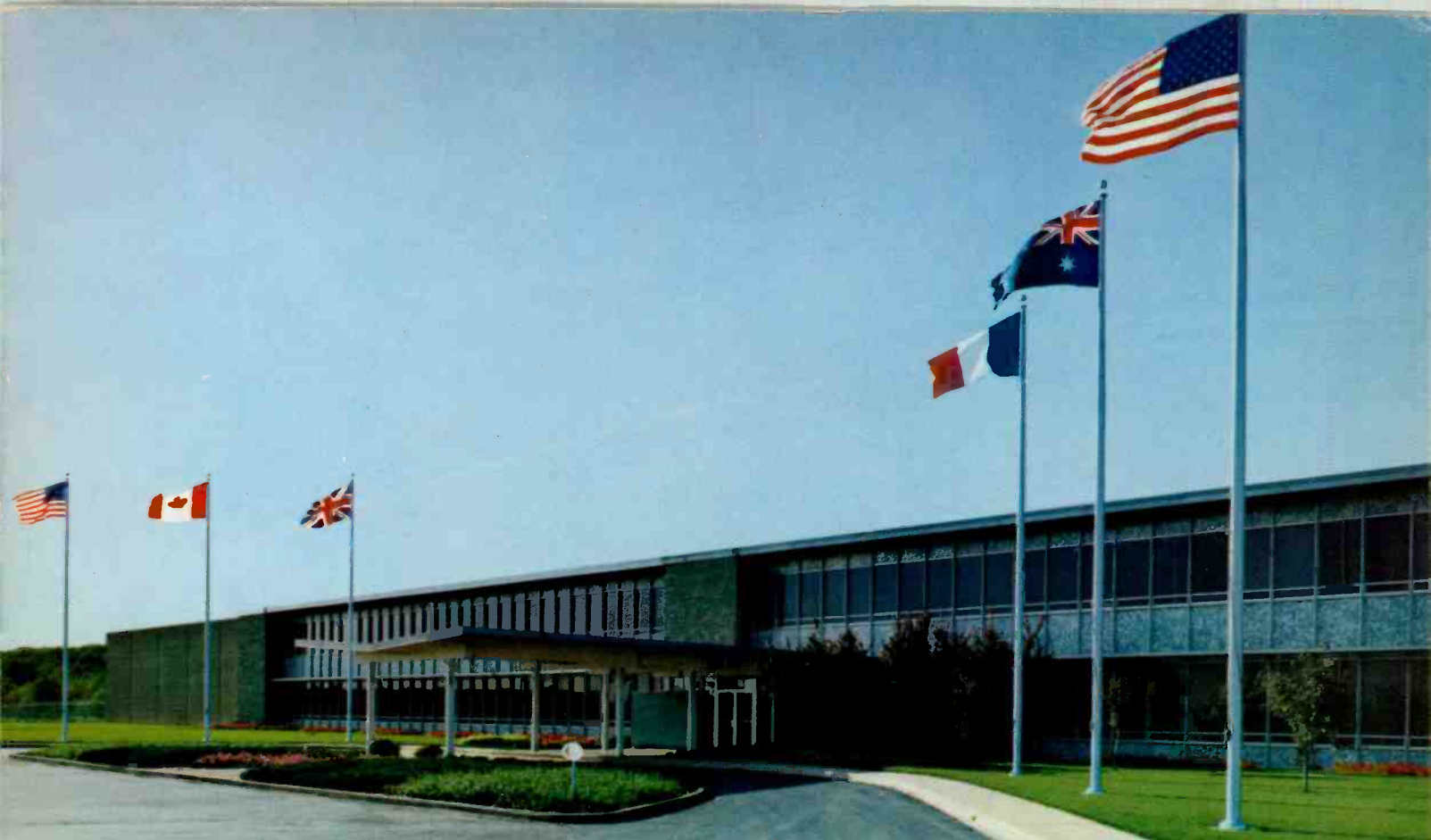


ANDREW

catalog 26
antennas/transmission lines



ORLAND PARK, ILLINOIS

SALES OFFICES AND PLANTS

CHICAGO*

Andrew Corporation
10500 W. 153rd St.
Orland Park, Illinois, U.S.A. 60462
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Cable: WERDNA, Chicago

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Andrew Corporation
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Rockville, Maryland, U.S.A. 20850
Phone: (301) 762-1900, Telex: 8-9688

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Andrew Corporation
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451 E. 58th Avenue
Denver, Colorado, U.S.A. 80216
Phone: (303) 222-1579, Telex: 45-732

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Andrew Corporation
P. O. Box 938
Richardson, Texas, U.S.A. 75080
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Andrew California Corporation
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Phone: (714) 986-1121, Telex: 67-4377

Andrew California Corporation (Plant only)
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Phone: (714) 626-3505, Telex: 67-0426

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Whitby, Ontario, Canada
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St. Lambert, Quebec, Canada
Phone: (514) 672-5833, Telex: 01-26467

VANCOUVER

Andrew Antenna Company Ltd.
422 - 6th Street
New Westminster, B.C., Canada
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EDINBURGH*

Andrew Antenna Systems
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Andrew Antennas Division of Andrew Corporation
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Phone: 460-1544, 46-4178, Telex: 30840
Cable: ANDANT, Melbourne

Andrew is a highly specialized company, concentrating on antennas, RF transmission lines, and related items comprising an antenna system. Our chosen field of specialization is narrow, but we cover it in depth.

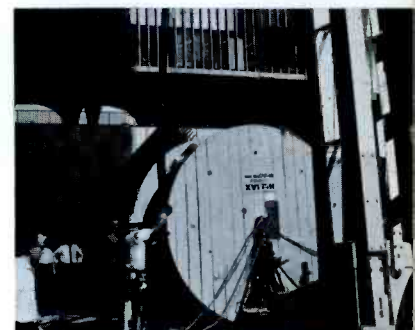
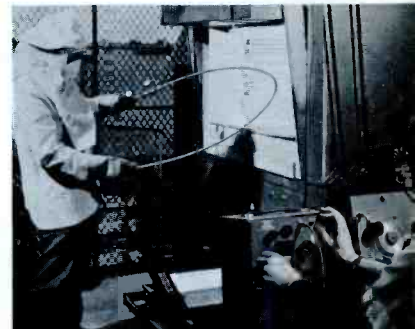
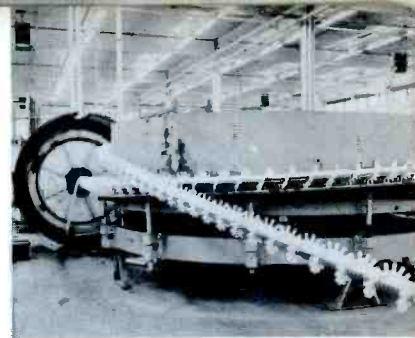
Although we serve a technically dynamic industry, we know that nobody wants an experimental model of an antenna, coaxial cable, or waveguide. These are hardware items. They must perform their functions effectively and reliably, and with modest skill requirements for installation. That is why, when you order from Andrew, you get equipment that has been thoroughly debugged, and which fulfills the performance claims stated in this catalog.

Most of this catalog is devoted to our standard product line of antennas, cables, waveguides, and related items. Not described, but playing a vital role in the historic growth of Andrew, is our proficiency in performing special contracts in the antenna systems field.

The resources we can bring to bear on such programs—including system and product engineering, program management, manufacturing, quality control, contract administration, finance, and field service—are evenly balanced for effective contract performance, and in their totality represent a combination of skills and capabilities that is unique in the electronics industry.

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MICROWAVE ANTENNAS



INTRODUCTION

Since 1948, Andrew microwave antennas, radomes and accessories have been used by leading radio relay companies in thousands of installations throughout the world. EIA, FCC, DOT and PTT requirements have been met or exceeded.

Andrew manufactures microwave antennas from 0.4 to 18.0 GHz at four plant locations in Australia, Canada, Scotland, and the United States. Eight fully equipped pattern ranges provide a means for reliable test procedures. Production VSWR sweep testing of each feed assures the purchaser of guaranteed performance for every antenna.

Andrew antennas described in this catalog section fall into three types. Standard parabolic antennas offer a reliable product for economical, medium density, moderate length systems. Low VSWR antennas use the same parabolic reflectors but include specially tuned low VSWR feeds to minimize echo distortion noise contribution. High performance antennas include both the low VSWR feeds and high directivity shields to meet long haul CCIR and trans-continental common carrier transmission objectives with full channel expansion. The shielded antennas are useful in congested areas for proper interference coordination.

GUARANTEED ELECTRICAL CHARACTERISTICS.

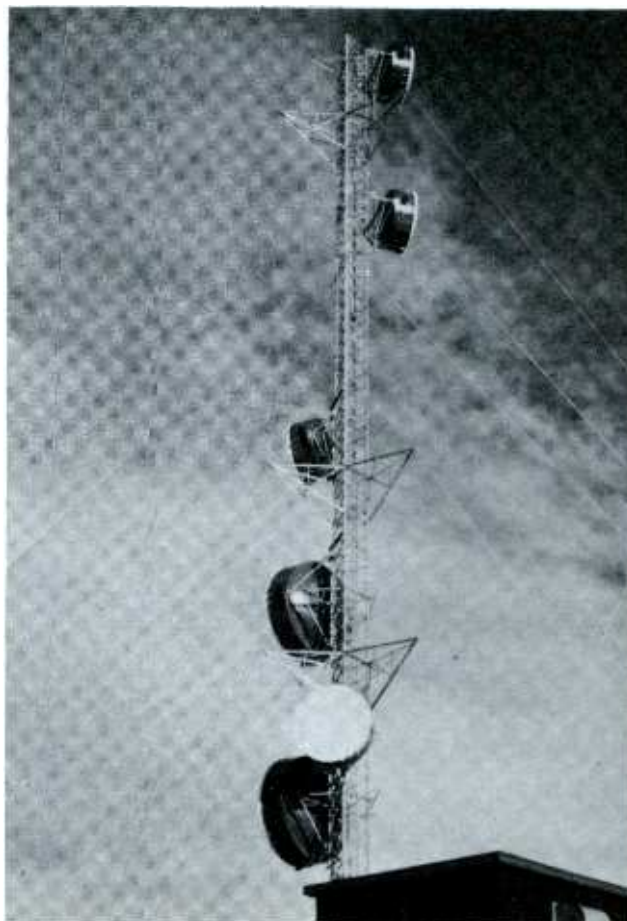
The following terms are used to describe the guaranteed characteristics of Andrew antennas.

Frequency refers to the operating frequency band. These bands correspond to CCIR recommendations or common allocations used in the United States or Canada. It is usually practical to tune antenna feeds for slightly different frequency ranges while retaining the same electrical characteristics. Should your requirements cover other ranges, they can be accommodated on special order.

Gain is given in dBi (decibels over an isotropic radiator) at three frequencies: bottom of band, mid-band and top of band.

Front-to-Back Ratio in decibels denotes highest radiation relative to the main beam at $180^\circ \pm 5^\circ$, across the band. For high performance shielded antennas, the ratio refers to the region $180^\circ \pm 80^\circ$.

VSWR, maximum, is the peak value over the entire operating band. For the conversion table of VSWR versus return loss and reflection coefficient, see page 18.



Half Power Beamwidth is the width of the main beam to the -3 dB points on either side and may be found from the graph on page 18 using the antenna gain.

Cross Polarization Discrimination exceeds 25 dB for all antennas listed.

Isolation. All dual polarized designs feature isolation between inputs of at least 35 dB, unless otherwise noted.

Pressurization. All feeds are pressure tight to 10 psig, unless otherwise noted.

Input Flange types per U.S. EIA or MIL standards are stated for each antenna series. A table of waveguide and flange nomenclature listing IEC standards is shown on page 27. Special flange types are available on special order.

Radiation Pattern Envelopes for all antennas listed are on file with the U.S. FCC, Canadian DOT and microwave radio equipment manufacturers. These are available on request to assist in your system planning. See Page 19 for more information.

The radiation pattern envelope, or RPE is generated by measuring radiation patterns of each antenna type at the low end, middle and high end of the operating band. These patterns are folded around the main beam and superimposed on a common grid. The "Typical" RPE is drawn as the smooth pattern near which most patterns fall. The "Guaranteed" RPE is drawn as the smooth pattern below which all measured patterns fall.

Your application may be served by catalog designs or modifications thereof. Andrew sales engineers will be pleased to review your specific requirements.

450 AND 890 MHz MICROWAVE ANTENNAS

Plane polarized.

Coaxial dipole primary radiators.

Continuous polarization adjustment.

7/8" EIA 50 ohm flange input.

Antenna mounts are listed on pages 11-13.

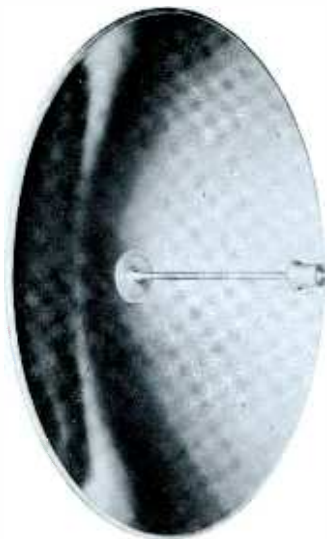
7/8" and 1-5/8" HELIAX coaxial cable feed lines are shown on pages 64-67.



GUARANTEED ELECTRICAL CHARACTERISTICS

Frequency MHz	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
450-470	P6-4	6	15.2	15.5	15.8	20	1.3
	P10-4	10	19.9	20.2	20.5	25	1.3
890-960	P4-9	4	18.6	19.0	19.4	27	1.3
	P6-9	6	21.6	22.0	22.4	30	1.3
	P10-9	10	26.4	26.8	27.2	37	1.3

2 GHz MICROWAVE ANTENNAS



Plane
Polarized

Plane Polarized—Standard and Low VSWR

Broadband coaxial horn radiator.
7/8" EIA 50 ohm input flange.
Continuous polarization adjustment.
Pressure tight to 5 psig.
Average power rating, 100 watts.

Dual Polarized—Low VSWR

7/8" EIA 50 ohm input flanges.
Other Frequency bands available.

Accessories And Feed Lines

Radomes are listed on page 10.
Antenna mounts are listed on pages 11-13.

7/8" and 1-5/8" HELIAX coaxial cable and fittings
are listed on pages 64-67.
Type EW17 HELIAX elliptical waveguide and fittings
are described on pages 22-29.

GUARANTEED ELECTRICAL CHARACTERISTICS

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
1.7 - 1.85 Plane Polarized	P4-17	4	23.8	24.2	24.6	29	1.3
	P6-17	6	27.6	28.0	28.4	35	1.3
	P10-17A	10	31.9	32.3	32.7	43	1.1
1.85 - 2.11 Plane Polarized	P4-18	4	24.8	25.4	26.0	31	1.3
	P6-18	6	28.4	29.0	29.6	36	1.3
	P10-18A	10	32.8	33.4	34.0	44	1.1
2.11 - 2.3 Plane Polarized	P4-21	4	26.1	26.5	26.9	34	1.3
	P6-21	6	29.6	30.0	30.4	36	1.3
	P10-21	10	34.1	34.5	34.9	45	1.1
1.7 - 2.1 Plane Polarized Low VSWR	PL6-17	6	27.6	28.5	29.4	35	1.10
	PL8-17	8	30.1	31.0	31.9	38	1.06
	PL10-17	10	32.1	33.0	33.9	43	1.06
	PL12-17	12	33.6	34.5	35.4	44	1.06
	KL15-17	15	35.5	36.4	37.3	46	1.06
1.9 - 2.3 Plane Polarized Low VSWR	PL6-19	6	28.4	29.3	30.2	36	1.10
	PL8-19	8	30.9	31.8	32.7	39	1.06
	PL10-19	10	32.8	33.7	34.6	44	1.06
	PL12-19	12	34.4	35.3	36.2	47	1.06
	KL15-19	15	36.3	37.2	38.1	49	1.06
1.9 - 2.3 Dual Polarized Low VSWR	70749	10	32.9	33.7	34.5	43	1.08
	70750	12	34.5	35.3	36.1	44	1.08
	70751	15	36.3	37.1	37.9	46	1.08
2.45 - 2.7 Plane Polarized	P4-24	4	27.3	27.7	28.1	34	1.3
	P6-24	6	30.8	31.2	31.6	38	1.3
	P10-24	10	35.4	35.8	36.2	42	1.2

4 AND 5 GHz MICROWAVE ANTENNAS

3.7 - 4.2 GHz Common Carrier Antennas

WR229 Waveguide Feeds.

CPR229G input flanges.

Plane polarized feeds have continuous polarization adjustment.

Pressure tight to 5 psig.

3.55-4.2 GHz available on special order

Type EWP-37 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

4.4 - 5.0 GHz Government Band Antennas

WR187 Waveguide Feeds (RG-49/U).

UG-148C/U input flanges.

Plane polarized feeds have continuous polarization adjustment.

Pressure tight to 8 psig.

Type EW-44 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

Accessories

12 Foot antennas, all low VSWR and all dual polarized antennas include feed guy kits when required. All other antennas require feed guy kits when tower mounted, see page 9.

Radomes are listed on page 10.

Antenna mounts are listed on pages 11-13.



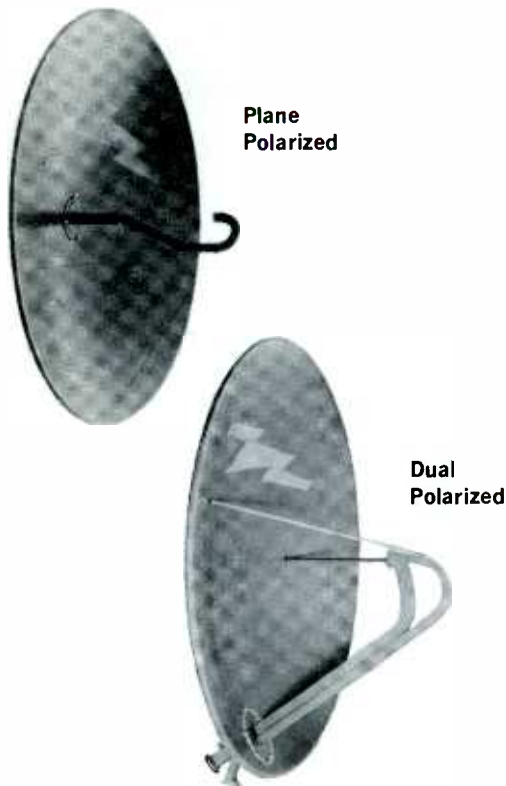
GUARANTEED ELECTRICAL CHARACTERISTICS 3.7 - 4.2 GHz

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
3.7 - 4.2 Plane Polarized Low VSWR	PL6-37	6	34.5	35.0	35.5	40	1.07
	PL8-37	8	36.8	37.3	37.8	41	1.05
	PL10-37	10	38.8	39.3	39.8	45	1.05
	PL12-37	12	40.3	40.8	41.3	48	1.05
3.7 - 4.2 Dual Polarized Low VSWR	PXL8-37	8	36.7	37.2	37.7	44	1.06
	PXL10-37	10	38.7	39.2	39.7	45	1.06
	PXL12-37	12	40.2	40.7	41.2	48	1.06

GUARANTEED ELECTRICAL CHARACTERISTICS 4.4 - 5.0 GHz

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
4.4 - 5.0 Plane Polarized	P4-44	4	32.3	32.8	33.3	40	1.10
	P6-44	6	35.8	36.3	36.8	42	1.10
	P8-44	8	38.3	38.8	39.3	44	1.10
	P10-44	10	40.2	40.7	41.2	46	1.10
4.4 - 5.0 Dual Polarized	PX6-44	6	35.7	36.2	36.7	42	1.10
	PX8-44	8	38.2	38.7	39.2	44	1.10
	PX10-44	10	40.1	40.6	41.1	46	1.10

6 GHz MICROWAVE ANTENNAS



5.925—6.425 GHz Low VSWR

WR159 Waveguide feeds, CPR159G Flanges.

Plane polarized feeds have continuous polarization adjustment.

Type EW56 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

5.925—6.425 And 6.575—7.125 GHz

WR137 Waveguide feeds, UG343B/U Flanges.

Plane polarized feeds have continuous polarization adjustment.

Type EW59 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

Accessories

All 12 and 15 foot antennas, all low VSWR, and all dual polarized antennas include feed guy kits when required. All other antennas require feed guy kits when tower mounted, see page 9.

Radomes are listed on page 10.

Antenna Mounts are listed on pages 11-13.

GUARANTEED ELECTRICAL CHARACTERISTICS

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
5.925-6.425 Plane Polarized Low VSWR	PL6A-59	6	38.3	38.7	39.1	45	1.06
	PL8A-59	8	40.7	41.1	41.5	47	1.04
	PL10A-59	10	42.6	43.0	43.4	52	1.04
	PL12A-59	12	44.2	44.6	45.0	52	1.04
	KL15A-59	15	45.6	46.0	46.4	52	1.04
5.925-6.425 Dual Polarized Low VSWR	PXL6A-59	6	38.2	38.6	39.0	45	1.07
	PXL8A-59	8	40.6	41.0	41.4	47	1.06
	PXL10A-59	10	42.5	42.9	43.3	48	1.06
	PXL12A-59	12	44.1	44.5	44.9	49	1.06
5.925-6.425 Plane Polarized	P4-59	4	34.8	35.2	35.6	40	1.10
	P6-59	6	38.3	38.7	39.1	45	1.10
	P8-59	8	40.7	41.1	41.5	47	1.10
	P10-59	10	42.6	43.0	43.4	49	1.10
	P12-59	12	44.2	44.6	45.0	52	1.10
5.925-6.425 Dual Polarized	PX6-59	6	38.2	38.6	39.0	45	1.10
	PX8-59	8	40.6	41.0	41.4	47	1.10
	PX10-59	10	42.5	42.9	43.3	48	1.10
6.575-7.125 Plane Polarized	P4-65	4	35.6	36.0	36.4	41	1.10
	P6-65	6	39.1	39.5	39.9	47	1.10
	P8-65	8	41.6	42.0	42.4	48	1.10
	P10-65	10	43.6	44.0	44.4	50	1.10
	P12-65	12	45.2	45.6	46.0	52	1.10
6.575-7.125 Dual Polarized	PX4-65	4	35.5	35.9	36.3	40	1.10
	PX6-65	6	39.0	39.4	39.8	47	1.10
	PX8-65	8	41.5	41.9	42.3	47	1.10
	PX10-65	10	43.5	43.9	44.3	48	1.10

7 and 8 GHz MICROWAVE ANTENNAS

7.125-8.400 GHz Plane and Dual Polarized

WR112 Waveguide feeds.

UG-52/U Input flanges.

Plane polarized feeds have continuous polarization adjustment.

Type EW71 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

7.125-7.750 GHz Low VSWR

WR112 Waveguide feeds.

CPR112G Input flanges.

Plane polarized feeds have continuous polarization adjustment.

Type EWP71 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

Accessories

All low VSWR and all dual polarized antennas include feed guy kits when required. All other require feed guy kits when tower mounted, see page 9.

Radomes are listed on page 10.

Antenna mounts are listed on pages 11-13.



Dual Polarized Antenna

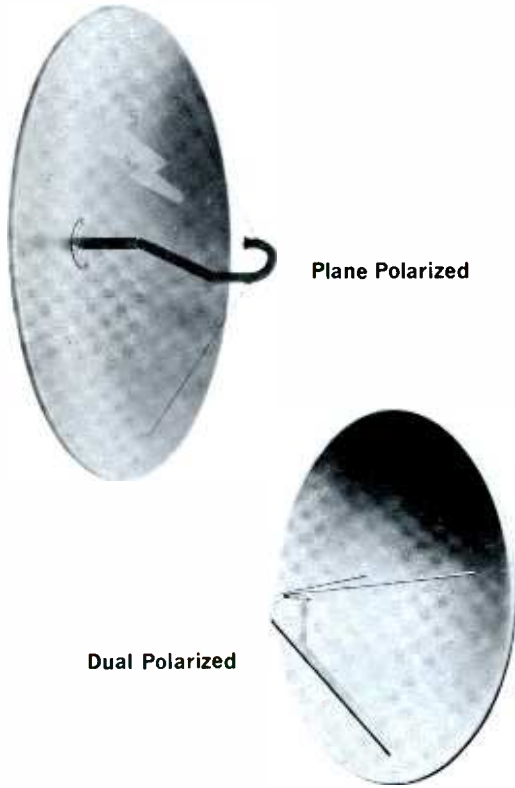


Plane Polarized Feed

GUARANTEED ELECTRICAL CHARACTERISTICS

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
7.125 - 8.400 Plane Polarized	P4-71G	4	36.5	37.1	37.7	41	1.10
	P6-71G	6	40.0	40.6	41.2	47	1.10
	P8-71G	8	42.5	43.1	43.7	50	1.10
	P10-71G	10	44.5	45.1	45.7	50	1.10
	P12-71G	12	46.0	46.6	47.2	51	1.10
7.125 - 8.400 Dual Polarized	PX4-71G	4	36.4	37.0	37.6	41	1.10
	PX6-71G	6	39.9	40.5	41.1	47	1.10
	PX8-71G	8	42.4	43.0	43.6	48	1.10
	PX10-71G	10	44.4	45.0	45.6	50	1.10
7.125 - 7.750 Plane Polarized Low VSWR	PL6-71G	6	40.0	40.3	40.6	47	1.06
	PL8-71G	8	42.5	42.8	43.1	50	1.04
	PL10-71G	10	44.5	44.8	45.1	50	1.04
	PL12-71G	12	46.0	46.3	46.6	51	1.04
7.125 - 7.750 Dual Polarized Low VSWR	PXL6-71G	6	39.9	40.3	40.5	47	1.08
	PXL8-71G	8	42.4	42.7	43.0	48	1.06
	PXL10-71G	10	44.4	44.7	45.0	50	1.06

11-15 GHz MICROWAVE ANTENNAS



10.7 - 11.7 GHz Standard and Low VSWR

WR90 Waveguide feeds.

CPR90G Input flanges.

Continuous polarization adjustment.

Types EW107 and EWP107 HELIAX elliptical waveguide and accessories for use with these antennas are described on pages 22-29.

12.2-13.2 GHz Plane and Dual Polarized

WR75 Waveguide feeds.

WR75 Choke flange input.

Plane polarized feeds have continuous polarization adjustment.

Type EW122 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

14.4 - 15.2 GHz Plane Polarized

WR62 Waveguide feeds.

UG-541/U Flange input.

Continuous polarization adjustment.

Accessories

Radomes are listed on page 10.

Antenna mounts are listed on pages 11-13.

GUARANTEED ELECTRICAL CHARACTERISTICS

Frequency, GHz and Type	Type Number	Diameter, Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
10.7 - 11.7 Plane Polarized	P2-107	2	34.1	34.5	34.9	40	1.15
	P4-107	4	39.9	40.3	40.7	45	1.10
	P6-107	6	43.4	43.8	44.2	47	1.10
	P8-107	8	45.6	46.0	46.4	50	1.10
	P10-107	10	47.3	47.7	48.1	52	1.10
10.7 - 11.7 Plane Polarized Low VSWR	PL6-107	6	43.4	43.8	44.2	47	1.06
	PL8-107	8	45.6	46.0	46.4	50	1.06
	PL10-107	10	47.3	47.7	48.1	52	1.06
12.2 - 13.2* Plane Polarized	P2-122B	2	35.0	35.3	35.6	40	1.15
	P4-122B	4	41.1	41.4	41.7	46	1.10
	P6-122B	6	44.6	44.9	45.2	49	1.10
	P8-122B	8	47.1	47.4	47.7	50	1.10
	P10-122B	10	48.3	48.6	48.9	52	1.10
12.2 - 13.2* Dual Polarized	PX4-122B	4	41.0	41.3	41.6	45	1.15
	PX6-122B	6	44.5	44.8	45.1	47	1.15
	PX8-122B	8	47.0	47.3	47.6	50	1.15
	PX10-122B	10	48.2	48.5	48.8	52	1.15
14.4 - 15.2 Plane Polarized	P4-144C	4	42.5	42.7	42.9	48	1.10
	P6-144C	6	46.0	46.2	46.4	55	1.10

* Specify frequency; either 12.2 - 12.7 or 12.7 - 13.2 GHz

6/12 GHz MICROWAVE ANTENNAS

6/12 GHz, 2 Port Dual Frequency

For cross-band diversity system.

6.575-6.875 GHz Feed uses WR137 waveguide with UG-343B/U input flange.

12.2-12.7 GHz Feed uses WR75 waveguide with choke type input flange.

Continuous polarization adjustment.

Types EW59 and EW122 HELIAX Elliptical Waveguide and accessories for use with these antennas are described on pages 22-29.

Accessories

Radomes are listed on page 10.

Antenna mounts are listed on pages 11-13.

6/12 GHz, Dual Frequency,
2 Port Antenna



GUARANTEED ELECTRICAL CHARACTERISTICS

Type Number	Diameter Feet	Band GHz	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
P6-612	6	6	39.3	39.5	39.7	55	1.10
		12	43.8	44.0	44.2	50	1.15
P8-612	8	6	41.8	42.0	42.2	57	1.10
		12	46.3	46.5	46.7	52	1.15
P10-612	10	6	43.7	43.9	44.1	59	1.10
		12	48.2	48.4	48.6	54	1.15

FEED GUY WIRE KITS

Feed guy wire kits consist of precut stainless steel guy ropes, spring loaded fasteners and instructions for attachment.

Feed guy kits should be ordered for vibration dampening of standard VSWR plane polarized feeds in 4, 6, 8 and 10 foot reflectors for 3.7 through 8.4 GHz bands when the antennas are mounted vertically on a tower.

The antennas may be used horizontally (with radomes) to illuminate passive reflectors without guying kits.

Dual polarized antennas include feed support struts or guy wires as standard equipment when needed.

All 12 and 15 foot antennas, all 10 GHz and higher frequency models and all low VSWR (PL series) antennas include feed guy wires or struts as standard equipment when required.



ORDERING INFORMATION

Antenna Series

P-37 Series
P-44 Series
P-59,65,71,71G Series

Type No.

31581-(*
31585-(*
28746-(*

*Antenna size - 4,6,8 or 10

MICROWAVE ANTENNA RADOMES



Andrew radomes consist of conical fiberglass plastic domes clamped to the rim of the reflector with galvanized steel brackets. Radomes are used to protect antennas from the accumulation of ice, snow and dirt. They are recommended for microwave systems operating above 3.5 GHz in areas subject to freezing temperatures. Unheated radomes listed below are satisfactory for use with 2 GHz antennas. A special series of heated radomes is available for use with 2 GHz plane polarized antennas. Ask for quotation.

Andrew radomes are fabricated by careful hand lay-up methods using multiple layers of fiberglass cloth and high strength, slow curing, bonding resins. A gel coat finish treatment is applied to protect the surface against deterioration due to ultraviolet rays. The radome taper angle, materials and fabrication methods have been selected for the best balance between electrical transparency and mechanical strength. Maximum additional VSWR due to radome is 1.02 at 4 GHz and 6 GHz and 1.03 at 11 GHz.

Unheated radomes offer suitable protection for most installations. In areas subject to severe sleet or heavy snow, heated radomes are recommended. These radomes include nichrome resistance wires molded between the fiberglass layers. The wires are laid in a circular pattern to eliminate the need for polarization alignment, and to accommodate dual polarized operation without added loss. An air sensing thermostat, included, energizes the heaters in the critical icing range or 2°C (35°F) to -4°C (24°F). Heated radomes with 240V, 2 wire or other special operating voltage inputs are available on special order.

Extended radomes listed below are required for feed clearance with 1.7-2.4 GHz dual polarized antennas, all 3.7-4.2 GHz antennas and 6/12 GHz dual frequency antennas. Type PXL8-37 requires a special extended radome not listed. Ask for quotation. All other antennas listed use standard depth radomes.

Standard and extended radomes will survive winds up to 100 mph without damage. For locations subject to severe hurricane winds or extreme gusts, the "extra strength" series of reinforced fiberglass radomes are designed to withstand 150 mph winds.

CHARACTERISTICS

	Diameter feet	Type Number		Attenuation, dB			Heated Radome Power Requirements	
		Unheated	Heated	4 GHz	6 GHz	11 GHz	Watts	Input Voltage
Standard Radomes	2	R-2C	HR-2C	—	0.3	0.7	125	120V, 50/60Hz, 2 wire
	4	R-4C	HR-4C	—	0.3	0.7	750	120V, 50/60Hz, 2 wire
	6	R-6C	HR-6C	—	0.5	1.1	1400	120V, 50/60Hz, 2 wire
	8	R-8D	HR-8E	—	0.5	1.2	2550	120/240V, 50/60Hz, 3 wire
	10	R-10D	HR-10E	—	0.7	1.4	3100	120/240V, 50/60Hz, 3 wire
	12	R-12D	HR-12D	—	0.8	1.6	4500	120/240V, 50/60Hz, 3 wire
Extended Radomes	6	35255-2	35254-2	0.3	0.5	1.1	1400	120V, 50/60Hz, 2 wire
	8	35357-2	35256-2	0.3	0.5	1.2	2550	120/240V, 50/60Hz, 3 wire
	10	35259-2	35258-2	0.4	0.7	1.4	3100	120/240V, 50/60Hz, 3 wire
Extra Strength Radomes	4	35253-1	—	—	0.3	0.8	750	120V, 50/60Hz, 2 wire
	6	35255-1	—	—	0.6	1.4	1400	120V, 50/60Hz, 2 wire
	8	35257-1	35256-1	—	0.8	1.6	2550	120/240V, 50/60Hz, 3 wire
	10	35259-1	35258-1	—	1.1	1.6	3100	120/240V, 50/60Hz, 3 wire
	12	35249-1	35248-1	—	1.2	1.6	4500	120/240V, 50/60Hz, 3 wire

MICROWAVE ANTENNA MOUNTS

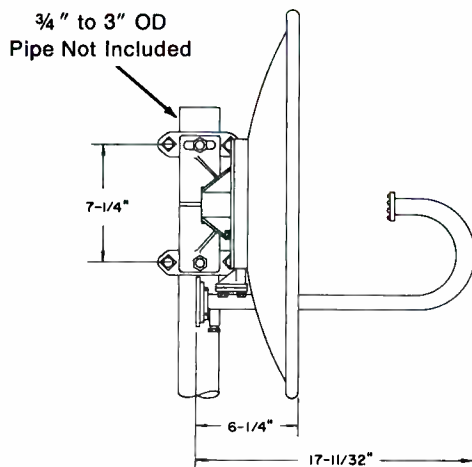
The antenna mounts described on this and the following two pages are for use with the standard Andrew line of parabolic antennas on pages 3 to 9. High performance antenna mounts are shown on page 15. Mounts are constructed of hot-dip galvanized structural members and galvanized or stainless steel hardware.

Four and 6 foot antennas have an aluminum angle reinforcing ring with mounting holes located on a 30-5/8" diameter circle. 8, 10, and 12 foot antennas also use an aluminum angle reinforcing ring, with mounting holes on a 43-1/4" diameter circle for the 8 and 10 foot sizes, and a 56-1/4" diameter circle for the 12 foot size. Aluminum radial reinforcing ribs are used on the back of 6, 8, 10, and 12 foot antennas.

Andrew 15 foot antennas consist of a solid spun aluminum paraboloidal reflector reinforced with a heavy back torsion ring. The right and left sides of

the 15 foot reflector assembly are truncated to reduce shipping dimensions. This segmenting does not affect the structural integrity of the assembly since the torsion ring is not broken. The 15 foot antenna may be assembled easily in a few hours by installation personnel. An integral vertical mount is included as standard with all 15 foot antennas.

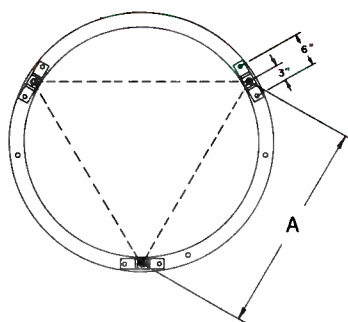
Unshielded antennas and mounts will withstand a 125 mph wind, with 1" of radial ice, without damage, and will maintain antenna deflection to less than .1° in 70 mph winds. Standard radomes are limited to a rating of 100 mph with 1" of ice. When used with "extra strength" radomes, the antennas and mounts will survive winds of 150 mph and 1" radial ice. EIA recommendations RS-222A, RS-195A, and applicable industry standards are met or exceeded. The antennas operate over an ambient of -54°C (-65°F) to 65°C (150°F) and may be stored from -62°C (80°F) to 79°C (175°F) without damage.



The 2 foot antennas include an integral clamp mount for attachment to a 3/4" to 3" OD pipe.



The 2 foot antenna mount allows 360° azimuth and ±5° elevation adjustment.



Clearance - Input Flange To Mounting Surface

ANTENNA	Max	Min
4 Ft.	15"	10"
6 Ft.	16"	11"
8 & 10 Ft.	14"	9"

Dimension "A"

4 & 6 Ft. 26-17/32"

8 & 10 Ft. 37-7/16"

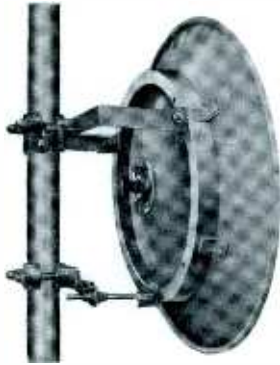
Mounting Hole Size 7/8"

Type M10 Horizontal Mount for use with 4, 6, 8 and 10 foot antennas consists of 3 adjustment bolt assemblies and

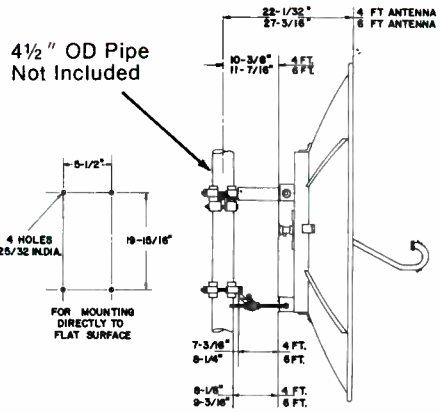


3 U-shaped steel legs to mount to a horizontal surface. Adjustment ±5°.

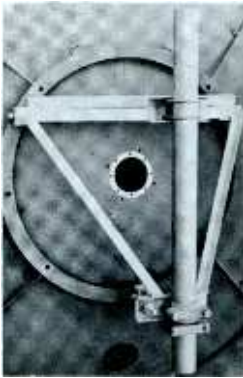
MICROWAVE ANTENNA MOUNTS



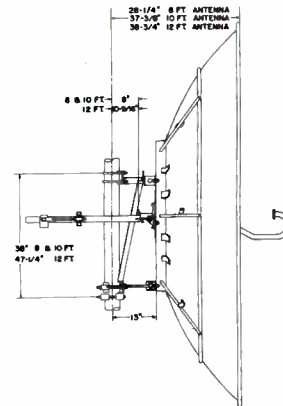
Type T4A Vertical Mount attaches 4 ft. and 6 ft. antennas to a 4-1/2" OD pipe. Elevation adjustment of $\pm 5^\circ$ by threaded steel rod which also serves as a bottom suspension arm.



Type T4B Vertical Mount, an offset T4A, includes a triangular structural frame with a 5 3/8" center offset, to allow clearance to radiator flanges. Includes a side strut with azimuth adjustment of $\pm 5^\circ$ for alignment under windy conditions.



Type T10 Vertical Mount for use with 8 and 10 ft. antennas, mounts to 4-1/2" OD pipe. Includes one side arm strut with a $\pm 5^\circ$ azimuth adjustment bolt assembly for use in windy conditions. Mount is offset for convenient access to radiator.

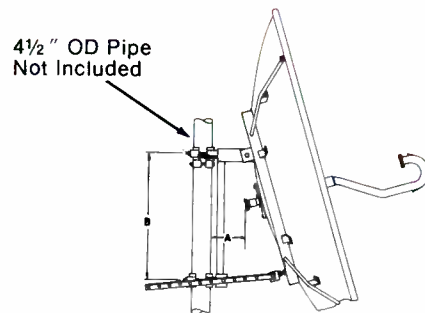


Type T12C Vertical Mount for 12 ft. antennas is similar to Type T10. Mount is offset and includes one adjustable strut.

Type 38891 Side Strut is an optional fixed second strut to provide increased rigidity to Types T10 or T12C.

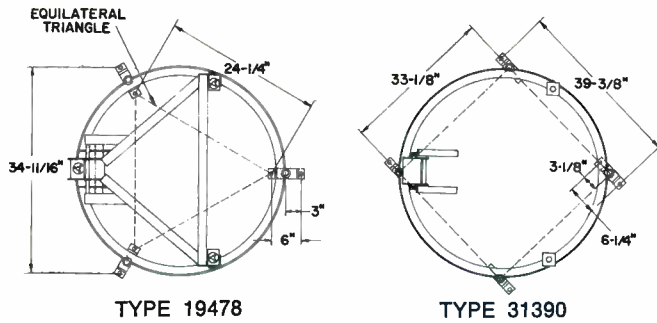


Vertical Tilt Mount, elevation adjustment — 5 to +50° degrees. **Type 19474A** for use with four and six foot reflectors. **Type 31400** for use with eight and ten foot reflectors. Mount to 4-1/2" OD pipe.



	A Dimension	B Dimension
4 Ft Antenna	Min (-5°) $7\frac{3}{8}$ " Max ($+50^\circ$) $13\frac{17}{32}$ "	20"
6 Ft Antenna	Min (-5°) $8\frac{7}{16}$ " Max ($+50^\circ$) $14\frac{19}{32}$ "	20"
8 and 10 Ft Antennas	Min (-5°) 4" Max ($+50^\circ$) $10\frac{1}{8}$ "	33"

MICROWAVE ANTENNA MOUNTS



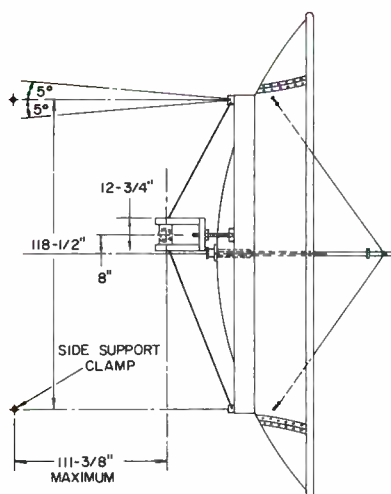
Clearance—			
Input Flange To Mounting Surface			
4 Ft Antenna	Max 25"	8 and 10 Ft. Antennas	Max 31"
	Min 19 ¹ / ₄ "		Min 22 ¹ / ₂ "
6 Ft Antenna	Max 26 ¹ / ₁₆ "	Mounting Hole Size	7 ⁷ / ₈ "
	Min 20 ⁹ / ₁₆ "		

Horizontal Tilt Mount, elevation adjustment -5° to $+50^{\circ}$.
Type 19478 for use with four and six foot reflectors
Type 31390 for use with eight and ten foot reflectors.
 Mount to flat surfaces.

A-Frame Mounts for telephone company applications.
Type 32841 is for use with 4 and 6 foot antennas.
Type 31869 is for 8 and 10 foot antennas. Azimuth and elevation adjustments are ± 6 degrees.

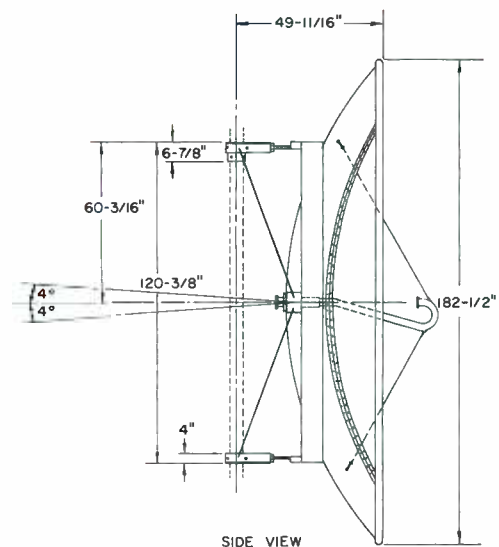
Both sizes mount directly to towers or surfaces designed for Bell Telephone KS type mounts. These mounts are the same as the KS mounts except the bolt arrangements fit Andrew antenna backup structures.

For complete details ask for instruction sheets; Bulletin 17803A for Type 32841 or 17892B for Type 31869.



TOP VIEW

15 Foot Antenna Mount



SIDE VIEW

An integral galvanized steel mount is included as standard with all 15 foot antennas. The mount clamps to a 4¹/₂" OD pipe and offers $\pm 4^{\circ}$ eleva-

tion adjustment. Two heavy duty side arm struts (one with an adjustable bolt assembly), provide continuous adjustment of $\pm 5^{\circ}$ in azimuth.

HIGH PERFORMANCE MICROWAVE ANTENNAS

Advanced high performance antennas are used in heavy capacity, trunk line microwave systems. These antennas offer the high directivity and low VSWR characteristics necessary to meet CCIR or Bell System circuit noise objectives. In 4 GHz and 6 GHz systems, the high directivity normally allows full channel expansion with simultaneous use of identical transmitter frequencies at repeater stations. Even in cases without full channel expansion, shielded antennas may be necessary for frequency interference coordination.

The high directivity pattern is achieved through the use of a cylindrical metal shield to attenuate side and back radiation. The shield is lined with a long life, broadband, RF absorbent material which reduces stray reflection and refraction around the edge of the shield. A precision contour reflector and a resonant absorbent strip along critical portions of the primary radiator combine to control the near-in radiation. Stray leakage is prevented by RF sealing of the shield, reflector and feed interfaces.

High performance antennas include low loss planar radomes with less than 0.1 dB attenuation and negligible VSWR contribution. (The radomes do not exceed 0.2 dB loss, even when wet.) All of the tabulated gain and VSWR figures include radomes.



Typical High Performance Antenna
(Radome Removed).

The Hypalon* coated nylon is stretched across the opening of the shield and spring loaded at the edge.

The radome surface flexes slightly in the wind, and readily sheds ice and snow in most environments. Heated Hypalon coated nylon radomes are available on special order for unusual climatic conditions.

Low VSWR feeds are included with all high performance antennas. The 2 GHz plane polarized feeds utilize a slot excited coaxial horn and a 7/8" EIA flange input. Above 3 GHz, plane and dual polarized designs employ sectoral horns, rectangular waveguide, precision waveguide flanges and feed guy kits.

Also included with all antennas are tower mounts and adjustable side arm struts. Mounting details are shown on page 15, opposite.

The complete high performance antenna, including radome and mount, will survive 125 mph winds with 1 inch radial ice and is designed to meet or exceed EIA and other pertinent industry standards. Tests conducted on the 10 foot and 12 foot antennas confirm less than 0.15 degree of beam deflection when subjected to 100 mph winds and 1 inch radial ice. All steel parts are protected against corrosion. Operating temperature range is -54°C (-65°F) to 65°C (150°F). The antennas may be safely stored in temperatures from -61°C (-80°F) to 79°C (175°F).

Pages 16 and 17, following, outline the popular sizes and frequency bands of high performance antennas. Other types are available on special order.

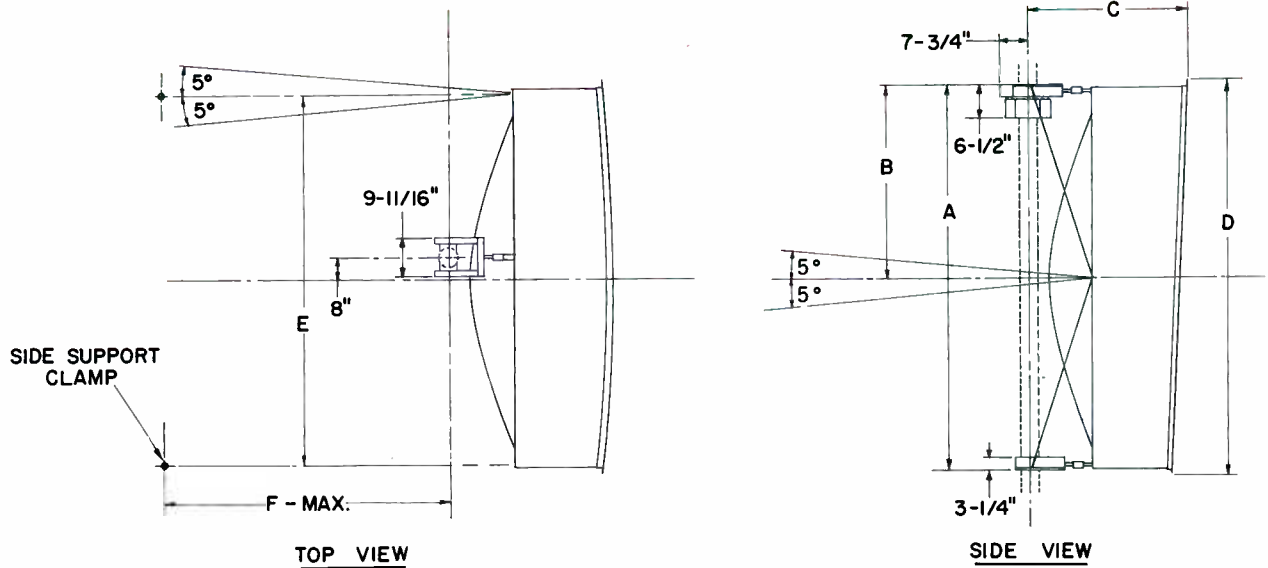
* Registered trademark of E.I. duPont de Nemours and Co. (Inc.)

HIGH PERFORMANCE ANTENNA MOUNTING

High performance antennas include a torsion ring backup which serves as a structural element and as an extended surface for mounting of the cylindrical metal shield.

The antennas include mounts which attach to a 4½" OD pipe and permit ±5° elevation adjustment. Two adjustable side arm struts provide ±5° vernier azimuth adjustment.

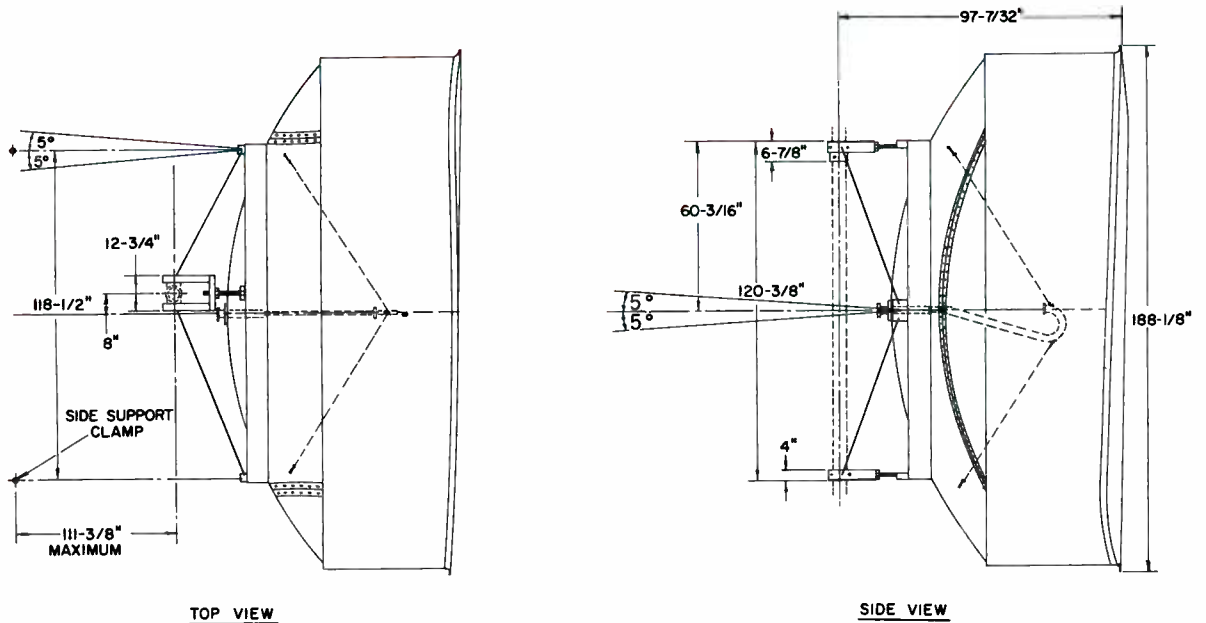
OUTLINE DRAWING OF 8, 10 AND 12 FT SHIELDED ANTENNAS



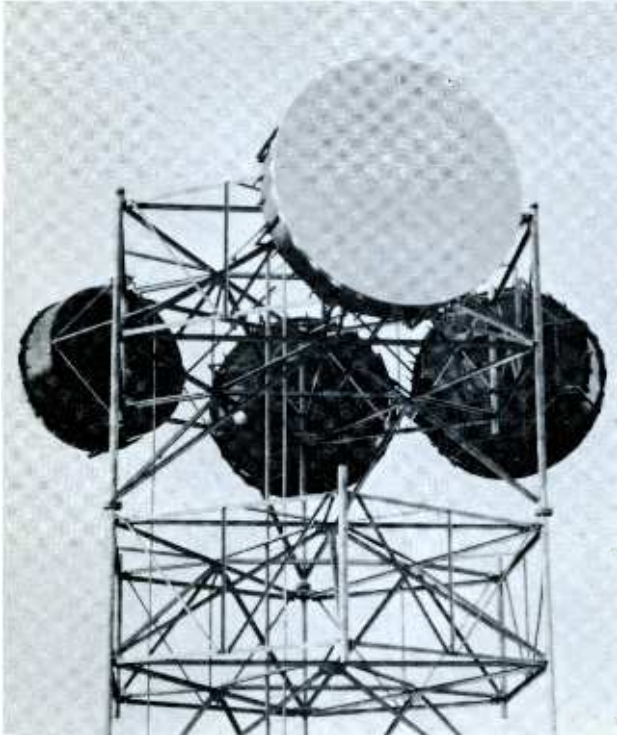
Dimension, Inches	A	B	C	D	E	F
8 Ft Antenna	99 ³ / ₈	49 ⁵ / ₁₆	55 ⁵ / ₁₆	102 ¹ / ₈	96	90
10 Ft Antenna	121 ⁵ / ₈	60 ³ / ₈	58	126 ¹ / ₄	120	90
12 Ft Antenna	146 ⁵ / ₈	72 ⁷ / ₈	71	150 ¹⁵ / ₁₆	145	90

Note: Dimension C is 5" larger than indicated when feed is WR229 rectangular waveguide.

OUTLINE DRAWING OF 15 FT SHIELDED ANTENNA



2 AND 4 GHz HIGH PERFORMANCE ANTENNAS



1.7 — 2.3 GHz Plane Polarized

Broadband coaxial horn radiator.

7/8" EIA 50 ohm input flange.

Pressure tight to 5 psig.

7/8" and 1-5/8" HELIAX coaxial cable and fittings to feed these antennas are listed on pages 64-67.

Type EWP17 HELIAX elliptical waveguide to feed these antennas is listed on pages 22-29.

3.7 — 4.2 GHz Plane and Dual Polarized

WR229 Waveguide feeds.

CPR229G Input flanges.

Pressure tight to 5 psig.

Type EWP37 HELIAX elliptical waveguide to feed these antennas is listed on pages 22-29.

GUARANTEED ELECTRICAL CHARACTERISTICS 1.7-2.3 GHz

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
1.7 - 2.1 Plane Polarized	HP10-17	10	32.1	33.0	33.9	51	1.06
	HP12-17	12	33.6	34.5	35.4	55	1.06
	KHP15-17	15	35.4	36.3	37.2	57	1.06
1.9 - 2.3 Plane Polarized	HP10-19	10	32.9	33.8	34.7	52	1.06
	HP12-19	12	34.5	35.4	36.3	56	1.06
	KHP15-19	15	36.2	37.1	38.0	58	1.06

GUARANTEED ELECTRICAL CHARACTERISTICS 3.7-4.2 GHz

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
3.7 - 4.2 Plane Polarized	HP10-37	10	38.8	39.3	39.8	65	1.05
	HP12-37	12	40.3	40.8	41.3	65	1.05
	3.7 - 4.2 Dual Polarized	HPX10-37	10	38.8	39.3	39.8	65
HPX12-37		12	40.3	40.8	41.3	65	1.06

6, 7 AND 11 GHz HIGH PERFORMANCE ANTENNAS

5.925 — 6.425 GHz Plane and Dual Polarized

WR159 Waveguide feeds.

CPR159G Input flanges.

Type EWP56 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

7.125 — 7.750 GHz Plane and Dual Polarized

WR112 Waveguide feeds.

CPR112G Input flanges.

Type EWP71 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

10.7 — 11.7 GHz Plane and Dual Polarized

WR90 Waveguide feeds.

CPR90G Input flanges.

Type EWP107 HELIAX elliptical waveguide for use with these antennas is described on pages 22-29.

All high performance antennas are supplied complete with shielded reflector, low VSWR feed, feed guy kit (except 2 GHz), planar radome, mount and side struts. 15 foot antennas are shipped in a partially knockdown state, with the shield detached to reduce shipping container size. Mounting details are shown on page 15.

GUARANTEED ELECTRICAL CHARACTERISTICS 5.925 - 6.425 GHz

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
5.925-6.425 Plane Polarized	HP8A-59	8	40.7	41.1	41.5	65	1.04
	HP10A-59	10	42.6	43.0	43.4	70	1.04
	HP12A-59	12	44.2	44.6	45.0	70	1.04
	KHP15A-59	15	45.6	46.0	46.4	70	1.04
5.925-6.425 Dual Polarized	HPX8A-59	8	40.6	41.0	41.4	65	1.06
	HPX10A-59A	10	42.5	42.9	43.3	70	1.06
	HPX12A-59	12	44.1	44.5	44.9	70	1.06
	HPX15A-59	15	45.5	45.9	46.3	70	1.06

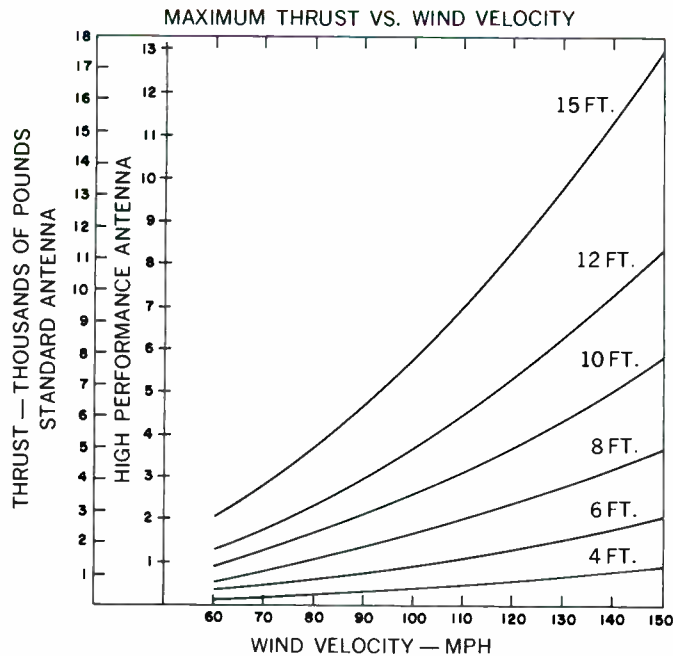
GUARANTEED ELECTRICAL CHARACTERISTICS 7.125 - 7.750 GHz

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
7.125-7.750 Plane Polarized	HP8-71G	8	42.2	42.8	43.2	65	1.04
	HP10-71G	10	44.4	44.8	45.2	65	1.04
	HP12-71G	12	46.0	46.4	46.8	65	1.04
7.125-7.750 Dual Polarized	HPX8-71G	8	42.1	42.7	43.1	65	1.06
	HPX10-71G	10	44.3	44.7	45.1	65	1.06
	HPX12-71G	12	45.9	46.3	46.7	65	1.06

GUARANTEED ELECTRICAL CHARACTERISTICS 10.7 - 11.7 GHz

Frequency, GHz and Type	Type Number	Diameter Feet	Gain, dBi			Front-to-Back Ratio, dB	VSWR Maximum
			Bottom	Mid Band	Top		
10.7-11.7 Plane Polarized	HP8-107	8	45.6	46.0	46.5	65	1.06
	HP10-107	10	47.3	47.7	48.1	65	1.06
10.7-11.7 Dual Polarized	HPX10-107A	10	47.1	47.5	47.9	65	1.10

MICROWAVE ANTENNA DATA

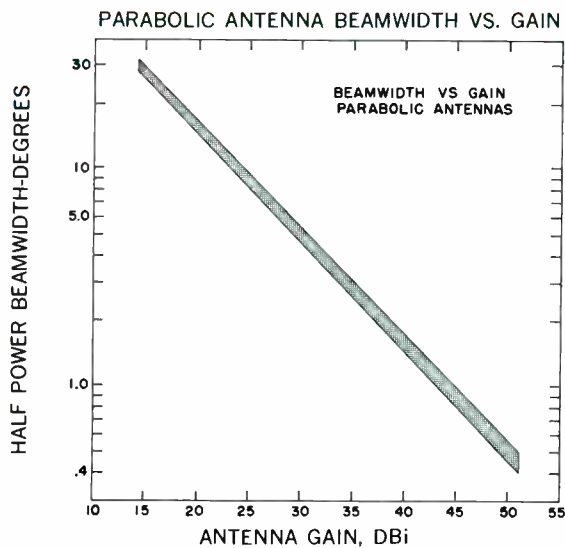


ANTENNA THRUST

All Andrew antennas and mounts are designed to withstand at least 125 mph windloads with one inch of radial ice. The curves at left indicate the maximum thrust in pounds on the supporting structure for the several sizes of standard and high performance antennas at winds of 60 to 150 mph (from worst direction).

The high performance antenna loads are with planar radome supplied with antenna. The standard antenna curves are without radomes. Antennas with radomes have one half the thrust shown.

For additional information on windloading characteristics or mechanical data, contact your Andrew sales engineer.



ANTENNA BEAM WIDTH

The curve at left shows the range of half power beamwidth angles as a function of antenna gain. The data are sufficient for most tower loading and twisting calculations.

If more precise information is needed regarding a particular antenna, ask for the radiation pattern envelope (RPE) for that antenna. See page 3 for further description of RPE's available, and page 19 for typical pattern.

For any additional information on antenna patterns, gain, VSWR, guarantees, etc., contact your Andrew sales engineer.

VSWR CONVERSION CHART

VSWR	Return Loss, dB	Reflection Coefficient, %	SWR dB	VSWR	Return Loss, dB	Reflection Coefficient, %	SWR dB	VSWR	Return Loss, dB	Reflection Coefficient, %	SWR dB
1.01	46.0	0.5	.086	1.08	28.3	3.8	.669	1.15	23.0	7.0	1.21
1.02	40.0	1.0	.172	1.09	27.4	4.3	.748	1.16	22.6	7.4	1.29
1.03	36.5	1.5	.256	1.10	26.4	4.8	.826	1.17	22.0	7.8	1.36
1.04	34.0	2.0	.304	1.11	25.5	5.2	.905	1.18	21.7	8.3	1.44
1.05	32.0	2.5	.424	1.12	24.9	5.7	.984	1.19	21.0	8.7	1.57
1.06	30.8	2.9	.506	1.13	24.0	6.0	1.06	1.20	20.8	9.1	1.58
1.07	29.4	3.4	.589	1.14	23.7	6.6	1.14	1.30	17.6	13.0	2.28

RADIATION PATTERN INFORMATION

Antenna gain was originally the all important microwave antenna electrical characteristic. However, increasing microwave usage has created a need for pattern detail of greater reliability for use in system design. EIA first recognized this need in the middle 1950's when the "keyhole" pattern was derived. Polar pattern plots were required of license applicants at that time. As spectrum congestion continued, pattern information was published by sectors in tabular form. This, too, proved inadequate for difficult paths.

Andrew has developed the radiation pattern envelope (RPE) to fill the information gap between tabular gain, beamwidth and front-to-back ratio and

detailed radiation patterns. Ease in reading is a major advantage as is the reliability achieved through averaging.

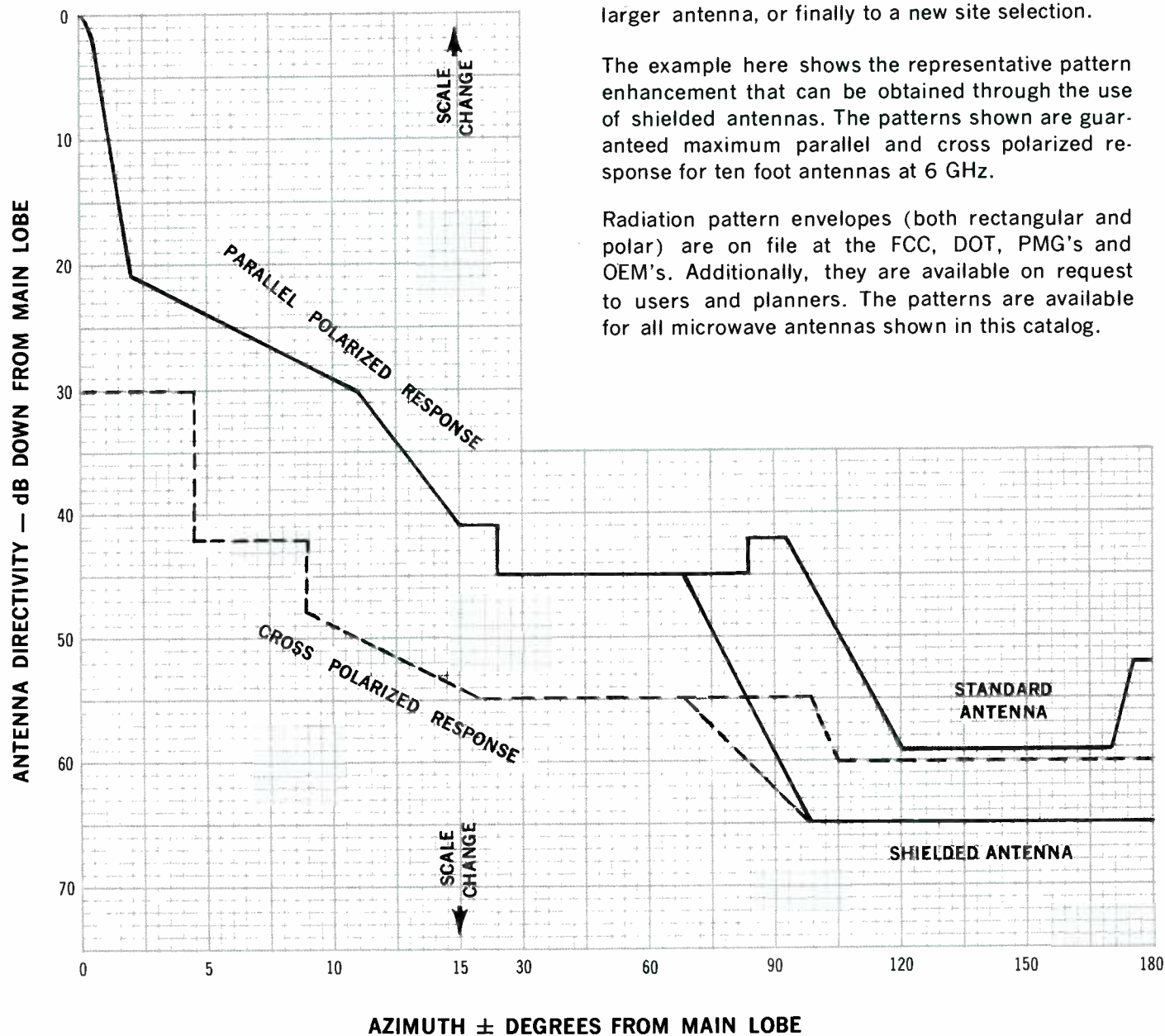
The majority of system design needs will be met by the use of gain and front-to-back ratio information and standard antennas. When these indicate an interference problem, recourse is made to the RPE for the standard antenna.

If this does not clear the problem, the next step is to the detailed pattern, if the interference is small, or to the RPE of the corresponding shielded antenna if the interference is significant.

If interference is still indicated, one then proceeds in order to the detailed measured pattern of the shielded antenna at the specific frequency, to a larger antenna, or finally to a new site selection.

The example here shows the representative pattern enhancement that can be obtained through the use of shielded antennas. The patterns shown are guaranteed maximum parallel and cross polarized response for ten foot antennas at 6 GHz.

Radiation pattern envelopes (both rectangular and polar) are on file at the FCC, DOT, PMG's and OEM's. Additionally, they are available on request to users and planners. The patterns are available for all microwave antennas shown in this catalog.



MICROWAVE ANTENNA SHIPPING INFORMATION

The charts below give normal packing and shipping information for Andrew microwave antennas and accessories, both domestic and export pack. The figures are for guidance in planning transportation requirements and are not guaranteed.

Ten foot and larger antennas and radomes may re-

quire special handling in shipping, depending on destination and routing.

For reduction of shipping volume, particularly helpful in export shipments, antennas or radomes may be "bulk" packed. Contact your Andrew sales engineer for details.

Diameter Feet	Net Wt Pounds	Gross Wt, Lbs		Volume, Cu Ft		No. of Containers		Type of Containers	
		Domestic Pack	Export Pack	Domestic Pack	Export Pack	Domestic Pack	Export Pack	Domestic Pack	Export Pack

HIGH PERFORMANCE ANTENNAS (Including radome and mount)

8	400	750	910	405	260	2	1	Crate	Crate
10	515	1450	1800	643	416	2	1	Crate	Crate
12	715	2100	2600	1212	675	2	1	Crate	Crate
15	1000	2500	3200	860	900	2	1	Crate	Crate

STANDARD ANTENNAS

2	17	25	65	5	6	1	1	Carton	Crate
4	45	130	140	20	23	2	1	Crate	Crate
6	100	180	280	50	70	2	1	Crate	Crate
8	150	380	400	150	150	2	1	Crate	Crate
10	225	800	1000	340	340	2	1	Crate	Crate
12	365	1200	1700	550	550	2	1	Crate	Crate
15	500	1600	2200	710	710	2	1	Crate	Crate

RADOMES

2	10	15	45	9	12	1	1	Carton	Crate
4	20	40	120	40	52	1	1	Carton	Crate
6	30	70	200	100	135	1	1	Carton	Crate
8	70	230	300	230	230	1	1	Crate	Crate
10	100	700	800	450	450	1	1	Crate	Crate
12	140	900	1000	700	700	1	1	Crate	Crate

ANTENNA MOUNTS

Type Number	Net Wt Pounds	Gross Wt, Lbs		Volume, Cu Ft		No. of Containers		Type of Containers	
		Domestic Pack	Export Pack	Domestic Pack	Export Pack	Domestic Pack	Export Pack	Domestic Pack	Export Pack
T4A	68	80	80	1	2	1	1	Box	Box
T4B	91	120	120	1	2	1	1	Box	Box
M10	21	40	40	1	1	1	1	Box	Box
T10	140	200	200	6	8	3	1	Box	Box
T12	163	250	250	10	12	1	1	Box	Box
19474A	80	100	100	10	10	1	1	Box	Box
19478	87	150	150	18	18	1	1	Box	Box
31390	160	200	200	20	20	1	1	Box	Box
31400	190	165	165	25	25	1	1	Box	Box
31869	300	325	325	5	5	1	1	Box	Box
32841	150	165	165	3	3	1	1	Box	Box

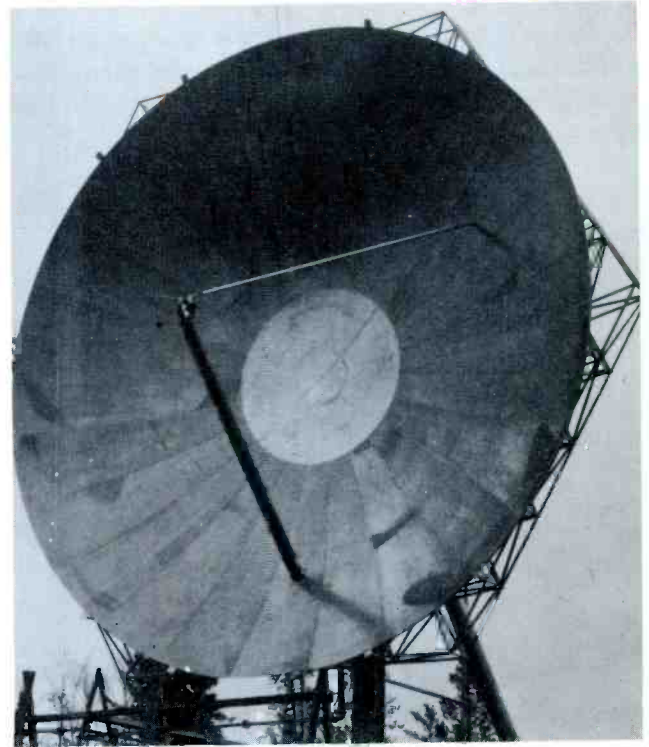
28-60 FOOT ANTENNAS

Andrew has designed and manufactured large parabolic antennas for the high performance requirements of major communications networks in a world-wide variety of severe environments.

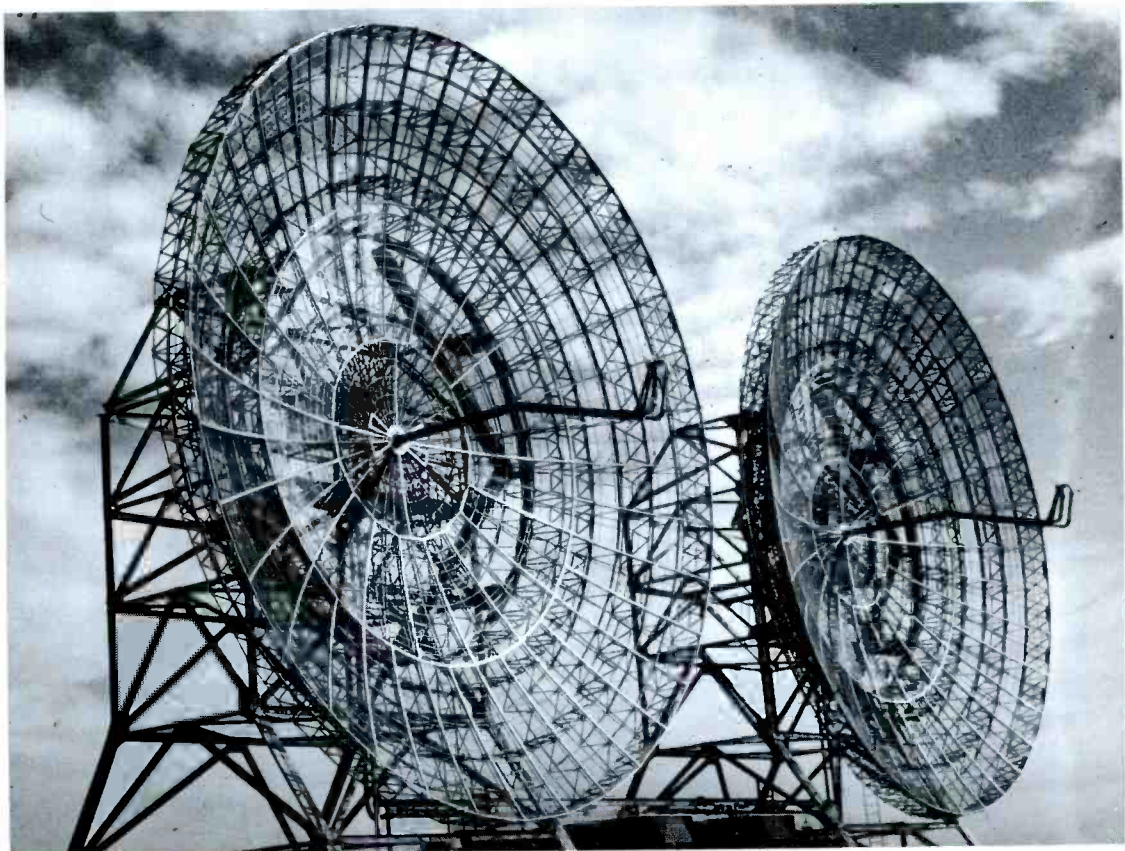
These antennas are in use at frequencies of 200 MHz to 5 GHz. For most requirements in this range, expanded metal mesh is used for the reflector surface because of lower wind loading. However, solid surfaces are utilized where required by gain and contour tolerance specifications. Precision control of the surface contour is obtained by adjustment.

This experience is your assurance that an Andrew engineered and produced large antenna system will deliver optimum performance, electrically and structurally.

These units are all custom designed and manufactured with price depending on quantity and specific requirements. Your Andrew sales engineer can quote to your specifications.



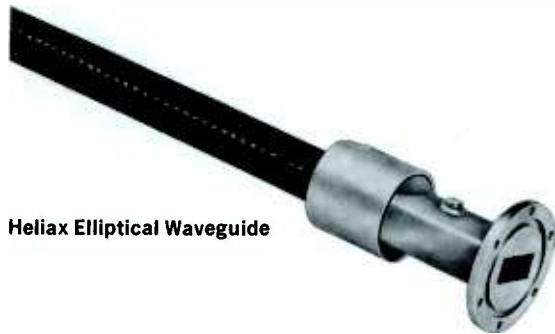
28 Ft. Solid Surface Antenna, 4.4-5.0 GHz, 125 mph Maximum Wind Load.



60 Ft. Antennas, 1.7-2.4 GHz, 175 mph Maximum Wind Load.

MICROWAVE WAVEGUIDES

Andrew offers three types of waveguides for use in microwave systems: HELIAX® elliptical, rigid rectangular and circular.



Helix Elliptical Waveguide

HELIAX elliptical waveguide, available in continuous flexible lengths, minimizes site design and installation time. Advanced manufacturing techniques yield a high performance system that is more predictable in both attenuation and noise characteristics than systems comprised of varied individual components. The basic design consists of precision formed corrugated high conductivity copper tubing with an elliptical cross section terminated in transitions to rectangular flanges. The elliptical waveguide is polyethylene jacketed.



Rectangular Waveguide

Rectangular waveguide manufactured by Andrew conforms to EIA standards and IEC recommendations. Complete microwave waveguide systems are available in commonly used sizes. For maximum efficiency, all waveguide sections are made of high conductivity copper. Efficiency remains high after years of service because all Andrew waveguide is chromate conversion coated to prevent corrosion. Special finishes or painting are available on special order.



Circular Waveguide

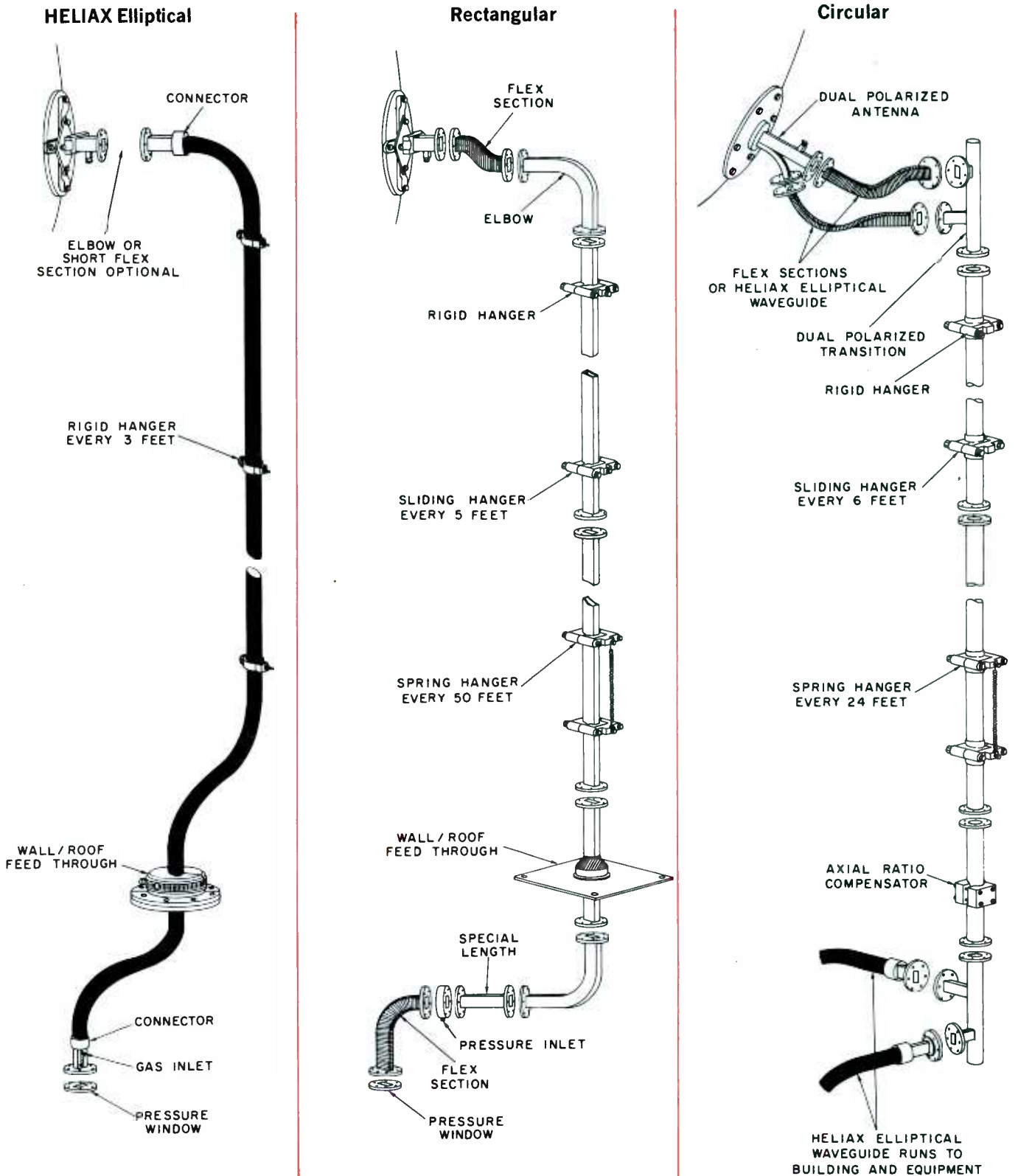
Circular waveguide is recommended for system applications requiring very low attenuation. System expansion from single to dual polarization is possible without extensive extra investments by using a single run of circular waveguide for both polarizations. Andrew circular waveguide is fabricated from precision formed high conductivity heavy wall copper tubing. Transitions to rectangular waveguide are compatible with components designed for use with Andrew rectangular waveguide.

Since economics is frequently a factor in determining the best system, optimizing performance versus dollars can result in combinations of all three types of guides. Consult your local Andrew office for technical assistance.

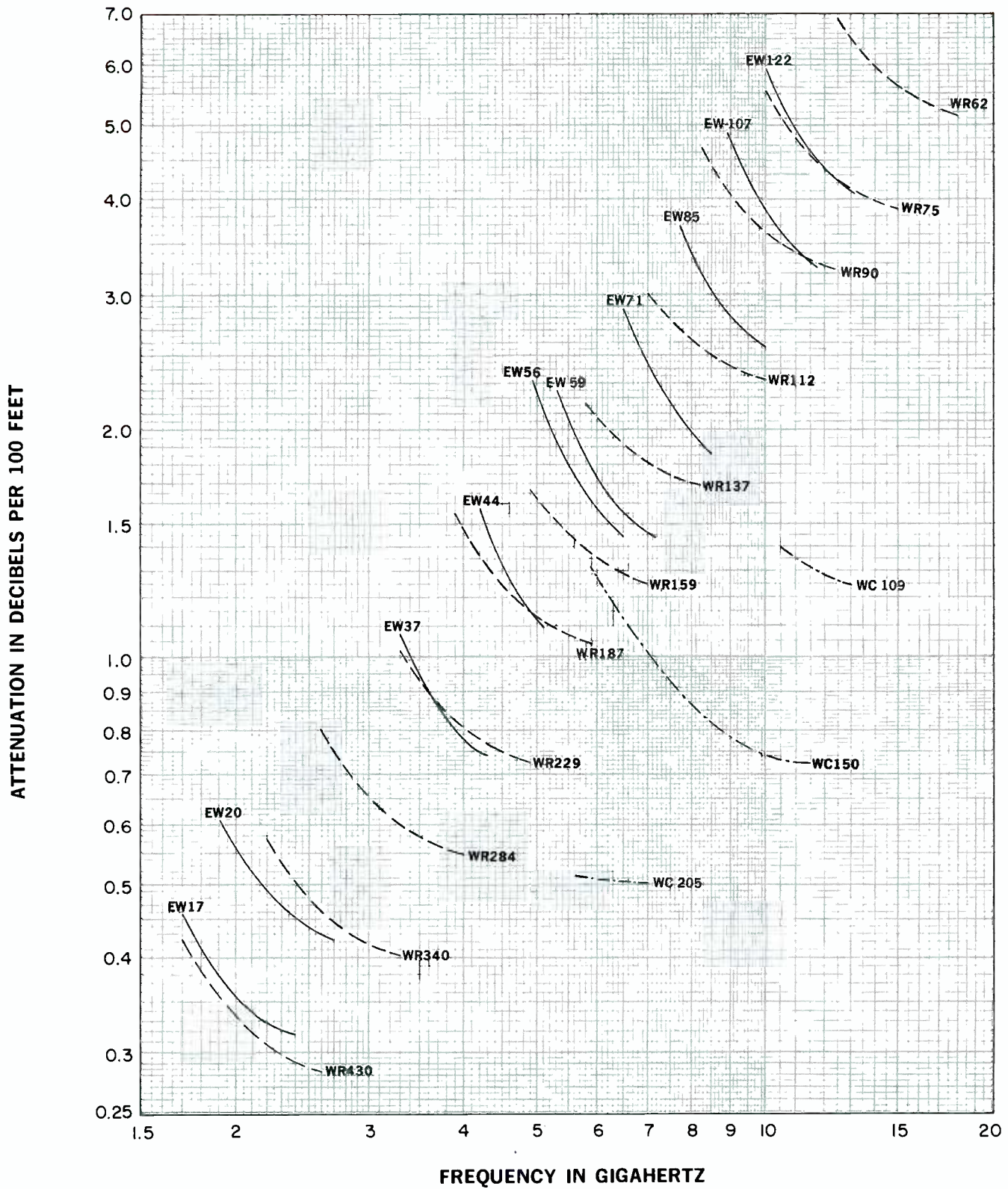
MICROWAVE WAVEGUIDE SYSTEMS

Illustrated below are typical waveguide systems for runs to tower mounted antennas. These diagrams show single polarized waveguide runs for rectangular and elliptical systems and a dual polarized waveguide run for circular waveguide.

For dual polarized installations, all components shown for the rectangular and elliptical systems must be duplicated. The following pages cover the standard microwave waveguide components offered by Andrew.



MICROWAVE WAVEGUIDE ATTENUATION



Attenuation curves based on:
 VSWR 1.0
 Ambient Temperature 24°C (75°F)

Conversion Data:
 1 dB/100 feet — 3.28 dB/100 meters

HELIAX® ELLIPTICAL WAVEGUIDE

Low Attenuation
Low VSWR
Continuous Flexible Lengths
Reduces Station Layout Time
Reduces Installation Time
Lower Cost with Better System Performance

HELIAX elliptical waveguide* is available for the commonly used bands between 1.7 and 13.2 GHz. Designs for other frequency ranges are under development. Elliptical waveguide connectors are available to mate with U.S. Military, U.S. EIA, and international IEC type flanges.

ATTENUATION

The attenuation of an elliptical waveguide assembly is generally lower than that of the equivalent rectangular copper waveguide. The attenuation characteristics of Andrew HELIAX elliptical waveguide are shown on the opposite page along with values for rigid rectangular and circular waveguides.

VSWR

Elliptical waveguide provides a complete feeder run with known VSWR characteristics. On the other hand, the VSWR of rigid waveguide installations depends upon the combination of components with different VSWR specifications ranging from 1.01 to 1.05 each.

HELIAX elliptical waveguide assemblies consist of flexible corrugated copper tubes of elliptical cross section with waveguide transitions to conventional rectangular flanges at each end. The elliptical cross section propagates the ${}_{e}TE_{11}$ dominant mode similar to the TE_{10} dominant mode in rectangular waveguide. The continuous construction eliminates the multiple joints of miscellaneous bends, flex sections,



and rigid sections inherent in a rectangular waveguide installation. The waveguide includes a rugged black polyethylene jacket which provides protection in handling and installation.

Two versions of elliptical waveguide are offered by Andrew. Standard elliptical waveguide is recommended for short and medium haul radio relay systems. Premium type elliptical waveguide assemblies with tuned connectors are recommended for long haul, high capacity radio systems. The standard and premium elliptical waveguides differ only in attainable assembly VSWR.

All assemblies are VSWR sweep tested and shipped pressurized.

CHARACTERISTICS

Frequency Band, GHz	Type Number		Dimensions Over Jacket, inches	Minimum Bending Radii, inches		Weight Pounds per Foot
	Standard	Premium		E Plane	H Plane	
1.7—2.4	EW17	EWP17	5.675 x 3.050	28	81	2.73
1.9—2.7	EW20	—	5.020 x 2.831	26	71	2.02
3.3—4.3	EW37	EWP37	2.896 x 1.855	17	41	1.01
4.2—5.1	EW44	EWP44	2.312 x 1.590	15	32	0.74
4.9—6.425	EW56	EWP56	1.964 x 1.270	12	27	0.62
5.3—7.125	EW59	EWP59	1.857 x 1.196	11	26	0.53
6.5—8.5	EW71	EWP71	1.550 x 1.022	9	22	0.43
7.7—10.0	EW85	—	1.324 x 0.903	8	19	0.36
8.9—11.7	EW107	EWP107	1.163 x 0.796	7	16	0.32
10.0—13.2	EW122	EWP122	1.070 x 0.718	6	15	0.29

*Licensed for use or resale under United States Patent No. 3,200,356 and certain patents of the U.S.A., Canada and other countries. LIMITED LICENSE under pertinent patents of most countries in Europe and Asia to importations by a purchaser as part of a complete microwave system. Further information on inquiry. HELIAX® is the registered trademark under which elliptical waveguides are sold by Andrew Corporation.

HELIAX® ELLIPTICAL WAVEGUIDE



HELIAX elliptical waveguide connectors are transitions from the elliptical cross section to standard rectangular waveguide. The connector body is a precision casting with a broached taper section. 117 and 120 series are aluminum, all others are brass. All connectors are pressure tight and have a 1/8" NPT pressure inlet with plug. Included are flange pressure rings, hardware and instructions. Connectors are easily attached in the field with simple hand tools.

Connectors are available in two series. The "C" series mate with "UG" type choke and cover flanges. The Andrew flange is flat with pressure groove and will mate with either choke or cover flange. The "E" series mate with EIA CPR type contact flanges. Tuned connectors ("T" type) differ from standard connectors only in the addition of tuning screws.

ELLIPTICAL WAVEGUIDE ASSEMBLIES

HELIAX elliptical waveguide assemblies are available as either standard guide with untuned connectors or premium guide with tuned connectors. Connectors are factory attached at no extra charge.

The available waveguide and connector types are listed in the table below along with mating connector information and guaranteed VSWR figures for factory assemblies. Performance data for other bands are available on request.

Frequency Band, GHz	Elliptical Waveguide Type Numbers		Connector Type Numbers		Mate To U.S. Flange Types	VSWR, Lengths to 300 Ft.			
	Std.	Premium	Std.	Tuned		Standard RMS	Max.	Prem. Tuned RMS	Max.
1.7-2.1	EW17	EWP17	117E	117ET	CPR-430G	1.09	1.25	1.08	1.19
1.9-2.3	EW17	EWP17	117E	117ET	CPR-430G	1.09	1.25	1.07	1.17
1.9-2.3	—	EWP17	—	117RT	7/8" EIA	—	—	1.09	1.23
2.5-2.7	EW20	—	120E	—	CPR-340G	1.07	1.15	—	—
			120R	—	7/8" EIA	1.07	1.15	—	—
3.7-4.2	EW37	EWP37	137AE	137AET	CPR-229G	1.07	1.15	1.04	1.08
4.4-5.0	EW44	EWP44	144AC	144ACT	UG-148C/U, 149A/U	1.07	1.15	1.03	1.07
5.925-6.425	EW56	EWP56	156AE	156AET	CPR-159G	1.07	1.15	1.03	1.06
			256AC	256ACT	UG-343B/U, 344/U				
			256AE	256AET	CPR-137G				
5.925-6.425	EW59	EWP59	159AC	159ACT	UG-343B/U, 344/U	1.07	1.15	1.03	1.06
			159AE	159AET	CPR-137G				
6.425-7.125	EW59	EWP59	159AC	159ACT	UG-343B/U, 344/U	1.07	1.15	1.03	1.05
			159AE	159AET	CPR-137G				
7.125-7.750 or 7.750-8.400	EW71	EWP71	171AC	171ACT	UG-52B/U, 51/U	1.07	1.15	1.03	1.06
			—	171AET	CPR-112G				
8.5-10.0	EW85	—	185AC	—	UG-40B/U, 39/U	1.07	1.17	—	—
10.7-11.7	EW107	EWP107	1107AE	1107AET	CPR-90G	1.07	1.15	1.03	1.06
12.2-12.7 or 12.7-13.2	EW122	EWP122	1122C	1122CT	51752, 51745*	1.07	1.15	1.04	1.08

*Andrew part numbers for WR75 Flanges

SHIPPING INFORMATION

The table below shows the maximum lengths of elliptical waveguide (either standard or premium— with or without connectors) shipped in wood crates or on disposable wooden reels. The four foot reel has a tare weight, with lagging, of 94 pounds. The

six foot reel tare weight is 315 pounds with lagging.

Longer lengths than shown are shipped on returnable deposit type reels. For further information ask your Andrew sales engineer.

SHIPPING INFORMATION

Type Number	Weight, Lbs. Per Foot	Maximum Length, Feet	Wood Crates Size Inches	Tare Weight Pounds	Disposable Wooden Reels Capacity, Feet	
					48" Dia. x 24"W	72" Dia. x 31"W
EW17	2.73	75	86x86x20	210	—	—
EW20	2.02	75	86x86x20	210	—	—
EW37	1.01	100	72x72x24	125	—	101-425
EW44	0.74	135	57x57x16	110	—	135-450
EW56	0.62	145	57x57x16	90	—	146-550
EW59	0.53	150	57x57x16	90	—	151-600
EW71	0.43	175	48x48x15	75	176-450	451-800
EW85	0.36	200	46x46x16	70	201-550	551-1000
EW107	0.32	200	46x46x15	68	201-550	551-1200
EW122	0.29	200	46x46x14	66	201-600	601-1200

WAVEGUIDE AND FLANGE NOMENCLATURE

The table below lists the popular U.S. waveguide and flange standard types and the IEC equivalents. Andrew elliptical waveguide connectors will mate to the appropriate IEC flanges listed. Andrew standard connectors do not, however, include the alignment

pins or holes or alignment bolts used in some IEC designs. In addition there are some differences in gasket style and depth. Special designs are available on special order.

WAVEGUIDE AND FLANGE NOMENCLATURE

Frequency Band, GHz	Waveguide Types			U.S. Military Flanges		IEC Flanges			Contact Flanges	
	EIA	MIL	IEC	Choke	Cover	Choke	Cover	Cover/Gasket	EIA	IEC
1.7-2.6	WR430	RG104/U	R22	—	—	—	—	—	CPR430G	PDR22
2.2-3.3	WR340	RG112/U	R26	—	—	—	—	—	CPR340G	PDR26
2.6-3.95	WR284	RG48/U	R32	UG54B/U	UG53/U	CAR32	UAR32	PAR32	CPR284G	PDR32
3.3-4.9	WR229	—	R40	—	—	—	—	—	CPR229G	PDR40
3.95-5.85	WR187	RG49/U	R48	UG148C/U	UG149A/U	CAR48	UAR48	PAR48	CPR187G	PDR48
4.9-7.05	WR159	—	R58	—	—	CAR58	UAR58	PAR58	CPR159G	PDR58
5.85-8.2	WR137	RG50/U	R70	UG343B/U	UG344/U	CAR70	UAR70	PAR70	CPR137G	PDR70
7.05-10.0	WR112	RG51/U	R84	UG52B/U	UG51/U	CBR84	UBR84	PBR84	CPR112G	PDR84
8.2-12.4	WR90	RG52/U	R100	UG40B/U	UG39/U	CBR100	UBR100	PBR100	CPR90G	PDR100
10.0-15.0	WR75	—	R120	51752*	51745*	—	—	—	—	—
12.4-18.0	WR62	RG91/U	R140	UG541/U	UG419/U	—	—	—	—	—

* Andrew part numbers for WR75 Flanges

HELIAX® ELLIPTICAL WAVEGUIDE ACCESSORIES



Splice Fitting for use with either standard or premium elliptical waveguide.



Hoisting Grip use at 200 ft. intervals to raise guide on tower.



Bending Tool Kit for elliptical waveguide installation. One each E and H plane form included.



Wall/Roof Feed Through Molded rubber "boot" type.



Grounding Kit is typically used near tower base and ends of run.



Waveguide Hanger Kit includes 10 stainless steel hangers. Use one hanger every 3 feet.

Round Member Adaptor Kit includes 10 stainless clamps to mount hangers to round support members. Two kits are required for use with each EW17 or EW20 hanger kit.



Member Diameter	Type No.
1" — 2"	31670-1
2" — 3"	31670-2
3" — 4"	31670-3
4" — 5"	31670-4
5" — 6"	31670-5



Angle Adaptor Kit includes 10 clamps to mount waveguide hangers to angle members . . . Type 31768-1

Ceiling Bracket to mount waveguide hangers to ceiling or wall. Type 31771-1



Portable Reels

Capacity 100 feet of Types EW56, 59 or 71, 200 feet of Types EW107 or 122. Diameter 44", width 24", weight 24 pounds. Type 34397-1

Capacity 200 feet of Types EW56, 59 or 71, 400 feet of Types EW107 or 122. Diameter 54" width 24", weight 32 pounds. Type 34397-3

Reel Stand supports either reel above, roller type, fastens to side of reel for storage . . Type 34405-1

INSTALLATION ACCESSORIES

Waveguide Type	Splice Fitting	Hoisting Grip	Bending Tool Kit	Feed Through	Grounding Kit	Waveguide Hanger Kit
EW17	117Z	34759	33586-4	35849-10	30417-3	31766-9
EW20	120Z	34759	33586-4	35849-9	30417-5	31766-10
EW37	137AZ	31535	33586-3	35849-8	33212	31766-4
EW44	144AZ	24312A	33586-3	35849-7	24811-2	31766-2
EW56	156AZ	24312A	33586-2	35849-6	24811-2	31766-7
EW59	159AZ	29961	33586-2	35849-5	24811-2	31766-1
EW71	171AZ	19256B	33586-1	35849-4	33211	31766-3
EW85	185AZ	29958	33586-1	35849-3	24810-2	31766-5
EW107	1107AZ	29958	33586-1	35849-2	24810-2	31766-6
EW122	1122AZ	29958	33586-1	35849-1	24810-2	31766-8

HELIAX® ELLIPTICAL WAVEGUIDE INSTALLATION

The availability of HELIAX elliptical waveguide in long lengths and the guide flexibility normally allow a "one piece" installation with connectors only at equipment and antenna terminations. Installation instructions are included with each shipment for information.

All HELIAX elliptical waveguide connectors can be attached in the field with ordinary hand tools. Complete instructions are included with each connector.

PREPARATION

The transmitting equipment and antenna should be installed prior to the waveguide. Inspect the guide for possible shipping damage and pressure loss. Bulk waveguide and assemblies are pressure tested at 10 psig prior to shipping and are shipped pressurized.

Factory attached connectors are shipped with blank cover plates attached to retain pressure during shipment. Do not remove blank covers until connection to equipment as they afford protection to the connector face and prevent entry of foreign matter.

When unfitted guide is used, attach the connector to the antenna end before hoisting. Pressure test the assembly prior to hoisting.

HOISTING AND VERTICAL RUN

A pulley and line are recommended for lifting HELIAX elliptical waveguides. The hoist line should be long enough to allow tying to the guide along the vertical run. Hoisting grips are used to support the guide weight on the hoisting line — one every 200 feet.

Position the reel at the tower base so that the guide pays off the bottom toward the tower, and support the reel on an axle to permit free rotation. Short lengths not on reels are uncoiled along the ground and away from the tower.

Place a protective covering over the connector to prevent damage during hoisting; then slowly hoist the guide. Rotation of the reel should be retarded to control payout of the guide.

In most installations the guide may be connected directly to the parabolic antenna with the top bend providing enough flexibility to allow antenna alignment. If necessary an elbow or flex-twist section may be used.

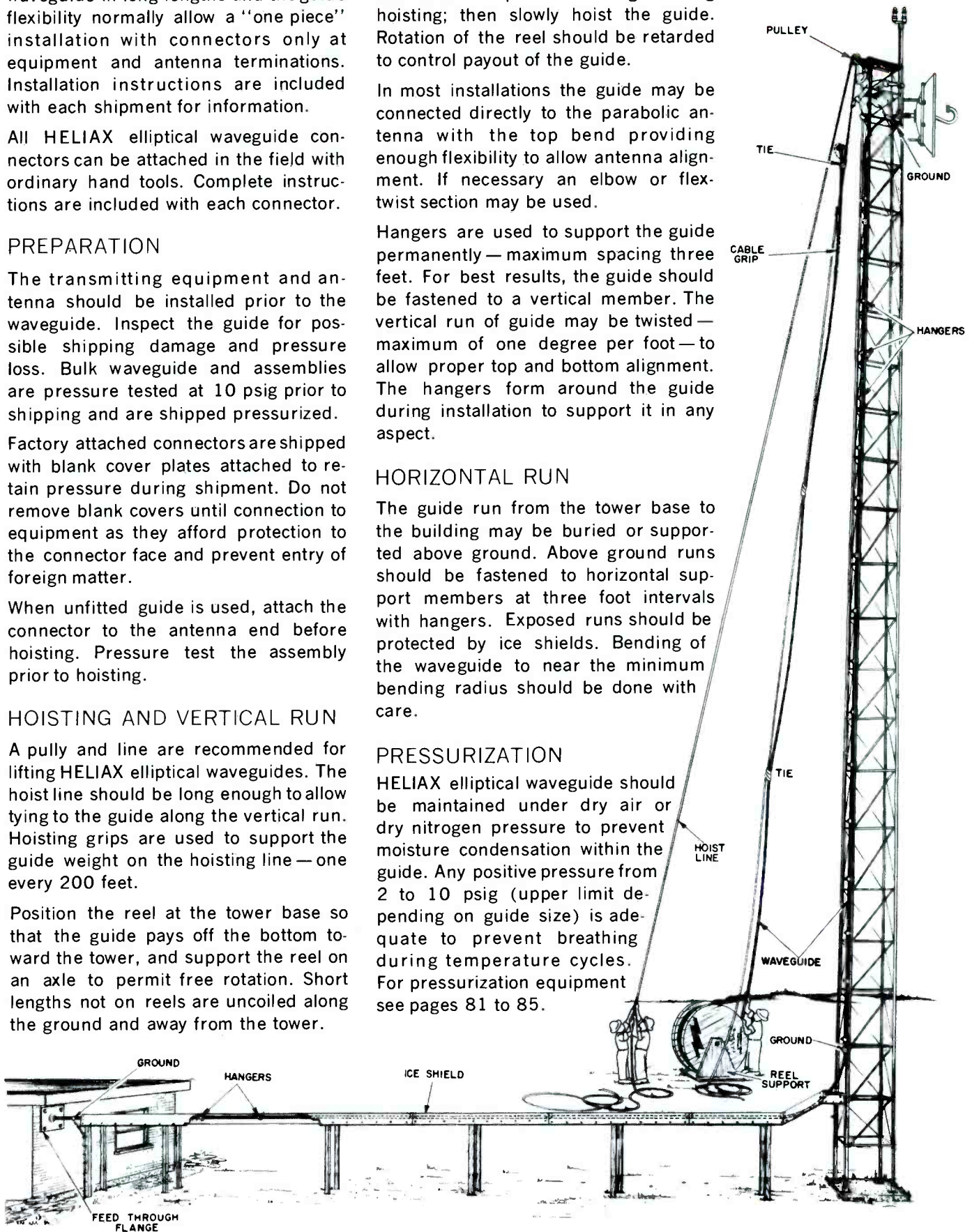
Hangers are used to support the guide permanently — maximum spacing three feet. For best results, the guide should be fastened to a vertical member. The vertical run of guide may be twisted — maximum of one degree per foot — to allow proper top and bottom alignment. The hangers form around the guide during installation to support it in any aspect.

HORIZONTAL RUN

The guide run from the tower base to the building may be buried or supported above ground. Above ground runs should be fastened to horizontal support members at three foot intervals with hangers. Exposed runs should be protected by ice shields. Bending of the waveguide to near the minimum bending radius should be done with care.

PRESSURIZATION

HELIAX elliptical waveguide should be maintained under dry air or dry nitrogen pressure to prevent moisture condensation within the guide. Any positive pressure from 2 to 10 psig (upper limit depending on guide size) is adequate to prevent breathing during temperature cycles. For pressurization equipment see pages 81 to 85.



RIGID RECTANGULAR WAVEGUIDE

A complete line of rectangular waveguide is offered for use in short haul systems and with HELIAX elliptical waveguide. The waveguide is fabricated from high conductivity copper with MIL type choke and cover flanges or EIA contact flanges. Waveguide and components are chromate conversion coated for corrosion protection. Each piece includes flange hardware and gasket. The guide should be pressurized to prevent condensation.

Straight Lengths

are available in standard five and ten foot lengths and in special lengths up to twenty feet. Maximum VSWR is 1.03.

Flexible-Twistable

sections are frequently used to connect to antennas and equipment and for special angles and twists. Fabricated from spiral type silver plated brass conductor. Include pressure tight neoprene protective jackets. Allowable twist 100°/ft. for WR75, 45°/ft. for WR229.

Maximum VSWR 1.10. Standard lengths are one, two and three feet with five foot lengths available in WR137. Other lengths on special order.

90° Elbows

are available in both E Plane and H Plane bends. Maximum VSWR 1.05. Other angles available on special order.

90° Twist

section rotates plane of polarization. VSWR 1.06. Other angles on special order.

Pressure Inlet

is 3/4" machined brass section with 1/8" female pipe threads and plug. Unit is not a pressure window. VSWR 1.02.

Pressure Window

1/16" thick. Maximum pressure 10 psig for WR229, 15 psig for WR62. VSWR 1.04 for choke/cover flange, 1.03 for CPR flange. Not a gas inlet.

Field Flange

for field fabricated waveguide sections. Includes hardware and pressure gasket. Use soft solder to attach.

Hardware Kit

is spare set of nuts, bolts and pressure gasket for one flange connection.

RECTANGULAR WAVEGUIDE AND COMPONENTS WITH CPR FLANGES

Waveguide Size and Frequency Band	WR229 3.3-4.9 GHz	WR187 3.95-5.85 GHz	WR159 4.9-7.05 GHz	WR137 5.8-8.2 GHz	WR112 7.05-10.0 GHz	WR90 8.2-12.4 GHz
Flanges	CPR229G	CPR187G	CPR159G	CPR137G	CPR112G	CPR90G
5 Foot Straight Length	54055-60	55234-60	54749-60	54390-60	55172-60	54396-60
10 Foot Straight Length	54055-120	55234-120	54749-120	54390-120	55172-120	54396-120
Special Length	54055-(*)	55234-(*)	54749-(*)	54390-(*)	55172-(*)	54396-(*)
1 Foot Flex-Twist Section	54059-12	55235-12	54756-12	54395-12	55233-12	54401-12
2 Foot Flex-Twist Section	54059-24	55235-24	54756-24	54395-24	55233-24	54401-24
3 Foot Flex-Twist Section	54059-36	55235-36	54756-36	54395-36	55233-36	54401-36
5 Foot Flex-Twist Section	—	—	—	54395-60	—	—
90° E Plane Elbow	55229-229	55229-187	55229-159	55229-137	55229-112	55229-90
90° H Plane Elbow	55230-229	55230-187	55230-159	55230-137	55230-112	55230-90
90° Twist Section	55231-229	55231-187	55231-159	55231-137	55231-112	55231-90
Pressure Inlet	55674-229	55674-187	55674-159	55674-137	55674-112	55674-90
Pressure Window	55001-229	55001-187	55001-159	55001-137	55001-112	55001-90
Field Flange	56045-229	56045-187	56045-159	56045-137	56045-112	56045-90
Flange Hardware Kit	55219-229	55219-187	55219-159	55219-137	55219-112	55219-90

* Specify Length in Inches

RIGID RECTANGULAR WAVEGUIDE



E Plane Elbow



H Plane Elbow



Straight Section



Twist



Field Flange



Pressure Inlet



Pressure Window



Flex-Twist Section

RECTANGULAR WAVEGUIDE AND COMPONENTS WITH CHOKE/COVER FLANGES

Waveguide Size and Frequency Band	WR187 3.95-5.85 GHz	WR137 5.8-8.2 GHz	WR112 7.05-10.0 GHz	WR90 8.2-12.4 GHz	WR75 10.0-15.0 GHz	WR62 12.4-18.0 GHz
Flanges, Choke Cover	UG-148C/U UG-149A/U	UG-343B/U UG-344/U	UG-52B/U UG-51/U	UG-40B/U UG-39/U	51752† 51745†	UG-541/U UG-419/U
5 Foot Straight Length	52080-60	19065-60	19045-60	19051-60	51741-60	53210-60
10 Foot Straight Length	52080-120	19065-120	19045-120	19051-120	51741-120	53210-120
Special Length	52080-(*)	19065-(*)	19045-(*)	19051-(*)	51741-(*)	53210-(*)
1 Foot Flex-Twist Section	52095-12	19075-12	51727-12	51737-12	51747-12	53215-12
2 Foot Flex-Twist Section	52095-24	19075-24	51727-24	51737-24	51747-24	53215-24
3 Foot Flex-Twist Section	52095-36	19075-36	51727-36	51737-36	51747-36	53215-36
5 Foot Flex-Twist Section	—	19075-60	—	—	—	—
90° E Plane Elbow	55220-187	55220-137	55220-112	55220-90	55220-75	55220-62
90° H Plane Elbow	55221-187	55221-137	55221-112	55221-90	55221-75	55221-62
90° Twist Section	55222-187	55222-137	55222-112	55222-90	55222-75	55222-62
Pressure Inlet	55675-187	55675-137	55675-112	55675-90	55675-75	55675-62
Pressure Window	55000-187	55000-137	55000-112	55000-90	55000-75	55000-62
Field Choke Flange	53015-187	53015-137	53015-112	53015-90	53015-75	53015-62
Field Cover Flange	53025-187	53025-137	53025-112	53025-90	53025-75	53025-62
Flange Hardware Kit	55224-187	55224-137	55224-112	55224-90	55224-75	55224-62

*Specify Length in Inches

†Andrew Part Number For WR75 Flanges.

RECTANGULAR WAVEGUIDE ACCESSORIES



Tapered Waveguide Transition



Transition to Type N Jack



Rigid or Sliding Hanger



Wall/Roof Feed Through



Spring Hanger



Angle Adaptor



Round Member Adaptor

Tapered Waveguide Transition

Transition between waveguide sizes, 3 to 10 inches in length depending on waveguide size. VSWR 1.10. Other size and flange combinations available.

From	To	Type No.
WR159 (CPR159G)	WR137 (CPR137G)	59220-37
WR137 (UG-344/U)	WR112 (UG-51/U)	59220-5
WR112 (UG-51/U)	WR90 (UG-39/U)	59220-6
WR90 (UG-39/U)	WR75(Cover)	59220-13

Flange Adaptor

WR137 Waveguide with UG flange one end and CPR flange other end. Length 4 inches.

From	To	Type No.
UG-343/U	CPR137G	55249-4
UG-344/U	CPR137G	54658-4

Transition to Type N Jack

VSWR 1.3 over entire waveguide band. Improved VSWR for narrower frequency bands on special order. Other sizes and flange types available.

Waveguide	Flange	Type No.
WR159	CPR159G	54418-159
WR137	CPR137G	54418-137
WR137	UG-344/U	59210-137
WR112	CPR112G	54418-112
WR112	UG-51/U	59210-112
WR90	CPR90G	54418-90
WR90	UG-39/U	59210-90

Wall/Roof Feed Through

1/8" steel plate, split rubber washers and plastic sealing compound. For single waveguide run. Units for multiple runs available on special order.

. Type 55040(*)

Hangers

Molded Tenite with openings to support waveguide in either plane. Use rigid hanger at top of waveguide run. Use sliding hanger every 5 feet as lateral restrainer. Use spring hanger every 50 feet to support waveguide and allow differential expansion between guide and tower. Hardware is stainless.

Rigid Hanger	Type 19007-(*)
Sliding Hanger	Type 19008-(*)
Spring Hanger	Type 19009-(*)

Angle Adaptor Kit

Includes 10 clamps to mount above hangers to angle support members up to 1/2" thick.

. Type 31768-1

*When ordering, insert numeral portion of EIA waveguide designation; i.e. 19007-137 is rigid hanger for WR-137 waveguide.

Round Member Adaptor Kit

Includes 10 stainless steel clamps to mount above hangers to round support members running at right angles to waveguide.

Round Member Diameter	Type No.
1" - 2"	31670-1
2" - 3"	31670-2
3" - 4"	31670-3
4" - 5"	31670-4
5" - 6"	31670-5

CIRCULAR WAVEGUIDE

Low loss WC-109 circular waveguide is often employed for long feeder runs to tower mounted antennas in 11 GHz and 12 GHz microwave systems. When a vertical run exceeds 100 feet, circular waveguide offers a reduction of several decibels of attenuation compared to rectangular or elliptical waveguide. Circular waveguide is particularly useful in a dual polarized system where one run carries both sets of signals.

Andrew circular waveguide is made of heavy wall high conductivity copper tubing and is chromate conversion coated to prevent corrosion. Standard 20 ft. sections and special lengths include CPC fixed flanges on each end with hardware and pressure gaskets.

The guide should be pressurized (10 psig maximum). The VSWR per section is guaranteed below 1.02 and is typically better than 1.005.

COMPONENTS

Transitions convert from circular to rectangular waveguide at the ends of the vertical run. Transitions include swivel flanges for easy installation and polarization alignment. The axial ratio compensator is a rotatable assembly installed at the bottom of the run. It is used to adjust the eccentricity of the bottom section to cancel out the axial ratio distortion of the run.

The alignment shorting plate is used during initial alignment. It is installed at the top of the run while the axial ratio is adjusted.

The hangers are of molded Tenite with stainless steel hardware. One or more rigid hangers are used at the top of the run, one for each 75 feet of waveguide. Sliding hangers are installed every six feet to maintain mechanical stability. Spring hangers are used every 24 feet (instead of sliding hangers) to provide weight suspension and accommodate differential expansion between waveguide and tower. Hangers include 1/2" hardware to mount to the angle adaptor offered or to other brackets.

CHARACTERISTICS

Typical electrical characteristics for a complete 240 ft. run of WC-109 with dual polarized transitions at each end are: VSWR 1.08 maximum, 1.04 average; axial ratio (compensated) 30 dB minimum, 35 dB or more average; isolation between polarizations 30 dB minimum, 35 dB average; attenuation 3.5 dB (includes .2 dB for each transition).



ORDERING INFORMATION

WC109 Straight Sections 10.5 — 13.2 GHz

Type 54346-240 20 ft. section w/flanges

Type 54346-(*) Special length w/flanges

*Specify Length in inches.

Plane Polarized Transitions

Type 57222-107 10.7—11.7 GHz band
w/CPR 90 flange

Type 57222-127 12.7—12.95 GHz band
w/WR-75 choke flange.

Dual Polarized Transitions

Type 57001-107 10.7—11.7 GHz band
w/CPR 90 flanges.

Type 57001-127 12.7—12.95 GHz band
w/WR-75 choke flanges.

Axial Ratio Compensator

Type 54348

Alignment Shorting Plate

Type 56207

Hangers

Fixed Hanger
Sliding Hanger
Spring Hanger

Type 19007-18
Type 19008-18
Type 19009-18

Angle Adaptor

Type 13555A

TELEMETRY ANTENNAS

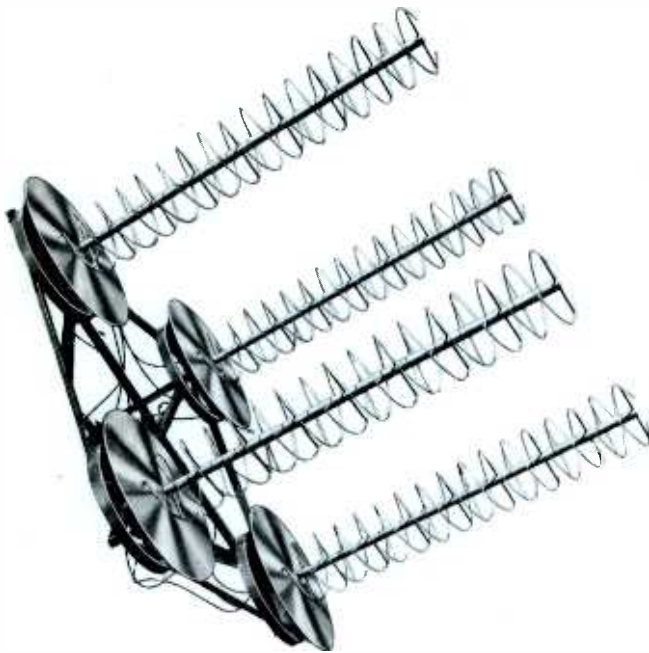
ANDREW offers a wide choice of antennas for telemetry, command and control, and special purpose applications from 50 MHz to 10 GHz. Standard designs include discons, discages, helicones, helical, bifilar parabolic and log periodic antennas. The specific items on this and the following pages are indicative of the types offered in all popular frequency bands. For information on similar antennas ask your Andrew Sales Engineer.



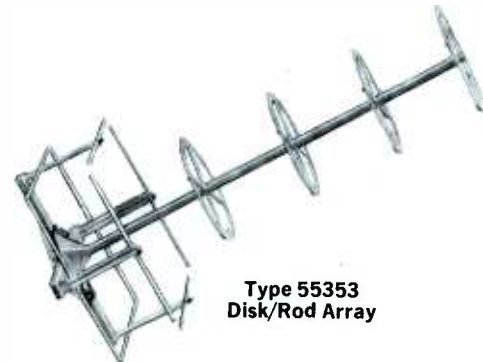
**Type 55050
Conical Horn**



**Type 55244
Broad Band Antenna**



**Type 52650
Quad Helical Array**

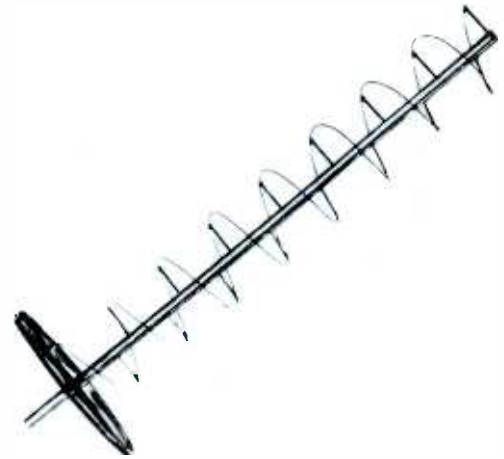


**Type 55353
Disk/Rod Array**

Type Number	52650	55050-14	55244	55353
Antenna Description	Quad Helical Array	Conical Horn	Broad Band Horn	Low Gain Disk/Rod Array
Frequency, MHz	215-265	1400-1550	500-2000	130-140
Polarization	rh circular	planar	planar	rh/lh circular
Gain, midband, dBi or dBic	19	16.5	14	11
VSWR, maximum	2.0	1.4	2.5	1.7
Beamwidth, midband, degrees	16.5	29	33	50
Side Lobes, dB down	10	10	10	10
Power, cw watts	250	100	100	250
Input	N Jack	N Jack	N Jack	N Jack
Dimensions, inches	110x110x99	21 dia. x 17	38x18x24	51 dia. x 160
Rated Wind Velocity, mph (no ice)	120	150	120	100
Net Weight, pounds	400	7	60	100

DIRECTIONAL HELICAL ANTENNAS

These antennas provide right hand circular polarization in a directional pattern. They are light weight, rugged units capable of withstanding 120 mph winds and salt and sand environment. All units have "N" Jack input. Each unit is available with three mount options; -1 is without mount, -3 is with pipe mount (4" up to 1000 MHz and 1-3" above) and -5 includes Type 51930 manual mount.



Frequency, MHz	Type No.	Gain, dBic midband	Beamwidth degrees	Side Lobes dB down	Maximum VSWR	Power (cw) watts	Dimensions, inches	Net Weight pounds
215-265	60102	13.5	35	9	2	250	44 dia. x 135	35
260-320	60103	13.5	35	10	2	250	36 dia. x 113	32
320-400	60104	13.5	35	10	2	200	31 dia. x 100	28
400-550	60109	12.0	38	10	2	200	25 dia. x 83	22
600-700	60111	12.0	38	10	2	200	17 dia. x 71	18
1300-1600	60115	12.0	38	10	1.5	150	9 dia. x 16	3
1600-2000	60116	12.0	38	10	1.5	100	6 dia. x 16	3
2100-2300	55305	15.0	30	12	1.5	100	7 dia. x 17	3

BROADBAND OMNIDIRECTIONAL ANTENNAS

These units are vertically polarized and provide omnidirectional coverage in the azimuth plane. The vertical pattern is essentially that of a dipole. All units will withstand 120 MPH winds, salt spray, and sand/dust erosion. Other frequency bands are available.



Frequency, MHz	Type No.	Antenna Type	Gain, dBi midband	Maximum VSWR	Power, (cw) watts	Dimensions, inches	Input	Net Weight, pounds	Mounts To Pipe
50-108	50170-2	Discage	2	2	500	66 dia. x 67	"N" Jack	60	4"
108-215	19050-1	Discone	2	2	1500	35 dia. x 32	7/8" EIA	16	1"
215-420	19050-2	Discone	2	2	1000	16 dia. x 14	7/8" EIA	12	1"
420-1000	19050-3	Discone	2	2	600	11 dia. x 14	7/8" EIA	9	1"
550-1500	19050-4	Discone	2	2	500	9 dia. x 14	7/8" EIA	8	1"
1300-2400	19050-5	Discone	2	2	400	6 dia. x 14	7/8" EIA	5	1"
1000-4000	55520-10	Biconical Dipole	2	2.5	250	3 dia. x 13	"N" Jack	3	1"
4200-7500	54608	Discone	2	2	300	1 dia. x 10	"N" Jack	3	1"

TELEMETRY ANTENNAS

AIRBORNE OMNIDIRECTIONAL ANTENNAS



Type 55070-14

Air Speed Rating: Mach 2

Military Specifications: MIL-E-5400, MIL-E-5272

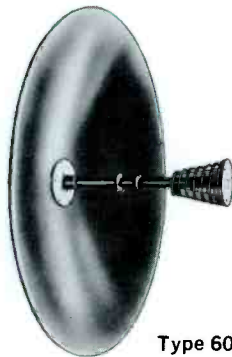
All models provide a radiation pattern essentially that of a quarter wave monopole and gain of 5 dBi when mounted on ground plane six or more wavelengths in diameter. Polarization is vertical, input is "N" Jack and net weight is 7 oz. Other frequency models are available.

Frequency, GHz	Type Number	VSWR, Maximum	Power, (cw) Watts	Frequency, GHz	Type Number	VSWR, Maximum	Power, (cw) Watts
.88-.92	55070-9	1.3	500	7.1- 8.4	55070-71	1.5	50
1.43-1.54	55070-14	1.3	300	2.0- 4.0	56520-20	2.0	75
1.70-1.85	55070-17	1.3	250	4.0- 7.0	56520-40	2.0	50
2.1 -2.3	55070-21	1.3	200	7.0-10.0	56520-70	2.0	25
4.4 -5.0	55070-44	1.3	200				

CIRCULARLY POLARIZED PARABOLIC ANTENNAS



Type 60004-21



Type 60008-4

These antennas are used for ground-to-air and other applications. Polarization is r.h. circular. Three foot diameter units include same mount as two foot antennas shown on page 11; all other units use standard parabolic antenna mounts shown on Pages 11, 12 and 13.

Other sizes and/or frequency bands are available on special order.

Frequency, MHz	Type Number	Diameter, feet	Gain, dBic	Beam Width, degrees	Power, (cw) watts	VSWR, maximum	Input
400-550	60008-4	8	19	18	10,000	2.0	3-1/8" EIA
400-550	60010-4	10	21	15	10,000	2.0	3-1/8" EIA
1400-1600	60003-14	3	19.5	18	100	1.5	N Jack
1400-1600	60004-14	4	22.5	12	100	1.5	N Jack
1400-1600	60008-14	8	28.5	6.3	100	1.5	N Jack
2100-2300	60003-21	3	23.2	11.5	25	1.5	N Jack
2100-2300	60004-21	4	25.8	8.5	25	1.5	N Jack
2100-2300	60006-21	6	29.2	5.5	25	1.5	N Jack

TELEMETRY ANTENNAS

BROADBAND VHF DIRECTIONAL

Type **59135** is a log periodic antenna covering the 140-750 MHz band. The unit is fabricated of stainless steel tubing for corrosion resistance and may be mounted for either vertical or horizontal polarization.

HIGH GAIN UHF OMNIDIRECTIONAL

Type **56090** and similar units are used in missile test ranges to transmit range timing signals. Polarization is vertical, horizontal pattern is circular with $\pm 0.2^\circ$ and vertical pattern is 8.5° to half power points. The unit is 1.5 inches in diameter and 62 inches high.

CHARACTERISTICS

Type Number	59135	56090
Frequency, MHz	140-750	1725-1775
Gain, Mid-band dBi	10	9.5
VSWR, Maximum	3.0	1.5
Power, (cw) Watts	250	100
Input	N Jack	N Jack
Rated Wind Velocity mph, (no ice)	150	100
Net Weight, pounds	35	8



Type 59135
VHF Directional



Type 56090
UHF Omnidirectional

ANTENNA MOUNTS

Omnidirectional and certain directional antennas include pipe mounts, as indicated in the previous pages. These allow 360° azimuth adjustment. The 1.4-1.6 and 2.1-2.3 GHz antenna pipe mounts also provide $\pm 180^\circ$ elevation adjustment.

The parabolic antennas in this section can be used with any of the standard mounts shown on pages 11, 12 and 13. These antennas and the helical arrays may also be used with any of the positioners shown on pages 40 to 43.

Type **51935**, Portable Tripod, is a heavy duty model used for temporary or permanent installation. Height is 50 inches and net weight is 20 pounds.

Type **51930**, Tilt Mount allows 360° azimuth adjustment and 0° to 90° elevation adjustment and may be locked in position. Type 51930 Tilt Mount is designed for use with Type 51935 Portable Tripod.



Type 51930
Tilt Mount

Type 51935
Tripod
(with antenna and tilt mount)

TELESCOPING PNEUMATIC MASTS



**Lightweight
Quick Installation
Up to 100 Feet Heights**

Andrew telescoping masts are used in military and commercial applications for quick erect antenna installations. Masts with extended heights ranging up to 100 feet and nested heights as low as 6 feet are available. Guy assemblies, ground anchors, tensioning devices, base level indicators, hardware and fittings are available as standard equipment.

Andrew offers over 16 years' experience in designing and supplying field proven masts for various communications applications. One of a kind designs with known reliability can be provided. Andrew applications engineers are prepared to demonstrate how the versatile telescoping mast can serve your system.

MAST CONSTRUCTION

Andrew mast sections are constructed of specially extruded aluminum or stainless steel tubing, varying in length and diameter according to extended and nested height design requirements. Each tube section has two longitudinal keys which mate with keyways in the next section's collar to prevent rotation of the mast. The collar attached to each section contains the keyway and latch assembly and provides for guy wire attachment. Special seals maintain air pressure within mast sections.

TYPICAL APPLICATIONS

Quick erect guyed support structures for microwave antennas or HF log periodic arrays.

HF vertical radiator antenna providing electrical continuity.

Self-supported whip antenna for remote control.

Mobile mast used in station wagons, trucks or trailers as extendable supports or whip antennas.

Temporary support for television cameras, microphones, and PA systems.

Hardened site antennas in permanent underground bunker installations.

Trailer transport systems containing the entire antenna communication package.

TACTICAL TRANSPORTABLE MASTS

Mobile Mast System

Illustrated at the right is a complete Andrew mobile microwave antenna system. Included in the trailer mounted package are:

100 ft. telescoping pneumatic mast complete with guy wires, guy stakes, and pneumatic cylinder to lift it into vertical position.

EI/Az positioner to fit on top of the mast.

Six foot 7 GHz parabolic antenna to fit on the positioner.

Length of HELIAX elliptical waveguide to feed the antenna with control and power cables for the positioner as well as messenger cables extruded in the waveguide jacket.

Andrew dehydrator to pressurize the guide and raise the mast.

Gasoline driven motor generator set to power the dehydrator, the positioner, and the obstruction lights.

This is indicative of the type of complete antenna system Andrew can furnish.



Manually Erected Transportable Mast

Lightweight Aluminum
Easy to Assemble
Adaptable to Various Loadings
Compact Design
Meets Military Specifications

Andrew has designed a manually erected transportable mast, well suited for temporary installations or remote location applications.

During erection the five foot aluminum tubular sections are "breech loaded" into the erecting mechanism and manually raised by the lever arm assembly. The units include safety brake and locking ring arrangements and quick locking guy assemblies to facilitate installation.

APPLICATIONS

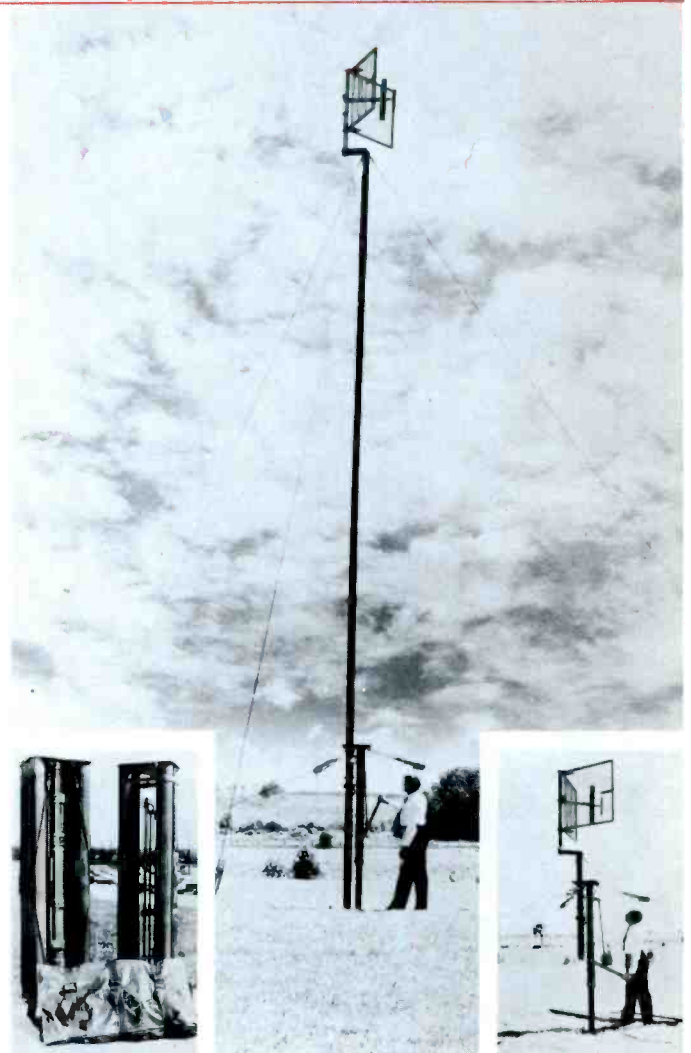
Transportable Communications Systems—VHF or UHF—vehicular or airborne. Path testing for microwave system layout.

Emergency service.

Temporary radio systems.

SPECIFICATIONS

35 foot and 50 foot models have been manufactured. Erection time is on the order of 15 minutes for two men. Maximum horizontal thrust load at top is 320 pounds. Maximum vertical load is 70 pounds. Net weight of entire package is 115 pounds for 35 foot mast, 150 pounds for 50 foot. Your Andrew sales engineer can provide further details.



38500 SERIES ANTENNA POSITIONERS



**Type 38500 Positioner, 6 Foot Antenna
With Mount And Counterweight Assembly**



**Type 38500
El/Az Positioner**



**Type 38501
Az Only Positioner**

Type **38500** is a compact dual axis positioner. This lightweight unit is intended for use with antenna loads up to the equivalent of a 6 foot diameter solid paraboloid or up to an 8 foot mesh type paraboloid. Under rated load the positioner will withstand 115 mph winds and will function within rated accuracies in 30 mph winds. Stow pins are not necessary under maximum rated loads. A mount adaptor is available to convert the standard pedestal for mounting on portable or telescoping masts.

Standard speed of rotation and elevation is one degree per second on 60 Hz power. Other speeds are available up to four degrees per second. Limit switches are included in azimuth/elevation drives. All positioners include 1:1 synchros for each axis. Position readout dials are provided on the control panel for each axis. All circuits are fused at the panel.

A control panel is included with each positioner. Control cable, antenna mounts, counterweights and pedestal extensions must be ordered separately.

The 38500 series pedestal is fully enclosed, gasket sealed and weather tight. The unit will withstand exposure to sand, dust, rain and salt spray. Gear trains are enclosed in gear boxes with permanent lubrication.

The unit is available in several standard versions as outlined on the next page.

CHARACTERISTICS

Type Number	38500
Function	El/Az
Input Voltage	120v, 60 Hz
Power Requirements, watts	400
Maximum Vertical Load, pounds	1200
Wind Load, survival, mph*	115
Operational*	45
Readout Accuracy, degrees*	±1.0
Position Accuracy, degrees*	±0.5
Travel Limits, degrees	
Elevation	-10 to +190
Azimuth	400
Rated Speed, degrees/second (60 Hz)	
Azimuth	1.0
Elevation	1.0
Delivered Torque, ft. lbs.	120
Base Diameter, inches	24
Height, inches	21-1/4
Net Weight, pounds	235

* With 6 foot solid parabolic antenna.

38500 SERIES ANTENNA POSITIONERS

POSITIONER OPTIONS

Type **38500** is the basic El/Az positioner for 120V/60 Hz operation with characteristics as outlined on Page 40. Units include control panels, but no control cable, antenna mounts, counterweights, etc.

Type **38501** is the azimuth only version with the same characteristics as the azimuth section of the basic unit, for 120V/60 Hz operation. Units include control panels but no control cable, antenna mounts, counterweights, etc. Net weight is 140 pounds.

Type **38502** is the basic El/Az positioner for 120V/60 Hz operation with mounting brackets designed specifically for microwave relay applications. The mount and counterweight assembly is drilled for L-brackets or mounts used with RF heads. Control panel is included but no control cable. Characteristics are the same as the basic Type 38500 except that elevation travel limits are $\pm 15^\circ$ and net weight is 425 pounds (including mount/counterweight assembly).

220V, 240V and 50 HZ versions of the above units are available. For information specify the supply voltage and frequency desired.

ACCESSORIES

Type **31681** is a 19 conductor cable assembly with connectors attached, for use between Type 38500 series positioners and the control panel. Specify length required up to 1000 feet. For lengths over 1000 feet special engineering is required.

Type **38552-20** Pedestal Extension (steel) is 20 inches in height to raise the 38500 series positioner for antenna clearance. This height is sufficient to clear a 4 foot parabolic antenna on Type 38500 or a 6 foot antenna on relay Type 38502.

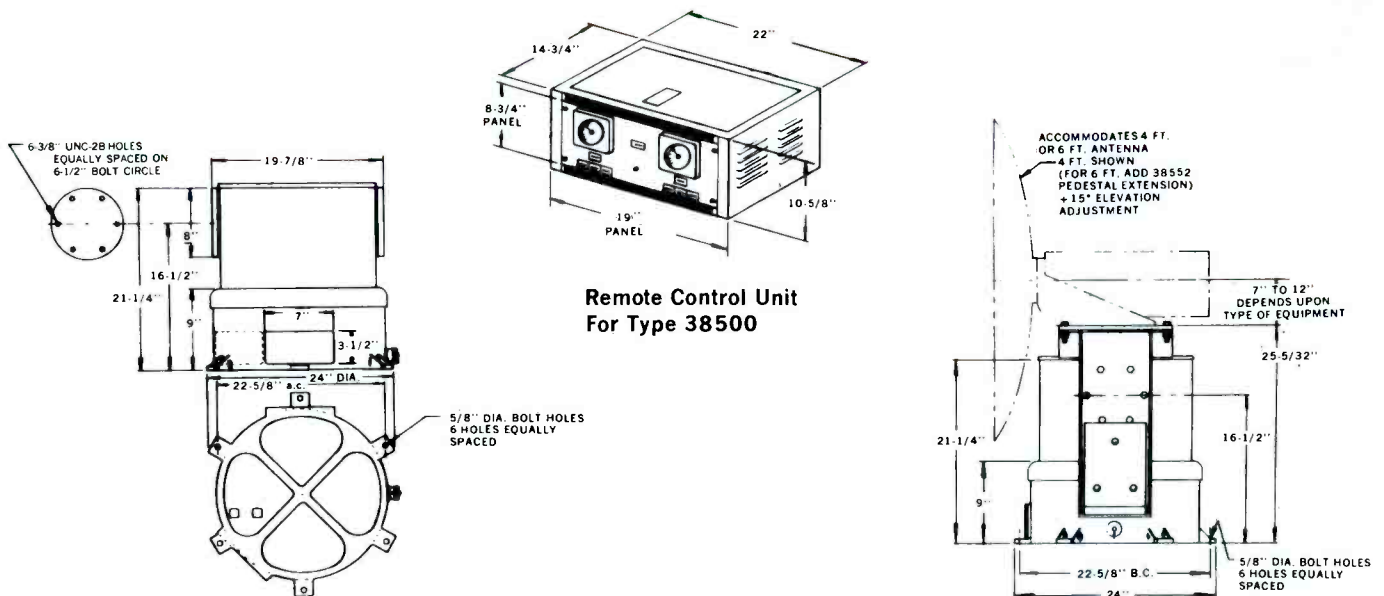
Type **38552-32** Pedestal Extension (steel) is 32 inches in height, sufficient to clear a 6 foot parabolic antenna on Type 38500. Other heights are available.

Aluminum Pedestal Extensions are available on special order for lightweight installations.

Antenna mounting brackets are available for four and six foot antennas and may be ordered with appropriate counterweights for the antenna to be mounted. Specify the Andrew antenna to be mounted.

The 38500 series positioners normally do not require mechanical stops because the gear train friction provides adequate holding power under rated loads.

OUTLINE DIMENSIONS



Type 38500 Positioner

Remote Control Unit For Type 38500

Type 38502 Shown With Typical "L" Bracket and TV Relay Unit.

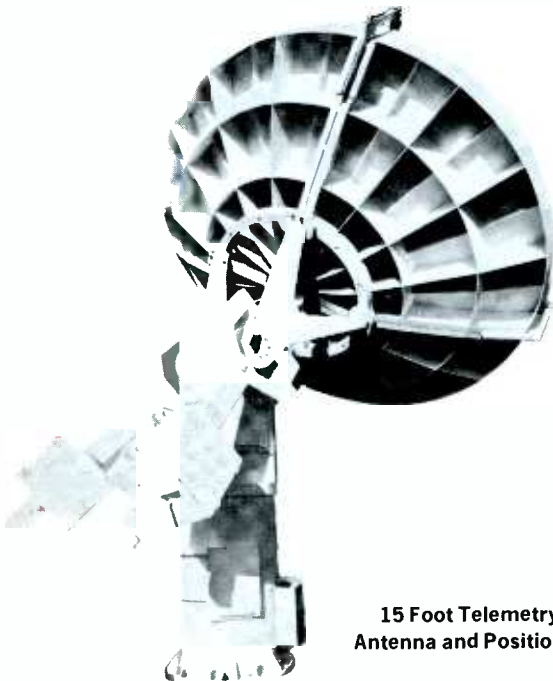
CUSTOM DESIGNED ANTENNA POSITIONERS



**Complete Installation of Rotatable
60 Foot Tropospheric Antenna
and Positioner**



**Inset:
Positioner Being Lifted
Into Position**



**15 Foot Telemetry
Antenna and Positioner**

**125 mph Heavy Duty Designs
Antennas Up to 60 Feet
Solid State Power Supplies
Optional Servo Controls**

Andrew single and dual axis positioners will accommodate a wide selection of operating options and control systems.

All large positioners are custom designed to specific requirements using standard building blocks — housings, motors, gear trains, antenna mounts, etc.

All positioners feature enclosed gear trains and motors. Large access doors, interlock switches and convenience outlets in positioner housings facilitate field inspection and maintenance. Heavy precision power gears assure long life and quiet operation. Motors, controlled by power amplifiers, assure relatively constant torque outputs at all speeds and loads within rating. Electromechanical braking is supplied when necessary.

Units typically include electromanual controls with 1:1 synchros and readout indicators for each axis. Limit switches are used in both azimuth and elevation.

Azimuth only positioners include standard electromanual controls. Motors, protective devices and optional controls and equipment are similar to those available in dual axis positioners.

Shock absorbers may be provided in the elevation section. These shock absorbers, in conjunction with torque limitations on driving motors, prevent damage in the event of a circuit failure.

Standard options include servo controls, slip rings for continuous rotation, 36:1 position indicators, stow pins, rotary joints and dynamic braking.

Standard motors and counterweights are available for use with these positioners and any Andrew parabolic or directional telemetry antenna.

Special antenna mounts and counterweights can be designed and fabricated to your specifications.

Base spacers are available to increase positioner heights and provide clearance for large antennas.

As these units are all custom designed, price and delivery depend on individual requirements. Your Andrew Sales Engineer can submit a quotation to your specifications.

ANTENNA POSITIONER CONTROL SYSTEMS

ELECTRO MANUAL CONTROL SYSTEM

Andrew positioners are supplied with basic controls for electro manual operation. These panels fit standard 19 inch relay racks and provide necessary dc voltages and position information for the operation of all positioner functions. Control cable assemblies are ordered separately.

Azimuth only positioners are supplied with a single axis control panel.

Positioners equipped with optional 36:1 synchro transmitter or other ratios are supplied with appropriate position dials. Zero reset indicators are available.

Variable speed positioners can be supplied and include the basic unit shown at right. Panels include 1:1 synchro driven position indicators and variable speed "center off" controls for each motor. These controls allow continuously variable speed control in two directions for each axis. Individual solid state power supplies are provided for each motor and control circuit.

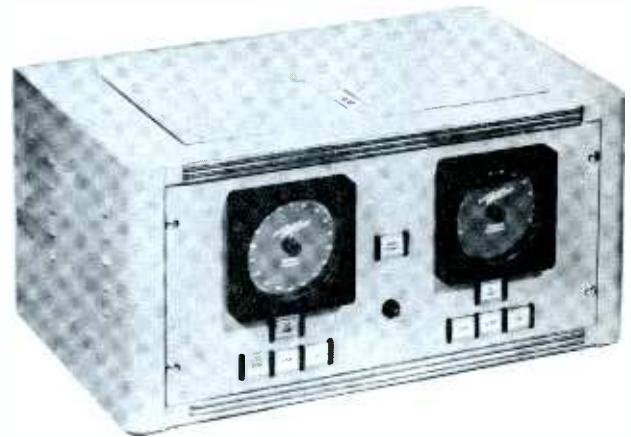
SERVO CONTROL SYSTEM

Servo controls are available for all variable speed, dc powered positioners. These systems feature solid state or rotary amplifiers to operate both azimuth and elevation drive motors. Smooth tracking is assured by a high gain tachometer loop, enclosed by the position loop which receives one speed synchro data from a remote slaving source.

Control and indication functions are panel mounted. Standard operational modes are standby, rate and slave. In stand-by mode, the drive motor brakes are applied and motor power is removed, but the servo amplifiers remain energized. In rate mode, the tachometer rate signal of each axis is matched against the command signal from the corresponding rate potentiometer, on the control panel, to give a closed loop rate control. In slave mode, the position control is closed through the one-speed synchros in the mount and at the remote slaving source.

Solid state components are used throughout the control circuitry. Radio frequency interference is reduced through a system of suppressors and shielding.

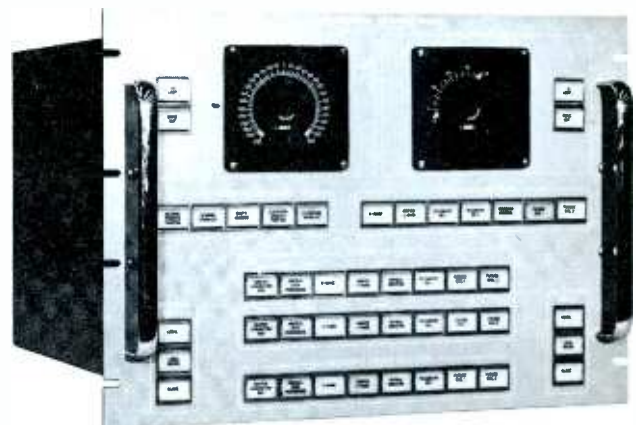
Control functions and panel layout are available to meet specific requirements. Andrew is prepared to assist in your planning.



EI/Az Fixed Speed Control Unit.



EI/Az Variable Speed Control Unit.



Control and Indication Unit
For Servo Control System

FIXED STATION ANTENNAS

INTRODUCTION

Andrew, a pioneer in the field, offers a wide selection of fixed station antennas for the two-way communications industry. Many thousands of Andrew antennas are now in service throughout the world, many in continuous service for more than 15 years. Andrew antennas are designed, built and production tested with great care to ensure reliable field performance to system requirements. Andrew fixed station antennas include unipole, collinear array, corner reflector, and Yagi types in four frequency bands from 25 to 470 MHz.

The gains shown for antennas are given in dBd (Gain in decibels relative to a half wave dipole).

All antennas have a 50 ohm nominal input impedance.

Windload ratings are shown for all antennas. Thrust is indicated in pounds at 87 mph (30 psf) in accordance with EIA standards.

Unless otherwise indicated, a dc path to ground is provided for lightning protection.

Certain antennas require separate mounting clamps. Clamps are illustrated and described on page 50.

Omnidirectional Unipole Antenna 25-148 MHz



Type 900C

The Andrew unipole antenna has been one of the more popular fixed station antennas for many years. It provides omnidirectional coverage at minimum cost. For directional coverage see the cardioid unipole antenna on opposite page.

CHARACTERISTICS

Type Number	900C
Frequency, MHz	25-148
Gain, dBd	0
VSWR, maximum	1.5
Power Rating, watts	700
Termination, jack (female)	UHF
Survival Wind Velocity, mph	100
Thrust at 87 mph, pounds	46
Mounting Clamps: * For	
round member tower, order	29291-3
angular member tower, order	14672-3

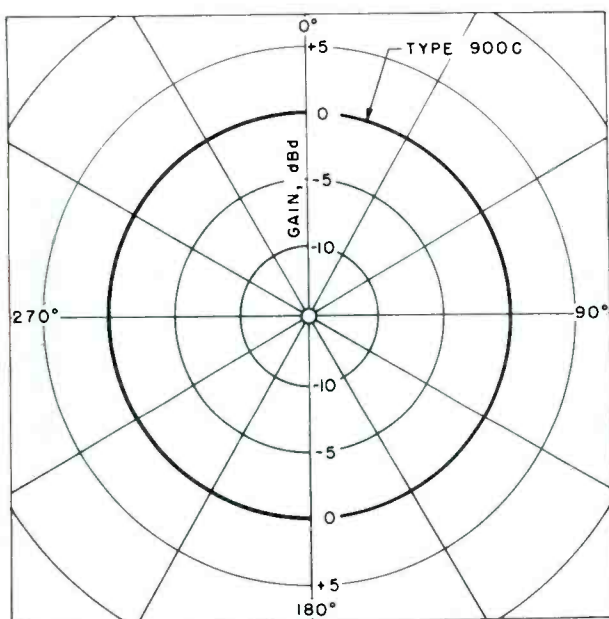
* See Page 50

ORDERING INFORMATION

Omnidirectional Unipole Antenna

Type Number	Frequency MHz	Net Weight Pounds
900C-0	25-30	28
900C-1	30-44	24
900C-2	44-54	20
900C-3	72-76	14
900C-4	108-148	10

Horizontal Radiation Pattern



FIXED STATION ANTENNAS

30-50 MHz Cardioid Unipole Antenna



The cardioid unipole provides gain over a 180 degree horizontal sector. This antenna is ideally suited for service along city or state boundaries, shorelines or back to back with other services.

148-174 MHz Omnidirectional Antenna



The high band unipole is an economical antenna for omnidirectional coverage when high gain is not required. For omnidirectional gain antennas, see page 46.

CHARACTERISTICS

Type Number	920	925A
Frequency, MHz	30-50	148-174
Gain, dBd	3.0	0
Front to Back Ratio, minimum, dB	15.0	-
VSWR, maximum	1.5	2.0
Termination, jack (female)	UHF	UHF
Power Rating, watts	700	500
Survival Wind Velocity, mph	87	125
Thrust at 87 mph, pounds	87	18
Mounting Clamps:* For		
round member tower, order	29291-3	21208
angular member tower, order	14672-3	—

* See Page 50

ORDERING INFORMATION

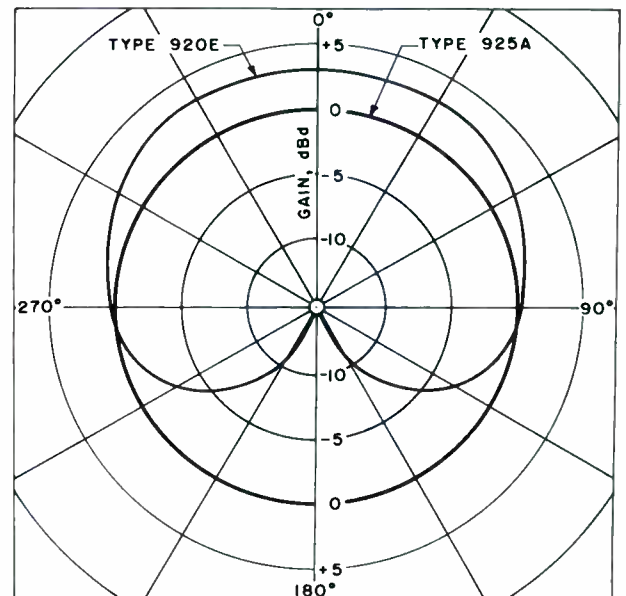
Cardioid Unipole Antenna

Type Number	Frequency MHz	Net Weight Pounds
920E-1	30-36	57
920E-2	36-42	46
920E-3	42-50	42

High Band Omnidirectional Antenna

925A	146-174	7
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Horizontal Radiation Patterns



FIXED STATION ANTENNAS

136-174 MHz High Gain Omnidirectional and Offset Antennas

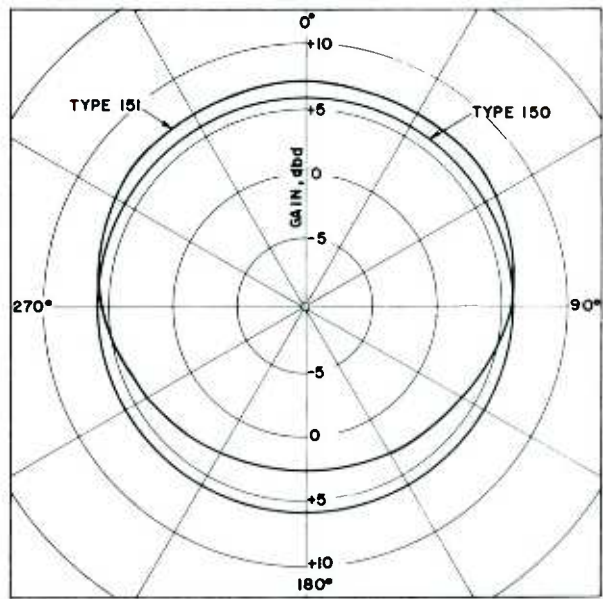


Type 150



Type 151

Horizontal Radiation Patterns



These high gain antennas offer reliable all weather performance. Radiating elements are completely enclosed in a high strength fiberglass reinforced plastic radome. Type 151, the offset version, consists of the basic Type 150 omnidirectional unit plus a reflecting element to provide directivity.

CHARACTERISTICS

Type Number	150	151
Frequency, MHz	136-174	136-174
Gain, dBd	5.8	7.6
Front to Back Ratio, minimum, dB	-	5.5
VSWR maximum	1.5	1.5
Power Rating, watts	500	500
Termination, jack (female)	UHF	UHF
Survival Wind Velocity, mph	125	125
Thrust at 87 mph, pounds	70	105
Length, maximum, feet	24	24
Mounting Clamps *For		
round member tower, order	29291-3	29291-3
angle member tower, order	14672-3	14672-3

* See Page 50

ORDERING INFORMATION

High Gain Omnidirectional Antenna

High Gain Offset Antenna

Type Number	Frequency MHz	Net Weight pounds	Type Number	Frequency MHz	Net Weight pounds
150-9	136-140	26	151-9	136-140	33
150-10	140-144.5	26	151-10	140-144.5	33
150-11	144.5-149	25	151-11	144.5-149	32
150-1	149-153	24	151-1	149-153	31
150-2	152.5-158.07	24	151-2	152.5-158.07	31
150-3	154-159	23	151-3	154-159	30
150-4	159-164	23	151-4	159-164	30
150-6	164-169	22	151-6	164-169	29
150-8	169-174	21	151-8	169-174	28

FIXED STATION ANTENNAS

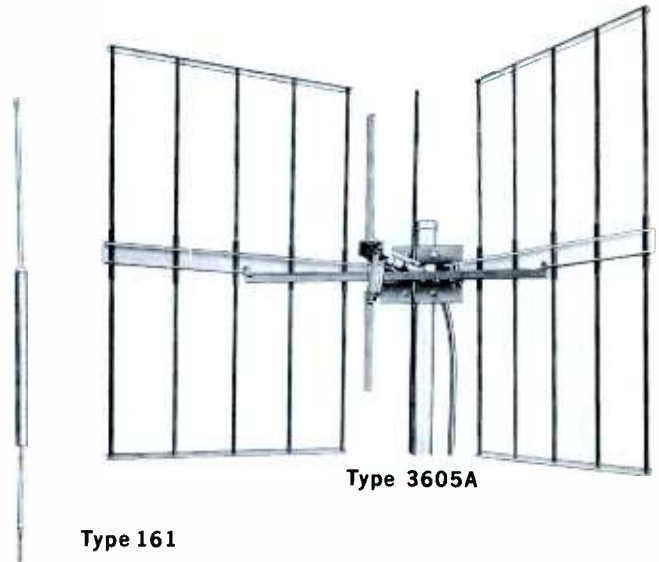
136-174 MHz Medium Gain Omnidirectional and Corner Reflector Antenna

Type 161

Type 161 is an economical medium gain antenna designed to fill both the price and performance gap where a unity gain antenna won't quite do the job and a high gain antenna is more than needed.

TYPE 3605A

High gain unidirectional coverage is afforded by the 3605A corner reflector. Gains up to 12.5 dB in the forward direction are achieved by stacking 4 units. 2 and 4 bay unit arrays include cable harness.



CHARACTERISTICS

Type Number	161	3605A	3625	3645
Frequency, MHz	136-174	148-174	148-174	148-174
Gain, dBd	2.8	7.5	10.0	12.5
Front to Back Ratio, minimum, dB	—	24.5	24.5	24.5
VSWR, maximum	1.5	1.5	1.5	1.5
Power Rating, watts	500	500	500	500
Termination, jack (female)	UHF	UHF	UHF	UHF
Survival Wind Velocity, mph	100	125	125	125
Thrust at 87 mph, pounds	33	60	125	250
Length, maximum, inches	120	—	—	—
Mounting Clamps* For				
round member tower, order	30150			
angular member tower, order	14672-3			

— Included to mount to 2" OD pipe —

* See Page 50

ORDERING INFORMATION

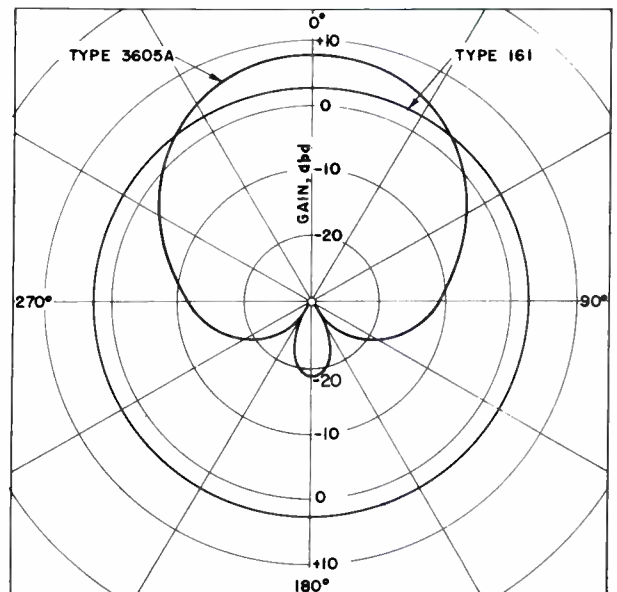
Medium Gain Omnidirectional Antenna

Type Number	Frequency MHz	Net Weight Pounds
161-4	136-144	7
161-3	144-150	7
161-1	150-162	8
161-2	162-174	8

Corner Reflector Antennas

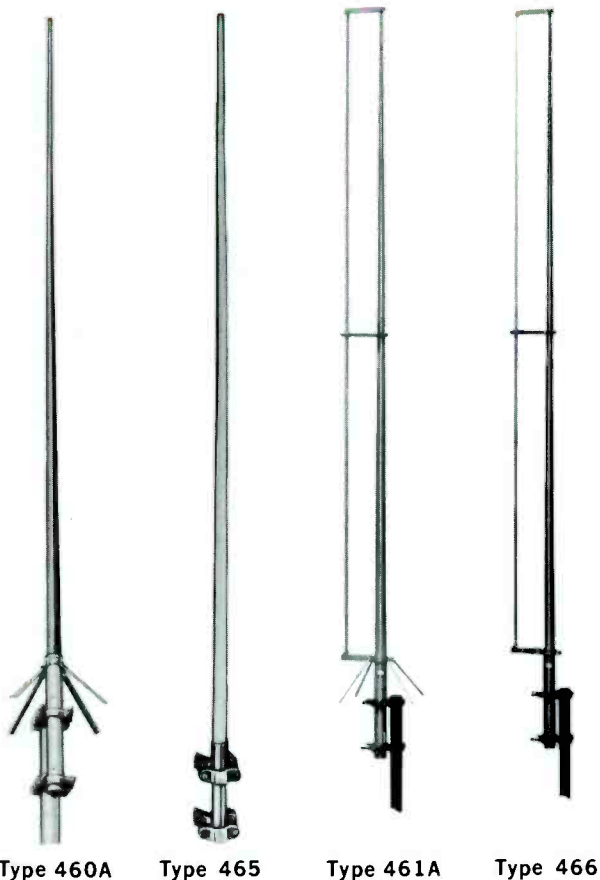
Type Number	Frequency MHz	No. of Units	Net Weight Pounds
3605A	148-174	1	26
3625	148-174	2	55
3645	148-174	4	115

Horizontal Radiation Patterns

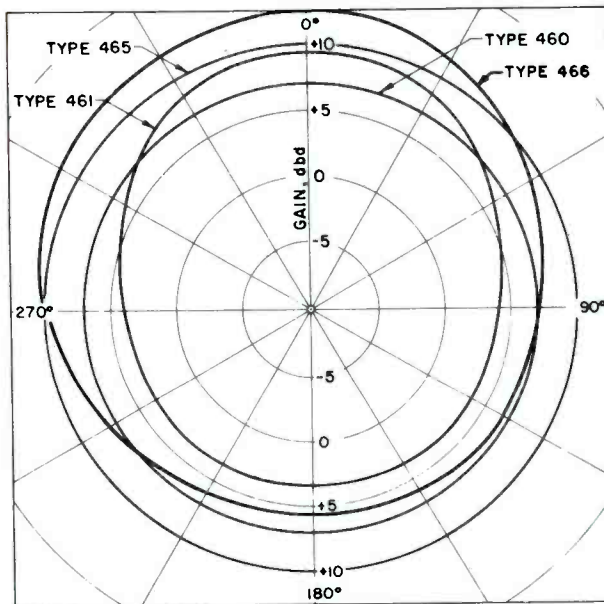


FIXED STATION ANTENNAS

These high gain antennas are the most efficient means for covering wide areas. Omnidirectional and offset (slightly directional) units are offered in two models each for widest variety of coverage requirements. Radiating elements are completely enclosed in a high strength fiberglass reinforced plastic radome. The offset versions include reflecting elements to provide directivity.



Horizontal Radiation Patterns



CHARACTERISTICS

Type Number	460A	465	461A	466
Frequency, MHz	450-470	450-470	450-470	450-470
Gain, dBd	7	10.0	9.3	12.3
Front to Back Ratio, minimum, dB	—	—	6.0	6.5
VSWR, maximum	1.5	1.5	1.5	1.5
Power Rating, watts	250	250	250	250
Termination, jack (female)	Type N	Type N	Type N	Type N
Survival Wind Velocity, mph	125	125	125	125
Thrust at 87 mph, pounds	22	75	33	110
Length, maximum, feet	10	21	10	21
Mounting Clamps: *For				
round member tower, order	29291-3	29291-3	29291-3	29291-3
angular member tower, order	14672-3	14672-3	14672-3	14672-3

* See Page 50

ORDERING INFORMATION

High Gain Omnidirectional Antennas

Type Number	Frequency MHz	Net Weight Pounds
460A-1	450-460	7
460A-2	460-470	7
465-1	450-460	22
465-2	460-470	22

High Gain Offset Antennas

Type Number	Frequency MHz	Net Weight Pounds
461A-1	450-460	9
461A-2	460-470	9
466-1	450-460	26
466-2	460-470	26

FIXED STATION ANTENNAS

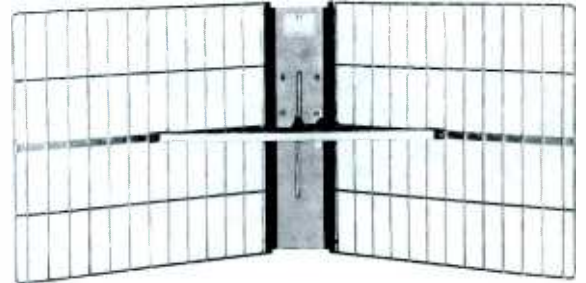
450-470 MHz Yagi Antenna



Type 116

Type 116 Yagi antenna is the most efficient antenna for directional coverage. The unit is constructed of brass, chromate conversion coated for corrosion protection. **Type 117** is two units complete with pipe separator and cable harness.

406-420 and 450-470 MHz Corner Reflector Antenna.



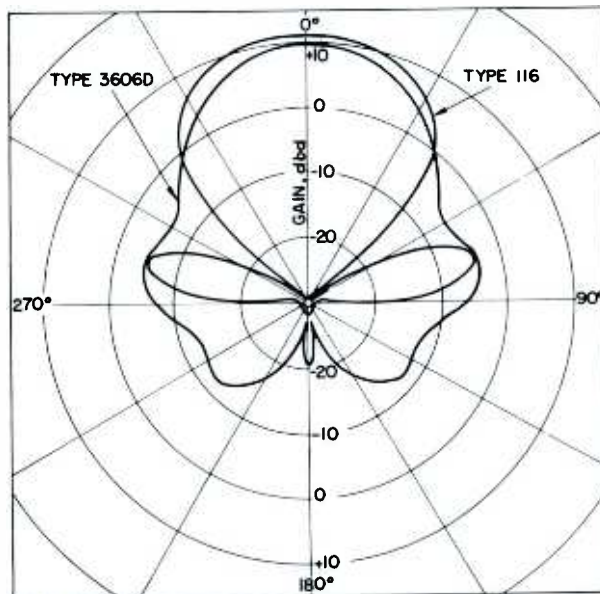
Type 3606D

Corner reflector antennas provide directional coverage less susceptible to variations due to ice and bad weather with a slight cost and weight penalty. Two and four bay units include cable harness.

CHARACTERISTICS

Type Number	116	117	3608D	3606D	3626D	3646D
Frequency, MHz	450-470	450-470	406-420	450-470	450-470	450-470
Gain, dBd	10	12.5	8.5	9	11.5	14
Front to Back Ratio, minimum, dB	16	16	20	25	25	25
VSWR, maximum	1.5	1.5	1.5	1.5	1.5	1.5
Power Rating, watts	600	600	500	500	500	500
Termination, jack (female)	Type N	Type N	UHF	Type N	Type N	Type N
Survival Wind Velocity, mph	125	125	125	125	125	125
Thrust at 87 mph, pounds	8	17	60	58	110	220
Mounting Clamps (Included) to pipe size	¾" OD	1½" OD	¾" to 2" OD			

Horizontal Radiation Patterns



ORDERING INFORMATION

Yagi Antennas

Type Number	Frequency MHz	No. of Units	Net Weight Pounds
116	450-470	1	5
117	450-470	2	14

Corner Reflector Antennas

Type Number	Frequency MHz	No. of Units	Net Weight Pounds
3608D	406-420	1	20
3606D	450-470	1	19
3626D	450-470	2	40
3646D	450-470	4	80

FIXED STATION ANTENNA ACCESSORIES



Type 20898

Type 21208



Type 15681

Type 14672-3



Type 29291-3



Type 31553



Type 25834

MOUNTING CLAMPS

Check the antenna specifications to determine which models require separate mounting hardware. For antennas requiring mounting hardware, Andrew offers a wide selection of pipe and tower clamps constructed of heavy duty galvanized steel for maximum strength and durability.

Set of two clamps for mounting Type 920E cardioids to round pipe members from 3/4" —3" ODType **20898**

Set of two clamps for mounting 925A series Unipoles to 1" OD pipe.Type **21208**

Set of two clamps for attachment of antenna to any round member from 3/4" —3" OD. Type **15681**

Set of two clamps for attachment of antenna to angle type members up to 7/8" thick without drilling.Type **14672-3**

Set of two clamps for attachment of antenna to any round member from 1" —3" OD. Type **29291-3**

Set of two clamps for attachment of Type 161 series antennas to 1 3/4" OD pipe (not illustrated)Type **30150**

SIDE MOUNT KITS

Kits are provided with bracket, clamps and hardware necessary for mounting antennas to side of tower. Mounting bracket and clamps are heavy duty galvanized steel.

Side Mount Kit is designed for mounting Type 150, 151, 465, and 466 antennas. Includes high wind-load sway brace.Type **31553**

Side Mount Kit designed for mounting Type 460, 461, and 161. Type **31554**

JUMPER CABLES

6 feet of 1/2" Foam HELIAX coaxial cable with 2 type N plugs.Type **25832**

6 feet of 1/2" Foam HELIAX coaxial cable with 2 type UHF plugs.Type **25833**

6 feet of 1/2" Foam HELIAX coaxial cable with 1 each type UHF and type N plugs. Type **25834**

4 feet of RG8U with 2 type N plugs. Type **16253-21**

4 feet of RG8U with 2 type UHF plugs Type **16253-23**

4 feet of RG8U with 1 each type UHF and type N plugs.Type **16253-24**

SOLID DIELECTRIC CABLE



RG 8A/U Cable used for jumper connections between equipment and HELIAX coaxial cable. Use types N and UHF connectors below. . . . Type **10791-1**

RG 17/U Cable used for longer jumper connections. Use type LC connectors below Type **10791-7**

Fittings



N Cable Plug (Male)
UG 21 E/U. Use with
RG8A/U. Type **10804-36**



N Junction (Female both ends), UG29B/U.
. Type **10804-11**



N Right Angle (Male-Female), UG27C/U . . .
. Type **10804-10**



UHF Cable Plug (Male)
PL259A. Use with RG
8A/U. . . Type **10805-1**



UHF Right Angle (Male-Female), M359
. Type **10805-5**



Adaptor UHF Jack (Female) N Plug (Male)
UG 146A/U
. Type **10805-11**



LC Cable Plug (Male),
UG 154A/U. Use with
RG17/U.. Type **12418-1**



N Cable Plug (Male),
UG 167F/U. Use with
RG 17/U.
. Type **12418-5**



N Cable Jack (Female),
UG23E/U. Use with
RG8A/U.Type **10804-34**



N Junction (Male both ends), UG57B/U.
. Type **10804-9**



N Panel Receptacle (Female). UG58A/U. . .
. Type **10804-31**



UHF Junction (Female both ends), PL258. . .
. Type **10805-6**



UHF Tee (Female-Male-Female), M358.
. Type **10805-4**



Adaptor UHF Plug (Male) N Jack (Female)
UG83B/U
. Type **10805-12**

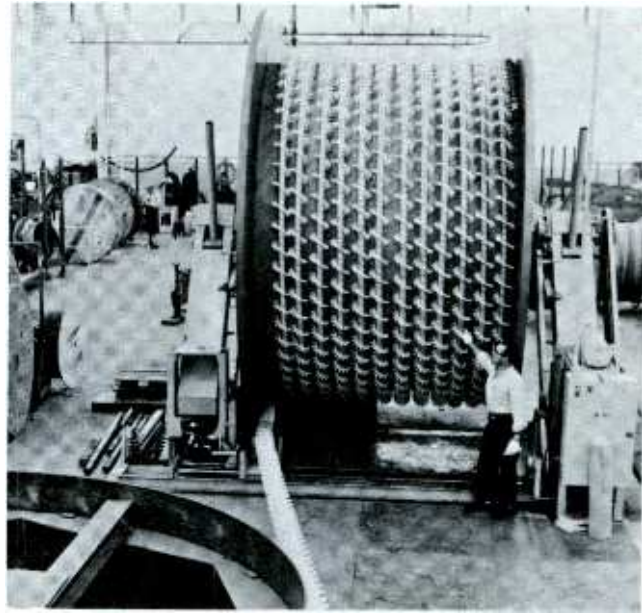
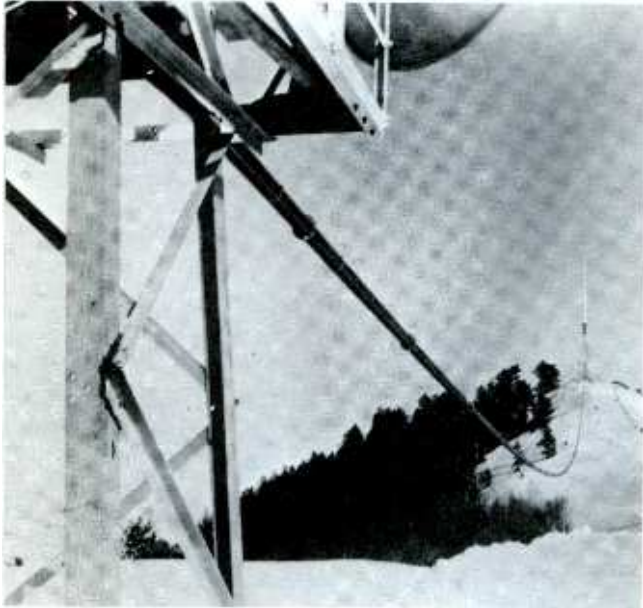


LC Junction (Female both ends), UG215/U.
. Type **12418-3**



UHF Cable Plug (Male).
Use with RG17/U.
. Type **12418-12**

HELIAX® FLEXIBLE COAXIAL CABLE



APPLICATION

HELIAX* coaxial cables are ideally suited for any application, RF or otherwise, where use of coaxial transmission line is indicated.

Long continuous lengths (limited only by reel shipping restrictions) provide ease of installation and maintenance free service not found in rigid coaxial lines or in other coaxial cables. The corrugated outer conductors (and inner conductors of the large sizes) provide a unique combination of strength and flexibility.

All HELIAX coaxial cables are available jacketed for direct burial or for corrosive environmental conditions. Standard jacketing material is 20 year life black extruded polyethylene suitable for operation down to -54°C (-65°F) and installation down to -40°C .

HELIAX coaxial cables are lighter weight and more flexible than smooth aluminum cables, more permanent and trouble-free than solid dielectric cables and electrically superior to either.

HELIAX fittings complement the cables for which they are designed. Standard materials are brass bodies (chromate conversion coated for 250 hour salt spray protection or chrome plated for use with aluminum cables), Teflon insulators and anchor beads, beryllium copper contacts and stainless steel or bronze hardware.

PRODUCTION

These cables are produced by a continuous process with equipment specifically designed and built for its production. Essentially the process consists of winding an insulator strip (or extruding a foam core) onto the inner conductor, then forming accurately sized strip stock into a tube around the inner assembly, welding the outer tube and corrugating it. Both portions of the process are continuous.

QUALITY CONTROL

HELIAX coaxial cables are inspected continuously throughout the manufacturing process to assure maintenance of electrical performance and mechanical characteristics. Each production length of cable is given a pulse reflection test as a final electrical check. HELIAX air dielectric coaxial cables are pressure checked before shipment and shipped under pressure of dry air.

AVAILABILITY

Large stocks of all standard cables and connectors are maintained to allow quick delivery of most requirements. Lengths are normally custom cut and fittings factory attached (at no extra charge). Standard cutting tolerance is $+ 2\%$, -0 . Closer tolerance is available on special order.

*These cables and connectors are proprietary products of Andrew Corporation manufactured under patents issued and pending. HELIAX® is the registered trademark under which coaxial cables are sold by Andrew Corporation.

HELIAX® FLEXIBLE COAXIAL CABLE

SPECIALS

In addition to standard sizes and types of HELIAX coaxial cables and fittings as described on the following pages, many other types have been or can be designed and produced for special orders.

75 ohm and 100 ohm cables are available or can be designed for all sizes.

Teflon[†] insulated cables are available in a number of sizes and impedances for high temperature or high power requirements.

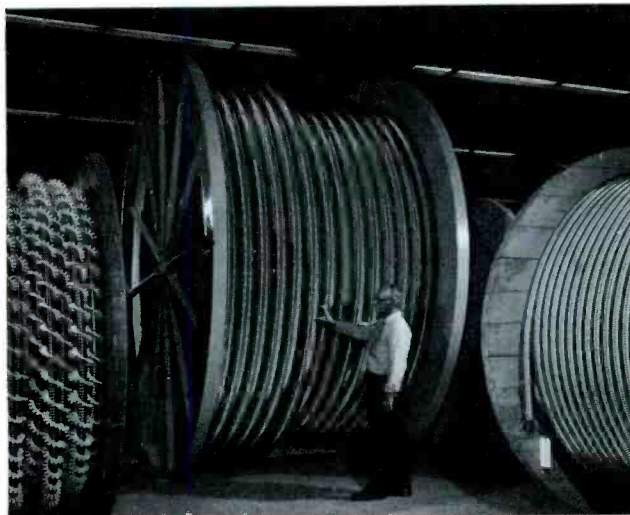
In addition to the large variety shown, HELIAX coaxial cable fittings are available to connect to many other types of connectors. For instance, adaptors to the HN series and the General Radio Type 874BL connector are available for many cables.

PHASE STABLE CABLES

All HELIAX coaxial cables may be phase stabilized to provide a repeating (or "stable") phase-temperature characteristic. This stabilization is obtained through factory heat treatment aging of the cable.

Special phase compensated cables are also available. These designs provide a relatively flat electrical length versus temperature characteristic over selected temperature ranges. Such cables have achieved phase-temperature coefficients of 1 to 2 PPM/°F over 30°F operating range. This characteristic has been useful in applications such as phased array radar.

[†] DuPont Polytetrafluoroethylene Resin



FIXED ELECTRICAL LENGTH ASSEMBLIES

HELIAX cable assemblies may be ordered, with connectors attached, where all are cut to equal electrical length within a close tolerance. Phase adjustable connectors may be included for fine adjustment, such as trimming of the system in the field.

MECHANICAL DATA

Special application mechanical data are available for HELIAX coaxial cables. Crush strength, hydraulic crush strength, tensile strength and reverse bend cycling tests have been made for all cables. Other tests for special environments can be made as required.

MULTIPAK CABLES



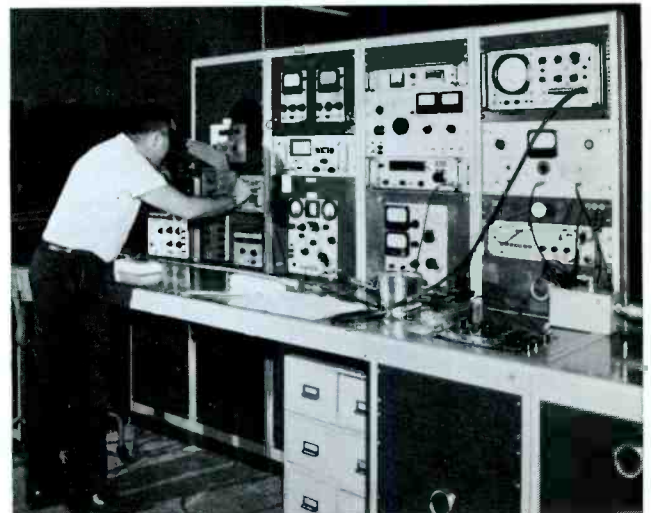
MULTIPAK* composite coaxial cables incorporate several strands of HELIAX coaxial cable in a single polyethylene sheath. This construction offers all the inherent electrical and mechanical advantages of HELIAX coaxial cable with compact packaging for the fastest and easiest method of installing multiple cable runs. Combinations of up to 7 strands of 7/8 inch and 19 strands of 3/8 inch have been manufactured.

Combinations of up to 7 strands of 7/8 inch and 19 strands of 3/8 inch have been manufactured.

INQUIRIES SOLICITED

Ask your Andrew engineer for information on any special type HELIAX coaxial cable, fitting or assembly.

* Trademark of Andrew Corporation



1/2" SUPERFLEXIBLE HELIAX® CABLE



This superflexible HELIAX foam dielectric coaxial cable offers the flexibility of braided solid dielectric cable with the lower attenuation and superior shielding characteristics of a continuous solid sheath copper outer conductor.

The braided inner conductor and deeply corrugated seam welded copper outer conductor permit easy bending on small radii and continuous flexing with no impairment of electrical efficiency. Attenuation is 35% less than RG213/U (RG8A/U). A polyethylene jacket is standard for abrasion protection.

This superflexible cable is ideal for short length applications, such as patch cords and jumper cables, where repeated flexing is a prime consideration, and in long lengths for temporary tactical or restoration systems where cable must be handled quickly and easily to provide reliable connections.

Fittings are easily assembled to cable with simple hand tools.

CABLE TYPE

FSJ4-50

CHARACTERISTICS

Electrical

Impedance, ohms	50
Maximum Frequency, GHz*	10.2
Velocity, percent	78
Peak Power Rating, kw	7.5
Attenuation	See Page 90
Average Power Rating	See Page 91

Mechanical

Outer Conductor O.D. inches	.478
Diameter, over jacket, inches	.518
Minimum Bending Radius, inches	1.25
Cable Weight	
Jacketed, pounds per foot	.156

* For applications above 1GHz, consult your Andrew Sales Engineer.

SHIPPING INFORMATION (Domestic)

Length, Feet	Package	Size, Inches	Tare Weight, Lbs.
to 150	Carton	31 x 31 x 3	5
151 to 400	Carton	48 x 48 x 6	15
401 to 2000	Disposable reel	48 dia x 24w	94

COMPONENTS



N Plug (Male) Mates with UG23. Type 36723



General Radio Plug Mates with GR 874 Type 36722

1/4" AND 3/8" FOAM DIELECTRIC HELIAX® CABLES

These small HELIAX cables are ideal for all low power coaxial cable applications, particularly where space is at a premium.

The corrugated copper outer conductors and foamed polyethylene dielectrics result in cables with combinations of strength, corrosion resistance, flexibility and electrical efficiency not found in smooth wall aluminum or solid dielectric cables.

The "solid" outer conductors assure noise-free characteristics which will not deteriorate with time.



CABLE TYPES

Nominal Size	1/4"	3/8"
Type	FH1-50	FH2-50A
Jacketed Type	FHJ1-50	FHJ2-50A

CHARACTERISTICS

Electrical

	1/4"	3/8"
Nominal Size	1/4"	3/8"
Impedance, ohms	50	50
Maximum Frequency, GHz*	18	12
Velocity, percent	79	79
Peak Power Rating, kw	5	8
Attenuation	See page 90	
Average Power Rating	See page 91	

* For applications above 1 GHz, consult your Andrew Sales Engineer.

Mechanical

	1/4"	3/8"
Nominal Size	1/4"	3/8"
Outer Conductor O.D., inches	.250	.375
Diameter, over jacket, inches	.290	.435
Minimum Bending Radius, inches	2.5	3.75
Cable Weight, pounds per foot		
Unjacketed	.05	.10
Jacketed	.06	.12

SHIPPING INFORMATION (Domestic)

Length, Feet		Package	Size, Inches	Tare Weight, Lbs.
1/4" Cable	3/8" Cable			
to 300	to 250	Carton	31 x 31 x 3	5
301 to 600	251 to 500	Carton	48 x 48 x 6	15
601 to 3500	501 to 2000	Disposable reel	48 dia. x 24w	94
3501 to 7000	2001 to 3500	Disposable reel	72 dia. x 31w	315

COMPONENTS



UHF Jack (Female)
Mates with PL259A
1/4" Cable . . Type **41U**
3/8" Cable . . Type **42U**



UHF Plug (Male) Mates with S0-239A
1/4" Cable . . Type **41P**
3/8" Cable . . Type **42P**



TNC Plug (Male) Mates with TNC female
1/4" Cable . Type **41WT**
3/8" Cable . Type **42WT**



N Jack (Female) Mates with UG21
1/4" Cable . . Type **41N**
3/8" Cable . . Type **42N**



N Plug (Male) Mates with UG23
1/4" Cable . . Type **41W**
3/8" Cable . . Type **42W**



End Terminal Adaptor
Type N jack. Use with Type 41W or 42W on Cable . . . Type **13212-2**

1/2" FOAM DIELECTRIC HELIAX® CABLE



This foam HELIAX coaxial cable is designed for fixed station antenna use and other low power applications.

The corrugated outer conductor and foam dielectric provide a combination of strength, flexibility and efficiency not available in semiflexible smooth wall or solid dielectric cables.

The cable is available with either copper or aluminum corrugated outer conductor as shown in the table below. The aluminum version (jacketed only) retains most of the strength and flexibility of the copper cable with savings in weight and cost at a degradation of only 12% in attenuation and 10% in average power rating. The basic electrical and mechanical data shown apply to both copper and aluminum versions.

CABLE TYPES

	Copper	Copper	Aluminum
Outer Conductor Impedance, ohms	50	75	50
Andrew Type	FH4 - 50B	FH4 - 75	—
Jacketed Andrew Type	FHJ4 - 50B	FHJ4 - 75	FLJ4 - 50B
Military Number	RG366/U		

CHARACTERISTICS

Electrical

Impedance, ohms	50	75
Maximum Frequency, GHz*	8.1	9.1
Velocity, percent	79	79
Peak Power Rating, kw	19	12.7
Attenuation	See pages 90 & 92	
Average Power Rating	See pages 91 & 93	

Mechanical

Outer Conductor O.D. inches	.540
Diameter, over jacket, inches	.620
Minimum Bending Radius, inches	5
Cable Weight, pounds per foot	
Unjacketed, copper	.125
Jacketed, copper	.185
Jacketed, aluminum	.135

* For applications above 1GHz, consult your Andrew Sales Engineer.

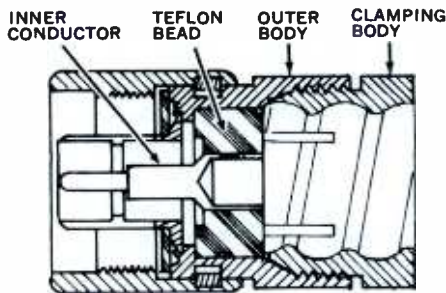
SHIPPING INFORMATION (Domestic)

Length, Feet	Package	Size, Inches	Tare Weight, Lbs.
to 150	Carton	31 x 31 x 3	5
151 to 400	Carton	48 x 48 x 6	15
401 to 2000	Disposable reel	48 dia. x 24 w	94
2001 to 3000	Disposable reel	72 dia. x 31 w	315

The listing of military nomenclature and/or Federal Stock Numbers with Andrew part numbers is for reference only.

1/2" COMPONENTS

All flanged items include inner connector, "O" ring, silicone grease and hardware. Components may be used for aluminum and copper cables unless otherwise noted. Type N and UHF 75 ohm connectors have 50 ohm pins in mating sections.



Typical Connector Construction



7/8" EIA Flange
Not pressure tight.
For copper cable.
50 ohm Type **44AR**
For aluminum cable.
50 ohm . . Type **44AR-3**



Splice
For copper cable.
50 ohm Type **44AZ**



LC Plug (Male) mates with UG 352.
For copper cable.
50 ohm Type **44AM**



LC Jack (Female) mates with UG 154.
For copper cable.
50 ohm Type **44AL**



UHF Plug (Male) mates with SO239A.
For copper cable.
50 ohm Type **44AP**
For aluminum cable.
50 ohm . . Type **44AP-3**



UHF Jack (Female) mates with PL259A.
For copper cable.
50 ohm Type **44AU**
75 ohm . . Type **44AU-75**
For aluminum cable.
50 ohm . . Type **44AU-3**



N Plug (Male) mates with UG23.
For copper cable.
50 ohm Type **44AW**
75 ohm . . Type **44AW-75**
For aluminum cable.
50 ohm . . Type **44AW-3**



N Jack (Female) mates with UG 21.
For copper cable.
50 ohm Type **44AN**
75 ohm . . Type **44AN-75**
For aluminum cable.
50 ohm . . Type **44AN-3**



End Terminal for strap connection to center conductor.
For copper cable.
50 ohm Type **44AT**



HN Plug (Male) mates with UG60.
For copper cable.
50 ohm Type **44AJ**



EIA Gas Barrier use when connecting Type 44AR to pressurized line.
50 ohm Type **1260A**

7/8" FOAM DIELECTRIC HELIAX® CABLE



This foam HELIAX coaxial cable is used extensively for long run fixed station antenna installations and HF receiving systems. The cable outperforms comparable size semiflexible smooth wall cables and all solid dielectric cables.

This cable is available with either copper or aluminum corrugated outer conductor as shown in the table below. The aluminum version (jacketed only) retains most of the strength and flexibility of the copper cable with savings in weight and cost at a degradation of only 12% in attenuation and 10% in average power rating. The basic electrical and mechanical data shown apply to both copper and aluminum versions.

CABLE TYPES

Outer Conductor	Copper	Copper	Aluminum
Impedance, ohms	50	75	50
Andrew Type	FH5-50A	FH5-75	—
Federal Stock Number	FSN 6145-052-5568		
Military Number	RG324/U		
Jacketed Andrew Type	FHJ5-50A	FHJ5-75	FLJ5-50A
Federal Stock Number	FSN 6145-011-0336		
Military Number	RG323/U		RG376/U

CHARACTERISTICS

Electrical

Impedance, ohms	50	75
Maximum Frequency, GHz*	4.4	4.9
Velocity, percent	79	79
Peak Power Rating, kw	44	29
Attenuation	See pages 90 and 92	
Average Power Rating	See pages 91 and 93	

* For applications above 1GHz, consult your Andrew Sales Engineer.

Mechanical

Outer Conductor O.D. inches	.980
Diameter, over jacket, inches	1.090
Minimum Bending Radius, inches	10
Cable Weight, pounds per foot	
Unjacketed copper	.32
Jacketed copper	.42
Jacketed aluminum	.36

SHIPPING INFORMATION (Domestic)

Length, Feet	Package	Size, Inches	Tare Weight, Lbs.
to 50	Carton	48 x 48 x 6	15
51 to 200	Tire Wrap	48 dia. x 6w	15
201 to 550	Disposable reel	48 dia. x 24w	94
551 to 1500	Disposable reel	72 dia. x 31w	315
1501 to 2200	Returnable reel, Type 25190-3	74 dia. x 46w	925
2201 to 4500	Returnable reel, Type 25190-2	86 dia. x 52w	1645

The listing of military nomenclature and/or Federal Stock Numbers with Andrew part numbers is for reference only.

7/8" COMPONENTS

All flanged items include inner connector, "O" ring, silicone grease and hardware. Components may be used for aluminum and copper cables unless otherwise noted. Type N 75 ohm connector has 50 ohm inner connector pin in mating sections.



7/8" EIA Flange Not pressure tight.
For copper cable.
50 ohm . . . Type **45AR**
For aluminum cable.
50 ohm . . . Type **45AR-3**
FSN 5935-854-0850



LC Jack (Female) Mates with UG 154.
For copper cable.
50 ohm. . . Type **45AL**



Splice
For copper cable.
50 ohm . . . Type **45AZ**
For aluminum cable.
50 ohm . . . Type **45AZ-3**
FSN 5935-998-3639



LC Plug (Male) Mates with UG 352.
For copper cable.
50 ohm . . . Type **45AM**
For aluminum cable.
50 ohm . . . Type **45AM-3**
FSN 5935-891-9442



UHF Jack (Female) Mates with PL259A.
For copper cable.
50 ohm . . . Type **45AU**
For aluminum cable.
50 ohm . . . Type **45AU-3**
FSN 5935-500-8871



HN Plug (Male) Mates with UG 60.
For copper cable.
50 ohm . . . Type **45AJ**
For aluminum cable.
50 ohm . . . Type **45AJ-3**
FSN 5935-891-6141



UHF Plug (Male) Mates with SO 239A
For copper cable.
50 ohm . . . Type **45AP**
For aluminum cable.
50 ohm . . . Type **45AP-3**



End Terminal For strap connection to center conductor.
For copper cable.
50 ohm . . . Type **45AT**
For aluminum cable.
50 ohm . . . Type **45AT-3**



N Jack (Female) Mates with UG21.
For copper cable.
50 ohm . . . Type **45AN**
75 ohm . . . Type **45AN-75**
For aluminum cable.
50 ohm . . . Type **45AN-3**
FSN 5935-891-6140



90° EIA Miter Elbow
50 ohm . . . Type **1060**
FSN 5985-773-9032



N Plug (Male) Mates with UG 23.
For copper cable.
50 ohm . . . Type **45AW**
FSN 5935-000-0425
For aluminum cable.
50 ohm . . . Type **45AW-3**



EIA Gas Barrier Use when connecting Type 45AR to pressurized line.
50 ohm . . . Type **1260A**

1 5/8" FOAM DIELECTRIC HELIAX® CABLE

This large diameter foam HELIAX coaxial cable provides high efficiency and power handling capability without the need for pressurization.

As with all HELIAX coaxial cable, connectors are compensated electrically and are suitable for either factory or field installation with ordinary hand tools.

This cable is available with either copper or aluminum corrugated outer conductor. The aluminum version retains most of the strength and flexibility of the copper cable with savings in weight and cost and degradation of only 12% in attenuation and 10% in average power rating. The basic electrical and mechanical data shown below apply to both copper and aluminum versions.



CABLE TYPES

Outer Conductor	Copper	Aluminum
Impedance, ohms	50	50
Jacketed Andrew Type	FHJ7 - 50	FLJ7 - 50

CHARACTERISTICS

Electrical

Impedance, ohms	50
Maximum Frequency, GHz*	2.3
Velocity, percent	79
Peak Power Rating, kw	145
Attenuation	See pages 90 & 92
Average Power Rating	See pages 91 & 93

Mechanical

Outer Conductor O.D., inches	1.830
Diameter, over jacket, inches	2.000
Minimum Bending Radius, inches	20
Cable Weight, pounds per foot	
Jacketed copper	1.35
Jacketed aluminum	1.05

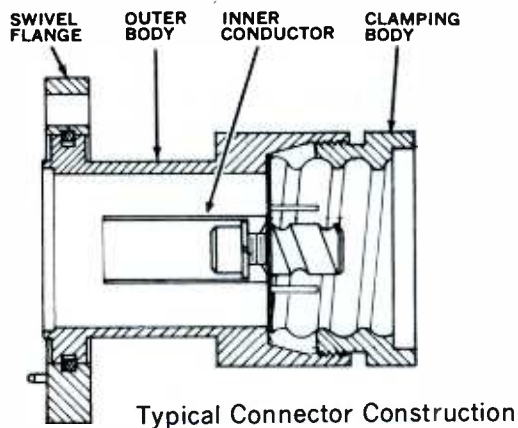
* For applications above 1GHz, consult your Andrew Sales Engineer.

SHIPPING INFORMATION (Domestic)

Length, Feet	Package	Size, Inches	Tare Weight, Lbs.
to 20	Box	9 x 9 x 252	120
21 to 100	Crate	72 x 72 x 24	120
101 to 200	Crate	108 x 108 x 30	180
201 to 400	Disposable reel	72 dia. x 31w	315
401 to 750	Returnable reel, Type 25190-3	74 dia. x 46w	925
751 to 1000	Returnable reel, Type 25190-2	86 dia. x 52w	1645
1001 to 3001	Returnable reel, Type 25190-5	98 dia. x 66w	2100

1 5/8" COMPONENTS

All flanged items include inner connector, "O" ring, silicone grease and hardware. Components may be used for aluminum and copper cables unless otherwise noted.



90°EIA Miter Elbow
50 ohm . . . Type 1061



EIA Gas Barrier use when connecting Type 47R to pressurized line
50 ohm . . . Type 1261B



1-5/8" EIA Flange
Not pressure tight.
*For copper cable.
50 ohm . . . Type 47R
For aluminum cable.
50 ohm . . . Type 47R-3



Splice
For copper cable.
50 ohm . . . Type 47Z
For aluminum cable.
50 ohm . . . Type 47Z-3



LC Jack (Female) Mates with UG154.
For copper cable.
50 ohm . . . Type 47L



N Jack (Female) Mates with UG21.
For copper cable.
50 ohm . . . Type 47N
For aluminum cable.
50 ohm . . . Type 47N-3



End Terminal for strap connection to center conductor. Use with Type 47R
50 ohm . . . Type 2061



Reducer, 1-5/8" EIA to 7/8" EIA
50 ohm . . . Type 1860A



Reducer, 3-1/8" EIA to 1-5/8" EIA
50 ohm . . . Type 1861

1/4" AND 3/8" AIR DIELECTRIC HELIAX® CABLES



These small diameter HELIAX air dielectric coaxial cables are ideal to use as sampling lines and in low power or microwave frequency applications. For all uses, the inner and outer copper conductors assure optimum performance.

The connectors are compensated electrically and are easily attached with ordinary hand tools.

CABLE TYPES

Nominal Size	1/4"	3/8"
Andrew Type	H1-50	H2-50
Jacketed Andrew Type	HJ1-50	HJ2-50

CHARACTERISTICS

Electrical

Nominal Size	1/4"	3/8"
Impedance, ohms	50	50
Maximum Frequency, GHz*	21.6	14.2
Velocity, per cent	86.3	87
Peak Power Rating, kw	3.1	6.5
Attenuation	See page 88	
Average Power Rating	See page 89	

Mechanical

Nominal Size	1/4"	3/8"
Insulation	Polyethylene	
Outer Conductor, O.D., inches	.250	.375
Diameter over jacket, inches	.290	.435
Minimum Bending Radius, in.	2.5	3.75
Cable Weight		
Unjacketed, pounds per foot	.06	.12
Jacketed, pounds per foot	.07	.14

*For applications above 3 GHz, consult your Andrew Sales engineer.

SHIPPING INFORMATION (Domestic)

Length, Feet

1/4" Cable	3/8" Cable	Package	Size, Inches	Tare Weight Lbs.
0-300	0 to 250	Carton	31 x 31 x 2.5	5
301 to 600	251 to 500	Carton	48 x 48 x 6	15
601 to 3500	501 to 2000	Disposable reel	48 dia. x 24w	94
	2001 to 3500	Disposable reel	72 dia. x 31w	315

COMPONENTS



N Jack (Female) Mates with UG21.
1/4" Cable . . . Type **71N**
3/8" Cable . . . Type **72N**



N Plug (Male) Mates with UG23.
1/4" Cable . . . Type **71W**
3/8" Cable . . . Type **72W**



End Terminal Adaptor (Type N Jack) Use with Type 71W or 72W connector on cable.
. Type **13212-2**

Splice, use pair of connectors

1/4" Cable Types **71N** and **71W**
3/8" Cable Types **72N** and **72W**

1/2" AIR DIELECTRIC HELIAX® CABLE

Type H4 HELIAX coaxial cable is widely used in sampling lines, low power and microwave frequency applications. The cable features copper inner and outer conductors.

The connectors are compensated electrically and are easily attached with ordinary hand tools.



CABLE TYPES

Andrew Type	H4-50
Military Number	RG-268/U
Jacketed Andrew Type	HJ4-50

CHARACTERISTICS

Electrical

Impedance, ohms	50
Maximum Frequency, GHz*	10.9
Velocity, per cent	91.4
Peak Power Rating, kw	10
Attenuation	See page 88
Average Power Rating	See page 89

*For applications above 3 GHz, consult your Andrew Sales engineer.







Mechanical

Insulation	Polyethylene
Outer Conductor, O.D. inches	.500
Diameter, over jacket, inches	.580
Minimum Bending Radius, inches	5
Cable Weight	
Unjacketed, pounds per foot	.21
Jacketed, pounds per foot	.27

SHIPPING INFORMATION (Domestic)

Length, Feet	Package	Size, Inches	Tare Weight, Lbs.
0 to 150	Carton	31 x 31 x 2.5	5
151 to 400	Carton	48 x 48 x 6	15
401 to 2000	Disposable reel	48 dia. x 24w	94
2001 to 2500	Disposable reel	72 dia. x 31w	315

COMPONENTS

	N. Jack (Female) mates with UG21 Type 74N		N Plug (Male) mates with UG23 Type 74W
	UHF Jack (Female) mates with PL-259 Type 74U		UHF Plug (Male) mates with SO-239A. Type 74P
	Splice Type 74Z		End Terminal for strap connection to center conductor Type 74T

7/8" AIR DIELECTRIC HELIAX® CABLE



This HELIAX coaxial cable is preferred for low power R.F. systems. The low attenuation is also desirable for long runs in receiving antenna systems.

The cable is available with either copper or aluminum corrugated outer conductor as shown in the table below. The aluminum version (jacketed only) retains most of the strength and flexibility of the copper cable while saving in weight and cost with a degradation of only 12% in attenuation and 10% in average power rating. The basic electrical and mechanical data shown below apply to both copper and aluminum versions.

Low VSWR cable is available for radio relay systems operating in the 1.7 to 2.3 GHz band.

This cable is specially selected and tested version of 50 ohm copper, jacketed, cable. Maximum VSWR over the band with Types 75AR or 75AG connectors is less than 1.08 with an RMS of less than 1.05.

CABLE TYPES

	Copper	Copper	Aluminum
Outer Conductor	Copper	Copper	Aluminum
Impedance, ohms	50	75	50
Andrew Type	H5-50	H5-75	—
Military Number	RG269A/U	RG284/U	
Jacketed Andrew Type	HJ5-50	HJ5-75	LJ5-50
	FSN 6145-939-9297		FSN 6145-814-8124
Military Number	RG318/U		
Low VSWR Andrew Type	25817		

CHARACTERISTICS

Electrical

Impedance, ohms	50	75
Maximum Frequency, GHz*	5.2	5.6
Velocity, percent	91.6	90.0
Peak Power Rating, kw	44	29
Attenuation	See pages 88 & 92	
Average Power Rating	See pages 89 & 93	

* For applications above 3 GHz, consult your Andrew Sales engineer.

Mechanical

Outer Conductor O.D., inches	1.005
Diameter, over jacket, inches	1.115
Minimum Bending Radius, inches	10
Cable Weight, pounds per foot	
Unjacketed copper	.43
Jacketed copper	.53
Jacketed aluminum	.38

SHIPPING INFORMATION (Domestic)

Length, Feet	Package	Size, Inches	Tare Weight, Lbs.
to 50	Carton	48 x 48 x 6	15
51 to 200	Tire Wrap	48 dia. x 6w	15
201 to 550	Disposable reel	48 dia. x 24w	94
551 to 1500	Disposable reel	72 dia. x 31w	315
1501 to 2200	Returnable reel, Type 25190-3	74 dia. x 46w	925
2201 to 4500	Returnable reel, Type 25190-2	86 dia. x 52w	1645

The listing of military nomenclature and/or Federal Stock Numbers with Andrew part numbers is for reference only.

7/8" COMPONENTS

All flanged items include inner connector, "O" ring, silicone grease and hardware. Components may be used for aluminum and copper cables unless otherwise noted. 75 ohm Type N and UHF fittings have 50 ohm connector pins in mating sections.



7/8" EIA Flange
For copper cable
50 ohm . . Type **75AR**
FSN 5935-982-8197
75 ohm . Type **75AR-75**
For aluminum cable
50 ohm . . Type **75AR-3**



LC Jack (Female) Mates with UG154
For copper cable
50 ohm . . . Type **75AL**



7/8" EIA Flange
includes gas barrier
For copper cable
50 ohm . . . Type **75AG**
For aluminum cable
50 ohm . . Type **75AG-3**



LC Plug (Male) Mates with UG352
For copper cable
50 ohm . . Type **75AM**
For aluminum cable
50 ohm . Type **75AM-3**
FSN 5935-994-1935



End Terminal For strap connection to center conductor
For copper cable
50 ohm . . . Type **75AT**
75 ohm . Type **75AT-75**



UHF Jack (Female) Mates with PL259A
For copper cable
50 ohm . . . Type **75AU**
75 ohm . Type **75AU-75**
For aluminum cable
50 ohm . . Type **75AU-3**



Splice
For copper cable
50 ohm . . . Type **75AZ**
For aluminum cable
50 ohm . . Type **75AZ-3**



90° EIA Miter Elbow
50 ohm . . . Type **1060**
FSN 5985-773-9032



N Jack (Female) Mates with UG21
For copper cable
50 ohm . . . Type **75AN**
FSN 5935-952-8195
75 ohm . Type **75AN-75**
For aluminum cable
50 ohm . . Type **75AN-3**



EIA Gas Barrier
50 ohm . . Type **1260A**
FSN 5985-849-4808



N Plug (Male) Mates with UG23
For copper cable
50 ohm . . . Type **75AW**
For aluminum cable
50 ohm . Type **75AW-3**



Reducer, 1-5/8" EIA to 7/8" EIA
50 ohm . . Type **1860A**

1 5/8" AIR DIELECTRIC HELIAX® CABLE



This HELIAX coaxial cable is widely used for medium power HF, AM and FM antenna installations. The low attenuation also makes it popular at microwave frequencies.

The cable is available with either copper or aluminum corrugated outer conductor as shown in the table below. Retaining most of the strength and flexibility of the copper cable, the aluminum version offers savings in weight and cost with a degradation of only 12% in attenuation and 10% in average power rating. The basic electrical and mechanical data shown below apply to both copper and aluminum versions.

Low VSWR cable is available for radio relay systems operating in the 1.7 to 2.3 GHz band. This cable is a specially selected and tested version of the 50 ohm copper, jacketed, cable. Maximum VSWR over the band with flanged connectors Types 87R, 87G, 87S or 87SG is less than 1.15 with an RMS of less than 1.08.

CABLE TYPES

Outer Conductor Impedance, ohms	Copper 50	Copper 75	Aluminum 50
Jacketed Andrew Type	HJ7-50A	HJ7-75	LJ7-50A
Federal Stock Number			FSN 6145-822-4904
Military Number	RG319A/U	RG292/U	RG378/U
Low VSWR Andrew Type	25816A		

CHARACTERISTICS

Electrical

Impedance, ohms	50	75
Maximum Frequency, GHz	2.63	3.0
Velocity, percent	92.1	92.4
Peak Power Rating, kw	145	98
Attenuation	See pages 88 & 92	
Average Power Rating	See pages 89 & 93	

Mechanical

Outer Conductor O.D., inches	1.830
Diameter, over jacket, inches	2.000
Minimum Bending Radius, inches	20
Cable Weight, pounds per foot	
Jacketed copper	1.04
Jacketed aluminum	.73

SHIPPING INFORMATION (Domestic)

Length, Feet	Package	Size, Inches	Tare Weight, Lbs.
to 20	Box	9 x 9 x 252	120
21 to 100	Crate	72 x 72 x 24	120
101 to 200	Crate	108 x 108 x 30	180
201 to 400	Disposable reel	72 dia. x 31w	315
401 to 750	Returnable reel, Type 25190-3	74 dia. x 46w	925
751 to 1000	Returnable reel, Type 25190-2	86 dia. x 52w	1645
1001 to 3000	Returnable reel, Type 25190-5	98 dia. x 66w	2100

The listing of military nomenclature and/or Federal Stock Numbers with Andrew part numbers is for reference only.

All flanged items include inner connector, "O" ring, silicone grease and hardware. Components may be used for aluminum and copper cables unless otherwise noted.



1-5/8" EIA Flange
 For copper cable
 50 ohmType **87R**
 75 ohm . Type **77AR-75**
 For aluminum cable.
 50 ohm . . Type **87R-3**
 FSN 5935-854-0855



End Terminal for strap connection to center conductor.
 For copper cable.
 50 ohmType **87T**
 75 ohm . Type **77AT-75**



1-5/8" EIA Flange includes gas barrier
 For copper cable
 50 ohmType **87G**
 For aluminum cable
 50 ohm . . Type **87G-3**



LC Jack (Female) mates with UG154.
 For copper cable.
 50 ohmType **87L**



Reducer Connector to 7/8" EIA flange.
 For copper cable.
 50 ohmType **87S**



90° EIA Miter Elbow
 50 ohmType **1061**
 FSN 5985-867-1711
 75 ohmType **1071**



Reducer Connector to 7/8" EIA flange includes gas barrier.
 For copper cable.
 50 ohmType **87SG**



EIA Gas Barrier
 50 ohm . . Type **1261B**
 75 ohmType **1271**



Splice
 For copper cable
 50 ohmType **87Z**
 75 ohm . Type **77AZ-75**
 For aluminum cable
 50 ohm . . Type **87Z-3**



EIA End Terminal
 50 ohmType **2061**
 FSN 5935-010-7751
 75 ohmType **2071**



N Jack (Female) mates with UG21.
 For copper cable.
 50 ohmType **87N**
 For aluminum cable
 50 ohm . . Type **87N-3**



EIA Inner Connector
 50 ohm . . Type **34660**
 75 ohm . . Type **24254**

3" AIR DIELECTRIC HELIAX® CABLE



This HELIAX coaxial cable is ideally suited for all high power RF services and for long runs at lower power where attenuation and efficiency are important.

Flexible and easy to install, it is available in long splice-free lengths for one piece connection from transmitter to antenna.

The cable is lighter and easier to install than comparable semiflexible aluminum cables. The corrugated copper conductors provide a degree of corrosion resistance and electrical efficiency not available in aluminum cables.

Use of a new special polyolefin copolymer dielectric permits inner conductor operation up to 250°F (212°F is standard for polyethylene) with resulting higher average power rating.

Connectors include anchor insulators and feature positive clamping of both conductors, eliminating any possibility of uncertain contact with movement, vibration or time. They are compensated electrically and are suitable for field attachment with ordinary hand tools.

CABLE TYPE

Impedance, ohms	50
Jacketed Andrew Type	HJ8-50B
Military Number	RG322/U

CHARACTERISTICS

Electrical

Impedance, ohms	50
Maximum Frequency, GHz	1.64
Velocity, percent	92.3
Peak Power Rating, kw	320
Attenuation	See page 88
Average Power Rating	See page 89

Mechanical

Outer Conductor O.D., inches	2.850
Diameter over jacket, inches	3.020
Minimum Bending Radius, inches	30
Cable Weight	
Jacketed, pounds per foot	1.78

SHIPPING INFORMATION (Domestic)

Length, Feet	Package	Size, Inches	Tare Weight, Lbs.
to 20	Box	9 x 9 x 252	120
21 to 75	Crate	72 x 72 x 24	120
76 to 200	Crate	108 x 108 x 30	180
201 to 550	Returnable reel, Type 25190-14	93 dia. x 40w	1900
551 to 1000	Returnable reel, Type 25190-5	98 dia. x 66w	2100
1001 to 2000	Returnable reel, Type 25190-6	110 dia. x 70w	2800

The listing of military nomenclature and/or Federal Stock Numbers with Andrew part numbers is for reference only.

3" COMPONENTS

All flanged items include inner connector, "O" ring, silicone grease and hardware.



**3-1/8" EIA Flange
(Male)**
50 ohm . . . Type **78ARM**



**LC Jack (Female) Mates
with UG154**
50 ohm . . . Type **78AL**



**3-1/8" EIA Flange
(Female)**
50 ohm . . . Type **78ARF**



**3-1/8" EIA Flange Right
angle (Male)**
50 ohm . . . Type **33875**



3-1/8" EIA Flange (Male)
includes gas barrier.
50 ohm . . . Type **78AGM**



**Right Angle Splice
(cable to cable)**
50 ohm . . . Type **33868**



**3-1/8" EIA Flange (Fe-
male) includes gas bar-
rier.**
50 ohm . . . Type **78AGF**



90° EIA Miter Elbow
50 ohm . . . Type **1062**



**Reducer Connector to
1-5/8" EIA flange.**
50 ohm . . . Type **78AS**



EIA End Terminal
50 ohm . . . Type **2062**



Splice
50 ohm . . . Type **78AZ**



**Reducer, 3-1/8" EIA to
1-5/8" EIA.**
50 ohm . . . Type **1861**

5" AND 8" AIR DIELECTRIC HELIAX® CABLES



These HELIAX coaxial cables are designed for very high power, low attenuation service. From VLF, LF and HF up through UHF-TV both sizes are being used to replace many 6-1/8" rigid transmission line installations.

The corrugated copper conductors and polyethylene jacket provide a combination of strength, flexibility, corrosion resistance and electrical efficiency not found in any other type of coaxial transmission line.

Installation of cable and connectors requires no special tools or bending fixtures.

CABLE TYPES

Nominal Size	5"	8"
Jacketed Andrew Type	HJ9-50	HJ10-50
Military Number	RG367/U	—

CHARACTERISTICS

Electrical

Nominal Size	5"	8"
Impedance, ohms	50	50
Maximum Frequency, MHz	960	600
Velocity, percent	93	94
Peak Power Rating, kw	830	1500
Attenuation	See Page 88	
Average Power Rating	See Page 89	

Mechanical

Nominal Size	5"	8"
Outer Conductor OD, inches	5.00	8.00
Diameter, over jacket, inches	5.20	8.20
Minimum Bending Radius, inches	50	63
Cable Weight		
Jacketed, pounds per foot	4.2	8.9

SHIPPING INFORMATION (Domestic)

Cable Size	Length, Feet	Returnable Reel	Size, Inches	Tare Weight, Lbs.
5"	151 to 600	Type 25190-9	128 dia. x 80w	3600
	601 to 1100	Type 29076	146 dia. x 84w	4500
8"	151 to 400	Type 38269-2	154 dia. x 120w	6500
	401 to 800	Type 38269-1	172 dia. x 120w	7000

COMPONENTS

All flanged items include inner connector, "O" ring, silicone grease and hardware.



6 1/8" EIA Flange
(Male)
5" cableType **79R**
8" cableType **80R**



Reducer, 6-1/8" EIA to
3-1/8" EIA
. Type **1872**



6 1/8" EIA Flange
(Male)
includes gas barrier.
5" cableType **79G**
8" cableType **80G**



90° EIA Miter Elbow . .
. Type **1073**

Splice
5" cableType **79Z**
8" cableType **80Z**

HELIAX® CABLE HANGERS



Copperweld Tie Wires
20 insulated ties for use at 3 foot intervals with all cables 7/8" and smaller. Type **27290A**



Stainless Steel Wraplock
100 feet complete with fasteners. Use at three foot intervals with all cables 1-5/8" and smaller. Type **12395-1**



Hanger Kit 10 hangers for copper or aluminum cable. Maximum spacing is 3 feet for 7/8" and 1-5/8" cables, 5 feet for 3" and larger cables.

Cable Size	Type No.
7/8"	31766-5
1-5/8"	33598-1
3"	33598-3
5"	33598-5
8"	33598-9

Ceiling Adaptor (one piece), 12" threaded rod with ceiling mounting plate, nuts and washers for suspending cable hangers.

3/8" diameter for 7/8" & 1-5/8" hangers Type **31771-1**
1/2" diameter for 3" & larger hangers Type **31771-2**

Hanger Adaptor Kits, each kit includes 10 adaptors to mount noninsulated hangers to towers and other supports.

Angle Tower Adaptor Kits



Hanger Size	Type
7/8" & 1-5/8" hangers . . .	31768-1
3" & 5" hangers	33981-1
8" hangers	33981-2

Round Member Tower Adaptor Kits



Member Diameter, In	7/8" & 1-5/8" Hangers	Type
1-2		31670-1
2-3		31670-2
3-4		31670-3
4-5		31670-4
5-6		31670-5
1-3	3" & 5" Hangers	33984-1
1-3	8" Hangers	33984-2

Insulated Hangers, single, use on insulated towers for all HELIAX cables. Maximum spacing 3 feet for 1-5/8" and smaller cables, 5 feet for 3" and larger cables.



Cable Size	Type No.
1/2"	11662-3
7/8"	11662-2



1-5/8"	33948-3
3"	33948-2
5"	33948-1



Hanger Adaptors, use to mount insulated hangers to towers without drilling.

Tower Style	Type No.
Angle	13555A

Round Members up to 3" dia. **13550**

HELIAX® CABLE ACCESSORIES

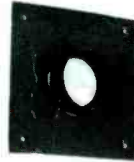


Hoisting Grips use at 200 foot intervals with all cable types.

Cable Size	Unjacketed Cable	Jacketed Cable
7/8"	Type 29958	Type 19256B
1-5/8"	—	24312A
3"	—	26985A
5"	—	31031-1
8"	—	31031-2

Connector Burial Kit consists of tape, primer and silicone adhesive/filler to protect connectors for underground burial. Kit will adequately cover one 8" splice, two 5" splices, three 3" splices, four 1-5/8" splices, six 7/8" splices, or twelve 1/2" or smaller splices Type **34283**

Wall/Roof Feed Through for all cable types, includes split washers and waterproofing compound.



Cable Size	Type
1/4, 3/8 & 1/2"	33938-1
7/8"	33938-2
1-5/8"	33938-3
3"	33938-4
5"	33938-5

Grounding Kits



For Copper Cables		
Size	Type Unjacketed	Type Jacketed
1/2"	26892-1	26892-2
7/8"	24810-1	24810-2
1-5/8"	—	24811-2
3"	—	28708-2
5"	—	30417-2

For Jacketed Aluminum Cables	
Size	Type
1/2"	26892-4
7/8"	24810-4
1-5/8"	24811-4

CABLE INSTALLATION

HELIAX coaxial cables are shipped in tire wrapped coils, cartons or on disposable or returnable reels as indicated on the individual product pages. When connector fitted cable assemblies are ordered, the antenna end of the cable is wound on the outside of the coil, and may be hoisted directly up the tower. Any necessary trimming of excess cable is done at the transmitter end.

The availability of unlimited continuous lengths and the cable flexibility normally allow an easy "one piece" installation with connectors only at equipment and antenna terminations.

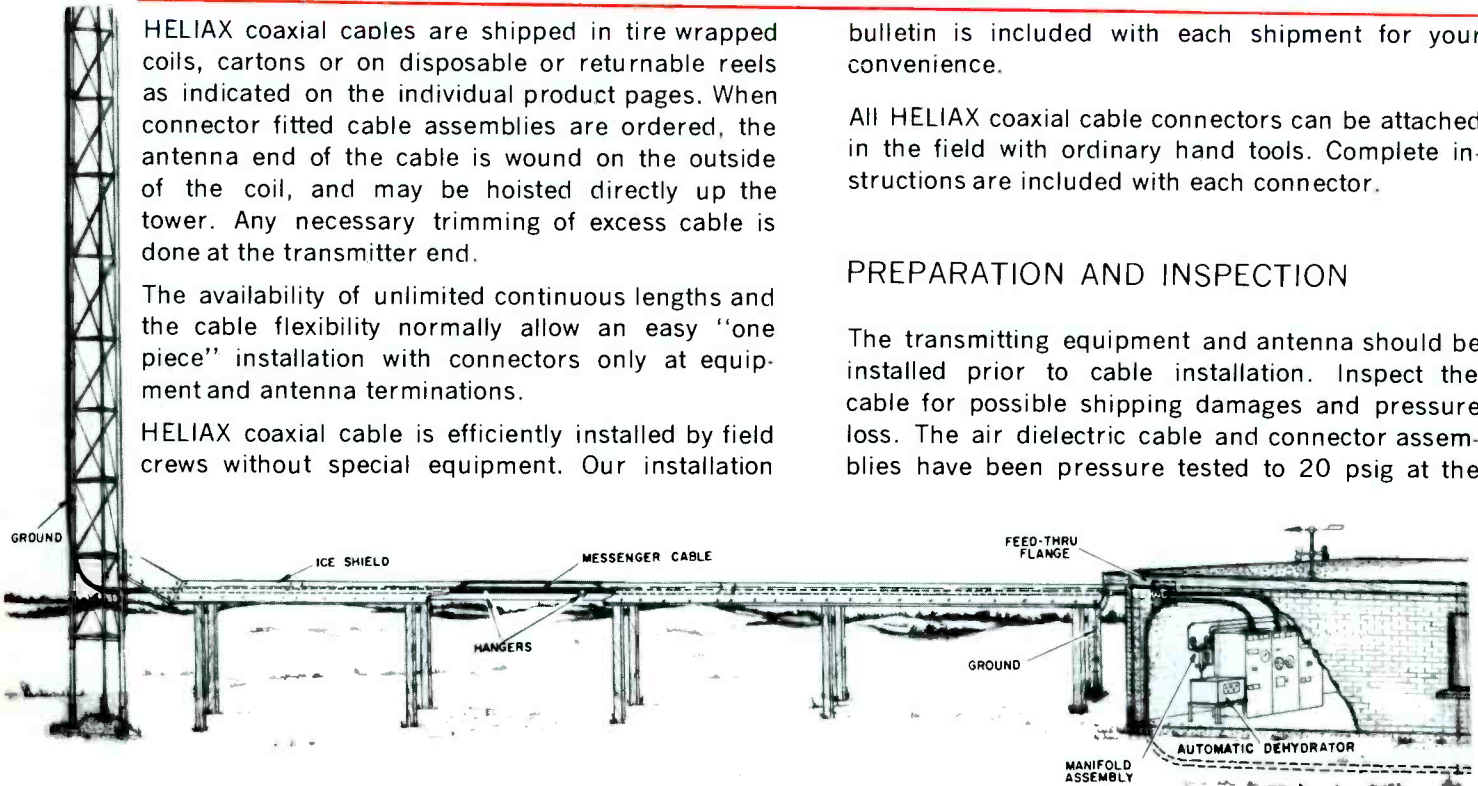
HELIAX coaxial cable is efficiently installed by field crews without special equipment. Our installation

bulletin is included with each shipment for your convenience.

All HELIAX coaxial cable connectors can be attached in the field with ordinary hand tools. Complete instructions are included with each connector.

PREPARATION AND INSPECTION

The transmitting equipment and antenna should be installed prior to cable installation. Inspect the cable for possible shipping damages and pressure loss. The air dielectric cable and connector assemblies have been pressure tested to 20 psig at the



factory and shipped at 10 psig. The factory pressure test is recorded on an inspection tag tied to the assembly.

Factory attached flange connectors are shipped with a blank cover to retain pressure during shipment. Do not remove the blank cover until the cable is installed as it affords protection to the connector face and prevents entry of foreign matter.

When unterminated cable is used, field attachment of the connector for the antenna end must be completed before hoisting. Remove the pressure cap prior to attaching the connector to the end of the cable in accordance with the connector instructions. Keep all connector parts clean. Pressure test the assembly prior to hoisting.

Hoisting and Vertical Run

A pulley and line are recommended for lifting HELIAX coaxial cables. Line size and lifting power requirements depend upon line length and cable size (see mechanical characteristics tables for cable weights). The hoist line should be long enough to allow tying to the cable along the vertical run during hoisting. Cable grips are used to support the cable weight on the hoisting line and may be fastened to the tower as permanent supports.

Position the reel at the tower base so that the cable pays off from the bottom of the reel. Support the reel on an axle to permit free rotation as the cable is being hoisted. Short lengths are uncoiled along the ground and away from the tower.

Place a protective covering over the connector to prevent damage during hoisting; then slowly hoist the cable. Rotation of the reel should be retarded to control payout of the cable.

Wraplock, copperweld tie wires or cable hangers are used to tie the cable permanently to vertical tower members—maximum spacing of three feet for 1-5/8" and smaller cables, five feet for 3" and larger cables.

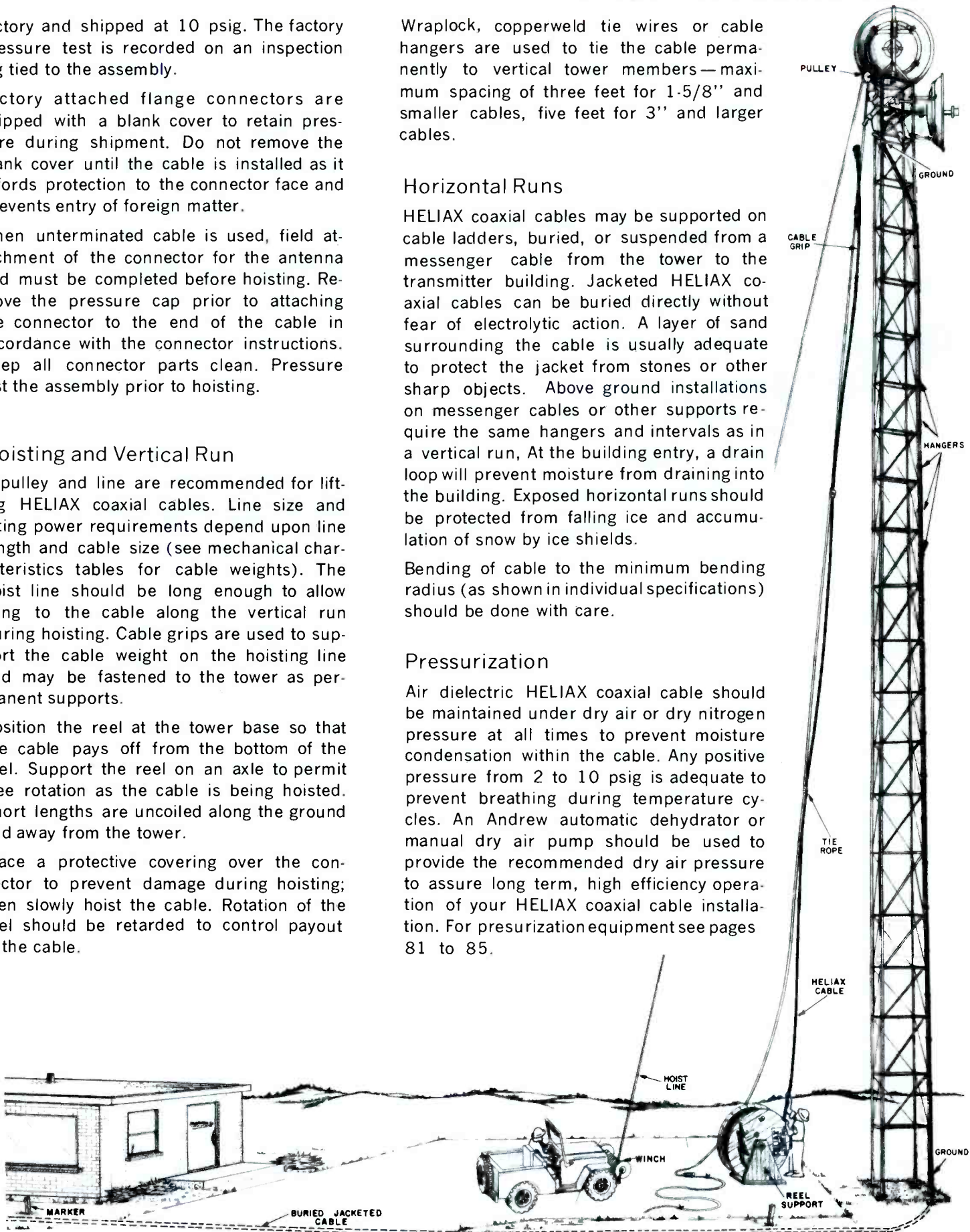
Horizontal Runs

HELIAX coaxial cables may be supported on cable ladders, buried, or suspended from a messenger cable from the tower to the transmitter building. Jacketed HELIAX coaxial cables can be buried directly without fear of electrolytic action. A layer of sand surrounding the cable is usually adequate to protect the jacket from stones or other sharp objects. Above ground installations on messenger cables or other supports require the same hangers and intervals as in a vertical run. At the building entry, a drain loop will prevent moisture from draining into the building. Exposed horizontal runs should be protected from falling ice and accumulation of snow by ice shields.

Bending of cable to the minimum bending radius (as shown in individual specifications) should be done with care.

Pressurization

Air dielectric HELIAX coaxial cable should be maintained under dry air or dry nitrogen pressure at all times to prevent moisture condensation within the cable. Any positive pressure from 2 to 10 psig is adequate to prevent breathing during temperature cycles. An Andrew automatic dehydrator or manual dry air pump should be used to provide the recommended dry air pressure to assure long term, high efficiency operation of your HELIAX coaxial cable installation. For pressurization equipment see pages 81 to 85.



50 OHM RIGID TRANSMISSION LINES



Type 561



Type 562A

ANDREW offers over 30 years experience in the design and manufacture of rigid coaxial transmission lines. This includes standard and special versions, 7/8" to 14" in diameter.

Standard transmission lines are manufactured from high conductivity hard drawn copper tubing with Teflon dielectric peg spacers.

50 ohm EIA line is offered in 7/8" to 6-1/8" sizes with bolted flanges and inner connectors in accordance with EIA standard RS-225. These lines are also compatible with IEC recommendations.

For indoor applications where pressurization is unnecessary, lines may be used without flanges. These unflanged lines and components are joined by simple straight couplings consisting of an inner connector, copper outer sleeve and clamps.

Both flanged and unflanged lines are available in standard twenty foot lengths or special lengths. Flanged lines include inner connector, "O" ring and hardware.

CHARACTERISTICS

Electrical

	7/8"	1-5/8"	3-1/8"	6-1/8"
Nominal Size	7/8"	1-5/8"	3-1/8"	6-1/8"
Maximum Frequency, GHz	3.0	3.0	1.6	0.75
Velocity, percent	99.8	99.8	99.8	99.8
Peak Power Rating, kw	43	140	400	1500
Attenuation	See Page 94			
Average Power Rating	See Page 95			

Mechanical

	7/8"	1-5/8"	3-1/8"	6-1/8"
Outer Conductor, inches	.875x.785	1.625x1.527	3.125x3.027	6.125x5.981
Inner Conductor, inches	.341x.291	.664x.588	1.315x1.231	2.600x2.520
Net Weight, pounds per length	13	25	55	135
Number of Sections per crate	12	6	4	1
Crate Shipping Weight, pounds	400	290	425	305
Crate Dimension, inches	13x14x245	8x12x245	13x14x245	12x12x245

ORDERING INFORMATION

Length	Flanges	7/8" Type No	1-5/8" Type No	3-1/8" Type No	6-1/8" Type No
20 ft.	Both ends	560	561	562A	573
20 ft.	One end	560-11	561-11	562A-11	573-11
20 ft.	Without	560-21	561-21	562A-21	—
Special*	Both ends	2760-1	2761-1	2762A-1	2773-1
Special*	One end	—	2761-11	2762A-11	—
Special*	Without	—	2761-21	2762A-21	—

*Specify in inches.

50 OHM RIGID LINE COMPONENTS

All flanged items are EIA standard and include inner connector, "O" ring, silicone grease and hardware except when noted.



90° Miter Elbow Flanged,
brass construction

Line Size	Type
7/8"	1060
1-5/8"	1061
3-1/8"	1062
6-1/8"	1073



Type N Adaptor (Female)
Mates with UG21. Gas tight with vent plug.

Line Size	Type
7/8"	2260B
1-5/8"	2261A
3-1/8"	2262



90° Miter Elbow
Unflanged, does not include inner or outer connectors

Line Size	Type
1-5/8"	1061-3
3-1/8"	1062-3



Type LC Adaptor (Female)
Mates with UG154 Gas tight with vent plug.

Line Size	Type
7/8"	2360A
1-5/8"	2361A



45° Miter Elbow Flanged,
brass construction

Line Size	Type
3-1/8"	1162



Unpressurized Straight Coupling connects unflanged lines and fittings. Includes inner connector and clamps.

Line Size	Type
1-5/8"	4861A
3-1/8"	4862A



Gas Barrier, fixed male inner connectors on both ends. May be used as gas inlet.

Line Size	Type
7/8"	1260A
1-5/8"	1261B
3-1/8"	1262A
6-1/8"	1273



Soft Solder Field Flange Kit includes inner connector and hardware.

Line Size	Type
7/8"	1560A
1-5/8"	1561A
3-1/8"	1562A
6-1/8"	1573A

Fixed Flange Kit consists of flange, silver solder ring and flux. Inner conductor not included.

Line Size	Type
7/8"	18630
1-5/8"	18631
3-1/8"	15840
6-1/8"	18111

Swivel Flange Kit consists of fixed flange, silver solder ring and flux. Inner conductor not included.

Line Size	Type
7/8"	18096
1-5/8"	18041
3-1/8"	18200
6-1/8"	18110

50 OHM RIGID LINE COMPONENTS

All flanged items are EIA standard and include inner connector, "O" ring, silicone grease and hardware except when noted.



Reducer Includes two inner connectors. Type 1861 has captivated 3-1/8" inner connector.

Connection	Type
6-1/8"—3-1/8"	1872
3-1/8"—1-5/8"	1861
1-5/8"—7/8"	1860A



Adaptor (Male to male) joins two components having captivated inner connectors. Inner connector not included.

Line Size	Type
1-5/8"	30452
3-1/8"	23187
6-1/8"	31472



End Terminal for strap connection, gas tight with vent plug.

Line Size	Type
1-5/8"	2061
3-1/8"	2062
6-1/8"	2073



Inner Connector with Teflon anchor bead.

Line Size	Type
7/8"	34389A
1-5/8"	34660
3-1/8"	15093A
6-1/8"	18902



1-5/8" Flexible Section accommodates vibration and angles up to 30°. Maximum offset is 1/4". Length 10"..... Type 20695



Coated Inner Connector silver plated and coated with dry baked molybdenum compound to minimize expansion and contraction effects.

Line Size	Type
3-1/8"	30079
6-1/8"	30080



3-1/8" Flexible Section accommodates vibration and angles up to 30°. Maximum offset is 1/2". Length 18"..... Type 19209B



Adaptor Inner Connector 50-51.5 ohm

Line Size	Type
7/8"	4850A
1-5/8"	4851
3-1/8"	4852

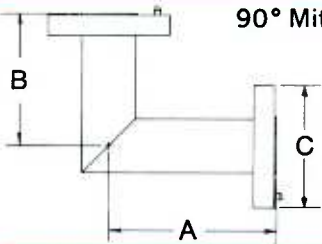
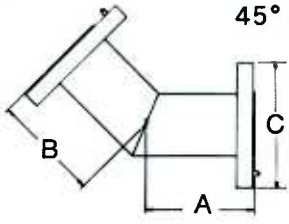
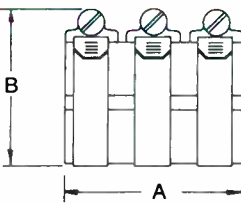
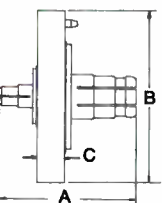
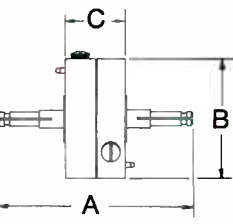
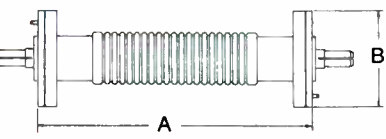
Hardware Kit set of nuts, bolts and lockwashers for one flange joint.

Line Size	Type
7/8"	11381-5
1-5/8"	11381-2
3-1/8"	11381-3
6-1/8"	21206

"O" Ring Gasket for EIA flange.

Line Size	Type
7/8"	10683-11
1-5/8"	10683-2
3-1/8"	10683-3
6-1/8"	10683-10

RIGID LINE COMPONENT DIMENSIONS

Component Description	Line Size	Type No.	Dimensions, inches			Weight, lbs.	
			A	B	C	Net	Shipping
 <p>90° Miter Elbow</p>	7/8"	1060	3-5/64	2-7/16	2-1/4	1.4	1.8
	1-5/8"	1061	2-57/64	2-7/16	3-1/2	3.6	4.0
	3-1/8"	1062	4-3/16	4-3/16	5-3/16	8.5	9.5
	6-1/8"	1073	5-5/8	5-5/8	8-1/8	23	27
 <p>45° Miter Elbow</p>	3-1/8"	1162	4-1/2	4-1/2	5-3/16	9	10.5
 <p>Unpressurized Straight Coupling</p>	1-5/8"	4861A	2-1/2	2-1/4	—	0.5	0.6
	3-1/8"	4862A	4-1/4	3-1/2	—	1.5	1.8
 <p>Reducer to 7/8 Reducer to 1-5/8" Reducer to 3-1/8"</p>	1-5/8"	1860A	—	3-1/2	4-25/64	2.3	2.7
	3-1/8"	1861	4-1/8	5-3/16	7/8	5.6	6.3
	6-1/8"	1872	—	8-1/8	7-1/8	20	26
 <p>Gas Barrier</p>	7/8"	1260A	3-5/8	2-1/4	1-1/8	1.2	1.4
	1-5/8"	1261B	4-21/32	3-1/2	1-21/32	3.6	4.3
	3-1/8"	1262A	6-1/8	5-3/16	1-7/8	6.6	7.4
	6-1/8"	1273	6-23/32	8-1/8	3-3/4	16.3	18
 <p>Flexible Section</p>	1-5/8"	20695	10	3-1/2	—	4.2	4.7
	3-1/8"	19209B	18	5-3/16	—	15	16.9

EIA Standard Flange Dimensions

Line Size, inches	7/8	1-5/8	3-1/8	6-1/8
Flange Overall Diameter, inches	2-1/4	3-1/2	5-3/16	8-1/8
Bolt Circle Diameter, inches	1.750	2.810	4.375	7.375
Number of Bolts	3	4	6	12
Bolt Size, inches	1/4	5/16	3/8	3/8

COAXIAL TRANSFER SWITCHES



TYPE 6740A



TYPE 6730C



- High Reliability**
- Four Port Transfer Type — or SPDT**
- Mount in any Position**
- Frequencies up to 1000 MHz**

Andrew offers two basic coaxial transfer switches — one each in the 1-5/8" and 3-1/8" sizes. The switches are used wherever RF power must be re-routed quickly and reliably from a central control point.

FM and Television broadcast stations use these switches to transfer from one transmitter to another or from one antenna to another with a minimum loss of air time. Andrew switches are used in HF transmitter sites for military communications. These coaxial transfer switches have provided maximum flexibility where several transmitters and antennas are involved.

The switches may be used as four port transfer types (DPDT) or three port SPDT switches. Because they are transfer types, fewer units are generally required to perform complex switching functions than if SPDT or SP3T switches were used. The switches may be mounted in any position either in a panel or individually at the most convenient point for connecting coaxial lines or cables.

In the event of AC power failure, these motor driven switches can be cycled manually by means of external knobs at the rear of each switch.

CHARACTERISTICS

Type Number	6730C	6740A
Termination, Male EIA flange	1-5/8"	3-1/8"
Frequency Range, MHz	0-1000	0-1000
Impedance, Ohms	50	50
Average Power Rating, * KW@		
2 MHz	80	350
30 MHz	21	90
100 MHz	11	50
500 MHz	5.0	20
1000 MHz	3.4	15
Peak Power Rating, * KW	100	400
VSWR, Maximum		
0-500 MHz	1.03	1.02
500-1000 MHz	1.08	1.05
Isolation, Minimum, dB@		
30 MHz	70	70
100 MHz	60	65
500 MHz	45	60
1000 MHz	35	45
Power Drain (during switching), watts	40	200
Dimension, LXWXD inches,	8 x 8 x 10	14 x 14 x 14
Net Weight, pounds	13	65

*At unity VSWR and 40°C (104°F) ambient temperature.

COAXIAL TRANSFER SWITCHES

120 and 240V Models Available
Motor Driven — Manual Emergency Operation
Optional Control Panel
Versatile Interlock Circuitry

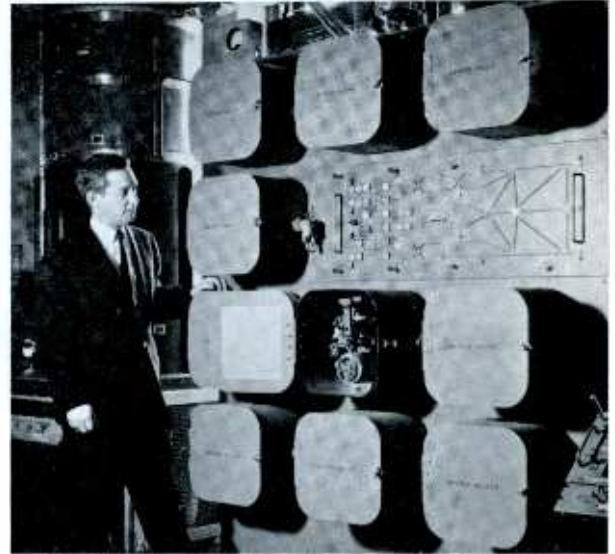
Each series switch is available for either 120 or 220/240 volt operation, 50/60 Hz. See table below.

All transfer switches include two completely independent interlock circuits which follow the rf path, opening and closing as the switch contacts open and close. The circuits are two wire, isolated from ground and control circuitry to allow cascading from one switch to the next. Contacts to indicate switch position are also included.

Input and output rf connections to all switches are male EIA flanges (fixed inner connectors).

Type **33630A** is an optional control panel for any of these switches. It is mounted on a standard 19" relay rack panel and includes on-off switch, operating switch and position indicating lights.

Also available are input adaptor kits for adapting Types 6740A and 6742A, 3-1/8" switches to unflanged 3-1/8" transmission line. Each kit includes four short outer conductor sections (flanged on one end to bolt to switch), inner conductors, inner connectors, outer sleeve couplings and clamps. Type **41038** is to 50 ohm 3-1/8" transmission line and Type **41039** is to 51.5 ohm 3-1/8" transmission line (to be used to 216 MHz only).



10 Transfer Switches
On a Single Frame With Local Control Panel
 (System also includes Remote Control Panel)

ORDERING INFORMATION

Type **6730C** 1-5/8" Transfer Switch, 120V, 50/60 Hz operation.

Type **6732C** 1-5/8" Transfer Switch, 220/240V, 50/60 Hz operation.

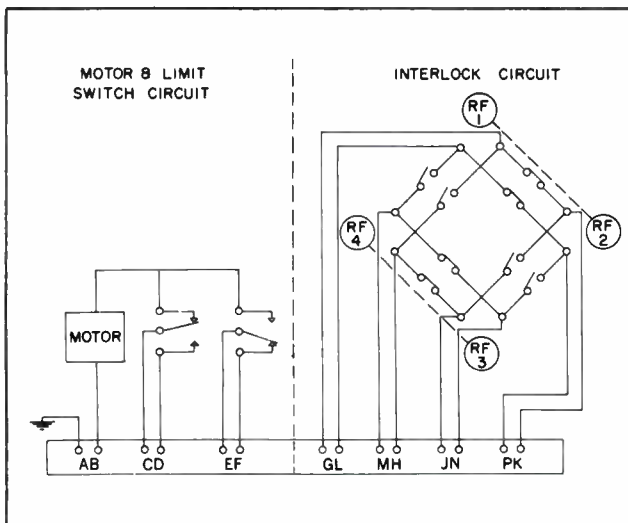
Type **6740A** 3-1/8" Transfer Switch, 120V, 50/60 Hz operation.

Type **6742A** 3-1/8" Transfer Switch, 220/240V, 50/60 Hz operation.

Type **33630A** Control panel for any switch above.

Type **41038** Adaptor Kit for use with Type 6740A and 6742A to convert to 50 ohm unflanged 3-1/8" input.

Type **41039** Adaptor Kit for use with Type 6740A and 6742A to convert to 51.5 ohm unflanged 3-1/8" input. Use up to 216 MHz only.

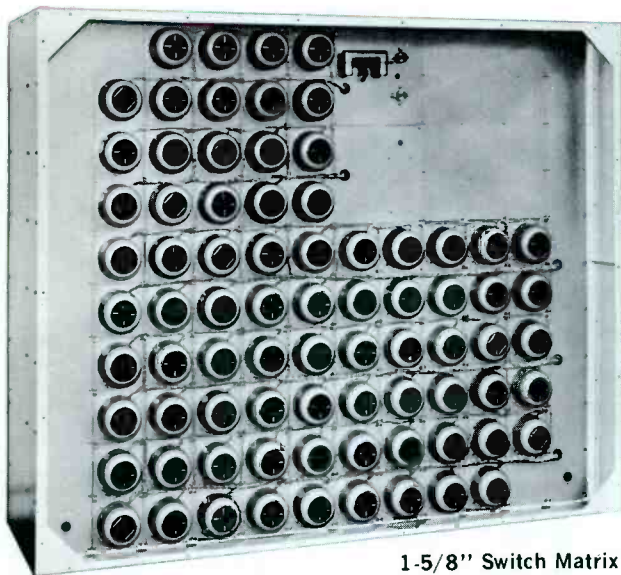


Simplified Wiring Diagram
 Switch Shown With rf Terminals 1-2 and 3-4 Connected



Type 33630A 19" Rack Mounted Control Panel For All Andrew Single Switches

COAXIAL SWITCHING EQUIPMENT



1-5/8" Switch Matrix

COAXIAL SWITCHING MATRICES

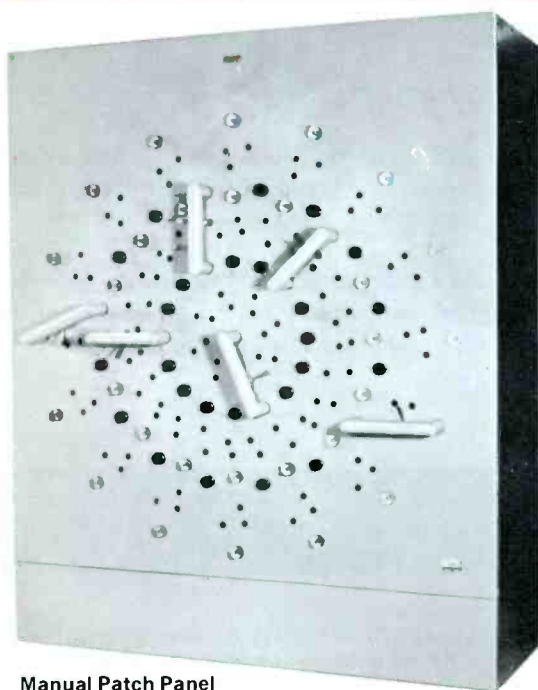
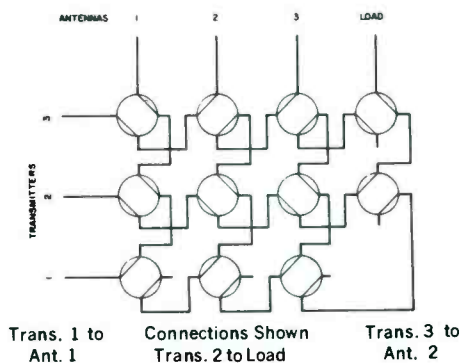
Andrew motor driven 1-5/8" and 3-1/8" coaxial transfer switches described on pages 78 and 79 can easily provide the basis for remotely controlled RF switching systems of any required degree of complexity. By arranging inputs and outputs in the form of a matrix, Andrew engineers have custom designed systems capable of performing a wide variety of RF switching functions.

For maximum ease of operation, provision is available for direct visual routing indication on a remote control panel as well as on the matrix itself. RF routing may be chosen in any desired sequence or path. Automatic interlocks are provided for deactivation of equipment during switching.

Complete versatile matrices permit connection of any combination of inputs to outputs and the changing of circuits without interrupting other connections. Nonversatile matrices require fewer switches but interrupt some existing paths when switching other input to output paths.

Contact your Andrew Sales Engineer for help with your switching matrix requirements.

3 x 4 Switching Matrix



Manual Patch Panel

MANUAL PATCH PANELS

Andrew coaxial patch panels offer a less expensive solution to the switching problem than switching matrices, particularly where circuit changes are not made frequently or when switching speed is not critical.

Designs are available in 1-5/8" and 3-1/8" size lines from 1 by 2 combinations up to 16 by 17. Variations of existing designs can easily be made to suit any requirement.

Complete interlock systems are included to prevent switching while lines are energized.

HEATLESS AUTOMATIC DEHYDRATOR

**Dew Point Below — 38°C (-37°F)
 Dry Air in All Climates
 No Heat Reactivation Cycles
 Fully Automatic**

Type 1920A (FSN 440-924-6542) is a fully automatic dehydrator capable of delivering a continuous supply of dry air under any climatic condition. No down time is necessary to reactivate drying agents. Type 1920A will function over an ambient range of -18°C (0°F) to 49°C (120°F) with an input relative humidity of 95%. Through this range, the dew point of the output air is held below -38°C (-37°F), which is less than one grain of moisture per pound of air.

The curves below show the operating characteristics of the unit.

Maximum output pressure is factory set at 8 psig. When transmission line is pressurized, the dehydrator automatically shuts off. Check valves prevent loss of line pressure through the dehydrator. A pressure switch starts the unit when line pressure drops to 3 psig.

50 Hz units are available with slightly reduced output (1 CFM).

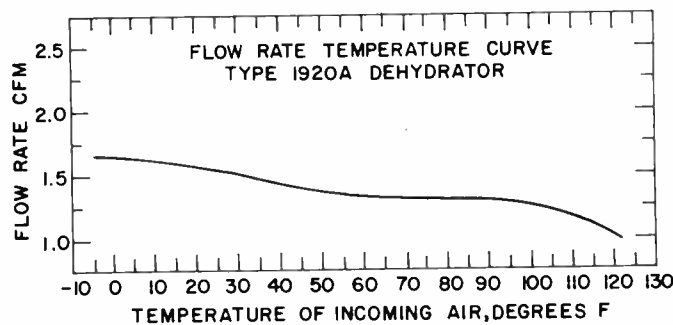
The units are capable of pressurizing the following lengths of transmission line, based on an initial pressurization period of up to approximately eight hours.

Line Size and Type	Length, feet
1-5/8" and smaller coax	20,000
3" & 3-1/8" coax	10,000
5" coax	4,000
6-1/8" & 8" coax	2,500
EW37, WR229 and smaller waveguides	2,000
EW17, 20; WR284, 340, 430 waveguides	1,000

ACCESSORIES

Regulating tank assemblies for use with waveguides and smaller air dielectric cables as well as pressure and humidity alarm sensors are described in page 83.

For distribution manifolds and fittings, see page 84.



Type 1920A

CHARACTERISTICS

Electrical

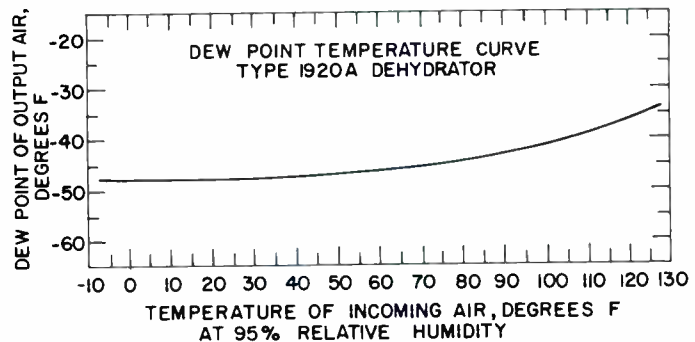
Power Consumption, watts	600
during pumping	10
when idle	10
Power Cord	7 ft, 3 conductors
Safety	Grounded Chassis

Mechanical

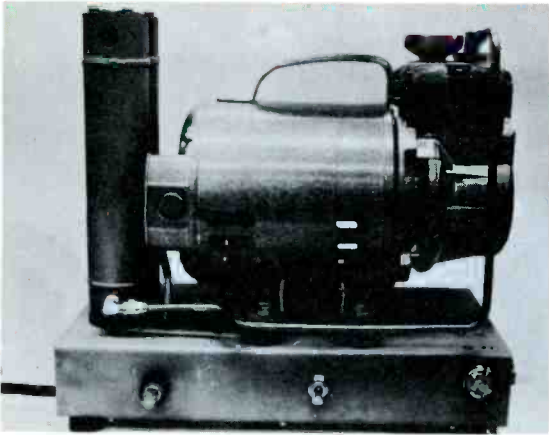
Output Capacity	1.3SCFM
Ambient Inlet Temperature	-18° to 49°C 0° to 120°F
Ambient Humidity, percent	95
Output Dewpoint	Below -38°C (-37°F)
Output Connection	1/8" M.P.T.
Output Air Line, poly tubing	20 feet, 3/8" O.D.
Net Weight, pounds	80
Shipping Weight, pounds	90
Dimensions, HxWxD	15-3/8"x24"x14-1/4"

ORDERING INFORMATION

Type 1920A —	120V, 60 Hz
Type 1921 —	120V, 50 Hz
Type 1924 —	240V, 50 Hz
Type 1923 —	Spare Parts Kit for Types 1920A and 1921



AUTOMATIC DEHYDRATORS



Type 1930

The units are capable of pressurizing the following lengths of transmission line:

Line Size and Type	Length, feet
1-5/8" and smaller coax	4,000
3" and 3-1/8" coax	2,000
EW37, WR229 and smaller waveguides	1,000
EW17, 20, WR284, 340, 430 waveguides	500

ORDERING INFORMATION

- Type 1930 — 120V, 60 Hz
- Type 1931 — 120V, 50 Hz
- Type 1934 — 240V, 50 Hz

Type 1930 series dehydrators are heatless automatic units similar in operation to the Type 1920A series with lower output capacities and pressures. Output is factory set to 1 psig start, 5 psig stop.

An output air humidity indicator is included.

50 Hz units are available with slightly reduced output (.17 SCFM).

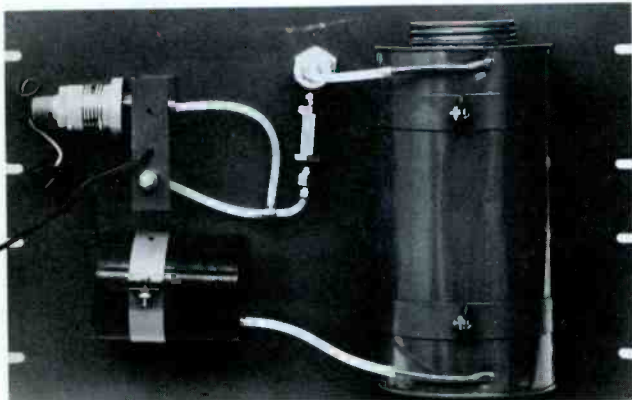
CHARACTERISTICS

Electrical

Power consumption, watts	
during pumping	300
when idle	0
Power Cord	7 ft., 3 conductors
Safety	Grounded Chassis

Mechanical

Output Capacity	.20 SCFM
Ambient Inlet Temperature	-18° to 35°C 0 to 95°F
Ambient Humidity, percent	95
Output Dewpoint	Below -28°C (-20°F)
Output Connection	1/8" M.P.T.
Output Airline, Poly Tubing	20 feet, 3/8" O.D.
Net Weight, pounds	40
Dimensions, HxWxD	13-1/4"x7-1/4"x14-7/8"



Type 55690

The unit is capable of pressurizing the following lengths of transmission line:

Line Size and Type	Length, feet
7/8" and smaller coax	500
EW37, WR229 and smaller waveguides	500
EW17, 20; WR284, 340, 430 waveguides	200

Type 55690, desiccant type low pressure dehydrator, is designed to supply dry air to small systems. It will operate for several months before replacement or reactivation of desiccant is required. A humidity indicator on the front panel gives a visual indication when replacement is necessary.

CHARACTERISTICS

Electrical

Power Source	120V, 60 Hz
Power Consumption, watts	5

Mechanical

Output Capacity	2 SCFH (.0334 SCFM)
Output Pressure, Max.	1.75 psig
Output Dewpoint	-34°F
(Input Air 70°F-60%R.H.)	
Drying Agent, sova beads	5 pounds
Output Connection	1/8" F.P.T.
Net Weight, pounds	12
Mounting	19" rack panel

PRESSURIZATION EQUIPMENT

Regulating Tank, is used with automatic dehydrators for pressurization of small HELIAX coaxial cable (1/2" and below) and microwave waveguide.

The tank has a 10 gallon capacity (approximately 1.5 cu. ft.). The regulator may be adjusted down to 1.0 psig output pressure. Included are necessary fittings and tubing to allow connection of the unit between the dehydrator and transmission line or waveguide.

Type **31614-1** is used with Types 1920A and 1930 series dehydrators to prevent excessive cycling when pressurizing small diameter cables. Gauge included is 15 pounds full scale.

Type **31614-3** is used to reduce the output pressure of Type 1920A series dehydrators for use with microwave waveguides. A 5 pound full scale gauge is included.

Humidity Sensor, Type **31616** is designed for field installation in Type 1920A or 1921 dehydrators or existing dry air systems to activate remote indicators or alarms when moisture is detected in the output of dehydrators. The sensor is set for 10% relative humidity, but other relative humidity settings down to 2% can be supplied. Leads from the electrical contacts are brought to a terminal block installed in the dehydrator for the external connection. The standard unit connects to 3/8" polyethylene tubing. The unit can be factory installed in Types 1920A or 1921 dehydrators on special order.

Pressure Sensors, Type **31618-1** for low pressure indication and Type **31618-2**, for high pressure indication are designed for field installation in existing dry air systems. The units are preset at the factory for low pressure (1-1/2 psig) and high pressure (10 psig) so that the SPDT contacts can activate remote indicator or alarm circuits. Other preset pressures in the 1 to 15 psig range may be specified. Either sensor can be ordered factory installed in any of the 1920 series dehydrators on special order.

Dry Air Hand Pump, Type **878A** (FSN 4320-334-8658) pressurizes up to 1,000 feet of 7/8" cable or up to 250 feet of 1-5/8" line. Supplied with 1 pound of silica gel and 7 feet of hose. The desiccant condition is shown by the color indicator on the body of the pump.

Spare Hose Assembly, Type **10195** for pump 878A

Silica Gel Refill, Type **210**, one pound package for Type 878A.



Type 31614
Regulating Tank



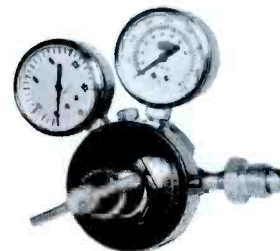
Type 31616
Humidity Sensor



Type 31618-1
Pressure Sensor



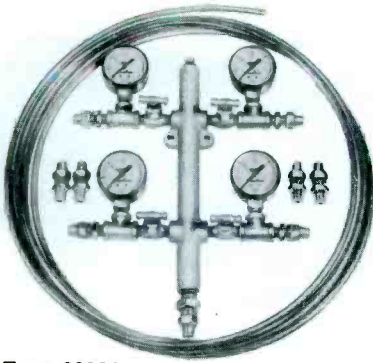
Type 878A
Dry Air
Hand Pump



Type 858C
Nitrogen Tank Fitting

Nitrogen Tank Fitting, Type **858C** includes a pressure regulator, high and low pressure gauges and 10 feet of 3/8" OD polyethylene tubing with fittings for 1/8" pipe threads. The unit fits a CGA 580 (.965 inch right-hand internal) connection on the nitrogen tank. **Adaptor**, Type **35751** for use with 858C to fit a CGA 550 (.903 inch left-hand external) connection on the nitrogen tank.

PRESSURIZATION EQUIPMENT



Type 6600A

Gas Distribution Manifold, Type 6600A (FSN 5820-392-7233) includes pressure gauges, needle valves, fittings and 15 feet of 3/8" polyethylene tubing for each outlet. Specify number of outlets required.



Gas Inlet Valve has 1/8" male pipe thread Type **3017**



Male Connector for 3/8" poly tubing, has 1/8" male pipe threads one end Type **31680-1**



Pressure Gauge reads 0-30 psi and has 1/8" male pipe thread. Indoor use only Type **3500**



Male Connector for 3/8" poly tubing, has 1/4" male pipe threads one end Type **31680-2**



Release Valve has 1/8" male pipe thread on one end Type **3027**



Male Branch Tee for 3/8" poly tubing, has 1/4" male pipe threads on one outlet. Type **31680-3**



Release Valve has 1/8" male pipe thread on both ends Type **4944**



Elbow for 3/8" poly tubing, has 1/8" male pipe threads one end Type **31680-4**

Pipe Tee
1/8" female pipe thread each outlet Type **3028**

Street Tee
One male and 2 female 1/8" pipe thread outlets Type **3022**

Pipe Nipple
1/8" male pipe threads entire length Type **3026**

Polyethylene Tubing 3/8" diameter Type **25435**

Mounting Strap
For 3/8" poly tubing Type **10712-24**

Pipe Plug Has 1/8" male pipe thread Type **3018**

Thread Lubricant 4 cc tube Type **3012**

PRESSURIZATION LAYOUTS

All air dielectric coaxial transmission line and microwave waveguide installed outdoors should be pressurized with dry air or gas. Unpressurized systems are subject to moisture condensation with temperature changes with possible impairment of electrical characteristics of the line.

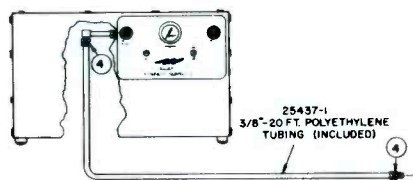
Pressurization can be accomplished by manual or automatic means, depending upon the amount of line in use at the station and whether or not the site is attended. Automatic dehydrators are recommended for unattended sites or those where large amounts of line are employed. A dry air pump or cylinder of dry nitrogen gas is usually satisfactory for attended sites using a relatively small amount of cable or guide.

All installations of air dielectric cable or microwave waveguide should be purged prior to putting the system in service and at any time moist air enters the line. To purge the system, pressurize with dry air or gas at the equipment end of the line and bleed the line using the gas port at the antenna end of the line. Repeat the procedure three times.

When it is too difficult or inconvenient to bleed the air at the antenna end of the line, it may be bled at the input end, allowing an hour each time for the air to mix.

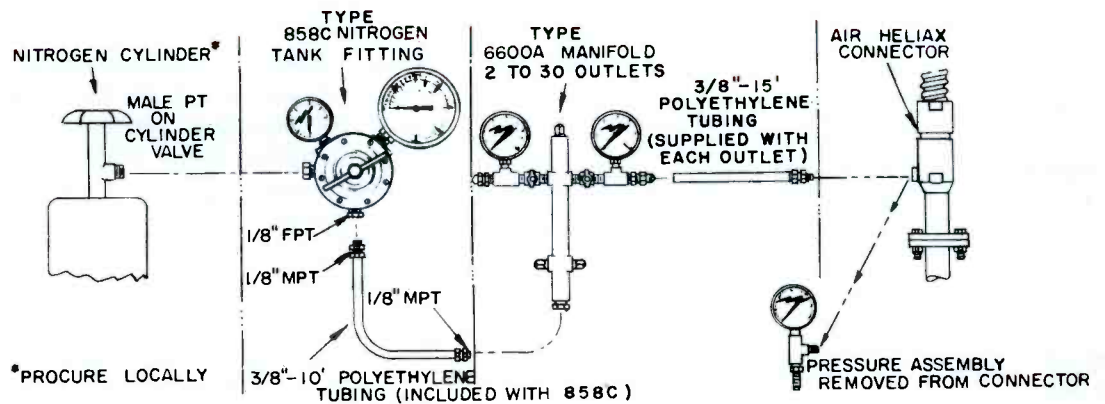
The illustrations below show how the various units and accessories are used together in typical pressurization systems.

Automatic Dehydrator System

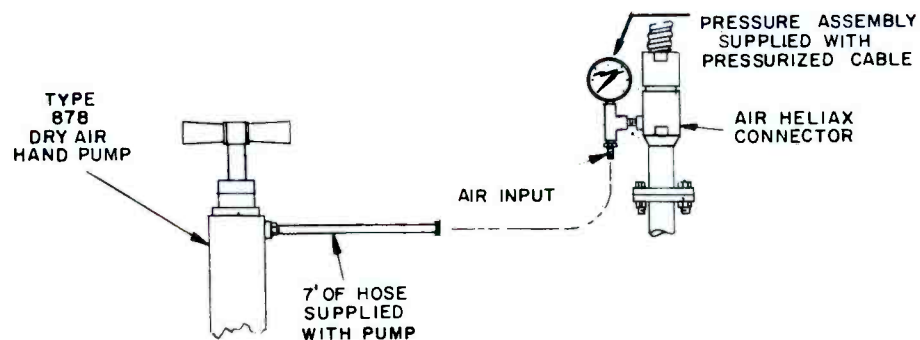


For single transmission line installations, the pressure source (dehydrator, gas cylinder or pump) is connected directly to the line. In multiple line installations, a Type 6600A manifold is used to distribute the pressure to the several lines, with provisions for isolating and checking each line individually. Each item (pump, manifold, etc.) includes sufficient 3/8" polyethylene tubing and fittings to connect to the next item or line.

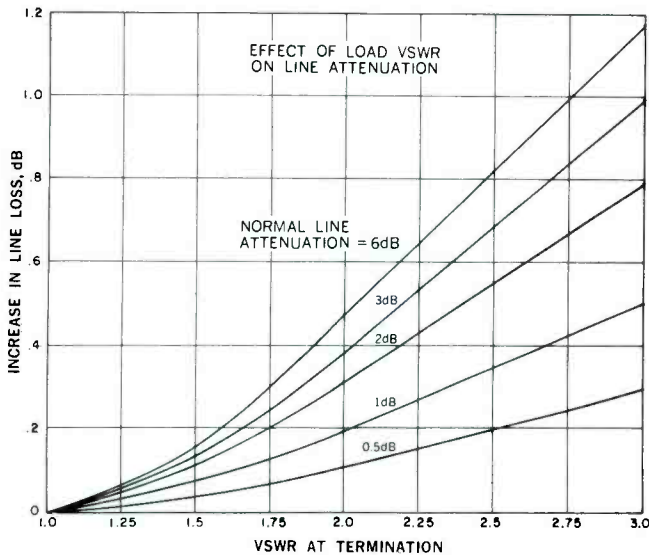
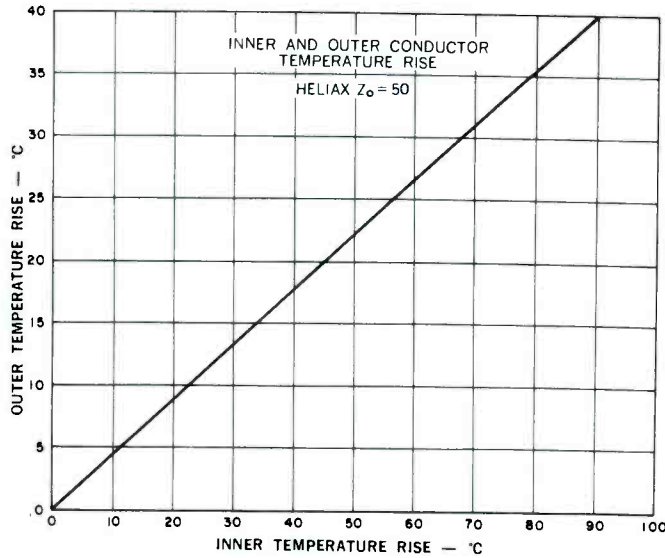
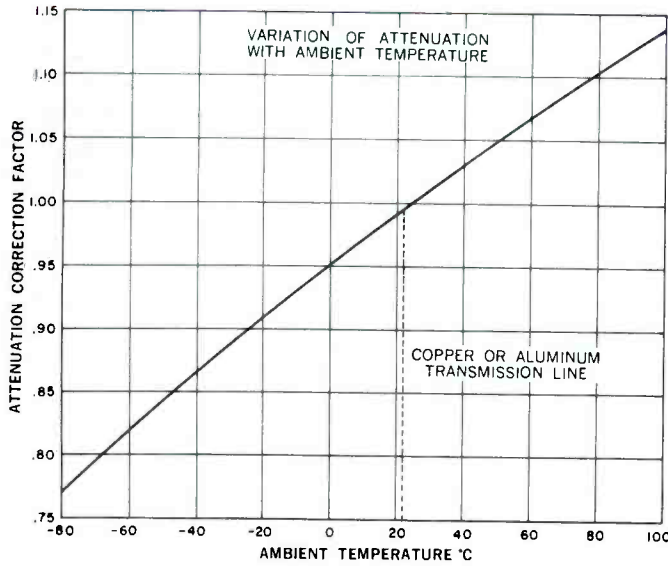
Compressed Gas System



Manual System



COAXIAL CABLE DATA



ATTENUATION

The following pages show the attenuation versus frequency characteristics of all standard Andrew rigid and HELIAX transmission lines. The values shown are for 24°C (75°F) ambient, and increase slightly with higher temperature or applied power, up to approximately 13% above the curves at full average power rating. The curve at left shows this relationship. Inner and outer conductor temperature rise is also shown for reference.

VSWR EFFECT ON ATTENUATION

When transmission line is attached to an antenna, the VSWR of the antenna increases the attenuation of the line. This effect is quite small for normal conditions. The curve shows increase in line loss versus VSWR.

POWER RATING

Peak and average power ratings are both required to fully describe the capabilities of a given transmission line. Typically, peak power ratings limit the low frequency or pulse usage while average power ratings limit the high frequency usage.

STANDARD PEAK POWER RATINGS

The permissible voltage between inner and outer conductors of a coaxial cable determines the peak power rating.

Voltage breakdown is independent of frequency, but varies with line pressure and VSWR. Peak power ratings are therefore generally stated for the following conditions: Unity VSWR, no modulation, and one atmosphere absolute dry air pressure. 100% AM modulation reduces the peak power rating by a factor of 4. Peak power rating is given by the expression

$$P_{pk} = \frac{(E_{rf})^2}{Z_0(1+M)^2 \text{ VSWR}} (S_d)^2 \text{ watts}$$

where M is modulation percentage expressed decimally, VSWR is voltage standing wave ration on the line, SD is dielectric strength of the pressurizing medium relative to air, E_{rf} is determined as follows: $E_{rf} = 0.247 E_p$. E_p is the dc production test voltage (the values in the table below are typical), and the constant 0.247 includes factors to relate dc voltage to rf voltage, to adjust to rms value, and includes a safety factor of 2. All of these factors are empirical and have been verified.

Outer Conductor OD, inches	7/8	1-5/8	3	3-1/8	5	6-1/8	8
E_p volts	6,000	11,000	16,000	19,000	25,000	35,000	35,000

INCREASED PEAK POWER RATINGS

Pressurization and/or the use of high dielectric strength gases can be used to increase peak power ratings. The variation with several popular gases is shown at the right.

STANDARD AVERAGE POWER RATINGS

The limitation is the safe long term operating temperature of the inner conductor when the cable is operated in a 40°C (104°F) ambient. The ratings are based upon an inner conductor temperature of 100°C (212°F) for HELIAX air dielectric coaxial cable (polyethylene) and 80°C (176°F) for foam HELIAX coaxial cable. Rigid line ratings are based upon an inner conductor temperature of 102°C (216°F).

The curve at the right indicates the variation of average power rating with ambient temperature.

For CW, AM, or FM applications, the average power rating of a cable is determined by derating the power curves shown, according to VSWR. See expression below. SSB transmitters are generally rated by peak envelope power (PEP). Average power for these applications is considerably lower, typically about half the PEP. Television transmitter ratings are based on sync peak video power. Average power output for transmission line evaluation is 83% of nominal rating of transmitter.

DERATING AVERAGE POWER FOR VSWR

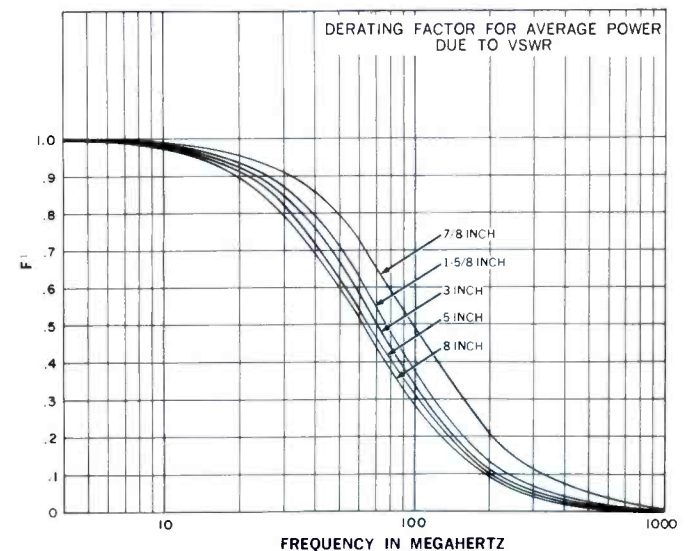
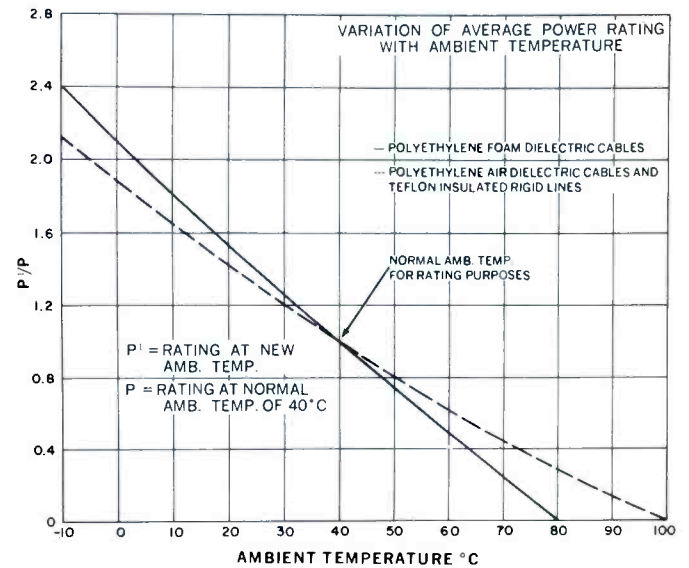
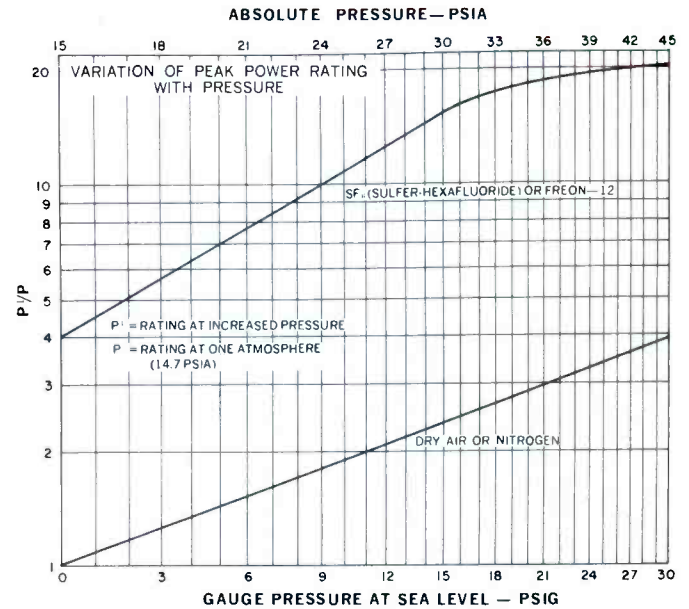
The derating factor (DF) is calculated from the following formula.

$$D.F. = \frac{(VSWR^2 + 1)}{(2 VSWR)} + F^1 \frac{(VSWR^2 - 1)}{(2 VSWR)}$$

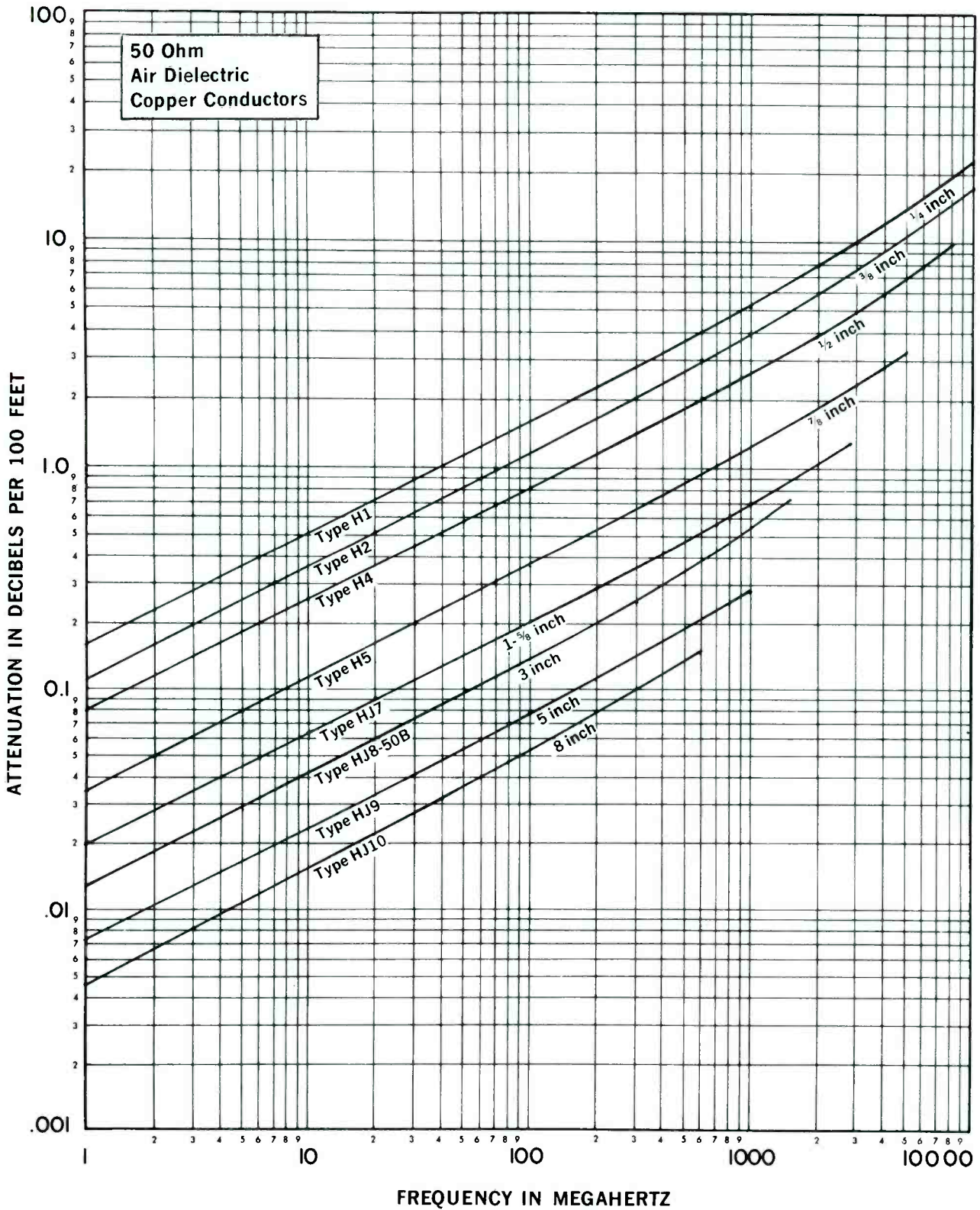
where F^1 is a factor that varies with frequency and line size. Select the factor from the curve at right.

INCREASED AVERAGE POWER RATINGS

These are achievable by (1) treating the conductor surfaces for greater heat emissivity, (2) pressurizing the line, (3) using a gas with a larger heat transfer coefficient. For special applications your Andrew sales engineer will supply complete information.



HELIAX® CABLE ATTENUATION



Attenuation Curves based on:

VSWR 1.0

Ambient Temperature 24°C(75°F)

One atmosphere absolute dry air pressure (0 psig)

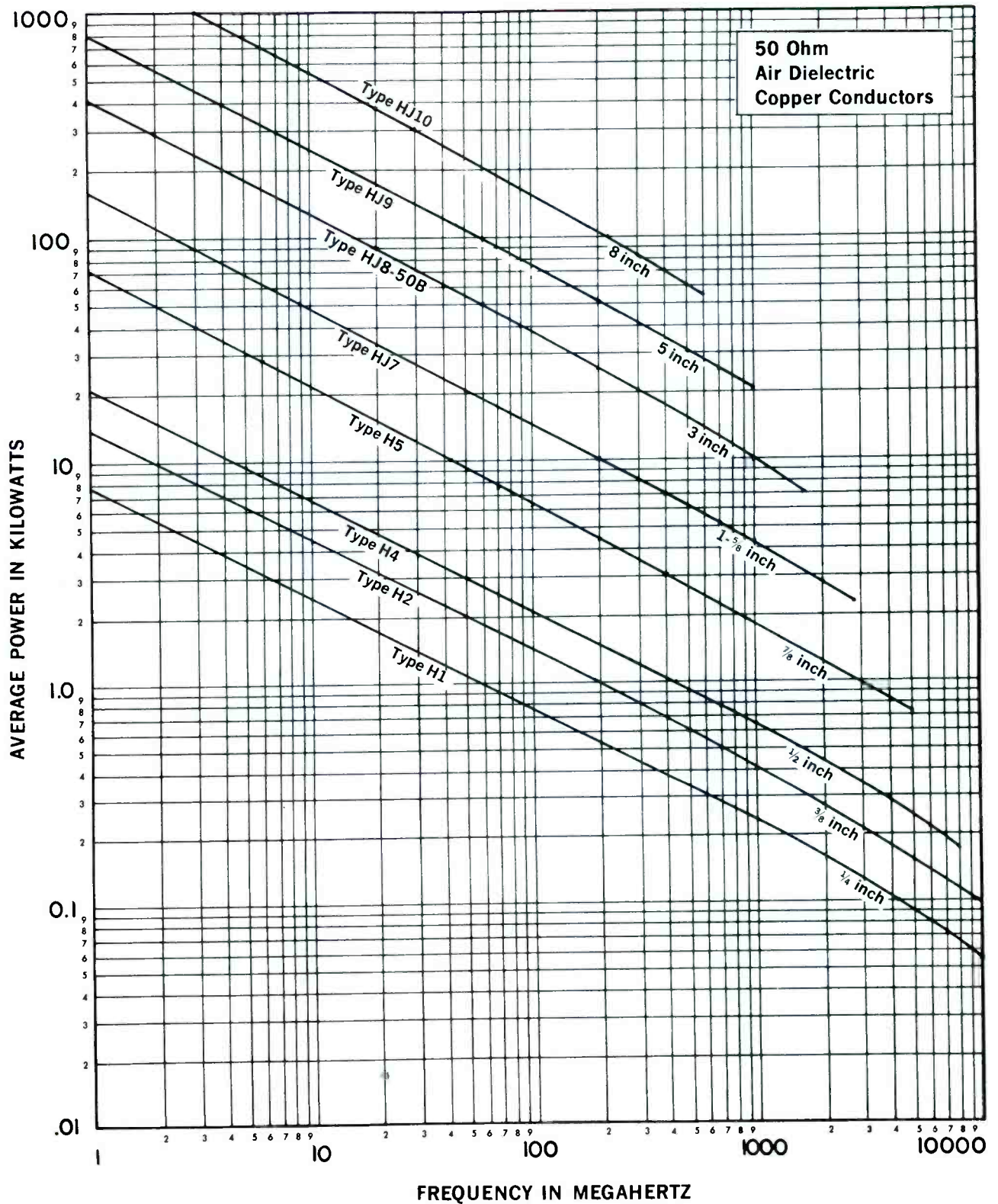
Conversion Data:

1 dB/100 feet = 3.28 dB/100 meters

For 75 ohm cables, multiply values by .95

For other ambient temperatures see curve on Pg. 86

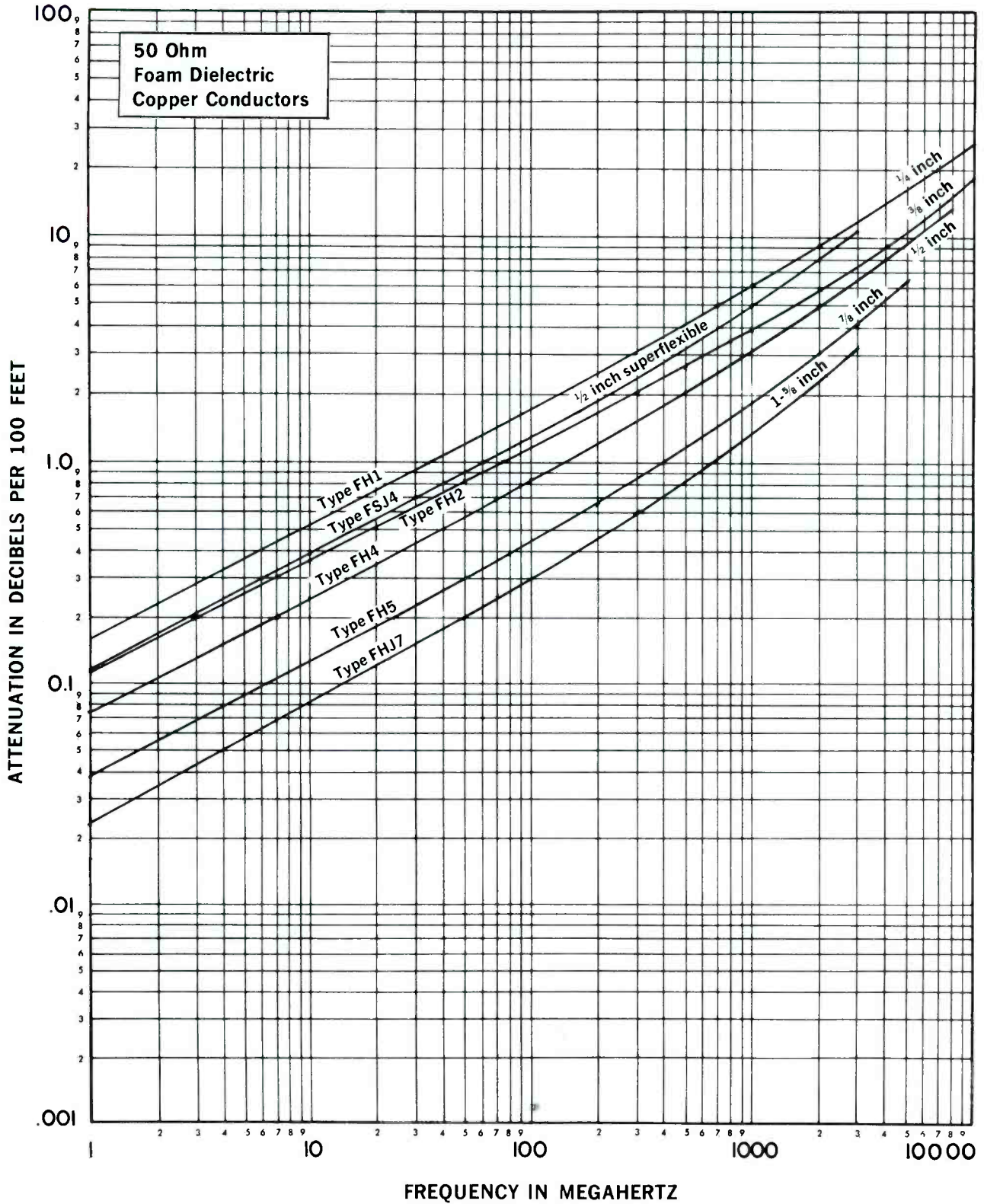
HELIAX® CABLE POWER RATING



Power ratings based on:
 VSWR 1.0
 Ambient Temperature 40°C (104°F)
 Inner conductor temperature 100°C (212°F)
 One atmosphere absolute dry air pressure (0 psig)

Conversion Data:
 For 75 Ohm cables, multiply values by .70
 For other ambient temperatures see curve on Pg. 87
 For 10 psig dry air pressure, multiply values by 1.15

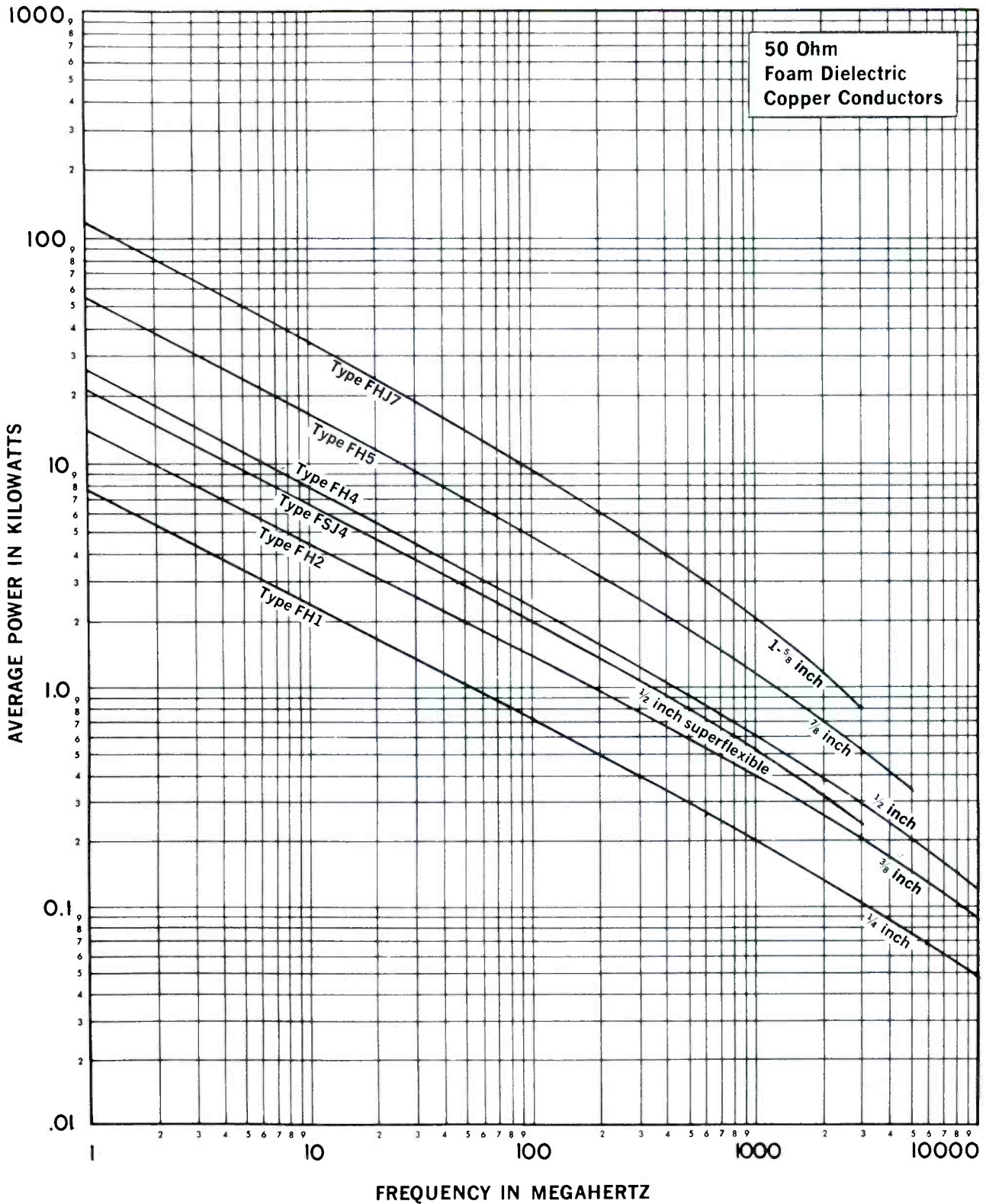
HELIAX® CABLE ATTENUATION



Attenuation curves based on:
 VSWR 1.0
 Ambient Temperature 24°C(75°F)

Conversion Data:
 1 dB/100 feet = 3.28 dB/100 meters
 For 75 ohm cables, multiply values by .95
 For other ambient temperatures see curve on Pg. 86

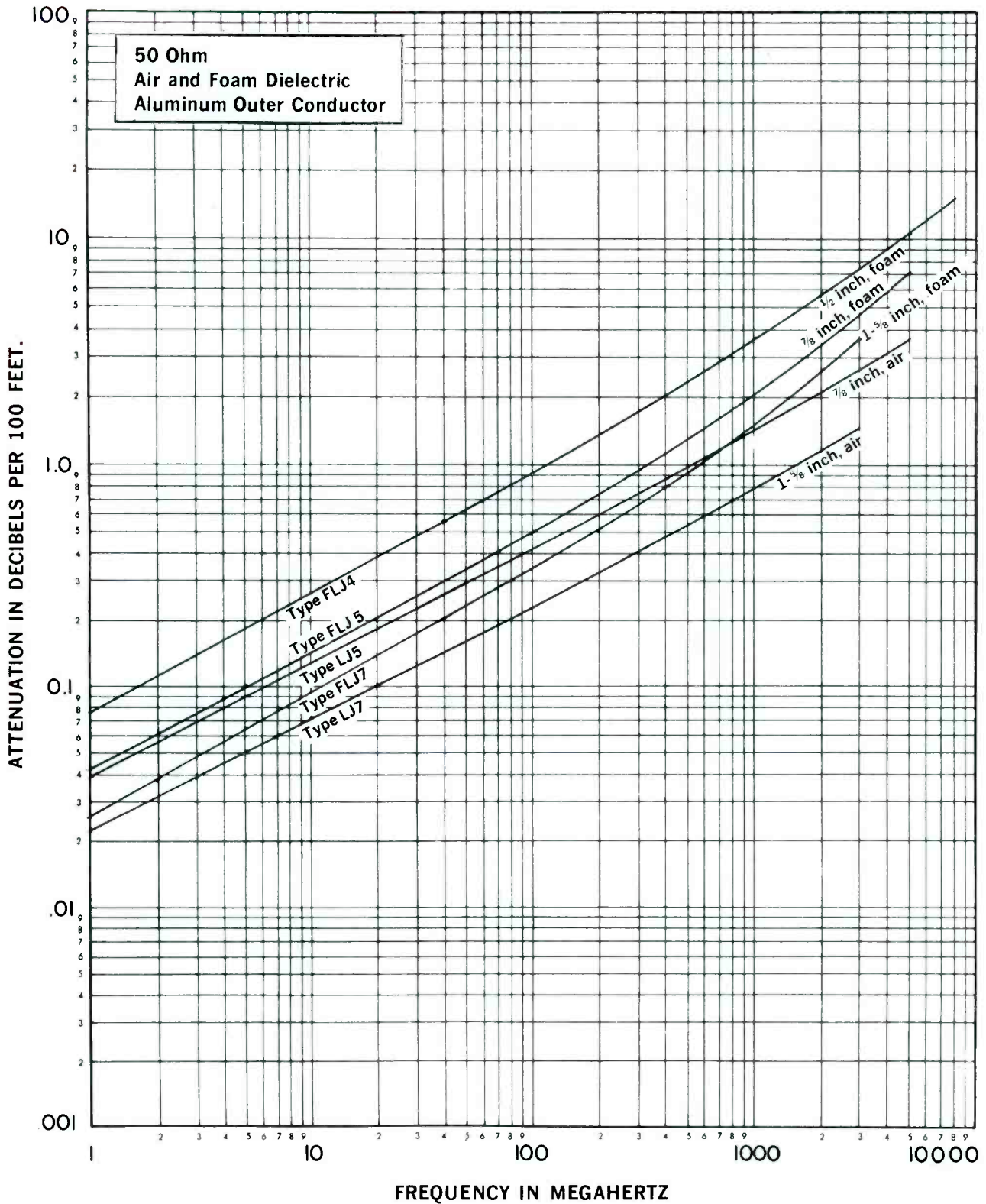
HELIAX® CABLE POWER RATING



Power Ratings based on:
 VSWR 1.0
 Ambient temperature 40°C (104°F)
 Inner conductor temperature 80°C (176°F)

Conversion Data:
 For 75 ohm cables, multiply values by .70
 For other ambient temperatures see curve on Pg. 87

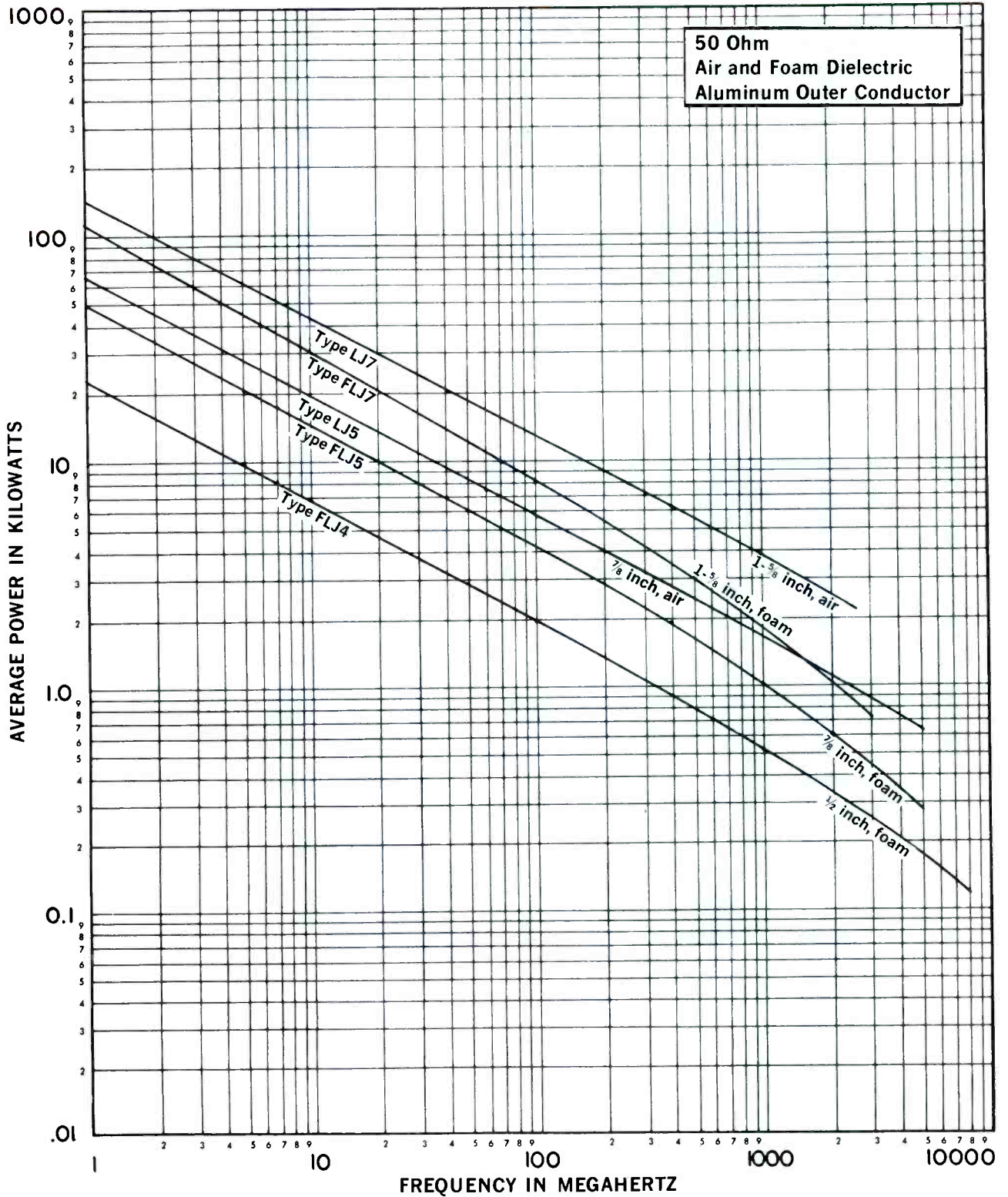
HELIAX® CABLE ATTENUATION



Attenuation curves based on:
 VSWR 1.0
 Ambient Temperature 24°C (75°F)
 One atmosphere absolute dry air pressure (0 psig)
 (air cables)

Conversion Data:
 1 dB/100 feet = 3.28 dB/100 meters
 For 75 ohm cables, multiply values by .95
 For other ambient temperatures see curve on Pg. 86

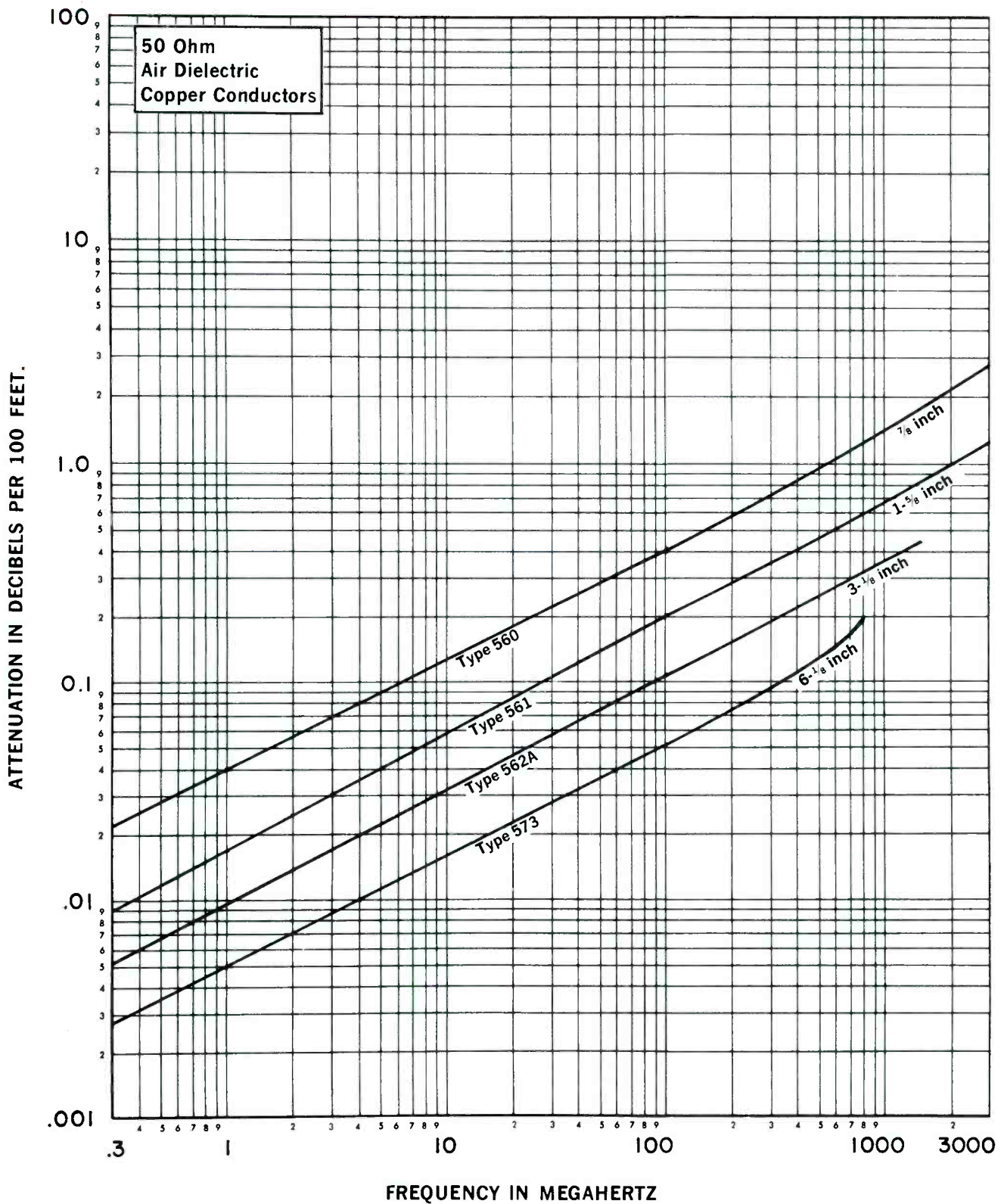
HELIAX® CABLE POWER RATING



Power ratings based on:
 VSWR 1.0
 Ambient Temperature 40°C (104°F)
 Inner conductor temperature 100°C (212°F)
 for air cable and 80°C (176°F) for foam cables
 One atmosphere absolute dry air pressure (0 psig)
 (air cables)

Conversion Data:
 For 75 ohm cables, multiply values by .70
 For other ambient temperatures see curve on Pg. 87
 For 10 psig dry air pressure (air cables) multiply
 values by 1.15

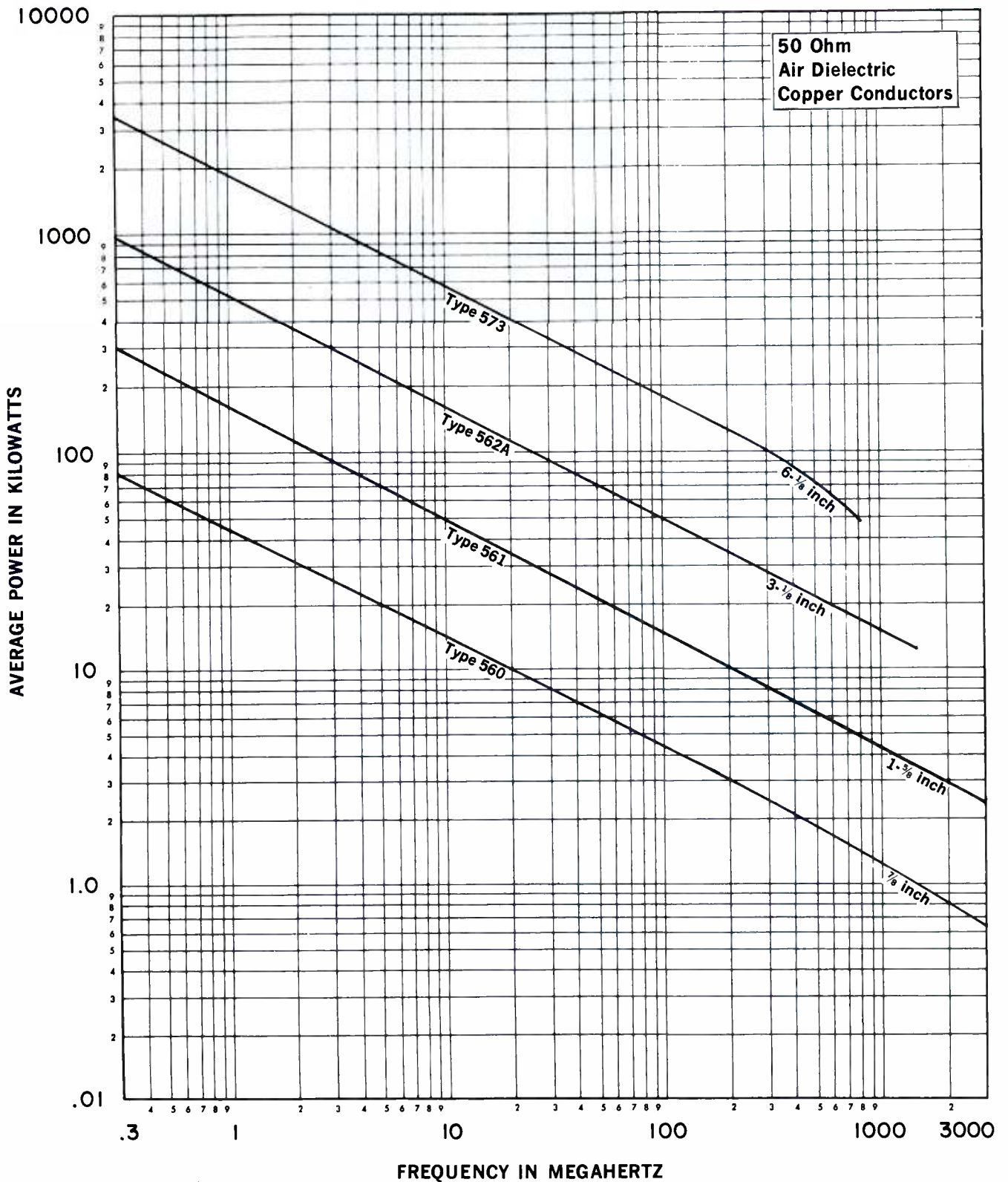
RIGID LINE ATTENUATION



Attenuation curves based on:
 VSWR 1.0
 Ambient Temperature 24°C (75°F)
 One atmosphere absolute dry air pressure (0 psig)

Conversion Data:
 1 dB/100 feet = 3.28 dB/100 meters
 For other ambient temperatures see curve on Pg. 86

RIGID LINE POWER RATING



Power ratings based on:

VSWR 1.0

Ambient Temperature 40°C (104°F)

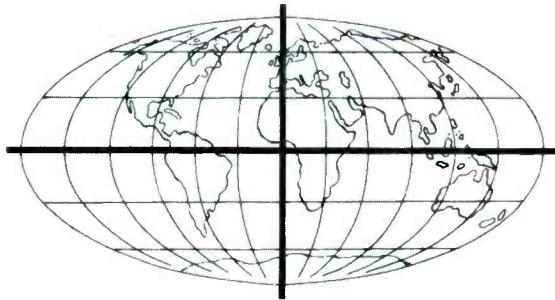
Inner conductor temperature 102°C (216°F)

One atmosphere absolute dry air pressure (0 psig)

Conversion Data:

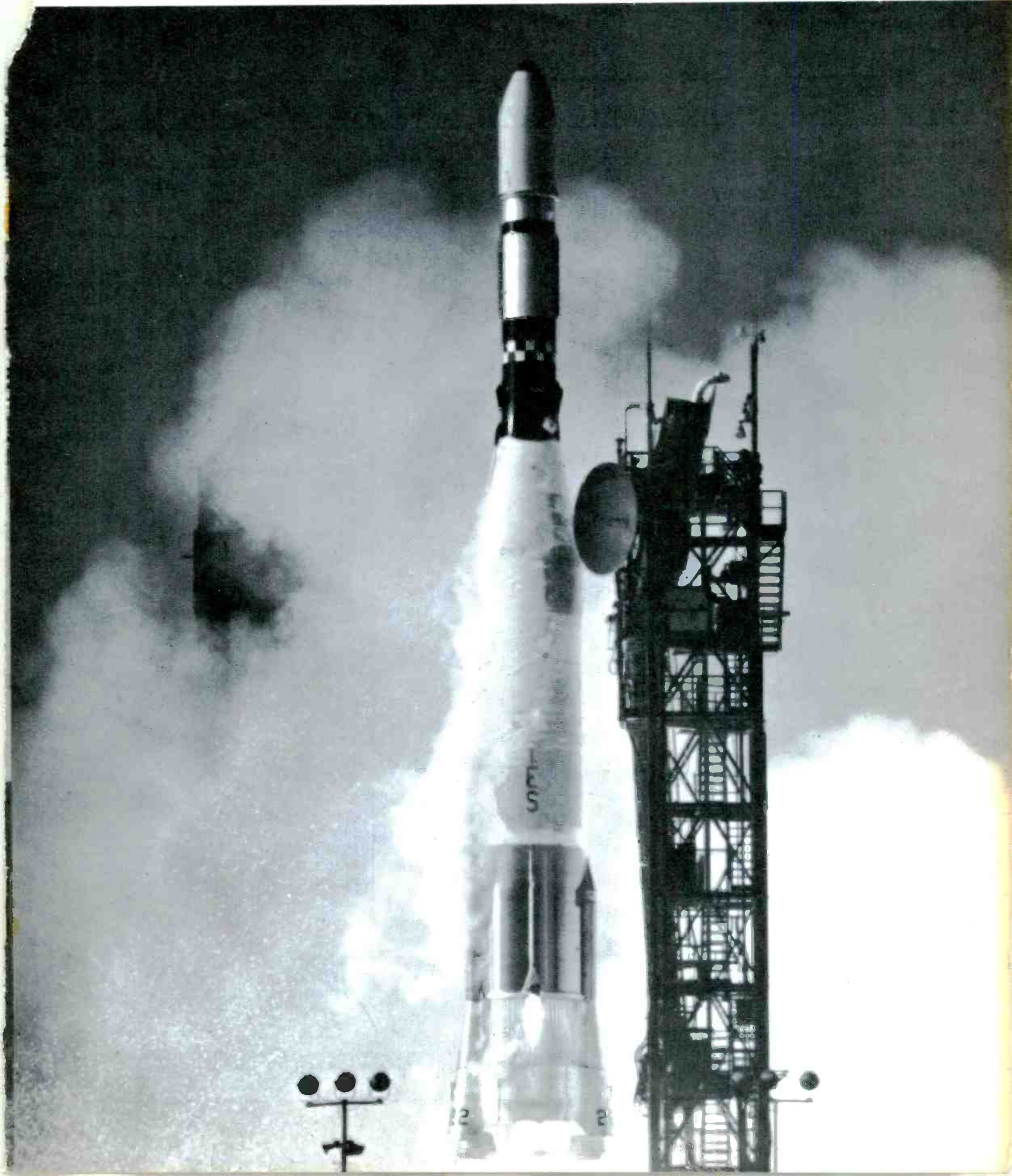
For other ambient temperatures see curve on Pg. 87

For 10 psig dry air pressure, multiply values by 1.15



SALES AGENTS

BELGIUM	E.T.I. S.A., 219, rue Royale, Brussels 3, Telephone: 13.31.38, Telex: 22555, Cable: TECHINFOR, Brussels
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FRANCE	Salies Import, 65-67 Avenue Jean Jaures, 91 Palaiseau Telephone: 920.4010, Telex: 28823, Cable: SODIVAR, Paris
GREECE	Andreas E. Devletoglou, 20 Voukourestiou Street, Athens 134, Telephone: 623-426, Cable: ANDREWDEV, Athens
INDIA	Motwane Private Ltd., 127 Mahatma Gandhi Rd., Bombay 1, Telephone: 252-337, Telex: 456, Cable: EASLEKTRIK, Bombay
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SWEDEN	Magnetic AB, Box 11060. 161 11 Bromma 11. Stockholm Telephone: 08/29.04.60, Telex: 19037, Cable: MAGNETIC, Sweden
OTHER AREAS	SEE INSIDE FRONT COVER



PRICE LIST FOR CATALOG 26

All Prices in U. S. Dollars

Effective April 15, 1969 and Supersedes Previous Prices

This price list covers the general product line presented in Catalog 26. Not all products are manufactured at all locations. Prices and specifications are subject to change without notice. Firm quotations are available for specific time periods. Prices as listed are F. O. B. point of shipment, freight collect, and do not include export packing, insurance, taxes, tariffs, or duties.

Refundable reel deposits are charged for some larger size cable reels as listed on Page 15. For international shipments, quotations may be obtained F. O. B. plant, F. A. S. port of departure, or C. I. F. port of entry. All orders subject to acceptance by Andrew at corporate headquarters.

MICROWAVE ANTENNAS (PAGES 2-19)

TYPE NO.	DIAMETER (FEET)	PRICE	TYPE NO.	DIAMETER (FEET)	PRICE	TYPE NO.	DIAMETER (FEET)	PRICE
450 And 890 MHz ANTENNAS			COMMON CARRIER ANTENNAS			5.925-6.425 GHz (Page 6)		
0.45-0.47 GHz (Page 3)			3.7-4.2 GHz LOW VSWR (Page 5)			P4-59	4	\$ 270.00
P6-4	6	\$ 500.00	PL6-37	6	\$ 720.00	P6-59	6	360.00
P10-4	10	900.00	PL8-37	8	1,030.00	P8-59	8	660.00
0.89-0.96 GHz (Page 3)			PL10-37	10	1,500.00	P10-59	10	1,080.00
P4-9	4	300.00	PL12-37	12	2,800.00	P12-59	12	2,600.00
P6-9	6	390.00	3.7-4.2 GHz LOW VSWR DUAL POLARIZED (Page 5)			5.925-6.425 GHz DUAL POLARIZED (Pg.6)		
P10-9	10	1,200.00	PXL8-37	8	1,550.00	PX6-59	6	620.00
2 GHz ANTENNAS			PXL10-37	10	1,950.00	PX8-59	8	970.00
1.7-1.85 GHz (Page 4)			PXL12-37	12	3,200.00	PX10-59	10	1,400.00
P4-17	4	330.00	GOVERNMENT BAND ANTENNAS			6.575-7.125 GHz (Page 6)		
P6-17	6	400.00	4.4-5.0 GHz (Page 5)			P4-65	4	270.00
P10-17A	10	1,200.00	P4-44	4	400.00	P6-65	6	360.00
1.85-2.11 GHz (Page 4)			P6-44	6	500.00	P8-65	8	660.00
P4-18	4	330.00	P8-44	8	800.00	P10-65	10	1,080.00
P6-18	6	400.00	P10-44	10	1,200.00	P12-65	12	2,600.00
P10-18A	10	1,200.00	4.4-5.0 GHz DUAL POLARIZED (Page 5)			6.575-7.125 GHz DUAL POLARIZED (Pg.6)		
2.11-2.3 GHz (Page 4)			PX6-44	6	880.00	PX4-65	4	570.00
P4-21	4	330.00	PX8-44	8	1,250.00	PX6-65	6	620.00
P6-21	6	400.00	PX10-44	10	1,650.00	PX8-65	8	970.00
P10-21	10	1,200.00	6 GHz ANTENNAS			PX10-65	10	1,400.00
2.45-2.7 GHz (Page 4)			5.925-6.425 GHz LOW VSWR (Page 6)			7 GHz ANTENNAS		
P4-24	4	330.00	(CPR 159 Flange)			7.125-8.400 GHz (Page 7)		
P6-24	6	400.00	PL6A-59	6	600.00	P4-71G	4	300.00
P10-24	10	1,200.00	PL8A-59	8	900.00	P6-71G	6	390.00
1.7-2.1 GHz LOW VSWR (Page 4)			PL10A-59	10	1,320.00	P8-71G	8	700.00
PL6-17	6	550.00	PL12A-59	12	2,800.00	P10-71G	10	1,150.00
PL8-17	8	900.00	KL15A-59	15	6,400.00	P12-71G	12	2,650.00
PL10-17	10	1,350.00	5.925-6.425 GHz LOW VSWR-DUAL POLARIZED (Page 6)			7.125-8.400 GHz DUAL POLARIZED (Pg.7)		
PL12-17	12	2,800.00	(CPR-159 Flange)			PX4-71G	4	610.00
KL15-17	15	6,400.00	PXL6A-59	6	930.00	PX6-71G	6	660.00
1.9-2.3 GHz LOW VSWR (Page 4)			PXL8A-59	8	1,280.00	PX8-71G	8	1,000.00
PL6-19	6	550.00	PXL10A-59	10	1,700.00	PX10-71G	10	1,450.00
PL8-19	8	900.00	PXL12A-59	12	3,200.00	7.125-7.750 GHz LOW VSWR (Page 7)		
PL10-19	10	1,350.00	5.925-6.425 GHz LOW VSWR-DUAL POLARIZED (Page 6)			PL6-71G	6	490.00
PL12-19	12	2,800.00	(CPR-159 Flange)			PL8-71G	8	800.00
KL15-19	15	6,400.00	7.125-7.750 GHz LOW VSWR DUAL POLARIZED (Page 7)			PL10-71G	10	1,250.00
1.9-2.3 GHz LOW VSWR DUAL POLARIZED (Page 4)			7.125-7.750 GHz LOW VSWR DUAL POLARIZED (Page 7)			PL12-71G	12	2,750.00
70749	10	2,000.00	PXL6A-59	6	930.00	7.125-7.750 GHz LOW VSWR DUAL POLARIZED (Page 7)		
70750	12	3,200.00	PXL8A-59	8	1,280.00	PXL6-71G	6	860.00
70751	15	6,400.00	PXL10A-59	10	1,700.00	PXL8-71G	8	1,200.00
			PXL12A-59	12	3,200.00	PXL10-71G	10	1,650.00

NOTE: 2 and 15 foot diameter antennas include mounts. All 12 and 15 foot antennas, all 10 GHz and higher frequency models, all low VSWR (PL series), all dual polarized antennas and all high performance (shielded) antennas include guy wires or feed support struts when required. Feed guy kits should be ordered for tower mounted antennas with standard VSWR feeds in 4,6,8 and 10 foot sizes for 3.7 through 8.4 GHz bands.

MICROWAVE ANTENNAS (PAGES 2-19) CON'T

TYPE NO.	DIAMETER (FEET)	PRICE	TYPE NO.	DIAMETER (FEET)	PRICE	TYPE NO.	DIAMETER (FEET)	PRICE
11 GHz ANTENNAS			RADOMES (Page 10)			HIGH PERFORMANCE ANTENNAS (Pages 16 & 17)		
10.7-11.7 GHz (Page 8)			STANDARD UNHEATED			2 GHz ANTENNAS		
P2-107	2	\$ 525.00	R2C	2	\$ 80.00	1.7-2.1 GHz PLANE POLARIZED (Page 16)		
P4-107	4	500.00	R4C	4	120.00	HP10-17	10	\$ 3,700.00
P6-107	6	600.00	R6C	6	180.00	HP12-17	12	4,800.00
P8-107	8	900.00	R8D	8	360.00	KHP15-17	15	8,500.00
P10-107	10	1,350.00	R10D	10	525.00	1.9-2.3 GHz (Page 16)		
			R12D	12	860.00	HP10-19	10	3,700.00
10.7-11.7 GHz LOW VSWR (Page 8)			STANDARD HEATED			HP12-19	12	4,800.00
PL6-107	6	700.00	HR2C	2	250.00	KHP15-19	15	8,500.00
PL8-107	8	1,000.00	HR4C	4	270.00	4 GHz ANTENNAS		
PL10-107	10	1,450.00	HR6C	6	360.00	3.7-4.2 GHz (Page 16)		
			HR8E	8	600.00	HP10-37	10	3,800.00
			HR10E	10	800.00	HP12-37	12	5,000.00
			HR12D	12	1,200.00	3.7-4.2 GHz DUAL POLARIZED (Page 16)		
12 GHz ANTENNAS			EXTENDED RADOMES—UNHEATED			HPX10-37	10	4,200.00
12.2-13.2 GHz * (Page 8)			35255-2	6	300.00	HPX12-37	12	5,400.00
P2-122B	2	420.00	35257-2	8	660.00	6 GHz ANTENNAS		
P4-122B	4	380.00	35259-2	10	1,050.00	5.925-6.425 GHz (Page 17)		
P6-122B	6	460.00	EXTENDED RADOMES—HEATED			HP8A-59	8	3,100.00
P8-122B	8	780.00	35254-2	6	500.00	HP10A-59	10	3,700.00
P10-122B	10	1,240.00	35256-2	8	1,000.00	HP12A-59	12	4,800.00
			35258-2	10	1,280.00	KHP15A-59	15	8,500.00
12.2-13.2 * GHz DUAL POLARIZED (Pg. 8)			EXTRA STRENGTH RADOMES UNHEATED			5.925-6.425 GHz DUAL POLARIZED (Page 17)		
PX4-122B	4	780.00	35253-1	4	180.00	HPX8A-59	8	3,500.00
PX6-122B	6	860.00	35255-1	6	280.00	HPX10A-59A	10	4,100.00
PX8-122B	8	1,150.00	35257-1	8	540.00	HPX12A-59	12	5,200.00
PX10-122B	10	1,600.00	35259-1	10	800.00	HPX15A-59	15	9,000.00
*Specify 12.2-12.7 or 12.7-13 GHz			35249-1	12	1,200.00	7 GHz ANTENNAS		
15 GHz ANTENNAS			EXTRA STRENGTH RADOMES HEATED			7.125-7.750 GHz (Page 17)		
14.4-15.25 GHz (Page 8)			35256-1	8	900.00	HP8-71G	8	3,000.00
P4-144C	4	680.00	35258-1	10	1,100.00	HP10-71G	10	3,600.00
P6-144C	6	780.00	35248-1	12	2,000.00	HP12-71G	12	4,800.00
6/12 GHz ANTENNAS			ANTENNA MOUNTS (Pgs. 11-13)			7.125-7.750 GHz DUAL POLARIZED (Page 17)		
2 PORT DUAL FREQUENCY			HORIZONTAL MOUNTS			HPX8-71G	8	3,400.00
6.575-6.875, 12.2-12.7 GHz (Page 9)			M10	4,6,8 and 10	60.00	HPX10-71G	10	4,000.00
P6-612	6	1,700.00	19478	Tilt, 4 and 6	200.00	HPX12-71G	12	5,200.00
P8-612	8	2,300.00	31390	Tilt, 8 and 10	400.00	11 GHz ANTENNAS		
P10-612	10	2,900.00	VERTICAL MOUNTS			10.7-11.7 GHz (Page 17)		
FEED GUY KITS (Page 9)			T4A	4 and 6	105.00	HP8-107	8	3,000.00
31585-(†)	P-44 Series	17.00	T4B	4 and 6 Offset	150.00	HP10-107	10	3,600.00
28746-(†)	P-59, 65, 71G Series	17.00	T10	8 and 10	190.00	10.7-11.7 GHz DUAL POLARIZED (Pg. 17)		
31581-(†)	P-37 Series	17.00	T12C	12	315.00	HPX10-107A	10	4,000.00
			19474A	Tilt, 4 and 6	115.00			
			31400	Tilt, 8 and 10	210.00			
			32841	A Frame 4 and 6	500.00			
			31869	A Frame 8 and 10	740.00			
			38891	Side strut 10 & 12	50.00			

† Specify antenna size, ie. 28746-6 is guy kit for P6-59 antenna.

NOTE: 2 and 15 foot diameter antennas include mounts. High performance (shielded) antennas include planar radome. Extended radomes required for feed clearance with 1.7-2.4 GHz dual polarized, all 3.7-4.2 GHz and 6/12 dual frequency antennas. Type PXL8-37 requires a special extended radome not listed. Ask for quotation.

28-60 FOOT ANTENNAS (PAGE 21)

Prices depend upon specifications and quantities. Please contact your local Andrew sales engineer or write for quotation covering your specific requirements.

HELIAX® ELLIPTICAL WAVEGUIDE** AND CONNECTORS (PAGES 25—29)

Standard HELIAX Elliptical Waveguide and Connectors				
Frequency Band, GHz	Standard Elliptical Waveguide Type No.	Price Per Foot	Connector Type No.	Price
1.7-2.3	EW-17	\$9.00	117E	\$280.00
2.5-2.7	EW-20	8.50	120E 120R	250.00 250.00
3.7-4.2	EW-37	6.00	137AE	100.00
4.4-5.0	EW-44	5.30	144AC	74.00
5.925-6.425	EW-56	4.90	156AE 256AC 256AE	80.00 90.00 90.00
5.925-7.125	EW-59	4.40	159AC 159AE	42.00 46.00
7.125-8.400	EW-71	4.20	171AC	46.00
8.5-10.0	EW-85	4.00	185AC	46.00
10.7-11.7	EW-107	3.80	1107AE	60.00
12.2-13.2	EW-122	3.60	1122C	60.00

Premium Tuned HELIAX Elliptical Waveguide Assemblies *				
Frequency Band, GHz	Premium Elliptical Waveguide Type No.	Price Per Foot	Tuned Connector Type No.	Price
1.7-2.3	EWP-17	\$10.00	117ET 117RT	\$320.00 320.00
3.7-4.2	EWP-37	7.00	137AET	110.00
4.4-5.0	EWP-44	6.30	144ACT	84.00
5.925-6.425	EWP-56	5.90	156AET 256ACT 256AET	90.00 100.00 100.00
5.925-7.125	EWP-59	5.40	159ACT 159AET	52.00 56.00
7.125-8.400	EWP-71	5.20	171ACT 171AET	56.00 56.00
10.7-11.7	EWP-107	4.80	1107AET	70.00
12.2-13.2	EWP-122	4.60	1122CT	70.00

*Specify operating frequency band

HELIAX® ELLIPTICAL WAVEGUIDE INSTALLATION ACCESSORIES (PAGE 28)

Waveguide Type No.	Splice	Hoisting Grip	Bending Tool Kit	Wall/Roof Feed Thru	Grounding Kit	Rigid Hanger Kit (10 per kit)
EW-17 or EWP-17	117Z \$280.00	34759 \$30.00	33586-4 \$100.00	35849-10 \$48.00	30417-5 \$10.00	31766-9 \$30.00
EW-20	120Z 260.00	34759 30.00	33586-4 100.00	35849-9 36.00	30417-3 10.00	31766-10 30.00
EW-37 or EWP-37	137AZ 100.00	31535 18.00	33586-3 40.00	35849-8 30.00	33212 6.00	31766-4 20.00
EW-44 or EWP-44	144AZ 90.00	24312A 18.00	33586-3 40.00	35849-7 30.00	24811-2 5.00	31766-2 20.00
EW-56 or EWP-56	156AZ 78.00	24312A 18.00	33586-2 30.00	35849-6 30.00	24811-2 5.00	31766-7 20.00
EW-59 or EWP-59	159AZ 66.00	29961 14.00	33586-2 30.00	35849-5 28.00	24811-2 5.00	31766-1 18.00
EW-71 or EWP-71	171AZ 66.00	19256B 14.00	33856-1 30.00	35849-4 28.00	33211 5.00	31766-3 18.00
EW-85	185AZ 66.00	29958 14.00	33586-1 30.00	35849-3 28.00	24810-2 4.50	31766-5 18.00
EW-107 or EWP-107	1107AZ 66.00	29958 14.00	33586-1 30.00	35849-2 28.00	24810-2 4.50	31766-6 18.00
EW-122 or EWP-122	1122AZ 66.00	29958 14.00	33586-1 30.00	35849-1 28.00	24810-2 4.50	31766-8 18.00

ROUND MEMBER ADAPTOR KIT (10 CLAMPS PER KIT)		
Type No.	Member Diameter	Price
31670-1	1" to 2" Dia.	\$ 8.00
31670-2	2" to 3" Dia.	8.00
31670-3	3" to 4" Dia.	10.00
31670-4	4" to 5" Dia.	10.00
31670-5	5" to 6" Dia.	10.00

INSTALLATION ACCESSORIES		
Type No.	Description	Price
31768-1	Angle Adaptor Kit (10 per kit)	\$ 20.00
31771-1	Ceiling Bracket	5.00
34397-1	Portable Reel	400.00
34397-3	Portable Reel	440.00
34405-1	Reel Stand	280.00

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RIGID RECTANGULAR WAVEGUIDE AND COMPONENTS (PAGES 30-32)

Order waveguide by Andrew type number shown in red. Suffix on type number of straight sections and flex-twist sections indicates length in inches. When ordering variable lengths be sure to specify length in inches. Price charged to next whole foot.

STANDARD RECTANGULAR WAVEGUIDE WITH CPR FLANGES (PAGE 30)*

DESCRIPTION	WR-229 3.30-4.90 GHz	WR-187 3.95-5.85 GHz	WR-159 4.9-7.05 GHz	WR-137 5.8-8.2 GHz	WR-112 7.05-10.0 GHz	WR-90 8.20-12.40 GHz
5 ft. straight section	54055-60 \$172.00	55234-60 \$100.00	54749-60 \$ 80.00	54390-60 \$ 58.00	55172-60 \$ 58.00	54396-60 \$ 52.00
10 ft. straight section	54055-120 225.00	55234-120 130.00	54749-120 110.00	54390-120 70.00	55172-120 70.00	54396-120 64.00
Special lengths	54055-() 112.00 +12.60/ft.	55234-() 90.00 +5.00/ft.	54749-() 80.00 +4.00/ft.	54390-() 48.00 +3.00/ft.	55172-() 48.00 +3.00/ft.	54396-() 42.00 +3.00/ft.
1 ft. flex-twist section	54059-12 140.00	55235-12 140.00	54756-12 125.00	54395-12 90.00	55233-12 90.00	54401-12 70.00
2 ft. flex-twist section	54059-24 160.00	55235-24 160.00	54756-24 135.00	54395-24 100.00	55233-24 100.00	54401-24 80.00
3 ft. flex-twist section	54059-36 170.00	55235-36 170.00	54756-36 150.00	54395-36 110.00	55233-36 110.00	54401-36 90.00
5 ft. flex-twist section	—	—	—	54395-60 130.00	—	—
90° E plane bend	55229-229 155.00	55229-187 90.00	55229-159 75.00	55229-137 60.00	55229-112 58.00	55229-90 56.00
90° H plane bend	55230-229 155.00	55230-187 90.00	55230-159 75.00	55230-137 60.00	55230-112 58.00	55230-90 56.00
90° twist	55231-229 160.00	55231-187 92.00	55231-159 90.00	55231-137 60.00	55231-112 70.00	55231-90 85.00
Pressure inlet	55674-229 50.00	55674-187 50.00	55674-159 40.00	55674-137 40.00	55674-112 40.00	55674-90 40.00
Pressure window	55001-229 20.00	55001-187 20.00	55001-159 20.00	55001-137 20.00	55001-112 20.00	55001-90 20.00
Field flange	56045-229 65.00	56045-187 65.00	56045-159 50.00	56045-137 40.00	56045-112 40.00	56045-90 40.00
Hardware kit	55219-229 6.00	55219-187 5.00	55219-159 5.00	55219-137 5.00	55219-112 5.00	55219-90 5.00

STANDARD RECTANGULAR WAVEGUIDE WITH CHOKE/COVER FLANGES (PAGE 31)*

DESCRIPTION	WR-187 3.95-5.85 GHz	WR-137 5.8-8.2 GHz	WR-112 7.05-10.0 GHz	WR-90 8.20-12.40 GHz	WR-75 10.0-15.0 GHz	WR-62 12.4-18.0 GHz
5 ft. straight section	52080-60 \$ 74.00	19065-60 \$ 48.00	19045-60 \$ 45.00	19051-60 \$ 45.00	51741-60 \$ 50.00	53210-60 \$ 45.00
10 ft. straight section	52080-120 100.00	19065-120 60.00	19045-120 60.00	19051-120 60.00	51741-120 60.00	53210-120 60.00
Special lengths	52080-() 60.00 +5.00/ft.	19065-() 38.00 +3.00/ft.	19045-() 38.00 +3.00/ft.	19051-() 36.00 +3.00/ft.	51741-() 36.00 +3.00/ft.	53210-() 34.00 +3.00/ft.
1 ft. flex-twist section	52095-12 110.00	19075-12 65.00	51727-12 65.00	51737-12 65.00	51747-12 88.00	53215-12 110.00
2 ft. flex-twist section	52095-24 132.00	19075-24 75.00	51727-24 75.00	51737-24 75.00	51747-24 105.00	53215-24 120.00
3 ft. flex-twist section	52095-36 146.00	19075-36 85.00	51727-36 85.00	51737-36 85.00	51747-36 115.00	53215-36 130.00
5 ft. flex-twist section	—	19075-60 100.00	—	—	—	—
90° E plane bend	55220-187 70.00	55220-137 50.00	55220-112 48.00	55220-90 46.00	55220-75 42.00	55220-62 42.00
90° H plane bend	55221-187 70.00	55221-137 50.00	55221-112 48.00	55221-90 46.00	55221-75 42.00	55221-62 42.00
90° twist	55222-187 72.00	55222-137 50.00	55222-112 60.00	55222-90 75.00	55222-90 64.00	55222-62 45.00
Pressure inlet	55675-187 64.00	55675-137 64.00	55675-112 50.00	55675-90 40.00	55675-75 40.00	55675-62 40.00
Pressure window	55000-187 16.00	55000-137 16.00	55000-112 16.00	55000-90 16.00	55000-75 16.00	55000-62 16.00
Field choke flange	53015-187 72.00	53015-137 40.00	53015-112 60.00	53015-90 100.00	53015-75 100.00	53015-62 70.00
Field cover flange	53025-187 64.00	53025-137 30.00	53025-112 40.00	53025-90 100.00	53025-75 100.00	53025-62 65.00
Hardware kit	55224-187 3.00	55224-137 2.00	55224-112 2.00	55224-90 3.00	55224-75 3.00	55224-62 3.00

*F.O.B. Claremont, California

RECTANGULAR WAVEGUIDE HANGERS AND ACCESSORIES (PAGE 32) *

DESCRIPTION	WAVEGUIDE TYPE						
	WR-229	WR-187	WR-159	WR-137	WR-112	WR-90	WR-75
Transition Type N to CPR	—	—	54418-159 \$170.00	54418-137 \$105.00	54418-112 \$105.00	54418-90 \$105.00	—
Transition Type N to UG	—	—	—	59210-137 100.00	59210-112 100.00	59210-90 100.00	—
Wall/roof feed thru	55040-229 \$70.00	55040-187 \$70.00	55040-159 65.00	55040-137 65.00	55040-112 65.00	55040-90 65.00	55040-75 \$65.00
Rigid hanger	19007-229 12.00	19007-187 10.00	19007-159 10.00	19007-137 10.00	19007-112 10.00	19007-90 10.00	19007-75 10.00
Sliding hanger	19008-229 12.00	19008-187 10.00	19008-159 10.00	19008-137 10.00	19008-112 10.00	19008-90 10.00	19008-75 10.00
Spring hanger	19009-229 30.00	19009-187 20.00	19009-159 20.00	19009-137 20.00	19009-112 20.00	19009-90 20.00	19009-75 20.00

TAPERED TRANSITION*		
Type No.	Transition	Price
59220-37	WR-159 to WR-137	\$60.00
59220-5	WR-137 to WR-112	50.00
59220-6	WR-112 to WR-90	90.00
59220-13	WR-90 to WR-75	40.00

ROUND MEMBER ADAPTOR KITS					
Includes 10 Clamps to mount hangers to round members					
Type No.	Member Dia. In Inches	Price	Type No.	Member Dia. In Inches	Price
31670-1	1 to 2	\$8.00	31670-4	4 to 5	\$10.00
31670-2	2 to 3	8.00	31670-5	5 to 6	10.00
31670-3	3 to 4	10.00			

FLANGE ADAPTOR* FROM CPR 137G		
Type No.	To	Price
55249-4	UG-343/U	\$40.00
54658-4	UG-344/U	40.00

STUD ADAPTOR KIT*	
Includes 18" threaded stud 3/8" diameter with hardware for suspending waveguide hangers.	
Type No.	Price
19080A-1	\$6.00

ANGLE ADAPTOR KIT	
Includes 10 clamps to mount hangers to angle members.	
Type No.	Price
31768-1	\$20.00

CIRCULAR WAVEGUIDE AND COMPONENTS (PAGE 33) *

DESCRIPTION	For WC-109**		DESCRIPTION	For WC-109**	
	Type No.	Price		Type No.	Price
20 ft. straight section, flanged	54346-240	\$160.00	Axial ratio compensator	54348	\$70.00
Special length, flanged (specify length)	54346-()	80.00 +4.50/ft.	Shorting plate	56207	20.00
Plane polarized transition WC-109 to WR-90	57222-107	280.00	Rigid hanger	19007-18	15.00
Plane polarized transition WC-109 to WR-75	57222-127	280.00	Spring hanger	19009-18	30.00
Dual polarized transition WC-109 to WR-90	57001-107	420.00	Sliding hanger	19008-18	15.00
Dual polarized transition WC-109 to WR-75	57001-127	420.00	Angle adaptor	13555A	5.00

*F.O.B. Claremont, California
**Specify exact frequency band

TYPE NO.	DESCRIPTION	PRICE	TYPE NO.	DESCRIPTION	PRICE
TELEMETRY ANTENNAS (PAGES 34-37)*			TRANSPORTABLE MASTS (PAGES 38-39)		
TELEMETRY ANTENNAS (Page 34)*			Prices depend on specifications and quantities. Contact Andrew for quotation covering your specific requirements.		
52650	Quad helical array, 215-265 MHz	\$6,000.00	ANTENNA POSITIONERS (PAGES 40-43)		
55050-14	Conical horn, 1400-1550 MHz	400.00	38500 SERIES ANTENNA POSITIONERS (Page 41)		
55244	Broadband horn, 500-2000 MHz	2,500.00	38500	Elevation/azimuth positioner	\$4,000.00
55353	Low Gain disk/rod array, 130-140 MHz	2,500.00	38501	Azimuth only positioner	2,500.00
DIRECTIONAL HELICAL ANTENNAS (Page 35)*			38502	Elevation/azimuth positioner for TV relay RF heads	4,800.00
60102-1	215-265 MHz, no mount	800.00	31681	19 wire cable assembly, (spec. lgth.)	20.00+1.00/ft.
60102-3	215-265 MHz, with pipe mount	900.00	38552-20	Steel pedestal extension, 20 in. height	240.00
60102-5	215-265 MHz, with tilt mount	1,100.00	38552-32	Steel pedestal extension, 32 in. height	260.00
60103-1	260-320 MHz, no mount	1,300.00	Prices for custom designed positioners and special control systems depend on specifications. Contact Andrew for quotation.		
60103-3	260-320 MHz, with pipe mount	1,400.00	FIXED STATION ANTENNAS (PAGES 44-51)		
60103-5	260-320 MHz, with tilt mount	1,600.00	25-148 MHz (Page 44-45)		
60104-1	320-400 MHz, no mount	840.00	900C-0	Omnidirectional Unipole, 25-30 MHz	230.00
60104-3	320-400 MHz, with pipe mount	940.00	900C-1	Omnidirectional Unipole, 30-44 MHz	135.00
60104-5	320-400 MHz, with tilt mount	1,140.00	900C-2	Omnidirectional Unipole, 44-54 MHz	125.00
60109-1	400-550 MHz, no mount	450.00	900C-3	Omnidirectional Unipole, 72-76 MHz	145.00
60109-3	400-550 MHz, with pipe mount	550.00	900C-4	Omnidirectional Unipole, 108-148 MHz	140.00
60109-5	400-550 MHz, with tilt mount	750.00	920E-1	Cardioid Unipole, 30-36 MHz	230.00
60111-1	600-700 MHz, no mount	340.00	920E-2	Cardioid Unipole, 36-42 MHz	230.00
60111-3	600-700 MHz, with pipe mount	440.00	920E-3	Cardioid Unipole, 42-50 MHz	230.00
60111-5	600-700 MHz, with tilt mount	640.00	148-174 MHz (Page 45)		
60115-1	1300-1600 MHz, no mount	250.00	925A	High band omnidirectional 148-174 MHz	95.00
60115-3	1300-1600 MHz, with pipe mount	350.00	136-174 MHz (Pages 46-47)		
60115-5	1300-1600 MHz, with tilt mount	550.00	150-9	High gain omnidirectional, 136-140 MHz	240.00
60116-1	1600-2000 MHz, no mount	250.00	150-10	High gain omnidirectional, 140-144.5 MHz	240.00
60116-3	1600-2000 MHz, with pipe mount	350.00	150-11	High gain omnidirectional, 144.5-149 MHz	240.00
60116-5	1600-2000 MHz, with tilt mount	550.00	150-1	High gain omnidirectional, 149-153 MHz	180.00
55305-1	2100-2300 MHz, no mount	200.00	150-2	High gain omnidirectional, 152.5-158.07 MHz	180.00
55305-3	2100-2300 MHz, with pipe mount	300.00	150-3	High gain omnidirectional, 154-159 MHz	180.00
55305-5	2100-2300 MHz, with tilt mount	500.00	150-4	High gain omnidirectional, 159-164 MHz	180.00
BROADBAND OMNIDIRECTIONAL ANTENNAS (Page 35)*			150-6	High gain omnidirectional, 164-169 MHz	190.00
50170-2	Discone, 50-108 MHz	2,500.00	150-8	High gain omnidirectional, 169-174 MHz	190.00
19050-1	Discone, 108-215 MHz	490.00	151-9	High gain offset, 136-140 MHz	300.00
19050-2	Discone, 215-420 MHz	275.00	151-10	High gain offset, 140-144.5 MHz	300.00
19050-3	Discone, 420-1000 MHz	270.00	151-11	High gain offset, 144.5-149 MHz	300.00
19050-4	Discone, 550-1500 MHz	390.00	151-1	High gain offset, 149-153 MHz	240.00
19050-5	Discone, 1300-2400 MHz	300.00	151-2	High gain offset, 152.5-158.07 MHz	240.00
55520-10	Biconical dipole, 1000-4000 MHz	400.00	151-3	High gain offset, 154-159 MHz	240.00
54608	Discone, 4200-7500 MHz	240.00	151-4	High gain offset, 159-164 MHz	240.00
AIRBORNE OMNIDIRECTIONAL ANTENNAS (Page 36)*			151-6	High gain offset, 164-169 MHz	250.00
55070-9	.88-.92 GHz	115.00	151-8	High gain offset, 169-174 MHz	250.00
55070-14	1.43-1.54 GHz	115.00	161-4	Medium gain omnidirectional, 136-144 MHz	115.00
55070-17	1.70-1.85 GHz	115.00	161-3	Medium gain omnidirectional, 144-150 MHz	115.00
55070-21	2.1-2.3 GHz	115.00	161-1	Medium gain omnidirectional, 150-162 MHz	100.00
55070-44	4.4-5.0 GHz	115.00	161-2	Medium gain omnidirectional, 162-174 MHz	115.00
55070-71	7.1-8.4 GHz	115.00	3605A	Corner reflector, 148-174 MHz	170.00
56520-20	2.0-4.0 GHz	145.00	3625	Corner reflector, 148-174 MHz, two units	360.00
56520-40	4.0-7.0 GHz	145.00	3645	Corner reflector, 148-174 MHz, four units	700.00
56520-70	7.0-10.0 GHz	145.00	ANTENNA MOUNTS (Page 37)*		
CIRCULARLY POLARIZED PARABOLIC ANTENNAS (Page 36)*			51935	Portable tripod	375.00
60008-4	8 ft., 400-550 MHz	2,650.00	51930	Tilt mount	270.00
60010-4	10 ft., 400-550 MHz	3,700.00	* Prices shown are F.O.B., Claremont, California		
60003-14	3 ft., 1400-1600 MHz	900.00			
60004-14	4 ft., 1400-1600 MHz	1,200.00			
60008-14	8 ft., 1400-1600 MHz	2,000.00			
60003-21	3 ft., 2100-2300 MHz	840.00			
60004-21	4 ft., 2100-2300 MHz	1,100.00			
60006-21	6 ft., 2100-2300 MHz	1,300.00			
BROADBAND DIRECTIONAL ANTENNA (Page 37)*					
59135	Log periodic, 140-750 MHz	1,150.00			
HIGH GAIN OMNIDIRECTIONAL ANTENNA (Page 37)*					
56090	Vertically polarized, 1725-1775 MHz	1,125.00			

TYPE NO.	DESCRIPTION	PRICE	TYPE NO.	DESCRIPTION	PRICE
FIXED STATION ANTENNAS (PAGES 44-51)			FOAM DIELECTRIC HELIAX® FLEXIBLE COAXIAL CABLE* (PAGES 54-61)		
406-420 & 450-470 MHz (Pages 48-49)			See Page 15 for Shipping Reel Information		
460A-1	High gain omnidirectional, 450-460 MHz	\$220.00	1/2" SUPERFLEXIBLE HELIAX COAXIAL CABLE (Page 54)		
460A-2	High gain omnidirectional, 460-470 MHz	220.00	FSJ4-50	1/2", 50 ohm, jacketed	\$1.00/ft.
465-1	High gain omnidirectional, 450-460 MHz	350.00	CONNECTORS FOR 1/2" SUPERFLEXIBLE CABLE (Page 54)		
465-2	High gain omnidirectional, 460-470 MHz	350.00	36723	N plug	25.00
461A-1	High gain offset, 450-460 MHz	250.00	36722	General Radio plug	25.00
461A-2	High gain offset, 460-470 MHz	250.00	1/4" FOAM DIELECTRIC COPPER HELIAX CABLE (Page 55)		
466-1	High gain offset, 450-460 MHz	420.00	FH1-50	1/4", 50 ohm	0.34/ft.
466-2	High gain offset, 460-470 MHz	420.00	FHJ1-50	1/4", 50 ohm, jacketed	0.36/ft.
116	Yagi antenna, 450-470 MHz	100.00	CONNECTORS FOR 1/4" FOAM CABLE (Page 55)		
117	Yagi antenna, 450-470 MHz, two units	240.00	41U	UHF jack	8.00
3608D	Corner reflector, 406-420 MHz	150.00	41P	UHF plug	8.00
3606D	Corner reflector, 450-470 MHz	125.00	41N	N jack	8.00
3626D	Corner reflector, 450-470 MHz, two units	270.00	41W	N plug	8.00
3646D	Corner reflector, 450-470 MHz, four units	530.00	41WT	TNC plug	8.00
ACCESSORIES (Page 50)			13212-2	End terminal adaptor (use with 41W)	10.00
MOUNTING CLAMPS (Set of 2)			3/8" FOAM DIELECTRIC COPPER HELIAX CABLE (Page 55)		
20898	For series 920E to 3/4" - 3" OD pipe	17.00	FH2-50A	3/8", 50 ohm	0.50/ft.
21208	For series 925A to 1" OD pipe	8.00	FHJ2-50A	3/8", 50 ohm, jacketed	0.52/ft.
15681	All series to 3/4" - 3" OD pipe	18.00	CONNECTORS FOR 3/8" FOAM CABLE (Page 55)		
14672-3	All series to 7/8" angle member	20.00	42U	UHF jack	10.00
29291-3	All series to 1" - 3" OD pipe	10.00	42P	UHF plug	10.00
30150	For series 161 to 1-3/4" OD pipe	12.00	42N	N jack	10.00
SIDE MOUNT KITS			42W	N plug	10.00
31553	For types 150, 151, 465, 466	90.00	42WT	TNC plug	10.00
31554	For types 161, 460A, 461A	60.00	13212-2	End terminal adaptor (use with 42W)	10.00
JUMPER CABLES			1/2" FOAM DIELECTRIC HELIAX CABLE (Page 56)		
25832	1/2" foam HELIAX cable, N plugs, 6 feet	20.00	FH4-50B	1/2", 50 ohm, copper	0.62/ft.
25833	1/2" foam HELIAX cable, UHF plugs, 6 feet	18.00	FHJ4-50B	1/2", 50 ohm, copper, jacketed	0.66/ft.
25834	1/2" foam HELIAX cable, UHF-N plug, 6 ft.	19.00	FH4-75	1/2", 75 ohm, copper	0.62/ft.
16253-21	RG8A/U, N plugs, 4 feet	9.00	FHJ4-75	1/2", 75 ohm, copper, jacketed	0.66/ft.
16253-23	RG8A/U, UHF plugs, 4 feet	9.00	FLJ4-50B	1/2", 50 ohm, aluminum, jacketed	0.60/ft.
16253-24	RG8A/U, UHF-N plug, 4 feet	9.00	CONNECTORS FOR 1/2" 50 ohm, COPPER (Page 57)		
SOLID DIELECTRIC CABLES (PAGE 51)			44AR	7/8" EIA flange	24.00
10791-1	RG8A/U cable	0.30/ft.	44AZ	Splice	24.00
10791-7	RG17/U cable	1.20/ft.	44AM	LC plug	24.00
FITTINGS			44AL	LC jack	24.00
10804-36	N cable plug, RG8A/U	3.00	44AP	UHF plug	6.00
10804-34	N cable jack, RG8A/U	3.00	44AU	UHF jack	6.00
10804-11	N junction, RG8A/U	4.00	44AW	N plug	7.00
10804-9	N junction, RG8A/U	4.50	44AN	N jack	7.00
10804-10	N right angle connector, RG8A/U	5.50	44AT	End terminal	24.00
10804-31	N panel receptacle, RG8A/U	2.50	44AJ	HN plug	24.00
10805-1	UHF cable plug, RG8A/U	2.00	CONNECTORS FOR 1/2", 75 ohm, COPPER (Page 57)		
10805-6	UHF junction, RG8A/U	3.00	44AU-75	UHF jack	6.00
10805-5	UHF right angle connector, RG8A/U	6.00	44AW-75	N plug	7.00
10805-4	UHF tee connector, RG8A/U	6.00	44AN-75	N jack	7.00
10805-11	Adaptor, UHF jack-N plug, RG8A/U	5.00	CONNECTORS FOR 1/2", 50 ohm, ALUMINUM (Page 57)		
10805-12	Apaptor, UHF plug-N jack, RG8A/U	4.00	44AR-3	7/8" EIA flange	24.00
12418-1	LC cable plug, RG17/U	16.00	44AP-3	UHF plug	6.00
12418-3	LC junction RG17/U	15.00	44AU-3	UHF jack	6.00
12418-5	N cable plug, RG17/U	10.00	44AW-3	N plug	7.00
12418-12	UHF cable plug, RG17/U	16.00	44AN-3	N jack	7.00
			COMPONENTS FOR 1/2", 50 ohm, CABLE (Page 57)		
			1260A	7/8" EIA gas barrier	30.00

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TYPE NO.	DESCRIPTION	PRICE	TYPE NO.	DESCRIPTION	PRICE
7/8" FOAM DIELECTRIC HELIAX CABLE (Page 58)			AIR DIELECTRIC HELIAX® FLEXIBLE COAXIAL CABLES* (PAGES 62-70)		
			See Page 15 for Shipping Reel Information		
FH5-50A	7/8", 50 ohm, copper	\$1.64/ft.	1/4" AIR DIELECTRIC COPPER HELIAX CABLE (Page 62)		
FHJ5-50A	7/8", 50 ohm, copper, jacketed	1.70/ft.	H1-50	1/4", 50 ohm	\$0.58/ft.
FH5-75	7/8", 75 ohm, copper	1.64/ft.	HJ1-50	1/4", 50 ohm, jacketed	0.60/ft.
FHJ5-75	7/8", 75 ohm, copper, jacketed	1.70/ft.	CONNECTORS FOR 1/4", 50 ohm, COPPER (Page 62)		
FLJ5-50A	7/8", 50 ohm, aluminum, jacketed	1.50/ft.	71N	N jack	10.00
CONNECTORS FOR 7/8", 50 ohm, COPPER (Page 59)			71W	N plug	10.00
45AR	7/8" EIA flange	22.00	13212-2	End terminal adaptor (use with 71W)	10.00
45AZ	Splice	28.00	3/8" AIR DIELECTRIC COPPER HELIAX CABLE (Page 62)		
45AU	UHF jack	15.00	H2-50	3/8", 50 ohm	0.84/ft.
45AP	UHF plug	15.00	HJ2-50	3/8", 50 ohm, jacketed	0.86/ft.
45AN	N jack	18.00	CONNECTORS FOR 3/8", 50 ohm, COPPER (Page 62)		
45AW	N plug	18.00	72N	N jack	15.00
45AT	End terminal	30.00	72W	N plug	15.00
45AM	LC plug	34.00	13212-2	End terminal adaptor (use with 72W)	10.00
45AJ	HN plug	44.00	1/2" AIR DIELECTRIC COPPER HELIAX CABLE (Page 63)		
45AL	LC jack	34.00	H4-50	1/2", 50 ohm	1.06/ft.
CONNECTORS FOR 7/8", 75 ohm, COPPER (Page 59)			HJ4-50	1/2", 50 ohm, jacketed	1.10/ft.
45AN-75	N jack	18.00	CONNECTORS FOR 1/2", 50 ohm, COPPER (Page 63)		
CONNECTORS FOR 7/8", 50 ohm, ALUMINUM (Page 59)			74N	N jack	18.00
45AR-3	7/8" EIA flange	22.00	74W	N plug	18.00
45AZ-3	Splice	28.00	74Z	Splice	24.00
45AU-3	UHF jack	15.00	74U	UHF jack	22.00
45AP-3	UHF plug	15.00	74P	UHF plug	22.00
45AN-3	N jack	18.00	74T	End terminal adaptor	24.00
45AW-3	N plug	18.00	7/8" AIR DIELECTRIC HELIAX CABLE (Page 64)		
45AM-3	LC plug	34.00	H5-50	7/8", 50 ohm, copper	1.94/ft.
45AJ-3	HN plug	44.00	HJ5-50	7/8", 50 ohm, copper, jacketed	2.00/ft.
45AT-3	End terminal	30.00	H5-75	7/8", 75 ohm, copper	1.94/ft.
COMPONENTS FOR 7/8", 50 ohm, CABLE (Page 59)			HJ5-75	7/8", 75 ohm, copper, jacketed	2.00/ft.
1060	7/8" 90° EIA miter elbow	34.00	LJ5-50	7/8", 50 ohm, aluminum, jacketed	1.80/ft.
1260A	7/8" EIA gas barrier	30.00	25817	7/8", 50 ohm, copper, low VSWR jacketed	60.00+2.10/ft.
1-5/8" FOAM DIELECTRIC HELIAX CABLE (Page 60)			CONNECTORS FOR 7/8", 50 ohm, COPPER (Page 65)		
FHJ7-50	1-5/8", 50 ohm, copper, jacketed	3.80/ft.	75AR	7/8" EIA flange	27.00
FLJ7-50	1-5/8", 50 ohm, aluminum, jacketed	3.40/ft.	75AG	7/8" EIA flange, includes gas barrier	44.00
CONNECTORS FOR 1-5/8", 50 ohm, COPPER (Page 61)			75AT	7/8" End terminal	44.00
47R	1-5/8" EIA flange	60.00	75AZ	Splice	30.00
47Z	Splice	70.00	75AN	N jack	22.00
47L	LC jack	70.00	75AW	N plug	27.00
47N	N jack	60.00	75AL	LC jack	40.00
CONNECTORS FOR 1-5/8", 50 ohm, ALUMINUM (Page 61)			75AM	LC plug	40.00
47R-3	1-5/8" EIA flange	60.00	75AU	UHF jack	22.00
47Z-3	Splice	70.00	CONNECTORS FOR 7/8", 75 ohm, COPPER (Page 65)		
47N-3	N jack	60.00	75AR-75	7/8" EIA flange	30.00
COMPONENTS FOR 1-5/8", 50 ohm, CABLE (Page 61)			75AT-75	7/8" End terminal	44.00
1061	1-5/8" 90° EIA miter elbow	50.00	75AN-75	N jack	30.00
1261B	1-5/8" EIA gas barrier	54.00	75AU-75	UHF jack	40.00
2061	1-5/8" EIA end terminal	62.00	CONNECTORS FOR 7/8", 50 ohm, ALUMINUM (Page 65)		
1860A	Reducer, 1-5/8" EIA to 7/8" EIA	48.00	75AR-3	7/8" EIA flange	27.00
1861	Reducer, 3-1/8" EIA to 1-5/8" EIA	70.00	75AG-3	7/8" EIA flange, includes gas barrier	44.00
			75AZ-3	Splice	30.00
			75AN-3	N jack	22.00
			75AW-3	N plug	27.00
			75AM-3	LC plug	40.00
			75AU-3	UHF jack	22.00
			COMPONENTS FOR 7/8", 50 ohm, CABLE (Page 65)		
			1060	7/8" 90° EIA miter elbow	34.00
			1260A	7/8" EIA gas barrier	30.00
			1860A	7/8" EIA reducer, 1-5/8" EIA to 7/8" EIA	48.00

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TYPE NO.	DESCRIPTION	PRICE	TYPE NO.	DESCRIPTION	PRICE
1-5/8" AIR DIELECTRIC HELIAX CABLE (Page 66)			HELIAX COAXIAL CABLE HANGERS AND ACCESSORIES (PAGES 71-72)		
HJ7-50A	1-5/8", 50 ohm, copper, jacketed	\$4.50/ft.	SMALL CABLE HANGERS (Page 71)		
HJ7-75	1-5/8", 75 ohm, copper, jacketed	4.50/ft.	27290A	Copperweld tie wires	\$ 3.00
LJ7-50A	1-5/8", 50 ohm, aluminum, jacketed	4.10/ft.	12395-1	Stainless steel wraplock	15.00
25816A	1-5/8", 50 ohm, copper low VSWR, jacketed	60.00+4.80/ft.	NONINSULATED HANGERS (KIT OF 10) (Page 71)		
CONNECTORS FOR 1-5/8", 50 ohm, COPPER (Page 67)			31766-5	For 7/8" jacketed cable	18.00
87R	1-5/8" EIA flange	54.00	33598-1	For 1-5/8" unjacketed cable	16.00
87G	1-5/8" EIA flange, gas barrier	68.00	33598-3	For 3" jacketed cable	20.00
87S	Reducer to 7/8" EIA	68.00	33598-5	For 5" jacketed cable	34.00
87SG	Reducer to 7/8" EIA, includes gas barrier	75.00	33598-9	For 8" jacketed cable	68.00
87Z	Splice	76.00	HANGER ADAPTOR, (KIT OF 10) (Page 71)		
87N	N jack	58.00	31768-1	Angle adaptor kit for 7/8" & 1-5/8" hangers	20.00
87T	1-5/8" End terminal	80.00	33981-1	Angle adaptor kit for 3" & 5" hangers	20.00
87L	LC jack	68.00	33981-2	Angle adaptor kit for 8" hangers	40.00
CONNECTORS FOR 1-5/8", 75 ohm, COPPER (Page 67)			31670-1	Round member adaptor for 7/8" & 1-5/8"	8.00
77AR-75	1-5/8" EIA flange	60.00	31670-2	Round member adaptor for 7/8" & 1-5/8"	8.00
77AZ-75	Splice	80.00	31670-3	Round member adaptor for 7/8" & 1-5/8"	10.00
77AT-75	1-5/8" End terminal	86.00	31670-4	Round member adaptor for 7/8" & 1-5/8"	10.00
CONNECTORS FOR 1-5/8", 50 ohm, ALUMINUM (Page 67)			31670-5	Round member adaptor for 7/8" & 1-5/8"	10.00
87R-3	1-5/8" EIA flange	54.00	33984-1	Round member adaptor for 3" & 5" hangers	40.00
87G-3	1-5/8" EIA flange, gas barrier	68.00	33984-2	Round member adaptor for 8" hangers	80.00
87Z-3	Splice	76.00	CEILING ADAPTOR, (SINGLE HANGER) (Page 71)		
87N-3	N jack	58.00	31771-1	3/8" dia. for 7/8" & 1-5/8" hangers	5.00
COMPONENTS FOR 1-5/8", 50 ohm CABLE (Page 67)			31771-2	1/2" dia. for 3" & larger hangers	6.00
1061	1-5/8", 90° EIA miter elbow	50.00	INSULATED HANGER (SINGLE HANGER) (Page 71)		
1261B	1-5/8" EIA gas barrier	54.00	11662-3	For 1/2" cable	5.00
2061	1-5/8" EIA end terminal	62.00	11662-2	For 7/8" cable	6.00
34660	1-5/8" EIA inner connector	10.00	33948-3	For 1-5/8" cable	10.00
COMPONENTS FOR 1-5/8", 75 ohm, CABLE (Page 67)			33948-2	For 3" cable	22.00
1071	1-5/8" 90° EIA miter elbow	52.00	33948-1	For 5" cable	32.00
1271	1-5/8" EIA gas barrier	54.00	13555A	Adaptor to angle tower	5.00
2071	1-5/8" EIA end terminal	62.00	13550	Adaptor to round member tower	5.00
24254	1-5/8" EIA inner connector	10.00	HELIAX COAXIAL CABLE ACCESSORIES (Page 72)		
3" AIR DIELECTRIC COPPER HELIAX CABLE (Page 68)			29958	Hoisting grip for 7/8" unjacketed cable	14.00
HJ8-50B	3", 50 ohm, jacketed	9.00/ft.	19256B	Hoisting grip for 7/8" jacketed cable	14.00
CONNECTORS FOR 3", 50 ohm, COPPER (Page 69)			24312A	Hoisting grip for 1-5/8" cable	18.00
78ARM	3-1/8" EIA flange, male	100.00	26985A	Hoisting grip for 3" cable	23.00
78ARF	3-1/8" EIA flange, female	110.00	31031-1	Hoisting grip for 5" cable	60.00
78AGM	3-1/8" EIA flange, male, gas barrier	110.00	31031-2	Hoisting grip for 8" cable	80.00
78AGF	3-1/8" EIA flange, female, gas barrier	120.00	34283	Connector burial kit	36.00
78AS	1-5/8" EIA flange, female	120.00	33938-1	Wall/roof feed thru, 1/4", 3/8" and 1/2" cable	14.00
78AZ	Splice	120.00	33938-2	Wall/roof feed thru, 7/8" cable	17.00
78AL	LC jack	120.00	33938-3	Wall/roof feed thru, 1-5/8" cable	23.00
33875	Right angle flange connector	170.00	33938-4	Wall/roof feed thru, 3" cable	34.00
33868	Right angle splice connector	220.00	33938-5	Wall/roof feed thru, 5" cable	44.00
COMPONENTS FOR 3", 50 ohm, CABLE (Page 69)			26892-1	Grounding kit, 1/2" unjacketed cable	3.00
1062	3-1/8" 90° EIA miter elbow	90.00	26892-2	Grounding kit, 1/2" jacketed cable	4.00
2062	3-1/8" EIA end terminal	100.00	26892-4	Grounding kit, 1/2" jacketed aluminum cable	4.00
1861	Reducer, 3-1/8" EIA to 1-5/8" EIA	70.00	24810-1	Grounding kit, 7/8" unjacketed cable	3.50
5" AIR DIELECTRIC COPPER HELIAX CABLE (Page 70)			24810-2	Grounding kit, 7/8" jacketed cable	4.50
HJ9-50	5", 50 ohm, jacketed	17.00/ft.	24810-4	Grounding kit, 7/8" jacketed aluminum cable	4.50
CONNECTORS FOR 5", 50 ohm, COPPER (Page 70)			24811-2	Grounding kit, 1-5/8" jacketed cable	5.00
79R	6-1/8" EIA flange, male	240.00	24811-4	Grounding kit, 1-5/8" jacketed aluminum cable	5.00
79G	6-1/8" EIA flange, male, gas barrier	260.00	28708-2	Grounding kit, 3" jacketed cable	7.00
79Z	Splice	260.00	30417-2	Grounding kit, 5" jacketed cable	8.00
COMPONENTS FOR 5", 50 ohm, CABLE (Page 70)					
1872	Reducer, 6-1/8" EIA to 3-1/8" EIA	360.00			
1073	6-1/8" 90° EIA miter elbow	270.00			
8" AIR DIELECTRIC COPPER HELIAX CABLE (Page 70)					
HJ10-50	8", 50 ohm, jacketed	25.00/ft.			
CONNECTORS FOR 8", 50 ohm, COPPER (Page 70)					
80R	6-1/8" EIA flange, male	320.00			
80G	6-1/8" EIA flange, male, gas barrier	340.00			
80Z	Splice	370.00			
COMPONENTS FOR 8", 50 ohm, CABLE (Page 70)					
1872	Reducer, 6-1/8" EIA to 3-1/8" EIA	360.00			
1073	6-1/8" 90° EIA miter elbow	270.00			

RIGID COAXIAL TRANSMISSION LINES (Pages 74-77)

RIGID COPPER LINES-50 ohm (Page 74)

Length	7/8" LINE		1-5/8" LINE		3-1/8" LINE		6-1/8" LINE	
	Type No.	Price	Type No.	Price	Type No.	Price	Type No.	Price
20 Ft., both ends flanged	560	\$100.00	561	\$120.00	562A	\$210.00	573	\$520.00
20 Ft., one end flanged	560-11	94.00	561-11	114.00	562A-11	200.00	573-11	500.00
20 Ft., without flanges	560-21	88.00	561-21	108.00	562A-21	190.00	—	—
Special Length*, both ends flanged	2760-1	70.00 +2.00/ft.	2761-1	70.00 +3.00/ft.	2762A-1	80.00 +7.00/ft.	2773-1	220.00 +16.00/ft.
Special Length*, one end flanged	—	—	2761-11	64.00 +3.00/ft.	2762A-11	70.00 +7.00/ft.	—	—
Special Length*, without flanges	—	—	2761-21	58.00 +3.00/ft.	2762A-21	60.00 +7.00/ft.	—	—

*Specify in inches

RIGID LINE COMPONENTS – 50 ohm (75 - 76)

Length	7/8" LINE		1-5/8" LINE		3-1/8" LINE		6-1/8" LINE	
	Type No.	Price	Type No.	Price	Type No.	Price	Type No.	Price
90° Miter Elbow, flanged	1060	\$34.00	1061	\$50.00	1062	\$90.00	1073	\$270.00
90° Miter Elbow, unflanged	—	—	1061-3	34.00	1062-3	60.00	—	—
45° Miter Elbow, flanged	—	—	—	—	1162	90.00	—	—
Gas Barrier	1260A	30.00	1261B	54.00	1262A	100.00	1273	340.00
Type N Adaptor (Female)	2260B	30.00	2261A	48.00	2262	100.00	—	—
Type LC Adaptor (Female)	2360A	38.00	2361A	52.00	—	—	—	—
Unpressurized Straight Coupling	—	—	4861A	10.00	4862A	32.00	—	—
Soft Solder Field Flange Kit	1560A	12.00	1561A	18.00	1562A	36.00	1573A	100.00
Fixed Flange Kit	18630	4.00	18631	10.00	15840	12.00	18111	32.00
Swivel Flange Kit	18096	9.00	18041	12.00	18200	20.00	18110	40.00
Reducer	—	—	To 7/8" 1860A	48.00	To 1-5/8" 1861	70.00	To 3-1/8" 1872	360.00
End Terminal	—	—	2061	62.00	2062	100.00	2073	280.00
Flexible Section	—	—	20695	170.00	19209B	300.00	—	—
Adaptor (Male to Male)	—	—	30452	34.00	23187	28.00	31472	124.00
Inner Connector	34389A	5.00	34660	10.00	15093A	22.00	18902	72.00
Inner Connector, coated	—	—	—	—	30079	30.00	30080	90.00
Adaptor Inner Connector	4850A	12.00	4851	12.00	4852	13.00	—	—
Hardware Kit	11381-5	3.00	11381-2	2.50	11381-3	3.00	21206	6.00
"O" Ring Gasket for EIA flange	10683-11	0.50	10683-2	0.60	10683-3	0.50	10683-10	1.30

COAXIAL SWITCHING EQUIPMENT (PAGES 78-80)

TYPE NO.	DESCRIPTION	PRICE	TYPE NO.	DESCRIPTION	PRICE
1-5/8" COAXIAL TRANSFER SWITCHES (Page 79)			3-1/8" COAXIAL TRANSFER SWITCHES (Page 79)		
6730C	1-5/8" switch (120V, 50/60 Hz)	\$ 480.00	6740A	3-1/8" switch (120V, 50/60 Hz)	\$1,320.00
6732C	1-5/8" switch (220/240V, 50/60 Hz)	540.00	6742A	3-1/8" switch (220/240V, 50/60 Hz)	1,440.00
33630A	Control Panel	120.00	33630A	Control panel	120.00
			41038	Adaptor kit, unflanged 50 ohm line	200.00
			41039	Adaptor kit, unflanged 51.5 ohm line	200.00
COAXIAL SWITCHING MATRICES AND PATCH PANELS (Page 80)					
Prices on coaxial switching matrices and patch panels quoted to your specific requirements.					

PRESSURIZATION EQUIPMENT (PAGES 81-85)

TYPE NO.	DESCRIPTION	PRICE	TYPE NO.	DESCRIPTION	PRICE
AUTOMATIC DEHYDRATORS (Page 81)			PRESSURIZATION FITTINGS AND ACCESSORIES (Page 84)		
1920A	Automatic dehydrator, 120v, 60 Hz	\$ 720.00	6600A	Gas distribution manifold	\$ 30.00 + 12.00/outlet
1921	Automatic dehydrator, 120v, 50 Hz	800.00	3017	Gas inlet valve	0.85
1924	Automatic dehydrator, 240v, 50 Hz	840.00	3500	Pressure gauge	3.50
1923	Spare parts kit	20.00	3027	Release valve	3.00
SMALL AUTOMATIC DEHYDRATORS (Page 82)			4944	Release valve	4.00
1930	Automatic dehydrator, 120v, 60 Hz	500.00	4949	Release valve	4.00
1931	Automatic dehydrator, 120v, 50 Hz	580.00	3028	Pipe tee	0.50
1934	Automatic dehydrator, 240v, 50 Hz	620.00	3022	Street tee	0.95
55690	Low pressure dehydrator, 120v, 60 Hz	220.00	3026	Pipe nipple	0.50
AUTOMATIC DEHYDRATOR ACCESSORIES (Page 83)			31680-1	Male connector	0.80
31614-1	Regulating tank, 15 lbs. gauge	120.00	31680-2	Male connector	0.80
31614-3	Regulating tank, 5 lbs. gauge	120.00	31680-3	Male branch tee	1.80
31616	Humidity sensor (field installation)	200.00	31680-4	Elbow	1.20
31618-1	Low pressure sensor (field installation)	36.00	25435-1	Polyethylene tubing	0.16/ft.
31618-2	High pressure sensor (field installation)	36.00	10712-24	Mounting strap	0.20
878A	Dry air hand pump	90.00	3018	Pipe plug	0.60
10195	Spare hose assembly for 878A	4.00	3012	Thread lubricant	0.36
210	Silica gel refill for 878A	4.00			
858C	Nitrogen tank fittings, fits CGA-580	100.00			
35751	Adaptor, 858C to CGA-550	12.00			

NUMERICAL PRICE LIST BY TYPE NUMBER

Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page
EW-17	\$9.00/ft.	25	HJ5-50	\$2.00/ft.	64	PL6-19	\$550.00	4	PX8-71G	\$1,000.00	7	HP10-71G	\$3,600.00	17
EWP-17	10.00/ft.	25	H5-75	1.94/ft.	64	P6-21	400.00	4	PXL8-71G	1,200.00	7	HPX10-71G	4,000.00	17
EW-20	8.50/ft.	25	HJ5-75	2.00/ft.	64	P6-24	400.00	4	HP8-71G	3,000.00	17	P10-107	1,350.00	8
EW-37	6.00/ft.	25	LJ5-50	1.80/ft.	64	PL6-37	720.00	5	HPX8-71G	3,400.00	17	PL10-107	1,450.00	8
EWP-37	7.00/ft.	25	FHJ7-50	3.80/ft.	60	P6-44	500.00	5	P8-107	900.00	8	HP10-107	3,600.00	17
EW-44	5.30/ft.	25	FLJ7-50	3.40/ft.	60	PX6-44	880.00	5	PL8-107	1,000.00	8	HPX10-107A	4,000.00	17
EWP-44	6.30/ft.	25	HJ7-50A	4.50/ft.	66	P6-59	360.00	6	HP8-107	3,000.00	17	P10-122B	1,240.00	8
EW-56	4.90/ft.	25	HJ7-75	4.50/ft.	66	PL6A-59	600.00	6	P8-122B	780.00	8	PX10-122B	1,600.00	8
EWP-56	5.90/ft.	25	LJ7-50A	4.10/ft.	66	PX6-59	620.00	6	PX8-122B	1,150.00	8	P10-612	2,900.00	9
EW-59	4.40/ft.	25	HJ8-50B	9.00/ft.	68	PXL6A-59	930.00	6	P8-612	2,300.00	9	M10	60.00	12
EWP-59	5.40/ft.	25	HJ9-50	17.00/ft.	70	P6-65	360.00	6	R8D	360.00	10	R10D	525.00	10
EW-71	4.20/ft.	25	HJ10-50	25.00/ft.	70	PX6-65	620.00	6	HR8E	600.00	10	HR10E	800.00	10
EWP-71	5.20/ft.	25	P2-107	525.00	8	P6-71G	390.00	7	P10-4	900.00	3	T10	190.00	12
EW-85	4.00/ft.	25	P2-122B	420.00	8	PL6-71G	490.00	7	P10-9	1,200.00	3	PL12-17	2,800.00	4
EW-107	3.80/ft.	25	R2C	80.00	10	PX6-71G	660.00	7	P10-17A	1,200.00	4	HP12-17	4,800.00	16
EWP-107	4.80/ft.	25	HR2C	250.00	10	PXL6-71G	860.00	7	PL10-17	1,350.00	4	PL12-19	2,800.00	4
EW-122	3.60/ft.	25	P4-9	300.00	3	P6-107	600.00	8	HP10-17	3,700.00	16	HP12-19	4,800.00	16
EWP-122	4.60/ft.	25	P4-17	330.00	4	PL6-107	700.00	8	P10-18A	1,200.00	4	PL12-37	2,800.00	5
FH1-50	0.34/ft.	55	P4-18	330.00	4	P6-122B	460.00	8	PL10-19	1,350.00	4	PXL12-37	3,200.00	4
FHJ1-50	0.36/ft.	55	P4-21	330.00	4	PX6-122B	860.00	8	HP10-19	3,700.00	16	HP12-37	5,000.00	16
H1-50	0.58/ft.	62	P4-24	330.00	4	P6-144C	780.00	8	P10-21	1,200.00	4	HPX12-37	5,400.00	16
HJ1-50	0.60/ft.	62	P4-44	400.00	5	P6-612	1,700.00	9	P10-24	1,200.00	4	P12-59	2,600.00	6
FH2-50A	0.50/ft.	55	P4-59	270.00	6	R6C	180.00	10	PL10-37	1,500.00	5	P12-65	2,600.00	6
FHJ2-50A	0.52/ft.	55	P4-65	270.00	6	HR6C	360.00	10	PXL10-37	1,950.00	5	PL12A-59	2,800.00	6
H2-50	0.84/ft.	62	PX4-65	570.00	6	PL8-17	900.00	4	HP10-37	3,800.00	16	PXL12A-59	3,200.00	6
HJ2-50	0.86/ft.	62	P4-71G	300.00	7	PL8-19	900.00	4	HPX10-37	4,200.00	16	HP12A-59	4,800.00	17
FH4-50B	0.62/ft.	56	PX4-71G	610.00	7	PL8-37	1,030.00	5	P10-44	1,200.00	5	HPX12A-59	5,200.00	17
FHJ4-50B	0.66/ft.	56	P4-107	500.00	8	PXL8-37	1,550.00	5	PX10-44	1,650.00	5	P12-71G	2,650.00	7
FH4-75	0.62/ft.	56	P4-122B	380.00	8	P8-44	800.00	5	P10-59	1,080.00	6	PL12-71G	2,750.00	7
FHJ4-75	0.66/ft.	56	PX4-122B	780.00	8	PX8-44	1,250.00	5	PL10A-59	1,320.00	6	HP12-71G	4,800.00	17
FLJ4-50B	0.60/ft.	56	P4-144C	680.00	8	P8-59	660.00	6	PX10-59	1,400.00	6	HPX12-71G	5,200.00	17
FSJ4-50	1.00/ft.	54	R4C	120.00	10	PL8A-59	900.00	6	PXL10A-59	1,700.00	6	R12D	860.00	10
H4-50	1.06/ft.	63	HR4C	270.00	10	PX8-59	970.00	6	HP10A-59	3,700.00	17	HR12D	1,200.00	10
HJ4-50	1.10/ft.	63	T4A	105.00	12	PXL8A-59	1,280.00	6	HPX10A-59A	4,100.00	17	T12C	315.00	12
FH5-50A	1.64/ft.	58	T4B	150.00	12	HP8A-59	3,100.00	17	P10-65	1,080.00	6	KL15-17	6,400.00	4
FHJ5-50A	1.70/ft.	58	P6-4	500.00	3	HPX8A-59	3,500.00	17	PX10-65	1,400.00	6	KHP15-17	8,500.00	16
FH5-75	1.64/ft.	58	P6-9	390.00	3	P8-65	660.00	6	P10-71G	1,150.00	7	KL15-19	6,400.00	4
FHJ5-75	1.70/ft.	58	P6-17	400.00	4	PX8-65	970.00	6	PL10-71G	1,250.00	7	KHP15-19	8,500.00	16
FLJ5-50A	1.50/ft.	58	PL6-17	550.00	4	P8-71G	700.00	7	PX10-71G	1,450.00	7	KL15A-59	6,400.00	6
H5-50	1.94/ft.	64	P6-18	400.00	4	PL8-71G	800.00	7	PXL10-71G	1,650.00	7	KHP15A-59	8,500.00	17

Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page
41N	\$ 8.00	55	75AG	\$44.00	65	150-3	\$180.00	46	920E-1	\$230.00	45	3017	\$ 0.85	84
41P	8.00	55	75AG-3	44.00	65	150-4	180.00	46	920E-2	230.00	45	3018	0.60	84
41U	8.00	55	75AL	40.00	65	150-6	190.00	46	920E-3	230.00	45	3022	0.95	84
41W	8.00	55	75AM	40.00	65	150-8	190.00	46	925A	95.00	45	3026	0.50	84
41WT	8.00	55	75AM-3	40.00	65	150-9	240.00	46	1060	34.00	75	3027	3.00	84
42N	10.00	55	75AN	22.00	65	150-10	240.00	46	1061	50.00	75	3028	0.50	84
42P	10.00	55	75AN-3	22.00	65	150-11	240.00	46	1061-3	34.00	75	3500	3.50	84
42U	10.00	55	75AN-75	30.00	65	151-1	240.00	46	1062	90.00	75	3605A	170.00	47
42W	10.00	55	75AR	27.00	65	151-2	240.00	46	1062-3	60.00	75	3606D	125.00	49
42WT	10.00	55	75AR-3	27.00	65	151-3	240.00	46	1071	52.00	67	3608D	150.00	49
44AJ	24.00	57	75AR-75	30.00	65	151-4	240.00	46	1073	270.00	75	3625	360.00	47
44AL	24.00	57	75AT	44.00	65	151-6	250.00	46	1107AE	60.00	26	3626D	270.00	49
44AM	24.00	57	75AT-75	44.00	65	151-8	250.00	46	1107AET	70.00	26	3645	700.00	47
44AN	7.00	57	75AU	22.00	65	151-9	300.00	46	1107AZ	66.00	28	3646D	530.00	49
44AN-3	7.00	57	75AU-3	22.00	65	151-10	300.00	46	1122AZ	66.00	28	4850A	12.00	76
44AN-75	7.00	57	75AU-75	40.00	65	151-11	300.00	46	1122C	60.00	26	4851	12.00	76
44AP	6.00	57	75AW	27.00	65	156AE	80.00	26	1122CT	70.00	26	4852	13.00	76
44AP-3	6.00	57	75AW-3	27.00	65	156AET	90.00	26	1162	90.00	75	4861A	10.00	75
44AR	24.00	57	75AZ	30.00	65	156AZ	78.00	28	1260A	30.00	75	4862A	32.00	75
44AR-3	24.00	57	75AZ-3	30.00	65	159AC	42.00	26	1261B	54.00	75	4944	4.00	84
44AT	24.00	57	77AR-75	60.00	67	159ACT	52.00	26	1262A	100.00	75	4949	4.00	84
44AU	6.00	57	77AT-75	86.00	67	159AE	46.00	26	1271	54.00	67	6600A	30.00	84
44AU-3	6.00	57	77AZ-75	80.00	67	159AET	56.00	26	1273	340.00	75		+12.00/outlet	
44AU-75	6.00	57	78AGF	120.00	69	159AZ	66.00	28	1560A	12.00	75	6730C	480.00	78
44AW	7.00	57	78AGM	110.00	69	161-1	100.00	47	1561A	18.00	75	6732C	540.00	78
44AW-3	7.00	57	78AL	120.00	69	161-2	115.00	47	1562A	36.00	75	6740A	1,320.00	79
44AW-75	7.00	57	78ARF	110.00	69	161-3	115.00	47	1573A	100.00	75	6742A	1,440.00	79
44AZ	24.00	57	78ARM	100.00	69	161-4	115.00	47	1860A	48.00	76	10195	4.00	83
45AJ	44.00	59	78AS	120.00	69	171AC	46.00	26	1861	70.00	76	10683-2	0.60	76
45AJ-3	44.00	59	78AZ	120.00	69	171ACT	56.00	26	1872	360.00	76	10683-3	0.50	76
45AL	34.00	59	79G	260.00	70	171AET	56.00	26	1920A	720.00	81	10683-10	1.30	76
45AM	34.00	59	79R	240.00	70	171AZ	66.00	28	1921	800.00	81	10683-11	0.50	76
45AM-3	34.00	59	79Z	260.00	70	185AC	46.00	26	1923	20.00	81	10712-24	0.20	84
45AN	18.00	59	80G	340.00	70	185AZ	66.00	28	1924	840.00	81	10791-1	0.30/ft.	51
45AN-3	18.00	59	80R	320.00	70	210	4.00	83	1930	500.00	82	10791-7	1.20/ft.	51
45AN-75	18.00	59	80Z	370.00	70	256AC	90.00	26	1931	580.00	82	10804-9	4.50	51
45AP	15.00	59	87G	68.00	67	256ACT	100.00	26	1934	620.00	82	10804-10	5.50	51
45AP-3	15.00	59	87G-3	68.00	67	256AE	90.00	26	2061	62.00	76	10804-11	4.00	51
45AR	22.00	59	87L	68.00	67	256AET	100.00	26	2062	100.00	76	10804-31	2.50	51
45AR-3	22.00	59	87N	58.00	67	460A-1	220.00	48	2071	62.00	67	10804-34	3.50	51
45AT	30.00	59	87N-3	58.00	67	460A-2	220.00	48	2073	280.00	76	10804-36	3.00	51
45AT-3	30.00	59	87R	54.00	67	461A-1	250.00	48	2260B	30.00	75	10805-1	2.00	51
45AU	15.00	59	87R-3	54.00	67	461A-2	250.00	48	2261A	48.00	75	10805-4	6.00	51
45AU-3	15.00	59	87S	68.00	67	465-1	350.00	48	2262	100.00	75	10805-5	6.00	51
45AW	18.00	59	87SG	75.00	67	465-2	350.00	48	2360A	38.00	75	10805-6	3.00	51
45AW-3	18.00	59	87T	80.00	67	466-1	420.00	48	2361A	52.00	75	10805-11	5.00	51
45AZ	28.00	59	87Z	76.00	67	466-2	420.00	48	2760-1	70.00	74	10805-12	4.00	51
45AZ-3	28.00	59	87Z-3	76.00	67	560	100.00	74		+2.00/ft.		11381-2	2.50	76
47L	70.00	61	116	100.00	49	560-11	94.00	74	2761-1	70.00	74	11381-3	3.00	76
47N	60.00	61	117	240.00	49	560-21	88.00	74		+3.00/ft.		11381-5	3.00	76
47N-3	60.00	61	117E	280.00	26	561	120.00	74	2761-11	64.00	74	11662-2	6.00	71
47R	60.00	61	117ET	320.00	26	561-11	114.00	74		+3.00/ft.		11662-3	5.00	71
47R-3	60.00	61	117RT	320.00	26	561-21	108.00	74	2761-21	58.00	74	12395-1	15.00	71
47Z	70.00	61	117Z	280.00	28	562A	210.00	74		+3.00/ft.		12418-1	16.00	51
47Z-3	70.00	61	120E	250.00	26	562A-11	200.00	74				12418-3	15.00	51
71N	10.00	62	120R	250.00	26	562A-21	190.00	75	2762A-1	80.00	74	12418-5	10.00	51
71W	10.00	62	120Z	260.00	28	573	520.00	74		+7.00/ft.		12418-12	16.00	51
72N	15.00	62	137AE	100.00	26	573-11	500.00	74	2762A-11	70.00	74	13212-2	10.00	62
72W	15.00	62	137AET	110.00	26	858C	100.00	83		+7.00/ft.		13550	5.00	71
74N	18.00	63	137AZ	100.00	28	878A	90.00	83				13555A	5.00	33
74P	22.00	63	144AC	74.00	26	900C-0	230.00	44	2762A-21	60.00	74	14672-3	20.00	50
74T	24.00	63	144ACT	84.00	26	900C-1	135.00	44		+7.00/ft.		15093A	22.00	76
74U	22.00	63	144AZ	90.00	28	900C-2	125.00	44	2773-1	220.00	74	15681	18.00	50
74W	18.00	63	150-1	180.00	46	900C-3	145.00	44		+16.00/ft.		15840	12.00	75
74Z	24.00	63	150-2	180.00	46	900C-4	140.00	44	3012	0.36	84	16253-21	9.00	50

Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page
16253-23	\$ 9.00	50	21206	\$ 6.00	76	31766-4	\$20.00	28	35849-7	\$30.00	28	54346-()	\$80.00	33
16253-24	9.00	50	21203	8.00	50	31766-5	18.00	28	35849-8	30.00	28		+4.50/ft.	
18041	12.00	75	23187	28.00	76	31766-6	18.00	28	35849-9	36.00	28	54346-240	160.00	33
18096	9.00	75	24254	10.00	67	31766-7	20.00	28	35849-10	48.00	28	54348	70.00	33
18110	40.00	75	24312A	18.00	28	31766-8	18.00	28	36722	25.00	54			
18111	32.00	75	24810-1	3.50	72	31766-9	30.00	28	36723	25.00	54	54390-()	48.00	30
18200	20.00	75	24810-2	4.50	28	31766-10	30.00	28	38500	4,000.00	41		+3.00/ft.	
18630	4.00	75	24810-4	4.50	72	31768-1	20.00	28	38501	2,500.00	41	54390-60	58.00	30
18631	10.00	75	24811-2	5.00	28	31771-1	5.00	28	38502	4,800.00	41	54390-120	70.00	30
18902	72.00	76	24811-4	5.00	72	31771-2	6.00	71	38552-20	240.00	41	54395-12	90.00	30
19007-18	15.00	33	25435-1	0.16/ft.	84	31869	740.00	12	38552-32	260.00	41	54395-24	100.00	30
19007-75	10.00	32	25816A	60.00	66	32841	500.00	12	38891	50.00	12	54395-36	110.00	30
19007-90	10.00	32		+4.80/ft.		33211	5.00	28	41038	200.00	79	54395-60	130.00	30
19007-112	10.00	32	25817	60.00	64	33212	6.00	28	41039	200.00	79	54396-()	42.00	30
19007-137	10.00	32		+2.10/ft.		33586-1	30.00	28	50170-2	2,500.00	35		+3.00/ft.	
19007-159	10.00	32	25832	20.00	50	33586-2	30.00	28	51727-12	65.00	31	54396-60	52.00	30
19007-187	10.00	32	25833	18.00	50	33586-3	40.00	28	51727-24	75.00	31	54396-120	64.00	30
19007-229	12.00	32	25834	19.00	50	33586-4	100.00	28	51727-36	85.00	31	54401-12	70.00	30
19008-18	15.00	33	26892-1	3.00	72	33598-1	16.00	71	51737-12	65.00	31	54401-24	80.00	30
19008-75	10.00	32	26892-2	4.00	72	33598-3	20.00	71	51737-24	75.00	31	54401-36	90.00	30
19008-90	10.00	32	26892-4	4.00	72	33598-5	34.00	71	51737-36	85.00	31	54418-90	105.00	32
19008-112	10.00	32	26985A	23.00	72	33598-9	68.00	71	51741-()	36.00	31	54418-112	105.00	32
19008-137	10.00	32	27290A	3.00	71	33630A	120.00	79		+3.00/ft.		54418-137	105.00	32
19008-159	10.00	32	28708-2	7.00	72	33868	220.00	69	51741-60	50.00	31	54418-159	170.00	32
19008-187	10.00	32	28746-()	17.00	9	33875	170.00	69	51741-120	60.00	31	54608	240.00	35
19008-229	12.00	32	29291-3	10.00	50	33938-1	14.00	72	51747-12	88.00	31	54658-4	40.00	32
19009-18	30.00	33	29958	14.00	28	33938-2	17.00	72	51747-24	105.00	31	54749-()	80.00	30
19009-75	20.00	32	29961	14.00	28	33938-3	23.00	72	51747-36	115.00	31		+4.00/ft.	
19009-90	20.00	32	30079	30.00	76	33938-4	34.00	72	51930	270.00	37	54749-60	80.00	30
19009-112	20.00	32	30080	90.00	76	33938-5	44.00	72	51935	375.00	37	54749-120	110.00	30
19009-137	20.00	32	30150	12.00	50	33948-1	32.00	71	52080-()	60.00	31	54756-12	125.00	30
19009-159	20.00	32	30417-2	8.00	72	33948-2	22.00	71		+5.00/ft.		54756-24	135.00	30
19009-187	20.00	32	30417-3	10.00	28	33948-3	10.00	71	52080-60	74.00	31	54756-36	150.00	30
19009-229	30.00	32	30417-5	10.00	28	33981-1	20.00	71	52080-120	100.00	31	55000-62	16.00	31
			30452	34.00	76	33981-2	40.00	71	52095-12	110.00	31	55000-75	16.00	31
19045-()	38.00	31	31031-1	60.00	72	33984-1	40.00	71	52095-24	132.00	31	55000-90	16.00	31
	+3.00/ft.		31031-2	80.00	72	33984-2	80.00	71	52095-36	146.00	31	55000-112	16.00	31
19045-60	45.00	31	31390	400.00	13	34283	36.00	72	52650	6,000.00	34	55000-137	16.00	31
19045-120	60.00	31	31400	210.00	13	34389A	5.00	76	53015-62	70.00	31	55000-187	16.00	31
19050-1	490.00	35	31472	124.00	76	34397-1	400.00	28	53015-75	100.00	31	55001-90	20.00	30
19050-2	275.00	35	31535	18.00	28	34397-3	440.00	28	53015-90	100.00	31	55001-112	20.00	30
19050-3	270.00	35	31553	90.00	50	34405-1	280.00	28	53015-112	60.00	31	55001-137	20.00	30
19050-4	390.00	35	31554	60.00	50	34660	10.00	76	53015-137	40.00	31	55001-159	20.00	30
19050-5	300.00	35	31581-()	17.00	9	34759	30.00	28	53015-187	72.00	31	55001-187	20.00	30
			31585-()	17.00	9	35248-1	2,000.00	10	53025-62	65.00	31	55001-229	20.00	30
19051-()	36.00	31	31614-1	120.00	83	35249-1	1,200.00	10	53025-75	100.00	31	55040-75	65.00	32
	+3.00/ft.		31614-3	120.00	83	35253-1	180.00	10	53025-90	100.00	31	55040-90	65.00	32
19051-60	45.00	31	31616	200.00	83	35254-2	500.00	10	53025-112	40.00	31	55040-112	65.00	32
19051-120	60.00	31	31618-1	36.00	83	35255-1	280.00	10	53025-137	30.00	31	55040-137	65.00	32
			31618-2	36.00	83	35255-2	300.00	10	53025-187	64.00	31	55040-159	65.00	32
19065-()	38.00	31	31670-1	8.00	28	35256-1	900.00	10	53210-()	34.00	31	55040-187	70.00	32
	+3.00/ft.		31670-2	8.00	28	35256-2	1,000.00	10		+3.00/ft.		55040-229	70.00	32
19065-60	48.00	31	31670-3	10.00	28	35257-1	540.00	10	53210-60	45.00	31	55050-14	400.00	34
19065-120	60.00	31	31670-4	10.00	28	35257-2	660.00	10	53210-120	60.00	31	55070-9	115.00	36
19075-12	65.00	31	31670-5	10.00	28	35258-1	1,100.00	10	53215-12	110.00	31	55070-14	115.00	36
19075-24	75.00	31	31680-1	0.80	84	35258-2	1,280.00	10	53215-24	120.00	31	55070-17	115.00	36
19075-36	85.00	31	31680-2	0.80	84	35259-1	800.00	10	53215-36	130.00	31	55070-21	115.00	36
19075-60	100.00	31	31680-3	1.80	84	35259-2	1,050.00	10	54055-()	112.00	30	55070-44	115.00	36
19080A-1	6.00	32	31680-4	1.20	84	35751	12.00	83		+12.60/ft.		55070-71	115.00	36
19209B	300.00	76				35849-1	28.00	28	54055-60	172.00	30			
19256B	14.00	28	31681	20.00	41	35849-2	28.00	28				55172-()	48.00	30
19474A	115.00	13		+1.00/ft.		35849-3	28.00	28	54055-120	225.00	30		+3.00/ft.	
19478	200.00	13	31766-1	18.00	28	35849-4	28.00	28	54059-12	140.00	30	55172-60	58.00	30
20695	170.00	76	31766-2	20.00	28	35849-5	28.00	28	54059-24	160.00	30	55172-120	70.00	30
20898	17.00	50	31766-3	18.00	28	35849-6	30.00	28	54059-36	170.00	30	55219-90	5.00	30

Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page	Type No.	Price	Page
55219-112	\$ 5.00	30	55224-112	\$ 2.00	31	55234-60	\$100.00	30	56045-112	\$40.00	30	60008-4	\$2,650.00	36
55219-137	5.00	30	55224-137	2.00	31	55234-120	130.00	30	56045-137	40.00	30	60008-14	2,000.00	36
55219-159	5.00	30	55224-187	3.00	31	55235-12	140.00	30	56045-159	50.00	30	60010-4	3,700.00	36
55219-187	5.00	30	55229-90	56.00	30	55235-24	160.00	30	56045-187	65.00	30	60102-1	800.00	35
55219-229	6.00	30	55229-112	58.00	30	55235-36	170.00	30	56045-229	65.00	30	60102-3	900.00	35
55220-62	42.00	31	55229-137	60.00	30	55244	2,500.00	34	56090	1,125.00	37	60102-5	1,100.00	35
55220-75	42.00	31	55229-159	75.00	30	55249-4	40.00	32	56207	20.00	33	60103-1	1,300.00	35
55220-90	46.00	31	55229-187	90.00	30	55305-1	200.00	35	56520-20	145.00	36	60103-3	1,400.00	35
55220-112	48.00	31	55229-229	155.00	30	55305-3	300.00	35	56520-40	145.00	36	60103.5	1,600.00	35
55220-137	50.00	31	55230-90	56.00	30	55305-5	500.00	35	56520-70	145.00	36	60104-1	840.00	35
55220-187	70.00	31	55230-112	58.00	30	55353	2,500.00	34	57001-107	420.00	33	60104-3	940.00	35
55221-62	42.00	31	55230-137	60.00	30	55520-10	400.00	35	57001-127	420.00	33	60104-5	1,140.00	35
55221-75	42.00	31	55230-159	75.00	30	55674-90	40.00	30	57222-107	280.00	33	60109-1	450.00	35
55221-90	46.00	31	55230-187	90.00	30	55674-112	40.00	30	57222-127	280.00	33	60109-3	550.00	35
55221-112	48.00	31	55230-229	155.00	30	55674-137	40.00	30	59135	1,150.00	37	60109-5	750.00	35
55221-137	50.00	31	55231-90	85.00	30	55674-159	40.00	30	59210-90	100.00	32	60111-1	340.00	35
55221-187	70.00	31	55231-112	70.00	30	55674-187	50.00	30	59210-112	100.00	32	60111-3	440.00	35
55222-62	45.00	31	55231-137	60.00	30	55674-229	50.00	30	59210-137	100.00	32	60111-5	640.00	35
55222-75	64.00	31	55231-159	90.00	30	55675-62	40.00	31	59220-5	50.00	32	60115-1	250.00	35
55222-90	75.00	31	55231-187	92.00	30	55675-75	40.00	31	59220-6	90.00	32	60115-3	350.00	35
55222-112	60.00	31	55231-229	160.00	30	55675-90	40.00	31	59220-13	40.00	32	60115-5	550.00	35
55222-137	50.00	31	55233-12	90.00	30	55675-112	50.00	31	59220-37	60.00	32	60116-1	250.00	35
55222-187	72.00	31	55233-24	100.00	30	55675-137	64.00	31	60003-14	900.00	36	60116-3	350.00	35
55224-62	3.00	31	55233-36	110.00	30	55675-187	64.00	31	60003-21	840.00	36	60116-5	550.00	35
55224-75	3.00	31	55234- ()	90.00	30	55690	220.00	82	60004-14	1,200.00	36	70749	2,000.00	4
55224-90	3.00	31	+5.00/ft.			56045-90	40.00	30	60004-21	1,100.00	36	70750	3,200.00	4
									60006-21	1,300.00	36	70751	6,400.00	4

SHIPPING REEL INFORMATION

Very short lengths of HELIAX elliptical waveguide and HELIAX coaxial cable are usually shipped in cardboard cartons or in open wooden crates as shown in Catalog 26. Most shipments of HELIAX elliptical waveguide and HELIAX coaxial cable up to 3" in size are made on non-deposit, disposable wooden reels. Cable of 3" or larger sizes and very long continuous lengths of smaller sizes are shipped on returnable reels requiring a reel deposit. Cables cut to length and terminated at the factory will be shipped with a length tolerance of plus 2%, minus 0%. Cable may be supplied with a closer mechanical length tolerance on special order for a nominal additional charge.

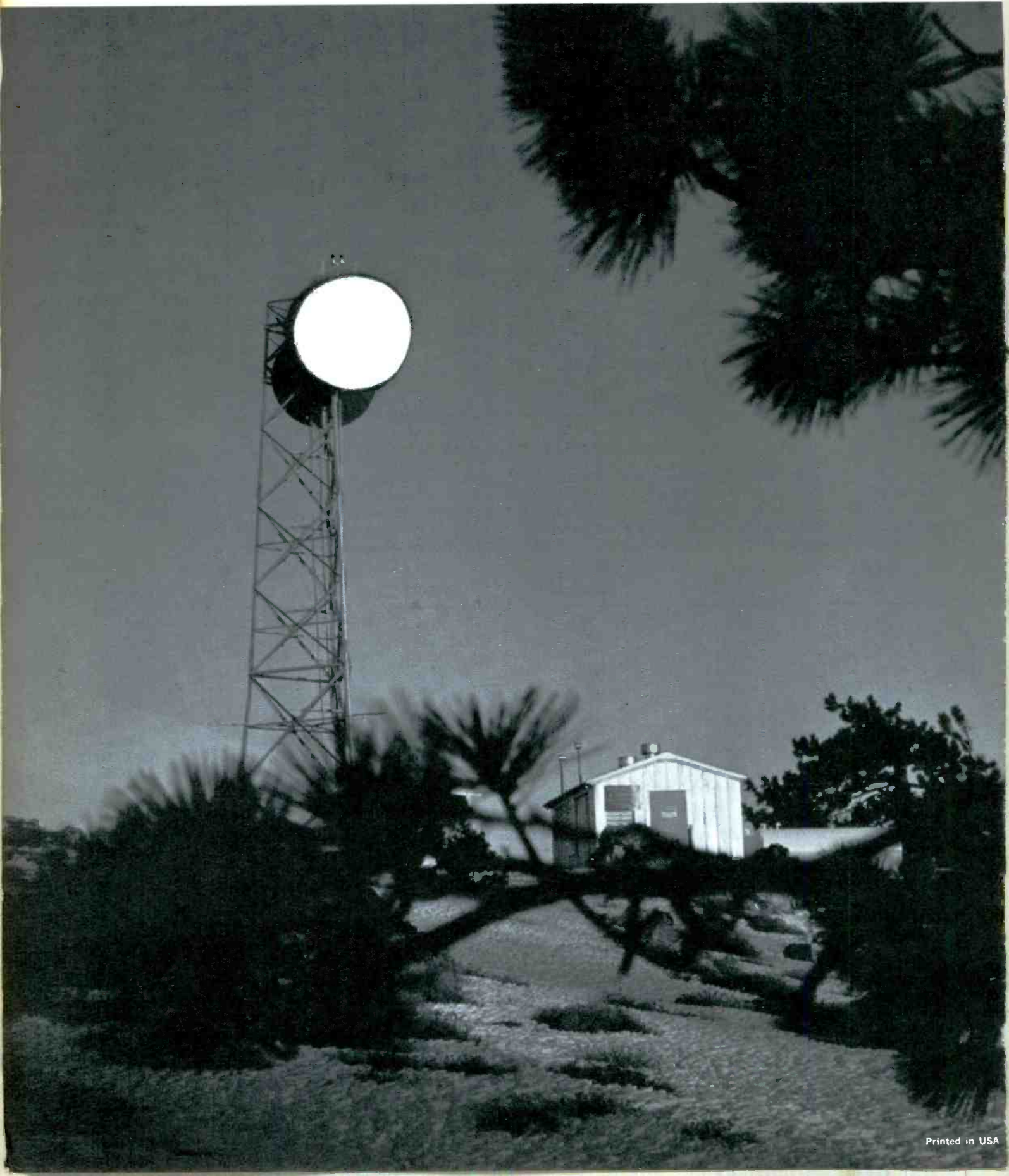
REEL SIZE	TYPE NO.	OUTSIDE DIAMETER	WIDTH	TARE WT., LBS.	DEPOSIT
4 Ft.	-	48 in.	24 in.	94	N/C
6 Ft.	-	72 in.	31 in.	315	N/C
6 Ft.	25190-3	74 in.	46 in.	925	\$ 150.00
7 Ft.	25190-2	86 in.	52 in.	1645	250.00
7-1/2 Ft.	25190-4	93 in.	40 in.	1900	300.00
8 Ft.	25190-5	98 in.	66 in.	2100	350.00
9 Ft.	25190-6	110 in.	70 in.	2800	400.00
10-1/2 Ft.	25190-9	128 in.	80 in.	3600	600.00
12 Ft.	29076	146 in.	84 in.	4500	1,200.00
12-1/2 Ft.	38269-2	154 in.	120 in.	6500	2,000.00
14 Ft.	38269-1	172 in.	120 in.	7000	2,600.00

Notes:

- (1) Tare/Wt. is the empty weight of the reel plus an outside covering (lagging) for shipment. For shipping weight, add weight of cable shown in catalog.
- (2) Dimensions and weights are nominal, for planning purposes and are not guaranteed.
- (3) Reel types 29076, 38269-2 and 38269-1 are steel, all others are of wood construction.
- (4) Reel types 38269-2 and 38269-1 can be dis-assembled to reduce return shipping costs.
- (5) Reels shown are for domestic shipment only. Special reels for export shipments or other special applications are available on request.

RETURNABLE REEL POLICY

Reel deposits are not included in the price of the cable but are charged separately, charges being on a net basis (no discount allowed). Full credit will be allowed for reels returned within twelve months from date of shipment, in good condition, reasonable wear and tear accepted. Reels shall be returned at customer's expense, F.O.B. the Andrew plant, 10500 W. 153rd. Street, Orland Park, Illinois 60462. Shipping charges for return of reels should be prepaid. If reels are returned Collect, we will deduct shipping costs from reel deposit. Reels requiring repairs will be accepted at our option, and reasonable charge for repairs will be deducted from the deposit. There is no charge for lagging and therefore no credit will be allowed for return of lagging. No deposit is charged and therefore no credit will be allowed for return of Non-Returnable Reels.

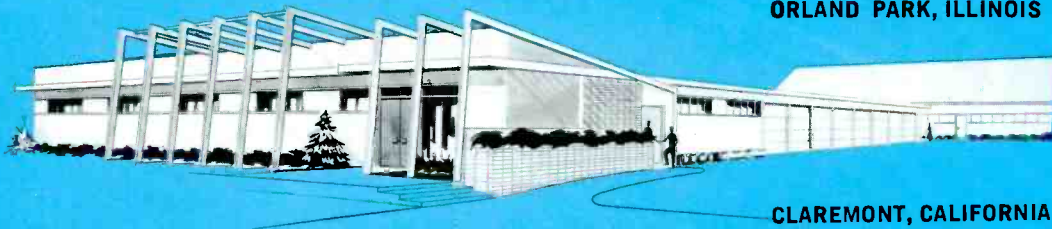


PLANTS

UNITED STATES

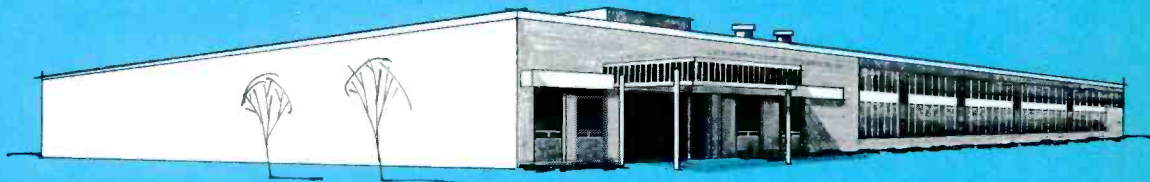


ORLAND PARK, ILLINOIS



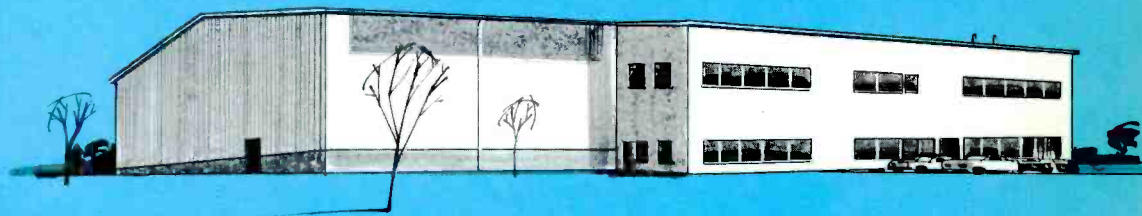
CLAREMONT, CALIFORNIA

CANADA



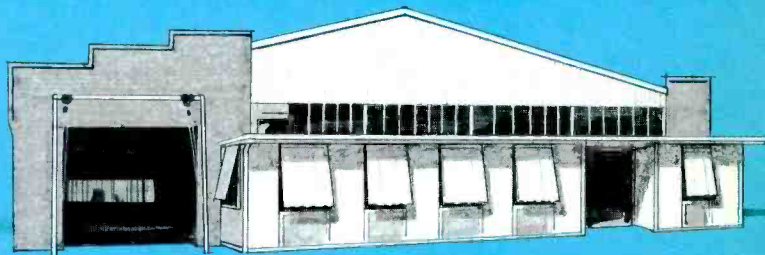
WHITBY, ONTARIO

GREAT BRITAIN

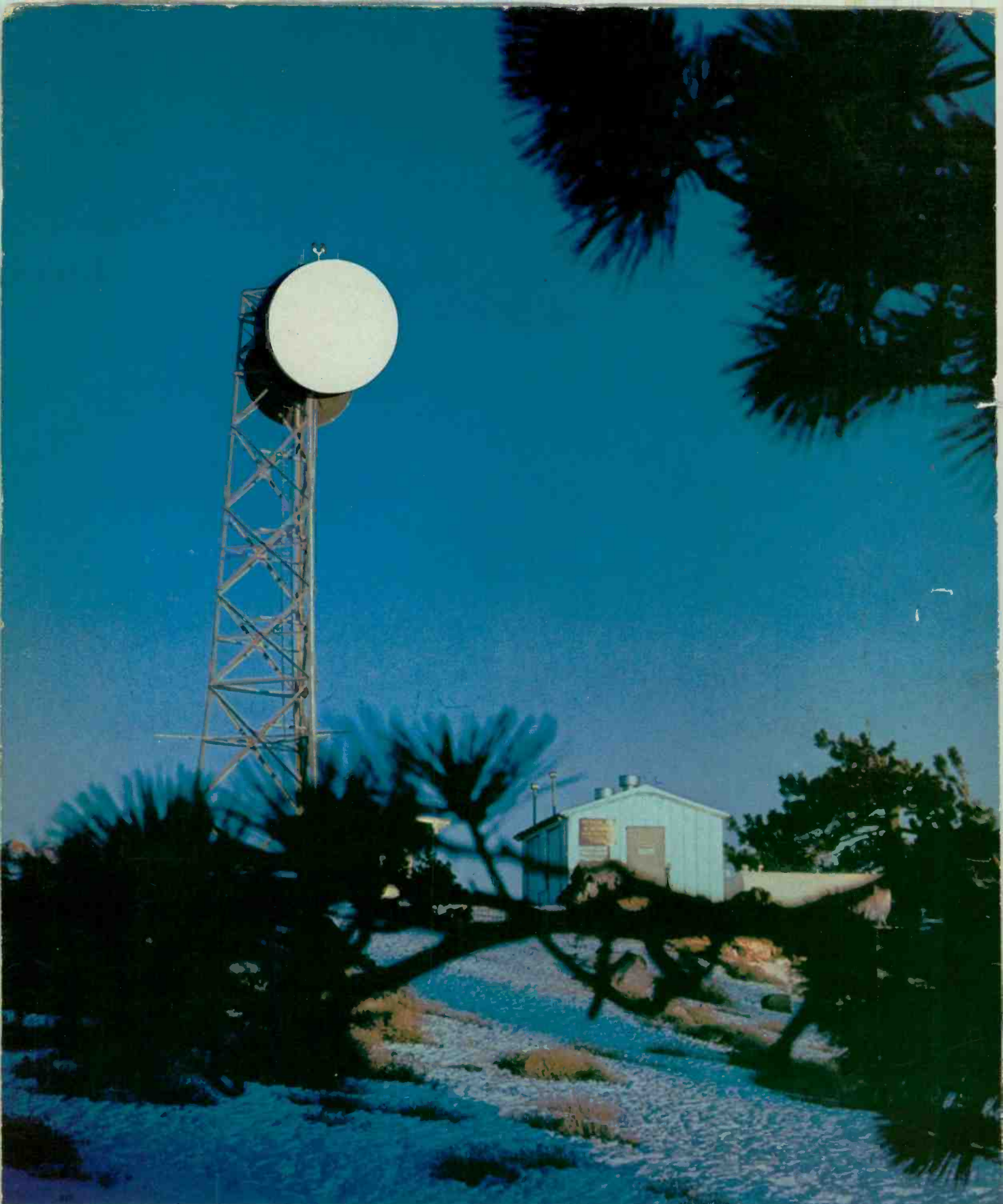


LOCHGELLY, FIFE

AUSTRALIA



RESERVOIR, VICTORIA



ANDREW

catalog 26
antennas/transmission lines

Printed in U.S.A.