CQ

September 1971
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CQ W.W. DX Contest C.W. Results

TRAVIS 71

The Radio Amateur's Journal

08240

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The new Heath IO-102 5" solid-state scope offers maximum performance at a price every ham can afford. Ideal for almost any job in the shack.

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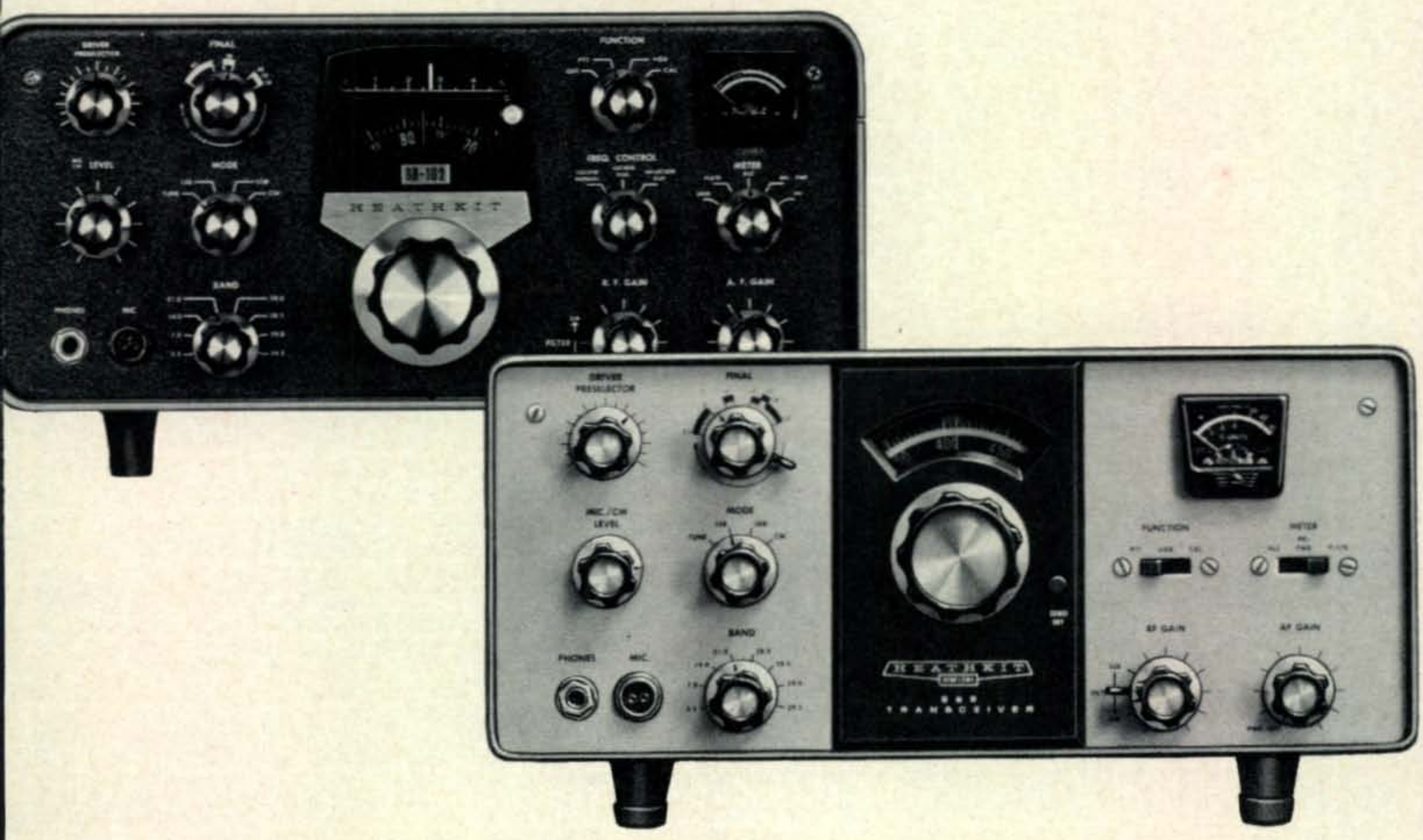

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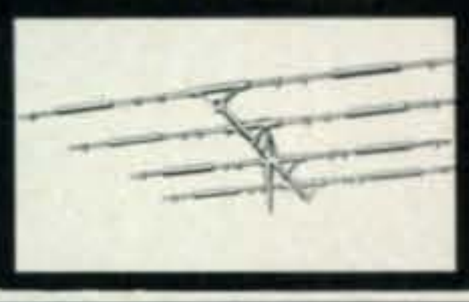
ANTENNAS 	Tri-band Beams 10-15-20 meters	
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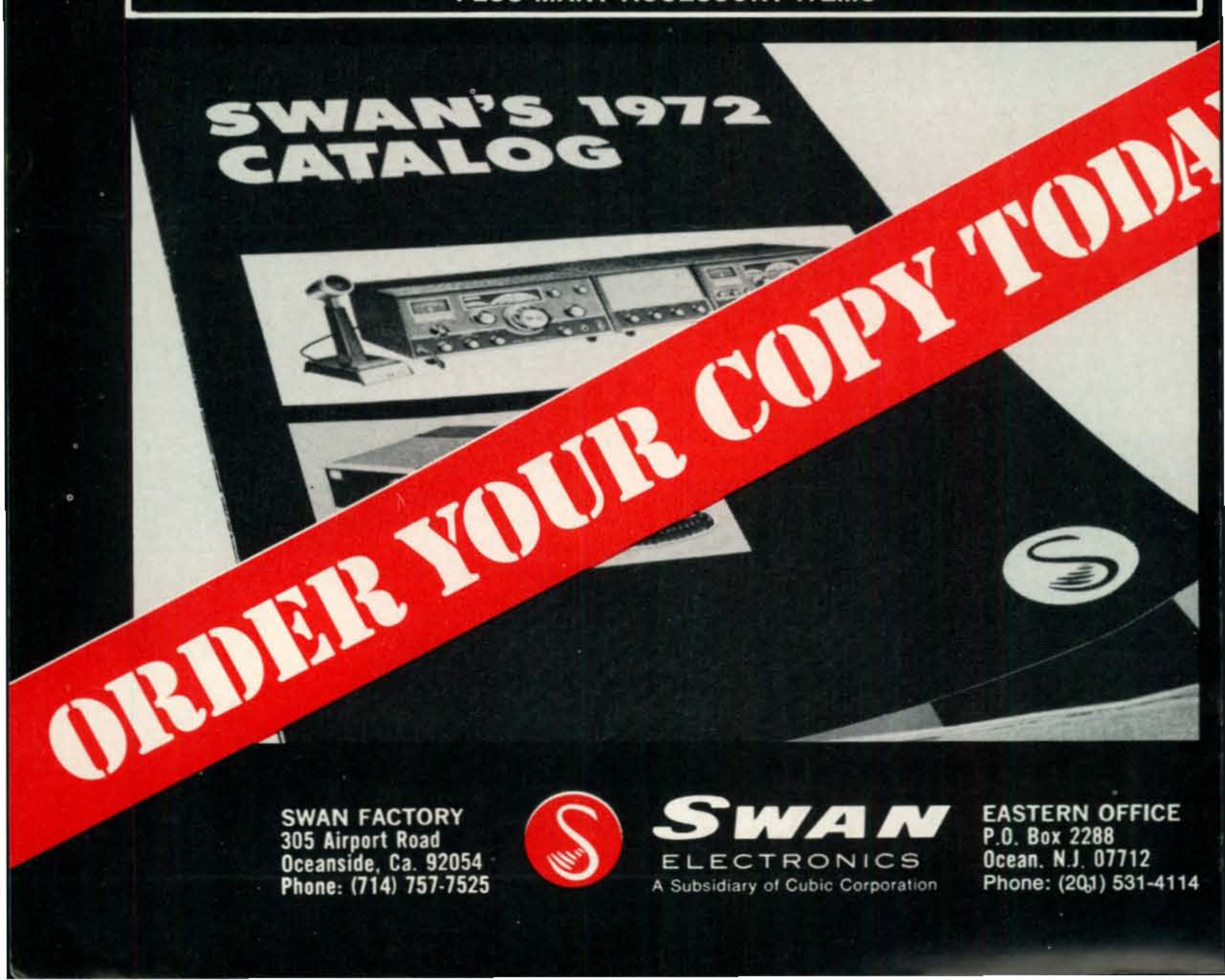

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SEPTEMBER, 1971 VOL. 27, NO. 9

CQ The Radio Amateur's Journal

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DEPARTMENTS

Offices: 14 Vanderventer Avenue, Port Washington, L.I., N.Y. 11050. Telephone: 516-883-6200.

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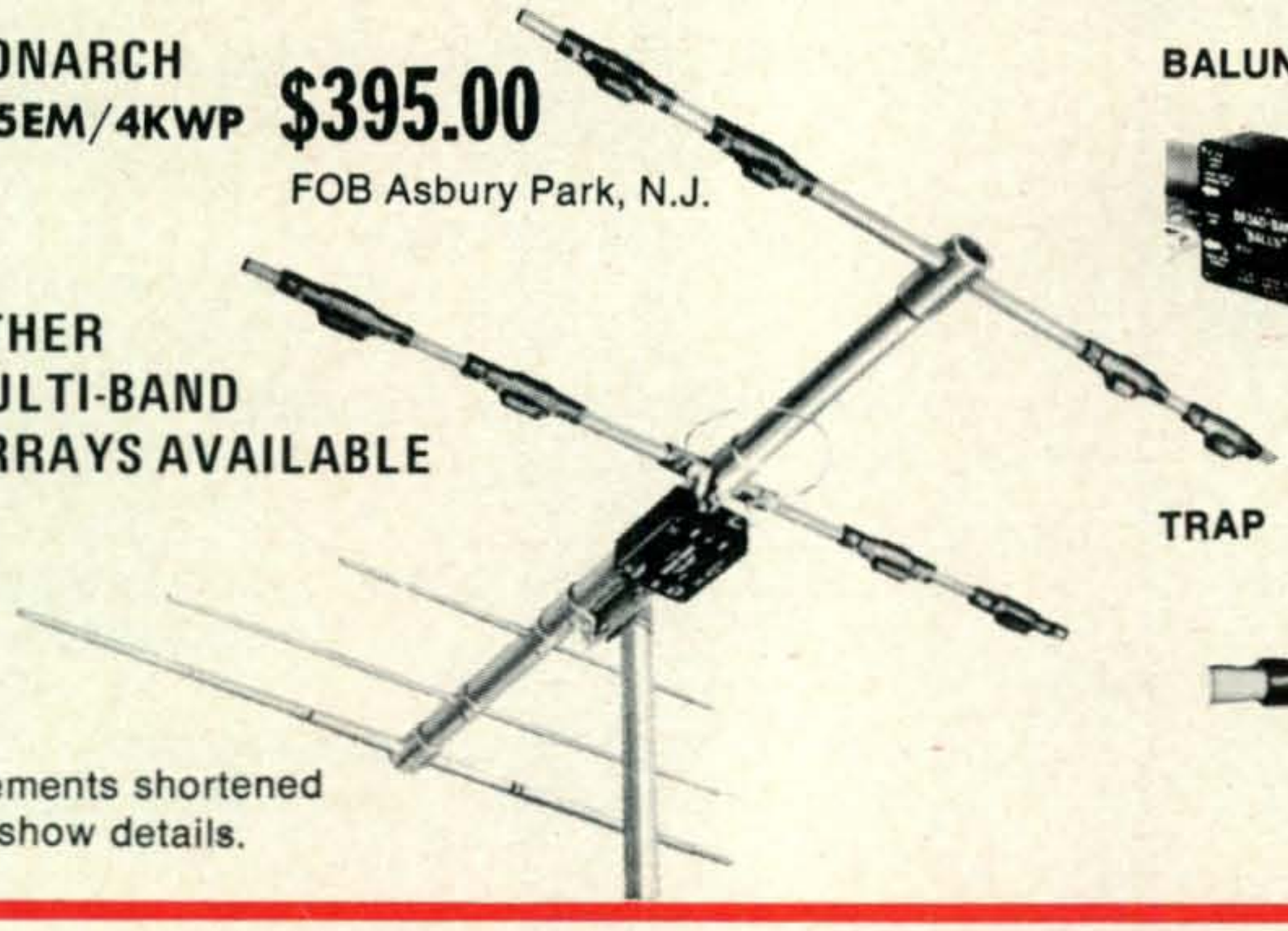

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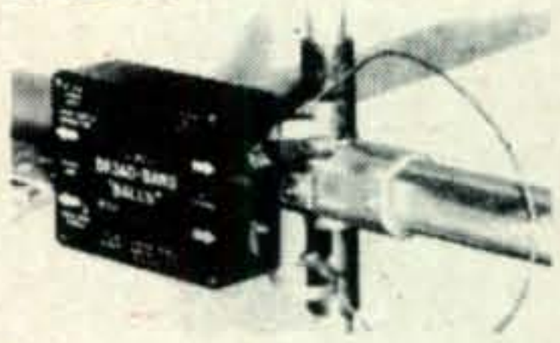

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OUR READERS SAY

10 W.P.M. Code Speed

Editor, *CQ:*

I was interested in the letters in the issue citing the "hump" at 10 w.p.m.

It may be that the method used in attempting to learn the code creates the "hump" because people start out to count dots and dashes—or just to make 5 w.p.m. for Novice.

By contrast, the approach used in the Heathkit Code Records starts off teaching the recognition of letters and short words at 13 w.p.m. and without attempting to copy until the student "hears" the letters and the words without trouble.

I don't own any stock in Heath, so I am not trying to benefit myself by suggesting these records. There may be other tapes or records available which use the same approach, but I don't happen to know about them.

If you have never listened to these records, please do so. I think you could help a lot of people get "over the hump" without ever knowing there is such a thing—provided you find you are willing to recommend the records.

Ed McKinney, W5FK
Richardson, TX

Editor, *CQ:*

Regarding 10 w.p.m. vs 13 w.p.m., I would like to vote "no" even though it would postpone my General ticket. There has been too much lowering of standards the last few years. I do have a suggestion, though, that I think would be a big help to people like me.

My suggestion is to create a new group of amateurs without phone privileges who can pass 10 w.p.m. code speed. This would let them practice on the air. This ticket could be converted to a General by passing 13 w.p.m.

When I first received my Novice license, I did not have a transmitter or receiver and I moved about so much that when my rig was ready, I had about six months left on my Novice. I have practiced receiving and sending with a dummy antenna for about a year and a half. This gets very tiresome. A 10 w.p.m. Novice or "Novice plus" could "stay on the team" while he worked to reach the 13 w.p.m. level.

Wilbur O. Garner
Arlington, TX

Editor, *CQ:*

I have read with much interest the letters concerning the possibility of reducing the General class code speed requirement to ten words per minute.

Many hams have expressed a concern over the declining ham population. They feel that this is a bad situation and think that lowering the code speed would be one means of correcting this problem.

I would have to agree that lowering the code speed would probably increase the number of licensed amateurs in the U.S. But how long would it be before some aspiring hams would find ten words per minute just a little fast and would be asking for a further reduction in code speed?

If we are going to tackle this problem I propose that we do it all the way. I have thought this problem over and have come up with a solution that should make all happy. I propose that there be only one class of ham license and to obtain this license all the applicant would have to do is send in three box tops from his favorite cereal and fifty cents to cover the cost of handling and mailing.

If my proposal was to be put into effect, I'm sure that we would have hams coming out in droves.

Frank J. Connerly, Pr., WA7GWL
Bremerton, WA.

Rudder Off Course

Editor, *CQ:*

In the July issue of *Rudder,* the department "ask Rudder about electronics" answered a query as to whether f.m. or s.s.b. will soon be required by the government. Toward the end of a very lengthy and informative answer by Manfred W. Meisels (department conductor), touched on use of CB in maritime (pleasure) operations. I'll quote briefly from a portion. "...CB should be good for regattas, club cruises, calling the launch and similar fun and games. That's why CB is so terribly crowded in some areas. Taxicab operators, high school kids, model airplane fans, radio amateurs and what-have-you are all in on CB. Why not: 50 bucks or so can get you on the air."

Dick, this is another example of the crud some writers are prone to sling at hams. *Rudder* magazine is first rate. It is read by a relative affiuent section of our society, perhaps outnumbering in gross enthusiasts of ham radio. If you have or can get a copy of this issue please do so. I'm sure it's meat for a meaningful editorial message.

Charles S. Newman, K4HJ
Concord, TN

Superpower

Editor, *CQ:*

I agree completely with the transmitter super power solution presented by Mr. Hart, WØIBZ, in his letter to the editor (June 1971 *CQ*).

I do run the legal limit during DX contests (3-1000Z) to a set of better than average antennas. It only takes one or two competitive situations to get a good idea of the competitor's equipment. Listening to those huge ground wave and reflected skip signals virtually confirms the situation. And the active grapevine does not suggest any error in reasoning.

Perhaps, as a minimum, handicapping on contest scores based on transmitter plate (or collector) dissipation would provide some relief.

C. L. Ray, K9CUY
Grabill, IN

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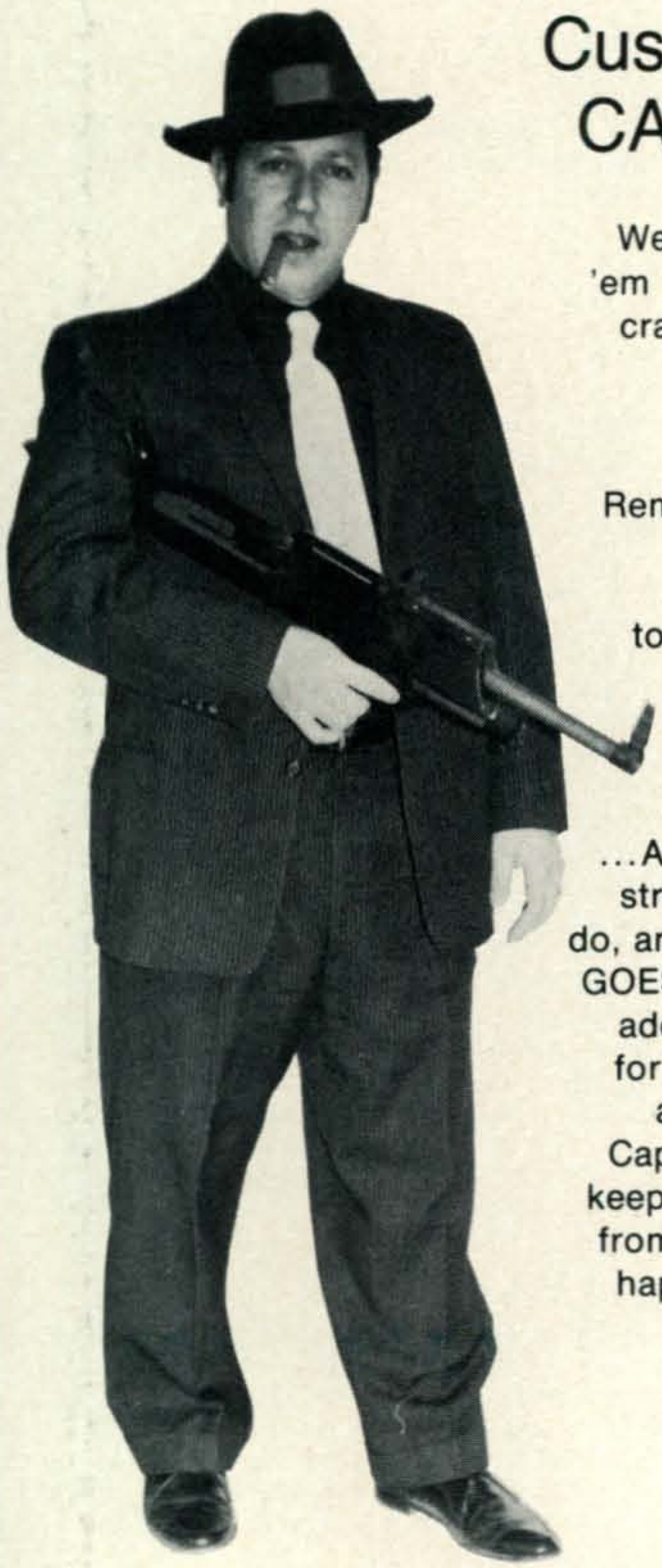

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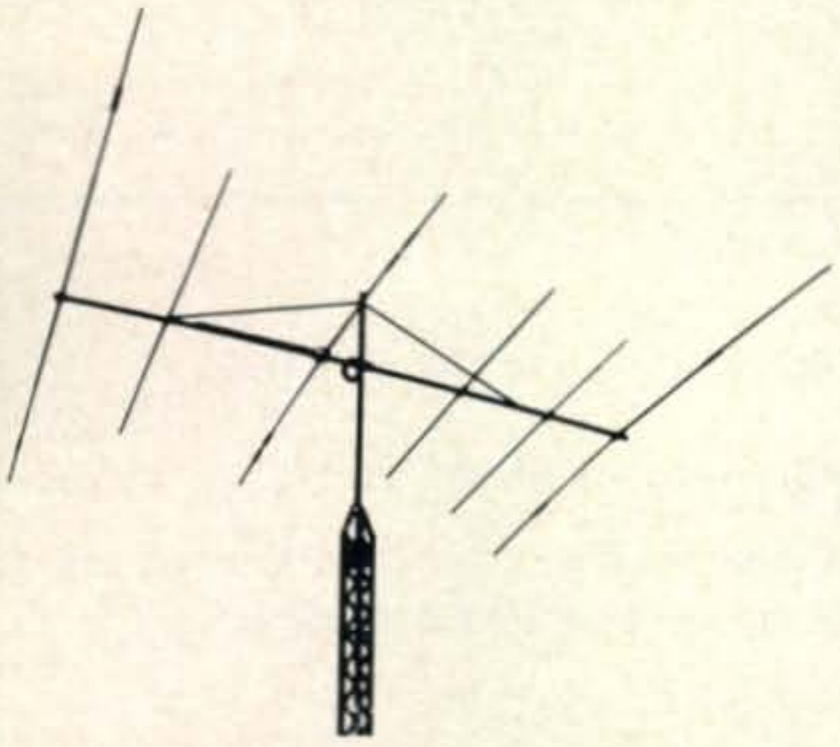

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These days, when you think of Japanese-built products, think of Nikon, or Sony, or Toyota. And Yaesu. Our transceivers are state-of-the-art engineered and carefully hand-assembled. They're so solid, stable and reliable we guarantee them for one year. Yaesu is quite likely the best transceiver made anywhere in the world today.

The complete Yaesu story is a long one. So we've compiled a comprehensive information packet that gives you the complete picture. Including things like comparative detail photos, a schematic, and a comparison chart that shows you the FTdx 560's superiority over rigs you're more familiar with. Once you've looked over the FTdx 560 literature we think you'll agree that the amateur operator's impossible dream has become an incredible fact.

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Announcements

Correction

Several errors crept into the article "The BA Identifier" which appeared in the July 1971 issue. The diodes in the right hand side of the bridge should have their polarity reversed. The value of the audio output level potentiometer was omitted. Though the value is uncritical, a 3500 ohm, linear taper pot will provide 3-5 kc deviation at a Motorola mike input with the pot in the middle of its range with no degradation of the repeated audio level. The first mention of the Mallory SC-628 Sonalert in the text was reversed to SC-682. All other instances were designated correctly.

The Delta County ARS informs us that the site of their Hamfest has been changed from Escanaba to Escarba, Michigan. The date is still July 31-Aug. 1.

Novice Newsletter

Greogry Ginn, WB6ZNM, would like to get in touch with anybody interested in a new Novice newsletter publication. He can be reached at 1240 21st St., Hermosa Beach, Calif. 90254.

Des Moines, Iowa

The Des Moines Radio Amateur Assn. (DMRAA) has attained a location at the Iowa State Fair and are attempting to get KIØISF or WIØISF. The station will be operating and handling traffic from Aug. 20-29.

Puyallup, Washington

The Puget Sound Council of Amateur Radio Clubs will issue an operating achievement award signed by Governor Daniel J. Evans for contacts made during Washington State Amateur Radio Week, Sept. 4-12, 1971. Out-of-state amateurs must work ten Washington stations, and in-state amateurs must work twenty other Washington stations during this week. Send list of stations worked, their locations, dates worked, and your name, call, and address to: The Puget Sound Council of Amateur Radio Clubs, 12306 80th Ave. East, Puyallup, Washington 98371. An s.a.s.e. would be appreciated.

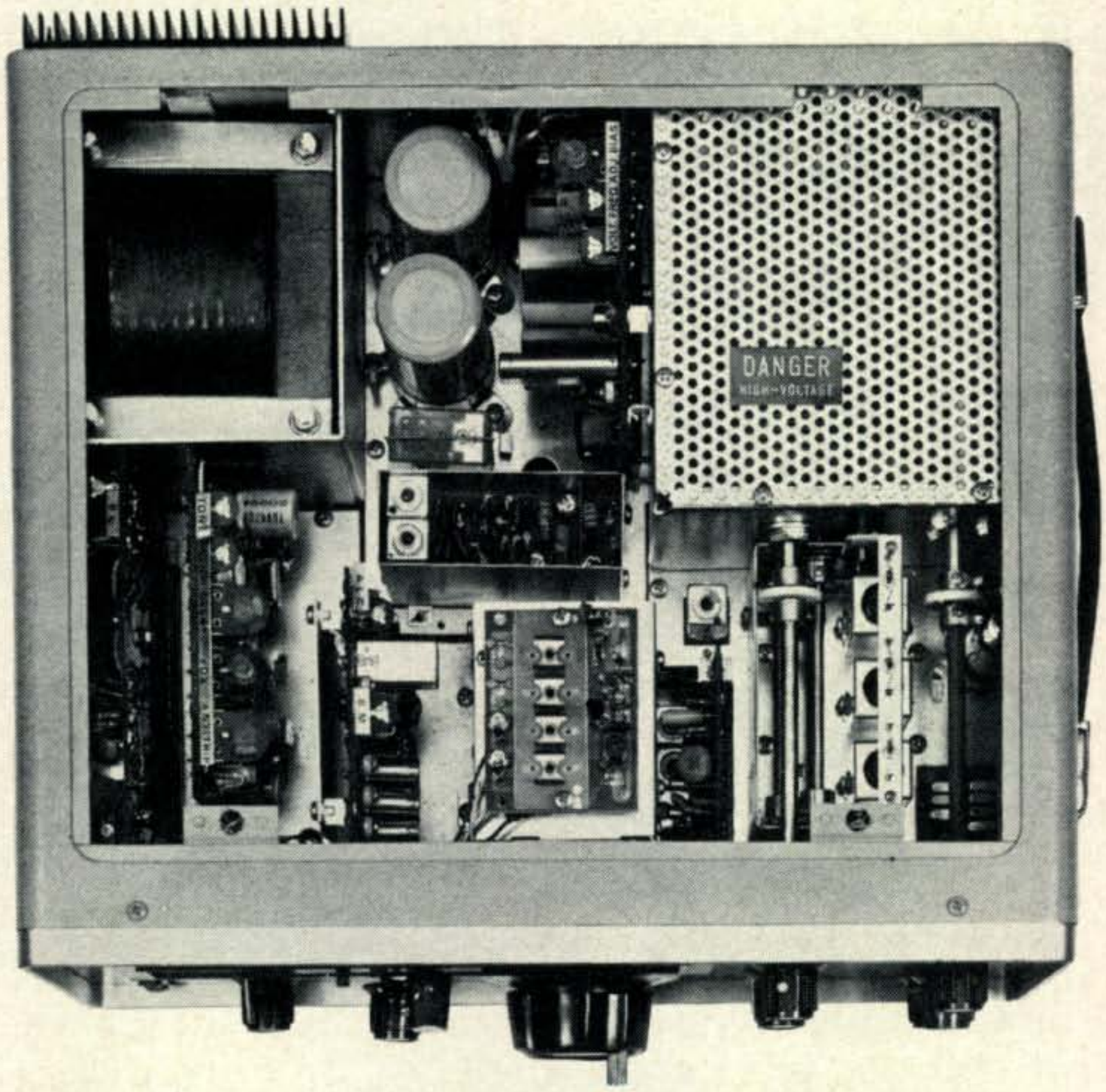
Findlay, Ohio

The annual Findlay Radio Club sponsored Hamfest will be held at Riverside Park, Findlay, Ohio on Sept. 12th. Numerous activities are planned. Donations are $1.00 in advance, $1.50 at the Park. For further information contact Dan Jernigan, K8VXD, Route 2, Findlay, Ohio 45840.

Haddonfield, N.J.

The 23rd annual Hamfest of the South Jersey Radio Association will be held on Sunday, Sept. 12, at Molia Farms, N.J. There are numerous activities planned as well as many prizes given out. For full information write to: South Jersey

The reason the Yaesu FT-101 is the world's best portable rig is really an inside story.



Mill-spec gear? That's the way it looks. And that's the way it works. It's the solid-state FT-101 portable Yaesu.

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It's all in a thirty-pound package that even includes built-in 12 VDC and 117 VAC power supplies. You supply the 12 or 117 volts plus an antenna and you're ready to work the world — on the 80 meter band right through 10 meters. And you'll work it with 260 W PEP, 180 W CW or 80 W AM maximum input power. Receiving sensitivity is 0.3 microvolts for a 10 db signal-to-noise ratio.

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Radio Association, Hamfest Headquarters, Box 909, Sicklerville, N.J. 08081.

Farmington, New Mexico

The Totah Amateur Radio Club announces the Four Corners Field Day will start at 1800 GMT Sept. 18th and end at 1800 GMT on Sept. 19th. This is the annual 5Ø7 Award Field Day held each year as a fund raising project. For further details write to the Totah ARC, P.O. Box 24, Farmington, N.M. 87401.

Albuquerque, New Mexico

The amateur radio clubs of New Mexico will sponsor the New Mexico Hamvention 1971 on Sept. 17-19. It will be held at the Sheraton Motor Hotel on East Highway 66, in Albuquerque. There will be plenty of activities and programs plus prizes and displays of equipment. Swapfest and flea market on Sunday. Pre-registration $8.50 (includes banquet meal), $12.00 at the door. Contact N.M. Hamvention, Box 14381, Albuquerque, N.M. 87111.

Gloucester, R.I.

The R.I. Swamp Yankee Amateur Radio Club & the Eastern Conn. Amateur Radio Club are sponsoring a Tri-Sate Picnic at Pulaski Park in West Gloucester, R.I. off of Route 44, on Sept. 19. It will run from 9:30 A.M. to sunset, rain or shine. Talk in station (K1ZKR) on 50.36. The park is half way between Putnam and Chepachet, R.I. on Route 44.

Springfield, Missouri

The Southwest Missouri ARC will hold their annual Picnic and Hamfest for their four state area on Aug. 22, at Lake Springfield, Missouri. For more information contact Fred P. Mellers, KØFZT.

Peoria, Illinois

The Peoria Area Amateur Radio Club will hold its 14th annual Hamfest on Sept. 19th at Exposition Gardens on the northwest edge of Peoria. Plenty of activities for the entire family. Advance registration is $1.50, $2.00 at the gate. For further details and advance registration contact: Wendell McWilliams, WN9DZJ, Box 1, Rome, Illinois 61562.

Walla Walla, Washington

The Walla Walla Valley Radio Amateur Club will hold its Silver Anniversary all family Picnic and Hamfest on Sept. 25 & 26 at the Jefferson Park fieldhouse in Walla Walla. For more information write to Pat Stewart, W7GVC, 1404 Ruth Ave., Walla Walla, Washington 99362.

Guelph, Ontario

The Guelph ARC will host the Radio Society of Ontario Convention on Oct. 22 & 23 at the Holiday Inn in Hespeler, Ontario. It is at the junction of Hwys. 401 & 24, 46 miles from Toronto, 174 miles from Windsor. For further details contact: D. Gore, VE3DGA, or R. Jenning, VE3CZE, Box 342, Guelph, Ontario.

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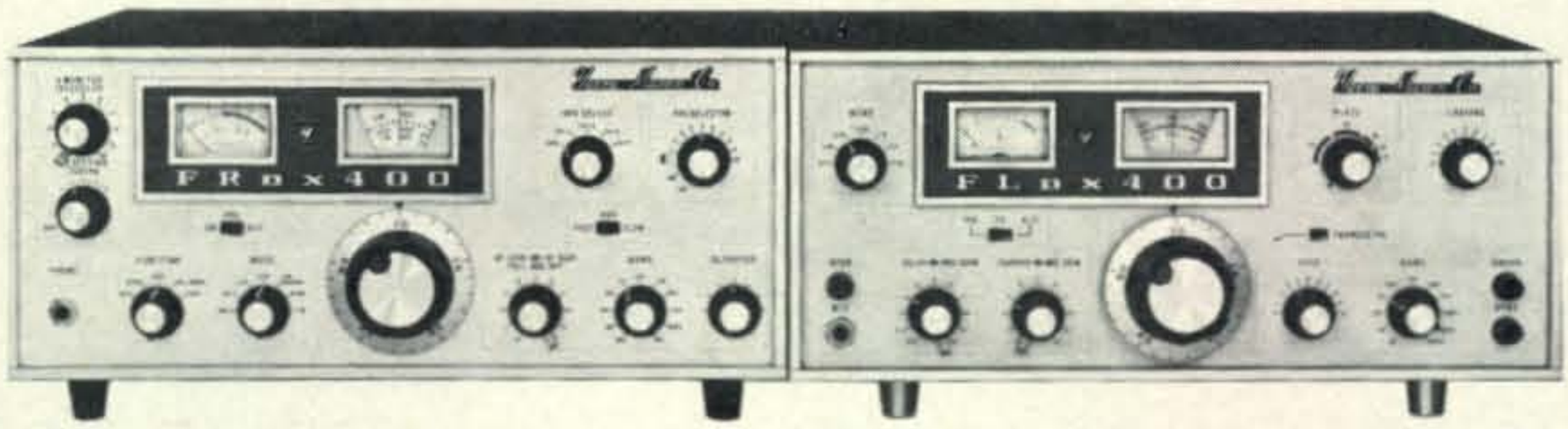

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An Optium Performance Array for 160, 40 and 20 Meters

BY ADRIAN WEISS,* K8EEG/ϕ

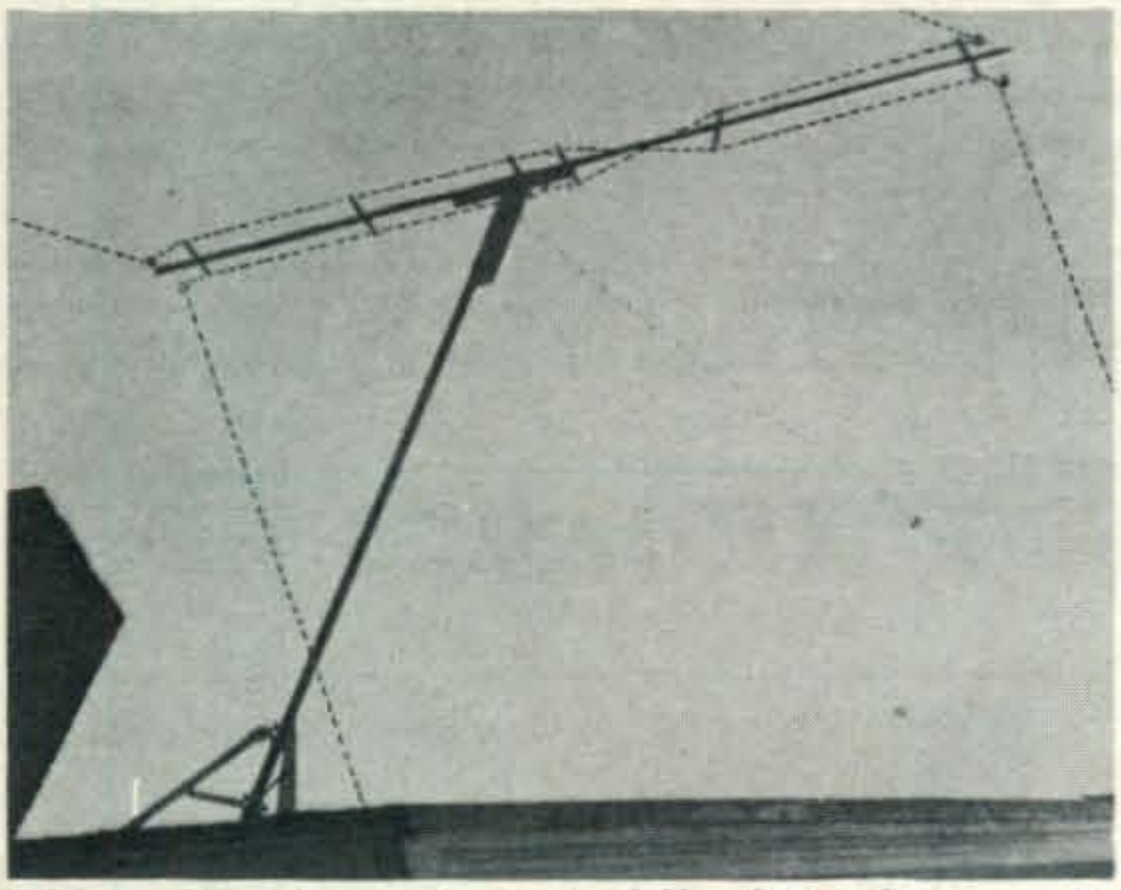
THE antenna described in this article represents one possible solution to the perennial problem of the city-dwelling amateur—limited space. After having enjoyed the advantages of various longwire antennas 1300-1900 feet long during the past several years, moving to a 40′ × 70′ city lot was a traumatic event in this ham's life, but the solution has made my particular brand of ham radio—QRPP, or under-five watt operation—as enjoyable as ever, with the added bonus of 160 meter operation thrown in for good measure.

The basic antenna is the familiar "8JK" endfire wire array that has been described in numerous places in the literature. It consists of two elements (at 7 mc, or half-wave frequency) or four elements (at 14 mc, or full-wave frequency) fed 180° out of phase, thereby resulting in a bi-directional pattern perpendicular to and in the plane of the elements. Under conditions of optimum spacing, the antenna described herein results in a theoretical gain of 4.7 db at 7 mc and 6.2 db at 14 mc. The spacing used in my version is a compromise between optimum spacing for these two bands—just under 1/8th wave on 7 mc and just over 1/8th wave on 14 mc. Since the array is fixed in an East-West pattern, the North-South direction is sacrificed, but when faced with the prospect of gaining the advantage in two directions that the antenna offers, it is not difficult to do without 360° coverage.

One reason for choosing this type of array over other possibilities was the potential of the array as a top-loaded vertical radiator on 160 meters. There was no way of predicting the performance of the array beforehand on this band, but is was decided to take the chance on it—and it has turned out to be a fortunate choice. Judging from tests of the antenna as a top-loaded vertical on 160 meters, and from its DX performance during the 1971 *CQ* W.W. 160 DX Test, the antenna functions as a vertically polarized radiator on this band, resulting in excellent long-distance propagation.

At first glance, the mechanical requirements of such an array seemed a formidable obstacle. Usually this type of antenna is end-supported between two poles or trees or similar, with the result that the entire weight of the array (which is quite light due to its use of wire for the elements) depends for its stability upon the end-supports. With the 40 m.p.h. winds that characterize South Dakota weather, it seemed unlikely that the thing would stay up unless two telephone poles were planted—an impossibility. So, it was necessary to rethink the mechanical installation. It seemed logical to provide a stable support at the center of the array, the point of greatest stress, thereby eliminating the need for two stable end supports, and

*Editor, *The Milliwatt*, Meckling, S.D. 57044



Although a wire antenna is difficult to photograph, this photo shows the entire center boom mounted on a 10′ TV mast for added center height. Wires have been indicated by broken lines added by CQ artist. The 300 ohm open wire feedline is visible running off to the lower right of the photo.

greatly increasing the durability of the whole affair. Coincidentally, the use of a single center support worked in perfectly with the apex of the roof of our two-story house—it was possible to achieve a center height of 40 feet with a single 10 foot TV aluminum mast, unguyed. Since the trees to be used for end-supports were very unstable at the 40 ft. level, it was decided to anchor the ends of the array at the 20 foot level where little movement occurred in even the highest winds. What resulted, thus, was an "8JK" array that looks like an inverted V. Judging from the performance of the array, the effects of bending the elements at the center as in an Inverted V seem to be the same broadening of the bi-directional pattern that is evidenced in the bending of a dipole at the center. No stations have been worked to the North or South, but the Southeast and Southwest have been worked consistently on 40 and 20 meters, but with appreciably lower signal strengths than the favored East-West pattern.

A quick appraisal of the materials needed will indicate that the outlay of cash for the array is quite low. At the most, $25.00 could be spent if #10 solid copper wire is used for the elements and feeders. This writer's array cost about $7.00 and one afternoon of time, excluding $3.50 for 100 feet of commercial 300 ohm open-wire feeders. The only problematic items are the bamboo poles used for the spacing booms. Usually these can be found in any sporting goods store that carries fishing equipment, and can be had for under $1.50 each, if thick 20 foot poles are used, and this is advisable.

The most difficult part of the mechanical setup is the "T" bracket used to secure the center boom to the TV mast, and even a Tenderfoot scout could handle this job. Figure 2 gives the details of the "T" bracket. In constructing the bracket, notches are first cut into the sides of the mounting pieces (1" × 3" and 1" × 2" pine or other suitable material) at the proper places for the insertion of the U-bolts which clamp the boom and mast to the "T" bracket. The horizontal and vertical mounting pieces are nailed together with 3 inch nails, which are then flattened on the underside for improved mechanical rigidity, Next, center of balance of the ten foot bamboo center boom is matched up with the vertical mounting piece of the "T" bracket and U-bolted to the horizontal piece with 1¼ inch U-bolts.

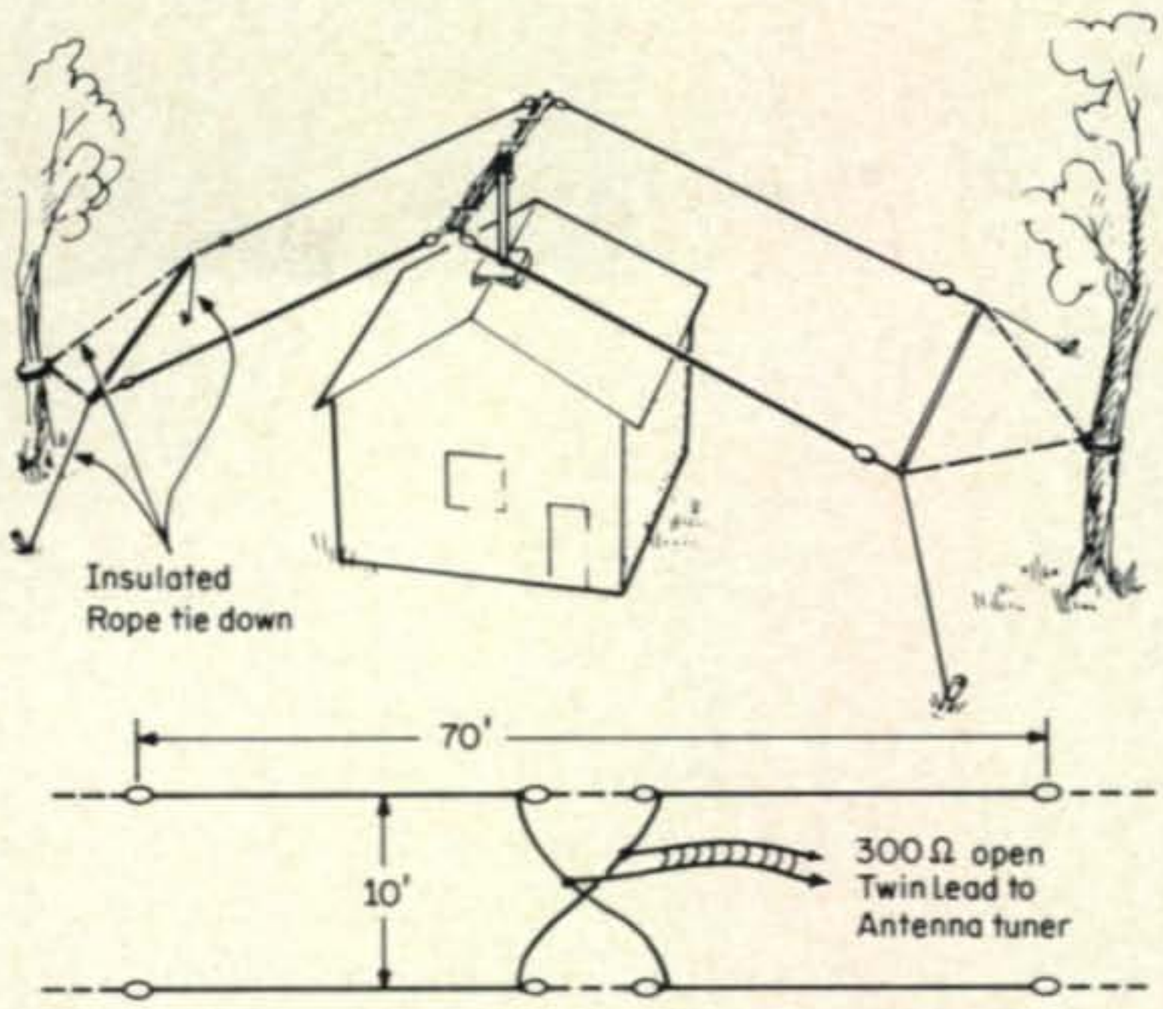


Fig. 1—Overall drawing of the optimum performance 160, 40 and 20 meter array showing positioning of the 10 foot bamboo poles used as booms for the wire elements. Also shown is the actual antenna configuration. Note the crossover of the elements at the center feedpoint. At each end of each element, heavy insulating cord is used to support the wire ends.

Six spacer arms six inches long are cut from 1/2" × 1" trim stock, and two small holes, 1/4" apart, are drilled in each end of the spacer arms. When securing the wire elements to the spacer arms, a small piece of bell-wire is looped through these holes and tightened to secure the elements in place. Finally, 1 foot lengths of heavy gauge wire —aluminum guy-wire is perfect—are connected to the ends of the boom (four required) for securing the insulators to which the elements are later connected. The "T" bracket can be varnished or painted, and is ready for the installation of the elements and for mounting.

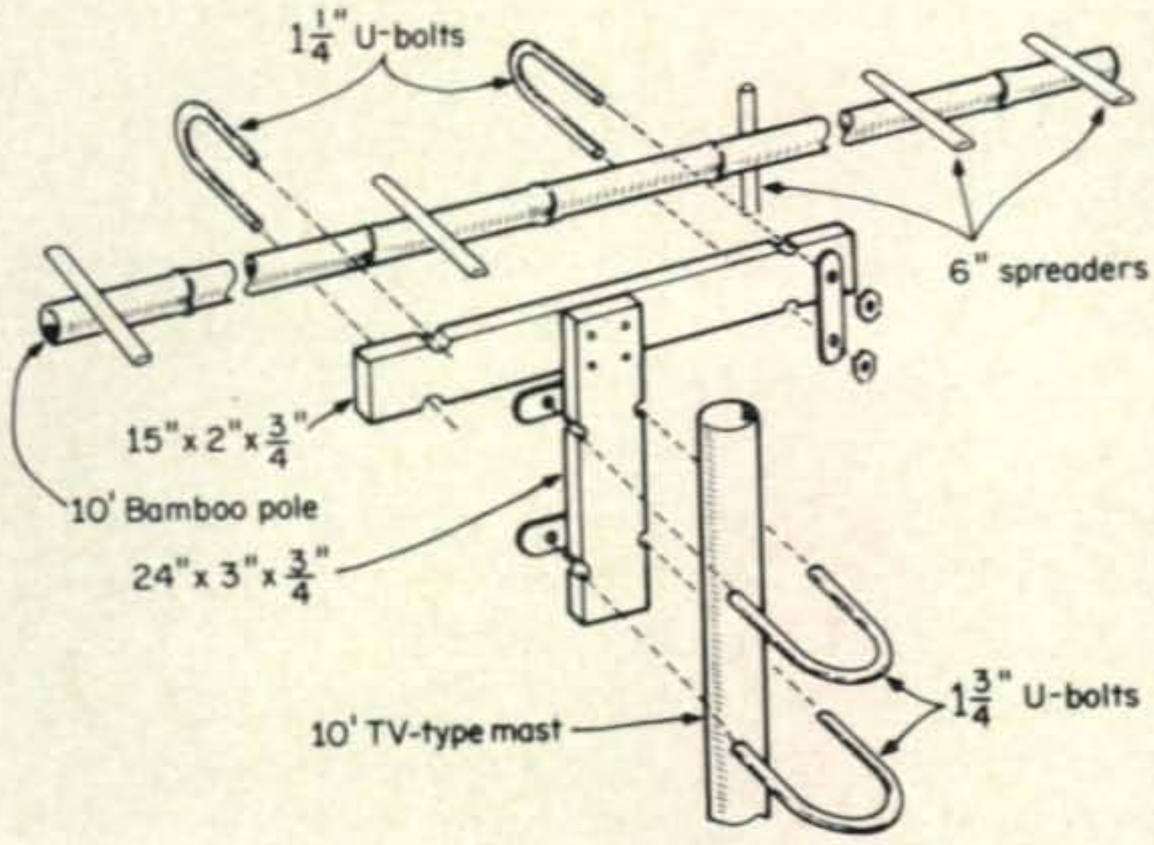


Fig. 2—Center boom construction. See text for detailed assembly instructions.

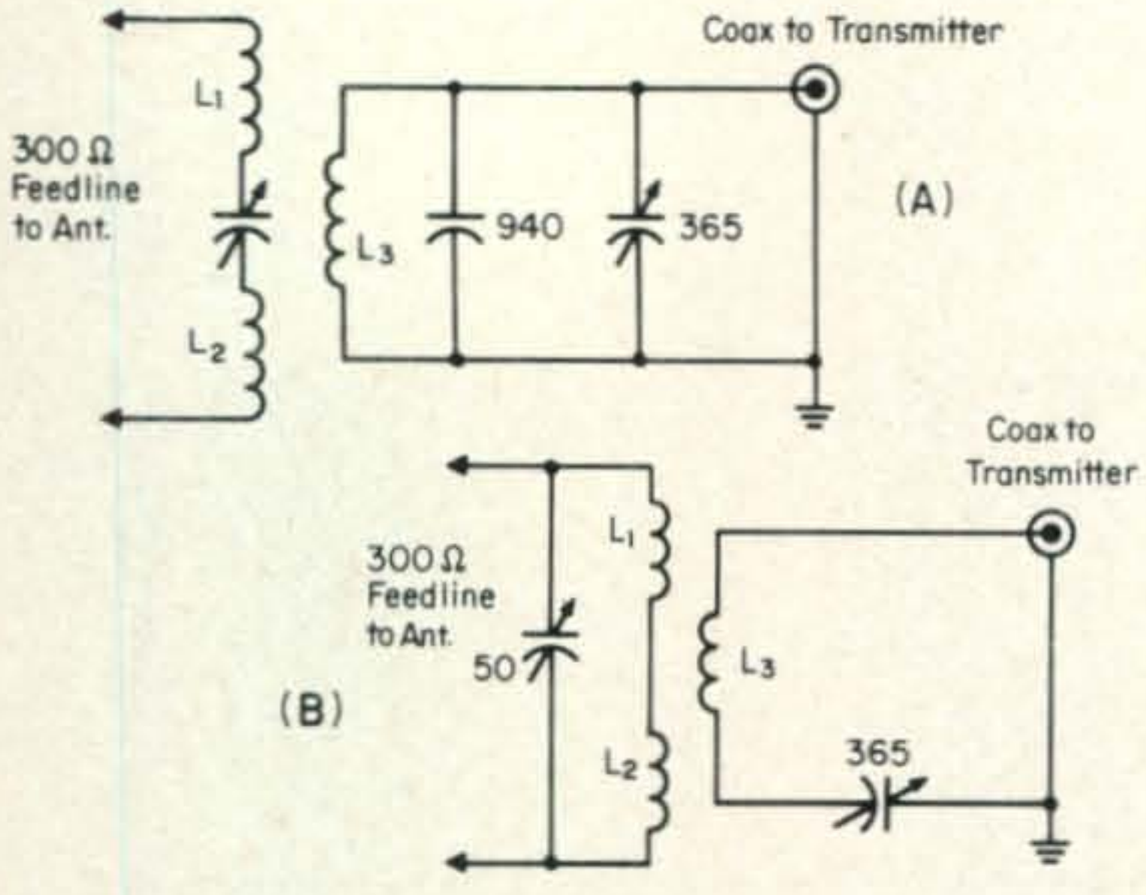


Fig. 3—(A) Antenna tuner for 7 mc. L_1 and L_2 are 26.1 μh total (20 t. #12, 3½" dia. close spaced). Separate L_1 from L_2 by width of L_3. L_3 is .82 μh (4t. #12 on same form as L_1 and L_2. Coupling can be made variable by using three forms. (B) 14 mc tuner. L_1 and L_2 are 2.5 μh total (10 t. #14, 1½" dia. close spaced). Separate by width of L_3. L_3 is 2 t. #12.

One beautiful aspect of this type of array is that the lengths of the wire elements are non-critical. The only requirement is that all elements be the exact same length to insure electrical balance. It is wise to use two continuous lengths of wire for the elements in order to keep actual ohmic resistance as low as possible by eliminating unnecessary soldering connections. Two lengths of from 70-85 feet can be laid out side-by-side, and folded in half to determine the exact center points where the feedline is to be attached. The easiest way of proceeding is to coil up the wire elements from the four ends to the centers before attaching them to the boom. Beginning at the center of the boom, the wire elements are attached to the spacer arms by looping a piece of bell-wire through the two holes at each end of the arms, and tightened by splicing. *Do not forget to cross-over the wire elements half-way between one end of the boom and the center—otherwise the antenna will not function properly.* The cross-over is aided greatly by mounting one spacer arm vertically and crossing at that arm.

The feed-line can then be soldered to the wire elements at the exact midpoint of the elements. It is important to insure a good connection at this point because of the electrical conditions which exist there. On 7 mc, for example, the radiation resistance of the array at the feedpoint is approximately 8 ohms, and the actual or ohmic resistance can be several times that amount—any lossy connections will hence result in wasted r.f.

The best approach is to splice several inches of the feedline along the wire elment and solder liberally. I found it the easiest approach to unwind only a few feet of feedline so that the whole array can be mounted without difficulty.

The work on the center boom is completed, and the array can be swung aloft. Regular TV aluminum mast will carry the scant two pound weight of the entire assembly without any difficulty. U-bolts are used to secure the boom to the mast.

The end booms are then connected to the uncoiled wire elements at each end by means of insulators and heavy guage wire. Strong cord, such as bricklayer's twine, is entirely satisfactory for the halyards which secure the end-booms to their trees or poles. A continuous loop of cord, with its two ends tied to the ends of the boom, is used for the main connection; two single cords tied to each end of the boom are used to maintain horizontal attitude once the booms are raised aloft. After securing all points and adjusting for horizontal attitude, the array may be forgotten for several years, I suspect. The fiercest winds that the South Dakota plains can muster have failed to even sway this array, so its longevity seems hardly a matter for speculation.

On all three bands, antenna couplers are used to match the feedline to the transmitter. It is nigh impossible to get a good match between the feeder and the antenna, and the s.w.r. at the feedpoint can range as high as 30:1, but this does not affect the performance of the array. On 160 meters s.w.r. is no problem due to the electrical nature of the antenna on that band.

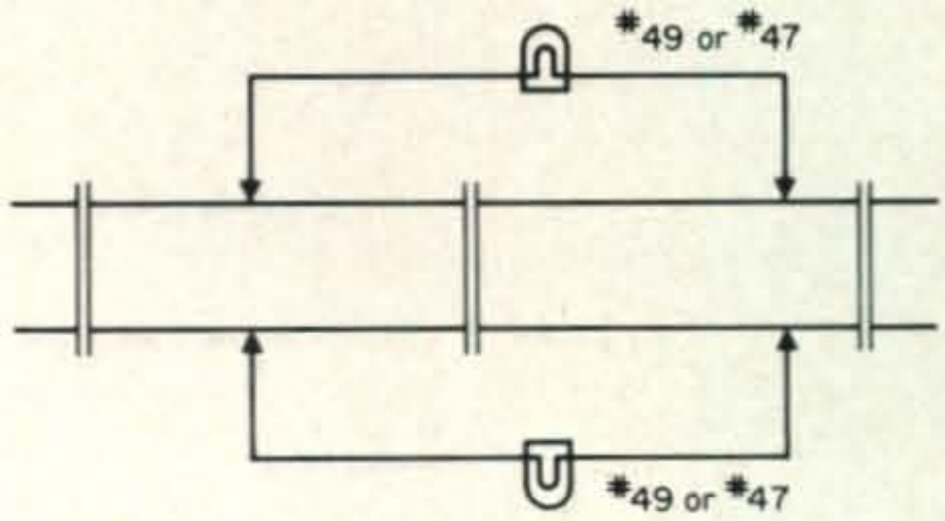


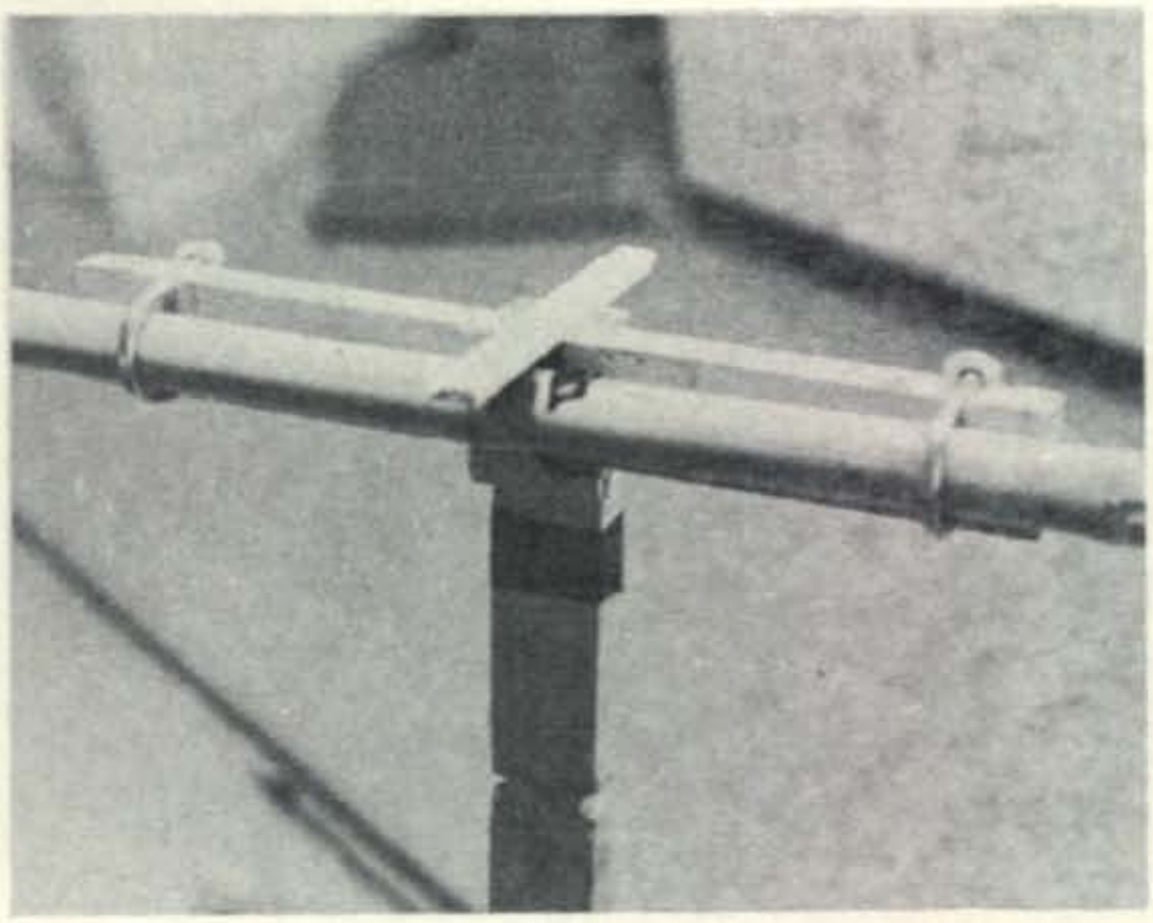
Fig. 4—Shunting #49 or #49 bulbs across 1"-6" of feedline will provide a handy current indicator for under-five-watt powers. Highest current indication is generally, but not always an indication of low s.w.r. Below 1 watt, bulb may have to be placed in series with feedline to get an indication, but in any case, they must be removed when tuning is completed.

Although any length of feedline can be used with a properly designed antenna coupler, it is wise to stick as close to the points of pure resistance on the feedline—or the electrical quarter-wave points—in choosing the length of the feedline. The *electrical* quarter wave-length of a feedline is computed from the following formula:

$$L\ (\text{ft}) = \frac{248}{f\ (\text{mc})} V\ (\text{velocity factor of feedline})$$

The velocity factor of your feedline may be determined from formulae found in the *ARRL Handbook* or *ARRL Antenna Book*, or from manufacturer's specifications. Any multiple of an *electrical* quarterwave for 7 mc suffices for both 40 and 20 meters. Capacitance and inductive reactance components will be at a minimum with such a length, thus making the design of an antenna coupler simpler.

Special care must be taken with the design and construction of antenna couplers to be used with this antenna on 40 and 20 meters. Although most handbooks and journals describe a variety of all-band antenna couplers involving tapped capacitances and inductances, a word of caution is in order. Even though these couplers will allow you to achieve a 1:1 s.w.r. between feedline and transmitter, any coupler which uses tapped inductances or capacitances (dual section capacitor with rotor tied to ground) is likely to be quite lossy. R.f. invariable seems to flow in the shorted-out portions of both components and is wasted internally, never reaching the feedline. For best efficiency, the feedline should be connected across a lumped inductance-capacitance—this assures that the coupler is canceling out only the capacitive/inductive reactances presented to it by the feedline—and not some internal components (see George Bonadio, W2WLR, "Antenna Tuner for Optimum Power Transfer," *ham radio*, May, 1970, 28-31, for discussion of this phenomenon). For example, I compared my "tried-n-true" all-band coupler with one designed especially for this antenna on 20 meters, and utilizing a lumped inductance-capacitance. The all-band coupler achieved a perfect 1:1 s.w.r. between transmitter and feedline, and *no* current flowed in the feedline! The compatible coupler achieved a 1:1 s.w.r. also but the current flowing in the feedline from my 130 milliwatts output was sufficient to burn out a #49 bulb in three seconds! The difference, in short, was no less than between no current and high current! Similarly, on 40 meters, the old coupler, with the same output and a 1:1 s.w.r., showed only half the feeder current as did the properly designed unit. This should be convincing proof of the need for a "compatible" coupler employing simple lumped inductance-capacitance.



Closeup view of the "T" bracket used to join the bamboo center boom to the 10 foot TV-type mast on the roof of the house. Also shown is one of the six 6" long spreaders mounted atop the "T".

In my installation, a feedline slightly in excess of a half-wave was required—which resulted in a high degree of capacitive reactance presented by the feeders to the coupler. Correspondingly, a high amount of inductance was required in the coupler to cancel the reactive components involved. The circuits for couplers for 40 and 20 meters and proper values (for my set-up) are given in fig. 3. In regard to mechanical construction, it is wise to use the lowest loss components in any power-transfer circuit—this is especially true of operation at one-watt QRPP levels (see Bob Schoening, WØBE,

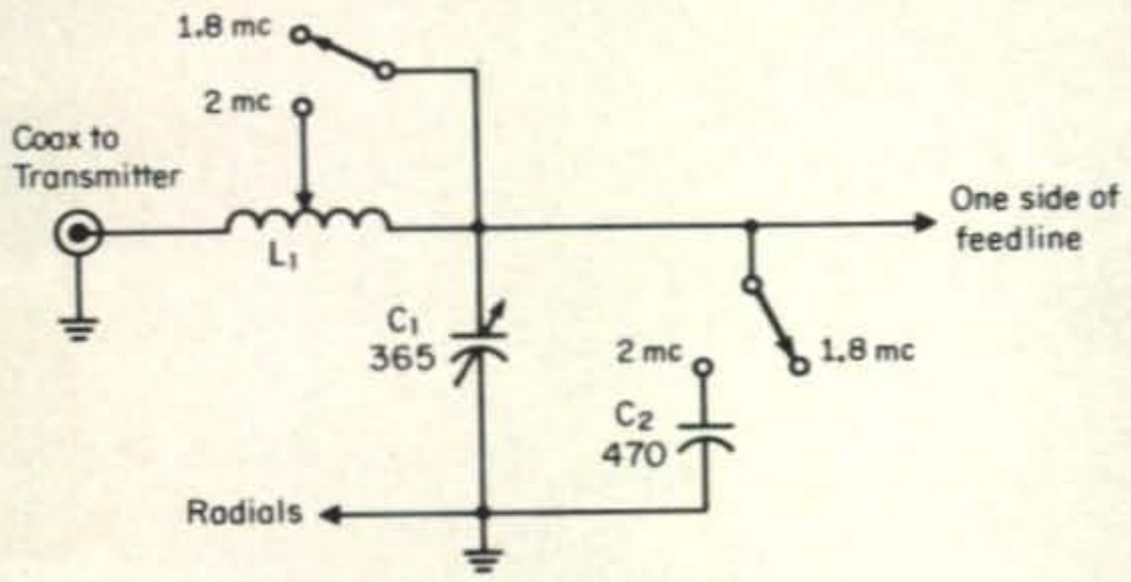


Fig. 5—Antenna tuner for 160 meters. L is approximately 47.4 mh for 1.8 mc, and 16.4 mh for 2.0 mc. Tap on L_1 must be determined by experiment, as must the value of C_2.

[*Continued on page 100*]

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THE HALF-WAVE DDRR ANTENNA

BY JOHN J. SCHULTZ,* W2EEY

The half-wave "directional discontinuity ring radiator" presents a number of advantages—both electrical and as far as construction is concerned—over the conventional quarter-wave ring antenna. The design is particularly suitable for v.h.f. operation. Constructional and adjustment details are presented in this article.

THE DDRR ring antenna or hula-hoop antenna—however you prefer to call it—has proved to be a very controversial antenna development. In its original quarter-wave form (fig. 1), it was developed to replace large quarter-wave vertical radiators on medium frequencies. Adapted to use on the high-frequency and v.h.f. bands, it can be made to perform well but proper adjustment of the antenna becomes very critical as the frequency of operation is increased and the useful bandwidth becomes very narrow. The situation is somewhat similar to a very thin wire dipole being used on v.h.f.—very small changes in physical dimensions produces very pronounced changes in operation.

Also, the physical configuration of the antenna makes it somewhat unhandy to construct and support when it is made from tubing. The ungrounded end has to be supported by some insulating material. Both the electrical and physical shortcoming of the DDRR antenna on v.h.f. are overcome nicely by a newly developed commercial design.

Basic Half-Wave DDRR

The basic half-wave DDRR can be simply visualized, as shown in fig. 2, as two conventional quarter-wave DDRR's connected back-to-back. Only one of the sections of the antenna is connected to the transmission line and a small capacitor at the mid-point of the ring—the equivalent of the capacitor at the open end of the conventional DDRR—may be necessary to tune out stray reactance for exact resonance. Since both ends of the ring are at ground potential, they may simply be combined and grounded together. Thus, a single grounded support point is all that is necessary for the antenna structure. This single support point may be connected by a metal rod to the ground plane surface or if an independent ground plane is desired, a similar ring may be connected the proper distance below the first ring—both being directly grounded to the support mast, as shown in fig. 3. The directivity pattern of the antenna is the same as that of the conven-

*1829 Cornelia St., Brooklyn, N.Y.

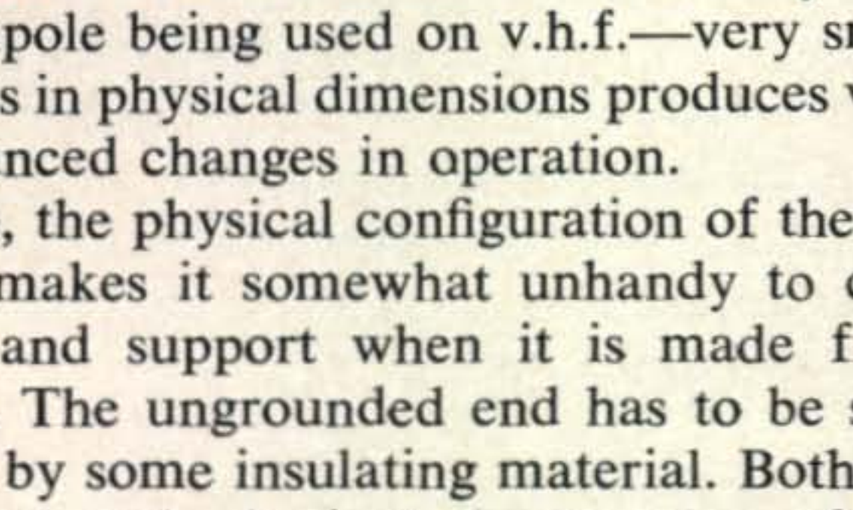

Fig. 1—Conventional quarter-wave ring antenna.

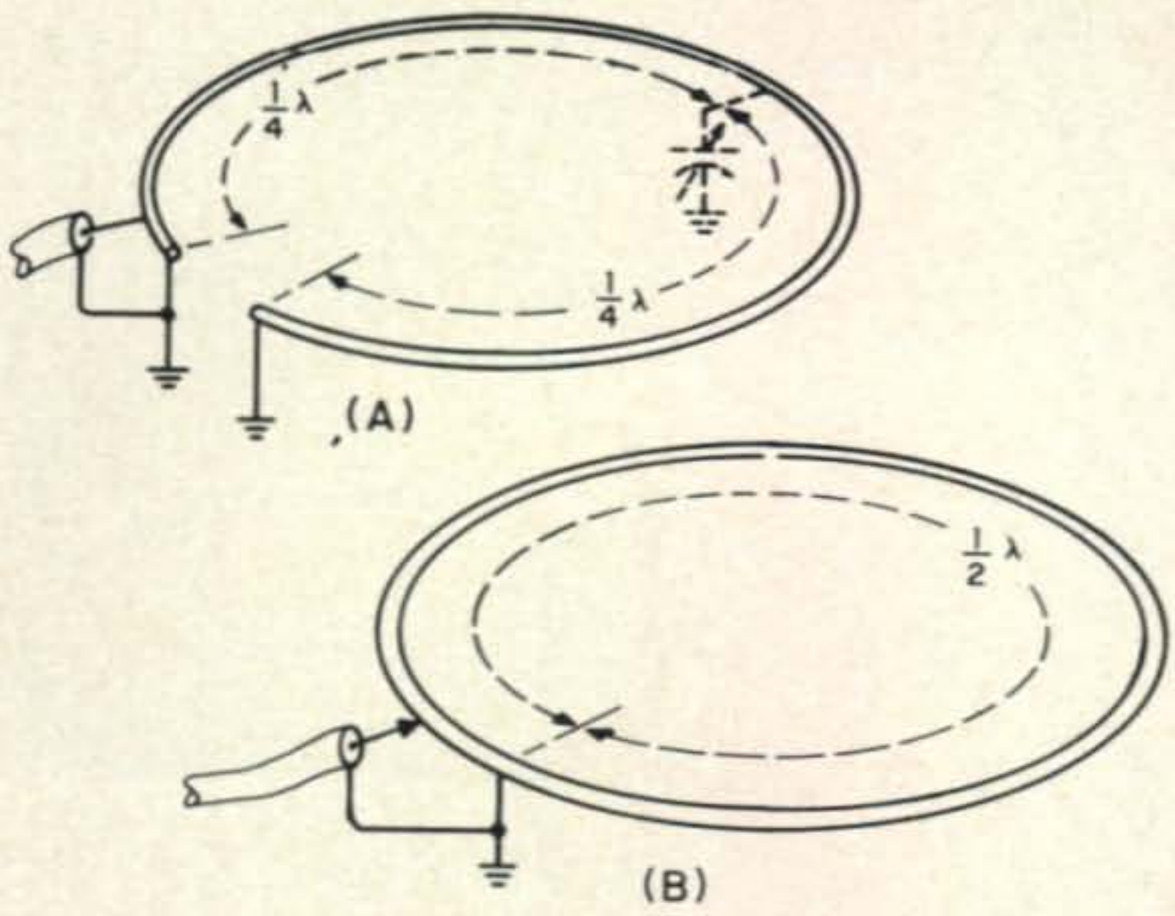

Fig. 2—Basic half-wave ring antenna (A) can be developed from two quarter-wave types but only single ground-support is actually required (B).

tional DDRR—that is, omnidirectional in the horizontal plane. A very minor gain of 1-2 db over a conventional quarter-wave DDRR is also present but this is just an added bonus and not a design objective for the antenna. Another slight bonus of the design is that its completely grounded structure provides a direct path to ground for the buildup of precipitation static charges. With proper adjustment, a half-wave DDRR will exhibit a low s.w.r. over the complete range of almost any v.h.f. band.

A 2 Meter Version

Figure 4 shows a half-wave DDRR dimensioned for operation on the 2-meter band. Because of the effect of the tubing diameter, the total circumference is not exactly a half-wavelength but somewhat reduced, the same as for a conventional dipole used on v.h.f. which is made from tubing. The tubing itself can be thin wall type of either aluminum or copper as long as the outside diameter is correct. With care and using a form, the tubing can be bent into shape. During the process, packing the tubing with fine sand will insure that it doesn't develop any unusual kinks. The ends of the tubing can either be soldered together or joined mechanically. Usually, it is better as far as mechanical stability is concerned to place this "joined" point in the ring at the side opposite the midpoint of the ring which is supported from the ground plane or mounting mast. A solid 1/2" diameter rod should be used for the vertical support to hold the ring above the ground plane. The height of the ring above the ground plane (or similar ring used as a ground plane) is important and cannot be arbitrarily chosen.

Adjustment of the antenna for proper operation with a coaxial feedline of 50 to 72 ohm impedance is fairly simple. With the antenna mounted in place, the tap point of the inner conductor of the coaxial feedline is varied to produce the lowest s.w.r. For the 2-meter model, this distance should be about 1/2" to 3/4" from the ground point. If the lowest s.w.r. which can be achieved is around 1.5:1 or less across the band of frequencies desired, no further adjustments are necessary and the antenna is ready to operate. Otherwise, if the lowest s.w.r. which can be achieved is not acceptable, either one of two adjustments can be made. A small disc plate type capacitor can be connected to the midpoint of the ring opposite the ground point. A disc of about 2" diameter is usually satisfactory. For each setting of the disc capacitor, the feedline tap point is varied to produce the lowest s.w.r. After this is done, the disc setting is changed to reduce the s.w.r. This process is carried back and forth until the lowest possible s.w.r. close to 1:1 is obtained.

Another method that can be used is to tilt the plane of the loop either away from or closer to the ground plane. The effect produced is somewhat similar to the use of the disc capacitor and the adjustments are carried out in the same manner. The only restriction is that the ring plane should not be set much more than 10 to 15 degrees above or below its horizontal axis or else the radiation pattern will be affected.

The half-wave DDRR antenna is a very much improved version of the conventional

[*Continued on page 104*]

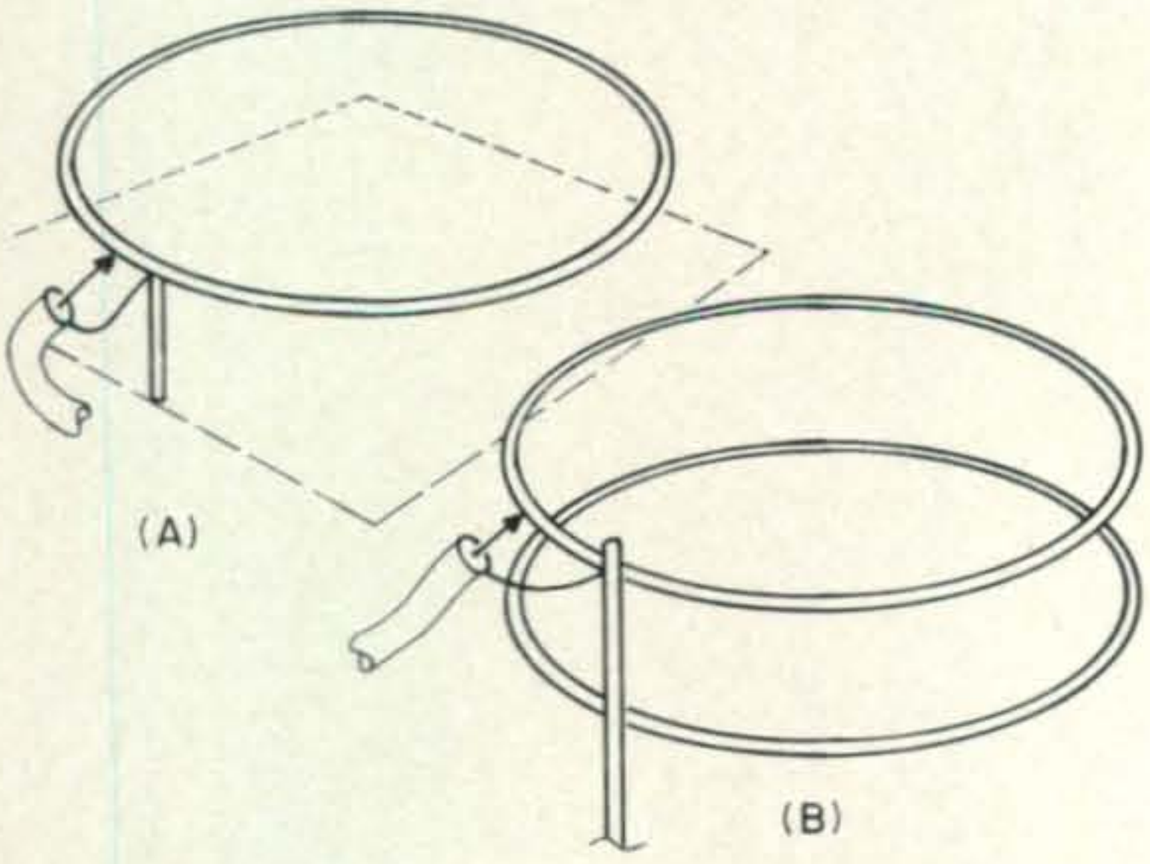

Fig. 3—Single half-wave ring may be mounted at the proper height above a metal ground plane (A) or two rings used (B), one to simulate ground plane.

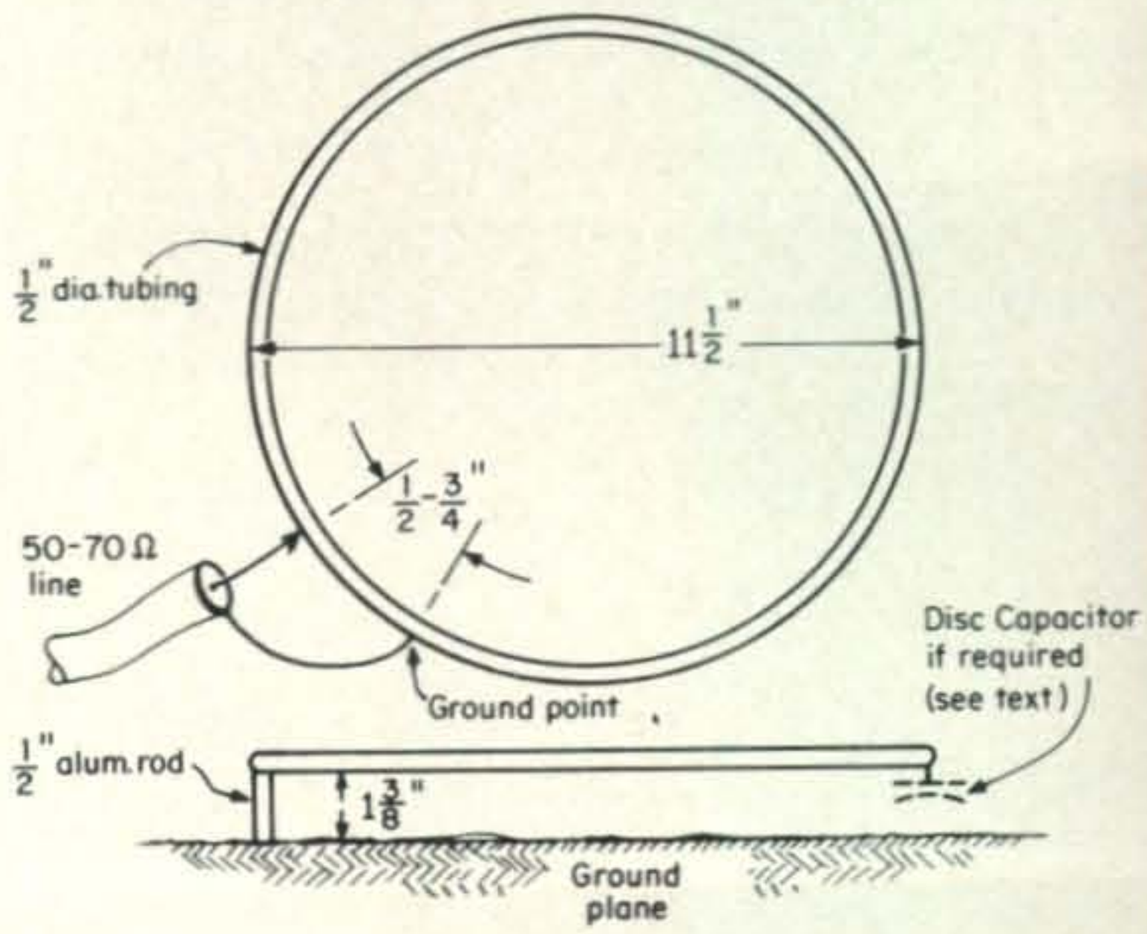

Fig. 4—Top and side view of half-wave ring antenna dimensioned for 2 meters.

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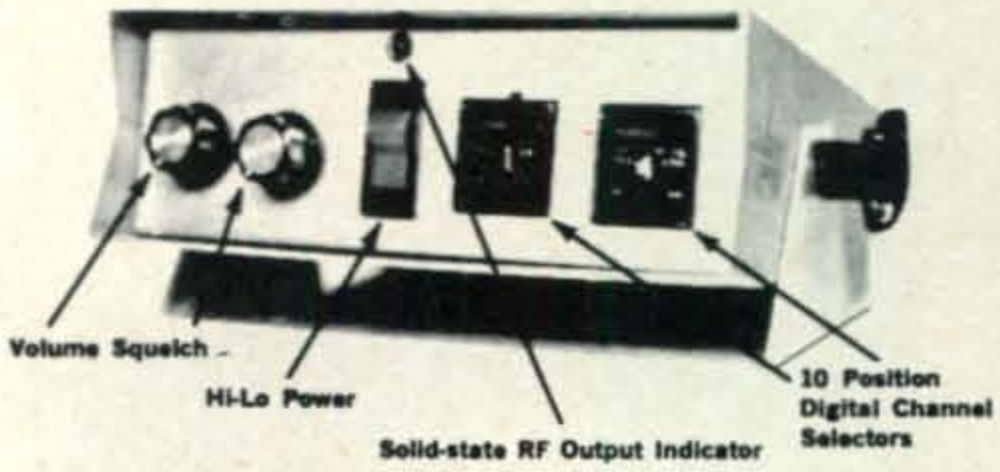

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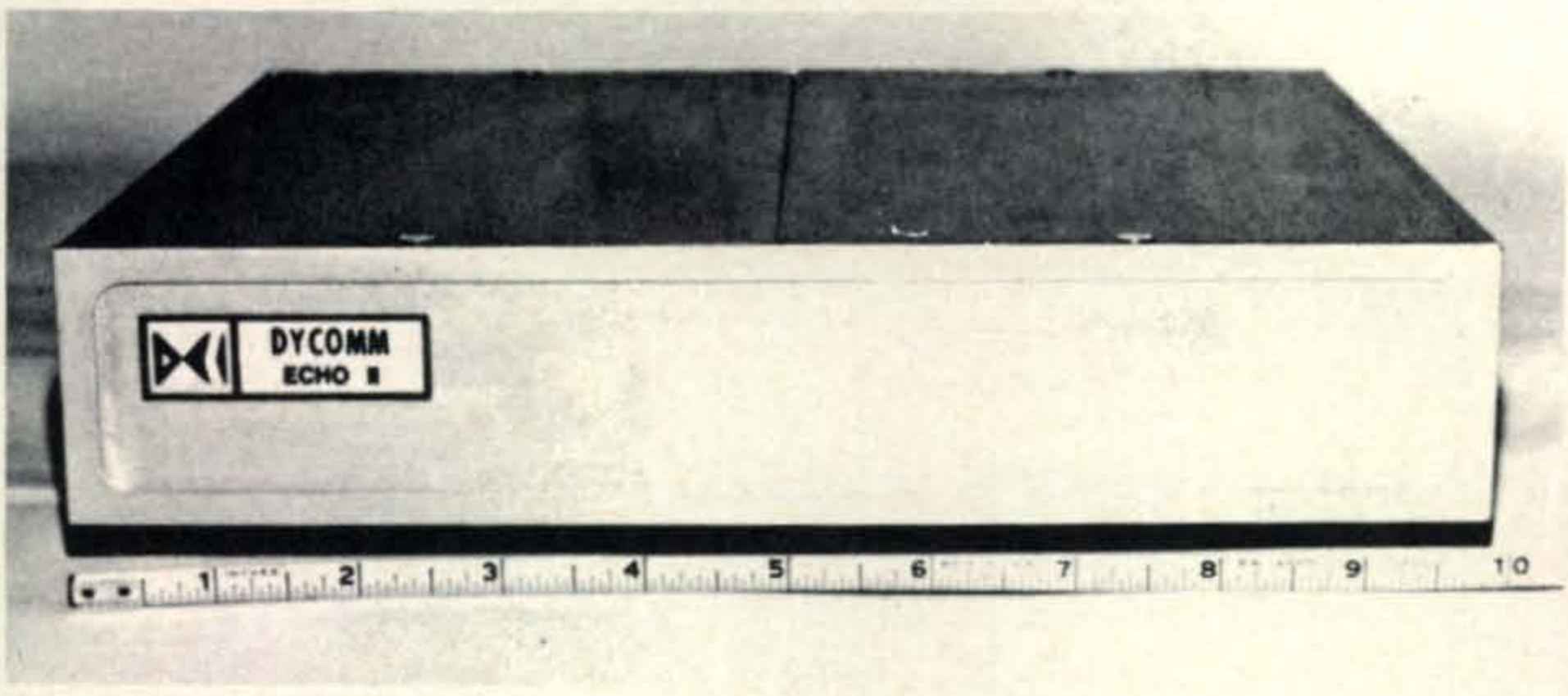

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An Antenna For 75 Meter WAS

A breezy account of how one ham discovered the obvious and turned it to his advantage while tackling a 30-day 75 meter WAS.

BY JOSEPH E. TAYLOR,* K5PAC

ONE of this country's wisest statesmen/scientists, B. Franklin, is reported to have said, "It is amazing how consistently, and with what exquisite persistence, we mortals reject and all truth which does not fit into the mold of our existing systems of thought."

Gentle Ben was one of the foremost electronics experts of his day; a real pioneer, one might say. And he was not paid for his efforts in this direction, so we might say that he was an amateur. Even so, it would be somewhat presumptuous to call him an early day ham.

Nor is it likely that Franklin was speaking prophetically of us hams as a genre in the above quoted statement. But, in any case, the shoe fits, doesn't it? Who of us has not had the experience of suddenly realizing the significance of some old axion we have known all our lives but never thought was really important?

A few weeks ago I was idling away a pleasant hour or two of early A.M. time on 75 meters, an unaccustomed band and hour for me. As the dial spun back and forth across the band, I was amazed to hear the long skip coming in so well. Sevens and sixes were pounding through with nine-plus signals. Even a KH6 was clearly copiable in our mid-southern QTH as he checked into a western phone net.

It was apparent that there was more here than I had suspected! After working a few of the rarer western states that morning, a warm recollection began to course through my mind. It was the memory of a pleasant winter whiled away racking up a WAS on 80 meter c.w. The rig at that time was a converted ARC-5 running, as I recall, just under 15 watts. I never got Vermont that winter, and Hawaii and Alaska were not counted in the totals then, but the thrill was the same.

That evening the rig was still set up for 75 so we got everything warmed up and began again to see who we could sort out. In a matter of hours, without ever actually making the decision to start, an outline map of the US was found and the services of the #2 son were recruited in a bona fide effort as getting a 75 meter s.s.b. WAS. The #2 son's job was to fill in red ink the outlines of the states as we worked them.

The equipment then, as now, was a Swan 350. A linear was available but we agreed not to use it to add just a bit of a handicap factor. The antenna at that time was a dipole 134 feet in length and fed with open wire into a tuner. This combination had served quite heroically for several years past on a number of bands, including 75. We established the time limitation of one month which was, just incidentally, about the time the winter long skip would be fading out anyhow).

Every evening and every morning produced new states—for the first week or so. Then at the time of our first inventory, it looked to #2 son that we had been too generous in giving ourselves a month for this task. Being 11 years old and a fairly optimistic turn anyhow, he just couldn't see our taking more than another week to finish up. After all we had 28 states then and that was well over half ...or so he reasoned.

But the inevitable slowdown came soon enough. #2's exaggerated sense of optimism began to fade. The new ones were becoming scarcer than the dental apparatus of the rooster's bride, of proverbial fame. But it was the eleven year old who noticed that about our map which I had completely overlooked.

*6 Evergreen Court, Little Rock, Ark. 72207

"Why is it," he asked, "That we have all these down here, (pointing to the southwest) and all these up here, (pointing northeast) but nothing here or here (as he indicated the opposite quadrants)?

"Well Son," I began patiently, "it is really quite elementary. You see an antenna like ours radiates best at 90° angles. That would mean up here and down here."

This was, of course, lesson number one in antenna theory. But then #2 came back with the clincher: "It looks like a big eight, doesn't it?"

Like a *big eight*, indeed!! That was exactly what we had outlined on our map as we had colored in the states we had worked! For more years than I cared to remember I had known this simple basic fact about antennas, but that evening what we had traced out, altogether accidentally, hit me with all the force of a new discovery!

There was no real question about it, we had to put up another wire as nearly as possible at 90° to the present one.

But like other ideas that have crept into our cranial cavities, this one was easier to say than to accomplish. We had pine trees in the aforementioned corners of the lot far enough apart to hang a half wave on 75 meters; but other direction was something else.

Our lot, like most other lots, was hardly in the acreage category, but something had to be done, so the manuals were consulted and the midnight oil was ignited.

The requirements were simple enough to understand:

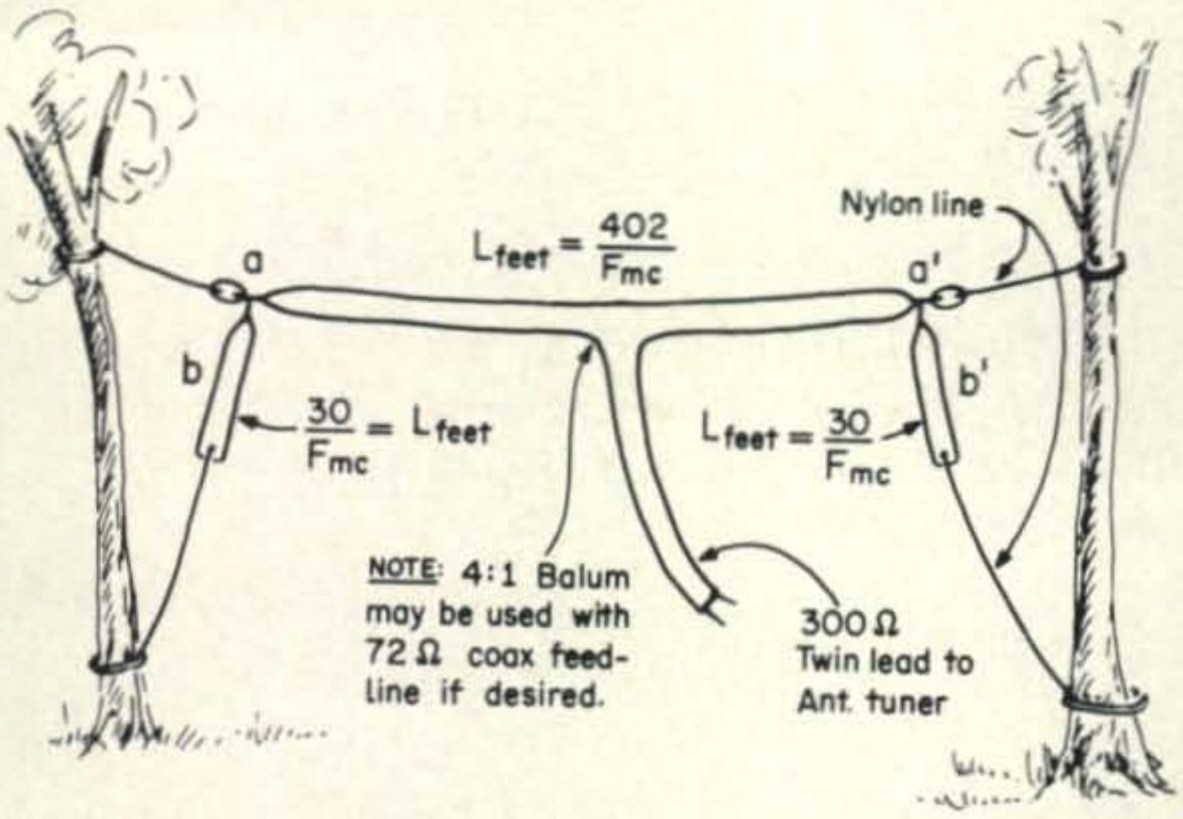

Fig. 1—Dimensions and construction of an efficient, inexpensive antenna for 75 meters suitable for the average city-lot dwelling amateur. The antenna is shown fed with 300 ohm line but if a 4:1 balun is used at the dipole center, 72 ohm coax may be used instead.

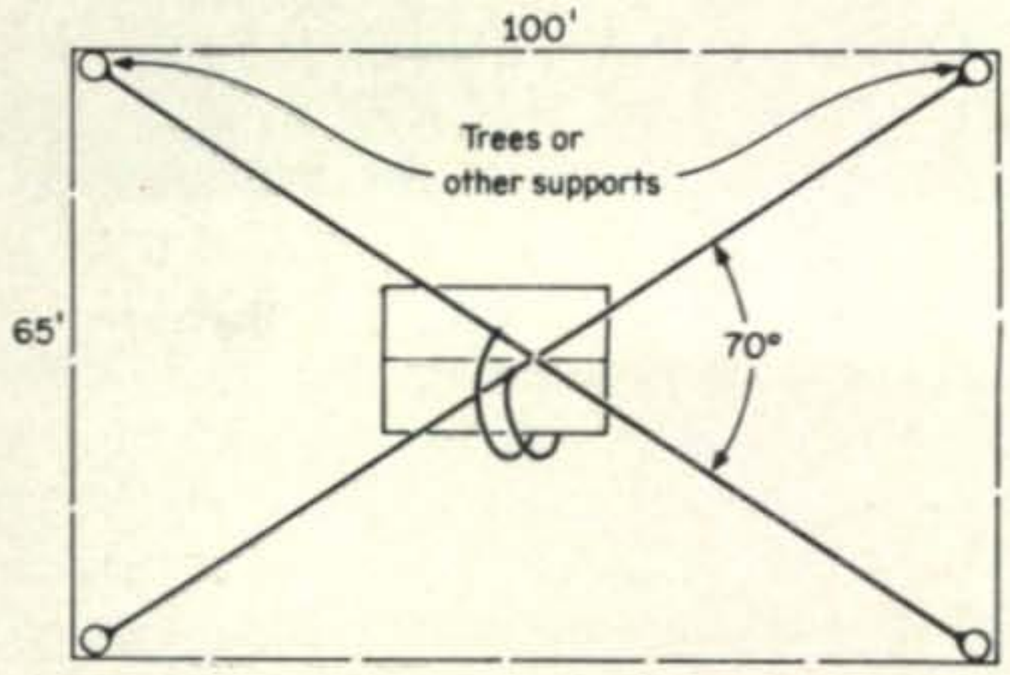

Fig. 2—Two of the shortened 75 meter dipoles may be erected at a 70° angle to each other within the confines of a reasonably small 65' × 100' city lot.

1. We needed an antenna with a high order of efficiency (some of the remaining states were the more remote ones, naturally).

2. We needed an antenna with a *maximum* length of 108 feet.

3. The antenna must have fairly wide band coverage with an acceptable s.w.r. overall.

All sorts of options were considered. We looked at verticals; loaded dipoles; fan dipoles; etc., etc. Each had its advantage and each its liabilities.

After much consideration the antenna that was selected was the old, but not frequently used, configuration of the folded dipole with ends shorted and bent down. This antenna has all the advantages most of the others have, and suffers from only a few of the disadvantages. It can be erected in a space of just over a hundred feet. It is efficient and well matched, and, not least of all, it is fairly broadband when constructed with 300 ohm line.

A good grade of twin lead was secured since previous experience with the cheaper variety had proved that it is just that: cheap. Any constructor will do well to shop a bit before buying any twin lead. Investment in a higher quality will ensure larger wire and more strands which is important since the antenna must support its own weight in all varieties of weather.

Figure 1 shows both the configuration and the formula for calculating the length of such an antenna. The velocity factor of the twin is used in deriving the length of the shorted ends, but this has already been taken into account and is mentioned here only for the curious.

When constructing such an antenna, or any other for that matter, one rule stands out above all others: Measure the length carefully! Lest you may have blinked while read-

ing that last sentence, a repetition may be in order: MEASURE CAREFULLY. More unhappiness results from the overlooking of this cardinal rule than all other causes put together in antenna construction.

Once the correct length has been established and the wire cut, proceed next to fold the antenna section (the flat top) in the exact center. This will ensure symmetry which is vital for the proper functioning of this radiator.

To find the shorting point measure off the distance from the end of the wire after the leads have been stripped and shorted and soldered together. Then when the insulation is to be removed for the shorting at points a and a^1, cut *very* cautiously and slowly so as not to cut or score any of the strands of small wire. This is not as difficult as it sounds, but caution is in order here.

If you cut for a center frequency of 3.9 mc your antenna will be about 118 feet long and sections b and b^1 will be about 7 feet 8 inches long. These can be folded at any convenient angle up to 90°.

Such an antenna can be matched to a modern transmitter in any of several ways. Two of the best ways are: 1—Bring the 300 ohm balanced line into a tuner and thence to the coax input to the transmitter or transceiver, or 2—A toroidal balun with a 4:1 ratio can be used without tuning. For a number of reasons the second method may be better if you are pursuing WAS. With the balun there is no further tuning to be done after the rig itself has been adjusted. This is an advantage when QSYing any distance. This matter of a minute or two lost in returning the antenna can make the difference between getting Vermont or North Dakota and having to wait for another opportunity. A second factor is that if the baluns are used they can go directly into a switch so that changing directions of maximum radiation is just a matter of one click. Such toroids also provide a consistently low s.w.r. over wide excursions of frequency.

If the reader is entertaining doubts about the advantage of a second wire for 75 meters, a few hours spent switching back and forth between two identical antennas differing only in direction or orientation will dispel any lingering uncertainties. The matter of working all states on 75 meters is not the easiest of enterprises in the first place so there is very good reason to put every possible advantage on your side.

[*Continued on page 104*]

The K7GCO Modified HT-18 Hy-Tower

BY KEN "JUDGE" GLANZER,* K7GCO

The following modifications made to the Hy-Gain HT-18 Hy-Tower give improved performance on the 160, 80 and 40 meter bands, and provide the added advantage of not requiring an extensive radial system except on 160 meters. Thus the antenna is ideal for installations on concrete or blacktop surfaces. The modified antenna is also outstanding because of its exceptional bandwidth and lower angle of radiation.

A SIGNIFICANT increase in performance of the Hy Gain HT-18 Hy Tower is obtained from the K7GCO conversion described here at the expense of automatic multiband operation, as separate matching systems are used on 75 and 40 meters. Direct feed is still used on 160 meters. On 160 meters the HT-18 does a good job base loaded, particularly with a "long" radial system. However, top loaded it works even better. A loading coil was added at the top along with a 2-piece extension and side braces or guy wires to support the extra weight and length in the wind.

160 Meter Operation: On 160 meters the K7GCO version is fed directly with coax in the normal manner. Current feed is still used on 160 and so a radial system is still

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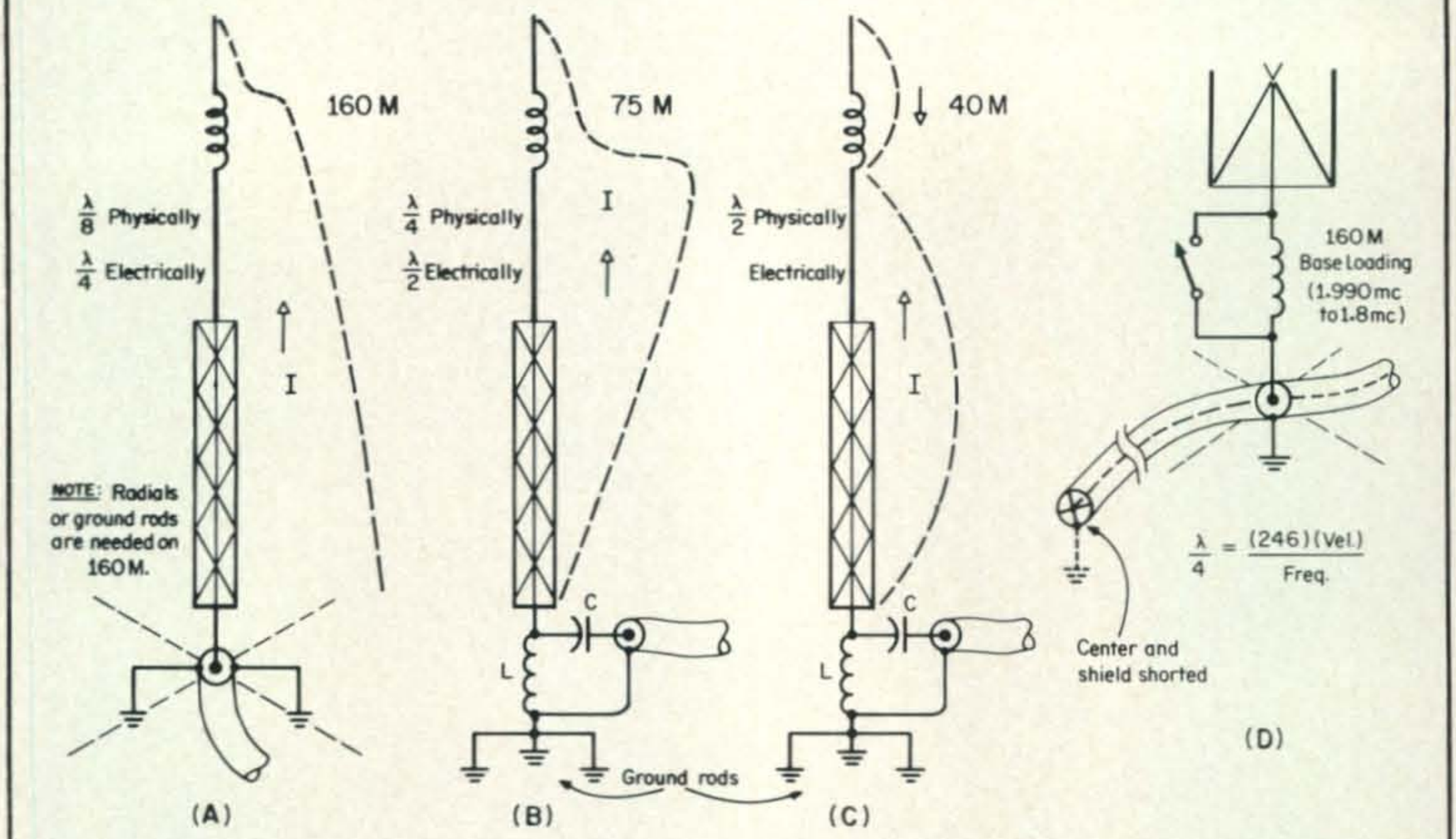

Fig. 1—Current distribution on the modified Hy Gain HT-18 Hy Tower. (A) 160 meters. (B) 75 meters. (C) 40 meters. Feed systems are also shown for each band. (D) Additional bandwidth can be obtained by paralleling a shorted-quarter-wave coaxial stub across the feedline. On 160 it will serve the added purpose of draining off the static buildup on the antenna. The antenna is already

necessary on this band. The top loading inductance is adjusted for resonance in the portion of the 160 meter band desired. 1 to 1 s.w.r. with greater bandwith is obtained as compared to 2 to 1 minimum with base loading, direct feed and less bandwith. Current distribution changes as illustrated in fig. 1A.

75 Meter Operation: Now on 75 meters the electrical length is essentially a half wave (physical length still a quarter wave). But the current distribution is as illustrated in fig. 1B. It might be called an upside down radiating quarter wave as the high current section is now at the top, a quarter wave higher. The antenna is voltage fed with an L network. An extensive radial system is not needed or desired on 75 and 40 meters. The extent of the ground system needed is only enough to cool the shield of the coax: 3 or more long ground rods spaced around the base and tied together will do. An ideal condit on exists. The antenna works into a lower angle reflection factor and since the low current section is next to the ground the normally short radials—if used—do little insofar as reinforcing the higher angle components as with current fed verticals. With the reverse current condition there is less absorpt on and reflection by nearby objects to distort the pattern.

40 Meter Operation: On 40 meters the current distribution is illustrated in fig. 1C. It's a full half wave now to the coil plus the tip, approximately /2 physically, a electrically. An L network is used for matching with slightly different *L* and *C* values. On 75 and 40 meters the bandwith is exceptional. Both the 80 and 75 sections of the band can be covered with one setting of the L network, a feature not enjoyed with quarter wave verticals. One reason is that the L network is non-resonant as compared to a tank circu t normally used to match voltage fed antennas. Furthermore, an L network will easily match highly reactive loads which is not the case with a tank circuit. An L network will literally match anything so the necessity of antenna resonance, although desirable, is not necessary.

Another distinct advantage of the L network is that it will tune out large amounts of reactance without affecting the system bandwidth as with a tank circuit. In fact there are no obvious indications of a reactive load. So any length of radiator can be matched and this feature allows one to take advantage of height possibilities up to 5/8 wave rather than specific lengths such as quarter, half or 5/8 wave exactly.

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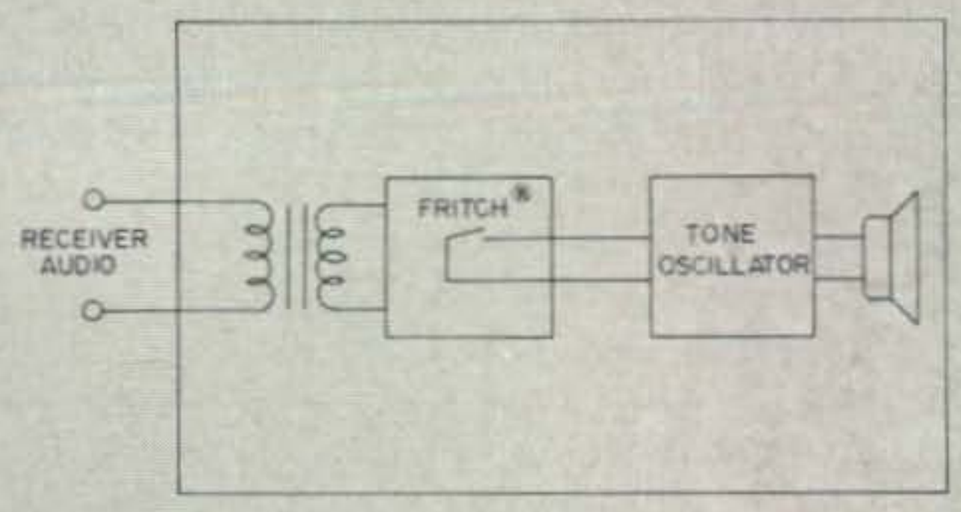

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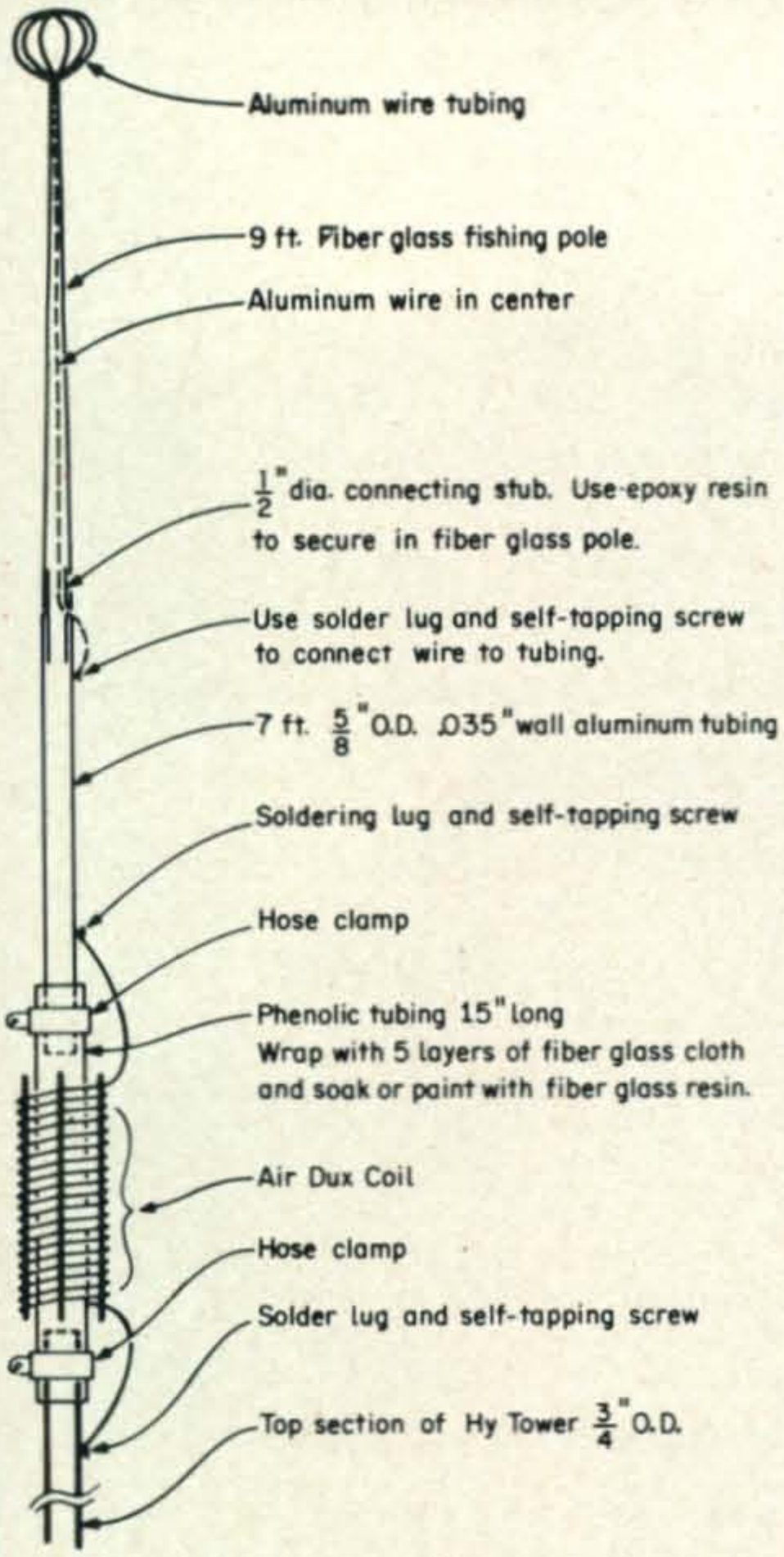
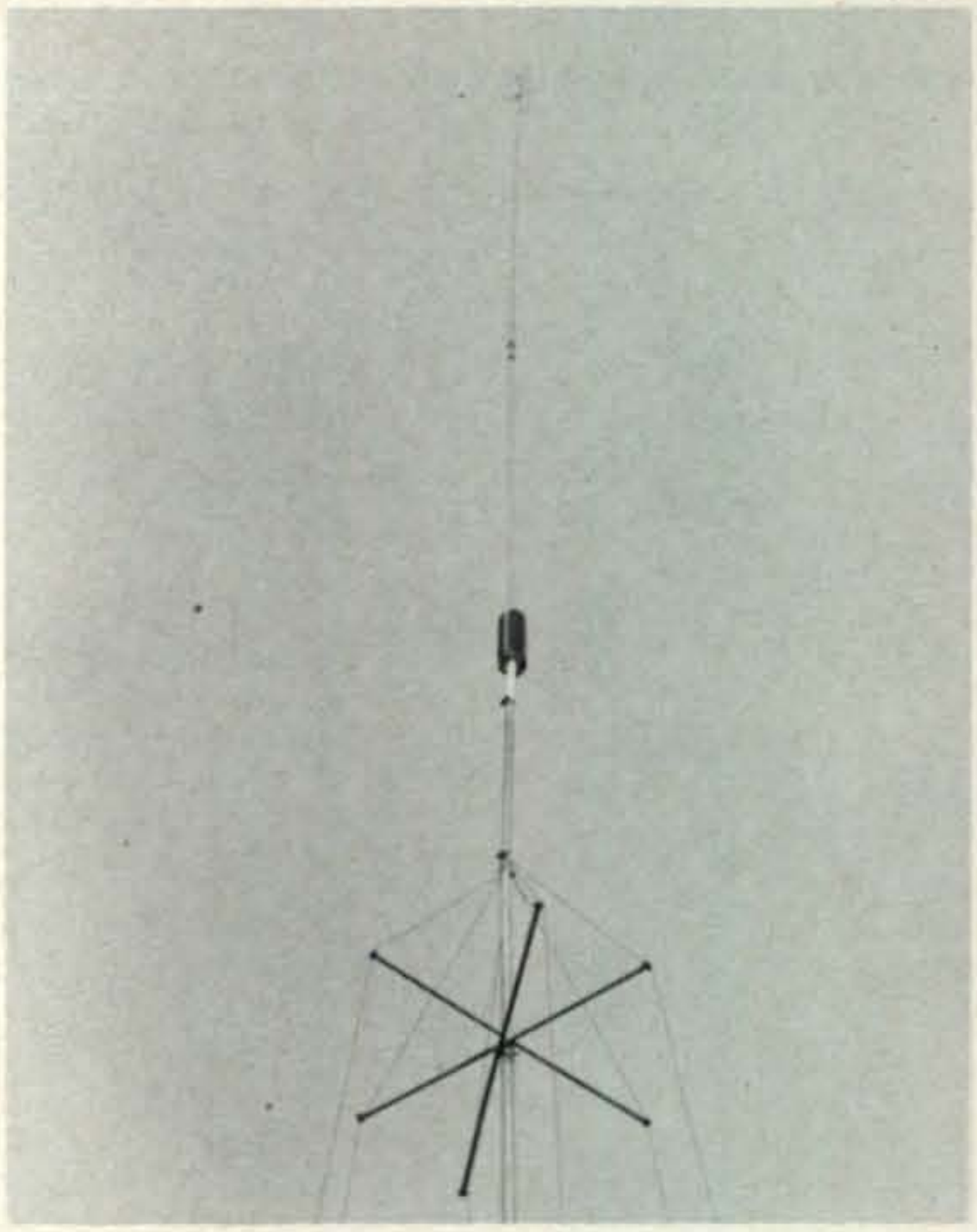


Fig. 2 — Modifications to the HT-18 top section. Hose clamps are used to secure the phenolic tubing insulator to the HT-18 top tubing and the new 7′ length of 5/8″ dia. tubing. The 100 turn loading coil described in the text will resonate the antenna on 1.990 mc; more turns will be needed for 1.8 mc. An alternative to adding more turns to cover the lower segement is to use the 100 turn coil and base load the antenna to 1.8 mc, shorting out the base loading for 1.9 mc operation. By using a remotely switched relay to perform this function, a station may conveniently work both ends of the band. This is shown at fig. 1(D).



Closeup of the new upper section of the modified HT-18. The Hy-Tower normally ended just below the coil. The top 9′ is a fiberglas fishing pole with a wire running up the center, and connected to the next lower aluminum section using a short fiberglas connecting stub. Electrical connection is made by means of a solder lug and self-tapping screw.

Matching

Actually the loading coil inductance should be reduced on 75 meters so that the antenna is exactly a half wave electrically but the antenna would have to be lowered to do so. *(The hinge used on the K7GCO conversion permits this.) To determine the correct number* of turns on 75 meters use a receiver connected to a vertical antenna on the other side of town or a field strength meter several wavelengths away. With walkie talkies, communication can be maintained as the coil inductance is reduced 2 turns at a time and the L network readjusted to 1 to 1 s.w.r. It can be shorted out on 40 meters for optimum performance. The inductance value that is resonant on 160 meters may be fairly close to optimum on 75 meters.

The fastest way to find the exact values of *L* and *C* in fig. 1 (B) and (C) is by cut and try. Select a value of *L* (8 turns, 3″ diameter), vary the capacitor (500 mmf) through its range, and observe the s.w.r. change. Make mental note of lowest s.w.r. Change the value of *L* by one turn (+ or −) and repeat the process striving for lower s.w.r. with each adjustment. When correct amount of *L* is used the s.w.r. will dip to 1 to 1. Measure the value of *C* in the variable capacitor. Substitute a fixed value slightly less in capacity and parallel a small variable for fine tuning.

Mechanical Modifications

A ship's mast or outrigger system of guying the mast with top loading coil is used. Figure 2 illustrates how the six guys are used. Three 3/4″ × 6′ lengths of aluminum tubing are bolted to the top of the tower for the middle spider. A smaller spider is installed below

[*Continued on page 106*]

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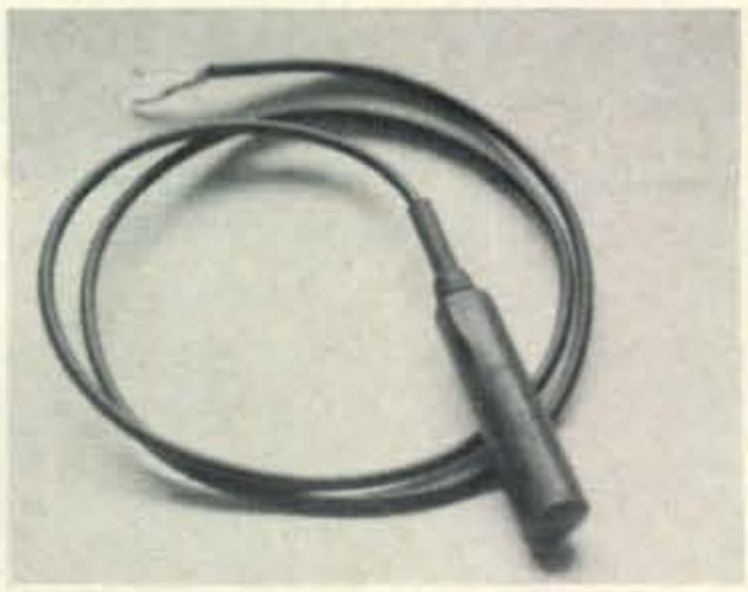

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LATE RADIO AMATEUR SATELLITE NEWS

Space Conference Interim Report

BY GEORGE JACOBS,* W3ASK

THIS is being written during the first days of July, slightly past the mid-point of the World Administrative Radio Conference for Space Telecommunications (WARC-ST) being held under the auspices of the International Telecommunication Union in Geneva, Switzerland's huge Exposition Palace.

At this time there is some good and some disappointing news to report concerning frequency allocations for radio amateur satellites.

At precisely 11 A.M. local time on June 7, 1971, the Secretary General of the ITU called to order the first session of the WARC-ST, or the space conference, as it is more generally called. Heralded as one of the most important conferences to be convened in the more than 100-year history of the ITU, it is attended by more than 700 telecommunication officials from at least 100 different countries. The Conference will remain in session until July 17.

The object of the space conference is to allocate frequencies throughout the entire radio spectrum to meet not only the present requirements for space telecommunications, but also those envisioned for the next decade or two, and to revise and supplement the administrative and technical provisions of the Radio Regulations which affect space communication. The Radio Regulations is an international treaty which governs the use of the radio spectrum.

Among the space telecommunication requirements being considered at the Conference are those for weather, broadcasting, communication, navigation and research satellites, for manned and unmanned space vehicles, for the exploration of the moon, the sun and the planets, and for amateur radio.

In short, decisions made at the space conference will be binding in the field of space telecommunications for the next ten, and perhaps the next twenty years. As far as amateur radio is concerned, the Conference is very important because the future of amateur radio in space will be determined here.

Amateur radio is represented officially at the space conference by the International Amateur Radio Union (IARU). In fact, for the first time at any conference, the IARU team consists of representatives from the three ITU regions; Win Dalmyjn, PAØDD from Region I (Europe and Africa); Noel Eaton, VE3CJ from Region II (Western Hemisphere) and Tom Clarkson, ZL2AZ from Region III (Asia and Oceania). Also present are Bob Denniston, WØDX, the President of the IARU and Dick Baldwin, W1RU and John Huntoon, W1RW of IARU headquarters. Representing the Radio Amateur Satellite Corporation (AMSAT) on the IARU team is Dr. Perry Klein, K3JTE. Several other distinguished radio amateurs also are participating in the work of the IARU at the Conference and there are about three dozen radio amateurs scattered among the national delegations.

The good news to report at the half-way mark is that the working group (officially designated as Working Group 5C) to which the amateur service has been assigned has proposed to the Conference that space radio communication techniques be *permitted* in the following bands allocated *exclusively* to the amateur radio service:

7,000- 7,100 kc
14,000-14,250 kc
21,000-21,450 kc
28- 29.7 mc
144- 146 mc

It is expected that the working groups pro-

*Space Communications Editor, *CQ*, 11307 Clara Street, Silver Spring, Md. 20902.

posals will be approved by the Conference.

Regretfully, the news at this point isn't so good as far as the bands *shared* between amateur radio and other services are concerned. The working group decided *against* amateur satellite activity in the following bands:

50	-	54 mc
146	-	148 mc
220	-	225 mc
1,215	-	1,300 mc
2,300	-	2,450 mc
3,300	-	3,500 mc
5,650	-	5,925 mc
10.0	-	10.5 gc

In the 420-450 mc band there is hope that an amateur space allocation will be made in the segment 435-438 mc/s. There is also some optimistic indications that the Conference might approve an allocation at 24.0-24.05 gc (*not* mc)!

The negative recommendations of the working group *are not* final. There still remain three weeks in which the IARU will attempt to convince the Conference to permit space techniques by the amateur service in at least small segments of each shared band on condition that harmful interference shall not be caused to, or protection claimed from, other services operating in accordance with the Radio Regulations.

Based upon the successful results of the AUSTRALIS-OSCAR 5 satellite, the IARU plans to assure the Conference that any harmful interference caused by emissions from amateur satellite can be immediately eliminated by ground control techniques.

There will be a final report from the WARC-ST in next month's issue of *CQ*.

AMSAT Flyover Successful

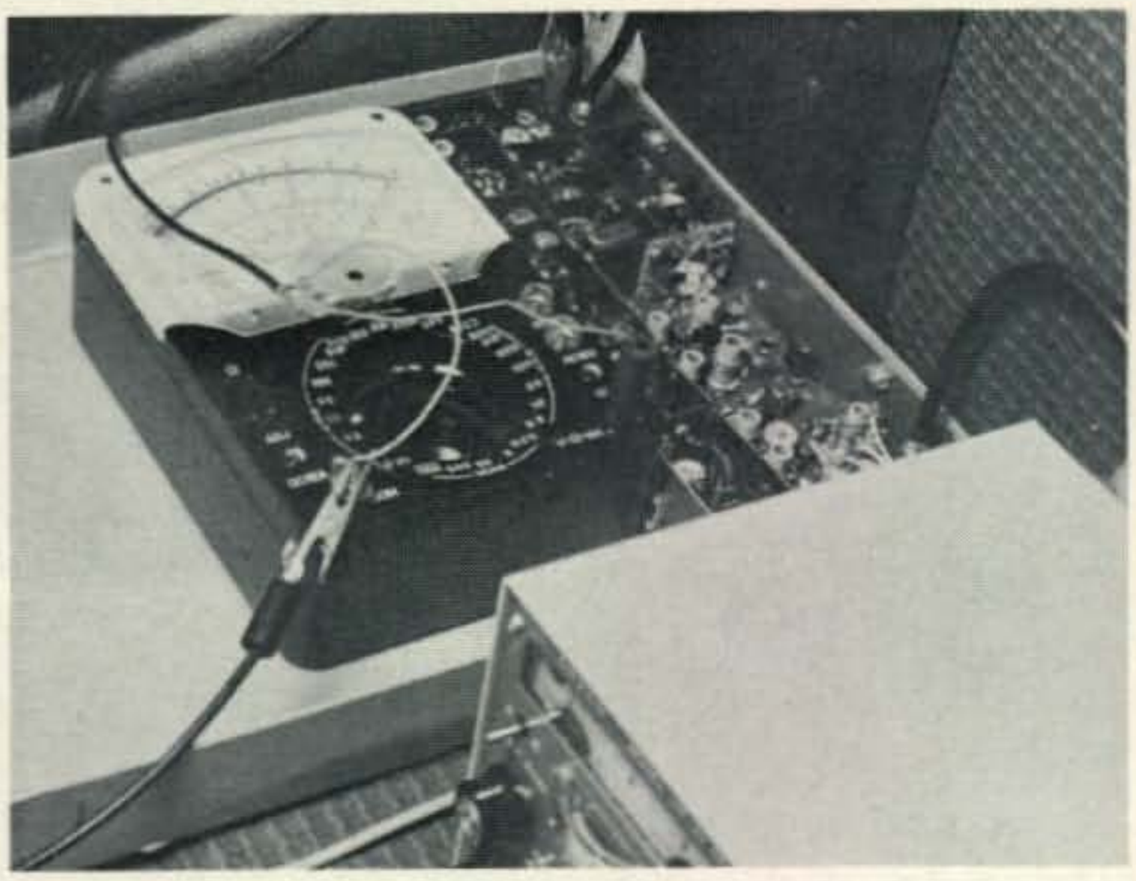
During the weekend of May 15-16, 1971, a prototype of the AMSAT 2-to-10 meter satellite repeater was flown aboard a light aircraft over a good portion of the northeastern part of the United States. This flyover gave AMSAT the opportunity to check out the repeater under simulated operating conditions, gave radio amateurs along the route an opportunity to work through the repeater, and helped mark the observance of World Telecommunication Day. World Telecommunication Day is observed annually on May 17, to honor the founding of the International Telecommunication Union.

The AMSAT aviators were pilot Jim Cristo (no call), Joe (Skip) Reymann, WA4EAG, co-pilot; and Jan King, W3GEY (ex-K8VTR), in charge of the repeater equipment. The plane left Friendship Airport near Baltimore, Md. about 9:30 A.M. EDT on Saturday, May 15, heading toward Boston. It passed over Manchester, N.H. and turned westward toward Rochester, N.Y. From there the route was over the southern tip of Ontario to Pontiac, Michigan. Sunday morning the plane continued across lower Michigan to South Bend, Indiana, then south to Kokomo, east to Columbus, Ohio and back to Baltimore, Md. for touchdown a few minutes before 5 P.M. on Sunday, May 16.

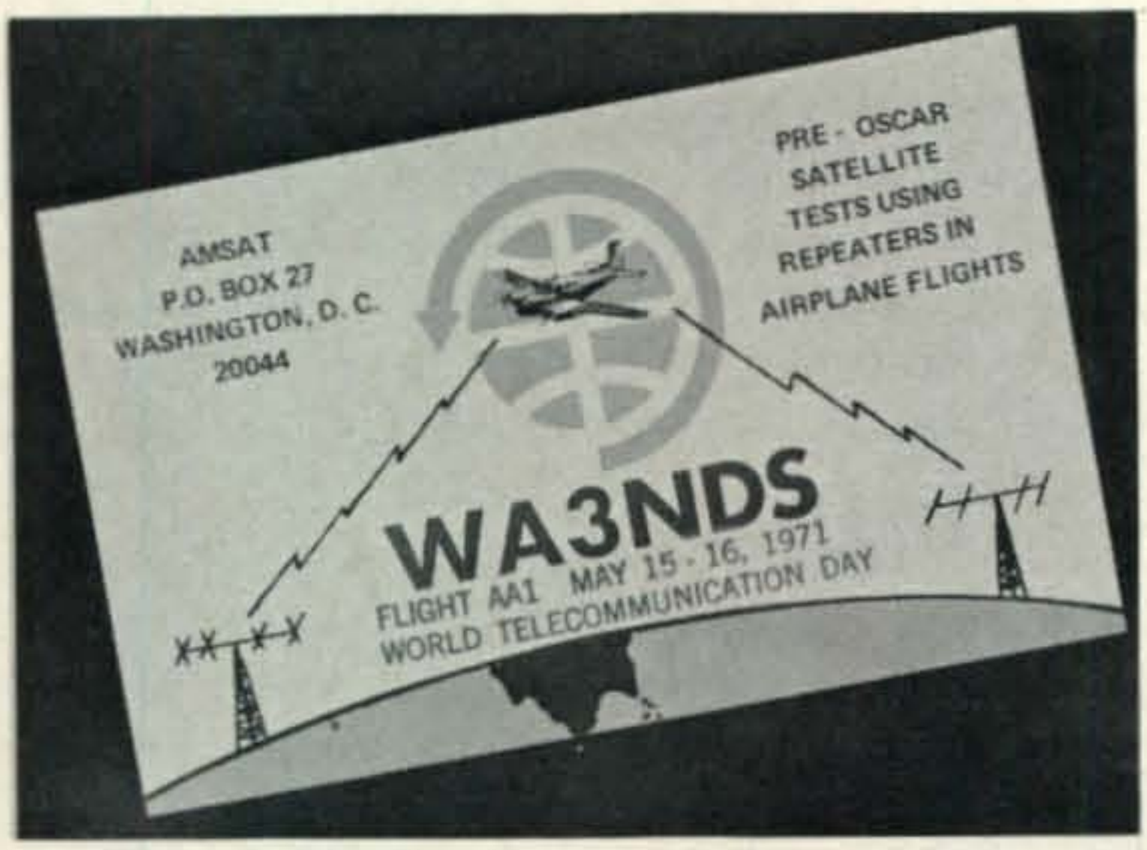
The repeater received signals between about 145.9 and 146.0 mc in the amateur 2 meter band, and converted them to 29.45 to 29.55 mc in the 10 meter band. A beacon signal on 29.45 mc enabled acquisition of the aircraft even when no signals were coming through the repeater. The repeater's power was limited to a 1/2 watt output into a quarterter-wave wire in order to simulate the level of signal that would actually have been received if the repeater were in a space orbit.

W3GEY, aboard the plane, reported hearing more than 100 amateur stations through the repeater.

Working through the repeater was no easy matter. For stations located more than 40 or 50 miles from the aircraft, high gain, multi-element antenna arrays were required on both 10 and 2 meters. The 10-meter down link signal was often so weak that c.w. was required for all but relatively short-range communication. While s.s.b. worked well



A close-up view of the 2-to-10 meter prototype AMSAT repeater successfully tested on board a special aircraft flight honoring World Telecommunication Day. The unit contains the repeater, the beacon transmitter and the command receiver.



Commemorative QSL card send to each station participating in the AMSAT flyover.

over short distances, the majority of participants reported disappointing results with attempts to use a.m. or f.m.

Among the more active stations participating in the tests were K1HTV who worked 10 stations and heard 2 others, including his own signals through the repeater; WB8ELK who heard 18 stations; WA1IOX on Talcott Mountain who worked 7 stations and heard 5 others; and WA9UHV who worked 8 and heard 7 other stations through the repeater.

A very interesting report was turned in by WA8LOW of Cincinnati, Ohio. He reported hearing the 29.45 mc beacon during the leg of the trip from Baltimore to Boston and when the plane was over New York State heading west. He heard 12 stations including K2SS (Long Island, N. Y.), W3 ZPO (Md.), K1HTV (Conn.), and his best DX, W1QXX in eastern Massachusetts. This last path was approximately 725 miles and took place while the aircraft was over New England. It probably resulted from sporadic-E propagation on 10 meters, and no doubt, the 24 element 10-meter array (4 stacked 6-element beams) installed at WA8LOW especially for the flyover helped also.

Air-to-ground liaison for the AMSAT flyover was provided by a special net operating on 7225 kc with WA1IOX at the Talcott Mountain Science Center, Avon, Conn., as net control. W8FSO was in contact with the plane during a good portion of its trip west across Ontario, as well as its flight east across Ohio and West Virginia. Check-ins to the AMSAT net totalled well over 100, and simulated the type of report-in operation that will be required when the next amateur satellite is launched.

[*Continued on page 100*]

A Rotatable Dipole for 20, 40 and 80 Meters

BY RONALD LUMACHI,* WB2CQM

I'd bet a dollar to a doughnut that a great many hams operating on the lower frequencies (40-80m.) would never attempt to rotate their half-wave dipoles. I wouldn't either if my antenna were 60-120′ long. It seems a shame it isn't done since a dipole antenna does have a great deal of directivity. It could be used to great advantage by hams especially when pulling in those weak stations. Cheer up fellows—it can be done—cheaply and inexpensively. By electrically lengthening a shortened dipole with a coil, the radio amateur can pick and choose those areas he wishes to radiate his strongest signal. Incidentally, this feature works equally well when receiving. Sound good? Why not build a similar system and pack away that long hunk of wire for a more compact design.

*73 Bay 26th Street, Brooklyn, N.Y. 11214

Antenna Theory

The antenna is made from two lengths of aluminum tubing in series with a length of Air Dux 2010 coil. By shortening an 80 meter antenna, for example, to 32′ it can then be easily rotated. All that remains is to re-stretch the antenna electrically by installing a suitable coil. An antenna of this design unfortunately exhibits a very high center impedance. This can be overcome easily by inductively coupling the antenna to the transmitter via a length of 50 ohm co-axial transmission line. The antenna also exhibits very high Q and consequently, narrow bandwidth.

Construction

Cut a length of 1¾" wooden pole (actually measures 1⅝") to 13". In each end, drill a 7/8" hole 3" deep. Use a brace and bit. One caution—have someone guide your boring so that the holes are parallel. Cut two lengths of 3/4" thick wood to 2¾ × 5". In each piece, drill a hole 1⅝" for the wooden pole to pass through snugly. Use a saber saw if an adjustable auger bit is not available. Cut the circle coil supports. Use the actual size template in fig. 2. Notch out the four detents using the rounded end of a file. When fitting the units to the coils, do not allow the wood to touch the coil windings. The wood should touch the coil only at its plastic supports. This is only a precaution since damp wood in contact with the coil may effect the frequency during rainy weather. Attach the two notched circles to their supports. Use a single wood screw at each end. Count off 45 turns and cut the coil at this point. Temporarily mount in position. Drill two 1/4" holes for the mast clamp.

It may be difficult to locate a "U" clamp sufficiently long to mount this unit to the mast. In that case, cut a length of 1/4-20 threaded rod 10" long. Bend it around the pole and install with nuts and lockwashers. The yoke clamp shown in the photo was salvaged from the scrap heap of the local muffler repair shop.

Cut lengths of 7/8" tubing to 16'3½". Shorter lengths of tubing may be butted to dimension by using hose clamps and two half shells. The shells are made from a 6" length of tubing slit lengthwise.

Drill a small hole 3½" from the end of the

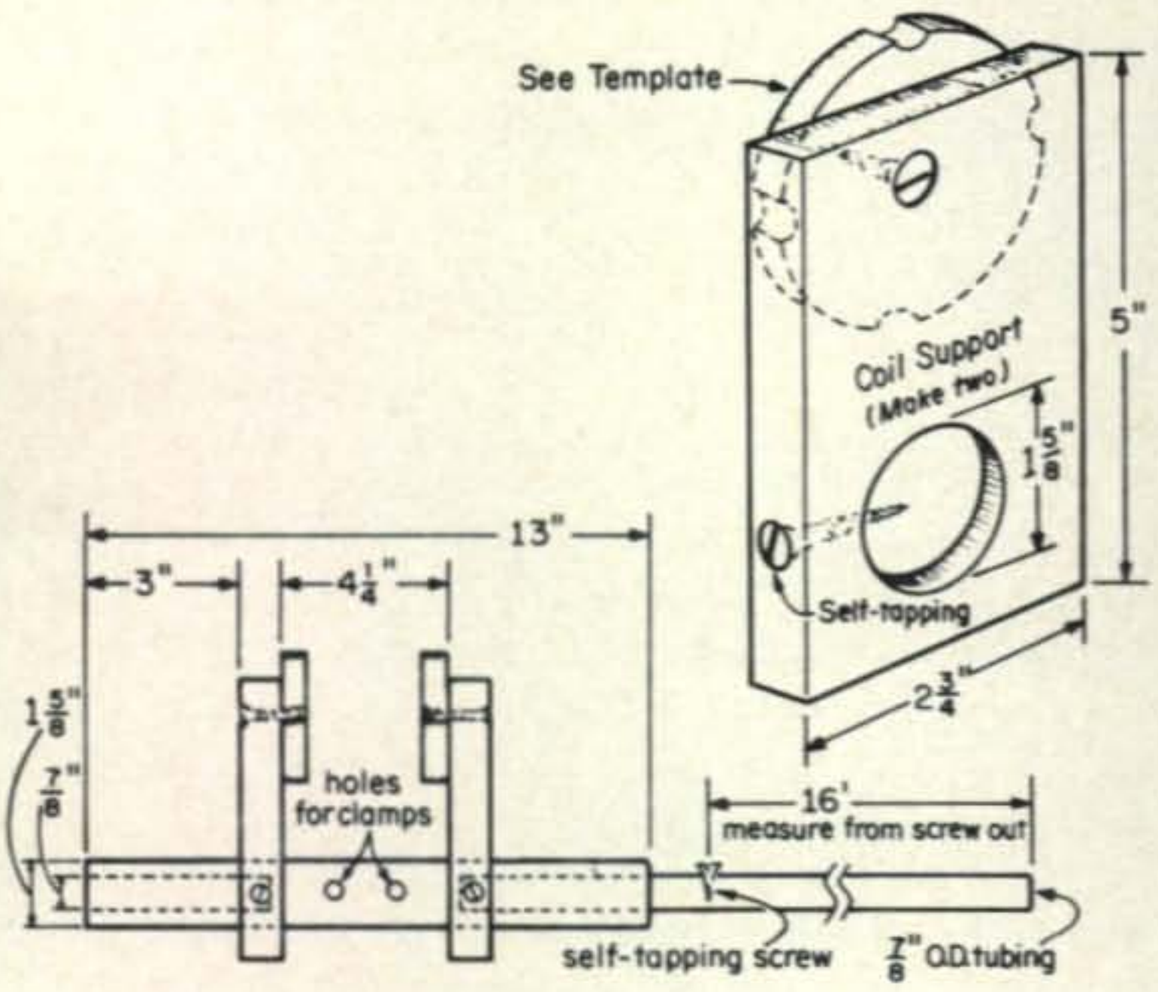
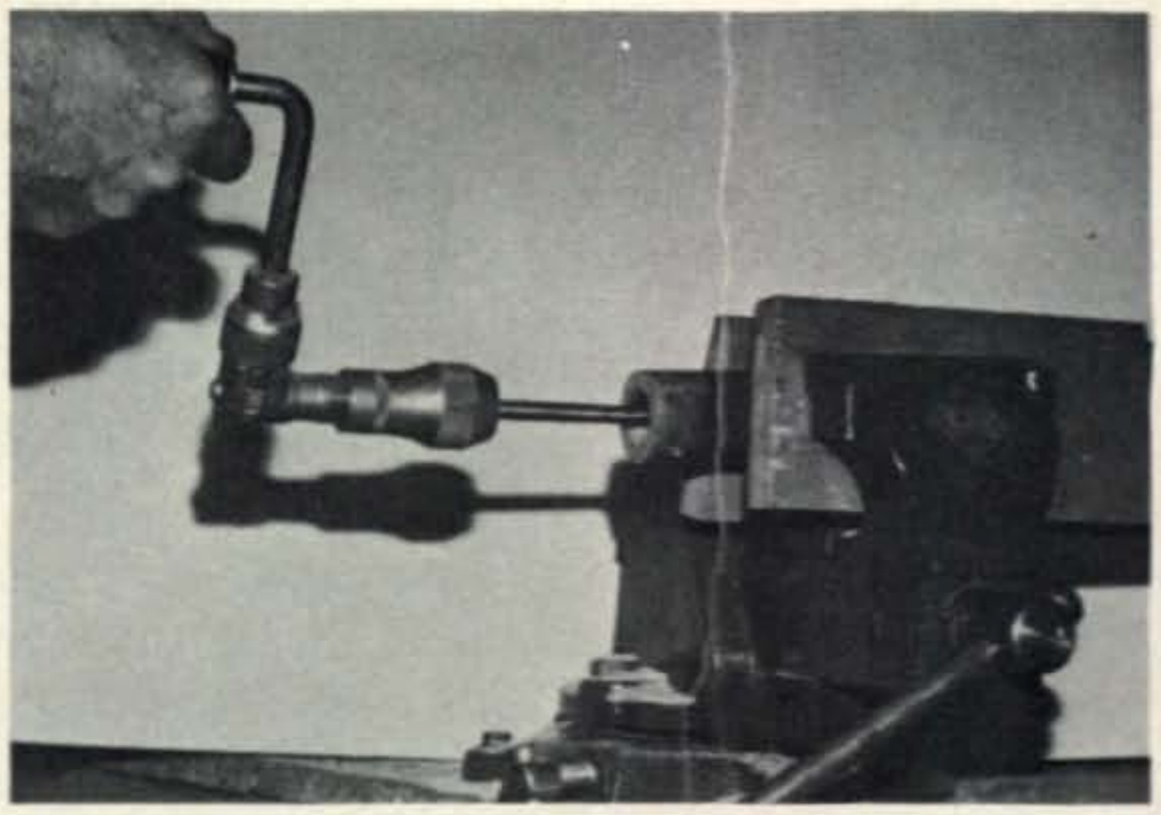
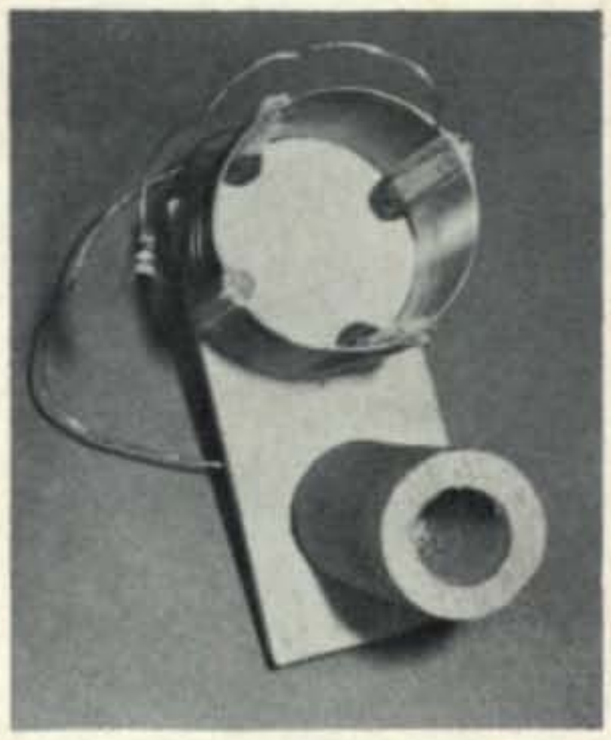
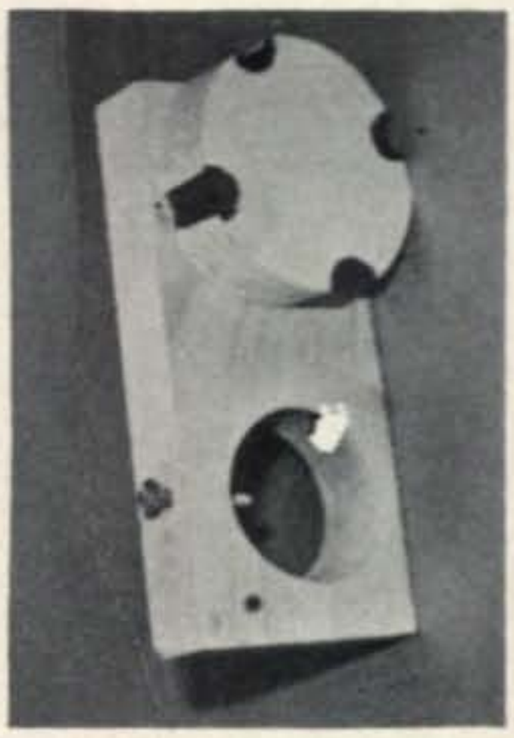


Fig. 1—Construction details of the loading coil support/center insulator for the rotatable dipole.

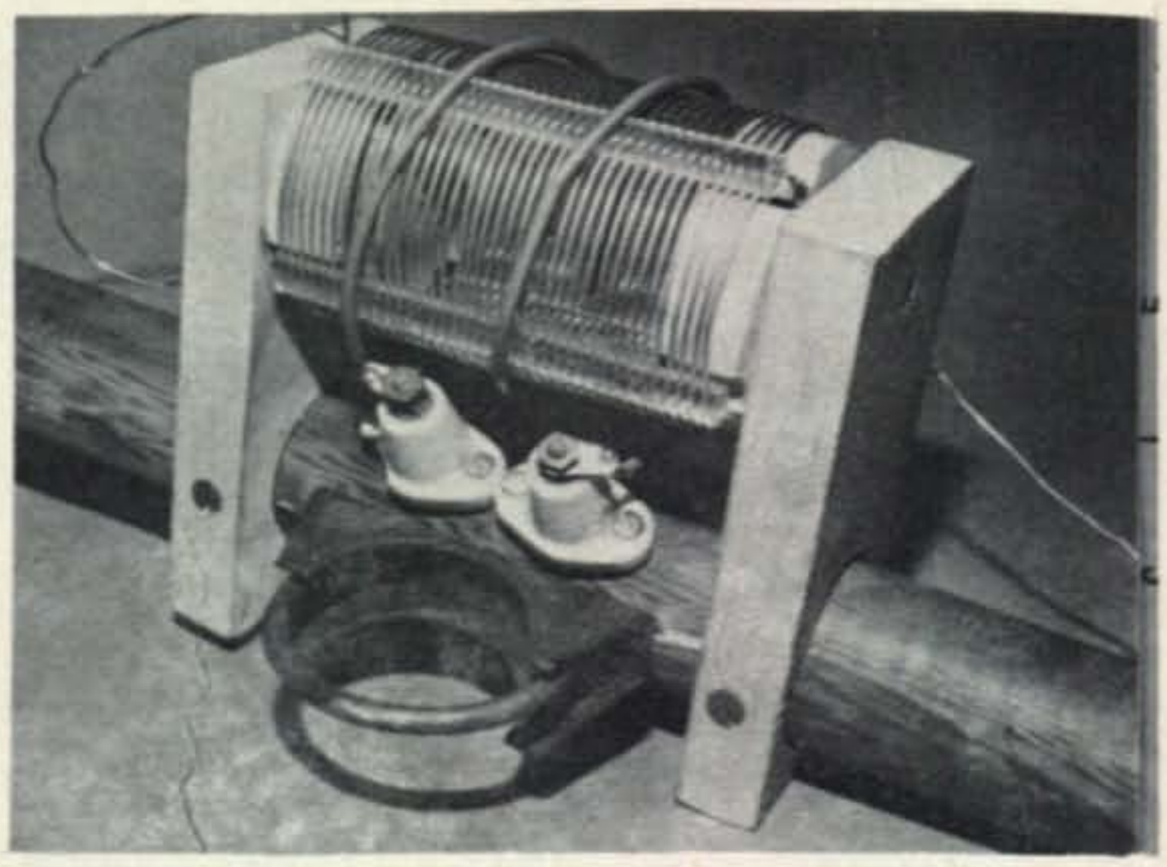


Brace and bit cuts opening for 7/8" o.d. tubing elements. Bore 3" deep parallel to the length of the wood so that the elements will be straight when installed.





The notched sections in the coil support circle are to accomodate the plastic coil spacers. The circle is attached to the support with a single wood screw. The wood screw in the side of the support projects through the wooden dowel and aluminum element. The other photo shows the coil in position on one half the support.



The completed coil assembly ready for the coax feedline to be attached. The coil end is connected to the self tapping screw out of view at the end of the dowel Coupling to the coax feedline is via a 2-turn link secured to porcelain insulators. The yoke on the mast clamp was salvaged from an old muffler clamp.

tubing. Start a self-tapping screw here. The ends of the coil will be attached at these points. The lengths of tubing should measure 16′ from this point. Drill two holes through each vertical support, dowel, and into the tubing. Use a self-tapping screw to keep the units in place. Install two porcelain stand-off insulators above the "U" clamp. Cut a length of #14 plastic insulated wire to length and wrap it 2 times around the coil. Connect the ends to the insulator's tie points. It is convenient to use solder lugs. Connect the center conductor and shield of RG-58/U cable (8/U for higher power) at these two tie points. Mount the mast. TV tubing is suitable. Use any light duty rotator for movement.

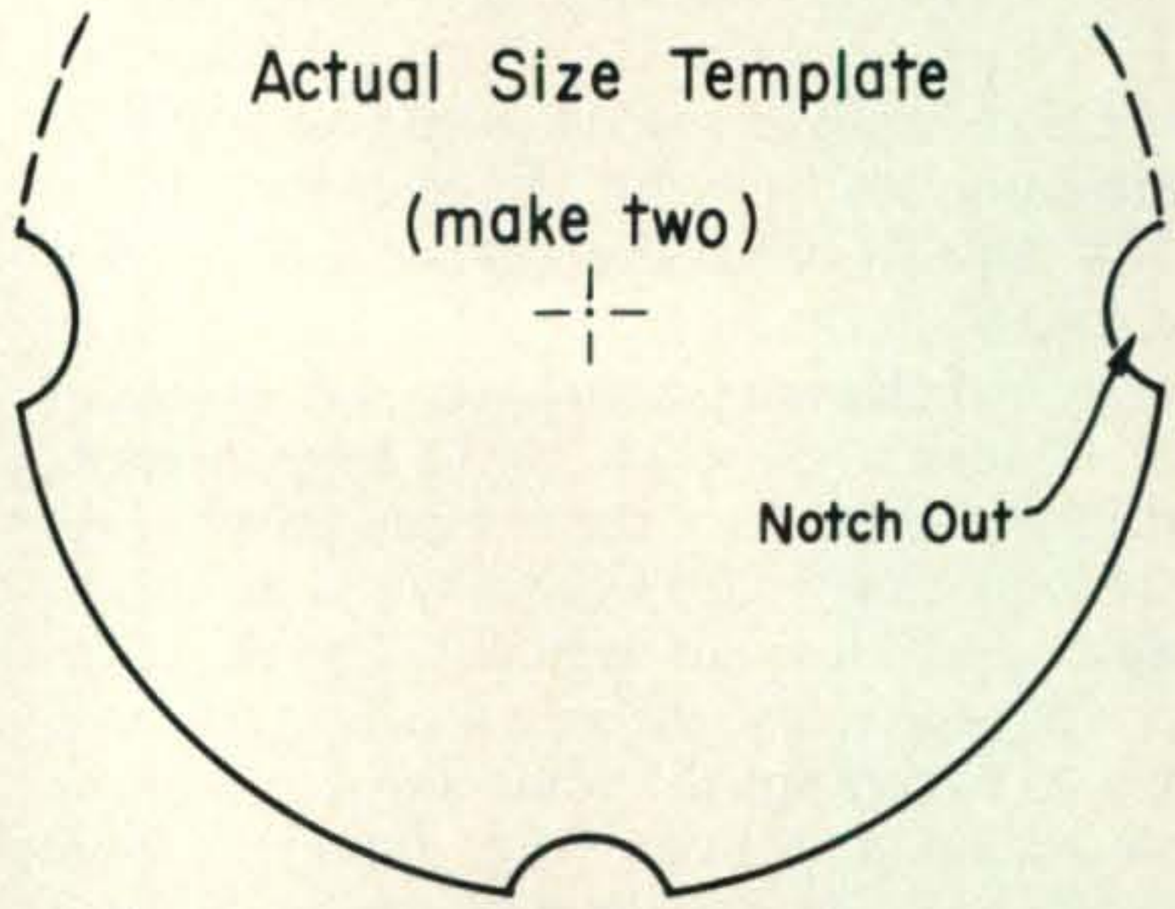


Fig. 2—Actual-size template for the coil supports. Two are needed. Material is 1/2" to 3/4" wood.

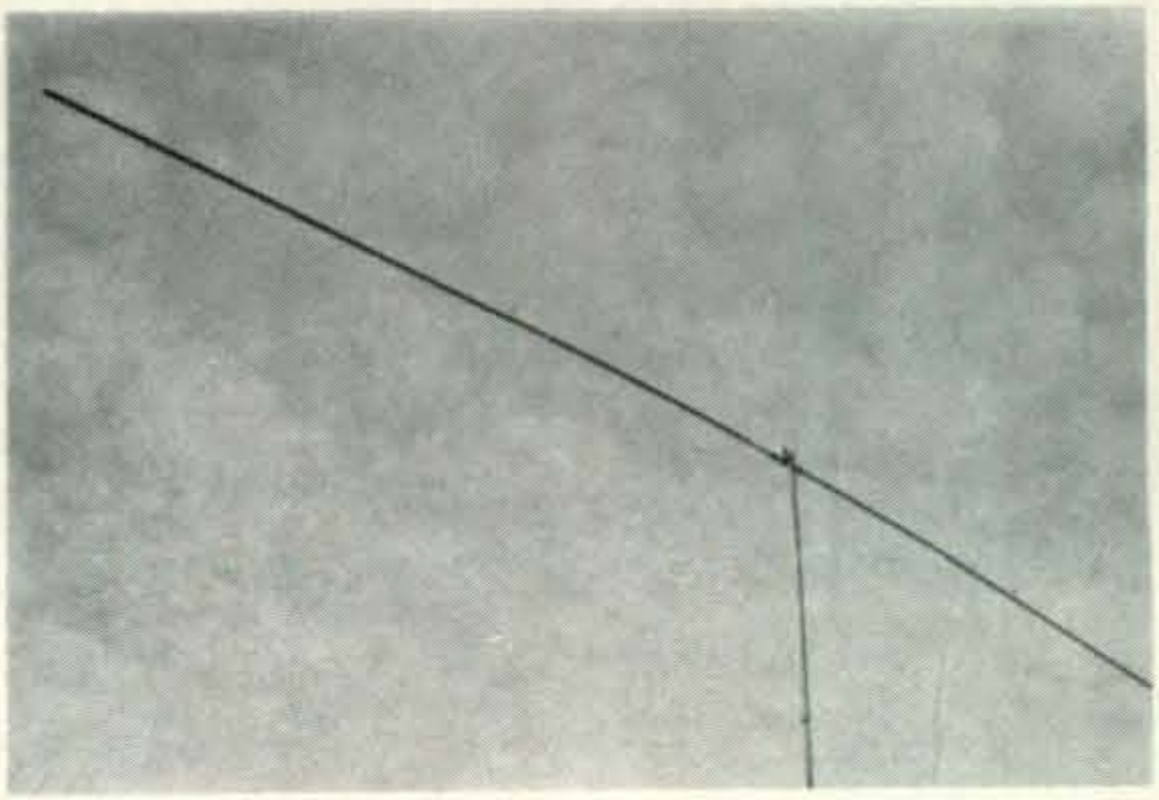
Final Assembly and Tuning

Several turns of coil have been deliberately left on the form. Since each antenna is different because of height above ground, final tuning must be made in the operating position. On 80 meters, height above ground is particularly critical. Begin tuning by connecting the ends of the coil to the element tie points. Short out turns of coil and strive for a low s.w.r. Once the resonant point on 80 meters has been found, the excess coil may be removed. Solder lugs to the coil ends and permanently attach to the tie points. Count off approximately 18 turns from one end and tune the 40m. band. A grid dip meter may be useful here. Otherwise, use the s.w.r. bridge. The inductive winding may be off center for the 40 meter operation, however, it does not seem to have any adverse effect. For 20 meter operation, remove the coil ends from the elements. Run a length of wire from the two transmission line termination points to the tie points on the elements previously occupied by the coil ends. When changing to any of the three bands· it becomes a simple matter to simply shift more or less coil into the circuit.

Although only one band can be operated at one time, the bandwidth, or that point of either side of the resonant frequency of the antenna, is reasonable. For any major change in 40-80 meter operating frequency beyond about 10 kc, readjust the coil taps at the antenna. For drastic changes on 20 meters either shorten or lengthen the tubing elements for minimum s.w.r.

The greatest signal will radiate from the dipole in a plane perpendicular to the broadside of the antenna. By rotating the array so that its full length faces the receiving or transmitting station, the greatest signal will be sampled. Signals to the rear of the antenna will be equally strong and directional; however, there will be a null area off both ends of the antenna. ■

Use 6" half shells with two hose clamps to join lengths of tubing to achieve the needed 16′ dimension.



View of the dipole in the operating position. Construction is very light; consequently it can be rotated even with light TV rotators. For 20 meter operation the coil is removed. The 32′ elements will then resonate on 14.350 mc.

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A Cheap 10 Meter Vertical

BY WILLIAM E. LaFARRA,* W5ZCC

PERHAPS one of the best antennas to come from the CB buildup was the 1/2 wavelength vertical, commonly called the "Super Magnum." After the CB boys tested the 1/4 wavelength drooping ground plane, it was obvious something was lacking. Working with limited power called for something more powerful and potent to lay that base station along the ground, mainly to work the mobile units as far as possible. The half wavelength and 5/8 wavelength antenna meet this requirement by getting the signal to a lower angle. From the amateurs standpoint, especially on the higher bands, that is what he hopes to accomplish.

We have been hoping to get our hands on some of the good antennas designed for CB'ers. Frequency wise they are next door to 10 meters so they can be very easily converted to ten meter operation. Unable to get any of the local CB'ers to part with their "Super Magnum," we decided to try our hand at a homebrew job utilizing electrical conduit from an old beam.

Conduit is a readily available item, and the homebrewer shouldn't have any trouble obtaining it from an electrical supply house. It is also relatively inexpensive and comes in 10 foot lengths. For a half wave on 10, 20 feet will be needed. One-half inch tubing will telescope inside 3/4 inch nicely. These pieces are strong enough to be self supporting. Aluminum tubing would be lighter, easier to work with and preferable, if available.

*P.O. Box 43, McGehee, Ark. 71654

Construction

Use a ten foot section of 3/4" for the main support and first 10 feet. Inside we telescoped the ten foot section of 1/2" conduit with about 6 feet protruding. This gave us the 1/2 wave length section of 16 feet calculated from the formula:

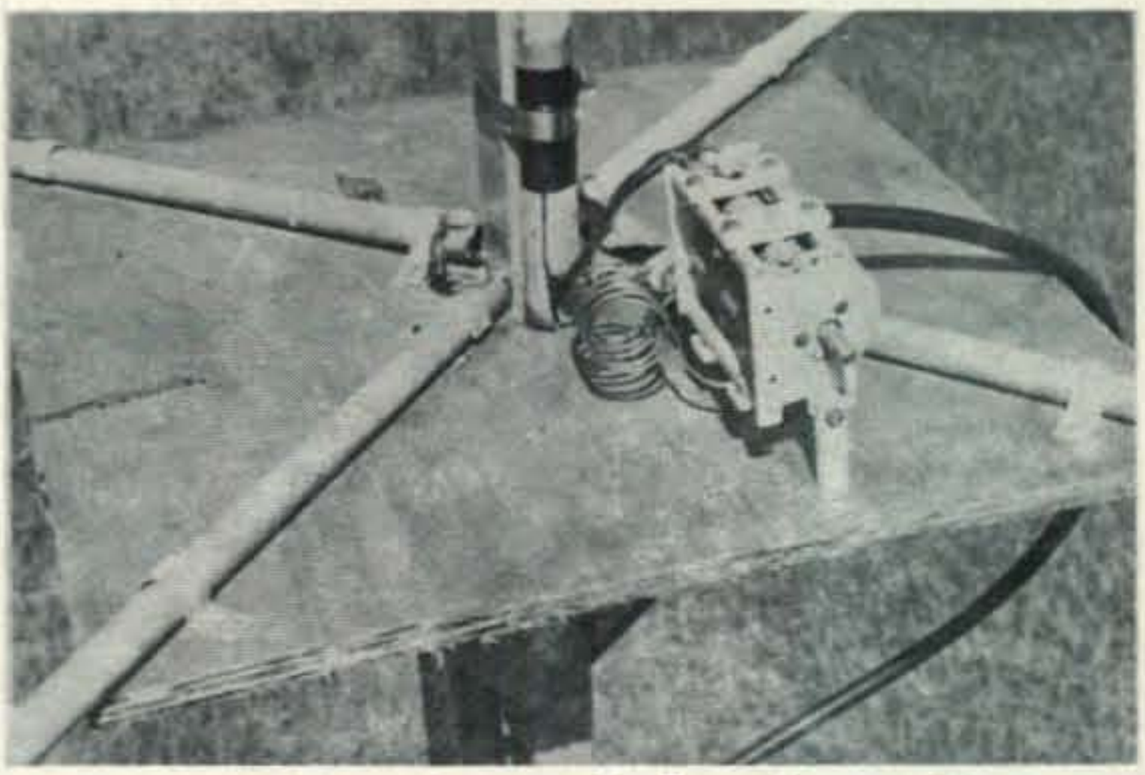
$$I = \frac{468}{28.6}$$

We looked for a simple support and selected an all wooden approach. This proved easy to fabricate and was durable enough to stand the weather.

An eighteen inch square sheet of 3/8" plywood was used for the radial support. This square was braced with 9 inch triangular pieces of 3/8" plywood fastened to a 5 foot piece of 2-by-2. The 2-by-2 was used to clamp to the TV mast and the 2½ feet of 2-by-2 projecting through the 18" center piece was used to support the tubing. Stand-Off insulators here would make a nice job, but since I found none in the junk box, I used Scotch electrical tape at the support points and utilized adjustable pipe or hose clamps to hold the tubing. Fastening the 2-by-2 to the TV support mast was also accomplished with pipe clamps.

We first cut our 18" square piece of ply-

The 18" square plywood base is fastened to the 2-by-2 vertical strut with 9" plywood triangles. The entire assembly is glued and wood screwed together, and then heavily varnished for weather protection.



Close-up of the base of the cheap 10 meter vertical antenna showing mounting of radials which are strapped together at the antenna end using copper braid. Conduit clamps are used to anchor the radials to the 18" square plywood base.

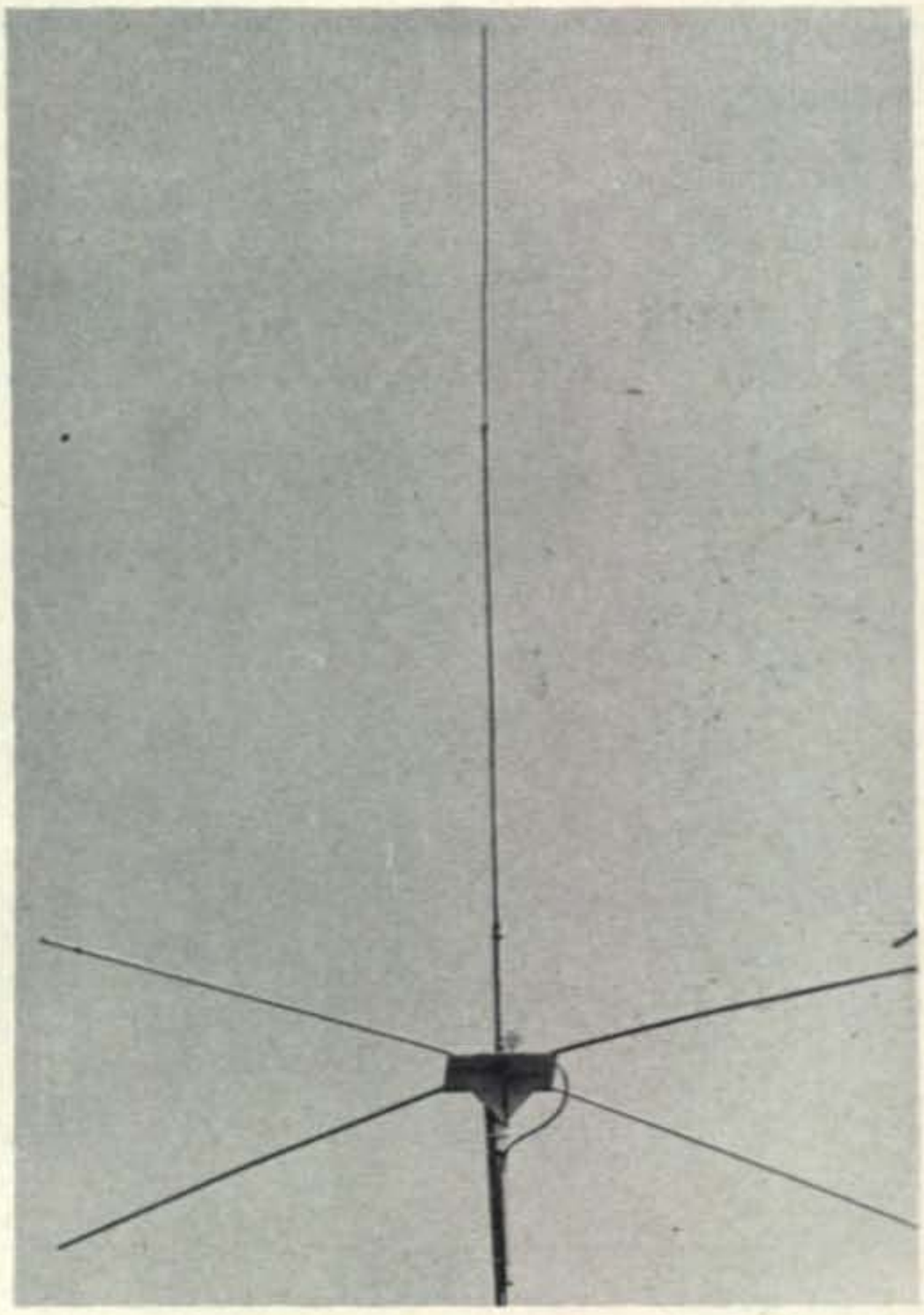
wood and found the center. At this point we cut a hole to make a tight fit for the 5 foot 2-by-2 pole. Then we cut the 4 nine-inch triangle pieces. These were mounted around the 2-by-2 pole about half way and the 18" square piece was pushed down until it rested on the triangular pieces. Using glue and wood screws the assembly was fastened solidly and then heavily varnished against the weather.

For a ground plane we used 4 pieces of 1/2-inch conduit cut to 8 feet, (not critical). Each radial was mounted radiating from a corner of the 18" square plywood, with the ends abutting the 2-by-2 center piece as shown in the photo. Using conduit clamps these were fastened to the plywood. The whole assembly was secured to the TV mast using hose clamps around the 2-by-2 footing sticking from the bottom. This assembly can now be handled like a TV antenna.

Mount coil and capacitor assembly on the 18" square plywood. A plastic cover will give more protection. Connect one end of the tuned circuit to the antenna. The other end of the coil capacitor assembly is joined to the coax shield and all four radials are connected to this point. The center lead of the coax is connected approximately one full turn from the same end as the shield.

Tuning

You are now ready to select your preferred operating frequency. Feed low power to the antenna from your exciter through an s.w.r. bridge, or use a small neon bulb; resonate the coil and capacitor to the transmitter frequency by touching it to the antenna end of the coil. Rotate capacitor; when resonance is reached the neon bulb will light. Do not touch the tuning until you have adjusted the coil for lowest s.w.r. at which you might repeat the resonance adjustment. Check s.w.r. Move the tap up or down the coil until the lowest s.w.r. reading is obtained (not necessarily 1 to 1, just the lowest reading). Adjust the physical length of the antenna with the telescoping section, a few inches at a time, until the lowest s.w.r. reading is reached. Now, recheck other adjustments. You may secure tubing with clamps or self tapping screws or utilize both methods. If the coil arrangement is used without the capacitor the same procedure is covered with the additional adjustment of the coil's total length to achieve the lowest s.w.r.; first adjust the coil, second the antenna length, third the tap on the coil.



Overall view of the cheap 10 meter vertical.

Results

Our main purpose for this type of antenna was to work 10 meter mobiles. The vertical is a necessity for this mode; however, we found no trouble in working across the pond and received S-8 to S-9 reports from several European countries. The ham without a ten meter antenna might consider the merits of the 1/2 wavelength vertical for this band utilizing this inexpensive arrangement. ■

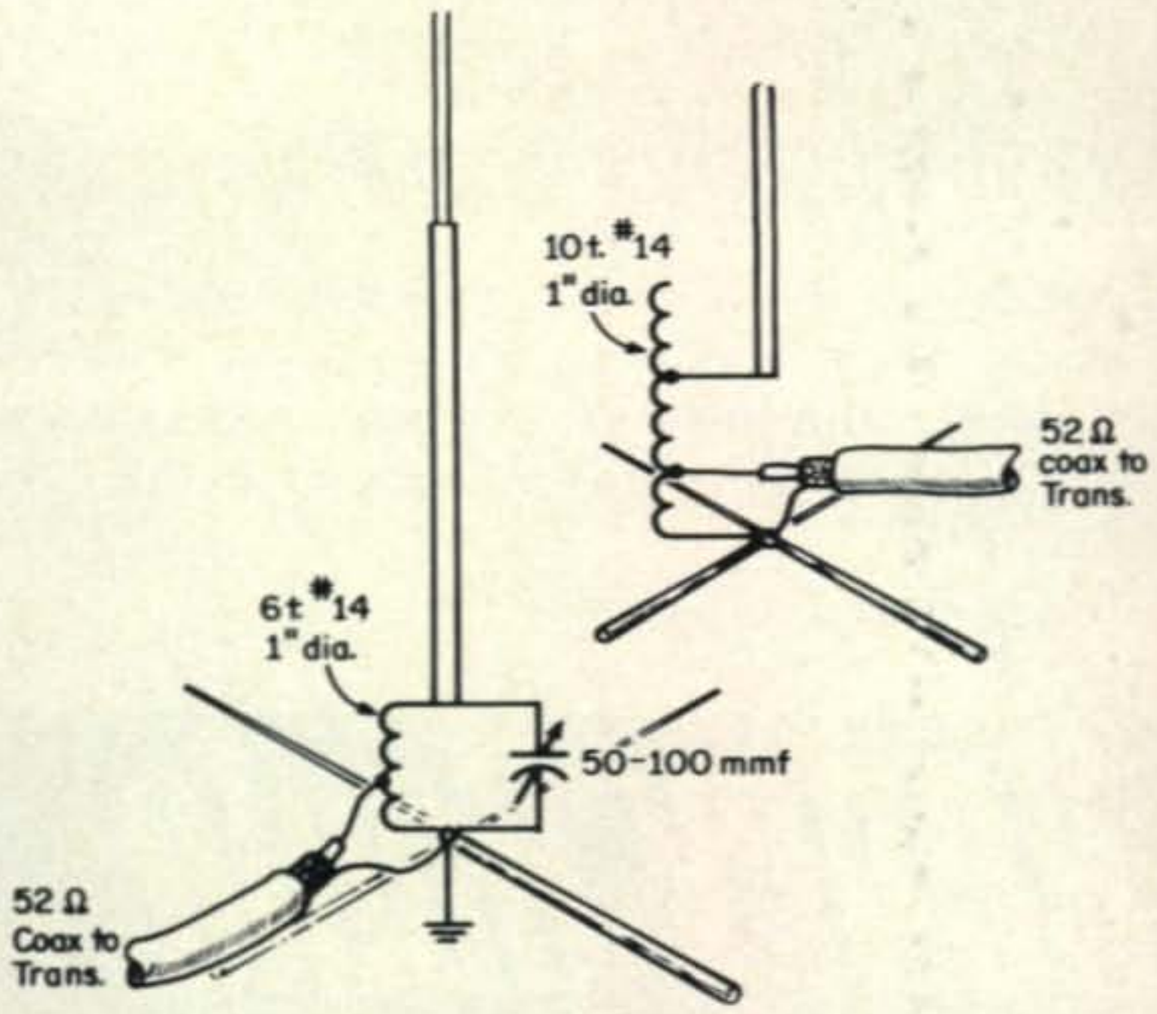


Fig. 1—Two systems of matching the 10 meter vertical to 52 ohm coax feedline. The parallel-tuned circuit is easier to adjust, but tapping down the coil is just as efficient.

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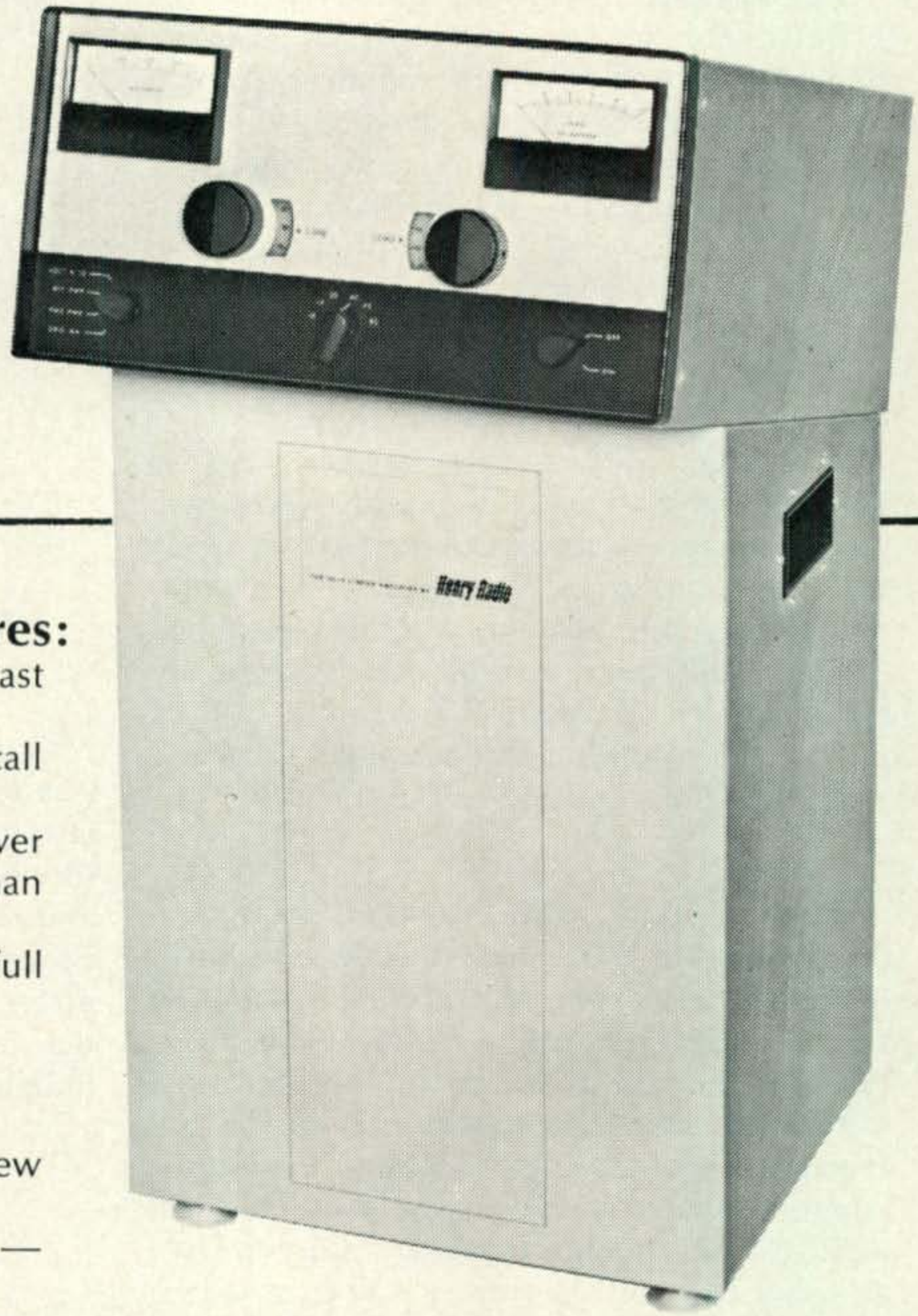

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BY GLEN E. ZOOK,* K9STH/5

LABOR Day is rapidly approaching, and with it the end of summer. The kids are back in school, and vacations are over. Obviously it is time to begin preparing the repeater for winter. Antennae, feedlines, and similar items should get special care, for they will get the brunt of the winter weather. Any weak points in the system should be carefully analyzed and improvements made (if possible). During this preparation for bad weather another item should be looked at: Balancing the transmitting and receiving ranges. During the Spring and Summer months I had an opportunity to use many repeaters and hear many others. Unfortunately, many repeaters are "alligators" (big mouths and little ears). That is, the transmitting range of these repeaters extends considerably beyond the usable receiving range.

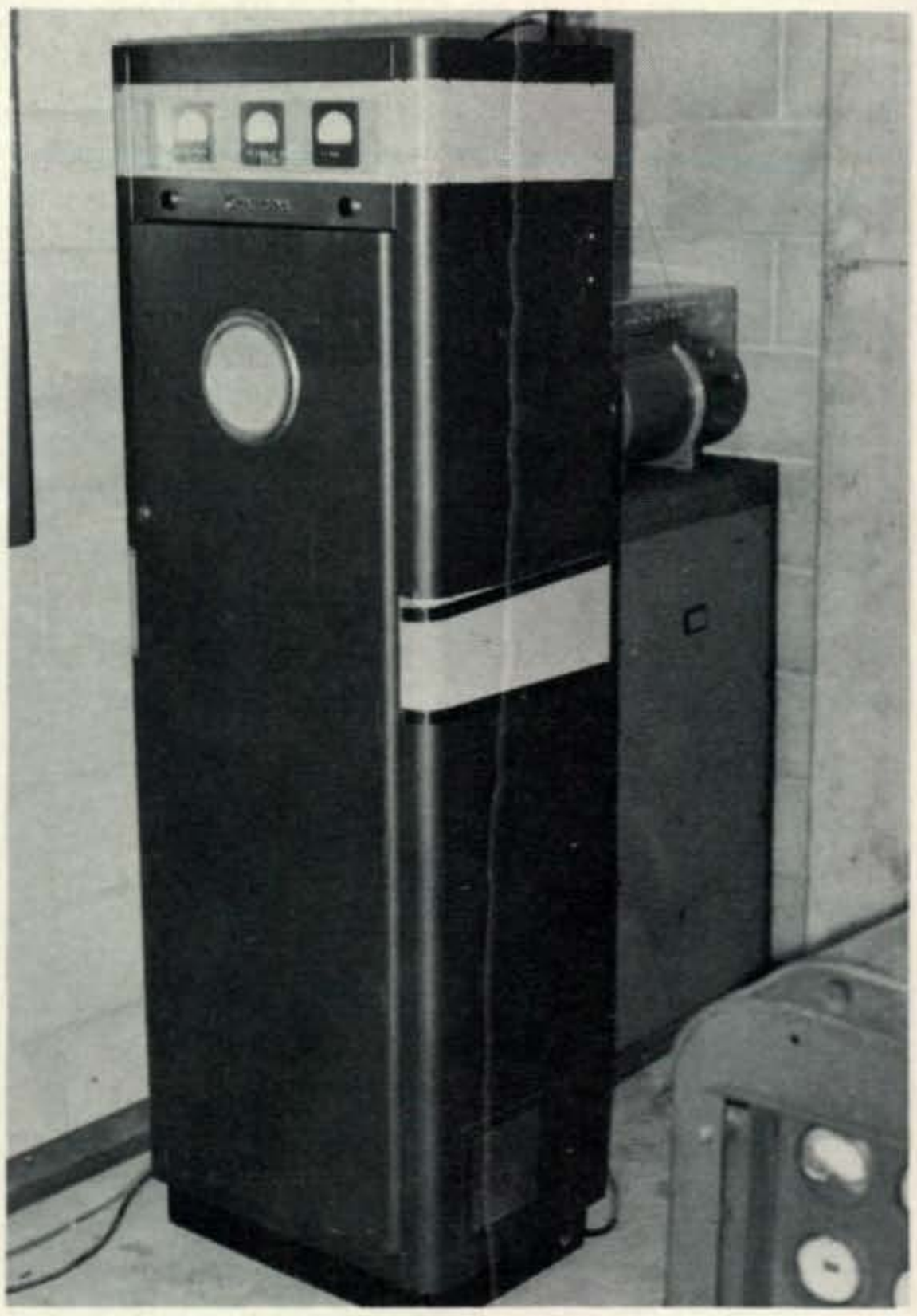
Such an unbalance is often due to the old repeater problem, desense. This desense can often be reduced simply by reducing the transmitting power. This reduced power can extend the receiving range, and with a little effort, the ranges can be brought into proper perspective. Another help is separating the receiving and transmitting antennae (in the vertical plane) even further, with the receiving antenna on top.

Balancing the repeater system requires use of a standard rig. Of course power outputs range from under one watt to over one hundred watts. Fortunately, receiver sensitivities for 20 db quieting are normally in the neighborhood of 0.5 microvolts. Thus, receivers will hear just about the same distance (depending on antenna used and absolute sensitivity of the individual receiver). So, the problem in balancing lies with transmitter power output of the mobile units. Repeater owners and operators with whom I talked with seemed to agree that the 25 to 30 watt output commercial rigs are the units to design the system around. Thus, the 10 watt ham-only rigs will hear the repeater a little sooner than they can hit it, and those of us running over 25 watts output will hit the repeater a little before hearing it. Of course gain antennae and receiver preamps will alter this a bit.

When the system is balanced there will be cries of despair from those amateurs who have let their receivers degrade. This is quite a problem in areas running high power output repeaters. These operators are happy as long as they can hear the repeater, and thus do not keep their equipment up as well as they should. However, within a few weeks these individuals will have upgraded their receivers to normal specifications, and all should be well again.

Why bother to balance the system? Well, a repeater that blankets a frequency in areas in which it cannot be used is a nuisance, not a benefit. This is especially true for repeaters with outputs on normal simplex frequencies such as 146.94 mc. When a repeater blankets a frequency in a given locality, but cannot be used by mobile stations, much animosity often results.

Three repeaters which seemed to be well balanced for my mobile equipment were the Louisville, Kentucky, Indianapolis, Indiana, and the Ft. Worth, Texas. The Louisville and Ft. Worth repeaters are .34/.94 machines, and the Indianapolis is .34/.76. Of course I live with the Ft. Worth repeater, so know its characteristics relatively well. The other two repeaters could be hit within about one mile coming and going from the spot at which it was heard. Both machines are running less than twenty watts output! The Ft. Worth machine is much different, but the



The interior of the emergency generator room atop Stone Mountain near Atlanta, Georgia. The unit is the Atlanta .34/.76 machine.

*818 Brentwood Lane, Richardson, Texas 75080

The diplexer for the Atlanta .34/.76 system is on the bottom and the voice id machine is on the top. The unit operates from Stone Mountaine Memorial Park near Atlanta.

installation is such to provide excellent desense characteristics because of vertical separation of antennae and great heighth in respect to the area served.

So, fellows, lets balance those systems, and keep the f.m'ers in the outlying areas our friends.

One of the bright spots during my travels was the Atlanta, Georgia, .34/.76 repeater. This repeater has received much adverse publicity, principly because of the treatment of transient operators. Since I used to live in the Atlanta area, and visit the area often, I can honestly say that the criticism was justified. However, the parent organization has been reorganized with an emphasis placed on being an open repeater and good treatment of transients. As a result, the morale and attitudes are the best I have seen in years. So, everyone remove Atlanta from their blacklists.

One thing further, when going through a new area always announce what frequency you are listening to. Persons transmitting on 146.34 and receiving on 146.94 are often a problem in the East and Southeast where repeaters output on 146.76. The same goes for the .34/.76 operator who goes through areas with .94 outputs. By announcing the receiving frequency, a local can call you and let you know what frequency the local repeater is on. Well, enough opinions for now.

Technical Talk

Last month I promised two construction projects to make up for the lack of one in August. Well, the first is a continuation of the test equipment discussion, a universal control head. The second was submitted by F. T. McAllister, W8HKT, and consists of a simple, but effective, single tone ("tone burst") encoder.

A universal control head is a simple, useful bench test item which allows many types of mobile units to be operated from a single set of controls. Basically it consists of an off-on switch, a pad type volume control, squelch control, and multiple frequency switch. By plugging in various control cables which mate the desired mobile unit, mobile units can be easily bench tested.

The reasoning behind use of a pad type volume control lies in the fact that some units have a fixed internal volume, others have a built in d.c. volume control, and others have a d.c. volume control in the control head. The pad type volume

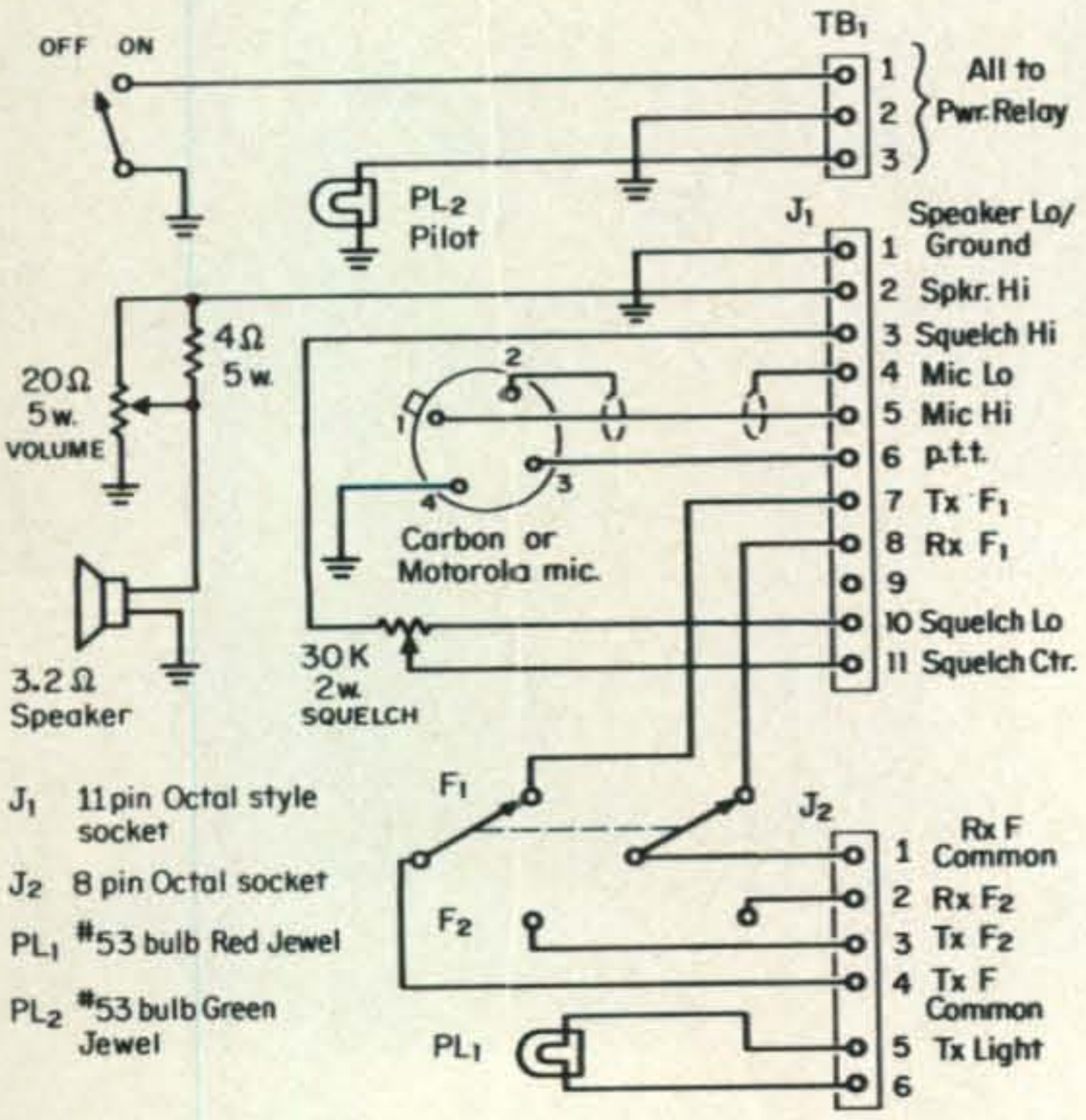


Fig. 1—The basic control head.

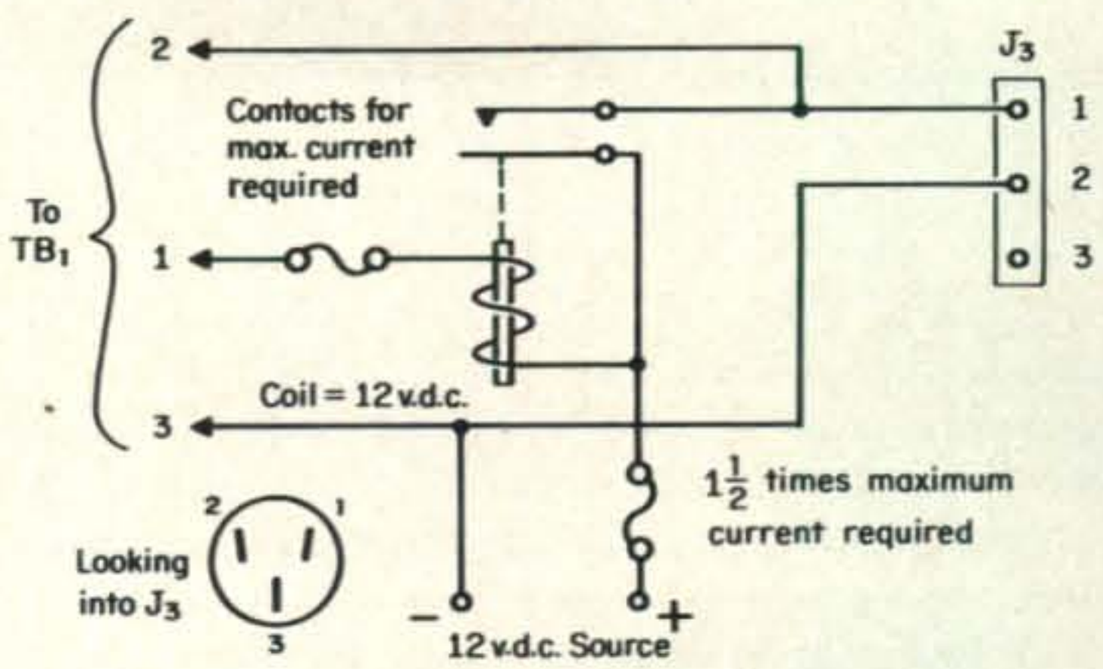


Fig. 2—Power relay connections.

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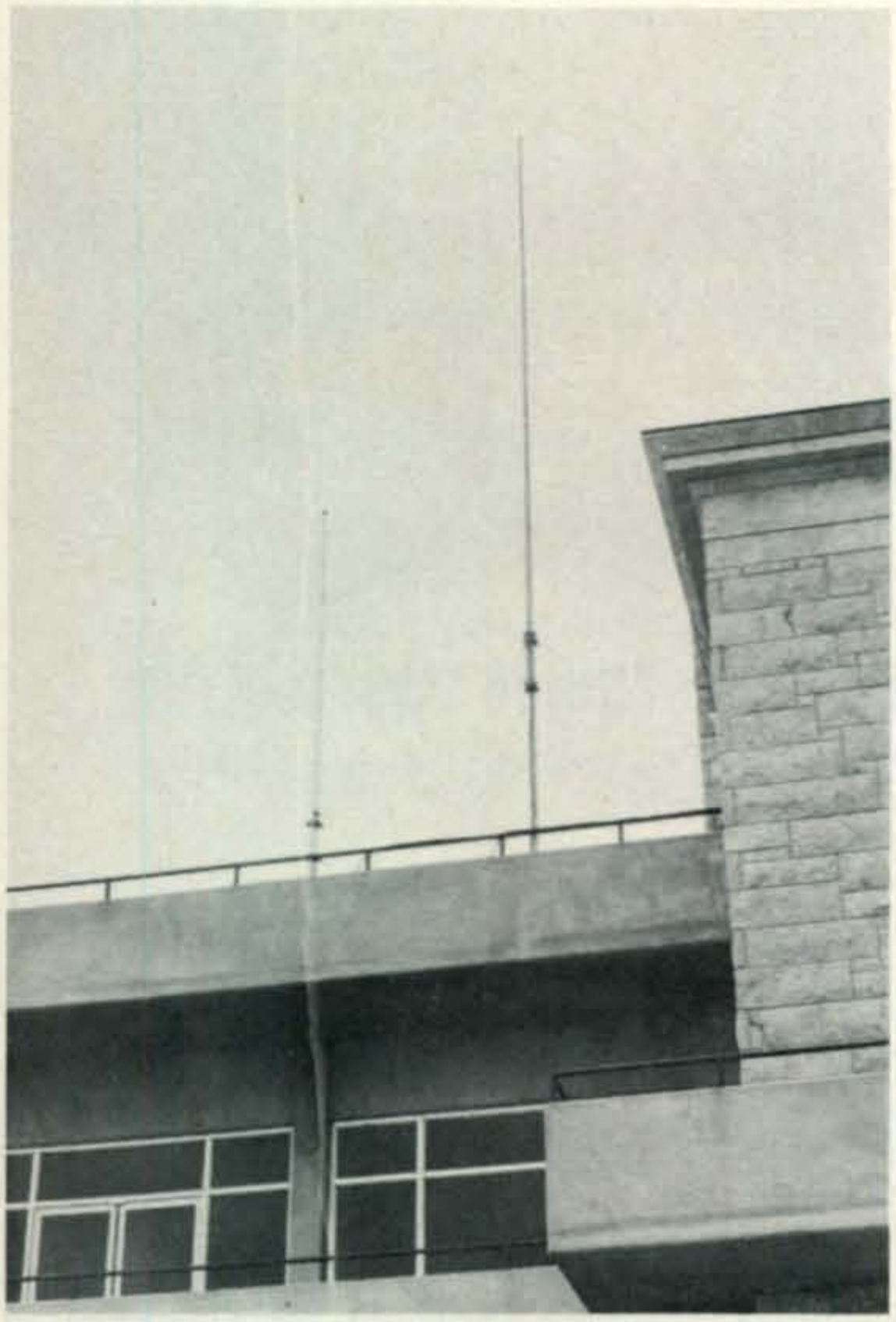

The antenna system for the Atlanta .34/.76. The short antenna is for 450 control. The long antenna has 6 db gain for 2 meters.

control will allow the speaker volume to be varied without affecting the setting inside the receiver. In the case of units using an external d.c. type volume control it can be simulated by using two resistors each with a value 1/2 that of the original volume control. This results in a "half" volume setting. See the schematic of the Motrac cable for an example.

By making cables to match the units normally used in an area, one can easily service the units. Old cables can be utilized, or new one constructed depending on circumstances.

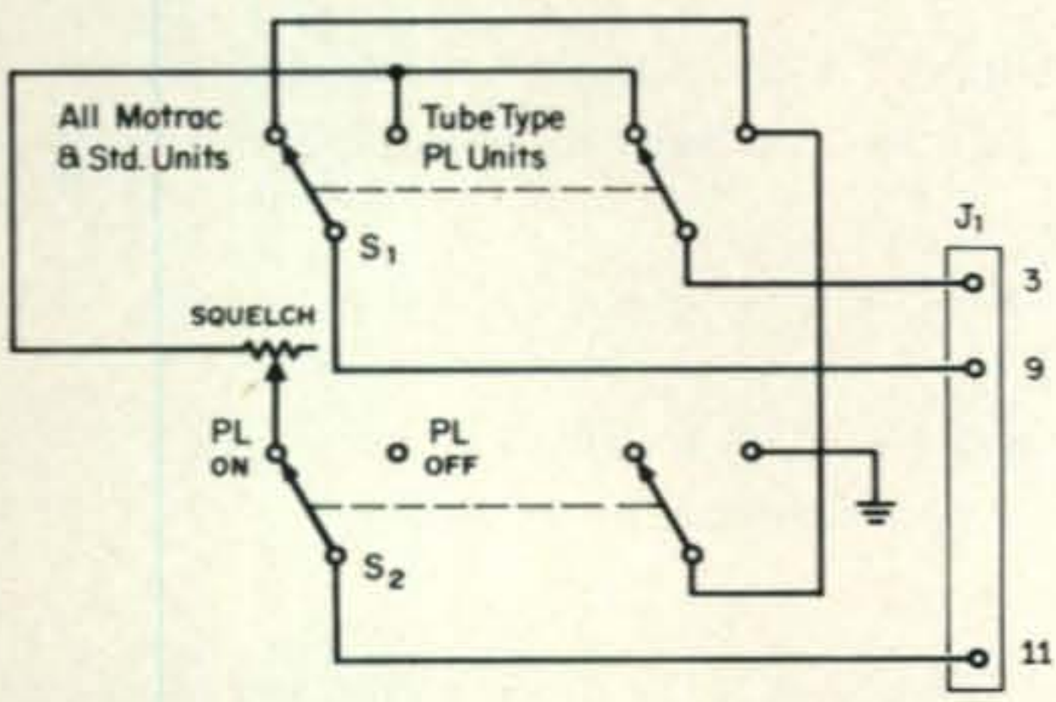

Fig. 3—Optional "PL" capabilities. Make sure that the switch is in the correct position before applying power. "PL" switch must be in off position for squelch to work on std squelch units.

The d.c. power connector used in the example is the connector often used for 220 v.a.c. clothes-dryer connections. These connectors are polarized, which prevents reversing positive and negative connections (which results in disaster when servicing transistorized equipment). Also, these connectors are available at nominal cost from most hardware stores. Since these connectors were designed for high current continuous use, they work out very well for the d.c. requirements of even 140D equipment.

The remainder of the universal control head description consists of schematics of the head and various cables. By matching the control points with the intercabling of other units one can make up any combination desired. Construction is not critical, and any convenient box, chassis, or panel can be used for the head. The OFF-ON switch controls a relay, which in turn controls the d.c.

The tone encoder is a transistorized version of the old Motorola P9301 series encoder. W8HKT claims no orginality, but his contribution is greatly appreciated. Basically the unit uses an 88 mh telephone loading torroid (familar to RTTY operators). The capacitor labeled "C" sets the basic tone. The exact value will have to be determined experimentally, but starting values are given. For multiple tone possibilities, the switching arrangement is used. This places additional capacitors in series with "C", thus reducing the effective capacity and raising the tone. The 0.15 mf capacitor may be changed to vary the tone duration. As set it is about 1/3 second. By the way, I suggest that you use paper capacitors rather than mica for maximum frequency stability. For a complete explanation of this see the *New RTTY Handbook* published by

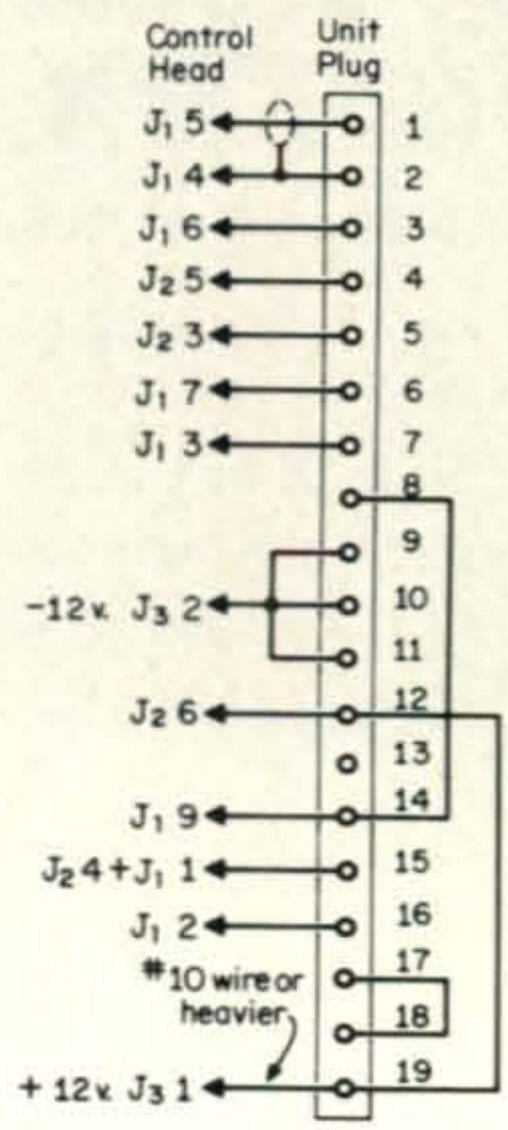

Fig. 4—Motorola 10" 6/12 v.d.c. vibrator units and 10" "T Power".

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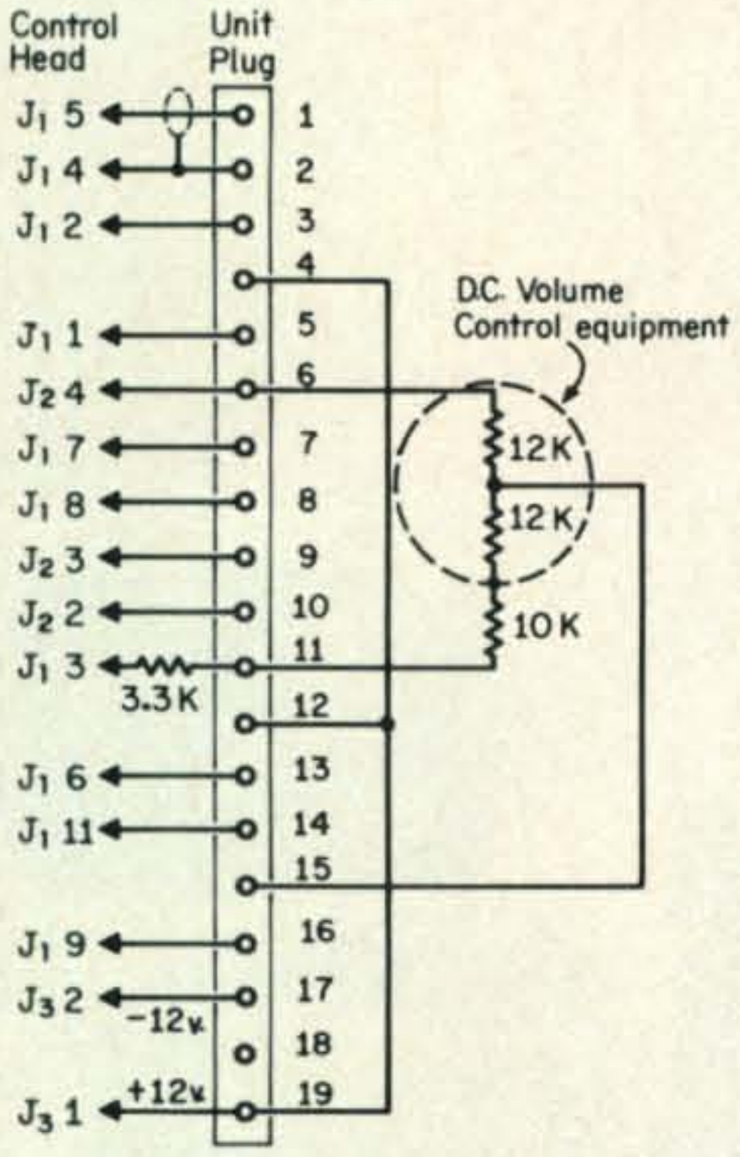

Fig. 5—12v "Motrac".

CQ. No schematic is provided, only a reduced drawn in. It is a simple matter to trace the schematic if the circuit board is not used. The unit is keyed by applying A+ (6 to 12 v.d.c.). This can be obtained from the transmit light on most control heads. The tone duration can be changed easily by grounding point X (for about 1/3 second duration), by leaving it open (for about 1 second duration) or by applying A+ (for continuous tone, ideal for initial setting of tone freq). Full size of the board is 138% of dwg.

Southeastern F.M. Convention

This columnist was privileged to speak at the Southeastern F.M. Convention held 22 and

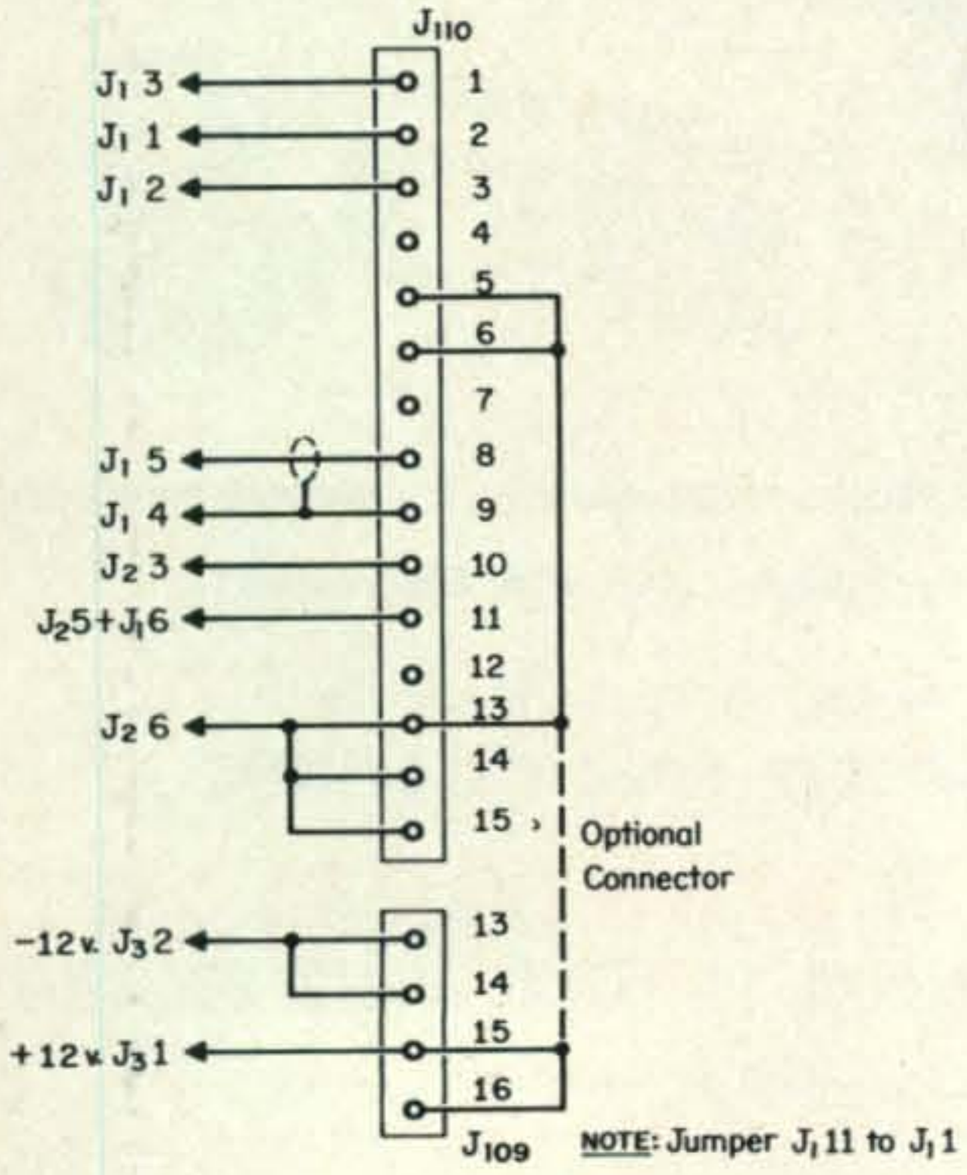

Fig. 6—12v G.E. ES12, ES17.

23 May in conjunction with the 25th Orlando Hamfest. This meeting is one of the largest, if not the largest, f.m. Meetings in the Southeast. Although an exact count of persons present at the meeting is not available at this writing, I estimate over 120 were present, and many others could not find space in the room provided. The principle meeting was to conduct business of the Southeastern Repeater Association (SERA). Previous to the Orlando meeting the organization consisted of member repeater groups from Florida. However, the Orlando meeting marked the expansion into a true Southeastern organization with the acceptance of the Atlanta .34/.76 repeater group.

Besides myself, Mike Van den Branden (along with Art Householder) was present to plug his new commercial/amateur f.m. magazine, to be called *rpt*. Also, many f.m'ers from around the Southeast were present. Unfortunately the number of f.m'ers present was more than the Jamaica Room (provided for the meeting) could hold. As a result, next year's meeting may have to be held in other quarters. It looks like the expansion of amateur f.m. is going great guns in the Southeast. If you are planning on a Florida vacation next spring, I suggest that you make it to coincide with the Orlando Hamfest to get in on an excellent f.m. meeting.

News

The Rome, Georgia, .34/.94 repeater has a 2100 c.p.s. tone instead of the 1800 c.p.s. previously reported. Also, Rome has a 146.46 mc open input for general use and auto-patch. Birmingham, Alabama's .34/.94 machine is working very well, and a second .28/.88 machine is also operating. Atlanta, Georgia, now has .28/.88 and .22/.82 as well as the .34/.76 machines. St. Louis is working out very well on .34/.94, and Durant, Oklahoma, has joined the ranks of .34/.94 in the Southcentral area. Ardmore, Oklahoma, is on .46/.94. The Chattanooga, Tennessee, .34/.94 machine is doing a good job from Signal Mountain, but the mountainous terrain does present some problems.

Some corrections to Canadian repeater frequencies were received from VE7AZG. Believe it or not, I have information from four Canadian sources, and the information differs. How about hearing from f.m'ers in each province about what is going on. The repeater corrections and additions for VE7 (B.C.) are as follows:

City	Input	Output	Call
Chilliwack	147.33	146.58	VE7ELK
Kimberly-Cranbrook	146.34	146.94	VE7CAP
Nelson	146.46	147.33	VE7BTU
Prince George	146.58	147.33	VE7AFG
Trail	146.34	147.33	VE7CAQ
Vancouver	146.34	146.94	VE7RPT

Q & A

Q. Is there any modification which can be

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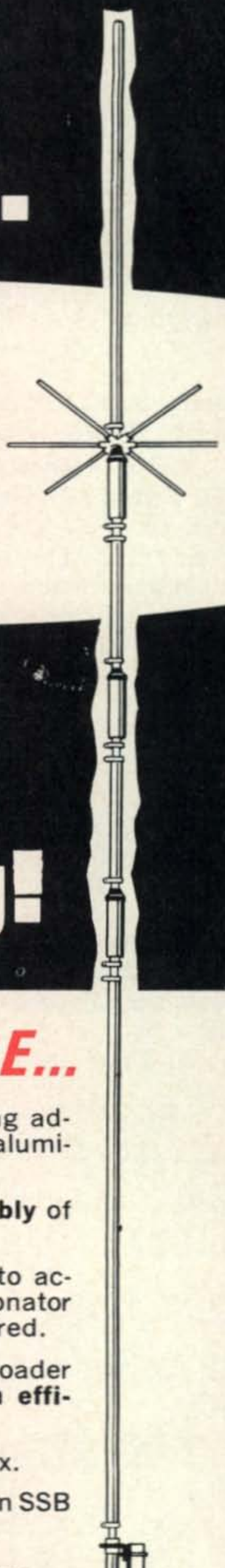

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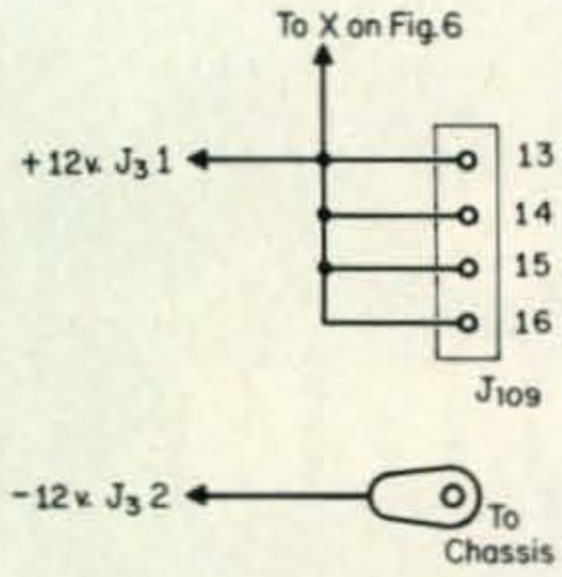

Fig. 7—G.E. ES13, ES15, ES16. Control Cable same as fig. 6.

made to replace the 7V7 tubes in older equipment? These tubes are getting hard to find.

A. Yes. Motorola is now furnishing adaptors for both the 7V7 and 7C5 tubes. These adaptors convert the older loctal types to newer 9 pin type tubes. The adaptors, along with the new tube and instructions for slight modification of the equipment is provided when a 7V7 or 7C5 tube is ordered. Normally I suggest local sources for parts, but the only source I know of for these adaptors is Motorola Parts. Since the adaptors are complete and instructions provided, they are much easier and cheaper (in the long run) than trying to build such an adaptor.

Q. My ham band f.m. unit (solid state) and my buddy's similar unit will talk to each other with no problem. However, when trying to use the local repeater or when trying to talk with others using older commercial units we cannot communicate without distortion. We hear the commercial units ok, but they can't seem to hear us.

A. There are several possibilities. Most localities have gone to narrowband repeaters, and much of the obsolete commercial gear available nowadays is narrowband. Many of the ham only units have the deviation set between ±10 and ±15 kc. This is too wide for the narrowband equipment (which is designed for ±5 kc deviation). Since your receivers will accept wider deviation you can communicate with each other, but "chop out" of the commercial gear. Also, the commercial gear (as well as the repeater) probably is using crystal ovens and 0.0005% commercial grade crystals. Most ham band only equipment have tolerances of 0.001%. Usually there is no problem here. However when some amateurs add frequencies to their ham only equipment they take advantage of special crystal offers made by certain crystal companies. Often these special crystals (sold at an attractive lower price) are only 0.0025% tolerance. When considering a two meter signal, this means that the frequency can vary almost 4 kc to either side of the desired frequency (actually 3.675 kc at 147 mc). Since the bandpass of a narrowband signal is only ±5 kc either side of the desired frequency, this means that the 0.0025% crystal may drift outside the passband of the repeater and commercial gear receiver. Although these 0.0025% crystals can be used satisfactorily in ovens where the temperature is maintained relatively constant, they are quite unsatisfactory where temperatures change. Thus, they will not work out satisfactorily in the ham only rigs which may go from a comfortable 75°F in a heated or air-conditioned home into a −30°F to +160°F (under the dash in summer) automobile.

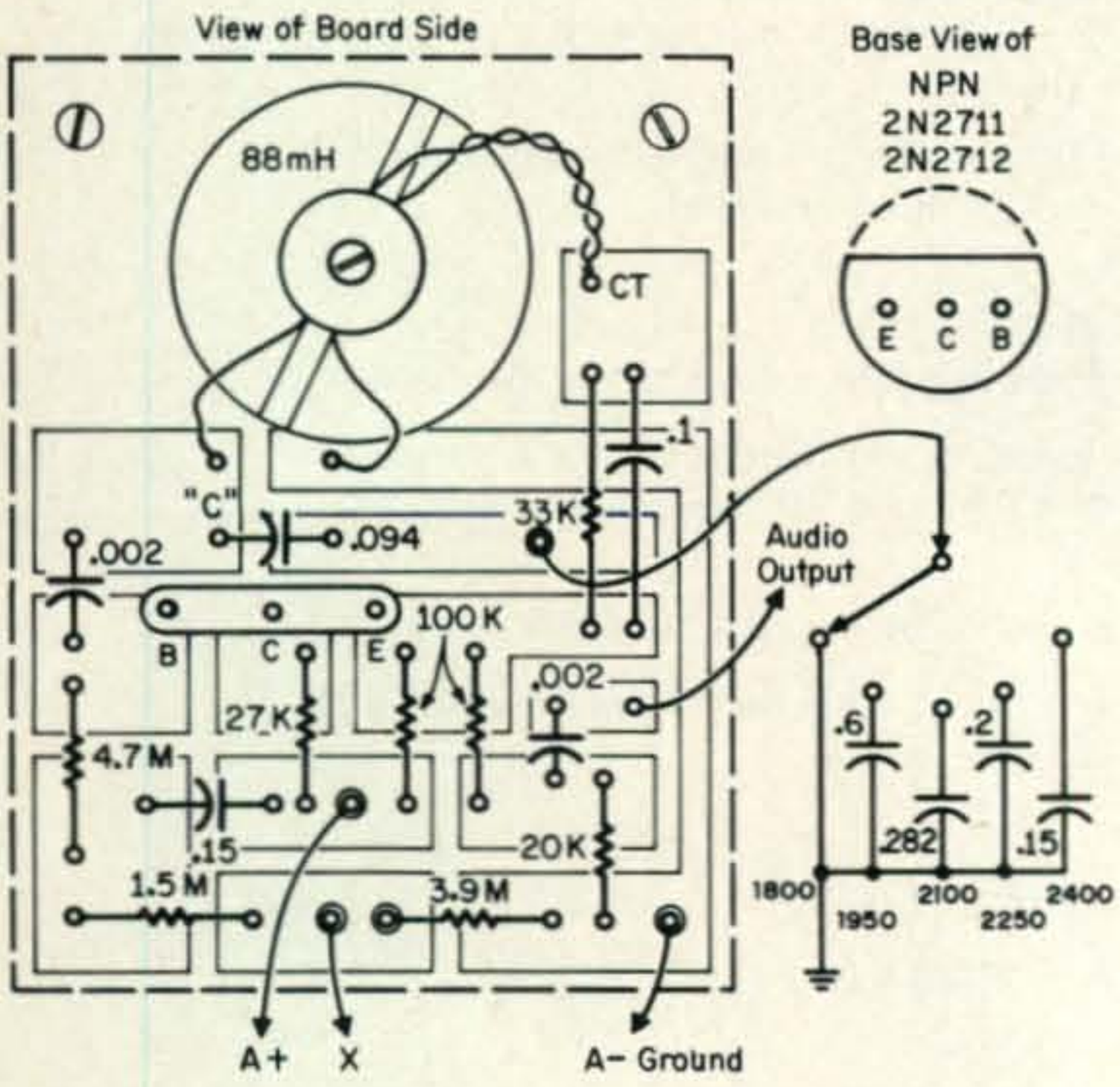

Fig. 8—Single tone encoder. Ground point X for .33 sec. duration; unground for 1.0 sec. Connect to A+ for continuous tone.

Finalé

This column has thus-far concentrated efforts either on items of general interest or on two meter and 450 f.m. activities. The reasoning is simple, most activity in the United States and Canada is on two meters. The 450 band is used extensively for control links and, in some areas, repeaters and simplex activity. There is, however, f.m. activity on the other v.h.f. (and even 10 meters) bands. There has been no intent to slight these bands. In order to accurately discuss and report on the 10, 6, and even 220 f.m. activity the news must be first obtained from you, the reader. So, fellows, lets hear about f.m. activity on the other bands as well as on two meters. *CQ* is preparing articles on conversion of certain types of equipment to 220 mc. This should help the f.m. activity on the "forgotten band." f.m'ers in channel 2 areas have a difficult time on 6 meter f.m., but there is extensive 52.525 mc activity in other places. Also, 6 meter repeaters are not unheard of. How about it?

Finally, while winterizing the repeater, take along a camera and take *many photographs of* the equipment installation, and site. Then forward them for inclusion in the column. That was easy, wasn't it! ■

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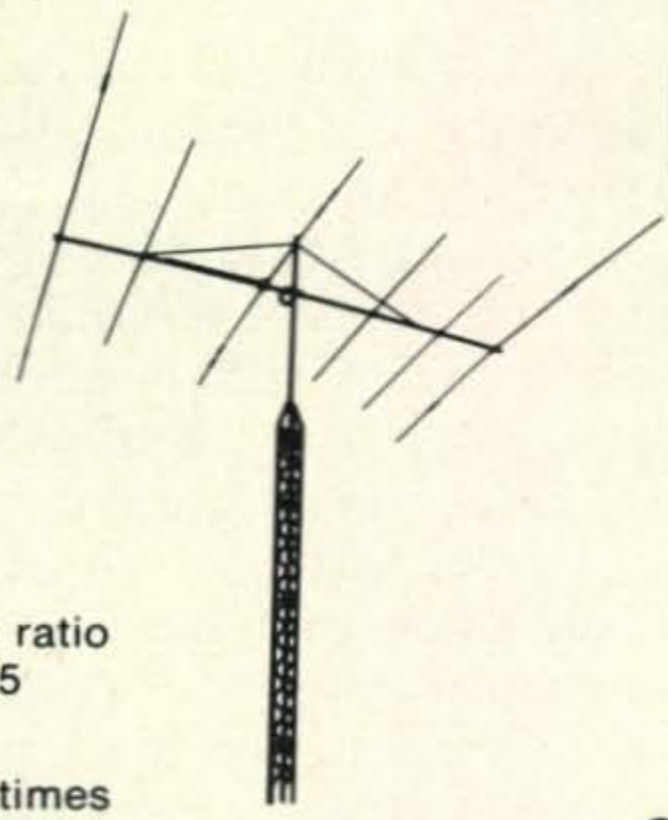

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Results of the

1970 CQ World Wide DX (C.W.) Contest

BY FRANK ANZALONE,* W1WY

CONDITIONS were not too bad for this one, (Nov. 1970). Even 10 meters produced some good activity. CX1AAC set a new record on that band. On 21 mc it was TJ1AW for a new mark and on 14 mc KV4FZ, who else. The Europeans had a ball on 160 with DL1CF at the top also with a new mark to shoot at. And the real big one, the "Flying Expedition" PJ0FC in the multi-multi category. If that gang gets any bigger they will have to charter a 747 to get them all down to Curacao.

I'm sure there are many other records that I have overlooked, but Freddie will give you a full report in next month's issue.

We would have settled for the same number of returns as last year, but we were more than pleased after we had totaled them all up and found that the 1718 entries represented a 5% increase over last year. Add that to the 1425 logs in the phone contest and we have a grand total of 3143, which really puts us in the "cat bird seat" as the biggest contest going.

Still there are certain areas that just do not generate the activity we would like to see, especially the Caribbean/C.A. area. So once again we have left out the W3AA award for that area, keeping in mind that this award, and also the one for Africa are only available to permanent residents of those areas.

We do not go along with the reasoning that the lack of activity from the Caribbean and Central America is due to our scoring system. The two point per QSO and a special award for them only, does not seem to have any effect, so I guess it's the good life down there.

Each year I seem to find it a bit more difficult to compile all the scores and get this report out on time. Maybe I'm slowing up, or it could be because of the increasing number of returns, but some of you fellows sure do not make it any easier. Can you imagine sending in a log and not indicating what band was used? And what do you think that QSO column on the summary sheet is for? Many of the foreign entries have the habit of bunching their multiplier in one figure, which sure does not help the chap checking his log, but probably adds a few choice words to his vocabulary.

So come on fellows, take a little more time in preparing your log before submitting it. Remember you only have to work on one, we have over 3000 to check. We do not expect you to put your log through a computer, like the ones sent in by W4BVV and W6GFS, but we do expect you to screen it for duplicates and see that it is properly scored. A summary sheet showing the number of QSOs, Zones, Countries and final score is a must. And how do we know where to send your certificate if you do not also include your name and address?

Reporting that the PVRC gang again won the Club Plaque is getting to be old hat. But the FRC is closing the gap and a couple more "big guns" would do the trick. W3GM (old W3BES) gave a good account of itself. The single operator totals are well in favor of the Frankford boys but the multi scores kill them. This year the Contest Expedition scores had little bearing in the final outcome.

K6RU the west coast "Big Gun." Here's Cam Pierce, K6RU showing K6SEN the 3-400Z "that won the contest?" Looking on from l. to r. are W6VSS, WB6VFJ, K6SEN, K6BCE, K6QPH and WA2WMT. (Rest of crew not shown were W6NAD and K6JYO.)

*Chairman, Contest Committee.

PLAQUE & TROPHY WINNERS

Single Operator, Single Band

WORLD—North Jersey DX Association, Earl Lucas, W2JT Memorial Trophy. Won by Herb Schoenbohm, KV4FZ (14 mc)

Single Operator, All Band

WORLD—Larry LeKashman, W9IOP Trophy. Won by Jorgen Rottger, ZS3AW.
U.S.A.—Frankford Radio Club Trophy. Won by John Lawrence, K1KTH.
EUROPE—W3AU Operators' Trophy. Won by George A. Rumiancev, UA1DZ.
AFRICA—Gordon Marshall, W6RR Plaque. Won by Gordon Hardman, ZE-1DC.
ASIA—Japan CQ Magazine Trophy. Won by Sam Edelman, UK9ABA. (UA9-AN)
OCEANIA—Maui A.R.C. Trophy. Won by Willard Myers, KH6RS. (KH6GPQ)

Multi-operator, Single Transmitter

WORLD—Dr. Anthony Susen, W3AOH Trophy. Won by Station 4M5ANT. (Oprs. YV5AAQ, YV5AAS, YV5ANT, YV5BOA)

Multi-operator, Multi Transmitter

WORLD—Hazard Reeves, K2GL Trophy. Won by Station W4BVV. (Oprs. G5ALY, K2UYG, K3GJD, K3NPV, K3-OAE, K9OPE, W1BGD, W3BY, W3-BQV, WA3LST, W4BVV)

Contest Expedition

WORLD—Dr. Donald Miller, W9WNV, Dr. Harold Megibow, K2HLB Memorial Trophy. Won by Station ZF1AN. (opers. W2GGE, W2PCJ, W2SUC, WB2CKS)

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Club Award

Potomac Valley Radio Club

Over on the West Coast, the Southern Cal. boys turned the tables on their Northern rivals reversing the standings of the past two years.

And although the Ohio Valley ARA improved their score they still are not producing the output they are capable of doing. The Florida DX group are now two up onK4IIF's Plaque and get to keep it if they win once more.

There were not too many Expedition stations in this section of the contest but it was not difficult to choose this year's winner of Don Miller's Contest Expedition Award. ZF1AN has been doing an outstanding job for the past years and improving its score each year. So we are awarding the Trophy to the "Boiled Owls" from Long Island for making the Caymans available on all bands to over 2800 contacts.

Totaling up the club scores has gotten to be quite a chore, mostly due to the sketchy information submitted by some of the club secretaries, and the failure to indicate club affiliation on the logs. Even though your club may not be in the running for top honors you probably have something going with some rival organization. Therefore it is important that your secretary submit a list of participating members and their scores, and that club affiliation is indicated on the logs. Remember that at least 3 entries are required for a club to be listed.

We always check with interest to see what YL operators were in the brawl. We were happy to see Jinny (ex-9N1RA) had organized a multi group at her new VU2IRA location. And you fellows had better watch it,

Another "Big Gun," this the mid-west multi-multi WØAIH. Paul at the main operating position is already making plans for next year's operation. Especially a better output on 10, if the band is still open, that is.

Single Operator — All Band

Station	QSO's						Zones						Countries					
	1.8	3.5	7	14	21	28	1.8	3.5	7	14	21	28	1.8	3.8	7	14	21	28
ZS3AW		6	55	793	511	1102		3	11	27	26	24		4	17	54	57	70
KH6RS	11	167	492	442	561	598	1	16	22	31	32	28	2	16	31	58	37	33
AX6HD		62	106	766	452	455		16	20	30	30	22		23	29	78	65	58
UK9ABA		34	287	344	279	222		17	24	34	24	25		51	61	78	69	68
K1KTH		86	297	253	345	225		20	26	34	32	30		38	61	84	67	64
HC2GG		146	208	399	404	403		12	16	28	31	24		13	26	64	71	49
UA1DZ		195	185	556	249	190		16	23	33	26	29		47	51	80	60	71
EL2CB		19	72	661	408	362		8	9	36	24	18		7	17	81	57	48
W1BPW		86	283	244	265	181		12	23	34	30	25		36	58	95	67	61
KH61J		128	216	465	534	473		8	19	28	29	21		7	21	58	35	26

Multi-Operator — Single Transmitter

4M5ANT	2	176	301	620	882	442	2	10	17	32	27	20	2	20	42	87	60	47
ZF1AN	15	295	545	608	682	659	4	14	17	30	23	22	3	31	47	69	55	50
W3WJD		148	424	380	335	249		19	34	37	27	29		51	87	98	76	67
CV3BH	3	15	78	696	551	799	2	7	14	31	26	28	3	7	18	67	54	77
WB2SQN	1	62	325	373	337	186	1	12	27	38	30	23	1	30	70	98	77	64
OHØAA	18	143	181	608	486	254	2	11	18	32	29	27	9	52	67	108	102	98

Multi-Operator — Multi-Transmitter

PJØFC	92	668	1338	1974	1641	1377	8	17	26	34	34	31	8	46	75	109	84	79
W4BVV	14	173	665	810	909	485	4	25	33	38	37	31	5	56	86	122	107	80
W3AU	15	185	652	872	784	502	4	24	30	38	37	31	5	60	80	128	112	84
W7RM	14	158	752	837	747	311	7	25	33	38	34	30	6	35	78	106	88	60
W3GM	15	191	721	740	532	409	6	23	30	37	29	29	7	57	81	108	70	70
SK5AJ		394	679	793	748	305		9	32	35	32	31		43	76	91	73	82

Band-by-band breakdown of top scores.

the multi operation at UK2BAP was an all girl team of 3 YL's. And here's more to look forward to, the operation at UK3XAM was by a 13 year old young lady. There must have been others that we unfortunately overlooked.

Many exotic calls heard during the contest never show up in the results list simply because they fail to submit a log, but it was good to receive UA1KAE/1's all the way from the Antarctic via Moscow. But we can't get one from the guy in our own backyard.

EA2FA, one of the few active c.w. stations out of Spain, most of the operation seems to be on phone. Maybe Jesus can stir up more contest activity in the next one.

Enough of this chatter, let's see what some of the boys had to say.

Ray, 3B8CR in faraway Mauritius was plagued with duplicate QSOs, wants a foolproof system of eliminating 'em before they occur. Apologies to those who tried to work his 28 mc harmonic. To those who worked his 14 mc fundamental twice, "Rats," and to the two who managed 3 QSOs, "Ah! I can just hear them asking all their friends, how do you get a card out of 3B8CR?"

You think you have TVI troubles? Alex, UA3RH found conditions on 80 outstanding, and two broken windows by TV lovers.

John, G3HCT, the big signal on 21 mc, had no problem working Zone 29 now that his brother Mich, ex-G3HDA is signing AX6HD.

And G2BW arrived at 9H1CH just in time

[*Continued on page 96*]

TOP SCORES

TOP SCORES
SINGLE OPERATOR
ALL BAND

ZS3AW	**2,098,466**	HC2GG	1,533,728
KH6RS	**2,064,575**	**UA1DZ**	**1,398,688**
AX6HD	2,007,852	EL2CB	1,373,415
UK9ABA	**1,719,663**	W1BPW	1,361,808
K1KTH	**1,632,480**	KH6IJ	1,355,508

SINGLE BAND

28 mc

CX1AAC	681,636
ZE1BT	263,430
9J2XZ	197,910
ZS2HI	149,645
K1LWI	138,132
K1DIR	136,885

21 mc

TJ1AW	549,888
OA3Y	434,231
CX1JM	378,392
G3HCT	317,312
WA8LYF	286,767
YU3TVP	225,877

14 mc

KV4FZ	**908,514**
PY2BGL	673,679
PY4AP	652,974
CR6IK	549,180
3B8CR	450,018
CR6AI	339,068

7 mc

W6ISA	131,214
W2LXK	116,905
W5WZQ	114,002
YV5AW	87,730
K1ZND/1	87,482
YV5KL	80,288

3.5 mc

SM5BPJ	76,320
UG6AD	76,012
DJ5DT	64,350
UK2GAN	63,546
W3MFW	60,768
OK1XW	59,598

1.8 mc

DL1CF	5,206
GM3YCB	4,540
HB9NL	3,536
OK1ATP	2,844
OK1KRS	2,176
EI9ONE	2,041

MULTI-OPERATOR

SINGLE TRANSMITTER

4M5ANT	**2,657,892**	CV3BH	2,101,528
ZF1AN	2,343,665	WB2SQN	1,701,723
W3WJD	2,259,075	OHØAA	1,658,980

MULTI TRANSMITTER

PJØFC	**11,586,428**	W7RM	4,346,460
W4BVV	**5,552,352**	W3GM	4,076,791
W3AU	5,536,851	SK5AJ	2,987,204

Number groups after call letters denote the following: Band (A-all); Final score; Number of QSOs; Zones and Countries. Certificate winners are listed in **Bold Face.**

SINGLE OPERATOR
NORTH AMERICA

United States

K1KTH	**A**	**1,632,480**	**1206**	**142**	**314**
W1BPW	**A**	**1,361,808**	**1059**	**124**	**317**
K1NOL	**A**	**1,274,286**	**995**	**126**	**316**
KØDQI/1	A	909,230	754	122	297
W1PL	"	699,352	713	101	243
W1EZD	"	333,675	501	73	152
W1OR	"	175,175	251	85	160
W1DIT	"	129,592	234	71	123
W1CNU	"	117,150	241	52	113
W1WY	"	87,101	197	56	108
W1CHA	"	82,458	187	58	104
W1FLN	"	66,178	151	62	101
WA1FBX	"	60,984	141	49	105
W1ARR/1	"	55,937	152	48	83
K1VTM/1	"	23,594	96	36	58
W1IQD	"	23,000	84	39	61
G3XPM/W1		13,104	73	30	61
W1EGM	"	6,670	42	25	33
W1CCZ	"	5,670	48	20	25
W1PLJ	"	1,596	20	13	15
K1LWI	**28**	**138,132**	**442**	**30**	**78**
K1DIR	**28**	**136,885**	**410**	**33**	**82**
W1NU	"	78,351	300	27	64
WA1CYT	"	22,980	134	18	42
K1HVV	**21**	**190,722**	**566**	**33**	**81**
W1MDO	**21**	**173,124**	**471**	**34**	**92**
WA1FCN/1		1,241	27	6	11
W1WAI	**14**	**180,608**	**457**	**36**	**100**
WA1LVW	"	1,360	28	6	14
K1ZND/1	**7**	**87,482**	**369**	**21**	**62**
W7TML/1	**3.5**	**38,559**	**207**	**15**	**32**
W1CKA	"	14,640	88	19	42
W1SWX	"	6,902	43	17	41
W1FTD	"	1,902	32	9	15
W1HGT	**1.8**	**1,160**	**28**	**8**	**12**
VE2MW/W2	**A**	**494,382**	**584**	**99**	**199**
K2INP	**A**	**374,825**	**468**	**100**	**175**
K2QIL	"	333,540	471	72	183
W2UI	"	126,672	253	64	118
W2CP	"	122,199	202	66	165
W2IRV	"	105,525	215	67	108
W2YCW	"	93,280	185	65	111
W2HL	"	72,772	158	65	96
K2DDK	"	71,442	136	68	121
W2DF	"	60,270	142	44	103
WB2GGO	"	43,318	126	43	78
WA2VYA	"	42,097	163	29	60
W2HUG	"	40,875	130	35	74
W2CKR	"	35,035	134	27	64
WA2LOG	"	31,105	108	40	63
W2HO	"	21,008	76	43	61
K2SHL	"	11,242	59	30	43
WA2BEX	"	5,824	39	28	28
W2UJ	"	5,390	34	25	30
W2MB	"	2,175	22	12	17
W2HAE	"	1,550	18	14	17
WA2MSF	"	630	14	6	9
WA2HZR	**28**	**66,839**	**258**	**26**	**63**
W2NEP	"	19,800	101	20	46
W2WD	**21**	**156,116**	**428**	**33**	**91**
W2NIN	"	131,214	395	31	83
W2EUO	"	43,659	185	23	58
WB2MQI	"	11,954	96	12	31
WB2KSK	"	2,220	29	11	19
W2BJH	**14**	**40,107**	**159**	**28**	**59**
WA2AUB	"	29,808	114	28	64
W2LXK	**7**	**116,905**	**388**	**27**	**76**
K2EKM	"	2,835	31	14	27
W2YT	**3.5**	**16,801**	**116**	**12**	**41**
WA2LDX	1.8	24	3	2	2
K3HTZ	**A**	**1,181,521**	**1009**	**125**	**282**
W3GRF	**A**	**1,023 178**	**942**	**117**	**260**
W3WPG	**A**	**963,850**	**897**	**103**	**267**
W3VT	"	753,781	631	123	296
W3OV	"	475,694	572	95	194
W3NZ	"	464,778	532	89	213
W3MFJ	"	434,928	596	94	178
K3WJV	"	369,075	456	94	191
W3AXW	"	361,501	432	102	199
W3GN	"	306,240	431	87	153
K3AIG	"	302,892	407	91	167
W3VW	"	256,740	400	69	151
W3AIZ	"	254,634	396	77	145
W3KV	"	252,047	366	84	154
W3GRS	"	236,522	300	95	191
W3NX	"	228,663	330	85	158
W3QOR	"	213,864	333	76	152
K3TGM	"	206,354	347	69	142
W3NNK	"	203,680	277	94	174
W3KT	"	179,352	204	67	145
W3FA	"	158,604	269	74	134
W3ALB	"	145,160	261	61	129
W3AZD	"	134,306	276	62	109
W3GID	"	128,681	207	77	140
W3GHD	"	121,752	247	63	108
W3DRD	"	116,090	211	65	125
W3ECW	"	94,640	189	69	113
WA3JIH	"	87,675	189	66	109
WA3ENM	"	49,956	134	57	81
W3HVM	"	45,012	131	48	73
W3ZJ	"	43,648	123	48	76
W3CGS	"	42,003	122	45	72
WA3JZR	"	36,594	116	43	71
K3DRT	"	25,048	95	36	65
W3KA	"	20,526	92	29	47
W3CBF	"	20,405	89	21	56
W3AEL	"	18,571	114	36	74
W3TV	"	12,008	54	32	47
W3YSH	"	7,874	44	25	37
W3CRE	"	6,028	50	16	28
W3ML	"	5,406	38	20	31
W3EVW	"	4,324	31	22	25
W3EKZ	"	3,515	34	12	25
K3JLI	"	2,752	25	19	24
W3CSZ	"	2,688	32	9	19
W3PZW	**28**	**114,290**	**350**	**32**	**78**
K3JGJ	"	58,328	217	27	63
WA3PGK	"	49,980	202	25	59
WA3HMM	"	49,581	189	25	62
WA3IWX	"	37,418	177	24	54
W3KFQ	**21**	**105,664**	**342**	**34**	**70**
W3QQL	"	88,300	303	29	71
WA3JGY	"	76,140	281	27	67
W3TMZ	"	41,148	172	23	58
K0QET/3	"	16,821	93	18	45
W3UHN	"	12,644	75	18	40
WA3LRN	**14**	**12,852**	**82**	**16**	**38**
W3MQ	"	4,515	35	17	26
W3MFW	**3.5**	**60,768**	**221**	**28**	**68**
W4YHD	**A**	**1,018,139**	**883**	**122**	**279**
K4PQL	**A**	**738,276**	**736**	**113**	**244**
W4DW	"	393,390	490	93	189
K4FW	"	381,710	461	95	192
K5YPS/4	"	325,920	522	59	151
K4CTY	"	325,146	415	95	187
K4KQ	"	322,350	370	103	204
W4WSF	"	295,404	435	89	150
W4PGW	"	292,058	427	80	159
K4CEF	"	236,898	341	86	160
W4TMR	"	217,422	309	93	164
K4OD	"	216,568	325	90	163
K4ZA	"	198,531	291	88	155
W4SGE	"	192,920	312	71	141
W4HOS	"	161,938	244	92	151
K4SXD	"	151,278	457	33	81
W4KXV	"	79,056	171	60	102
W1ETU/4	"	55,892	127	54	103
WB4JEZ	"	54,955	140	59	86
W4BJ	"	48,909	140	48	71
W4VC	"	31,080	102	39	66
K4AEH/4	"	21,600	87	37	53
WB4PQC	"	18,960	112	32	47
K4OCE	"	17,424	76	38	61
W4WRY	"	13,983	64	36	43
K4PR	"	13,510	70	28	42
K4JO	"	7,308	45	25	33
W4KMS	"	6,464	37	28	36
W7BBX/4	"	1,178	21	15	16
W4SPQ	"	247	7	6	7
K4JWM	**28**	**104,944**	**342**	**34**	**78**
K4KJN	"	93,330	316	30	72
K4CYU	"	81,641	272	31	76
W4CRW	"	68,068	256	25	66
WB4SPK	"	23,392	122	22	46
K4AUA	"	714	13	10	11
WB4IAE	**21**	**110,700**	**420**	**31**	**59**
WB4RYZ	"	6,930	53	1*	29
W4EEO	"	3,024	25	17	25
WB4JSV	**14**	**226,023**	**562**	**36**	**95**
K4PDV	"	105,909	285	35	94
WB4QKE	"	65,752	204	35	81
K4TBN/4	"	14,283	74	27	42
W4EZ	**7**	**8,756**	**70**	**12**	**32**
W4ZRT	"	10	2	2	2
K4ARP	**3.5**	**9,936**	**83**	**14**	**34**
W4ONO	"	8,184	72	15	29
WA4LDM	"	4,760	56	14	21
WB4SJG	"	1,617	31	8	13

A4SGF	1.8	448	27	7	9
ADBV	"	312	18	6	7
K5JAW	A	870,909	744	140	271
K5KGJ	"	367,722	464	99	180
K5LUJ	"	318,784	398	104	180
K5QNY	"	150,381	242	93	138
WA5UCT	"	136,374	258	74	117
K5ZSX	"	130,600	189	79	121
K5OSJ	"	130,453	246	76	115
K5OB	"	92,296	185	82	114
K5FCX	"	84,968	199	69	83
WA5SOG	"	17,170	73	36	49
K5ABV	28	56,964	213	30	64
WA5RXT	"	51,531	204	26	63
K5RMC	"	42,640	191	27	55
K5GO	21	121,440	360	33	82
K5RTQ	"	98,273	350	30	71
K5OYH	14	25,502	86	31	51
K5WZQ	7	114,002	330	32	87
K5SBX	3.5	9,246	80	17	29
K5KC	"	3,370	43	11	20
K5RSZ	"	1,380	30	9	11
K6RR	A	975,066	1040	118	208
K6AHV	A	956,484	1010	127	199
K6MAR	A	864,058	911	132	202
K6SDR	"	779,220	836	122	202
K6DGH	"	513,906	631	122	169
K6CYX	"	453,654	577	115	164
K6DQX	"	431,230	524	121	169
K6NA	"	355,328	451	106	150
K6WX	"	340,360	487	111	157
K6TZD	"	285,824	435	94	138
K6BH	"	284,752	465	77	131
K6NKR	"	208,951	366	87	136
K6MOR	"	203,983	329	77	144
K6JPH	"	196,600	349	90	110
WA6DKF	"	195,980	306	101	138
K6RX/W6		171,648	328	80	112
K6APW	"	166,158	324	77	104
K6DC	"	156,599	362	62	87
K6ISQ	"	139,275	227	101	124
K6YGS	"	110,346	254	68	91
K6CLM	"	97,097	247	64	79
WA6TKM/6	"	84,150	198	67	83
K6EJ	"	77,244	174	62	95
K6EJJ	"	75,957	163	80	93
K6CYX	"	73,700	178	69	84
WA6CMX	"	67,990	182	60	70
K6HIH	"	62,602	191	51	62
K6HQN	"	54,279	122	72	91
K6JKJ	"	52,736	150	62	66
K6WE	"	51,205	163	49	64
K6KPJ	"	42,007	133	56	63
K6JKR	"	38,070	110	64	77
WB6WAV	"	28,424	112	43	45
WA6KHE	"	22,989	106	36	43
K6TXA	"	15,247	66	34	45
K6KHS	"	14,454	73	30	42
K6EIF	"	13,650	72	32	33
K6OC	"	12,128	115	17	20
K6NT	"	10,575	77	23	24
WA6LLY	"	9,627	46	32	39
K6GBY	"	9,338	69	22	24
K6EJA	"	8,256	59	23	25
K6CLP	"	7,590	50	26	29
WB6KOR	"	5,244	44	23	23
K5MHG/6	"	4,403	47	26	23
K6YFV	"	2,432	29	20	18
K6RQZ	"	1,173	28	9	8
K6BIL	"	924	14	9	13
WA6NGG	28	51,012	226	27	51
WB6AQF	"	48,840	256	26	40
K6AO	21	21,896	117	24	44
K6HJ	"	15,635	93	22	37
K6EBB	14	151,095	491	33	72
K6OZL	"	84,985	262	35	80
K6IH	"	67,748	235	34	68
K6QZ	"	66,543	191	37	86
WA6IQM	"	57,134	201	34	64
K6QW	"	52,421	203	32	57
W6ISA	7	131,214	484	33	60
W6MAV	"	52,575	254	29	28
W6ITY	3.5	15,000	117	22	28
W6NJU	1.8	80	10	4	4
W7CFJ	A	820,938	810	131	235
W7RS	"	309,120	371	110	170
W7NP	"	243,390	454	75	108
WA7CGR	"	195,446	426	68	90
W7AYY	"	50,436	172	49	59
W7QN	"	15,836	74	35	39
W7IEU	"	15,824	66	40	46
WA7MMK	"	4,150	30	25	25

KZ5CLN is a Novice station in the Canal Zone. uy had to explain to other novices that he was in a contest, so contacts were slow and drawn out. (We'll send you a certificate for your efforts Guy.)

W7YB	"	3,480	35	21	19
K7UWT	"	2,606	38	9	11
K7EFB	"	806	21	7	6
W7PRF	"	441	21	11	10
W7CRT	28	57,035	236	30	55
W7UDG	21	83,692	290	31	67
WN7OLT	"	25,872	161	21	35
WN7PEZ	"	4,116	70	9	12
WA9WIF/7		3,276	46	14	14
W7JLU/7	7	35,896	226	20	36
W7DV	"	21,840	134	24	32
W8SH	A	357,840	445	106	174
WA8GUF	A	201,549	396	94	175
WA8NYB	"	250,560	362	77	163
W8AJW	"	153,260	291	73	121
WB8EUN	"	111,202	224	73	109
WA8CIA	"	109,564	216	55	117
W8KZO	"	94,770	212	55	107
W8KCJ	"	91,120	188	61	109
W8GOC	"	81,158	187	59	95
WA8MCR	"	70,356	147	67	97
WB8CCE	"	68,667	171	53	88
W8BVF	"	66,102	164	59	79
WA8TBQ	"	55,930	166	43	76
W8DSO	"	40,800	137	35	67
W8WVU	"	27,772	100	46	60
WA8USU	"	18,067	78	37	52
W8KZH	"	13,578	82	25	37
K8GVK	"	11,937	61	30	39
WA8MEM	"	9,000	73	15	30
WB8BOR	"	7,614	56	17	30
K8BPX	"	6,600	42	27	33
WB8EAS	"	5,130	50	21	24
W8GBH	"	5,130	32	28	29
K8EJN	"	2,048	27	14	18
W8TWJ	"	1,893	39	13	20
W8JAQ	28	30,132	129	24	57
W8KYD	"	18,156	94	24	44
WB8AAX	"	12,600	70	20	43
K8BGZ	"	9,729	72	15	37
WA8LYF	21	286,767	756	35	94
WA8QIY	"	183,480	544	33	87
WB8FOS	"	6,670	52	16	30
W8CGD	"	2,464	28	11	21
K8MMM	14	269,552	695	37	99
WA8JUN	"	174,980	467	37	93
WB8HAT	"	73,125	221	35	82
K8IDE	"	28,105	129	25	52
WA8ZDT	7	57,024	235	26	62
W8IDM	"	350	9	6	8
W8HBK	3.5	15,600	106	22	38
K8EHU	"	13,776	100	20	36
W8BDO	"	9,936	84	16	32
W9RER	A	638,260	687	113	216
W8FAW/9	"	536,536	522	116	248
K9TTE	"	318,304	484	76	148
W9DL	"	195,858	284	84	159
W9IOP	"	192,910	344	58	133
W9FT	"	111,090	243	57	104
W9RQM	"	106,387	194	69	122
W9PJT	"	72,850	168	61	94
WA9WJS	"	65,650	189	51	79
W9HE	"	62,370	160	54	81
K9DDA	"	23,406	93	40	54
W9WCE	"	21,300	98	29	46
W9LVH/9	"	8,645	50	28	37
WA9GAQ	"	1,053	26	12	15
W9YYG	28	99,246	339	30	72
K9UQN	"	208	9	3	5
W9KYZ	21	63,012	245	26	63
WB9AJB/9	"	1,375	25	12	11
WB9BWU	14	164,263	417	37	100
K9PPY	"	120,124	353	36	82
W9JOO	"	43,617	167	30	63
K9MMH	7	14,630	102	20	35
W9WYB	"	6,280	54	13	27
W9WKU	"	6,063	50	19	28
W9HUZ	3.5	15,996	103	22	40
W9LKJ	"	4,454	54	12	22
WAØCPX	A	88,200	208	56	91
WAØYEF	"	10,360	59	35	39
KØLHE	"	5,610	36	25	30
KØARS	28	55,930	204	29	65
WØSQD	"	27,880	146	26	42
WØKBG	"	20,646	115	21	41
WAØCVS	21	168,386	493	33	85
WAØEMS	"	9,256	67	21	31
WBØBPQ	"	1,575	25	13	12
WØIYH	14	152,208	360	39	105
WBØSCR	"	67,973	236	30	71
WB8AQV/Ø	"	34,765	147	30	55
WAØWST	"	25,584	117	28	54
KØTPF	7	11,648	79	22	34
WAØEPG	"	3,026	36	13	21
WØNFL	1.8	240	14	6	6

Alaska

KL7EWA	A	153,408	668	48	54
KL7MF	"	31,008	208	23	34
KL7AIZ	21	29,550	424	16	14

Bermuda

VP9BY	28	60,996	527	15	36

Canada

VO1AW	A	368,720	661	63	157
WA2HVN/VO2	14	553	40	4	3
VE1EK	A	26,684	105	34	60
VE1TG	28	135,594	563	26	67
VE1JN	21	129,600	580	24	66
VE1AE	14	15,600	94	19	41
VE1AIH	7	34,580	198	20	50
VE2UN	A	798,876	1042	93	220
W2DXL/VE2	"	644,259	1247	84	147
VE2AYU	"	552,475	764	93	194
VE2WA	"	278,016	393	85	171
VE2BZD	"	221,276	424	61	127
VE2NV	"	161,700	368	52	113
VE2DKJ	"	24,990	286	40	45
VE2AIL	"	20,010	224	29	29
VE3BUV	A	90,258	296	59	88
VE3WW	"	6,670	59	17	36
VE3BMV	7	32,565	194	21	44
VE3CDX	3.5	54,834	444	18	39
VE3KZ	"	29,856	305	15	33
VE6MZ	A	20,794	125	34	40
VE7BZC	A	231,616	634	64	90
VE8BB	A	211,770	840	50	67

Canal Zone

KZ5CU	A	92,105	365	44	72
KZ5CLN	21	2,840	68	9	11

Costa Rica

K1WKK/TI2	A	110,134	490	48	58

Dominican Rep.

HI3XAM	A	26,038	287	24	23
HI8LC	14	42,029	320	23	38

Greenland

OX3WQ	A	626,772	1154	54	172
OX3AX	14	99,400	600	22	48

Guadeloupe

FG7XF	14	7,587	134	11	16

Honduras

HR2GK	A	6,468	93	17	16

Nicaragua

HT1MG	A	540	14	10	10

Panama

HP1BR	14	9,288	68	21	33

Puerto Rico

KP4DJI	A	142,437	601	38	41
KP4DXK	7	73,570	548	19	51

Virgin Islands

KV4AM	28	19,960	239	20	20
KV4FZ	14	908,514	2315	36	117

AFRICA

Angola

CR6IK	14	549,180	1375	34	101
CR6AI	"	339,068	989	32	84

Ascension Is.

ZD8H	A	96,434	352	34	59

Cameroon

TJ1AW	21	549,888	1447	35	93

Canary Islands

EA8BK	A	127,925	356	41	78
EA8FH	"	6,804	67	15	21

Cape Verde Is.

CR4BV	14	2,314	31	10	16

Ivory Coast

TU2BW	28	45,300	257	16	44

Kenya

5Z4LW	A	135,767	344	50	87

Liberia

EL2CB	A	1,373,415	1522	95	210
EL2BZ	14	162,603	624	27	62

Madeira Is.

CT3/DJ1QP	A	1,014,448	1209	81	203

TOP U.S.A. SCORES

Single Operator

All Band	**K1KTH**	**1,632,480**
28 mc	K1LWI	138,132
21 mc	WA8LYF	286,767
14 mc	K8MMM	269,552
7 mc	W6ISA	131,214
3.5 mc	W3MFW	60,768
1.8 mc	W1HGT	1,160

Multi-Operator

Single Trans.	W3WJD	2,259,075
Multi Trans.	**W4BVV**	**5,552,352**

Malawi

7Q7AA	**A**	**735,750**	**831**	**88**	**162**	

Mauritius

3B8CR	**14**	**450,018**	**1159**	**35**	**103**	

Morocco

CN8DW	**3.5**	**15,759**	**153**	**9**	**26**	

Rhodesia

ZE1DC	**A**	**519,912**	**1001**	**70**	**104**	
ZE3JO	"	60,860	351	21	47	
ZE1BT	**28**	**263,430**	**983**	**26**	**64**	
ZE1BL	**21**	**98,637**	**431**	**26**	**51**	
ZE1CU	**14**	**332,010**	**951**	**34**	**85**	
ZE2KV	"	284,144	858	35	77	

Seychelles

VQ9TF	**14**	**20,515**	**131**	**24**	**31**	

South Africa

ZS2CW	**A**	**60,372**	**190**	**40**	**77**	
ZS2HI	**28**	**149,645**	**616**	**25**	**58**	
ZS6AYU	**21**	**116,058**	**451**	**30**	**57**	
ZS5EY	**14**	**140,650**	**499**	**30**	**67**	

Southwest Africa

ZS3AW	**A**	**2,098,466**	**2467**	**91**	**202**	

Swaziland

ZD5X	**A**	**130,350**	**284**	**65**	**100**	

Tristan da Cunha

ZD9BM	**A**	**115,940**	**344**	**43**	**67**	

Zamb'a

9J2XZ	**28**	**197,910**	**749**	**29**	**66**	

ASIA

Bahrain

MP4BHM	**A**	**173,376**	**363**	**55**	**117**	

Hong Kong

VS6BL	**A**	**160,427**	**655**	**49**	**88**	
VS6AF	**21**	**124,200**	**763**	**31**	**69**	

India

VU2JN	**A**	**218,178**	**434**	**74**	**112**	

Iran

EP2BQ	**A**	**1,084,870**	**1198**	**88**	**226**	
EP2FB	"	251,771	503	54	127	

Israel

4X4VF	**28**	**18,040**	**142**	**12**	**32**	

Japan

JA2HO	**A**	**220,782**	**496**	**83**	**103**	
JA5BJY	**A**	**206,504**	**447**	**76**	**90**	
JH1MRS	**A**	**145,690**	**337**	**81**	**89**	
JA7AD	"	142,104	316	83	103	
JA6CLO	"	138,857	302	86	99	
JA3BKC	"	138,566	334	62	96	
JA3HTT	"	99,448	303	55	69	
JA7ARZ	"	98,889	297	56	63	
JA1AYO	"	96,026	292	65	68	
JA8DIM	"	80,370	301	55	59	
JR1OUU	"	72,292	231	55	69	
JA3FYC	"	61,716	225	55	56	
JA1KZP	"	61,132	203	54	62	
JH1WIX	"	58,235	223	43	52	
JA2CEC/1	"	53,245	118	56	59	
JA2HNP	"	51,600	114	56	64	
JA1JKG	"	46,592	284	28	28	
JA1AS	"	39,790	145	57	58	
JA5MG	"	28,158	134	30	48	
JA3CKR	"	26,544	162	42	37	
JA1AFF	"	23,577	108	45	42	
JH1DJD	"	23,254	119	37	40	
JA9CWJ	"	16,820	112	25	33	
JA5AF	"	13,529	72	41	42	
JA3OLQ	"	12,529	84	33	34	
JA1BZM	"	12,376	93	29	27	
JA3XNL	"	10,472	68	33	35	
JA6DD	"	9,900	60	28	27	
JA3OEA	"	5,952	59	24	24	
JH1IIW	"	4,095	43	20	19	
JA2SHV	"	3,306	58	9	10	
JA9EDG	"	2,670	34	12	16	
JA1OAQ	"	2,280	40	17	14	
JA6QEM	"	1,323	28	11	10	
JA1OYB	"	1,083	21	10	9	
JA9RO	"	896	22	7	7	
JA1KNZ	"	703	13	9	10	
JA2MPX	"	405	17	5	4	
JA0BOP	"	380	16	5	5	
JA1OLP	"	168	7	7	7	
JH1QOJ	**28**	**18,396**	**159**	**21**	**21**	
JA1DFQ	"	16,224	149	19	20	
JA0AT	"	2,736	50	10	9	
JA1XGI	**21**	**211,850**	**767**	**33**	**62**	
JA0CUV/1		**179,586**	**641**	**33**	**66**	
JH1CJQ	"	160,854	551	35	67	
JR1BPF	"	96,323	374	31	62	
JA2ITH	"	69,108	329	31	47	
JA3JRI	"	55,950	262	27	48	
JA1WYZ	"	24,733	134	28	41	
JA1LDJ	"	19,886	128	25	36	
JA0EJN/1		7,106	83	18	16	
JA1CWX	"	5,967	63	18	21	
JA3AVO	"	270	9	5	5	
JA1KSO	**14**	**156,464**	**536**	**37**	**75**	
JA1NLX	**14**	**74,646**	**297**	**35**	**64**	
JA1SR	"	15,004	101	27	35	
JA5BYQ	"	14,742	105	28	35	
JA8GR	"	11,682	97	26	33	
JA1BNW	"	8,480	62	25	28	
JA4AQR/5		4,514	57	17	20	
JH1KAU	"	3,267	33	14	19	
JA3AFY	"	2,170	30	17	18	
JA9AKH	"	955	32	10	9	
JA1SGU	"	546	39	8	6	
JA4BTD	"	544	19	8	9	
JR1IWZ	"	325	17	6	7	
JH1KEJ	"	56	4	4	4	
JA1JYI	**7**	**35,164**	**230**	**24**	**35**	
JA1PPW	"	20,286	169	18	28	
JA1XCZ	"	17,101	148	20	29	
JA2AAQ	"	9,118	73	20	27	
JA3AA	"	5,502	61	17	25	
JA3TAT	"	4,524	67	15	14	
JA3ERG	"	2,336	36	14	18	
JA8IEV	"	1,005	25	9	6	
JA0OP	"	414	23	3	3	
JH1EYB	**3.5**	**26,070**	**179**	**20**	**35**	
JA1MCU	"	10,481	95	20	27	
JA1IZZ	"	210	10	5	5	
JA3IVW	"	24	3	2	2	
JA2CLI	**1.8**	**108**	**8**	**3**	**3**	

Lebanon

OD5LX	**A**	**116,466**	**336**	**40**	**78**	

Malaysia. West

9M2LN	**A**	**297,774**	**741**	**77**	**136**	

Ryukyu Is.

KR6AY	**A**	**876,800**	**1477**	**105**	**169**	

Saudi Arabia

7Z3AB	**A**	**319,113**	**688**	**43**	**116**	

U.S.S.R.

Asiatic

UK9ABA	**A**	**1,719,663**	**1366**	**124**	**327**	
UW9AI	"	515,217	743	71	192	
UA9WS	"	474,700	731	60	175	
UA9WO	"	165,396	400	44	110	
UA9OO	"	132,916	302	57	131	
UA9IO	"	15,174	114	20	34	
UA9MAI	"	10,260	75	24	33	
UA9SH	"	7,680	70	10	30	
UA9GF	"	2,208	34	9	15	
UA9MCM	"	40	7	4	4	
UW9WB	**28**	**94,668**	**350**	**28**	**70**	
UA9JL	"	13,900	124	16	34	
UA9CN	**21**	**26,544**	**193**	**12**	**36**	
UA9TT	**14**	**86,255**	**496**	**19**	**46**	
UK9HAC	"	46,664	262	26	50	
UV9UT	"	34,452	270	18	40	
UW9AT	"	21,576	136	19	39	
UA9IF	"	20,956	163	19	41	
UA9NN	"	20,700	116	22	47	
UV9CO	**7**	**68,860**	**327**	**15**	**45**	
UA9UY	"	24,451	286	13	36	
UA0AG	**A**	**331,485**	**547**	**77**	**154**	
UW0BA	"	72,765	310	41	66	
UA0GF	"	66,690	310	59	55	
UK0CAB	"	46,308	390	26	25	
UA0YAE	"	42,880	269	29	45	
UW0LT	"	41,646	263	29	37	
UA0YD	"	40,812	258	29	47	
UW0LI	"	25,476	241	33	33	
UA0ABC	**21**	**100,552**	**453**	**26**	**62**	
UA0FR	"	28,595	276	18	21	
UA0LJ	"	8,330	102	17	17	
UA0ML	"	8,234	78	23	23	
UA0GU	"	1,302	64	8	6	
UA0TD	**14**	**37,092**	**251**	**26**	**40**	
UW0UQ	"	18,630	129	23	31	
UV0BB	"	18,577	163	16	27	
UW0LR	"	17,992	215	26	26	
UA0MI	"	11,076	135	26	26	
UA0YT	"	6,510	119	12	18	
UW0IZ	"	5,550	114	12	13	
UA0SA	"	5,313	80	14	19	
UA0CAK	"	3,874	124	15	11	
UA0VG	"	1,404	25	13	14	
UA0ZAM	"	306	26	4	4	
UA0OI	**7**	**3,510**	**84**	**11**	**16**	
UA0LAD	"	1,826	40	10	11	
UA0LAF	"	32	16	1	1	
UW0FB	**3.5**	**1,950**	**95**	**7**	**8**	

Armenia

UG6JJ	**14**	**82,800**	**408**	**25**	**55**	
UK6GAE	"	28,704	196	18	34	
UG6EA	"	25,960	171	19	40	
UG6AD	**3.5**	**76,012**	**436**	**13**	**49**	
UG6AV	"	493	12	6	11	

Azerbaijan

UD6AM	**A**	**331,449**	**623**	**69**	**132**	
UD6BQ	"	233,334	473	52	122	
UD6CN	"	185,535	464	45	108	
UD6FA	"	14,602	108	13	36	
UD6BW	**3.5**	**8,262**	**95**	**6**	**28**	

Georgia

UF6LA	**A**	**577,486**	**823**	**77**	**189**	
UF6CX	"	10,440	285	13	22	
UK6QAA	**14**	**85,728**	**437**	**24**	**52**	
UF6DD	"	14,152	179	8	20	

Kazakh

UL7LA	**A**	**272,833**	**628**	**52**	**135**	
UL7GW	"	185,760	519	64	116	
UL7CA	"	114,807	302	45	102	
UK7GAB	"	80,458	341	37	61	
UL7JE	**21**	**41,730**	**257**	**24**	**54**	
UL7XE	**14**	**32,426**	**250**	**16**	**38**	
UL7YP	"	19,159	189	16	33	
UL7HV	"	18,568	158	16	28	
UL7LE	"	17,184	130	13	35	
UK7NAA	"	7,800	88	11	19	
UL7BL	**7**	**39,034**	**256**	**15**	**43**	
UL7BB	**3.5**	**17,490**	**132**	**13**	**42**	

Kirghiz

UM8FM	**A**	**391,564**	**763**	**62**	**21**	
UM8FG	"	3,982	67	6	1	

Tadjik

UJ8BQ	**A**	**10,920**	**92**	**19**	**3**	
UJ8AB	**14**	3,597	45	12	2	
UJ8AW	**7**	**9,160**	**93**	**10**	**3**	

Turkoman

UH8CS	**A**	**148,000**	**326**	**59**	**12**	
UH8BO	"	141,000	278	66	13	
UH8DC	"	16,878	117	22	3	
UH8DK	"	14,204	90	25	4	
UH8BZ	**14**	2,700	52	8	2	

Uzbek

UK8IAA	**A**	**70,300**	**209**	**35**	**9**	
UI8BL	**14**	2,356	59	11		

EUROPE

Austria

OE3AX	**A**	**36,295**	**207**	**40**	**7**	

Belgium

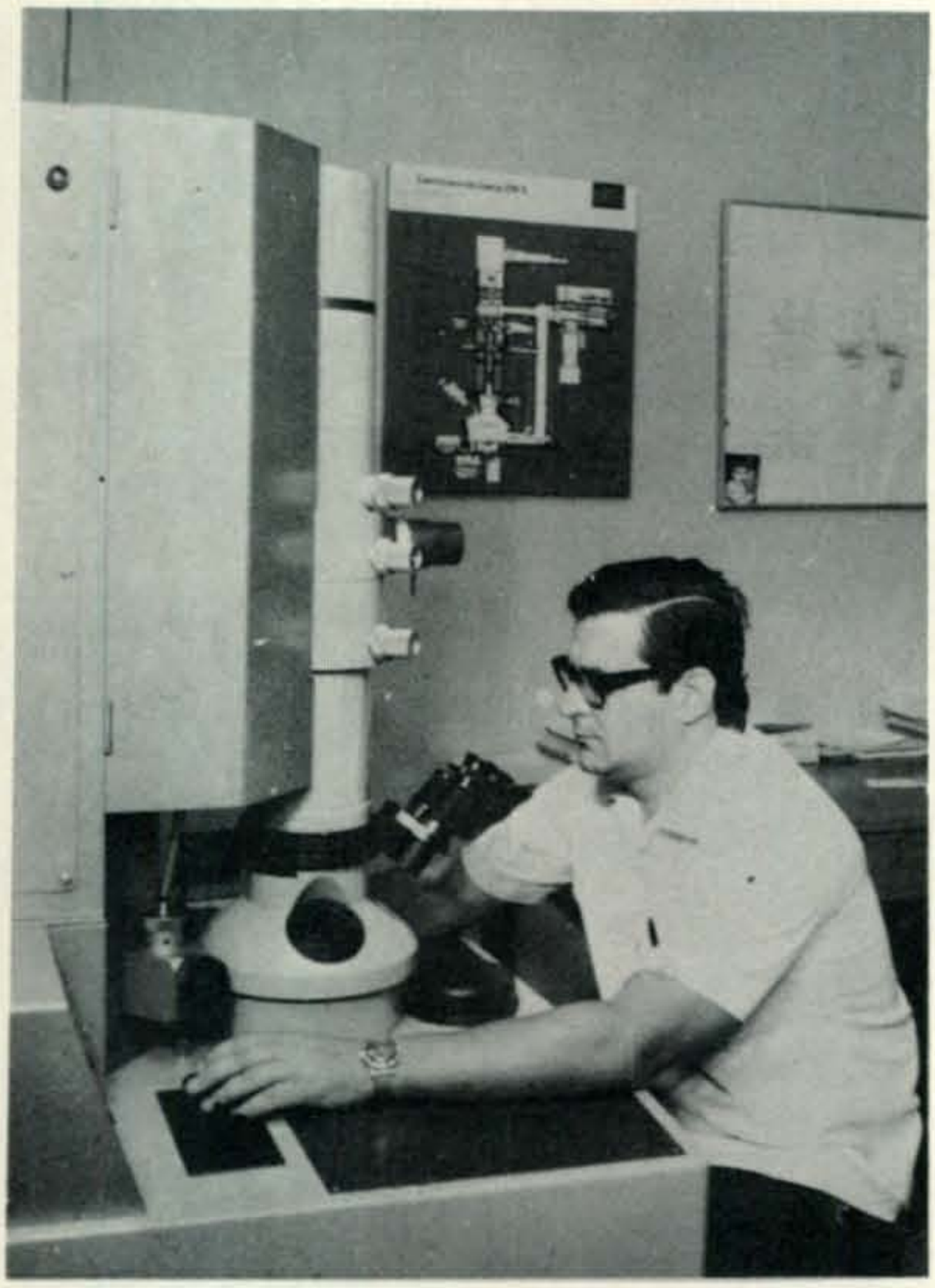
ON4XG	**A**	**337,467**	**705**	**67**	**15**	
ON5GQ	**21**	**110,308**	**482**	**29**	**6**	

Bulgaria

LZ2PG	**A**	**330,505**	**694**	**74**	**17**	
LZ2RF	"	224,609	579	64	16	
LZ2KKZ	"	153,216	518	47	10	
LZ2IM	"	37,320	205	41	7	
LZ2KAF	"	15,969	231	38	8	
LZ1XZ	"	14,213	197	14	4	
LZ2RN	"	5,831	95	14	3	
LZ2RH	"	1,060	59	5	1	
LZ1BM	**28**	**39,600**	**218**	**31**	**4**	
LZ1CW	"	27,875	168	22	5	
LZ1GU	**21**	**19,720**	**199**	**19**	**4**	
LZ2EE	**14**	**20,898**	**185**	**22**	**3**	
LZ1NJ	**7**	**56,644**	**546**	**16**	**5**	
LZ1AG	"	45,072	400	18	5	
LZ1VM	"	23,814	318	12	3	
LZ2KGO	"	22,308	334	13	3	
LZ1MD	**3.5**	**8,015**	**195**	**8**	**2**	

Czechoslovakia

OK2RZ	**A**	**932,256**	**1182**	**110**	**24**	
OK1PD	**A**	**908,556**	**980**	**117**	**27**	
OK1ARN	**A**	**294,576**	**750**	**63**	**14**	
OK1AGI	"	167,055	413	69	14	
OK1AOR	"	149,139	348	63	15	
OK1ACF	"	107,865	405	48	9	
OK2BNZ	"	100,800	305	56	14	
OK1KYS	"	97,470	332	51	12	
OK3ER	"	86,625	335	38	8	
OK1KZ	"	56,461	258	40	9	
OK2BMF	"	54,990	303	37	9	
OK1MSP	"	39,750	170	41	6	
OK1DIM	"	34,500	306	18	8	
OK3EE	"	33,184	128	49	7	
OK2BWI	"	30,888	164	34	7	
OK1KCD	"	27,775	150	33	6	
OK2BPE	"	26,404	218	27	8	
OK2BEC	"	25,155	154	33	8	
OK3CHX	"	24,600	152	20	7	
OK2LN	"	22,374	173	30	6	
OK2BJJ	"	8,712	107	21	5	
OK1MIN	"	6,480	78	14	4	
OK1AII	"	6,240	41	28	3	
OK3CDN	"	5,472	82	19	3	
OK1BLU	"	4,446	114	7	3	
OK1DZS	"	3,744	47	19	2	
OK2PCL	"	2,844	49	11	3	
OK2BXA	"	2,220	40	14	2	
OK2BMH	"	1,891	21	14	1	
OK3EQ	"	1,755	29	12	2	
OK2KMB	"	1,652	73	8	2	
OK2BCI	"	1,632	27	13	2	
OK2BBQ	"	1,410	45	9	2	
OK1GT	**28**	**104,834**	**376**	**32**		
OK1KTL	"	15,812	96	23		
OK1MGW	"	15,552	116	21		
OK2WDC	"	14,805	117	20		
OK2PAD	"	7,804	90	14		
OK3AS	"	5,952	62	12		
OK2QX	**21**	**149,036**	**593**	**31**		
OK1ZL	"	60,916	278	28		
OK2BKR	"	54,880	250	29		
OK2PAE	"	27,170	185	20		
OK1DN	"	23,900	185	19		
OK1MX	"	21,672	121	26		
OK2PCN	"	16,796	139	19		
OK1CIJ	"	5,715	47	21		
OK3QQ	"	4,131	57	12		



Don't know if Biu, PY4AP is pulling our leg but he claims this is his final, and that he is looking for a new country on 14 mc. Evidently he did not find enough of them. (PY2BGL nosed him out.)

OK3CEG	"	1,188	18	13	14
OK3OM	**14**	**140,112**	**661**	**30**	**82**
OK3ZFM	**14**	**55,298**	**400**	**24**	**62**
OK2BFS	"	48,149	293	24	65
OK3ALE	"	48,140	308	27	56
OK3DT	"	42,679	268	27	64
OK1AMF	"	26,726	178	28	55
OK1EP	"	20,748	153	22	54
OK1DBM	"	18,632	123	22	46
OK3CEA	"	17,485	149	20	45
OK3CES	"	13,200	140	17	43
OK2BBJ	"	10,032	149	12	36
OK2BNI	"	9,850	148	14	36
OK2PBG	"	4,928	71	14	30
OK3KGQ	"	3,219	85	8	21
OK3CGT	"	1,404	52	5	21
OK1AIN	"	1,080	31	9	18
OK1AEH	"	494	18	6	13
OK2PEQ	"	418	20	7	12
OK1ATT	**7**	**38,290**	**362**	**18**	**52**
OK2BOL	"	12,300	173	12	38
OK2PDL	"	7,266	108	9	33
OK2BIP	"	6,895	87	12	23
OK2PAW	"	5,950	119	9	26
OK1XW	**3.5**	**59,598**	**586**	**17**	**60**
OK2RO	"	19,224	299	9	45
OK2HI	"	14,418	240	10	44
OK2ALC	"	3,108	112	5	23
OK3BHU	"	2,652	100	6	20
OK3YCL	"	2,160	98	4	20
OK3TOA	"	1,888	49	8	24
OK3CGI	"	1,701	59	6	21
OK2PDM	"	1,265	58	4	19
OK1HBD	"	954	55	3	15
OK2BRR	"	563	43	4	9
OK2BSA	'	450	25	5	13
OK3TBC	"	133	19	2	5
OK1ATP	**1.8**	**2,844**	**165**	**3**	**15**
OK1KRS	**1.8**	**2,176**	**135**	**3**	**13**
OK3YCF	"	795	62	2	13
OK1JJB	"	468	38	2	11
OK3CCC	"	207	26	2	7
OL5ANJ	"	84	13	2	5
OL7AOC	"	64	21	2	6
OK2PDN	"	35	6	2	5
OK1HAS	"	24	5	1	5

Denmark

OZ1LO	**A**	**1,100,050**	**1432**	**110**	**240**
OZ4FF	"	32,144	142	44	6[illegible]
OZ4H	"	13,612	87	33	5[illegible]
OZ5CI	"	13,230	117	23	44
OZ3Q	"	7,920	52	31	2[illegible]
OZ4HW	"	7,852	121	15	2[illegible]
OZ6HS	"	5,907	75	14	1[illegible]
OZ2UA	"	1,426	52	11	2[illegible]
OZ7YY	**28**	**24,928**	**120**	**28**	**54**
OZ7BQ	"	20,618	128	20	41
OZ8JT	"	3,040	34	15	2[illegible]
OZ7XG	**21**	**5,069**	**68**	**15**	**2[illegible]**
OZ1W	**7**	**24,242**	**276**	**11**	**51**
OZ3PO	"	12,122	128	15	43

England

G3FXB	**A**	**1,121,445**	**1218**	**103**	**248**
G2DC	"	261,820	475	66	181
G3ESF	"	223,839	549	60	159
G3RUX	"	134,640	370	57	123
G2AJB	"	114,660	359	55	125
G2BOZ	"	100,596	467	26	57
G3CWL	28	1,955	37	10	13
G3HCT	**21**	**317,312**	**924**	**38**	**96**
G8DI	"	14,130	175	13	32
G3JKY	**14**	**22,620**	**217**	**20**	**40**
G3YWX	"	7,436	84	15	37
G2HDR	"	4,375	66	9	26
G3KDB	**7**	**64,042**	**432**	**23**	**59**
G3CXX	"	39,370	330	17	45
G3KMA	"	33,098	318	17	50
G3XAP	"	30,488	219	17	57
G3TVW	"	21,594	212	12	47
G5AQO	"	8,160	150	8	40
G5ATD	**3.5**	**10,280**	**142**	**9**	**31**
G3NT	**1.8**	**648**	**54**	**2**	**10**

Finland

OH1VA	**A**	**256,841**	**480**	**85**	**214**
OH3WZ	**A**	**113,436**	**375**	**58**	**149**
OH1LX	"	84,630	296	50	136
OH6RE	"	75,411	238	54	93
OH1LU	"	71,280	247	54	126
OH2YL	"	35,369	180	35	78
OH2VZ	"	29,250	148	35	55
OH7SX	"	22,940	166	32	42
OH9RJ	"	20,116	90	41	53
OH5PA	"	18,634	104	34	43
OH1PG	"	18,601	153	25	64
OH5OD	"	13,290	102	27	58
OH3TH	"	9,240	65	26	62
OH7OQ	"	8,758	124	18	40
OH1KA	"	7,645	100	16	39
OH4AB	"	5,712	46	27	41
OH1KB	"	3,869	58	16	37
OH5UX	"	2,847	31	17	22
OH1UR	"	792	16	8	10
OH2BLU	"	528	26	6	16
OH4RV	"	294	17	7	14
OH2RD	"	24	2	2	2
OH2FS	**28**	**31,058**	**126**	**27**	**79**
OH6RC	"	14,835	97	22	47
OH6NH	"	21,033	80	20	43
OH1XA	"	18	2	1	2
OH2BAD	**21**	**152,100**	**638**	**34**	**83**
OH2BCP	"	135,744	546	33	79
OH1NK	"	93,122	406	30	71
OH1TN	"	83,808	404	29	68
OI3NS	"	45,484	233	29	67
OH2LU	"	27,186	209	19	50
OH3LA	"	9,230	75	18	47
OH6ZJ	"	5,148	78	11	28
OH3IH	"	2,100	59	7	21
OH2JQ	"	2,072	63	7	21
OH2KU	"	858	25	8	14
OH5VT	**14**	**231,420**	**834**	**36**	**80**
OH2BDP	"	205,670	714	36	95
OH6VP	"	39,100	175	31	61
OH8OB	"	16,055	147	22	43
OH7NW	"	8,480	101	16	37
OH3NR	"	7,728	86	16	30
OH3LH	"	1,320	26	10	12
OH3MM	**7**	**21,830**	**190**	**21**	**53**
OH6YA	"	6,357	134	9	30
OH1SH	**3.5**	**24,635**	**293**	**14**	**51**
OH2BJY	"	9,016	163	10	36
OH2BO	"	936	35	5	21
OH7SQ	"	850	51	3	14
OH3IF	"	435	29	3	12
OH6LG	"	168	15	3	9
OH6LF	"	40	6	3	5

France

F8TC	**A**	**281,253**	**754**	**55**	**122**
F8TQ	"	178,972	390	60	142
F8TM	"	88,509	295	49	114
F2PO	"	18,468	109	35	41
F6ACV	"	4,558	52	18	35
F6API	"	4,223	55	16	25
F8SF	"	1,794	42	14	25
F2QQ	**7**	**40,664**	**419**	**12**	**40**
F9RO	**3.5**	**3,248**	**78**	**6**	**22**

Germany

DL7AA	**A**	**544,150**	**740**	**89**	**189**
DL6WD	**A**	**487,340**	**806**	**71**	**165**
DJ2HH	"	396,256	716	74	158
DJ5JH	"	365,607	500	96	201
DJ4ZR	"	341,972	681	70	144
DL1MD	"	242,740	485	73	156
DJ2XP	"	218,808	486	67	149
DL8FD	"	211,344	461	80	158
DL1JF	"	206,307	375	78	165
DJ7JC	"	180,245	496	58	107
DK3SN	"	145,527	345	60	119
DL8AM	"	126,599	380	61	126
DJ6BW	"	125,208	432	49	99
DJ4UF	"	107,520	281	55	105
DL1GN	"	102,060	292	48	114
DL1ES	"	95,400	227	68	132
DL9EY	"	80,088	252	51	90
DJ5GG	"	51,610	162	52	78
DJ1VP	"	50,479	271	46	97
DJ2GG	"	41,760	194	28	59
DL8HA	"	32,033	157	39	64
DL6BP	"	30,912	153	40	56
DK4EX	"	15,330	167	13	57
DL1TH	"	11,929	144	12	67
DJ5QK	"	9,765	105	30	63
DK1KS	"	9,536	142		16
DL1KD	**28**	**133,455**	**478**		**32**
DJ2IB	"	52,731	246		26
DL1KS	"	34,279	151		29
DL2TI	"	21,320	144		17
DL1QT	"	10,302	75		20
DL1IP	"	5,103	86		11
DL8AN	**21**	**101,871**	**440**		**32**
DJ7RJ	"	36,482	185		27
DJ7PT	"	33,157	205		20
DJ3YU	"	32,328	195		21
DL1RB	"	32,256	177		26
DL8XA	"	6,468	60		18
DJ2VY	"	1,420	35		7
DK3KF	**14**	**20,150**	**188**		**18**
DJ5DT	**3.5**	**64,350**	**476**		**20**
DJ6LV	"	49,080	499		13
DJ8FRA	"	24,786	440		13
DJØTA	"	23,940	245		12
DL1CF	**1.8**	**5,206**	**295**		**3**
DL1VW	"	1,300	70		2
DL5DY	A	1,845	32		12
DM2BTO	**A**	**150,062**	**391**		**64**
DM3FD	**A**	**126,732**	**433**		**50**
DM3PEL	"	83,592	242		57
DM3WYF	"	62,140	312		35
DM3OC	"	36,036	143		44
DM4YEL	"	33,108	98		57
DM2CHM	"	28,448	84		56
DM2BZN	"	22,570	103		46
DM2DQN	"	20,301	96		37
DM2DEO	"	18,758	94		38
DM4ROL	"	17,632	158		22
DM4SJJ	"	15,010	117		29
DM2ADC	"	12,008	120		23
DM3XUE	"	11,627	53		34
DM2CLM	"	8,800	78		20
DM2CYO	"	8,690	68		23
DM3XHF	"	5,529	82		13
DM2CCM	"	4,888	58		14
DM4WL	"	4,872	63		19
DM2DRO	"	3,939	85		8
DM5YVL	"	3,003	76		9
DM4EL	"	2,691	39		32
DM2BBE	"	1,911	47		12
DM2AWI	"	1,798	24		15
DM2BXH	"	1,122	29		11
DM2BYE	**21**	**12,922**	**83**		**25**
DM2BBK	"	12,480	103		21
DM5XOG	"	7,920	90		13
DM3TF	"	6,435	63		17
DM3UE	"	5,428	45		21
DM2BNL	"	2,100	31		14
DM3DCE	"	1,560	24		13
DM2AUO	**14**	**85,215**	**435**		**33**
DM2AYK	"	43,605	296		25
DM2AIC	"	1,400	28		9
DM3XVD	"	1,250	44		6
DM2BPB	"	648	34		3
DM2CEG	"	616	22		6
DM2CHJ	"	552	18		7
DM5ZVL	**7**	**817**	**31**		**7**
DM5ZGL	**3.5**	**1,480**	**80**		**4**
DM4WWL	"	130	13		3

Gibraltar

ZB2AV	**A**	**66,330**	**363**		**32**

Greece

SVØWP	**14**	**134,400**	**1016**		**26**

Hungary

HA5HS	**A**	**91,186**	**408**		**38**
HA8CH	"	7,755	135		12
HA9PE	"	5,014	110		12
HA5JK	"	2,574	91		9
HA9PS	"	1,107	31		10
HG5EA	**28**	**13,560**	**91**		**20**
HG5CI	"	608	15		8
HA2ME	**21**	**26,180**	**166**		**22**
HA5AM	**14**	**51,110**	**291**		**31**
HA7MC	"	5,187	97		11
HA5FA	"	1,300	43		7
HA8UX	"	735	32		6
HA9OX	**7**	**3,008**	**83**		**7**
HA3GO	**3.5**	**6,888**	**154**		**9**

Iceland

K2LQQ/TF	**14**	**136,980**	**954**		**26**

Ireland

EI5F	**A**	**8,178**	**58**	**21**	**26**
EI9ONE	**1.8**	**2,041**	**157**	**2**	**11**

Isle of Man

GD3AIM	**A**	**41,216**	**236**	**31**	**61**

Italy

I1BQI	**A**	**492,915**	**892**	**74**	**181**
I1CVC	"	38,770	247	26	56
I1MMR	**7**	**32,065**	**400**	**11**	**42**
Contest Scores Gal. 6					
I1AMD	"	11,400	143	12	28
IR0KGM	"	7,700	145	7	28
I1ANP	"	7,626	148	8	33
I1YCZ	"	4,384	106	5	27
I1HL	**3.6**	**722**	**38**	**4**	**15**

ITU

4U1ITU	**A**	**659,360**	**1,286**	**80**	**180**

Luxembourg

DJ6SI/LX	**A**	**359,030**	**872**	**72**	**158**

Malta

9H1CH	**28**	**38,532**	**268**	**24**	**52**

Netherlands

PA0INA	**A**	**313,690**	**640**	**76**	**171**
PA0VB	"	102,354	354	52	104
PA0WAC	"	17,010	147	23	31
PA0PHK	"	6,627	47	19	28
PA0UV	**28**	**13,344**	**113**	**20**	**28**
PA0ABM	**7**	**36,852**	**348**	**19**	**55**
PA0PN	**1.8**	**198**	**22**	**2**	**7**

Norway

LA1OA	**A**	**561,834**	**1,050**	**80**	**154**
LA6GF	"	338,500	583	80	170
LA8OM	"	146,327	477	44	87
LA4EJ	"	103,704	375	47	102
LA2Q	"	68,900	326	39	91
LA4ZL	"	42,543	216	39	48
LA3HM	"	21,168	129	31	53
LA1P	"	7,584	78	16	32
LA9M	"	540	23	6	14
LA8WG	**14**	**27,531**	**249**	**17**	**36**
LA6U	**7**	**19,520**	**170**	**9**	**52**
LA8XM	"	3,078	58	10	28
LA6XI	"	196	13	4	10

Poland

SP8CNR	**A**	**156,210**	**403**	**59**	**146**
SP9CTW	**A**	**133,678**	**460**	**53**	**125**
SP8CUJ	"	115,005	394	55	110
SP8BAJ	"	98,072	332	50	94
SP5AFL	"	94,183	347	57	130
SP8AWP	"	54,480	285	39	81
SP1CQN	"	34,840	292	28	76
SP8MJ	"	34,823	210	36	67
SP5AIB	"	32,895	153	42	87
SP9ABE	"	28,840	139	35	50
SP5OD	"	20,960	190	24	56
SP9AAB	"	20,340	210	20	70
SP9PT	"	14,790	63	42	45
SP9AGS	"	12,629	136	19	54
SP5ATO	"	6,039	39	27	34
SP6PBA	"	4,680	64	21	31
SP2AN	"	2,451	60	10	33
SP2AHD	"	1,600	32	14	26
SP9AVZ	"	580	30	6	14
SP3DOI	**28**	**47,112**	**215**	**25**	**53**
SP1AGE	"	35,910	158	29	61
SP8AWL	"	21,352	121	24	44
SP3AK	"	6,169	72	14	17
SP3AOT	"	2,100	31	12	13
SP1CTN	"	1,911	31	10	11
SP9ZD	"	1,278	25	9	9
SP2UU	"	792	18	8	10
SP5ZA	**21**	**26,082**	**150**	**24**	**45**
SP8AG	"	11,800	79	25	41
SP8HR	"	11,374	98	17	30
SP9CAV	"	8,372	104	17	29
SP1EFU	"	2,754	60	10	17
SP9BPF	"	2,120	51	12	14
SP6CXC	"	384	14	5	7
SP2AVE	**14**	**86,900**	**443**	**33**	**77**
SP9ADU	"	78,480	428	31	78
SP8CP	"	74,547	433	28	71
SP5BAK	"	40,016	299	25	57
SP7ASZ	"	26,568	219	22	50
SP2AJO	"	17,500	150	23	47
SP2KDS	"	5,382	87	13	26
SP6UK	"	3,400	75	11	29
SP1BLE	"	1,769	51	7	22
SP9DOW	"	1,066	32	8	18
SP6TQ	**7**	**49,544**	**359**	**23**	**65**
SP8AQN	"	10,868	126	14	38
SP9CS	"	6,600	98	11	29
SP2PAH	"	6,279	148	7	32
SP9DBK	"	4,932	112	8	28
SP8KID	"	3,192	109	9	19
SP2BMX	"	2,929	103	5	24
SP5ELX	"	2,366	71	6	20
SP8CCC	"	2,175	61	6	23
SP9EML	"	1,750	64	6	19
SP5DRE	"	924	32	6	15
SP9PBZ	"	238	12	5	12
SP9DH	**3.5**	**48,107**	**534**	**16**	**57**
SP5ELA	"	2,904	121	4	20
SP2LV	"	2,002	82	5	21
SP6DHH	"	658	49	4	10
SP9EEE	"	234	27	3	6
SP7DQR	"	90	10	3	7

Portugal

CT1SH	**14**	**1,180**	**33**	**5**	**15**

Romania

YO7DL	**A**	**162,729**	**506**	**54**	**135**
YO8DD	**A**	**102,828**	**346**	**46**	**118**
YO8FZ	"	47,458	147	58	64
YO4CS	"	41,785	198	36	101
YO3AC	"	37,080	219	36	84
YO9APK	"	19,522	115	33	53
YO6UX	"	17,556	136	21	55
YO2RA	"	8,856	105	22	50
YO2AVP	"	6,608	94	15	44
YO2BP	"	6,264	73	18	36
YO6KBM	"	3,630	110	10	23
YO3QO	"	3,609	43	15	32
YO3TU	"	3,384	69	14	33
YO5TO	"	1,836	25	14	22
YO8GF	"	1,012	47	8	14
YO7KFE	"	504	26	7	14
YO7DO	**28**	**28,870**	**155**	**22**	**40**
YO3RT	"	1,482	23	11	15
YO3JW	**21**	**36,000**	**268**	**24**	**56**
YO8GV	**14**	**20,332**	**187**	**22**	**46**
YO9HE	"	4,917	56	13	20
YO3RF	"	1,536	22	12	20
YO7VJ	**7**	**24,070**	**320**	**14**	**44**
YO6EX	"	19,360	251	12	43
YO6AFP	"	10,664	199	9	34
YO3BD	"	6,929	147	8	33
YO3QK	"	4,572	111	7	29
YO7IY	**3.5**	**192**	**12**	**4**	**12**

Sardinia

IS1AOV	**21**	**82,144**	**622**	**23**	**45**

Scotland

GM3CFS	**21**	**93,786**	**487**	**27**	**60**
GM3JDR	**7**	**20,655**	**225**	**12**	**39**
GM3YCB	**1.8**	**4,540**	**217**	**4**	**16**
GM3YOR	"	1,116	98	2	10

Spain

EA5BS	**A**	**83,600**	**397**	**27**	**81**
EA1CP	"	58,830	315	35	71
EA2FA	"	55,097	296	35	84
EA2CL	"	8,804	100	19	43
EA3KT	**28**	**12,040**	**147**	**16**	**27**
EA2HR	"	6,845	98	11	26

Svalbard

JW5NM	**A**	**233,168**	**696**	**55**	**97**

Sweden

SM3BIZ	**A**	**422,464**	**662**	**90**	**232**
SM4DHF	**A**	**287,260**	**599**	**74**	**138**
SM7ID	"	239,000	571	63	167
SM2COR	"	192,140	414	81	179
SM0BDS	"	158,543	397	67	136
SM2EKM	"	129,685	320	61	124
SM7TV	"	122,536	334	60	132
SM7EAN	"	55,085	246	46	69
SM7WT	"	45,276	140	57	97
SM0FO	"	37,044	210	36	62
SM5ERP	"	35,475	163	39	90
SM0BYD	"	33,465	167	38	77
SM7AIL	"	30,200	154	32	68
SM5QU	"	25,520	180	30	58
SM2EDE	"	23,433	120	34	39
SM6CKU	"	21,965	96	38	77
SM7QY	"	19,662	88	39	48
SM4CJY	"	13,940	135	21	64
SM7BUG	"	12,350	76	37	58
SM4AZD	"	7,749	97	21	42
SM7EH	"	4,730	38	19	24
SM6PF	"	2,511	47	10	17
SM7DNG	"	2,501	46	14	27
SM0IX	"	1,400	28	9	11
SM2CJX	"	1,120	20	10	10
SM6AFH	**28**	**103,896**	**377**	**31**	**73**
SM0FY	"	54,245	215	29	66
SM0CER	"	9,024	98	14	18
SM6CMR	"	1,770	23	12	18
SM5DRW	**21**	**57,060**	**340**	**27**	**63**
SM6CUK	"	28,512	186	24	42
SM6BLT	"	9,860	143	12	22
SM7CTJ	"	3,645	66	11	16
SM7EGO	"	525	19	8	
SM4WQ	"	242	11	3	
SM5BNX	**14**	**66,430**	**530**	**22**	**48**
SM6CRA	"	31,290	238	21	49
SM5BRS	"	29,664	248	21	51
SM5UQ	"	7,436	119	13	31
SM6JY	"	4,560	102	8	30
SM0EIH	"	532	24	5	14
SM5CMP	**7**	**56,801**	**485**	**22**	**52**
SM5BPJ	**3.5**	**76,320**	**395**	**33**	**81**
SM5API	"	52,949	495	22	57
SM5GM	"	50,758	434	20	62
SM4APZ	"	9,350	137	11	39

Switzerland

HB9ADD	**A**	**276,640**	**454**	**73**	**187**
HB9AGH	"	158,788	389	67	141
HB9PQ	"	68,045	274	52	103
HB9QA	"	45,175	171	39	100
HB9IX	"	26,228	174	23	50
HB9KC	"	8,610	75	21	20
HB9UB	**28**	**111,435**	**448**	**30**	**66**
HB9ANR	"	39,816	217	28	44
HB9DX	**21**	**67,988**	**305**	**28**	**64**
HB9UD	14	2,430	35	12	18
HB9NL	**1.8**	**3,536**	**222**	**2**	**14**

Wales

GW3NJW	**21**	**109,600**	**671**	**25**	**58**

Yugoslavia

YU3EY	**A**	**383,985**	**635**	**81**	**184**
YT1ECD	"	50,046	261	32	81
YU3ER	**28**	**86,769**	**374**	**29**	**64**
YT1SJ	"	75,360	375	26	54
YU2BOP	"	13,965	104	21	30
YU3TVP	**21**	**225,877**	**858**	**35**	**71**
YU3APR	**7**	**66,251**	**413**	**22**	**61**
YU3TFU	"	22,500	273	17	41
YU1SF	"	12,480	242	10	33
YU1NPZ	**3.5**	**10,836**	**239**	**8**	**33**

U.S.S.R.
European

UA1DZ	**A**	**1,398,688**	**1375**	**127**	**305**
UA3RH	**A**	**1,100,736**	**1445**	**122**	**310**
UW3HV	**A**	**793,104**	**1132**	**106**	**266**
UW6CY	"	229,357	647	66	145

The multi-multi group of VU2IRA in what we believe was the first multi operation out of India. L. to R.—VU2BEO, VU2OLK, VU2OMR, Jinny VU2IRA and VU2KV.

Jussi, OH7OQ claims to be the youngest radio amateur in Scandinavia, probably in all of Europe. He was a Novice in '69 and operating in the contest 2 days after receiving his full ticket. How about that!

K2CQQ/TF was the only c.w. entry from Iceland, so we had to use this photo of Clint, even if it would have been more appropriate for the phone contest.

UA1ZX	21	173,670	738	31	74	
UA4QX	"	89,570	496	30	76	
UV3GW	"	48,587	329	22	52	
UW3NE	"	35,721	205	24	57	
UA3YI	"	31,990	258	19	51	
UA4MX	"	12,393	165	13	38	
UA6LC	"	7,020	78	8	22	
UA3YR	"	4,343	53	11	32	
UA3LAB	14	101,808	537	29	72	
UA6UO	14	70,200	383	29	71	
UW6NM	"	59,682	329	30	68	
UK1ZAB	"	58,432	339	26	57	
UA1ZL	"6	34,816	198	24	44	
UW4IK	"	31,840	186	28	52	
UA4LK	"	22,032	299	13	38	
UA3JD	"	21,762	208	18	50	
UK1ZAN	"	21,672	204	19	37	
UA4IW	"	19,635	118	27	58	
UW6CW	"	18,837	170	20	43	
UA3PE	"	18,526	182	18	41	
UA4BB	"	13,750	262	12	38	
UA3AJ	"	13,212	219	12	31	
UA6BV	"	12,620	131	17	43	
UA1XI	"	10,187	106	16	45	
UA3FK	"	9,120	90	20	37	
UV3NC	"	8,073	115	12	27	
UA3GP	"	6,392	69	14	33	
UW3HY	"	5,440	80	11	23	
UK3YAA	"	3,737	61	11	26	
UA6AAQ	"	2,104	74	8	24	
UA3XAW	"	1,400	36	7	21	
UK3PAG	"	1,104	26	9	15	
UK3TAG	"	1,034	23	8	14	
UW6FA	"	890	27	6	10	
UW6MD	"	704	30	5	17	
UA3HE	"	702	30	6	13	
UA1CI	"	120	5	4	4	
UA3LM	7	64,064	509	24	64	
UA3DAK	3.5	18,821	236	14	45	
UA6AL	"	17,013	249	11	42	
UA3LAA	"	11,662	208	11	38	
UA4PU	"	2,850	87	7	23	
UA3XT	"	437	22	5	14	
UA3YH	"	234	19	4	9	

Estonia

UR2QI	A	208,780	649	69	151
UR2GT	"	2,337	56	13	28
UK2RAX	"	462	24	6	15
UR2EK	28	29,925	178	24	51
UR2QD	"	7,020	65	18	34
UR2OV	21	1,034	31	8	14
UR2LO	14	43,500	274	22	53
UR2JW	7	15,510	234	13	34
UR2FQ	3.5	26,015	398	12	43
UR2AO	"	15,456	222	13	43

Kaliningrad

UA2DM	A	337,272	560	91	185
UA2CK	"	36,300	238	25	75
UA2EC	28	52,896	241	26	61
UA2BI	14	14,679	96	25	38
UK2FAS	7	4,840	120	10	30

Latvia

UQ2PP	A	233,046	653	58	156
UQ2OC	"	135,020	532	41	116
UQ2OA	"	4,240	90	11	29
UQ2OK	"	792	31	8	16
UQ2AQ	21	4,926	43	15	37
UQ2GW	14	136,425	587	32	75
UQ2IL	"	36,661	360	17	44
UQ2CR	"	2,465	86	9	20
UQ2OH	7	27,392	295	16	48
UQ2AO	"	1,560	29	9	17
UK2GAN	3.5	63,546	530	23	66
UQ2NN	"	20,898	340	8	46
UQ2OF	"	12,400	226	10	40
UQ2GBG	"	1,562	69	5	17

Lithuania

UP2NK	A	1,087,693	1228	104	257
UP2OX	A	728,670	1122	91	230
UP2BL	"	118,335	518	47	114
UP2MC	"	109,416	485	42	99
UP2SA	"	108,147	617	32	109
UP2CV	"	74,772	403	34	100
UP2MB	"	27,245	267	22	63
UP2BAC	"	26,390	226	21	70
UK2BAA	"	13,920	89	30	64

UW3UO	"	212,496	517	69	159
UA3QO	"	189,981	630	63	146
UK6AAB	"	183,300	423	75	160
UW3EH	"	120,200	309	59	141
UA4IV	"	108,466	456	58	135
UA1UD	"	49,500	288	35	90
UW6AO	"	48,287	162	47	62
UA3AB	"	43,200	151	46	89
UA4MA	"	37,596	219	33	78
UA3NG	"	35,568	135	48	104
UW3TR	"	22,590	105	33	57
UA3TA	"	15,795	98	27	54
UW3UV	"	12,024	127	19	53
UK1ABC	"	10,353	91	19	32
UK3VAJ	"	9,027	137	15	36
UA1DI	"	7,600	74	18	22
UA6PAA	"	4,988	66	16	27
UV3HD	"	4,545	77	12	33
UA3ST	"	4,040	70	12	28
UA3VA	"	3,066	81	9	12
UA3SS	"	2,378	46	11	30
UA4WAE	"	2,145	52	13	20
UA3CU	"	1,010	43	11	19
UA1ZF	"	316	10	8	10
UW3IY	"	130	12	4	9
UK3ABO	28	60,364	248	27	66
UA4DK	"	23,870	159	22	48
UA6JWW	"	22,400	235	17	43
UW1YY	"	9,750	159	15	35
UA1MV	"	7,680	62	20	40
UK3XAM	"	3,168	49	13	23
RA3LAN	"	2,760	40	13	17
UA4BI	"	2,739	67	9	24
UA3DD	"	2,240	65	8	20
UA3DL	"	1,770	30	10	20
RA1ALU	"	1,568	32	12	16

[Cont. on page 108]

CLUB SCORES

United States

Potomac Valley Radio Club	**32,219,333**
Frankford Radio Club	28,831,275
Southern California DX Club	18,244,499
Northern California DX Club	15,606,300
Western Washington DX Club	10,205,232
Golden Triangle DX Club (Fla.)	4,271,425
128 Contest Club (Mass.)	4,250,010
Florida DX Club	4,244,868
Murphy's Marauders (Conn.)	3,562,818
Order of Boiled Owls (N.Y.)	3,391,398
Central Michigan A.R.C.	2,867,946
Ohio Valley Amateur Radio Assoc.	2,304,190
Metro Detroit DX Association	2,045,600
Richardson A.R.C. (Texas)	2,005,262
Minnesota Wireless Association	1,319,934
Columbus A.R.A. (Ohio)	1,059,289
Detroit A.R.C. (Mich.)	653,140
West Park Radiops (Ohio)	635,635
Northern Illinois DX Assoc.	613,982
Blossomland A.R.A. (Mich.)	572,738
North Carolina DX Club	519,239
Oak Park A.R.C. (Mich.)	391,218

Canada

McGill University A.R.C.	3,114,140
Calgary Amateur Radio Assoc.	1,262,943
Laurentian DX Club (Que.)	1,087,448
Edmonton DX Club	332,860

Foreign Clubs

Rhein—Ruhr DX Assoc. (Germ.)	15,633,036
Saar—Pfalz Radio Club (Germ.)	10,902,357
Uruguay DX Club	7,590,614
Kaunas Poly. Tech. A.R.C. (Lith.)	7,095,603
Honolulu DX Club	4,513,422
Leningrad Radio Club (U.S.S.R.)	4,513,145
Radio Club Venezolano	4,209,954
Chelyabinsk Radio Club (UA9)	3,829,524
Lamperheim—Bergstr. (Germany)	3,147,984
Kiel Canal Radio Club (Germany)	2,296,512
VFDB Radio Club (Germany)	1,841,207
Coral Isle A.R.C. (Guam)	1,699,470
Swiss DX Club	1,660,534
YU DX Club (Yugoslavia)	1,388,684
LVOVDX Club (Ukraine)	1,180,268
SP DX Club (Poland)	975,023
Moscow City Radio Club	769,449
Radio Club of Tallinn (Estonia)	610,865
Krasnoyarsk Radio Club (UA0)	517,248
Dniepropetrovsk Radio Club (UB5)	403,239
Novosibirsk Radio Club (UA9)	375,880
DM DX Club (East Germany)	364,154
Vitebsk City Radio Club (UC2)	349,299
Kiev Radio Club (Ukraine)	269,884
Murmansk Radio Club (U.S.R.)	263,840
Hiraishin Radio Club (Japan)	153,170
MHSZ Radioklub (Hungary)	118,896
Vladisvostok Radio Club (UA0)	114,612
Crimean Radio Club (Ukraine)	63,045

THE GALAXY 550A

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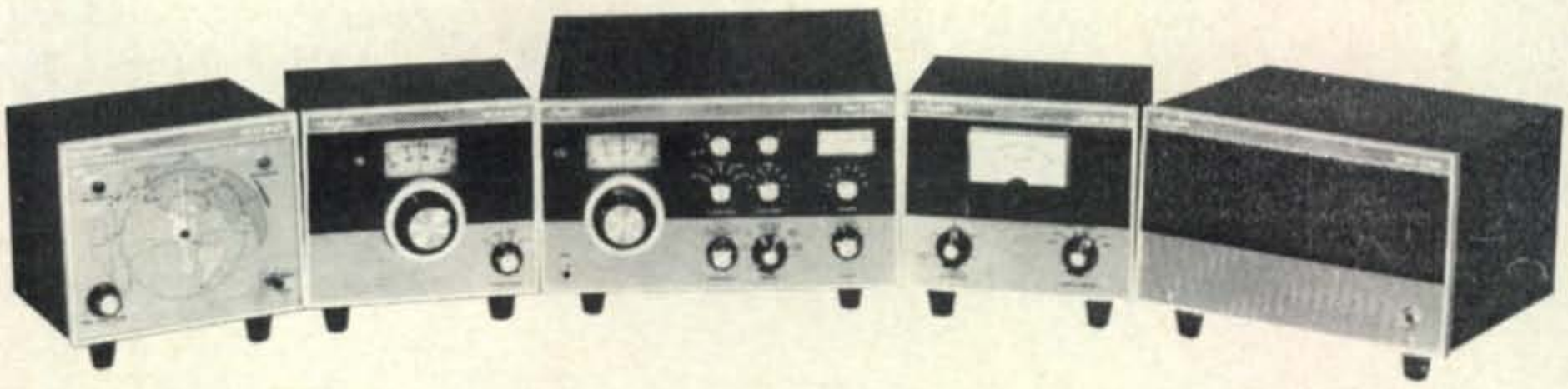


GT-550A Transceiver Order No. 855 Ham Net $495.00

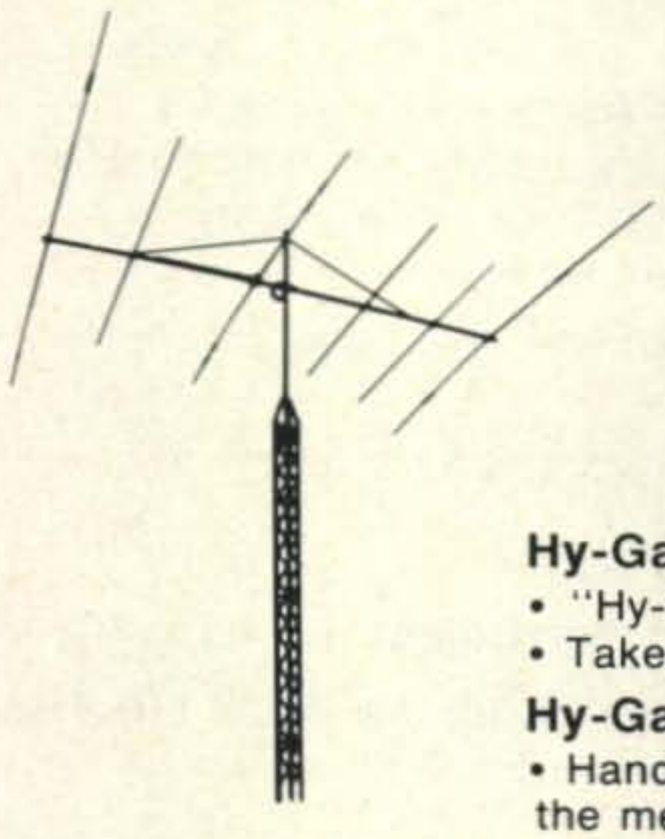
The GT-550A is the best transceiver on the market for the money. Bar none. Costs just $495.00 and delivers 550 watts of power. Operating either fixed station or mobile, this transceiver is guaranteed to have a top frequency stability after warm-up. We're so proud of the stability we include a graph with each GT-550A showing the purchaser how stable his radio was when it went through final check. 550 watts SSB; 360 watts CW; sensitivity better than .5 uv for 10db S+N/N; stable—45db carrier suppression; 25 KHz calibrator and vox option; no frequency jump when you switch sidebands.

RF550A contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 857 Ham Net $75.00

RV550A is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 856 Ham Net $95.00

SC550A Speaker Console with headphone jack. AC400 power supply will mount inside. Order No. 858 Ham Net $29.95

AC400 Power Supply is heavy duty solid state to operate GT-550A at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net $99.95



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Hy-Gain's Thunderbird TH3Mk3 (not shown)

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CQ Reviews: The Millen Model 90652 Solid-State Dipper

BY WILFRED M. SCHERER,* W2AEF

SEVERAL years ago *CQ* reviewed the Millen Model 90651-A Grid-Dip Oscillator,[1] a revised version of the famous original unit, the Model 90651, both of which have become standards in the amateur and industrial field. The Millen people have now come up with a solid-state version, the Model 90652 which overcomes the most objective shortcomings heretofore experienced with solid-state dippers. As a matter of fact, the Model 90652 provides performance equal to or better than that realized with many vacuum-tube jobs; plus some additional features.

It has high sensitivity with deep and sharp dips, Hi-Q with good coupling to test circuits, Q-multiplier setup for increased sensitivity and sharp responses with absorption-type operation at energized circuits (otherwise customarily conducted as straight low-Q diode detection), headphone jack, self-contained battery operation for convenient handling and instant performance.

The instrument case has a 1/4-20 tapped socket hole for attachment of a wrist strap or other retaining device to prevent dropping the dipper from locations such as at antenna towers. A handy polypropylene carrying case also is supplied.

Retained are original attributes such as frequency coverage of 1.7-300 mc[2] overlapping in seven ranges, protected inductors, built-in meter, rugged construction, absence of spurious dips, one-hand operation, 2% frequency calibration on a drum dial, anti-backlash drive mechanism.

Circuitry

The circuitry for the Millen Solid-State Dipper is shown at fig. 1. The oscillator employs a 3N128 single-gate MOSFET operating in a split-Colpitts circuit with the resonating tank connected between the drain and gate of the MOSFET. As usual, the circuit is tuned by a split-stator variable capacitor with its rotor grounded. The MOSFET source is at r.f. ground through a bypass capacitor.[3] The amplitude of oscillation is controlled by a potentiometer, R_3, that varies a d.c. potential appl'ed to the source. This is the DET.-OSC. control which is used for Q-multiplier operation as explained later.

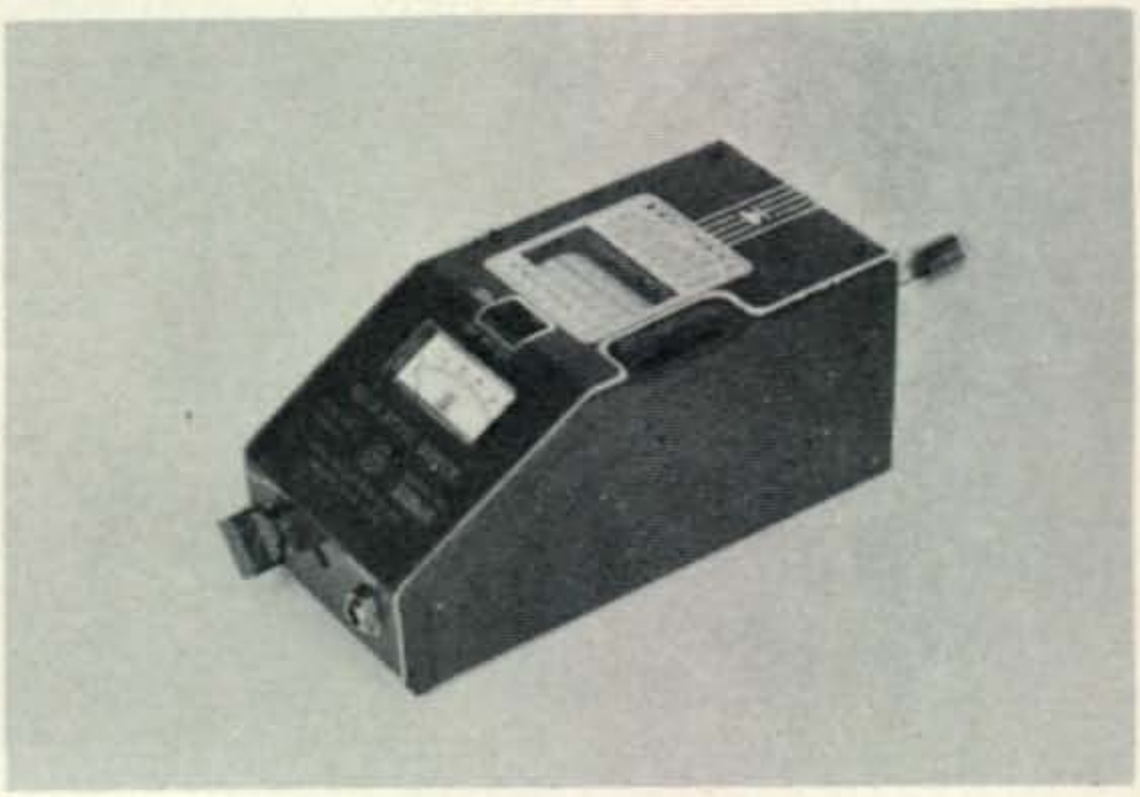
Operating potential is applied to the MOSFET drain which is at an r.f. potential, because one side of the oscillator tank is connected to it. The voltage-supply source must therefore be r.f.-isolated from the drain. In a vacuum-tube job, the isolation (similarly required at the tube plate) can be simply handled by a series resistor of several thousand ohms; however, it cannot be as simply accomplished with a transistorized setup, because the voltage drop would be too high. This could be avoided by use of an r.f. choke, but another problem would arise due to the virtual impossibility of obtaining a satisfac-

*Technical Director, *CQ*.

[1]"*CQ* Reviews The Millen Model 90651-A Grid-Dip Meter," *CQ*, May 1968, p. 62.

[2]Extended to 1.6 mc in this model.

[3]This is a specially fabricated capacitor that eliminates erratic operation and avoids spurious dips. It has no leads and is built into the tuning-capacitor frame. It is located directly at the source socket terminal for the MOSFET.



The Millen Model 90652 Solid-State Dipper.

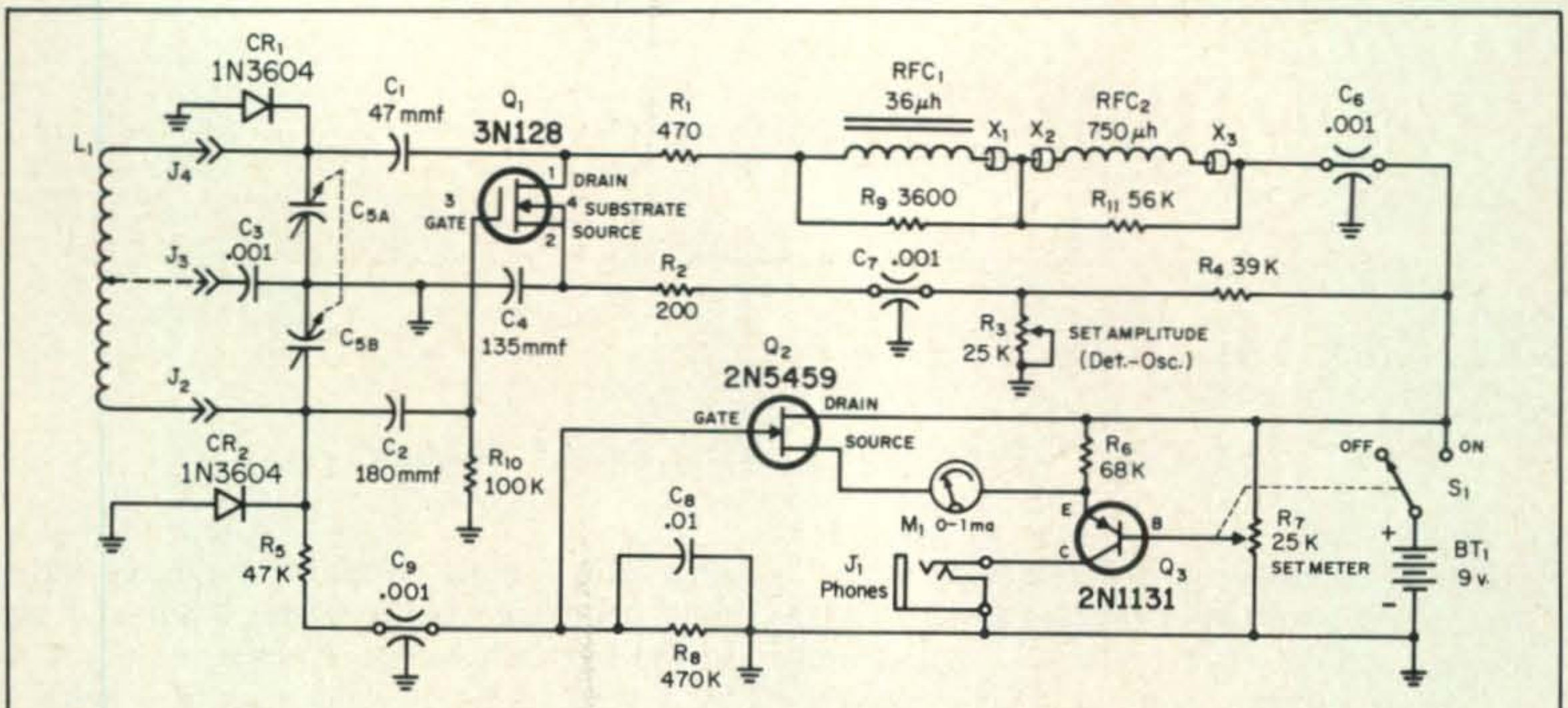


Fig. 1—Circuit diagram for the Millen Model 90652 Solid-State Dipper. Details are given in the text. J_3 is for use with l.f. inductors which will be available on special order.

tory single choke for operation over the wide frequency range of the unit.

In the Millen job the situation is taken care of by a network consisting of a small-value resistor, R_1, in series with two series-connected different-value r.f. chokes, RFC_1-RFC_2, one of which has an iron core, each swamped with a resistor. These primarily handle the isolation at the lower and middle frequencies. Three ferrite beads, X_1-X_3, enhance the required isolation at the higher frequencies. This setup permits a smooth and wide frequency range of oscillation without spurious "holes." As with the Millen vacuum-tube units, spurious dips or suckouts also are avoided by bonding straps between part of the case and selected points on the chassis.

Metering

The r.f. potential across the oscillator tuned circuit is indicated by a meter whose reading dips when the circuit is resonated with the test circuit to which it is coupled. The metering arrangement is activated by a d.c. potential obtained from a full-wave rectifier across the oscillator tank. Two 1N3604 diodes, CR_1-CR_2 are used. This setup provides deeper and sharper dips than those obtainable with a half-wave rectifier at only one side of the tank. The two diodes also provide *some* protection from strong r.f. fields that might otherwise damage the MOSFET.

The d.c. potential is applied to a 2N5429 JFET d.c. amplifier in the source circuit of which is a 1 ma meter. The meter circuit itself is the zero-suppressed type; that is, readings are indicated for only the upper portion of the current range. This, in effect, provides an expanded scale in the useful working area and thus further contributes to deep dip indications.

The suppressed zero, or the delay in readings below a certain current, is obtained with a bias applied to the JFET *source*. This bias is obtained from a stiff voltage divider and is controlled by the emitter-collector junction of a 2N1131 bipolar transistor which forms one leg of the divider in series with the source return of the JFET. The current through the 2N1131 transistor, and thus the bias for the JFET, is adjusted by varying the base bias on the 2N1131. This is handled by the METER-SET control, R_7.

A jack in the source return is furnished for headphone use as may be desired in some applications.

Q-Multiplier Setup

One function usually provided with a dipper is that of diode detection for utilizing the instrument as an absorption-type detector or frequency meter at energized circuits. The Model 90652 goes this one better by allowing the oscillator to function as a Q-multiplier which markedly increases the sensitivity and provides sharper peak readings as the unit is tuned to the frequency of energized circuits. This is realized by setting the DET.-OSC. control to the point just below where actual oscillation commences which is where regeneration is produced.

Construction

The type of construction, size and styling

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The TEMPO "ONE" SSB transceiver represents the culminating achievement of many years of experience in the amateur radio field. Modern design, superb performance, high styling, sturdy construction, outstanding reliability, exceptional value . . . all these factors combined for the first time in an amateur SSB transceiver make the TEMPO "ONE" the obvious choice in today's amateur market. Power input: 300 watts PEP SSB, 240 watts CW. Five band coverage: 80 through 10 meters. VFO range: 500 khz. Complete with: Selectable Sideband, Crystal Calibrator, VOX, Receiver Off-set Tuning. Price: $298.00. AC/ONE power supply 117/230 volt 50/60 cycle . . . $99.00 DC/ONE power supply 12 volts DC . . . $107.00

The TEMPO "2000" is the smallest self-contained, full legal-limit kilowatt amplifier in its price range. It has an entirely self-contained, solid-state power supply that makes it fully operational within three seconds from turn-on. The "2000" provides full kilowatt input on all modes, band-switched 80 through 10 meters, and grounded-grid input for maximum compatibility with modern transceivers and transmitters. Look at the price . . . look at the features . . . you can't do better for only $395.00.

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The Millen Model 90652 Solid-State Dipper with carrying case.

with a sturdy copper-plated case are the same as that of the Millen vacuum-tube models; however, the weight is only 2½ lbs (with battery) compared with 4¼ lbs for the other models.

The meter has a taut-band suspension and thus is less susceptible to mechanical shock or sticky operation.

The tuning capacitor is driven by about a 1.75:1 anti-backlash gear train operated by a knurled thumbwheel attached to the drum-dial shaft in an arrangement that conveniently permits one-hand handling and operation of the instrument.

The inductors for the different ranges have molded form-fitted plastic covers. They are marked as to frequency and are color- and letter-coded to correspond to the related ranges at the drum-dial window where the frequency range for each inductor is also indicated opposite the corresponding scale on the dial.

Hi-Q and efficient operation on the highest range (120-300 mc) is enhanced with a silver-plated inductor. High-Q with better-than-usual coupling to the test circuit on the lowest range (1.6-3.5 mc) also is maintained by a specially-wound inductor with a powdered-iron core.

The instrument is powered by a self-contained 9-volt transistor-radio alkaline battery. The estimated battery life is up to 6 months when the dipper is operated 2 hours per day. The power is turned on with the METER-SET control which is operated by a black knurled thumbwheel that shows a yellow band around its edge whenever the battery is engaged.

Operation and Performance

Except for some of the control adjustments, operation of the 90652 in general is similar to that employed with other instruments of like nature. For conventional dipper use (on de-energized circuits) the DET.-OSC. control is advanced fully clockwise to the OSC. position. The METER-SET control is advanced to apply the battery power and is turned to the point where an initial meter reading of one-half scale or more is obtained. Because of the suppressed-zero, the meter will not produce a reading until the control is advanced quite a way. The instrument is now set for g.d.o.-type operation.

During such operation, good coupling plus positive dips of good depth were obtained on all ranges with our unit. No spurious suckouts or dips were experienced at any time. With the METER-SET adjusted for a full-scale reading at the maximum-obtainable current point on any range, an on-scale reading was indicated at any frequency within the associated range. No readjustment of the METER-SET was necessarily required, although at one end of two ranges the meter reading dropped toward the lower end of the scale in which case, further advancing the control to raise the reading in the particular area might be desirable for more convenient observations. Of no consequence, as far as operation goes, is that because of the type of metering setup, a meter reading may still be had when the METER-SET control is well advanced and no inductor is installed.

Frequency calibration of the instrument, checked with a frequency counter, was within the manufacturer's specification of 2% tolerance. This relates to that when the oscillator is decoupled from a test circuit, inasmuch as the oscillator frequency can be "pulled" by a test circuit, depending on the degree of coupling between the two. For maximum frequency accuracy, the least coupling should be used that still enables a dip indication to be had. This is a requisite with any other similar instrument used in like applications.

Detection Use

As described earlier, absorption-type detection at energized circuits is obtained by operating the dipper as a Q-Multiplier. This function is set up by rotating the DET.-OSC. control toward the DET. position, until the meter reading suddenly drops or fails to continue to fall. This will be at the border of os-

[*Continued on page 96*]

FIBRE-GLASS

GEM-QUAD

WE ARE MAKING A GOOD QUAD BETTER

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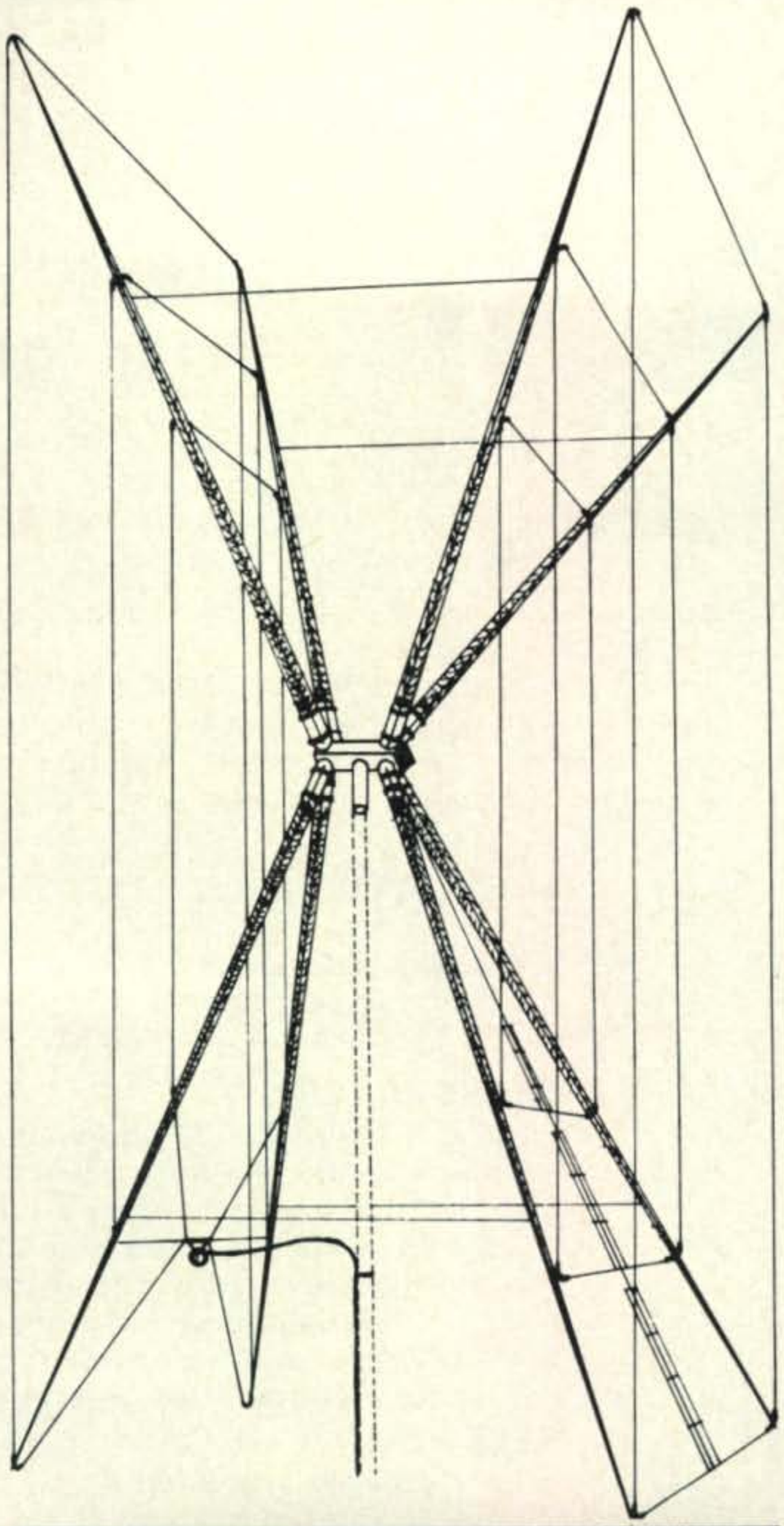

- The GEM QUAD is a two, three, or four element antenna designed to operate on ten, fifteen, and twenty meters.
- Nylon tension tubes create an anti-wire breaking device.
- Forward gain for two element GEM QUAD gives maximum gain on DX, "where it counts."
- Optional third element (easily installed) has given optimum forward gain with a narrow forward cone of effectiveness, resulting in excellent rejection of unwanted signals.
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- Toroid balun kit supplied for single feed line matching.
- Mounting spider of durable heavy duty aluminum alloy. 1½ inch o.d. stub facilitates easy mast mounting.
- Hollow spider allows insertion of boom for additional element.
- Fibreglass arms withstand 100 m.p.h. wind with minimum loading on tower (2.5 sq. ft. wind load area).
- Tridetic arm design (air passes through the arm). Low wind resistance eliminates need for excessive guy wires.
- Simple assembly and tuning instructions are supplied with every kit, showing measurements and assembly procedure. When assembled as instructed, tuning only takes a matter of minutes.
- Maintains rigid form continuously. Double "Cone-shaped" design resists change in critical measurements under severe weather conditions. Weather resistant.

WORLD WIDE DEALER INQUIRIES INVITED

$107.00 Two Element Quad — **$60.00** Extra Element

Includes U.S. Customs Import Duty or Canadian Federal Sales Tax

Shipped Collect

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- Light weight (complete antenna weighs 20 lbs., 3rd element 10 lbs.). Simple TV rotator will rotate antenna.
- Single 52 ohm feed-line for all bands. SWR of 1 to 1 easily obtained using ferrite Toroid Balun provided, (produces minimum harmonic radiation). Will handle maximum power input.

Canadian Patent No. 794506
U. S. Patent No. 3532315

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THE CTR-144 by COMCRAFT

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COMPARE THESE FEATURES

TRANSMITTER:

- Built-in VFO (Frequency converted for stability*)
- AM and FM both crystal and VFO
- Four transmit crystal positions (8 MHz)
- 12 watt input AM and FM
- High level transmitter modulation on AM
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- Three internal transmit crystal sockets with trimmers for netting
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RECEIVER:

- Double conversion
- Crystal controlled first conversion
- MOS FET receiver front-end
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- Built-in squelch for both AM and FM

GENERAL:

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- Optional portable rechargeable snap-on battery pack available
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- Anodized lettering and front panel
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- 10¼"W x 6¼"H x 7½"D

†U.S. ONLY

*VFO operates from 7 to 9 MHz and is converted to 72 to 74 MHz using a 65 MHz crystal oscillator. 72 to 74 MHz is then doubled to 2 meters.

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FROM: NAME_____

STREET_____

CITY_____ STATE_____ ZIP_____

DX

BY JOHN A. ATTAWAY,* K4IIF

As I have always considered c.w. the fastest route to a high country score, I wish to clear up a misunderstanding which may exist regarding my personal opinion of this mode. I was recently lectured by an irate reader who equated my reservations on incentive licensing, and its proliferation of sub-bands, with strong opposition to the existence of c.w. This particular reader stated that my writing clearly proved I felt c.w. was not here to stay.

Those of you who have read "De Extra" objectively are aware that no connection exists between my philosophical objections to the policies which produced our hacked up ham bands and any particular mode of operation, be it c.w., a.m., s.s.b., f.m., RTTY, slow scan TV or what have you. However, if anyone else has misunderstood my position I will cite the record which shows that Jerry Hagen and I were instrumental in launching the new *CQ* C.W. DX Award. As DXCC has only a c.w.-phone category to which the c.w. country chaser may aspire, our award is the only refuge for the pure c.w. DXer. K4IIF qualified for the *CQ* C.W. DX certificate in the first round and was assigned the special *CQ* staff certificate number 00. Two of the three transmitters here are not even equipped for voice operation. The piece of gear which receives the hardest service of anything in the shack is an Instructograph used for our code classes.

Perhaps this would be a good time to repeat a portion of what De Extra had to say on page 72 of the June, 1967 issue. I referred my irate reader to this passage, but he felt it gave only "lip service" to c.w. C'est la vie! Here it is:

"Ole 'Charley Whiskey' is still the best mode for the guy with average equipment to use in running up a good prefix score or working all zones. This isn't to say you can't do it on s.s.b. because you can. However, it takes a lot bigger investment in gear and a lot more know how. The reasons are simple: First, hams in many parts of the world use pretty primitive gear and consider themselves lucky to have it. Surplus World War II equipment is very popular, and c.w. rigs with low power to a dipole or longwire antenna are common. Stations with sideband gear are very rare in many of these countries, and frequently appear only when a DXpedition hits the scene. This is why it takes only 200 prefixes to make WPX on s.s.b., while it takes 300 on c.w., but the 300 will be easier to get.

"A second reason for starting your DXing on c.w. is that unless you have beaucoup kilobucks for an extra good receiver, a linear amplifier, and beams on a high tower you're going to have a hard time competing on s.s.b. Now you can work a lot of countries with your 150 watts p.e.p. to a 3-element tribander at 35 feet. However, when the rare stations come on you're going to be sitting down on the 10th level and it will be a long time before they hear you. You will miss a lot of the short DXpeditions. However, on c.w. your chances of getting through on low power are not only better, but you may work the local man with 20 watts to a dipole and not have to depend on the DXpedition.

After an 8500 mile trip across the Pacific from Ecuador, the raft La Balsa arrived safely at Brisbane, Australia in November, 1970. The 4 crewmen were feted by the Brisbane DX Club who were instrumental in raft communications. Left to right are Vital Alsar, VK4YP, President of the Brisbane DX Club; Gabriel Salas, VK4NP, President of Queensland Division, W.I.A.; Marc Modena; and Norman Tetreault. (Photo courtesy C.A.M. Weller, Secretary, Brisbane DX Club.)

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

The cards really poured in for the W7UXP/KH6 expedition to Kure Island. Wading through about 2500 of the over 3000 cards answered are left to right: KH6HGP, WB20IF, and KH6HCM/W7UXP.

"If you're dubious about all this listen down on 20 meter c.w. some evening from 0000 to 0300 GMT and count the number of UA9s, UAØs, UL7s, UH8s. VU2s, etc. that you hear, and then tune up in the phone band and count the number you hear on s.s.b. It should be a revelation to you. but if you still need convincing listen for DX in the 7000 to 7010 kc band segment for a while and then tune into the 40 meter phone band, nuff said, huh!"

De Extra

This month's De Extra is the highlights of a letter from Howard Kelley, K4DSN, who handles my QSL cards for operations outside the U.S.:

"I'm in the process of coming up with a questionnaire to be sent to a couple of dozen prominent QSL Managers to get their opinions on the changing face of QSLing. With the rising cost of postage and printing, plus five band DXCC and increasing activity by DX stations in the *CQ* DX Contests, things have reached the point where some thought must be given to standardizing the QSL procedure so it doesn't become any more of a burden to those sending and receiving cards.

"It seems that some system could be worked out with a convenient well-understood set of standards to make the job easier. I'm not speaking only of QSL's which confirm more than one contact on a card, or of methods of some of the bureaus, or other mechanical aspects. You'll get the idea when I'm through and the data is complied.

"There is nothing more frustrating than to get QSL's sent in 11 × 14 inch envelopes, or with non-U.S. money, or oversized cards, or with cute little ways of expressing the information. So cute you spend 3 or 4 minutes deciphering the card. Sometimes you get cards stapled three different ways including to the envelope, etc.

"Speaking of over-size cards, yours for VP5JA were too big to fit the standard envelope, so I trimmed them down to size."

Haa—rumph, aaah—Howard,
about those cards, it was this way...

The WPX Program

S.S.B. WPX

611.....WØIKD
612.....DJ2RB
613.....W9KXX
614.....KR6JX
615.....WA1FBX
616.....YU1NOL
617.....W4CRW
618.....SP5BB

C.W. WPX

1103.....YU1AFQ
1104.....K3AQR
1105.....OK1DH
1106.....WB8AAX
1107.....VE1MF
1108.....SP3DOI
1109.....WBSXT

Mixed WPX

285.....W9KXK
286.....HI8LC
287.....WAØKGD
288.....KØPMZ
289.....W9EVD

WPNX

33.....WN9DZP
34.....WN7OTT

VPX

34.....Hans Jeinitz, DEM-14829

WPX Endorsements

S.S.B.: PAØSNG — 700, WB2RLK — 550, WB6DXU—450, W9GHO—400, W9KXK — 400, CR7IK — 400, WB2FMK — 350, W2EHB — 350, G3UKH — 300, W3YHR — 300, KC6WS — 300, KR6JX — 300, WA6INK—250, and WA2EAH—250.

C.W.: W2AIW — 850, OK2QR — 800, ON4QX—800, SP3DOI—400, W9EVD—350, and VE1MF—350.

Mixed: PAØSNG — 850, W9KXK — 600, WB4KZG — 500, WA3GNW — 500, and K1AGB — 450.

Phone: WA6TAX—500, W1PCD—500, and W8PQD—500.

80 Meters: VO1AW.

20 Meters: K6SSN and SP5BB.

10 Meters: WB2FMK and VO1AW.

Asia: VE3GCO and YU1NOL.

Europe: KØDEQ and SP5BB.

South America: W4WSF.

Complete rules for WPX, WPNX, and VPX may be found on pgs. 66-67 of the June, 1970 issue. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to Award Manager, P.O. Box 1271, Covina, Cal. 91722, or to the DX Editor.

CQ DX AWARD HONOR ROLL

The CQ DX Award Honor Roll recognizes those DXers who have submitted proof of confirmations with 275 or more countries for the mode indicated. The ARRL DXCC Country List, LESS DELETED COUNTRIES, is used as the country standard.

2XSSB

TI2HP	319
W2TP	319
WA2RAU	319
DL9OH	318
WA2IZS	317
K6LGF	317
W9ILW	317
W3NKM	316
K6YRA	316
IØAMU	314
W3DJZ	313
W4OPM	313
W6NJU	312
ZS6LW	312
W6KTE	311
W9JT	311
XE1AE	311
W6EUF	310
I8KDB	309
W4IC	309
VE3ACD	308
WA2EOQ	306
VE2WY	302
W6FW	302
F2MO	301
K1SHN	300
OZ3SK	300
YS1O	300
F9MS	299
XE2YP	294
K4RTA	293
W6KZS	293
KH6BB	286
G3RWQ	285
HP1JC	285
W9KRU	284
WAØKDI	282
OE2EGL	280
WAØCPX	278
ZL1AGO	278
WA3IKK	276
WA6MWG	275
WØYDB	275

CW

W6ID	318
W4IC	301
DL3RK	300
W4OPM	299
WA6EPQ	293
W6NJU	291
ON4QX	287
K1SHN	286
W6ISQ	285
W4BQY	280

If you've worked TU2DD send your card to this gentleman, Art Freud, K2QHT, of Smithtown, N.Y. Art also handles QSLs for PY2DBN/mm. He maintains regular skeds with TU2DD on 14270 kc.

We hope to hear more from Howard on this subject later. Meanwhile, I'm sure he would appreciate suggestions from others concerned about the burgeoning QSL problem. You can write to him at 6563 Sapphire Drive, Jacksonville, Fla. 32208.

Rare and Unusual Prefixes

First the PY gang made the WPX contest a prefix chasers dream, then the new Italian prefixes hit. Now we find that the good ole FCC is h'gh on the list in issuing new ones. This is an unusual situation so let's enjoy it while we can.

First here's info on some of the latest of our own, then the new ones from the worldwide circuit:

KA5—This isn't exactly U.S., but KA5EE, reported on 14215 at 1200 GMT is a rare KA. QSL to W4UC.

KCØ—KCØKC was a special station operating July 1-5, 1971. QSL to Box 753, Shawnee Mission, Kansas 66201.

KD2—KD2UMP, on April 1 of all days, aroused a lot of suspicions but was a legitimate operation by the Buffalo Amateur Radio Repeater Association. QSL to W2RSJ.

KD4—KD4ITU operated from May 15-23 in commemoration of World Wide Telecommunication Day. QSL to Rundy, W3ZA.

KF4 — The Puerto Rico Amateur Radio Society operated the station KF4SJ in July, 1971 to commemorate the 450th anniversary of San Juan, oldest city in the nation. The station was operated from various historical points in the island on all bands 6-80

The WAZ Program

S.S.B. WAZ

879.....SM5AQB
880.....SM2CTY
881.....WA3IKK
882.....DM2BUL
883.....CR7IK
884.....K4BBF
885.....LA6RL
886.....EA1IY
887.....JA1VKV
888.....WA2CRD
889.....WB4QKE

C.W.—Phone WAZ

3175.....OH2LU
3176.....SM5BRS
3177.....SM6CUK
3178.....SM5CMP
3179.....SK6AW
3180.....K4OCE
3181.....OK2SFS
3182.....G3JVJ
3183.....K4OD
3184.....DM4WPL
3185.....DM2DGO
3186.....WA3EFH
3187.....I1ASE
3188.....W4RNP
3189.....DL4CE
3190.....W4DRK
3191.....W3RCW
3192.....DL8VN
3193.....DJ4IT
3194.....DL6CT
3195.....DL7DO

Phone WAZ

461.....WA1HFN
462.....VE6MJ

Complete WAZ rules are shown on pgs. 64-66 of the June, 1970 issue. Application blanks and reprints of the rules may be obtained by sending a self-addressed, stamped envelope to DX Editor, P.O. Box 205, Winter Haven, Fla. 33880.

meters. QSL to P.O. Box 626, Ponce, Puerto Rico 00731.

KIØ (WIØ)—At press time it is reported that the Des Moines Radio Amateur Association has a location at the Iowa State Fair and will operate either KIØISF or WIØISF.

KQØ — KQØNEB operated from the Nebraska State Fair. Sept. 1-9. QSL to WØYOY.

WD6—Even the ARRL is getting in on the WPX fun and plans to activate WD6WD during the national convention at Disneyland on Sept. 1-4, 1971.

WL2—WL2NAS was operated in June to commemorate the 50th anniversary of Lakehurst Naval Air Station. More information and photo's will be available next month.

WM8—WM8ICH was the Michigan Week station. QSL to 250 Martin St., Birmingham, MI 48011.

WSØ—WSØATA (Arrows To Aerospace) operated June 26-July 7 to celebrate the 25th anniversary of the Strategic Air Command. QSL to KØBLT.

WU3—WU3SNA was the Naval Academy station on Armed Forces Day. QSL to W3ADO.

WZ6—WZ6SNI operated from San Nicolas Island on Armed Forces Day. QSL to WA6WWC.

From around the world lick your chops over these:

IMØ—IMØKH was an expedition to Maddelena Island. QSL to 12JQ.

ON6—ON6CE, June 7-19, 1971 operated from the 36th General Meeting of the International Electrochemical Convention in Brussels.

PA9—PA9QX on Aug. 10-20, 1971 was Dr. Bob L. TH. Berge, ON4QX, operating from the Netherlands with a special call. He is handling the cards himself.

SPØ—SPØITU was another Telecommunications Day prefix. QSL to SP5PEK.

3FI — 3F1IE by HP1IE and 3F1JC by HP1JC were also for ITU activity.

4U3—This rare one was used by the IARC gang on Telecommunications Day. QSL to Box 6, Geneva, Switzerland.

5T3—5T3ITU was manned by 5T5AD in Mauritania. QSL to F8RU.

9L9—9L9ITU was the special station operated by Ray, 9L1RP.

The CQ DX Award Program

C.W. DX

44.....ON4QX
45.....W1DMD
46.....WB2CDZ
47.....W3RCW
48.....DK3KD
49.....DJ1VB
50.....W4IC
51.....WA6MWG
52.....ZS5SY

S.S.B. DX

112.....K6ZXS
113.....ZS6LW
114.....VE3ACD
115.....WØIKD
116.....W6HUR
117.....DK3LP
118.....WØUCK
119.....W4UPJ
120.....WB2RLK
121.....WB6WAV
122.....W4EAL
123.....K4HJE
124.....OZ3SK
125.....W6KTE

CQ DX Endorsements

C.W.: WA6MWG—250.

S.S.B.: XE1AE—310, W6KTE—310, K1SHN—300, W4HJE—300, OZ3SK—300, WØYDB—275, KH6BB—275, G3RWQ—275, K4RTA — 275, W4EAL — 250, and W4WSF—200. W6KTE—28 MHz

Complete rules for the CQ DX Award Program may be found on pg. 58 of the January, 1971 issue. Application blanks and copies of the rules may be obtained by sending a self-addressed, stamped envelope to the Award Manager, P.O. Box 1271, Covina, Cal. 91722, or to the DX Editor.

Attention Novice DXers: The Novice, monthly newsletter published by Greg, WB6ZNM, needs reports of DX worked by Novices. They may be mailed to him at 1240 21st St., Hermosa Beach, Cal. 90254.

Need List: Bev Cavender, W4CKB, advices that he will happily accept collect calls alerting him to stations in operation at the time of the call from the following countries: China(BY), Maria Theresa(FO8M), Iraq (YI), Syria(YK), Vietnam(3W8/XV5), Cambodia(XU), Minerva Reef(1M), Spratly Island(1S), or Saudi-Iraqui Neutral Zone (8Z4). Bev lives in Lake Placid, Florida, Area Code 813, 465-7941(home) or 465-4451(office). As a reward he offers 1 full bushel of tree ripened Florida oranges or grapefruit for information leading to a *legitimate* contact with any of the above countries.

On an experimental basis, this column will publish a need list of up to 5 countries for any U.S. or Canadian amateur. The desired mode of contacting you must be specified, *i.e.* telephone, telegram, special listening frequency, etc.

Arabian Knights Certificate: This beautiful certificate is awarded by the Middle East DXing Society to amateurs who work 10 Arab countries, one of which must be JY1, after Jan. 1, 1971. Eligible countries by prefix are CN8, HZ/7Z, JY, MP4B, MP4Q, MP4M, MP4T, OD5, ST2, SU1, 7X, 9K2, YK1, 3V8, 4W1, and VS9. Send list, verified by 2 other amateurs, and 7 IRC's to JY1 himself, King Hussein, who issues the award. The Middle East Society members meet saturdays on 14295 kc at 1800 GMT to contact interested DXers.

7-Band DXCC?—W4BRB/VP7 on 6 and 2 meters only! Is this the wave of the future?

Club News: NTDXA—The newly organized North Texas DX Association had 86 in attendance at its Charter Day banquet in Richardson, Texas. W5IO was proclaimed DXer of the Year.

NCDXC—New officers of the Northern California DX Club are WB6UJO, President; K6KQN, Vice President; WA6ISX, Secretary; and K6AUC, Treasurer.

SCDXC—Southern California DX Club officers are W6DGH, President; WA6ZZK, Vice President; K6YRD, Secretary; and WB6UDC, Treasurer.

DXOTC—The Executive Committee of the DX Ole Timers Club is composed of I1AA, I1KDB, IT1SEZ, IT1TAI, and IT1ZGY.

Thanks to Wayne Warden, W9IGW, we have these 3 pictures from the recent DXpedition to Juan Fernandez island by he and Joe Goggin, K9KNW. Wayne is at the key and Joe at the mike. The air view shows the rugged terrain of Juan Fernandez, believed to be island of the legendary Robinson Crusoe. Joe and Wayne made 3793 contacts using 10-80 meters.

160 Meter News (de K6DDO): By gentlemen's agreement the frequencies are being used as follows:

1800 1810 kc—c.w.
1810-1825 kc—a.m. & s.s.b.
1825-1830 kc—c.w.
(DX window for listening only.)
1830-1900 kc—a.m., s.s.b., & testing.

Left to right are W6CS, W6NJU, WA6GLD and F9MS. NJU is CQ DX Committeeman for Southern California, GLD is CQ DX Awards and WPX Manager, F9MS is DX Editor for R.E.F. and maintains CQ's checkpoint in France, while CS is an avid California DXer.

QRPPDX News: Interest in the DXCC, QRPP awards are building up. Low power operators interested in applying should contact Ade Weiss, Editor, *The Milliwatt*, Meckling, S.D. 57044 for the official announcement and complete rules. Top stations on the QRPP Honor Roll at press time are K4OCE with 135 countries using 4.8 watts output, W4VNE at 63 countries with 1 watt output, and WA8DDI at 50 countries with less than 1 watt output. By definition, the upper power limit of QRPP operation is 5.0 watts *output*.

Who's Number One? de WA3HGV: When you accidentally misprinted W3HGV as QSL Manager for VP9DX, practically all the s.a.s.e.'s went to him instead of me although listings in other magazines were correct. Certainly shows who is No. 1 in DX readership! (Sorry we goofed, Future VP9DX cards should go to WA3HGV, 2102 Weatherton Drive, Wilmington, Del. 19810.)

QSL Information

CP3BY—Via WAØEMS, 4912 North Wheeling, Kansas City, Mo. 64119.
CR6KT—To W3HNK.
DJ1US/DJ1USA — c/o WA7LMZ, Rt. 1, Box 229, Silverdale, Wash. 98383.
EL2BA—Via WA2DHF.
EL2CB—To W3HNK.
ET3DS—c/o VE2DCY.
ET3ZU/A—Via I1IJ.
FØWJ—To W5QNY.
FL8HM—c/o W9FN.
FYØNA—Via FØNA.
GB3FI—To GW3VKL.
HI8XPM—Direct, *not* via VE3DLC.
HL9TY—c/o K5ZOL.
HM1EX—Via WB8EUN.
HQ2GK—To WA8VRB.
HR2GK—c/o WA8VRB.
HT1MG—Via WA5GFS.
IMØKH—To I2JQ.
IP1MOL—c/o W2GHK.
JW5NM—Via LA7RB.
JY9AA—To WA3HUP.
JY9B—c/o EP2WB.
KC6RK—Via WA5BON.
KC6WS—To W3FDP.
KG6SI—c/o WA6AHF.
LA1H—Via W2GHK.
LR3DGX & LR3DL—To Casilla 23, Dolores, Buenos Aires, Argentina.
MP4TDM—c/o K1DRN.
PA9QX—Via ON4QX, Everdijstreet 33, Antwerp 2000, Belgium.
SVØWE—To SM2AGD.
TA1KT (logs through March 20, 1971)—c/o K4IEX, 11 Heritage Cove Court, Casselberry, Fla. 32707.
TA6JB—Via DJ9ZB.
TJ1BA—To 4X4RH.
TT8AC—c/o W4SPX.
TT8AD—Via F2MO.
VP9KS—To W1YRC.
VP1FW—Direct, *not* via VE3DLC.
VP1IE—c/o DL1JW.
VP1TM—Direct, *not* via VE3DLC.
VP2AAP—To WA5UHR.
VP2DAN—c/o VE3GMT.
VP2GBG—Via VE3GMT.
VP2GBH—To VE3GMT.
VP2MO (After May 1, 1971) — WA3HGV, 2102 Weatherton Drive, Wilmington, Del. 19810.
VP2SAH—c/o WB2AMO.
VP7NA—Via W9GZK.
VP7NY—To W2GHK.
VR5DK—c/o WA6QWW.
VS6DO—Via W2GHK.
YB8AAN—To K7DVK.
YB8AAP—c/o WB6IZK, Box 984, King City, Cal. 93930.
YN1MG—Via WA5GFS.
ZD8JK—To WA3FNK.
ZF1BL—c/o WØBL.
ZF1WF—Via W4DRW.
ZK1CD—To ZL2FA.
ZK1CE—c/o W7VRO.
ZL4OA/A—Via ZL2GX.
ZM7AG—To K3RLY.
ZP9AC—*not* via K1HDO.
IZ5A—c/o OH2NB.
5H3MM—Via SM5CEU.
5W1AM—To W7YBX.
5Z4KL—Direct, *not* via VE3DLC.
6W8GE—c/o F6AZN.
6Y5GB—Via VE3GMT.
7Q7AA—To K4CDZ.
8P6AH, 8P6BX, 8P6BN, and 8P6CP — c/o VE3GMT.
8R1J—Via K2DDK, Box 248, Manhasset, N.Y. 11030.
8R1U—To VE3GMT.
9H1BL—c/o G3VPS.
9M8FMF—Via W1YRC.
9Q5LW—To WA2GZC.
9X5CC—c/o WA5UHR.
9X5RG—Via ON5TO.
9X5VL—To ON5TO.

73, John, K4IIF

Propagation

BY GEORGE JACOBS,* W3ASK

THE solar cycle is now declining at a relatively rapid rate.

The Swiss Federal Solar Observatory at Zurich reports monthly mean sunspot numbers of 71 for April and 54 for May, 1971. This results in 12-month smoothed numbers of 92 centered on October and 88 centered on November, 1970.

At the present rate of decline, a smoothed sunspot number of approximately 62 is forecast for September, 1971. As can be seen from the following table, this is about the same level that was observed during September, 1966, and considerably lower than the levels observed during September of the past four years.

Table 1

Solar Level Observed During September For Each Year Of The Present Sunspot Cycle

Year	*Smoothed Sunspot Number*
1964	10
1965	17
1966	63
1967	95
1968	107
1969	105
1970	96

Seasonal propagation changes usually take place on the high frequency amateur bands from about mid-September through mid-October. During this period, despite lower solar activity, an increasing number of DX openings can be expected during the daylight hours on 10, 15 and 20 meters, although these bands will close somewhat earlier than during the mid-summer months. Improved nighttime DX propagation conditions are also forecast for 40, 80 and 160 meters, with considerably lower static levels and with these bands remaining open somewhat longer than during the past few months.

A seasonal improvement on long DX openings between the temperate regions of the northern and southern hemispheres is also expected during this period. From mid-September through at least mid-October this should result in more frequent openings between the USA and such areas as South Africa, Australasia, South Asia and South America, on all bands between 10 and 40 meters, with some long DX openings also possible on 80 and perhaps 160 meters as well.

While September usually marks the month when the 10 meter band again becomes alive with DX signals, because of declining solar activity the number of openings this year will be

*11307 Clara Street, Silver Spring, Md. 20902

LAST MINUTE FORECAST

Day-to-Day Conditions and Quality for September, 1971

Days	*Rating & Forecast Quality* (4)	(3)	(2)	(1)
Above Normal: 4-5, 7, 11, 21-22, 24, 31	A	A-B		
Normal: 3, 6, 8-10, 12, 14-15, 18-20, 23, 25-26, 30	A A-B	A-B B	B C	B-C D
Below Normal: 1-2, 13, 16, 27-29	B-C C-D	C-D D-E	D E	E E
Disturbed: 17	C-D	D-E	E	E

HOW TO USE THESE CHARTS

The following is an explanation of the symbols shown above, and instructions for the use of the *CQ* propagation predictions:

1—Enter Propagation Charts on following pages under appropriate band and distance or geographical area columns. Read predicted times of band openings at intersection of both columns.

2—Following each predicted time of band opening is a forecast rating which indicates the relative number of days the band is expected to open during each month of the forecast period. The higher the rating, the more frequent the opening, as follows: (4) band open more than 22 days each month; (3) between 14 and 22 days; (2) between 2 and 13 days; (1) less than 7 days.

On the "Short-Skip" Chart where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. Note the forecast rating for later use.

3—With the forecast rating noted above, start with the numbers in parenthesis at the top of the "Last Minute Forecast" appearing above. Read down the table for a day-to-day forecast of propagation conditions in terms of Above Normal (WWV rating high than 6); Normal (WWV rating 5-6); Below Normal (WWV rating 4); Disturbed (WWV rating less than 4). The letter symbols (A-E) describe reception conditions (signal quality, noise and fading levels) expected for each day of the month and have the following meaning: (A—excellent opening with strong, steady signals; B—good opening, moderately strong signals, little fading and noise; C—fair opening, signals fluctuating between moderately strong and weak; D—poor opening, signals generally weak and considerable fading and noise; E—poor opening, or none at all.

4 — This month's short skip Charts are based upon a transmitter power of 75 watts c.w.; 150 watts s.s.b., or 800 watts d.s.b., into a dipole antenna one quarter-wave above ground on 160, 80 and 40 meters and a half-wave above ground on 20, 15 and 10 meters. For each 10 db increase above these reference levels, reception quality shown in the "Last Minute Forecast" will improve by one level; for each 10 db loss reception will become poorer by one level.

The DX Propogation Charts are based upon a transmitter power of 250 watts c.w.; 1 kw p.e.p. s.s.b., or 1000 watts d.s.b., into a dipole antenna a quarter-wave above ground on 160 and 80, a half-wave above ground on 40 and 20, and a wave-length above ground on 15 and 10.

5—Local standard Time for these predictions is based on the 24-hour system.

6—The short skip Charts are valid Oct. 15, and the DX Charts from Sept. 15 to Dec. 15, 1971. These Charts are prepared from basic propagation, data published monthly by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado.

somewhat fewer than those observed during the past four years of higher solar activity. It will probably be a toss-up between 15 and 20 meters for the best DX band honors during the daylight hours, while 40 meters is expected to provide optimum DX propagation conditions during the hours of darkness.

Because of the marked changes in propagation conditions expected during September, this month's column contains both DX and Short-Skip Propagation Charts. The Short-Skip Charts are valid for both September and October, while the DX Charts are valid from September 15 through October 15.

V.H.F. Ionospheric Openings

Conditions for trans-equatorial, or TE-scatter openings are expected to peak during September and much of October, and 6 meter openings of this type between the USA and South America should be possible during most nights of this period. The optimum time for TE openings on 6 meters is between 8 and 11 P.M., local standard time at the path mid-point. Openings should last from about one to several hours, with weak to moderately strong signals, with some flutter fading at times. While TE propagation favors the southern half of the United States, during September 6 meter openings should be possible from most areas of the country.

Although the summertime sporadic-E propagation season usually comes to an end during September, some 6 meter short-skip openings are still likely to occur over distances ranging between approximately 1000 and 1300 miles. At times two-hop openings up to about 2400 miles may also be possible. While sporadic-E propagation may take place at any time, it is more likely to occur before noon and during the early evening hours. Sporadic-E 6 meter openings are likely to be of only a few minutes duration when they occur, and will rarely last for more than an hour or so, but signal levels can be exceptionally strong.

During September some v.h.f. ionospheric openings should be possible as a result of auroral ionization. Check the "Last Minute Forecast" at the beginning of this column for periods that are forecas to be disturbed or below normal, as these are the days on which auroral type openings are most likely to occur during the month. Auroral-scatter openings last from several minutes to an hour or so, and are usually characterized by weak to moderately strong signals badly distorted by flutter fading.

With the decline in solar activity this will probably be the last year during which F-layer 6 meter openings may be possible, and at best, few openings are expected even this year. During September, some 6 Meter F-layer openings may be possible between the USA and South America, and perhaps to South Africa and Australasia as well. The hours between noon and sundown local time should be optimum for such openings, if they are to occur at all.

No major meteor showers will occur during September, and few, if any significant v.h.f. meteor-scatter openings are likely to be possible during the month.

CQ DX Contest Special

This year's *CQ* Worldwide DX contest will be held on the following dates:

Oct. 30-31 Phone Section
Nov. 27-28 C.w. Section

As has been the practice for the past 20 years, next month's Propagation column will be devoted to a special, comprehensive forecast which will include both contest sections.

CQ Short-Skip Propagation Chart

September and October, 1971
Local Standard Time At Path Mid-Point
(24-Hour Time System)

Distance From Transmitter (Miles)

Band (Meters) / *50-250*	*250-750*	*750-1300*	*1300-2300*
10	*Nil*	09-13 (0-1)	07-09 (1) 09-12 (1-2) 12-13 (1-3) 13-14 (0-3) 14-16 (0-2) 16-21 (0-1)	07-08 (1) 08-09 (1-2) 09-12 (2-3) 12-14 (3-4) 14-15 (2-3) 15-16 (2) 16-17 (1-2) 17-18 (1)
15	*Nil*	07-09 (0-1) 09-14 (0-2) 14-21 (0-1)	07-08 (1) 08-09 (1-2) 09-14 (2-4) 14-16 (1-4) 16-18 (1-3) 18-19 (1-2) 19-21 (1) 21-07 (0-1)	07-08 (1) 08-09 (1-3) 09-16 (4) 16-17 (3-4) 17-18 (3) 18-19 (2) 19-21 (1) 21-07 (1-0)
20	11-13 (0-1) 13-15 (0-2) 15-21 (0-1)	07-08 (0-2) 08-09 (0-3) 09-11 (0-4) 11-13 (1-4) 13-15 (2-4) 15-17 (1-4) 17-18 (1-3) 18-21 (1-2) 21-07 (0-1)	06-07 (1-3) 07-09 (3-4) 09-17 (4) 17-18 (3-4) 18-21 (2-3) 21-23 (1-2) 23-05 (1) 05-06 (1-2)	06-07 (3-2) 07-09 (4-3) 09-13 (4-2) 13-15 (4-3) 15-18 (4) 18-20 (3-4) 20-21 (3) 21-23 (2-3) 23-01 (1-2) 01-05 (1) 05-06 (2)
40	07-09 (1-3) 09-17 (3-4) 17-19 (2-3) 19-21 (1-2) 21-05 (0-1) 05-07 (0-2)	07-09 (3-4) 09-11 (4-3) 11-15 (4-2) 15-17 (4-3) 17-19 (3-4) 19-21 (2-4) 21-23 (1-4) 23-03 (1-3) 03-05 (1-2) 05-07 (2-3)	07-09 (4-2) 09-11 (3-1) 11-15 (2-1) 15-17 (3-2) 17-20 (4-3) 20-23 (4) 23-03 (3-4) 03-05 (2-3) 05-07 (3-4)	07-09 (2-1) 09-15 (1-0) 15-17 (2-1) 17-19 (3-2) 19-20 (3) 20-03 (4) 03-05 (3-4) 05-07 (4-3)
80	06-08 (3-4) 08-11 (4) 11-18 (4-3) 18-22 (4) 22-04 (3-4) 04-06 (2-3)	06-08 (4-2) 08-11 (4-1) 11-16 (3-1) 16-18 (3-2) 18-20 (4-3) 20-04 (4) 04-05 (3-4) 05-06 (3)	06-08 (2-1) 08-16 (1-0) 16-18 (2-1) 18-20 (3-2) 20-21 (4-3) 21-03 (4) 03-05 (4-3) 05-06 (3-2)	06-08 (1) 08-16 (0) 16-18 (1) 18-20 (2) 20-21 (3-2) 21-03 (4-3) 03-05 (3-2) 05-06 (2-1)
160	16-18 (1-0) 18-20 (2-1) 20-05 (4) 05-07 (3-2) 07-09 (2-1) 09-11 (1-0)	17-19 (1-0) 19-20 (1) 20-02 (4-3) 02-05 (3-2) 05-07 (2-1) 07-09 (1-0)	19-20 (1-0) 20-22 (3-1) 22-02 (3) 02-05 (2-1) 05-07 (1)	20-22 (1-0) 22-02 (3-2) 02-05 (1) 05-07 (1-0)

SEPTEMBER 15-OCTOBER 15, 1971

Time Zone: EST (24-Hour Time)

EASTERN USA TO:

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Western & Central Europe & North Africa	08-10 (1) 10-11 (2) 11-13 (1)	07-08 (1) 08-10 (2) 10-13 (4) 13-14 (3) 14-15 (2) 15-16 (1)	02-03 (1) 03-05 (2) 05-09 (3) 09-11 (2) 11-14 (3) 14-16 (4) 16-19 (3) 19-22 (2) 22-00 (1)	17-18 (1) 18-20 (2) 20-22 (3) 22-01 (4) 01-02 (3) 02-03 (2) 03-04 (1) 19-21 (1)* 21-00 (2)* 00-03 (1)*
Northern Europe & European USSR	08-11 (1)	07-08 (1) 08-09 (2) 09-12 (3) 12-13 (2) 13-14 (1)	02-05 (1) 05-07 (2) 07-10 (3) 10-12 (2) 12-16 (3) 16-18 (2) 18-20 (1)	17-19 (1) 19-03 (2) 03-04 (1) 20-03 (1)*
Eastern Mediter-ranean & Middle East	09-12 (1)	07-08 (1) 08-11 (2) 11-13 (3) 13-15 (2) 15-16 (1)	06-08 (2) 08-14 (1) 14-16 (2) 16-20 (3) 20-22 (2) 22-00 (3) 00-02 (2) 02-06 (1)	18-20 (1) 20-23 (2) 23-00 (1) 21-23 (1)*
West & Central Africa	09-11 (1) 11-13 (2) 13-15 (3) 15-16 (2) 16-17 (1)	06-08 (1) 08-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	04-07 (2) 07-14 (1) 14-16 (2) 16-17 (3) 17-20 (4) 20-22 (3) 22-02 (2) 02-04 (1)	19-22 (1) 22-01 (2) 01-03 (1) 00-02 (1)*
South Africa	08-10 (1) 10-12 (2) 12-13 (1)	06-10 (1) 10-11 (2) 11-12 (3) 12-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	13-15 (1) 15-18 (2) 18-22 (3) 22-00 (2) 00-01 (1) 05-07 (1)	18-21 (1) 21-23 (2) 23-01 (1) 22-00 (1)*
East Africa	11-13 (1) 13-16 (2) 16-17 (1)	06-08 (1) 08-12 (2) 12-14 (3) 14-16 (4) 16-18 (3) 18-19 (2) 19-20 (1)	11-13 (1) 13-16 (2) 16-20 (3) 20-00 (2) 00-01 (1)	19-00 (1)
Central & South Asia	08-10 (1) 18-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 19-21 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-18 (1) 18-21 (2) 21-00 (1)	19-22 (1) 04-06 (1)
Southeast Asia	10-12 (1) 18-20 (1)	08-10 (1) 13-15 (1) 17-18 (1) 18-19 (2) 19-20 (1)	05-07 (1) 07-09 (2) 09-11 (1) 14-17 (1) 19-20 (1) 20-23 (2) 23-01 (1)	05-07 (1)
Far East	17-19 (1)	08-10 (1) 15-17 (1) 17-19 (2) 19-20 (1)	06-07 (1) 07-09 (2) 09-11 (1) 16-19 (1) 19-21 (2) 21-23 (1)	05-07 (1)
South Pacific & New Zealand	08-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-17 (2) 17-20 (3) 20-21 (1)	11-19 (1) 19-22 (2) 22-02 (3) 02-07 (2) 07-09 (3) 09-11 (2)	00-01 (1) 01-02 (2) 02-05 (3) 05-07 (2) 07-08 (1) 03-07 (1)*

HAWAII

Openings Given in Hawaiian Standard Time†

To:	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	08-09 (1) 09-11 (2) 11-13 (3) 13-14 (2) 14-15 (1)	06-07 (1) 07-08 (2) 08-11 (1) 11-12 (2) 12-14 (3) 14-15 (2) 15-16 (1)	11-14 (1) 14-16 (2) 16-19 (3) 19-22 (2) 22-01 (1) 04-06 (2) 06-08 (1)	18-20 (1) 20-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 20-22 (1)* 22-00 (2)* 00-01 (1)*
Central USA	08-09 (1) 09-11 (2) 11-14 (3) 14-15 (2) 15-16 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	08-14 (1) 14-16 (2) 16-18 (4) 18-20 (3) 20-23 (2) 23-05 (1) 05-08 (2)	18-20 (1) 20-22 (2) 22-01 (3) 01-03 (2) 03-04 (1) 21-22 (1)* 22-00 (2)* 00-02 (1)*
Western USA	08-09 (1) 09-10 (2) 10-14 (4) 14-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (2) 09-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-19 (1)	10-14 (2) 14-15 (3) 15-18 (4) 18-21 (3) 21-00 (2) 00-05 (1) 05-06 (2) 06-08 (4) 08-10 (3)	18-19 (1) 19-20 (2) 20-02 (4) 02-04 (3) 04-05 (2) 05-06 (1) 21-22 (1)* 22-23 (2)* 23-02 (3)* 02-03 (2)* 03-04 (1)*

ALASKA

Openings Given in GMT‡

	10 Meters	15 Meters	20 Meters	40/80 Meters
Eastern USA	18-20 (1) 20-22 (2) 22-23 (1)	16-18 (1) 18-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	12-15 (1) 21-23 (1) 23-00 (2) 00-02 (3) 02-03 (2) 03-04 (1)	08-12 (1)
Central USA	19-22 (1) 22-00 (2) 00-01 (1)	17-19 (1) 19-21 (2) 21-01 (3) 01-02 (2) 02-03 (1)	13-17 (1) 21-23 (1) 23-01 (2) 01-03 (3) 03-04 (2) 04-06 (1)	08-14 (1)
Western USA	20-22 (1) 22-01 (2) 01-02 (1)	18-21 (1) 21-22 (2) 22-00 (4) 00-01 (3) 01-02 (2) 02-04 (1)	16-18 (1) 18-20 (3) 20-00 (2) 00-02 (3) 02-03 (4) 03-04 (3) 05-05 (2) 05-07 (1)	08-11 (1) 11-14 (2) 14-16 (1) 11-14 (1)*

*Indicates predicted 80 Meter openings. Openings on 160 Meters are also likely to occur during those times when 80 Meter openings are shown with a forecast rating of (2) or higher.

†To convert from HST shown in the Chart to Local Standard Time in other USA Time Zones, add 2 hours in the PST Zone, 3 hours in the MST Zone; 4 hours in the CST Zone; and 5 hours in the EST Zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 Noon in Honolulu, it is 14 or 2 P.M. in Los Angeles; 17 or 5 P.M. in Washington, D.C.; and 22 GMT.

‡To convert to Local Standard Time in Alaska, subtract 8 hours from GMT in the Pacific Standard Time Zones; 9 hours in the Yukon Zone; and 10 hours in the Alaskan Standard Time Zone. In other USA Time Zones subtract 5 hours from GMT in the EST Zone; 6 hours in the CST Zone and 7 hours in the MST Zone. For example, at 20 GMT it is 12 Noon in Juneau and 15 or 3 P.M. in N.Y.C.

Special CQ Contest Propagation Forecast Next Month

Australia	09-11 (1) 15-16 (1) 16-18 (2) 18-20 (1)	07-08 (1) 08-10 (2) 10-11 (1) 13-16 (1) 16-19 (2) 19-21 (1)	06-08 (2) 08-10 (3) 10-12 (2) 12-15 (1) 15-17 (2) 17-20 (1) 20-22 (2) 22-01 (3) 01-02 (2) 02-06 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Northern & Central South America	08-09 (1) 09-10 (2) 10-13 (4) 13-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-17 (4) 17-18 (3) 18-19 (2) 19-20 (1)	03-05 (1) 05-06 (2) 06-09 (4) 09-14 (2) 14-16 (3) 16-21 (4) 21-02 (3) 02-03 (2)	18-19 (1) 19-20 (2) 20-03 (4) 03-05 (3) 05-06 (2) 06-07 (1) 20-22 (1)* 22-03 (2)* 03-05 (1)*
Brazil, Argentina, Chile & Uruguay	08-09 (1) 09-11 (2) 11-13 (1) 13-14 (2) 14-16 (4) 16-17 (3) 17-18 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	09-15 (1) 15-17 (2) 17-19 (3) 19-00 (4) 00-02 (3) 02-03 (2) 03-05 (1) 05-07 (3) 07-09 (2)	20-23 (1) 23-04 (2) 04-06 (1) 00-05 (1)*
McMurdo Sound, Antarctica	16-18 (1)	11-14 (1) 14-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	15-17 (1) 17-20 (2) 20-23 (3) 23-00 (2) 00-02 (1) 06-08 (1)	22-00 (1) 00-04 (2) 04-06 (1) 03-05 (1)*

Time Zones: CST & MST (24-Hour Time)

CENTRAL USA TO:

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

Time Zone: PST (24-Hour Time)

WESTERN USA TO:

	10 Meters	*15 Meters*	*20 Meters*	*40/80 Meters*
Western Europe & North Africa	08-10 (1)	07-08 (1) 08-11 (2) 11-13 (1)	05-06 (1) 06-09 (2) 09-12 (1) 12-13 (2) 13-15 (3) 15-16 (2) 16-18 (1)	19-20 (1) 20-22 (2) 22-23 (1) 20-22 (1)*
Central & Northern Europe & European USSR	*Nil*	07-08 (1) 08-10 (2) 10-12 (1)	05-06 (1) 06-08 (2) 08-11 (1) 11-13 (2) 13-15 (1) 20-22 (1)	19-23 (1)

Continued on page [98]

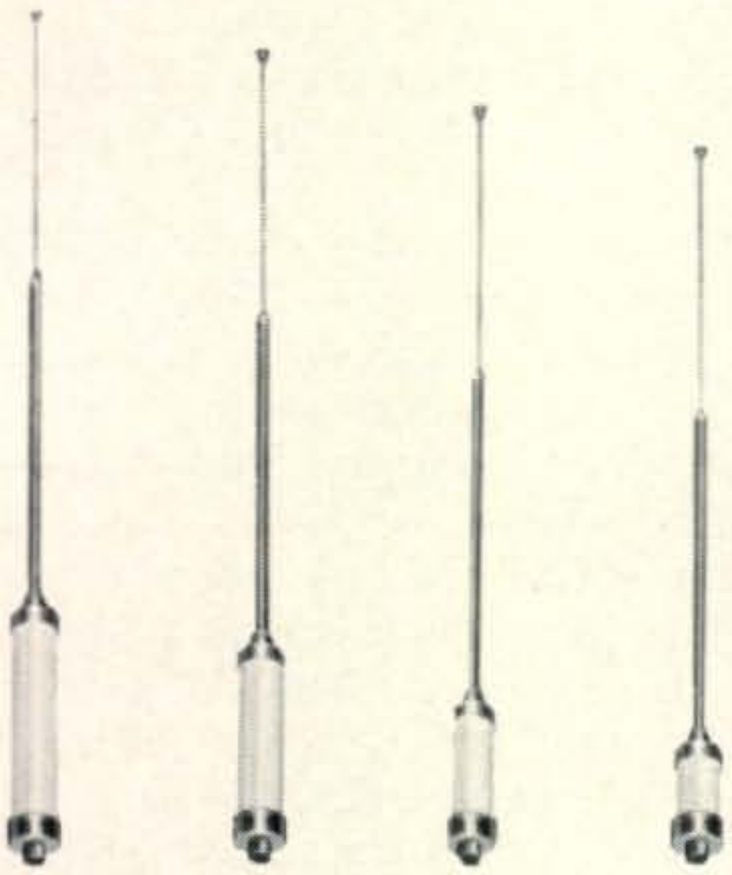
The most powerful antennas under the sun!

Hy-Gain's ALL NEW HAMCAT

Now The Best Is Even Better!

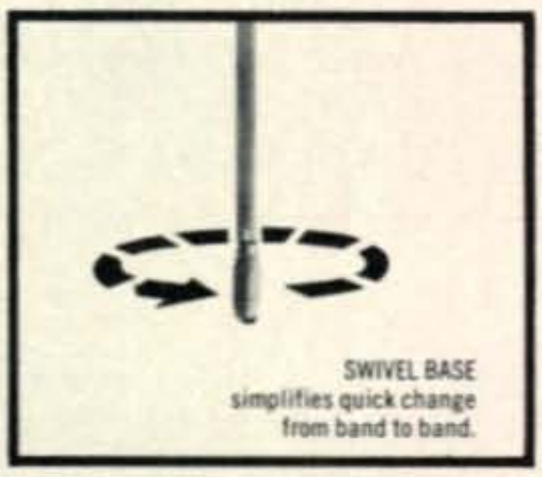
- More power capability with lower VSWR
- Higher Q plus broad band performance
- Higher radiation effectiveness
- Lightweight, super strength construction
- Shake-proof sleeve lock folds over for garaging
- Lightweight precision wound coils sealed in an indestructible epoxy-fiberglass sleeve
- Swivel base for quick change from band to band
- Nominal 52 ohm impedance on all bands—no special matching (any length coax will work)
- Coil sleeve is distinctive white with heavy chrome plated brass fittings
- Turn-over mast is hefty ⅝" dia. heavy wall tubing of highly polished heat-treated brite dipped aluminum
- All connections are standard ⅜ x 24 thread
- Mast folds over, swivels, turns over—mount it on bumper or deck
- Swivel lock base is stainless steel
- Coil and tip rods are a one-piece assembly. Coil diameters are constant, only lengths change

Order No. 257	All new design 5' long heavy duty mast of high strength heavy wall tubing	**$16.95**
Order No. 252	75 meter mobile coil	**$19.95**
Order No. 256	40 meter mobile coil	**$17.95**
Order No. 255	20 meter mobile coil	**$15.95**
Order No. 254	15 meter mobile coil	**$12.95**
Order No. 253	10 meter mobile coil	**$10.95**



No. 256 No. 255 No. 254 No. 253

Shake-proof SLEEVE LOCK releases fold-over hinge.



SWIVEL BASE simplifies quick change from band to band.

Order No. 492

Price $2.80

Coil and tip rod SPRING also available. Shpg. Wt. 0.2 lbs.

COIL ASSEMBLY CUT-AWAY
A. Chrome plated brass fittings.
B. Inner fiberglass core.
C. Precision coil.
D. Outer fiberglass shield.

All permanently assembled and completely impregnated with special moisture-proof compound.

No. 257

Hy-Gain Heavy Duty Bumper Mount

- Rugged stainless steel construction • Handles full size heavy whip
- Clamps to most car bumpers

Order No. 415 **$8.95**

HAMTRONICS DIVISION TREVOSE T.V. & ELECTRONICS

999 Howard Avenue / Burlingame, California 94010 / 415—342-5757

Contest Calendar

BY FRANK ANZALONE,* W1WY

Calendar of Events

Sept.	5-6	Nebraska QSO Party
Sept.	11-12	DARC WAE Phone Contest
Sept.	11-13	Washington State QSO Party
Sept.	11-13	Four Land QSO Party
Sept.	18-19	SAC C.W. Contest
Sept.	18-20	Pennsylvania QSO Party
Sept.	22-24	YLRL "Howdy Days"
Sept.	25-26	North Dakota QSO Party
Sept.	25-26	VE/W Contest
Sept.	25-26	SAC Phone Contest
Oct.	2-3	California QSO Party
Oct.	2-3	VK/ZL/Oceania DX Phone
Oct.	9-10	VK/ZL/Oceania DX C.W.
Oct.	9-10	RSGB 21/28 mc Phone
Oct.	9-11	Fifth District QSO Party
Oct.	16-17	Boy Scouts Jamboree
Oct.	16-17	WADM C.W. Contest
Oct.	16-18	CARTG RTTY Contest
Oct.	20-21	YL Anniversary C.W.
Oct.	23-24	RSGB 7 mc C.W. Contest
Oct.	**30-31**	**CQ WW DX Phone Contest**
Nov.	3-4	YL Anniversary Phone
Nov.	6-7	Illinois QSO Party
Nov.	6-7	RSGB 7 mc Phone Contest
Nov.	14	Czechoslovakia Contest
Nov.	13-14	ARRL SS Phone Contest
Nov.	20-21	ARRL SS C.W. Contest
Nov.	**27-28**	**CQ WW DX C.W. Contest**

Nebraska QSO Party

Starts: 0000 GMT Sunday, September 5
Ends: 2300 GMT Monday, September 6

This one is sponsored by the Lincoln ARC, and planned to create some activity over the Labor Day week-end.

Exchange: Signal report and QTH; county for Nebr. stations, state for all others.

Scoring: *Nebr.* — 2 points per QSO, each mode. Multiplied by total number of states, provinces and countries worked. *Others* — 3 points per QSO each mode, multiplied by Nebr. counties worked. (max. of 93) Mobiles in a different county count as a separate QSO and multiplier.

Station KQØNEB will be active from Sept. 1-9 during the State Fair. Contacts with KQØNEB during this period count 10 points per QSO on each mode regardless if its during the QSO party. Add 1000 points to your total score if worked on 4 different bands.

Frequencies: 3560, 3982, 7060, 7260, 14060, 14300, 21060, 21360, 28060, 28560.

Awards: Certificates to high score in each Nebr. county and in each state, province and DX country.

Mailing deadline is October 15th to: Awards Chairman, Michael Nickolas, WAØKGD, 4921 Tipperary Trail, Lincoln, Nebraska 68512. Include s.a.s.e. for copy of results.

Washington State QSO Party

Starts: 2000 GMT Saturday, September 11
Ends: 0200 GMT Monday, September 13

The sixth annual QSO Party sponsored by the Boeing Employees' A.R.S. will be held on the final week-end of the Washington State Amateur Radio Week.

All bands and modes may be used and the same station may be worked on each band and mode for contact points. Wash. may work in-state stations for QSO points.

Exchange: QSO nr., RS/RST and QTH. County for Wash. stations, state, province or country for others.

Scoring: Wash. stations score one point for each QSO. all others 2 points for each Wash. contact. Multiplier for Wash. is states, provinces and countries; others total Wash. counties worked. (max. of 39).

Frequencies: C.W. — 3560, 7060, 14060, 21060, 28060. Phone — 3960, 7260, 14280, 21380, 28660. Novices—3735, 7175, 21204.

Awards: Certificates to top scorer in each state, province, country and Wash. county. Worked Five Bears Award is available to anyone working five club members before, during or after the party. Three Bear Cubs Award for working three novice members.

Mailing deadline October 9th to: Boeing Employees' A.R.S., Att: Willis D. Propst, K7RSB, 18415 38th Ave., South, Seattle, Wash. 98188.

Four Land QSO Party

Starts: 1800 GMT Saturday, September 11
Ends: 0200 GMT Monday, September 13

This is the second annual QSO party sponsored by the 4th District Chapter #79 of the CHC International to make the many counties in the eight 4th District states available for the county hunters.

The same station may be worked on each band and mode fixed, and again if operating portable

*14 Sherwood Road, Stamford, Conn. 06905.

or mobile. Fourth District stations may work other in-district stations.

Exchange: QSO nr., RS/RST and QTH. County and state for 4th district; state, province or country for others.

Scoring: *For 4th District:* Total QSOs × states × countries × continents. *All Others:* QSOs × 4th Dist. states × 4th Dist. counties. Count states and counties once only.

Frequencies: C.W. — 3575, 7060, 14075, 21090, 28090. Phone — 3940, 7260, 14343, 21360, 28600. Novice—7150, 21100.

Awards: Certificates to top scorers in each state, province, country and continent, 2nd and 3rd place awards when warranted. Also county awards to 4th Dist. states and special awards to Novices and s.w.l.s.

Mailing deadline Oct. 31st to: CHC Chapter #79, att; Bob Knapp. W4OMW, Rt. 7, Box 187, Greenville, N.C. 27834.

Scandinavian Activity Contest

C.W.— Sept. 18-19 **Phone**—Sept. 25-26
Starts: 1500 GMT Saturday
Ends: 1800 GMT Sunday

It's the world working the Scandinavians on all bands, 3.5 thru 28 mc. Country prefixes are: LA, JW, JX, OH, OHØ, OHØ, OX, OY, OZ, SM/SK/SL.

Both single and multi-operator operation is permitted. Simultaneous operation on more than one band is permitted but the exchange must be in chronological order. Multi-transmitter stations will use separate series of serial numbers for each band.

Exchange: Five or six figures, RS/RST plus a progressive QSO nr. starting with 001.

Scoring: Each completed QSO counts 1 point. The multiplier is the SAC prefixes above, max. of 10 per band. Scoring is for all band operation only.

Awards: Certificates to the two top scorers, both phone and c.w., in each country and each US call area.

A summary sheet showing the scoring is requested, your name and address in BLOCK LETTERS, and a signed declaration that all rules and regulations have been observed.

This year the logs go to: SRAL Contest Committee, Box 306, SF-00100, Helsinki, 10 Finland.

Pennsylvania QSO Party

Starts: 2300 GMT Saturday, September 18
Ends: 0200 GMT Monday, September 20

The 14th annual QSO party is again sponsored by the Nittany ARC. The same station may be worked on each band and mode for QSO points.

Exchange: QSO nr., RS/RST and QTH. County for Penn., ARRL section or country for others.

Scoring: *For Penn*—3 points for out-of-state contacts, 1 point with other Penn. stations. Multiply total by ARRL sections and countries worked. *Others*—1 point per QSO multiplied by

That's Brother Ed in the center, with yours truly on the left and Al, I1AMU on the right. Frank, I1ZV was the man behind the camera. (I neglected to get the name of the fellow at the mic. of HV3SJ). This shot was taken last May when we visited Rome.

Penn. counties worked. (max. of 67).

Frequencies: On c.w. activity will be found 72.5 kc in from lower edge of each band. Phone activity on even GMT hours on 3990, 7290, 14290, 21390, 28590.

Awards: 1st place certificates in each ARRL section and country, 2nd and 3rd place awards where activity justifies. Stations qualifying for the Penn. Counties Award will be issued the certificate free. (Min. of 30 counties)

Mailing deadline October 19th to Nittany ARC QSO Party, P.O. Box 60, State College, Penn. 16801.

"YL Howdy Days"

Starts: 1800 GMT Wednesday, September 22
Ends: 1800 GMT Friday, September 24

This is a YL activity only, OMs keep out. Scores will be based on contacts between licensed women operators only. All bands and modes may be used, but cross-band and net contacts do not count.

Score 2 points for each YLRL member worked and 1 point for each non-member. Only one contact with the same station permitted, There is no multiplier.

The top scoring YLRL member will receive her choice of a YLRL pin, charm or stationery. The highest non-member will receive a year's membership in the YLRL.

Logs go to: Mae Hipp, K7QGO, 5655 Yukon Drive, Sparks, Nev. 89431.

North Dakota QSO Party

Starts: 1700 GMT Saturday, September 25
Ends: 2359 GMT Sunday, September 26

The Forx, the Sioux and other radio clubs in North Dakota sponsoring this activity may find the going a bit rough bucking the VE/W contest on the same week-end.

Exchange: QSO nr., RS/RST and QTH. County for North Dakota, state, province or country for others.

Scoring: One point per QSO. North Dakota use states, provinces and countries worked for

their multiplier. Others use North Dakota counties. (max. of 53)

Frequencies: C.W. — 3580, 7080, 14080, 21080, 28080. Phone — 3980, 7280, 14300, 21380, 28580.

Awards: Certificates to the top station in each state, province and country, and first place in each North Dakota county. The high Novice scorer will also be awarded.

Mailing deadline is October 15th to: Paul Kube, WAØOVW, Contest Chairman, 630 Boyd Drive, Grand Forks, N.D. 58201.

VE/W Contest

Starts: 2300 GMT Saturday, September 25
Ends: 0200 GMT Monday, September 27

The Montreal Amateur Radio Club once again announces its annual VE/W contest.

Its the VE/VO's working the W/K's in the "General" portion of the US bands. Phone and c.w. are considered different contests and must be scored separately. There are two classifications, single and multi-operator.

Only 20 hours of operating is allowed during the 27 hour contest period. The minimum off period is 15 minutes, and on and off times must be indicated on the log.

Exchange: QSO nr., RS/RST and QTH. ARRL section for W/K's; geographical areas for the VE/VO's. (Provinces, plus Newfld., Lab., Yukon and N.W.T. total of 13.)

Scoring: Each completed QSO counts 2 points. W/K's use sum of VE sections from each band for their multiplier. (13 on each band) VE/VO's will use ARRL sections.

Awards: Certificates to the highest scoring stations, both phone and c.w., in each section. (min. of 25 QSOs) Awards to multi-operator stations will only be issued when there are at least 3 entries per section. And two Trophies to the highest scoring Canadian and U.S. station.

Summary and check sheets are a must, as is a signed declaration that all rules and regulations have been observed. Also a dupe check sheet for logs with 200 or more contacts.

Improved log forms and summary sheets are available by sending a s.a.e. and IRCs to address below.

Mailing deadline for logs is October 31st to: VE/W Contest Committee, Att: David Weiner, VE2DCW, 676 Wiseman Ave., Outremont 154, P.Q. Canada.

CQ World Wide DX Contest

Phone: Oct. 30-31 **C.W.:** Nov. 27-28
Starts: 0000 GMT Saturday
Ends: 2400 GMT Sunday

Rules are the same as previous years and will be given in detail next month. Following is a brief break-down for the benefit of our friends in remote areas.

1. All bands may be used, 1.8 thru 28 mc.
2. Exchange, RS/RST plus your *CQ* Zone.
3. QSO point value. (a) 3 points between stations on different continents. (b) 1 point between stations on the same continent but in different countries. (c) Contacts between stations in the same country are permitted for Zone and/or Country multiplier but have no QSO point value. (d) *This is for North American stations only:* Contacts between stations within the North American (WAC) boundries count 2 points.
4. Your multiplier is determined by the sum of Zones and Countries *worked* on each band. (*CQ* Zone list and ARRL and DARC country list.)
5. Final score: (a) Single band, Zones plus Countries multiplied by QSO points. (b) All band, sum of Zones plus sum of Countries from all bands multiplied by total QSO points.
6. Competition: Three divisions. (a) Single operator, single band or all band. (b) Multi-operator, single transmitter. (c) Multi-operator, multi transmitter. Multi-operator stations are judged on all band operation only.
7. Definition of a multi-operator station: Single transmitter, only one transmitter and *one* signal permitted within the same time period. Multi transmitter, several transmitters may be active, but *only one* signal per band is permitted.
8. Use a separate log sheet for each band, 40 contacts to the page. Indicate the zone and country *only the first time* it is worked on each band.

Official rules including a list of over 25 Trophies donated by prominate hams and clubs all over the world will appear in next month's issue. These rules as well as official log forms and summary sheets are available from *CQ*. Include a large s.a.s.e. or IRCs to cover your request. Our address: CQ World Wide DX Contest, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050.

Editor's Notes

From time to time we receive criticism regarding the scoring system in our contests. And also suggestions on how to equalize these inequities in areas that feel that they are operating under a handicap.

It is conceded that certain areas have advantages over others. Rick Niswander, WA8VRB feels that the Caribbean/Central American area is at a disadvantage, and proposed a change in our QSO point structure to correct this. In theory his plan has merits, but what do we do with other areas of the world who also have a gripe?

Even with the increase of QSO point value instituted a few years ago and the offering of special awards for that area, we have seen no improvement in the activity.

With over 25 Trophy awards available, covering all areas of the world, it is not necessary for a station to compete on a world wide basis. There is a "bacon" right in his own back yard.

73 for now, Frank, W1WY

Q AND A

BY WILFRED M. SCHERER,* W2AEF

Which S.W.R.?

A frequent inquiry is one that concerns s.w.r. problems and line-matching to the transmitter. The subject was touched upon somewhat in the November 1968 Q & A Column, but inasmuch as this month's issue of *CQ* is an antenna one, it appears appropriate to further go into this related matter, particularly for newer readers or those who may have overlooked the earlier comments.

A typical question in this respect is, "I have a three-band antenna for which the manufacturer claims an s.w.r. of within 1.5:1 on each band, but when I check the s.w.r. at the transmitter, it is higher on some bands. The transmitter cannot then be properly loaded and I'm afraid it will be harmed because of this. I used transmission-line lengths as recommended, but by changing line lengths I can get almost any s.w.r. I wish. What goes?"

We might start off by saying that there are two types of s.w.r., depending on the point at which you're looking at the antenna system. One is presented to the transmission line by the antenna. It is based on the relationship between the antenna impedance and the characteristic impedance of the transmission line. This is what determines the s.w.r. along the line or the line s.w.r.

The other is the s.w.r. as it *appears* to the transmitter at the *input* to the transmission line. If the antenna impedance is perfectly matched to the line impedance, the s.w.r. *on the line* will be 1:1 and will also appear so at the input to the line, regardless of the line length.

If the antenna is not matched to the line, the line s.w.r. will be other than 1:1 and the impedance at the input of the line may be such as to make it appear as if the line s.w.r. were different than it actually is. This situation hinges on the mismatch at the antenna and the inherent line losses coupled with the reflected impedance which may be resistive or reactive (inductively or capacitively) according to the line length relative to frequency. The s.w.r. as thus presented at the line input is the load seen by the transmitter. Since much of the amateur gear is rated as to the capability of proper loading into a load with a given s.w.r. and because most amateurs are s.w.r.-conscious through the almost universal use of an s.w.r. indicator, the term *line-input* s.w.r. will be used herein, rather than the line input impedance.

What are the different effects between the line s.w.r. and the line-input s.w.r.?

The line s.w.r. determines the transmission power loss due to mismatch at the antenna. Note that there also are other losses which depend on the frequency of operation and the inherent properties of the line (ohmic resistance and dielectric) and line radiation. These losses are those usually given as attenuation in db per 100 feet of length with operation at a specific frequency. Losses due to the line s.w.r. may be found in charts published in radio handbooks.

The line-input s.w.r. determines whether or not the line can be matched within the loading capabilities of the transmitter p.a.

Most rigs can be satisfactorily loaded into an impedance that looks like an s.w.r. of 1.5:1 or 2:1 (relative to 50 ohms). If the line-input s.w.r. is higher than these amounts, the p.a. either cannot be fully loaded or cannot be sufficiently unloaded.

Improper loading of the transmitter p.a. can result in low r.f. output, excessive screen current or plate dissipation, breakdown of components, r.f. feedback or poor linearity (with s.s.b. rigs). During tuneup where the transmitter cannot be adequately *un*loaded, the resonant point for the p.a. may be so broad as to obscure resonance which thus may cause excessive tube heating, resulting in possible damage.

The line s.w.r., of course, must be taken care of by adjusting the antenna to match the line or to present as low an s.w.r. as possible to the line. This is best done while using an r.f. impedance bridge or an s.w.r. indicator *at the antenna.*

Where this is not possible, the next best

[*Continued on page 99*]

*Technical Director, *CQ*.

THE dwards PROGRAM

BY ED HOPPER.* W2GT

Special Honor Roll
All Counties

#56—Jack du Bois, K2CPR 5-25-71.
#57—Ed J. Alston, W4LXI 5-29-71.
#58—Ray Phillips, K5RPC 6-5-71.
#59—J. H. Carnett (Jim), TG9UZ 6-7-71.
(#2 outside K/W)

USA-CA HONOR ROLL

3000		2000		1000	
K5RPC	77	WB6RMZ	132	WB6RMZ	240
TG9UZ	78	TG9UZ	133	TG9UZ	241
2500		**1500**		**500**	
WB6RMZ	107	WB6RMZ	165	WB6RMZ	852
K4WVX/1	108	TG9UZ	166	WB2ZNN	853
TG9UZ	109			WB6AUA	854
				TG9UZ	855

THE September, "Story of The Month is:

Jack du Bois, K2CPR

(All Counties #56, 5-25-71)

Jack's interest in County Hunting was renewed in late 1969, when he was invited to join the CW NET on 7055. Having earned the basic USA-CA-500-Award-#178, in January 1963, he had directed his efforts toward completing the qualifications for additional awards, at the same time improving his DXCC total (Presently 318 confirmed).

At the beginning of 1970, a check of QSLs revealed a total of just under 900 counties confirmed, and with a little "nudge" from K1ZFQ, it was pushed over the 1000 mark.

It goes without saying that any County Hunter with phone capabilities will eventually learn about the Mobile Net (Independent County Hunters) on 14336 plus other such activities also on 40 and 75 meters. Once that reservoir of new counties was tapped, it was "full speed ahead" until USA-CA-3000 was earned in November, '70 and six months later Ed, KH6TS gave him Kalawao for #3079!

As for background, Jack was born December 23, 1909, in Philadelphia, Pa., and obtained the call sign W3BXE in March 1932 while employed as a mechanical designer with Philco. Starting out with a 1-V-1 receiver and a 45-TNT connected to a 66 foot bent end-fed antenna, the station set-up was gradually improved and in 1941, the ECO transmitter ended up with 100 watts to an 809 feeding a sloping all band center-fed antenna. During this period, Jack's code speed increased (35 w.p.m. certificate in August 1940) and he became interested in traffic handling, making BPL many times. After WWII, all this was changed, for WCAU, which previously had been located in Newtown Square, Pa., moved their 50 KW transmitter to within 3 miles of Jack's QTH, dropping a 3rd harmonic on 3630, the frequency of the Atlantic-Pacific Trunk Line, one of his biggest traffic outlets. This put a crimp in message handling, so he turned to low power DX-ing. Once encouraged by a few confirmations from the easy ones, almost 100% of "on-the-air" time was devoted to chasing DX, until DXCC certificate #64 was earned in October 1947.

Because of his pre-war position as Ass't SCM and his familiarity with the E. Pa. networks, Jack was appointed SEC and served in that capacity until elected SCM of E. Pa. in 1951. During his term of office a move was made to New Jersey where the call became K2CPR. An Extra Class license was obtained in 1965 and thereafter award hunting occupied most of his time. Incidentally, he received a "5BWAS" en-

Jack duBois, K2CPR.

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

The County Hunter Picnic. Rear—L. to R.: K2CPR; WA2QNW; W2KXL (Host); ZL1KG & "LIL"; WA2-AMM; WAØWOB; W3RY. Center: WA1CXE; WB6-AUA; WA2HGL; WB2FVO; WB2GLI. Front: WB2-SJQ; K2RAR; WB2TWM; W2BLM; W2GT; W2IPE; W2OST.

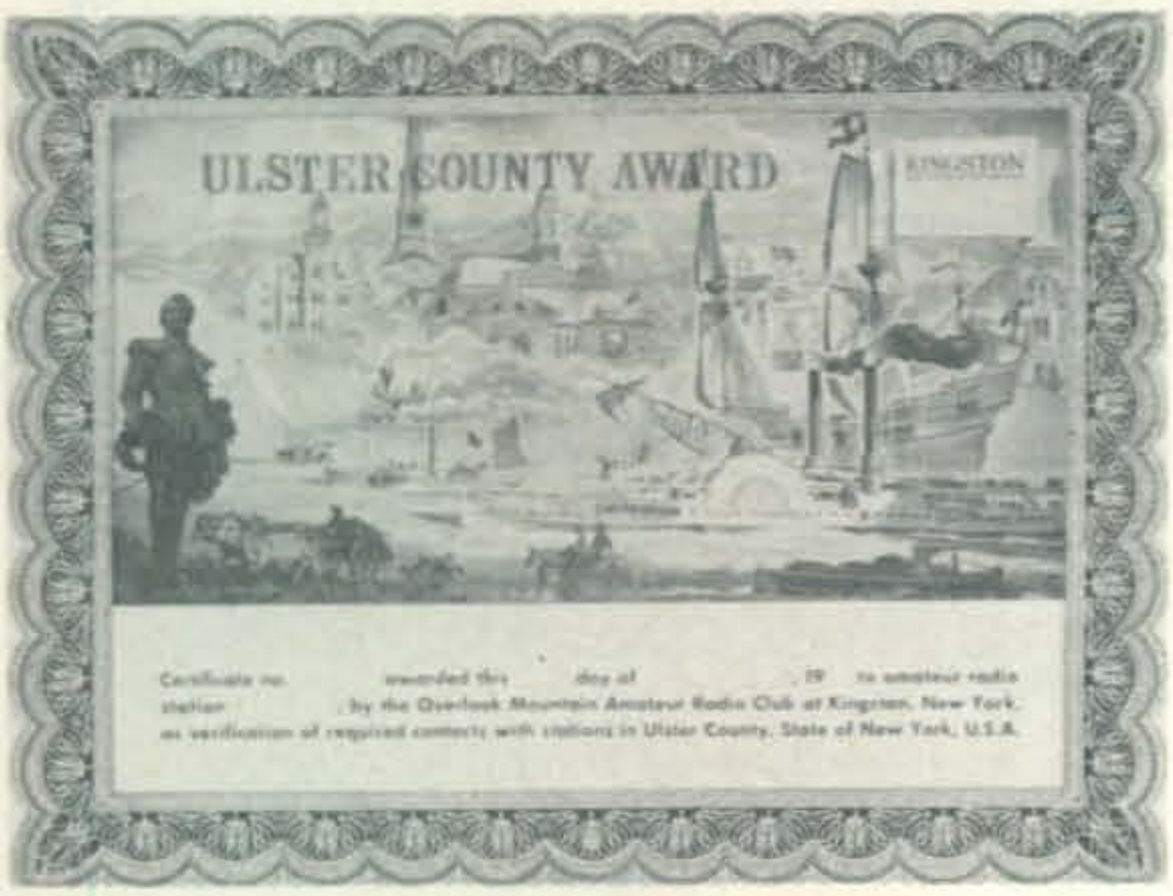
dorsement in 1959 and had "5BDXCC" confirmed by January 1966—all this with no beam and a maximum of 175 watts, until September 1966, when a TR-4 was purchased.

In August 1949, Jack became the first licensed amateur in St. Pierre as FP8AA and during 1969/1970, was a member of the ARRL Contest Advisory Committee, the latter appointment resulting from contest activity as a member of the Frankford Radio Club.

Having been a Mechanical Engineer associated with the design of electronic equipment for many years, Jack decided to take early retirement in 1966 so that he would be able to continue pursuing his second hobby — traveling. Visits to ham friends in 25 countries have been made, some of them several times, but amateur radio operations occurred from only 8, plus FP8AA/MM.

Present equipment includes 75A-4, TR-4, Johnson match-box, 9TO keyer and Heathkit s.w.r. bridge.

In addition to the many Net Control Stations, Jack wishes to thank all those mobilers who went out of their way, or kept schedules in order to help him earn that coveted "3079" plaque!



Ulster County Award (N.Y.)

Awards Issued

Another big month for All Counties as the Special Honor Roll indicates. Special note re Jim Carnett, TG9UZ getting #2 outside K/W and All 14 mc 2 × SSB, and naturally he hit them all, 500 through 3079.

Jack du Bois, K2CPR already had 500 through 3000.

Ed Alston, W4LXI also had 500 through 3000 already in his nest.

Ray Phillips, K5RPC qualified for USA-CA-3000 as well as the whole shooting match.

Dwain Schunke, WB6RMZ did a lot of homework and won 500 through 2000 All 14 mc, All Mobiles, All SSB; and 2500 Mixed.

Jim Perry, K4WVX/1 (who some years ago operated as HR3JP) dug in for USA-CA-2500.

Penny Ruth Bonnema, WB2ZNN (with OM John showing some patience) acquired USA-CA-500 endorsed All 14 mc, All Mobiles, All SSB.

David Brown, WB6AUA (that traveling man) applied for USA-CA-500 All A3A.

John Dyer, WA5ALB, received USA-CA-2000 and added All 14 mc 2 × SSB endorsement to his USA-CA-1000.

Awards

Ulster County Award (N.Y.): This new award is issued by the Overlook Mountain Amateur Radio Club, Kingston, N.Y. for contacting amateur radio stations in Ulster County, New York. No time, mode or band limitations. DX stations (inc. KH6, KL7) contact any two stations in Ulster County, N.Y. Continental U.S. contact any three Ulster County stations. Ulster County stations must contact any five stations within Ulster County. Cost: 50 cents to W-K stations; 4 IRCs for DX stations. QSLs not required, but log entry data must accompany your request for the award. Send request to Ulster County Award Manager, Harold Twiss, WA2-RXF, Country Lane, Lake Katrine, N.Y. 12449.

Wisconsin Operating Achievement Award: This award signed by his Honor, The Governor of Wisconsin will be issued for the following qualifiers during the annual Wonderful Wisconsin Week—September 20 through September 26: A Wisconsin amateur radio operator must submit his QSL card with the call letters, name and QTHs of ten (10) or more contacts with out of state or DX amateur radio operators. An out-of-state amateur radio operator (U.S. only) submits his QSL card with call letters and QTHs of five (5) Wisconsin amateur radio operators contacted. A DX amateur radio operator (inc. VE, KH6 & KL7) submits his QSL card with call letters, name and address of two (2) Wisconsin amateur radio operators contacted. Only contacts made during Wonderful Wisconsin Week will be considered valid for the award. Send log data only, GCR not required, logs will be cross checked. Submit data and 25¢ to:

THE GALAXY 550A

MORE POWER, MORE FLEXIBILITY FOR THE Fixed Station...

GT-550A Transceiver Order No. 855 Ham Net $495.00

The GT-550A is the best transceiver on the market for the money. Bar none. Costs just $495.00 and delivers 550 watts of power. Operating either fixed station or mobile, this transceiver is guaranteed to have a top frequency stability after warm-up. We're so proud of the stability we include a graph with each GT-550A showing the purchaser how stable his radio was when it went through final check. 550 watts SSB; 360 watts CW; sensitivity better than .5 uv for 10db S+N/N; stable—45db carrier suppression; 25 KHz calibrator and vox option; no frequency jump when you switch sidebands.

RF550A contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 857 Ham Net $75.00

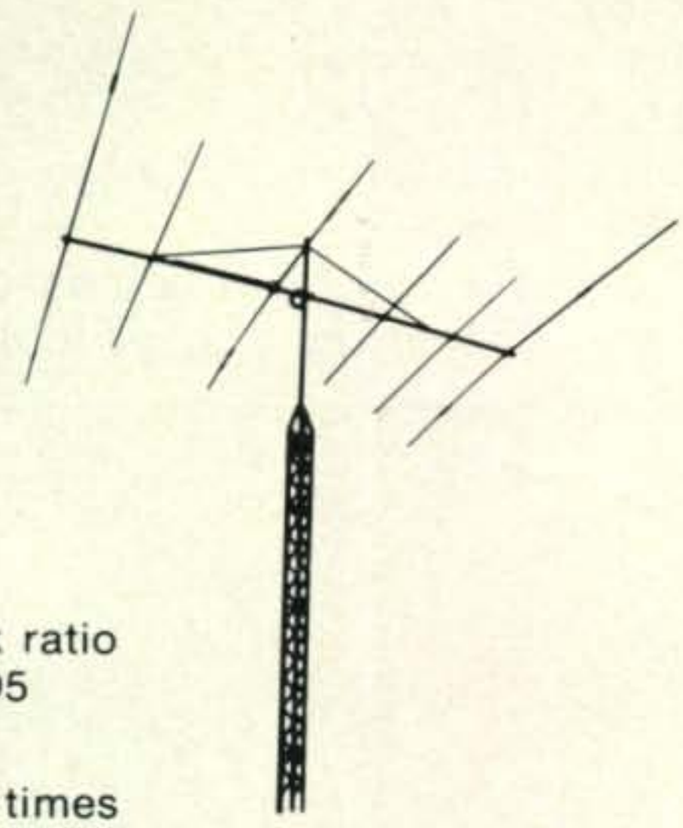
RV550A is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 856 Ham Net $95.00

SC550A Speaker Console with headphone jack. AC400 power supply will mount inside. Order No. 858 Ham Net $29.95

AC400 Power Supply is heavy duty solid state to operate GT-550A at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net $99.95

Hy-Gain's *Super Thunderbird* TH6DXX

• "Hy-Q" Traps • Up to 9.5db forward gain • 25db front-to-back ratio • SWR less than 1.5:1 on all bands • Takes maximum legal power • 24-foot boom. Order No. 389
Ham Net $179.95



Hy-Gain's 18 AVT/WB

• Wide band performance, 80 through 10 meters • Three Hy-Q traps • Top loading coil • True 1/4 wave resonance on all bands • SWR of 2:1 or less at band edges. Order No. 386
Ham Net $59.95

Hy-Gain's Thunderbird TH3Mk3 (not shown)

• "Hy-Q" traps • Up to 8db forward gain • 25 front-to-back ratio
• Takes maximum legal power. Order No. 388 Ham Net $144.95

Hy-Gain's 400 Rotator/Indicator

• Handles large beams and stacked arrays with ease—up to 10 times the mechanical and braking capability of any rotator on the market.
Order No. 400 Ham Net $189.95

PORTLAND RADIO SUPPLY COMPANY

1234 S.W. Stark / Portland, Oregon 97205 / 503—228-8647

Robert J. Draeger, WA9KNH, State Chairman W.W.W. A.R. Committee, P.O. Box 2501, West Allis, Wisconsin 53214.

Munich Olympic Diploma (Mod): The DARC "Ortsverbands" of the Olympic City of 1972 invite all Radio Amateurs of the world to participate in the Amateur Radio friendship activity of the Olympic Games 1972. The Munich Olympic Diploma is established for this purpose.

Requirements:

1. All contacts with stations in Munich, from January 1, 1970, 0000 GMT to 2400 GMT the day of the official closing of the Olympic Games 1972, will count for the award.
2. For the purpose of this award all stations located in the "DOK" C-ø9, C-11, C-12, C-13, C-18 or C-3ø are considered as Munich stations.
3. Contacts with Munich stations are credited these points:
   German participants—Phone 2 points, C.W. 4 points.
   Other Europeans, per WAE-list—Phone 4 pts., C.W. 8 pts.
   Participants outside Europe — Phone 6 pts,. C.W. 12 pts.
4. The MOD will be issued separately for c.w., phone and mixed and possibly all one band and the following are the minimum points required for each class:
   CLASS I (Gold) 250 points
   CLASS II (Silver) 200 points
   CLASS III (Bronze) 100 points.
5. Contacts may be made on 160, 80, 40, 20, 15 and 10 meters.
6. The MOD is available also to s.w.ls.
7. Special requirements are issued for Munich stations.
8. Fee: U.S. $1.00, DM 4, or 10 IRCs.
9. Send GCR LIST and fee to: Engelbert Misera DJ8ZU, D 8 Munich 13, West Germany Keuslinstr. 6. NOTE—Munich stations must have received their QSLs before the award will be issued.

Wonderful Wisconsin Week Certificate.

Notes

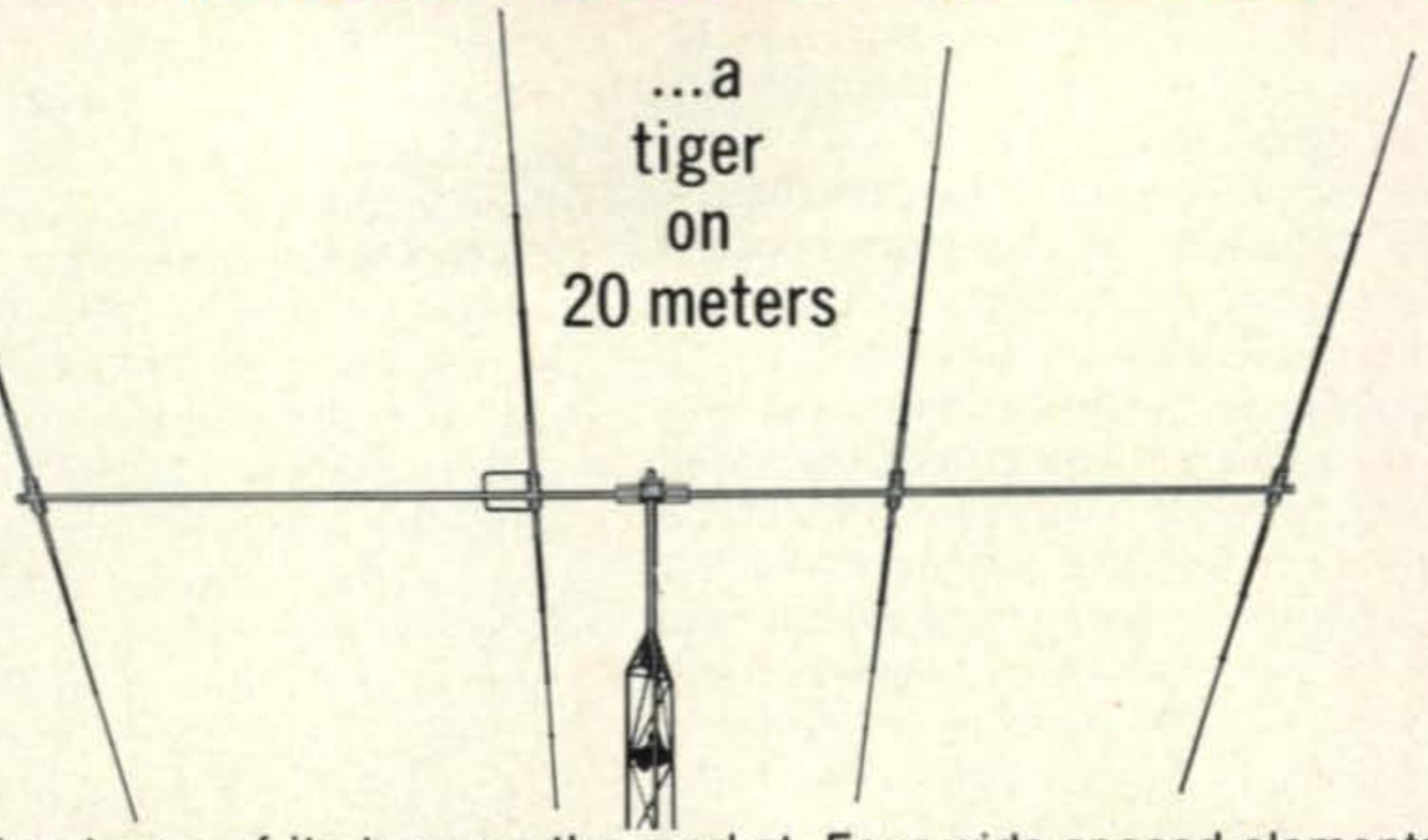
Jerry Fischer, W2KXL and XYL "Dot" — sure were great hosts for the big turn-ou o County Hunters, XYLs and children on Ma 23rd to honor Roy Needham, ZL1KG and XY "Lil", yes even the weather was on good be havior. Those not in the photograph (courtes of Frank Gerratana, WA1CXE and XYL "Ev elyn") include: Gary, W2EQK; Jack, W2FMQ Jacob, K2JVX; Gene, Sr., WA2MGV; Gene, Jr. WB2UVB; Roger, WB2WZE; Penny, WB2ZNN and Dick Davidson and family. There wa enough food (plus drinks) to feed an Army. So again thanks "Jerry" and "Dot", Helenmae an I greatly enjoyed ourselves as did everyone.

In order to get a QSL from those mobile an fixed stations who work so many many station it is necessary for you to send a completed car so they can easily check it against their log an sign it. Be sure to have it self-addressed an stamped or include s.a.s.e. *AND* one of you QSLs—most of them also collect counties an thus need your card. Although all domesti postal rates have increased, as I write this, yo may still obtain 500 County Hunter Reply QS cards from WA2AMM for $4.00 postpaid—ad 25¢ if you are west of the Mississippi River

[*Continued on page 94*]

for the most advanced antennas under the sun!

HY-GAIN 204BA MONOBANDER



The best antenna of its type on the market. Four wide spaced elements (the longest 36'6") on a 26' boom along with Hy-Gain's exclusive Beta Match produce a high performance DX beam for phone or CW across the entire 20 meter band.

- 10 db forward gain
- 28 db F/B ratio
- Less than 1.05:1 SWR at resonance
- Feeds with 52 ohm coax
- Maximum power input 1 kw AM; 4 kw PEP
- Wind load 99.8 lbs. at 80 MPH
- Surface area 3.9 sq. ft.

The 204BA Monobander is ruggedly built to insure mechanical as well as electrical reliability, yet light enough to mount on a lightweight tower. (Recommended rotator: Hy-Gain's new Roto-Brake 400.) Construction features include taper swaged slotted tubing with full circumference clamps; tiltable cast aluminum boom-to-mast clamp; heavy gauge machine formed element-to-boom brackets; boom 2" OD; mast diameters from 1½" to 2½"; wind survival up to 100 MPH. Shipping weight 51 pounds.

See the best distributor under the sun...the one who handles the Hy-Gain 204BA Monobander.

Model 204BA (4-element, 20 meters).....**$149.95**
Model 203BA (3-element, 20 meters).....**$139.95**
Model 153BA (3-element, 15 meters).....**$ 69.95**
Model 103BA (3-element, 10 meters).....**$ 54.95**

FERRITE BALUN MODEL BN-86

Improves transfer of energy to the antenna; eliminates stray RF; improves pattern and F/B ratio. **$14.95**

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SURPLUS sidelights

BY GORDON ELIOT WHITE*

ANOTHER batch of Command Sets has recently been released by the Defense Surplus Sales Office, in Army bid sales. Several thousand of the Korean War vintage low frequency, broadcast band and v.h.f. units have been bought by surplus dealers, and are becoming once more available in the usual surplus channels.

All but the smallest dribbles of the World War II low and high-frequency equipment has dried up now, 27 years after the wartime production ended. Presumably there are a few thousand left in the crannies of the Defense Department, but there cannot be many that have not been bought, used, and converted by the amateur fraternity.

But the modernized command sets were widely used in helicopters and light Army aircraft during the Korean War, and well into the 1960's. This generation of planes is now fading away, giving us another chance at Command Set goodies.

As long-time followers of this surplus column are aware, the Command Sets trace direct ancestry back to Jimmy Doolittle's pioneering instrument flights in 1929, when aviation was growing from its barnstorming phase into an important business and a potent war weapon. The forerunners of the Command Sets proved unable to handle the demands of aviation during the Army's venture into carrying the air mail, in 1933. The answer to that need was the Type K set, designed by Fred Drake and Paul Farnham at Aircraft Radio Corporation, on a tiny grass airfield near Boonton, N.J.

The Type K was slightly modified as RAT, RAV, ARA/ATA, SCR-274-N, and AN/ARC-5 when World War II broke out, and top-quality radio gear was needed in a hurry. More than a million Command Sets were eventually turned out by Western Electric, Stromberg Carlson, Colonial Radio, and Aircraft Radio Corp.

When very high frequency bands came into use, Aircraft Radio Corp. (ARC) and Western Electric designed v.h.f. versions of the SCR-274-N (N for Navy, the first purchaser of the Command Sets). The Western Electric v.h.f. set, known as BC-942 and R-28, T-23 /ARC-5, was a crystal controlled set, which was widely used, particularly in the Pacific, at the end of the War. The ARC version, a tuneable set, virtually identical in appearance to the older h.f. equipment was not ready for use in WW II, but it was adapted to the light civil aircraft market in 1946, and was a logical off-the-shelf item for observation planes and helicopters when the Korean War came along in 1950.

Known as ARC Type 12, and as AN/ARC-60, these later, gray-painted Command Sets were excellent, state-of-the art receivers. The transmitters were much less imposing, but their simplicity is a definite advantage for amateur use, compared to the super-complex AN/ARC-27, 33, 34, etc. The demands of air traffic control for 360 and now 720 channels has forced the design of solid-state crystal controlled equipment with which the Command Equipment can no longer compete.

The most common surplus Command sets now are the R-10 and R-11, low-frequency receivers covering 520-1,500 kc and 190-550 kc

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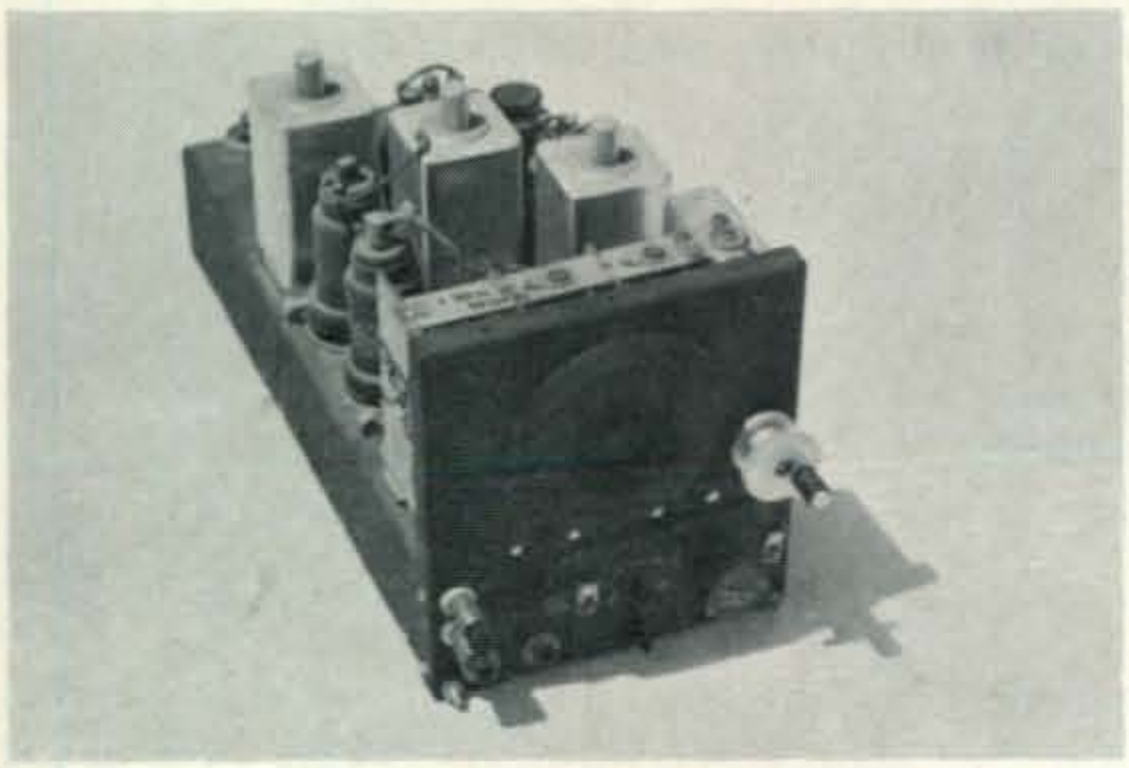
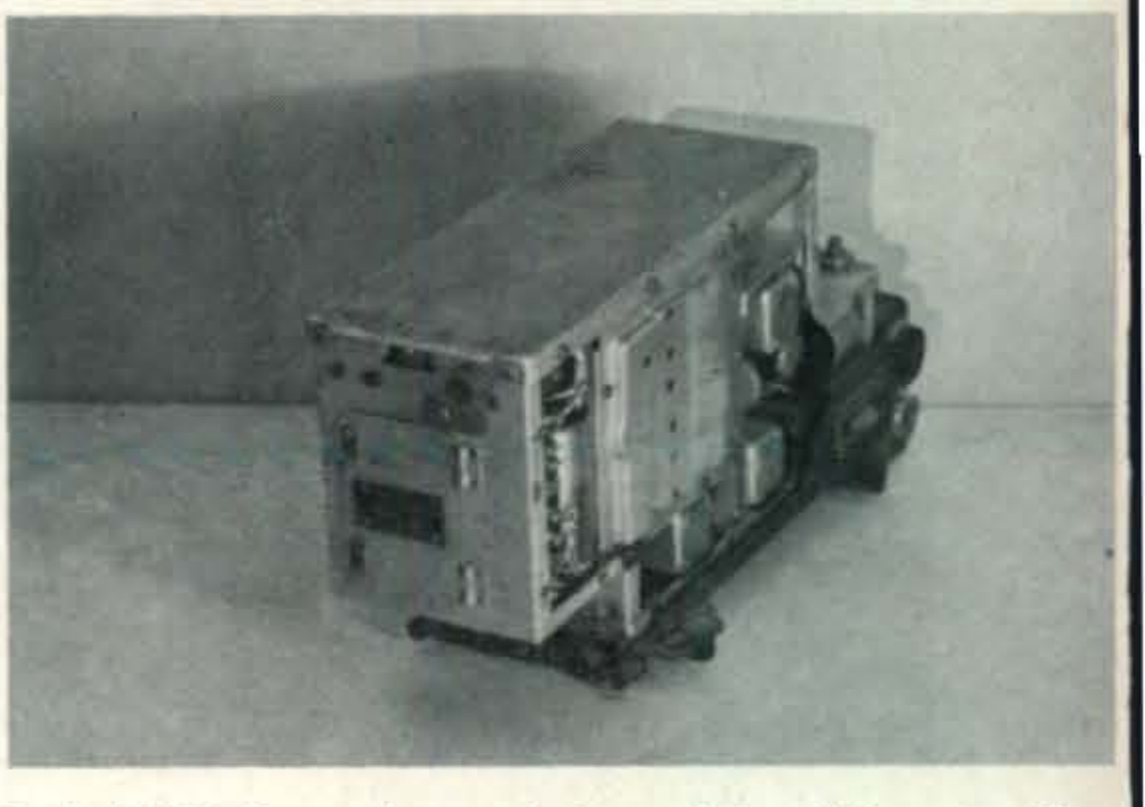
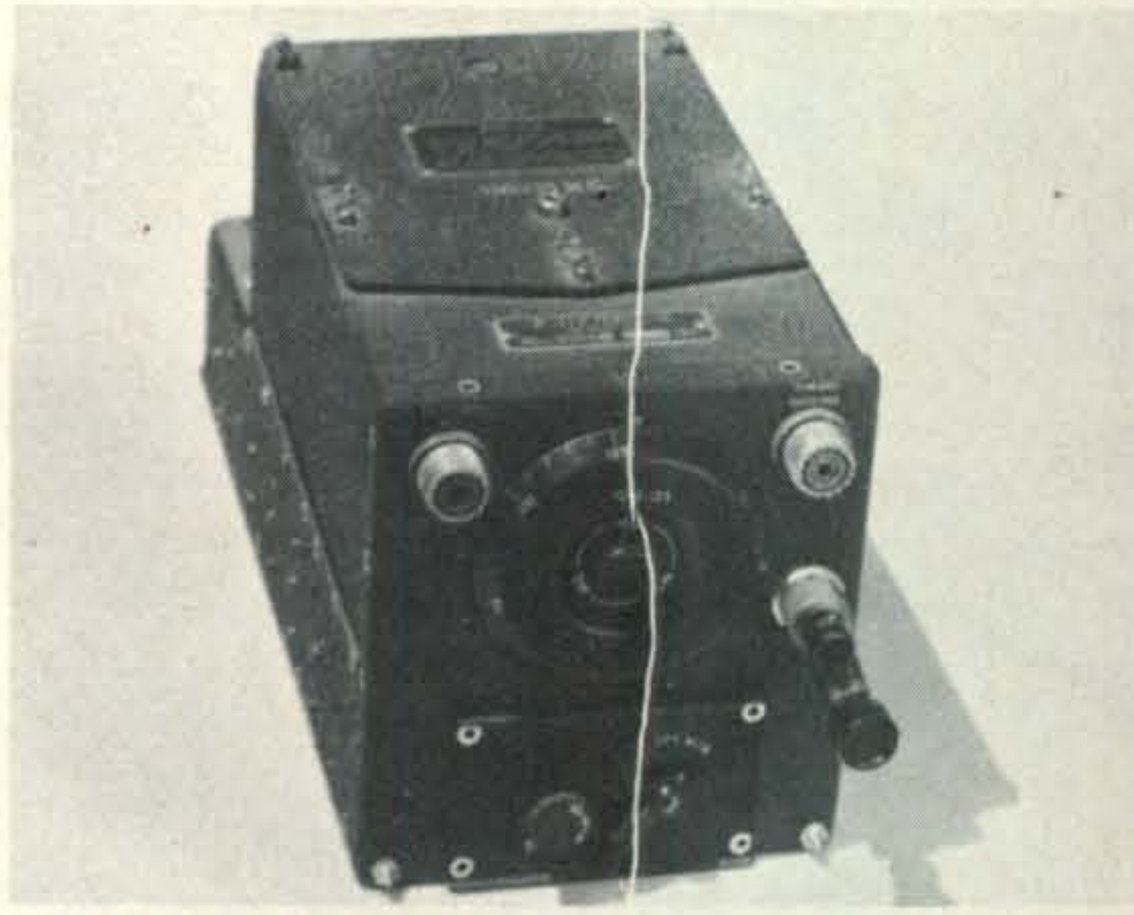
*5716 N. King's Hgwy., Alexandria, Vir. 22303.



Model 1, serial 1 of the Command receiver. Known as "Type K" when it was designed in 1935, the set shown here covered 9-13.5 mc. The differences between this early, hand-built, version, and the million plus Command Sets manufactured during World War II are slight.



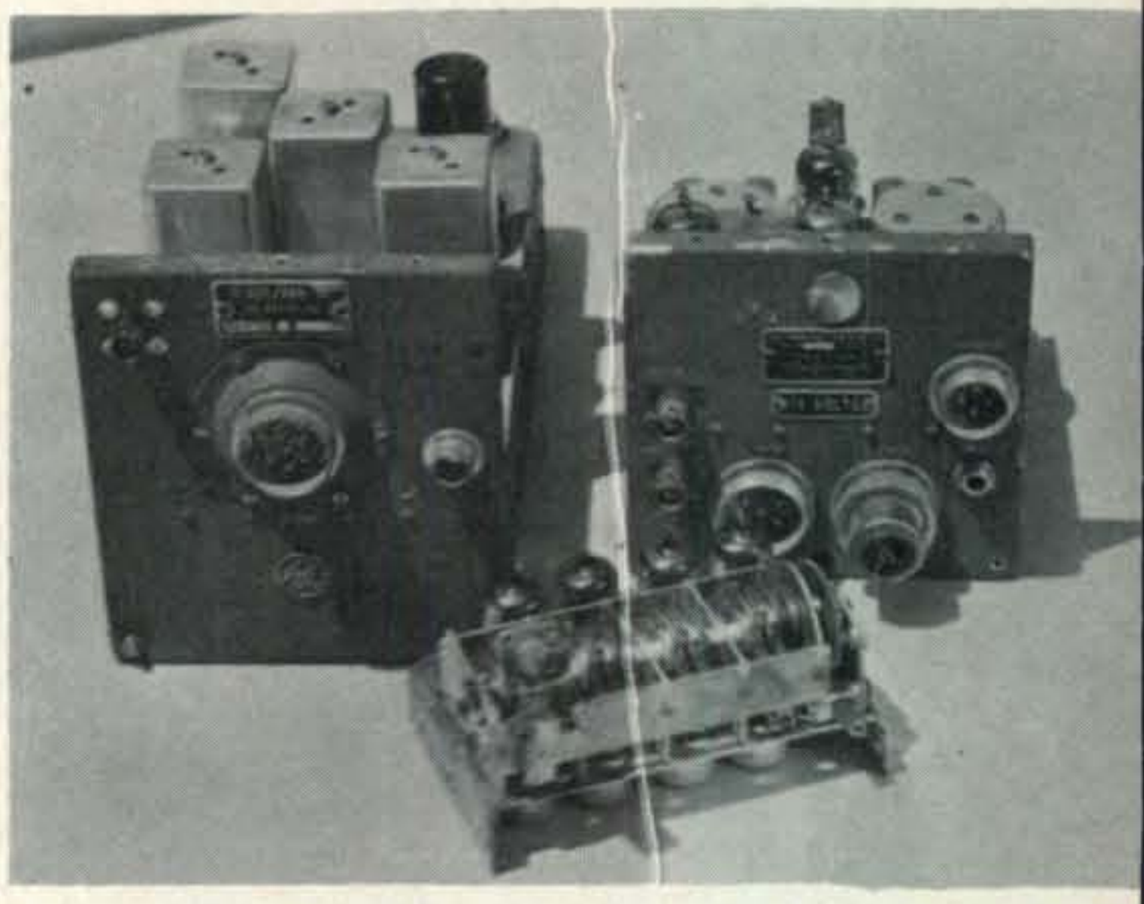
R-28/ARC-5 receiver, designed by Western Electric Corporation to work in the "command" series. It was preceded by the BC-942 Army v.h.f. receiver. It offered four channels crystal-controlled. Though several score thousand were produced and used chiefly in the Pacific, the design was not carried on after the War.



This R-112/ARC-5 was the last of the receivers designed for the World War II "Command" series. Covering 100-125 mc, it was an excellent tuneable receiver, and was the basis for the later gray-painted A.R.C. type 12, AN/ARC-60, and AN/ARN-30 communications and navigations receivers, now being phased out of light military aircraft.

respectively, and the R-18 and R-19 v.h.f. sets, tuneable from 108-135 mc and 118-148 mc. The latter of course is a perfect 2-meter receiver, and the T-11 (116-132 mc) and T-13 (125-148 mc) are useful for low-power 2-meter work. See *CQ*, September, 1968, P. 110, for information and schematic.

The R-11 receiver is, of course, just the BC-



The R-445/ARN-30 tuneable v.h.f. receiver, (left) covering 108-135 mc, was used for the "omni range" v.h.f. navigation system, installed in the U.S. in the 1950's and 60's. A direct outgrowth of the v.h.f. AN/ARC-5 design, it eliminated the dial (which was relocated to the control box) and sported a gray paint job. The T-11B transmitter was a companion six-channel v.h.f. set, restricted to a 2 mc portion of the 118-135 mc aircraft bands. Shown in front is the v.h.f. receiving preselector which was designed by Aircraft Radio Corp. in 1943, and was in production for more than 20 years. For stability, sensitivity, and all-round excellent design, it is hard to beat, even today.

453 or R-23/ARC-5 in gray paint, with different plugs, and without a dial—the control box had a dial, so why bother with a dial on the set, hidden back in the radio rack of the plane? The v.h.f. receivers are laid out much the same way but have a miniature 4-tube pre-selector in place of the low frequency tuning capacitor system. Excellent design, and the smaller physical size of v.h.f. tuning elements made the fit possible, with an extra stage of r.f. amplification and a fourth intermediate-frequency stage.

Fig. 1 shows the proper connections to the plugs on the receivers and transmitters.

Specs for the receivers, properly calibrated, show sensitivity down to less than 2 microvolts, selectivity in the l.f.-m.f. ranges, less than 2 kc at 2:1 down, and calibration accuracy of better than 200 kc on the v.h.f. receivers.

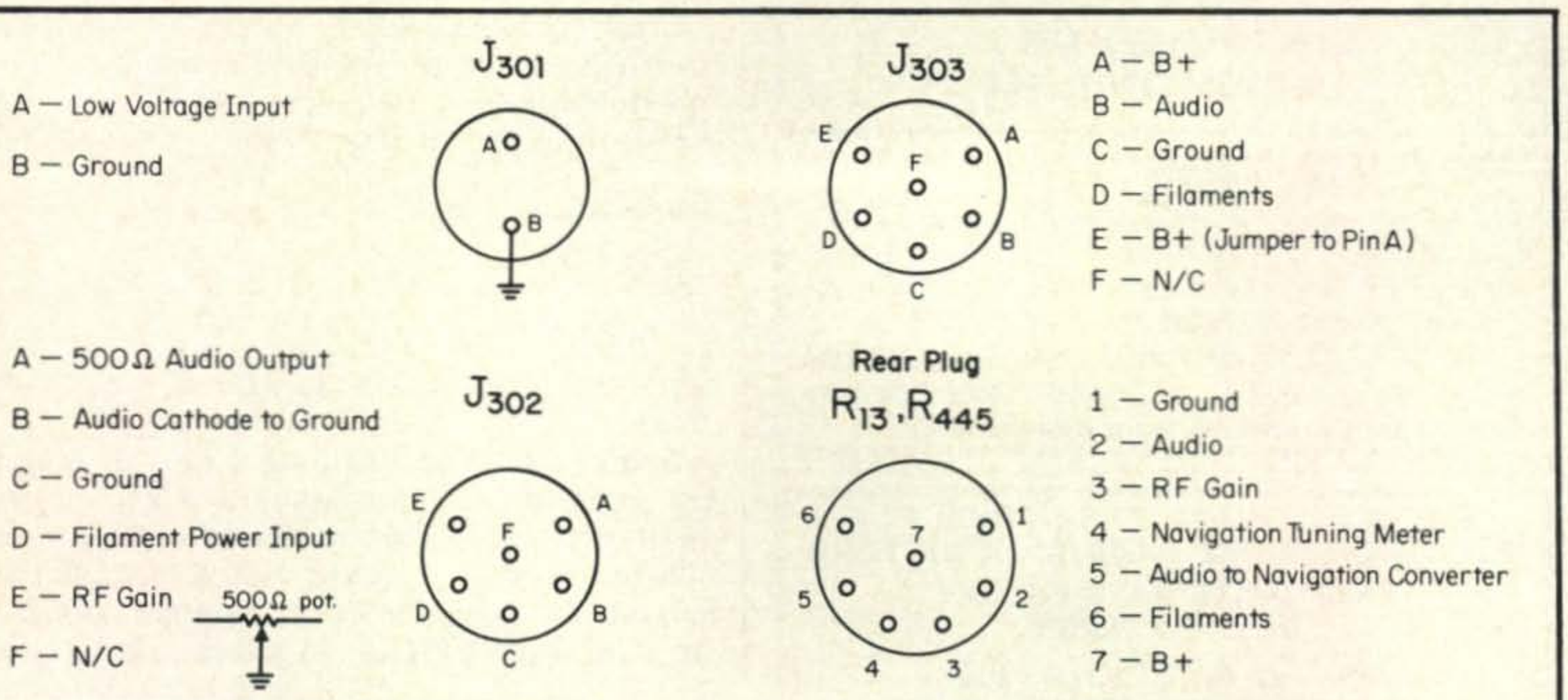


Fig. 1—Command Set plug connections for receivers and transmitters.

I heard recently from a reader who had built a nuvistor r.f. stage for the R-19 receiver, getting 0.3 microvolts sensitivity—a very good figure indeed. Certainly, for a tunable v.h.f. set, nothing I have seen can beat these receivers for compactness, sensitivity, simplicity, and reasonable power requirements (250 v.d.c. B plus at less than 100 ma) with 12 of 24 volts a.c. or d.c. for the tube filaments.

The R-13 receiver is virtually identical to the other v.h.f. sets. It and the R-30, R-445, and other numbers, are navigation receivers. Aside from extra filtering in the audio section, and some extra care in the r.f. portions, they are the same as the standard R-15 unit, covering 108-135 mc.

Noise limiters were incorporated into some of the late sets, and can be added easily, see *CQ*, June, 1968, p. 91.

The Western Electric-designed v.h.f. sets are larger than the ARC units, though they fit into the same racks and use the same dynamotors. These were 4-channel crystal-controlled jobs, which are less sensitive and harder to convert than the tuneable versions. However, the BC-950 /T-23/ARC-5 transmitters offer a possible three band transmitter. Amateurs have converted the tuning turrets to six meters, two meters and 220 mc, with appropriate crystals. See May, 1962, *73* Magazine.

The R-28 (BC-942) Western Electric receiver may be converted to tuneable operation simply by removing the grid bypass capacitor (C_{163}) from pin 4 of V_{108} and adding a .0001 mf capacitor from pin 4 to the cold side of inductor L'_{111} at the junction with R'_{152}. This provides plate to grid feedback and should make the oscillator take off on its own. (This trick can be applied as well to any number of other crystal-controlled sets with variable-tuned oscillator and r.f. sections.)

A full technical discussion of the Western Electric sets will follow later in this column, but for readers interested, the following articles may be interesting reading on the subject:

CQ Magazine: December, 1953; Feb. 1954; April, June, 1957; June, 1969; July, 1960; Nov., 1962; March, 1967; June, September, 1968.
QST: May, 1960.
73: May, 1962. ■

USA-CA [*from page 88*]

Send order and money to Jack Brenner, WA2-AMM, 162 Meisel Ave., Springfield, N.J. 07081.

Sad to report the death on 1 May of Merle A. Green, W6HVU, All Counties #22, March 4, 1970. See "Story" September 1969 *CQ*.

Marv Hagan, WB2SJQ has kindly offered to be QSL Manager for Frank Coursey, G4JZ, but for USA-CA *ONLY*, so please send County QSLs for G4JZ to WB2SJQ, 353 Woodmere Blvd., Woodmere, N.Y. 11598.

How was your month? 73, Ed., W2GT.

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MOTOROLA — NATIONAL

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RTL or TTL LOGIC

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UL 914 Gate	80¢	10/5.50
UL 923 JK Flip-flop	$1.50	10/8.50
MC 790P Dual JK Flip-flop	$2.00	10/18.95
MC 890P Dual JK Flip-flop	$2.00	10/18.95
MC 789P Hex Inverter MC 724P Quad 2 Input Gate MC 799P Dual Buffer		$1.00 ea. 10/9.25

◆ ◆ ◆

MC 780P Decade	$3.00	
MC 767P Quad Latch	3.00	
MC 9760P Decade	5.00	

ONE EACH OF 3 ABOVE $10.50

◆ ◆ ◆

7400 Quad 2 Input NAND Gate	65¢	10/5.95
7404 Hex Inverter	65¢	10/5.95
7441A Decimal Decoder/Driver	$3.50	10/29.95
7473 Dual JK Flip-flop	$1.30	10/10.95
7475 Quad Latch	$2.10	10/19.95
7490 Decade Counter	$2.40	10/19.95
709 Op Amp	$1.75	10/16.50
741 Op Amp	$2.70	10/25.00
CA 3035 Linear Amplifier	$2.25	10/21.95
14 Pin Dual Inline socket terminals	25¢	10/2.25
16 Pin Dual Inline socket terminals	30¢	10/2.75

◆ ◆ ◆

NEW NATIONAL Long Life Nixie tubes NL 940S 0-9 with two decimal points $4.50 ea. 10/42.95

SOCKET for NL 940S ..... 50¢ each

100 KC CRYSTAL NEW $3.95

88 MH TOROIDS 10/3.00

DOOR KNOB CAPACITORS

600 PF - 12 KV	75¢
40 PF - 5 KV	50¢
50 PF - 7.5 KV	50¢

◆ ◆ ◆

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CRYSTAL CALIBRATOR
FROM

- 100 - 50 - 25 KC MARKERS
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- USES NEW 100 KC CRYSTALS (included in all units)
- GLASS EPOXY BOARDS
- VERY COMPACT 2" x 3" x ½"
- 3.5 V. OPERATION

$12.95 KIT
with
100 KC CRYSTAL

Wired and zeroed to W W V $15.95

ARN-30 108-135 mc tunable receivers. High frequency version of the famous command receivers. Listen to local airport frequency or convert to 2 meters. Like New with schematic and operating instructions. 12 lbs. $14.95

◆ ◆ ◆

Western Union facsimile machines, send and receive pictures and memos. Works on 115 v 60 cycles. Shipped with auto-start, auto-phase pos-to-pos, conversion instructions. 20 lbs. $19.95

◆ ◆ ◆

Telfax paper ..... 2¢ each 1000 for $12.95

CQ Reviews Millen Dipper [*from page 66*]

cillation and the point of regeneration where the detecting sensitivity and Q are high. In our tests, the sensitivity was five- to ten-times greater than that found with the customary diode-type detection of other instruments.

Furthermore, responses were sharply peaked without the broadening effect otherwise due to the diode-loading effect experienced with the usual g.d.o. or dipper devices. With Q-Multiplier operation a very slight change in frequency calibration was noted; however, this was less than that experienced with a switch between the oscillate and diode mode with conventional instruments.

Diode-type detection also may be had with the 90652 simply by further reducing the setting of the DET.-OSC. control to below the regeneration point.

Headphone operation for detecting beat notes with other signals, while using the oscillate mode, also was considerably more sensitive than with conventional-type units.

As mentioned earlier, the oscillator MOSFET s protected against overload-damage to *some* degree; nevertheless, care should be taken to avoid operation close to very strong r.f. fields. Should any damage result, the 3N128 MOSFET is a low-cost type that is relatively easy to obtain. In addition, it plugs into a teflon socket, making replacement a simple matter. The effect on calibration will be negligible.

The solid-state dippers operate at lower power levels than do vacuum-tube jobs and thus do not put out adequate power to operate the customary r.f. bridges used in the amateur field. They also are weaker as a signal source for other applications such as with receiving equipment, but in some cases this may be an advantage, since stronger signals tend to overload a receiver and generate confusing birdies.

The Millen Model 90652 Solid-State Dipper is priced at $110 with battery and carrying case. Also included are instructions for using the device in various applications.[4] It is a product of James Millen Manufacturing Co., Inc., 150 Exchange Street, Malden, Mass. 02148.

—*W2AEF*

[4]For those not familiar with the applications and methods of use for dippers, a three-part article on the subject may be found in the May, June and July 1968 issues of *CQ* under the title of "Using the Grid-Dip Meter."

C.W. Results [*from page 54*]

to put up a dipole and make Malta availabl to the boys on 28 mc.

You can thank Kjell, SMØCCE for mak ing 4U1ITU available in the contest. He di the operating in both the c.w. and phone sec tions of the contest. (I believe there wa some token operation by others during th phone week-end.)

What do you do when it's so cold in th shack that the Vibroplex is sending out a di when you want a dah? Dick, F2QQ jus QRT, but not before he had run up a winning score on 40. (Me, I have no such problem with the old pump handle I use.)

Here's a potential member for the QCWA Nick UB5OE has been hamming since 1927 so the boys over there date back quite a spell too.

Bob, VS6AE was an ex-VS6 less than a week after his contest operation on 21 mc. He is now back in West Australia so maybe another one in Zone 29 in November.

That winning all-band score by ZS3AW didn't come easy for Jurgen, DJ3KR the station operator, even with the use of a rombic that eventually conked out anyway. The station is located at an ionospheric research center and the high powered pulse transmitters used for sounding purposes raised havoc when they were in operation, 15 minutes out of every hour.

Where was W3MSK in the contest? Oh! they were in there all right, but now signing W3AU. Ed has joined the confusing two letter brigade.

We again want to thank the many European contest managers who processed the logs of their respective clubs. Especially Milos Prostecky OK1MP, Werner Stiehm DJ8SW, Wojciech Klosok SP9PT, J. Matzon HA5FA and Klaus Voight DM2ATL.

The same old crew with two new additions over here. Andy Malashuk W1GYE, Bob Entwistle W1MDO, Freddie Caposella W2IWC, Bernie Welch W8IMZ and two new members, Ralph Nichols W1CNU and Gene Walsh K2KUR. I had better not leave out Joan of the *CQ* staff, or she will not save all those pretty stamps for me when she opens those overseas entries.

That's it for this one, now you can start your letters of complaints, or maybe a few kind words for your hard working Committee?

73 for now, Frank, W1WY

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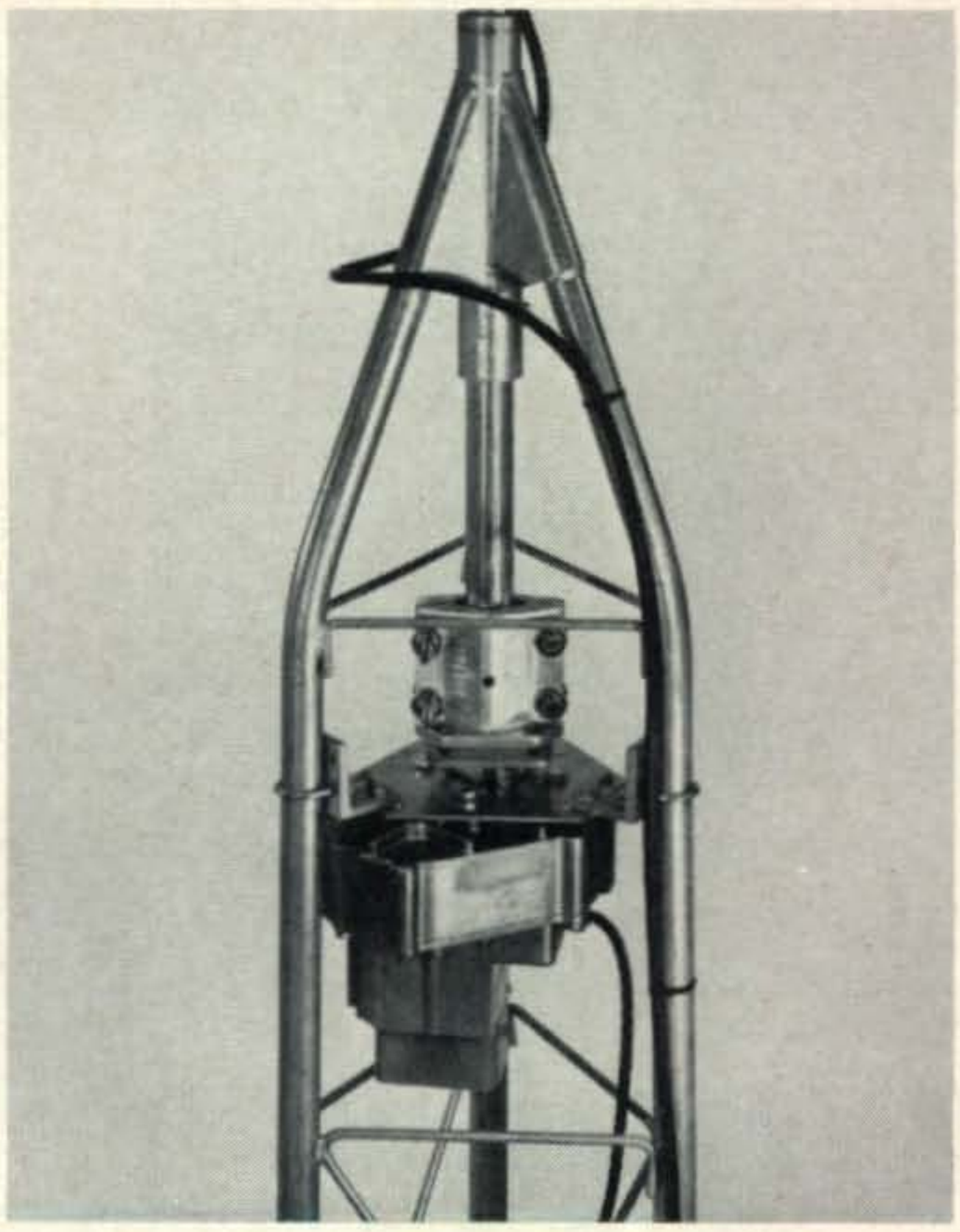

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Propagation [*from page 78*]

Eastern Mediterranean & Middle East	*Nil*	07-08 (1) 08-10 (2) 10-11 (1) 19-21 (1)	05-06 (1) 06-09 (2) 09-12 (1) 12-14 (2) 14-15 (1) 18-19 (1) 19-21 (2) 21-22 (1)	19-22 (1)
West & Central Africa	10-11 (1) 11-13 (2) 13-14 (1)	07-10 (1) 10-13 (2) 13-16 (3) 16-17 (2) 17-18 (1)	05-06 (1) 06-08 (1) 08-13 (1) 13-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-00 (1)	20-23 (1)
East Africa	12-14 (1)	09-13 (1) 13-16 (2) 16-17 (1)	06-08 (1) 12-14 (1) 14-16 (2) 16-18 (3) 18-20 (2) 20-22 (1)	20-22 (1)
South Africa	09-12 (1)	06-08 (1) 08-10 (2) 10-12 (3) 12-14 (2) 14-15 (1)	04-06 (1) 06-08 (2) 08-09 (1) 11-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-21 (1) 21-23 (2) 23-00 (1)	18-21 (1)
Central & South Asia	16-18 (1)	07-10 (1) 15-16 (1) 16-18 (2) 18-20 (1)	06-07 (1) 07-10 (2) 10-12 (1) 16-18 (1) 18-21 (2) 21-23 (1)	05-07 (1) 18-20 (1)
Southeast Asia	14-18 (1)	08-09 (1) 09-11 (3) 11-15 (1) 15-17 (2) 17-20 (1)	04-06 (1) 06-08 (3) 08-10 (2) 10-11 (1) 20-22 (1) 22-00 (2) 00-01 (1)	00-02 (1) 02-05 (2) 05-07 (1)
Far East	14-15 (1) 15-17 (2) 17-18 (1)	13-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	06-07 (2) 07-09 (4) 09-12 (3) 12-14 (2) 14-19 (1) 19-21 (2) 21-23 (3) 23-01 (2) 01-06 (1)	00-02 (1) 02-07 (2) 07-08 (1) 02-06 (1)*
South Pacific & New Zealand	10-12 (1) 12-14 (2) 14-16 (3) 16-18 (2) 18-20 (1)	08-10 (1) 10-12 (3) 12-16 (2) 16-18 (3) 18-20 (4) 20-22 (3) 22-23 (2) 23-00 (1)	16-18 (1) 18-20 (2) 20-22 (3) 22-00 (4) 00-02 (3) 02-04 (2) 04-05 (1) 05-06 (2) 06-08 (3) 08-10 (2) 10-12 (1)	21-22 (1) 22-05 (3) 05-07 (2) 22-01 (1)*
Australia	12-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	07-09 (1) 11-16 (1) 16-18 (2) 18-20 (3) 20-21 (2) 21-22 (1)	18-20 (1) 20-22 (2) 22-00 (4) 00-02 (3) 02-03 (2) 03-06 (1) 06-07 (2) 07-09 (3) 09-11 (2) 11-12 (1)	00-01 (1) 01-02 (2) 02-05 (3) 05-07 (2) 07-09 (1) 01-03 (1)* 03-05 (2)* 05-06 (1)*
Northern & Central South America	07-09 (1) 09-11 (3) 11-13 (4) 13-15 (3) 15-16 (2) 16-17 (1)	06-07 (1) 07-09 (3) 09-11 (2) 11-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	05-07 (4) 07-09 (3) 09-14 (2) 14-16 (3) 16-22 (4) 22-00 (3) 00-05 (2)	18-20 (1) 20-01 (3) 01-03 (2) 03-06 (1) 19-21 (1)* 21-02 (2)* 02-04 (1)*

Brazil, Argentina, Chile & Uruguay	07-09 (1) 09-11 (2) 11-13 (3) 13-15 (4) 15-16 (3) 16-17 (2) 17-18 (1)	06-07 (1) 07-08 (2) 08-12 (1) 12-14 (2) 14-15 (3) 15-18 (4) 18-19 (2) 19-20 (1)	05-14 (1) 14-16 (2) 16-18 (3) 18-22 (4) 22-01 (3) 01-05 (2)	20-23 (1) 23-01 (2) 01-03 (1) 23-02 (1)*
McMurdo Sound, Antarctica	16-18 (1)	10-14 (1) 14-17 (2) 17-19 (3) 19-20 (2) 20-21 (1)	07-09 (1) 16-18 (1) 18-19 (2) 19-22 (3) 22-00 (2) 00-02 (1)	00-05 (1)

Q & A [*from page 84*]

bet is to use a transmission line (between the antenna and the bridge or s.w.r. meter) that is an electrical length equal to a multiple of a half wave at the desired operating frequency. This can be physically measured by applying the formula:

$$\text{length in feet} = \frac{492}{f_{me}} \times \text{velocity constant}$$

The constant for most coaxial lines is 0.66. The correct length also may be electronically checked using a g.d.o. or an r.f. bridge.

Now, should the line-input s.w.r. fall outside the loading range of the transmitter, there are two ways of providing the proper load (besides that of obtaining an actual line s.w.r. that is near 1:1).

The sure-fire method is to employ an antenna-matching coupler such as the Millen Transmatch[1] or the Drake MN-Series.[2] You can also build your own as described in radio handbooks. Such a coupler can be adjusted to convert the line-input s.w.r. to within the matching capabilities of the transmitter. Note that the coupler will *not* change the s.w.r. *on the line*, it simply permits the transmitter to *look into* an impedance that appears as the required low s.w.r. The coupler will allow this to be done over the entire range on all bands; however, retuning will be required when bands are changed and also may be needed when a wider frequency excursion is made on a particular band. About a 0.5 db power loss will be experienced through a well-designed coupler, but this is more than made up by the overall benefits derived with proper matching to the transmitter.

The other method of obtaining a low line-input s.w.r. is to alter the length of the line for the best result. (Usually in multiples of 1/16-1/8 wavelength). This is a cut-and-try

[1]*CQ* Reviews the Millen Model 92200 Transmatch, *CQ*, February 1969, p. 60.
[2]*CQ* Review the Drake MN-4 Antenna Matching Network, *CQ*, January 1968, p. 65.

proposition that may not always work out and where it does so, it may be good over only a limited frequency range. Unless you're lucky, a different length may be required for each band. Nevertheless, where no other means is possible, this method would be worth a try.

Where the *line* s.w.r. is within 2.5:1, any loss due thereto usually will be relatively small. If the *line-input* s.w.r. can be handled by the transmitter (using the above means, if needed), you'll be in good shape as to power transferred to the anntenna and proper operation of the transmitter p.a. —W2AEF

Oscar Flyover [*from page 36*]

Jan, W3GEY, riding in the aircraft with the repeater at his side was able to check and observe its operation first-hand. While the repeater operated well during the test, some modifications will be made to improve its performance still further before it is launched into space.

Similar flyovers are planned for the remainder of 1971. Some may again involve the 2-to-10 meter repeater used on this flight, but others will probably take aloft a 432 mc-to-146 mc repeater being constructed by European radio amateurs or a 4-channel f.m. repeater being constructed in Australia.

Each successful flyover brings closer the day on which the next radio amateur satellite will be launched. According to AMSAT officials, that date is now tentatively set for early 1972. ■

Optimum Performance Array
[*from page 19*]

"Hunting for Losses," *The Milliwatt: National Journal of QRPP*, April, 1970, p. 5., for discussion). The 40 meter coupler was wound with #12 plastic covered house-wire on a 3.5 inch diameter plastic cleaning fluid container. The 20 meter coupler used #14 wire on a 1.5 inch diameter bullion cube container. If at all possible, use a wide-spaced capacitor with the feedline coil of the 40 meter coupler—this is a high-voltage point.

Tuning the coupler is the same as with any. With an s.w.r. meter between the coupler and transmitter, tune for lowest s.w.r. #49 and #47 bulbs provide handy feedline current indicators when shunted across the appropriate length of feedline. For under-five watt levels, #49 bulbs shunted across about 6 inches is adequate, but for greater power,

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shunt distance may be less than an inch. The lowest s.w.r. usually corresponds to the highest current, but not always—tune for highest indication of feedline current. See fig. 4 for connection of current indicators.

The circuit of the 160 meter coupler is shown in fig. 5. Again, low-loss parts are utilized. I found it best to connect the coupler to one side of the feedline and let the other side "float". Actually, little variation occurs between the two connections, but this seemed to work best. For efficient 160 meter operation, it is necessary to utilize several ground radials which are connected directly to the ground side of the coupler. In my installation, eight radials of random lengths were laid out along the curb of my street and another intersecting street. A few were run along neighbor's hedgelines. All were bent in several places, a matter of no consequence. Suffice it to note that the addition of the radials made a 3-6 db difference in signal level at the 1000 mile range! It may be further noted that said radials won't remain obscure during the summer, so they are pulled in until the fall when 160 opens up again. With a little ingenuity, adequate radial systems can be devised using small guage wire properly anchored to the ground and no one will know the difference. Be circumspect though!

Results

The performance of the array has been gratifying on all three bands. In some nine months of operation, my calls/QSO's rate has approximately doubled over previous antennas, and the stability of contact has increated considerably. On 40 meter, with an output of 800 milliwatts, I have managed to work 37 states, with KH6 twice! On 20 meters, with 130 milliwatts output, I have worked some 28 states and KH6. I rarely fail to raise a station on 20 meters even with such low power. With the addition of a transmitter capable of 900 milliwatts output on 20 meters, results are fantastic—fellows even call me now! The performance during the *CQ* WW 160 DX TEST was indeed amazing. Despite poor conditions, the array used as a top-loaded vertical was excellent on receiving—South Americans and KH6 were anywhere from S5-S9! Using about 75 watts output, I managed to work some 47 states, and 8 countries, including KH6, YV5, HKØ, VP9, VP2, KV4. According to later ragchews, it appears that my signal was the

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strongest reaching the East Coast from west of the Mississippi. In short, this old stand-by "8JK" has performed very well and made what once seemed a dead-end city lot a very rewarding experience. If you're in my predicament, this antenna could well be the answer to your problems. Give it a try. It costs little and requires little effort! ■

Half-Wave DDRR [*from page 22*]

DDRR antenna for v.h.f. use. Its dimensions for 6-meters probably make it somewhat impractical for most applications. However, for two meters on down it is particularly easy to construct for either fixed or mobile station use. The dimensions for bands other than two meters can be frequency scaled, as a first approximation, from the dimensions given for the 2-meter model. A model should be constructed for test purposes to determine the final dimensions. ■

75 M. WAS Antenna [*from page 28*]

The cost of the whole system including all the wire necessary to make both folded dipoles, is nominal. Refinements may be added, and these will certainly elevate the cost, but the basic antennas, lead-ins, and switches with a balun, should not cost in excess of $15-$20.

Nor is this system a particularly space consuming proposition. All of us know that a 75 meter antenna of any useful kind is not ideally suited to apartment dwelling—neither is this antenna. But if two such wires are put up at 70° angles to each other, (see fig. 2), the whole affair will go on a 100 × 65 foot lot, which is hardly in the estate category.

Result-wise, we completed our WAS in just over the month we had set as our goal. One or two of the "less difficult" states proved more of a problem than we had expected. We seldom had more than an hour of operating time per day, which didn't always come at the optimum propagation period, and this proved troublesome too. Depending upon whether you want to check into nets to get new states, on whether you want to make schedules on other bands for 75 meter contacts etc., you may expect to do better or worse than this. In any case, having two antennas oriented so that they cover all quadrants with major radiation lobes, will greatly help. Good luck. ■

K7GCO Modified HT-18 [*from page 32*]

the coil. This construction has withstood several high winds.

The coil is Air Dux 10 t.p.i., 2.75" dia. #16 wire. The number of turns in the coil (100) could be reduced if the fiberglas pole were wrapped with aluminum foil, using contact cement to secure it. The insulator and support for the coil is Phenolic tubing (grade C) and was wrapped with a couple of layers of fiberglas cloth and coated with epoxy resin. A larger diameter tube is suggested for more strength. The fiberglas wrapping would then be primarily for weather proofing.

The top pieces are 7 ft. of 5/8" dia. .035" wall aluminum and a 9 ft. fiberglas fishing pole with an aluminum wire up the center and a wire cage on top.

Two heavy hinges are used on the bottom of the HT-18 so that one man can lower the tower for maintenance or initial adjustment of the coil. Only the opposite guy ropes are lowered. Two heavy stand off insulators are added at the bottom between the hinge and existing insulators to withstand the high voltages. A sturdy pipe for the tower to rest on when in the horizontal position has proved useful.

This has been the most effective vertical the author has ever used and this basic design should stimulate many variations. Voltage fed antennas solve many space and other problems and contrary to what those think who have not any practical experience with them, they do not require extensive radial systems to out-perform a current fed antenna. If a radial system is to be of any benefit insofar as reflections are concerned, the radials have to be well over a wavelength long to obtain beneficial reflections at desired low angles. ■

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RF550A contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 857 Ham Net $75.00

RV550A is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 856 Ham Net $95.00

SC550A Speaker Console with headphone jack. AC400 power supply will mount inside. Order No. 858 Ham Net $29.95

AC400 Power Supply is heavy duty solid state to operate GT-550A at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net $99.95

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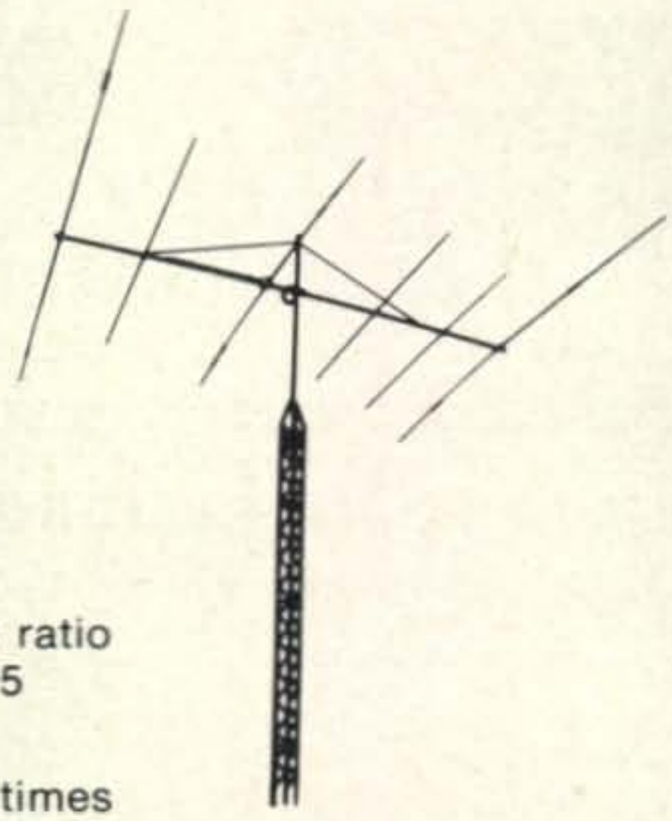

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C.W. Results [*from page 60*]

RP2BCD	**28**	**3,429**	**50**	**11**	**16**
UP2ON	**21**	**103,400**	**511**	**31**	**69**
UP2NX	"	5,764	72	14	30
UP2AW	**14**	**14,841**	**206**	**13**	**38**
UP2BV	"	12,760	151	19	30
UP2BB	"	6,665	117	11	32
UP2CY	**7**	**65,352**	**542**	**22**	**62**
UP2NA	"	9,200	196	10	30
UP2PAP	"	656	35	5	11
UP2GF	**3.5**	**19,306**	**335**	**11**	**38**
UP2OQ	"	8,897	203	9	32
		Muldavia			
UO5AP	**A**	**206,498**	**579**	**67**	**156**
UO5WU	"	38,054	242	33	73
UK5OAA	"	17,112	198	14	48
UO5GR	**28**	**8,304**	**86**	**16**	**30**
UO5FP	**21**	**24,012**	**257**	**19**	**39**
UO5GS	**14**	**95,790**	**520**	**32**	**71**
UO5SA	"	52,725	289	28	83
UO5DN	**7**	**8,855**	**150**	**10**	**35**
		Ukraine			
UB5CV	**A**	**1,116,339**	**1368**	**105**	**266**
UB5IU	**A**	**93,906**	**446**	**43**	**98**
UB5IB	"	59,875	329	36	89
UY5TE	"	53,190	289	36	99
UT5AC	"	50,180	221	39	91
UY5JF	"	40,439	212	37	72
UB5DW	"	40,406	166	29	60
UY5EM	"	23,652	166	26	56
UB5LR	"	23,115	110	41	74
UB5NS	"	15,365	126	21	47
UY5DV	"	14,104	134	22	64
UB5WAB	"	12,556	75	30	43
UB5SP	"	12,489	136	20	49
UT5GR	"	10,556	194	10	42
UY5TH	"	8,340	77	19	41
UT5NA	"	7,353	117	14	43
UV5AB	"	5,568	54	21	37
UB5HN	"	5,562	86	16	38
UB5ZE	"	4,448	76	15	29
UY5AP	"	1,170	19	15	15
UB5WK	**28**	**39,263**	**182**	**28**	**51**
UK5MAG	"	38,157	233	23	56
UY5HB	"	30,528	200	23	49
UY5OO	"	26,937	156	23	50
UY5OB	"	13,794	104	22	44
UT5BY	"	9,519	69	20	37
UB5EM	**21**	**46,737**	**329**	**22**	**59**
UB5FL	"	14,756	119	21	47
UB5EF	"	1,554	29	8	18
UT5BP	**14**	**125,180**	**601**	**31**	**79**
UY5ZP	"	98,910	567	30	75
UK5IAI	"	74,676	437	30	68
UB5TR	"	51,615	332	26	67
UT5LE	"	37,120	240	27	53
UB5OE	"	28,375	169	21	52
UT5BW	"	23,360	165	25	55
UY5HW	"	10,810	151	11	36
UB5FB	"	6,160	140	9	26
UB5VAA	"	4,550	102	8	27
UT5LN	"	1,053	17	13	14
UB5IF	**7**	**76,464**	**560**	**23**	**58**
UB5VY	"	45,195	424	18	71
UY5EX	"	30,464	286	15	49
UT5BX	"	24,242	262	13	49
UB5VK	"	10,633	129	11	38
UT5PC	"	2,241	72	8	19
UT5LU	"	630	26	6	15
UT5PB	**3.5**	**19,864**	**309**	**12**	**40**
UB5ES	"	2,100	56	7	23
UT5HZ	"	380	16	5	14
		White Russia			
UC2IJ	**A**	**104,800**	**458**	**41**	**119**
UC2CY	**A**	**104,192**	**494**	**35**	**113**
UC2RV	"	34,791	234	29	76
UK2WWW	"	24,794	171	28	70
UC2OG	"	1,419	35	11	21
UC2OAA	**28**	**22,081**	**149**	**22**	**49**
UC2XB	"	3,135	43	12	21
UC2DN	"	2,565	49	8	11
UC2WP	**21**	**109,388**	**573**	**27**	**65**
UC2OC	**14**	**61,321**	**391**	**29**	**60**
UC2DF	"	2,144	47	9	23
UC2XR	"	1,200	42	7	13
UC2AAB	**7**	**63,525**	**557**	**20**	**55**
UC2WG	**3.5**	**17,342**	**338**	**9**	**37**
UC2WAE	"	7,716	173	7	29

OCEANIA

		Australia			
AX2GW	**A**	**296,835**	**619**	**68**	**97**
AX2RA	**28**	**66,650**	**365**	**21**	**41**
AX2APK	**14**	**268,096**	**776**	**36**	**82**
AX3XB	**A**	**26,966**	**100**	**42**	**58**
VK3AHQ	**28**	**61,938**	**283**	**26**	**48**
AX3AXK	**21**	**112,104**	**484**	**26**	**55**
VK3QI	**7**	**43,414**	**303**	**23**	**26**
AX3APN	"	42,504	254	22	35
AX3OP	"	40,800	274	20	30
AX4XJ	28	2,760	60	21	25
VK4SS	**7**	**10,080**	**85**	**17**	**23**
AX5NO	**14**	**305,244**	**872**	**37**	**85**
VK5KO	1.8	5	3	2	3
AX6HD	**A**	**2,007,852**	**1841**	**118**	**253**
AX6AJ	**14**	**33,120**	**161**	**26**	**46**
		Guam			
KG6JAR	**A**	**127,776**	**346**	**44**	**48**
KG6JAC	"	85,400	475	31	30
KG6JAK	**14**	**19,304**	**176**	**18**	**20**
KG6ASP	"	2,522	70	6	7
		Hawaii			
KH6RS	**A**	**2,064,575**	**2270**	**130**	**177**
KH6IJ	**A**	**1,355,508**	**1816**	**105**	**147**
KH6HGL	**21**	**15,054**	**194**	**14**	**12**
KH6BZM	"	60	5	2	2
W4FAY/KH6	**14**	**137,418**	**449**	**35**	**76**
WØDAD/KH6	"	24,486	106	32	45
KH6HCM	**3.5**	**11,286**	**200**	**10**	**6**
		New Zealand			
ZM1AJU	**A**	**1,009,750**	**1380**	**95**	**155**
ZM1AFW	"	83,864	329	43	45
ZL1AMO	**14**	**265,625**	**725**	**38**	**87**
ZL1ARV	"	13,468	99	25	27
		Argentina			
LU6AX	**A**	**65,726**	**207**	**53**	**65**
LU2DKG	**21**	**208,128**	**729**	**35**	**61**
LU3FG	"	151,962	595	36	50
LU9FAN	"	40,800	336	26	42
LU6FA	**14**	**156,980**	**560**	**34**	**60**
LU3DSI	"	40,755	233	25	33
LU5AES	"	39,644	257	24	29
		Brazil			
PY1ADA	**A**	**283,201**	**582**	**72**	**101**
PY1BLG	"	126,144	309	65	79
PY3APH	"	1,166	21	8	14
PY4ABH	**28**	**126,876**	**449**	**30**	**67**
PY2PH	"	702	13	6	12
PY2BGL	**14**	**673,679**	**1390**	**38**	**125**
PY4AP	**14**	**652,974**	**1496**	**36**	**111**
PY2ACT	"	92,718	480	33	69
PY1SJ	"	5,270	62	14	17
		Chile			
CE2DK	**A**	**181,324**	**450**	**65**	**78**
CE2CR	"	14,960	76	37	43
CE3CF	**14**	**100,214**	**388**	**30**	**59**
		Easter Island			
CE0AE	**A**	**78,029**	**373**	**38**	**33**
		Ecuador			
HC2GG	**A**	**1,533,728**	**1560**	**111**	**223**
		Guyana			
WA4OVP/8RI	**A**	**13,395**	**101**	**20**	**27**
		Peru			
OA3Y	**21**	**434,231**	**1229**	**36**	**83**
		Suriname			
PZ1AH	**3.5**	**34,914**	**256**	**13**	**33**
		Trinidad			
9Y4VU	**A**	**168,634**	**462**	**48**	**81**

Uraguay

CX1AAC	28	681,636	1711	36	93
CX1JN	21	378,392	1102	36	80

Venezueia

YV5DEG	21	216	13	4	2
YV5AW	7	87,730	476	17	45
YV5KL	7	80,288	509	15	37
YV4NQ	3.5	1,296	56	4	4
YV1OB	1.8	1,656	63	4	5

MULTI-OPERATOR
Single Transmitter

NORTH AMERICA

U.S.A.

W3WJD	2,259,075	1536	146	379
WB2SQN	1,701,723	1284	131	340
K4HF	1,519,706	1214	129	302
W9EWC	1,327,880	1050	141	304
K6CQF	1,015,488	1073	125	203
K8UDJ	928,796	809	119	285
W6HX	895,806	1001	121	192
W4JDR	681,204	679	106	240
WA6IVM/6	674,238	745	119	190
K2BK	583,484	680	92	206
K3JYZ	578,744	671	98	206
W4JD	561,372	560	102	224
K9CUY	482,040	554	104	205
K6AN	466,905	575	105	150
W6KG	348,300	566	86	129
W6BIP	325,666	365	88	174
WA0YAW	287,130	415	99	156
W3YIK	235,764	365	71	151
WA6EPQ/6	214,000	334	83	117
VE7AZT/W7	201,348	474	71	82
WA3JYB	139,730	271	55	123
W6RGG	104,280	305	35	85
WA8TOB	92,170	255	49	81
WA1KZE	52,542	161	46	80
WA2LYM	3,440	35	19	21

Canada

VE1ASJ	1,075,647	1300	111	228
VE4MF	199,880	424	83	107

Cayman Islands

ZF1AN	2,343,665	2804	110	255

AFRICA

Kerguelen Is.

FB8XX	405,450	617	80	145

ASIA

Israel

W6DLE/4X	160,565	680	27	58

Japan
Club Stations

JA3YBF	1,115,064	1333	117	189
JA9YBA	735,158	1005	107	170
JA6YAD	237,300	455	91	119
JA7YAA	86,498	25	60	62
JA6YCL	31,064	143	43	45
KA8FY	230,584	593	71	77

U.S.S.R.
Club Stations
Asiatic

UK9QAA	602,525	810	73	202
UK9AAG	453,420	705	63	166
UK9MAA	176,952	359	62	140
UK9CAM	151,371	488	37	90
UK9HAD	145,126	384	49	100
UK9HAB	135,042	369	43	99
UK9AAC	95,590	302	34	87
UK9SAA	86,320	488	26	39
UK9SAD	40,950	200	21	54
UK9XAC	17,225	131	22	33
UK9AAK	1,152	24	6	12
UK0FAA	1,233,040	1764	119	201
UK0UAB	465,212	867	63	131
UK0JAA	429,066	936	77	120
UK0KAA	141,232	496	35	62
UK0ZAA	109,280	582	36	42
UK0ZAD	87,100	574	34	33
UK0FAF	64,701	470	35	44
UK0OOA	49,218	401	35	43
UK0CAQ	42,364	490	32	36
UK0CAA	30,632	435	28	28
UK0FAD	21,286	255	20	38

Azerbaijan

UK6DAU	51,486	358	31	63

Georgia

UK6FAA	494,050	758	63	178

Kazakh

UK7GAA	443,484	695	78	176
UK7PAA	65,284	317	33	43

Turkoman

UK8HAC	120,150	331	53	97

EUROPE

Aaland Islands

OH0AA	1,658,980	3805	119	317

Austria

OE1KRA	239,256	561	78	158

Bulgaria
Club Stations

LZ1KVV	1,224,828	1772	109	283
LZ2KAD	502,208	1131	80	181
LZ1KRD	339,076	809	65	14
LZ2KRZ	276,738	772	58	173
LZ1KKZ	161,755	594	52	13
LZ1KEZ	151,360	581	53	12
LZ2KCS	137,268	469	43	14
LZ1KWF	136,045	526	49	11
LZ1KML	89,999	407	37	12
LZ2KPD	73,787	420	38	8
LZ2KGB	58,138	498	20	6
LZ2KRS	43,442	311	36	7
LZ1KBZ	39,560	342	23	6
LZ1KRB	37,471	248	33	6
LZ1KBD	32,148	256	22	7
LZ1KBG	23,696	222	28	6
LZ2KRE	11,610	199	10	3
LZ1KHB	2,208	92	5	1

Czeckoslovakia

OK1KZD	92,568	391	47	10
OK2KMR	82,500	272	58	10
OK3RKB	17,556	200	16	1
OK2KUF	13,608	154	19	2

England

G3KWK	305,696	612	79	15
G3VYI	300,576	689	56	13

Faroe Islands

OY6NRA	48,107	322	23	5

Finland

OH1VR	812,032	919	122	29
OH5AB	133,940	417	59	12

France

F6KAW	482,526	1005	68	13
F6AAS	103,435	357	47	14

Germany

DL0WR	1,385,878	1576	105	24
DL8CM	619,080	969	89	17
DL8FR	582,966	880	86	19
DL0WN	507,940	1042	75	15
DL0JRA	364,325	714	88	15
DL0BH	359,480	791	74	14
DL0NS	107,214	642	55	11
DJ5ZN	99,185	416	47	10
DM2ATD	1,105,632	1553	107	24
DM3BE	72,698	274	55	10
DM5DL	65,394	364	32	9

Hungary
Club Stations

HA5KDQ	756,141	1071	97	21
HA4KYH	161,700	542	63	10
HA3KNA	98,842	464	37	9
HA2KRB	88,970	308	57	9
HA2KME	33,756	212	34	8
HA2KMR	31,314	227	31	7
HA3KGC	27,864	350	22	5
HA3YGC	17,841	365	8	4
HA8KIIV	7,473	147	14	3
HA9KPE	5,152	114	13	3
HA9KOV	3,420	75	11	2
HA3YGB	2,546	202	4	1
HA9YON	435	30	4	1

Italy

I1CRC	515,610	943	76	17

Poland

SP5PWK	139,320	500	54	12
SP3KCL	111,220	655	37	9
SP9KHR	34,272	264	26	7
SP6PWT	24,564	152	30	6

Sweden

SM7CZL	60,384	376	35	7

THE GALAXY 550A

MORE POWER, MORE FLEXIBILITY FOR THE Fixed Station...

GT-550A Transceiver Order No. 855 Ham Net $495.00

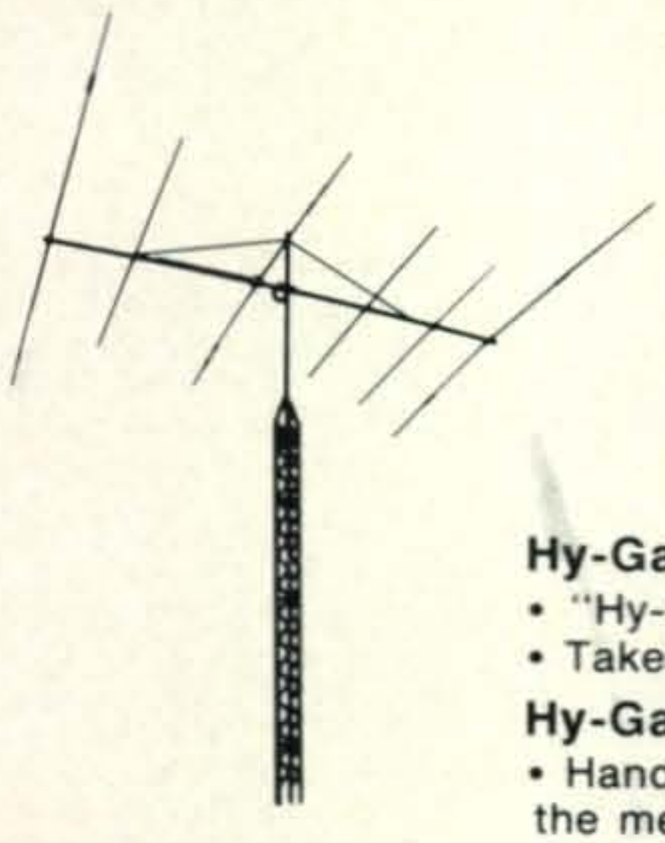
The GT-550A is the best transceiver on the market for the money. Bar none. Costs just $495.00 and delivers 550 watts of power. Operating either fixed station or mobile, this transceiver is guaranteed to have a top frequency stability after warm-up. We're so proud of the stability we include a graph with each GT-550A showing the purchaser how stable his radio was when it went through final check. 550 watts SSB; 360 watts CW; sensitivity better than .5 uv for 10db S+N/N; stable—45db carrier suppression; 25 KHz calibrator and vox option; no frequency jump when you switch sidebands.

RF550A contains high accuracy watt meter; calibrated in 400 and 4,000 watt scales; switch for forward or selected power; switch to select 5 antennas or dummy load. Order No. 857 Ham Net $75.00

RV550A is a solid state VFO. Function switch selects the remote unit to control Receive-Transceive-Transmit frequency independently. Order No. 856 Ham Net $95.00

SC550A Speaker Console with headphone jack. AC400 power supply will mount inside. Order No. 858 Ham Net $29.95

AC400 Power Supply is heavy duty solid state to operate GT-550A at full power, on SSB or CW, and with switch selection of 115/230 VAC, 50/60 Hz input voltages. Order No. 801 Ham Net $99.95



Hy-Gain's *Super Thunderbird* TH6DXX

• "Hy-Q" Traps • Up to 9.5db forward gain • 25db front-to-back ratio • SWR less than 1.5:1 on all bands • Takes maximum legal power • 24-foot boom. Order No. 389 Ham Net $179.95

Hy-Gain's 18 AVT/WB

• Wide band performance, 80 through 10 meters • Three Hy-Q traps • Top loading coil • True 1/4 wave resonance on all bands • SWR of 2:1 or less at band edges. Order No. 386 Ham Net $59.95

Hy-Gain's Thunderbird TH3Mk3 (not shown)

• "Hy-Q" traps • Up to 8db forward gain • 25 front-to-back ratio • Takes maximum legal power. Order No. 388 Ham Net $144.95

Hy-Gain's 400 Rotator/Indicator

• Handles large beams and stacked arrays with ease—up to 10 times the mechanical and braking capability of any rotator on the market. Order No. 400 Ham Net $189.95

QUEMENT Electronics

1000 South Bascom Avenue
San Jose, California 95128 / 408—294-0464

The OHØAA operaion took place at Sigge's OHØNI location. In the operating position, l. to r.—Martti OH2BH, Sigge and Ville OH5SE. (OH2MM took the foto.)

Switzerland

HB9AHP	**63,591**	**..261**	**40**	**83**

Yugoslavia

YU1BCD	**1,126,224**	**1179**	**119**	**277**
YT2FVW	906,096	1404	102	242
YT2BHI	568,113	919	86	187
YU1AHI	314,550	725	87	183
YU1EFG	183,600	438	72	153

U.S.S.R.

Club Stations

European

UK3AAO	**1,308,600**	**1180**	**127**	**323**
UK6LAZ	**1,140,300**	**1468**	**126**	**324**
UK1AAC	810,084	1106	107	254
UK1AAA	734,445	1154	85	200
UK1ABR	645,840	1060	84	186
UK1ABA	351,702	684	75	159
UK1AAG	296,834	678	50	143
UK1TAA	247,248	617	63	141
UK4WAC	169,338	666	45	124
UK4WAB	167,902	573	49	130
UK4AAB	144,478	556	53	138
UK1AAQ	128,484	461	61	111
UK1ADK	115,440	460	45	103
UK3EAA	108,108	534	38	116
UK1TAB	97,812	292	45	111
UK6UAA	90,534	335	47	109
UK3XAI	16,320	180	17	43
UK1ACT	6,000	103	1	29
UK1AAN	5,440	112	14	26

Estonia

UK2RAN	**215,046**	**889**	**40**	**77**
UK2RAJ	71,551	480	29	88

Kaliningrad

UK2FAM	**178,651**	**739**	**40**	**109**

Latvia

UK2GAA	**335,124**	**901**	**58**	**156**
UK2GAY	124,243	581	39	110
UK2GBY	2,982	53	14	28

Lithuania

UK2PAD	**861,360**	**1019**	**109**	**261**
UK2BBB	821,470	1116	101	254
UK2BAP	303,099	900	56	157
UK2PAN	30,378	353	15	68
UP2BAE	20,865	130	24	41

Ukraine

UK5IAZ	**931,736**	**1115**	**120**	**283**
UK5IAA	723.840	955	111	305
UK5UAL	381,640	795	70	165
UK5KAA	351,078	631	71	186
UK5LAK	258,780	521	66	161
UK5UAO	184,680	604	55	135
UK5UAL	132,363	540	54	137
UK5MAA	123,735	552	35	78
UK5ZAA	81,952	338	36	68
UK5VAA	50,397	319	33	74
UK5UAK	33,908	307	31	45
U5ARTEK	18,422	204	18	43
UK5ICA	11,570	138	23	42
UK5QAC	8,568	64	15	36

White Russia

UK2WAF	**228,717**	**..798**	**60**	**137**
UK2AAG	141,593	581	48	121
UK2SAA	15,075	195	25	42
UK2OAA	6,848	83	19	45

OCEANIA

Australia

AX2BKM	**949,750**	**1121**	**108**	**182**

Guam

KG6AAY	**242,901**	**591**	**61**	**76**

SOUTH AMERICA ANTARCTICA

UA1KAE/1	**1,229,304**	**1420**	**74**	**202**

Uruguay

CV3BH	**2,101,528**	**2142**	**108**	**226**

Venezuela

4M5ANT	**2,657,892**	**2423**	**108**	**258**

MULTI-OPERATOR

Multi Transmitter

North America

W4BVV	**5,552,352**	**3056**	**168**	**456**
W3AU	**5,536,851**	**3010**	**164**	**469**
W7RM	**4,346,460**	**2819**	**167**	**373**
W3GM	**4,076,791**	**2608**	**154**	**397**
K6RU	**2,860,116**	**2104**	**157**	**318**
WØAIH	**1,308,391**	**1180**	**127**	**282**
W6GFS	**1,167,427**	**1155**	**134**	**233**
W3MWC	**1,032,804**	**908**	**119**	**274**
WA3ATX	**724,113**	**..735**	**111**	**240**
W5IVN	**392,814**	**..512**	**102**	**176**

AFRICA

ET3USA	**989,175**	**1204**	**83**	**192**

ASIA

VU2IRA	**2,273,616**	**2128**	**125**	**307**

EUROPE

SK5AJ	**2,987,204**	**2919**	**139**	**365**
DKØKC	**2,296,512**	**2481**	**127**	**316**
LZ1KAB	**1,936,368**	**2469**	**122**	**330**
DLØPG	**1,851,255**	**2287**	**114**	**283**
UK2PAA	**1,744,925**	**2244**	**114**	**299**
OH3AA	**1,717,404**	**2452**	**115**	**289**
OK3KAS	**734,440**	**1562**	**87**	**218**
OY6FRA	**615,588**	**1576**	**69**	**189**
LA2T	**600,944**	**1176**	**92**	**191**
HA5KBM	**91,728**	**335**	**48**	**96**
YO9KAG	**59,875**	**314**	**36**	**89**

SOUTH AMERICA

PJØFC	**11,586,428**	**7090**	**150**	**401**

Our thanks to the following stations who submitted their logs for checking purposes. AX4KX, DM2ABG, DA2AHD, DM2AMF, DM2AUD, DM2BJD, DM2BOB, DM2BOV, DM2BYJ, DM2CBE, DM2CF, DM2CPL, DM2DGO, DM2DSO, DM3LOG, DM3NIG, DM3PQO, DM3RFC, DM3TDM, DM3UDM, DM3WSO, DM4CF, DM4PSM, DM4RFM, DM4VOL, DM4WKL, DM4ZWD, F8RU, HA1SB, HA1YSB, HA4KYB, HA5FA, HA5KFC, HA6KNB, HA6NA, HA6NC, HA6NJ, HA6YNB, HA7KLF, HA7PQ, HA7RN, HA7RS, HADC, HA8QC, HA9KOL, HA9KOZ, HAØDD, HAØKDA, HAØKHP, HAØYH
K8BYH, KV4AA, LA4N
LA8CE, OH1XO/9 OH3K
OH5WX, OH7NJ, OK1AF
OK1AOU, OK1ARH, OK
DOH, OK1FAF, OK1DJ
OK1TA, OK2BKI, OK2BK
OK2SKU, OY2R, OZ8V
PA0TO, SM3CJD, SM5BD
SM5UU, SM7TQ, SP1BS
SP3AIJ, SP3BLP, SP3CD
SP4BRL, SP6RT, SP7CK
SP9ECH, UA1DX, UB5N
UC2AI, UK5KGA, UK5WA
UK0CAD, UL7-GAA, UL7H
UV3DO, UW9PT, VE3B
VU2MD, W2EGI, W2G
W2KL, W2LKH, W3-ARK, W
CTE, W4JUK, W5GO, W
IMZ, W9EG, YO5PJ. YO8M

Station Operatòrs

Multi-operator Single Transmitter

AX2BKM & OK3UH. **CV3BH:** CX3BH, CX7BBU, CX8BB CX9BT. **DJ5ZN** & DK2VQ, DK2YJ. **DL8CM** & DL8C **DL8FR** & DL8AJ. **DL0BH:** DJ8CY, DK1EI, DK1VM, DK4P DK4PH, DJ9PS. **DL0JRA:** DL7BQ, DL7HN, DL70 DL7OR, DL7PV. **DLØNS:** DJ4AN, DJ5ZV, DJ7VH, DL2T **DLØWN:** DJ2SL, DJ3GY, DJ7IK, DJ9CB, DJØJX, DJØL OH5RO, OH5TY, OH5UN, .OH5YF. **OHØAA:** OH2B DK4TP. **DM2ATD** & DM2DT0. **DM3BE** & DM3KBE. **DM5S** DM5SDL, DM5VDL. **F6AAS** & F6BAZ. **F6KAW** & F3Q F6AGN, F6ASS, F6AUO, F90E, FG7TG/F0, FG7XI/F **G3KWK** & G3RZI, G3WJN. **G3VYI** & G3SJX, G3WRR, G3UF **HA5KDQ:** HA5AD, HA5FM, HA5HP, HA5JI. **HB9AHP** HB9AII, HB9AIW, HB9AKM. **I1CRC** & I1ALU. **KA8F** WB2MRD, WB4HKM, WA8WPW. **K2BK** & WB2ZPW. **K3J** &WA3JXJ, **K4HF:** K4AUA, W4ETO, W4LCP, W4QBK, K4TH W4WS. **K6AN** & K6AUC. **K6CQF** & W6UF. **K8UDJ** & K7NH K8MFO, WA8LWK. **K9CUY** & W9EI, WA9RQY. **KG6AA** K3JSV, WA4DFE, WA5KAK, WAØJYD, WB4CMP. **OE1XR** OE1JBA, OE1ZK. **OH1VR** & OH3YI. **OH5AB:** OH5P OH5RO, OH5TY, OH5UN, OH5YF. **OHØAA:** OH2B OH2MM, OH5SE, OHØNI. **OY6NRA:** OY1F, OY3PJ, OY4 OY7S. **SM7CZL** & SM7EXL. **SP3KCL:** Club. **SP5PW** SP5AGU, SP5ARP, SP5SIP, SP9AWV, **SP6PWT:** SP3B SP3CHN, SP4CFD, SP8BPY, SP8EHD, SP9DL **SP9KHR:** SP9AKG, SP9AOX, SP9AQO, SP9BOH. **VE1ASJ** VE1ACU, VE1DH. **VE4MF** & VE4JB. **VE7AZT/W7** & WA7HC VE7ZZ. **W3WJD** & W3YUW, WA2BLV. **W3YIK** & WA3JL **W4JD** & W4CHK, W4DMS, K4LRL. **W4JDR** & W4LB W4ZCB. **W6BIP** & K6OSO, WA6DJI. **W6DLE/4X:** TA1S 4X4XX. **W6HX** & WB6OLD, WB6WIT. **W6KG** & W6DO **W6RGG** & K6ALH. **W9EWC** & W9AQW, W9SZR. **WA1KZE** WA1LAK. **WA2LYM** & WN2LYN. **WA3JYB** & WA3LA **WA6EPQ/6** & WA6GLD. **WA6IVM/6** & WA6IVN. **WA8TOB** WA8RSG. **WAØYAW** & WAØZRD. **WB2SQN** & K2KU W2IWC, WA2HIN. **YU1BCD:** YU1NQM, YU1NQ YU1PCF, YU1QBC. **ZF1AN:** W2GGE, W2PCJ, W2SU WB2CKS. **4M5ANT:** YV5AAQ, YV5AAS, YV5ANT, YV5BO

Multi-operator Muliti Transmitter

DKØKC: DJ3JB, DJ4FZ, DJ6TN, DJ7SN, DL1FL, DL2Z **DLØPG:** DJ1FC, DJ6TK, DJ9IQ, DJ9TS, DK3BJ, DK3H DK7QV, DL6WE. **ET3USA:** Club. **HA5KBM:** Club. **K6RU** K6BCE, K6JYO, K6QPH, K6SEN, W6NAD, W6VS WA2WMT, WB6VFJ. **LA2T:** LA3PK, LA3VK, LA5YJ, LA8G LA8HK. **LZ1KAB:** Club. **PJØFC:** K1UDD, K4BAI, K4BVD/ PJ2VD, W1BIH, W1EOB, W2EQS, W2TA, W4BRB, W4DQ W4GF, W4KFC, W4SHB. **OH3AA:** Club. **OK3KAS:** OK2I OK2PCC, OK2VHL, OK3CBY, OK3CCK, OK3CDL, OK3CF OK3CFZ, OK3CIG, OK3QF, OK3QQ. **OY6FRA:** OY2H, OY2 OY3B, OY3H, OY400, OY4R, OY5NS, OY5Q, OY7M, OY9I OY9LV. **SK5AJ:** SM5AD, SM5CAK, SM5CBN, SM5CE SM5CNQ, SM5DJZ, SM5EXE. **UP2PAA:** UP2OE, UP2O UP2PA, UP2PAV, UP2PAX, UP2PX, UP2QA. **VU2IRA** VU2BEO, VU2KV, VU2OLK, VU2OMR, VU2REG. **W3AU** K3EST, K3NZV, W3IN, W3MVB, W3ZKH, W4TFX, WA3CV WA3GVP, WA3HRV, WA3HWN, WA3IAQ, WA3LVX. **W3G** & K4WVY, W3EAN, W3GHM, W3JSX, W3LTU, W3NO W3SS, WA3DJZ. **W3MWC** & K3JLI, K3JLK, W3YCI. **W4B** & G5ALY, K2UYG, K3GJD, K3NPV, K3OAE, K9OPF, W1BG W3BY, W3BQV, WA3LST. **W5IVN** & WA5LES. **W6GF** WB6IWS, WB6KBK. **W7RM** & K7HTZ, K7JCA, K7JJ K7VPF, W5QQQ, W7EXM, W7YGN. **WØAIH** & KØORK, WØB WØIYP, WAØHVR, WAØPRS, WAØRBW, WAØTWW, WAØUC WAØVIS, WAØWEZ, WAØYMM. **WA3ATX** & WA3CO WA3JYT, WA3KNB. **YO9KAG:** YO9AFT, YO9AFY, YO9AV YO9HT.

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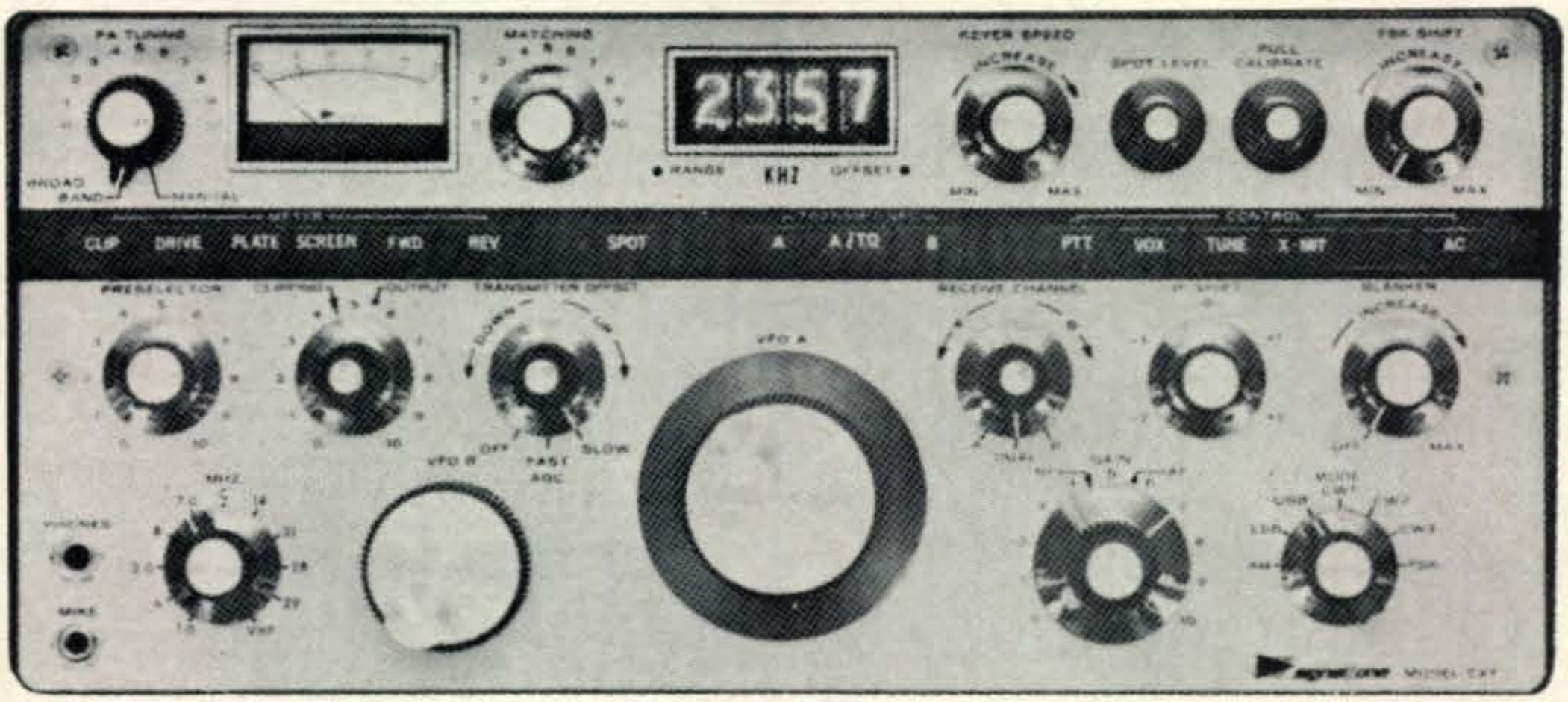
THEY'RE BETTER
AND WE'VE GOT THEM



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SAROC Seventh Anniversary January 6-9, 1972. Advance Registration $9.00 per person entitles registrant to SAROC Special room rate $12.00 per night plus room tax, single or double occupancy, effective January 4 thru 12, 1972; tickets for admission to technical seminars, HAM RADIO MAGAZINE and SAROC Happy Hour Thursday, SWAN ELECTRONICS and SAROC Social Hour Friday, HY-GAIN/GALAXY ELECTRONICS and SAROC Champagne Party Saturday, Buffet Hunt Breakfast, Sunday. Ladies who register will receive transportation for shopping tour, luncheon and Crazy Hat program at the New Union Plaza Hotel downtown Las Vegas, Saturday. Advance Registration, with Flamingo Hotel mid-night show two drinks, $14.50. Advance Registration, with Flamingo Hotel Dinner Show (entrees Brisket of Beef or Turkey) no drinks, $17.50. Tax and Gratuity included except for room. Frontier Airlines SAROC group flight package planned from Chicago, St. Louis, Omaha, Denver, send for details. Fifth National FM Conference, ARRL, WCARS-7255, WPSS-3952, MARS, meetings & tech. sessions scheduled. Accommodations request to Flamingo Hotel, Las Vegas, Nev. before 15th Dec. Adv. Registration to SAROC, Southern Nev. ARC, INC., Box 73, Boulder City, Nevada. 89005 before 31st December.

STATIONERY, 12 imprinted sheets, envelopes. 12 second sheets, white, pink, or blue. 3 line imprint. $1.00. JOYCE'S CHOICES, Department A-26, 2908 Columbia Avenue, Lancaster, Pennsylvania. 17603.

FOR SALE: Heath HW-100, $175; Radio Control GD-19, never used, $150. E. Van Horn, WA4-ROV, 39-45 NW 39th Ave., Gainesville, Fla. 32601.

FREE CHAMPAGNE Party for one hour if you can elbow to the bar. Hy-Gain/Galaxy and SAROC Champagne Party, Saturday, Jan. 8th. SAROC Convention, Flamingo Hotel Convention Center, Las Vegas, Nevada.

FOR SALE: Duobander 84, 250C mike, $95. New Saturn 6, $6. W35SJL, Virginia Road, RD 1, St. Marys, Pa. 15857. Guthrie.

FREE DRINKS for one hour if you can elbow to the bar at Ham Radio Magazine and SAROC Happy Hour, Thursday, Jan. 6th. SAROC Convention, Flamingo Hotel Convention Center, Las Vegas, Nevada. 89005.

SELL: Lafayette No. 750—6 meter, solid state transceiver and HA-250 Mobile 6-10-11-15 meter linear, 100 watt amplifier, $175.00. JAVELIN solid state television camera, one inch vidicon new $175.00; Mod. No. MC930. HEATH-QM1 —Q-meter-new, never used $50.00. HEATH-Audio Generator No. AG-9A, like new, $50.00. MILLEN No. 90651 Griddip meter with No. 90751 tone modulator and 11 coils, $50. Approx. 800 boxed IRC-QJ assorted controls and approx. 160 special shafts and 120 base elements. QJ8 to over 738. Lot $50.00. Portable-Hydrolic lift for air conditioning, etc. $150.00. Sal Francione, W2IDC, 146-07 Jamaica Avenue, Jamaica, New York. JA 3-5973.

LOOKING FOR OFFERS OVER $100, Collins 75A-3 Beckman 7170, N.E. 14-20AT, 2 master oscillators Collins 708A-1 and TMC VOX; Robert Ireland, Pleasant Valley, N. Y. 12569.

WANTED: RME 20 Preselector or later model. Private collection. W5PM, RFD Number 1, Box 399, Covington, La. 70433.

GALAXY FM210 with AC210. Like new. $175, or trade for C.W. Transmitter and Receiver. WB2-DMU, 4767 Lake Road, Burt, N. Y. 14028.

FOR SALE: Clegg Thor-6 w/AC, 6 meter xcvr, factory aligned, new tubes, $125.00; Knight TR-108 2 meter xcvr with V-107 VFO & mike, $87, Ameco TX-62 with Dow-Key relay, new tubes, $76.00; John Keramidas, 1833 Lake Howard, Winter Haven, Fla. 33880. (813) 293-0190.

SELL: Hammarlund HQ-170A, $160; Heath DX-40 and VF-1, $40; Drake 2NT, $80; Johnson 275W. matchbox, $20; Johnson Signal Sentry, $10; New EIMAC 304TH, $25; Ameco PCL-P Preamp, $15; two 23 ch. CB sets 12 volt, $90 each. You pay shipping. C. Strauch, 742 Woodfield Rd., W. Hempstead, N. Y. 11552.

"!971 TESTS-ANSWERS" for FCC First and Second Class License —plus— "Self-Study Ability Test." Proven! $9.95. Satisfaction guaranteed. Command, Box 26348-H, San Francisco, Calif. 94126.

WARREN ARA 14TH HAMFEST — Still the friendliest. Sunday, Aug. 22, new site: Yankee Lake, on Ohio Rt. 7, five miles north I-80. Picnic, swimming, playground. Prizes, displays, giant free flea market. For details & map, send card: Hamfest, Box 809, Warren, Ohio. 44480.

FOR SALE: Old CQ and QST magazines 25 cents each. Send SASE for list. W0BK, 1022 N. Rockhill Road, St. Louis, Missouri. 63119.

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RUBBER ADDRESS STAMPS, $2.00. Signature $3.50. Free catalog. Jackson's, Box 443F, Franklin Park, Illinois. 60131.

DXCC Certificate holders are invited to attend the W9DXCC annual meeting September 18, 1971. Holiday Inn (Eden's Expressway) Chicago, Illinois. Registration and program until 5:00 P.M. Dinner at 6:00 P.M. Advance PAID registration $10.00—(includes dinner), Eligible for EARLY BIRD PRIZES! at door $11.00. W9GIL, Chairman, 910 East Calumet Road, Milwaukee, Wis. 53217.

HEATHKITS Wired, 15% of cost. Price References, on request. SASE P. O. Box 6144, Linglestown, Pennsylvania. 17112.

GERTSCH FM7/DM3 Frequency, Modulation Meter, 560 FM Generator, all excellent, will sacrifice. Home Service Center, Carroll, Iowa. 51401. Ph. 712-792-9684.

AUDIO FILTERS: Knock down that background noise. KOJO SSB, AM, and CW filters do the job. Write for free brochure and see how serious DX boys hear them. KOJO, Box 7774, 741 E. Highland Ave., Phoenix, Arizona. 85011.

SELL: Johnson Thunderbolt Linear, Exc. Cond. w/manual, legal limit all modes. $225 or best offer. Edward H. Dauphin, 143 White St., So. Burlington, Vt. 05401.

CINCY STAG HAMFEST: The 34th Annual STAG Hamfest will be held on September 26, 1971 at Stricker's Grove, Compton Road, Mt. Healthy, Cincinnati, Ohio. Door prizes each hour, raffle lots of good, flea market, model aircraft flying, and contests. Identify Mr. Hamfest and win prize. $5.00 cost covers everything. For further info, contact: John Bruning, W8DSR, 6307 Fairhurst Avenue, Cincinnati, Ohio. 45213.

MANUALS— $6.50 each: R-390/URR, SP-600JX, CV-591A/URR, URM-25D, TS-34A/AP, BC-779B, BC-639A, OS-8C/U, LM-21. W3IHD, 4905 Roanne Drive, Washington, DC. 20021.

EARPHONES FOR SALE: NEW! Lightweight, Carce z type TH37 Telephonics Corp. make. Units wired in pairs with molded short cord. No headband. $1.00 per pair, plus postage. Douglas, 2254 Pepper, Concord, California. 94520.

SELL: CW Filter Kit for YAESU FT DX400 Transceiver. New, asking $15. M. D. Minkoff, WA6IYK/5, 513 Utah NE, Apt. B, Albuquerque, New Mexico. 87108.

WANTED: Instructograph with tapes. Send Post Card. All replied to. K6RJG, W. H. Faust, P. O. Box 1176, Rohnert Park, Calif. 94928.

LISTING SERVICE: Gear to sell? Need rig? Sellers-$1.00. List information year. Buyers— FREE. SASE brings details. Listing Service, Box 1111, Benton Harbor, Michigan. 49022.

SELL: Hammarlund HQ-129-X: Multi Elmac AF-67, M-1070 AC-DC ps; Heath HW-18 cap xcvr., Johnson Messenger III with crystals; Knight KG-620; Courier Port-A-Lab. Best offer, you ship. Doug Aldrich, RR 2, Mellette, So. Dakota. 57461.

FOR SALE: Galaxie FM210 and AC-210. Brand new, never taken out of package, was birthday present. Warranty card. First money order for $150. B. Madrick, 84-57 126th St., Kew Gardens, N. Y. VI 9-8484.

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CV-89 TERMINAL UNITS, plus CM-22 Comparators. Used good condition. Both for $100.00. Mike Tewksbury, Box 8324, Norfolk, Va. 23503.

FOR SALE: Never used Drake Model TR-4 SIDEBAND Transceiver including power supply, $550. HALLICRAFTER Receiver Model SX-101, $175; Lastly, a Challenge for Troubleshooters, Heathkit Transmitter Model DX-100, $65. C. Powell, 105 Ann Drive, Pittsfield, Mass. 01201. Telephone: 413-442-4812.

DRAKE TR-4, RV-4, and AC-4. All excellent, like new. Original owner. Ed Tischer, W8JLO, 2061 E. Whipp Rd., Kettering, Ohio. 45440.

H-P Counter 5 Nixie, $75; TS-186D Freq Meter LN AC pwr, $48; 160M LORAN Rx $15; swap unusual VHF/UHF and test gear, large list. SASE W4API, Box 4095, Arlington, Va. 22204.

HELP! Need diagram for McMurdo—Silver Model 700 144/240 Mcs Xmitter! N. Obenstein (WN2-PIM) 621 W. 171 St., N. Y. 10032.

SELL: EICO 753 transceiver, fact, wired, with P.S., no drift VFO. Realigned. Excellent condx. S. Reinhardt, WB2KXP, 17 Flower Ave., Floral Pk., N. Y. 11001.

EXCITING LISTENING! Police — Fire — Emergency Calls on your broadcast radio, $19.95 up. Also receivers, scanners, dual/band, crystals. Salch Company, Woodsboro, 3, Texas. 78393.

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ONE—DAY SHIPMENT on Regency, Swan, and Drake, 2-meter rig and crystals. Crystals $3.95 each, all popular frequencies and some "off-channels" in stock. Ed Juge Electronics, Inc., 3850 South Freeway, Fort Worth, Texas. 76110. Phone (817) 926-5221.

QSLS. SECOND TO NONE. Same day service. Samples 25 cents. Ray, K7HLR, Box 331, Clearfield, Utah. 84015.

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BEST OFFER: Gonset II, 12 volt — 117 volt, with Gonset Companion V.F.O., Mike, Cables. Manual. W2ASI, 15 Kensington Oval, New Rochelle, N. Y. 10805. 914-NE 3-7077.

WANTED: Collins and Drake gear. State condition and lowest price prepaid to my QTH. WA7PPN, 13615 N. 17th Dr., Phoenix, Arizona. 85029.

EARPHONES FOR SALE: Lightweight, scarce 300 z type th37 telephonics cop. Units wired in prs./w molded short cord. No head band. $1 pr, plus postage. Douglas, 2254 Pepper, Concord, Ca. 94520.

SALE: SX100, TX-1, No. 6 Copperweld, ant. insulators, UHF pwr transistors, coax w/conn. W3-EZT c/o Airtronucs, 301-384-1624.

LINEAR BUILDERS send SASE for delightful list of low-priced linear and power supply goodies. W6 RW, Mace, 8600 Skyline Dr., L. A., Ca. 90046.

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JOIN THE WORLD'S GREATEST CLUB for info, send to NAHC, J. Schwartz, 43-34 Union St., Flushing, New York. 11355.

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WON A $120.00 GIFT CERTIFICATE on a TR-4. Will sell for $50 or will trade. A. Tumas, W9 CPF, 225 E. Madison St., Villa Park, Illinois. 60181.

WANTED: S-Meter for S-76 Hallicrafters or entire receiver if reasonable. WA0 HFS, 4490 Decatur, Denver, Colo. 80211.

FOR SALE: 4—1000 A linear, two new tubes, band-switching, built-in power supply. $250 plus shp. Chgs.. SASE for description. B. Taylor, K8 TBW, RFD 4, Fostoria, Ohio. 44830.

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SELL: JOHNSON THUNDERBOLT LINEAR, exc. cond. with manual, legal limit all modes, $225 or best offer. E. H. Dauphin, 143 White St., So. Burlington, Vt. 05401.

SELL: 2 Meter FM, IC-2 F-STD, $180.00. W4-YNP, 612 Archove Ct., Norfolk, Va. 23502.

COLLINS 75A3, $225; Ranger II (factory wired) very excell., $165. SB-34 with vox and mike, $225. SX-100, $115; HQ-110 AC (VHF), $145; HQ 145C, $150; ART-13, $45. Much more. S.A.S.E. J. Shank, 21 Terrace Ln., Elizabethtown, Pa. 17022.

INTERNATIONAL FIRE FIGHTERS: Net forming on 15 meters. Contact WA9 BLE, Ron. 2408 26 St., Rockford, Illinois. 61108.

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SELL: QST's, CQ's, German DL-QTC's; 220 Mhz Rx; Reg DCPS. 24 V, 40 amp; VTVM, 2 mtr TDQ xmtr; etc. K. Paquee, 53 Jerome Ave., Trumbull, Ct. 06611.

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COLLINS Mechanical filter F455 N-20. Bandwidth 2.0 Kc, center freq. 455 Kc, with skirt selectivity-sharper than amateur filters. $20 postpaid. K7-CPW, 2115 Wolfe Pl. West, Seattle, Wash. 98199.

WANTED: Manual for No. 266 Simpson VTVM or a working schematic. R. C. Harlow, 1607 Park Rd., Waynesboro, Virginia. 22980.

SELL: Johnson 6N2 Transmitter $45; Courier $115; Drake SC-2 with 6 & 2 mtr converters, $90. 811's $2.50 each. Wagner Xfmr 3600-0-3600 at 1 amp 110/220 pri. $25. W0 AIH, 814 4th St. S., Virginia, Minn. 55792.

COLLINS 3KC Mech filter for 75A4 exc. condx. Like new. $15. First check takes it. 15 Kensington Oval, New Rochelle, N. Y. 10805. (914) NE 3-7077. W2 ASI.

WANTED: Drake SPR-4 or R4B receiver; Johnson T-R switch; Drake Low Pass Filter TV-1000LP. Earl Carsner, 935 Geary St., San Fran., Ca. 94109.

ELMAC AF68 Xmitter. PMR-8 Rec. W/A.C.—D.C. sply's. $110., plus shpg. W7 AHZ, 126 Hillcrest Ave. E., Eugene, Oregon. 97402.

SPIKE JONES RECORDS OR TAPES WANTED. Art Prutzman, K3 DTL, 31 Maplewood Ave., Dallas, Penna. 18612.

SELL: HW-32 beautiful $75 with extra crystal for LSB. AC Sup $25. Eico 710 Grid Dip, $30. R. Clark, 806 Jones Ave., Maryville, Tn. 37801.

CDR HAM-M ROTATOR completely factory rebuilt. Price $60. Expertly wired, mint. Heath SB101 with latest Heath modifactons, HP23A power supply Heath 400 cycle CW filter. Heath speaker, SB-600, $360.00. Write or phone: Mel Marsley, 2242 Stevens Ave., Kalamazoo, Mich. 49001. (616) 342-8838.

FOR SALE: Eico 751 AC P.S. 750, 280, —100 and 12 volts. $30. shipped C.O.D. T. E. Isaacson, St. Rt. 1, Box 833E, Branson, Mo. 65616.

KEEP SENDING CLIPPINGS and news stories about hams. WA1 GFJ, Gabe, 17 Whitney, East Hartford, Ct. 06118.

SWAN: 500C 550 w P.E.P. Vry gd cond. $340. Drake 2C mint $190.00. B. Kolash, 532 Spring Ave., DuBois, Pa. 15801. (814) 371-5307.

WANTED: Old battery-operated radios, crystal sets. Need not be working. Also want iron and tin toys and lead casting molds. State price. D. T. McKenzie, 1200 W. Euclid, Indianola, Iowa. 50125.

QST— 73— CQ Mags. 1970 issues, some '71. 35 cents each. (minimum 3). W2 JBL, 123 Davis Ave., Hackensack, N. J. 07601.

TRADE: My Heath HW17A Two Meter Transceiver with P.S. 2 Mobile Supply for your HW32A Twenty meter transceiver. Pierre Turillon, F3 VN/W2, Ramsey, N. J. (201) 327-7670.

SELL OR TRADE: Knight C-577 compressor, APX-6 mod. per CQ, H. B. phone patch, Gen Elect UHF-101 translator, Eico-232 VTVM, 6-meter BC-1158A mod. per CQ, TS-26A/TSM Multimeter, two BC-453's. What ya got. WA8 QBJ, Clinton, Oh. 44216.

SELL: Conrac 14" Monitor; Reg. DC PS 40 amp 24V; German DL-QTC; 220 MHz RX; Beckman Scaler; 7" VTVM; QST's and CQ's. K. Paquee, 53 Jerome Ave., Trumbull, Ct. 06611.

NON-LINEAR SYS. DIGITAL VOLTMETER, $400. Lambda Power Supply, $275. H-P VTVM 400-A, Port. $150. Sell or trade. A. C. Perry, Rt. 1, Box 192-E, Banks, Ore. 97106.

WANTED: P&H 6 and 2 mtr xmtr conv. SALE: GT550. RV550, Cal 25, Vox 35C, SC550, AC400, $495. Capt. D. C. Steinbarger, CMR Box 308, APO N. Y. 09130.

WANTED: Manual for Navy Transmitter-Receiver, Model MAW-1. Buy or rent. Hal Camlin, W3 QLP, 1634 Pulaski Dr., Norristown, Penna. 19403.

WANTED: Drake TR-4 Transceiver in good condition at good price. R. E. Dorough, 801 N. Catherine St., Terrell, Texas. 75160.

VAC. VAR., 1500 MMF-10KV, $50.00. Comp. I.F. Assy. for R-390A. New 25 amp Variacs, $25. W6 FVU, 953 MaClay Dr., San Jose, Ca. 95123.

SELL OR TRADE: Galaxy V MKIII, Ac400, F-3 filter, speaker console, 5BDQ antenna, all excellent. Going HMBRW. Trade in part for RCVR. W0 MDB, "Hal" (319) 363-4352. $340 takes all.

WANTED: Robot slow scan TV camera and monitor. Mike Ludkiewicz, 143 Richmond, Ludlow, Mass. 01056.

SALE: CROSLEY 52. Circa 1924. Bookplate tuning. Conversation piece. Investment $40. ppd. R. D. 1, Frankfort, N. Y. 13340.

CQ LIBRARY BOUND 1952-1968 Complete, excellent condx. 73 Magazine complete 1960-1968. R. Mendelson, 27 Somerset Pl., Murray Hill, New Jersey. 07974.

I-177 Mutual Cond. tube checker with MX-949A/U adapter. New Cond. $65.00. W4 JGO, 643 Diamond Rd., Salem, Va. 24153.

NEED: The Operating Manual for the R.M.E.-70 Jeff Nelson, 9614 N.E. 3rd St., Vancouver, Wn. 98664.

DOCTORS DIRECTORY—lists over 1500 M.D., D.D.S., D.V.M., & O.D. Send $2 to International Doctors C.H.C. Chpt. No. 24, K4 RTA, 105 Freshrun Dr., Hendersonville, Tenn. 37075 for this invaluable reference work.

SELL: BC-221 with mod., Regulated power sply, original cal. book, exc. cond. $75.00. W4JGO, 643 Diamond Rd., Salem, Va. 24153.

420 mc LINEAR 4x150As, $50. Heath Condenser Checker $10. Want: HP525 Counter plug in units A, B, or C. W. Davis, K6KZT, 4434 Josie Ave., Lakewood, Calif. 90713.

CQ's from 46, QST's from 1917 any quantity, from one to a hundred. Send list for quote. Erv Rasmussen, 164 Lowell St., Redwood City, California. 94062.

SALE: Drake 2B with Calibrator and 2BQ Spkr—Q Multiplier. Excell. cond. $150. P. Miller, K1DSS, (617) 327-6514, 6 Keane Rd., West Roxbury, Ma. 02132.

FOR SALE: Galaxy G-35 12V.D.C. DC Power Supply capable of powering 350W Transceiver. $50. Mel Cohen, K2EWJ, 12 Huntington Bay Rd., Huntington, N. Y. 11743. 516-427-8449.

WANTED: TR106 with matching V.F.O. For Sale: 2 Heathkit Sixers, $25 each. Thanks. WA4GER, S. Webber, 504 Bayberry Dr., Savannah, Ga. 31406.

WANTED: Ham Rotor and Cable. If used, must be in A-1 condition. WB8AXU, 1148 Third St., Portsmouth, Oh. 45662.

MOSLEY TA-40KR Kit. Add 40 meters to TA33, etc. Like new, $42. PP. 4D21-4-125 new $15 ppd. R. Silveira, Star Rt. Box 194-A, Mariposa, Ca. 95338.

FERRITE BEADS— 9 for $1, includes postage. R. Vaceluke, 17 W. 540 Hillcrest, Wood Dale, Il. 60191.

1—MA/E 36B 50 watt High Band 4 rcve, 4 xmit—1-MA36W50 watt High Band 3-4 rcve, 4 xmit, $110. ea. 1—Mot X53GJV-10 High Band 2 rcve, 4 xmit, $100. All accessories for above. No ovens. You pay freight. R. Eckton, 1100 W. Cypress, Redlands, Ca. 92373.

DRAKE RV4 unused $75; Galaxy Spkr new $13; NC156/RAO Novice RX $35; D104 w/G std $22; Simpson 260 $20; AF68 w/Universal pwr, $65. Art Ford, 9 Havemeyer Ln., Commack, N. Y. 11725.

TRADE: 4—125A w Socket & PLT cap Fil Choke, 5V 13A Fil Xfmr, Plt Choke, 2 TZ 40's. 2BP1. Want: 2 810's. WB4TFQ, Rt. 1, Centertown, Ky. 42328.

FOR SALE: 1 new Turner plus 2 Hand mike, $25; 1 new Turner Base mike plus 3, $30. K3YMN, 2185 Sampson St., Pgh., Pa. 15235.

CQ's from 1946 one or a hundred. QST's from '17, any quantity. Send list. Erv Rasmussen, W6YPM, 164 Lowell, Redwood City, Calif. 94062.

FOR SALE: Hallett Shielded Ignition System for GM V-8 Engines. Make offer. WA5KZE, 101 Georgia Dyess AFB, Tx. 79607.

SELL: G-28 10M comm, $125; G-PPI PH Patch, $30; DX-40, $50; Heath 10'er $50; WB9FHQ, R. Cook, Rt. 1, Box 132A, Warrenville, Il. 60555.

BARGAINS: Factory wired Ranger II, $150; Knight T-150A-$65; ART-13, $20; 75A3, $225; SX-71, $75; SX-100, $120; RME 4350, $75; Model B slicer and Q Mult, $50. Much more. Send stamp for list. J. Shank, 21 Terrace Ln., Elizabethtown, Penna. 17022.

WANTED: 7211 or 7698 tubes. Can use up to six. Bird element 25L lower. Sell: Realistic DX150A, FET front end, 30% off list, $85 or trade for perfect Allied 2515 plus $15.00. G. Vilardi, WA2-VTR, 14 Oakwood Terrace, Spring Valley, New York. 10977.

BRAND NEW: 75R alumifoam coax cable, 3/8" diam—10 cents/ft. Very low loss! SASE for further info. R. Zurawski, RB646, Menominee, Mi. 49858.

FOR SALE: ART-14 w/Dyna, $45; ARR-15 Rcvr $50; TS-413C/U Sig. Gen. 75 Khz—40 Mhz w/mod $50; TTY conv CV-57 & combiner CM-14&75 Binary Counter, $35. R. Konkel, 919 Raton Ct., Manitowoc, Wis. 54220.

SELL: Johnson Viking Phone Patch, $15; Galaxy RF550 wattmeter, $50; Dow Key Antenna Relay, DK60-G2C, $10. WB2YRU, A. Povol, 3538 Centerview Ave., Wantagh, N. Y. 11793.

LINEAR BUILDERS: 30 AMP FILAMENT CHOKES for GG Linears. Brand new, not surplus. Perfect for pair 4-400A, 3-500Z, or single 4-1000A, 3-1000Z, etc. $5.00 ea. PPD U. S. Vonn R. Murrell, K4HHA, 712C Rich Rd., Newport, Tennessee. 37821.

INTERNATIONAL FIRE FIGHTER NET forming on 15 meters. Contact WA9BLE, Ron, 2408 26th St., Rockford, Illinois. 61108.

NC183 RECEIVER, $65; Hallicrafters SP-44 Panadaptor, $45; 2KV KW Power Supplies, $25 ea W1BPW, Pete Butler, Elizabeth Dr., Merrimack, N. H. 03054.

HEATH TWOER, Crystals, Mike, Manual, $35. PPD. Want Old QST. Adinolf, 5113 Arvada, Torrance, Ca. 90503.

SELL: California Kilowatt Pair 4—1000A's. Output in excess of 4000 watts (8KW Pep) Super Deluxe Construction. $500.00. Al Povol, 3538 Centerview Ave., Wantagh, N. Y. 11793.

FOR SALE: Swan 350 with AC & DC Pwr sply's & mic. All latest factory modifications. Mint condition. $395.00. O. Levin, W5RK, 4103 Ave. S, Galveston, Texas. 77550.

VHF/UHF Send you 35 mm color slides of your station/antennas to be shown at various conventions and ham clubs in U. S. Write to W6DOR, 4100 Worthington Dr., North Highlands, Ca. 95660.

FOR SALE: Full-sized 20 meter beam by Cushcraft w/instructions. DXCC, WAZ, etc. Will deliver 200 mile radius of Marietta, O. Make offer. 3 EL. L. Beebe, P. O. Box 387, Beverly, Oh. 45715.

DRAKE: 2NT mint condx. I'll ship. $110. TA-33 Beam, excellent. I'll deliver 100 miles, $70. Lazor, 3800 Norwood, Alliance, Oh. 44601.

WANTED: Tower, Rotor, and Tri-Band beam. Tom Dornback, K9MKX, 19W167 21st Place, Lombard, Illinois. 60148.

MECH FILTER: Collins F455Y31, bandwidth 3.1 kc at 455 kc with crystal at 20 db point and IN40 diode, $30. Peter Buyaki, K6MWM, 927 Beryl St., San Diego, Ca. 92109.

WANTED: Good mobile SSB Rig with DC Power Supply, prefer tri-bander. Also good Vertical Antenna for 10, 15, 20, and 40 mtrs. R. Dorough, 801 N. Catherine St., Terrell, Tex. 75160.

FOR SALE: DX100, Hallicrafter HT18 VFO/NBFM exciter, R1155 all band rcvr, Heath "Twoer", novice xmtr, BC458 CE20a VFO, Dynamotor power supply, M. Schwartz, 166-36 24th Rd., Flushing, New York. 11357.

FOR SALE: Fisher 400 CX Master Audio Control $95. B & W 515B sideband generator, $85. W8IIT, 281 Jenny Ln., Dayton, Ohio. 45459.

WANTED: Good mobile DC Power Supply. Prefer 14-117 Swan. Also would like tower for Tri-Band Beam. R. Dorough, 801 N. Catherine, Terrell, Texas. 75160.

WANTED: SSB Crystal Filter 9MHz, $15—20. W2ISL, A. Porterfield, 41 Winnebago Rd., Yonkers, N. Y. 10710. (914) SP9-6145.

HMBRW CW XMTR — 50W, 80-15M, $30. EICO 711 S.W. Rcvr. $30. Both for $55. Johnson Messenger, 123 CB Xcvr, w/PortaPak & M plus 2/U, $190. WN2RXV, 38 Rolling Ridge Rd., Saddle River, N. J. 07458.

LINEAR BUILDERS: 30 amp filament chokes for GG Linears. Perfect for pair 4-400A's, 3-500Z's, or single 4-1000A, etc. Brand new. Not surplus. Bifilar wound. $5 ea. ppd. V. R. Murrell, K4HHA, 712C Rich Rd., Newport, Tenn. 37821.

WANTED: UNIQUE Products Antenna Tuner; LAFAYETTE HA-460 Transceiver, in new condition; R. Scott, 371 Claymore Blvd., Cleveland, Ohio. 44143.

FOR SALE: Sencore FE-14, Field Effect Volt Meter, (mint) $50; Appr. Elec. Inst. A-200 Sig. Gen. $20. Heath TO-1, Test Osc. $17.50. All F.O.B. Wendel, 160-20 Grand Central Pkwy., Jamaica, L. I., N. Y. 11432.

WANT: Military typewriter w/Block letters; Johnson KW Matchbox w/coupler. SELL: Collins R-390/URR Rcvr. Exc. — $650. W9CO, 604 Wyatt, Lincoln, Ill. 62656.

HAVE ABOUT 300 75 OHM to 300 OHM Matching Transformers for T.V. 50 cents each. 2537 Cannady Rd., N.E., Roanoke, Va. 24012.

WANTED: Information. How does Tri-band Conversion for Heath HW series work? DL4CJ, HHC 7 Corps (Signal) APO N. Y. 09107.

BEGINNERS' radio text, unused hardback, plus supply copper PC board. $5 cash or ship $9 value. Any trading items. J. B. Shrewsbury, Princeton, Ky.

BC-1269A AM/FM REC. 145 to 600 MC less P.S., Make offer. J. Wasiewicz, W2DQC, 229 Sarles Ln., Pleasantville, N. Y. 10570.

SELLING: Johnson Matchbox 275W. w/out SWR Brand new. Also DX-60B and Xtals. Make offer. D. Grahs, WB9EZS, 751 Fall St., Eau Claire, Wisconsin. 54701.

MINT: KWM-2, 516F-2, NCX-5 MKII, NCXA, sell/trade. Want: 75S3(B)(C), CX-7, Ftdx 560. Don Payne, K4ID, Box 525, Springfield, Tenn. 37172. Nites (615) 384-5643.

FOR SALE: QST 1934 thru 1965 - Poor to excellent condition. Some "Radio" or "CQ" .50 each ppd. W7GBL, Box 608, Kalispell, Montana. 59901.

SELL: Hy-Gain Antennas 68B stacked 210 stacked TH-4 "Cushcraft" 1 1/2 meter 11 elements. RF analyzer model MM-2, by Multiphase. No reasonable price turned down. All complete with manuals. K1MND, Schlosser, 29 Hettieferd Rd., Greenwich, Conn. 06830.

SCHEMATIC NEEDED for Nems-Clarke Mod. 1304 Rcvr. Tech. manual also. M. Brame, WB8EQQ, Rt. 4, Logan, Ohio. 43138.

FOR SALE: Ham-M used 2 years. TR-44 used 1 yr. Ant gets bigger. K. Rich, 224 NW7, Jamestown, No. Dakota. 58401.

WANTED: SB-600, HP-23A and Knight Kit SWR bridge. Leon Kirshemann, RR 2, Regent, N. Dak., 58650.

W6AG still trying sell out lifetime collection rigs, parts, ham tv camera, tubes, test equipment, etc. SASE for list. State your needs. Blanchard, Jr., W6AG, 130-48 Cantara St., No. Hollywood, Ca.

SWAP: 10 new GE6146 tubes (surplus). Need 572Bs. Will sell for $20 postpaid. Write K6GAK, 1088 Benjamin Pl., El Cajon, Calif. 92020.

SELL: Johnson Thunderbolt Linear, exc. cond. with manual, legal limit all modes. $225 or best offer. E. H. Dauphin, 143 White St., So. Burlington, Vt. 05401.

WANTED: Battery operated breadboard radios & tubes, pre-1923. Also Mercury Arc G.E. rectifier. W9LGH, 610 Monroe Ave., River Forest, Il. 60305.

WANT: Manuals control head cables for KAAR Eng trans Model FM177X; rec FM 47X High Band taxi rig. T. Adams, 9707 Hansford Dr., Austin, Tx. 78753.

SELL: Mod. 32 Ksr TTY. Bought new 1965. Used on weekends. $400. H. S. Blossom, Rt. 1, Box 244, Wimberley, Texas. 78676.

DX STATIONS: Let W2KF be your QSL mgr. QSL cards can be provided at no monetary cost. Write to W2KF for details, 309 Cherry Hill Blvd., Cherry Hill, N. Y. 08034. K. Muler.

SELL: UTC plate transformer rated at 2, 2.5 es 3KV CT at 500 mA. Model S-48. Local only. $50. WA3LPK, 2300 Louise Ave., Balto., Md. 21214.

SELL OR SWAP: ARC-5 EQUIP., BC348, Simpson 260, EICO 232, 460W. SASE for list. T. Gosman, 143 Roxton Rd., Plainview, N. Y. 11803.

FOR SALE: SX-110, like new, $75. SB-200, best offer takes. WA9MFZ, G. Kopstein, Oxford, Wisconsin. 53952.

VIKING RANGER I, $60. R. H. Petersen, 1207 28 St. S.E., Cedar Rapids, Iowa. 52403.

LINEAR, GG 811A's on 9" panel. Separate pwr/Sup to 500 w. $75. W2HWH, H. Lowenstein, 747 Valley St., Maplewood, N. J. 07040.

SALE: Hallicrafters SW500 Rcvr, $35. SX100, $160. Like new. W7ADS, 109 No. 32nd Ave., Yakima, Washington. 98902.

COLLINS 500 cycle CW mechanical filter for 75S3B rcvr. Mod. F455FA-05, $40 ppd. K7CPW, 2115 Wolfe Pl. West, Seattle, Wash. 98199.

JAPANESE ham gear catalog. $1. 50 rigs, photos, specs, prices, in English. K4EPI, R. Guard, Box 4455, Huntsville, Ala. 35802.

SALE: SSB300 Receiver mint condx. $185. WB6EFR, V. Whitley, 610 Foothill Dr., Pacifica, California. 94044.

WORKED SOUTH AMERICA CERTIFICATE: Work all 13 countries. Send $1 and confirmation list to HC1TH, 4050 Drummond, Houston, Texas. 77025.

LAMPKIN 105B $125; Twoer $40. 12VDC for twoer $10. HE45B $50. WA5CMC, 2309 Bullington, Wichita Falls, Texas. 76301.

WANTED: Millen "Transmatch Junior" or Drake MN-4 antenna tuner; New-Tronics 4BTV vertical antenna with 80 meter resonator. E. Carsner, 935 Geary St., San Francisco, Calif. 94109.

FOR SALE: 6.3v-6A Xfmr—$2. 6.3V-10A Xfmr, $2.50. Chokes 200 mil 12H — $3. 300M-12H—$4.00. UTC VM3 Modulation Xfmr, $9.00. Other Ham Bargains. E. Tischler, 58 Carey Ave., Wilkes-Barre, Penna. 18702.

FOR SALE: Ten Tec PM3A, nearly new, $55. Lafayette HA460, $55. Heath HD-10 Keyer, $30. D. J. Reese, 747 Madison Avenue, Charlottesville, Va. 22903.

EARPHONES FOR SALE: 50 sets, lightweight, scarce 300Z type. TH37. Telephonics Corp. makes Units wired in pairs with molded short cord. No headband. $1.00 per pair, plus postage. Douglas, 2254 Pepper Dr., Concord, Calif. 94520.

SELL: Hewlett Packard DCU's (AC4-A and G), $5. Okonite Rubber Insulating Tape. 10 Roll Box, $3. Hycon Digital Multimeters, $50. Trammell, 1507 White Oak Ct., Martinsville, Va. 24112.

SELL: Pr. of 4-1000 on 80 thru 10 meters. Set of spare finals included. SASE for more information. $300. D. Roden, Jr., WA4NPL, P. O. B. 684, Scottsboro, Al. 35768.

SELL: Mint Swan 350C, Calibrator, 117XC supply, $350.00. Swan 250 calibrator, 117XC, $265. Swan 510X Crystal Oscillator, $25.00. Model 22 VFO Adaptor, $15.00. WA3HMQ, (717) 761-1107.

LINEAR BUILDERS: 30 Amp Filament Chokes for GG Linears. Brand new, not surplus. Perfect for pair 4-400A, 3-500Z, or single 4-1000A, 3-1000Z, etc. $5 ea postpaid USA. V. R. Murrell, K4HHA, 712C Rich Rd., Newport, Tenn. 37821.

SELL: 1942 Special Defense Handbk, gud cond, make offer. Will sked 7176 Sat es Sun. Will QSL. S. Quayle, WN8HMG, 2526 Hilliard Rome Rd., Hilliard, Ohio. 43026.

WANTED: Telrex Tri-Band Beam. M. Ludkiewicz, 143 Richmond Rd., Ludlow, Mass. 01056.

WANT: Oil filled capacitors. 5KV at 5MFD or better. K8NGV, 26496 W. Six Mile, Detroit, Mi. 48240.

SELL: Mint C.E. 200-V with 160 meters, $415. Drake SC-2/SC-6, CPS-1 & Console $100. Hallicrafter P-26 AC Supply, $40. Johnson 6N2 Xmtr, $75. Johnson Courier, $120. Rev. Bittner, 814 4th St. So., Virginia, Minn. 55792.

DX'ers join World Club with close to 6000 members in 240 countries representing over 650 call prefixes for awards purposes, write CHC Hq, Box 385-Bonita, California. 92002.

WANTED: RME69 instruction book to buy or copy. Wells Chapin W8GI, 2775 Seminole Rd., Ann-Arbor, Michigan. 48104.

JAPANESE HAM GEAR CATALOG—FLYER in English. Photos, Specs., Prices of 60 JA Rigs. $1. K4EPI, Roland Guard, Box 4455, Huntsville, Alabama. 35802.

WANTED: Hallicrafters HT-33B, must be mint condition, with good final. Send description and price. Glenn Kramer, WA2PSV, P. O. Box 2322, Newburgh, N. Y. 12550.

SALE: SWR REFLECTOR METER & Relative Power meter, brand new. $24.00. K3YMN, 2185 Sampson St., Pgh., Penna. 15235.

SWAP: Eico 435 Scope for Ham Gear or Radio Control. W9KAA, P. O. Box 85, Butler, Ind. 46721.

FREQ COUNTERS, Berkeley, 43 MHz, Mod. 5571 and 1 MHz, mod. 7160. Excellent condx. 7 digits R. Mendelson, 27 Somerset Pl., Murray Hill, N. J. 07974.

WANTED: Mobile Antenna, Swan 55, 45, or Complete Hustler. Rollin Silveira, W6OHB, Star Rt. Box 194-A, Mariposa, Calif. 95338.

WANTED: Manual for EICO 720 transmitter. I will copy or buy it. WN8IMG, 140 Paw Paw Lake Dr. Chagrin Falls, Ohio. 44022.

WANTED: Swan 14C module. Will trade BC221T, with power or pay reasonable cash. L. Basham, 735 Caves Hwy., Cave Jct., Oregon. 97523.

SELL: DX60-A, $50; HG10B w/cables for connection DX60, $25. 51J-4 excellent condx, $200. Ebie, 502 Oakshire Ave., Modesto, Ca. 95351

WANTED: Early Atwater-Kent battery receivers Grebe and Kennedy, all models. Early wireless material as well. Erv Rasmussen, W6YPM, 164 Lowell Redwood City, Ca. 94062.

JOIN The 4th U.S. Call District Amateur Radio Assn., and help promote the ARS in all our 'Rebel' States. Write: Robt. Knapp, W4OMW, Rte. 7, Box 187, Greenville, N. C. 27834.

SELL: Swan 500C with both A.C. and D.C. supply, $400.00. Also F.T. 200 with both A.C. & D. C. supply, $350.00. W. E. Cann, W1HSC, Box 264, Hampton Beach, N. H. 03842. 603-926-2359.

MUST SELL: Johnson Ranger II Xmtr. Ex. condx. 160-6 meters CW-AM, $125. WB9AMI, Box 128, Pittsboro, Ind. 46167.

BC221E, $40.00. Xtal Calibrator 11 mc, 1 mc, 10 mc, $20. TS18.6 freqmeter 100 mc to 10,000 mc. $50. W6JX, 14945 Dickens St., Sherman Oaks, Ca. 91403.

FOR SALE: Lighted speaker 75A4, $15. Wheatstone Keyboard Perforator, $50. W2CVW, 13 Robert Cir., So. Amboy, N. J. 08879.

SBE-33, perfect. Gotham 3 band Quad. Eico FM tuner. Roy Neste, Park River, N. D. 58270.

FOR SALE: Model 19 teletype with W2JAV converter. Need RCA SSB-5 transceiver. W9FYM, 1538 S. Post Rd., Indianapolis, Indiana. 46239.

HY-GAIN Roto-Brake 400 Rotator slightly used, $160 & 130' No. 412 5 conductor, cable, $15; 3 section 24' Spaulding Tower, $15; 25' alumifoam 52 coax. New low loss, $25. W. Wiaduck, W9ZWH, 4926 Hawthorne, Hillside, Il. 60164.

SELL: Mosley TA-36 very clean, $70. Galaxy FM-210 with mike and xtals, $110. WB2SIH, (914) 273-3058. W. A. Fisher, 2 Barnard Rd., Armonk, N. Y. 10504.

SWAN: 350, 117XC, VX-1, Cal; Valiant; HW-100. No time. WA3LVC, 37 Hearth Rd., Levittown, Pa. 19056. (215) 943-1251.

HIGH-POWER COMPONENTS. W6MUR, 7511 (9) Clay Ave., Huntington Bch., Ca. 92648. (714) 847-8070.

FOR SALE: Galaxy 300, 80-40-20 tri-bander 300 watts pep. and A.C. supply — Both for $140. R. Brass, 2633 Whitney Dr., Alhambra, Ca. 91803.

FOR SALE: Swan SW 240 tri-band transceiver w/ Heath AC power supply. Excellent. $175, plus shipping. W8BHL, 232 Van Buren, Toledo, Oh. 43605.

HAVE two 35 mm. CAMERAS. Will take best cash offer, or will trade for good quality receiver or transceiver. One Univex, Mercury Mod. CC, Tricor 35 mm. f-3.5 lense. ONE Bolsey, mod. B-2 .44 mm. -f-3.2 lense, with case. All lenses are by Wollensak. ONE Lott Federal Enlarger, Contact J. Hall, 4 Lakecrest Ave., Lakewood, N. Y. 14750. Call: 716-763-1511.

RAK—47 NAVY RCVR. 15KC to 600KC with AC Power Supply, $15. A. Schur, WB2FJO, 1878 E. 47th St., Brooklyn, N. Y. 11234.

WANTED: Wide Angle Lens—"C" Mount—8 to 12M/M. f1.9 or better. To fit TV camera. Will pay cash or swap RTTY gear. All letters answered. W9YVP, 8280 S. Tennessee, Clarendon Hills, Il. 60514.

NEW: Alarm equipment intended for my home and car, but never used. Send SASE for prices. A. Schur, WB2FJO, 1878 E. 47th St., Brooklyn, N. Y. 11234.

Cash and very good 51J4 with mech. filters, ssb. for good R390A. So. Cal. P. C. Bilis, 18162 Dewberry, Irvine, Calif. 92664. 714-833-2274.

SELL: Knight KG-220 FM Monitor 30-50 mc squelch with const manual, $18; Tunaverter Model 1828 118-128 mc, $12. W4UPE, 3127 Oriole Dr., Louisville, Ky. 40213.

OLDTIMERS— Join new "Senior Citizen's International Amateur Radio Association." 20-30-40-50 60-70 years a HAM! Write me, WA1IRY, or ARA Secty W5IZU or K6BX. 18 Gorwin Dr., Sharon, Ma. 02067.

POWER LINE R.F. FILTERS ALL 115 vac 60 cy. 100 amps 4.70 7 amps 1.65 1/2 amp .85 add postage. Ken Maas, Burlington, Wis. 53105.

LAMPKIN 105B $125.00 Motorola T43GGV operational on 94-94, 34-94, 34-76, and 28-88 $200 FOB WA5CMC, 2309 Bullington, Wichita Falls, Texas. 76301.

WANT TO BUY NATIONAL XCU-27 Crystal Calibrator for NCX-5 MKII. Also Collins 312B-4 station console. Hammarlund FM50A, etc. Sell or trade for mint SSB equipment. WA0SMR, 601 Maple, Overbrook, Ks. 66524.

HIGH POWER COMPONENTS tubes, filters, trans., cab. racks, butterfly caps. R. W. Johnson, W6MUR, Qth Callbook.

WANTED: Manual for SP-600 to buy or make a copy of. Frank Miller, Clarkson, Nebr. 68629.

SALE: Cabin, California — wooded 1500' elevation, streams, fishing, hunting. 2 lots, furnished no smog. $13,900.00. Owner will finance, Keleher, 136 Bidwell Way, Vallejo, Ca. 94590.

WANT: Globe Sidebander DSB-100 and CQ binders, Lorenson, Hillsdale, N. Y. 12529.

WANTED: Schematic of Hickok Universal Adaptor Model CA-5 for 752 and 752A tube tester. W1JE, Old Comers Road, Chatham, Mass. 02633.

WANT: All-Band Master Mobile Coil. WA4KCN, 4921 Edenshire, Memphis, Tennessee. 38117.

FOR SALE: Raytrack Speech Compressor, still under guarantee. Best offer. Also 75A-2. Wanted: R388, 390, 390A, SP600, K2QHT, 516-265-6479.

HEATHKIT SB301/SB401. With mike, spkr, manuals, all cables, CW, AM, SSB filters. Excellent condition, and guaranteed perfect. $480.00. Colella, 105 18 131 St., Richmond Hill, N. Y. 11419. Phone: 212-641-2559.

4—400A's, $36.00 for pair. Telecon Xstr 12VDC P.S. 500v @200ma, 250V @ 100ma. New unused—$40.00. J. Davis, 904 Haws Ave., Norristown, Pa. 19401.

FOR SALE: Collins 75A4, $300. OR Trade for Collins 75A3 and $75. E. D. Fox, W4DWR, 318 Montcastle Dr., Greensboro, N. C. 27406. Phone (919) 275-6092.

SELL: Wagner Plate Xfmers 3600-0-3600 at 1 amp, $25; 1.7 amp $40. All with 110/220 pri. Want Drake line. W0AIH, P. Bittner, 814 4th St S., Virginia, Minn. 55792.

WOW! BARGAINS New. SO-239, .18, 10/1.70; PL-259A, .30, 10/2.80; Millen Dial No. 1009, .30 with Vernier .42 Add Postage. Ken Maas, Burlington, 256 Robert Street, Wisconsin. 53105.

FOR SALE: Toroidal Coil Winder; Takes to No. 18 wire. Cost $2,200.00, sell for $800.00. K8VEZ, W. R. Collinsworth, 5925—Verdi Dr., Dayton, Oh. 45449.

YAESU FT-200X P.S./Spkr, $350.00. Ronald M. Nagata, W6RPZ, 1330 Curtis St., Berkeley, Calif. 94702. (415) 526-7345.

INT. NOVICES ARA sponsors programs to assist the novice operator. For info., write to WB9AHJ, Winkel, 607 East St., Madison, In. 47250.

SELL: Jennings Vacuum Var Capacitor 0-1000pf 5kv $75 each. Johnson Var Coils 10 uh Samp, 18 uh 5amp, $10 each. WB6PRL, 522 Newville, Los Gatos, Calif. 95030.

WANTED: 2M, 1 1/4M and 3/4 M Tapetone converters with 26-30 MHz IF frequency. Cash or trade. W7ZBS, T. Custer, 8811 E. Kenyon Dr., Tucson, Ariz. 85710. Phone (602) 298-5693.

NEEDED: Noise blanker and 200 or 500 Cycle filter for Collins 75A4. WA8HNM, Lee Beyer, 10 W. 35th St., Holland, Michigan. 49423.

WANTED: Heath HO-10 Mon. scope; tunaverter Mod. 1828; 200 (w/BFO). State cond., price. WB2-FWS, 31 Penny Dr., Hunt. Sta., N. Y. 11746.

WANTED: HT-44 with power supply and HT-45 linar amp in good condition. Price including shipping with first letter. James H. Lasater, W4PRU, Box 492, APO New York. 09305.

KG-687 KNIGHT Sweeper-marker wanted w/manual. Clean, need not be operative. Bud Power, 509 Howard Ln., Eustis, Fla. 32726.

SALE: Pair of RCA CW-5B, 960 Mc. crystal controlled receivers, rack mounting, $50.00 each. W6DOU, 3154 Stony Point Rd., Santa Rosa, California. 95401.

FOR SALE: 60 M&D 4000VDC Filter, $35.00. Very compact. Also Pole Pig Xfmr (local only), $60.00. W6EUF, 2301 Canehill, Long Beach, California. 90815.

FOR SALE: Telrex 5el Tribander TC99D. $120. 6 meter 5el Cushcraft, $12; P&H 6 mtr Transmitting conv., model 6-150., $130. SB100 and HP23 mint, $335; Much more. Inquire. J. Bodycote, K4—QPR, 2214 59th St., Sarasota, Fla. 33580.

WANTED: Cliff Dweller 40/80 mtr. Beam. R. W. Walters, 7375 SW 100th St., Miami, Fla. 33580.

SELL: Mint Heath HW18-3, 160M, VFO Mod; 5 new unused xtals; HP23-A Pwr Supp; $160.00; Morton Berger, 57 Meeting Lane, Hicksville, N. Y. 11801.

WANTED: CQ June 45 and Feb. 46. Ed Alves, 275 So. Marengo Ave., Number 30, Pasadena, Ca. 91106.

SELL. several new Vibroplex Lightning Bugs $15, New Johnson Speed-X bug w/chrome finish $15, Hallicrafters SX-46A Trcvr with built in 115/12v supplies and HA-26 6&2M VFO $140. Want SB-110, SB-610, SB-620, Duobander. K3TML, 27 Sheldon St., Wilkes Barre, Pa. 18702.

COMPONENT HI-FI: Harmon Kardon pre & amp 'Citation' Fairchild turntable. Sell or trade for Mobile XCVR. J. L. Davis, 904 Haws Ave., Norristown, Pa. 19401.

GROUNDED GRID AMPLIFIERS: Single 4-1000 or Pair of 4-1000's — Zener Diode, all band or single band. W4GD, 3087 Carnes Ave., Memphis, Tennessee. 38111.

WANTED: Tower for beam antenna. Will pick up inthe California area. Craik, 44702 No. 12th St. E., Lancaster, Calif. 93534.

COMPLETE STATION: PMR-7 Rcvr, AF-67 xmtr, M1070 AC/DC pwr supply ALL cables plus T/R relay. $165.00. M. Bokulich Sr., K8SJU, 916 Columbia Drive, Amherst, Ohio. 44001.

SWAN 250 Supply 117XC, VOX VX2 unused in original cartons. Best offer. Pankhurst, WA4YOI, 4331 W. Trade Winds Ave., Ft. Lauderdale, Florida. 33308.

WANT: Antenna books by Jordan, Harper, LaPort, Keen (DF) & will pay $10 postpaid. Sell: Vibroplex, $10. W3AFM, 5800 Hillburne, Chevy Chase, Md. 20015.

WANTED: HWA-17-2 FM Adapter for Heath HW-17. G. R. Harrison, P. O. Box 467, Bolivar, Mo. 65613.

SELL: HW-12a $75, Hwl6 and Hgl0 VFO $100. Contact John Dunham, WA1MOW, RR 1, Box 611, Gales Ferry, Ct. Tel. 203-464-6422.

SWAN 350C Transcvr, 117XC supply, like new, $325. HEATH SB-610 monitor scope, mint condition. $50. WA0QOI, 437 Gabriel, Kirkwood, Mo. 63122. (314) 966-2849.

HY-GAIN 14AVQ/WB/LC809 29.95. W6RQZ, 415-526-7345. Berkeley, Calif. 94702. R. Nagata.

SELL QST MAGS 1932 to 1968, 25 cents ea. or $2.50 yr. QST Binders wanted. Larry Mueller, 12700 Elliott Ave., SP287, ElMonte, Ca. 91732. 213-442-0015.

WANTED: Unique wire tuner, and Drake Mobile speaker/wattmeter. WA4KCN, 4921 Edenshire, Memphis, Tennessee. 38117.

WANTED: Rotary Inductor, complete from 40 meter ARC-5 transmitter. State price and condition. Earl Carsner, 935 Geary St., San Francisco, California. 94109.

FOR SALE: Microphones. Astatic D104 with PTT stand and Electro-Voice slim broadcasting type-Half price. George Norton, 250 Milledge Terrace, Athens, Georgia. 30601.

810 AND 8000 TUBES 750 watts input to 30 megs bux 10 or 18 pair. Modified prop pitch motor $30. W3TW, 4114 Tuxey Ave., Pgh., Pa. 15227.

SBE 34 with manual. Best offer over $150. OR trade for 2 meter transceiver. Regency HR-2 or equal. K1CCW, 6 Wirthmore Ln., Lynnfield, Mass. 01940.

SELL: Drake L4 Linear and Power Supply. Excellent condx. $400. Emil Malek, 4660 Fair Oaks Blvd., Sacramento, California. 95825.

SELL: Pair Eimac 450 TL's new, never used. $30 each. The pair $50.00. You pay shipping. James W. Maxwell, 1233 Leawood St., Memphis, Tenn. 38122.

WANT: HRO Dial for project. Prefer NPW-0, PW-0, PW-1R (225mmf), PW-1L (225mmf). Want like new in appearance and operation. Mac, K5-MVN, 113 Woodcrest, New Iberia, La. 70560.

SP600 540KC to 54mc, $200. RBA 15kc to 600kc $50. CV253 1ALR 38 to 1000 mc. $70. 50w AM 6MTR Xmtr, $25. J. Murray, 4033 61st, Woodside, N. Y. 11377.

KF4GSC, WC4GSC, WE4SUN, WA4DTF, W5TIA, QSL all these stations to: W4DQD, Box 2067, Statesboro, Georgia. 30458.

FOR SALE: HW-100, HP-23A, HDP-21A. Little used. Excellent condx. with manuals, $325 plus shipping. Gerald I. Miles, 5700 Leslie Ave., Apt. 20, Nashville, Tenn. 37209.

WANTED: Planetary dial parts for RME 4350. WA4UZM, 324 S. Riverhills Dr., Temple Terrace, Florida. 33617.

FOR SALE: Model 19 teletype machine. Brand new, never used. Erv Sly, 217 Santa Mariana, La Puente, Calif. 91746. (213-336-6915).

WANTED: Back issues of Ham, and S.W.L. magazines. Quote your price. J. Wood, 463 Torner Rd., Baltimore, Md. 21221.

SALE: 10.7mc CRYSTAL FILTER, 3 db— 2.4 kc., 60 db— 3.6 kc. $20 postpaid. Worcester, R.D. 1, Frankfort, N. Y. 13340.

FOR SALE: Hybander — VHF-62, HQ170, 6—180M. Make an offer. You pay shipping. C. Holmberg, WB2NPL, RFD 1, Lodi, N. Y. 14860.

HW-100 and P.S. $280. Also Heath Apache and Hammarlund HQ170 with speaker for best offer. (315-638-1630 or write: Dave Solt, Plainville Rd., RD 2, Baldwinsville, N. Y. 13027).

FOR SALE: Drake TR-3 transceiver, AC-3 power supply/spkr, DC-4 DC Power Sup. Make offer. R. Conley, 37 Wyoming Ave., Billings, Mont. 59102.

WANTED: 2 meter F.M. equipment, base and mobile. HQ-110A-VHF receiver and Johnson Challenger transmitter for sale or trade. WA5YJM, 422 Cottonwood, Ardmore, Okla. 73401.

LINEAR BUILDERS: Send SASE for low-priced list of HiPower parts — W6RW, 8600 Skyline Dr., Hollywood, Calif. 90046.

WANTED: Motorola HT-200 Two-Watt FM Hi-Band for two meter FM. K4AKE.

MANUALS FOR SALE: $3.00 each or $10.00 for all. BC794A, SCR274N, Art 13, BC224/348. J. Hart, 26 William St., Glens Falls, N. Y. 12801.

WANTED: Tower, Rotor, Triband Beam, and calibrator for NCX500. Tom Dornback, K9MKX, 2515 College Rd., Downers Grove, Il. 60515.

AFFLICTED with NON-WORKING NEMS-CLARKE Mod. 1304 Rcvr. Does Anyone have schematic for this beast? M. Brame, WB8EQQ, Rt. 4, Logan, Ohio. 43138.

MOBILERS—Join The International Mobilers' Amateur Radio Association affiliate of Int. AR Society. Write Secty the IMARA, WA6PDE or IARS, Box 385, Bonita, Ca. 92002. or WB6TUI.

SALE: Ranger I, Vibroplex original. Both $70. Mark, WA2HPB, (609) 396-8503, 1801 S. Clinton, Trenton, N. J. 08610.

CANADIANS: Popular Electronics 100KHz Standard. $10. D. Renwick, 2420 Eastview, Saskatoon, Sask., Canada.

FOR SALE: RIDER'S MANUALS Volumes three through fifteen, $20.00 each postpaid. Will trade some for RIDER's Volumes one and two. W7BIF, 107 Wyoming St., Boulder City, Nv. 89005.

WANTED: Heath H.P. 24 power supply. Please state condition and price in first letter. W5FMY, J. Ray Holmlund, Box 1268, Dalhart, Texas. 79022.

COMPETITION! Contests, DX, Antennas, Parties, Outings, Field Day, Parties, Friendship. These are what membership in Murphy's Marauders has to offer. N.E. USA contact K1VTM, K1IXG, 516 Deercliff Rd., Avon, Ct. 06001.

SELL: HENRY 3-K, 8 mos. old, 3, 5KW input, $695.00. A. Kogerup, W9HOG, 703 Huntington, Schaumburg, Illinois. 60172.

WILL TRADE: SX-110 RCVR for DX100 or similar transmitter. E. Chestnut, P. O. Box 571, Louisville, Ky. 40201.

FOR SALE: B & K Model 400 Cathode—Tester—Rejuvenator w/instructions. Make offer. Bob, K8-KRK, 466 So. Sandusky, Tiffin, Ohio. 44883.

GALAXY 5, Mk II, with A.C., very clean, carton and manuals, prepaid, to first $275 cashiers check. W7HWL, Charles Pranger, 1932 Bonita, Las Vegas, Nevada. 89105.

SELL: Galaxy GT550, RV550 VFO, AC400 P.S., SC550 Spkr, $450. WB2ZAP, 922 Southern Dr., Franklin Square, N. Y. 11010.

FOR SALE: Unmodified 522, UTC S-49 Trans-new; 500 volt Lambda power supply, reg. Frank Kedl, W7CRP, 55 E. Eighth, Sheridan, Wyo. 82801.

SELL: Drake TR-3 — AC3, $385. Collins 32-V2-175, others. Write Ray Clark, W2WNW, 126 Slosson, Staten Island, N. Y. 10314.

FACTORY WIRED RANGER II: $140; 2—Johnson Viking II transmitters, $45 each. SX-71 very excellent, $75. Much more. Send stamp for list. J. R. Shank, 21 Terrace Ln., Elizabethtown, Pa. 17022.

WANTED: To Buy, Rent, or Copy! Tube listing chart for Realistic Type T-B-C Tube Tester. WN-8IMG, 140 PawPaw Lake Dr., Chagrin Falls, Ohio. 44022.

TRADE FOR DRAKE LINE-BESSLER CB7 Enlarger never used. Cost $1100.00. E. Fliegman, 5174 Via de Palma, Las Vegas, Nevada. 89102.

WANTED: CQ, QST, and Ham Radio Magazines. All years before 1969. WA7PPN, 13615 N. 17th Dr., Phoenix, Arizona. 85029.

FOR SALE: Collins 75S-3B, SN16528, Collins 32S-3, SN10307, 516-F2 SN3016. Excellent condition. $1000 FOB. A. Schnurle, W7DUP— Rt. 1, Bx. 216, St. Anthony, Idaho. 83445.

SELL: Gonset G-76 Six band transceiver with cal., and P.S./spkr matching unit. $115.00. Cash and carry. R. Randall, 1263 Lakehurst Rd., Livermore, California. 94550.

HAVE YOU EXPRESSED YOUR VIEWPOINT on FCC Docket 19162 yet? K6ARE.

500C & AC PS Like new. $500, ppd. 813's, $16. Pair PP— Silveira, Star Rt., Bx 194A, Mariposa, Calif. 95338. Also: 40 mtr. traps for TA33, etc. $42.00 ppd.

WANTED: TR4, AC power & speaker, L4B linear, MN2000 network, Collins 30S1 Linear. ALL must be late model, unmodified and in good condition. H. Cushing, W6LXZ, 5224 Bobbie Ave., San Jose, California. 95130.

MECHANICAL FILTERS: 455 Khz. 2.1 khz. $18.95. 300 Hz. $22.95. J. A. Fredricks, 314 South 13th Avenue, Yakima, Washington. 98902.

MOSLEY CL-33. 6 mos. old. $100. Prefer local sale. WA9YNE, 151 White Pine, Bensenville, Illinois. 60106.

SELL: Heath HR-10B Receiver, speaker, Cal., Manual, like new. $70 ppd in U.S.A. WB4SPT, 240 Colony Rd., Jupiter, Fla. 33458.

CV253/ALR 38—1000MC Converter, $70. 50W 6mtr AM-CW Xmtr, $25. Heath Scope, 0-7, $10. Strobe-Conn., 6T4, $70. J. Murray, W2OAP, 40-33 61st St., Woodside, L. I., N. Y. 11377.

VHF/UHF send your 35 mm color slides of your station/antennas to be shown at various conventions, and ham clubs in U.S. Write to W6DOR, 4100 Worthington Dr., North Highlands, California. 95660.

OSCILLOSCOPE: Knight Wide Band with Demodulator and Low Capacity Probes, $50 FOB. WA3-JHB, 2286 Rose Garden, Pittsburgh, Pa. 15220. 412/341-3456.

SELL: R4B, $350; T4XB, $340; AC4, $75; MS-4, $15; xtals, $4 each; package price $725. Mosley CL-20, MCQ-3B 2EL Quad, K1VTM/1, 23 Sunrise, Saybrook, Conn. 06475.

WANTED: Heath SB-10 SSB Adapter w/manual. K7PEJ, 640 23rd Ave., Lewiston, Id. 83501.

WANTED: Tri-Band Beam or Quad & Rotor. Guy A. Primiano, WN8ITQ, 14217 Wheeler Rd., Maple Hts., Ohio. 44137.

WANTED: for Collins collection — COLLINS 30K/310A Pse write Jock White, ZL2GX, 152 Lytton Road, Gisborne, New Zealand. All letters answered Air Mail.

FOR SALE: Eico 751 AC P.S. 750, 280-100 & 12VAC. Perfect with manual. $25. Shipped C.O.D. T. Isaacson, 101 S. Lake Dr., Branson, Mo. 65616.

SELL: 40 new 1625 tubes. $1.25 each if take all; $1.50 ea. single. Mod. G8000C Philco VHF to UHF Sig. Gen. Adapter with G8002 UHF Sweep. Gen. $20.00. FOB. J. J. Crowl, Box 74, Ingram, Texas. 78025.

KNIGHT KG-320 32 watt Solid-State Stereo Amp with Manual. Excellent— $35. C. Moore, 3329 March Lane, Garland, Texas. 75040.

MUST MOVE: Send stamp for my list of meters, parts, books. SAMKOFSKY, W2YSF, 201 Eastern Parkway, Brooklyn, N. Y. 11238.

INFORMATION PLEASE! — For information of the NEW International Amateur Radio Society, write IARS HQ, Box 385, Bonita, Calif. 92002.

FOR SALE: VFO, 80 meters described in Dec. 67 CQ, $15.00. W6BLZ, 528 Colima St., La Jolla, Calif. 92037.

WANTED: Galaxy Remote VFO RV-1 condition unimportant. State price. W1SAI, 31 E. St., Hull, Mass. 02045.

FOR SALE: Heath Shawnee 6M transceiver, $150. GE 2M-FM Prog. Line Portable HN-31, with N-cap supply, xtals for 34-94 xmit, 94 rcv. K2JMU, Box 1122, Rome, N. Y. 13440.

TELETYPE PARTS AND MACHINES. Model 32ASR, $225.28 RO less cabinet, $50. Have many oddball parts. 28 TD new $75. WA2HWJ, 133 William Rd., N. Massapequa, N. Y. 11758.

RTTY INFORMATION for the Amateur interested in RTTY. F. DeMotte, P. O. Box 6047, Daytona Beach, Florida. 32022.

SALE: Wilcox CW3 CW RCVR 2 ea, $20. Both $35. ELDICO 7STR 75W CW Xmtr, $20. RCA Voltohmyst, WV77E, $25. S. F. Carter, 6675 E. 19th St., Indpls., Ind. 46219.

SELL: LAMPKIN 105B with instructions. $85. PPD. Sever, 8464 Cleveland Ave. NW, North Canton, Ohio. 44720.

DOT GENERATOR, new, 10, 10, 699A for Baud rate testing etc. $75.00. Goodman, 5826 S. Western Avenue, Chicago, Illinois. 60636.

FOR SALE: Toschiba 6T-115P 5" Reel Recorder. $60. Mayfair 1844 5" Reel Recorder. $35. Robert Haase, 417 Old Jesup Rd., Brunswick, Ga. 31520.

WANTED: Collins 399C-1 VFO Unit, 70K-2 P.T.O. 516F-2 ac. 312B-3 speaker. Frank Andrei, W3OEL, MR-1, Saltsburg, Pa. 15681.

FOR SALE: Heathkit 90 watt AM & CW Transmitter completely assembled and tested. W. Hayes, P. O. Box 1725, Chattanooga, Tn. 37401.

OLD TELEPHONES OR PARTS WANTED for personal collection, circa to 1930, all inquiries answered. Stan Schreier, WA2VFC, 1560 Selwyn Avenue, New York, N. Y. 10457.

HALLICRAFTER'S S-120 receiver with Heathkit Q Multiplier. $30.00. Nordmendl Globetraver, 15 band, receiver, $70.00. All excellent/manuals. WA9WVJ, G. Young, 7527 So. Morgan, Chicago, Illinois. 60620.

COLLINS 136A-1 Noise Blanker for 75S-1 receiver, instructions, tubes. $49 prepaid. Len Hoops, W5JTA, 1704 Glenn, Ft. Worth, Texas. 76131.

FOR SALE: Nearly new 1800 watt 110 VAC generator-gasoline powered. With special muffler. $150 FOB. J. Kersten, 717 Crest Ave., Fort Dodge, Ia. 50501.

WANT: Collins MM-1 mike, also CC-2 case and 136B-2 Noise Blanker. State condition and lowest cash price. W4AIS, 300 Thornwood, Taylors, S. C. 29687.

SELL: Apache TX-1 mint cond. used little. $125. Sorry! Bay Area and Vicinity only. W6PZX. So. S. F. 589-1369.

BERKELEY COUNTERS, one 43 MHz, one 2 MHz. Both working 100%. Back issues CQ, QST, 73, bound by year. 12 Mendelson, 27 Somerset Pl., Murray Hill, N. J. 07974.

GE PREPROG. n 2 chan. receive, 4 chan. trans., 30W vibrator supply. $125. K2ABZ, 42 Bulaine Rd., East Rockaway, N. Y. 11518.

SELL: Drake 2B receiver, calibrator, WWV&CB crystals. Very high serial 11895, perfect. $145. W0-RJZ, Creston, Iowa. 50801.

COLLINS: 62S1 never used $600. KWM-2 with 516F-2, $650. MPI brand new, $140. EICO 369 TV-FM Sweep/Marker Gen., $75. K6AHV, Rt. 2, Box 221, Brentwood, Calif. 94513.

FOR SALE: POLYCOM 62B two and six meter transceiver with VFO & crystal control. Complete with instruction book. AC and DC cables. Very good condition. $100. Earl D. Fox, W4DWR, 318 Montcastle Dr., Greensboro, N. C. 27406. Phone: 919-275-6092.

SELL: GEIGER COUNTERS, Navy Surplus, good condition. $7.95 ea. W4JGO, 643 Diamond Rd., Salem, Va. 24153.

WANTED: Schematic for RCA Radiola III. E. H. Taves, K1KPS, 12 Hubbard Park, Cambridge, Mass. 02138.

SWAN: 500C Xcvr and 117XC power supply, used 15 months. Mint condx. Pick up only. $450.00. Henry Wroblewski, 3747 S. Harvey Avenue, Berwyn, Illinois. 60402.

SALE: Cabin, California. Wooded 1500' elevation, streams, fishing, hunting. 2 lots furnished. No smog. $13,900.00. Owner will finance. Keleher, 136 Bidwell Way, Vallejo, Calif. 94590.

SELL: Jones Micromatch 561 coupler also new HRO dial. Make offer. Douglass, 6 Damon St., RGE Belen, N. M. 87002.

WHO CARES ABUT THE BLIND AND PARALYZED. International CHC does; largest Int. ARS Club in world. No charges to the B or P. Write Hq. CHC, P. O. Box 385, Bonita, Calif. 92002.

TRADE: Plate transformer, out-put 2400 volt at 1 amp. Trade for good V.T.V.M. or ?. B. Nastoff, 320 W. 56th Place, Gary, Indiana. 46410.

FOR SALE: Drake R-4B mint, six extra crystals, $350; Drake 2C mint, one extra crystal, $160. All original cartons. Earl W. Carsner, 283 N. Colorado St., Chandler, Az. 85224.

FOR SALE: Clegg Zeus with Power Supply $225. Clegg Intercepter, $225; Will sell as package for $400. WB2IFC, Ken Birmingham, 413 Holmes Dr., Burlington, N. J. 08016.

NOVICES: QRP'ers: Join largest Int. AR Society in w rld open to NOVICES and QRP'ers. For information write IARS Hq., P. O. Box 385, Bonita, Calif. 92002.

ARC-5 Xmtrs. 80 meters, $15. 40 meters, $15. Power supply, $13. Sell separately or $33 for the works. S. N. Silbert, White Sulphur Springs, N. Y. 12787.

FOR SALE: EICO 751 AC PS. 750, 280—100 & 12 volts A.C. Perfect with manual, $25 shipped C.O.D. T. Isaacson, 101 S. Lake Dr., Branson, Mo. 65616.

FOR SALE: Stereo Recorder— in case, perfect condition, $75.00. APR-4Y and Converter, covers 38-1000 MC. Motor tune. $125.00. RCA W088A 5" scope & Probe, $45.00. Swan 250, $225.00. K4BPY, B. Nickles, 1031 Bayfield Dr. SE., Huntsville, Al. 35801.

WANTED: New-Tronics 4—BTV Vertical; Millen Transmatch Jr. Earl Carsner, 283 N. Colorado Street, Chandler, Az. 85224.

TUBES: Unused 807W or 4E27, $2.00 PPD. Heath HP-23 Supply, $35.00. Adinolf, 5113 Arvada, Torrance, Ca. 90503.

FOR SALE: National NC—300 Recvr. Excl. cond. $135.00. Harold Kelley, 505 W. Ohio Ave., Sebring, Ohio. 44672.

WANT ARRL HANDBOOK. 1960 ed. Must be clean. $2.00 include postage. M. Bae, Box 95, S. Branch, N. J. 08881.

CW XMTR, 90 watts on 160 thru 10. Globe Chief Model 90, with manual. Excellent buy at $27. First check or money order takes it. S. N. Silbert— White Sulphur Springs, N. Y. 12787.

FOR SALE: EICO's best Signal Generator, Model 315. Mint condition, $35 plus postage. Hal Smith, W2GKE, 26 Linden St., Bayonne, N. J. 07002.

SELL: 75A4, serial in low 3000's. Includes 500-hz filter. $360. Kurt Meyers, 4743 Iroquois, Detroit, Michigan. 48214.

HEATH SB100, Plate Xformer 3,000 ct @ 1 amp, Mosley Jr—Triband Beam, SX71 rcvr, w0FGB/6, 4453 Via Pinzon, Palos Verdes Est., Calif. 90274.

FOR SALE: Heath HW-16 Xcvr. and HG-10 VFO. Novice Xtals. Good rig, $100, or offer. Allen Gilchrist, 209 Foch, Bryan, Texas. 77801.

WANTED: General Radio 916A or Later Model R.F. Impedance Bridge. WA8FVD, Ronald Zurawski, RB646, Menominee, Michigan. 49858.

SALE OR TRADE: LM21, LM18 Freq. Meters, GR650A Imped. Bridge, Dumont 322A Dual-Beam Scopes. Johne, Box 109A, Pembine, Wis. 54156.

WANTED: Heath MP-10 Marine Converter, Heath Q Multiplier, Mobile Speaker. State price and condition. T. Coddington, WB6AWC, 7825 Scotts Valley Rd., Lakeport, California. 95453.

WANTED: Heathkit HO-10 Scope; Collins 32V3, Collins 310-B. State price, condx, and serial no. in first letter. KH6HCM, 5952 Gannet Ave., Ewa Bch., Hawaii. 96706.

E.V. Model 664 Microphone — $40.00. Heathkit Hybrid Phone Patch. H.D. 19, $20.00. Heathkit S.W.R. Meter AM-2, $12.00. New Heathkit Watt Meter/SWR Bridge HM-102 — $29.00. All exInt working condx es manuals. Dr. B. W. Dukett, 2523 Durwood Rd., Little Rock, Ark. 72207.

RUBBER STAMPS: $1.00 per line up to 3 inches Engraved call Badges, 2 lines, $1.50. WA4HYA, 120 Noble Ave., N.E., Roanoke, Virginia. 24012.

WANTED: Motorola HT-200 Handi-Talkie. Send price and description to Glenn—WA2PSV, P. O. Box 2322, Newburgh, New York. 12550.

B & K ANALYZER Model 1076 in perfect condition, $200 FOB or trade for Heathkit 1B-101 Frequency Counter. L. Basham, Cave Junction, Oregon. 97523.

SELL: RCA WO-88A 5" Scope, $40.00; P & H 600-A6 meter transverter, $20.00. APR-4Y and 38-1000 MC tuner, $130. IBM Selectric Typewriter, $325.00. K4BPY, 1031 Bayfield Dr., Huntsville, Alabama. 35802. 881-3908.

FOR SALE: 5 new Pearce-Simpson Companion IV CB xcvrs, $50 ea — one base sta pwr sup for same, $20. K1ZJW, 46 Branch St., Scituate, Ma. 02066.

FOR SALE OR SWAP: Collectors' item 1935 Collins xmtr with manual and P.S. Model 30 FXB (local) WB2GFG, 609-665-1767 SNJ after 6 p.m.

SELL: Hallicrafters SX96, $80.00 and Heath DX-40, $35.00. Both excellent condx. U pick up. WNXFXF, 13391 Wilson Garden Grove, Ca. 92644. (714) 530-2145.

WANTED: 51J3 good cond., in cabinet. Pay to $325.00. Konrad Macata, W6RYZ, 1330 Curtis, Berkeley, Calif. 94702. (415) 526-7345.

SELL OR TRADE: Marrow C.D. receiver, Wanted: Gonset G-50 or 6-meter communicator, Heath C.W. Keyer, reasonable WA8QBJ, 6305 Redbird Terr. Dr., Clinton, Ohio. 44216.

WANTED: Class B Drive Transf. Thord. 20D79, Stancor A-4762, will pay postage. W9MKO, 9657 Pacific A., Franklin Park, Illinois. 60131.

COLLINS 70E-24 PTO for 75A-4 receiver. Excellent condition. $45.00. Certified check only. W2HC, Telephone 516-333-1079, Westbury, N. Y.

COLLINS 75S3 s/n 14482, $450; KWM2 s/n 11237, Waters notch, $650. Both excellent. Terms F.O.B., cert. m/o. Edward R. Stolz, WA6YQS, 916-489-8659.

FOR SALE: Collins Station: Receiver, 75A1, very nice condition, excellent calib and stability, $150. Also Transmitter 32V1, works on C.W. only, a.m. out. $75.00. Package deal $200. W. C. Small, W6LZX, 27828 E. 15th St., Hayward, Ca. 94544.

WANTED: Tower and Rotator; or those interested in group purchase of same. K2EWJ, 12 Huntington Bay Rd., Huntington, N. Y. 11743. Locals preferred. (516) 427-8449.

WANTED: Collins 75A4 filters. 6KHZ, $22; 3 KHZ, $10; 2.1 KHZ, $15; 0.8 KHZ, $25. Gary Yantis, K0BHM, 10809 Johnson Dr., Shawnee, Kansas. 66203.

CLEAN HT44 and PS-150-120, $200; mint sx146 complete $175. Fair SX71, $50. All FOB. WA2-IBE, Box 215, Ironia, N. J. 07845.

SALE: Mint 51J4, 32V2, GSB-100, SR160 all with manuals. Lge. and Sm. tubes and parts, 4-400A's, 4-1000A's. Offers, lists, W6AGO, Box 1275, Paso Robles, California. 93446.

HY-GAIN TH3MKIII, $75; W6SAI 10/15 mtr beam (3L each band, 5L in all), $40.00. R. J. Gorski, 615 E. Otjen St., Milwaukee, Wis. 53207. 414-482-1575.

SELL: Conrac 14" Monitor; Reg. DC PS 40 Amp, 24V; German DL-QTC; 220 mHz RX; Beckman Scaler; 7" VTVM; QST's and CQ's. K. Paquee, 53 Jerome Ave., Trumbull, Ct. 06611.

BUY OR SWAP FOR SIGNAL—ONE, KWM2, Drake, Heath, or Yaesu. W0BNF, Box 105, Kearney, Nebraska. 68847.

INT. NOVICES ARA Sponsors programs to assist the novice operator. For info, Write to WB9AHJ, Winkel, 607 East St., Madison, In. 47250.

MAGAZINES FOR SALE: CQ/QST/73/HAM Radio issues @ 10 cents each, plus shipping from Lockheed Ham Club, 2814 Empire, Burbank, Calif. 91504. Send list and money. The available issues will be sent promptly, plus any refund due.

SELL: HW-16 original condx, mint shape, used 2 mos. $75.00. M. Brittingham, Montgomery Woods, Hockessin, Del. 19707.

SELL: CQ and QST 1950 to 1970, mint condition. Pay shipping and cost of binders used for a few years, $70.00. Also a few extras earlier issues. Write: K. Lindberg, W2KLH, Jamestown, N. Y. 14701.

WANTED: TELREX tri-band beam. ROBOT slow scan TV equipment. Mike Ludkiewicz, 143 Richmond, Ludlow, Mass. 01056.

HY-GAIN TH6DXX $139.00; 244 Quad, $90.00; new in carton. W4FDA, 7305 May Apple Rd., Jacksonville, Florida. 32211.

KWM-2, AC & DC PS, Manual. Best offer over $650.00. TSGT C.A. Bowers, 7th ABCCC SQD., APO S.F., California. 96237.

BC-652A Receiver-Gen. Coverage 2 to 6 MHz, in 2 bands. 6 & 2 meter converters & A.C. supply, also spkr. built-in. Good rcvr—no junk. Sell $45.00 or trade. What you got? WA8QBJ, Clinton, Ohio. 44216.

WANTED: DowKey DK-7Z, Cliffdweller, Keyer Paddle. Rod, W7YBX, 5632— 47th SW, Seattle, Washington. 98116.

COLLECTORS: need room, make offer on Federal 59 receiver, DeForest F6 Broadcast Rcvr., Kennedy type 311 portable rcvr., Radiola 11 portable rcvr., Atwater Kent 20 compact, General Radio 274 wavemeter, etc. G. Angle, K0TAM, Clear Lake, S. Dak. 57226.

WANTED: Transceiver or Rcvr—Xmitter. Good & reasonably priced. F. E. Coble, 251 Collier Ave., Nashville, Tenn. 37211.

COLLINS R105A/ARR15 Receiver. Six bands 1.5 thru 18.5 MHz. 12 tubes. Twin Collins VFO's for tuning and bandspread. Xtal calibrator. Excellent. Clean, w/schematic. $125.00 FOB. K1VTW, Box 103, Sherborn, Mass. 01770.

COLLECTOR's ITEM: WWII Polish Spy Rcvr. 200-500KC and 5-12MC. Tubes: 1 R5, 2x1TR's, 1S5. With battery pack, plus 110V A.C. Pack. Best offer. W9WPE, Grant, 1020 Hull Terr., Evanston, Il. 60202.

WANTED: Johnson 500 or Valiant II. Advise condition and price. Andrasko, 54-31 65th Pl., Maspeth, N. Y. 11378.

SELL: Telex MB-20 headset w/boom mike. Hi z-mike; low z-phones, $20. Erco 710 Grid Dip, $25. R. C. Clark, 806 Jones Ave., Maryville, Tn. 37801.

WANTED: Carbon Brushes for lge. size Prop-Pitch Motor. George F. Norton, W4EEE, 250 Milledge Terrace, Athens, Ga. 30601.

OLD RADIO SHOWS: Would like to exchange lists of programs for trade. Hal Cox, 552 Plumas Ave., Oroville, Ca. 95965.

SELL: 6 new 4C27 triodes, 60 w. ea., @ 300 MHz. $1.00 ea., ppd. W3WTO, K. Mitchell, 1004 Mulberry, Hagerstown, Md. 21740.

MAKE OFFER: EICO 753f/w Xistor VFO, clean, working. K5ENL, Ed Block, Grandview, Tx. 76050.

FOR SALE: NCX-5, AC & DC Supplies, Xtal cal. on air & can be heard. $300.00. Turner Mobile mike, M&2U, $21.00. W2FXA, E. W. Nadolny, 72 South Pierce St., Buffalo, N. Y. 14206.

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BEST OFFER OVER $100.00. LAMPKIN 105B, w/charts. W. Schwiebert, K7HGZ, 6410 W. Sells Dr., Phoenix, Arizona. 85033.

LICENSING COURSES: The Lockheed Ham Club regularly conducts ham courses open to all Los Angeles Area People. Write to 2814 Empire Avenue, Burbank, Calif. 91504, for details.

SELL: HQ-100 with homebrew Mech. Filter, $75, plus shipping, or swap for R.F. Signal Generator, M. Gray, 1739 E. 26th St., Brooklyn, N. Y. 11229.

FOR SALE: Drake Model DC-4 Power Supply, used very little, warranty covered. First $90.00 M.O. or certified check. K3YMN, 2185 Sampson St., Pgh., Pa. 15235.

WANTED: Manual or schematic for Tele-Signal Model 129 Regenerative Repeater. J. Buckler, 29 Parkview Dr., Plains, Pa. 18705.

SALE: Johnson Viking Phone Patch, new, $15. Excellent Headphones, $5.00. S. Harrison, WB4-FJO, 1045 Wateree St., Kingsport, Tn. 37660.

1/2 PRICE 11 and 15 meter Hygain 3 el. beams in unopened boxes. $26.00 and $40.00. Used 3el 10 mtr beam, $10.00. P. Miller, 6 Keane Rd., W. Roxbury, Ma. 02132. Tel. (617) 327-6514.

FOR SALE: WO-91A RCA Scope & 1076 B & K Analyst in good condx. Will sell for $150.00 or trade for transceiver. R. Dorough, 801 N. Catherine St., Terrell, Texas. 75160.

SELL: Drake TR3, RV3, H.B. Supply, $450. Package. K4WYM, F. C. Howard, 3608 Susanna Dr., Louisville, Ky. 40213.

FOR SALE: HW22A, $90.00 Apache TX-1, $88; Both mint condition. K3AAG, Box 341, Clinton, Md. 20735.

WANTED: Data sheets on Philco color chassis 17MT80 1967 Model No. 7307555 Serial No. AF6334. C. Kelley, W8ZLU, 7204 Clovernook Av., Cincinnati, Ohio. 45231.

FOR SALE: Gonset SB101 linear, no plate xfmr, $95; Johnson 6N2, very clean, $85; Tapetone Skysweep with converters, $100. P. Butler, W1BPW, Elizabeth Dr., Manemach, N. H. 03054. (603-424-7373.)

GR1932A distortion analyzer, $295. OS-34 3" portable scope $75. FR47/USM-29 Synthesizer, $100. Mark, 200 Kanawha, Richmond, Va. 23229.

WANTED: Heath IT-28 Cap. Checker and HD-10 Keyer. Also Hustler 20M Mobile Tip and misc. 80, 40, & 20M xtals. State price 1st letter. Tom Coddington, WB6AWC, 7825 Scotts Valley Rd., Lakeport, Calif. 95453.

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HT-32, $195; 2kw Thunderbolt amp., $250; NC-303 and 6 & 2 meter converters, $259; all $625. WANT: 600L, 75A4, Box 163, Cannelton, In.

SELL: Galaxy GT550 complete with power supply speaker. VOX Xtal Calibrator used 5 hrs. W3-NV, 8258 Brittany Pl., Pittsburgh, Pa. 15237.

SELL: 3 ELEMENT 10 MTR BEAM with Rotor and Rotor Cable. $25. You pick up or pay freight. C. Cook, WB5BAM, Rt. 1, Bx 225C, Breckenridge, Texas. 76024.

WANT USED OR HB FINAL, Ham-band crystals, tower. J. M. Hoffer, W1DL, 24 Cherry Rd., Framingham, Mass. 01701. (617) 872-5084.

CANADIANS: Holstrom SK-20 Preselector with Vernier and Power Supply, $18.00. D. Renwick, 2420 Eastview, Saskatoon, Sask., Canada.

URGENTLY NEED: Complete manual for AN/SRT-15 Navy Transmitter. Give price in your first letter. WA4FCC, J. E. Carr, Rt. 2, Rockmart, Ga. 30153.

WANTED: SB100, HW100, SB300, SB400 or 75A4. Broken unit or incomplete kit ok. Have Collins 75A1 and 32V1 to trade or cash. C. Small, W6-LZX, 27828 E. 15th St., Hayward, Ca. 94544.

NEEDED: 200 or 500 CPS Filter and Noise Blanker for 75A4. Lee Beyer, 10 W. 35th St., Holland, Mich. 49423. WA8HNM.

WANTED: Radio Station engineers to form net. For information contact, V. Weiss, WA9VLK, Chief Engineer, WKAK Radio, Kankakee, Illinois. 60901.

FOR SALE: ARC-5, T28, 6&2 Xmtr. $35.00. J. W. Hall, Box 70A Lakecrest Ave., Lakewood, N. Y. 14750. Phone: 716-763-1511 anytime.

WANTED: SBE-34 code adapter with Schematic. Price? Condition? W6YQS, P. O. Box 22022, San Francisco, Ca. 94122.

LAMPKIN 105B $125.00. Lafayette HE45B, $50. Heath Twoer $35.00 or $50.00 wtih 12 dc supply. WA5CMC, 2309 Bullington, Wichita Falls, Tx. 76301.

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TWO KNIGHT 5 channel 12V transistor CB's, $39.00 each; also one HR20 & HX20, excellent. $195.00. W. A. Svoboda, Box 170, Riverton, Wyoming. 82501.

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SELL: EICO 753 w/AC supply. H.B. regulated. Triband xcvr. SSB—CW—AM. Very late Solid State VFO. No drift. Very clean. $160.00. WA8QBJ, Clinton, Ohio. 44216.

WANTED: R.M.E. DB-22-A Pre-Amp in good working order. J. Callan 65 Beechcroft St., Brighton, Ma. 02135.

HRO-7 Factory Power Supply & Speaker/coils. Outstandingly clean cond. $175.00 FOB Banks. A. C. Perry, Rt. 1, Box 192E, Banks, Ore. 97106.

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SBE-34 Xcvr with xtal calibrator, SB-2 mic, SB-2 CW Codadaptor, manual. $300. K7KPL, Box 67, Winthrop, Wa. 98862.

FOR SALE: B & W 51SB sideband generator, $85 Fisher Master Audio Control Preamplifier, $95. W8IIT, 281 Jenny Ln., Dayton, Ohio. 45459.

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SELL: Johnson Valiant I Factory W. Exc. cond., $125. W6DJZ, 3748 Floresta Way, Los Angeles, Calif. 90043.

WANTED: Back issues QST, CQ, etc., for college radio club library. Postage refunded. W4DQD, Box 2067, Statesboro, Ga. 30458.

SELL OR SWAP: Heath Phone Patch, $20. SWR mtr, $12; 100 KHz xtal cal., $8. WANT: Quad parts. All mint/will ship. WA1JFG, Gardella, 120 Oak Tree Dr., N. Kingstown, R. I. 02852.

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WANTED: 32S-3, 516F-2. State No., condx. and best price. Sell/Trade SB101, CW Filter, SB-640, HP-23. Nevers, R., 23 Sunrise, Saybrook, Ct. 06475. (203-388-0372).

DRAKE 2—NT XMTR., MINT, Manual, 3 xtals, $117.50. FOB. WA6MWP, P. O. 325, Capitola, Calif. 95010.

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SELL: G28 10M Comm, $125; GPPI Ph. Patch, $30; DX-40, $50; Heath 10'er, $50; WB9FHQ, R. Cook, Rt. 1, Box 132A, Warrenville, Il. 60555.

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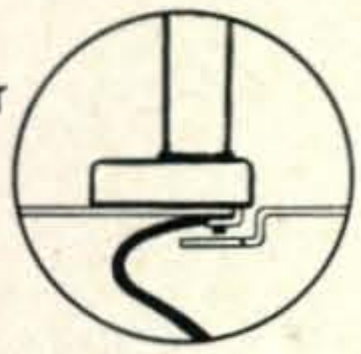

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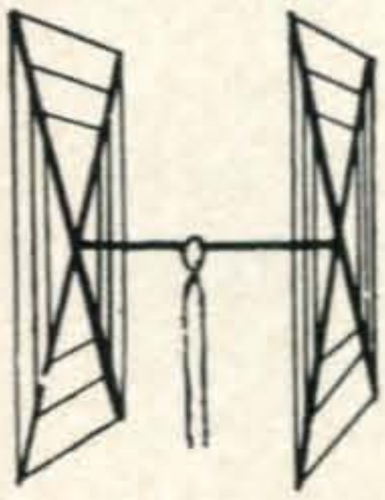
QUADS

Worked 42 countries in two weeks with my Gotham Quad and only 75 watts...



W3 CUBICAL QUAD ANTENNAS — these two element beams have a full wavelength driven element and a reflector; the gain is equal to that of a three element beam and the directivity appears to us to be exceptional! ALL METAL (except the insulators) — absolutely no bamboo. Complete with boom, aluminum alloy spreaders; sturdy, universal-type beam mount: uses single 52 ohm coaxial feed; no stubs or matching devices needed; full instruction for the simple one-man assembly and installation are included; this is a fool-proof beam that always works with exceptional results. The cubical quad is the antenna used by the DX champs, and it will do a wonderful job for you!

10/15/20 CUBICAL QUAD SPECIFICATIONS

Antenna Designation: 10/15/20 Quad
Number of Elements: Two. A full wavelength driven element and reflector for each band.
Freq. Covered: 14-14.4 Mc. 21-21.45 Mc. 28-29.7 Mc.
Shipping Weight: 28 lbs. Net Weight: 25 lbs.
Dimensions: About 16' square.
Power Rating: 5 KW.
Operation Mode: All
SWR: 1.05:1 at resonance
Gain: 8.1 db. over isotropic
F/B Ratio: A minimum of 17 db. F/B
Boom: 10' long x 1¼" O.D.: 18 gauge steel; double plated; gold color
Beam Mount: Square aluminum alloy plate incorporating four steel U-bolt assemblies. Will easily support 100 lbs. Universal polarization.

Radiating Elements: Steel wire, tempered and plated, .064" diameter.

X Frameworks: Each framework consists of two 12' sections of 1" OD aluminum 'hi-strength' (Revere) tubing, with telescoping ⅞" tubing and short section of dowel. Plated hose clamps tighten down on telescoping sections.

Radiator Terminals: Cinch-Jones two-terminal fittings

Feedline (not furnished); 52 ohm coaxial cable

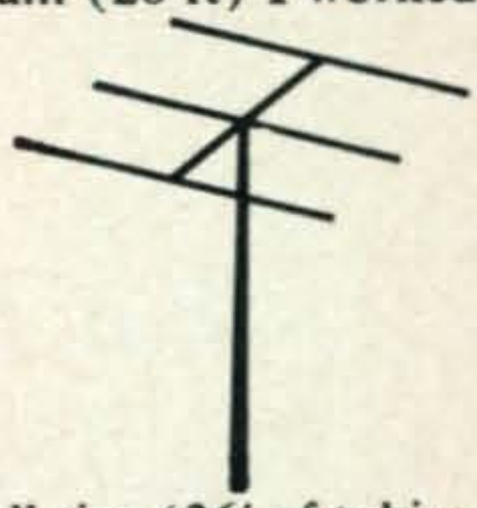
Now check these startling prices—note that they are *much lower* than even the bamboo-type:

10-15-20 CUBICAL QUAD	$37.00
10-15 CUBICAL QUAD	32.00
15-20 CUBICAL QUAD	34.00
TWENTY METER CUBICAL QUAD	27.00
FIFTEEN METER CUBICAL QUAD	26.00
TEN METER CUBICAL QUAD	25.00

(all use single coax feedline)

BEAMS

The first morning I put up my 3 element Gotham beam (20 ft) I worked YO4CT, ON5LW, SP9-ADQ, and 4U1ITU THAT ANTENNA WORKS! WN4DYN Compare the performance, value, and price of the following beams and you will see that this offer is unprecedented in radio history!



Each beam is brand new; full size (36' of tubing for *each* 20 meter element, for instance); absolutely complete including a boom and all hardware; uses a single 52 or 72 ohm coaxial feedline; the SWR is 1:1; easily handles 5 KW; ⅞" and 1" alumnium alloy tubing is employed for maximum strength and low wind loading; all beams are adjustable to any frequency in the band.

2 EL 20	$21	4 EL 10	20
3 EL 20	27	7 EL 10	34*
4 EL 20	34*	4 EL 6	20
2 EL 15	17	8 EL 6	30*
3 EL 15	21	12 EL 2	27*
4 EL 15	27*		
5 EL 15	30*		

***20' Boom**

ALL-BAND VERTICALS

"All band vertical!" asked one skeptic. "Twenty meters is murder these days. Let's see you make a contact on twenty meter phone with low power!" So K4KXR switched to twenty, using a V80 antenna and 35 watts AM. Here is a small portion of the stations he worked: VE3FAZ, T12FGS, W5KYJ, W1WOZ, W2-ODH, WA3DJT, WB2FCB, W2YHH, VE3-FOB, WA8CZE, K1SYB, K2RDJ, K1MVV, K8HGY, K3UTL, W8QJC, WA2LVE, YS1-MAM, WA8ATS, K2PGS, W2QJP, W4JWJ, K2PSK, WA8CGA, WB2KWY, W2IWJ, VE3-KT. Moral: It's the antenna that counts!
FLASH! Switched to 15 c.w. and worked KZ5-IKN, KZ5OWN, HC1LC, PY5ASN, FG7XT, XE2I, KP4AQL, SM5BGK, G2AOB, YV5-CLK. OZ4H. and over a thousand other stations!

V40 vertical for 40, 20, 15, 10, 6 meters	$14.95
V80 vertical for 80, 75, 40, 20, 15, 10, 6 meters	$16.95
V160 vertical for 160, 80, 75, 40, 20, 15, 10, 6 meters	$18.95

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