

**NEW PRODUCT
SUPPLEMENT**
VOLUME II: FOR USE WITH CURRENT CATALOG 32

 **ANDREW**

ANTENNA SYSTEMS



HOW TO USE THIS SUPPLEMENT

This Supplement is designed to be used in conjunction with Catalog 32. Most of the products listed are new or have been improved since Catalog 32 was issued. Additions have been made to nearly every product line. An entire product line, HF radio system equipment, is also introduced in this Supplement. For complete product information, refer to both the Catalog 32 and the Supplement pages listed below in the Table of Contents.

Andrew is a multinational firm widely recognized as the world's leading producer of antenna system equipment. Since 1937, Andrew has been known for innovative design, superior product performance, and outstanding customer service.

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New microwave antennas, accessories and specifications from Andrew are presented on pages S1-S7. This supplements the information presented in Catalog 32. For additional products, mechanical specifications and system design information refer to Catalog 32. See "Table of Contents" on opposite page.

Guaranteed Radiation Pattern Envelopes. Actual radiation patterns for production antennas will not have any peak exceeding the current RPE by more than 3 dB from 0° to 100°, excluding the co-polarized main beam, and 2 dB from 100° to 180°. An angular accuracy of ±1° is maintained throughout. This guarantee applies to all Andrew parabolic microwave antennas unless otherwise stated on the RPE.

VSWR, Maximum is the guaranteed peak voltage-standing-wave-ratio within the operating band. Nominal return loss is also presented in the tables. A conversion table from VSWR to return loss and reflection coefficient is on page 195 of Catalog 32.

Input Flange information for the antennas described on pages S2-S7 is listed below:

Antenna Type	Input Mates with
Rural Fixed Cellular	N-Plug (male)
2.7 GHz and below, air-dielectric	7/8" EIA, 50 ohm
2.7 GHz and below, unpressurized	"F" Flange, male
4 GHz (except SHX)	CPR229G, PDR40
6 and 6.5 GHz (except SHX)	CPR137G, PDR70
8 GHz (except SHX)	CPR112G, PDR40
11 GHz (except SHX)	CPR90G, PDR100
18 GHz, 22 GHz	UG-595, UG-596A
	CBR220, UBR220, PBR220
SHX10A and SHX10B	WC281
SHX10C 4/6 GHz	WC212
SHX10C 6 GHz only	WC166

Pressurization. Following are maximum pressure ratings for the antennas described on pages S2-S7.

SHX10 Series	0.5 lb/in ² (3.5 kPa)
UMX ()-459, -A465 Series	0.5 lb/in ² (3.5 kPa)
UMX10-611	5 lb/in ² (35 kPa)
PL () -186C	2 lb/in ² (14 kPa)
All other pressurized	10 lb/in ² (70 kPa)

Recommended operating pressure for SHX10 Series is 0.2 lb/in² (1.4 kPa). Maximum leak rate is 10 ft³/h (283 l/h) at 0.2 lb/in² (1.4 kPa).

WIND FORCES AT 125 mph (200 km/h)

Antenna Types	Antenna Dia. Feet (m)	F _A Max. Pounds (N)	F _S Max. Pounds (N)	M _T Max. ft-lb (N·m)
KP4-15, -17, -19, -23, -25	4 (1.3)	355 (1560)	175 (775)	420 (570)
KP6-15A, -17, -19, -23, -25	6 (2)	820 (3650)	410 (1825)	1240 (1680)
KP8 Series	8 (2.4)	1180 (5250)	600 (2650)	2030 (2750)
KP10-15B, -17, -19, -23, -25	10 (3)	1825 (8095)	915 (4050)	3490 (4730)
KP13-15, -17, -19, -23, -25	13 (4)	3135 (13930)	1570 (6960)	7100 (9630)
HP4 Series	4 (1.2)	640 (2850)	390 (1740)	780 (1060)
UHX12-59J with Planar Radome	12 (3.7)	5830 (25930)	3000 (13340)	11960 (16220)



Power Rating. All microwave antenna feeds are rated at 150 watts. Antennas for higher power applications are available on special order.

Wind Forces. Wind effects can be separated into two force components and a twisting moment. Refer to Catalog 32, pages 6 and 7 for illustrations and information on other antennas.

MICROWAVE ANTENNAS

New single-band microwave antennas from Andrew are presented below and on page S3. The wide range of antennas offered by Andrew permits the system designer to choose an antenna that is optimized for his requirements. More than four hundred additional antennas are offered in Andrew Catalog 32.

ELECTRICAL CHARACTERISTICS

Frequency, GHz and Type	Type Number	Diameter Feet (m)	U.S. FCC Class.	Gain, dBi ± 0.2 dB			Beamwidth Degrees	Front-to-Back Ratio, dB	VSWR, max (R.L., dB)
				Bottom	Mid-Band	Top			
1.427-1.535 GHz									
GRIDPAK Air Dielectric Single Polarized	KP8-15	8 (2.4)	*	28.5	28.8	29.1	6.2	32	1.20 (20)
GRIDPAK Unpressurized Single Polarized	KP8F-15	8 (2.4)	*	28.4	28.7	29.0	6.2	32	1.20 (20)
1.7-2.11 GHz									
GRIDPAK Air Dielectric Single Polarized	KP8-17	8 (2.4)	B	30.2	31.2	31.8	4.8	36	1.08 (28)
GRIDPAK Unpressurized Single Polarized	KP8F-17	8 (2.4)	B	30.1	31.0	31.7	4.8	36	1.20 (20)
1.9-2.3 GHz									
GRIDPAK Air Dielectric Single Polarized	KP8-19	8 (2.4)	A***	31.1	31.9	32.7	4.6	39	1.08 (28)
GRIDPAK Unpressurized Single Polarized	KP8F-19	8 (2.4)	A***	31.0	31.8	32.6	4.6	39	1.20 (20)
2.3-2.5 GHz									
GRIDPAK Air Dielectric Single Polarized	KP4-23 KP6-23 KP8-23 KP10-23	4 (1.3) 6 (2.0) 8 (2.4) 10 (3.0)	* * * *	27.3 31.1 32.7 34.6	27.6 31.4 33.0 34.9	27.9 31.7 33.2 35.2	6.9 4.5 3.4 3.0	30 36 35 38	1.20 (20) 1.10 (26) 1.08 (28) 1.08 (28)
GRIDPAK Unpressurized Single Polarized	KP4F-23 KP6F-23 KP8F-23 KP10F-23	4 (1.3) 6 (2.0) 8 (2.4) 10 (3.0)	* * * *	27.2 31.0 32.6 34.5	27.5 31.3 32.9 34.8	27.8 31.6 33.1 35.1	6.9 4.5 3.4 3.0	30 36 35 38	1.30 (17) 1.20 (20) 1.15 (23) 1.15 (23)
2.48-2.7 GHz									
GRIDPAK Air Dielectric Single Polarized	KP8-25	8 (2.4)	**	33.2	33.7	33.9	3.2	37	1.08 (28)
GRIDPAK Unpressurized Single Polarized	KP8F-25	8 (2.4)	**	33.1	33.6	33.8	3.2	37	1.15 (23)
5.85-6.425 GHz									
High Performance High XPD Dual Polarized	HXPD12-58	12 (3.7)	—	44.1	44.4	44.7	1.07	71	1.08 (28)
5.925-7.125 GHz									
Ultra High Performance Dual Polarized	UHX10A-59	10 (3.0)	A†	43.0	44.0	44.9	1.2	68	‡

*Does not apply

**Satisfy U.S. FCC requirements of Parts 94 and 74

***Also meets FCC standards for Part 21.

† Compliance applies to Parts 94 and 21. Also meets FCC requirements for Part 74.

‡ 1.06 (30) from 5.925-6.425 GHz and 1.10 (26) from 6.425-7.125 GHz

For further information, see page S1.

ELECTRICAL CHARACTERISTICS

Frequency, GHz and Type	Type Number	Diameter Feet (m)	U.S. FCC Class.	Gain, dBi ±0.2 dB			Beamwidth Degrees	Front-to-Back Ratio, dB	VSWR, max. (R.L., dB)
				Bottom	Mid-Band	Top			
5.925-6.425 GHz									
Ultra High Performance Dual Polarized	UHX12-59J*	12 (3.7)	A	44.4	44.8	45.2	0.9	80	1.06 (30)
Low VSWR Standard Dual Polarized	PXL6-59E	6 (1.8)	B	38.4	38.7	39.1	1.8	46	1.07 (29)
6.425-7.125 GHz									
Ultra High Performance Dual Polarized	UHX6-65D	6 (1.8)	B	39.1	39.5	40.0	1.7	70	1.06 (30)
High Performance Single Polarized	HP6-65E	6 (1.8)	B	39.4	39.8	40.2	1.7	64	1.06 (30)
7.725-8.5 GHz									
Focal Plane Dual Polarized	FPX6-77G**	6 (1.8)	—	40.2	40.4	40.6	1.5	58	1.08 (28)
10.5-10.7 GHz									
Ultra High Performance Dual Polarized	UHX4-105	4 (1.2)	A	39.8	39.9	40.0	1.7	70	1.08 (28)
10.7-11.7 GHz									
Ultra High Performance Dual Polarized	UHX4-107	4 (1.2)	A	40.0	40.4	40.8	1.6	70	1.08 (28)
17.7-19.7 GHz									
High Performance Single Polarized	HP2-180E†	2 (0.6)	A	38.4	38.9	39.4	1.8	65	1.15 (23)
	HP4-180E†	4 (1.2)	A	44.4	44.9	45.4	0.9	66	1.15 (23)
	HP6-180E†	6 (1.8)	A	48.0	48.5	48.9	0.6	76	1.15 (23)
21.2-23.6 GHz									
High Performance Single Polarized	HP2-220†	2 (0.6)	A	40.0	40.5	41.0	1.5	65	1.15 (23)
	HP4-220A†	4 (1.2)	A	45.8	46.3	46.8	0.8	66	1.15 (23)
	HP6-220†	6 (1.8)	A	49.3	49.7	50.2	0.5	80	1.15 (23)

* Requires two side struts and a bottom strut, which are provided.

** Manufactured at our factory in Great Britain. To order, contact your local Andrew Sales Engineer.

† Includes vertical tilt mount.

Nodal Antennas are designed for the 10.5-10.7 GHz point-to-multipoint services. For further information on these antennas, ask for Andrew Bulletin 1325. LD ()-105 Series Antennas, for "subscriber" use, are described on page 41 of Catalog 32.

NODAL ANTENNAS — ELECTRICAL CHARACTERISTICS

Polarization	Type Number	Gain, dBi Minimum	Nominal Sector Coverage, Degrees	Front-to-Back Ratio	VSWR, max. (R.L., dB)
10.5-10.7 GHz					
Vertical	104140	15.5	90	30	1.2 (20)
Horizontal	104141	15.5	90	30	1.2 (20)

For further information, see page S1.

RURAL FIXED CELLULAR SYSTEM ANTENNAS MICROWAVE ANTENNA ACCESSORIES



Molded Radome

MICROWAVE ANTENNA ACCESSORIES

Mounts for the antennas listed on pages S2 and S3 are described on pages 56-59 of Catalog 32.

Optional Fixed Side Struts for Grid Antennas. Provides increased rigidity. Optional for use as a first strut with 6 ft (1.8 m) antennas or as a second strut for 8, 10 or 12 ft (2.4, 3.0 or 3.7 m) antennas.

Grid Antenna Dia. ft (m)	Strut Type Number
6 (1.8)	75645-1
8 (2.4)	201632
10 (3.0)	201632-2
12 (3.7)	75645-3

Radomes. The molded radomes listed below are for special applications, as indicated. For other radomes, refer to Catalog 32 pages 53-55.

VSWR. Refer to VSWR table on page 54 of Catalog 32. Add 0.05 for 2 and 4 ft molded radomes at 11 GHz and above. Other values are unchanged.

MOLDED RADOMES

Application	Diameter ft (m)	Unheated Type No.	Heated Type No.	Heated Radome Watts	Heated Radome Input
SPECIAL APPLICATION RADOMES FOR STANDARD ANTENNAS					
PXL6-59D, PXL6-65D, PXL6-71E	6 (1.8)	35255-2	35254-2	1525	120/240V, 50/60 Hz
Dual Pol. Standard, 2700 MHz and Below	8 (2.4)	77025	—	—	—
Dual Pol. Standard, 2700 MHz and Below	12 (3.7)	76496	—	—	—
P8-144E, PX8-144E	8 (2.4)	35257-41	35256-46	3300	120/240V, 50/60 Hz
P10-144E, PX10-144E	10 (3.0)	35259-42	35258-47	4250	120/240V, 50/60 Hz

RURAL FIXED CELLULAR SYSTEM ANTENNAS

Andrew offers a line of base station and subscriber antennas for use in rural analog or digital cellular and multi-access radio distribution systems. For additional information, contact your Andrew Sales Engineer.

BASE STATION ANTENNAS

Frequency GHz	Polarization	Type Number	Gain, dBi at 1.5 GHz	Input Power watts	Input Mates with	VSWR, max. (R. L., dB)
1.425-1.535	Vertical	124528-1	8	150	N Plug (male)	1.5 (14)
	Vertical	124528-3	11	150	N Plug (male)	1.5 (14)
1.425-1.535	Horizontal	124527-1	8	150	N Plug (male)	1.5 (14)
	Horizontal	124527-2	11	150	N Plug (male)	1.5 (14)

SUBSCRIBER ANTENNAS

Frequency GHz	Type Number	Gain, dBi at 1.5 GHz	Input Power watts	Input Mates with	VSWR, max. (R. L., dB)
1.425-1.535	124519	14	100	N Plug (male)	1.5 (14)
	124520	20	100	N Plug (male)	1.5 (14)

SHX® SUPER HIGH PERFORMANCE ANTENNAS

SHX super high performance antennas from Andrew offer high gain, low VSWR and outstanding radiation characteristics. Three versions are offered. Type SHX10A is available for use in all of the frequency bands listed in the table and has the highest gain. Type SHX10B, compared with Type SHX10A, has improved radiation patterns and is available in the 2, 4, 6 and 11 GHz bands. Type SHX10C has the best overall pattern performance available for the 4 and 6 GHz bands.

Radiation Pattern Envelopes (RPE's) meet U.S. FCC Standard A (Part 21) in the common carrier bands, and Category A (Parts 94 and 78) in the operational fixed and CATV bands. RPE's are available on request.

Cross Polarization Discrimination is better than 40 dB at the boresight null and 20 dB minimum over an angle ±2° from boresight.

Mechanical Considerations. All three antennas are metal construction and are mechanically interchangeable except for the circular waveguide input flange interface. Other mechanical information presented on pages 46-49 of Catalog 32 applies for all three versions.

Mounts and Accessories described in Catalog 32, pages 48 and 49, are applicable for all three antennas.

2 GHz Operation requires the addition of a WC281 to 7/8" EIA, 50 ohm transition. Types HJ7P-50A and HJ7SP-50A HELIAX® cables provide an adequate pressure path to the antenna and are recommended for most applications. Type HJ5P-50 is also suitable, but requires a separate line from the pressurization equipment to the antenna.



SHX Super High Performance Antenna

WC281 to 7/8" EIA, 50 ohm Transition permits connection of HELIAX® coaxial cable to SHX10A or SHX10B for 2 GHz operation.

Single Polarized Type **203106**
 Dual Polarized Type **203105**

SHX SUPER HIGH PERFORMANCE ANTENNAS — ELECTRICAL CHARACTERISTICS

Frequency, GHz	Type Number	Aperture Feet (m)	U.S. FCC Class.	Gain, dBi ±0.2 dB			Beamwidth Degrees	Front-to-Back Ratio	VSWR, max. (R.L., dB)
				Bottom	Mid-Band	Top			
2.1-2.2	SHX10A	10 (3.0)	A	33.3	33.5	33.7	3.85	75	1.08 (28)
	SHX10B	10 (3.0)	A	32.9	33.1	33.3	3.85	77	1.08 (28)
3.7-4.2 †	SHX10A	10 (3.0)	A	39.3	39.8	40.3	2.5	90	1.02 (40)
	SHX10B	10 (3.0)	A	38.7	39.2	39.7	2.5	90	1.02 (40)
	SHX10C*	10 (3.0)	A	38.7	39.2	39.7	2.5	92	1.06 (30)
5.925-6.425	SHX10A	10 (3.0)	A	43.1	43.5	43.8	1.40	95	1.02 (40)
	SHX10B	10 (3.0)	A	42.3	42.7	43.0	1.40	95	1.02 (40)
	SHX10C*	10 (3.0)	A	42.3	42.7	43.0	1.40	95	**
6.425-7.125	SHX10A	10 (3.0)	A	44.0	44.3	44.6	1.2	90	1.02 (40)
7.725-8.275	SHX10A	10 (3.0)	‡	45.2	45.5	45.8	1.10	90	1.02 (40)
10.7-11.7	SHX10A	10 (3.0)	A	47.3	47.7	48.1	0.8	91	1.02 (40)
	SHX10B	10 (3.0)	A	47.3	47.7	48.1	0.8	91	1.02 (40)
12.7-13.25	SHX10A	10 (3.0)	A	48.7	48.9	49.1	0.7	90	1.02 (40)

* Specify 3.7-4.2 and 5.925-6.425 GHz or 5.925-6.425 GHz only.
 ** 1.03 (36) with WC166 input (6 GHz only); 1.06 (30) with WC212 input (4/6 GHz).
 † 3.58-4.2 GHz is also available on request.
 ‡ Does not apply.

For further information, see page S1

DUAL AND MULTIBAND ANTENNAS



UMX Multiband Antenna

UMX® MULTIBAND ANTENNAS

UMX multiband antennas provide simultaneous dual-frequency band, dual polarized (4-port) operation in the 4/6 GHz, 4/6.5 GHz or 6/11 GHz bands. The 4/6 GHz antennas are improved versions of those presented on Catalog 32 pages 50 and 51. The 4/6.5 and 6/11 GHz antennas are new.

4/6 GHz Antennas include a feed, shielded reflector and TEGLAR® long-life radome. The 4-port combining network and vertical tower mount are ordered separately from the table on page S7.

4/6.5 GHz Antennas include a feed, shielded reflector, TEGLAR long-life radome, 4-port combining network and vertical tower mount.

6/11 GHz Antennas include a feed, shielded reflector, TEGLAR long-life radome, 4-port combining network and vertical tower mount.

4-Port Combining Network. Andrew's compact 4-port combining network offers low VSWR and high frequency-band and polarization isolation. The 4/6 GHz combiner has provision for antenna realignment without traffic interruption. Circulators are included for all four ports on 4/6 GHz antennas. They are not included with 4/6.5 or 6/11 GHz antennas. Gain and port isolation specifications for the 4/6 GHz antennas include losses contributed by the circulators. Optional circulators are available to provide 1.06 VSWR for the 6/11 GHz antenna. The use of circulators limits each antenna port to transmit or receive-only operation.

S6



Special Environment Antenna

Cross Polarization Discrimination is 30 dB minimum.

Input Power Rating is 100 watts per port.

Isolation, dB minimum.

4/6 GHz Antennas

4 GHz port-to-port	40
6 GHz port-to-port	40
4 GHz at 6 GHz ports	Below Cutoff
6 GHz at 4 GHz ports	50

4/6.5 GHz Antennas

4 GHz port-to-port	40
6.5 GHz port-to-port	40
4 GHz at 6.5 GHz ports	Below Cutoff
6.5 GHz at 4 GHz ports	50

6/11 GHz Antennas

6 GHz port-to-port	35
11 GHz port-to-port	35
6 GHz at 11 GHz ports	Below Cutoff
11 GHz at 6 GHz ports	35

Vertical Tower Mount. 6/11 GHz antennas (10 ft) include a Type T10SB mount with two side struts (Catalog 32, pages 56-58). 4/6.5 GHz antennas (12 ft) include a T12SA mount (Catalog 32, pages 56-58). Mounts for 4/6 GHz antennas are listed in the table on page S7. The "standard" and "extended pipe" versions differ in the waveguide support hardware supplied and the mounting required. The "standard" version attaches the antenna to a standard length 4.5 in (115 mm) diameter pipe. Customer supplied lengths of 1.5 in (38 mm) pipe are required for attachment of the wave-

DUAL AND MULTIBAND ANTENNAS SPECIAL ENVIRONMENT ANTENNAS

guide supports. The "extended pipe" version requires an extended length of 4.5 in (115 mm) diameter pipe for attachment of the waveguide supports. For most applications, the "extended pipe" version is easier to install. One 10.5 ft (3.2 m) and one 16 ft (4.9 m) side strut are included.

Ice Shield. For 4/6 GHz antennas, protects 4-port combining network from falling ice. It will sustain the impact of a 10 lb (4.5 kg) piece of ice falling from a height of 50 ft (15 in).

To Order. Specify antenna Type Number. Also, where applicable, specify Type Number for mount, 4-port combining network and ice shield. See ordering information table below.

SPECIAL ENVIRONMENT ANTENNAS*

High Wind Survival Antennas. Andrew's line of standard, high performance and ultra high performance antennas can be supplied with a four-point fixing diamond mount which permits wind survival up to 150 mph (240 km/h) without the use of side struts. These antennas feature strong back structures providing excellent pointing accuracy in adverse operating conditions. Certain antennas, without radomes, are available for wind survival up to 200 mph (320 km/h).

Marine Environment Antennas. For marine environment applications, the added protection of a two-part epoxy paint finish is available as an option to provide excellent corrosion resistance.

*Manufactured at our factory in Great Britain. To order, contact your local Andrew Sales Engineer.

DUAL BAND ANTENNAS — ELECTRICAL CHARACTERISTICS

Frequency GHz	Type Number	Diameter Feet (m)	U.S. FCC Class.	Band	Gain, dBi ±0.2 dB			Beamwidth Degrees	F/B dB	VSWR, max (R.L., dB)
					Bottom	Mid-Band	Top			
UMX® MULTIBAND ANTENNAS										
3.7-4.2 and 5.925-6.425	UMX10-459B	10 (3.0)	A A	4 6	38.4 42.8	39.0 43.1	39.4 43.5	1.8 1.1	72 78	1.06 (30) 1.06 (30)
3.7-4.2 and 5.925-6.425	UMX12-459A	12 (3.7)	A A	4 6	40.7 44.9	41.3 45.3	41.5 45.7	1.5 0.9	74 80	1.06 (30) 1.06 (30)
3.58-4.2 and 6.425-7.125	UMX12-A465†	12 (3.7)	A A	4 6.5	40.3 44.5	40.9 45.0	41.5 45.4	1.7 0.95	73 78	1.12 (25) 1.12 (25)
5.925-6.425 and 10.7-11.7	UMX10-611	10 (3.0)	A A	6 11	42.0 47.0	42.2 47.4	42.5 47.3	1.4 0.8	67 70	1.13 (24)** 1.13 (24)**
HIGH PERFORMANCE ANTENNAS										
5.925-6.425 and 10.7-11.7	HP8 611D	8 (2.4)	A A	6 11	40.9 44.3	41.3 44.7	41.6 45.1	1.4 0.8	65 70	1.06 (30) 1.10 (26)
LOW-VSWR STANDARD ANTENNAS										
1.85-1.99 and 6.425-7.125	PL8 186C	8 (2.4)	A A	2 6.5	30.5 39.6	30.8 42.0	31.1 42.5	4.5 1.3	39 49	1.10 (26) 1.08 (28)
1.85-1.99 and 6.425-7.125	PL10-186C	10 (3.0)	A A	2 6.5	32.5 43.7	32.8 44.0	33.1 44.4	3.7 1.0	42 52	1.10 (26) 1.08 (28)

**VSWR of 1.06 is available as an option. Circulators limit antenna ports to transmit or receive only. Gain specifications do not include circulator losses.

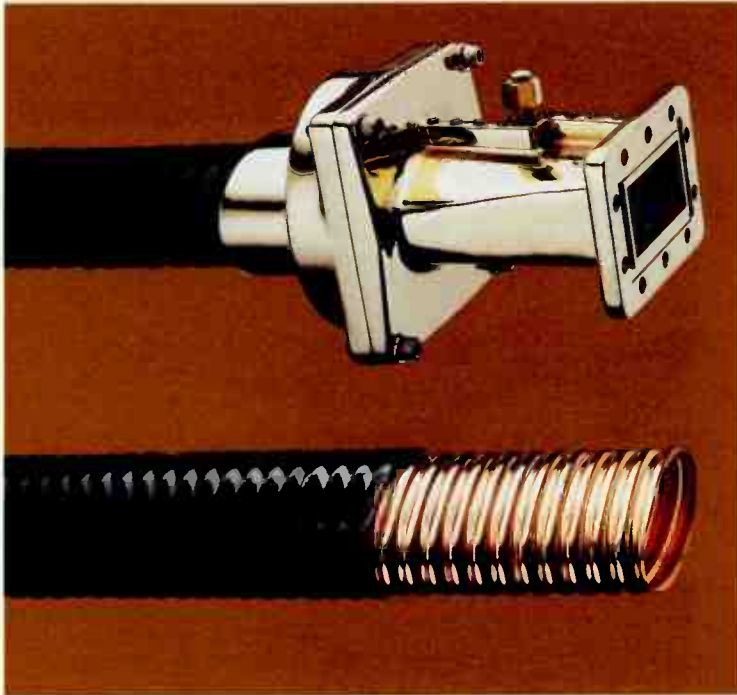
† Input flanges are CPR229F and CPR137F.

MULTIBAND ANTENNA ORDERING INFORMATION

Multiband Antenna Diameter, ft (m)	Type No.	4-Port Combining Network Type No.	Vertical Tower Mounts		Ice Shield Type No.
			Standard Type No.	Extended Pipe Type No.	
10 (3.0) 12 (3.7)	UMX10-459B UMX12-459A	200816 200816	203978 203979	203978-2 203979-2	200480 200481
12 (3.7)	UMX12-A465	Included	Included	—	—
10 (3.0)	UMX10-611	Included	Included	—	—

For further information, see Page S1

HELIAX® ELLIPTICAL WAVEGUIDE



New HELIAX elliptical waveguides and accessories are presented below and on the following pages through S13.

HELIAX Elliptical Waveguide. Types EW34 and EW220 are new sizes from Andrew. Type EW37 will continue to be offered as an alternative for 4 GHz applications. Type EW132A is an improved version of, and replaces, Type EW132 presented in Catalog 32. Connectors and accessories for EW132, listed in Catalog 32, are compatible with the new waveguide.

New Pre-Tuned Connectors for field-fitted applications offer low VSWR and eliminate the need for field tuning.

Accessories. The new flaring tool kit produces high accuracy waveguide flares, in the field, for optimum electrical performance.

Rectangular Waveguide Components. High-power flex-twist and flex (no twist) sections for earth station antenna transmit applications and a 90° step twist are presented on pages S10 and S11.

HELIAX ELLIPTICAL WAVEGUIDE CHARACTERISTICS

	EW34	EW132A	EW220
ELECTRICAL CHARACTERISTICS			
Max. Potential Frequency Range, GHz	3.1-4.2	11.0-15.35	17.0-23.6
eTE_{11} Mode Cutoff Frequency, GHz	2.38	9.00	13.4
Attenuation, dB/100 ft (m) at Frequency, GHz	0.81 (2.67) at 3.1 0.68 (2.23) at 3.7 0.64 (2.09) at 4.2	4.4 (14.5) at 14.4 4.3 (14.2) at 14.9 4.3 (14.0) at 15.35	8.8 (28.9) at 21.2 8.6 (28.2) at 22.4 8.5 (27.7) at 23.6
Group Velocity, percent at Frequency, GHz	64 at 3.1 77 at 3.7 82 at 4.2	78 at 14.4 80 at 14.9 81 at 15.35	78 at 21.2 80 at 22.4 82 at 23.6
MECHANICAL CHARACTERISTICS			
Major and Minor Dimensions over jacket, in (mm)	3.31 x 1.90 (84.1 x 48.3)	0.96 x 0.61 (24.4 x 15.5)	0.70 x 0.44 (17.8 x 11.2)
Minimum Bending Radii, with Rebending, in (mm)			
E-plane	14 (360)	5 (125)	4 (100)
H-plane	38 (970)	14 (355)	9 (230)
Minimum Bending Radii, without Rebending, in (mm)			
E-plane	12 (300)	5 (125)	4 (100)
H-plane	32 (810)	14 (355)	9 (230)
Recommended Twist, deg./ft (m)	0.5 (1.5)	2 (6)	2 (6)
Weight, lb/ft (kg/m)	1.13 (1.68)	0.22 (0.33)	0.12 (0.18)
Maximum Hanger Spacing	5 ft (1.5 m)	4 ft (1.2 m)	20 in (500 mm)
SHIPPING INFORMATION — Lengths ft (m)			
Carton or Wood Box	0-20 (0-6)	0-200 (0-60)*	0-500*
Wood Crate	20-150 (6-45)*	—	—
Disposable Reel			
4 ft (1.2 m)	—	200-1200 (60-365)	500-2100
5 ft (1.5 m)	—	1200-1600 (365-485)	2100-3200
6 ft (1.8 m)	—	1600-4400 (485-1340)	3200-8500
6.5 ft (2.0 m)	150-300 (45-90)	—	—

* Premium (EWP series) waveguides longer than 20 ft (6 m) are shipped on disposable reel.

HELIAX® ELLIPTICAL WAVEGUIDE ASSEMBLIES

Low-VSWR Premium Waveguide Assemblies consist of lengths of premium waveguide terminated with tunable* connectors. VSWR characteristics listed are guaranteed for factory assemblies within the indicated bands. They are also typical for assemblies with field installed and tuned connectors. Performance data for other bands are available on request. Pre-tuned connectors for field-fitted applications are described on page S11.

Standard Waveguide Assemblies consist of lengths of standard waveguide terminated with factory attached

non-tunable connectors. VSWR characteristics are guaranteed for factory assemblies within the indicated bands. They are also typical for assemblies with field installed connectors. Performance data for other bands are available on request.

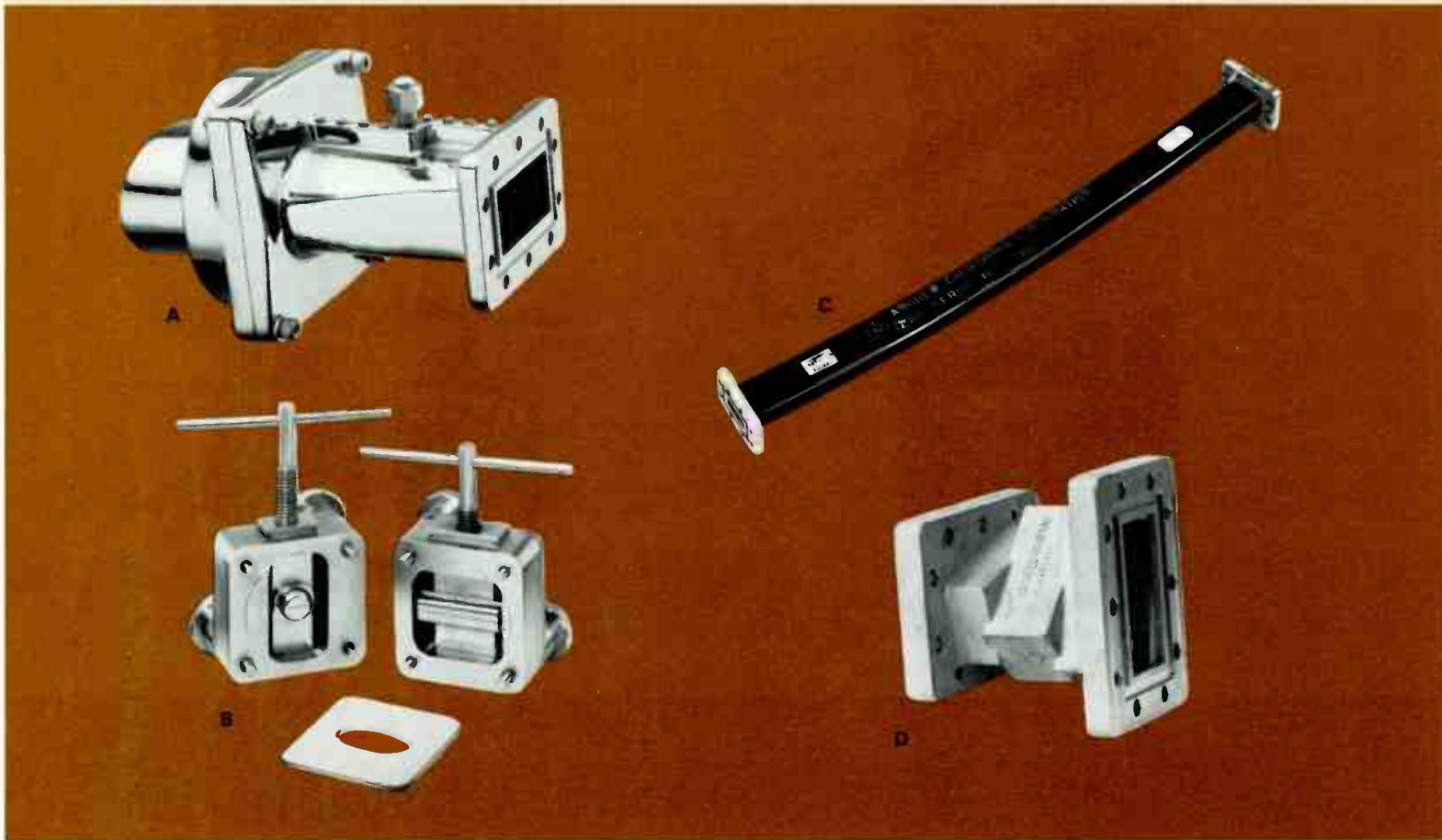
To Order. Specify *waveguide type number, frequency band in GHz, length in feet or metres, connector type numbers, and "fitted" or "unattached."* Where fitted connectors on an assembly are different, specify which is "first off" the reel.

ORDERING INFORMATION FOR WAVEGUIDE ASSEMBLIES

Frequency Band, GHz	Waveguide Type No.	Connector Type No.	Connector Mates with U.S.	Flange Types IEC	VSWR, max. (R.L., dB) up to 300 ft (90 m)
LOW-VSWR PREMIUM WAVEGUIDE ASSEMBLIES					
3.4-3.8	EWP34	134DET	CPR229G	PDR40	1.10 (26)
3.4-3.9	EWP34	134DET	CPR229G	PDR40	1.10 (26)
3.54-4.2	EWP34	134DET	CPR229G	PDR40	1.08 (28)
3.6-4.2	EWP34	134DET	CPR229G	PDR40	1.08 (28)
3.7-4.2	EWP34	134DET	CPR229G	PDR40	1.08 (28)
10.7-11.7	EWP90	290SC*	WR75 choke or cover	CBR120, UBR120, PBR120	1.06 (30)
14.0-14.5	EWP132A	2132DCT	WR75 choke or cover	CBR120, UBR120, PBR120	1.08 (28)
14.0-14.5	EWP132A	2132DET	—	PDR120	1.08 (28)
14.4-15.35	EWP132A	1132DCT	UG-419/U, UG-541/U	CBR140, UBR140, PBR140	1.08 (28)
21.2-22	EWP220	1220SC*	UG-595/U, UG-596A/U	CBR220, UBR220, PBR220	1.10 (26)
22-23.6	EWP220	1220SC*	UG-595/U, UG-596A/U	CBR220, UBR220, PBR220	1.10 (26)
STANDARD WAVEGUIDE ASSEMBLIES					
3.1-3.6	EW34	134DE	CPR229G	PDR40	1.20 (20)
3.4-3.9	EW34	134DE	CPR229G	PDR40	1.15 (23)
3.54-4.2	EW34	134DE	CPR229G	PDR40	1.15 (23)
3.6-4.2	EW34	134DE	CPR229G	PDR40	1.15 (23)
3.7-4.2	EW34	134DE	CPR229G	PDR40	1.15 (23)
10.7-11.7	EW90	290SC	WR75 choke or cover	CBR120, UBR120, PBR120	1.15 (23)
14.0-14.5	EW132A	2132DC	WR75 choke or cover	CBR120, UBR120, PBR120	1.15 (23)
14.0-14.5	EW132A	2132DE	—	PDR120	1.15 (23)
14.4-15.35	EW132A	1132DC	UG-419/U, UG-541/U	CBR140, UBR140, PBR140	1.15 (23)
21.2-22	EW220	1220SC	UG-595/U, UG-596A/U	CBR220, UBR220, PBR220	1.15 (23)
22-23.6	EW220	1220SC	UG-595/U, UG-596A/U	CBR220, UBR220, PBR220	1.15 (23)

*Connector Types 290SC and 1220SC do not require tuning. The flaring tool kit described on page S10 is recommended for field assemblies.

**HELIAX® ELLIPTICAL WAVEGUIDE ACCESSORIES
AND RECTANGULAR WAVEGUIDE COMPONENTS**



A New Pre-Tuned Connectors from Andrew are recommended for field-fitted applications requiring low VSWR without field tuning. VSWR specifications listed on page S11 are typical for field assemblies. Type **204919** flaring tool kit, described below, is required to achieve the indicated VSWR specification for Type 190DEP-1 pre-tuned connector. Other pre-tuned connectors and frequency bands are available on request.

B Flaring Tool Kit. One each major and minor axis flaring tools produce consistent, high accuracy waveguide flares having a uniform contact area for optimum electrical performance. Especially recommended for field installation of pre-tuned connectors on premium waveguide.

For Waveguide Types	Type Number
EW52, EWP52	204897
EW63, EWP63	204677
EW90, EWP90	204919
EW127A, EWP127A	204960
EW132A, EWP132A	203809
EW180, EWP180	201439
EW220, EWP220	205127

C High-Power Flex-Twist and Flex (No Twist) for earth station antenna transmit applications.

D 90 Degree Step Twist, WR229, used to rotate the plane of polarization where space is limited.
CPR229G flange Type **65230-229**

Offset WR229 Waveguide Section. Spacing on 4 GHz dual polarized microwave antenna feeds does not allow direct connection of two EW34 connectors. Offset permits connection without use of flex section Type **201087**

Accessories for Types EW34, EW132A and EW220 elliptical waveguide are listed in the table on page S11. For descriptions of these components, refer to the indicated Catalog 32 pages.

Other HELIAX Accessories are described on pages 69-72 of Catalog 32.

HELIAX® ELLIPTICAL WAVEGUIDE ACCESSORIES AND RECTANGULAR WAVEGUIDE COMPONENTS

PRE-TUNED ELLIPTICAL WAVEGUIDE CONNECTORS

Connector Type No.	Frequency Band, GHz	Waveguide Type No.	Connector Mates with U.S.	Flange Types IEC	VSWR, max. (R.L., dB) up to 300 ft (90 m)
134DEP-1	3.7-4.2	EWP34	CPR229G	PDR40	1.09 (27)
137CEP-1	3.7-4.2	EWP37	CPR229G	PDR40	1.09 (27)
152DEP-1	5.925-6.425	EWP52	CPR159G	PDR58	1.07 (29)
252DEP-1	5.925-6.425	EWP52	CPR137G	PDR70	1.07 (29)
163DCP-1	6.525-6.875	EWP63	UG-343B/U, UG-344/U	CAR70, UAR70, PAR70	1.06 (30)
163DCP-2	6.425-7.125	EWP63	UG-343B/U, UG-344/U	CAR70, UAR70, PAR70	1.07 (29)
164DEP-1	7.125-7.750	EWP64	CPR137G	PDR70	1.07 (29)
177DCP-1	7.125-7.750	EWP77	UG-52B/U, UG-51/U	CBR84, UBR84, PBR84	1.07 (29)
177DCP-2	7.750-8.500	EWP77	UG-52B/U, UG-51/U	CBR84, UBR84, PBR84	1.07 (29)
177DEP-1	7.125-7.750	EWP77	CPR112G	PDR84	1.07 (29)
177DEP-2	7.750-8.500	EWP77	CPR112G	PDR84	1.07 (29)
190DEP-1	10.7-11.7	EWP90	CPR90G	PDR100	1.07 (29)

HIGH-POWER FLEX-TWIST AND FLEX (NO TWIST)

	Type Numbers		Average Power Rating Watts	
	WR137	WR75	WR137	WR75
Frequency Band, GHz	5.925-6.425	10.95-12.75		
Flanges	CPR137G	Choke or Cover		
Flex-Twist Type No.				
1 ft (0.3 m)	162047-12	—	3300	—
2 ft (0.6 m)	162047-24	—	3300	—
3 ft (0.9 m)	162047-36	—	3300	—
Flex (No-Twist) Type No.				
1 ft (0.3 m)	162048-12	162615-12	5300	1300
2 ft (0.6 m)	162048-24	162615-24	5300	1300
3 ft (0.9 m)	162048-36	162615-36	5300	1300

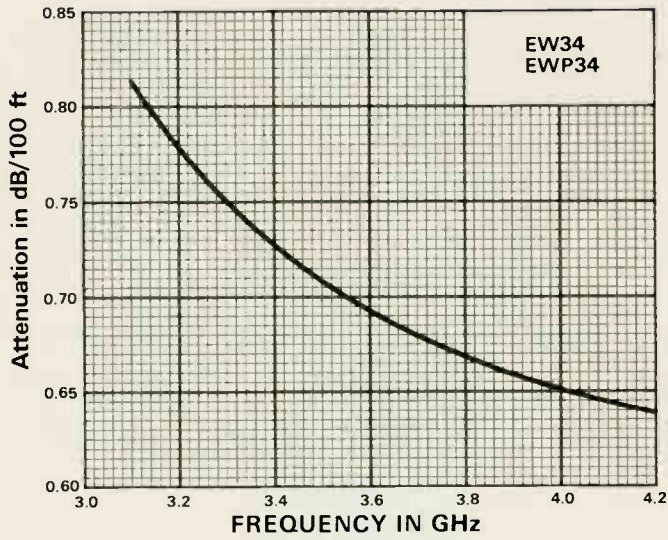
ACCESSORY ORDERING INFORMATION

	EW34*	EW132A	EW220	See Catalog 32 Page
Splice Connector	134DZ	1132DZ	1220Z	69
Waveguide Hanger Kit of 10	42396-15	31766-13	43211	70
Maximum Hanger Spacing	5 ft (1.5 m)	4 ft (1.2 m)	20 in (500 mm)	
Grounding Kit	40993A-20	40993A-12	40993A-12	69
Hoisting Grip	26985A	29958	43094	69
Bending Tool Kit	33586-11	33586-1	33586-1	69
Connector Reattachment Kit	33544-43	33544-39	33544-44	69
Single Entrance Wall/Roof Feed-Thru Assembly	35849-17	35849-11	35849-19	71

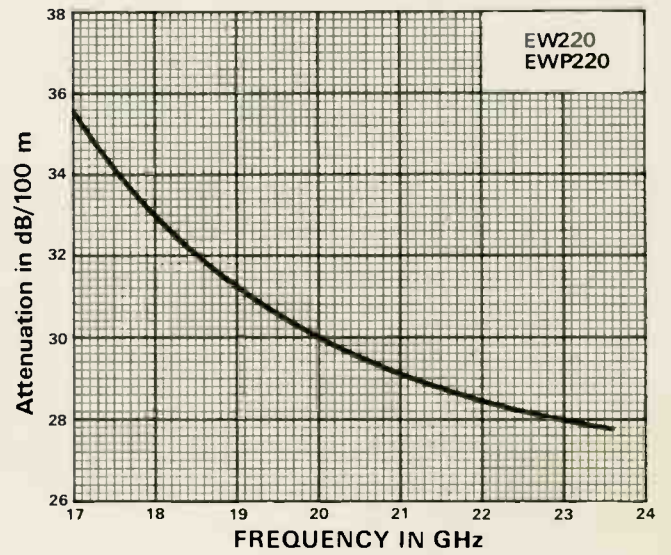
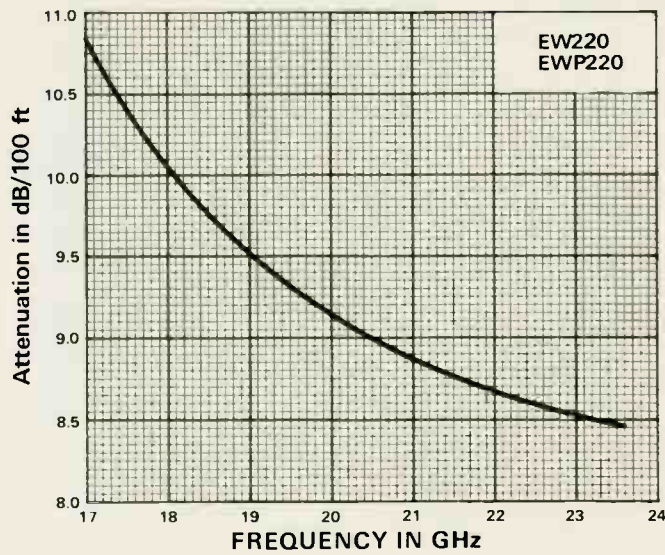
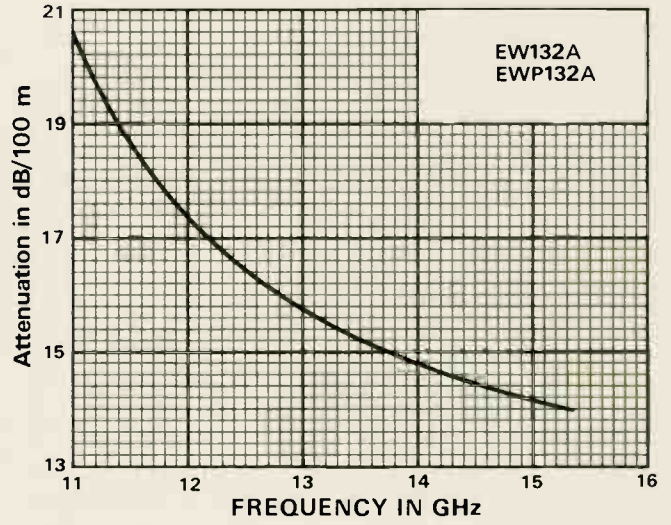
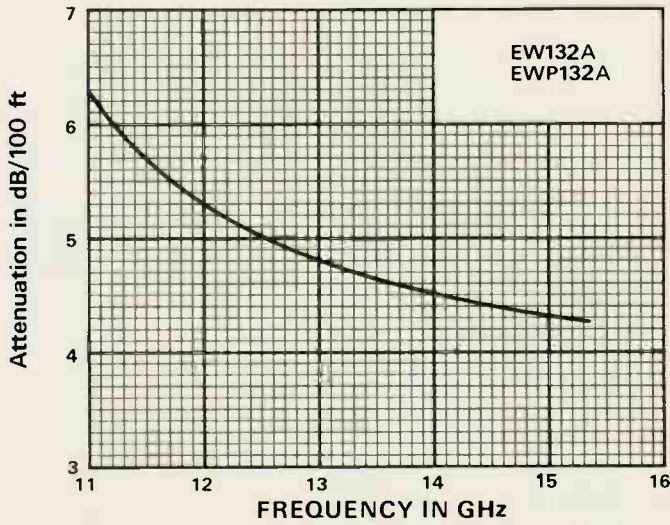
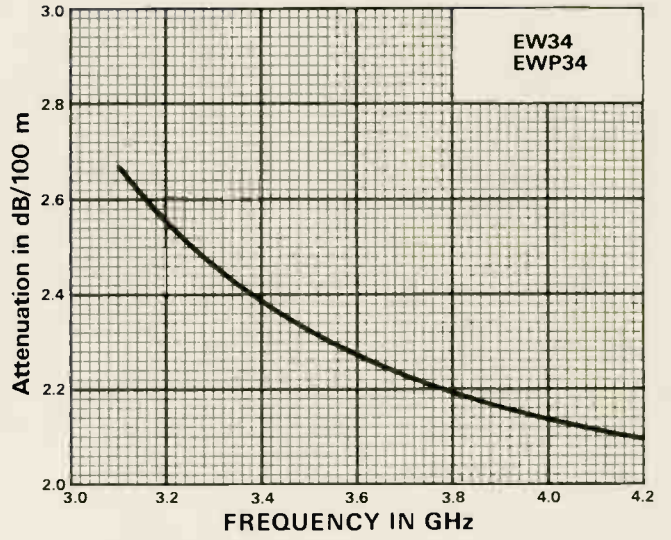
*Also see offset WR229 Waveguide section on page S10.

HELIAX® ELLIPTICAL WAVEGUIDE ATTENUATION

ENGLISH UNITS



METRIC UNITS



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

A WC109 to WR42 Circular-to-Rectangular Waveguide Transitions for 17.7–19.7 GHz mate with UG-596A/U, UG-595/U, CBR220, UBR220 and PBR220 flanges. Dual polarized. Includes termination load for single polarized use, alignment pins, flange hardware and pressure gaskets. Refer to Electrical Characteristics table. Other WC109 components are described on pages 74-79 of Catalog 32.

Top Transition Type 160516-177
 Bottom Transition Type 160515-177

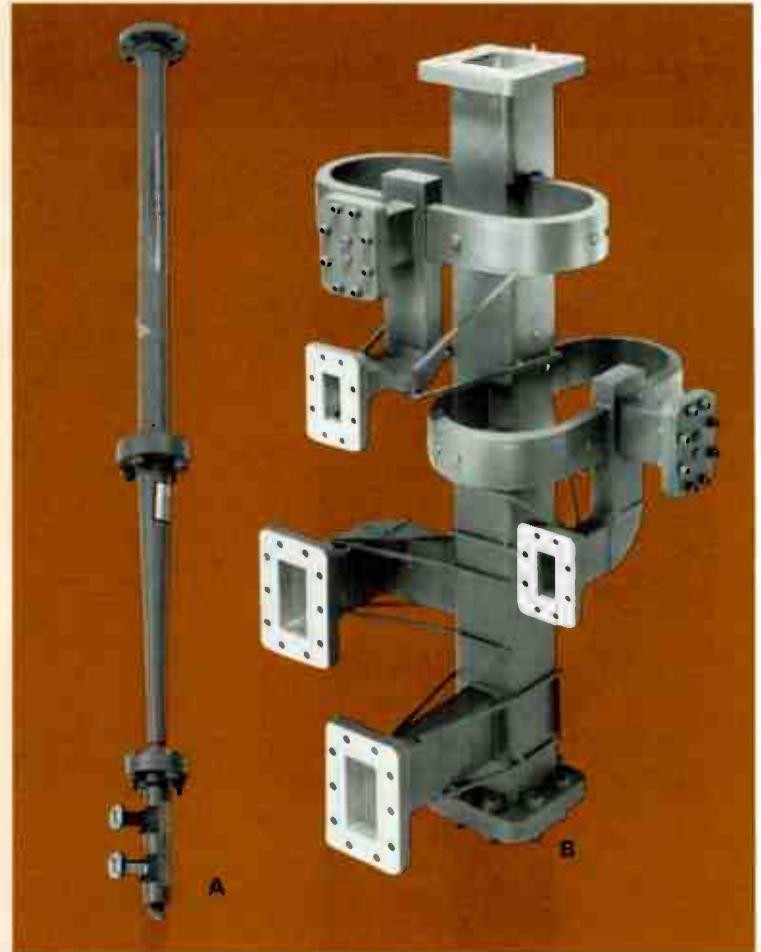
ELECTRICAL CHARACTERISTICS — 17.7-19.7 GHz

Waveguide Size	WC109
Attenuation* at 18.7 GHz, dB/100 ft (100 m)	1.12 (3.67)
Transition Attenuation (each end), dB maximum	0.17
Max. Assembly VSWR, up to 300 ft (90 m)	1.09
Cross Polarization Isolation, dB	30
Reconverted Mode Level, dB	
above 100 ft (30 m) lengths	55
40-100 ft (12-30 m) lengths	50
Average Power** at 18.7 GHz, kW	5.1

*Attenuation values are guaranteed not to exceed +5%.
 **Average Power based on 42°C (76°F) temperature rise over 40°C (104°F) ambient and VSWR of 1.0.

Angle Member Adaptor. For mounting circular waveguide sliding or spring/sliding hangers to angle or flat tower members up to 7/8 in (22 mm) thick. Replaces Type 31768A (Catalog 32, page 79) for this application Type 13555A.

B Compact 4-Port Combining Network provides simultaneous dual-frequency-band, dual-polarized operation with low VSWR, excellent frequency-band isolation and high polarization isolation. Use taper transitions to match combining network flange to circular waveguide run. Restrainer (see table) attaches combining network to tower slot angles for applications at bottom of circular waveguide run.



WC166 to WS108 Taper Transition . . . Type 205137
 WC281 to WS176 Taper Transition . . . Type 202559
 WC281 to WC166 Taper Transition . . . Type 69271
 WC281 to WC212 Taper Transition . . . Type 49545

COMPACT 4-PORT COMBINING NETWORKS

Type Number	49677	201759	205136
Frequency Bands	3.7-4.2 and 5.925-6.425	3.58-4.2 and 6.425-7.125	5.925-6.425 and 10.7-11.7
VSWR, max. (Return Loss, dB)	1.06 (30.7)	1.06 (30.7)	1.06 (30.7)
Insertion Loss, dB max.			
Low Band	0.15	0.15	0.15
High Band	0.40	0.40	0.40
Polarization Isolation, dB min.			
Low Band Ports	40	40	40
High Band Ports	40	40	40
Frequency Band Isolation, dB min.			
Low Band at High Band Ports	Below Cutoff	Below Cutoff	Below Cutoff
High Band at Low Band Ports	50	50	50
Flanges Mate with			
Circular or Square Waveguide	WC212	WS176	WS108
Low Band Ports	CPR229G, PDR40	CPR229G, PDR40	CPR137G, PDR70
High Band Ports	CPR137G, PDR70	CPR137G, PDR70	CPR90G, PDR100
Length, in (mm)	23 (584)	24 (610)	18.5 (470)
Weight, lb (kg)	25 (11.4)	25 (11.4)	14 (6.4)
Restrainer Type No.	49532-2	49532-4	49532-3

HYBRID T REFLECTOMETER



The Andrew hybrid T reflectometer is a unique and extremely accurate test instrument for measuring return loss or VSWR in waveguide systems. The reflectometer utilizes a precision hybrid T junction to separate the incident and reflected waves at the input of the system under test.

In addition to the reflectometer, a signal generator and equipment to detect and display the return loss or

VSWR is necessary. For information on operation of the Andrew hybrid T reflectometer, ask for Bulletin 37260.

To Order specify Type number from the table. A calibration load, a termination load and a carrying case are included.

Elliptical Waveguide Sliding Load. Terminates elliptical waveguide without use of a transition to rectangular waveguide (connector).

ELLIPTICAL WAVEGUIDE SLIDING LOADS

Waveguide Type	Type No.	Frequency Band, GHz	VSWR, Max (R.L., dB)
EW37	40502-37	3.4-4.2	1.052 (32)
EW44	40502-44	4.4-5.0	1.02 (40)
EW52	40502-52	5.925-6.425	1.02 (40)
EW63	40502-63	6.425-7.125	1.02 (40)
EW90	40502-90	10.5-11.7	1.02 (40)

ORDERING INFORMATION — HYBRID T REFLECTOMETERS

Frequency Band GHz	Waveguide Size		Type Number	Directivity Min dB	EIA*	Mates with Flange Types	
	EIA	IEC				U.S. Mil	IEC
1.7-2.110	WR430	R22	49000-430A-1	50	CPR430G	—	PDR22
1.9-2.3	WR430	R22	49000-430B-1	50	CPR430G	—	PDR22
2.45-2.75	WR340	R26	49000-340C-1	60	CPR340G	—	PDR26
2.9-3.5	WR284	R32	49000-284D-1	60	CPR284G	—	PDR32
3.4-4.2	WR229	R40	49000-229E-1	55	CPR229G	—	PDR40
3.7-4.2	WR229	R40	49000-229F-1	60	CPR229G	—	PDR40
4.4-5.0	WR187	R48	49000-187G-1	60	CPR187G	UG-148C/U UG-149A/U	CAR48, UAR48 PAR48, PDR48
5.925-6.425	WR159	R58	49000-159H-1	60	CPR159G	—	PDR58
5.925-6.425	WR137	R70	49000-137H-1	60	CPR137G	UG-343B/U UG-344/U	CAR70, UAR70 PAR70, PDR70
5.925-7.125	WR137	R70	49000-137J-1	60	CPR137G	UG-343B/U UG-344/U	CAR70, UAR70 PAR70, PDR70
5.925-7.750	WR137	R70	49000-137K-1	60	CPR137G	UG-343B/U UG-344/U	CAR70, UAR70 PAR70, PDR70
7.125-8.5	WR112	R84	49000-112L-1	60	CPR112G	UG-52B/U UG-51/U	CBR84, UBR84 PBR84, PDR84
10.5-11.7	WR90	R100	49000-90M-1	60	CPR90G	UG-40B/U UG-39/U	CBR100, UBR100 PBR100, PDR100
12.2-13.25	WR75	R120	49000-75N-1	60	—	WR75 choke and cover	CBR120, UBR120 PBR120
12.2-13.25	WR75	R120	205594-75N-1	60	—	—	PDR120
14.4-15.35	WR62	R140	49000-62P-1	60	—	UG-541A/U UG-419/U	CBR140, UBR140 PBR140

*Also mates with "F" suffix.

**TYPE R24 GUYED TOWER
CELLULAR RADIO PLATFORM**



TYPE R24 GUYED TOWER

Type R24 guyed tower is a 24 in (610 mm) face-width tower ideal for use in cellular radio station and light microwave requirements. In a typical application, the tower can support a cellular radio antenna platform with up to twelve omnidirectional antennas and two 6 ft (1.8 m) standard microwave antennas or two shielded 8 ft (2.4 m) antennas for microwave use only.

The triangular configuration features all bolted construction. The tower legs consist of 50 KSI yield strength steel plate formed into a 60° leg member. A single-laced bracing system is utilized in low shear areas while X-bracing is applied in heavy shear areas such as antenna and torque stabilizer mounting points. All bracing consists of Andrew patented formed diagonals.

The R24 can be equipped with the cellular radio antenna platform for mounting of omnidirectional and directional antennas while providing access for installation and adjustment. A photo of the R24 with platform is shown above.

Refer to Catalog 32, pages 86-90 for general information on GRASIS® guyed towers.

CELLULAR RADIO ANTENNA PLATFORM

The cellular radio antenna platform is available for use with guyed, self-supporting and monopole towers. The platform mounts up to twelve omnidirectional or directional cellular radio antennas. It provides a safe working environment for installation and adjustment of antennas. The platform consists of steel angles and channels connected by high strength bolts. All members and hardware are hot-dipped galvanized. The platform floor is steel grating. Maximum antenna spacing is 11.5 ft (3.5 m). This can be increased to 18 ft (5.5 m) by using retractable arms. Survival wind rating is 125 mph (200 km/h).

Cellular Radio Antenna Platform for use with tower types:

- R24 or monopole Type 348213
- LST, 3ST or M46 Type 348214

TYPE LST SELF-SUPPORTING TOWER



Type LST self-supporting tower is an economical, light-weight triangular tower ideal for cellular radio station applications and light duty microwave use. The tower is designed to support a cellular radio antenna platform plus up to two 8 ft (2.4 m) diameter standard microwave antennas or various combinations of microwave, mobile, or LPTV antennas.

STANDARD FEATURES

Fast, Easy Assembly and Erection. The LST has the lowest part count for any bolted tower in its class. Because it has fewer parts to assemble, the LST reduces installation costs and in-service time.

Tubular Legs. The LST utilizes high strength tubular legs for low wind resistance.

Flanged Leg Splices. Flanged leg splices simplify erection. All splices utilize A325 bolts designed to carry the maximum capacity of the tower leg.

Bracing consists of angular members in an "X" pattern for high strength and torsional rigidity.

Step-Bolt Climbing Devices. Standard LST towers include step bolts on one leg for climbing purposes.

OPTIONAL EQUIPMENT

Cellular Radio Antenna Platform. The LST can be equipped with the cellular radio platform described on page S15. The platform mounts up to twelve omnidirectional or directional antennas and provides a safe working environment for installation or adjustment of antennas.

Antenna Supports. Antenna supports for cellular radio, LPTV, VHF-TV and terrestrial microwave antennas are available as options. All standard supports clamp to the tower legs for easy installation. Supports for special antennas can be provided upon request.

Cable Supports. Cable supports can be provided for direct mounting of cable/waveguide clamps. Waveguide ladders are also available.

Coaxial Cable/Waveguide Bridges. Tower supported and pipe supported bridges are available for routing transmission line from the tower to the equipment shelter.

Epoxy Paint. Factory applied epoxy paint is available as an option for towers that require painting under U.S. FAA regulations.



STANDARD EQUIPMENT SHELTERS

Andrew offers two lines of equipment shelters for use in microwave, broadcast, cellular radio, military communications, telephone digital loop carrier systems, and other system applications.

PLASTIDOME® equipment shelters feature one-piece sandwich panel construction. The sandwich panel consists of two fiberglass reinforced polyester (FRP) skins with a foamed-in-place urethane core. These exceptionally strong shelters are highly weatherproof and provide excellent insulation.

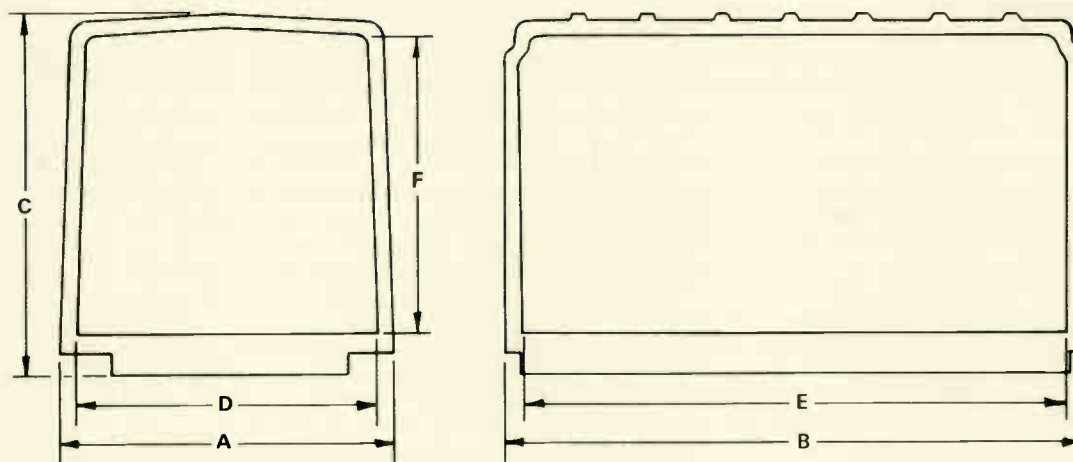
Concrete shelters combine the permanence of reinforced concrete construction with an aesthetically appealing appearance to offer the premier concrete transportable equipment shelter available.

Andrew's standard line of shelters and options are presented on the following pages S17-S21. The ordering information presented here replaces that given on Catalog 32 pages 97 and 99.

PRE-EQUIPPED SHELTERS

Andrew maintains a line of standard shelters that are pre-equipped with commonly requested options. These are available with short delivery times and are cost-effective choices for many applications. Contact your Andrew Sales Engineer for further information.

PLASTIDOME® SHELTERS



Basic PLASTIDOME Shelter includes the fiberglass-reinforced polyester (FRP) urethane sandwich panel dome, sandwich panel floor, floor tile, one 32 x 72 in (813 x 1829 mm) fiberglass door and a tie down kit. The basic electrical system and all options are ordered separately.

Options. Standard options are presented on pages S20 and S21. Other options are available on request. Contact your Andrew Sales Engineer for further information.

To Order. To order, specify the "basic shelter" type number and type numbers for all desired options.

ORDERING INFORMATION FOR PLASTIDOME SHELTERS

Basic Shelter Type No.	Outside Dimensions, ft (m)			Inside Dimensions, ft (m)			Weight lb (kg)	Basic Electrical System Type No.
	A	B	C	D	E	F		
GES68-(*)-28	6.0 (1.83)	8.0 (2.44)	9.2 (2.80)	5.4 (1.65)	7.4 (2.26)	8.0 (2.44)	1300 (530)	368016-43-1
GES810-(*)-28	8.0 (2.44)	10.0 (3.05)	9.2 (2.80)	7.4 (2.26)	9.4 (2.87)	8.0 (2.44)	2000 (907)	368016-43-2
GES810-(*)-29	8.0 (2.44)	10.0 (3.05)	10.5 (3.20)	7.4 (2.26)	9.4 (2.87)	9.2 (2.80)	2200 (998)	368016-43-3
GES812-(*)-29	8.0 (2.44)	12.0 (3.65)	10.5 (3.20)	7.4 (2.26)	11.4 (3.48)	9.2 (2.80)	2700 (1225)	368016-43-4
GES814-(*)-28	8.0 (2.44)	14.0 (4.27)	9.2 (2.80)	7.4 (2.26)	13.4 (4.09)	8.0 (2.44)	3000 (1361)	368016-43-5
GES816-(*)-29†	8.0 (2.44)	16.0 (4.88)	10.5 (3.20)	7.4 (2.26)	15.4 (4.70)	9.2 (2.80)	3600 (1633)	368016-43-6
GES1016-(*)-29†	10.0 (3.05)	16.0 (4.88)	10.5 (3.20)	9.4 (2.87)	15.4 (4.70)	9.2 (2.80)	4500 (2041)	368016-43-7
GES1020-(*)-29†	10.0 (3.05)	20.0 (6.09)	10.5 (3.20)	9.4 (2.87)	19.4 (5.91)	9.2 (2.80)	5700 (2575)	368016-43-8
GES1024-(*)-29†	10.0 (3.05)	24.0 (7.31)	10.5 (3.20)	9.4 (2.87)	23.4 (7.13)	9.2 (2.80)	6900 (3130)	368016-43-9
GES1216-(*)-29†	12.0 (3.66)	16.0 (4.87)	10.5 (3.20)	11.4 (3.48)	15.4 (4.70)	9.2 (2.80)	5500 (2495)	368016-43-10
GES1224-(*)-29†	12.0 (3.66)	24.0 (7.31)	10.5 (3.20)	11.4 (3.48)	23.4 (7.13)	9.2 (2.80)	8200 (3720)	368016-43-11
GES1232-(*)-29†	12.0 (3.66)	32.0 (9.75)	10.5 (3.20)	11.4 (3.48)	31.4 (9.57)	9.2 (2.80)	10900 (4944)	368016-43-12

*For "end" door specify "A". For "side" door (centered) specify "B".

†Side doors to the left and right of center are also available upon request.

Basic Concrete Shelter includes the shelter with an exposed aggregate finish, one 36 x 80 in (914 x 2032 mm) steel door and a field installation kit. The basic electrical system and all options are ordered separately.

and S21. Other options are available on request. Contact your Andrew Sales Engineer for further information.

To Order. To order, specify the "basic shelter" type number and type numbers for all desired options.

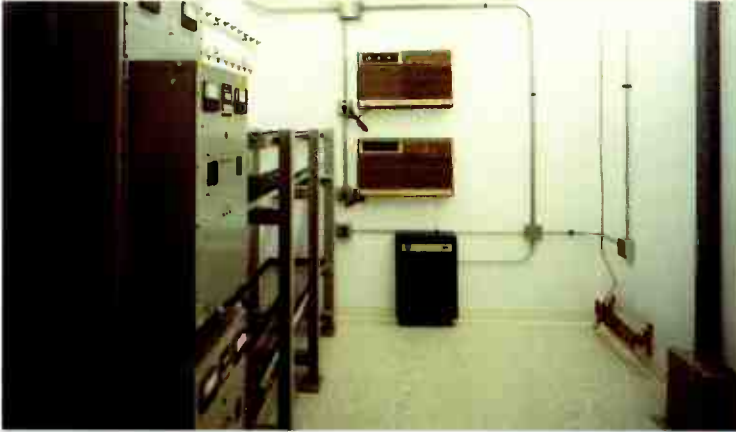
Options. Standard options are presented on pages S20

ORDERING INFORMATION FOR CONCRETE SHELTERS

Basic Shelter Type No.	Outside Dimensions, ft (m)			Inside Dimensions, ft (m)			Weight lb (kg)	Basic Electrical System Type No.
	Width	Length	Height	Width	Length	Height		
FCS68-(*)-28	6.0 (1.83)	8.0 (2.44)	8.0 (2.44)	5.3 (1.61)	7.3 (2.22)	7.0 (2.13)	10380 (4672)	368016-41-1
FCS810-(*)-28	8.0 (2.44)	10.0 (3.05)	9.0 (2.74)	7.3 (2.22)	9.3 (2.83)	8.0 (2.44)	17320 (7856)	368016-41-2
FCS810-(*)-29	8.0 (2.44)	10.0 (3.05)	10.0 (3.05)	7.3 (2.22)	9.3 (2.83)	9.0 (2.74)	18710 (8487)	368016-41-3
FCS812-(*)-28	8.0 (2.44)	12.0 (3.66)	9.0 (2.74)	7.3 (2.22)	11.3 (3.44)	8.0 (2.44)	19900 (9026)	368016-41-4
FCS812-(*)-29	8.0 (2.44)	12.0 (3.66)	10.0 (3.05)	7.3 (2.22)	11.3 (3.44)	9.0 (2.74)	21450 (9730)	368016-41-5
FCS814-(*)-28	8.0 (2.44)	14.0 (4.27)	9.0 (2.74)	7.3 (2.22)	13.3 (4.05)	8.0 (2.44)	22560 (10233)	368016-41-6
FCS814-(*)-29	8.0 (2.44)	14.0 (4.27)	10.0 (3.05)	7.3 (2.22)	13.3 (4.05)	9.0 (2.74)	24260 (11004)	368016-41-7
FCS816-(*)-28	8.0 (2.44)	16.0 (4.88)	9.0 (2.74)	7.3 (2.22)	15.3 (4.66)	8.0 (2.44)	25080 (11340)	368016-41-8
FCS816-(*)-29	8.0 (2.44)	16.0 (4.88)	10.0 (3.05)	7.3 (2.22)	15.3 (4.66)	9.0 (2.74)	26950 (12224)	368016-41-9
FCS1012-(*)-29	10.0 (3.05)	12.0 (3.66)	10.0 (3.05)	9.3 (2.83)	11.3 (3.44)	9.0 (2.74)	24950 (11317)	368016-41-10
FCS1014-(*)-29	10.0 (3.05)	14.0 (4.27)	10.0 (3.05)	9.3 (2.83)	13.3 (4.05)	9.0 (2.74)	28030 (12714)	368016-41-11
FCS1016-(*)-29	10.0 (3.05)	16.0 (4.88)	10.0 (3.05)	9.3 (2.83)	15.3 (4.66)	9.0 (2.74)	31110 (14111)	368016-41-12
FCS1020-(*)-29	10.0 (3.05)	20.0 (6.09)	10.0 (3.05)	9.3 (2.83)	19.3 (5.88)	9.0 (2.74)	37390 (16960)	368016-41-13
FCS1024-(*)-29	10.0 (3.05)	24.0 (7.31)	10.0 (3.05)	9.3 (2.83)	23.3 (7.10)	9.0 (2.74)	43430 (19700)	368016-41-14
FCS1212-(*)-29	12.0 (3.66)	12.0 (3.66)	10.0 (3.05)	11.3 (3.44)	11.3 (3.44)	9.0 (2.74)	23990 (10882)	368016-41-15
FCS1216-(*)-29	12.0 (3.66)	16.0 (4.88)	10.0 (3.05)	11.3 (3.44)	15.3 (4.66)	9.0 (2.74)	35080 (15876)	368016-41-16
FCS1220-(*)-29	12.0 (3.66)	20.0 (6.09)	10.0 (3.05)	11.3 (3.44)	19.3 (5.88)	9.0 (2.74)	41990 (19046)	368016-41-17
FCS1224-(*)-29	12.0 (3.66)	24.0 (7.31)	10.0 (3.05)	11.3 (3.44)	23.3 (7.10)	9.0 (2.74)	48890 (22176)	368016-41-18
FCS1228-(*)-29	12.0 (3.66)	28.0 (8.53)	10.0 (3.05)	11.3 (3.44)	27.3 (8.32)	9.0 (2.74)	55810 (25315)	368016-41-19

* For "end" door specify "A". For "side" door specify "B".

EQUIPMENT SHELTERS



OPTIONAL EQUIPMENT

Standard options, including door options, structural options, environmental control equipment options, a Basic Electrical System, and electrical equipment options are presented in the following tables. Other options are available on request.

S20

DOOR OPTIONS

PLASTIDOME®

Description	Dimensions	Type No.
Fiberglass Doors		
Standard	32 x 72 in (813 x 1829 mm)	362170
Bullet Resistant	32 x 72 in (813 x 1829 mm)	362172
Optional	36 x 81 in (914 x 2057 mm)	322200-1
Bullet Resistant	36 x 81 in (914 x 2057 mm)	362202
Steel Door	36 x 84 in (914 x 2133 mm)	367981-84
Open Door Alarm	—	367959-7
Dead Bolt Lock	—	367978-20
Hydraulic Door Closer	—	367991-8

Concrete Shelter

Description	Type No.
Additional Steel Door 36 x 80 in (914 x 2032 mm)	367981-72
Open Door Alarm	367959-8
Lock Guard	379890-12
Hydraulic Door Closer	367991-8

STRUCTURAL OPTIONS

PLASTIDOME

Ice Shielding, Roof	Finished Openings
Bullet Resistance, .22 caliber long rifle, 100 ft (30 m)	PVC Entries
Ohio Compliance Certification	Cable Guides
Color Change (from white)	Partitions
	Partition Door

Concrete Shelters

Floor Tile	Partitions
Insulate and Finish	Partition Door
Waveguide Openings	

BASIC ELECTRICAL SYSTEM FOR 100 AMP, SINGLE PHASE SERVICE

AC power entrance elbow, 1-1/4 in, which rotates 360 degrees

Sixteen circuit load center with 100 amp main breaker and eight breakers

125 volt, 20 amp convenience outlets

Fluorescent interior lights with switch

One exterior light with 100 watt bulb and switch

One air conditioner receptacle, 20 amp

Order from the tables on pages S18 and S19. A 200 amp, single phase system is also available on request.

OPTIONAL ELECTRICAL EQUIPMENT

Description	Type No.	Description	Type No.
Overhead Power Entry	368016-12	Wall-Mounted Insulated Ground Bar 1/4 x 4 x 20 in (6 x 100 x 500 mm)	367964-14
Exterior Light Photocell	D22480	1/4 x 1 x 12 in (6 x 25 x 300 mm)	367964-13
Short Range Lighting and Ventilation System Timer	D23110	Grounding Systems for PLASTIDOME	
Exterior Light Timer	367961-1	Halo Perimeter Grounding	367956-74
100A, 240V Manual Transfer Switch	366250-8	Equipment Ground Drop	367956-75-1
200A, 240V Manual Transfer Switch	366250-15	External Ground Drop	367956-75-2
240V, 60A DPST Fused Safety Switch	366250-10	Cable Tray/Equipment Grounding	367956-75-3
240V, 100A, DPST Fused Safety Switch	366250-5	Grounding Systems for Concrete Shelters	
240V, 200 DPST Fused Safety Switch	366250-43-2	Halo Perimeter Gounding	367956-72
240V Surge Arrestor	367989-13	Equipment Ground Drop	367956-73-1
120/240V Surge Arrestor	367989-11	External Ground Drop	367956-73-2
120V Surge Arrestor	367989-14	Cable Tray/Equipment Grounding	367956-73-3
60A Auxiliary Generator Receptacle	366960-26		
100A Auxiliary Generator Receptacle	366969-24		
120V Exterior GFI Receptacle	366200-22		

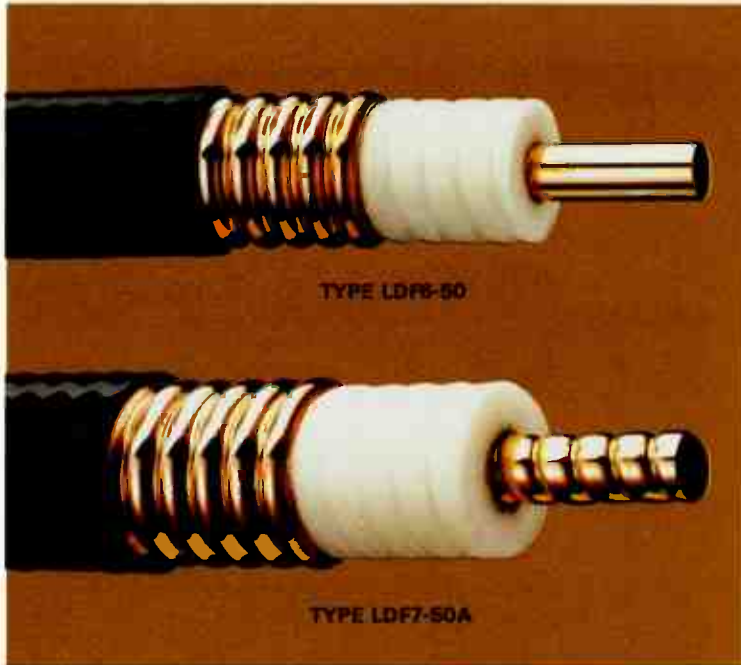
ENVIRONMENTAL CONTROL EQUIPMENT*

Description	Type No.	Description	Type No.
Air Conditioners for PLASTIDOME		Forced Air Heating Systems	
5800 BTU, 115V, 6A	367000	1500W, 240V	367983-27
7800 BTU, 115V, 9A	367300-25-1	3000W, 208V	367983-28
9500 BTU, 115V, 12A	367300-25-3	4000W, 240V	367983-29
9500 BTU, 230/208V, 6A	367100	Ventilation Systems for PLASTIDOME†	
11,400 BTU, 230/208V, 9A	367300-25-6	650 cfm (18.4 cmm)	368022-1
16,800 BTU, 230/208V, 9A	367300-25-8	1000 cfm (28.3 cmm)	368022-3
22,900 BTU, 230/208V, 16A	367300-25-10	Ventilation Systems for Concrete Shelters†	
Air Conditioners for Concrete Shelters		650 cfm (18.4 cmm)	368022-18-1
5800 BTU, 115V, 6A	367300-25-12	1000 cfm (28.3 cmm)	368022-18-2
7800 BTU, 115V, 9A	367300-25-2	Exhaust Fans with Damper and Rainhood	
9500 BTU, 115V, 12A	367300-25-4	650 cfm (18.4 cmm)	368022-9
9500 BTU, 230/208V, 6A	367300-25-5	1000 cfm (28.3 cmm)	368022-11
11,400 BTU, 230/208V, 9A	367300-25-7	Motorized Louvers with Rainhoods	
16,800 BTU, 230/208V, 9A	367300-25-9	12 x 12 in (305 x 305 mm)	367979-47
22,900 BTU, 230/208V, 16A	367300-25-11	14 x 26 in (355 x 660 mm)	367978-48
Baseboard Heating Systems		Thermostats	
500W, 120V	368022-4	Single Stage	E21590
750W, 120V	367220	High-Low Temperature Alarm	367959-9
1000W, 120V	367230	Remote Bulb	E21570
1000W, 240V	367983-24		
Rainhood for Air Conditioner		*Requires Basic Electrical System.	
Single A/C with Screen	367966-24	† Ventilation systems include an exhaust fan with damper, motorized louvers, rainhood with filter, rainhood with screen, single stage ther- mostat, and finished openings.	
Double A/C with Screen	367966-25		

MISCELLANEOUS OPTIONS

Description	Type No.	Description	Type No.
Smoke Detector	E21595	Ceiling Support Brackets Use one every 6 ft (1.8 m)	367954-67
Fire Extinguisher		Tee Junction for Cable Ladder	367954-58
Dry, 5 lb	367968-10	Wireway, 4 x 4 in, 5 ft section	367974-39
Dry, 9 lb	367968-30	90° Elbow	367974-12
Carbon Dioxide, 5 lb	367968-28	Tee Section	367974-21
Carbon Dioxide, 10 lb	367968-29	Closing Plates	367974-2
Emergency Lights	366176-13		
PLASTIDOME Repair Kit	362391		
Cable Ladder, 12 in (305 mm) wide	367954-17		

1-1/4" AND 1-5/8" FOAM-DIELECTRIC CABLE



These low-loss HELIAX® foam-dielectric cables are designed for efficient performance in long-run fixed station installations, HF receiving stations and 2 GHz microwave antenna systems. Type LDF6-50 is a new 1-1/4" size. Type LDF7-50A replaces Type LDF7-50 (Catalog 32, pages 60 and 124). It is a new improved version with lower attenuation.

Low-VSWR versions for use in microwave systems are listed in the table. Tested and selected cables for cellular radio systems are described on page S26.

When used with L46 connectors (except L46F), LDF6-50 provides a pressure path through the tubular inner conductor, thereby making it suitable for use with air-dielectric feed antennas.

Special versions of cable Types LDF5-50A and LDF7-50A are available to meet MIL-C-28830.

To Order. Specify cable type number, connector type numbers and cable length in feet or metres. For low VSWR cable, specify frequency band.

CHARACTERISTICS

Standard Cable Type No. Low VSWR Cable Type No.	LDF6-50 LDF6P-50	LDF7-50A LDF7P-50A
DESCRIPTION		
Nominal Size	1-1/4"	1-5/8"
Impedance, ohms	50	50
Outer Conductor	Copper	Copper
ELECTRICAL CHARACTERISTICS		
Maximum Frequency, GHz	3.3	2.5
Velocity, percent	89	88
Peak Power Rating, kW	90	145
Attenuation	Refer to page S24	
Average Power Rating	Refer to page S24	
MECHANICAL CHARACTERISTICS		
Diameter over Jacket, in (mm)	1.6 (40)	2.0 (50)
Minimum Bending Radius, in (mm)	15 (380)	20 (508)
Cable Weight, lb/ft (kg/m)	0.66 (0.98)	0.92 (1.36)
Shipping Information	†	‡
LOW VSWR CABLE		
VSWR Max * <i>Specify Frequency Band</i>		
1427 — 1535 MHz	1.15	1.15
1700 — 1900 MHz	1.15	1.15
1850 — 1990 MHz	1.15	1.15
1990 — 2110 MHz	1.15	1.15
2110 — 2200 MHz	1.15	1.15
1700 — 2110 MHz	1.15	1.15
1900 — 2300 MHz	1.15	1.15
2300 — 2700 MHz	1.20	—

* Guaranteed maximum for factory assemblies; typical for field-fitted assemblies.

† Lengths from 5 to 90 ft (2-25 m) are shipped in cartons. Lengths from 90 to 1000 ft (25-300 m) are shipped on disposable reels. Longer lengths are shipped on returnable, deposit type reels.

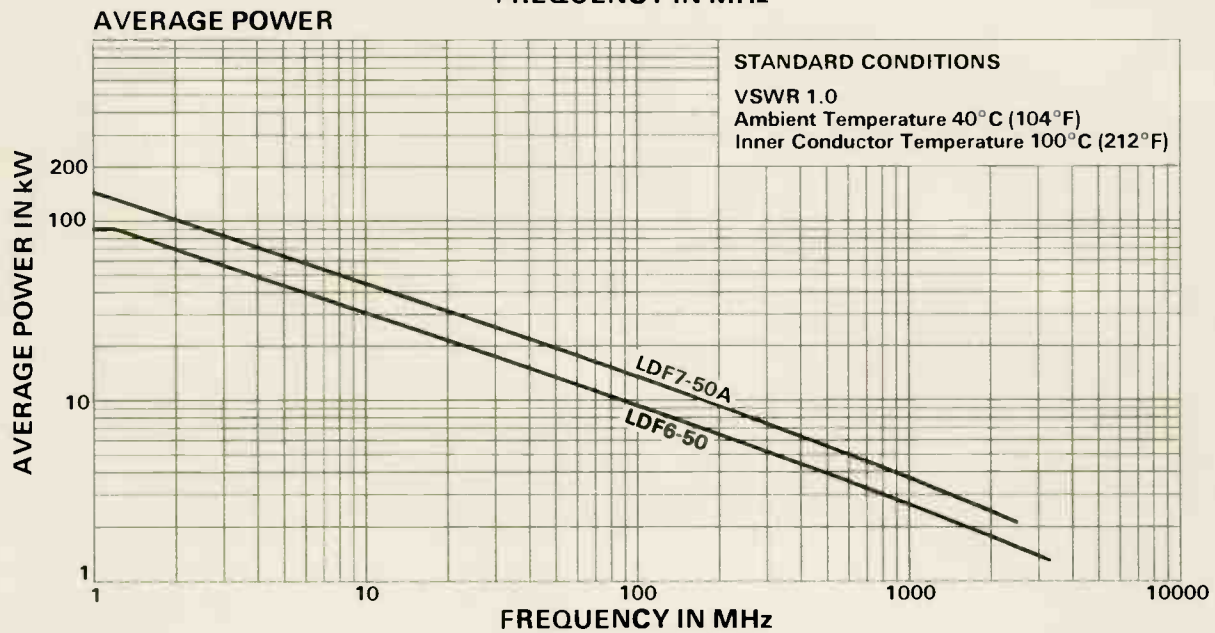
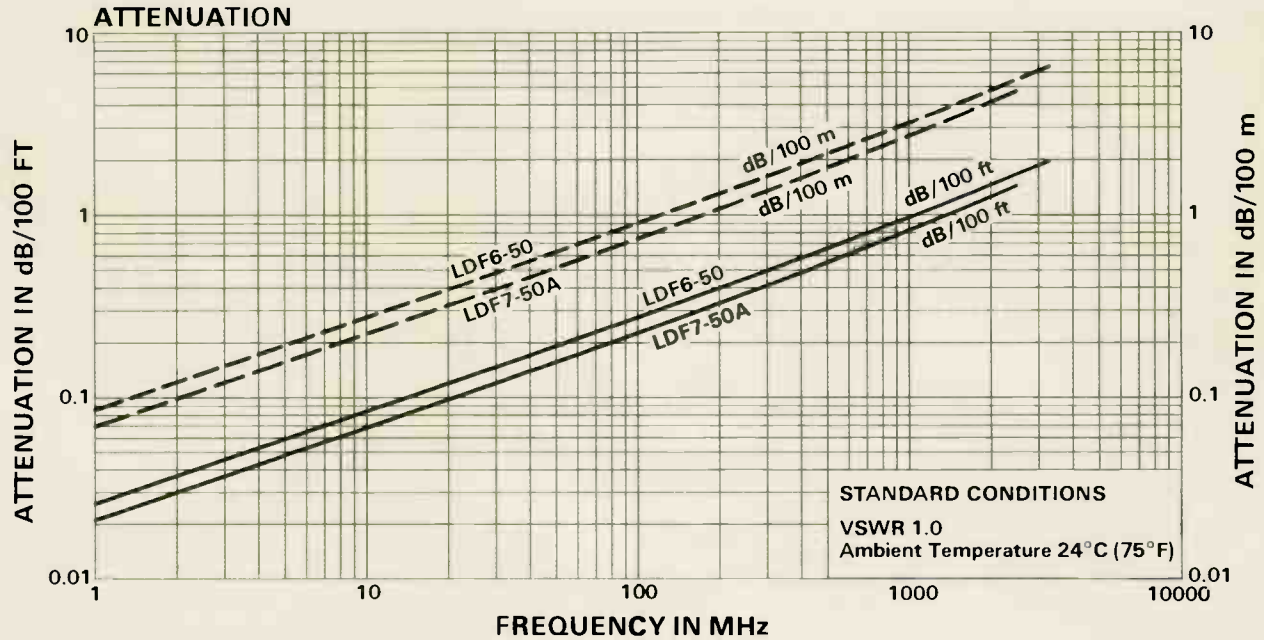
‡ Refer to Catalog 32 pages 203-205. LDF7-50 information applies.



CONNECTOR TYPE NUMBERS

	Interface	For 1-1/4" LDF6-50	For 1-5/8" LDF7-50A
A	1-5/8" EIA Flange, Not pressure tight, includes inner connector	L46R	L47R
B	7/8" EIA Flange, includes inner connector and pressure port for pressurization of antenna feed	L46S	—
C	Male "F" Flange for attachment to "F" series antennas	L46F	L47F
D	Female "F" Flange for Connection to jumper cable (see page S26)		201942
E	N Plug (Male), Mates with UG-23	L46W	—
F	N Jack (Female), Mates with UG-21	L46N	L47N
G	LC Plug (Male), Mates with UG-352	L46M	L47M
H	LC Jack (Female), Mates with UG-154	L46L	L47L
J	7/16 DIN Male	L46DM	L47DM
K	7/16 DIN Female	L46DF	L47DF
L	Splice	L46Z	L47Z
M	1-5/8" End Terminal, for strap connection to center conductor, includes inner connector. Use with Type L46R or L47R	2061	2061
N	1-5/8" Gas Barrier, for connecting Type L46R or L47R to pressurized line, includes inner connector	1261B	1261B

**HELIAX® COAXIAL CABLE
ATTENUATION AND AVERAGE POWER RATINGS**



TYPE LDF6-50

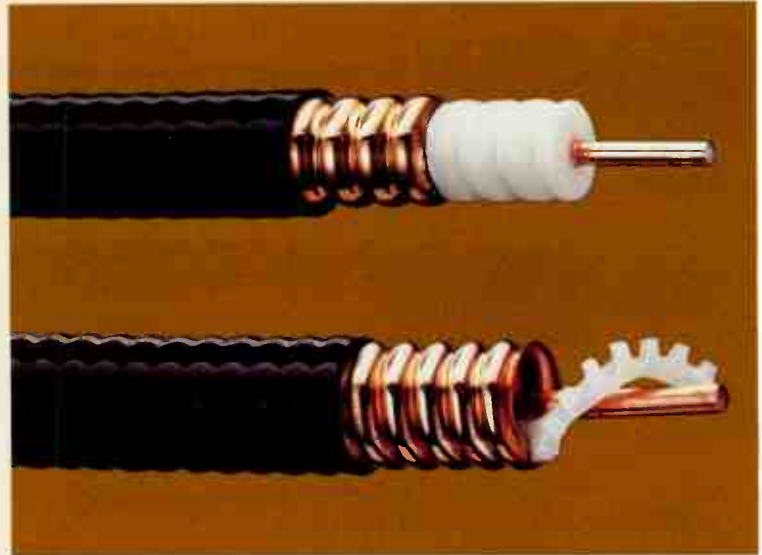
TYPE LDF7-50A

Frequency MHz	Attenuation dB/100 ft (dB/100 m)	Average Power, kW
1	0.026 (0.086)	90
2	0.037 (0.122)	68.9
10	0.084 (0.275)	30.5
30	0.147 (0.481)	17.4
50	0.191 (0.627)	13.4
100	0.275 (0.901)	9.30
150	0.340 (1.12)	7.50
200	0.397 (1.30)	6.43
450	0.617 (2.02)	4.14
800	0.851 (2.79)	3.00
1000	0.967 (3.17)	2.64
1500	1.22 (4.02)	2.08
2000	1.45 (4.77)	1.76
2500	1.66 (5.45)	1.53

Frequency MHz	Attenuation dB/100 ft (dB/100 m)	Average Power, kW
1	0.021 (0.069)	143
2	0.030 (0.098)	101
10	0.068 (0.223)	44.5
30	0.120 (0.393)	25.3
50	0.156 (0.513)	19.3
100	0.225 (0.740)	13.4
150	0.280 (0.920)	10.8
200	0.328 (1.08)	9.22
450	0.515 (1.69)	5.87
800	0.718 (2.36)	4.21
1000	0.819 (2.69)	3.69
1500	1.05 (3.43)	2.89
2000	1.25 (4.10)	2.42
2500	1.44 (4.72)	2.10

Andrew offers HELIAX 75-ohm coaxial cables in 1/4", 1/2" and 7/8" foam-dielectric sizes and 7/8" and 1-5/8" air-dielectric sizes. Type LDF4-75A is an improved version of Type LDF4-75 described on page 122 of Catalog 32. Characteristics are presented in the table. For more detailed information, ask for the following bulletins:

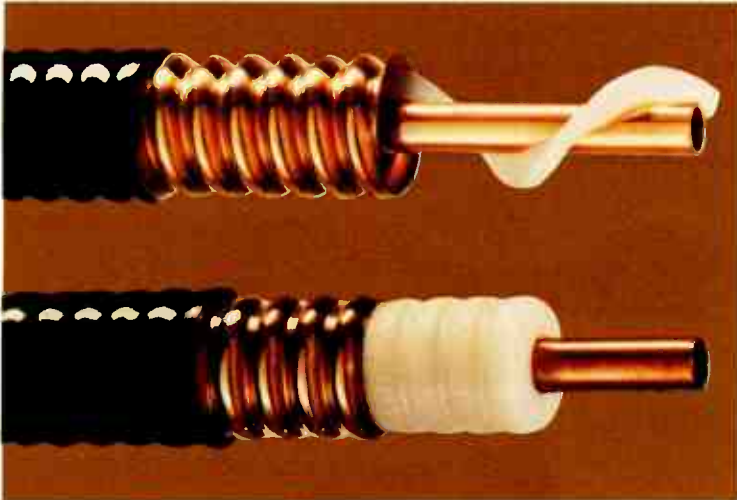
- Bulletin 1109 Type FHJ5-75
- Bulletin 1115 Type HJ5-75
- Bulletin 1118 Type HJ7-75
- Bulletin 1259 Type LDF4-75A
- Bulletin 1290 Type FSJ1-75



CHARACTERISTICS

	Type FSJ1-75	Type LDF4-75A	Type FHJ5-75	Type HJ5-75	Type HJ7-75
DESCRIPTION					
Nominal Size	1/4"	1/2"	7/8"	7/8"	1-5/8"
Dielectric Type	Foam Superflexible	LDF Foam	Foam	Air	Air
Impedance, ohms	75	75	75	75	75
ELECTRICAL CHARACTERISTICS					
Maximum Frequency GHz	24.4	10	4.9	5.6	3.0
Attenuation, dB/100 ft (dB/100 m)					
1 MHz	0.180 (0.591)	0.060 (0.197)	0.038 (0.123)	0.035 (0.115)	0.016 (0.052)
10 MHz	0.57 (1.87)	0.192 (0.629)	0.123 (0.403)	0.117 (0.384)	0.057 (0.187)
100 MHz	1.85 (6.07)	0.623 (2.04)	0.428 (1.40)	0.390 (1.28)	0.200 (0.656)
1000 MHz	6.5 (21.3)	2.14 (7.02)	1.75 (5.74)	1.29 (4.23)	0.710 (2.33)
2000 MHz	9.7 (31.8)	3.17 (10.4)	2.82 (9.24)	1.92 (6.30)	1.09 (3.58)
Average Power Rating, kW					
1 MHz	3.3	13.0	29.0	29.0	98.0
10 MHz	1.6	4.70	11.5	14.3	55.0
100 MHz	0.49	1.45	3.30	4.30	15.5
1000 MHz	0.142	0.421	0.808	1.29	4.3
2000 MHz	0.095	0.284	0.502	0.85	2.85
MECHANICAL CHARACTERISTICS					
Diameter over Jacket, in (mm)	0.30 (7.6)	0.64 (16)	1.1 (28)	1.11 (28.2)	1.98 (50.3)
Min. Bending Radius, in (mm)	1 (25)	5 (125)	10 (250)	10 (250)	20 (510)
CONNECTORS					
N Plug, 50 ohm Mating Pin	41SW	L44W-75	—	—	—
N Plug, 70 ohm Mating Pin	41SW-70	L44W-70	—	—	—
N Jack, 50 ohm Mating Pin	—	L44N-75	45AN-75	75AN-75	—
N Jack, 70 ohm Mating Pin	41SN-70	L44N-70	—	—	—
UHF Plug	41SP	L44P-75	—	—	—
UHF Jack	—	L44U-75	—	75AU-75	—
7/8" EIA Flange	—	—	—	75AR-75	—
1-5/8" EIA Flange	—	—	—	—	77AR-75
TNC Plug	41SWT-75	—	—	—	—

HELIAX® COAXIAL CABLES FOR CELLULAR RADIO SYSTEMS



HELIAX coaxial cables are ideal for use in cellular radio systems. The cables on this page are specially tested and selected for use in the 825-890 MHz band. Use of these cables assures optimum performance for cellular radio applications. Connectors, accessories, and all electrical and mechanical specifications for the similar standard cables (see table) apply. Reference pages are listed in the table.

Female "F" Flange for Type 42151A-18 (or LDF7-50A) 1-5/8" foam-dielectric cable. Use with jumper cable having "F" flange (Male) connectors for complete void-free antenna feeder system Type **201942**

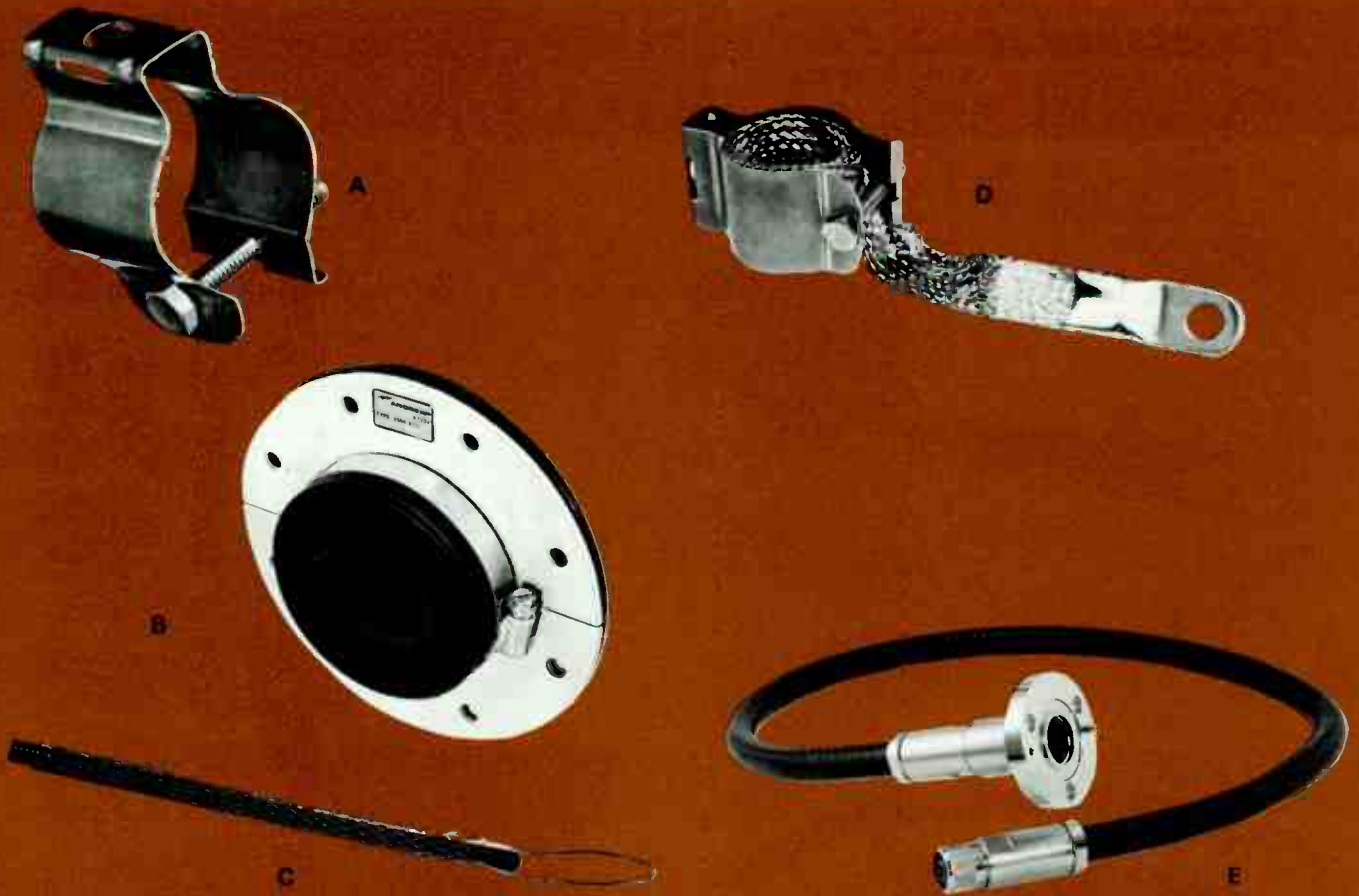
"F" Flange Elbow. "F" (Male) and "F" (Female) flanges Type **203361**

HELIAX COAXIAL CABLES FOR 825-890 MHz

Cable Type Nominal Size	Foam Dielectric Cables				Air Dielectric Cables	
	1/2"	7/8"	1-1/4"	1-5/8"	7/8"	1-5/8"
Order Type Number	43818-41	42150B-48	205360	42151A-18	25831-3	25816A-31
Similar to Standard Cable	LDF4-50A	LDF5-50A	LDF6-50	LDF7-50A	HJ5-50	HJ7-50A
Attenuation, dB/100 ft (100 m)						
825 MHz	2.10 (6.90)	1.17 (3.85)	0.87 (2.84)	0.73 (2.40)	1.14 (3.75)	0.63 (2.05)
890 MHz	2.19 (7.19)	1.22 (4.02)	0.91 (2.97)	0.76 (2.51)	1.19 (3.91)	0.65 (2.14)
Reference Pages, Catalog 32 Supplement	122, 123	124, 125	— S22-S27	— S22, S23	130, 131	132, 133

HELIAX JUMPER CABLES FOR 825-890 MHz

Cable Type	Connectors	Length ft (m)	Attenuation at 890 MHz, dB	Type No.
FOR ANTENNA CONNECTION				
1/2" LDF Foam	N Plug (Male)/N Plug (Male)	3 (0.91)	0.1	39816-100
1/2" LDF Foam	N Plug (Male)/N Plug (Male)	6 (1.82)	0.2	39816-96
1/2" LDF Foam	N Plug (Male)/N Plug (Male)	10 (3.04)	0.3	39816-97
1/2" LDF Foam	"F" Flange (Male)/"F" Flange (Male)	3 (0.91)	0.1	39816-101
1/2" LDF Foam	"F" Flange (Male)/"F" Flange (Male)	6 (1.82)	0.2	39816-102
1/2" LDF Foam	"F" Flange (Male)/"F" Flange (Male)	10 (3.04)	0.3	39816-103
1/2" Superflexible	N Plug (Male)/N Plug (Male)	3 (0.91)	0.1	39818A-240
1/2" Superflexible	N Plug (Male)/N Plug (Male)	6 (1.82)	0.2	39818A-241
1/2" Superflexible	N Plug (Male)/N Plug (Male)	10 (3.04)	0.4	39818A-208
7/8" Air Dielectric	7/8" EIA, 50 ohm/7/8" EIA, 50 ohm	7.33 (2.23)	0.1	48148
FOR EQUIPMENT ROOM CONNECTIONS				
1/2" LDF Foam	N Plug (Male)/N Plug (Male)	15 (4.57)	0.4	39816-104
1/2" LDF Foam	N Plug (Male)/N Plug (Male)	20 (6.09)	0.5	39816-105
1/2" LDF Foam	N Plug (Male)/N Plug (Male)	25 (7.62)	0.6	39816-106
1/2" LDF Foam	N Plug (Male)/N Plug (Male)	30 (9.14)	0.7	39816-107
1/2" Superflexible	N Plug (Male)/N Plug (Male)	15 (4.57)	0.5	39818A-209
1/2" Superflexible	N Plug (Male)/N Plug (Male)	20 (6.09)	0.7	39818A-210
1/2" Superflexible	N Plug (Male)/N Plug (Male)	25 (7.62)	0.9	39818A-211
1/2" Superflexible	N Plug (Male)/N Plug (Male)	30 (9.14)	1.0	39818A-212



ACCESSORIES FOR TYPE LDF6-50 1-1/4" HELIAX COAXIAL CABLE

- A **Hanger Kit** of 10 pieces. Stainless steel. Maximum spacing 3 ft (1 m). 3/8" mounting hardware not included Type **42396-1**
- B **Wall/Roof Feed Thru**. Molded rubber boot construction Type **40656-5**
- C **Hoisting Grip**. Use at 200 ft (60 m) intervals to raise cable on tower Type **24312A**
- D **Grounding Kit**. Used to ground cable to tower Type **40993A-1**

Connector Reattachment Kit includes rubber gasket parts (except flange gaskets) to replace those which may be damaged during disassembly and subsequent reattachment of connectors Type **34767A-43**

Additional accessories are described on Catalog 32 pages 138 and 141.

ACCESSORIES FOR TYPE LDF7-50A 1-5/8" HELIAX COAXIAL CABLE

LDF7-50A uses the same accessories as LDF7-50. Refer to Catalog 32, pages 138-141.

OTHER ACCESSORIES

- E **Low VSWR HELIAX 1/2" Foam-Dielectric Jumper Assemblies** for use in ITFS and MMDS systems. Additional assemblies are listed on Catalog 32, pages 60, 118 and 119.

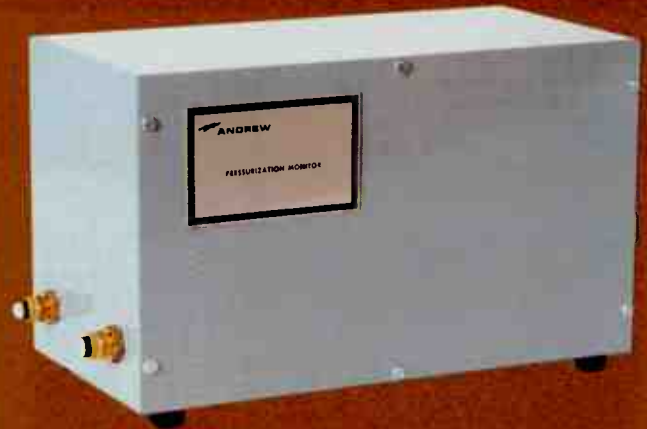
LOW VSWR HELIAX JUMPER ASSEMBLIES

Type No.	Frequency MHZ	Length ft (m)	Attenuation dB	VSWR Max.
7/8" EIA, 50-ohm Flange/N Plug (Male) Connectors				
202638-3	2500-2700	3 (0.9)	0.14	1.10
202638-6	2500-2700	6 (1.8)	0.28	1.10

PRESSURIZATION EQUIPMENT



1920E Dehydrator



40004B Pressurization Monitor

Type 1920E Series Automatic Dehydrators automatically regenerate the desiccant, eliminating down time and assuring output of uniform dryness. Two adsorption drying chambers are alternately cycled every thirty seconds. While one chamber is drying the air passing through it, the other chamber is being purged of accumulated moisture. Replaces 1920D series described on pages 106, 108 and 109 of Catalog 32.

Pressurization Monitor, activates Form C dry contacts for remote warning light or alarm (not supplied) when pressure is less than 1.5 lb/in² (10 kPa) or higher than 10 lb/in² (70 kPa), or when relative humidity in the system reaches 10%. Types 40004B-5 and -6 replace Types 40004A-5 and -6 described on page 111 of Catalog 32 and include a timer which activates contacts in case of excessive dehydrator operation. Order from table below.

DEHYDRATOR CHARACTERISTICS — 1920E SERIES

Type Number		
120V, 60 Hz		1920E
120V, 50 Hz		1921E
230V, 50 Hz		1924E
Power consumption, watts		
Operating		840
Standby		10
Output Capacity, ft ³ /min (l/min)		
60 Hz units		1.3 (36)
50 Hz units		1.1 (31)
Ambient Inlet Temperature	0° to 32°C (32° to 90°F)	
Ambient Humidity, percent		95
Output Dew Point, below		-40°C (-40°C)
Output Connection		1/8" pipe thread
Output Tubing		20 ft (6 m) of 3/8"
Net weight, lb (kg)		80 (36)
Shipping Weight, lb (kg)		90 (41)
Dimensions, H x W x D, in		14 x 18.5 x 14.5
	(mm)	(355 x 470 x 370)
Spare Parts Kit for 1920E and 1921E		1923E
Spare Parts Kit for 1924E		1923E-2

PRESSURIZATION MONITOR ORDERING INFORMATION

Type	40004A	40004A-2	40004A-3	40004A-4	40004B-5	40004B-6
Low Pressure Sensor (1.5 lb/in ²)	X	X	X	X	X	X
High Pressure Sensor (10 lb/in ²)	X	X	X	—	—	X
Humidity Sensor (10% RH)	X	X	—	—	—	X
High Pressure Relief (10 lb/in ²)	—	—	—	—	X	—
Dehydrator Timer	—	—	—	—	X	X
Voltage	120V, 60 Hz	230V, 50 Hz	—	—	120V, 60 Hz	120V, 60 Hz

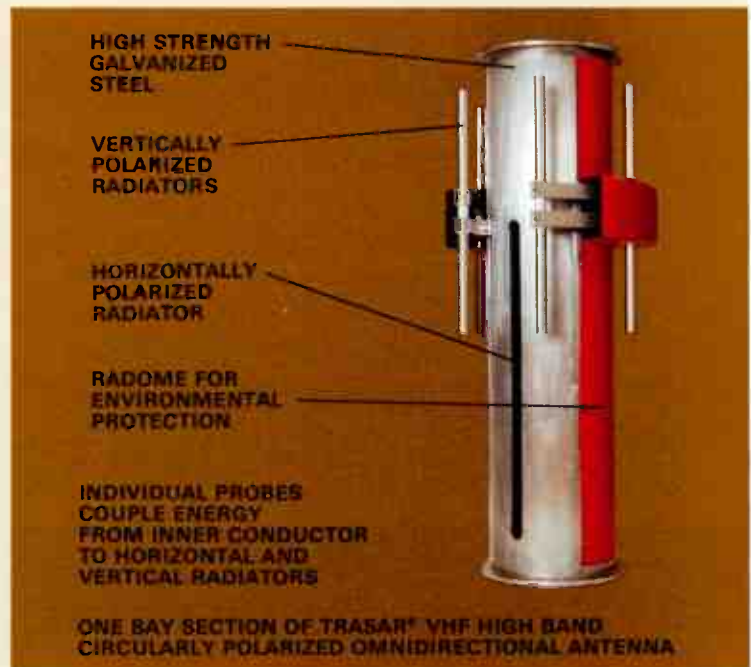
TRASAR® VHF-TV and UHF-TV TRANSMITTING ANTENNAS

Andrew has recently introduced an expanded line of TRASAR UHF-TV and VHF-TV Transmitting Antennas. All feature the field-proven TRASAR traveling-wave, slotted array with radome environmental protection. The TRASAR design permits very close control of both azimuth and elevation patterns for optimum, null-free radiation performance. The following general antenna types are now available. Radiation patterns and detailed electrical and mechanical specifications are available on request.

New V-Series VHF-TV Transmitting Antennas combine the advantages of circular polarization with Andrew's field proven traveling-wave, slotted array design for outstanding VHF-TV performance and reliability. Available models include 12 and 16 bay omnidirectional antennas for U.S. FCC channels 7-13. Axial ratio is 2.0 dB; circularity is ± 1.5 dB; input is 6-1/8" EIA, 50 or 75 ohm, 100 kW. VSWR is 1.05 at the visual carrier and 1.10 or better across the channel. For further information ask for Andrew Bulletin 1359.

Circular Polarized, Dual Polarized and Partial Vertically Polarized H-Series UHF-TV Antennas are new from Andrew. Medium and high gain versions are available. Side mount antennas have cardioid or peanut azimuth patterns. Top mount antennas have omnidirectional, cardioid or peanut patterns.

New S-Series and G-Series Linearly Polarized Medium Power UHF-TV antennas are described on page S30 of this Supplement.



Linear, Horizontally Polarized, H-Series UHF-TV Antennas. These antennas are described on pages 148 and 149 of Catalog 32. For greater detail, ask for Andrew Bulletin 1083J. Medium and high gain versions are available. Side mount antennas have cardioid, peanut, butterfly or trilobe (new) azimuth patterns. Top mount antennas have omnidirectional, cardioid, peanut or trilobe (new) patterns.

ELECTRICAL CHARACTERISTICS FOR VHF-TV ANTENNAS

Antenna Type No.	Beam Tilt, deg.	First Null Fill, Percent	Power Gain Each Polarization	Input Power kW†
ATW12V2E-CTO-(*)	0.5	17	6.0 (7.78 dBd)	100
ATW12V3E-CTO-(*)	0.75	17	6.0 (7.78 dBd)	100
ATW12V4E-CTO-(*)	1.00	17	6.0 (7.78 dBd)	100
ATW16V2E-CTO-(*)	0.5	17	8.0 (9.03 dBd)	100
ATW16V3E-CTO-(*)	0.75	17	8.0 (9.03 dBd)	100
ATW16V4E-CTO-(*)	1.00	17	8.0 (9.03 dBd)	100

*Specify Channel Number

† Peak Visual + 20% Aural, Single 6-1/8" feed, 50 or 75 ohm (specify).

MECHANICAL CHARACTERISTICS FOR VHF-TV ANTENNAS‡

Channel Number	Number of Bays	Antenna Height, ft (m)	Antenna Weight, lbs (kg)	Windload (Shear) lb (N)	Overturning Moment, ft-lb (N·m)
7	12	72.90 (22.22)	11,575 (5,250)	5,387 (23,961)	180,690 (244,979)
13	12	62.78 (19.13)	7,367 (3,341)	4,639 (20,634)	134,005 (181,684)
7	16	94.68 (28.85)	21,193 (9,612)	6,997 (31,122)	304,786 (413,228)
13	16	80.88 (24.65)	12,678 (5,751)	5,977 (26,585)	222,414 (362,548)

‡ Information for channels 8-12 available on request.

TRASAR® MEDIUM-POWER UHF-TV TRANSMITTING ANTENNAS



The medium power S and G series UHF-TV transmitting antennas listed below are suitable for applications ranging from primary antenna use to emergency and standby installations. The traveling-wave slotted array design produces broad elevation patterns, high reliability and dependable service.

All antennas are fully protected by a radome from icing and corrosion.

Emergency Antennas. Andrew stocks 4-gain, side mount antennas for all UHF-TV channels and can typically ship an emergency antenna from Upland, California, within 48 hours.

Input. The standard input is a 6-1/8" EIA, 75-ohm which determines the antenna's power handling capability. A 50-ohm input is also available on request.

Maximum VSWR Rating is 1.05 for the visual carrier and 1.10 across the band.

Additional Information. Ask for Bulletin 1297B for Top Mount (S-Series) Antennas and Bulletin 1351 for Side Mount (G-Series) Antennas.

TOP-MOUNT (S-SERIES) ANTENNAS

	Omnidirectional	Cardioid
Type Number	ATW25S(**)-HTO-(*)	ATW25S(**)-HTC-(*)
Peak Power Gain (dBd)	25 (13.98)	59 (17.70)
Power Gain at Horizontal (dBd)		
0.5° Beamtilt	20.0 (13.01)	47.8 (16.79)
0.75° Beamtilt	15.2 (11.82)	35.0 (15.55)
1.0° Beamtilt	10.9 (10.37)	25.7 (14.09)
Input Power, kW (dBk), Peak Visual +20% Aural		
Channel 14	80 (19.03)	80 (19.03)
Channel 69	56 (17.48)	56 (17.48)

SIDE-MOUNT (G-SERIES) ANTENNAS

	4-Gain	16-Gain	32-Gain	48-Gain	60-Gain
Type Number	ATW2G1-HSS-(*)	ATW8G4-HSS-(*)	ATW16G3-HSS-(*)	ATW24G(**)-HSS-(*)	ATW30G(**)-HSS-(*)
Pattern	Skull	Skull	Skull	Skull	Skull
Peak Power Gain (dBd)	4 (6.02)	16 (12.04)	32 (15.05)	48 (16.81)	60 (17.78)
Power Gain at Horizontal (dBd)					
No Beamtilt	3.97 (5.99)	—	—	—	—
0.5° Beamtilt	—	—	—	—	45.14 (16.57)
0.75° Beamtilt	—	—	28.28 (14.51)	35.92 (15.55)	38.75 (15.28)
1.00° Beamtilt	—	15 (11.76)	—	26.28 (14.19)	18.86 (12.74)
1.25° Beamtilt	—	—	—	—	9.6 (9.8)
1.50° Beamtilt	—	—	—	—	3.75 (5.74)
Input Power, kW (dBk), Peak Visual +20% Aural					
Channel 14	80 (19.03)	80 (19.03)	80 (19.03)	80 (19.03)	80 (19.03)
Channel 69	56 (17.48)	56 (17.48)	56 (17.48)	56 (17.48)	56 (17.48)

* Specify UHF-TV Channel Number.

** Specify 2 for 0.5°, 3 for 0.75°, 4 for 1.0°, 5 for 1.25°, or 6 for 1.50° Beamtilt.

Andrew introduces a new series of high performance transmitting antennas for the 2500-2700 MHz Instructional Television Fixed Service (ITFS) and Multichannel Multipoint Distribution Service (MMDS) band. These antennas replace the 2500-2700 MHz transmitting antennas on page 152 of Catalog 32. For detailed information, including radiation patterns and mechanical specifications, ask for Bulletin 1056C.

Beamtilt of 0.5° is standard. Other beamtilts are available on request.

Null Fill. Values other than the standard amount are available on special order.

Input Power rating is 400 watts.

Radome. Antennas are equipped with a full pressurized fiberglass radome for environmental protection.

Wind Survival. Antennas will withstand a 112 mph (180 km/h) wind without damage.

Pressurization. Antennas should be operated under dry air or gas pressure up to 10 lb/in² (70 kPa) maximum.

Guaranteed Performance. Every antenna is fully tested before shipment, including VSWR sweep test and pressure check.



TRANSMITTING ANTENNA ELECTRICAL CHARACTERISTICS

Antenna Type No.	Polarization	Azimuth Pattern Type	Elevation Pattern No.	Beamtilt Degrees	Gain, dBi at 2600 MHz	VSWR Max.**	Input Type
TOP MOUNT ANTENNAS							
HMD8HO-(*)	Horizontal	Omnidirectional	HMD8EL	0.5	11	1.25	7/8" EIA, 50 ohm
HMD12HO-(*)	Horizontal	Omnidirectional	HMD12EL	0.5	13	1.25	7/8" EIA, 50 ohm
HMD16HO-(*)	Horizontal	Omnidirectional	HMD16EL	0.5	14	1.25	7/8" EIA, 50 ohm
HMD8VO-(*)	Vertical	Omnidirectional	HMD8EL	0.5	11	1.25	7/8" EIA, 50 ohm
HMD12VO-(*)	Vertical	Omnidirectional	HMD12EL	0.5	13	1.25	7/8" EIA, 50 ohm
HMD16VO-(*)	Vertical	Omnidirectional	HMD16EL	0.5	14	1.25	7/8" EIA, 50 ohm
SIDE MOUNT ANTENNAS							
HMD8HC-(*)	Horizontal	Cardioid	HMD8EL	0.5	14	1.25	7/8" EIA, 50 ohm
HMD12HC-(*)	Horizontal	Cardioid	HMD12EL	0.5	16	1.25	7/8" EIA, 50 ohm
HMD16HC-(*)	Horizontal	Cardioid	HMD16EL	0.5	17	1.25	7/8" EIA, 50 ohm
HMD24HC-(*)	Horizontal	Cardioid	HMD24EL	0.5	19	1.25	7/8" EIA, 50 ohm
HMD32HC-(*)	Horizontal	Cardioid	HMD32EL	0.5	20	1.25	7/8" EIA, 50 ohm
HMD8VC-(*)	Vertical	Cardioid	HMD8EL	0.5	14	1.25	7/8" EIA, 50 ohm
HMD12VC-(*)	Vertical	Cardioid	HMD12EL	0.5	16	1.25	7/8" EIA, 50 ohm
HMD16VC-(*)	Vertical	Cardioid	HMD16EL	0.5	17	1.25	7/8" EIA, 50 ohm
HMD24VC-(*)	Vertical	Cardioid	HMD24EL	0.5	19	1.25	7/8" EIA, 50 ohm
HMD32VC-(*)	Vertical	Cardioid	HMD32EL	0.5	20	1.25	7/8" EIA, 50 ohm

*Insert ITFS Group Letter or W:

A = 2500 – 2542 MHz C = 2548 – 2590 MHz E = 2596 – 2638 MHz G = 2644 – 2686 MHz W = Extra cost wide band option 2500 – 2686 MHz
 B = 2506 – 2548 MHz D = 2554 – 2596 MHz F = 2602 – 2644 MHz H = 2650 – 2680 MHz

**Over 50 MHz bandwidth for "A" – "H" suffix antennas. For "W" suffix (wide band) antenna VSWR is 1.35 max.

3-1/8", 4-1/16" AND 6-1/8" RIGID COAXIAL LINES



Andrew's new 3-1/8", 4-1/16" and 6-1/8", 50 ohm rigid coaxial lines feature an exclusive field proven inner conductor design which compensates for differential expansion between the inner and outer conductors. Mechanical wear from sliding contacts is eliminated. The result is extremely long life.

Maximum VSWR is 1.02 per component and 1.07 per system. Optimized systems having 1.05 maximum VSWR across the operating channel are also available.

SUPPORT SYSTEM

Rigid Hanger. Attaches and secures the transmission line at the top of the run.

Line Size	Quantity Required
3-1/8"	One for every 500 ft (150 m)
4-1/16"	One for every 500 ft (150 m)
6-1/8"	One for every 1000 ft (300 m)

Spring Hanger. Supports the transmission line, prevents lateral motion and accommodates differential expansion and contraction. Use at 10 ft (3 m) intervals.

Lateral Brace. For bottom of vertical run. Prevents lateral motion.

50-OHM RIGID LINE COMPONENTS

	3-1/8" ACX350	4-1/16" ACX450	6-1/8" ACX650
Straight Sections			
20 ft flanged	ACX350-1-(*)	ACX450-1-(*)	ACX650-1-(*)
20 ft flanged one end	ACX350-4-(*)	ACX450-4-(*)	ACX650-4-(*)
20 ft unflanged	ACX350-5-(*)	ACX450-5-(*)	ACX650-5-(*)
19.75 ft flanged	ACX350-2-(*)	ACX450-2-(*)	ACX650-2-(*)
19.5 ft flanged	ACX350-3-(*)	ACX450-3-(*)	ACX650-3-(*)
90° Reinforced Mitre Elbow	ACX350-10-(*)	ACX450-10-(*)	ACX650-10-(*)
Gas Barrier	ACX350-16-(*)	ACX450-16-(*)	ACX650-16-(*)
Inner Connector	ACX350-20-(*)	ACX450-20-(*)	ACX650-20-(*)
Fixed Field Flange	ACX350-28	ACX450-28	ACX650-28
Swivel Field Flange	ACX350-27	ACX450-27	ACX650-27
Hardware Kit	ACX350-21	ACX450-21	ACX650-21
Rigid Hanger	ACX350-13	ACX450-13	ACX650-13
Vertical Spring Hanger	ACX350-11	ACX450-11	ACX650-11
Lateral Brace	ACX350-14	ACX450-14	ACX650-14
3-Point Suspension Hanger	ACX350-12	ACX450-12	ACX650-12
Horizontal Anchor	ACX350-15	ACX450-15	ACX650-15

*Specify Television Channel No. or Frequency.

3-Point Suspension Hanger. For horizontal run. Accommodates vertical movement caused by differential expansion and contraction of the vertical run.

Horizontal Anchor. For attaching line to entry wall.

COMPONENTS

Straight Sections are available in standard lengths of 20 ft, 19-3/4 ft and 19-1/2 ft, depending on channel applications. Special lengths are also available. Standard flanged sections include EIA standard flanges on both ends, one inner connector, "O" ring and hardware.

90° Reinforced Mitre Elbow. Heavy duty construction, unequal leg, flanged. Includes one inner connector, "O" ring and hardware.

Gas Barrier. Fixed male inner connectors both ends. May be used as a gas inlet.

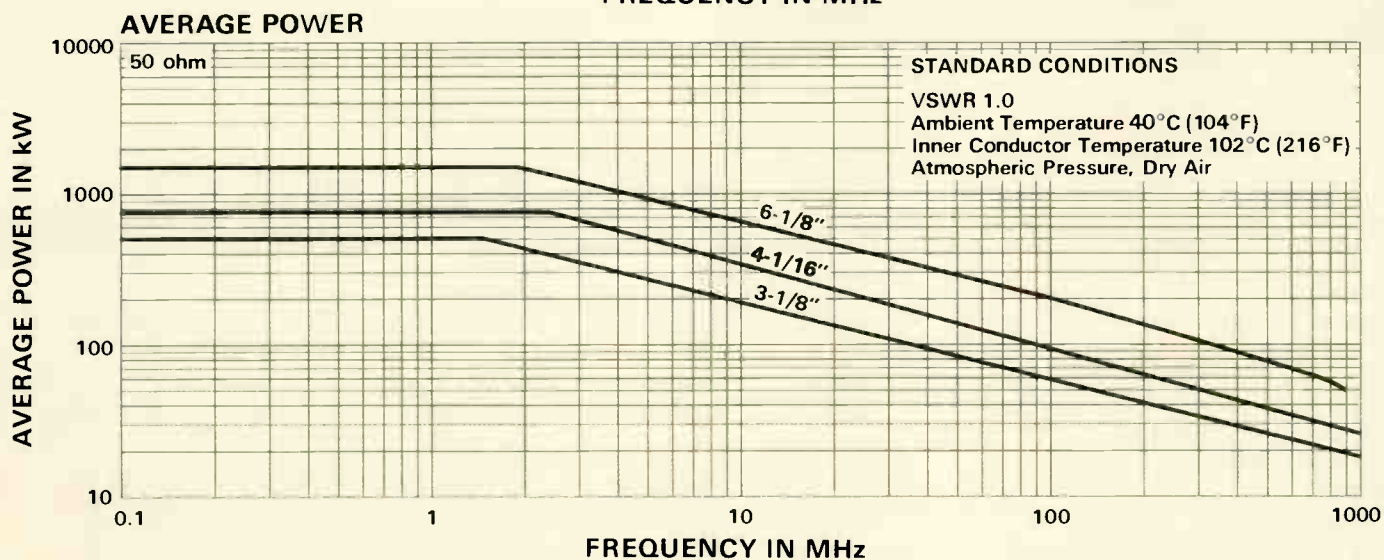
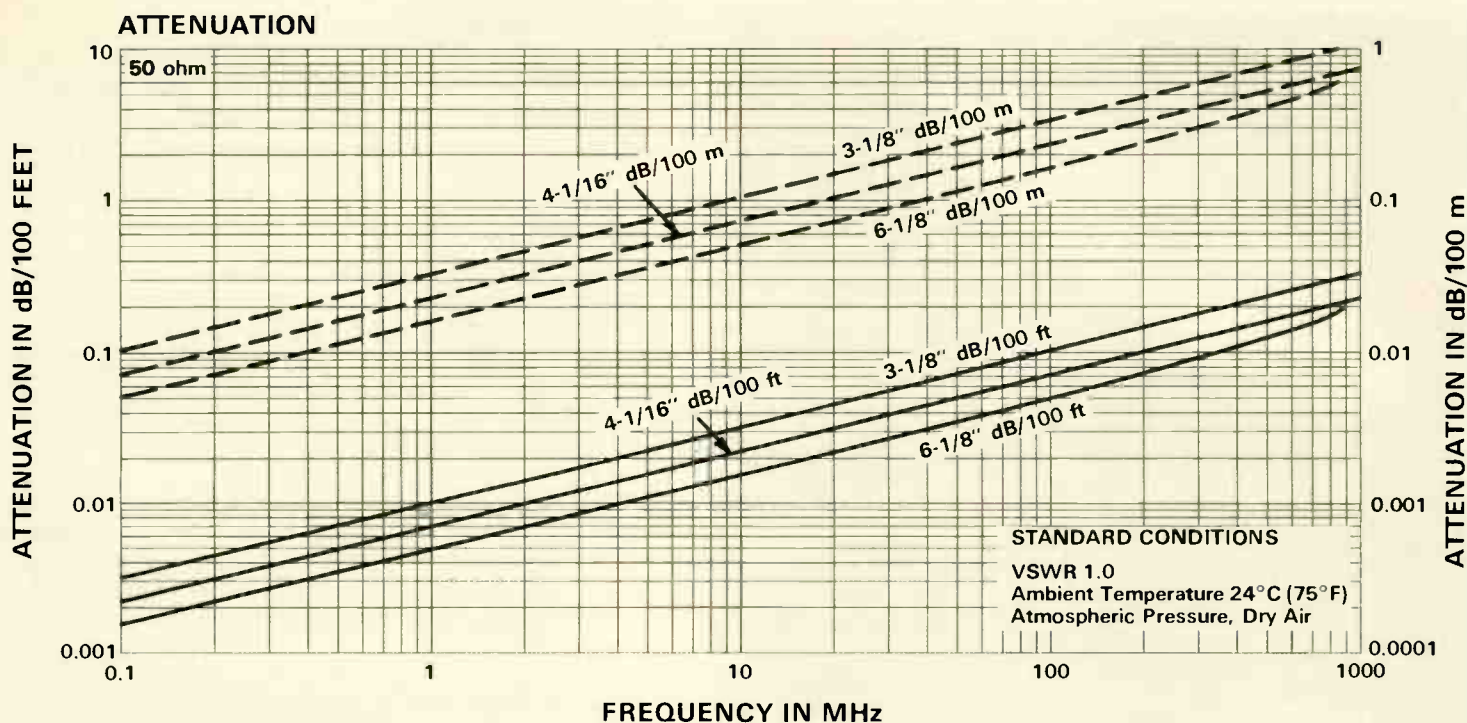
Inner Connector. Silver plated. Teflon disk insulator.

Additional Components. Associated rigid lines and components are described on Catalog 32 pages 156-163.

CHARACTERISTICS

	3-1/8"	4-1/16"	6-1/8"
Type No.	ACX350	ACX450	ACX650
Impedance, 50 ohm	50	50	50
Max. Frequency, MHz	1588	1197	788
Velocity, percent	99.8	99.7	99.7
Peak Power Rating, kW	500	750	1500
Outer Conductor Outside Diameter, inches	3.125	4.062	6.125
(mm)	(79.38)	(103.17)	(155.58)
Net Weight, lb/ft (kg/m)	3.0 (4.5)	5.6 (8.3)	7.3 (10.9)

RIGID LINE ATTENUATION AND AVERAGE POWER RATINGS



Television Channel No.	3-1/8", 50-ohm		4-1/16", 50-ohm		6-1/8", 50-ohm	
	Attenuation dB/100 ft (100 m)	Average Power, kW	Attenuation dB/100 ft (100 m)	Average Power, kW	Attenuation dB/100 ft (100 m)	Average Power, kW
2	0.077 (0.254)	77.5	0.054 (0.176)	127	0.037 (0.122)	267
6	0.095 (0.311)	63.2	0.066 (0.215)	101	0.046 (0.150)	217
7	0.138 (0.452)	43.5	0.095 (0.312)	67.2	0.068 (0.223)	144
13	0.151 (0.496)	39.6	0.104 (0.342)	60.6	0.076 (0.248)	129
14	0.227 (0.744)	26.4	0.156 (0.512)	38.7	0.121 (0.396)	79.2
25	0.242 (0.795)	24.7	0.167 (0.546)	36.0	0.131 (0.430)	73.0
35	0.256 (0.839)	23.4	0.176 (0.576)	33.9	0.140 (0.460)	68.4
45	0.268 (0.881)	22.3	0.184 (0.605)	32.2	0.149 (0.489)	64.4
55	0.281 (0.920)	21.3	0.193 (0.632)	30.6	0.159 (0.522)	60.4
65	0.292 (0.959)	20.4	0.201 (0.658)	29.3	0.173 (0.566)	55.9
69	0.297 (0.973)	20.1	0.204 (0.668)	28.8	0.178 (0.584)	54.3

Attenuation and Average Power Data Guaranteed within ±5%

8 AND 5.6-METRE EARTH STATION ANTENNAS FOR Ku-BAND



5.6-Metre Antenna

8-METRE ANTENNA

Antenna Types ESA80-114A, ESA80-124A and ESA80-134A replace Type ESA80-124 described on page 169 of Catalog 32. Gain specifications and Andrew Type numbers have been revised (see table below).

5.6-METRE ANTENNA

The new 5.6-metre earth station antenna from Andrew uses superior Gregorian dual-reflector optics to achieve maximum gain and excellent pattern performance. The antenna complies with U.S. FCC Regulation 25-209 and Memorandum Opinion and Order FCC38-185 dated 26 April 1983 for 2° satellite spacing and CCIR Recommendation 580 (1982).

The all-aluminum precision-formed reflector and truss back-structure ensure the antenna will meet or exceed the specified electrical characteristics. A large integral equipment enclosure, capable of accommodating a 4-port combiner, is included with the antenna.

Available options include: various 2, 3 and 4-port combiners, motor drive systems for elevation, azimuth and polarization, antenna control systems, anti-icing equipment, pressurization equipment, coaxial cables and waveguides.

CHARACTERISTICS

Antenna Size: Type Number:	8-Metre ESA80-114A	8-Metre ESA80-124A	8-Metre ESA80-134A	5.6-Metre ESA56-114	5.6-Metre ESA56-124	5.6-Metre ESA56-134
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ELECTRICAL

Operating Frequency Band, GHz						
Receive	10.95-11.70	11.70-12.20	12.25-12.75	10.95-11.70	11.70-12.20	12.25-12.75
Transmit	14.00-14.50	14.00-14.50	14.00-14.50	14.00-14.50	14.00-14.50	14.00-14.50
Polarization	Linear Orthogonal or Linear Co-Polar			Linear Orthogonal or Linear Co-Polar		
Gain, dBi ±0.2 dB, steady state, GHz						
Receive	57.9 @ 11.325	58.5 @ 11.95	58.8 @ 12.5	55.0 @ 11.325	55.3 @ 11.95	55.9 @ 12.5
Transmit	59.9 @ 14.25	59.9 @ 14.25	59.9 @ 14.25	56.7 @ 14.25	56.7 @ 14.25	56.7 @ 14.25
Beamwidth, mid-band, degrees						
Receive (Transmit)						
-3 dB	0.20 (0.16)	0.19 (0.16)	0.18 (0.16)	0.28 (0.23)	0.27 (0.23)	0.26 (0.23)
-15 dB	0.41 (0.32)	0.38 (0.32)	0.35 (0.32)	0.66 (0.54)	0.64 (0.54)	0.61 (0.54)
Noise Temperature @ 30° Elevation, K	52	52	52	47	47	47
VSWR, maximum, Receive (Transmit)	1.30 (1.25)	1.30 (1.25)	1.30 (1.25)	1.25 (1.25)	1.25 (1.25)	1.25 (1.25)
Average Transmit Power Rating, kW	2.0	2.0	2.0	2.0	2.0	2.0
Isolation, minimum, Transmit into Receive, dB	40	40	40	40	40	40
Cross-Polarization Discrimination, dB	30	30	30	30	30	30

MECHANICAL

Mount Type	EL over AZ			EL over AZ		
Mount Adjustment Range, Elevation	0 to 70°			0-90° continuous		
Azimuth	±30° with 25° continuous fine adjustment			360°; 120° continuous		
Survival Wind Rating, mph (km/h)	150 (240)	150 (240)	150 (240)	125 (200)	125 (200)	125 (200)

4.6 AND 3.7-METRE EARTH STATION ANTENNAS FOR KU-BAND

The new 4.6† and 3.7-metre earth station antennas from Andrew use superior Gregorian dual-reflector optics to achieve maximum gain and excellent pattern performance. The antennas comply with U.S. FCC Regulation 25-209 and Memorandum Opinion and Order FCC38-185 dated 26 April 1983 for 2° satellite spacing and CCIR Recommendation 580 (1982).

The elevation-over-azimuth mount provides horizon-to-horizon coverage from any worldwide location. The efficient pedestal mount design simplifies installation and minimizes foundation requirements. The manual adjustment kit, required for non-motorized versions, includes a hand crank for 15° continuous fine azimuth and elevation adjustment.

Cables and waveguides can be run inside the hollow square section pedestal for protection. The integral equipment enclosure attached to the back of the reflector can accommodate a 4-port combiner.

Available options include: various 2, 3 and 4-port combiners, motorized mount with 0-90° continuous elevation and 120° continuous azimuth adjustment, microprocessor earth station system controller, anti-icing equipment, pressurization equipment, coaxial cables and waveguides.



3.7-Metre Antenna

CHARACTERISTICS

Antenna Size: Type Number:	4.6-Metre ESA46-114	4.6-Metre ESA46-124	4.6-Metre ESA46-134	3.7-Metre ESA37-114	3.7-Metre ESA37-124	3.7-Metre ESA37-134
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ELECTRICAL

Operating Frequency Band, GHz						
Receive	10.95-11.70	11.70-12.20	12.25-12.75	10.95-11.70	11.70-12.20	12.25-12.75
Transmit	14.00-14.50	14.00-14.50	14.00-14.50	14.00-14.50	14.00-14.50	14.00-14.50
Polarization		Linear Orthogonal			Linear Orthogonal	
Gain, dBi ±0.2 dB, steady state, GHz						
Receive	53.2 @ 11.325	53.6 @ 11.95	54.0 @ 12.5	51.2 @ 11.325	51.6 @ 11.95	52.0 @ 12.5
Transmit	54.9 @ 14.25	54.9 @ 14.25	54.9 @ 14.25	52.9 @ 14.25	52.9 @ 14.25	52.9 @ 14.25
Beamwidth, mid-band, degrees						
Receive (Transmit)						
-3 dB	0.34 (0.28)	0.34 (0.28)	0.34 (0.28)	0.42 (0.36)	0.42 (0.36)	0.42 (0.36)
-15 dB	0.67 (0.57)	0.67 (0.57)	0.67 (0.57)	0.8 (0.7)	0.8 (0.7)	0.8 (0.7)
Noise Temperature @ 30° Elevation, K	41	41	41	38	38	38
VSWR, maximum, Receive (Transmit)	1.30 (1.30)	1.30 (1.30)	1.30 (1.30)	1.30 (1.30)	1.30 (1.30)	1.30 (1.30)
Average Transmit Power Rating, kW	2.0	2.0	2.0	2.0	2.0	2.0
Isolation, minimum, Transmit into Receive, dB	40	40	40	35	35	35
Cross-Polarization Discrimination, dB	35	35	35	30	30	30

MECHANICAL

Mount Type	EL over AZ			EL over AZ		
Mount Adjustment Range*	0 to 90° continuous			0-90° continuous		
Elevation	180°, 120° continuous			180°; 120° continuous		
Azimuth						
Survival Wind Rating, mph (km/h)	125 (200)	125 (200)	125 (200)	125 (200)	125 (200)	125 (200)

* Manual mount includes a hand crank for 15° continuous fine azimuth and elevation adjustment.

† Available December 1985.

SMALL TVRO EARTH STATION ANTENNAS FOR Ku BAND



1.5-Metre Antenna

Andrew's 1.2-metre and 1.5-metre TVRO earth station antennas are designed for Ku-band direct broadcast market and private network applications.

These all metal antennas are of the high efficiency, prime focus fed, symmetrical reflector type and are supplied complete with feed and mount for attachment to a customer supplied support pipe.

Manual coarse adjustment is 360° in polarization, 360° in azimuth and 90° in elevation. 10° of azimuth and elevation fine adjustment is provided by smoothly operating screws having an adjusting rate of approximately 0.5° per screw turn.

CHARACTERISTICS

Antenna Size: Type Number:	1.5-Metre ESA15-13	1.2-Metre ESA12-13
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ELECTRICAL

Operating Frequency Band, GHz		
Receive	12.25-12.75*	12.25-12.75*
Polarization	Monopolar, Linear	Monopolar, Linear
Gain, dBi minimum, steady state, GHz		
Receive	44.0 @ 12.5	42.0 @ 12.5
Beamwidth, mid-band, degrees		
-3 dB	0.9	1.1
Noise Temperature @ 30° Elevation, K	25	25
Cross-Polarization Discrimination, dB	30	30

MECHANICAL

Mount Type	EL over AZ	EL over AZ
Mount Adjustment Range		
Elevation	0-90°	0-90°
Azimuth	360°	360°
Survival Wind Rating, mph (km/h)	90 (145)	90 (145)

*10.95-11.70 GHz and 11.70-12.20 GHz bands also available.

9-METRE ANTENNAS

The new 9-metre antennas listed in the table below replace the 9.3-metre antennas described on page 168 of Catalog 32.

7.3-METRE ANTENNAS

The new 7.3-metre earth station antenna from Andrew provides the superior pattern performance and antenna versatility required by television broadcasters and telecommunication system operators.

The specially-shaped Gregorian dual reflector system, coupled with close-tolerance manufacturing techniques enable Andrew to produce reflector panels with extremely accurate surface contour. Radiation patterns from 360° far-field range tests and satellite measurements demonstrate the superior electrical performance. Efficiency at 4 GHz is 75%, measured at the orthocoupler output flange.

The antenna complies with U.S. FCC Regulation 25-209 and Memorandum Opinion and Order FCC 38-185 dated 26 April 1983 for 2° satellite spacing and CCIR Recommendation 580 (1982).

Available options include: various 2, 3 and 4-port combiners and motorized drive systems, ESC-200 earth



7.3-Metre Antenna

station system controller, enclosure upgrade kits, anti-icing equipment, pressurization equipment, coaxial cables and waveguides.

CHARACTERISTICS

Antenna Size: Type Number:	9-Metre ESA91-4	9-Metre ESA91-46	9-Metre ESA91-46CP	7.3-Metre ESA73-4	7.3-Metre ESA73-46	7.3-Metre ESA73-46CP
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ELECTRICAL

Operating Frequency Band, GHz, Receive	3.7-4.2	3.7-4.2*	3.7-4.2	3.7-4.2	3.7-4.2	3.7-4.2
Transmit	—	5.925-6.425*	5.925-6.425	—	5.925-6.425	5.925-6.425
Polarization	Linear	Linear	Circular	Linear	Linear	Circular
Gain, dBi ±0.2 dB, steady state, Receive @ 4.0 GHz	50.4	50.4	50.4	48.5	48.5	48.5
Transmit @ 6.175 GHz	—	53.9	53.9	—	51.5	51.5
Beamwidth, mid-band, degrees, Receive (Transmit)						
-3 dB	0.51	0.51 (0.34)	0.51 (0.34)	0.66	0.66 (0.44)	0.66 (0.44)
-15 dB	1.00	1.00 (0.65)	1.00 (0.65)	1.22	1.22 (0.88)	1.22 (0.88)
Noise Temperature @ 30° Elevation, K	18.5	18.5	18.5	18.5	18.5	18.5
VSWR, maximum, Receive (Transmit)	1.25	1.25 (1.20)	1.25 (1.20)	1.30	1.30 (1.30)	1.30 (1.30)
Average Transmit Power Rating, kW	—	5	5	—	5	5
Isolation, minimum, Transmit into Receive, dB	—	40	40	—	40	40
Cross-Polarization Discrimination, dB across the -3 dB beamwidth	30	30	—	30	30	—

MECHANICAL

Mount Type	EL over AZ	EL over AZ
Mount Adjustment Range, Elevation	0-90° continuous	0-90° continuous
Azimuth	180°; 120° continuous	180°; 120° continuous
Survival Wind Rating, mph (km/h)	125 (200)	125 (200)

*An extended band version is also available for 3.625-4.2 GHz receive and 5.85-6.425 GHz transmit.

4.5-METRE RECEIVE-ONLY EARTH STATIONS COMPLETE SYSTEMS FOR C AND KU BANDS



4.5-Metre Antenna

The new 4.5-metre receive-only earth station systems from Andrew are available† in a variety of configurations for C and Ku band applications. Basic system components include:

- 4.5-metre receive-only antenna. Motor drive system is optional.
- ESC200 earth station system controller

CHARACTERISTICS

Frequency Band:	C-Band	Ku-Band
Type Number with Manual Mount:	ESA45-4A	ESA45-12
Type Number with Motorized Mount:	ESA45L-4	ESA45L-12

ELECTRICAL

Operating Frequency Band, GHz	3.7-4.2	11.7-12.2
Polarization	Linear Orthogonal	Linear Orthogonal
Gain, dBi \pm 0.2 dB, steady state	44.2 @ 4 GHz	53.0 @ 12 GHz
Beamwidth, -3 dB, mid-band, degrees	1.2	0.4
Noise Temperature @ 30° Elevation, K	20	38
VSWR, maximum	1.3	1.3
Cross-Polarization Discrimination, dB	30	30

MECHANICAL

Mount Type	EL over AZ
Mount Adjustment Range, Elevation	0-90° continuous
Azimuth	180°; 120° continuous
Survival Wind Rating, mph (km/h)	125 (200)

† Available November 1985.

- Receivers for C and Ku bands
- Audio-Video switchers (10 input)
- HELIAX® coaxial cables
- Pressurization equipment
- Installation hardware kits

Andrew's patented prime-focus, beam-shaping feed and ground plane combination produces state-of-the-art antenna electrical performance. The antennas comply with U.S. FCC regulation 25-209 and Memorandum Opinion and Order FCC 38-185 dated 26 April 1983 for 2-degree satellite spacing and CCIR Recommendation 580 (1982). Measured patterns are based on far-field range and satellite tests.

The 4.5-metre segmented aluminum reflector panels are cut from a one-piece precision spinning. Mounting holes are drilled before the panels are cut to ensure that the assembled reflector will maintain the extremely accurate surface contour.

To simplify installation requirements, the design characteristics of the antenna and adjustment range of the mount permit non-critical foundation orientation. The versatile pedestal mount features 180° azimuth coverage in three continuous 120° overlapping ranges, and 90° continuous elevation adjustment.

Standard antenna versions are listed in the table. Anticiding systems are optional.

TRANSMISSION LINES FOR EARTH STATION ANTENNA SYSTEMS

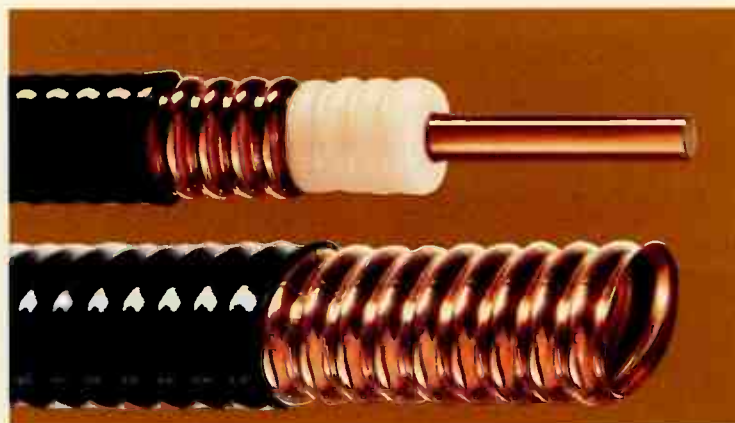
HELIAX® Coaxial Cables. Low VSWR, HELIAX foam dielectric coaxial cables of special interest for satellite earth station applications are listed below. For additional information on coaxial cables, see Catalog 32 pages 114-143 and pages S22-S25 of this Supplement.

HELIAX Elliptical Waveguides. Recommended elliptical waveguides for satellite earth station applications are listed below.

HELIAX ELLIPTICAL WAVEGUIDE

Frequency Range, GHz	Recommended Waveguide Types	Reference Pages
3.7-4.2	EW34, EWP34	S8-S12
3.7-4.2	EW37, EWP37	64-73
5.925-6.425	EW52, EWP52	64-73
10.95-12.75	EW127A, EWP127A	64-73
14.0-14.5	EW132A, EWP132A	S8-S12

Rectangular Waveguide Components. High-power flex-twist and flex (no twist) sections for earth station antenna transmit applications are listed on page S11.



AVERAGE POWER RATINGS*

Waveguide Type	Frequency GHz	Average Power kW**
EW52	5.925	5.92
	6.175	6.06
	6.425	6.18
EW132A	14.00	0.91
	14.25	0.92
	14.50	0.93

*Versions with higher power ratings are available on request.
**Based on 42°C (76°F) temperature rise over 40°C (104°F) ambient and VSWR of 1.0.

LOW-VSWR HELIAX FOAM-DIELECTRIC CABLE ASSEMBLIES

Frequency GHz	Connectors	Type No.	Maximum VSWR		
			to 10 ft (3 m)	10-20 ft (3-6 m)	over 20 ft (over 6 m)
1/2" HELIAX LDF FOAM-DIELECTRIC CABLE ASSEMBLIES					
3.7-4.2*	Type N plug/Type N plug	42125B	1.20	1.20	1.30†
	Type N plug/Type N jack	42167B	1.20	1.20	1.30†
3/8" HELIAX LDF FOAM-DIELECTRIC CABLE ASSEMBLIES					
3.7-4.2	Type N plug/Type N plug	201070	1.20	1.25	1.30
	Type N plug/Type N jack	201071	1.20	1.25	1.30
10.95-12.75**	Type N plug/Type N plug	201078A	1.30	1.35	1.40
	Type N plug/Type N jack	201079A	1.30	1.35	1.40
1/4" HELIAX FOAM-DIELECTRIC CABLE ASSEMBLIES					
3.7-4.2*	Type N plug/Type N plug	42169B	1.20	1.30	1.40
	Type N plug/Type N jack	42172B	1.20	1.30	1.40
10.95-12.75**	Type N plug/Type N plug	42171B	1.30	1.40	1.45
	Type N plug/Type N jack	42174B	1.30	1.40	1.45
	SMA plug/SMA plug	42962A	1.40	1.45	1.45
	SMA plug/SMA jack	42963A	1.40	1.45	1.45
1/4" HELIAX SUPERFLEXIBLE CABLE ASSEMBLIES					
3.7-4.2	Type N plug/Type N plug	201082A	1.25	1.30	1.35
10.95-12.2**	Type N plug/Type N plug	201084A	1.35	1.35	1.40
12.25-12.75**	Type N plug/Type N plug	201085	1.40	1.45	1.45

*Specify 3.7-4.2 GHz.

**Specify 10.95-11.70 GHz or 11.7-12.2 GHz or 12.25-12.75 GHz.

†1.35 max VSWR for lengths over 100 ft (30 m).

HF RADIO SYSTEM CAPABILITIES



HF ANTENNA SYSTEMS

Andrew recently acquired the HF Antenna and Transmission Division of Granger Associates, the world's leading manufacturer of HF antennas and related equipment.

Andrew's GRANGER® line of HF equipment includes a comprehensive range of antennas to meet a variety of applications. Antenna types range from compact transportable versions to highly directive, multiple array structures. Applications include shore-to-ship, ground-to-air, and point-to-point radio communications over very short to very long distances.

Electrical Design. GRANGER antennas are highly efficient, thus improving circuit reliability. A computer program is used to optimize the electrical design of the radiating structure, and each new design is fully tested using sweep frequency techniques to ensure proper impedance characteristics throughout the specified bandwidth.

Mechanical Design. GRANGER antennas are designed to withstand severe environmental conditions and meet applicable U.S., U.K. and NATO military specifications. Mechanical structural design is based on EIA Standard RS222C. Structures are typically designed to survive a wind velocity of 120 mph (192 km/h) without ice and 100 mph (160 km/h) with 0.5 in (12 mm) of radial ice. Antennas with increased ratings are available for use in more severe environments.

Manufacturing. Only extensively field-proven materials and construction techniques are used. Critical assemblies are pre-assembled and tested at the factory.

Antenna Selection. Selection of the appropriate antenna requires precise knowledge of the transmission path, location and distances of the stations, and power and type of radio system. Other considerations include environmental factors, desired grade of service, hours of operation and special requirements. Your Andrew Sales Engineer can assist you in the selection of HF antennas and related equipment.

Field Service. Andrew HF systems are available with a comprehensive field service package that includes system planning and propagation analysis, delivery to site, site civil work, tower erection, antenna installation and testing, maintenance and repair.

Transmission Lines. Andrew offers a complete line of HELIAX® air-dielectric and foam-dielectric coaxial cables and related components for use in HF radio systems. Sizes range from 1/4" to 5" in diameter. Refer to Catalog 32 pages 114-143 and pages S22-S27 of this Supplement.

Additional Information. The products described on the following pages represent the more frequently used GRANGER antennas and accessories, but modifications can be provided to meet individual customer requirements. Contact your Andrew Sales Engineer for information on options and detailed specifications.

SYSTEM CAPABILITIES

Andrew can provide systems engineering, management and integration services for a range of strategic and tactical, sea or landborne, HF-radio communication systems and networks. Advanced technology from Andrew is providing government and defense HF-radio systems with unprecedented reliability and availability. Andrew is able to deploy and focus its world-wide resources to solving the problems of HF-radio communications. It has also developed a range of analytical and system management tools in support of high quality systems.

ANALYTICAL TOOLS

Scientists at the Andrew HF Research and Development facility have developed Andrion, a new and advanced ray tracing computer program that permits more accurate analysis of ionospheric propagation paths than was previously possible. It is capable of tracing all possible modes along a path. The resulting raysets can be interpolated to any range required and all the usual parameters are available. Full allowance is made for gradients. Special formats are also available, such as oblique ionograms, backscatter ionograms and multistation margin as a function of time by task and contour. The analysis has shown, for example, that take-off and arrival angles can no longer be assumed to be equal in azimuth and elevation.

Andrion is an essential tool in the design of high availability, HF-radio communications particularly at transmission rates of 2400 bit/s or higher.

SYSTEM MANAGEMENT TOOLS

Channel Quality Sounder. The Channel Quality Sounder (CQS) from Andrew provides high frequency (HF) circuits with automatic real time frequency management (RTFM) capability, producing greatly increased availability at lower BER in circuits operating at high data rates. The CQS continuously sounds ionospheric HF propagation paths, analyzes path performance, and automatically directs the operator to the optimum frequency. The operator is not required to interpret ionograms. The CQS may also be interfaced directly to the HF communications control system for fully automated frequency changing with no operator intervention. The system is capable of automatically transferring frequency change data to the far end of the HF link. The CQS has a very low probability of intercept (LPI) due to the nature of the sounding signal. For further information, ask for Bulletin 1364.

Noise Trend Analyzer. To monitor signal degradation caused by increasing man-made noise at HF receiving sites, Andrew engineers have developed the Noise Trend Analyzer (NTA). The NTA continuously analyzes ambient noise and reports trends on a daily, monthly, and yearly comparison basis. Noise figures are continuously displayed and output to a data logger at 15

minute intervals. Long term statistical data is sent to the logger daily.

The NTA may be multicoupled directly to the main receiving antenna, since the NTA compensates for antenna and multicoupler characteristics. The NTA also discriminates against discrete interference and removes saturation peaks such as lightning pulses. For further information, ask for Bulletin 1365.

OTHER SYSTEMS

Andrew's broad HF capabilities include advanced research into ionospheric radio wave transmission and HF direction finding techniques, development of built-in test equipment (BITE) for circularly disposed antenna arrays (CDAA), and turnkey supply of HF communication systems.

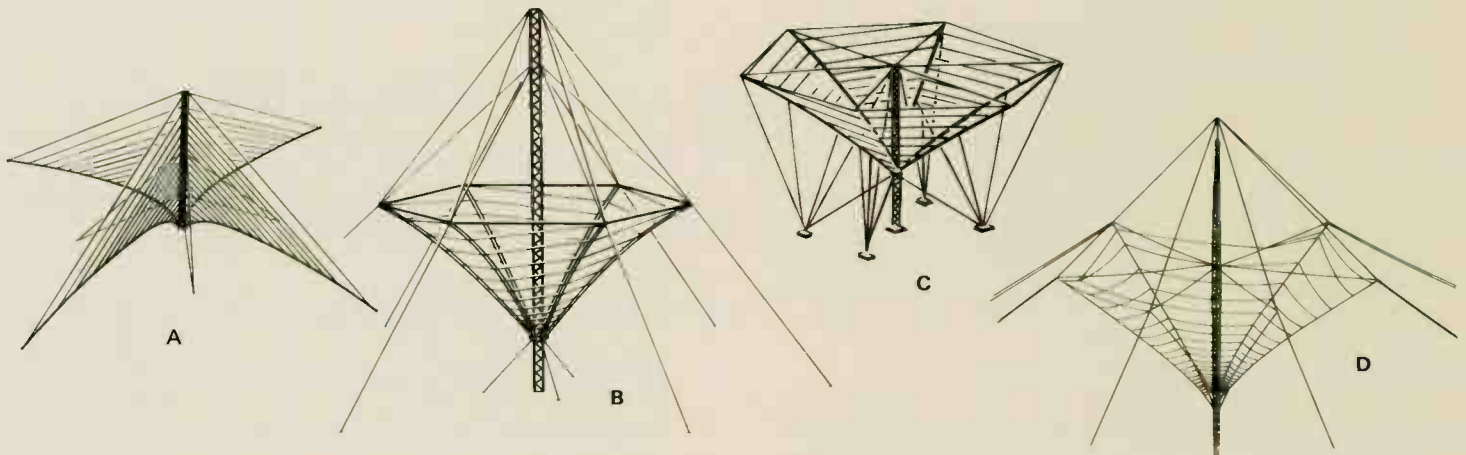
CHANNEL QUALITY SOUNDER CHARACTERISTICS

Frequency Range	2-40 MHz
Number of Channels	Up to 16
Sounding Sequence	Pseudorandom or regular
Sounding Time	30 sec/channel
Input Parameters	Modem type, antenna gain correction, QSY time, performance threshold, current channel, system configuration
Figure of Merit (FOM)	Based on measured and input parameters
Channel Selection Basis	FOM, trend analysis, QSY time and threshold
Display	Electroluminescent
Power Output	0.05 to 50W
Temperature	0 to +50°C (32 to 122°F)
Humidity	5 to 95% non condensing
Altitude	Operating: to 4600m Non-operating: to 12000m
Mechanical	3G, 5.5 to 55 Hz to MIL-STD-810D
Shock	MIL-STD-810D 30G, 11 ms, half sine wave
Power	99-132/198-264 VAC, 47-65 Hz
Size	19 inch rack mount

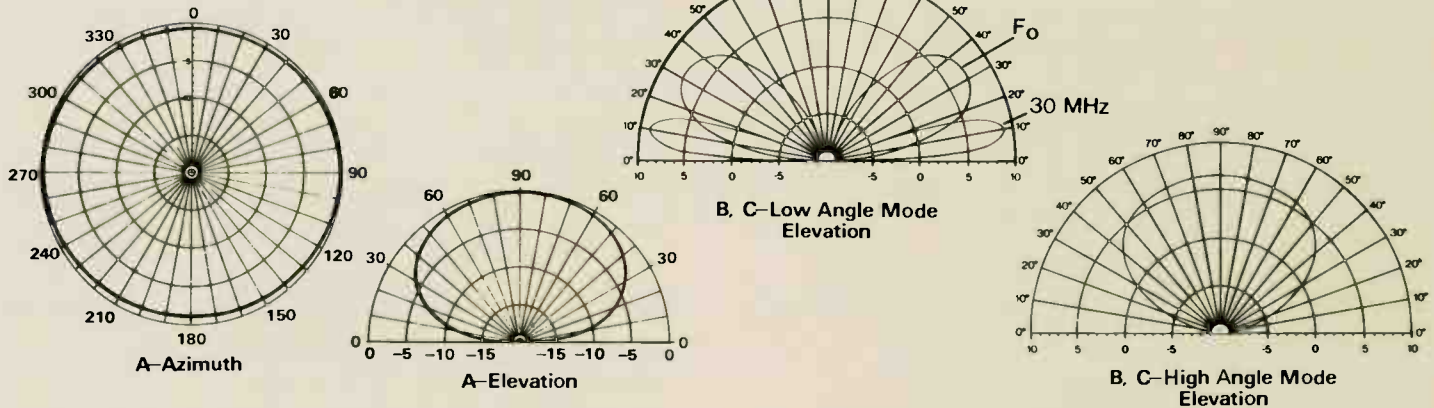
NOISE TREND ANALYZER CHARACTERISTICS

Frequency Range	2-40 MHz
Number of Channels	4 maximum
Bandwidth	100, 1000 and 3000 Hz
Dynamic Range	5 to 85 dB above KToB
Units Displayed	F_a , P_{abs} , V_{rms} , V_{av} , V_d , V_p , V_{qp}
Provided Statistics	History of units displayed
Calibration	Self calibrating
Memory Protection	8 hr survival
MTBF	15,000 hrs
MTTR	15 min
Operating Temp	0 to +50°C (32 to 122°F)
Storage Temp	-55 to +85°C (-67 to 185°F)
EMC	MIL-STD-461A
Power	99-132/198-264 VAC 47-65 Hz
Size	19 inch rack mount

HF ANTENNAS



RADIATION PATTERNS



OMNIDIRECTIONAL HORIZONTALLY ELLIPTICALLY-POLARIZED ANTENNAS

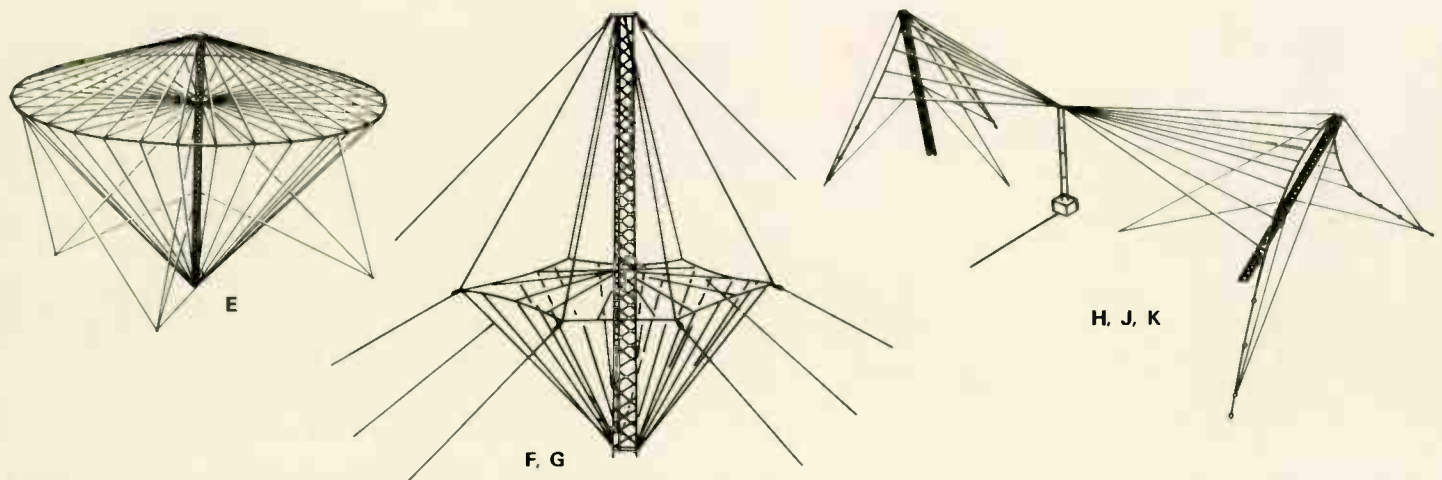
- A Type 2001 Series Broadband Antenna** is designed for short to medium range with operation from 2 to 30 MHz. It is used throughout the world for ground-to-air and point-to-point communication. Power rating is 25 kW average and 50 kW peak.
- B Type 3001 Series SPIRA-CONE™ Antenna** is a unique dual-mode design which permits a choice of short/medium or medium/long ranges. Operation is 2, 3 or 4 MHz to 30 MHz in the high-angle mode and 4, 6 or 8 MHz to 30 MHz in the low-angle mode, with optional remote mode switching. Both modes can be operated simultaneously using optional dual mode hybrid multicouplers. Power rating is 25 kW average and 50 kW peak.
- C Type 3002 Series SPIRA-CONE Rooftop Antenna** is a compact version of the Type 3001 Series. Operation is 2.8 to 30 MHz in the high-angle mode and 5.6 to 30 MHz in the low-angle mode with remote mode

switching. 1, 2.5 and 5 kW average power rating versions are available.

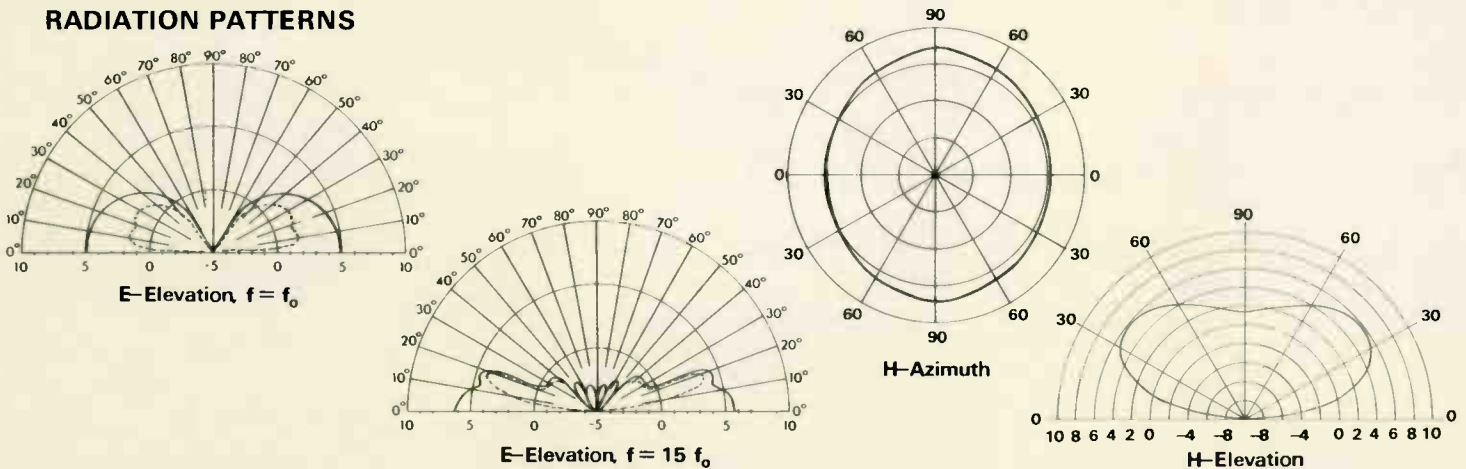
- D TYPE 3002MT Series SPIRA-CONE Transportable Antenna** has electrical performance similar to Type 3002 rooftop antenna and is ideal for rapid field deployment. It uses a single 70 ft (21 m) nesting type lattice tower and flexible catenaries for convenient stowage and assembly. Remote mode switching and dual-mode multicouplers are optional. Power rating is 1 kW average.

OMNIDIRECTIONAL VERTICALLY-POLARIZED ANTENNAS

MONOCONE™ and monopole antennas are recommended for ground-wave applications such as shore-to-ship (1.6-3.8 MHz) and short-range base station to mobile. Sky-wave applications include medium to long-range ground-to-air, base station to out stations requiring medium to low angle, shore-to-ship HF service, and omni HF Broadcast, including meteorological service. Monopoles are not suitable for short-range HF sky-wave due to the overhead null characteristic of the design.



RADIATION PATTERNS



E Type 1794 Series MONOCONE™ Antenna is designed for very long range, high-power transmit applications such as ground-to-air, en-route and shore-to-ship communications. A single central tower permits installation at difficult sites. Occupied land and civil works are minimized. MONOCONE antennas are available in six wide-band models in the 1.6-32 MHz frequency range. Power rating is 40 kW average and 160 kW peak. VSWR is 2.0:1 maximum.

F Type 2753 Series Conical Monopole Antenna is a cost-effective antenna for ground-to-air and shore-to-ship transmission. Five standard models cover the frequency range from 1.6 to 28.0. Wide bandwidth of 6:1 permits frequency change without tuning. Rugged and easily erected design. Power rating is 25 kW average and 50 kW peak.

G Type 2753T Series Transportable Conical Monopole Antenna is a quick erect version of Type 2753 Series. Operation is 4.0-24 MHz. Power rating is 10 kW average. The tower is 40 ft (12 m).

typically used for short to medium-range point-to-point communications or as an omnidirectional base station antenna. Five standard models are available in the 1.6 to 30 MHz frequency range. Nominal VSWR is 2.0:1 over the entire frequency range without tuning. Power ratings are available up to 10 kW average and 20 kW peak. No resistive loading is used. Antennas are available with coaxial or open wire inputs.

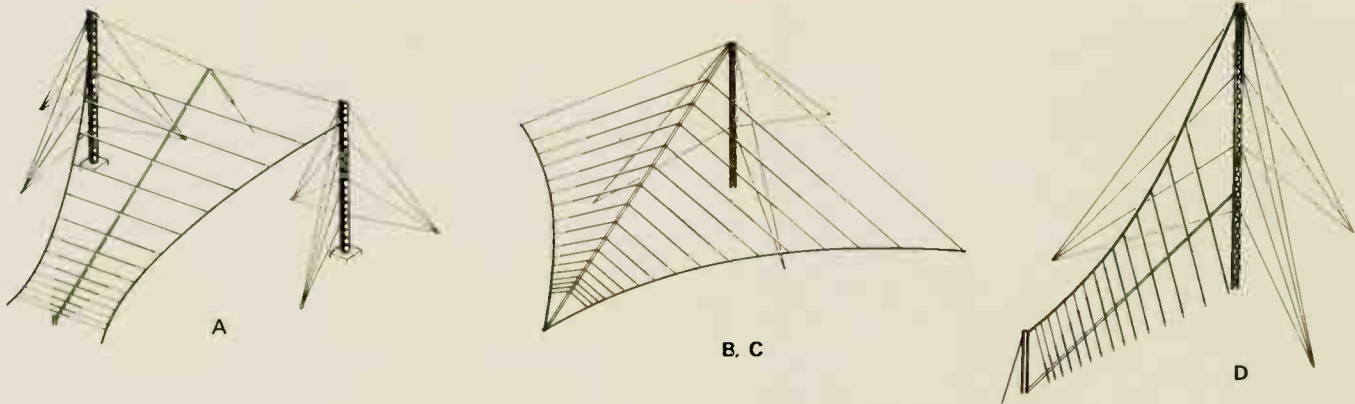
J Type 3065 Series Compact Broadband Dipole Antenna is similar in performance to the 1765 Series antenna (above). Its compact design reduces the required ground area. Eight standard models are available in the 1.6 to 30 MHz frequency range. VSWR is 2.0:1 nominal and 2.2:1 maximum over the entire frequency range without tuning. Power ratings are available up to 5kW average. Inputs are 50-ohm coaxial.

K Type 3065MT Series Super Compact Transportable Antenna utilizes minimum ground space. Two tubular 40 ft (12 m) masts are included. Nested lattice towers are optional. Broadband frequency range is 2.0 to 30 MHz with 2.0:1 nominal (2.3:1 maximum) VSWR over the band. Average power rating is 1 kW. Required ground area is 115 x 60 ft (35 x 18.5 m).

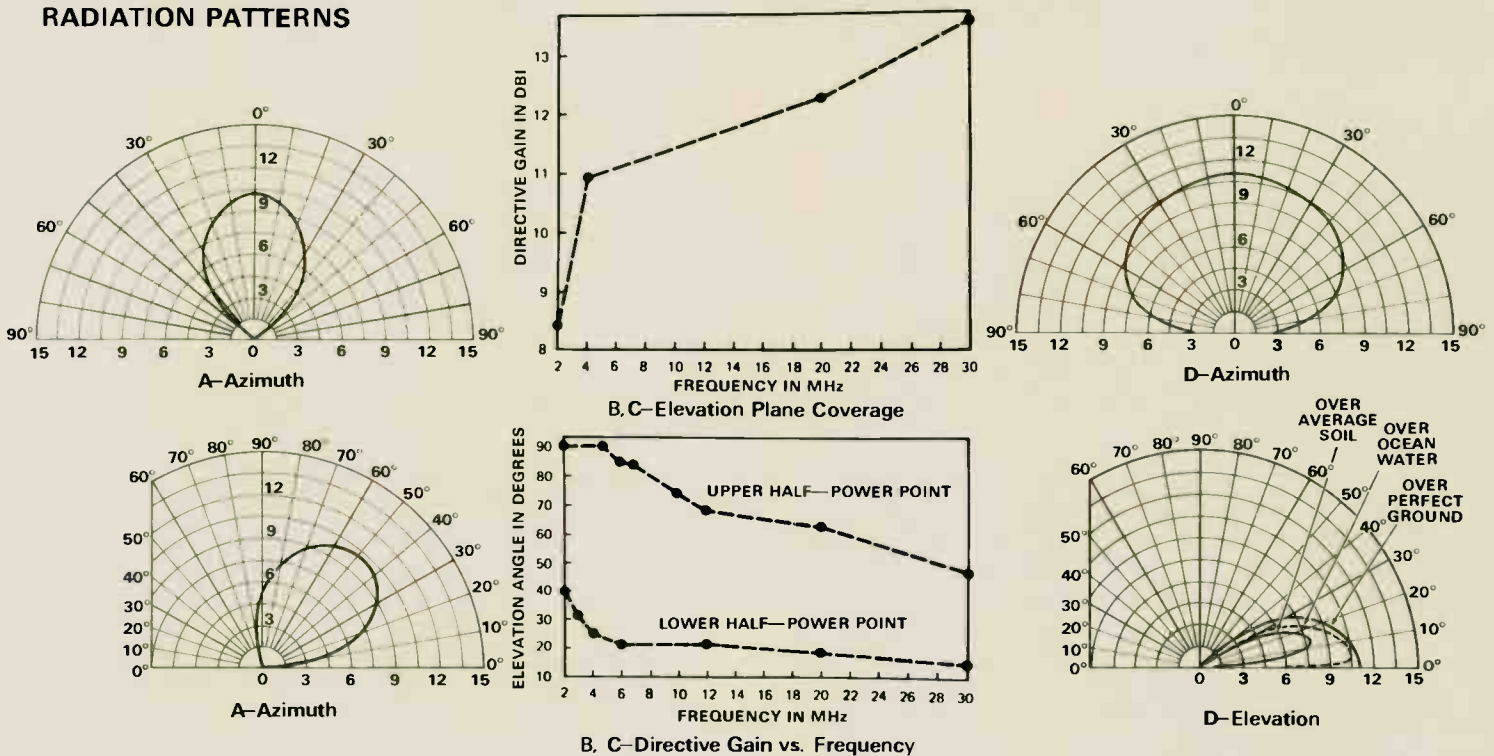
BROADBAND DIPOLE ANTENNAS

H Type 1765 Series Broadband Dipole Antenna is

HF ANTENNAS



RADIATION PATTERNS



LOG PERIODIC DIRECTIONAL ANTENNAS

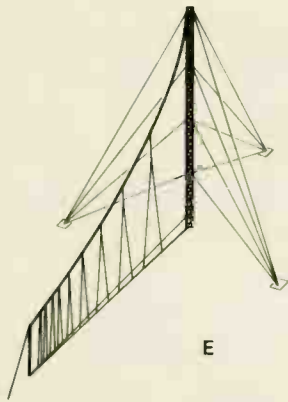
A Types 2701 and 2702 Series Horizontally-Polarized Antennas. Type 2701 Series antennas have a broad lobe directed at high elevation angles for short to medium ranges. Type 2702 Series have a narrower lobe directed at lower elevation angles for medium to long distance communications. Versions are available with eight frequency ranges in the 2 to 32 MHz band. Power rating is 20 kW average and 40 kW peak.

B Type 747FCD Series Horizontally-Polarized Fixed Antenna is designed for short, medium and long ranges with operation from 2 to 30 MHz or 4 to 30 MHz. The antenna uses a single tower and is lightweight, rugged

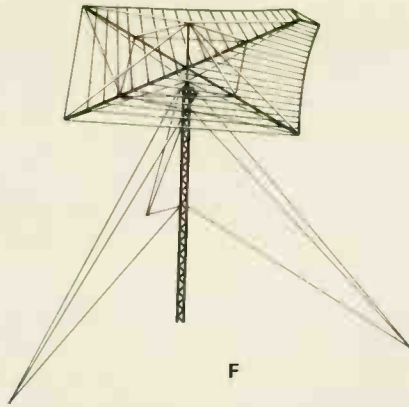
and withstands harsh environments. A hinged tower base results in easy erection. Power rating is 20 kW average and 40 kW peak.

C Type 747CD Series Horizontally-Polarized Transportable Antenna is ideal for emergency use. It is light weight and can be erected in two hours. The antenna is designed for short, medium and long ranges with operation from 2 to 30 MHz or 4 to 30 MHz. Power ratings up to 10 kW average and 30 kW peak are available.

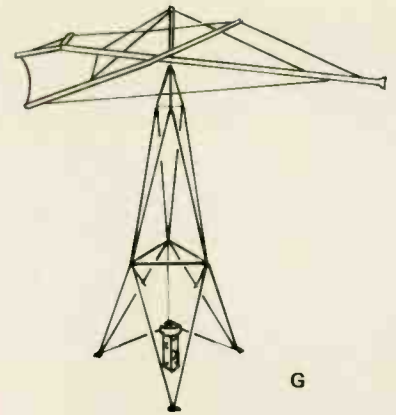
D Type 1703 Series Vertically Polarized Dipole Array Antenna is designed for long range communications. Versions are available with five frequency ranges in the



E

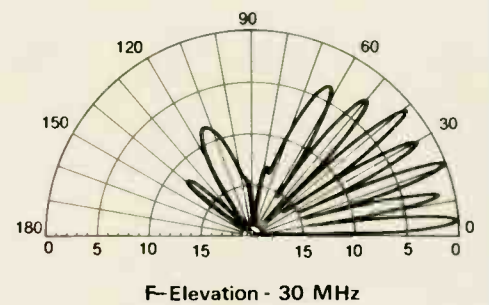
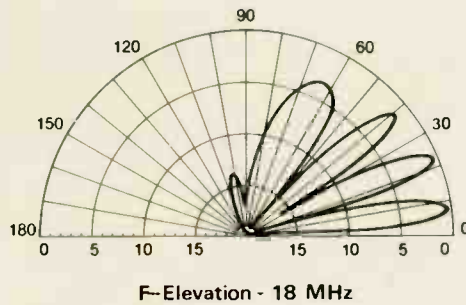
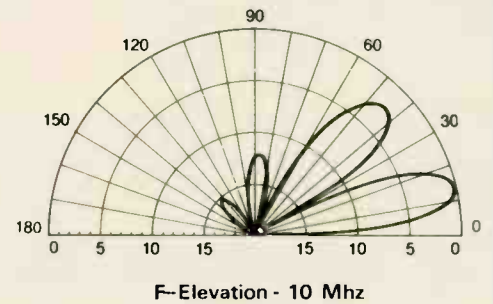
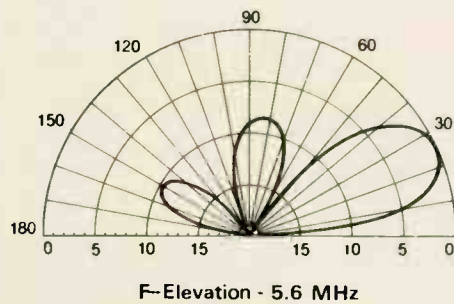
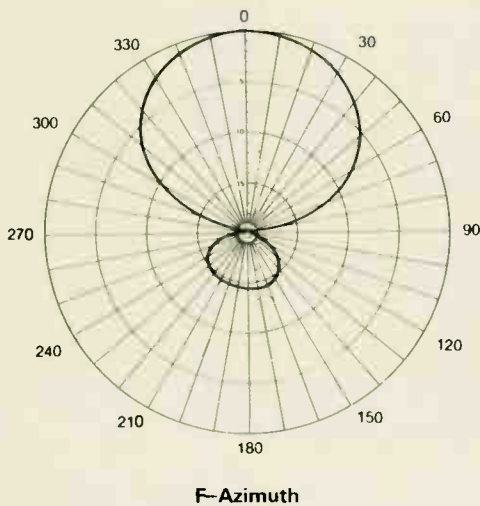


F



G

RADIATION PATTERNS



4 to 32 MHz band. No ground screen is required for impedance control. Power rating is 20 kW average and 40 kW peak.

E Type 2726 Series Vertically Polarized Monopole Array is designed for long range communication in the 2.5-32 MHz or 3.5-32 MHz bands. A ground screen is included. Power rating is 10 kW average and 20 kW peak.

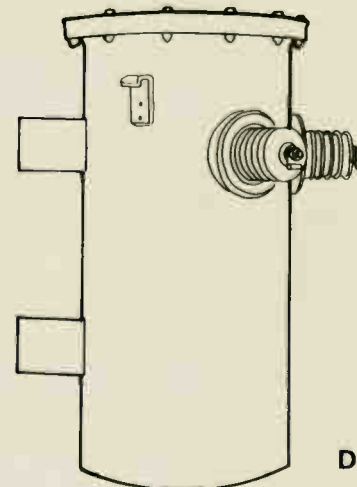
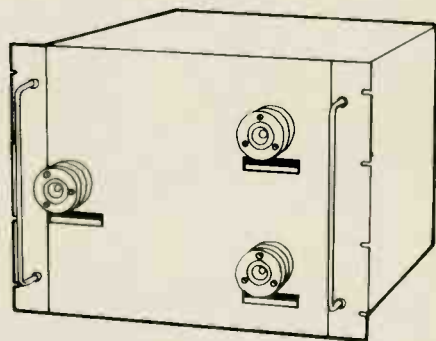
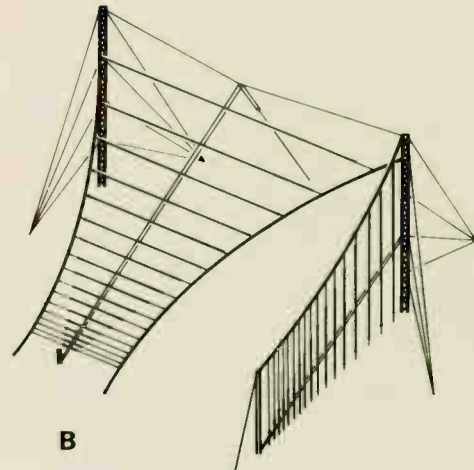
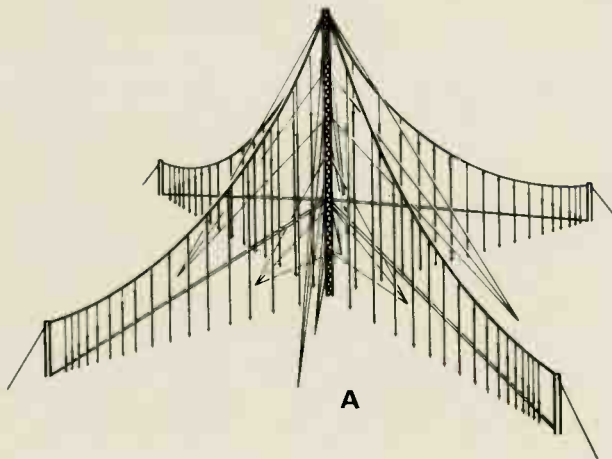
ROTATABLE ANTENNAS

F Type 2731 Series High Power Rotatable Antenna. This log-periodic, horizontally-polarized antenna is

designed for long-range communications with broadband operation in the 4 to 30 MHz frequency range. Power rating is 25 kW average and 50 kW peak. A variety of optional towers is available.

G Type 2004 Series Compact Rooftop Antenna. This log-periodic, horizontally-polarized antenna is inexpensive, light weight and compact. It is ideal for rooftop or ground mounting. Operating frequency bands are available in the 2 to 35 MHz range. A variety of optional towers is available. The SSAT (self-Supporting Articulated Tower) is illustrated.

HF ANTENNAS



SPECIAL ANTENNAS

- A Type 757 Series Electrically Steerable Log-Periodic Array.** Vertically polarized, steerable 360° azimuth coverage for long range shore-ship and air-ground communications. Seventeen different models with operation from 3 to 30 MHz. Power rating is 10 kW average and 20 kW peak.
- B Type 1747A Series Polarization Diversity Receiving Antenna** consists of horizontally and vertically polarized log-periodic arrays. Designed for medium to long range operation in the 4 to 32 MHz frequency band. Reduces circuit outage caused by polarization fading.

HF TRANSMITTING MULTICOUPLERS

- C Type 579, 520G and 557 Series Multicouplers** from Andrew connect two HF transmitters to a single broadband antenna so that both transmitters can operate simultaneously without interference or interaction and

without significant insertion loss. Power ratings are 2.5 kW per input for 579 Series, 10 kW per input for 520G Series and 20 kW per input for 557 Series.

BROADBAND HF BALUN TRANSFORMERS

- D Balun Transformers** couple 50 or 75-ohm unbalanced coaxial transmission line to 300 or 600 ohm balanced open wire transmission line. Baluns enable an HF transmitting installation to employ economical and efficient open wire lines on long runs from the transmitter building to antennas, while using convenient, safe and electrically isolated coaxial lines inside the transmitter building, at the antennas or both. GRANGER Baluns are ferrite core devices with very low VSWR's (typically 1.1:1). Terminal balance ratio is better than 5% over the entire frequency band. Power ratings range up to 50 kW average and 200 kW peak.

NAVIGATION AIDS AND SPECIAL APPLICATION ANTENNAS

Andrew is expanding its capability in the navigation aids (NAVAIDS) field with its Standard and Doppler VOR antennas and high performance L- and S-band radar antennas. The Standard and Doppler VOR printed circuit antenna systems designed to meet Canadian Ministry of Transport (MOT) specifications reflect Andrew experience and know-how. Andrew's VOR antenna, for example, achieves significantly greater field strength than a comparable metal loop antenna.

Advanced L-band primary radar reflectors are currently being designed and manufactured by Andrew for Raytheon Canada Ltd., as part of the Canadian MOT's Radar Modernization Project (RAMP).

Advanced technology from Andrew also developed a high performance S-Band Doppler radar antenna for the Sperry Corporation, as part of Sperry's bid for the Next Generation Radar (NEXRAD) weather radar system jointly proposed in the U.S. by the National Weather Service, the Federal Aviation Administration, and the Department of Defense. By using Doppler radar, the computerized NEXRAD system will be able to determine wind speed, wind direction, precipitation, storm size and intensity far more accurately and much earlier than is possible with conventional radar systems.

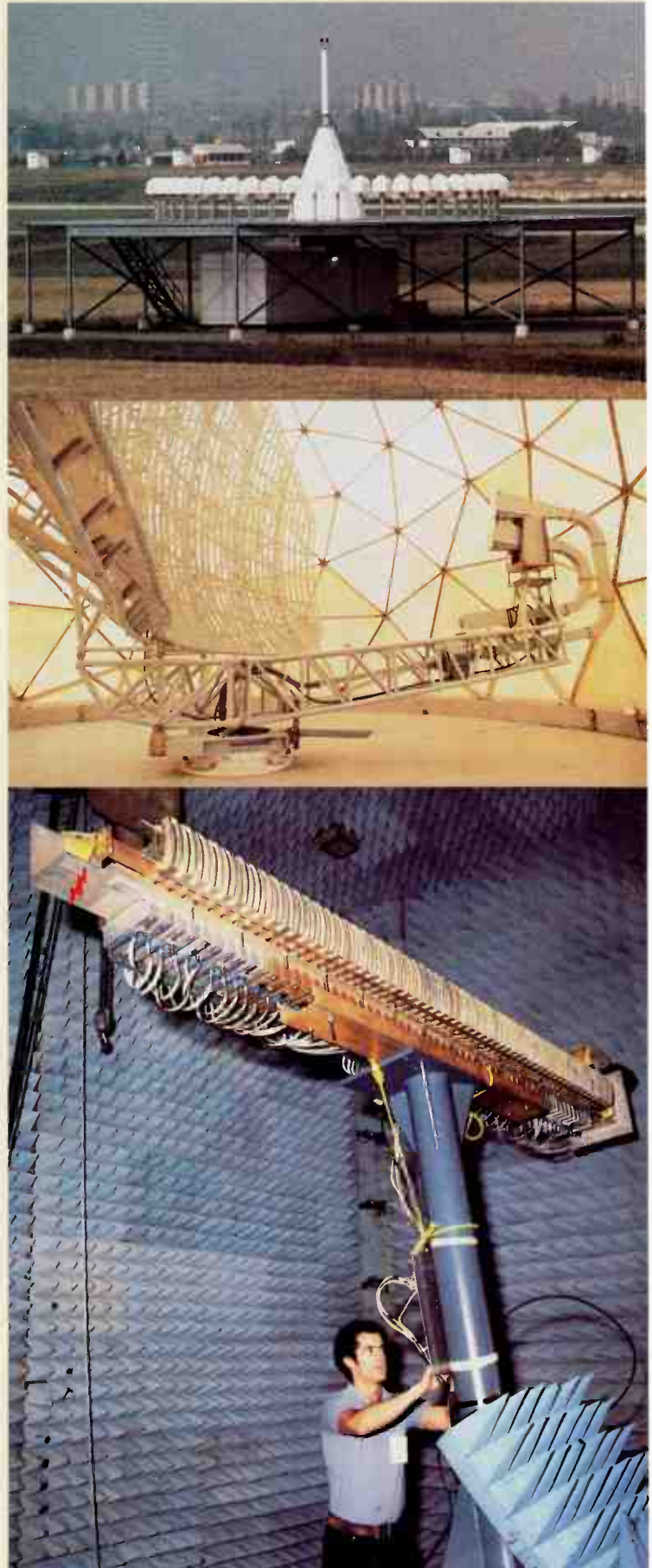
An elevation antenna array for the Microwave Landing System (MLS), the next-generation landing system, was also designed and produced by Andrew. This landing system allows aircraft to reach an airport on a number of different glide paths and approaches, providing much greater air traffic flexibility and safety.

Andrew has always been willing to accept new technological challenges. For the Apollo space program, Andrew provided NASA with a custom-designed disk-on-rod and helical array antenna used for simultaneous voice and telemetry data communication with the space module.

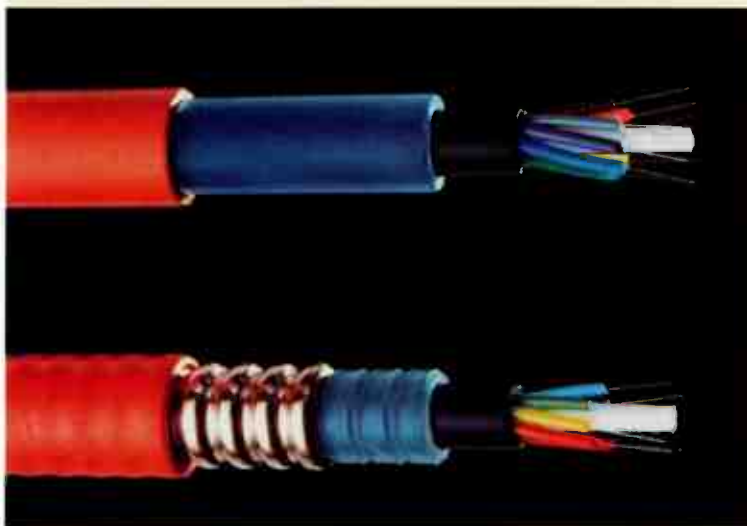
Andrew's structured quality system complies with the requirements of major commercial and military customers and specifications of the U.S. FAA. The quality assurance program meets MIL-Q-9858A, MIL-I-45208A and equivalent international standards.

With its years of experience in designing and building navigation aids, and such specialty items as variable beam antennas, dual beam antennas, broadband antennas, circularly polarized X-band antennas, and telemetry antennas, Andrew is uniquely qualified to provide the custom antenna system you need.

Andrew will translate your special requirements into carefully designed, high performance hardware. For further information, contact your Andrew Sales Engineer.



OPTICAL FIBER CABLES



Andrew has the capability and the experience to supply optical fiber cables for a wide variety of applications. Most commercially available fibers, up to twelve per cable, can be incorporated into the cable construction. Andrew offers custom-designed cables with customer-specified fibers and customer-specified cable construction. Cable designs can be developed which contain both optical and electrical conductors. Both all-dielectric and armored versions are available.

CUSTOM DESIGNED CABLE

Andrew developed an optical fiber cable which meets the rigid performance requirements of the U.S. Department of Energy. Developed for underground nuclear testing applications, the cable offers exceptional tensile strength and impact resistance. The cable is suitable for applications where a very rugged, all-dielectric construction is required.

Each of the eight fibers is contained within a loose tube filled with a viscous material to allow for mechanical isolation of the fiber during bending and tensile loading of the cable. When installed, the cable may be loaded to the maximum service tension without any effect on the performance properties of the optical fibers. The tubes are helically wound about a fiberglass central strength member and then jacketed with a multi-layer polyolefin jacket for increased impact resistance. The standard outer jacket is an orange, UV stabilized polyethylene. The cable is completely filled and sealed in such a way that it is impervious to the migration of liquid or gas along its length.

OPTIONAL CONFIGURATIONS

The basic cable developed for the DOE, described above, is suitable for a wide variety of applications. The cable can accommodate up to a quantity of eight of almost any available optical fiber, including single mode, multimode, 100 micron core, radiation hardened and mixed types. Where required, the cable can

be armored with a seam-welded and corrugated copper sheath without changing the optical properties. Lengths are available up to 6 km. Other jacketing colors are available on request.

Following are characteristics of the cable supplied to the U.S. Department of Energy:

CABLE CHARACTERISTICS

Outer Diameter	0.625 in (16 mm)
Number of Fibers	8 Maximum*
Cable Weight	0.16 lb/ft (0.24 kg/m)
Cable Length	6560 ft (2000 m)

*Less than 8 may be used in the same construction by substituting nylon monofilament.

MECHANICAL PERFORMANCE

Impact Resistance	10 Impacts at 7.4 ft-lb (10 N · m)
Maximum Service Tension	600 lb (2670 N)
Maximum Tension During Installation	1100 lb (4890 N)
Minimum Bend Radius	8 in (200 mm)
Bending Moment	2.5 ft-lb (3.4 N · m)
Number of Reverse Bends on the Minimum Bend Radius	50

FIBER CHARACTERISTICS

Fiber Supplier	Corning	Corning
Cable Type No.	45040-8	45040-9
Type	Graded Index (Multimode)	Graded Index (Multimode)
Core/Cladding Diameter (Microns)	50/125	50/125
Numerical Aperture	.20	.20
Attenuation at 850 Nm	3.5 dB/km	3.5 dB/km
Bandwidth at 850 Nm	400 MHz-km	1300 MHz-km

POLARIZATION MAINTAINING OPTICAL FIBER

Several advances have been made in this area of ongoing research since publication of Catalog 32 (page 180). Characteristics currently achievable for both the E (round) and the D-shaped single mode, polarization maintaining fibers are:

Attenuation at 850 nm	12 dB/km
Core size, elliptical at 850 nm, microns	2 x 1
Attenuation at 1300 nm	4 dB/km
Core size, elliptical at 1300 nm, microns	3 x 1.5
Polarization maintenance at 850 nm or 1300 nm	45 dB·m

The fabrication of polarization maintaining directional couplers from the D-shaped fiber has been demonstrated. A very accurate 1:1 split of the signal is achieved by using a bridge technique. Insertion loss for the couplers is typically less than 0.1 dB.

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