the wall!! The antenna is a 4BTV vertical ground mounted for 40-20-15, and a dipole for 80. Output is 1.5-3 watts and seems to be more than I really need. Every QSO has been a pleasure, and everyone has asked about my setup and encouraged me to keep up the good work. This encouragement and thoughfulness on the part of our brother hams has been great! So, as you can see, I am very excited and hooked on QRPp. Keep up the good work in *CQ* and I'd appreciate it if you'd pass along some info about *The Milliwatt* and QRP awards *(ED: see below)*. So 73's and great QRPp'ing!"



The QRPp QSL card used by G4BUE, well-known QRPp DX'er and holder of DXCC QRPp #8. Unless I'm mistaken, the "QRP, A Challenge of Skill & Determination" section at middle left is taken from an old Milliwatt ad in CQ. That makes the card design the "real thing!"

de...**KA1BIP**, David H. Hammond, 88 East St., Middleton, MA 01949: "I am a regular reader of your monthly column in *CQ* and an enthusiast of QRP operation. I have been licensed since July '78 and recently upgraded to Advanced Class. Since being licensed as a Novice, I have operated QRPp almost exclusively using an HW-8 and dipole. I've verified 35 states and 24 countries with 2.5 watts on 15 meters and enjoy battling and sometimes winning over

the kilowatt giants! A real thrill! I have recently purchased a 100 watt rig for s.s.b. use since upgrading, but use QRP about 50% of the time now. The HW-8 sits on my desk beside by Yaesu and is a great rig for teaching the operator humility! 73's."

de...**AF3S**, Ed Hall, S.R. Box 476A, Dingman's Ferry, PA 18329: "You let me down this month. I was anxiously awaiting the promised article on QRP associations and awards. Guess it has been postponed to another month. *(ED: sorry about the let-down Ed, but it will appear in the next month or two! promise!)* Because of your column, I've decided to go QRPp myself, and am waiting for my tax refund so that I can trade in my HW-16 and get an Argonaut. I am really enthused about the QRP idea, and have been playing around with the power level on my HW-16 as an experiment, and have raised MN with 1/10 watt! Sure hope to run into you on the bands sometime."

de...**W6ULZ**, John W. Crowe, 22060 Independence St., Woodland Hills, CA 91364: "Read your QRP article in January *CQ* ("How It All Started—the K8EEG Story") last night and just had to thank you for your feelings rediscovered. 'Mysterious words with a hidden power...' You obviously knew the radio feeling and wrote a beautiful little piece. Your 'grid leak,' 'bias' etc reminded me of my own signal words, some of which were 'feedback,' 'impedance,' and 'regeneration.' I was touched by the magic wand of radio in 1936 in Junior High School electric shop, never to be the same as before. My first one-tube receiver never worked! I don't know whatever happened to it. The next one did—a two-tube regenerative type. What glorious days! And your article allowed me to relive them a little. Thanks!"

R.F. Output Power Standard-Practical Case

In a recent two-part paper, I discussed the desireability of using the r.f. output power standard with regard to QRPp operation and awards and contests. By chance, a week or so after I sent in the paper, I received a packet consisting of W8URK's application for the QRP ARC I's "KM/W" Award which underscores one of the points made in that paper. Included in the packet were the cover letter of application, a copy of the log sheet which records the contact, a copy of a letter from DA1RA confirming the contact, a copy of the QSL card, and a copy of an independent commercial company's test report on the r.f. power output of the rig used by W8URK, showing a certifed output of 40 milliwatts. One additional bit of background information is necessary—namely, that the QRP ARC I uses input power as the standard for its KM/W award—and the letter explains the rest. Here it is:

"My QRP International Number is 4161 and my current membership expires September, 1979. This is formal application for the QRP Amateur Radio Club International KM/W Award. I would also like it to be considered as a club distance/power record for s.s.b. communications. My power output for the contact was 40 milliwatts and my contact was with DA1RA, Bob Raymond, operating from Bad Kissingen, West Germany, a distance of 4,537 miles. Using the power output figure, my contact was the equivalent of 113,425 miles-per-watt. However, according to our telephone conversation, you say that the award is figured on input power and for the purposes of the award, you double the output power to get input power. That figure would be 80 milliwatts for 56,712.5 miles-per-watt. But, before making the award, please consider the following facts. The FCC sets standards for CB radio manufacturers. These standards say no more than five watts D.C. input, but the CB rigs are capable of 12 watt PEP output. Using this formula, my 40 milliwatts output would be the equivalent of 16.667 milliwatts d.c. input power and the DA1RA contact therefore should be figured as 272,214.55 miles-per-watt. The decision is yours.

The rig used for the contact with DA1RA is a converted CB rig, a Radio Shack TRC-449. The antenna is a modified Radio Shack Crossbow III 11-meter YAGI antenna, up about 39 ft and pointing approximately 50 degrees...Thank you for your time and consideration. Best 73, Charles A Elliot, W8URK, 4308 Princeton Road, Hamilton, OH 45011."

I have not received any follow-up, but it is certain that the QRP ARC I's antiquated standard was used in conferring the award despite W8URK's reasoned plea.

Conclusion

Well gang, that's all the room that we have this month for reports and stuff. Keep up the good work in submitting reports and sharing your experiences and savy with the other guys. A lot of fellows are attracted to QRPp by what YOU say in your reports, so come thru with your comments and tips etc. Photos also. And if you have a special QRPp QSL card, we like those too! In the meantime, 73 and good QRP'ing!

73, Ade, K8EEG/W0RSP

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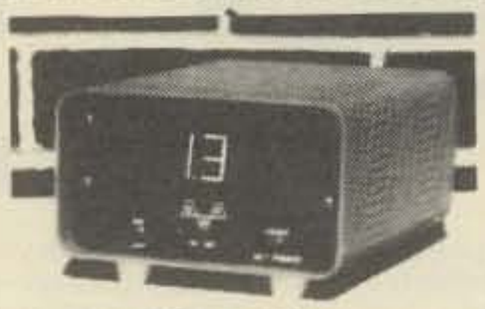

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Math's Notes

A look at the technical side of things

As promised last month, we will begin the new year with an investigation of the solid state laser. This device, unlike the well-known helium-neon gas laser, does not produce a narrow beam of bright red light, but rather operates in the near infra-red region—an area that is invisible to human beings. The light from a solid state laser also spreads out at a large angle which, as we will see, can only be shaped into a narrow beam by means of external lenses. Peak power output levels of such devices, unlike the gas laser however, can reach hundreds of watts with special devices, and the laser is therefore well suited for optical communications applications.

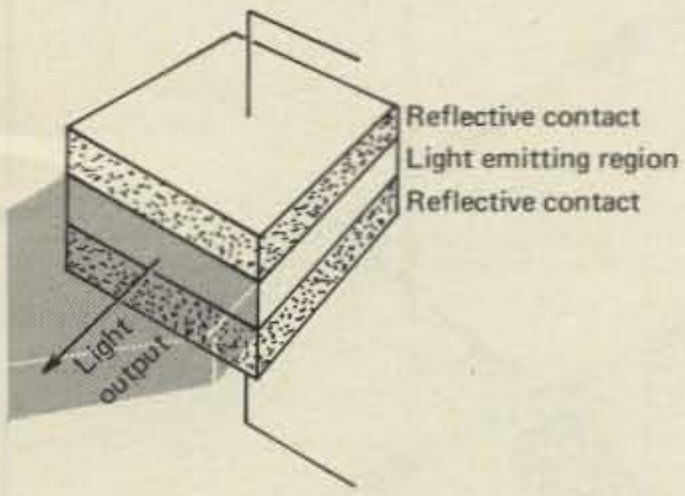

Fig. 1- Typical laser diode construction.

The basic solid state laser is similar to an LED in that both produce light in a tiny chip of Gallium Arsenide or a number of other exotic semiconductor materials. The construction of the light producing region is where the big difference occurs. As can be seen in fig. 1, the light producing material is "sandwiched" between two highly reflective surfaces. As a result, when the crystal emits, the light bounces back and forth between the reflectors until a large amount of power builds up. The distance between the two reflectors is kept highly accurate so that it acts as an optical "cavity" which only resonates at a single wavelength (frequency) of light. The result of this action is the production of large amounts of optical output power with very narrow bandwidths.

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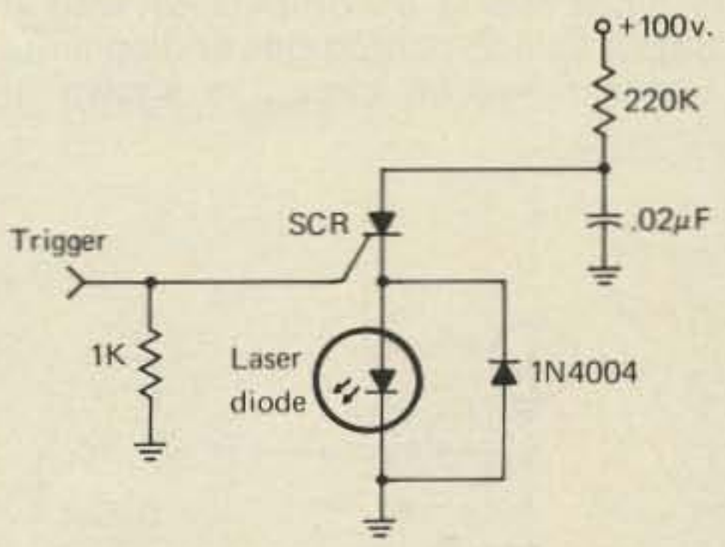


Fig. 2- A basic laser diode drive circuit. Note the 1N4004. Its purpose is to clamp reverse transients that could damage the laser diode.

There are two main types of laser diodes commonly available: the pulsed type and the CW type. CW lasers offer output levels of only 5-10 milliwatts, but have modulation capabilities of hundreds of megaHertz up to several gigaHertz. They also unfortunately have very high prices at present. Pulsed lasers however offer very high output powers, low cost, but very slow modulation capabilities—only tens of kiloHertz. Because all of the output of these diodes comes from a very tiny chip, heating is a problem and the average power must be kept very low. Furthermore, since the high optical outputs require high input currents, these currents must be supplied in the form of very short duration pulses with long "rest period" intervals between them.

For general experimentation there are a few low cost laser diodes such as the Laser Diode Laboratories LD-66 and a couple of surplus devices that are occasionally advertised in the literature. These are in the 10-15 dollar range (or less) and produce outputs of at least 5-10 watts of optical power. By comparison, a common flashlight using a #222 lamp consumes about 2 watts and produces less than a watt of actual output.

Looking at the specifications for the LD-66 you see two potential problems. The first is the 20-30 amperes necessary to drive the laser to full output and the second, the 100-200 nanosecond maximum pulse width to avoid destroying the chip. These problems are really not unsurmountable however as the circuit in fig. 2 produces such pulses quite easily.

As can be seen, the laser diode is connected in the discharge path of a capacitor in series with an SCR. With the SCR non-conducting, the .02 microFarad capacitor changes to the full value of the supply at a rate depending on the time constant formed with the 220K resistor. When the SCR is then triggered, the capacitor discharges through the diode causing a pulse of light to be emitted. Since the impedance of the discharge path is only a few ohms, the peak current easily rises to the 10-30 ampere level for the required 100-200 nanoseconds. Then it drops to zero since the 220K resistor will not allow enough current to flow to keep the SCR conducting. When the SCR cuts off, the capacitor recharges and the cycle can begin again.

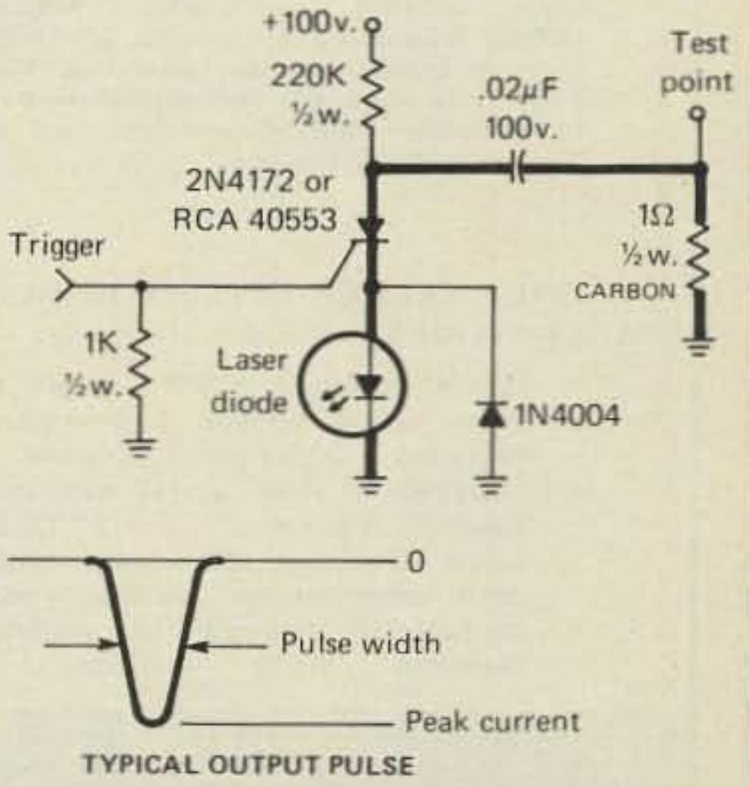


Fig. 3- A complete laser diode drive circuit. Note that the SCR is a special type that has a fast turn on. Also be sure to keep all heavy leads as short as possible.

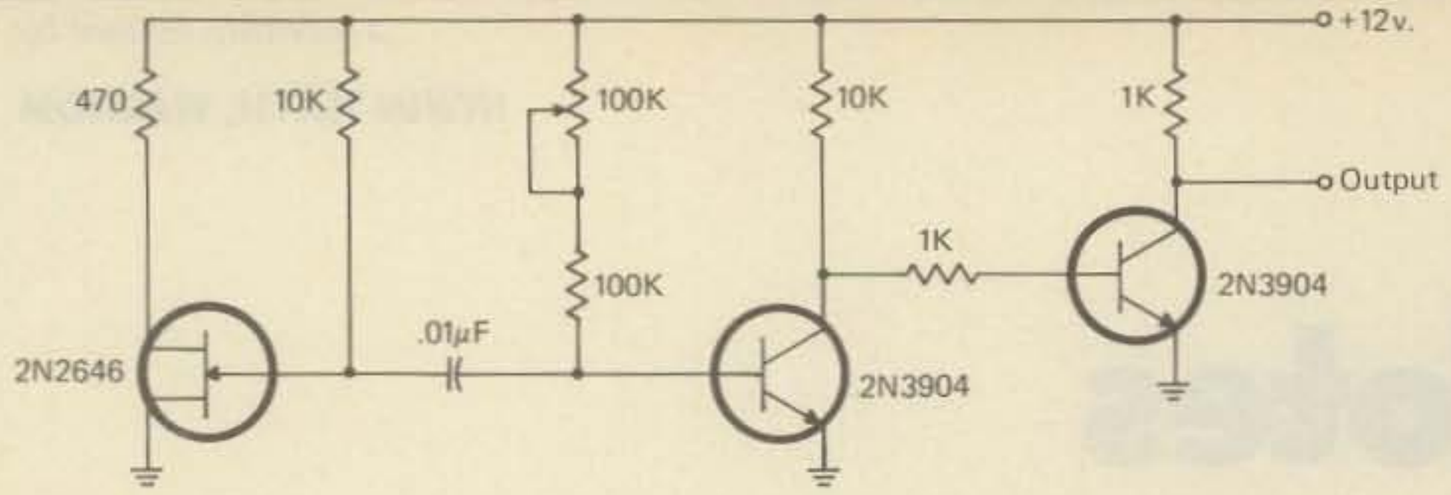


Fig.4- A unijunction pulser as described in the text.

When building such a circuit, it is customary to add a 1 ohm carbon resistor in series with the capacitor as a current monitor. Fig. 3 shows the addition of this resistor. To monitor current, you must connect a high speed oscilloscope capable of displaying a 100-200 nanosecond pulse across the resistor. The current waveform will then be displayed at a rate of 1 volt/ampere.

The circuit of figure 3 is capable of operating at a rate of 1-3 kHz. It can be driven by means of a commercial pulse generator or home built unijunction pulser as shown in fig. 4. When testing the setup connect an inexpensive LED instead of the laser diode. Most LED's will handle the high pulse current and cost much less than an actual laser to replace.

After building the laser diode assembly you will wish to test it. This is most easily accomplished with a simple silicon photodiode and op-amp. A recommended circuit is shown in fig. 5 and will be suitable for detecting the output from the diode for a significant distance. Either earphones or a scope can be connected to the op-amp output as a detector.

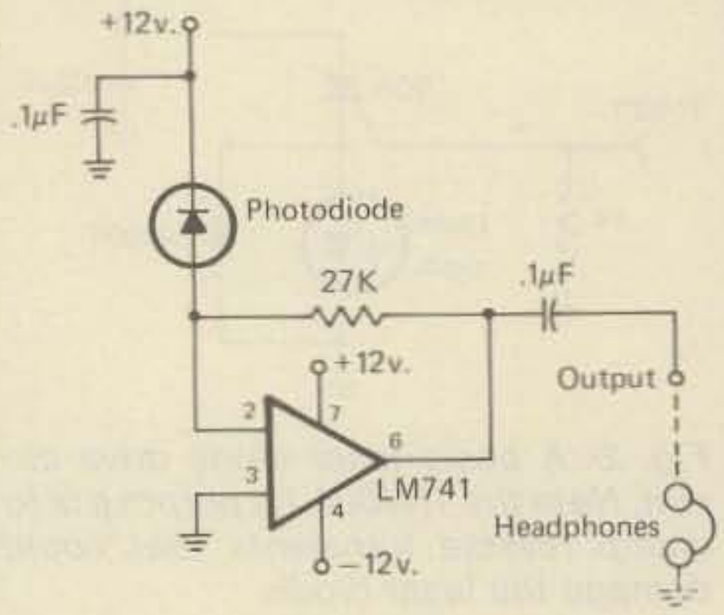
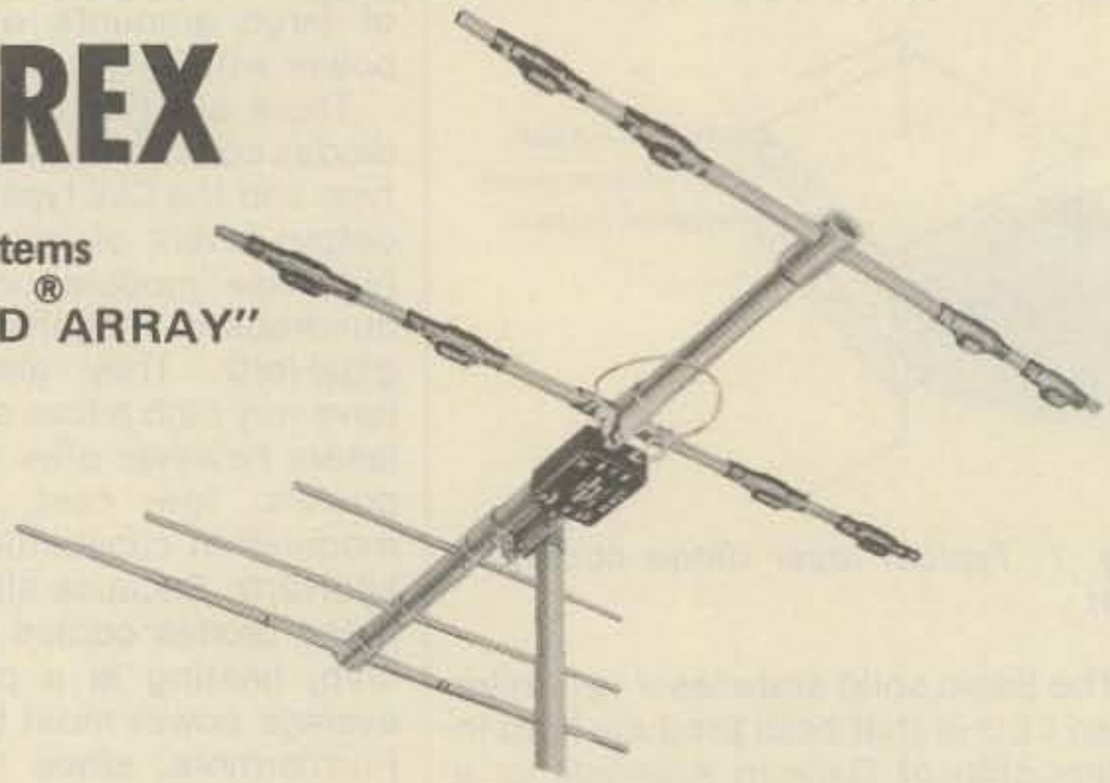


Fig. 5- A simple optical receiver.

Next month we will look at ways to produce a narrow beam from the laser diode for long range applications and how to modulate it with audio. In the meanwhile be sure to observe—DO NOT LOOK DIRECTLY AT THE OUTPUT OF THE LASER, OR AT A MIRROR REFLECTION OF THE BEAM. Although the average power is probably too small to harm you, it does not pay to take unnecessary chances.

73, Irwin, WA2NDM



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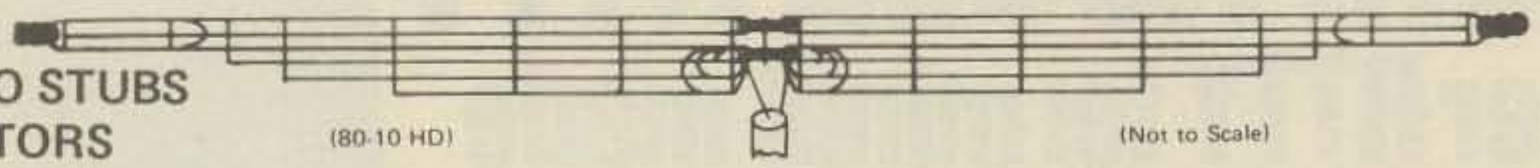

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75-10 HD(SP)	75/40/20/15/10	66	$94.25
75-10 HD(SP)A	75/40/20/15/10	66	$99.50
75-20 HD	75/40/20	66	$80.25
75-20 HD/A	75/40/20	66	$85.50
75-20 HD(SP)	75/40/20	66	$80.25
75-20 HD(SP)A	75/40/20	66	$85.50
75-40 HD	75/40	66	$68.00
75-40 HD/A	75/40	66	$73.25
75-40 HD(SP)	75/40	66	$68.00
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80-10 HD(NT)A	80/40/20/15/10	69	$103.75
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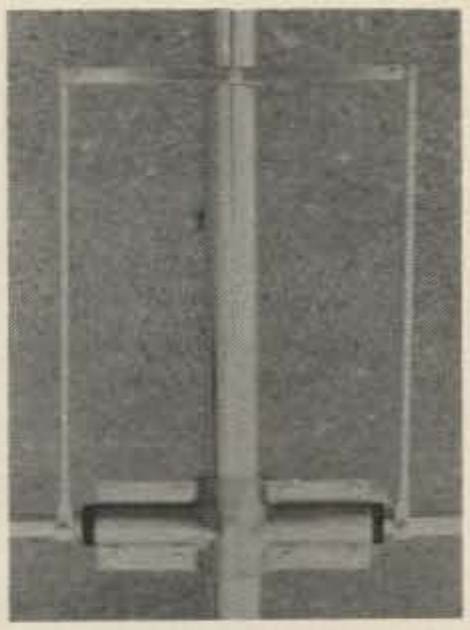

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M520A	20	11.5	25 dB	500 KHz	1.1:1	50 Ω	Beta	5	36'6"	2"	34'2½"	25'1"	8.9	227	2"	68
M420A	20	10.0	25 dB	500 KHz	1.1:1	50 Ω	Beta	4	36'6"	2"	26'0"	22'6"	7.6	189	2"	50
M515A	15	12.0	25 dB	400 KHz	1.1:1	50 Ω	Beta	5	25'3"	2"	26'0"	17'6"	4.2	107	2"	41
M415A	15	10.0	25 dB	400 KHz	1.1:1	50 Ω	Beta	4	24'2½"	2"	17'0"	14'11"	3.1	54	2"	25
M510A	10	12.0	25 dB	1.5 MHz	1.1:1	50 Ω	Beta	5	18'6"	2"	26'0"	16'0"	2.8	72	2"	36
M410A	10	10.0	25 dB	1.5 MHz	1.1:1	50 Ω	Beta	4	18'3"	2"	12'11"	11'3"	1.4	36	2"	20

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- Three antenna terminals.
- RF step attenuator.
- Tone control.
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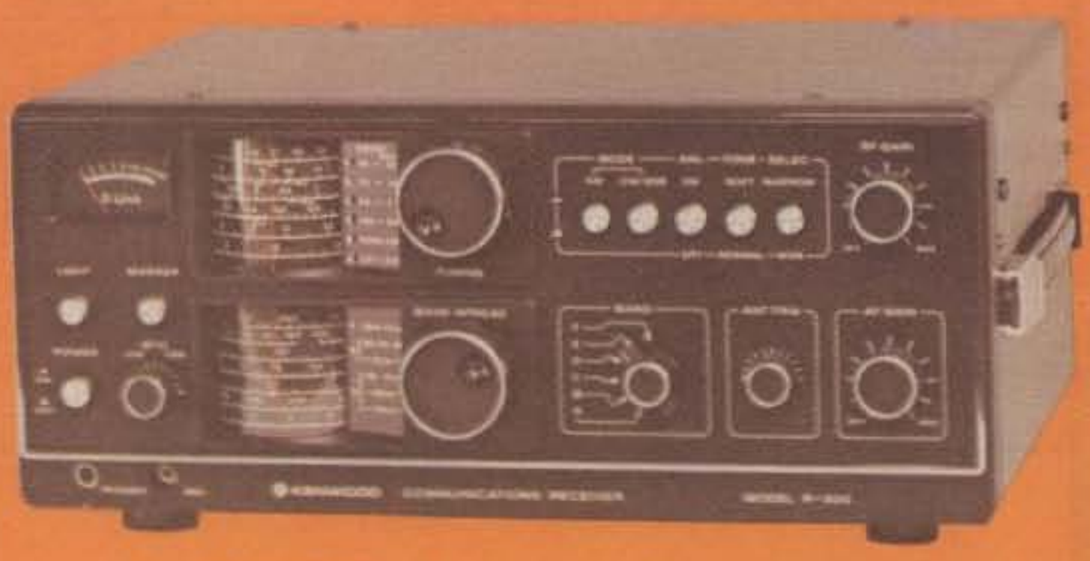

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R-300 FEATURES:

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- Full 5-kHz coverage from 144.000 to 147.995 MHz.
- Adaptable to any one MARS simplex or repeater channel between 143.7 and 148.3 (with modification kit).

RM-76

ADDED FEATURES WITH RM-76:

- Six memories.
- Automatic memory scan.
- Automatic scan up the band in 5-kHz steps, with selectable upper and lower frequency limits.
- Manual scan up or down the band in single or fast continuous 5-kHz steps.
- ± 1 MHz transmitter offset as well as ± 600 kHz and memory offset for repeater operation.
- MARS operation on 143.95 MHz simplex.
- Versatile digital display of transmit and receive frequencies, and operating functions.

KPS-7

The KPS-7 is a matching AC power supply for the TR-7600 and TR-7625. Output is 13.8 VDC at 7 A ICS (50% duty cycle).

TR-2400

The TR-2400 synthesized 2-meter hand-held transceiver features a large LCD frequency readout, 10 memories, scanning, and much more.

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- Large, illuminated LCD digital frequency readout. Readable in direct sunlight, and a lamp switch makes it readable in the dark. Shows receive and transmit frequencies and memory channels, and indicates "ON AIR", memory recall, battery status, and lamp switch on.
- 10 memories, with battery backup.
- Automatic memory scan, for "busy" or "open" channels.
- Mode switch for simplex, ± 600 kHz transmit repeater offset, and memory-frequency ("M 0") transmit repeater offset.
- REVERSE momentary switch.
- Built-in 16-button Touch-Tone generator.
- Keyboard selection of 5-kHz channels from 144.00 to 147.995 MHz.

ST-1

- Up/down manual scan and repeater or simplex operation from 143.900 to 148.495 MHz in single or fast continuous 5-kHz steps.
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- High-impact plastic case and zinc die-cast frame.
- BNC antenna connector.
- Standard accessories included with the TR-2400 are a flexible rubberized antenna with BNC connector, ni-cad battery pack, and AC charger.

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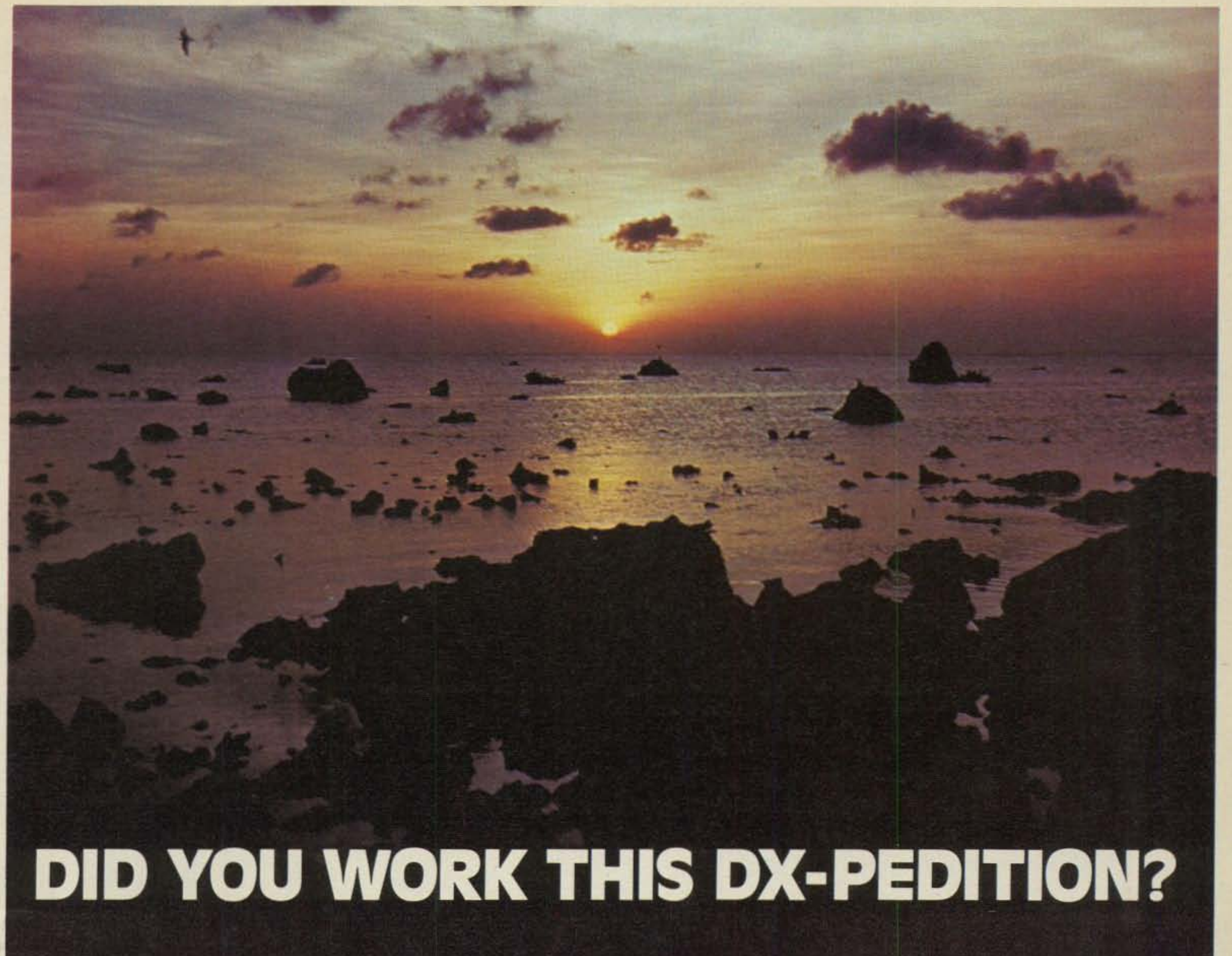

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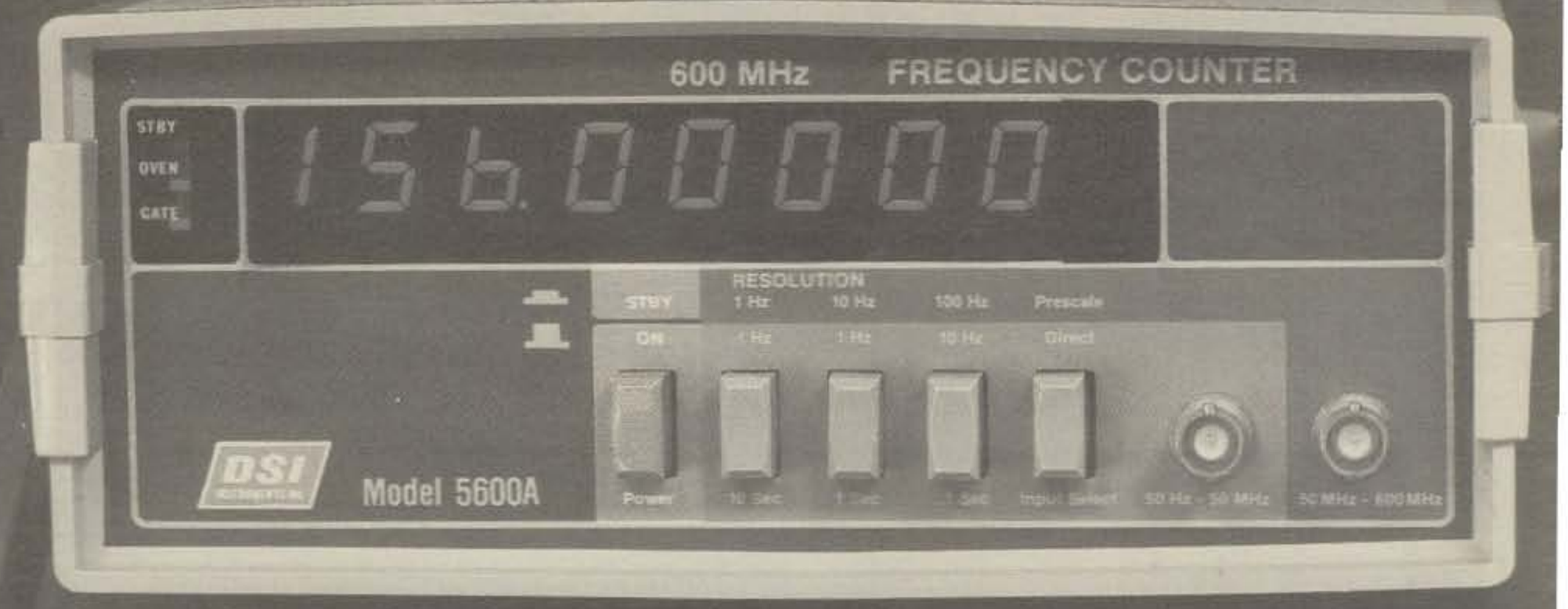

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5600A-W	$179.95									
3550	99.95	50Hz-550MHz	TCXO 1 PPM 17° - 40° C	25MV	25MV	75MV	8	.5 Inch	*115 VAC or 8.2-14.5 VDC	2¾" x 6" x 5"
500HH	$149.95	50Hz-550MHz	TCXO 1 PPM 17° - 40° C	25MV	20MV	75MV	8	.4 Inch	*115 VAC or 8.2-14.5 VDC or NICAD PAK	3" x 3¾" x 5¾"

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CIRCLE 12 ON READER SERVICE CARD

5600A Kit	$149.9
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CIRCLE 11 ON READER SERVICE CARD

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

3 KW VERSA TUNER IV's

1.5 KW VERSA TUNER III's

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

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

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

3 KW VERSA TUNER IV's

[1] MFJ-984 3 KW VERSA TUNER IV

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

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

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

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

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

[2] MFJ-981 3 KW VERSA TUNER IV

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

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

[3] MFJ-982 3 KW VERSA TUNER IV

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

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

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

[4] MFJ-980 3 KW VERSA TUNER IV

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

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

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

1.5 KW VERSA TUNER III's

[5] MFJ-962 1.5 KW VERSA TUNER III

$169.95 ***SWR, dual range forward and reflected power meter, 6 position antenna switch, encapsulated 4:1 ferrite balun.***

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

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

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

Black front panel has reverse lettering.

[6] MFJ-961 1.5 KW Versa Tuner III

$149.95 ***6 position antenna switch lets you select 2 coax lines thru tuner or direct, or random wire and balanced line.***

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

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CIRCLE 37 ON READER SERVICE CARD

a monthly feature by

WILLIAM I. ORR, W6SAI

Antennas

Design, construction, fact, and even some fiction

"What's up, Doc?" I asked.

Doctor Livingston I. Presume frowned and said, "Knock it off! I don't like to hear that a thousand times a day."

"My, we're a bit touchy, aren't we?" I asked.

Doc Liv smiled and shrugged. "I guess so. Pendergast was supposed to come over today and help me put up my new 10 meter beam. But he didn't show up. So everything grinds to a halt until next weekend."

"Ah, yes," I replied. "He's een seeing a lot of his buxom Vietnamese girl friend, How Bout Diem. I'm afraid he's lost to amateur radio and DX for a while."

Doctor Liv sighed and handed me a small envelope. "When do we get ready for the antenna party? I plan to incorporate the new matching device that Larry, KA9ACN, has worked out for a Yagi beam. Larry has his new Omega match on his stacked 10 and 15 meter beams (fig. 1). The match is waterproof and foolproof and this one model covers a range of 25 MHz to 33 MHz by simple adjustment. What do you think of it?"

I looked closely at the photograph. "The Omega match is a refined version of the Gamma match," I observed. "Both systems are used to match a coaxial line to a driven element. The Gamma match consists of a single rod (running parallel to the element) and a series resonating capacitor (fig. 2). The outer shield of the coax line is grounded to the center point of the element. The inner conductor is connected to the Gamma capacitor. Lengths, spacings and capacitance values for the various amateur bands are shown in the illustration. This is a very effective and simple method of matching a coax line to a Yagi beam driven element.

"One problem that exists with the Gamma match is that the Gamma rod is quite long for 20 and 40 meter antennas. This means that the experimenter must lean out from the tower to move the adjustable shorting bar at the end of the rod.

"Gamma rod length can be reduced by means of a shunt capacitor as shown in fig. 3. This is the Omega match. Match adjustment, instead of being made by changing the length of the rod, is accomplished by varying the Omega capacitor. The capacitor is at a high impedance point in the matching device and permits an impedance variation at the point the coax is attached of about two-to-one. Thus, the adjustable shorting bar can be roughly set before the antenna is erected and then the match fine-tuned

**48 Campbell Lane, Menlo Park, CA 94025*

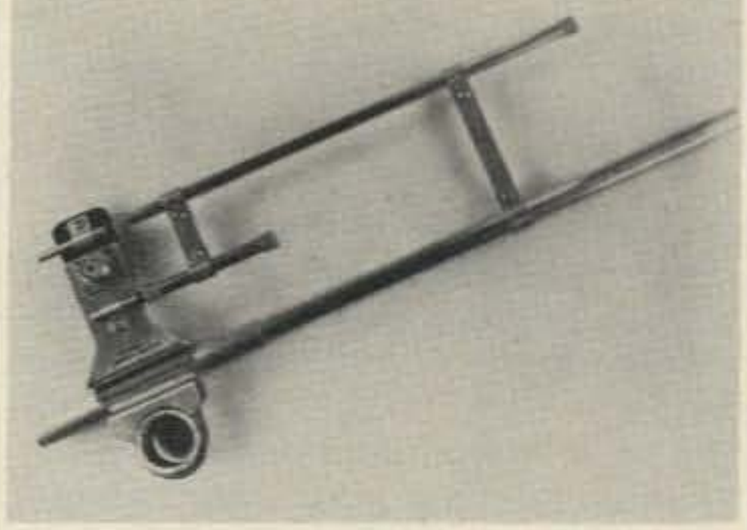


Fig. 2-A mechanical mockup of the KA9ACN Omega match. The match rod and integral, coaxial capacitor is between the coax plug and the driven element. This view is as if you are looking end-on, down the boom, at the center section of the driven element.

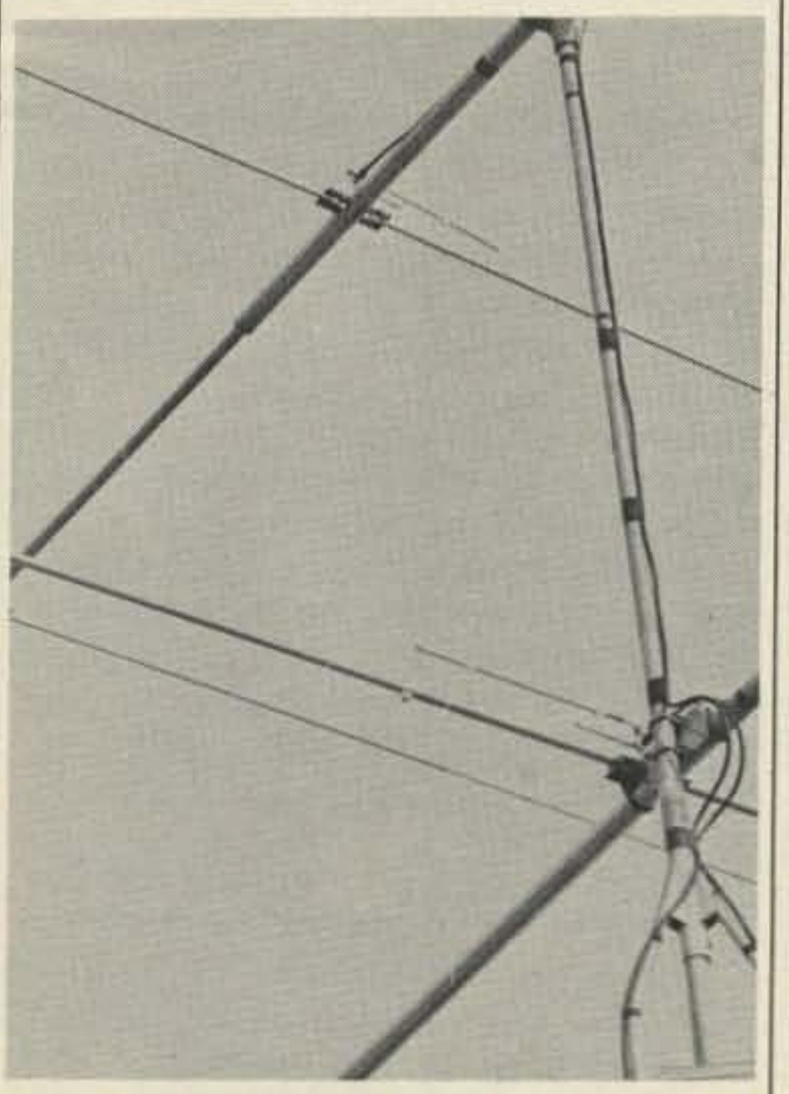
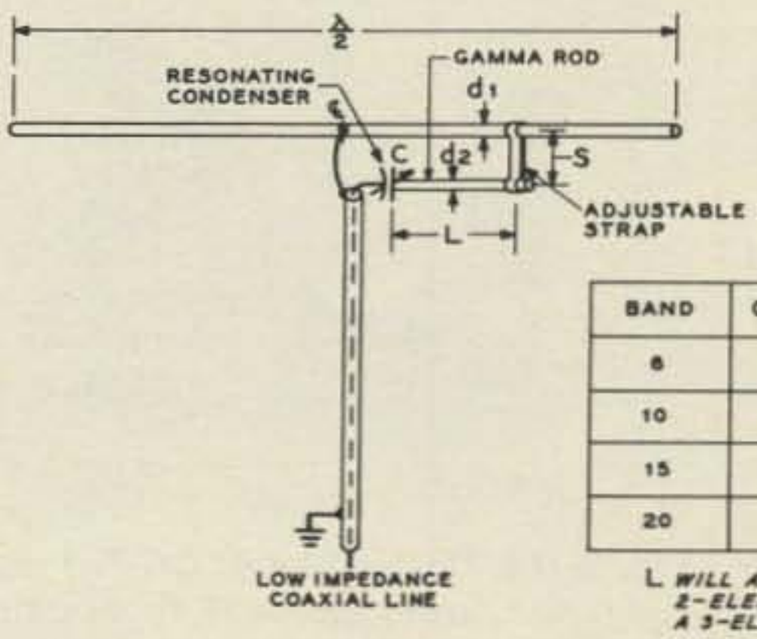


Fig. 1-The new Omega match assembly at KA9ACN. Larry has refined this match into a compact design and uses it on his stacked 10 and 15 meter beams. Each antenna is fed with a separate coaxial line. Detail of the assembly is shown in fig. 2.



FOR 52 Ω COAXIAL LINE

BAND	C MAX	L (INCHES)	S (INCHES)	d1 (INCHES)	d2 (INCHES)
8	25	12-14	3	1	3/16
10	45	20-24	4	1-1 1/2	1/4
15	70	30-36	5	1	3/8
20	130	40-48	6	1 1/2	1/2

L WILL APPROXIMATE THE SHORTER DIMENSION IN A 2-ELEMENT ARRAY, AND THE LONGER DIMENSION IN A 3-ELEMENT ARRAY.

Fig. 3-The basic Gamma match. This device matches a coaxial line to a dipole element. Length of gamma rod, spacing from element and diameter of rod are adjusted to provide correct impedance match. Series capacitor tunes out rod reactance. Suggested dimensions for high frequency amateur bands are shown in the drawing. (Courtesy of Radio Publications, Inc.)

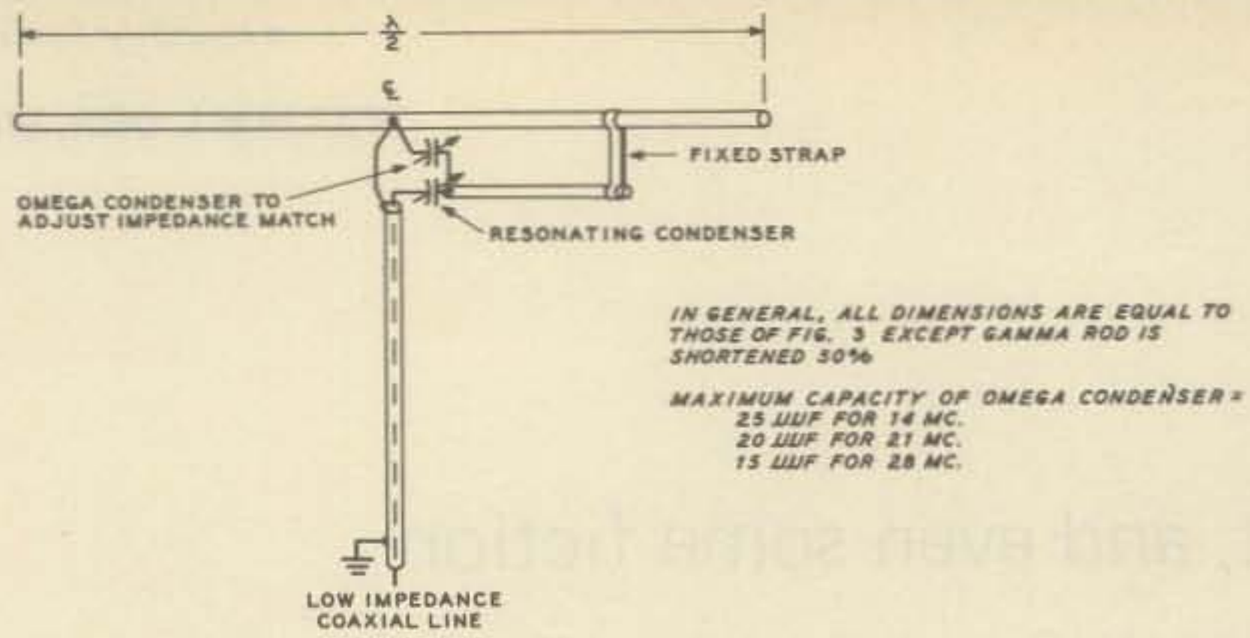


Fig. 4-The Omega match is an improved version of the Gamma match. The Omega capacitor allows a shorter gamma matching rod to be used and shorting strap does not require adjustment once approximate dimensions are set. The Omega match system was invented by W6SAI in 1955. (Drawing courtesy of Radio Publications, Inc.).

by means of the two variable capacitors to provide a very low value of s.w.r. on the transmission line."

"Sounds good," agreed Doc Liv. "Are there any shortcomings to this matching system?"

"Not really," I replied. "One vexing problem is waterproofing the variable capacitors. Some amateurs place them in plastic cups...some place them in waterproof metal boxes. Larry, KA9ACN, has a different approach to the problem. A close-up of his Omega match is shown in fig. 4. Larry made this model up to illustrate how his device goes together.

"This is a full-size model. The match is attached to a short section of dummy boom and a short dummy element. This shows how the matching system, boom and driven element are assembled.

"The Gamma rod is atop the element, running parallel with it. The Gamma capacitor is coaxial with, and inside, the rod. Heat-shrink tubing is used for the dielectric of the capacitor. The inner conductor of the capacitor is a short length of solid aluminum tube that can easily be slid in and out of the Gamma rod.

"The Omega capacitor, much shorter that the Gamma capacitor, is made in the same manner and can be seen between the Gamma rod and the driven element. The center conductor is grounded to the aluminum plate that serves as a mount for the coaxial receptacle and the Gamma rod, which, by the way, is insulated from the aluminum plate.

"Larry has a computer program which provides all the dimensions and settings for the Omega match system and this is a convenient point to use to zero-in on final adjustments."

A smile broke out on Doc Liv's face. "This is an elegant solution and I like it," he said.

I agreed, and added, "I would imagine that any readers of this column who desire more information can contact Larry directly. His address is 833 Cornelia St., Janesville, WI 53545. Or, quite possibly, he can be caught on the air."

"I hope to work him," said Doc Liv. "I'm sure he'd get a bang out of hearing his Omega match on the air."

"And I have something interesting for you in exchange," I remarked. "I finally got my hands on one of the new s.w.r.-power meters made by *Daiwa Corporation* in Japan. They are sold by the *J.W. Miller division of Bell Industries.* This is one nifty device (fig. 5)."

"Basically, it consists of two s.w.r. indicating devices in one box, connected back-to-back. A dual-pointer meter is used to provide instantaneous readings of forward power, reverse power and s.w.r. It has a readout in both watts and s.w.r. Once you use it, you'll not want to go back to the primitive models of s.w.r. meters that are floating around.

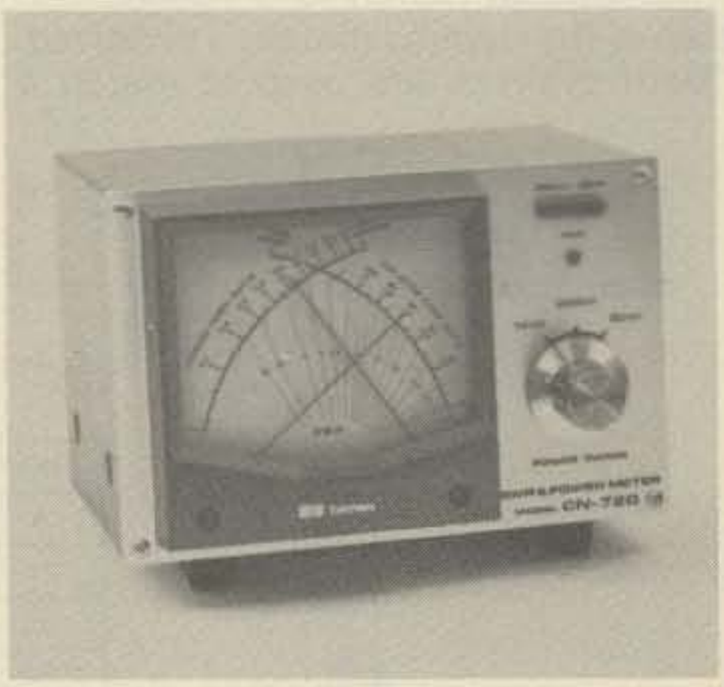


Fig. 5-The Daiwa Model CN-720 dual s.w.r. and power meter. A dual pointer meter provides instantaneous readings of forward and reverse power. The point the meter pointers intersect shows s.w.r. on a third scale. Meter operates at power levels up to one kilowatt.

"The unit provides three power scales of 1000 watts, 200 watts and 20 watts forward power. Reflected power scales are 200 watts, 40 watts and 4 watts. The forward and reflected power scales are selected automatically when you rotate the "Power Range" switch, and readout in terms of power and s.w.r. is automatic.

"It is possible to make s.w.r. readings across an amateur band and get both power and s.w.r. readouts directly from the dual meter. Not only does this give you a complete s.w.r. picture, but it also tells you what happens to power output at various frequencies and s.w.r. values. Some of the modern all solid-state rigs, you know, don't like to work into high values of s.w.r. and incorporate protection circuits that reduce power output as s.w.r. increases. This combination s.w.r. and power meter quickly shows up this action."

"Very interesting," remarked Doctor Liv as he studied the instruction manual. "This provides a 'three dimensional' picture of what is transpiring in the antenna circuit. Too bad the instrument belongs to you instead of to me!"

"I'll be pleased to loan it to you any time," I replied.

"Before we wrap this up, I know you'll be interested in a note I received from Lenny, W3GRF. I ran a picture of his 20 meter beam in a recent column and he gives me a run-down on the rest of his antenna farm. Listen to this: 'In addition to the big 40 meter beam, I have a 70 foot tower which holds three beams on a single boom 36 feet long. The array consists of two elements on 20, three on 15 and 5 on 10, all close-spaced for their individual band. There are no reflectors as such, only driven elements and directors.

'I also have two other 20 meter antennas, one a 5 element Yagi on a 48 foot boom at 100 feet height and another which is 7 elements on a 78 foot boom at 145 feet height. The fifth and last tower is 125 feet high and has a 6 element 15 meter beam on it.

'For 80 meters I use sloper antennas, a phased set on Europe and another phased set on a south-east heading. In addition, there are individual slopers for north-west and south-west headings. All the slopers have reflectors.

'Between the 125 foot tower and the 145 foot tower is the W3GRF antenna for 160 meters which is a 'T' with a 70 foot flat-top and the vertical portion the same. It has four radials at the base and is the best antenna I have used for the top-band. On the same rope holding the 160 meter antenna is a 40 meter vertical with radials, which is not too good.

'Lastly, I have four 550 foot long Beverage antennas used for reception

on 160 and 80 meters. Except for the slopers, all antennas are fed with large coaxial line (RG-218/U) to keep losses down, as some runs are well over 300 feet long. All the Yagis use Gamma matches, by the way. So, you see, the W3GRF antenna farm is extensive, requires a lot of upkeep and is very enjoyable.'

Dovtor Liv gave a low whistle. "Sure wish I had an antenna farm like that. I think I'm lucky to have a tri-bander Yagi and a sloper for the low frequency bands."

"Agreed," I said. "But it's fun to be into antennas in a big way. It gives you something to shoot for."

I handed my friend a slim paper booklet. "This is a dissertation on the construction of a simple and inexpensive two element wire Quad antenna for 40 meter operation. The antenna was built by Tony DePrator, WA4JQS, who has been a frequent contributor to my column. For those amateurs interested in 40 meter DX, this antenna should be very interesting. The antenna is slung between two towers, or other supports, and is aimed in a fixed direction. Tony aimed his array north and south to begin with, to reduce interference from European broadcasting stations and to improve his signal in deep Asia.

"He started out using just a driven element which gave him a bidirectional pattern but soon added the reflector for extra gain. Tony has prepared a four page write-up on his antenna and if you send a self-addressed, stamped envelope, I'll bet that he'll send you all the information on the 40 meter wire Quad. His address is 205 Cherokee Trail, Somerset, KY 42501."

"Good show," murmured Doc Liv as he jotted the address down in his note book. "If the antenna works, I'll trade him a root canal job for the information."

"Before you go, you might be interested in the unusual 80 meter antenna at KB4DV. Johnny calls it a modified sloper (fig. 6). He claims it covers the range of 3.5 MHz to 4.0 MHz with very low s.w.r. It looks like a variation of the so-called "ZL Special" antenna.

"KB4DV says it shows some directivity away from the feed point. He adjusts the resonant frequency by changing the length of the lower legs, but says the dimensions are relatively noncritical."

"It looks like an easy antenna to get working," remarked the Doc, as he gathered up his material and prepared to leave. "The 80 meter band is jumping, and now is the time to get something up in the air for all of that good DX."

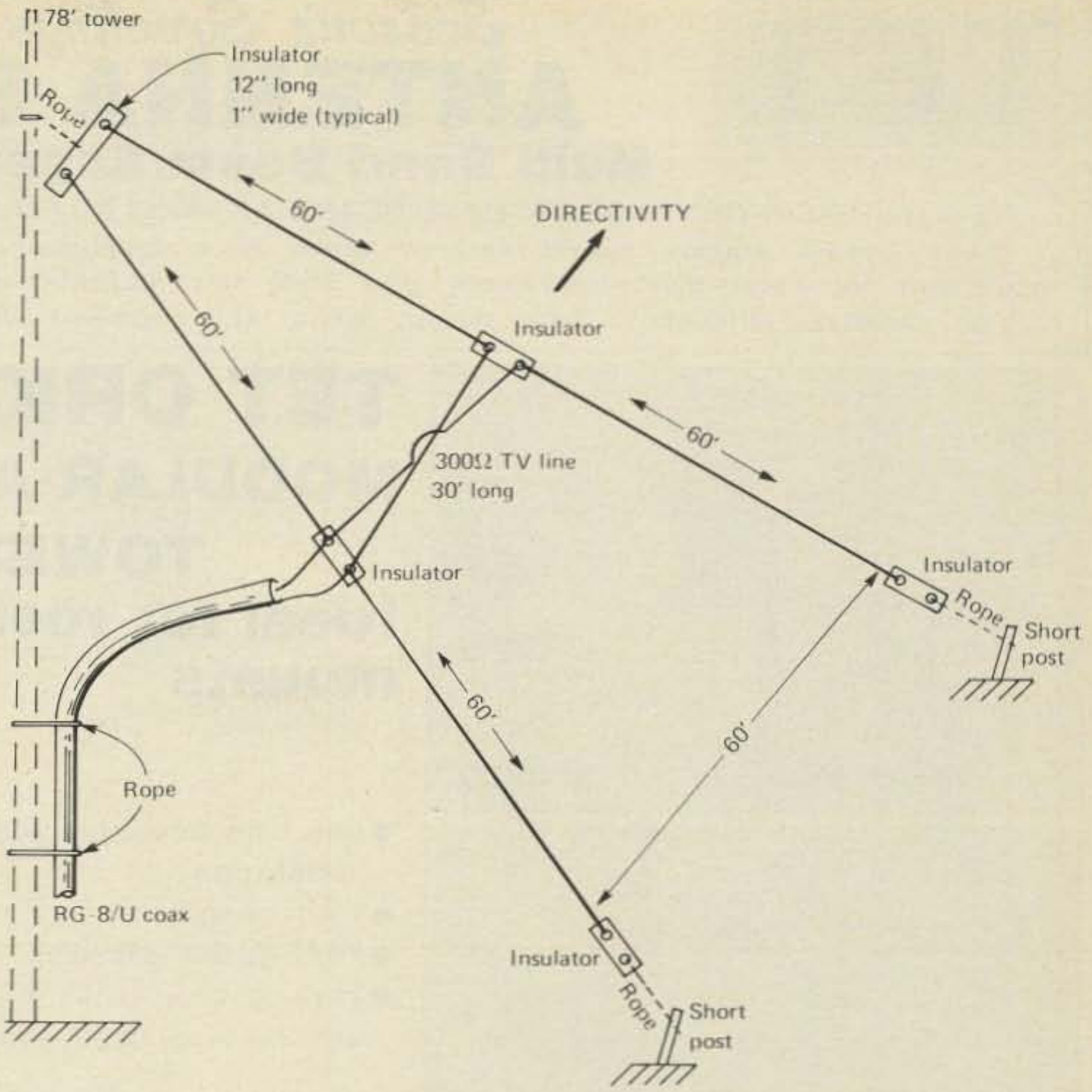


Fig. 6-The interesting 80 meter sloper antenna at KB4DV. It is a modified "ZL Special" hung from a single tower. Each leg of the antenna is about 120 feet long. The legs are fed at the center via a transposed length of 300 ohm TV ribbon line. The coaxial line is attached to the center of one leg. Antenna is hung from a 72 foot tower.

"Yes," I replied. "If you can't hear 'em, you can't work 'em."

Doctor Liv laughed. "You haven't been listening to the DX lists lately, have you?"

Note: Interested in inexpensive antennas that work? Read "Simple, Low-cost Wire Antennas for Radio Amateurs," by W6SAI. This 192 page handbook is published by Radio Publications, Inc., Box 149, Wilton, CT 06897. Price: $6.95 plus 75¢ for postage and handling.

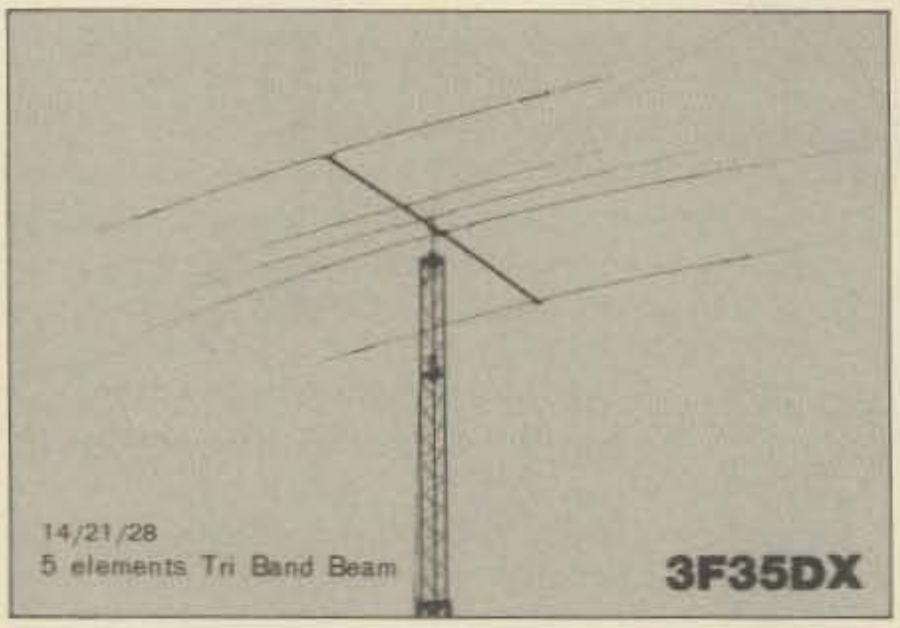
TET®

Season's Greetings From

ANTENNA SYSTEMS

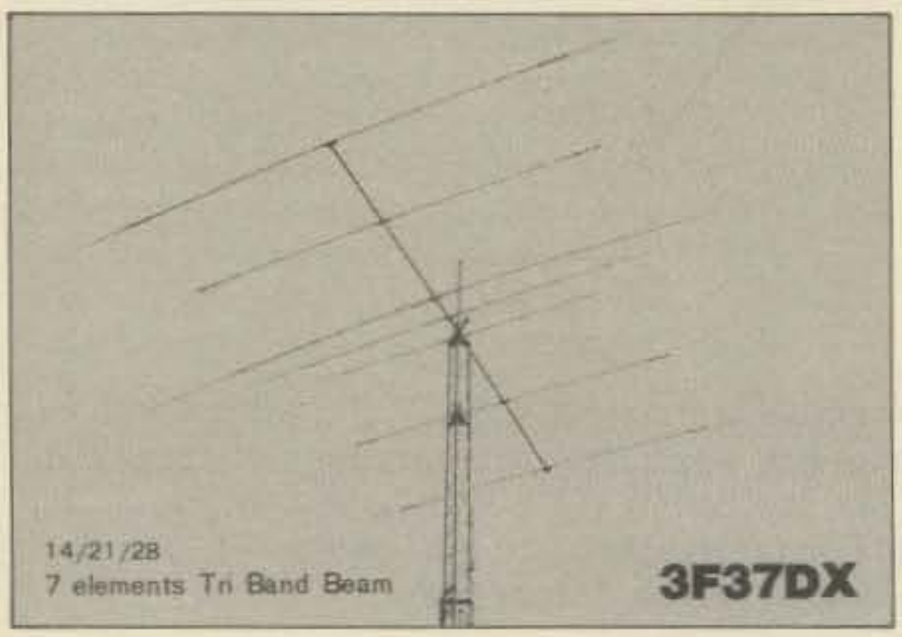
Multi Band Beam Super DX Series

NEW HIGH PERFORMANCE TRI-BAND BEAMS AS GOOD AS FULL-SIZE MONO BAND ANTENNAS.
These beams employ hybrid system which is a combination of separated full-size driven element for each band individually and Hi-Q trap parastic elements. These feature result high radiation efficiency, high power rating and excellent VSWR in entire band width.



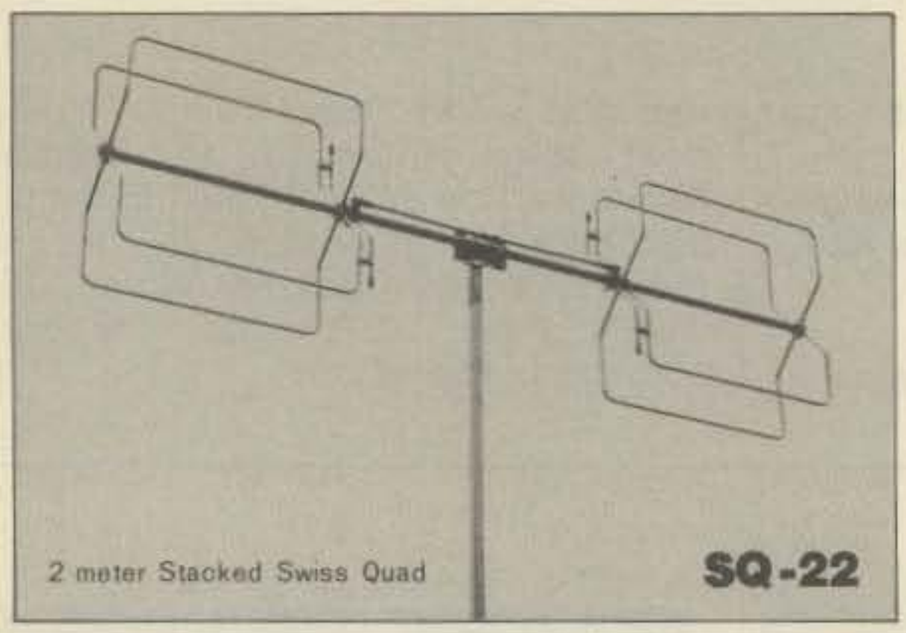
14/21/28
5 elements Tri Band Beam

3F35DX



14/21/28
7 elements Tri Band Beam

3F37DX

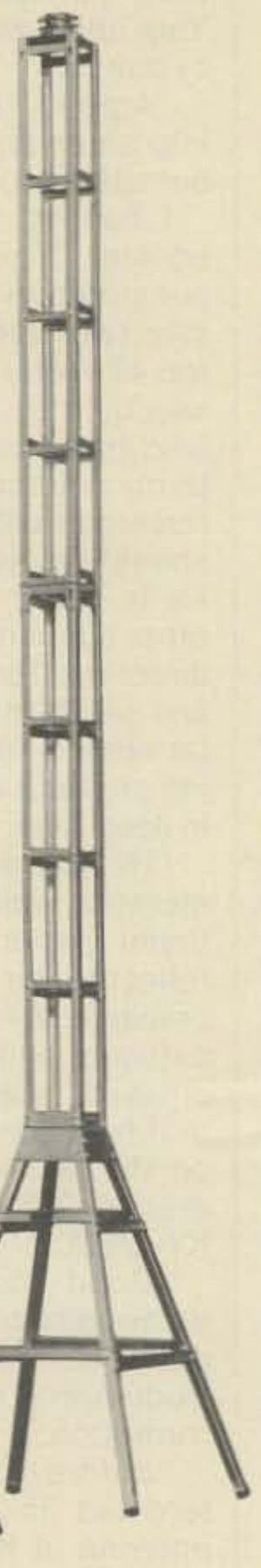


2 meter Stacked Swiss Quad

SQ-22

TET ORIGINAL MODULAR ANTENNA TOWERS

Ideal for roof & ground mounts



- one man assembly and installation
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Has been used by JD1YAH at Ogasawara island and DX pedi-tionning at Melish Reef (VK9ZR)

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KR-2000

KR 2000—Designed for 360° rotation. Brake holds up to 10,000kg/cm (8680lbs/inch) torque.

KR-600

KR 600—Designed for360° rotation. Brake holds up to 4000 kg/cm (3470 lbs/inch) torque.

KR-400

KR 400—Designed for 360° rotation. Rated to support up to 200 kg or 440 lbs. Read out tolerance ±5 degree max

KR-500

KR 500—Designed for 180° rotation. Brake holds up to 2000 kg/cm (1750 lbs/inch) torque.

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TET U.S.A., INC.

CIRCLE 51 ON READER SERVICE CARD

a monthly feature by

BILL WELSH, W6DDB

Novice

"How to" for the newcomer to Amateur radio

Worldwide Amateur Radio Callsigns

The April and May 1979 Novice columns explained the existing callsign structure as it presently applies to the amateur radio service in our country. That two-part article brought written responses from several readers. This article is presented at the suggestion of some people who wrote to me about the American callsigns article. As the heading indicates, foreign (DX) amateur radio callsigns are listed to enable you to quickly determine an amateur's country from any callsign. Since many American callsigns are now a bit on the strange side, they are also included in this article for your information. Last but not least, an asterisk (*) precedes each listing of a country which provides credit towards the ARRL DXCC (100 countries) award. Naturally, when one is ready to apply for the DXCC award, it is advisable to obtain a current countries list by requesting it from the American Radio Relay League, 225 Main Street, Newington, Connecticut 06111. Since this column is primarily written for the benefit of beginners, outdated callsigns are not included in the list. An attempt has been made to just show callsigns one could actually hear on the amateur bands, either now or in the future.

Notice how often a zero (Ø) appears in the callsign prefix of rare DX locations. If you were to work all 25 of the zero prefixes shown in the list, you would have contacted many of the rarest DX locations on earth. It is an excellent practice to work every DX amateur you hear who has a zero in his callsign prefix, such as CEØ, EJØ, HBØ, HKØ, HRØ, etc.

2814 Empire Ave., Burbank, CA 91504.

Here is Matt Beha (KA4DYM) of Richmond, Virginia. Matt is one of many good Novice retreads and he held WNØRED in 1954. He never got on the air the first time around but he is active now. Matt uses an indoor dipole with the Heath HW-7 Transceiver shown in the picture. He hopes to move out of his apartment into a house about the time he upgrades to the General ticket; then, he'll set up a real antenna farm.

A		See W
AA-AG		See W (with listed exceptions)
AC3	333	See A51 (Sikkim) (unofficial)
AC4	333	See A51 (Tibet) (unofficial)
AH1	250	See KB6
AH2	282	See KG6 (Guam)
AH3	263	See KJ6
AH4	280	See KM6
AH5	238	See KP6 (Palmyra)
AH5K	238	See KP6 (Kingman)
AH6	260	See KH6
AH7	280	See KH7
AH8	235	See KS6
AH9	278	See KW6
AHØ	285	See KG6R/S/T
AI-AK		See W
AL7	333	See KL7
AM-AO	044	See EA
* AP	354	Pakistan
AQ-AS	354	See AP
AT-AW	333	See VU2
AX	248	See VK
AY-AZ	135	See LU
* A2C	085	Botswana
A4X	008	Sultanate of Oman & Muscat
* A6X	003	United Arab Emirates
* A7X	011	Qatar
A8	071	See EL
* A9X	011	Bahrain Island
* A35	233	Republic of Tonga
* A51	333	Bhutan
BA-BZ	320	See BY
* BV2	308	Taiwan (Formosa)
* BY	320	Peoples' Republic of China
CA-CD	140	See CE
* CE	140	Chile
CE9A	153	South Shetland Islands
CE9B	180	See KC4AAA
* CEØA	171	Easter Island
* CEØX	144	San Felix Island
* CEØZ	148	Juan Fernandez Archipelago
CF-CK		See VE
CL	100	See CM
* CM	100	Cuba
* CN	051	Morocco
CO	100	See CM
* CP	128	Bolivia
CQ-CR		Portuguese Colonies
* CR3	073	Guinea Bissau
CR5	062	See S9
CR8	277	Timor
* CR9	311	Macao
CS	044	See CT1
* CT1	044	Portugal
* CT2	057	Azores
* CT3	052	Madeira Islands
CT4	044	See CT1
CU	044	See CT1
CV-CW	130	See CX
* CX	130	Uruguay
CY-CZ		See VE
C4	024	See 5B4
* C5A	070	The Gambia
* C6A	093	Bahama Islands
C7		World Meteorological Organization
C8	080	See C9M
* C9M	080	Mozambique
* C21	261	Republic of Nauru
* C31	040	Andorra
DA	030	See DL (foreign personnel)
DB-DK	030	See DL
* DL	030	Federal Republic of (West) Germany
* DM-DT	027	East German Democratic Republic
* DU	297	Phillipines
DV-DZ	297	See DU
* D2A	072	Angola
D3	072	See D2A
* D4C	065	Republic of Cape Verde
D5	071	See EL
* D6A	015	State of Comoros
D7-9	311	See HM

* EA	044	Spain
* EA6	043	Balearic Islands
* EA8	060	Canary Islands
* EA9	045	Ceuta & Melilla
EA9	063	Spanish Sahara (Ifni)
EB-EH	044	See EA
* EI-EJ	034	Republic of Ireland
EJ0	034	Aran Island
EK	013	See UA (European RSFSR)
* EL	071	Liberia
EM-EO	013	See UA (European RSFSR)
* EP-EQ	009	Iran
ER	013	See UA (European RSFSR)
ES	018	See UR2
* ET3	027	Ethiopia
EU-EW	019	See UC2
EX-EZ	013	See UA (European RSFSR)
* F	035	France
FA-FZ	035	See F
* FB8W	151	Crozet Island
* FB8X	198	Kerguelen Island
FB8Y	195	See KC4AAA
* FB8Z	249	Amsterdam & St. Paul Islands
* FC	037	Corsica
* FG7	093	French St. Martin
* FG7	109	Guadeloupe
* FH8	039	Mayotte
* FK	244	New Caledonia
FL8	017	See JZ8
* FM7	096	Martinique
* FO	158	Clipperton Island
* FO8	214	French Polynesia
* FP8	055	St. Pierre & Miquelon Islands
* F 7	034	Glorioso Island
* FR7	048	Juan de Nova & Europa Islands
* FR7	026	Reunion Island
* FR7	021	Tromelin Island
FS7	093	See FG7 (St. Martin)
FU8	246	See YJ
* FW8	240	Wallis & Futuna Islands
* FY7	099	French Guiana & Inini
* G	034	Great Britain
GA-GZ		British Territories
GB	034	See G (special)
* GD	034	Isle of Man
* GI	034	Northern Ireland
* GJ	037	Jersey Island
* GM	032	Scotland
* GU	037	Bailiwick of Guernsey & Dependencies
* GW	035	Wales
G5	034	See G (reciprocal)
* HA	027	Hungary
* HB	034	Switzerland
* HB0	034	Liechtenstein
* HC-HD	124	Ecuador
* HC8	138	Galapagos Islands
HE	034	See HB
HF	024	See SP
HG	027	See HA
* HH	099	Haiti
* HI	097	Dominican Republic
* HJ-HK	116	Colombia
* HK0	108	Bajo Nuevo
* HK0	123	Malpelo Island
* HK0	112	San Andres & Providencia Islands
HK0	111	See KS4 (Serrana)
HL	311	See HM (USA personnel)
* HM	311	Korea
HN	016	See YI
* HO-HP	116	Republic of Panama
* HQ-HR	118	Honduras
HR0	110	Swan Island
* HS	316	Thailand
HT	119	See YN
HU	120	See YS
* HV	035	Vatican City
HW-HY		France & French Colonies
* HZ	015	Saudi Arabia
H3	116	See HP
H5	071	Republic of Bophuthatswana
* H44	259	Solomon Islands
* I	034	Italy
IA-IZ	034	See I
IA5	034	Tuscan Archipelago
IC8	034	Capri & Ischia Islands
IE9	034	Ustica Islands
IF9	034	Levanzo Island
IG9	038	Lampedusa Islands
IH9	038	Pantelleria Islands
IM0	038	Maddalena Islands
* IS0	038	Sardinia
IT9	036	Sicily
IW	034	See I (VHF & above)
* JA	305	Japan
JB-JS	305	See J
JD	289	See 7J1
* JD1	298	Ogasawara (Bonin & Volcano) Islands
* JD1	289	Minami-Tori-Shima (Marcus) Island
JR6	305	See JA (Okinawa-Ryuku)
* JT1	332	Mongolia
JT-JV	332	See JT1
* JW	009	Svalbard & Bear Islands (Norway)
* JX	018	Jan Mayen Island (Norway)
* JY	023	Jordan
* J3A	099	Grenada & Dependencies W.I.
J4	029	See SV
J5	073	See CR3
* J28	017	Republic of Djibouti
K		See W
KA-KG		See W (with listed exceptions)
KA1		See JD1
KA1/2/6/8	305	See JA (USA personnel)
* KB6	250	Baker, Canton, Endenbury & Howland Islands
* KC4	101	Navassa Island
* KC4AAA/AAF	180	Antarctica
KC4USA/USZ	180	SEE KC4AAA
* KC6	280	Eastern Caroline Islands
* KC6	280	Western Caroline Island
* KG4	099	Guantanamo Bay, Cuba
* KG6	282	Guam
* KG6R/S/T	285	Northern Mariana Islands
KH1	250	See KB6
KH2	285	See KG6 (Guam)
KH3	263	See KJ6
KH4	280	See KM6
KH5	238	See KP6 (Palmyra)
KH5K	238	See KP6 (Kingman)
* KH6	260	Hawaii
* KH7	280	Kure Island
KH8	235	See KS6
KH9	278	See KW6
KH0	285	See KG6R/S/T
KI-KK		See W (with listed exceptions)
* KJ6	263	Johnston Island
* KL7	333	Alaska
KM-KO		See W (with listed exceptions)
* KM6	280	Midway Island
KP1	101	See KC4 (Navassa)
KP2	095	See KV4
KP3	111	See KS4 (Serrana)
* KP4	095	Puerto Rico
* KP6	238	Palmyra & Jarvis Islands
* KP6K	238	Kingman Reef
KQ-KZ		See W (with listed exceptions)
* KS4	111	Serrana Bank & Roncador Cay
* KS6	235	American Samoa
* KV4	095	Virgin Islands
* KW6	278	Wake, Wilkes & Peale Islands
* KX6	268	Marshall Islands
* KZ5	116	Canal Zone
* LA-LN	024	Norway
LA	180	See KC4AAA
LA	024	See LA-LN (Private)
LB	024	See LA-LN (Novice)
LF	024	See LA-LN (Business)
LG	024	See LA-LN (Special)
LJ	024	See LA-LN (School)
LO-LW	135	See LU
* LU	135	Argentina
LU-Z	180	See KC4AAA
* LX	033	Luxembourg
LY	020	See UP2
* LZ	027	Bulgaria
L2-L9	135	See LU
MA-MZ		British Territories
* M1	033	San Marino
N		See W
NA-NG		See W
NH1	250	See KB6
NH2	285	See KG6 (Guam)
NH3	263	See KJ6
NH4	280	See KM6
NH5	238	See KP6 (Palmyra)
NH5K	238	See KP6 (Kingman)
NH6	260	See KH6
NH7	280	See KH7
NH8	235	See KS6 (Samoa)
NH9	278	See KW6
NH0	285	See KG6R/S/T
NI-NK		See W
NL7	333	See KL7
NM-NO		See W
NP1	101	See KC4 (Navassa)
NP2	095	See KV4
NP3	111	See KS4
NP4	095	See KP4
NQ-NZ		See W
* OA-OC	132	Peru
* OD5	023	Lebanon
* OE	028	Austria
OF-OJ	018	See OH
* OH	018	Finland
* OH0	020	Aland Islands
* OH0M	020	See OJ0
* OJ0	020	Market Reef
* OK-OM	028	Czechoslovakia
OK4-0	028	See OK-OM (Special)
OL	028	See OK-OM (Novice)
* ON	028	Belgium
OO-OT	028	See ON
OR		See ON (Expedition)
OR4	180	See KC4AAA
OU-OW	025	See OZ
* OX3	032	Greenland
OX4/5	032	See OX3 (USA personnel)
* OY	028	Faeroes Islands
* OZ	025	Denmark

* PA	031	Netherlands
PB-PI	031	See PA
* PJ		Netherlands Antilles (see below)
PJ2/9	104	Curacao
PJ3/9	104	Aruba
PJ4/9	103	Bonaire
PJ5/8	095	St. Eustatius (with Sint Marteen)
PJ6/8	093	Saba Island
* PJ7/8	093	Sint Marteen (with St. Eustatius)
PK-PO	293	See YB
PP-PX	115	See PY
* PY	115	Brazil
* PY0	096	Fernando & Noronha Islands
* PY0	094	St. Peter & St. Paul's Rock
* PY0	108	Trindade & Martim Vaz Islands
* PZ	101	Surinam
* P29	265	Papua New Guinea
P3	024	See 5B4
P4	100	See PJ
P5-P9	311	See HM
Q		Q-signal use only
RA-RZ		See U (R is Novice)
RA1	013	See UA1 (RSFSR)
RA2	022	See UA2
RA3	013	See UA3
RA4	013	See UA4
RA6	013	See UA6
RA9	348	See UA9
RA0	348	See UA0
RB5	019	See UB5
RC2	019	See UC2
RD6	012	See UD6
RF6	013	See UF6
RG6	015	See UG6
RH8	001	See UH8
RI8	358	See UI8
RJ8	352	See UJ8
RL7	356	See UL7
RM8	350	See UM8
RO5	022	See UO5
RP2	020	See UP2
RQ2	018	See UQ2
RR2	018	See UR2
SA-SI	021	See SM
SJ	021	See SM (Private)
SK	021	See SM (Club)
SL	021	See SM (Military)
* SM	021	Sweden
SM8		See SM (outside Sweden)
SN-SR	024	See SP
* SP	024	Poland
SSA-SSM	028	See SU
SSN-STZ	033	See ST2
* ST2	033	Sudan
* ST0	040	Southern Sudan
* SU	028	Egypt
* SV	029	Crete
* SV	029	Greece
* SV	029	Mount Athos
* SV5	028	Dodecanese Islands
SW-SZ	029	See SV
* S2	327	Bangladesh
S6	303	See 9V1
S8	082	Transkei
* S9	062	Democratic Republic of St. Thomas & Princepe
* S79	004	Republic of Seychelles
* TA-TC	021	Turkey
TD	120	See TG
TE	119	See TI
* TF	028	Iceland
* TG9	120	Guatemala
TH		French Community
* TI	119	Costa Rica
* TI9	127	Cocos Islands
* TJ	061	Cameroon
TK		French Community
* TL8	053	Central African Republic
TM		French Community
* TN8	066	Congo Republic
TO-TQ		French Community
* TR8	067	Gabon Republic
TS	039	See 3V8
* TT8	052	Republic of Chad
* TU	072	Ivory Coast
TV-TX		French Community
* TY	066	Peoples' Republic of Benin (Dahomey)
* TZ	068	Mali Republic
U		Russian Soviet Federated Socialist Republic (RSFSR)
* UA1	013	European RSFSR
* UA1	003	Franz Josef Land
UA1	180	See KC4AAA
* UA2	022	Kaliningradsk
UA3	013	See UA1 (European)
UA4	013	See UA1 (European)
UA6	013	See UA1 (European)
* UA9	348	Asiastic RSFSR
UA0	348	See UA9
* UB5	019	Ukraine
* UC2	019	White RSSR (Byelorussia)
* UD6	012	Azerbaijan
* UF6	013	Georgia
* UG6	015	Armenia
* UH8	001	Turkoman
* UI8	358	Uzbek
* UJ8	352	Tadzhik
UK1	013	See UA1 (K is Club)
UK2	019	See UC2
UK2B	020	See UP2
UK2C	019	See UC2
UK2F	022	See UA2
UK2G	018	See UQ2
UK2I	019	See UC2
UK2L	019	See UC2
UK20	019	See UC2
UK2P	020	See UP2
UK2Q	018	See UQ2
UK2R	018	See UR2
UK2S	018	See UC2
UK2T	018	See UR2
UK2W	019	See UC2
UK3	013	See UA1
UK4	013	See UA1
UK5A-N	019	See UB5
UK5O	022	See UO5
UK5P-Z	019	See UB5
UK6	013	See UA1
UK6C	012	See UD6
UK6D	012	See UD6
UK6F	013	See UF6
UK6G	015	See UG6
UK6K	012	See UD6
UK6O	013	See UF6
UK6Q	013	See UF6
UK6V	013	See UF6
UK7	356	See UL7
UK8H	001	See UH8
UK8I	358	See UI8
UK8J	352	See UJ8
UK8M	350	See UM8
UK8N	350	See UM8
UK8R	352	See UJ8
UK9	348	See UA9
UK0	348	See UA9
* UL7	356	Kazakh
* UM8	350	Kirghiz
UN1	018	Karelo-Finnish Republic
* UO5	022	Moldavia
* UP2	020	Lithuania
* UQ2	018	Latvia
* UR2	018	Estonia
UT5	019	See UB5
UV1/3/4/6	013	See UA1 (European)
UV9/0	348	See UA9
UW1/3/4/6	013	See UA1 (European)
UW9/0	348	See UA9
UY5	019	See UB5
UZ3	013	See UA1 (European)
VA-VG		See VE
* VE		Canada
* VE1	056	Sable Island
VE1	060	See VE (New Brunswick, Nova Scotia & Prince Edward Island)
* VE1	054	St. Paul Island
VH-VN	247	See VK
* VK	247	Australia
* VK2	239	Lord Howe Island
* VK9	260	Mellish Reef
* VK9N	237	Norfolk Island
* VK9X	290	Christmas Island
* VK9Y	296	Cocos Keeling Island
* VK9Z	265	Willis Islands
VK0	180	See KC4AAA
* VK0	200	Heard Island
* VK0	218	Macquarie Island
VO		See VE
VO1	053	See VE (Newfoundland)
VO2	042	See VE (Labrador)
VP-VS		British Territories
* VP1	114	Belize (British Honduras)
VP2		Windward & Leeward Islands (see below)
* VP2A	094	Antigua & Barbuda, L.I.
* VP2D	095	Dominica, W.I.
* VP2E	093	Anguilla, L.I.
VP2G	099	See J3A
* VP2K	095	St. Kitts & Nevis Islands, L.I.
* VP2L	097	St. Lucia, W.I.
* VP2M	094	Montserrat, L.I.
* VP2S	098	St. Vincent & Dependencies, W.I.
* VP2V	094	British Virgin Islands, L.I.
* VP5	094	Turks & Caicos Islands
VP8	155	See KC4AAA
* VP8	145	Falkland Islands
* VP8	142	South Georgia Islands (also LU-Z)
* VP8	148	South Orkney Islands (also LU-Z)
* VP8	152	South Shetland Islands (also LU-Z)
* VP8	140	South Sandwich Islands (also LU-Z)
* VP9	077	Bermuda
* VQ9	339	Chagos Archipelago
* VR1	253	British Phoenix Islands
* VR1	253	Gilbert & Ocean Islands
* VR3	235	Northern Line Islands (with VR7)
VR4	259	See H44
* VR6	192	Pitcairn Island
VR7	235	Central & Southern Line Islands (with VR3)
* VR8	253	Tuvalu Islands
* VS5	297	Brunei
* VS6	311	Hong Kong
VS9	342	See 8Q
* VS9K	022	Kamaran Islands
VT-VW	344	See VU2
* VU2	344	India

* VU7	344	Laccadive Islands
* VU7	322	Nicobar & Andoman Islands
VX-VY		See VE
VY1		See VE (Yukon)
VZ	247	See VK
* W		United States of America
WA-WG		See W
WH1	250	See KB6
WH2	285	See KG6 (Guam)
WH3	263	See KJ6
WH4	280	See KM6
WH5	238	See KP6 (Palmyra)
WH5K	238	See KP6 (Kingman)
WH6	260	See KH6
WH7	280	See KH7
WH8	235	See KS6 (Samoa)
WH9	278	See KW6
WHØ	285	See KG6/R/S/T
WI-WK		See W
WL7	333	See KL7
WM-WO		See W
WP1	101	See KC4 (Navassa)
WP2	095	See KV4
WP3		See KS4 (Serrana)
WP4	095	See KP4
WQ-WZ		See W
XA-XI	126	See XE
* XE	126	Mexico
* XF4	155	Revilla Gigedo/Sorocco
XJ-XO		See VE
XP		See OZ (Special)
XP1	032	See OX3 (Special)
XQ-XR	140	See CE
XS	320	See BY
* XT2	155	Voltaic Republic (Upper Volta)
* XU	310	Khmer Republic (Cambodia)
* XV5	308	South Vietnam
* XW8	316	Loas Peoples' Democratic Republic
XX		See CT1 (Portuguese Territories)
XY	322	See XZ
* XZ	322	Socialist Republic of the Union of Burma
* YA	357	Afghanistan
* YB	293	Indonesia
YC-YH	293	See YB
* YI	016	Iraq
* YJ	246	New Hebrides
* YK	023	Syria
YL	018	See UQ2
YM	021	See TA
* YN	119	Nicaragua
* YO-YR	025	Romania
* YS	120	El Salvador
YT	028	See YU
* YU	028	Yugoslavia
* YV	105	Venezuela
* YVØ	103	Aves Island
YZ	028	See YU
Y2-9	027	See DM (Y3 is Club)
* ZA	030	Albania
ZB-ZJ		British Territories
* ZB2	048	Gibraltar
ZC4	024	See 5B4
* ZD7	085	St. Helena Island
* ZD8	089	Ascension Islands
* ZD9	116	Tristan de Cunha & Gough Islands
* ZE	067	Zimbabwe (Rhodesia)
* ZF	104	Cayman Islands
ZK-ZM		See ZL
* ZK1	221	North Cook Islands
* ZK1	230	South Cook Islands (Manihiki)
* ZK2	231	Niue Island
* ZL	227	New Zealand
* ZL/A	220	Auckland & Campbell Islands
* ZL/C	218	Chatham Island
* ZL/K	229	Kermadec Island
ZL5	180	See KC4AAA
* ZM7	240	Tokelau Islands
ZN-ZO		British Territories
* ZP	127	Paraguay
ZQ		British Territories
ZR-ZU		See ZS
* ZR3	086	Southwest Africa (Namibia)
* ZS	103	Republic of South Africa (But Not ZS3)
ZS1ANT	180	See KC4AAA
* ZS2	133	Prince Edward & Marion Islands
ZS3	086	See ZR3
ZV-ZZ	115	See PY
* 1S	308	Spratly Islands
2A-2Z		British Territories
* 3A	036	Monaco
3B6	011	Agalega Island (with 3B7)
3B7	013	St. Brandon Island (with 3B6)
* 3B8	014	Mauritius Island
* 3B9	355	Rodriguez Island
* 3C	064	Equatorial Guinea
* 3CØ	064	Annobon
* 3D2	240	Fiji Islands (3DN-3DZ)
* 3D6	081	Swaziland (3DA-3DM)
3E-3F	116	See HP
3G	140	See CE
3H-3U	320	See BY
* 3V8	039	Tunisia
3W8	316	North Vietnam
* 3X	074	Republic of Guinea
3Y	180	See KC4AAA (Norwegian)
3Y *	135	Bouvet Island (Norwegian)
3Z	024	See SP
4A-4C	126	See XE
4B-4I	297	See DU
4J-4L		See U
4K1	180	See KC4AAA (Russian)
4M	105	See YV
4N-4O	028	See YU
4P-4R	334	See 4S7
* 4S7	334	Sri Lanka (Ceylon)
4T	132	See OA
* 4U	034	ITU, Geneva, Switzerland
* 4U		UN Headquarters, New York
4V	099	See HH
* 4W	022	Yemen
4X4	020	Israel
4Y		International Civil Aviation Organization
4Z4	020	See 4X4
* 5A	040	Libyan Arab Republic
* 5B4	024	Cyprus
5C-5G	051	See CN
5H1	043	Zanzibar
* 5H3	042	Tanzania
5I	042	See 5H3
5J-5K	116	See HK
5L-5M	071	See EL
* 5N2	066	Nigeria
5O	066	See 5N2
5P-5Q	025	See OZ
* 5R8	042	Madagascar (Malagasy Republic)
5S	042	See 5R8
* 5T5	068	Mauritania
* 5U7	060	Niger Republic
* 5V	067	Togo Republic
* 5W1	236	Western Samoa
* 5X5	045	Uganda
5Y	040	See 5Z4
* 5Z4	040	Kenya
6A-6B	028	See SU
6C	023	See YK
6D-6J	126	See XE
6K-6N	311	See HM
* 6O	027	Somali Republic
6P-6S	354	See AP
6T-6U	033	See ST
6V	071	See 6W8
* 6W8	071	Senegal Republic
6X	042	See 5R8
* 6Y5	105	Jamaica
6Z	071	See EL
7A-7I	293	See YB
7J-7N	305	See JA
* 7J1	289	Okino-Tori-Shima (Marcus)
* 7O	022	South Yemen Republic (Kamaran Island)
* 7P8	090	Lesotho
* 7Q7	060	Malawi
7R	043	See 7X
7S	021	See SM
7T-7Y	043	See 7X
* 7X	043	Algeria
7Z	015	See HZ
8A-8I	293	See YB
8J	180	See KC4AAA (Japanese)
8J-8N	305	See JA
8O	080	See A2C
* 8P6	097	Barbados
* 8Q6	342	Maldive Islands
* 8R	101	Guyana
8S	021	See SM
8T-8Y		See VU2
* 8Z4	016	Saudi Arabia-Iraq Neutral Zone
9A	033	See M1
9B-9D	009	See EP
9E-9F	027	See ET3
* 9G1	068	Ghana
* 9H1	036	Malta
9H4	036	Gozo Island
9H5	036	See 9H1
9I	066	See 9J
* 9J	066	Zambia
* 9K2	013	Kuwait
* 9L1	075	Sierra Leone
* 9M2	308	Federation of Malaysia (West)
* 9M6	296	Sabah (East Malaysia)
9M8	306	Sarawak
* 9N1	338	Nepal
90-9T	066	See 9Q5
* 9Q5	066	Republic of Zaire (Congo)
* 9U5	052	Burundi
* 9√1	303	Republic of Singapore
9W	308	See 9M2
* 9X	050	Rwanda
* 9Y4	100	Trinidad & Tobago Islands

This is Jack Danner (KA4ESB) of Jacksonville, Florida. Jack is the Administration Manager for the Aerospace Division of UOP, Inc. He is another in a long list of retread Novices, having held KN4DLA in 1955. He rejoined the amateur radio service ranks in October of 1978. He has worked 45 states and 17 countries as KA4ESB with a Kenwood TS-520-S Transceiver. He likes to work DX on 10 meters and to chat with USA amateurs on 15 meters. Jack is also a pilot with both instrument and flight instructor ratings.

Just callsign prefixes are shown in the preceding list. It must be understood that each prefix can be followed by a wide variety of suffixes. Simply note the beginning part of the other amateur's callsign and look for it in the list. Comparing this list to associated data in *Callbooks* and DX-CC lists should convince you that this list details what you need to know in a very simple format. As is true in most of my articles, this month's column is based on a printed aid distributed to my licensing course students. I simply expand my course handouts to provide more detailed explanations to people I will not have a chance to instruct in person. Incidentally, if you have not read the April and May 1979 columns about callsigns used by American amateurs, you should read them to have an even better understanding of this subject.

If you want to improve your understanding of DX bureaus and the proper use of QSL cards, read the January through March 1979 Novice columns.

The preceding list can prove to be a very useful operating aid. It enables you to quickly identify each country you hear and it shows whether or not it has credit towards the DXCC award. It is a simple matter to cross off each country as it is confirmed by receipt of a QSL card. If you use this system, remember to cross off all prefix combinations that apply to each country as it is confirmed. As an example, if you get a QSL from a Cuban with a callsign such as CM7RO, mark off CL, CM, and CO. Another good way to use this list is to add in antenna headings; this will enable you to aim your directional antenna right at each country as you hear it. Headings from Los Angeles are show as an example and as an aid to southern California amateurs. If you have a world radio map centered on your location, it is a simple matter to extract required azimuth headings. If this kind of map is not available to you, check with local major stores selling amateur equipment, since they sometimes publish these lists as a service to their customers. There are also outfits which provide a computer-made map based on your precise geographic location. No matter how you get them, it is a good idea to add azimuth headings to the preceding list as an operating convenience.

The latest DXCC list shows that there are 318 "countries" available to new amateurs. Put up a directional antenna for 10 and/or 15 meters and have a little fun working DX. If you do this, you will quickly realize that this callsign prefix list is very helpful.

DX Net for Novices and Technicians

The National Novice DX Net (NNDXN) starts Saturday 1 December 1979 on 28,105 KiloHertz at 1500 UTC (7 AM PST, 8 AM MST, 9 AM CST, and 10 AM EST). If you are interested in participating in this net to increase your operating proficiency and DX countries total, send a self-addressed and stamped envelope to Paul Heroux (KA9AZZ), 120 Harlem, Glenview, Illinois 60025. It is extremely important that every net participant follow the exact instructions of the net control station (NCS), which will be either KA9AZZ or WD9EJE.

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

73, Bill, W6DDB

a monthly feature by

A. EDWARD HOPPER, W2GT

Awards

News of certificate and award collecting

The January, "Story of The Month" as told by Ray is:

Ray Phillips, K5RPC
All Counties #58, 6-5-71

"Born in Chester, Pennsylvania in the 30s, we immigrated to Texas in 1948. Shortly thereafter, was able to obtain a Texas citizenship (Ha).

"Became interested in radio in 1956, while teaching Guided Missile School for the USAF. First licensed as K0KVT in Denver, Colorado.

"Patsy, a native Texan, and I were married in 1955 and have a daughter Brenda and a son, Ray.

"Returned to Texas in 1958, and went to work for the C.A.A., now the Federal Aviation Administration, as an Electronics Technician. Presently maintain Navigation equipment at one of the airports in Houston.

"My County Hunting activities began in January, 1970, when I ran across the Kansas City group on 75 meters. They seemed to be having fun, so I joined in. When I later found out about the 20 meter frequency, I had a problem. No 20 meter antenna! Temporarily, I erected a dipole that was 15 feet above the ground, and this was my only antenna for 20 meters until I installed a beam in 1977.

"My first mobile trip was almost my last! Went to Aransas County, Texas, one evening. These Texas coast mosquitos are mean, they fought over me to see which pair would carry me off, by the ears. However, I managed to escape.

"On another trip, Hank, W5ULN, and I limped into a small, backroad town in the Louisiana swamps, desperately needing gas, in the wee morning hours. We almost didn't get it, as the station attendant, peering at all the radios and antennas, was convinced we were revenuers! This was the trip we were able to give K8YGU (#44) his last in the U.S. While in Mississippi, Hank and I were thrown off the FHC/CHC net for trying to run a county line. This added more fuel to the fire, and eventually the Independent County Hunters Net was formed.

"My last county, Kalawao, Hawaii appeared one Sunday afternoon. The phone started ringing off the hook, and after waiting 3 months, I couldn't be found! I was helping build a trailer for the Boy Scouts and Patsy called everywhere. Returning home, Patsy calmly told me Kalawao was on the air. After expressing my opinion on her sense of humor, she told me to go listen. That was it!

P.O. Box 73, Rochelle Park, N.J. 07662

Special Honor Roll
All Counties

#246 Lesley L. Shockey, WB8SNO 8-31-79
#247 Howard J. Siegel, WA2GLU 9-7-79
#248 Douglas E. Williams, WB9ZQA 9-10-79
#249 Loren M. Tate, W0RP 9-17-79
#250 Thomas A. Ross, K9GTQ 9-20-79
#251 David L. Sather, W7NXZ 9-20-79

"I'm very happy to have been able to become a Charter member of MARAC when it was formed. Another big thrill was being awarded the 1st Net Control of the year, in 1970.

"Patsy, the XYL, never had any interest in radio, until the hunting of counties began. Interest was stirred when she began meeting the County Hunters, XYLs, and harmonics. Since then, she has driven most of our mobile trips, kept logs, and also has been active in helping us form a local amateur radio club. She often monitors the net, letting me know the progress of various mobiles, destinations, counties, etc. In addition to her duties as a County Hunter's wife (and

Left to right in the foto taken March 5, 1978 are Ray Phillips, K5RPC; Willis, K5WQM' and Curt George, W4SSU.

mother), in her spare time she is an Office Manager for an Insurance Company in Houston.

"Brenda, our daughter, recently returned from a 3½ year trip to England. Her OM is in the USAF, and they are presently at Austin, Texas. Really convenient for us to baby-sit on occasions.

"Our son, Ray, is an apprentice machinist and likes it very much. Maybe because of all the automobile engines we rebuilt for a few years.

"Patsy and I have always had an open house for the County Hunters. On one occasion we had 5 of the first 60 Cliff Corne members at a party and were somehow able to provide sleeping accommodations for 23 people, including harmonics.

"Have one more county to work for the 2nd time around. Have enjoyed meeting the new County Hunters, as well as renewing friendships with the older ones. As we have said before, the County Hunters are a fine bunch of people and 'YALL WELCOME'.

"Present station equipment is a Kenwood TS-820S, Yaesu FL 2100B and a beam at 40 feet. I use a Yaesu FT-101-E with a Hustler for the Mobile rig.

"Patsy and I are very avid fisher (people) and also like crabbing. A very bad experience last year caused the

Mississippi, The Magnolia State Award.

US Coast Guard to tow us in, after a 9 hour wait. Moral: Don't lend the spare battery to your son, unles you replace it before going fishing.

"Been working on WPX of late, which is also much fun. Again, nice knowing you all, see you on the Net."

Awards Issued

Les Shockey, WB8SNO waited until he had them all and qualified for USA-CA-500 through USA-CA-3000 endorsed all S.S.B., All 20, All Mobiles and All Counties endorsed All S.S.B., All 20.

Howard Siegel, WA2GLU/WB5QLU added USA-CA-3000 and All Counties to his fine collection.

Doug Williams, WB9ZQA also waited until he had them All and received USA-CA-500 through All Counties endorsed All S.S.B.

Loren Tate, W0RP (ex W0BHC) found time for his paper work and was issued USA-CA-1500 through All Counties endorsed Mixed.

Tom Ross, K9GTQ found time for catching up on his QSLs and paper work and letters to add All 75, All 14 to his USA-CA-2000; to add All 14 to his USA-CA-2500 and then added USA-CA-3000 endorsed All S.S.B. All Mobiles and All Counties endorsed All S.S.B.

Dave Sather, W7NXZ requested USA-CA-500 through All Counties endorsed Mixed.

Dave Christensen, WA9WGJ collected USA-CA-2500 endorsed All S.S.B.

The Old South Award.

Don Priebe, W2IN (ex W2IAM) had me send him USA-CA-2500 endorsed Mixed.

Bill Grim, W0MHK claimed USA-CA-2000 endorsed Mixed.

Maury Mead, W9FBC won USA-CA-1500 endorsed Mixed.

Larry Riedel, K8ABD sent for USA-CA-500 endorsed Mixed.

Eric Rogers, 9H4G was sent USA-CA-500 endorsed All 2 x S.S.B., #1 so endorsed to Malta.

Suzanne Eichacker, WB1ATJ was issued USA-CA-500 endorsed All C.W.

Richard Eichacker, WB1ATK obtained USA-CA-500 endorsed All A-1.

Awards

Freeze Your Arctic Off Certificate: The annual Freeze Your Arctic Off Expedition starts about 2130Z January 19, 1980 and travels the frozen wastes of Lake St. Clair, near the US-Canadian border using batter power. The primary operating frequency will be around 7.275 MHz. A phased vertical array will be used for 40, and for the local amateur they will operate on 146.52, .55 and .58 MHz. Previous experience has shown that almost nationwide coverage is obtained on 40. No s.a.s.e. is necessary, for the certificate, just QSL to Ford Tin Lizzy Club, North Metro Chapter, Box 545, Sterling Heights, Michigan 48078.

USA-CA Honor Roll

3000		2000		1000	
WB8SNO	275	WB8SNO	385	WB8SNO	560
WA2GLU	276	WB9ZQA	386	WB9ZQA	561
WB9ZQA	277	W0MHK	387	W7NXZ	562
W0RP	278	W0RP	388	500	
K9GTQ	279	W7NXZ	389	WB8SNO	1386
W7NXZ	280	1500		K8ABD	1387
2500		WB8SNO	440	WB9ZQA	1388
WB8SNO	339	W9FBC	441	W7NXZ	1389
WA9WGJ	340	WB9ZQA	442	9H4G	1390
W2IN	341	W0RP	443	WB1ATJ	1391
WB9ZQA	342	W7NXZ	444	WB1ATK	1392
W0RP	343				
W7NXZ	344				

Certificate World Awards: The following four Awards are available to all amateurs for two-way communication in the separate award areas. All modes of communication can be used, except for repeaters. All awards are custom printed and suitable for framing. A list showing contact information is all that is needed. The list must be certified by having one other amateur sign it, attesting to its correctness. Do not send QSL cards.

For each certificate requested, send one dollar in cash, check or 10 IRCs. Send to: Certificate World, Rt. 2, Box 72, Fulton, Mississippi 38843.

#1. **The Old South:** This certificate depicts a scroll, listing the 11 states of the Old South. It is for one contact from each of the following states: Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas and Virginia.

The Freeze Your Arctic Off Annual Expedition Certificate.

#2. **Old Man River:** A certificate picturing the mighty Mississippi River and the ten states bordering the river. A description of the river is included. To earn it you must have one two-way communication with all ten states: Arkansas, Illinois, Iowa, Kentucky, Louisiana, Minnesota, Mississippi, Missouri, Tennessee, and Wisconsin.

#3. **Mississippi:** If you thought your first Mississippi QSO was hard to get, try getting a total of ten to earn this

Stu Heering, WB5ULD the man behind the Certificate World Awards.

award. A state outline and statistics add up to an interesting award for your hard work.

#4. **Capitols of The United States:** This one will not come easy. You must have a two-way communication with all 50 state capitols plus Washington, D.C. Fifty-one QSOs will earn you an award listing some facts about the U.S. Capitol and proof of a lot of hard work and fun.

Canadaward: The Canadian Amateur Radio Federation Inc. is pleased to offer the following awards to all Radio Amateurs, worldwide. A colorful certificate will be issued to any Amateur who confirms two-way QSOs with all Canadian Provinces and Territories. All Seperate awards are issued for each band on which the applicant qualifies (12 cards per band). A Mode endorsement is available if all QSOs are made on the same mode (c.w., s.s.b., RTTY, SSTV). Contacts made after 1 July 1977 only, will count for this award. Submit the 12 cards with one dollar ($1.00) Canadian or US funds or 10 IRCs plus sufficient funds for return postage. CARF members need send only funds for return postage.

5 Band Canadaward: A special plaque will be issued to any Amateur who confirms two-way QSOs with all Canadian provinces and Territories on each of five separate bands (total of 60 cards -12 cards per band). Contacts made after 1 July 1977 only, will count for this award. Submit the 60 cards with Seven

Old Man River Certificate.

Capitols of the United States Certificate.

Dollars ($7.00) Canadian or US funds or 70 IRCs plus sufficient funds for return postage. All CARF awards are FREE to CARF members who need send only funds to cover return postage.

6 Band Canadaward, 7 Band Canadaward *etc.:* Special endorsements to the basic 5 Band Canadaward will be issued to any Amateur who confirms two-way QSOs with all Canadian Provinces and Territories on more than 5 Bands. Submit the additional cards with sufficient funds for return postage.

List Of Canadian Provinces And Territories:

VO1/VO2 Newfoundland/Labrador
VE1 Prince Edward Island
VE1 Nove Scotia
VE1 New Brunswick

VE2 Quebec
VE3 Ontario
VE4 Manitoba
VE5 Saskatchewan
VE6 Alberta
VE7 British Columbia
VE8 Yukon Territory
VE8 Northwest Territories.
Note: VO2, Labrador, is part of the Province of Newfoundland and counts for Newfoundland.
All Amateur bands may be used. Each distinct satellite mode (432in/144out, 144in/29out, 144in/432out, etc.) will count as a separate band. Mail applications for Canadawards to: P.O. Box 76752, Vancouver, B.C., Canada V5R 5S7.

My friend Arthur Milne, G2MI who handled the Radio Society of Great Britain QSL bureau from September 1939 until January 1, 1978 and then turned it over to G3DRN. Art would guess he handled at least 56 million QSLs. L. to R. in front is son Roger, Roger's wife Pat with daughter Eleanor on lap, daughter Janet. In rear, Lucy, Art's wife and Art, G2MI. Missing from the foto is Geoff Milne, G3UMI, wife Mary and children Julia and David.

Notes

Again, my apologies for the delays of the Plaques, and as a New Year is present, I hope all are made, sent out and received by the time you read this.

The identifications under the two photographs in the October column got switched. The foto of the nice ham shack was that of Mike Gilmore, K7CLO, All Counties #197. And the foto tagged Mike, K7CLO was actually Gar, W7CUJ, All Counties #220 and his foto was also in my July '79 column. Gar did say that the rig foto would almost pass as his, set-up almost the same.

Don't forget, All *CQ* Awards now cost $5.00.

May I wish YOU ALL the very very best in 1980, 73, Ed., W2GT.

Some time back (October, 1978) CQ published an article discussing the amateur and his pacemaker. Here is another article on the subject that's worth reading—whether you use a pacer or not.

Electromagnetic Interference and The Pacemaker

BY GERALD SAMKOFSKY*, N4ZB

In the past the radio amateur often faced problems of b.c.i., t.v.i. and similar interference problems. Each presented hardships to the amateur who was at once devoted to the hobby, yet wanted peaceful conditions with his neighbors.

As the electronic industry entered a more sophisticated era, a new problem dealing with r.f. interference emerged, more serious than b.c.i. or t.v.i., it could in fact halt the function of a tiny, life-sustaining electronic device known as a **cardiac-pacemaker** and, momentarily, possibly cause much harm to an already weakened heart!

Electronic cardiac pacemaker. *An electronic device that can control the beating of the heart by a rhythmic discharge of electronic impulses.*

About a year ago my XYL entered a local hospital (Florida Hospital-Orlando) to determine why she would "black out" at times. A series of tests revealed that two or three muscle groups (*atrio-ventricular bundle*) were no longer functioning leaving only a single muscle to pump blood through her body. Her cardiologist then informed her she would require a pacemaker to sustain life in the near future.

On studying a brochure from a leading manufacturer one section caught my eye..."E.M.I."—Electromagnetic Interference. The pacemaker recipient is warned to stay away from such interference sources as diathermy equipment, microwave ovens, *amateur radio transmitting equipment!*

Did this mean that I would have to curtail my beloved ham radio hobby? More important to me now as I faced retirement years?

I discussed this factor with a leading cardiologist who at once suggested his electronic knowledge was nil. But he knew of occasions where r.f. had interfered with normal action of cardiac pacemakers. In discussing this problem with other local amateurs, I learned that pacemaker recipients were more numerous in Florida, since many retired folks had heart disease problems requiring pacemaker action.

Letters were sent to leading pacemaker manufacturers to learn what might be done to minimize this type of interference.

1. Kenneth W. Exworthy (KA0DAU) manager EMC Department, Physiological Research Labs kindly supplies the following information. Two models (Medtronic *Xytron* and *Xyrel*) are not affected to levels of over 500 v/m (200 v/m is the biological hazard level.) Their lab uses a signal with 25 ms "on-time" and 660 ms "off-time" for testing. He further recommends feed line must be of shielded type,

Two pacemaker models, the 6MD2184 and the 6MA3719.

**1420 Mount Vernon Drive, Holiday FL 33590*

antennas should be as high as possible keeping the antenna boresite pointed away from the house. Good low-impedance ground, good shielding of finals are also musts.

2. Cardiac Pacemakers, Inc. goes even further in their warning! Avoid linear power amplifiers, keep r.f. to 75 watts or less, and agrees good shielding is a must.

New models are emerging featuring titanium housings plus feedthrough filters. Certain models contain "demand unit" which reverts to a synchronous operation where strong continuous interference occurs.

Can a pacemaker recipient himself continue his ham radio hobby? Bill Schoppe (WB4DWA) apparently enjoys ham radio operation while receiving life sustaining action from his pacemaker implant.

Several cautionary measures are worthwhile noting. Where a radio amateur club is located in a school building, determine whether pacemaker recipients (Students or teachers) are located close to transmitting area. A neighbor, too, might have a pacemaker.

Where mobile operation is available, the amateur can enjoy his hobby away from a member of the family wearing a pacemaker. Again, if the pacemaker recipient is ambulatory, he/she might visit a neighbor (away from r.f. field) while hubby, etc., operates.

Electromagnetic interference (emi). *Any stray electrical or magnetic waves which could stimulate heart activity and unless properly protected against, could temporarily affect the normal function of a pacemaker (ie, upset the normal programming thus defeating pacemaker's life-supporting purpose.)*

Apart from the interference problem, the basic engineering of a modern pacemaker is worth studying. Extremely compact in size, approx. 56 mm diam. x 19 mm thick, one unit features programmable pacing rates from 30 to 130 pulses per minute. Shielded in a titanium casing, lithium-iodine batteries supplies 5.56 volts at 1.4 amp. hours lasting for years. . . all this around the pulse-generator! This precision instrument begins to deliver a stimulus *only* when the recipient's heart beat rate falls *below* the pre-set rate of the pulse-generator.

Admirably enough, many of the engineers responsible for today's sophisticated pacemakers are active amateurs. Perhaps some of the *CQ* readers, using amateur ingenuity will further correct EMI interference problems. . . even adding to the amazing circuitry of pacemakers.

References

1. Physiological Research Labs.
Div. Medtronics, Inc.
1500 Northdale Blvd.
Minneapolis, MN 55433
Attn: Mr. K. W. Exworthy

2. Cardiac Pacemakers, Inc.
4100 No. Hamline Ave.
St. Paul, MN 55165

3. Wm. Schoppe, WB4DWA
1100 102nd Ave. N. Apt. 103
St. Petersburg, FL 33702
(Send S.A.S.E. for info.)

The author will be glad to answer questions raised in this article. Please include a s.a.s.e. when writing.

No-71-72

Announcing:

The 24th Annual CQ World Wide WPX Contest

SSB: March 29-30, 1980
& C.W.: May 24-25, 1980

Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

I Contest Period: Only 30 hours of the 48 hour contest period permitted for Single Operator stations. The 18 hours of non-operating time may be taken in up to 5 periods anytime during the contest, and must be clearly indicated on the log. Multi-operator stations may operate the full 48 hours.

II Objective: Object of the contest is for amateurs around the world to contact as many amateurs in other parts of the world as possible during the contest period.

III Bands: All bands, 1.8 thru 28 MHz may be used.

IV Type of Competition: 1. Single Operator (a) All Band, (b) Single Band. 2. Multi-operator, All Band *only*. (a) Single Transmitter, (only one signal permitted), (b) Multi-Transmitter, (one signal per band permitted).

V Exchange: RS(T) report plus a progressive three digit contact number starting with 001 for the first contact. (Continue to four digits if past 1000) Multi-transmitter stations use separate numbers for each band.

VI Points: 1. Contacts between stations on different continents; count 3 points on the 14, 21, and 28 MHz. bands, and 6 points on the 7, 3.5 and 1.8 MHz. bands.

2. Contacts between stations in the same continent but not in the same country; count 1 point on 14, 21 and 28 MHz. and 2 points on 7, 3.5 and 1.8 MHz. (Exception: Contacts between different North American countries count 2 points on 14, 21 and 28 MHz. and 4 points on 7, 3.5 and 1.8 MHz. This applies to North American countries **only**).

3. Contacts are permitted between stations in the same country for the purpose of obtaining a Prefix multiplier, but have no QSO point value.

4. A Station in a call area different than that indicated by its call sign is required to sign portable. The portable Prefix would be the multiplier as indicated in Section VII (below).

VII Multiplier: The multiplier is determined by the number of different prefixes worked. A **"PREFIX"** is counted once during the entire contest regardless of how many times the same prefix is worked.

A **"PREFIX"** is considered to be the three letter/number combination which forms the first part of an amateur radio call. (N1, W2, WB3, K4, AA6, WD8, 4X4, DL7, G3, IT9, KH2, AL7, NP2, WP4, 9M2, CT9, 4J9, PY7, VK4, JE3, VE3, etc.). See the WPX Awards Program information if additional clarification is necessary. It is available from K6XP.

Special event, commemorative and other unique prefix stations are also encouraged to participate.

VIII Scoring: 1. Single Operator (a) All Band score, total QSO points from all bands multiplied by the number of different Prefixes worked. (b) Single Band score, QSO points on the band multiplied by the number of different Prefixes worked. See VII.

2. Multi-Operated stations. Scoring in both these categories is the same as the All Band scoring for Single Operator.

3. A Station may be worked once on each band for QSO point credit. However, prefix credit can be taken only **once** regardless of the band.

IX QRPp SECTION: (Single Operator Only). Power must not exceed 5 watts ouput to qualify for QRPp section competition. You must denote QRPp on the summary sheet and state the actual maximum power output used for all claimed contacts. Results will be listed in a separate QRPp section and certificates will be awarded to each top scoring QRPp station in the order indicated in Section X. These certificates will be marked QRPp and show your power output. QRPp stations will be competing only with other QRPp stations for awards. All other information contained in these rules is applicable to this section.

X Awards: Certificates will be awarded to the highest scoring station in each category listed under Sec. IV.

1. In every participating country.
2. In each call area of the United States, Canada, and Asiatic USSR.

All scores will be published. However, to be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must show a minimum of 24 hours.

A single band log is eligible for a single award **only.** If a log contains more than one band it will be judged as an all band entry, unless specified otherwise. However, a 12 hour minimum is required on the single band.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

XI Trophies, Plaques and Donors.

SSB

Single Operator, All Band

WORLD - North Florida DX Assn.
U.S.A. - Bob Epstein, K8IA
CANADA - Garth Hamilton, VE2VY
JAPAN - Palm Garden Radio Club.
WORLD QRPp - Dayton A.R.A.

Single Operator, Single Band

WORLD - John N. Reichert, N4RV
U.S.A. - Richardson Wireless Klub.
(Joe Johnson, W5QBM Memorial)
CANADA - Gene Krehbiel, VE7KB
EUROPE - Myron E. Crofoot, WB4VQO
WORLD - 21 MHz - Lee Wical, KH6BZF

Multi-Operator, Single Xmtr.

WORLD - Mike Badolato, W5MYA

Multi-Operator, Multi Xmtr.

WORLD - Henry Thel, VE7WJ

Contest Expedition

WORLD - Northern Ohio DX Assn.

C.W.

Single Operator, All Band

WORLD - Canadian DX Assn.
U.S.A. - Corker A. Rhines, W8EAO
(Charles Rhines, W7VIU Memorial)
CANADA - Canadian A.R.F.
EUROPE - Sig. Jakobsson, TF3CW
JAPAN - Palm Garden Contest Club.
WORLD QRPp - Nevada A.R.A
(George Hewitt WB700Q Memorial)

Single Operator, Single Band

WORLD - Pedro Piza, Jr., KP4RF
U.S.A. - Kansas City DX Club.
S. AMERICA - John Kroll, K8LJG

Multi-Operator, Single Xmtr.

WORLD - Ron Blake, N4KE
CANADA - Tehrahedral Contest Circle.
EUROPE - Jonas Bjarnason, TF3JB

Multi-Operator, Multi Xmtr.

WORLD - North Florida DX Assn.

Contest Expedition

WORLD - Northern Ohio DX Assn.

Club (SSB & C.W.)

WORLD - Canadian DX Assn.
(Bud Abraham, VE1VR Memorial)

Trophy and Plaque winners may win the same award *only once* within a three year period.

XII Club Competition: A trophy will be awarded each year to the club or group that has the highest aggregate score from logs submitted by members. The club must be a local group and not a national organization. Participation is limited to members operating within a local geographical area. ***(Exception: DX-peditions especially organized for operation in the contest and manned by members.)*** Indicate your club affiliation. To be listed, a minimum of three logs must be received from a club.

XIII Log Instructions: 1. All times must be in GMT. The 18 hour non-operating periods must be clearly shown.

2. Prefix multipliers should be entered only the FIRST TIME they are contacted.

3. Logs must be checked for duplicate contacts and prefix multipliers. Recopied logs must be in their original form, with corrections clearly indicated.

4. A Prefix check list is not only desirable but a **must** for proper contest operation. (It is recommended that you also send it along with your contest log.)

5. Each entry must be accompanied by a Summary Sheet listing all scoring information, the category of competition and the contestant's name and mailing address in BLOCK LETTERS.

Also a signed declaration that all contest rules and regulations for amateur radio in the country of the contestant, have been observed.

6. Official log and summary sample sheets are available from **CQ**. A large self-addressed envelope with sufficient postage or IRCs must accompany your request.

If official forms are not available you can make your own with 40 contacts to the page.

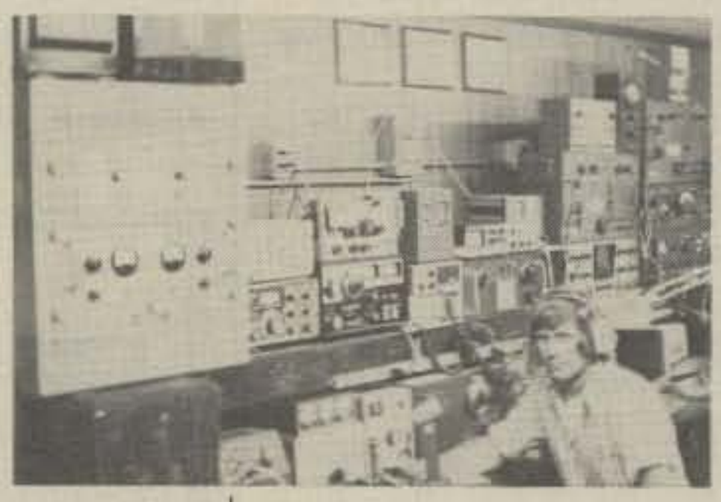
XIV Disqualification: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct, taking credit for excessive duplicate contacts; unverifiable QSO's or multipliers will be deemed sufficient cause for disqualification. Actions and decisions of the **CQ** WPX Contest Committee are official and final.

XV Deadline: All entries must be postmarked no later than May 10, 1980 for the SSB section and July 10, 1980 for the C.W. section. Indicate SSB or C.W. on envelope. From rare isolated areas the deadline will be made more flexible. You support is appreciated.

Logs go to: CQ Magazine, WPX Contest, 76 N. Broadway, Hicksville, N.Y. 11801.

Please remember to send in early for the WPX Contest Logs and Summary Sheets.

By the way . . .



R.C. Evans sent in this very impressive shot of his station. He noted that his whole family enjoyed CQ. Thanks OM for the kind words. The only thing missing in his note was his call letters.

Here's an interesting photograph taken by Dale Monaghen, W0HSK. Dale is a professional photographer from Kansas City, Mo. This shot shows the DaVinci Transamerica balloon as it passed 30 miles N.W. of Topeka, Kansas on Sunday morning Sept. 30, 1979. The balloon is at an altitude of 2500 feet when this shot was snapped by Dale as he flew in a small plane piloted by John Shideler, WB0NEV. Dale and John were able to talk to Fred, K0LIS, aboard the balloon as part of the crew, via 2 meters. For the camera buffs, this shot was taken with a Nikon F2, 500 mm F8 lens and Tri-X film.

The first teletype only repeater in the Chicago area went into service on July 9th from a temporary site, where extensive testing is being done. The repeater will be moved to its permanent location Northwest of Chicago, on what has been called the highest ground in the country. This Carrs repeater will have a computer which will supply full members with a mail box service to allow them to leave and retrieve messages. It will also have facilities to receive and relay emergency weather bulletins from the local RTTY weather frequency allowing members to monitor one common frequency.

It is located in the new meter sub band at 144.71 in and 145.31 out.

Pictured in the photograph in front of the repeater are from left to right: WB9RTX Ben Delaney, K9WRL Neil Petlock, and WA9KEK Howie Olson.

a regular feature by

THEODORE J. COHEN N4XX

dateline... Washington, D.C.

The ins and outs of the Washington scene

FCC Bureau Chief Registers Concern For Amateur Service

In a candid interview with Mr. Carlos Roberts, Chief, Private Radio Bureau, FCC, your Washington editor learned of Mr. Roberts' continued and increasing concern for the viability of the Amateur service in the U.S. Based on his travels around the country, which included a visit to the recent ARRL National Convention in Baton Rouge, Louisiana, Roberts was disappointed to find that many amateurs have little or no perception of the major problems facing amateur radio today. Nor did they have an appreciation for the many problems faced by the FCC, in general, and the Private Radio Bureau, in particular.

One result of this lack of awareness by amateurs was an apparent unwillingness by many to enter into a dialogue on major issues. According to Roberts, many of the amateurs with whom he spoke placed everything on a personal level; consequently, the discussions tended to be emotionally charged. Said Roberts: "If we are to enter into discussions on matters of mutual concern, I would hope that there would be a mutual appreciation of the problems faced by both parties. Only under such conditions will it be possible to examine objectively all of the factors which bear on an issue."

Roberts also expressed concern for the lack of a recognized voice for amateur radio in the Washington, D.C., area. On many occasions, noted Roberts, the Bureau could have benefited from a local "sounding board" for matters under consideration, but none was readily available.

That the lack of a readily available, recognized voice for amateur radio in the Federal City can lead to problems is already evident. Specifically, the October 1979 editorial in *QST,* written by Richard Baldwin, W1RU, General Manager of the ARRL, decries Commission action on Article 41 of the Radio Regulations. This Article, among other things, requires a demonstration of code proficiency for radio operators seeking privileges below 144 MHz. Mr. Baldwin asserts that the Commission ignored comments made to it in this matter. Whatever one's position may be, however, there is no question that the issue could have been resolved, in all probability, by an "on the scene" representative for amateur radio in the Washington, D.C. area...a representative (or group of representatives) who make it their business to stay in touch with the Federal agencies responsible for determining the future or our service.

Mr. Roberts has done the amateur service a favor; he has indicated that if we expect the FCC staff to be responsive to our needs, the Commission, in turn, expects that we will maintain an awareness of the issues and make known our concerns on a timely basis. What could be fairer?

While you are thinking about some of the problems we face today as amateurs, give some thought as to how our service can secure that local, "on the scene" representative we so urgently need.

*8603 Conover Place, Alexandria, VA 22308

Questions Raised About Russian Treaty Violations

Because of continued tests involving high-frequency (HF) over-the-horizon (OTH) radar systems (i.e., the Woodpecker), the Soviet Union is "in almost daily violation of an international treaty, while the rest of the world seems limited to sending official protests to Moscow" (J. Edwards, *The Washington Post,* 12 September 1979).

The treaty, of course, is the 1959 International Telecommunication Union (ITU) Radio Regulations, to which the Soviet Union—and the United States—are signatories. Yet, between 1976 and 1979, more than a dozen nations have joined the U.S. in pressing the Russians to respect the ITU's regulations regarding interference to radio services which are legally operating in assigned bands. In every case, the Russian response was that they "were working on the problem." So hopeless did the situation become in early 1979, in fact, that the U.S. State Department could do little but discuss the violations with the Russians as "a matter of opportunity."

At this writing, the 1979 World Administrative Radio Conference is in session in Geneva, Switzerland, and it seems certain that the matter of interference from Russian HF OTH radar systems will be a contentious issue. Regardless of whether the Woodpecker is silenced, however, the treaty violations by the Russians over the past three years raise serious questions about that nation's integrity...questions which almost certainly will have to be resolved before the U.S. signs a Strategic Arms Limitation Treaty (SALT) with the Soviet Union.

ARRL Representation In Washington, D.C., Discussed

The effectiveness of ARRL representation in the Federal City was the subject of discussions between ARRL President Harry Dannals (W1HD), Hal Steinman (K1FHN) and several Washington area amateurs. The discussions, which took place in early September, focused on increasing governmental influence in matters pertaining to the amateur service. One point stressed by the Washington area amateurs was the importance of making known the needs and preferences of the amateur

service at the earliest possible time during the development of contemplated regulatory changes.

Hal Steinman, Washington Area Coordinator, is now preparing a summary of the groups' observations. Presumably, this document will form the basis for another round of discussions which are to take place early in 1980.

ARRL Granted ASCII Waiver

The Federal Communications Commission (FCC) has granted the ARRL and its designates a waiver which permits the use of the ASCII with properly equipped OSCAR satellites. ASCII, which stands for the American Standard Code for Information Interchange, is an 8-bit code used in computer and data communications.

Amateurs have long sought to use ASCII because of its use in the computer industry and because of the increasing use of computers in amateur communications. Blanket permission for amateurs to use ASCII has been stalled, however, by the FCC's alleged inability to monitor ASCII transmissions at their Watch Offices.

One problem amateurs will encounter in using computer-generated ASCII in their transmissions is radio-frequency interference (RFI) to their satellite receivers. This problem is currently under investigation by the FCC. Another problem already recognized by those participating in the ASCII/OSCAR experiments is that a standard format for ASCII transmissions has not been developed for amateur work.

Regardless of the problems noted above, it is hoped that the results of experiments conducted under the FCC's ASCII waiver will eventually lead to authorization by the FCC for all amateurs to use ASCII in their transmissions.

Interception Of Satellite TV Signals Held Illegal

In a previous column (September 1979), it was noted that the unauthorized reception and beneficial use of addressed communications in the Multipoint Distribution Service (MDS) was illegal under Section 605 of the Communications Act of 1934 (as amended). Similar regulations apply in the case of unauthorized interception and use of satellite TV transmissions such as the so-called home box office (HBO) transmissions. That is, material transmitted by MDS or HBO stations is not intended to be "broadcast" material within the meaning of Section 605, and so, authority for its reception and use must be given by the sender.

Recent articles in the amateur literature on private television satellite receive-only terminals, and correspondence received by your Washington editor, suggest that the provisions of Section 605 are being ignored by some members of the amateur community. However, at this writing, the applicable regulations have not been changed, and they still read:

> "No person not being entitled thereto shall receive or assist in receiving any interstate or foreign communication by radio and use such communication (or any information therein contained) for his own benefit or for the benefit of another not entitled thereto."

For additional information on this subject, interested readers are referred to *The New Frontier* in October, 1979, *QST* (p. 79).

The staff of CQ Magazine *joins your Washington editor in expressing its sympathies to Mr. Harvey McCoy, Publisher of the* Long Island DX Bulletin, *on the loss of his wife, Clare, in September 1979. Your editor thanks Mr. Peter M. Hurd, N1SS.K4NSS, for his contribution to this month's column.*

a monthly feature by

GEORGE JACOBS, W3ASK

Propagation

The science of predicting radio conditions

1980—Another Good Year

Although the present solar cycle appears to be declining slowly, 1980 is expected to be a year of relatively high solar activity. The year should begin with a smoothed sunspot level of approximately 149 forecast for January, and should end with a level in the mid-120's by December. This is a level high enough to assure the continuation through the new year of the exceptionally good h.f. propagation conditions experienced during 1979.

During January, it should continue to be a toss-up between *10* and *15* meters for best DX propagation honors during the daylight hours. Both bands are expected to open to all areas of the world; often with exceptionally strong signals. Ten meters should have a slight edge from mid-morning through the early afternoon hours, while conditions on *15* meters should be optimum during the late afternoon hours and into the early evening. Excellent short-skip openings are forecast for *10* meters during the daylight hours for distances between approximately 1200 and 2300 miles. Similar short-skip conditions are expected on *15* meters from shortly after sunrise through the early evening hours, for distances between 1000 and 2300 miles.

Excellent propagation conditions are forecast for *20* meters, for both DX and short-skip openings, just about around-the-clock. For DX openings, conditions should peak shortly after sunrise and again during the late afternoon and early evening hours, often to as late as Midnight. For short-skip openings less than 1000 miles, conditions are expected to be optimum from mid-morning through the late afternoon hours; for openings between 1000 and 2300 miles, optimum conditions are expected during the late afternoon and early evening. Frequent short-skip openings are also forecast for this band during the hours of darkness.

Excellent DX conditions are forecast for *40* meters during January, with openings expected to all parts of the world from shortly before sundown, through the hours of darkness, and until shortly after sunrise. During the daylight hours, short-skip conditions should be optimum for openings between approximately 100 and 600 miles. Skip is expected to lengthen during the late afternoon, and by nightfall short-skip conditions should be optimum for openings between approximately 800 and 2300 miles.

Fairly good DX openings are also forecast for *80* meters to many areas of the world during the hours of darkness. Optimum short-skip conditions for openings between approximately 50 and 250 miles should occur during the daylight hours. During the late afternoon and early evening short-skip openings should increase to distances between 250 and 1500 miles, and by nightfall openings up to and beyond 2300 miles should be possible.

DX openings to some areas of the world should be possible on the *160* meter band during the hours of darkness. Short-skip openings up to a distance of 1300 miles also should be possible on a regular basis during the hours of darkness, and frequently the skip will extend out as far as 2300 miles. Daylight absorption will limit openings severely during the daylight hours, with only very infrequent openings possible up to distances on the order of 150 miles, or so.

All-in-all the New Year is off to a good start. January should be a good month for propagation conditions on all h.f. bands. Atmospheric noise levels (static) should also be at their lowest values of the year in the northern hemisphere, and signal levels are expected to be exceptionally strong during many band openings.

Short-Skip Charts

This month's column contains a Short-Skip Propagation Chart for use in the continental United States for distances between 50 and 2300 miles. (The maximum distance generally possible for one-hop, short-skip propagation is 2300 miles). Special prediction charts centered on Hawaii and Alaska are also included. The Charts appearing in this month's column are valid through the months of January *and* February, 1980. See last month's column for detailed DX Propagation Charts for use during January.

V.H.F. Ionospheric Openings

Unusually good DX openings on *6* meters to many areas of the world

LAST MINUTE FORECAST

Day-to-Day Conditions Expected for January 1980

Propagation Index	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 7, 28	A	A	B	C
High Normal: 3, 6, 8, 18, 27	A	B	C	C-D
Low Normal: 1-2, 4-5, 10-13 15-17, 20-21	A-B	B-C	C-D	D-E
Below Normal: 9, 14, 19, 22-23	B-C	C-D	D-E	E
Disturbed: None	C-E	D-E	E	E

Where expected signal quality is:

A—Excellent opening, exceptionally strong, steady signals greater than S9 + 30 dB.

B—Good opening, moderately strong signals varying between S9 and S9 + 30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be fair (C) on Jan. 1st and 2nd, good (b) on 3rd, fair (C) on 4th and 5th, etc. Conditions during the CQ WW DX Contest should be high normal on the 24th and above normal on the 25th.

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

11307 Clara St., Silver Spring, MD 20902

getting up in the middle of the night almost every day for months on end.

John Devoldere was born in the Flanders region of Belgium in 1941 and has been licensed since 1961. He is an electronic engineer for I.T.T. in Ghent, Belgium where he is engaged in research and development. His uncle, ON4GV, interested him in electronics at age 13 when he began to assemble simple radio circuits on cigar-box chassis. From the beginning of his amateur career he was interested in DXing on 80 meters and made WAC on 80 the first year. Today, with Abu Ail confirmed he has 299 countries on 80 and is actively looking for number 300. He has a total of 75,000 QSO's in his logs, all bands, more than 15,000 of which were with U.S. stations. There are 1500 W/K QSLs in his files for 80 meter contacts alone. John is a frequent competitor in the *CQ* contests and has won many trophies and certificates.

The 40 Zones for WAZ

The rules for WAZ, Single Band WAZ and 5-Band WAZ define the 40 zones by number, geographical location and a list of sample prefixes. However, the list of sample prefixes which we use has been rendered obsolete by the rapidly changing, world political map. For example, looking to zone 8, Grenada is now J3, St. Lucia is J6 and Dominica is J7. All 3 of these countries were formerly covered under the VP2 umbrella. In zone 21 we must add A4 for Oman, A6 for the United Arab Emirates, A7 for Qatar and A9 for Bahrain. In zone 25 the KR6 prefix has been deleted while in zone 31 there are many new U.S. prefixes such as KH1, KH3, KH5, KH7 and KH9. Of course, stations worked in past years which used the old prefixes are still good for WAZ credit, but the following new list contains the modern prefixes which will be heard in the future. For your convenience, here are the complete rules for regular WAZ with the new zone descriptions:

Nao Akiyama, JH1VRQ, is an avid prefix chaser and an excellent host to DXers visiting in Japan. He gave K4IIF the royal treatment back in 1978. (TKS K6XP)

WAZ Rules

The WAZ Award will be issued to any licensed amateur station presenting proof of contact with the forty zones of the world. This proof shall consist of proper QSL cards which may be checked by any of the authorized *CQ* checkpoints or sent directly to the WAZ Award Manager, Mr. Leo Haijsman, W4KA, 1044 Southeast 43rd. St., Cape Coral, FL 33904. Many of the major DX clubs in the U.S. and Canada and most national amateur radio societies abroad are authorized *CQ* checkpoints. If in doubt consult the WAZ Award Manager or the DX Editor, Mr. John Attaway, K4IIF. Any legal type of emission may be used providing communication was established after Nov. 15, 1945.

1. The official *CQ* WAZ Zone Map, and the printed zone list which follows these rules, will be used in determining the zone in which a station is located.

2. Confirmation must be accompanied by a list of claimed zones showing the call letters of the station contacted within each zone. The list should also clearly show the applicant's name, call letters and complete mailing address.

3. All contacts must be made with licensed, *land based*, amateur stations operating in authorized amateur bands.

4. All contacts submitted by the applicant must be made from within the same country. It is recommended that each QSL clearly show the station's zone number. When the applicant submits cards for multiple callsigns; evidence should be provided to show that he or she also held those call letters.

5. Any altered or forged confirmations will result in permanent disqualification of the applicant.

6. Include with the application a $5.00 processing fee plus a self-addressed envelope with sufficient postage stamps or international reply coupons to return the QSL cards by the class of mail service desired and indicated. International reply coupons equal in redemption value to $5.00 are acceptable. The 1979 redemption value of international reply coupons is 20¢ each. Checks should be made out to Mr. Leo Haijsman, WAZ Award Manager.

7. In addition to the conventional certificate for which any and all bands and modes may be used, spe-

Favel, YV5FQL, of Caracas is a CQ reader and an active participant in our contests and DX Award programs.

The WAZ Program

Single Band WAZ

10 Meter Phone

26....N4YD
27....JE2QWD
28....I6PLN

15 Meter Phone

26...JF1KKV
27...JI1HWW
28...K5UR
29...JA1TRC

20 Meter Phone

252...IT9UAG
253...IT9HLO
254...EA3SA
255...K8NA
256...HC5EB
257...WA6PJR
258...WB7EEI
259...WA0TKJ
260...I6PLN
261...UA9CBO

80 Meter Phone

6...SM7LQ

15 Meter C.W.

19...JF1KKV

All Band Worked All Zones

S.S.B.

1745...N5IH
1746...JH1IFS
1747...I0OLK
1748...I0DYB
1749...KB8JF
1750...CE3GN
1751...WA6PJR
1752...LA7FO
1753...PA2TMS
1754...WA7URW
1755...I4CSP
1756...DL9XN
1757...DL7EX
1758...DL3TI
1759...DF1QM
1760...WD5DUD
1761...W7JAL
1762...W4EBO
1763...KC4U
1764...K4ONF
1765...PA0LEG
1766...WA1JKK
1767...W9RT
1768...UW1AE
1769...UA3TN
1770...K8ES
1771...K1IK

C.W. and Phone

4635...JA3GN
4636...K2YGN
4637...HS1WR
4638...I4BFY
4639...YU4VOY
4640...JA3HCN
4641...DL7WL
4642...DK4YF
4643...WB9KBV
4644...W7OTO
4645...K6AC
4646...N0YC
4647...K7WF
4648...JH1BMV
4649...W3EV
4650...F6DYG
4651...JH3KAI
4652...UA0NR
4653...UA3ABD
4654...UA6AE
4655...UT5AC
4656...UK2ABC
4657...WB9TIY

The complete rules for WAZ are found in this issue of *C.Q. Magazine*. Application blanks and reprints of the rules may be obtained by sending a self-addressed stamped envelope, size 4½ 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 or a check point, should include sufficient postage for the safe return of their QSL cards. Please note that effective June 1, 1979 the processing fee for all C.Q. certificates was raised to $5.00. This fee must accompany all applications.

Left to right, Jorge D. Maquiera, LU7EES, Ralph Formica, WA2EBS and Jorge Caramignoli, LU9DKO. WA2EBS was visited by his ham friends from Argentina accompanied by their XYLS who left their country in early May by camper, for a 3 month vacation in U.S.A., Canada and Mexico and returning home in July. They were kept in daily contact with home by the use of an Atlas 210X.

cially endorsed and numbered certificates are available for phone and single sideband operation. The phone certificate requires that all contacts be two-way phone and the s.s.b. certificate requires that all contacts be two-way s.s.b.

8. If, at the time of the *original* application, a note is made pertaining to the possibility of a subsequent application for an endorsement or special certificate, only the missing confirmations required for that endorsement need be submitted with the later application, provided a copy of the original authorization signed by the WAZ manager is enclosed.

9. Decisions of the *CQ* DX Awards Advisory Committee on any matter pertaining to the administration of this award will be final.

10. All applications should be sent to the WAZ Award Manager or to *CQ* Magazine.

11. Zone maps, printed rules and application forms are available from the WAZ Award Manager or from *CQ* headquarters. Send a self-addressed stamped envelope, size 4 x 9½ inches with 28¢ postage, or a self-addressed envelope and 2 International reply coupons.

The following list of zones is presented as a guide. Any questions will be decided by the zone map. For rulings on borderline areas, consult the WAZ Award Manager, Mr. Leo Haijsman, W4KA, 1044 Southeast 43rd St., Cape Coral, FL 33904.

Zone 1. Northwestern Zone of North America: KL7, VE8-Yukon, the VE8-Northwest Territories Districts of Mackensie and, Franklin, and the islands west of 102° including Victoria, Banks, Melville, and Prince Patrick.

Zone 2. Northeastern Zone of North America: VO2-Labrador, that portion of VE2-Quebec north of the 50th parallel, and a portion of the Northwest Territories-VE8 east of longitude 102°. The latter includes part of the District of Franklin and the islands of King William, Prince of Wales, Somerset, Bathurst, Devon, Ellesmere, Baffin, and the Melville and Boothia Peninsulas.

Zone 3. Western Zone of North America: VE7, W6 and the W7 states of Arizona, Idaho, Nevada, Oregon, Utah, and Washington.

Zone 4. Central Zone of North America: VE3, VE4, VE5, VE6, the W7 states of Montana and Wyoming. W0, W9, W8 (except W. Va.), W5, and the W4 states of Alabama, Tennessee, and Kentucky.

Zone 5. Eastern Zone of North America: FP8, VE1, VO1, that portion of VE2-Quebec south of the 50th parallel, VP9, W1, W2, W3, the W4 states of Florida, Georgia, South Carolina, North Carolina, and Virginia, and the W8 state of West Virginia.

Zone 6. Southern Zone of North America: XE, XF and 6D4 (Revilla Gigedo).

Zone 7. Central American Zone: FO8-Clipperton, HK0 (San Andres), HP, HR, KS4, KZ5, TG, TI, TI9, VP1, YN, and YS.

Zone 8. West Indies Zone: C6A, CM/CO, FG7, FM7, FS7, HH, HI, HK0 (Bajo Nuevo) J3, J6, J7, KC4, (Navassa Is.), KG4, KP2, KP4, KV4, PJ6, PJ7, PJ8, VP2, VP5, YV0 (Aves Is.), ZF, 6Y5, 8L2 (St. Lucia) and 8P6.

CQ DX Awards Program

S.S.B.

746	K5OUK	755	LA7JO
747	W3GRS	756	LA2ZN
748	KB5AC	757	HC5EA
749	K8TUY	758	N0AMI
750	TG9GI	759	I8IHG
751	XE1MEX	760	WB3IVL
752	WB4YBF	761	WA4DAN
753	WD5CHM	762	WA4JIL
754	K3FN	763	WA1HHS

C.W.

388	K5OUK	390	W1WKP
389	W3GRS	391	K3FN

S.S.B. Endorsements

320	W6EUF/320	310	VE3GMT/316
310	W9DWQ/319	310	K9MM/314
310	VE3MR/318	310	K5OVC/316
310	W9QLD/317	300	W0SD/308
310	VE3MJ/317	300	W9SS/307
310	W3GRS/317	300	N4MM/305
310	W9JT/317	250	LA7JO/267
310	I8AA/317	250	K3MWV/263
310	F9RM/317	200	LA2ZN/215
310	WA2EOQ/317	150	WA6VHZ/161
310	W9KRU/317	150	KB5DN/160
310	ZL3NS/316	150	W0ULU/150
310	K6WR/316	3.5/7 MHz	YU1AG
28 MHz	W3GRS	28 MHz	K3MWW
28 MHz	YU1AG	28 MHz	KB5AC
Mobile	KB8KW		

C.W. Endorsements

320	W6PT/320	310	W3GRS/312
310	ON4QX/318	300	K9MM/305
310	W6ID/316	300	N6CW/304
310	DL7AA/315	275	K3FN/284
310	W9DWQ/315	3.5/7 MHz	W3GRS

Complete rules and application forms for the CQ DX Awards program can be obtained by sending a business size, No. 10, envelope, self-addressed and stamped to: CQ DX Awards, 911 Rio St. Johns Dr., Jacksonville, Fla. 32211 U.S.A.

Zone 9. Northern Zone of South America: FY7, HK, PJ1, PJ2, PJ3, PJ4, PJ9, PZ, YV, 8R and 9Y4.
Zone 10. Western Zone of South America: CP, HC, HC8, and OA.
Zone 11. Central Zone of South America: PY, PY0 (St. Peter & Paul Rock), PY0 (Trinidade) and ZP.
Zone 12. Southwest Zone of South America: CE and some antarctic prefixes.*
Zone 13. Southeast Zone of South America: CX, LU, VP8, and some antarctic prefixes.*
Zone 14. Western Zone of Europe: C31, CT1, CT2, DA, DF, DJ, DK, DL, DM, EA, EA6, EI, F, G, GB, GD, DI, GJ, GM, GU, GW, HB, HB0, LA, LG, LX, ON, OY, OZ, PA, PI, SK, SL, SM, ZB2, 3A and 4U1ITU.
Zone 15. Central European Zone: FC, HA, HB0, HV, I, IT, IS, MI, OE, OH, OH0, OJ0, OK, SP, UA2, UP, UQ, UR, YU, ZA, 9A and 9H.
Zone 16. Eastern Zone of Europe: UA1, UA3, UA4, UA6, UA9 (S,W)-Bashkir & Chkalov, UB5, UC2, UN1, and UO5.
Zone 17. Western Zone of Siberia: UA9(A,C,F,G,J,K,L,Q,S,X)-Sverdlovsk, Chelyabinsk, Komi, Jurgan, Molotav,

Here is the magnificent array which helped ON4UN in his quest for 5-Band WAZ. The highest beam is 3 elements on 10 meters at 100 ft., then 3 elements on 15 meters at 95 ft., followed by 5 elements on 20 meters at 85 ft. The 40 meter zone catcher is a 25.3 meter vertical with 75 radials and on 80 he uses both a vertical and a delta loop. For receiving John also has a choice of 1000 ft. beverage antennas covering 8 directions.

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 Countries List, LESS DELETED COUNTRIES, is used as the country standard. Total number of countries currently on the DXCC list as of this listing is 320. 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 at any time, in any number. Updates indicating "no change" will be accepted to meet the annual requirement.

C.W.

W6PT 320	W9DWQ 315	N6AV 308	W4BQY 304	WA8DXA 290
ON4QX 318	N4PN 313	K6JG 307	N6FX 299	DJ7CX 288
K6EC 316	W3GRS 312	W2GT 305	DL3RK 295	JA1GTF 287
W6ID 316	W8KPL 309	K9MM 305	K4CEB 293	K3FN 284
DL7AA 315		N6CW 304		W4OEL 275

S.S.B.

WA2RAU 320	K8DYZ 317	W4DPS 312	WB6DXU 302	OK1MP 290
W6EUF 320	W3CWG 317	W6RKP 312	DL6KG 301	YV5DFI 289
W9DWQ 319	W3AZD 317	I0ZV 311	HP1JC 301	VE7HP 289
K2FL 318	W4UG 317	OE2EGL 311	K8LJG 300	JH1VRQ 288
VE3MR 318	XE1AE 317	VE2WY 311	I5WT 300	I6PLN 287
DL9OH 318	ZL3NS 316	K5OVC 310	N6AV 300	WA4JTI 287
I0AMU 318	K6WR 316	DJ9ZB 310	W8ILC 300	W7OM 286
W2TP 318	VE3GMT 316	I4ZSQ 310	OE3WWB 297	YS1O 286
TI2HP 318	K4MQG 316	K9LKA 310	DJ7CX 296	VE3FJE 285
K2FL 318	I8KDB 316	YV1KZ 309	F9MS 295	I3LLD 283
W4EEE 318	W3NKM 316	ZL1AGO 309	W9DQ 295	K1UO 283
W9QLD 317	W9JT 316	W0SD 308	K8PYD 294	VK4VC 282
VE3MJ 317	I8YRK 315	F2MO 308	N2SS 294	K5DUT 279
W3GRS 317	SM6CKS 315	W9SS 307	W6FET 294	JA6GDG 277
W9JT 317	K9MM 314	XE1KS 307	LU1BAR/W3 ...293	AA4A 276
I8AA 317	G3FKM 314	N4MM 305	K4LSP 292	DJ2AA 276
F9RM 317	ZS6LW 313	W3GG 305	K9RF 291	K9PPY 276
WA2EOQ 317	EA4LH 313	VE7WJ 304	N6AW 291	W2CC 275
W9KRU 317	K6JG 313	DK2BL 303	9H4G 291	W0SR 275
K6YRA 317	K6EC 312	K6XP 302	VE7CE 290	N5FG 275
W4SSU 317	N4WF 312	W0SFU 302	WA4WTG 290	

SSTV

W8YEK 108
G3IAD 101

Omsk, Tyumen; and UH8, UI8, UL7 and UM8.

Zone 18. Central Siberian Zone: UA9 (H,I,O,P,U,V,W,Y,Z)-Novosibirsk, Tomsk, Kamerovo, Alta; UA0 (A,B,H,O,S,T,U, V,W)-Krasnovarsk, Irkutsk, Chita, Bruyate Mongolia and Dickson Island.

Zone 19. Eastern Siberian Zone: UA0 (C,E,F,G,I,J,K,L,M,Q,R,Z)-Khabarovsk, Amur, Yakutsk, Primorsky, Sakhalin Island, Wrangel Island and the Soviet Kuriles.

Zone 20. Balkan Zone: JY, LZ, OD5, SV, TA, YK, YO, ZC4/5B4, and 4X4.

Zone 21. Southwestern Zone of Asia: A4, A6, A7, A9, AP, EP, HZ/7Z, UD6, UF6, UG6, YA, YI, 4W1, 70, and 9K2.

Zone 22. Southern Zone of Asia: A51, S2, VU, VU5(Laccadive Is.), 4S7, 8Q6(Maldive Is.) and 9N1.

Zone 23. Central Zone of Asia: BY provinces of Tibet, Sinkiang, Kansu, and Hinghai, JT1, and UAOY-Tanna Tuva.

Zone 24. Eastern Zone of Asia: BV, BY(except the provinces in Zone 23), CR9, and VS6.

Zone 25. Japanese Zone: HL/HM and JA/KA.

Zone 26. Southeastern Zone of Asia: HS, XV, XU, XW, XZ, VU2-(Andaman and Nicobar Islands) and 1S (Spratly Is.).

Zone 27. Philippine Zone: DU, JD1(Minami Torishima), JD1(Ogasawara), KA1(Bonin Is.), KC6(Eastern Caroline Is.), KC6(Western Caroline Is.), AH2/KH2/NH2/WH2/KG6(Guam), KG6(R,S,T) and 7J(Okino Torishima).

Zone 28. Indonesian Zone: H4, P2, T2, VS5, YB, 9M2(West Malaysia, 9M6(Sabah), 9M8(Sarawak) and 9V1.

Zone 29. Western Zone of Australia: VK6, VK8, VK9X(Christmas Is.), VK9Y(Cocos-Keeling Is.). and some antarctic prefixes.*

Zone 30. Eastern Zone of Australia: VK1, VK2, VK3, VK4, VK5, VK7, VK2(Lord Howe Is.), VK9Z(Willis Is.), VK9(Mellish Reef), VK9(Willis Is.), VK0(Macquarie Is.) and some antarctic prefixes.*

Zone 31. Central Pacific Zone: C2, F0(Marquises Is.), AH1/KH1/NH1/WH1/KB6(Canton, Baker, Enderbury and Howland Is.), AH6/KH6/NH6/WH6 (Hawaii), AH3/KH3/NH3/WH3/KJ6 (Johnston Is.), AH4, KH4/NH4/WH4/KM6(Midway Is.), AH5/KH5/NH5/WH5/KP6(Palmyra & Jarvis Is.), AH5K/KH5K/NH5K/WH5K/KP6(Kingman Reef), KH7(Kure Is.), AH9/KH9/NH9/WH9/KH6(Wake Is.), KX6(Marshall Is.), T2(Tuvalu Is.), T3(Kiribati Rep.), VR1(British Phoenix Is.), VR3(Northern Line Is. or Christmas Is.), VR7(Central & Southern Line Is.), and ZM7(Tokelaus).

Zone 32. New Zealand Zone: A3, FK8, F0(Society Is.), FW8, KS6/KH8 (American Samoa), VK9(Norfolk Is.), VR6(Pitcairn Is.), YJ, ZK1(Coor Is.), ZK1(Manihiki Is.), ZK2, ZL(inc. Auckland, Campbell, Chatham & Kermadec Is.), 3D2, 5W1 and some antarctic prefixes.*

Alex (W1CDC) Kasevich was active as VP2MM on Montserrat during July and August. Having been subjected to many hours of no electricity because of mechanical problems at the island's electric generating plant, Alex managed to satisfy the many DXers and award hunters by making over 4,300 contacts. The pile ups were very large at times especially on 10 meters, however most everyone used good operating practice and courtesy. QSL with IRC's or SASE to W1CDC. On his next trip Alex said he will put VP2MM on OSCAR 8.

Zone 33. Northwestern Zone of Africa: CN2, CN8, CT3, EA8, EA9, 3V8, and 7X.

Zone 34. Northeastern Zone of Africa: ST, SU, and 5A.

Zone 35. Central Zone of Africa: C5, D4, EL, J5, TU, TY, TZ, XT, 3X, 5N, 5T, 5U, 5V, 6W8, 9G and 9L.

Zone 36. Equatorial Zone of Africa: D2, TJ, TL, TN, S9, TR, TT, ZD7, ZD8, 3C, 9J, 9Q, 9U and 9X.

Zone 37. Eastern Zone of Africa: C9, ET, J28, 5H, 5X5, 5Z4, 60, 70 and 7Q7.

Zone 38. South African Zone: A2, H5, S8, ZD9, ZE, ZS1,2,4,5,6, ZS2(Prince Edward & Marion Is.), ZS3, 3D6, 3Y, 7P8 and some antarctic prefixes.*

Zone 39. Madagascar Zone: D6, FB8W, FB8X, FB8Z, FH8, FR7(Reunion Is.), FR7(Glorioso Is.), FR7(Juan de Nova Is.), FR7(Tromelin Is.), S79, VK0(Heard Is.), VQ9, 3B6, 3B7, 3B8, 3B9, 5R8 and some antarctic prefixes.*

Zone 40. North Atlantic Zone: JW, JX, OX, TF and UA1(Franz Joseph Land).

*In the past all antarctic prefixes were grouped into Zone 13. However, recent exploration from South America, Africa, Australia and New Zealand into the antarctic land mass should be recognized and zones 12, 13, 29, 30, 32, 38, and 39 have now been extended to converge at the south pole. Stations will be credited to one of these zones, with the exception of KC4AAA located at the pole which can count for either of the above 7 zones. Questions regarding the zone location of a particular antarctic station should be directed to the WAZ Award Manager.

QSL Information

The following is interested in being a QSL Manager for DX stations: Kevin Vinson, N3AID, 936 Middleborough Rd., Baltimore, MD 21221.

A2CBW - Via DK3KD
A9XCE - To P.O. Box 5750, Bahrain
A51PN - Pradhan, Box 166, Thimpu, Bhutan
AJ6O/KH0 (Saipan) - c/o W6TAG
C5ACB - Via JA3KWJ
CM2HB - To ON5YL
CM7FM - c/o Box 247, Ciego de Avila, Cuba
CO7HC - Via Box 287, Camaguey, Cuba
CZ2RV, VY2RV and VC2RV - To VE2RV, R. Harvey, 1101 Cr. Albanel, Laval, Quebec, Canada H7G 4K9
EA9FH - c/o Box 252, Melilla
EA9GK - Via Box 103, Ceuta
FG0DDV/FS - To W2QM
FK0XR, FO0XR, FW0XR and YJ0XR - c/o DK6XR, P.O. Box 323222, D-2000, Hamburg 13, West Germany
FP8AN - Via KA2CMC
FP0KH - To W2HKQ
FR7BN - c/o Box 184, Le Port, 97420, Reunion Island
GB2MG - Via G4AZN
HK1AMW - To W3KT
HK1CWB - c/o N3SM
J3ABP - Via K5KG
J3ABQ - To W5SJS
K4HEM/PJ7 - c/o WB4INC
KG6SW - Via W7OM
LU3ZY (South Sandwich) - To LU2CN
M1C - c/o N2KY *only* for the March 4-13, 1979 operation. Others should go direct.
N1DX/H44 - Via W0PAH
OH2EE/OH0 (Aaland Island) - To OH2EE
OH2OT/OH0 (Aaland Island) - c/o OH2OT, Box 55, SF 02701, Kauniainen, Finland
OH0DX - Via OH2BH
OH8CAA - To SP1EYG, Wieslaw Dyduch, P.O. Box 91, PL 70-965, Szczecin 5, Poland
TI2BEV - c/o W4ZD
VK9YJ and VK9YR (Cocos-Keeling) - Via K9IL
VK9YK (Cocos-Keeling) - To WA3HUP
VK0PK (MacQuarie Island) - c/o VK3OT
VP1EF - Via WB4INC
VP2EAL - To WA7IRD
VP2MEH - c/o K8JLB
VP2MNB - Via W5YKE
VP2MPB - To W5STI, Perry Brittain, 6806 Hyde Park Drive, Dallas, TX 75231
VP2VDG - c/o W4KA, Leo Haijsman, 1044 Southeast 43rd. St., Cape Coral, FL 33904
VP2VFC - Via VE1ASJ
VP5ONX - To WB4OSN
VP8SU (South Georgia Island) - c/o G3RCA
VQ9KK - Via WA3HUP
VQ9MR - To N5GU
VR1AH/Banaba (formerly Ocean Island) - c/o W7OK
W6SOT/LX - Via KA5CCO, Keith C. Baker, 4805 Lovers Lane, Wichita Falls, TX 76318
WA1GXE/KG6 - To K1JDJ, P.O. Box 1003, Fairfield, CT 06430
WD9QGQ/KH7 (Kure Island) - c/o KH6JEB
ZB2FB - Via G3LNC
ZD8TC - To ZD8AR
ZF2CN - c/o WB4AXN
ZK1DR - To W0WO
ZK2PF - Via K9LSA
ZS2MI - To WA2IZN
ZS3LK - c/o DJ4PI
3B6CD - Via WD5BIF
3D6BW - To K2IJL
3V8ONU - Via I0AMU for W/K amateurs, others to OZ1CID
5H3GK - To SM5AWO
5H3KS - c/o K5VT
5N0AAS - Via DJ2HZ
5T5AY - To W4LZZ
9V1UA - c/o W2HG

73, John, K4IIF

The WPX Program

Mixed

780...K3FN
781...LA7JO
782...XE1OW
783...DM3UH
784...IT9KMU

S.S.B.

1195...WN4KKN
1196...EA6DE
1197...XE1MX
1198...WA1UZH
1199...XE1OW
1200...N7JB
1201...N4SX
1202...WD4ABN

C.W.

1863...K3FN
1864...JA8SPZ
1865...JA3GN
1866...JA7HKO
1867...N4IB
1868...DM2BCF
1869...WA4DAN
1870...JF1DMY

Endorsements

Mixed: 400 K3FN. 450 LA7JO, IT9KMU. 600 DM3UH. 850 WA0TKJ, G4BUE. 900 PY4OD. 1000 N4UH, IN3ANE. 1050 K6DT.

SSB: 300 XE1MEX, WA1UZH, N7JB, N4SX, WD4ABN. 400 I4SYG. 450 EA6DE. XE1OW. 600 YV5CIL. 650 WA2FKF, PY4OD, G4BUE. 750 G3YBH, W1DYH. 800 CT1UA. 1150 W6RKP.

CW: 300 JA7HKO, WA4DAN, JF1DMY. 350 K3FN, JA3GN, AG4L. 400 JA8SPZ, N4IB. 450 KL7AF. 600 W3OGY, G4BUE. 800 PY4OD. 950 K4RDU.

10 meters: WA2UZH, JA2IU, JA3XRC, G4BUE. DJ8WD.
15 meters: JA8SPZ, N5RR, G4BUE.
160 meters: N5RR.
Africa: G4BUE.
Asia: JA8SPZ, KL7AF.
Europe: JA8SPZ.
No. America: XE1OW, N7JB, W6YMH, DJ8WD.
Oceania: G4BUE.
So. America: G4BUE.

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.

No - 81-82

CQ Showcase

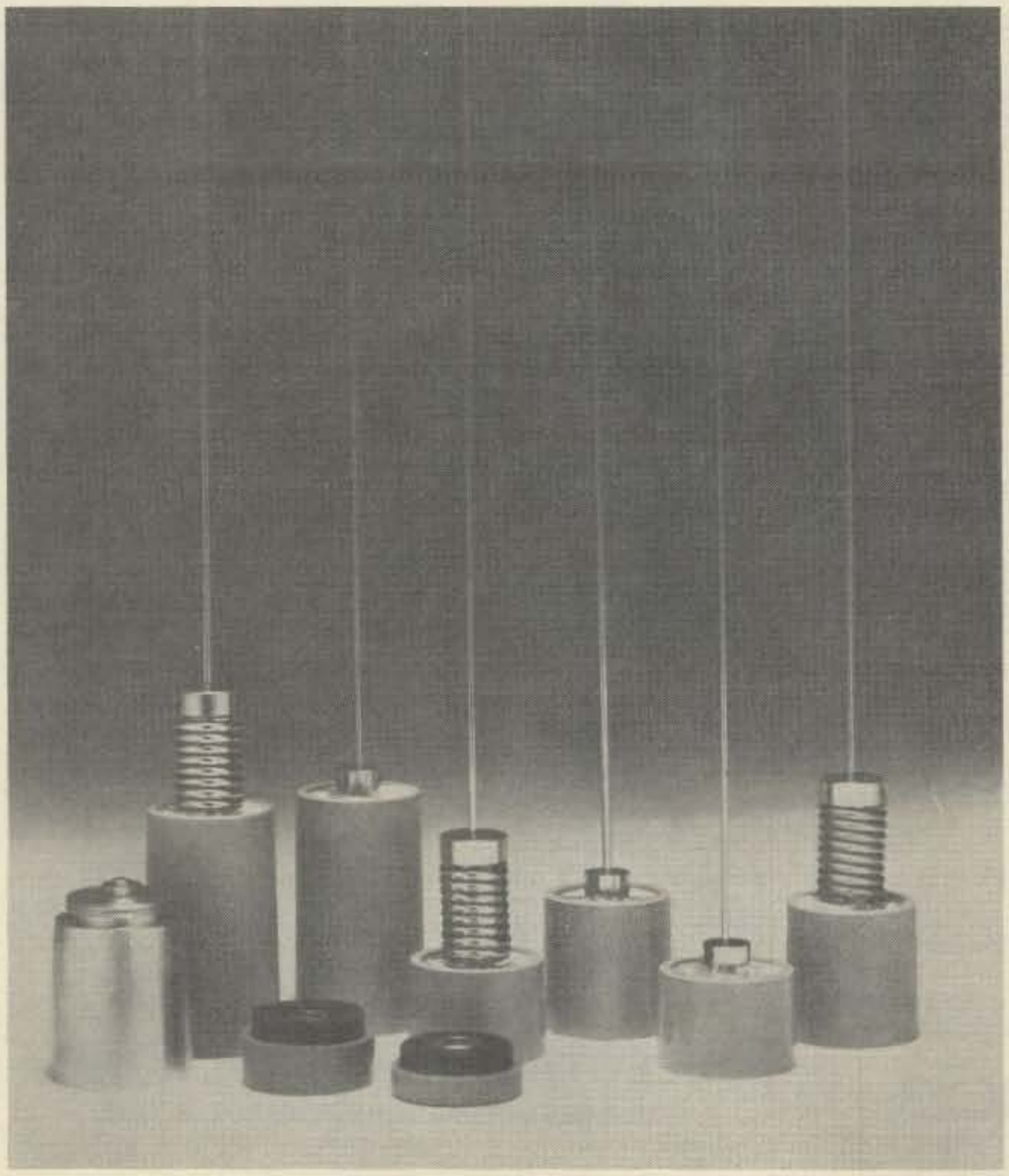
New Line Of Mobile Antennas

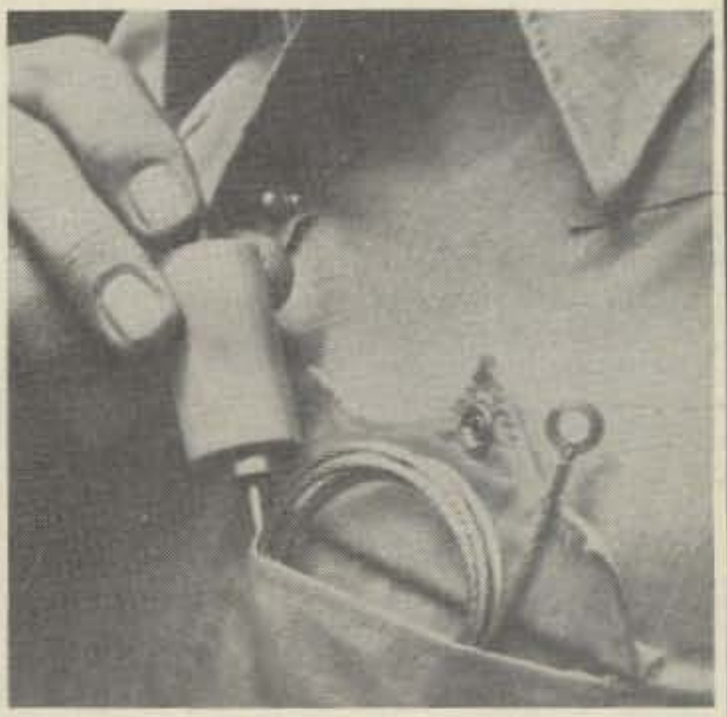
A completely new line of mobile antennas has been introduced by Signals Communications Corp. The new line covers 30 through 512 MHz two-way bands. These high-performance low-profile antennas feature plated whips, high-impact bases and optional springs.

The antennas feature solid dielectric coils enclosed in high-impact base covers. This configuration eliminates variation from coil to coil. They are rated at 200 watts with less than 1.5 to 1 VSWR and 50 ohms nominal impedance.

The whips are long enough to permit cutting to frequency and are quadraplated 17-7PH stainless, resulting in lower skin effect losses and greater radiation. The matchmate mobile mount adapter system permits the mounting of Signals' antennas on all popular mounts.

For more information about these mobile antennas, contact Signals Communications Corp., 1 Signals Park, P.O. Box 4833, Manchester, NH 03108, or circle number 76 on the reader service card.





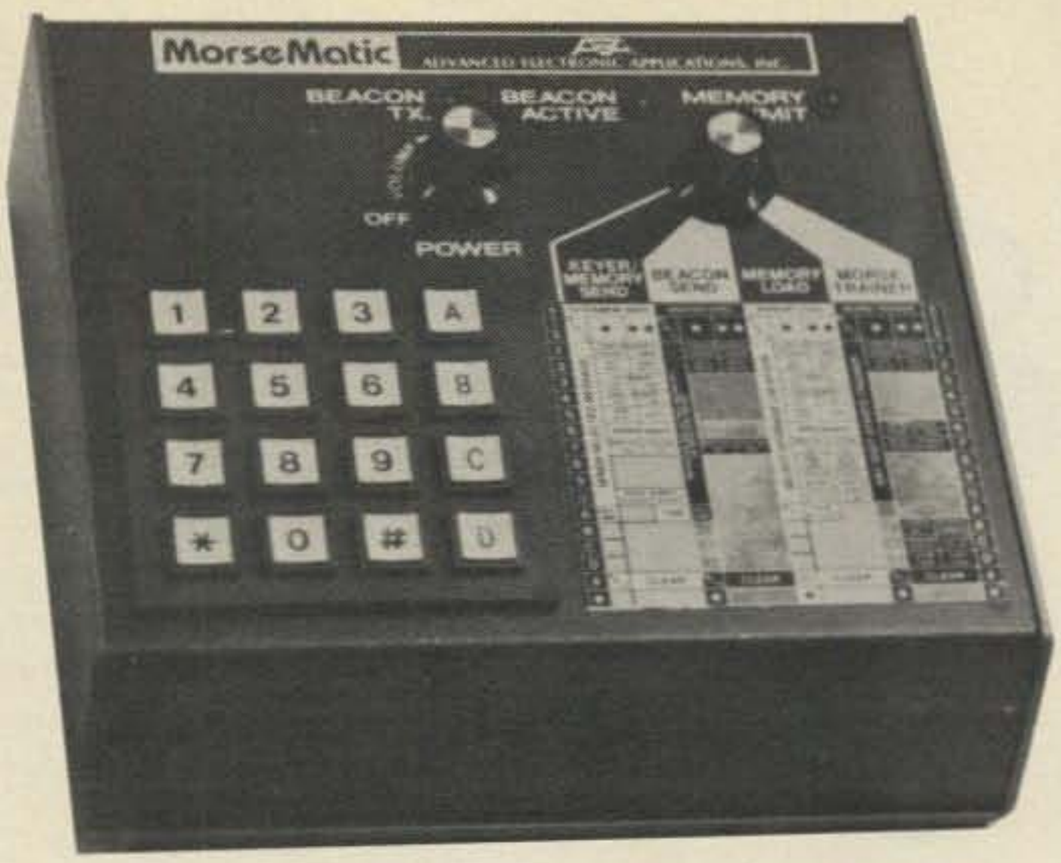
Larsen's Portable Emergency Antenna

Larsen Electronics, Inc. has introduced a Portable Emergency Antenna that requires no ground plane and is compact enough to fit in a pocket. The PHW-150 loaded half-wave antenna covers the 144-174 MHz band and features a stainless steel flexible radiating element that allows the PHW to be rolled up to a convenient portable size.

To operate the PHW, connect it to a portable radio with any length of coaxial cable. Then attach a length of fishing line to the antenna's eyelet and a weight to the other end of the line. Heave the weight over a tree limb and hoist the PHW into the air with the fishing line.

The PHW-150 is like having a base antenna and tower in one compact, portable unit. The antenna can give a portable as much as 20 db gain when compared to the portable's normal antenna.

The unit comes without fishing line, weight and coaxial cable. For more information, contact Larsen Electronics, Inc., P.O. Box 1686, Vancouver, WA 98663, or circle number 75 on the reader service card.



AEA MorseMatic Keyer for Contester or VHF DXer

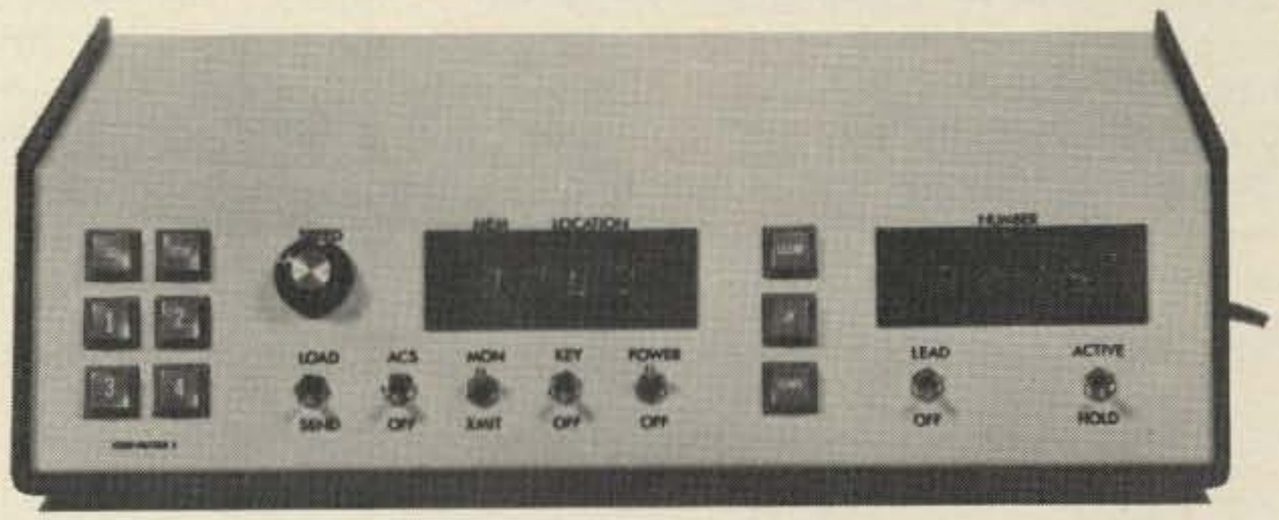
A new computerized electronic keyer is available from Advanced Electronic Applications, Lynwood, WA 98036, using two custom microprocessor chips to perform many exotic control functions. The MorseMatic is designed for the serious contest operator and the VHF DXer. Some of its features are: Slow or Fast Code mode, automatic beacon mode, selectable dot and/or dash memories, "bug" mode, memory hold for transport or power failure, keypad control, 500+ character memory with "Soft Partitioning," edit mode, message interrupt and resume, visual and audible memory limit indicators, optional expansion to 2000 character memory, auto serial number generator, graduated speed code practice, variable time-span beacon operation, and more. The price is $199.95. For complete information circle number 84 on the reader service card.

Build-It-Yourself Ideas In Catalog

A colorful, 104-page catalog describing the latest in electronic kits is now available free from Heath Company. New products featured include a five-antenna coax switch for Hams, a deluxe digital multimeter, a car thermometer, a series of self-instruction math programs and an educational program entitled, "Computer Concepts for Small Business."

Product categories include amateur radio, color television, stereo components, test instruments, digital clocks, personal computer systems, auto, marine and aircraft accessories, plus a selection of self-instruction programs in electronic-related subjects.

The catalog may be obtained by writing to Heath Company, Dept. 570-250, Benton Harbor, MI 49022, or circle number 79 on the reader service card.



Con-puter 1 Memory Keyer

The Con-puter 1, a new type of memory keyer for Amateur Radio cw contests or casual operation, permits the operator to store contest exchange messages which contain serial numbers. After initial storing of desired contest messages by the operator, Con-puter 1 automatically inserts and displays the correct serial number. Each time a message is initiated, the serial number automatically increases by one, and the complete message, with number, is sent without further attention from the operator. Numbers up to 9999 can be accommodated.

Con-puter 1 also contains a leading zero option which, when activated, automatically places lead zeros in front of numbers less than 100. The memory and address locations are digitally displayed for loading convenience.

Con-puter 1 has built-in sidetone and speaker. A regular or iambic key paddle may be used. Continuously adjustable keying speed is 5-60 wpm. Power requirements are 120 volt AC, 60 Hz or 12 volt DC. Memory contents may be protected against loss by connecting an external battery to terminals provided on the rear panel.

The heavy-duty aluminum cabinet is 12″W×3½″H×10″D, and the unit weighs 8 pounds. Price is $379 fully assembled, shipped prepaid.

For more information on the Con-puter 1 contact Con-puter 1, 3006 Lockheed, Midland, TX 79701, or circle number 78 on the reader service card.

Collins KWM-380 Transceiver

The new Collins KWM-380 amateur transceiver is a self-contained amateur station including an internal split frequency VFO function, a built-in AC/DC power supply and a speaker. The fully-synthesized KWM-380, with microprocessor-controlled tuning, gives frequency stability and accuracy in four tuning rates, even down to 10 Hz.

The KWM-380 also provides full frequency coverage in receive between the frequencies of .5 to 30 MHz, and has a microprocessor control system; simplified frequency selection with tuning in 1 MHz, 1 kHz, 100 Hz or 10 Hz increments; built-in split VFO memory capability; two frequency registers; passband tuning and IF selectivity; and more. For more information on the KWM-380, contact The Collins Telecommunications Products Division of Rockwell International, or circle number 85 on the reader service card.

Model EP-8 Pocket Shortwave Receiver

Measuring only 45 x 73 x 25mm, the Model EP-8 Pocket Shortwave Receiver is believed to be the smallest AM/SW 2-band receiver in the U.S. In addition to the standard broadcast band (AM), the EP-8 receives shortwave frequencies from 3.9 to 12 MHz. Controls include a Band Select switch, tuneable dial for AM and SW and volume control coupled with an on-off switch. Audio output is via the supplied earphone only, and the receiver is powered by two hearing-aid type batteries (included).

The unit has built-in Ferrite Rod antennas for both bands. While shortwave reception is satisfactory for powerful stations such as the BBC, Radio Canada International, Radio Nederland, Deutsche Welle and others, better SW sensitivity can be obtained by placing the receiver near a telephone or AC outlet. No direct antenna connections are necessary.

Priced at $24.95 ppd in the US, the Model EP-8 is available from Radios International, P.O. Box 6053, Richardson, TX 75080, or for more information circle number 83 on the reader service card.

a monthly feature by

FRANK ANZALONE, W1WY

Contest Calendar

News/views of on-the-air competition

A touch of the "bug" about the time I was preparing this column put me out of action for about two weeks. With time running out, Bob, N1XX came to the rescue and gave me a hand with this month's Calendar. The following introduction looks good; maybe I should con him into doing it more often. Trust you had a pleasant Holiday Season and that 1980 holds many good things for you.

73, Frank, W1WY

Not being a "midnight oil" type (which has probably cost me several new countries over the years) I rarely catch the Johnny Carson TV show. When I do, however, it is usually my luck that a guest host is taking Johnny Carson's place much to my disappointment.

As it happens I find myself in the position of being Frank Anzalone's "guest host" for this month's column. I certainly hope that his readers are not disappointed. After all, Frank is the resident contest expert at *CQ* and I couldn't begin to fill his shoes.

Having been at Frank's QTH when the mail arrives, I can assure you that he receives his share. Some of the letters make reference to "too many contests" and on this subject may I make a few observations.

First of all, *CQ* only has four major contests—namely, CQ W.W. fone and CW, CQ WPX fone and CW. Each of these occupy only one weekend a piece. The 160 contest is a specialized contest occupying only one band.

Secondly, the number of contest entrants increases every year, which in its own right advocates the popularity of contests.

Thirdly, we should look at all of the positive aspects of contesting. Look at the development of electronic keyers with memories, the development of speech processors, the advances in high performance antenna systems, the increase in accuracy of propagation predictions, the rare DX countries activated for contest purposes, the number of hams upgrading to a higher class of license in order to be more competitive, the improvement in operating techniques and last, but not least, the good will and friendship generated among participants.

Contests are sponsored by countries and groups the world over. In no way is it possible to have one clearinghouse to review and pass judgment on the pros and cons of one contest over another. Contests are here to stay, and contrary to the cigarette commercial, it's easier to switch to them rather than to fight them!

73's, Bob, N1XX

14 Sherwood Road, Stamford, CT 06905

Calendar of Events

Jan. 5-6	QSL Exchange Contest
Jan. 5-7	ZERO District QSO Party
Jan. 12-13	Int. Island DX Contest
Jan. 12-13	ARRL VHF Sweepstakes
Jan. 12-13	"Hunting Lions" Party
†Jan. 12-13	YU 80 Meter CW Contest
Jan. 19-20	AGCW-DL QRP Contest
Jan. 19-20	N. & S. America RTTY
Jan. 25-27	**CQ WW 160 Meter CW Contest**
Jan. 26-27	French CW Contest
Jan. 27-28	Classic Radio Exchange
Feb. 2-3	So. Carolina QSO Party
Feb. 9-10	Dutch "PACC" Contest
Feb. 9-10	TWO Land QSO Party
Feb. 9-10	QCWA CW QSO Party
Feb. 9-10	RSGB 7 MHz Phone Contest
Feb. 16-17	ARRL DX CW Contest
Feb. 16-17	YL-OM Phone Contest
Feb. 23-24	French Phone Contest
Feb. 23-24	RSGB 7 MHz CW Contest
Mar. 1-2	ARRL DX Phone Contest
Mar. 8-9	QCWA Phone QSO Party
Mar. 8-9	YL-OM CW Contest
Mar. 29-30	**CQ WW WPX SSB Contest**
Mar. 29-30	ISSB CW QSO Party
Apr. 8-9	DX to N. Amer. YL Phone
Apr. 15-16	DX to N. Amer. YL CW
Apr. 19-20	ISSB Phone QSO Party
May 24-25	**CQ WW WPX CW Contest**

† Not Official

CQ WW 160 C.W. Contest

Starts: 2200 GMT Fri. January 25
Ends: 1600 GMT Sun. January 27

Rules are the same as previous years. Like last year all logs will be checked more closely; penalties and disqualification criteria will be closely observed.

This is a c.w. only contest, c.w. to phone contacts are not permitted.

Exchange: RST plus a three figure QSO number starting with 001, and your state or province for Canadian stations. It is not necessary for DX stations to send their QTH; their call will identify them.

Scoring: *For W/VE/VO stations.* Two points per QSO with other W/VE/VO stations. All DX contacts are worth 10 points. (DXCC country list)

For DX countries: Two per QSO with stations in the same country, 5 points with stations in other countries. Except for QSOs with W/VE/VO which count 10 points.

Multiplier: For all stations. Once point for each U.S. state, VE province and DX country worked. (KH6 and KL7 considered DX, and the District of Columbia same as Maryland. Also remember that VE1 is divided into 3 provinces, New Brunswick, Nova Scotia and Prince Edward Island.)

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

Penalties: Three additional contacts will be deleted from the score for each duplicate, false or unverifiable contact removed from the log.

Disqualification: Violation of the

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

A second multiplier will be deleted for each one lost by the above action.

Disqualification can result if in the opinion of the Committee the penalty total is considered excessive. Disqualified stations and operators may also be barred from competition in all CQ contests for a period of up to three years.

Awards: Certificates to the top scorers in each state, each VE province and each DX country. Additional awards if the score or returns warrant.

There are two Plaques again being awarded by the West Coast A.R.C., both for single operators. One to the highest scorer in the U.S., and the other to the highest scoring European.

And for the World Champion in the contest, the new John Doremus, W0AW Memorial Plaque, donated by "Friends of John Doremus."

The above plaques may be won only once by the same station within a three-year period.

Sample log and summary sheets may be obtained from CQ by sending a large s.a.s.e. with sufficient postage to cover your request. (A 15¢ stamp will get you one summary sheet and 4 log forms, 40 contacts to the sheet.)

Mailing deadline for contest entries is Feb. 29th, and this year they go to our new address: CQ Magazine, 160 Contest, 76 N. Broadway, Hicksville, N.Y. 11801.

QSL Exchange Contest

Starts: 0000Z Sat., January 5
Ends: 2359Z Sun., January 6

This is a most unusual activity, more of a QSL exchange party than a contest. The objective is a positive exchange of QSL cards, since you agree that you are actually filling out a QSL card as the contact is being made.

The same station may be worked on each band and mode. Only single operator stations are eligible to participate.

Exchange: Your call and a signal report, followed by the statement "I have completed your QSL card," or "QSL done" if on c.w.

(Of course it is assumed that sufficient time is permitted to make out the card and that the other station will go along with the idea.)

So what do you do now? At the end of the contest you pack up all the cards and send them to W5GN, who dreamed up this idea. He in turn will sort the cards and mail them to the new owners.

Your cards *must* be received by February 6th. Include a large s.a.s.e. for the return of any cards that may have been received for you, and $1.00 for every 100 cards you send to cover expenses, etc.

To make it more interesting a Trophy and certificates will be awarded to stations with the highest count of QSL cards received by W5GN.

This has been a difficult contest to describe. Hope I have all the facts straight.

Your cards go to: H. W. Barry Merrill, W5GN, 10717 Cromwell Drive, Dallas, Texas 75229.

(And don't forget, cards must be received by February 6th. Barry promises to have your cards mailed by March 6th.)

Zero District QSO Party

Starts: 2000Z Sat., January 5
Ends: 0200Z Mon., January 7

This year's party has been moved up from the usual April dates by the Mississippi Valley Radio Club. The Zero district covers a lot of territory, so a lot of activity can be expected, hopefully from some of the rarer areas.

Stations outside the ZERO district may work ZERO stations only, but ZEROs may work both in and out of district stations. The same station may be worked once on each band and mode, and mobiles in each county change.

Exchange: RS(T), county and ARRL section for ZEROs, RS(T) and ARRL section for all others.

Scoring: *For ZEROs:* Total QSOs multiplied by (ARRL sections + ZERO counties + DX countries) worked.

For Others: Total QSOs multiplied by (ZERO ARRL sections + ZERO counties) worked.

Frequencies: CW—3560, 7060, 14060, 21060, 28060. Phone—3900, 7270, 14300, 21370, 28570. Novice—3735, 7125, 21125, 28125.

Awards: Certificates to the top scorers in each ARRL section and each DX country. Also to Novice/Technicians and a special mobile class.

Mailing deadline is February 15th to:
Mississippi Valley Radio Club, W0SI, 3518 W. Columbia, Davenport, Iowa 52804. Include a large s.a.s.e. for log forms or copy of results.

International Island DX Contest

Starts: 0000Z Sat., January 12
Ends: 2400Z Sun., January 13

This is the 2nd time around for this one. Many changes have been made in the rules. It is therefore recommended that you send for contest forms and the IDX Island listing.

The object of the contest is to work

worldwide DX stations with special emphasis on DXCC countries which are IDX Islands.

Contacts may be made on phone only, c.w. only or mixed modes. Three classes, single operator, multi-operator, single and multi transmitter. Single operators are limited to 36 hours out of the 48 hour contest period; multi stations can use the full 48 hours.

Exchange: RS(T) and a consecutive contact number. DX stations designated as IDX Islands must also include their Island name.

Points: One point for contacts within own country, 2 points if outside own country, and 1 bonus point if station worked is an IDX Island. The same station may be worked *only once* for QSO points, but may be worked on a new band for multiplier credit.

Multiplier: Each DXCC country worked on each band.

Final Score: Total QSO points times the total multiplier.

Frequencies: Lower 50 kHz of each phone and c.w. segment of the U.S. bands, 6 thru 160 meters.

Awards: A minimum of 12 hours of operation is required to be eligible for awards, which will be issued to qualified high scorers in each class and mode, in each state, each DXCC country and each IDX Island.

As previously indicated, the IDX Island list is a must; official log and summary sheets are also desirable. A dupe sheet for entries with 100 or more contacts is also required.

Logs and requests go to: Gary Pierson, WA7GVM, Box C, La Conner, Wash. 98257. Include a large s.a.s.e. (3 IRCs for DX) with your entry or requests.

"Hunting Lions" QSO Party

Starts: 1200 GMT Sat., January 12
Ends: 1200 GMT Sun., January 13

Sponsored by Lions International and coordinated by the Lion Club of Rio de Janeiro, Brazil, this activity is between Lions and non-members. The objective: "to create and foster a spirit of international understanding and cooperation," among Lions and amateur radio operators.

Exchange: Call, QSO no. and RS(T). Lions or Leos will also include their club name.

The same station may be contacted once on each band, 10 thru 80, both phone and c.w., but each mode is scored separately.

Scoring: One point for contacts between stations within the same continent, 3 points if between different continents. There is a bonus of 1 additional point if QSO is with a member of a Lion or Leo club, and 5 extra points if you contact a member of the Rio de Janeiro Arpoador Club.

Total QSO points is your score.

Awards: Will be made for both phone and c.w. A Trophy for 1st place. A Trophy Medallion for 2nd place. And a Plaque for 3rd place. There are also medallions for the 4th thru 10th places. Each participant will receive a certificate.

It is suggested that you write to Lions International, Att: Robert Cywinski, 300 22nd Street, Oak Brook, Ill. 60570 or the Arpoador Club for additional information.

Logs must be submitted no later than 30 days after the end of the party to: Lion Club of Rio de Janeiro Arpoador, Rua Souza Lima no. 310, Apt. 802, Rio de Janeiro 22081, Brazil.

YO 80 Meter CW Contest

Starts: 2100Z Sat., January 12
Ends: 2100Z Sun., January 13

The YU DX Club is making this an annual affair to stimulate more activity on 80 meter c.w. Both single and multi-operator are permitted.

Exchange: RST plus a progressive QSO number (579001 and etc.).

Scoring: Contacts between stations in the same country 1 point. With other

countries on the same continent 2 points. With countries on other continents 5 points. With YU stations 10 points.

Multiplier: Each DXCC country including your own, and each YU prefix worked.

Final Score: Multiply total QSO points by the sum of DX countries and YU prefixes worked.

Awards: Certificates to the top scorers in each country, 2nd and 3rd place awards where justified. Call areas in W/K, VE, PY, VK, ZL, JA and UA9 & UA0 will be considered separate areas for awards. There are also Trophies for continental leaders.

Include a summary sheet and the usual signed declaration with your entry. Check your log carefully. Taking credit for duplicate contacts in excess of 3% of the total made may mean disqualification.

Mailing deadline is March 1st to: YU DX Club of SRJ, P.O. Box 48, 11001 Belgrade, Yugoslavia.

AGCW-DL QRP Contest

Starts: 1500Z Sat., January 19
Ends: 1500Z Sun., January 20

This is the winter edition of this Contest organized by the AGCW-DL.

It's a c.w. only, all bands 10 thru 160. The same station may be worked on each band for QSO credit.

There are 5 classes as follows:
A.—Single Opr., 3.5 watts or less.
B.—Single Opr., 10 watts or less.
C.—Multi-Opr., 10 watts or less.
D.—QRO stations, over 10 watts.
E.—SWL's.

Multi-Opr. stations may operate the full 24 hours; all others must take a 9 hour break.

Exchange: RST, QSO no., and power input. Add X if transmitter is crystal controlled. (559001/5x), (579001/QRO) etc.

Points: QSO with own country, 1 point. Other countries own continent, 2 points. DX outside own continent, 3 points. Crystal controlled stations double above. Crystal controlled stations are limited to 3 crystals for each band.

Multiplier: One for each country and each DX contact.

Final Score: Total QSO points times the multiplier on that band. Add the sum of the scores from each band for final score.

For scoring purposes call areas in JA, PY, VE, VK, W/K and ZS are counted as multipliers.

Awards: Certificates to the first three places in each class and each band.

Special log sheets are available from the Contest Mgr. (s.a.s.e. and 2 IRCs). Include one IRC with your entry for results.

Your log must be received no later than 6 weeks after end of contest by Contest Mgr., Siegfried Hari, DK9FN, Spessartstrasse 80, D-6453 Seligenstadt, Fed. Republic of Germany.

North & South America RTTY Contest

Saturday, January 19, 1800-0200 GMT
Sunday, January 20, 1200-2400 GMT

This is the 2nd of a series of three Flash RTTY contests organized by Prof. Franco Fanti of I.A.T.G. Radiocommunications.

Rules are the same for each one except for the operating times and the continental areas.

The rules for the first one, the Oceania/Asian contest, given in the November Calendar, are also valid for this one. Just substitute North and South America for Oceania/Asia in the scoring.

Your entry for this one must be received before February 20th and they go to: Prof. Franco Fanti, Via A. Dallolio no. 19, 40139 Bologna, ITALY.

French DX Contest

CW - Jan. 26-27 Phone - Feb. 23-24
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

The following rules would indicate that there has been a change in the format of this contest.

This year the exchange will be limited to French Europeans and French oversees countries as per the following list.

95 French departments (two figures)
DA1/2 stn of F forces in DL
French overseas countries:
Mayotte FH, Reunion FR, Europa FR/E, Juan de Nova FR/J, Glorieuses FR/G, Tromelin FR/T, Guyane FY, St Pierre-et-Miquelon FP, Martinique FM, Guadeloupe FG, St. Martin FG, St Barthelemy FG, Clipperton FO, New Caledonie FK, I. Loyaute FK, Chesterfield FK, Wallis FW, Futuna FW, New Hebrides YJ, I.du Vent FO, I.sous le Vent FO, I.Australes FO, Rapa FO, Marquises FO, Gambier FO, Touamotou FO, Terre Adelie F FB8Y, Kerguelen FB8X, ST Paul-et-Amsterdam FB8Z, I.Crozet FB8W.

Single operator stations are limited to 36 hours out of the 48 hour contest period.

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

Exchange: RS(T) plus a 3 figure

QSO number. The French stations will include 2 figures or letters to identify their QTH. (/67,/FM,/FY, etc.)

Points: Three points for contacts between stations on the same continent, 10 points if with another continent.

Multiplier: Each French Department and country in above list worked on each band.

Final Score: Sum of all QSO points multiplied by the sum of the multiplier from each band.

Awards: Certificates to the top scorers in each country and each U.S. call area. In the past, contest contacts have been accepted for the many French awards.

Include a summary sheet with your entry showing the scoring, multiplier list for each band, etc.

Logs go to: REF French Contest, Att: Lucien Aubry, F8TM, sq. Trudaine 2, 75009 Paris, FRANCE.

Classic Radio Exchange

Starts: 2100Z Sun., January 27
Ends: 0400Z Mon., January 28

This is the winter edition of this unusual activity sponsored by the Southeast A.R.C. of Cleveland, Ohio.

Object is to restore, operate and enjoy older equipment with like-minded hams.

A classic radio is defined as any gear built since 1945, but at least 10 years old. An advantage in the contest but not required in the exchange.

The same station may be worked on each band and mode and with different equipment combinations. Non-contestants may be worked for credit.

Exchange: Name, RS(T), state, province or DX country, and receiver and transmitter type. (i.e. home brew, 807 final, etc.) Also any other interesting information.

Scoring: Add number of different transmitters, receivers and state, provinces and DX countries worked on each band. Multiply that total by the number of QSOs made on all bands. Multiply that total by your Classic Multiplier, total years old of all transmitters and receivers used. (3 QSOs minimum per unit.) If your equipment is a transceiver multiply age by two.

Frequencies: CW—60 kHz up from band edge. Phone—3910, 7280, 14280, 21380, 28580. Novice—3720, 7120, 21120, 28120. (Try 20 on the half hour and 15 on the three-quarter hour.)

Awards: Certificates will be awarded for the highest scores, longest DX and "unusual achievement."

Send logs with comments, pictures, anecdotes, etc. to: Stu Stephens, K8SJ, 1407 Hollyrood Rd., Sandusky, Ohio 44870.

Results of 1979 French Contest U.S.A. and Canada

Phone		C.W.	
WB1CRG	25,080	K1SA	343,360
W1BWS	3,570	W1BWS	51,220
F2YS/W2	501,835	WA1FCN	29,798
K2JFV	129,612	W1OPJ	2,040
KB2DE	41,440	W1PWK	819
HI3DJP/W2	11,070	W1CFZ	490
W2QHJ	7,752	K2SX	323,175
W2UL	1,680	W2GKZ	41,528
N4NX	75,190	K2MQ	31,878
W4KMS	39,200	K2PF	22,770
WA4AXT	27,280	W2NCG	22,386
WB5MSU	1,200	W3ARK	328,600
W6HX	68,884	W3HDH	105,892
N6TW	720	K3NR	29,100
N7DF	12,383	N3RL	640
KA8BAC	52,780	WA4OML	104,960
WA9FZQ	109,736	WB4ENI	101,994
W9OA	105,469	W4UNO	66,654
K9HDE	79,725	WB4YGL	3,888
W9QWM	16,502	N6AW	55,575
WØCDC	13,200	N6TW	2,002
WØPKO	1,820	N6OB	90
		W8UVZ	284,994
VE2RV	1,542,752	N8DE	240,909
VE2AFC	145,137	W8DSO	55,815
VE2EML	30,078	W8VSK	8,060
VE3KZ	1,592,730	K8NMG	3,360
VE3BR	5,400	W9OA	302,085
VE4SW	8,100	K9FD	56,792
VE7VP	35,345	WBØGOB	54,780
VE1AIH	check log	WØWDW	10,730
		VE1MX	159,238
		VE1AIH	90,288
		VE2WA	8,712
		VE3DAP	214,964
		VE3KZ	59,092
		VE6LU	30,618
		VO1KO	189,635

HAM SHOP

FREE TO CQ SUBSCRIBERS

Advertising Rates: Non-commercial ads are 10 cents per word including abbreviations and addresses. Commercial and organization ads are 35 cents per word. Minimum charge $1.00. No ad (non subscriber) will be printed unless accompanied by full remittance. Free to CQ subscribers (maximum 3 lines per month). All ads must be typewritten, double spaced. Recent CQ mailing label must accompany ad.

Closing Date: The 10th day in the third month preceding date of publication. Because the advertisers and equipment contained in Ham Shop have not been investigated, the Publisher of CQ cannot vouch for the merchandise listed therein. Direct all correspondence and ad copy to: CQ Ham Shop, 76 N. Broadway, Hicksville, NY 11801.

FOR SALE: Hallicrafters SX-28, Converted BC-459-A with power supply and key, Motorola TMN 6013a mike, parts and other gear, Mike Donovan, 3405 Dove St., Dubuque, Iowa 52001

WILL SELL by bid only a Brunswick wood cabinet table model broadcast radio, 1936 model-W5JHA, 800 N. Gray, Pampa, TX 79065.

CW KEYBOARD - Hal Model MKB-1, Mint Condx. with ten minute timer, custom dust cover. $160. John, N6HI, 8701 MacAlpine, Garden Grove, Ca. 92641. Phone: (714)539-6555

COLLINS SALE: KWM-2 $450, PM-2 w/samsonite carrying case $175; Mobile Rack w/2 mobile power supplies $125; Take All $650 firm. S-LINE: 75S3 $450; 32S3 $525; 516F2 $125; 312B4 $200; DX Eng. Processor for 32S3 (unused) $70; Tall All (S-Line) $1265 firm. CURTIS Deluxe Keyer EK-404 $70. ALL OF THE ABOVE for $1900 firm. Jack M. Gutzeit, W2LZX, c/o CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

SELL: Robot 70-B monitor, 80 camera. Manuals cables. 100% mint. Make offer. W7KSG, 1876 E. 2990 So. Salt Lake City, UT 84106

SELL Lafayette 6-Mtr. Crystal Converter, 7MC-11-MC. Output. Nathan Rosen— 2440 Olinville Ave., New York, N.Y. 10467

WANTED - Matching speaker for Yaesu FT-401B. Mark Wood, Rt. 1 Box 298, Thurmond N.C. 28683 919-957-2484

SELL or Trade: Excellent Drake T4XB, R4B, AC-4, MS-4; $795. Wanted: Johnson 6 & 2 Thunderbolt, Drake TR-6, Rohn 25G tower, Ham 2 or 3 rotor, Wilson System 1 or DB-65 antennas. KØMK—Rt. 2 Box 171—Gilbert, Minn 55741 218-865-6541 evenings.

MAGAZINES for sale at cost: Popular Electronics, Illustrated Electronics, Radio TV-Experimenter, Ham Radio Horizons, 73, QST. Bell, Box 562, Deming NM 88030

FOR SALE. Ham license plates, Saskatchewan VE5XH and VE5XJ. Contact Doug Rittinger, 1238 North Hill Drive, Swift Current, Saskatchewan.

WANTED: Robot 400 and other SSTV gear, or construction articles for same. John WA3GAY, Univ. of DE, Newark, DE 19711

FOR SALE - Hy-Gain TH6-DXX Triband beam. Used one year. R. Sever, W8IM, 248 Sheraton Dr. N.W., North Canton, Ohio 44720

HW-101, accessories, $400., Dentron MT2000A tuner, $150., WD9CJG. Dave, 311 Hwy 135, Oconomowoc, Wi 53066

WISH to sell a YAESU FT-101f virtually never used. Will sacrifice to someone in area at any reasonable price. Send a 10¢ postcard to: C. Mitchell, P.O. Box 1003, Fairfield, Conn. 06430

WANTED: Old Super Pro receiver section. SP110 to SP400. Any condition. No P. supply needed WATEI, 226 N. School, Fortville, Ind. 46040

(1,000) RET. ADDRESS LABELS w/call, gold striped, $2 PstPd.; QSL's printed low as (100)! low cost; SASE. D. Testa, Box 9064-CQ, NWK., NJ 07104

WANTED: FV400S External VFO for YAESU FTDX560. Jordan, W5EDX, 512-733-8978, 2334 W. Mulberry, San Antonio, TX 78201

WANTED: Transmatch 2000 PEP, Tri-Band Beam, Rotor, SSB Filter, Dummyload 1000 W. W. Pierson, 2050 Penna. Ave., St. Albans, W. Va. 25177

SALE: Ten-Tec Century/21 Transceiver with 12-volt breaker switch added for portable operation. Has been factory checked. Good condition. $210 FOB. K7BD, 103 E. Bartlett Ave, Selah, Wash., 98942

I.D. badges: Your name & call on an outline of your state $1.50 ppd. Donna Mollan WB7FDE, 7805 NE 147th Ave., Vancouver WA 98662

WANTED - Heathkit IT-12 signal tracer in good shape with manual. Glenn McMichael VE3CGU Box 231 Goderich ONT.

WANT Manual and adapter for I-177 tube tester. R.W. Randall, K6ARE 1263 Lakehurst Rd. Livermore, CA 94550

TRADE: Clegg 22 Mark II for HW 8 & p/s. Joseph Schwartz, 43-34 Union St. Flushing, N.Y. 11355 (212) 461-5933

WANTED: Manual or information for a Kaar DT-76 VHF high band transceiver. Ed-WA7DAX, 3509 Muriel Way, Granger, Utah 84119

H.P. Linear amp. parts, Rtty, Transformers, power units, Xmitting tubes; Send SASE for list. Cleaning house! LG Basham W7TCT, 735 Caves Hwy, Cave Junction, Ore. 97523

QSLs & Rubber Stamps-Top Quality-Card Samples & Stamp Catalog 50¢. Ebbert Graphics D-2, Box 70, Westerville, OH 43081

SELL: QST1936 thru 1965, CQ 1948 thru 1965. L. Lustyk, W2PZU, 50 Cinnabar Rd., Rochester, NY 14617

SELL Dentron 160-10AT $90. HW-8 $115. Argonaut 509 $280. All mint condx. WØMS, 7190 S. Franklin Wy, Littleton Co. 80122

CRYSTALS: S.A.S.E. for my list K8LJQ, 355 Mower Rd., Pinckney, Mich. 48169

WANTED: U.S. source for 4-1/4x6-1/4 light wt. air mail envelopes for return of large DX QSLs. W6EL, Box 2055, Culver City, CA 90230

HALLICRAFTERS HA-10 Preselector for SX-117, mint $50. 220MMZ cavity filters $35 ea. WANTED: any national receiver, working or not. T.N. Colbert 1800 Rhodes #612 Kent, OH 44240

ATLAS RX-110, TX110-H, PS110-H, all $410. TS520, CW520 $440. All equipment mint. KA4DGA, P.O. Box 350064, Miami, FL 33135.

DC to AC Inverter wanted, also Drake DC-4. H. Strobel, 84 Chichester Ave., C. Moriches, NY 11934

HEATHKIT - SB-401, SB-301 twins, 400 Hz Xtal filter, Retubed, realigned, ex. condition, $400. Bill Mullin-AA4M, 3103 Faber Dr., Falls Church, VA 22044

FOR SALE Electronic test equipment-reasonable-S.A.S.E. for list. Ken Miller, 10027 Calvin St., Pittsburgh, PA 15235.

INTERESTED in contacting anyone who has experimented in 1750 mtr band.—K1JDJ-P.O. Box 1003-Fairfield, Conn. 06430

WANTED: Schematic for Gonset G-76 transciever also the external power supply. Will take either/both for price. Leo Milner, Rt. 2 Box 112, Jay, FL 32565

HW-101 & Pwr Supply $325-10-18 Scope $100-IT-7400 Digital IC tester $70-SASE-Apt-216, 11325 Sugarpine Dr., Florissant, Mo. 63033

QRPers - Join the G-QRP-Club. Details: Rev. G.C. Dobbs, Willowdene, Central Ave, Stapleford, Nottingham, U.K. or from WB9QPS

DRAKE WV-4 $45. Astatic D-104 Silver Eagle $45. Heath battery eliminator BE-5 $25. K.E. Electronics Memo 512 Keyer $70. Clem W8VO/K8HWW

SELL 1979 DX and US callbooks. $18 for both. I ship. Lowry, 3 Darlin Dr., Reading, PA 19609

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

DX Callbook magazine. I will buy that old issue that you replaced. H. Anderson, 816 No. Cedar, Colo. Springs, Colo. 80903

WANTED - TRS-805 Wanted $$$$ Any Quantity, Any Condition, Immediate cash available. SASE for immediate cash offer, some units available. K2DCY, Box 632, W. Caldwell, NJ 07006. Tel eves. (201) 226-9185

SALE: 2 meter Yaesu FT221, FM AM SSB CW, $475. 2 meter Regency HR-2B FM + Ant $150. both in mint condition. Burke RR1 Box 164A, Farmingdale, NJ 07727

FOR SALE - TS-120S with ex UFO, ext spk, CW filter, mike, send S.A.S.E. for info. 7602 Timberwood Dr., Jay, FL 32224

APPLE II Programs-Disk & Cassette pgms for all applications. Will write custom pgms. SASE for list. B. Moran, 7335 Manning, Peoria, IL 61614

WANTED: Ten-Tec PM3-A unmodified, AC-5 SWR MTR, Johnson Viking VFO. State price and condx in 1st letter. R.H. Arland/G5CSU PSC Box 1454, APO NY 09127

WANTED: cy of "CQ Ghost Ship" and "DX Brings Danger" to encourage my children. W8JF, 6100 Upper Straits, West Bloomfield, MI 48033

WANTED: Drake FS-4. Henry L. Schultz, Jr., 610 Young Rd., Apt. 1, Erie, PA 16509

WANTED: Very early broadcast and commercial radios, XMTRS, parts, literature, etc. Troe, Skyline Drive, Morristown, NJ 07960

SELL: HEATH HW-8 & P.S., HD141D Keyer, Ten-Tec PM3A in original carton. Best offer. Art Epstein, WB2WMJ, 214-15 23rd Ave. Bayside, NY 11360

HAMMERLUND HQ180 Gen. Cov. Rcvr, Ham band-band spread. W/Clock & Xerox manual. Excellent cond. Make offer. WA8NTP, Rt. 2, Box 552, Watervliet, MI 49098

DRAKE TR-7/DR-7, PS-7, FA-7. Almost new, perfect $1350. N5UX, 1432 Pamela, Hurst, TX 76053

SELL: Hammarlund HQ-150, A-1, $175. You pay shipping. C. Klawiter, 4627 N. Bartlett Ave., Milwaukee, WI 53211.

SELL or Trade for Ham gear of equal value, $200. Bally Arcade Vidio entertainment home computer. M.S. Breyfogle WØMDM, Estherville, Iowa 51334

MAKE DUPLICATE CONTEST LOGS or anything else you want copied quickly at Center Copy Service, 1036 Main St., Newington CT 06111. Phone 203-666-3445 (home) or 203-666-3695 (office). Copies are priced at 10¢ per single copy or $4.17 per 100 copies tax included. There is a postage charge for out of state customers. Hope Smith, WB3ANE/1, proprietor.

CLUB CALL PINS 3 lines 1¼ x 3¼ $1.55 each call, first name and club. Colors blue black or red with white letters. (CATALOG) Arnold Linzner, 2041 Linden Street, Ridgewood, NY 11227.

QSL's, name tags, rubber stamps. Larger catalog and samples 25¢. Budget Print Center, 130 Lincoln Highway West, New Haven, Indiana, 46774.

FREE AD! To prove our service to you! One ad, maximum 35 words, to a person, please. "Electronics Trader", Box 73CQ, Folly Beach, SC 29439.

ROHN TOWER - Buy Wholesale from Worldwide distributor. 20G-$27.06 section. 25G-$37.62 section, 45G-$67.76 section, 48 ft. foldover tower - $605.00, 48 ft. BX free standing $2. 13.40.

CIPHERS FOR SECURITY!!! Possess the capability to communicate with encrypted messages!! Military proven countermeasures to signal surveillance. Free information. Write: TAC-COM, Inc., Dept. 210, P.O. Box 3255, York, PA 17402.

LOOK buying or selling ham gear? Next five issues plus your ad printed in our publication only $3.00. Press Exchange Dept. C, 60 Brookfield Lane, Ramsey, NJ 07446.

FOR SALE - K3CHP's DX QSL Guides with ham sentences in 54 languages for $3.95. Use for outgoing DX QSLs. Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

WANTED: RME-69 and DB-20 preselector. State price and condition. Bud, W6PBI P.O. Box 5973, Orange, CA 92667. (714) 639-5170.

MANUALS FOR HEATH AT-1 AND VF1 WANTED. R.W. Randall, K6ARE, 1263 Lakehurst Rd., Livermore, CA 94550.

WANTED: Tempo 8120 Speaker.
FOR SALE: SB-634 Console, new, $125; HW-8 $85; MFJ941, $50; GR-78 receiver, $90 NØWB. (402)397-2461.

WANTED: Gonset 910-A, 911-A 6MTR Sidewinder. Must be excellent. With Manual. Jim Gysan W1VYB, 53 Lothrop St., Beverly, MA 01915. (617) 922-3850.

SELL: MFJ Versa Tuner II Model 941, mint, $50. Kenwood PS-30 power supply, new, never used, $110. David Mitchell, 1620 Young Rd., Lithonia, GA 30058.

FREE CATALOG, IC's, components, tubes, kits. No minimum, no shipping. Hamshack P.O. Box 1313, Donaldsonville, LA 70346.

WANT: Manual/Schematic for Federal Signal Generator Model 804. A.S. Bielenda, W2-IDA, 43 Chestnut Ridge Rd., Saddle River, NJ 07458.

DXERS! Ham sentences in 54 languages on your outgoing DX QSLs get results. K3CHP's DX QSL Guide, still $3.95. Joe Mikuckis, 6913 Furman Pkwy., Riverdale, MD 20840.

DAHDIDAHDIT, DAHDAHDIDAH Vinyl bumper stickers, $1. Name and call sign badges, $1.50. D. Mollan, WB7FDE, 7805 NE 147th Ave., Vancouver, WA 98662.

WANT: Telegraphers Typewriter. Must be good condition. Sever, 248 Sheraton Dr. NW, North Canton, OH 44720.

TRADE: CIE First Class Phone Course for XCVR (HF/2M) or Federal Converage Rcvr. 203/245-9679, WA1RQU.

SEND SASE for list of 4-7000A Amplifier components. L. Basham, 735 Caves Hwy., Cave Junction, OR 97523.

ANTENNA TRIPOD — Install tubular masts singlehanded in vertical position $34.95 up. Details, SASE to: Antena, 5316 Fairfax St., Shreveport, LA 71108.

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

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

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

SALE: Sony ICF-5900W multi-band receiver. Designed for SWL's. Like new condition w/ manuals. $100. Schultz, W4FA, Box "L", FPO New York 09544.

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 SASE for free sample or $10 for 1-year domestic subscription to: LONG ISLAND DX BULLETIN, P. O. Box 173, Huntington, NY 11743.

SCANNER OWNERS! IT'S HERE! THE "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-plus 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 (U.S.A., APO, FPO orders only, please); from CRB Research, P.O. Box 56-CQ, Commack, NY 11725.

CQ AND QST 1950-1975 ISSUES FOR SALE. Send SASE 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, Burbank, CA 91504. Available issues and refund sent within one month.

CERTIFICATE FOR PROVEN TWO—WAY RADIO CONTACTS 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 W6-LS, 2814 Empire, Burbank, CA 91504.

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

FOR SALE: Complete set of Time-Life camera books, 17 volumes plus master index and Photographers Handbook, $125. A. Dorhoffer, K2EEK, CQ Magazine, 76 N. Broadway, Hicksville, NY 11801.

Q.S.L. — Q.S.L. — Q.S.L. — Q.S.L. Please send Q.S.L. Cards to: Philip Steven Kurland, Post Office Box 1686, New Haven, CT 06507.

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

WANTED: Collins 51-R receiver (VHF). Bill Orr, W6SAI. Eimac, 301 Industrial Way, San Carlos, CA 94070.

WANTED: Antique Glass. Looking for old milkglass - Purple, slag, carmel, and Greentown. Tell me what you have. I pay the highest prices. Write to: 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. Schultz, Box "L", FPO New York 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.

QSLFILE is the ONLY way to protect and display your QSLs. Working on DXCC or 5BWAS? QSLFILE shows the countries/states you still need, too. For details, write: QSLFILE, 1472 SW 13th St., Boca Raton, FL 33432.

QSLs with Class! Unbeatable quality, reasonable price. Samples: 50 cents, refundable. QSLs UNLIMITED, 1472 SW 13th St., Boca Raton, FL 33432.

TRAVEL-PAK QSL KIT-- Converts postcards, photos, to QSLs. Stamp brings circular. SAMCO, Box 203, Wynantskill, NY 12198.

HEATH HW/SB-104 OWNERS: Improve sensitivity, selectivity, intermodulation performance. For info sheet, send $2 and SASE to: WB4RRC, Box 461, Warner Robins, GA 31093.

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.

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.

KITS! ST5X TERMINAL UNIT/POWER SUPPLY/AFSK. WRU. RTTY SCOPE AMPLIFIER. Write for details: Bomark, Inc., Box 7116, Hollywood, FL 33021. 305/962-7219.

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

SALE: Swan Remote Control Mobile Antenna-little used-$100. Heath Q Mult HD-11 $15. W2CW. 343 Catherine St., S. Amboy, NJ 08879. (201) 721-6579.

6N2 KW AMP.: Johnson Thunderbolt $695. (Pick-up only) Detroit area. Clem Duval W8VO. (1-313-268-2467).

WANTED: Radio Specialty 1163 Modulation Scope, Bird 43. Elements 5C & D, 10C&D. K6KZT, 2255 Alexander Ave., Los Osos, CA 93402.

WANTED: Drake 2-AC X-tal cal., 2-CQ and 2-NB noise blanker. Mark Kiessling, KA1BZR, 42 Merton St., Fairfield, CT 06430.

ICOM IC-215, 2-MTR. FM XCVR, 15 channels, all crystaled popular frequencies, mike w/Velcro Holder, internal Nicads and charger, plus regulated 12-V. Base power supply, all manuals. Excellent condition. $269 delivered 48. Bob Reinhart, K1KK, 11-C Old Field Rd., Rowayton, CT 06853.

TEST EQUIPMENT collector's surplus, HP, GR, etc. Excellent stuff. SASE list. PhD, 5220 Carlingford, Riverside, CA 92504.

TOMMY ROCKFORD books by WA Tompkins K6ATX wanted. Hard and paperback. Dave Shriver, 305 Ash, Vila Grove, IL 61956.

WANTED: Heathkit SB-104A Transceiver. Al Newman, 942 Valley Rd., Blue Bell, PA 19422.

WANTED: YOUR 40, 80, 160 MTR FT-243 Crystals. Hand Keys and Bird 43 Slugs K8LJQ, 355 Mower Rd., Pinckney, MI 48169.

WANTED: Accessories for Swan 350. Need 14-X DC Module and VX-1 or VX-4 Vox unit. Harry, N4CBR, 1740 Jennifer A-5, Lexington, KY 40505.

FOR SALE - RTTY Model 26 with desk, manual good condition $50 or best offer. (212) 892-1725.

WANTED - ARRL Handbook 1946-49 edition. State price & condition. VE3CGU, Box 231, Goderich, Ontario, Canada N7A 3Z2.

HUNDREDS of old CQ, QST, HR, 73's for sale cheap. 1950's to present. SASE for list. N5UX, 1432 Pamela, Hurst, TX 76053.

SELL: Morgain 75-10HD Multiband Dipole 66 foot long-$40 -1 Ship-Manual Incl., C. Keske, 6609 Woodhaven Ave., Cleveland, OH 44144.

SELL: FT-2100 B Linear 10-80 MTRS, mint cond. $379 WA7JBE, Bill, 2024 West 4350 South, Roy, UT 84067.

SELL: Kenwood TS 820 with Dig. control and CW filter plus VFO 820. $925. firm. K9GM, 404 S. Pershing St., Howards Grove, WI 53081.

WANTED any type of amateur equipment and acces. in need of repair. Must be complete units. Hamshack P.O. Box 1313, Donaldsonville, LA 70346.

FOR SALE: Tempo 2020 $600, Midland 13-510 $300, Waters Model 359 Compreamp $25. All Equipment in excellent condition. G. Castellini, 3567 Lincoln Ave., Vineland, NJ 08360. (609) 825-5654.

ANTIQUE - 1935 Collins XMTR W/PS & Manual-rack mount - only 10 made sell or swap - N2FG - Andy. (609) 665-1767.

FOR SALE: TRS-80 Level II Computer & 700 SP All Mode 2 Meter Rig. Send S.A.S.E. for info, 7602 Timberwood Dr., Jacksonville, FL 32224.

WANTED: Manual for HQ 110C Receiver N4ACS, 7304 Dixon Ave., Tampa, FL 33604.

NOSTALGIA BUFFS: For Sale, Heathkit Apache TX1 with SB10 SSB Converter, Good Cond. $150 National NC300 Receiver Perfect Cond. $150. S & P Schaffer, 2320 Mark West Springs Rd., Santa Rosa, CA 95404.

FOR SALE: Heathkit HW-2036A 2-meter synthesized FM Rig. $225. Steve Reese, WD8BQT, 637 E. Breen, Kingsford, MI 49801. (1-906-774-2059).

FOR SALE: Kenwood-TS-520S, mint cond. $550, N8BF (313) 673-7425.

Triple section small variable 365mmfd each $3. MFJ SBF-2 new $20 or swap for MFJ CWF; ROTRON fan new boxed $10; IC22S VIP freq expansion factory recondx $200. Art Ford, 2903 Emory St., S. Melbourne FL 32901

MINT - hardly used SX117, $200 or best; PR9-FM Police-Alarm, $25; New 126 Kodak + Permacube Electronic Flash, $25; B&H 220, F2.5 lens; new Sylvania Sun Gun, Exposure Mtr-$30; New RCA cassette/recorder $25. U ship UPS. Chester Benson, 732 South 14th, Richmond In. 47374

SELL OR SWAP for SSTV gear. 30 year Science fiction collection, magazines, books, pockets. List SASE. N2VW, Box 65, Ft Dix, NJ 08640.

WANTED - Instruction book for Gonset Comm. IV, 2 meter. Original or copy. — W81M, R. Sever, 248 Sheraton Dr. N.W., North Canton, Ohio, 44720

BUMPER STICKER reads dah-didah-dit dah-dah-di-dah $1.00. Your name & call on a metal pinback badge $1.50. Donna Mollan, WB7FDE, 7805 NE 147th Ave., Vancouver, WA 98662

OSLS'. 24 hour service. Why wait? New, strong designs. Get more for your money. Send 25¢ for catalogue, Samples. Dx magic, 2448 Channing, Dept B, Berkeley, Cal. 94618

WANTED, WORKING OR NOT: NATIONAL SW-3, SW-5, FB-7, FB-X, HRO-500, NC-173. NC-183, NC-183D, NC-200, NC-400, 1-10. Sell: Hallicrafters HA-10 preselector for SX-117. T.N. Colbert, 1800 Rhodes Rd. 612, Kent OH 44240

FOR SALE: QST 1965 to 1975 solid. Best offer over $50. N5UX, 1432 Pamela, Hurst, Texas 76053

SELL - 6 el Telrex 6 mtr Beam - Pick up $20. SX101-A Rcvr - Pick up $90 or B.O. Tubes etc. M.E. Knowles, 9 Brown St., N. Billerica MA 01862. Tel: 617-663-3743

SEND SASE for list linear parts, Rtty, tubes power units & miscellaneous. L. Basham, 735 Caves Hwy., Cave Junction, Ore. 97523

NEEDED: AN/FRA-86 demod, C-626, C-628, C-853, C-905, C-1015, C-1024/ARC-27 control boxes w/plugs. C.T. Huth, 146 Schonhardt, Tiffin, OH 44883

WANTED - a Spec-Tronics DD-1 digital display. W1ZWL PO Box 15, Spencer, Ma 01562

LOOKING for amateurs who have operated from U.S. Possessions in Pacific for informational purposes. Gary Mitchell-(WA1GXE)--P.O. BOX 1003-Fairfield, Conn. 06430

WANTED: Used amateur equipment. State condition, make, model and price. H.F. SCHNUR, 115 intercept Avenue, North Charleston, SC 29405.

DRAKE R4A, T4X, AC3, MS4; $550, excellent condition, all crystals and filters. N9RC, 8377 Chestnut Dr., Newburgh, IN 47630

DRAKE C LINE, R4C, T4XC AC4 and MS-4, Mint, 160 and 10 XTALS $900. K8CV, 4612 Woodland, Royal Oak, Mich. 48073 or 313-549-1846

WANTED: FMTD-1 decoder for KDK-FM 144. C.W. Mathias, 8519 Warwick Rd., S.E., Warren, Ohio 44484

SELL: Amateur radio station. Send SASE for list. WD9-QSF, 1546 Jackson St., Beloit, WI 53511

STATION W0CVU: Kenwood TS-820S $725.00 Yaesu YO-100 Monitorscope $99.50. Both units like new. Charles Boegel, 1500 Center Point Road, NE, Cedar Rapids, Iowa. 52402.

SELL: Heath SB-401/303 Combo Rec/Trans and ELMAC AF-68A XMTR + Pwr. supply, Joe Reinhardt, 106 Pine St.,Garden City, NY 11530 (516) 742-8337

GONSET 2 meter 500 watt linear, like new, 5 watt drive. Uses 4x150A. $200. Walt, K8CV, 4612 Woodland, Royal Oak, Mich. 48073. 313-549-1846

SELL: Hammarlund HQ-150, A-1, $175. You pay shipping. C. Klawilter, 4627 N. Bartlett Ave., Milwaukee, WI 53211.

COLLINS PACKAGE: 32S-3, 75S-3B, 3OL-1, 516F-2, 312B-4, plus HD-10 Keyer, Shure Mike, and Hy-Gain Hy-Tower. Best sensible offer. K1QZV, 17 Winsor Ave., Johnston, RI 02919

WANTED: Radio Specialty 1163 DEV Scope, VMF Marine Radio,, K6KZT, 2255 Alexander, Los Osos, CA. 93402

COLLINS: KWM-2A and 516F-2 (both round emblem). Mint; used very little. $1000. Boyd Stepler, WA9ROU. (812) 847-7739.

WANTED: Crystals, N.B., all filters for Drake R4C receiver. (REAS.) J. Bedlovies, 30 Ridge St., Milford Conn. 06460

WANTED: Manual/Schematic for FEDERAL UHF frequency generator Model 804, Frequency 8-330 MHZ. A.S Bielenda, W2IDA, 43 Chestnut Ridge Rd., Saddle River, N.J. 07458

SELL Dentron 160-10AT $90. HW-8 $115. Argonaut 509 $280. All mint condx. W0MS, 7190 S. Franklin Wy, Littleton Co. 80122

QSL — 1965 to 1975 Solid. Excellent condition. $55.00. N5UX, 1432 Pamela St., Hurst TX 76053.

WANT: Any National Receiver. SELL: HA-10 Preselector, $30 mint. HR-2A $160. HW8/P.S. $100. D-104/Grip to Talk $25. T.N. Colbert, WA8MLV, 1800 Rhodes 612, Kent, OH 44240.

FOR SALE: Concord Model 700 Video and Audio Tape Recorder. Concord Wireless Amplifier Model WX-800. Panasonic closed circuit TV camera Model WV-0 33P. German-made Tripod for camera. Panasonic Vtr Model TR 120 TV set. All for $250 FOB. Radio Amateur W1DBS, John Savonis, 410 Balke Rd., New Britain, CT 06053. 203/223-3072.

HAM RADIO MAGAZINES. 25 cents ea. SASE for list. Pick-up or pay postage. G. Gargiulo, WA1GFJ, 160 Elm, North Haven, CT 06473.

SELL: Old RCA UV851 Transmitting Tube. Best offer. Paul Evanosky, RD Number 1, Box 151, Clark Summit, PA 18411.

WANT: Gen. Coverage Rcvr that can be used as a second station rcvr. W9TNZ, 9501 Lorel, Skokie, IL 60077.

SELL: INSTRUCTOGRAPH MODEL 500 with Tapes-- $75.00. WA2VCN, 214 W. Walnut St., Oneida, NY 13421.

HR1680 Rcvr $185. DX60 xmtr w/HG10 VFO and built-in TR switch, $120. You ship. W2EZ, 9 Whitney Farms Cir., Fairport, NY 14450.

SELL: Realistic DX300 (mint) $300 plus postage. Dr. Phoenix, Route 3, Columbia, TN 38401.

DRAKE R4 $250. GENAVE GTX200 2 mtr 1W-30W 4XTLS $110. W6NPY, 415/388-4489. 10G Locust Ave., Mill Valley, CA 94941.

QSLS AND RUBBER STAMPS, Top Quality. Cards, Samples, and stamp catalog, 50 cents. Ebbert Graphics, D-2, Box 70, Westerville, OH 43081.

WANT: Power Transformer for EICO Oscilloscope; Model 460. Used, no problem. C.D. Rogers, Sr., P.O. Box 462, Boston, MA 02102.

WANT: Will buy tube-type roll chart for Precise Tube Tester, Model 111 or Model 111A Tube Tester Adaptor. J. Goldstein, W2YZI, 82-50 Surrey Pl., Jamaica, NY 11432.

HP205AG Lab Audio Generator $75; Ringo AR-2 2-meter antenna, new, $15. G.E. 30-50 mc mobile receiver w/cont rol $8. K6-KZT, 2255 Alexander Ave., Los Osos, CA 93402.

YAESU XF-90B and XF-90C filters, new, cost $45 each, will sell for $25 each, plus $2 each for shipping. FT-301 series. G. Alfred Dodds, 874 Pepperwood Ln., Brunswick, OH 44212.

FOR SALE: Kenwood Twins like new $625; FT101B, CW filter, like new, $450. I ship. W2GC, 419 Main St., W. Hempstead, NY 11552. 516/481-8417.

WANT: Bird 10C, 25C, 250C, 100H, 250H, 1000H elements. Sell HT-44 SSB Exciter with HB Supply, $160. W0AIH, Paul Bittner, 1616 South St., Eau Claire, WI 54701

TEST EQUIPMENT Collector's Surplus, HP, GR, Tek. Excellent. SASE for list. PhD, 5220 Carlingford, Riverside, CA 92504.

NOVICE Starting 73, QST, HR, & HRH collections. Need help. Roger Williams, 745 S. Baker, Sp 4, McMinnville, OR 97128.

WANT: Collins 51S-1 receiver and 55G-1 preselector. John White, Mabel, MN 55954. 507/493-5461.

HW-16 XCVR, HG-10B VFO. W/Manuals. Excellent condition, $130. KA8CZP, Imre H. Soos, 5049 Willow Glen, Sylvania, OH 43560.

WANTED: Collins Techn, retired or moonlighter. To Doctor working but sick R 388/51 J. Particulars to: W7QNO, 4211 N. Indian Ln., Phoenix, AZ 85013.

SELL: DX60 XMTR w/HG10 VFO, $130. You ship. W2EZ, 9 Whitney Farms Circle, Fairport, NY 14450.

QSLs: Design your own or copy your present card at low prices. Write to Rick Dittmer, 1635 Norton Ave., Grissom AFB, IN 46971.

WANTED: Pilot WASP SERIES and other oldies. TROE, 111 Skyline, Morristown, NJ 07960.

SALE OR ? Heath DX100, TX-1, EICO VTVM 232, Yaesu FRG-7, Hallicrafters S22R, S72, S38. KA7BJA, Box 552, Tacoma WA 93401.

SWAP: Four 813's, two 811A's, two 811's, used, good for what-have-you. WA2PCL, 101-23 Lefferts, Jamaica, NY 11419.

FOR SALE: 4-400 EIMAC tubes, checked OK. All four for $60 or $15.00 each. Bill Easterly, 206 Alderman Dr., Greeneville, TN 37743. N4ATS.

KENWOOD TS520S: New October 1978. Little use since. $625.00. Call 513/767-1645, or write: L. Brewer, 877 N. Enon Rd., Yellow Springs, OH 45387.

WANTED: Drake TR7/DR7/PS7; TR6; Kenwood TS-600; System 1 antenna; Astron 35 amp power supply. F. Kauppi, Rt. 2, Box 171, Gilbert, MN. 218/865-6541.

BACK ISSUES OF CQ, QST, and Ham Radio wanted for cash. Ken Miller, K6IR, 16904 George Washington, Rockville, MD 20853.

COMPLETE SSTV by Robot. 70C monitor, 80A Camera with Macro lens, 61A Camera monitor, all absolutely MINT! $425. Bill Gosney, WB7BFK, 2665 N. 1250 East, Oak Harbor, WA 98277. 206/675-6143.

WANT: Novice xmtr 10-80M VFO must. Ted LeSarge, 6027 W. Decker Rd., Ludington, MI 49431. 616/845-6905.

WANT: Heathkit HW101, HW104, SB102, Kenwood 520, Yaesu FT101, FT301. Frank Varano, 37 South Market St., Shamokin, PA 17872.

SELL: Hallicrafters SX-25, A-1, restored, $125, you ship. C.K. Lawitter, 4627 N. Bartlett, Milwaukee, WI 53211.

SELL: RTTY Test Sets TS-2/TG. Sends FOX auto. 60-100 speed. ARMY $65 ea. or best offers. FOB. Teleprinter spools 50 cents each, plus postage. D. Testa, Box 9064-CQ, Newark, NJ 07104. (SASE).

PANASONIC RF-2200, mint, like new, $110. K8CV, 1-313/549-1846. 4612 Woodland, Royal Oak, MI 48073.

BEARCAT 250 Scanner $240 mint, new. Walt Amos, 1-313/549-1846. 4612 Woodland, Royal Oak, MI 48073.

SELL: Heath HW-32A; HP-13; 20M fold-over ant. All mint and w/manuals, $125. Fox, W0EE, Box 895, Greeley, CO 80632.

SELL: Drake TR-4C w/NB and AC4 power supply, Shure 444 desk mike. All in mint condition, $510.00. Will ship COD UPS. H.P. Ravlin, K0AEY. 3089 Sherman Ave., Monte Vista, CO 81144. Phone: 303/852-2930.

SELL: Morse-A-Word Morse Code Reader, $99. Bob Sherman, 83 Fox Blvd., Massapequa, NY 11758.

RADIO MANUALS: Motorola, GE, RCA, Test Equipment. 29-page list. $1. Whitney, 2490 Madison Ave., Yuma, AZ 85364.

FREQUENCY ALLOCATION CHART. See how the entire radio spectrum is used. 2 Khz to 200 Ghz. Send $3.00 to Collins Chart Co., Box 935, Coronado, CA 92118.

FREE ELECTRONICS SURPLUS CATALOG Bargain Packed. Fascinating items. Many never before advertised. ETCO-003, Box 762, Plattsburgh, NY 12901. SURPLUS WANTED

QSL CARDS: 500/$10. 400 illustrations. Free Catalogue. Bowman Printing, Dept. CQ, 743 Harvard, St. Louis, MO 63130.

WISH TO CONTACT a former employee of Wireless Specialty Co. from 1920's. Kreuzer, 1428 Main Rd., Corfu, NY 14036.

WANTED: Pre-1925 Wireless Gear, books, magazines, spark transmitters, and tubes. Jim Kreuzer, 1428 Main Rd., Corfu, NY 14036.

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.

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

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

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

The FT-107 has been created as a result of a blending of technologies — computer, solid state and RF design. By careful utilization of these disciplines and the experience gained from our FT-301 series, YAESU has achieved an HF transceiver which offers unique features (e. g. "Digital Memory Shift"), efficient operation and a level of performance that has been previously unattainable.

RECEIVER:

Sensitivity: 0.25 uV for 10dB S/N, CW/SSB, FSK
1.0 uV for 10dB S/N, AM
Image Rejection: 60dB except 10 meters (50dB)
IF Rejection: 70dB
Selectivity: SSB 2.4 kHz at −6dB, 4.0 kHz at −60dB.
CW 0.6 kHz at −6dB, 1.2 kHz at −60dB.
AM 6 kHz at −6dB, 12 kHz at −60dB
Variable IF Bandwidth
20dB RF Attenuator
Peak/Notch Audio Filter
Audio Output: 3 watts (4-16 ohms)
Accessories: FV-107 VFO (standard not synethized)
FTV-107 VHF (UHF Transverter)
FC-107 Antenna Tuner
SP-107 Matching Speaker
FP-107 AC Power Supply

TRANSMITTER

Power Input: 240 watts DC SSB/CW
80 watts DC AM/FSK
Opposite Sideband Suppression: Better than 50dB
Spurious Radiation: −50dB.
Transmitter Bandwidth 350-2700 hz (−6dB)
Transmitter: 3rd IMD −31dB neg feedback 6dB
Transmitter Stability: 30 hz after 10 min. warmup
less than 100 hz after 30 min.
Antenna Input Impedance: 50 ohms
Microphone Impedance: 500 ohms
Power Required: 13.5V DC at 20 amps
100/110/117/200/220/234V AC at 650 VA

YAESU
The radio.

And Specifications Subject To
ge Without Notice Or Obligation

CIRCLE 48 ON READER SERVICE CARD

1179

YAESU ELECTRONICS CORP., 6851 Walthall Way, Paramount, CA 90723 ● (213) 633-4007
YAESU ELECTRONICS Eastern Service Ctr., 9812 Princeton-Glendale Rd., Cincinnati, OH 45246

EIMAC takes the work out of 25 kW FM transmitter design.

1935, EIMAC was present at the birth of FM broadcasting. Major Armstrong's early transmitter used four EIMAC 150T tubes in the amplifier stages. And EIMAC still retains its commanding position in continuing high power vacuum tube technology.

New cavity amplifier and tetrode combo.

The new EIMAC CV-2200 power amplifier cavity assembly and companion 8990 tetrode is ready for use in next generation FM transmitters in the 88–108 MHz band.

EIMAC engineered interface provides capability between tube and cavity design and the result is an amplifier of classic simplicity that combines a useful power output of 25 kW with a stage gain of approximately 20 dB. These numbers make a one tube, high power FM transmitter a reality today.

Cost effective modern design.

EIMAC's cost-effectiveness and modern design are yours in the new cavity and tube combo. Anticipate reduced transmitter down-time and higher revenues with this new amplifier concept. Make sure your new transmitter is EIMAC equipped.

varian

For full information on the CV-2200, the 8990 (25 kW) and the 8989 (15 kW) write EIMAC, Division of Varian, 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.

CIRCLE 22 ON READER SERVICE CARD