CQ Special Winter Feature:

ANTENNAS

Antennas? In January? Why not! After all, is there a ham alive who hasn't risked his neck on an icy roof to string that new dipole in the dead of winter? Or decided to finally tune the beam atop a 60 foot tower in 12° weather? No, we've all done our share of cold weather antenna work, but aside from "tradition," January's the ideal time to begin to plan for the warm weather ahead. Being notoriously slow-moving, the average ham will no doubt have just barely enough time to firm up his spring antenna plans if he starts now.

To help your planning, we have gone to great lengths to tell you as much as possible about each and every type of antenna, each and every manufacturer and practically every ham antenna now being commercially made. No attempt has been made to recommend any particular antenna or any particular manufacturer because the individual's QTH, finances, and personal preference are ordinarily the deciding factors and, obviously, vary widely. But we are sure that our "encyclopedia" of antenna information will prove helpful in your planning. So read on . . . and when you do venture up to your roost, don't forget the warm mittens and that flask of 110 proof cough medicine!

A CATALOGUING of antennas available from various manufacturers is presented here along with their electrical and physical characteristics in the hope that it will aid prospective buyers in selecting the type and model most suited to his needs and purse. It also may serve as a handy reference-source from time to time for others. Before proceeding with such a listing, however, it might be well to take a generalized look at the various types of antennas involved.

Dipoles

Half-wave Dipole: (fig. 1A) This fundamental antenna is the shortest single conductor that will resonate at the operating frequency. This requires an element that, electrically, is one-half wavelength long. The half-wave antenna often is called a half-wave dipole or doublet. Most of the energy is radiated in a broad figure-eight pattern at right angles, or broadside to the line of the conductor. When the dipole is mounted horizontally, as usually is the case, the radiation will be bi-directional in the horizontal plane and will be horizontally "polarized." On the other hand, looking at the antenna end-on, the energy is radiated equally in all directions around the conductor, so when mounted vertically, omnidirectional radiation will occur in the horizontal plane and the signal will be vertically polarized. Dipoles may be fed at one end or at the center; however, center feed generally is used. The center impedance of a half-wave radiator depends on the height above ground and on the effects of nearby objects.

Folded Dipole: (fig. 1B) A folded dipole consists of two half-wave dipoles placed parallel to each other and spaced up to a few inches apart. The adjacent ends of the dipoles are connected together and the center of one of the dipoles is left open. The feedline is connected at this point where the impedance is raised by the square of the number of dipole elements. A broader bandwidth for a given standing-wave-ratio range also is obtainable.

Loaded Dipole: As already stated, a resonant antenna is an *electrical* half wave long. As such

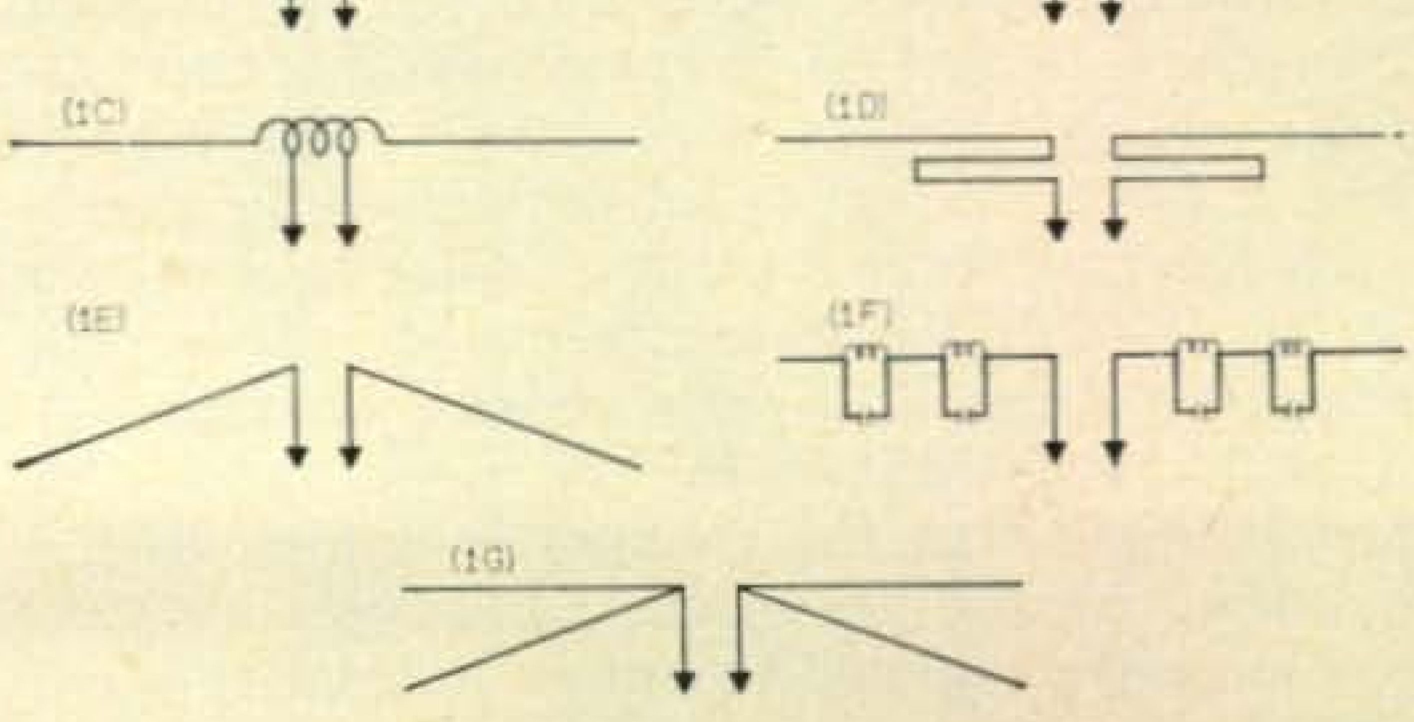


Fig. 1—Basic antenna configurations.

it is *physically* shorter than a natural half wave in space. In certain instances it may be desireable to have a dipole which is still shorter *physically*, as may be required due to space limitations. One way this can be done, while still maintaining the correct *electrical* length, is by means of inductive loading with a coil inserted at the center of the antenna. (fig. 1C) Alternatively, two coils may be used, one each inserted nearer the ends of the dipole. This can be more efficient.

A shorted transmission-line stub can be made to look like inductance, so it too may be used to provide *linear* loading as shown at fig. 1D and described later.

Inverted-V Doublet: (fig. 1E) With inverted-V doublet, the main high support is at its center. Each half of the antenna is drooped down at an angle and is held at the ends by lower supports. Thus, only *one* tall support is needed and less horizontal linear space is required than if the antenna were horizontally mounted. The middle portion of the doublet is held at a high elevation, so efficient radiation is maintained. Directivity is mostly broadside, but some signal may be expected off the ends.

Rigid or Rotable Dipole: If the dipole is made of rigid material, such as metal tubing, it may be supported only at its center and be rotated for maximum radiation in any favored direction. It also may be supported from a window ledge.

Remotely tunable 3-band rotatable dipole. (New-Tronics Cliff Dweller.)

Multi-Band Antennas

A multi-band antenna is one which may be operated on two or more bands. In this respect, a half-wave radiator may be operated at harmonically-related frequencies, but this may present feedline problems unless operation is limited to the odd-harmonic frequencies, so the schemes listed below are often used instead.

It must be remembered, though, that when compromises are made for shortening antennas or for providing multi-band operation, something is not gained for nothing, so the radiation efficiency can be expected to generally be lower than otherwise.

Trap Antenna: A trap antenna employs parallel-tuned resonant circuits (lumped constant traps) which automatically function as electronic switches, according to the applied frequency, to add on or cut off various end sections of an antenna and make it the proper length for operation as an individual dipole on each band. A three-band trap antenna is shown at fig. 1F. For the lowest frequency concerned, a trap antenna is slightly shorter (physically) than a normal dipole for the same band. The power applied to the antenna is limited to the handling capabilities of the traps.

Linear-Decoupled Antenna: A quarter-wave stub appears as a resonant circuit. In this capacity it can be employed in place of a lumped-constant trap to function as an electronic switch for isolating antenna sections. Fig. 1D shows a two-band affair. A second function of the stub is that when operation is conducted on the lower band, the stub appears as an inductance which effectively inductively loads the antenna (linear loading) increasing its electrical length and making it possible to reduce the overall physical length to about two-thirds normal size. Somewhat higher efficiency may be realized using linear stubs in place of lumped-constant devices.

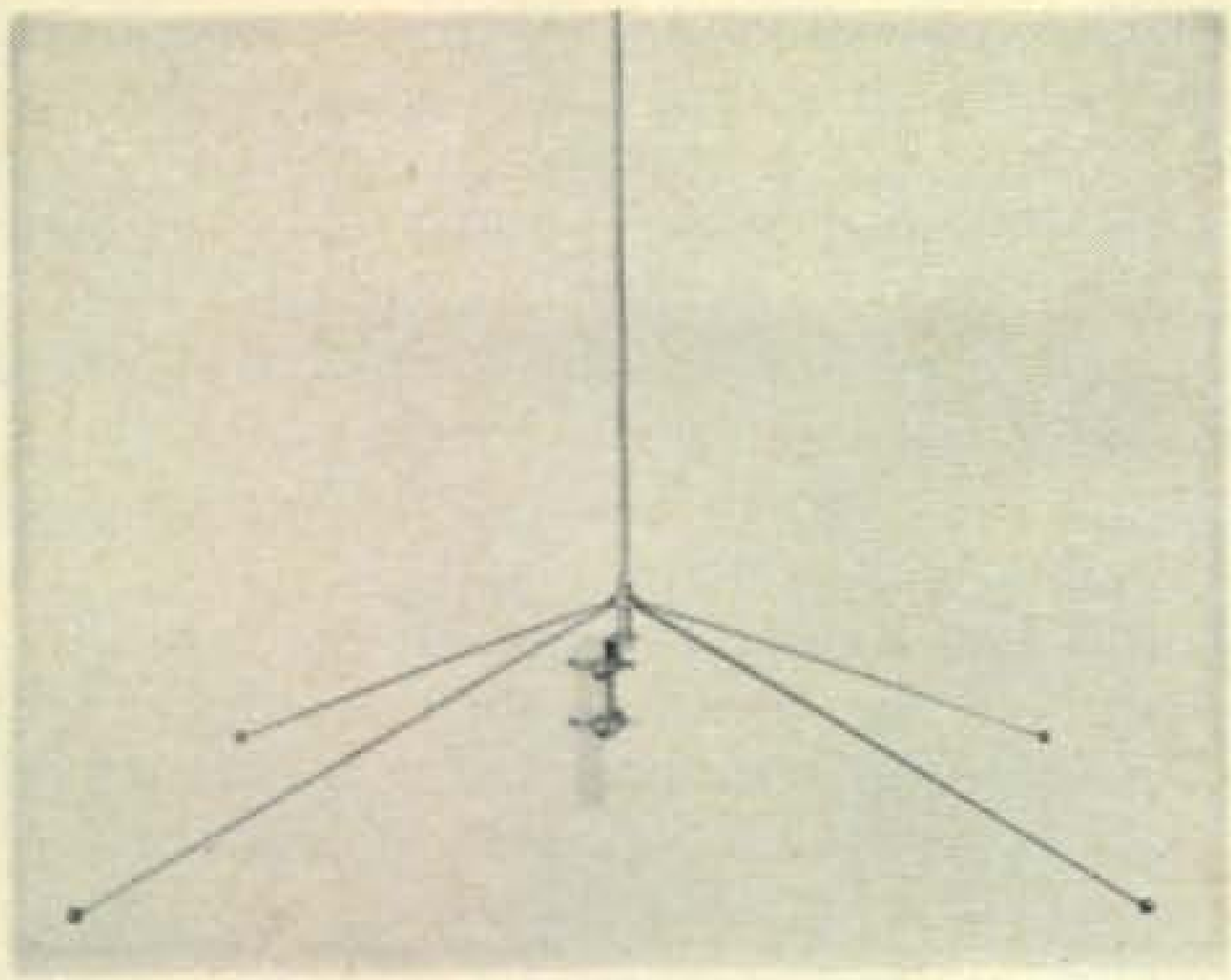
Two types of multi-band vertical antennas employing linear decoupling. (Hy-Gain Hy-Tower 18 HT at left, 18 JR at right).

Double-Doublet: A double-doublet (or fan-type doublet) consists of two split dipoles having a common connection at the center feed-point, while the dipoles are individually suspended with their adjacent halves spread out in a double-V or fan-shape. See fig. 1G. Each doublet is cut for operation on one of two different bands, but operation also is possible at odd harmonics of either doublet. Fan-type doublets also may employ traps for extended multi-band use.

Vertical Antennas

Quarter-wave Vertical: The commonly used vertical antenna employs only one-half of a dipole, or a quarter-wave radiator, with its bottom end grounded, in which case the ground essentially functions as the other half of the dipole. Vertical antennas produce vertically-polarized omni-directional radiation in the horizontal plane with low-angle radiation in the vertical plane. Inductive loading may be employed where the physical length must be reduced. This is widely done for mobile installations where, incidentally, the car body is the ground system. In general, the higher the coil is placed up the radiator, the better the antenna performance, but an advantage gained with a base-loading coil is that it can perform double duty as an impedance-matching transformer for properly terminating the transmission line. Traps in their various forms also may be used for multi-band work with vertical antennas.

Ground-Plane Antenna: The ground-plane antenna is a vertical system which uses an artificial ground consisting of several radials fanned out from the base of the quarter-wave radiator. The entire arrangement may be highly elevated to obtain optimum "line-of-sight" coverage with h.f. operation.



Quarter-wave ground plane antenna. Radials are slightly drooped to obtain proper impedance match for transmission line. (Antenna Specialists Model M-7A).

Gain in Antennas

Broadly speaking, the *total* power radiated by an antenna of given efficiency cannot be increased; however, measures can be employed to concentrate the radiated power in a given direction where power gain then will be realized, but with a corresponding loss in other directions.

The concentration of power in a horizontal plane is mainly accomplished by the use of additional antenna elements, while the horizontal gain at a given distance is highly dependent on the vertical directivity which, for a given antenna, largely is a function of the antenna height above ground. In general, radiation at increasingly lower angles takes place as the antenna is raised above a height of one-quarter wavelength (low-angle radiation is desirable for DX work). At lower heights, most of the radiation is directly upwards and is useless.

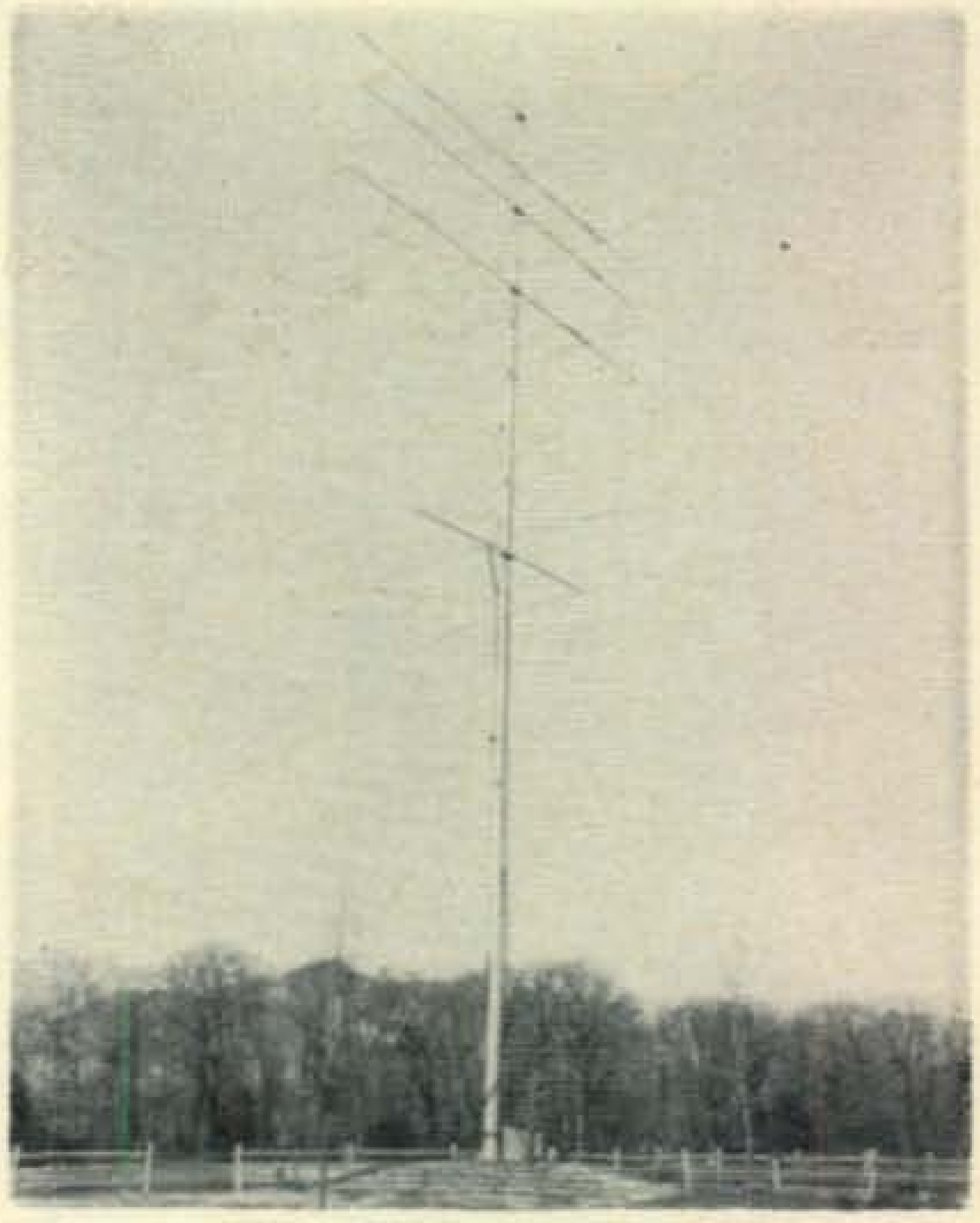
A beam antenna concentrates the radiated power over a relatively narrow width in one direction (forward direction). High attenuation results off the sides and at the rear. The difference between the forward gain and the rear attenuation is the "front-to-back" (F/B) ratio. By making the beam rotatable, maximum effectiveness can be obtained over a desired target area, while the attenuation in the other directions is useful for minimizing interference by the transmitted signal or by signals from these areas during reception.

Colinear Antennas: When additional dipole sections are placed in line with the main radiator, the antenna is a colinear one. With a horizontal system, broadside horizontal directivity and power gain may be obtained if a phase-reversal device (non-radiating resonant element) is installed between each colinear section. Parasitically excited colinear elements are sometimes used in connection with v.h.f. beams.

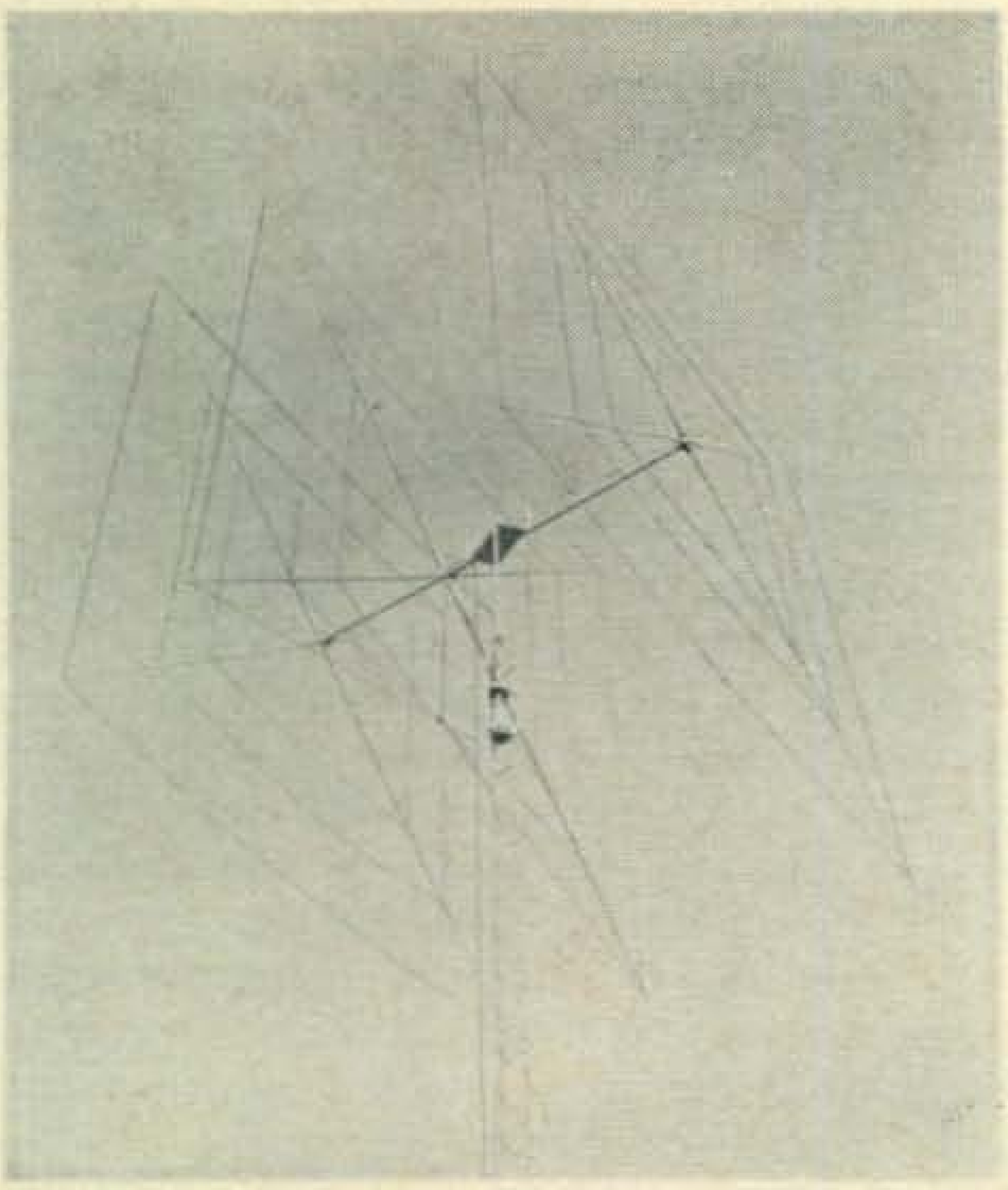
With a vertical colinear antenna, the radiation angle is lowered with a consequent realization of useful omni-directional gain. A colinear system, not requiring phase-reversal elements, may be a ⅝ wave or longer grounded radiator. Effectively it is a harmonically-operated system which also lowers the vertical angle.

Parasitic Beam: The commonly used beam employs a horizontal (or vertical) half-wave dipole with "reflector" and "director" elements adjacently parallel to it. The dipole is driven directly by the transmitter through a transmission line, while the other elements are parasitically excited by the driven dipole. The forward gain and the F/B ratio are a function of the number of elements, their length and the spacing between them. A reflector is slightly longer than the driven element, directors are slightly shorter. Spacing usually varies between 0.1 and 0.25 wavelength. "Close" or "medium" spaced beams have a little lower gain and F/B ratio than do "wide" or "optimum" spaced ones. Also, the adjustment may be more critical, feedpoint impedance lower and the bandwidth for a given s.w.r. range less. On the other hand, the smaller spacing shortens the length of the boom required to support the elements, thus reducing the turning radius, overall space required, weight, windload and cost. Comparative figures in the various categories may be obtained from the accompanying antenna listings where it also may be noted that the gain increases and the bandwidth narrows as the number of elements and the spacing (indicated by the boom length) is increased. On bands up to 30 mc, two to five elements are commonly employed, while on the higher bands, where physical dimensions are smaller, more elements are used, in which case the beam often is called a Yagi.

Stacking: Beams of the same type may be stacked above one another or side by side for additional gain. Such an arrangement is often used on the v.h.f. bands where it becomes practical. Two stacks provide 3 db extra gain, four stacks 6 db, but the effective useful gain may be even greater due to a lowering of the vertical



A "Big-Bertha" rotatable mast with 10, 15 and 20 meter full size beams in a "Christmas Tree" configuration at the top. A Tri-Band TM-30C beam is below. (All by Telrex).



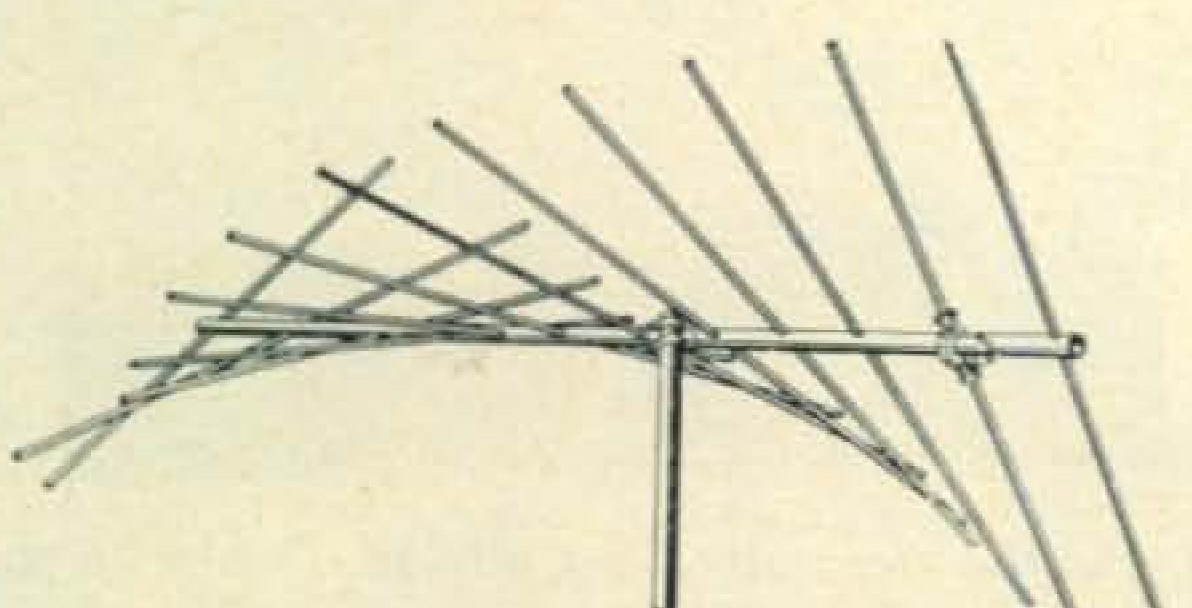
A 3-band 3-element quad antenna. The coax feedline is connected to the junction of the three loops in the middle section and is draped over the boom. (Skylane Products).

radiation angle which can result. The beamwidth also is narrowed.

Quad Antenna: The Quad antenna consists of two or more square-shaped wire loops a quarter-wavelength long on each side supported parallel to each other. One loop is the driven element, the others are reflector and directors which are adjusted with stubs or coils. High gain and excellent F/B ratio is attainable and the system has a relatively low-Q resulting in good bandwidth. For a given height, the vertical radiation angle of the Quad is much lower than that of a horizontal beam, making it particularly attractive for DX work.[1] Thus the Quad can be more effective, especially when antenna height must be restricted. In addition, its smaller horizontal dimensions reduce the turning radius and space requirements. The Quad also has a large "capture area" for better hauling in received signals and it is less susceptible to pulse static and noise.

Rhombic Antenna: The Rhombic is a long-wire antenna with four legs arranged in a diamond formation. Each leg is several wavelengths long. The transmission line (usually 600 ohms) is connected at one corner of the diamond with a terminating resistor installed at the opposite corner. A uni-directional beam pattern is produced in the direction pointing from the feed-point toward the terminated end. High forward gain is obtained at very low angle radiation and F/B ratio is very high. A rotatable rhombic is not mechanically feasible at low frequencies. Point-to-point communications companies have used the rhombic for years, as it has proven to be exceptionally reliable.

[1]Ross, Jr., Donald G., W2JMZ, "How DX Kings Rate Antennas," *QST*, Jan. '64.

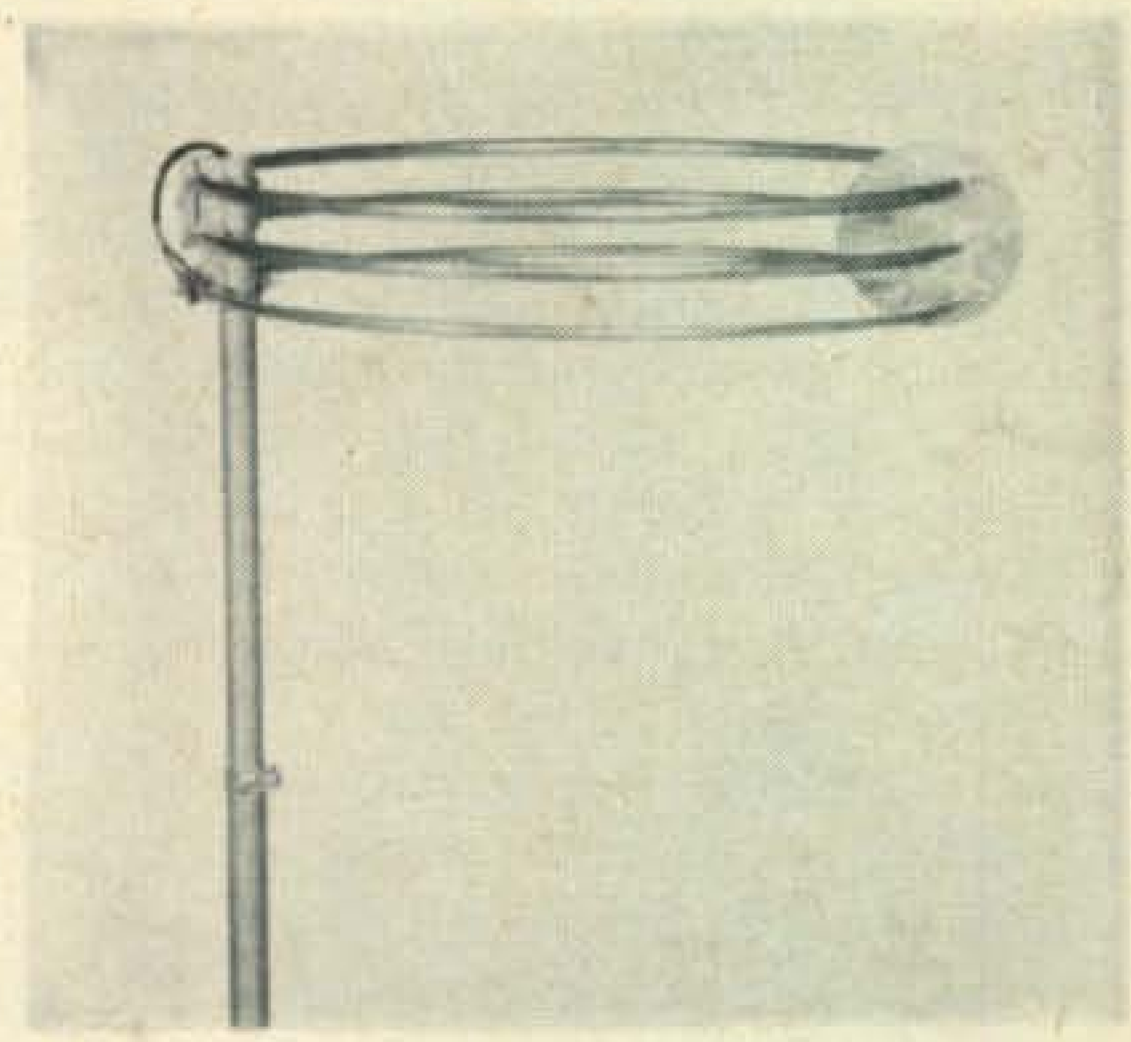


Circular-polarized beam for 6 meters. (Telrex Spiral Ray Model 6MSR-1147).

Spiral Ray Beam: The Spiral Ray basically is a parasitic Yagi beam with skewed elements, producing linear response to any radiation angle, vertical, horizontal or oblique, for optimum performance with various propagation or ducting phenomena. Noise and fading also is minimized.

Special Antennas

Halo Antenna: The Halo is a half-wave radiator, or folded dipole, formed in a small circle with capacitively-loaded ends and is horizontally mounted. The result is horizontally-polarized and omni-directional radiation, which together with the reduced space requirements make it very popular for v.h.f. mobile applications where flutter and noise usually experienced with vertical whips, also is eliminated. Gain also may be obtained by stacking.



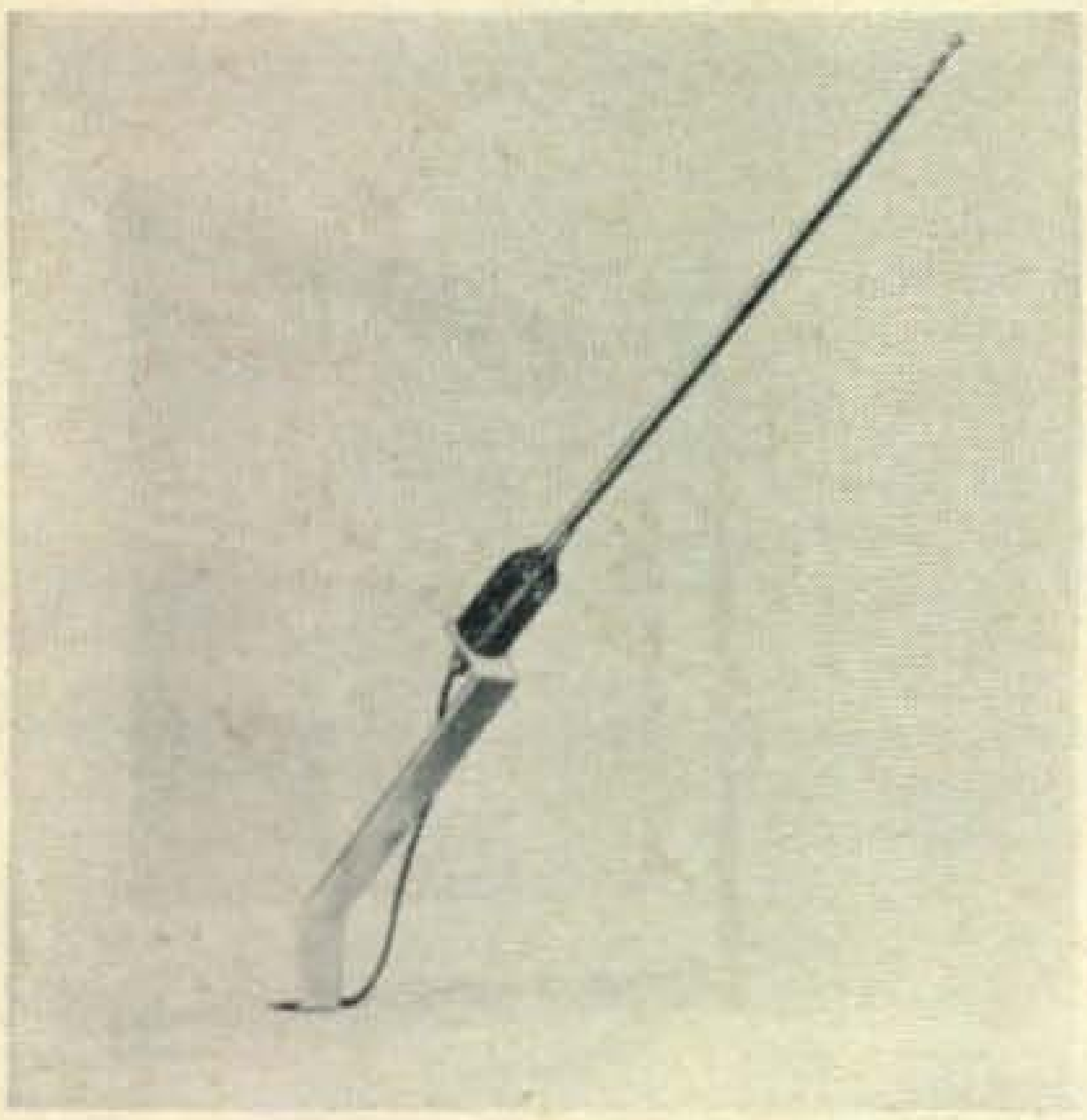
A 6-meter halo antenna made up of a three element folded dipole with capacitively loaded ends. (Hi-Par Saturn-6).

Foldover Mobile Antenna: The fold-over antenna, used for mobile work, is one which employs a locking-type hinged arrangement for tilting the upper section of a vertical mobile antenna over at a right angle to provide clearance when the vehicle is garaged. The upper section employs inductive loading.

Multi-band Vertical: An interesting and efficient multi-band system consists of a single grounded mast from the bottom of which a number of wires are extended upward to the ends of a double cross-arm located part way up the mast. The wires are arranged to provide automatic linear decoupled radiating elements for the individual bands.

Multi-band Tunable Dipole: A special type of commercial multi-band tunable dipole is a shortened affair which may be used for 10, 40 and 80 meters. For 80 meters, end-loading coils are employed. For 40, part of each coil is shorted out by a mechanically-linked switch driven by a motor in the center housing. The ends of the dipole are telescoping sections which can be individually extended or retracted by two separate motors for tuning the radiator to exact resonance. By making it possible to tune each half of the dipole separately, the feedpoint in effect can be moved either side of center to where the impedance matches that of a coax line, thereby ensuring a low s.w.r. at all times. On 10 meters the coils act as r.f. chokes and isolate the end sections leaving only the middle portion operational. The entire system may be remotely controlled from the radio operating position. An s.w.r. bridge is required for determining the proper adjustments. The antenna also may be turned with a separate rotator.

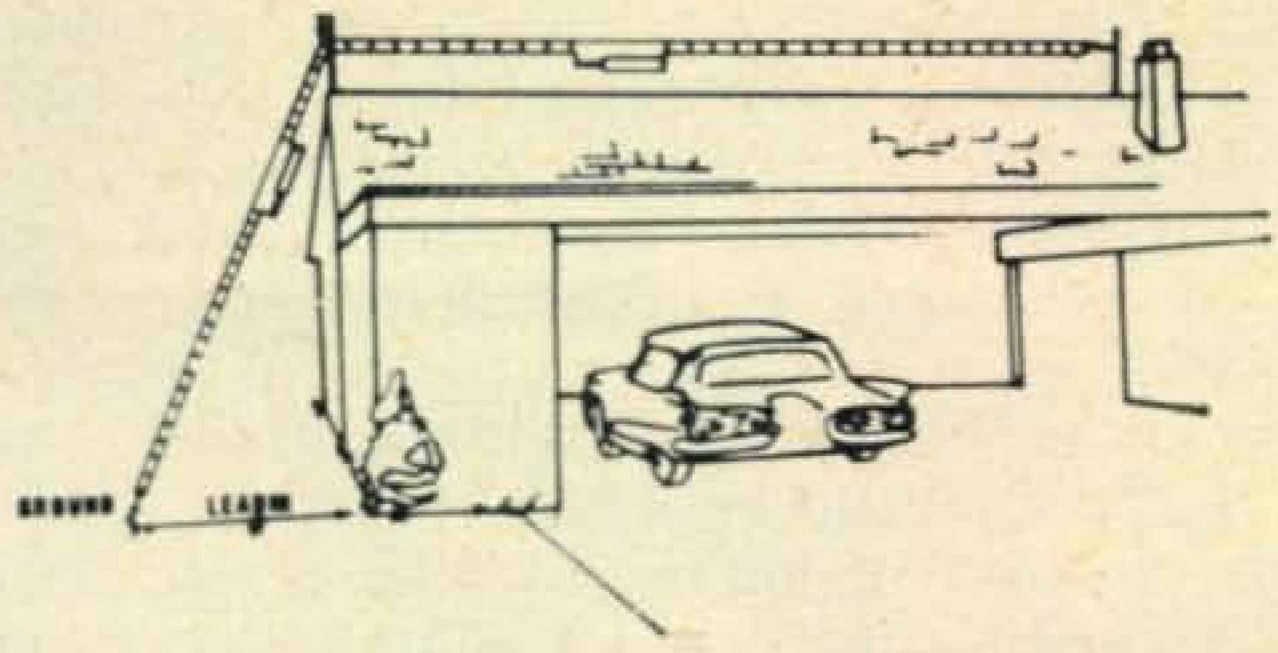
Portable Antenna: Portable antennas designed for temporary installation on a window frame or ledge, a fence railing, on boats, etc., often consist of a telescoping quarter-wave radiator with a base-loading coil held on a bracket which may be clamped to a suitable support. An insulated wire lead is connected to the bracket and run along the floor or ground surface for several feet. This acts as an artificial ground or "counterpoise" to make up the other part of a half-wave antenna system. When disassembled, the elements may be carried in a brief case.



Portable base loaded antenna for window, fence rail, or similar mounting (Barker and Williamson "Vacationeer").

Transmission-Line Antenna: A trap-type antenna, using a principle similar to linear decoupling, is made of quarter-wave sections of 450-ohm open-wire transmission line in conjunction with capacitors in one leg between each section. It is designed for use as a quarter-wave grounded radiator suspended vertically, angularly or in an L-shape. A double arrangement may be used as a horizontal half-wave antenna.

Log Periodic Antenna: The log periodic antenna is a multi-element beam, similar in appearance to a Yagi, but the elements are uniformly spaced and are made progressively shorter toward one end of the boom. The result is a system which provides gain and directivity over vary wide bandwidths (2:1 or more).



Grounded quarter-wave transmission line type antenna. It may be suspended vertically, angularly, or tilted. (Mosley El Toro).

Impedance Matching and Balancing

A transmission line may be connected directly to a split dipole if the antenna impedance matches that of the line. If the antenna does not present the proper impedance, special matching devices may be employed as shown at fig. 2. Such systems require additional and sometimes critical adjustment along with a narrowed bandwidth; nevertheless, they may be worthwhile for achieving an optimum result.

Balancing arrangements are often desirable. When coax line is used, unbalance of the system can take place which may produce radiation from the transmission line with subsequent distortion of the radiation pattern from the antenna itself. The possibility of t.v.i. and of noise pickup on reception also is increased.

Delta Match: The Delta match functions as an impedance step-up transformer. The impedance transformation is determined by dimensions *a* and *b*.

T-Match: The T-match, a variation of the Delta, is an adjustable device more suited for use with beams.

Beta or Hairpin Match: The Beta match is a short adjustable stub which may be used to slightly "hairpin" tune the antenna as well as provide a suitable impedance at the point where the line is connected. The arrangement may be likened to a small loading coil with the line tapped on it. The end of the stub may be grounded for lightening protection.

Folded Dipole: As pointed out earlier, an im-

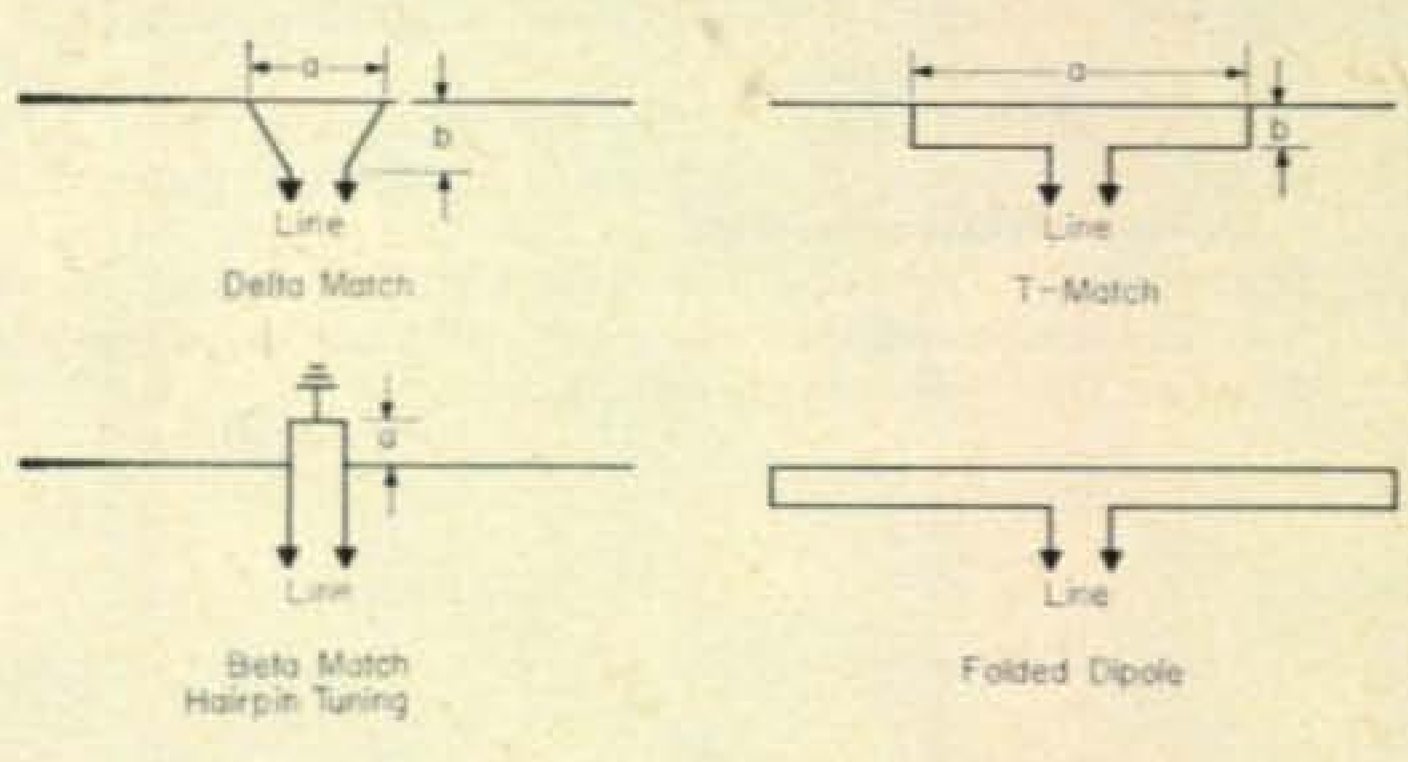


Fig. 2—Feedline matching and balancing systems.

pedance step-up over that of a single dipole can be obtained with a folded dipole. This expedient is sometimes used with beams.

Gamma Match: The Gamma match, one-half of a T-match, is designed to improve balance with coax line. The reactance of the Gamma loop is balanced out by the capacitor which in practice should be weatherproofed.

Balun: A Balun is a coupling device especially devised for use between an unbalanced line and a balanced circuit. It may have a 1:1 impedance ratio or it may be designed to present an impedance transformation and thereby also do away with other matching devices. Baluns may be constructed using coax cable as shown, or using coils for compactness and convenience.

The Manufacturers

The following paragraphs present a brief rundown on the products offered by nearly all of the manufacturers of ham antennas. An attempt has been made to outline any particular construction techniques or materials used by a manufacturer. A very detailed listing of individual antennas by manufacturers begins on page 56.

Antenna Specialists Co., 12435 Euclid Ave., Cleveland 6, Ohio: Features a wide line of 2, 6 and 10 meter antennas for mobile and base station use. Stainless steel radiators are used for mobile; rigid aluminum and cadmium-plated steel for base models. Base-loading coils or line matching transformers are sealed and tamper-proof. A large selection of mobile mounts and accessories is also offered.

Barker & Williamson, Inc., Bristol, Penna.: Features a portable antenna called the Vacationeer. Collapsible whip is chrome plated, separate loading coils for each band are high-*Q* air-wound type with protective hood, bracket is of iridited aluminum. When disassembled, fits into KWM-2 carrying case.

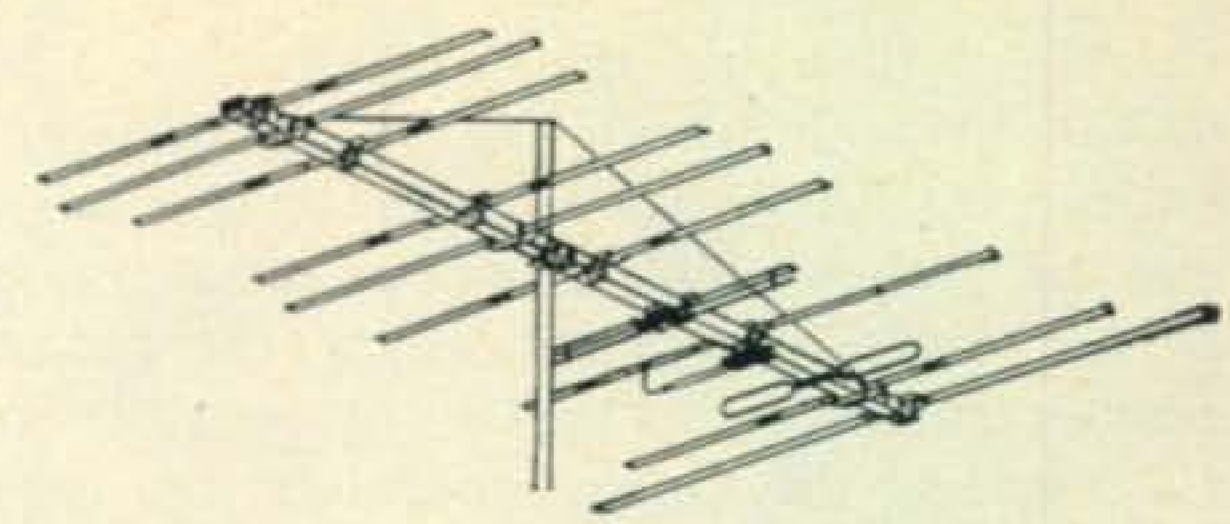
Columbia Products Co., R.F.D. 3, Columbia, S.C.: Features the Wondershaft Antenna for mobile work. Quarter-wave whips for use from 10 to 6 meters provide full quarter-wave efficiency in antenna lengths about ten-percent shorter than metal whips. The radiating element is sheathed in fiberglass which has a high damping factor, thus tending to reduce road sway, precipitation static and serves as a natural insulation to reduce the hazard of working under live wires.

The normal-mode helical mobile antennas are inductively loaded with the coil space-wound around an air core and embedded in a laminate of fiberglass. Antennas are white fiberglass terminated with ⅜"—24 threaded ferrules. The fiberglass is spirally wrapped for high-impact strength.

Three-quarter wave whips for 6 meters have 2.7 db gain and a more uniform omni-directional pattern.

Dorco Electronics, 109 E. Elm St., Compton, Calif.: Features the Orbitop, a mobile antenna top-hat section for improving performance of coil-loaded systems and enabling the use of shorter radiators.

Mobile whip with base loading coil/matching transformer and trunk groove mount. (Antenna Specialists Model M-87).

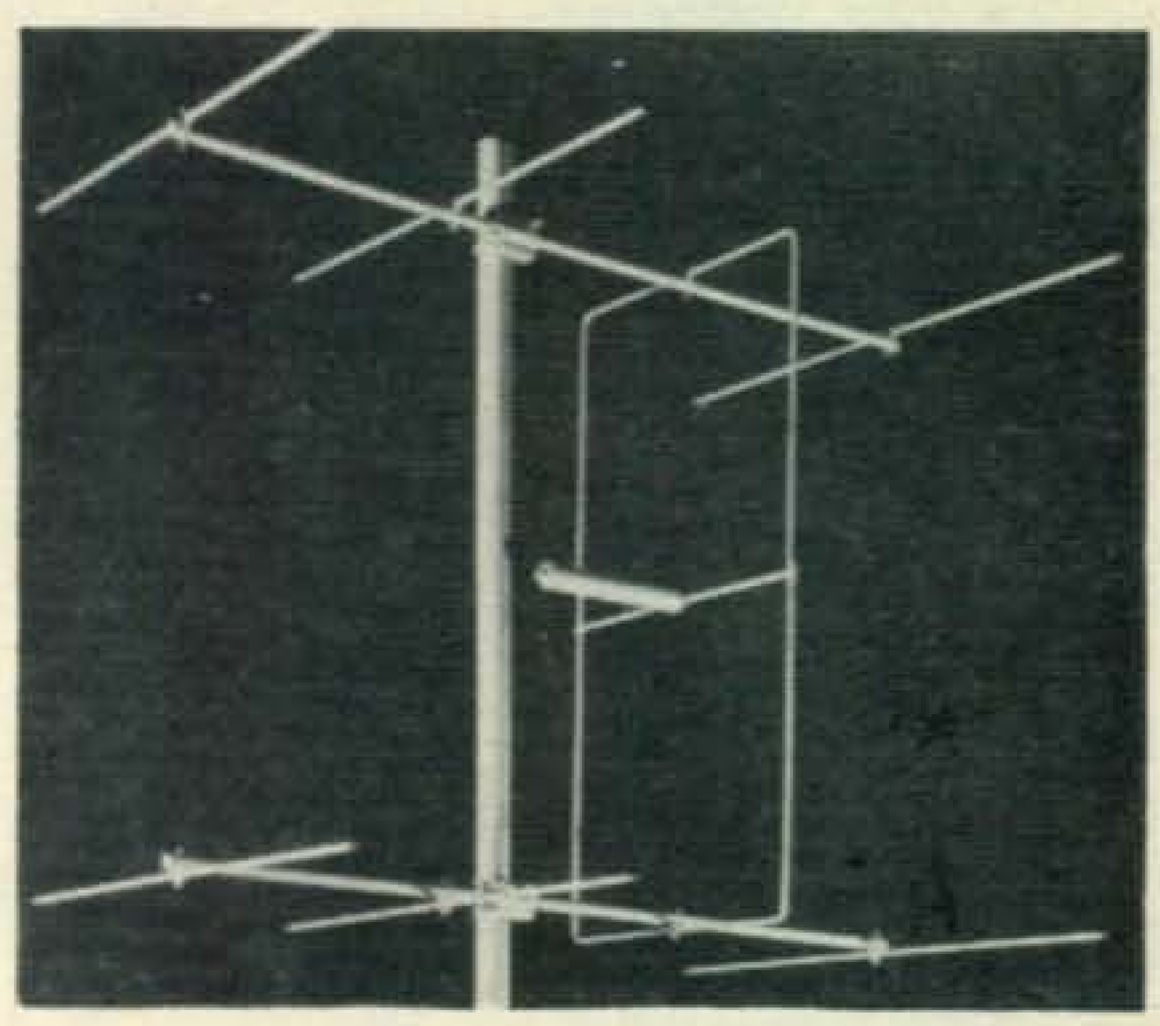


Two-band beam for 6 and 2 meters. On 6 meters four elements are used as a Yagi, the driven element being a folded dipole. For 2 meters there are five parasitic elements each consisting of three colinear sections. The driven element is a long folded dipole functioning as a three-section colinear element produced by a special phasing stub in front of the dipole. The 2-meter arrangement is thus equivalent to 18 elements. (Finco—Model A-62GMC).

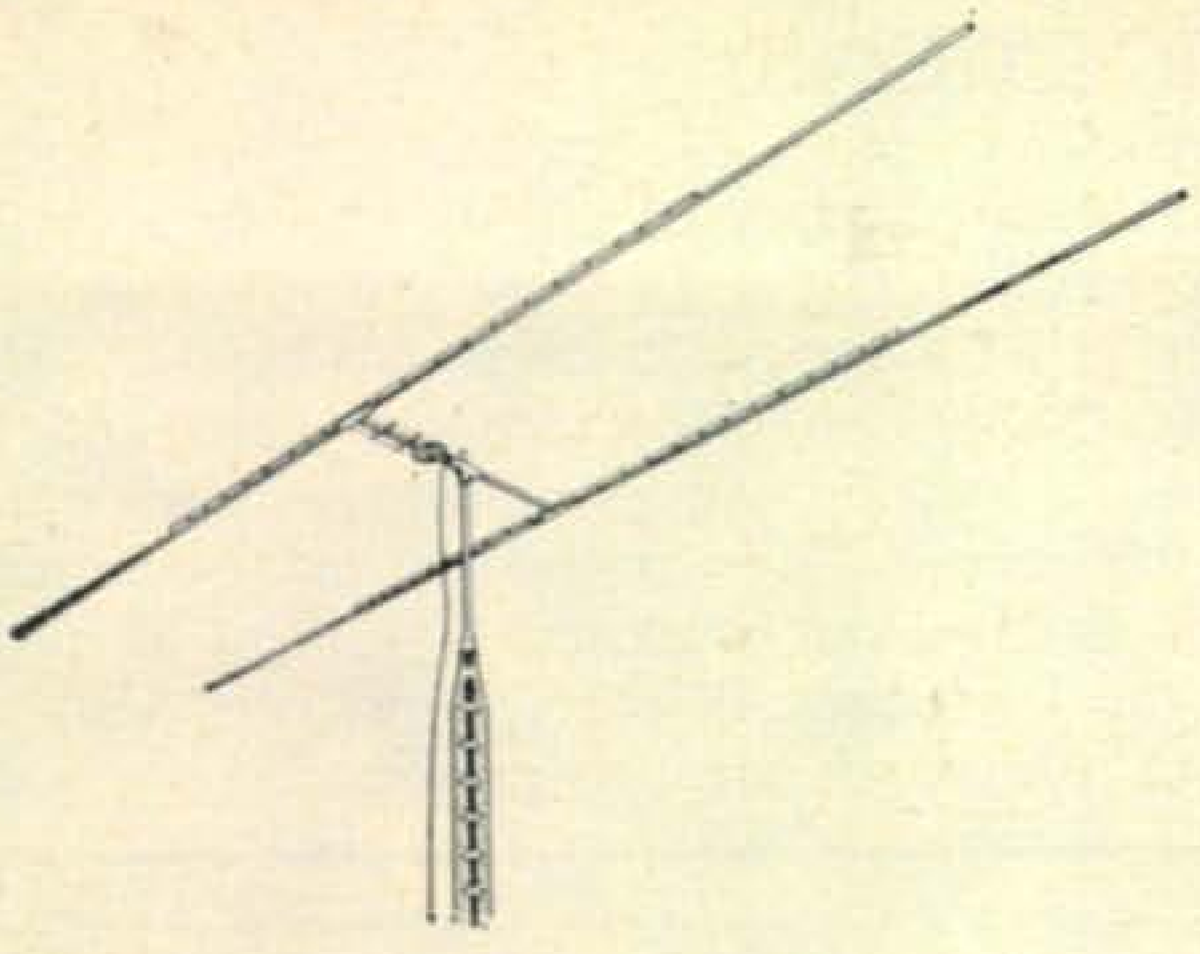
Finco—The Finney Co., 34 West Interstate St., Bedford, Ohio: Specializes in a line of 1¼, 2 and 6 meter beams. Antennas are pre-assembled with positive-locking snap-out construction on all elements for simple installation. Booms are 1" square with multiple-suspension type bracing. Elements are aluminum tubing with reinforced sleeves. Finish is gold corodized for corrosion protection. Except for the 300-ohm models, Gamma-match is supplied with all necessary coax connectors including that to be installed on the end of the transmission line. Collinear elements are used for 2-meter operation with Models A-62GMC and AB-62GMC. Detailed instruction sheets include complete graphs of the gain, F/B ratio, and s.w.r., all plotted against frequency. With some models s.w.r. curves also are furnished for different Gamma adjustments. 50 or 75 ohm lines may be matched. Data also is included for making stacking harnesses using coax cable.

Gain, Inc. 1209 West 74th St., Chicago 36, Ill.: Features stacked v.h.f.-u.h.f. "J" beams which are "slot" antennas similar to a Yagi in which the array is fed at an infinite impedance rather than by the normal low-impedance method. There are no side-radiation lobes, the beam-width is sharper, s.w.r. uniformly low. It is a compact affair with modular construction, so by starting with a basic model, additional gain can be had by adding sections as needed. The basic unit provides 11 db gain, added units each provide 2 to 3 db more gain. All models can be vertically or horizontally polarized without additional hardware. Construction is of heavy-walled aluminum tubing. Clamps and fittings are forged with a special alloy that cannot rust or form electrolytic corrosion.

Gotham, 1805 Purdy Ave., Miami Beach, Florida 33139: Gotham prides itself in its long record of consecutive advertising and acceptance of its line of vertical antennas. These are base loaded with High-*Q* B & W air-wound coils. Gotham beams are full size made of strong aluminum alloy and are designed to furnish high



A 2-meter double-J beam. The horizontal cylinder projecting at the left of the rectangular vertical element is a balun for 52 ohm coax line. (Gain, Inc. Model 144-S-4).



A 2-element 40-meter beam employing linear loading, reducing element length to two-thirds of normal size. (Hy-Gain Model 402-B).

gain for the number of elements. No tuning stubs, baluns, coils, traps or insulators are used.

Hilliard Laboratories, Box 2614, Macon, Georgia: Features 10, 15 and 20 meter Rhombics, four wavelengths per leg. Supplied with #12 hard copper wire, insulators and terminating resistor. Feed impedance is 600 ohms. Requires four supports.

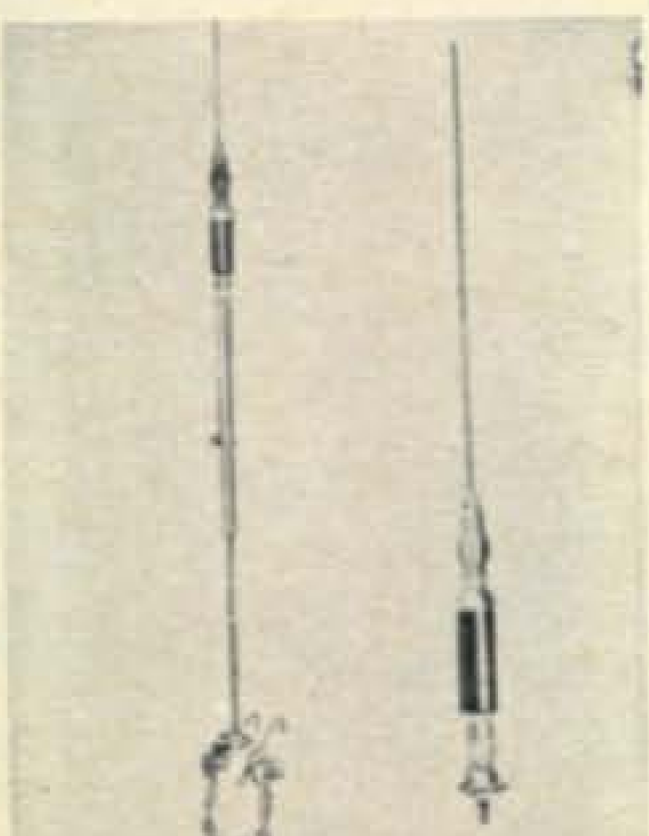
Hi-Par Products Co., 347 Lunenburg St., Fitchburg, Mass. 01421: Specializes in 2 and 6 meter antennas. Their original Saturn-6 Halo has long been popular. The 6-meter Long-John beams employ "plumbers delight" style with no holes drilled in either the boom or elements. Electrolysis from unlike metals in contact with each other is eliminated by using only aluminum where important parts are fastened together.

A new design of Gamma-match is used which increases the operating bandwidth of the antenna. The reactance-cancelling capacitor is located at the outer end of the arm, rather than at the inner end, and is completely weatherproofed and sealed. No critical adjustments are needed. Coax connector is built in.

Hy-Gain Antenna Products, N.E. Highway 6 at Stevens Creek, Lincoln, Nebraska: The large beams utilize a 2" boom. Telescoping elements are employed to minimize droop. Material is 6063T832 aluminum. New formed aluminum gusset bracket assemblies are used. All parts are pre-drilled. Light weight "Hi-Q" slim traps (2" dia.) are weather-proofed, wound and completely enclosed in aluminum housings. Junior beams made with lightweight taper-swaged aluminum tubing and brackets are die-formed aluminum. Traps use high-impact Styron coil forms and are weatherproofed in die-formed aluminum. Hy-Gain beams feature the Beta-match. Linear loading and decoupling is used with the 20 and 40 meter Duobander and Hy-Seven beams.

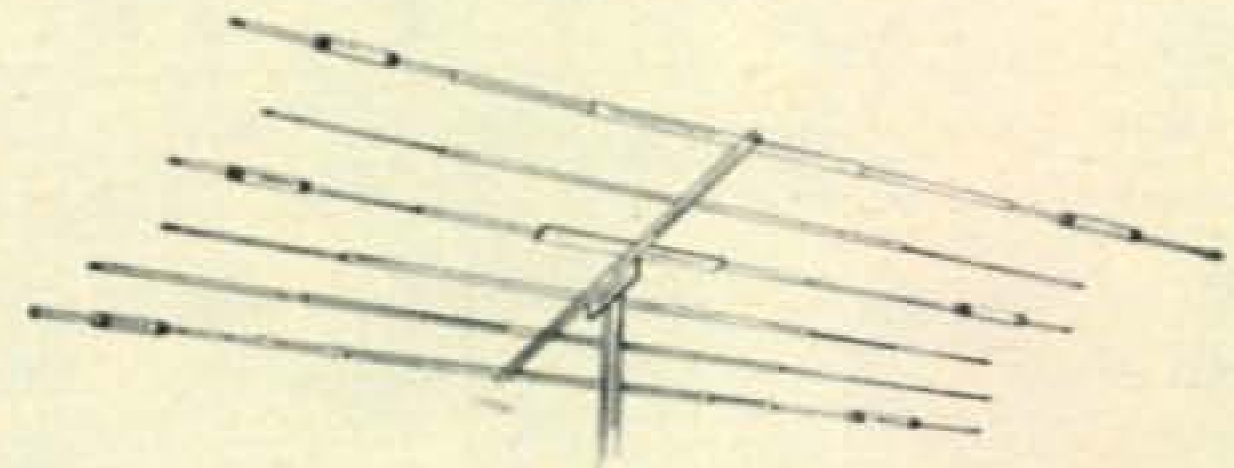
A series of self-supporting vertical antennas employs both traps and linear decoupling. They are furnished with Cycolac base with weatherproofed coax connector. Interesting data on phasing two or more verticals for directivity and gain is given in the literature. Bandwdth s.w.r. charts are supplied with beams and verticals.

The Topper mobile antenna uses fold-over mast made of ½" diameter solid aluminum rod with a positive lock quick-disconnect sleeve. Upper antenna section is ⅜" fiberglass rod with encapsulated top-loading coil tunable with a stainless steel rod. A "quick disconnect" is used between mast and antenna sections.



Left — ⅝ wave arrangement with adjustable coaxial tuning skirt and double chain bumper mount. (Master Mobile ABR-360). Right — A mobile ⅝ wave roof-top antenna with matching transformer at base. (Master Mobile ABR-370).

Master Mobile Mounts, 4125 W. Jefferson Blvd., Los Angeles, Calif. 90016: Has long specialized in mobile antennas but the line also includes base station models. The Dart-Line mobile antennas feature a fold-over stainless steel mast with brass fittings and is corrosion resistant and weatherproofed. A slim locking sleeve holds a rigid vertical position when conditions subject the antenna to lateral pressure. A one-piece whip and coil resonator are adjustable to move in and out of frequency. The 2-meter High-Gain antennas have stainless steel whips with set-screw type adapter for field cutting to frequency. When supplied, mounting spring is stainless steel, mount is plated and matching transformer is Cycolac molded. A wide line of mobile mounts and accessories is available.



A trap-type beam antenna with four elements on 10 meters, and three elements each on 15 and 20 meters. (Mosley Model TA-36).

Mosley—Carloma Corp., 4610 No. Lindbergh Blvd., Bridgeton, Missouri: Beam antennas are designed to give maximum gain wtih low s.w.r. using direct feed without the necessity of matching or balancing devices. The antennas are of heavy-duty construction, yet are light weight. Heavy-walled components are used to stand up under severe winds and ice loading. Elements are secured with husky stainless steel U-bolts, lockwashers and nuts, while other hardware is of non-ferrous metals and plastic. Penetrox solution is used as extra insurance against corrosion of metal parts.

The coils in Mosley traps are space-wound with #10 wire on grooved forms molded of high-impact polystyrene with coil leads held by screws. The coil form is molded directly on the aluminum element which, along with the outer aluminum trap casing, comprises the capacitor elements which are thus solidly fixed to ensure stability. The traps "breathe" and cannot collect condensation.

A series of multi-band doublets and self supporting vertical antennas employs traps. The Trap Mobile antenna uses a trap and base loading with a stainless steel whip which may be laid forward over the car for garaging. It is guaranteed not to warp or take a set. Also available are 2 and 6 meter beams, a transmission-line antenna—the El Toro, and a portable half-wave antenna for window sill mount—the Tote-Tenna.

New-Tronics Corp., 3455 Vega Ave., Cleveland, Ohio 44113: Features the "Cliff Dweller" remotely controlled tunable dipole which employs a sturdy aluminum diecast housing for motor and gear trains which drive the end sections of the dipole, heat-treated aircraft type 1¼" heavy-walled aluminum tubing and waterproofed resonator coils and housings. It is self supporting, accepting a 1¼" threaded pipe for mounting on standard rotators. May also be mounted on top of a beam assembly.

The Hustler mobile antenna employs a ½" aluminum fold-over mast which may be rigidly locked in the vertical position by a slide-proof sleeve clutch arrangement. The resonator sections embody inductive loading with the mast adjustable for precise tuning. No matching devices are needed and any length 52-ohm line may be used.

The Coveya-6, a new type beam for 50 mc, produces a cardiod pattern with no side nulls. It consists of a

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LISTED SPECIFICATIONS

In regards to the listing which follows, the specifications in each case are those given in the manufacturers' literature.

The antenna-gain figures are related to the radiation obtained from a half-wave dipole having the same height and orientation as the antenna concerned; however, neither the height nor the vertical radiation angle is indicated. In addition, surrounding objects and ground conditions may affect performance, so some discrepancies can be expected.

Vertical-antenna gain is related to a quarter-wave radiator at a given height using the same type ground system (real or artificial).

It should be noted that the gain and F/B ratio figures are the maximum values obtained at the center-design frequency or resonance, so performance can be expected to drop off slightly as the frequency deviates from this point (toward the band edges).

Model and Type	Band	No. El.	Gain (db)	Max. F/B	Beam W. (°)	Pwr. (Kw.)	Max. El. L.	Boom L.	Turn. Rad.	Wt. (lbs.)	Wind Load (lbs.)	Notes	Price
Antenna Specialists Co., 12435 Euclid Ave., Cleveland 6, Ohio													
M-7A - Ground Plane Vertical	2											U-Bolt mounting	5.40
G-3 Ground Plane Vertical	2					3						Heavy Duty-S0239 Connector in base—weathertight.	20.46
ASP-244 Vertical Coaxial	2	Field Tunable					89"					Supplied with 8'RG 8/U & N Type Connector	29.95
M-105 Vertical Ground Plane	6											Low Cost Type.	12.15
M-92 End fed ½ λ	6		6			.2	11' 10"					Dual U-Clamps-Uses shortened decoupling radials (supplied).	28.43
M-91 End fed ½ λ	10		6			.2	16' 10"						34.50
M-12 Vertical Ground Plane	6 or 10					.3						Heavy Duty-S0239 Connector in base—weathertight (Specify Frequency band).	42.21
ASPR1 Mobile, Roof top ¼ λ	2											¾" mtg. hole -Solderless lead connection	2.85
ASPR1L Mobile, Roof top ¼ λ	2											Same as ASPR 1 but with 12' RG58/U & PL259 Connector.	4.95
ASP 157 Mobile Gutter Mount ¼ λ	2											With 12' RG58/U & PL259 Connector.	8.10
ASPR 177 Mobile Roof top ½ λ	2		3									¾" mtg. hole, has spring mount, sealed matching transformer & 12'RG 8U & PL259 Connector.	24.00
ASPR 197 Mobile	2											Same as ASPR 177 but cowl mount.	30.00
ASPR 200 Mobile	2											Same as ASPR 177 but with double-chain bumper mount.	36.00
ASPC 201L Mobile Roof top	2											⅜" mtg. hole - has snap-on mtg. - Supplied with 12' RG 58/U & PL259 Connector.	5.55
ASPC 201 Mobile Roof top	2											Same as ASPC 201L but without coax cable.	3.08
ASP 242 Mobile Vertical Coax	2											Field Tunable, Bumper Mount.	21.00
ASP 243 Mobile Vertical Coax	2											Field Tunable, Cowl Mount.	18.00
ASP 249 Mobile Vertical Coax	2 & 6											Pre-tuned, cowl mount.	15.00
ASP 250 Mobile Vertical Coax	2 & 6											Pre-tuned, for Standard base with ⅜"—24 thread.	10.50
M-84 - Mobile, Roof top - base loaded	6											With matching transformer, 20' RG 58/U—PL 259 Connector.	15.68
M-85 Mobile Whip	6											59" Whip with cowl mount, gutter clip & 54" Coax Cable.	8.97
M-88 Mobile Whip base loaded	6											With 44" Whip for cowl, deck, fender mount Matching Transformer in base, with 20' RG58/U & PL 259 Connector.	19.32
M-87 Mobile Whip base loaded	6											Same as M-88 but trunk-groove mount.	17.06
M-86 Mobile Whip base loaded	10											Same as M-88.	19.32
M-89 Mobile Whip base loaded	10											Same as M-86 but trunk-groove mount.	17.06
MR-60 Mobile Whip - Center loaded	6						37"					Fiberglass - Spiral wound	9.96
MR-61 Mobile Whip - Center loaded	10						45"					Fiberglass - Spiral wound	9.96
MR-62 Mobile Whip - Center loaded	15						61"					Fiberglass - Spiral wound	9.96
MR-63 Mobile Whip - Center loaded	20						61"					Fiberglass - Spiral wound	9.96
MR-64 Mobile Whip - Center loaded	40						73"					Fiberglass - Spiral wound	11.05
MR-65 Mobile Whip - Center loaded	80						73"					Fiberglass - Spiral wound	11.05
Barker & Williamson, Inc., Bristol, Penna.													
Vacationeer - Portable - base loaded	2, 6, 10, 15, 20					.3P	57"			2		With mounting bracket & all loading coils - retracts to 18½".	19.95
Columbia Products Co. R.F.D. 3, Columbia, S.C.													
10-1 Wondershaft Mobile Whip ¼ λ	6						50"-60"					Fiberglass	6.95
10-2 Wondershaft Mobile Whip ¼ λ	10						61"-102"					Fiberglass	7.50
29-1 Base Extension							18"					For extending whips or using coil between whip & extension.	5.95
29-2 Base Extension							27"						6.29
29-3 Base Extension							36"						6.95
73-3 Helical Whip	10						4'					Distributed-load antenna with coil wound in lower section of Fiberglass whip.	11.25
73-4	15						4'						11.25
73-5	20						6'						15.90
73-6	40						6'						15.90
73-7	80						6'						15.90
73-8	40						8'						18.75
73-9	80						8'						18.75
238 - High Gain Whip - Col. ¾ λ	6		2.7				84"-108"			11 oz.		Fiberglass	12.50
Dorco Electronics 109 E. Elm St., Compton, Calif.													
Orbitop - Mobile Top-Hat Antenna	Section												15.45
Finco-The Finney Co., 34 West-Interstate St., Bedford, Ohio													
A 1¼-10 Yagi	1¼	10	13	21	40			118¾"	62"	3	22	For 300-ohm line	13.20
A 2 - 10 Yagi	2	10	13	19	45			118¾"	62"	3	24	For 300-ohm line	13.20
A 2 - 10 GMC Yagi - G	2	10	13	19	45			118¾"	62"	4¼	38		19.77
A 2 - 15 GMC Yagi - G	2	15	15	18	31			15½'	95"	6½	58		31.80
A 6 - 3 GMC Yagi - G	6	3	7.5	19.5	61			69¾"	66½"	3½	26		15.30
A 6 - 4 Yagi	6	4	9	18	60			118¾"	82"	4½	38	For 300-ohm line	18.60
A 6 - 4 GMC Yagi - G	6	6	9	18	60			118¾"	82"	4½	38		22.17
A 6 - 6 GMC Yagi - G	6	6	11	18	56			15½'	110"	8¼	61		33.30
A 6 - 7 GMC Yagi - G	6	7	13	18	49			19½'	132"	9½	75		37.50
A - 62 - Two Band Yagi	6	4	9	18	60							300 ohms - on 2M, 3 Colinear	
	2	18	10	17	45			118¾"	80"	7	58	Yagis of 6 elements each.	33.00
A - 62 GMC - Two Band Yagi - G	6	4	9	18	60							Same as above	
	2	18	10	17	45			118¾"	80"	7	58	but 50 ohms.	34.50
AB - 62 GMC - Two Band Yagi - G	6	6	11	18	56							On 2M, 3 Colinear Yagis	
	2	30	12	18	38			15½'	110"	21	89	of 10 elements each - 50 ohms.	52.50

Model and Type	Band	No. El.	Gain (db)	Max. F/B	Beam W. (°)	Pwr. (Kw.)	Max. El. L.	Boom L.	Turn. Rad.	Wt. (lbs.)	Wind Load (lbs.)	Notes	Price
Gain, Inc., 1209 West 74th St., Chicago 36, ILL.													
NOTE: A Double - 2 Booms													
144-S-2, J-Beam, One Double 2	2	4	8	14	70	1		20"				300 ohms	18.95
144-S-4, J-Beam, One Double 4	2	8	11	18	25	1		56"				Basic Antenna	23.50
144-S-6, J-Beam, One Double 6	2	12	13	22	20	1		90"					29.95
144-S-8, J-Beam, One Double 8	2	16	14	24	15	1		124"					36.50
144-S-16 J-Beam, Two Double 4	2	16	14	22	13	1		56"				300 ohms	46.50
144-S-16A, J-Beam, Four Double 4	2	32	17.2	24	8	1		56"					93.00
144-S-32, J-Beam, Two Double 8	2	32	17.5	23	8	1		124"					71.95
144-S-64, J-Beam, Four Double 8	2	64	20.9	27	6	1		124"				—	143.50
144-S-128, J-Beam, Eight Double 8	2	128	24.2	29	5	1		124"					285.95
50-S-4, J-Beam, One Double 4	6	8	11.8	21	24			124"				300 ohms	74.95
50-S-6, J-Beam, One Double 6	6	12	14.2	23	18			155"				300 ohms	84.95
50-S-16, J-Beam, Two Double 4	6	16	15	23	12			124"				with linear matching transformer.	145.95
50-S-24, J-Beam, Two Double 6	6	24	17.4	24.5	9			155"					166.45
A0-4 Add-on elements	2											Increases 144-S-4 to 144-S-6-Adds 2 db gain.	13.95
A0-8 Add-on elements	2											Increases 144-S-4-to 144-S-8-Adds 3 db gain.	17.95
		Stacked J-Beams are also available for 220 and 420 MC											
220 FD5-Conventional Beam, 1-Boom	1¼	11.6	18									52 ohms with Balun included.	14.95
220 FD8-Conventional Beam, 1-Boom	1¼	13.8	20									52 ohms with Balun included.	17.95
144 FD4-Conventional Beam, 1-Boom	2	10.4	16									300 ohms	12.45
144 FD6-Conventional Beam, 1-Boom	2	12.4	18									300 ohms	15.45
144 FD8-Conventional Beam, 1-Boom	2	13.4	20									300 ohms	17.95
50 FD3-Conventional Beam, 1-Boom	6	8.5	16									300 ohms	18.95
50 FD4-Conventional Beam, 1-Boom	6	10.4	17•									300 ohms	23.45
50-5-E1-Conventional Beam, 1-Boom	6	11.5	24									50 ohms	23.95
Gotham, 1805 Purdy Ave., Miami Beach, Florida 33139													
Beam-One Band	2	12	14					12'					24.95
Beam-One Band	6	4	9.5					12'					25.95
Beam-One Band	10	4											40.95
R-15 Beam-One Band	15	3	8										49.95
Beam-One Band	20	3	8					12'					59.95
Beam-Two Band	15, 20											Separate 52 or 72 ohm lines for each band-no loading coils or traps.	49.95
Beam-Three Band	10, 15, 20											Separate 52 or 72 ohm lines for each band-no loading coils or traps.	59.95
V 40 Vertical-Base loaded	6, 10, 15, 20, 40						23'						14.95
V 80 Vertical-Base loaded	6, 10, 15 20, 40, 80						23'					No radials or guys needed.	16.95
V 160 Vertical-Base loaded	6, 10, 15, 20 40, 80, 160						23'						18.95
Hilliard Labs., Box 2614, Macon, Georgia													
Rhombic	10		12	100			137'	O-L-245', O. W. 125'				For 600 ohm line	29.95
Rhombic	15		12	100			191'	O-L-340', O. W. 175'				Terminating resistor supplied.	37.95
Rhombic	20		12	100			282'	O-L-500', O. W. 260'				Vertical Steering 0 - 20 degrees.	44.95
Hi-Par Products Co., 347 Lunenburg St., Fitchburg, Mass. 01421													
2M8 Lunnenburg Yagi G	2	8	14	26	35			124½"		5			14.95
GM6 Lunnenburg Yagi G	6	5	10	30	30			12'		10		Adjustable 50-75 ohms.	22.50
HT2M Hilltopper Portable Yagi G	2	8	14	26	35			124½"		5		Boom in 3 sections, supplied with carrying case.	13.95
6MHT Hilltopper Portable Yagi G	6	3	8.5	25				78"		3¾		Boom in 2 sections, supplied with carrying case.	16.95
LJ6 Long John Yagi G	6	6	13	23	45			21½"		15		Adjustable 50-75 ohms.	34.95
2H-Mobile, Lunnenburg Halo	2											With 3-piece adjustable mast.	9.95
2H-Mobile, Lunnenburg Halo	2									7 oz.		Antenna only.	6.95
2H2												3-Piece 5½' Mast for stacking 2 Halos (3 db gain).	3.50
S-1 Saturn-6 Mobile Halo	6									2		With 2-piece adjustable mast	16.95
S-2 Saturn-6 Mobile Halo	6											Antenna only.	11.95
Hy-Gain Products, N.E. Highway at Stevens Creek, Lincoln, Nebraska													
313 VHF Yagi O.S.	¾	13	16	25		1	14"	8'	4'6"	3		450 ohm line.	12.95
111 VHF Yagi O.S.	1¼	11	14.2	25		1	27"	12'	6'8"	3¾		450 ohm line.	13.95
23 VHF Yagi O.S. (B)	2	3	9	20		1	42"	3'	4'	3		with Balun	6.95
28 VHF Yagi O.S. (B)	2	8	14.5	30		1	42"	14'	7½'	7		for 52-ohm	16.50
215 VHF Yagi O.S. (B)	2		17.8	30		1	42"	28'	14'	17		line.	33.50
63B VHF Yagi O.S. (B)	6	3	10	25		1	9'10"	8'	6'	5		with Balun	16.95
64B VHF Yagi O.S. (B)	6	4	12.7	25		1	9'11"	12'	8'	8		for 52-ohm	21.50
66B VHF Yagi O.S. (B)	6	6	15	25		1	9'9"	24'	12½'	17		line.	38.50
611B VHF Yagi O.S. (B)	6	11	19	30		1	9'8"	47'	24'2"	90			195.00
DB62 VHF 2 Band	6 2	4 18	8 15	20		1	10'	10'	7'			Colinear elements on 2M.	32.95
LP62 Log Periodic	6 2		8 15	25		1	9'	24'	16'	20			83.50
GP-3C Ground Plane ¼	1¼ or 2									4		Solid elements.	14.97
	2												
SGP-2 Ground Plane ¼	2						19"			2		U-Clamp Mtg.	5.90
GPG-2 Ground Plane Colinear	2		3.4				48"			2		U-Clamp Mtg.	14.95
GP-2C Ground Plane ¼	2		Heavy Duty							7		Telescoping Radiator and radials.	21.90
SPG-6 Ground Plane ¼	6						4'7"			3		U-Clamp Mtg.	13.95
GPG-6 Ground Plane Colinear	6		3.4				11'7"			9		Double U-Clamp Mtg.	24.95
GP-62 Ground Plane ¼	2,6						4'7"			4		Double U-Clamp Mtg. Uses decoupling stubs.	19.95
GP-1C Ground Plane ¼	10		Heavy Duty							10		Telescoping radiator and radials.	32.70
103BA Beam 1 Band F.S.	10	3	8	25			17'	8'		12			32.95
153BA Beam 1 Band F.S.	15	3	8	25			23'	12'		19			38.50
203BA Beam 1 Band F.S.	20	3	8	25			35'	16'		35			65.95
402B Hy-Seven-Linear loaded	40	2	5.2	30			43'	16'	23½'	24	149	(B)	99.75
DB24 2 Band Linear loaded	20 40	3 2	8 5	30 20		5P	43'	24'	24'2"	54		With balun (B)	69.95
TH2 Thunderbird-3-Band-Trap (B)	10,15,20	2	5	20		2P	26'	6'		19	86		69.95

Model and Type	Band	No. El.	Gain (db)	Max. F/B	Beam W. (°)	Pwr. (Kw.)	Max. El. L.	Boom L.	Turn. Rad.	Wt. (lbs.)	Wind Load (lbs.)	Notes	Price
Master Mobile Mounts, 4125 W. Jefferson Blvd., Los Angeles, Calif. 90016													
GP-4 Vertical Ground Plane ¼λ	2												5.95
ABR-365 Dynamaster Colinear Ground Plane 1½λ	2		5.8				7'					Supplied with SO-239 connector and cutting chart for 144-174 mc.	34.95
AM-106 Dynamaster Colinear Ground Plane #¾λ	6		3.7				7'					Supplied with SO-239 Connector at base.	34.95
B-20 Mobile, Roof mount ¼λ	2											7/16" Mtg. hole-has self-tapping threads.	2.25
ABR370 Mobile, Roof mount 5/8λ	2		3				57"					With stainless steel spring, plate mount, matching transformer, 12'RG58/U.	22.95
ABR360 Mobile, Roof mount 5/8λ	2		3				57"					Coax antenna using #370 whip with adjustable tuning skirt and double-chain bumper mount.	32.95
Dart-Line, mobile whip	10					1P	38"					Length does	5.95
with center-loading coil	15					1P	38¾"					not include	6.95
for use with	20					1P	39"					lower mast section.	7.95
fold-over	40					1P	40½"					Frequency is	8.95
lower mast	80					1P	46"					tunable.	9.95
AM-29 Fold-over Mast												36" Lower mast section, breaks at 18" for deck or fender mount.	11.95
AM-35 Fold-over Mast												48" Lower mast section, breaks at 36" for bumper mount.	14.25
RM-10	10					.3P	80"					Length includes lower mast, frequency tunable.	5.95
RM-15 Hustler mobile whip & resonator (center loaded)	15					.3P	81"					Length includes lower mast, frequency tunable.	6.95
RM-20 for use with fold-over	20					.3P	83"					Length includes lower mast, frequency tunable.	7.95
RM-40 lower mast	40					.3P	92"					Length includes lower mast, frequency tunable.	9.95
RM-80	80					.3P	97"					Length includes lower mast, frequency tunable.	11.95
MO-1 Fold-over mast												54" lower mast section-Folds at 15" for deck or fender mount.	7.95
MO-2 Fold-over mast												54" lower mast section-Folds at 27" for bumper mount.	7.95
Telrex Laboratories, Asbury Park, N.J. 07712.													
Unless noted, all beams balun ted, balun supplied													
430M-1511 Yagi W.S.	¾	15	16.5	24	27		13"	9'	5'	3	26	Hairpin Resonated, Balun Supplied.	39.70
A430/CR-30*2 λCorner Reflector	¾		13	20	45		30"		3'	15	40	Balun Supplied.	75.00
220M-54 Yagi O.S.	1¼	5	12.8	24	51		28"	4'	26"	1	15	Balun Supplied.	14.00
220M-1520 Yagi O.S.	1¼	15	17.2	24	27		28"	20'	11½'	10	50	Balun Supplied.	39.00
2M-5C Yagi M.S.	2	5	12.4	23	57		3½'	5'	3½'	1½	13	Hairpin Resonated, Balun Supplied.	14.00
2M-609 Yagi O.S.	2	6	14.6	23	42		3½'	9'	5½'	3	21	Hairpin Resonated, Balun Supplied.	23.00
2M-814 Yagi O.S.	2	8	16.5	23	35		3½'	14'	7'	5	36	Hairpin Resonated, Balun Supplied.	39.00
2M-1528 Yagi O.S.	2	15	17.2	23	27		3½'	28'	14'	15	65	T-Matched Balun Supplied.	65.00
6M-309 Yagi O.S.	6	3	10	23	58		10'	8'	6'	5	28	T-Matched Balun Supplied.	23.00
6M-516 Yagi O.S.	6	5	13	24	51		10'	16'	9½'	11	47	T-Matched Balun Supplied.	39.00
6M-624 Yagi O.S.	6	6	15	24	42		10'	24'	12½'	17	67	T-Matched Balun Supplied.	69.00
6M-1136 Yagi W.S.	6	11	17.8	24	33		10'	36'	19½'	42	134	T-Matched Balun Supplied.	135.00
6M-1147 Yagi Monarch O.S.	6	11	19	24	31		10'	47'	24½'	82	263	Balun Supplied.	225.00
6MSR-1147-Spiral Ray	6	11	18.7	24	32		10'	47'	24½'	82	308	T-Match Balun Supplied.	225.00
2VS2M-814 Stacked	2	16	19.2	23								Two Model 2M-814 Stacked.	90.00
4VS2M-814 Stacked	2	32	23.2	23								Four Model 2M-814 Stacked.	196.00
2VS2M-1528 Stacked	2	30	21	23								Two Model 2M-1528 Stacked.	146.00
4VS2M-1528 Stacked	2	60	24	23								Four Model 2M – 1528 Stacked.	295.00
TY6M-624 Stacked	6	12	18	24	20 42							Two Model 6M-624 Stacked-Complete.	195.00
10M-309B Standard M.S. Beam	10	3	8.5	24	60		18'	9'	11'	12	59		49.00
10M-310B Deluxe W.S. Beam	10	3	8.5	24	59		18'	10'	10'8"	21	75		79.00
10M-313B Super Deluxe O.S. Beam	10	3	10	24	57		18'	14'	12'	21	82		125.00
10M-518B-Deluxe M.S. Beam	10	5	11.6	24	56		18'	18'	14'	30	96		185.00
10M-523-Monarch O.S. Beam	10	5	13	24	49		18'	23'	17'	65	138		285.00
10M-636-Monarch O.S. Beam	10	6	14.6	24	48		18'	36'	20'	80	170		425.00
15M-312B-Standard M.S. Beam	15	3	8.5	24	60		23½'	12'	13½'	32	171		125.00
15M-317B-Super Deluxe O.S. Beam	15	3	10	24	58		24'	17'	14½'	37	107		159.00
15M-525 Super Deluxe M.S. Beam	15	5	11.6	24	55		24'	25'	17'	74	245		285.00
15M-532 Monarch O.S. Beam	15	5	13.4	24	53		24'	32'	19½'	95	310		365.00
20M-207CM Mini-beam	20	2	3.4	16	74		20'	6'8"	8½'	11	87	Inductively loaded, balun supplied.	68.00
20M-313HS Super Mini-Beam	20	3	7	24	63		27'	13'	15'	25	135	Hairpin Resonated, balun supplied.	90.00
20M-317B Deluxe M.S. Beam	20	3	8.5	28	60		36'	17'	22'	48	184	Hairpin Resonated, balun supplied.	159.00
20M-321B Super Deluxe W.S. Beam	20	3	9.5	28	59		36'	21'	23'	58	259	Hairpin Resonated, balun supplied.	195.00
20M-326B Super Deluxe O.S. Beam	20	3	10	28	58		36'	26'	24'	71	266	Hairpin Resonated, balun supplied.	235.00
20M-436 Super Deluxe O.S. Beam	20	4	11.5	28	53		36'	36'	26'	108	382	T-Match, coax-type balun supplied.	315.00
20M-536 Super Deluxe W.S. Beam	20	5	12	28	52		36'	36'	26'	113	432	T-Match, coax-type balun supplied.	385.00
20M-546 Monarch O.S. Trap-Beam	20	5	13	28	50		36'	46'	29'	150	448	T-Match, coax-type balun supplied.	595.00
20M-646 Monarch O.S. Trap-Beam	20	6	14	28	48		36'	46'	29'	176	533	T-Match, coax-type balun supplied.	688.00
40M-24 Super Mini Beam	40	2	3.4	16	77	1.2	46'	14'	24'	44	224	Inductively loaded, custom built to order.	265.00
40M-214 Deluxe M.S. Beam	40	2	5.6	16	66	3	64'	14'	34'	60	252	Custom built to order.	365.00
40M-329 Deluxe M.S. Beam	40	3	8.3	28	59	3	64'	29'	35'	110	406	Custom built to order.	515.00
40M-335 Super Deluxe W.S. Beam	40	3	8.7	28	58	4	64'	35'	36'	150	480	Custom built to order.	635.00
40M-346 Super Deluxe O.S. Beam	40	3	9.0	30	58		64'	46'	40'	177	427	Custom built to order.	785.00
DC-105 Duo Band Trap Beam	10,15	3	8.5	24	60		23'2"	12'	13½'	41	125	Single feedline, balun supplied.	225.00
DB-99D Duo Band Trap Beam	15,20	3	8.5	28	60		36'	18'	22'	49	184	Single feedline, balun supplied.	249.00
DB-30C Duo Band Trap Beam	15,20	3	10	28	59	3P	36'	26'	28'	85	300	Single feedline, balun supplied.	398.00
TC-88D Tri-Band Trap Beam	10,15,20	2	5.5 av.	14	72	1P	29'	8'	16½'	30	116	Single feedline, balun supplied.	149.00
TC-99D Tri-Band Trap Beam	10,15,20	3	8.5 av.	28	60	2P	36'	18'	22'	49	210	Single feedline, balun supplied.	249.00
TM-30C Tri-Band Trap Beam	10,15,20	4 3	10 av.	28	59	3P	36'	26'	28'	85	300	Single feedline, balun supplied.	398.00
ST-4BM/3 4-Band Trap Beam	10,15,20,40	4 3	8.2	23	63		58'	31'	35'	176	420	Single feedline, balun supplied	999.99
Inverted-V Kit Monoband	10 thru 80					1P						Any one band combination,balun supplied.	16.95
Inverted-V Kit Monoband	10 thru 80					2P						Any one band combination,balun supplied.	21.00
Inverted-V Kit Duo Band Trap	10 thru 80					1P						Any two band combination,balun supplied.	32.00
Inverted-V Kit Duo Band Trap	10 thru 80					2P						Any two band combination,balun supplied.	45.00
Inverted-V Kit Tri-Band Trap	10 thru 80					1P						Any three band combination-balun supplied	48.00
Inverted-V Kit Tri-Band Trap	10 thru 80					2P						Any three band combination-balun supplied	65.00
Inverted-V Kit Four Band Trap	10 thru 80					1P						Any four band combination-balun supplied.	64.00
Inverted-V Kit Four Band Trap	10 thru 80					2P						Any four band combination-balun supplied.	87.00
Inverted-V Kit Five Band Trap	10,15,20,40,80					1P						Balun supplied.	80.00
Inverted-V Kit Five Band Trap	10,15,20,40,80					2P						Balun supplied.	109.00
												Above Inverted-V Kits are supplied with copperweld wire, traps, & insulators.	

Model and Type	Band	No. El.	Gain (db)	Max. F/B	Beam W. (°)	Pwr. (Kw.)	Max. El. L.	Beam L.	Turn. Rad.	Wt. (lbs.)	Wind Load (lbs.)	Notes	Price
TH3 MK2 Thunderbird-3 Band-Trap (B)	10,15,20	3	8	25		2P	26'	14'2"		29	144		99.75
TH3 JR Thunderbird-3 Band-Trap (B)	10,15,20	3	8	25		.6P	26'	12'	14'9"	28			69.50
TH6 Thunderbird-3 Band-Trap (B)	10,15,20	6	8.5	25			32'	16'	17'10"	38	225		117.50
HD-1 Doublet F.S.						.5	16'					Supplied with	6.25
HD-1 Doublet F.S.	15					.5	22'					50'RG 58/U	6.25
HD-2 Doublet F.S.	20					.5	33'					center and	6.50
HD-3 Doublet F.S.	40					.5	65'					end	7.50
HD-4 Doublet F.S.	80					.5	125'					insulators.	8.95
3BDT Multi-Band Trap-Doublet	10,15,20					1P	33'						17.50
2BDT Multi-Band Trap-Doublet	40,80					1P	110½'						19.95
4BDT Multi-Band Trap-Doublet Fan Type	10,15,20,40					1P	68½'						24.50
5BDT Multi-Band Trap-Doublet Fan Type	10,15,20,40 80					1P	111½'						34.95
2BDP Multi-Band Trap-Doublet Fan Type	15,40,80					2P	131½'						19.95
248BDT Multi-Band Trap-Doublet Fan Type	20,40,80					.5	110'			2			22.50
12AVQ Vertical Trap	10,15,20					2P	13½'			9		with base insulator Requires	21.95
14AVQ Vertical Trap, Linear Decoupling	10,15,20,40					2P	21'			11		L680Q coil for 80M. requires short radials.	29.95
18V-Vertical, Base loaded	10 thru 80						18'	Retracts to 5'		o 5'		With base insulator. Requires short radials.	16.95
18HT-Hy-Tower Vertical, Linear Decoupled	10,15,20,40, 80	No Guys-Self Supporting				5P	50'			100	503	Requires 6'	139.50
18JR-Hy-Tower Vertical, Linear Decoupled	10,15,20,40, 80	No Guys-Self Supporting				2P	38'			30		Grounding Rod	79.95
HH2BA Mobile Halo (B)	2									1½		Center Mounted	5.95
HH6BA Mobile Halo (B)	6											Center Mounted	10.95
HH6BK Mobile Halo (B)	6											HH6BA with HMBA Mast BPRS steel strap, bumper mount.	16.50
TL10 Mobile Topper	10					.3P						Top loaded	7.95
TL15 Mobile Topper	15					.3P						whip for use	7.95
TL20 Mobile Topper	20					.3P						with foldover	7.95
TL40 Mobile Topper	40					.3P						mast-has	9.95
TL75 Mobile Topper	75					.3P						quick-disconnect fitting.	11.95
TM-36												36" Foldover Mast for above Toppers, Bumper or Cowl Mount, with quick-disconnect fitting.	7.95
Mosley-Carloma Corp., 4610 Lindberg Blvd., Bridgeton, Missouri													
A-92-S Beam-VHF Scotchmaster	2	9	14	20		2P	3'5"	12'	6½"	4	25	300 ohm feedline (Folded dipole radiator).	16.40
A-56-S Beam-VHF Scotchmaster G	6	5	10	20		2P	118"	12'	7'9"	7½	25		28.16
A-76-S Beam-VHF Scotchmaster G	6	7	12	20		2P	118"	22'	13'	12½	50		35.10
A-310 One Band-Power Master Beam	10	3	8	25		2P	18'7"	12'	11'1"	25	69	F.S.	41.36
A-315 One Band-Power Master Beam	15	3	8	25		2P	23'4"	12'	13'2"	26	87	F.S.	46.87
A-203C One Band-Power Master Beam G	20	3	8	24		2P	37'	24'	22'	40	140		113.95
TA-32 Three Band-Trapmaster Trap Beam	10,15,20	2	5	20		2P	28'	7'	14'6"	26	74		72.98
TA-32JR Three Band-Trapmaster Trap Beam	10,15,20	2	5	20		1P	26'8"	6'	13'9"	22	62		51.98
TA-33 Three Band-Trapmaster Trap Beam	10,15,20	3	8	20		2P	28'	14'	15½'	40	114		104.75
TA-33JR Three Band-Trapmaster Trap Beam	10,15,20	3	8	20		1P	26'8"	12'	14'9"	20	86		72.98
TA-3340 Four Band-Trapmaster Trap Beam	10,15,20 40	3	8			2P	38'7"		19'6"	50			147.35
TA-36 Three Band-Trapmaster Trap Beam	10,15,20	4 3	9 8	20		2P	29'	24'	19'3"	69	210		132.10
TA-20-40 Two Band-Trapmaster Trap Beam	20 40	3 2	8 5			2P	54'8"	20'	29'	150	405	Has tilting head.	354.39
S-402 Signal Master (center loaded)	40	2	5	20		2P	44'3"	20'	24'4"	58	200		130.73
TA-31-Rigid Rotable Trap Dipole, 3 Band	10,15,20	1				2P	23'11"			11	40		27.14
TA-31JR Rigid Rotable Trap Dipole, 3 Band	10 15,20	1				1P	24'7"			9	30		23.85
TD-2 Wire Trap Dipole, 2 Band	40-80					2P	114'11"			7		Supplied with wire, traps & insulators	39.42
TD-3JR Wire Trap Dipole, 4 Band	10,15,20, 40					1P	60'			1¾		Supplied with wire, traps & insulators	15.23
V-3 Vertical Trap 3 Band	10,15,20					2P	11'6"			4		Requires short radials-supplied with plastic guy	24.10
V-3JR Vertical Trap 3 Band	10,15,20					1P	11'9"			2		rope, base & coax fitting	18.85
V-4-6 Vertical Trap 4 Band	10,15,20 40					2P	20'			10		Requires 4-33' Radials.	28.50
V-4-8 Vertical Trap, 2 Band	40,80					2P	52'3"					Requires 12 radials 64' — supplied with plastic guy	89.25
V-5 Vertical Trap, 5 Band	10,15,20 40,80					2P	43'8"					rope, base & coax fitting.	124.43
RV-4 Vertical Trap, 4 Band	10,15,20 40					2P	20'9"			10		No radials required with good ground.	30.42
TW-3X El Toro-Transmission-Line type Multi-band antenna 3-bands	20,40,80					2P	58'			2		For vertical, angle	19.95
TW-3XJR El Toro-Transmission-Line type Multi-band antenna 3-bands	20,40,80					1P	58'			2		or L-mounting —	14.95
NS-3 El Toro-Transmission-Line type Multi-band antenna 3-bands	Novice 15,40,80					1P	58'			2		must be suspended.	14.95
MA-3 Mobile Trap	10,15,20					1P	7'8"					May be used with 40-80 M base loading coil.	22.00
TT-31 Portable Tote-Tenna	10,15,20 40	Window Sill Mtg.				1P	14'					With L-tuning network-retracts to 36".	88.20
TT-31A Carrying Case for TT-31													30.26
R1-6 S.W.R. Bridge for TT-31													52.54
TT-31X — TT31 Tote-Tenna with carrying case & S.W.R. Bridge													164.84
New-Tronics Corp., 3455 Vega Ave., Cleveland, Ohio 44113													
Coveya 6-Beam G	6	4	10	25		1	59"	34"	55"	8½		Similar to Corner Reflector.	39.90
Cliff Dweller-Remotely tuned dipole	10,40					1	28½'		14'3"	20		Rotatable, end loaded.	92.50
Cliff Dweller-Remotely tuned dipole	10,80					1	30½'		15'3"	20		Rotatable, end loaded.	99.50
Cliff Dweller-Remotely tuned dipole	10,40,80					1	31'4"		15'8"	24		Rotatable, end loaded	129.50
HF-62 Mobile-Top loaded	2 & 6					1	44"					Tunable with upper & lower sections adjustable.	10.44
HF-2 Mobile - Top loaded	2 & 6					1	44"					Tunable with upper & lower sections adjustable.	8.64

[*Continued on page 96*]

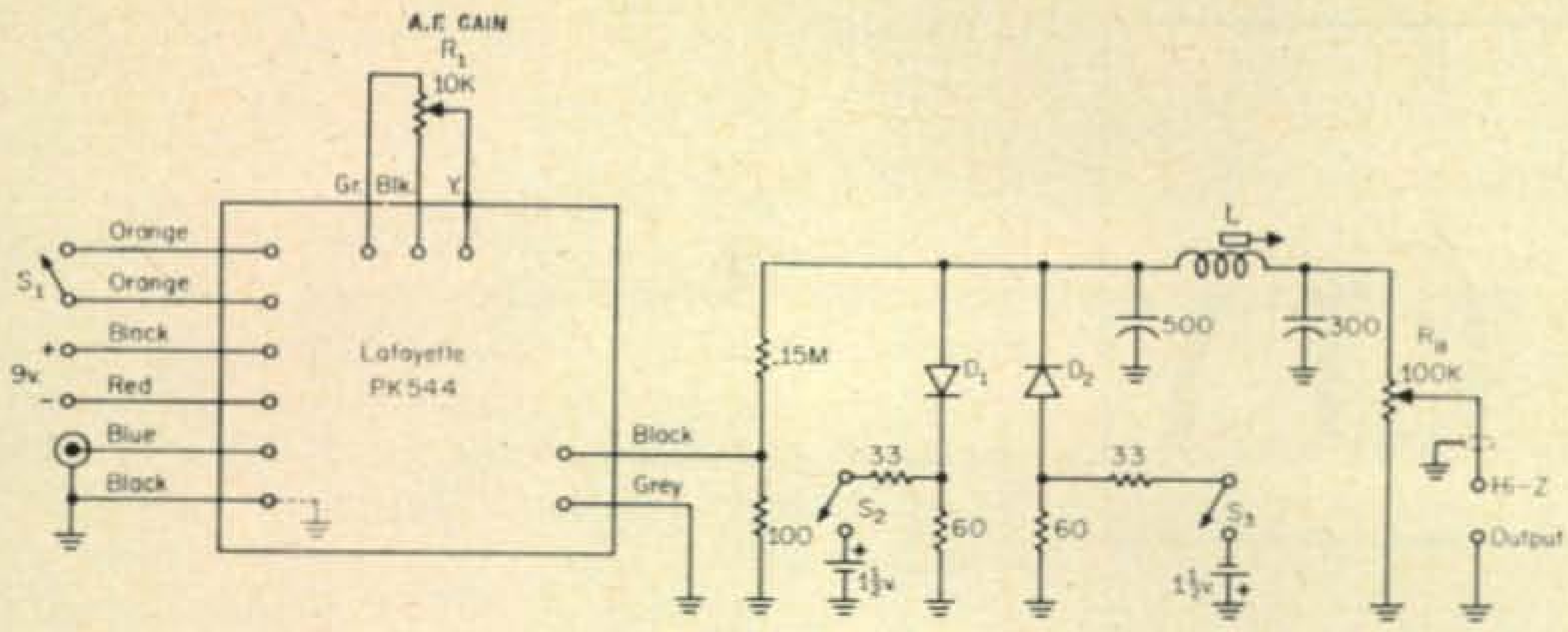

Fig. 2—A clipper using a packaged amplifier. "L" is a 20 Henry adjustable inductor. D_1 and D_2 are germanium diodes. The output of the unit must go to Hi-Z input of 500K or more. The wires of the amplifier are color coded for easy identification.

Isaacs of Lafayette for allowing us to use the info printed here.

It is suggested that the output elements be installed in a shielded case. As K6AI suggests, "the simplest way to adjust the clipper is as follows: (1) connect mike to input jack, (2) connect an oscilloscope or an a.c. v.t.v.m. to the output terminals to read output voltage, (3) close switch S_1-S_2 and S_3, (4) set R_8 for maximum output, (5) set R_1 so that the faintest whistle into the mike gives output voltage of approximately 1 volt. Note that a loud whistle then produces the same output voltage. R_1 now needs no further adjustment, (6) connect the output terminals to the input of the main amplifier in the transmitter, and, with the main amplifier gain control set to its normal position for 100% modulation of the transmitter, set R_8 for 100% modulation without overload distortion."

Thirty

We are now beginning our 8th year piloting HAM CLINIC through the pages of *CQ*. We are indeed happy that we have been able to help so many hams the world over. At times the going has been rough. Ever try to write for 7 years without repeating yourself?

We enjoyed our visit to the U.S. so much and enjoyed working so many of you on all the h.f. bands. At this point we would like to express our appreciation to Ted Henry of Henry Radio in Los Angeles for helping us out equipment-wise. His whole staff, especially his technicians were indeed helpful to us. Ted proved to us that he really does give *personal* service. We also want to thank W6VZS and WB6HTG who also helped us among others.

Being a ham anywhere is truly great! We now hope our Department of State will "get cracking" and implement the reciprocal law PL 88-313—they seem to be the only ones holding it up—other countries are waiting. 72, 73 and 75 Chuck & Elfriede.

Antennas [*from page 55*]

V-shaped radiator with three similar reflectors functioning like a corner reflector. Gamma match is used. Its appearance is like that of a TV antenna, so it is not apt to arouse the suspicions of neighbors!

Skylane Products, 406 Bon Air Ave., Temple Terrace, Florida: Features two and three element Quads which are precut and pre-tuned with rugged all-weather aluminum construction. Supplied with imported bamboo (waterproofing recommended) or with fiberglass spreaders. Boom is seamless tubing 1¼" dia., .046" wall. Slide-fit hardwood dowel extends inside entire length of boom for added strength. End spiders are 24" diameter high-strength aluminum alloy and are webbed and drilled. Mast casting is 24" long webbed aluminum alloy and is fastened to boom with U-bolts and saddles. Quad wires are #14 soft-drawn enameled wire. Reflector coils for each band are #14 enameled wire wound on non-hygroscopic tubing. Type 83-1R coax connector is mounted on plexiglass plate with lugs for easy soldering.

Telrex Laboratories, Asbury Park, N. J. 07712: Features arrays of "educated aluminum." They are engineered for optimum performance and are constructed using aluminum dural, micarta insulation, stainless steel hardware and heavy-duty cadmium-plated steel gusset-plate mount. Booms are 2" diameter. Except as noted, beams are hairpin-resonated and matched while baluns are supplied with *all* antennas for obtaining best balance, symmetry and efficiency. Most of the arrays are single band full-size, except a few multi-band models which employ traps using high-voltage high-*Q* ceramic capacitors and which are permanently weathersealed with seven coats of 3-M epoxy. Single and multi-band trap inverted-V antenna kits also are available. The 6-meter Spiral Ray is circularly polarized for optimum performance with any type propagation. Based on the premise that a beam optimized for a single band performs better than a multi-band one, the Telrex Tri-Band "Xmas Tree" is made up of separate beams each stacked above one another. Two beams for a single band are often stacked for additional gain. Bandwidth s.w.r. curves and beamwidth patterns are furnished with all beams. Mounting accessories, stacking harnesses for v.h.f. beams, broadband baluns, heavy-duty masting and rotators are available.

Unadilla Radiation Products, Unadilla, N.Y.: Features a two-element tri-band low-cost Quad which is pretuned using #14-gauge 7-strand copper wire and pre-cut air-wound high-*Q* coils in the reflectors. Spreaders are eight selected heavy-walled Korean-bamboo poles at least 1" diameter at the butt. End spiders are high-strength webbed aluminum to accommodate an eight-foot boom made of 2" diameter seamless tempered-aluminum tubing. Spreaders are fastened to the spiders by stainless steel-strap compression clamps, thereby eliminating holes which might otherwise weaken the spiders. Mounting plate for the boom is heavy dural plate drilled to accommodate boom-mounting clamps, U-bolts and saddles.

At one-quarter wavelength height, the angle of maximum radiation for the main lobe of the Quad is specified as 40 degrees compared to 90 degrees for a dipole, with the angle dropping to 16 degrees at ⅞ wavelength height.

Waters Manufacturing, Inc., Wayland, Mass.: The Waters Auto-Match is a fold-over type mobile antenna employing "top-center" loading for maximum radiating efficiency. Resonance is obtained with an adjustable radiator tip which is made of tapered drawn 17-7 PH stainless steel. The coils are interchangeable, so only a coil change is needed when bands are switched. They are molded in low-loss Epoxy and are completely sealed against moisture and water seepage. The high-Q coils also will handle 500 watts and at resonance present an "Auto-Match" of 50 ohms for coax feedline. The lower part of the foldover mast is made of 6061 ST6 aircraft aluminum tubing with stainless-steel mounting stud welded in standard base-mount thread.

in *Modern Electrics* for August, 1913: "A little Honolulu girl has the honor of being the first girl to pass the federal wireless examinations, which qualifies her to take a position as an operator for the government. The girl's name is Mary Ann Nobriga, and she is only 14 years old. Her complete outfit for sending and receiving is as follows: One loose coupler, double slide tuner used as a loading coil, one variable condenser, 2000 ohms receiver, galena detector, one fixed condenser, 1½ inch spark coil, one brass spark gap, six dry batteries. Her aerial consists of four No. 14 copper wires, spaced two feet apart, 60 ft. long and 55 ft. high."

Several other YLs also claimed to be "first licensed" (under the 1912 Law), as written up in the Dec. '60 YL Column. No calls were given for any of the above-mentioned gals.

33, W5RZJ

RTTY [*from page 89*]

Comments

In several past RTTY Columns we have suggested that you ask your Division Director, "Why doesn't W1AW put out the official ARRL bulletins on RTTY?" We further suggested that you, as an RTTYer, acquaint your Director, Vice-Director, and SCM, with a simple explanation of how this would *tremendously* increase the effectiveness of the OBS system. Well, already the letters have started to come in; actually copies of letters to various Directors. Have you written *yours* yet?

Would you like to see a picture of your RTTY ham shack in *CQ?* Very simple; just send us a glossy print, any size.

73, Byron, W2JTP

LETTERS [*from page 12*]

biased, so it shorts (not permanently). A voltmeter will then show plus 300 volts on the h.v. line and a few volts negative on the l.v. line. The l.v. electrolytic will not be damaged unless there is a load on the h.v. line, because current through it is limited by the h.v. bleeder.

I found this out the hard way several years ago when I built a similar supply for a small 10-meter rig. It took a bit of head-scratching to figure out what was happening. One way out is to use a double-pole switch or delay and break both h.v. and l.v. outputs. Another way is to replace the 5U4 with more silicons and control the supply in the primary.

Craig Allen, WB6IAQ, ex-W9IHT
1985 Alameda Terrace
San Diego, California 92103

S.W.L.'s Are Appreciated

Editor, *CQ:*

As a loyal subscriber to *CQ* for the past two years, and one who spends from two to three hours daily and nightly s.w.l.'ing on 10-meters to 80-meters a.m. and s.s.b., I have come to the conclusion that: 1. You have not given very much thought to the possibilities of s.w.l. recognition; 2. Insufficient numbers of licensed General ticket holders have any respect for s.w.l.'ers; 3. Those General ticket holders who recognize the friendship and assistance we s.w.l.'ers can give them are in the minority, and wouldn't stand a chance of being heard if they attempted to speak in our favor.

Much to my pride, I have many written expressions of appreciation for my assistance via long-line to two and three letter ticket holders. I have never been, and never will be a "QSL Hound," and have never requested a QSL card. Those I have received (from all over the world) have been sent to me for favors done with no anticipated recognition anticipated. Many letters of appreciation—in lieu of cards—have been more eloquent than any QSL card could have been.

As in my particular case, there may be many other s.w.l.'ers who have good reasons why they probably won't become licensed operators. Sensing the relative importance of XYL's—YL's in your publication, cannot there be a recognition of s.w.l.'s in your publication?

Norman D. Roberts
2480 16th N.W. #417
Washington, D.C.

ANTENNAS [*from page 59*]

Model and Type	Band	No. El.	Gain (db)	Max. F/B	Beam W. (°)	Pwr. (Kw.)	Max. El. L.	Boom L.	Turn. Rad.	Wt. (lbs.)	Wind Load (lbs.)	Notes	Price
Skylane Products, 406 Bon Air Ave., Temple Terrace, Florida													
Quad, 3-Band	10,15,20	2	8	25	75	2P	17'6"	8'	9'10"	28		Height 17'6" Bamboo Spreaders.	59.95
Quad, 3-Band	10,15,20	2	8	25	75	2P	17'6"	8'	9'10"	28		Height 17'6" Fiberglass Spreaders.	99.95
Quad, 3-Band	10,15,20	3	10	30	60	2P	17'6"	12'	10'8"	40		Height 17'6" Bamboo Spreaders.	99.95
Quad, 3-Band	10,15,20	3	10	30	60	2P	17'6"	12'	10'8"	40		Height 17'6" Fiberglass Spreaders.	149.95
Unadilla Radiations Labs., Unadilla, N.Y.													
W2AU-Quad, 3-Band	10,15,20	2	8	30	60	2P	17'	8'	9'11"	30		Height 17'-Korean-Bamboo Spreaders A single or separate feedlines may be used.	44.95
Waters Manufacturing, Inc., Wayland, Mass													
Auto-Match, Mobile Antenna													
370-1 Fold-over Mount													
370-2 Radiator Tip													12.95
370-10 Coil	10					.5							9.95
370-11 Coil	11					.5						Top-center	11.95
370-15 Coil	15					.5						loading	12.75
370-20 Coil	20					.5						50-ohms	13.45
370-40 Coil	40					.5						Approximate Overall	14.95
370-75 Coil	75					.5						length-8ft.	15.95

Legend

Unless otherwise noted, antennas are designed for use with 50-ohm transmission lines. Accessories such as stacking harnesses, special mounting components, baluns, etc. are not listed, but are available from most of the manufacturers. Abbreviations: B = Beta Match, F.S. = Full Size, G = Gamma Match, M.S. = Medium Spaced, O.S. = Optimum Spaced, P = P.E.P., W.S. = Wide Spaced. Beamwith is at ½ power points. Windload is rated at 100 m.p.h.