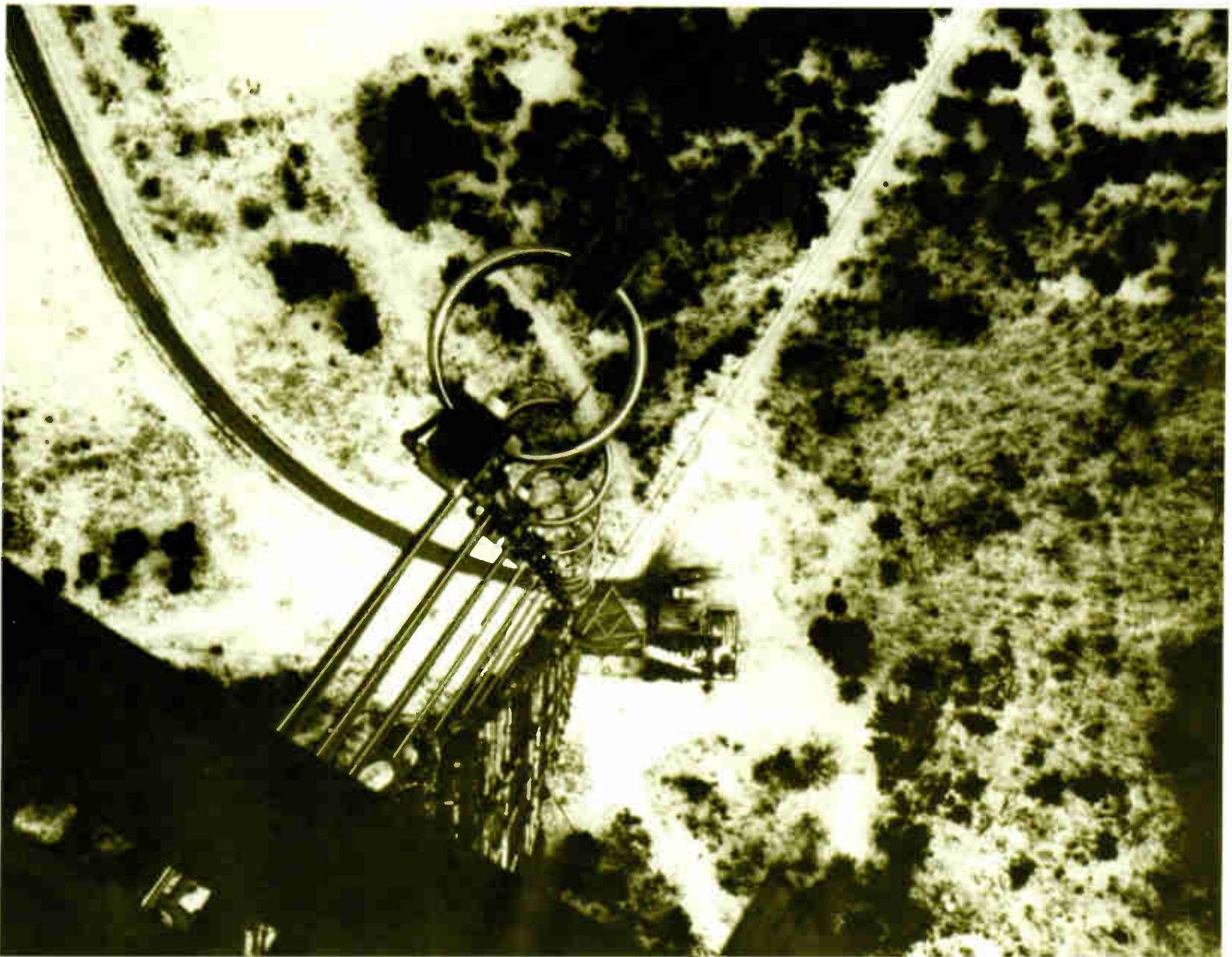


GATES

FM ANTENNAS
AND
ACCESSORIES



GATES...the Leader in FM Antennas



Gates' Directional Dual Cycloid antenna, installed at Station WCLV-FM, Cleveland, Ohio, is mounted atop the 640 foot Terminal Tower Building in downtown Cleveland. The WCLV-FM antenna consists of four Gates' directional circularly polarized elements. This antenna is available in arrays with up to eight bays.

Gates Radio Company, the leading supplier of FM antennas, has installed more FM antenna systems than any other manufacturer.

Gates established a reputation as a supplier of advance design antennas with the introduction of the Cycloid, the first major change in the FM antenna field since World War II. Primarily developed to accommodate FM stereo, it featured binary tuning.

With the advent of both vertical and horizontal polarization, Gates became a leading distributor of the 300G vertical radiator which permitted broadcasters to add vertical polarization.

The Dual Cycloid series is the company's latest contribution to the FM antenna state-of-the-art. This series provides circular polarization from one element, resulting in the reduction of the "plumbing" required on FM towers.

Gates offers four circularly polarized antennas: the Dual Cycloid for high power stations; Dual Cycloid II for medium power stations; Dual Cycloid III for low power stations and the Directional Dual Cycloid antenna.

These antennas are noted for their mechanical ruggedness and transmission reliability. Constructed of a brass alloy, they are assembled with either phosphor bronze or stainless steel nuts and bolts, which, unlike aluminum, withstand the corrosion from salt-laden air and industrial gasses.

Dual Cycloid antennas are normally supplied with equal power radiation in both horizontal and vertical planes. Each antenna is factory checked to assure this 50-50 power split. Other power splits, permitting a station to have more radiated power in the horizontal plane than in the vertical plane, are available on special order.

Null fill and beam tilt are offered with the Dual Cycloid and Dual Cycloid II. Null fill is achieved by adjusting the power relationship between the upper and lower bays. Beam tilt is normally accomplished by varying the phase relationship between the upper and lower bays.

The entire series of Dual Cycloid antennas has been performance proven. The polarization of the elements was verified by a private antenna testing laboratory which measured an accurately scaled model of the antenna. Tests found the Gates' Dual Cycloid antenna polarization to be within the accepted limits of circular polarization.

The antennas have withstood the test of rugged environments such as mountain top installations where heavy ice and high wind conditions prevail. Protection against icing is provided by optional antenna heaters which are available in varying wattages and with manual or automatic antenna deicer controls or by radomes.

All Gates antennas exhibit low standing wave characteristics as each antenna is factory tuned on a tower structure.

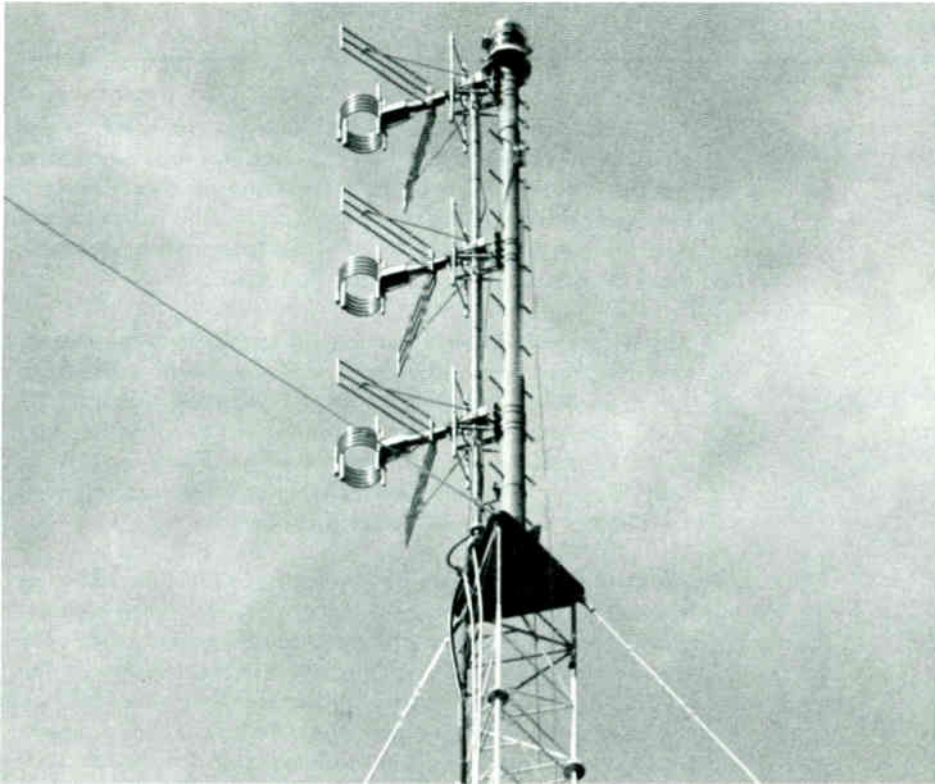
Designed specifically for Class "C" stations, the Dual Cycloid is available in any number of bays from 1 through 16. The standard configuration is a 50-50 power split with other power splits available on special request. Antennas of 9 bays or less are end fed through a 6 foot transmission line section while 10 or more bays are usually center fed through a 6 foot transmission line section, 90 degree elbow and coaxial "T" connector.

For the Class "B" stations, Gates supplies the Dual Cycloid II, which has all the electrical advantages of the higher power antenna. Because of lower power requirements, the Dual Cycloid II is constructed with a shorter balun, resulting in a lighter weight antenna and less windloading of the element. The Dual Cycloid II comes in from 4 to 12 bays handling powers up to 10 kW.

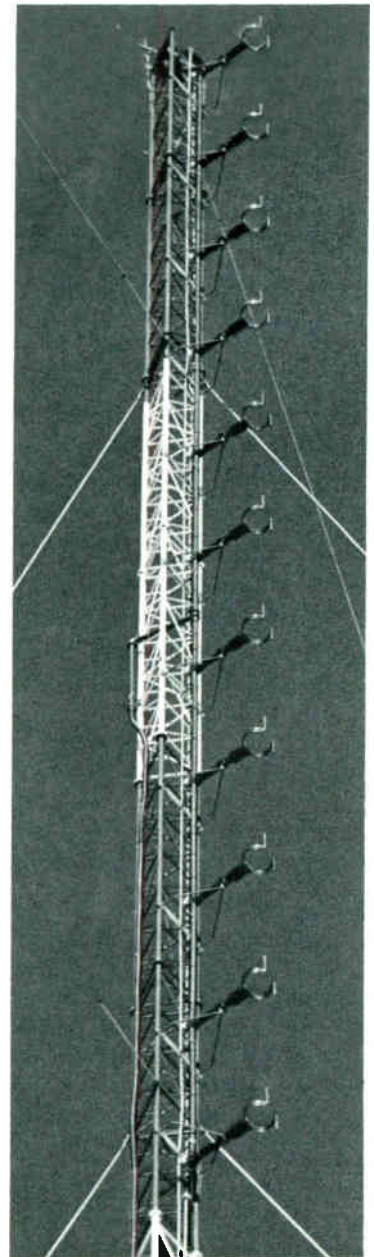
Hundreds of Class "A" FM stations are now equipped with the Dual Cycloid III, the end fed version of the medium power antenna. Weight and windloading are again reduced by removal of the center fed T section. The antenna is available in from 1 to 8 bays with handling power capabilities up to 5 kW.

Gates is continuing its leadership in the FM antenna field by providing Directional FM antennas to stations on the East and West coasts, the Great Lakes and Gulf of Mexico regions, and in areas where protection to stations on the same or adjacent operating frequencies is required.

A Cross Section of Gates Antenna Installations



At station WKZN-FM, Kenosha, Wis., Gates' Directional Dual Cycloid FM antenna is pole mounted. Each bay of the directional antenna is equipped with heaters totaling 900 watts.

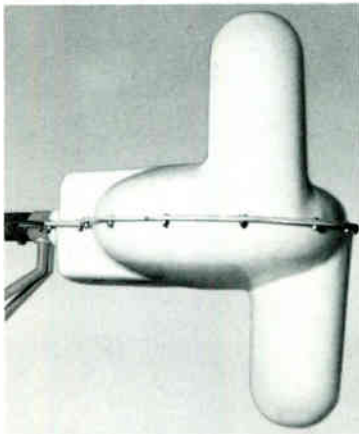
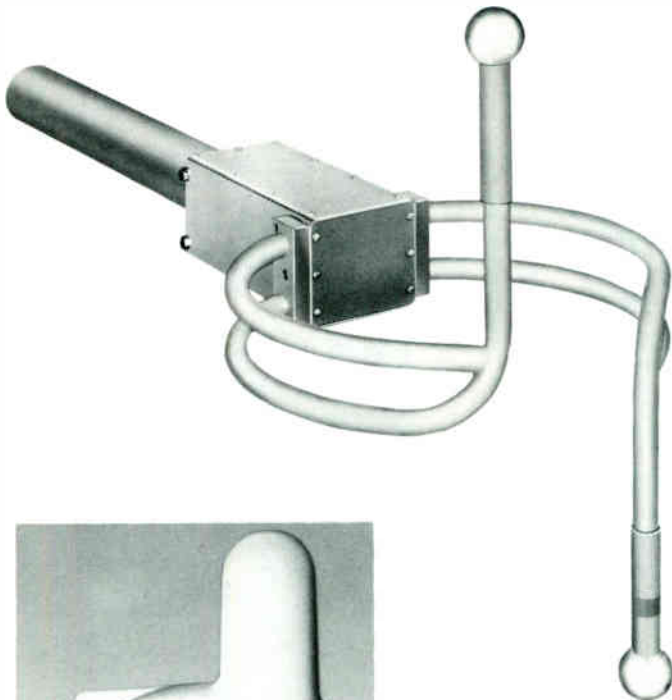


Station KGRC-FM, Hannibal, Mo., operates with a Gates' 11-bay Dual Cycloid circularly polarized FM antenna for an ERP of 100,000 watts. Primary coverage area has a population of 330,000 while secondary area has more than one million.



Models hold one element of the Gates' Dual Cycloid circularly polarized antenna which is now mounted atop the antenna tower at station WSM-FM, Nashville, Tenn. The antenna installation consists of 14-bays.

Circularly Polarized FM Antenna



Radomes are available with the Dual Cycloid antennas.

DUAL-CYCLOID FOR HIGHER POWER STATIONS

Gates Dual Cycloid FM Antenna with circular polarization has a radiation pattern intended to deliver an improved signal to FM receivers. A primary advantage of the Dual-Cycloid antenna is the reduction of antenna transmitting bays required when circular polarization is desired. Previously, individual elements, horizontal and vertical, and in most cases a power divider, had to be installed to obtain dual polarization. Now, only the Gates Dual-Cycloid is required.

Utilizing the time proven features of the Cycloid antenna, and other advantages of the Gates Type 300G vertical antenna, the Dual-Cycloid provides a radiating system with a low standing wave ratio over a bandwidth of 200 kHz. Ideal conditions are presented for the transmission of today's complex FM monaural, stereo, and SCA multiplex signals.

The Gates Dual-Cycloid Type FMC antenna transmits circular polarization as authorized by FCC rules and regulations. The station's effective radiated power will still be determined by the signal radiated in the horizontal plane. This is determined by the antenna gain (see table) in the horizontal plane multiplied by the power input to the antenna.

Any number of elements from one to sixteen may be utilized, providing maximum flexibility in the selection of power gain for a particular installation. Special antennas with null fill and beam tilt are available. Maximum power rating per bay is ten kilowatts; arrays will handle power inputs as high as forty kilowatts. De-icers are available and are recommended for climates that experience icing conditions.

The Dual-Cycloid consists of two basic parts: (1) the radiating element and, (2) the interconnecting transmission line sections. The radiating elements in an array are all identical electrically and mechanically. Utilizing the effective ring design of the Cycloid as the basic unit, two vertical elements have replaced the fixed end plates; the rear terminal block is now a matching balun mating the antenna impedance to the interconnecting transmission line.

The vertical sections have adjustable caps for a fine adjustment of the horizontal/vertical radiation ratio. Designed for rugged trouble-free operation, all antenna elements are fabricated of a durable weather resistant brass alloy with excellent electrical properties.

Antenna elements are normally spaced one wave-length apart with interconnecting transmission line sections and feed through a common system input termination of 50 ohms, which is a standard 3/8" EIA female flange.

MOUNTING: The antenna is mounted on a specially designed supporting bracket, fabricated to mate with the tower in a mounting arrangement specified by the purchaser. Antennas are usually mounted on the leg or tower face of a guyed or self supporting tower. Pole or top mounting is available on special order.

FEED POINT: Antennas of 9 bays or less are end fed through a 6 ft. transmission line section; 10 or more bays are usually center fed through a 6 ft. transmission line section, 90° elbow and coaxial "T" connector.

CIRCULARITY: Both the horizontal and vertical radiation pattern of the Dual-Cycloid antenna have been measured within ± 2 dB in free space. When side mounted, the antenna pattern will be somewhat affected by the supporting structure. This effect, however, has been minimized with the special supporting bracket and feed system which places the radiating element over 36" from the tower.

Supplied on a standard 3/8" EIA line, the antenna is complete with mounting brackets for standard AM and FM towers.

Circularly Polarized FM Antenna—Dual-Cycloid

Heavy-duty mounting brackets, designed to place the antenna element away from the supporting structure for the least effect on the radiation pattern, are supplied at no additional cost. Standard brackets are for use on tower legs or side mounting on the normal type AM radiator. A special quotation will be made for brackets on TV towers and non-standard radiators and poles.



SPECIFICATIONS

FREQUENCY RANGE: Factory tuned to one frequency in the 88 to 108 MHz band.

POLARIZATION: Circular, clockwise.

POWER GAIN (Over Dipole): Approximately equal to half the number of stacked bays for horizontal polarization; same for vertical polarization. See table below.

AZIMUTHAL PATTERN: Circular ± 2.0 dB in free space for horizontal polarization; same for vertical polarization. See table below.

VSWR AT INPUT (Without field trimming): Top mounting, 1.1:1 or better. Side mounting, 1.5:1 or better.

VSWR AT INPUT (With field trimming): Top or side mounting, 1.1:1 or better over ± 100 kHz.

INPUT IMPEDANCE: 50 ohms.

INPUT CONNECTION: 3/8-inch, 50 ohm EIA female flange.

POWER INPUT RATING: Approximately 10 kW per bay (see table).

WINDLOAD: 50 lbs. per square foot for flat surfaces; 33 lbs. per square foot for cylindrical surfaces.

DIMENSIONS: (One bay) 30 in. high, 45 1/2 in. long.

FEED POINT: One to nine bays, end fed. Ten bays and over, center fed with even number of bays, or at a point 1/2 bay below center with odd number of bays.

WEIGHT: Antenna bay, 41 lbs. (19 kg). Interconnecting feed line, 27.5 lbs. (12 kg). Mounting bracket, 22 lbs. (10 kg).

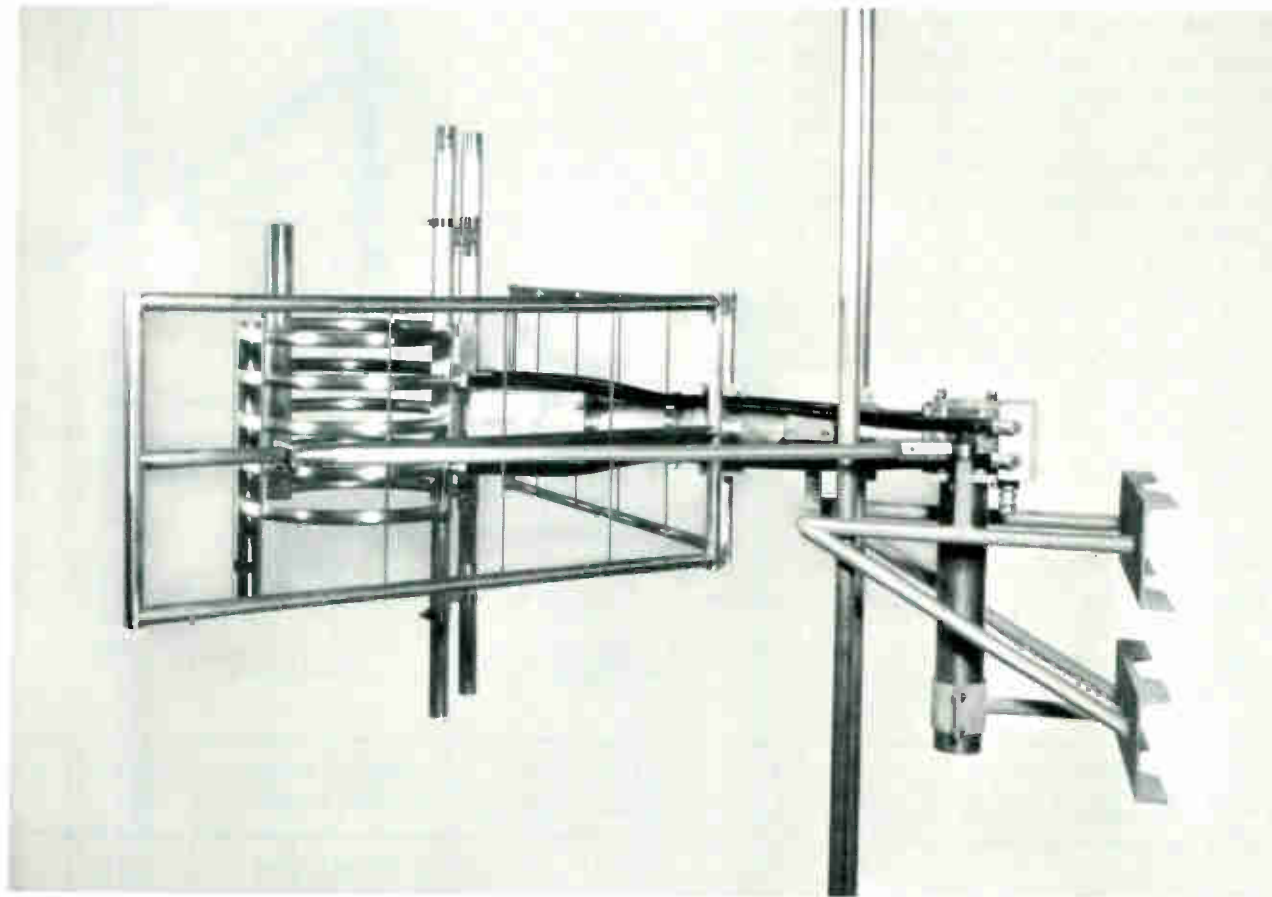
GATES TYPE	POWER GAIN		dB GAIN		FIELD GAIN ¹		POWER RATING	APPROX. ² LENGTH	WEIGHT ³ (lbs.)	WIND- ⁴ LOAD
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical				
FMC-1	0.46	0.46	-3.37	-3.37	0.678	0.678	10 kW	0	41	172
FMC-2	1.0	1.0	0	0	1.0	1.0	20 kW	10 ft.	110	391
FMC-3	1.5	1.5	1.76	1.76	1.23	1.23	30 kW	20 ft.	178	610
FMC-4	2.1	2.1	3.22	3.22	1.45	1.45	40 kW	30 ft.	247	829
FMC-5	2.7	2.7	4.31	4.31	1.64	1.64	40 kW	40 ft.	315	1049
FMC-6	3.2	3.2	5.25	5.25	1.79	1.79	40 kW	50 ft.	384	1268
FMC-7	3.8	3.8	5.80	5.80	1.95	1.95	40 kW	60 ft.	452	1487
FMC-8	4.3	4.3	6.34	6.34	2.07	2.07	40 kW	70 ft.	520	1707
FMC-9	4.9	4.9	6.87	6.87	2.21	2.21	40 kW	80 ft.	589	1926
FMC-10	5.5	5.5	7.40	7.40	2.35	2.35	40 kW	90 ft.	658	2192
FMC-12	6.6	6.6	8.20	8.20	2.57	2.57	40 kW	110 ft.	795	2630
FMC-14	7.8	7.8	8.29	8.29	2.79	2.79	40 kW	130 ft.	931	3069
FMC-16	8.9	8.9	9.49	9.49	2.98	2.98	40 kW	150 ft.	1069	3507

Equipment furnished: antenna elements as required; antenna mounting hardware (specify tower manufacturer and type); interconnecting rigid coax transmission line section (6 ft.); standard 3/8-inch EIA female flange.

Accessory equipment: RF shielded deicer system, 300 watts per bay, 115 volts, 50/60 Hz . . . complete with conduit boxes and RF shielded interbay wiring harness. Thermo-switch for control of deicers. AC heater cable.

1. To obtain the effective free space field intensity at one mile in mv/m for one kilowatt antenna input power, multiply field gain by 138. 2. When determining coax line lengths on end feed antenna, add 6' to allow for matching stub. When determining coax line lengths on center feed antenna, termination will be 6' below center due to matching stub. 3. A typical leg mounting bracket weighs approximately 22 lbs. and is not included in weights given. 1 per bay required. Weights given included antenna bay and interconnecting feedline. 4. Based on 50 psf wind pressure on flat surfaces, 33 psf on cylindrical surfaces (110 mph actual wind velocity).

Directional Dual Cycloid FM Antenna



Gates' FMC-(X)DA is a directional dual polarized FM antenna designed for pole mounting. The antenna is available with up to eight bays (the X in the type number indicates the number of bays—the 4-bay antenna is FMC-4DA, etc.). The interbay transmission feed line uses $3\frac{1}{8}$ -inch rigid coaxial line. Spacing between bays is one wavelength.

Typical horizontally measured relative field patterns for both polarizations are shown in the figures on the next page. Minor variations may be obtained, such as varying the null at 180° , decreasing or increasing the lobes at 90° and 270° by a small amount, or increasing or decreasing the lobe at 0° by a small amount. Any such changes would alter the power gain figures shown in the chart on the next page by a small amount. Extensive change of pattern is only available on a custom basis, and at added cost, since a special study would be required, including extensive pattern testing on the antenna range.

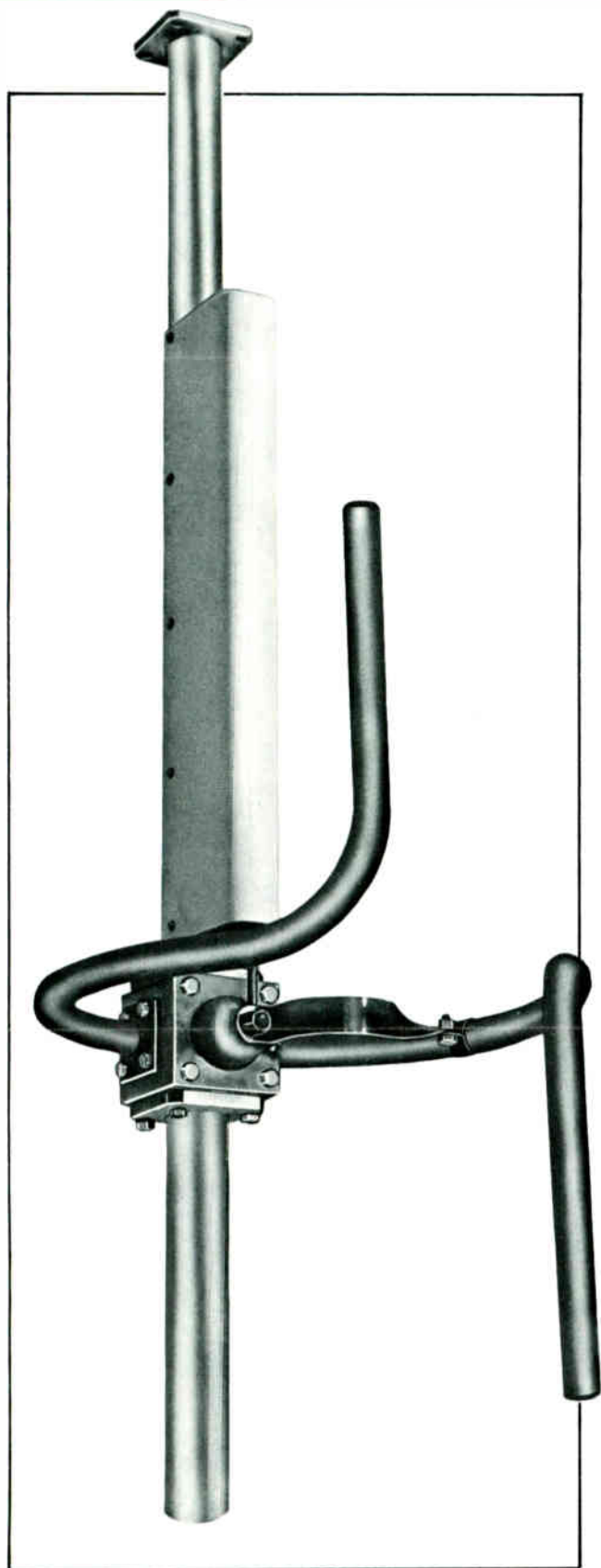
Each antenna bay uses a circularly polarized type driven element, plus one horizontal reflective screen and two parasitic vertical reflectors used for beam shaping to achieve the directional radiation pattern for both polarizations. The directional antenna patterns are developed by mechanical means, no special phasing lines being used. Thus, keeping the driven elements and beam shaping elements in good mechanical condition should be all that is required to maintain the pattern in adjustment.

Orders for the Gates Directional Dual Cycloid should stipulate the desired true azimuth orientation, radiated power limitations, transmitter power output capability, transmission line efficiency (or type and length of such line) and complete dimensions on the size of the pole to be used for the antenna mount. Antenna pattern requirements are normally stipulated by the station's consultant.

Each directional antenna is carefully patterned on an antenna range, not at the customer's site. A single bay of the antenna is mounted on a pole essentially identical in cross section to that on which the antenna is to be finally installed. Thus, it is necessary that the factory be supplied with complete data on pole diameters, step bolt size and location, and the location of any conduits and/or coaxial lines so that they may be duplicated during final testing.

The Directional Dual Cycloid can be equipped with factory installed heaters, and heaters are recommended for installations where icing may occur. A total of 900 watts of heat is used per antenna bay, which should assure proper deicing and maintenance of the antenna pattern during such weather conditions. Six 150-watt, 120-volt elements are used in each heater-equipped bay, and these individual elements may be replaced in the field. If a 240-volt supply for the heaters is desired, the order should so state so that heaters may be properly connected.

CLASS A CIRCULARLY POLARIZED FM ANTENNA



- **Low Profile—Low Windloading**
- **Stainless Steel Bellows Heater for Maximum Deicing**
- **Field Proven Design**
- **Rugged Brass Construction**

Gates Class A Circularly Polarized FM Antenna is the result of continuous Engineering research and development in the field of FM antennas. It provides the broadcaster with all of the electrical advantages of a high powered heavy duty Cycloid antenna, in a compact, low silhouette configuration for minimum windloading.

The antenna consists of a $1\frac{5}{8}$ " transmission line with individual bays separated by approximately one wavelength at the operating frequency. The Class A Circularly Polarized FM Antenna is carefully assembled and pre-tuned to the customer's operating frequency before leaving the factory. Tests are also conducted to insure that the antenna system is free from gas leaks.

Deicers consist of two 150 watt heating elements per bay, which are replaceable in the field. These elements are factory installed, and a junction box is included, allowing pig-tail connections to the interbay wiring (not supplied).

Null fill and beam tilt, utilized for the most part on higher power installations, are available on the Class A antenna. End fed, the antenna includes a six foot transformer section at the input, which has a $1\frac{5}{8}$ ", 50 ohm EIA female connector. Standard brackets for mounting the antenna on the tower leg are included with the antenna.

SPECIFICATIONS

ELECTRICAL

FREQUENCY RANGE: Factory tuned to one specific frequency in the 88-108 MHz band.

POLARIZATION: Circular, clockwise.

FREE SPACE PATTERN: Horizontal component circular ± 2 dB.

Vertical component circular ± 2 dB.

VERTICAL TO HORIZONTAL RATIO: Fixed at 1 to 1.

VSWR: 1.2 to 1 or better ± 200 kHz as tuned at the factory. VSWR when tower mounted 1.5 to 1 or better ± 200 kHz Capable of adjustment to 1.1 to 1 ± 100 kHz with field tuning.

POWER GAIN: Horizontal polarization: See table.
Vertical polarization: See table.

POWER INPUT RATING: Maximum of 5 kW for two to six bays. 3 kW for single bay.

INPUT CONNECTION: A six foot transformer section is provided on the bottom of each antenna system which has a 1 $\frac{5}{8}$ " 50 ohm EIA female connector.

MECHANICAL

WINDLOAD: Designed for 50 psf for flat surfaces, 33 psf for cylindrical surfaces.

WEIGHT: Single bay 27 lbs., less brackets. 1 $\frac{5}{8}$ " interbay coaxial line weighs approximately 10 lbs. per section.

DIMENSIONS: Height approximately 42". Length approximately 16".

Gates Type	Power Gain		dB Gain		(1) Field Gain		Power Rating	(2) Approx. Length	(3) Weight Lbs.	(4) Wind Loading
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical				
140 FMC-1A	0.46	0.46	-3.37	-3.37	0.678	0.678	3kW	0	27	87
1480 FMC-2A	1.0	1.0	0	0	1.0	1.0	5kW	10	64	168
2200 FMC-3A	1.5	1.5	1.76	1.76	1.23	1.23	5kW	20	101	249
2995 FMC-4A	2.1	2.1	3.22	3.22	1.45	1.45	5kW	30	138	330
3695 FMC-5A	2.7	2.7	4.31	4.31	1.64	1.64	5kW	40	175	411
4435 FMC-6A	3.2	3.2	5.05	5.05	1.79	1.79	5kW	50	212	492

- 1 To obtain the effective free space field intensity at one mile in Mv/M for one kilowatt antenna power, multiply field gain by 138.
- 2 When determining coax line lengths add six feet to the antenna length. A six foot transformer section is provided on the bottom of each antenna which has a 1 $\frac{5}{8}$ " E.I.A. female connector.
3. A single antenna bay weighs 27 lbs., the 1 $\frac{5}{8}$ " inter-bay coaxial line weighs approximately 10 lbs., and has been included in the above figures. Weights given are less mounting brackets.
- 4 Windloads are computed for a 100 MHz antenna, less mounting brackets and are based on 50 psf for flat surfaces, and 33 psf for cylindrical surfaces.

ORDERING INFORMATION

Class A Circularly Polarized FM Antenna FMC (No. of Bays) A

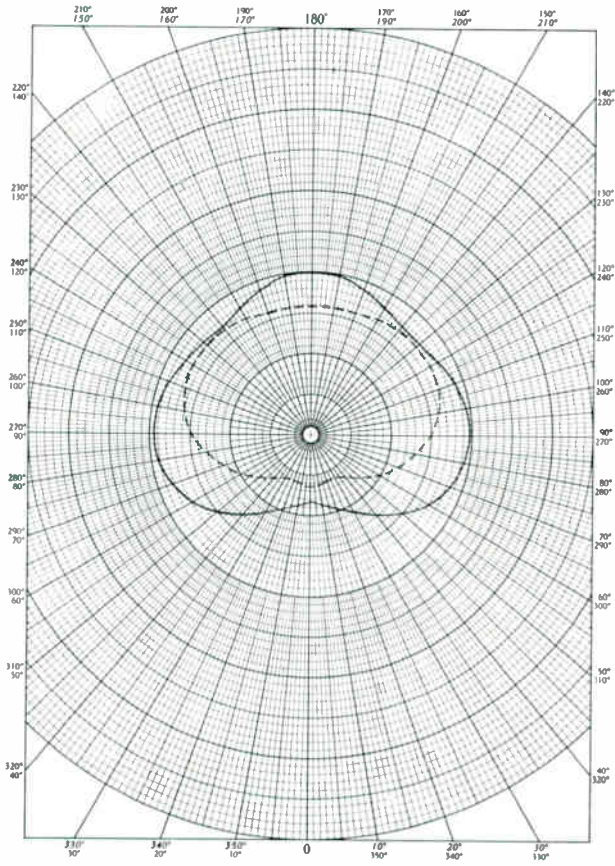
5175 FMC-7A

5915 FMC-8A



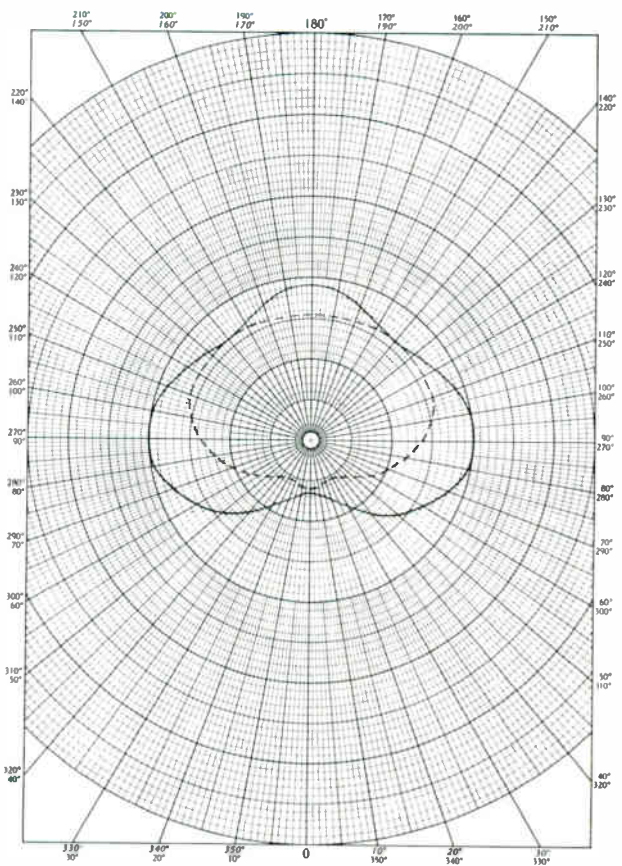
GATES RADIO COMPANY • QUINCY, ILLINOIS • 62301 • U.S.A.
A division of Harris-Intertype Corporation

Directional Dual Cycloid FM Antenna



PATTERN "A"
Horizontal Relative Field Patterns

Solid line—horizontal polarization HRMS 0.830
Dashed line—vertical polarization HRMS 0.659



PATTERN "B"
Horizontal Relative Field Patterns

Solid line—horizontal polarization VRMS 0.798
Dashed line—vertical polarization VRMS 0.619

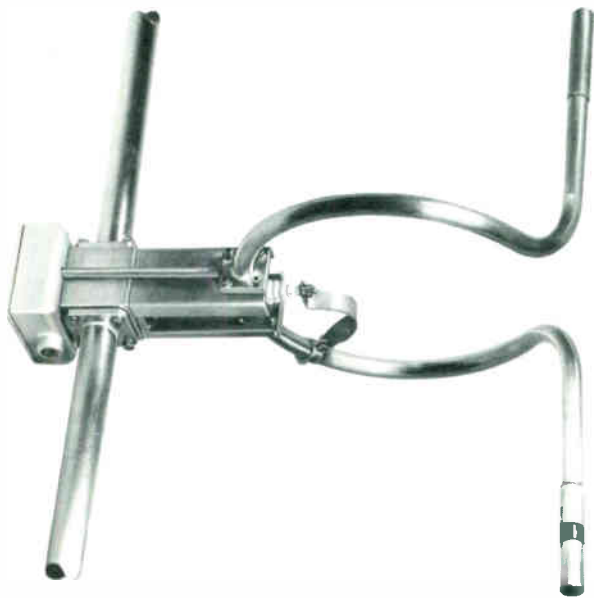
GATES TYPE	PATTERN "A"		PATTERN "B"		APPROX. WEIGHT*	CALCULATED WIND LOAD—50/33 PSF#
	Horiz. Pwr. Gain	Vert. Pwr. Gain	Horiz. Pwr. Gain	Vert. Pwr. Gain		
FMC-1DA	0.795	0.575	0.878	0.564	137 lbs.	354
FMC-2DA	1.71	1.23	1.89	1.21	284 lbs.	738
FMC-3DA	2.66	1.92	2.94	1.89	432 lbs.	1122
FMC-4DA	3.63	2.62	4.02	2.59	579 lbs.	1506
FMC-5DA	4.61	3.33	5.11	3.28	727 lbs.	1809
FMC-6DA	5.61	4.05	6.20	3.99	874 lbs.	2274
FMC-7DA	6.60	4.77	7.30	4.69	1022 lbs.	2658
FMC-8DA	7.60	5.49	8.42	5.41	1169 lbs.	3042

The above power gain figures will vary with the pattern shape. The power gain figures are given merely as a guide for roughly determining the number of bays required. Some variance may be expected in designing a given directional pattern, so that the exact gain figures are not known until the directional antenna pattern is finally achieved. Using pole mounting, the patterns should be quite similar to those patterns shown, but minor pattern changes may be achieved to fit given requirements.

* Weight includes interbay line, transformer section, brackets, heaters, heater junction boxes and heater wiring.

50 PSF wind pressure on flat surfaces, 33 PSF on cylindrical surfaces (110 MPH actual wind velocity). Wind load calculations include interbay line, transformer section, brackets, heater junction boxes and external heater wiring.

Circularly Polarized FM Antenna



DUAL-CYCLOID II FOR MEDIUM POWER STATIONS

Gates' Dual-Cycloid II circularly polarized FM antenna provides all of the electrical advantages of the Dual-Cycloid, in a lighter weight, low silhouette design for minimum windloading. The antenna features center feed for medium power handling capabilities—from four to twelve bays handle transmitter powers through 10 kilowatts. Antenna elements are normally spaced one wavelength apart with interconnecting transmission line sections and feed through a common antenna system input termination of 50 ohms, with a standard 3/8-inch EIA female flange.

The vertical sections have adjustable caps for the fine adjustment of the horizontal/vertical radiation ratio. All antenna elements are fabricated of a durable, weather-resistant brass alloy. Null fill and beam tilt available. Standard brackets for mounting the antenna on the tower leg are included with the antenna. Optional heaters consist of two 150-watt heating elements per bay, replaceable in the field. Interbay wiring is not included. Order Type FMC-(X)B. (X indicates the number of bays required.)

SPECIFICATIONS

FREQUENCY RANGE: Factory tuned to one specific frequency in the 88 to 108 MHz band.

POLARIZATION: Circular, clockwise.

FREE SPACE PATTERN: Horizontal component circular ± 2 dB.
Vertical component circular ± 2 dB.

VERTICAL TO HORIZONTAL POWER RATIO: Fixed at 50/50.

VSWR: 1.2 to 1 or better ± 200 kHz as tuned at the factory.

VSWR when tower mounted 1.5 to 1 or better ± 200 kHz. Capable of

adjustment 1.1 to 1 ± 100 kHz with field tuning.

POWER GAIN: Horizontal polarization: see table. Vertical polarization: see table.

POWER INPUT RATING: Maximum of 10 kW.

INPUT CONNECTION: 3/8" EIA female flange, 50 ohm.

WINDLOAD: Designed for 50 psf for flat surfaces, 33 psf for cylindrical surfaces.

GATES TYPE	POWER GAIN		dB GAIN		FIELD GAIN ¹		POWER RATING	APPROX. ² LENGTH	WEIGHT ³ (Lbs.)	WIND- ⁴ LOAD
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical				
FMC-4B	2.025	2.025	3.064	3.064	1.423	1.423	10 kW	30	147	340
FMC-5B	2.577	2.577	4.111	4.111	1.605	1.605	10 kW	40	175	412
FMC-6B	3.134	3.134	4.961	4.961	1.770	1.770	10 kW	50	204	485
FMC-7B	3.695	3.695	5.676	5.676	1.922	1.922	10 kW	60	232	557
FMC-8B	4.258	4.258	6.292	6.292	2.063	2.063	10 kW	70	261	629
FMC-9B	4.823	4.823	6.833	6.833	2.196	2.196	10 kW	80	289	701
FMC-10B	5.390	5.390	7.316	7.316	2.322	2.322	10 kW	90	318	773
FMC-11B	5.958	5.958	7.751	7.751	2.441	2.441	10 kW	100	346	845
FMC-12B	6.527	6.527	8.147	8.147	2.555	2.555	10 kW	110	375	917

1. To obtain the effective free space field intensity at one mile MV/M for one kilowatt antenna power, multiply field gain by 137.6.

2. The feed point of center fed antennas is 10 ft. below the center of the antenna. Center fed antennas have a 3/8" line input.

3. The weights given are less brackets, but the interbay transmission line, transformer section, the center fed tee section and elbow, are all included in the weight.

4. Windload based on 50 psf on flat surfaces and 33 psf for cylindrical surfaces (actual wind velocity 110 mph). Computed for 100 MHz antenna less mounting brackets and less heater junction boxes and heater cables.

Circularly Polarized FM Antenna

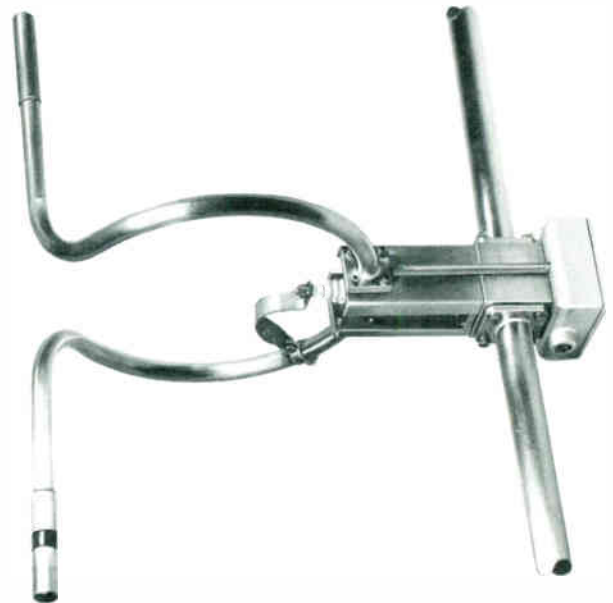
DUAL-CYCLOID III

FOR STATIONS UP TO 5 KILOWATTS

Designed for lower power stations, Gates' Dual-Cycloid III circularly polarized FM antenna is an end-fed version of the Dual-Cycloid II—it is lighter in weight, and has less windloading. From one to eight bays handle transmitter powers through 5 kilowatts.

The antenna consists of a 1½-inch transmission line with individual bays separated by approximately one wavelength at the operating frequency. All antenna elements are fabricated of a durable, weather-resistant brass alloy. Null fill and beam tilt are not available on the Dual-Cycloid III.

Deicers consist of two 150-watt heating elements per bay—interbay wiring is not included. These elements are factory installed, and are replaceable in the field. Standard brackets for mounting the antenna on the tower leg are included with the antenna. Order Type FMC-(X)A. (X indicates the number of bays required.)



SPECIFICATIONS

FREQUENCY RANGE: Factory tuned to one specific frequency in the 88-108 MHz band.

POLARIZATION: Circular, clockwise.

FREE SPACE PATTERN: Horizontal component circular ± 2 dB.
Vertical component circular ± 2 dB.

VERTICAL TO HORIZONTAL RATIO: Fixed at 50/50.

VSWR: 1.2 to 1 or better ± 200 kHz as tuned at the factory. VSWR when tower mounted 1.5 to 1 or better ± 200 kHz. Capable of adjustment to 1.1 to 1 ± 100 kHz with field tuning.

POWER GAIN: Horizontal polarization: see table.
Vertical polarization: see table.

POWER INPUT RATING: Maximum of 5 kW for two to eight bays. 3 kW for single bay.

INPUT CONNECTION: A six foot transformer section is provided on the bottom of each antenna system which has a 1½" 50 ohm EIA female connector.

WINDLOAD: Designed for 50 psf for flat surfaces, 33 psf for cylindrical surfaces.

WEIGHT: Single bay 24 lbs., less brackets. 1½" interbay coaxial line weighs approximately 10 lbs. per section.

DIMENSIONS: Single bay height approximately 42". Length approximately 16".

GATES TYPE	POWER GAIN		dB GAIN		FIELD GAIN ¹		POWER RATING	APPROX. ² LENGTH	WEIGHT ³ (lbs.)	WIND- ⁴ LOAD
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical				
FMC-1A	0.438	0.438	-3.585	-3.585	0.662	0.662	3 kW		24	54
FMC-2A	0.947	0.947	-0.237	-0.237	0.973	0.973	5 kW	10	53	126
FMC-3A	1.480	1.480	1.702	1.702	1.216	1.216	5 kW	20	81	198
FMC-4A	2.025	2.025	3.064	3.064	1.423	1.423	5 kW	30	110	271
FMC-5A	2.577	2.577	4.111	4.111	1.605	1.605	5 kW	40	138	343
FMC-6A	3.134	3.134	4.961	4.961	1.770	1.770	5 kW	50	167	414
FMC-7A	3.695	3.695	5.676	5.676	1.922	1.922	5 kW	60	196	486
FMC-8A	4.258	4.258	6.292	6.292	2.063	2.063	5 kW	70	225	558

1. To obtain the effective free space field intensity at one mile in MV/M for one kilowatt antenna power, multiply field gain by 137.6.

2. When determining coax length, add six feet to antenna length.

3. The weights given are less brackets, but the interbay transmission line and transformer section are all included in the weight.

4. Windload based on 50 psf on flat surfaces and 33 psf for cylindrical surfaces (actual wind velocity 110 mph). Computed for a 100 MHz antenna less mounting brackets and less heater junction boxes and heater cables.

Horizontally and Vertically Polarized FM Antennas



CYCLOID

Gates' Cycloid horizontally polarized FM antenna fills the need for a modern, easy to install and highly efficient antenna, with minimum standing wave ratio for FM stereo and monaural service. The field-proven Cycloid offers high gain and high power handling capabilities incorporated in an electrical design available exclusively from Gates.

The antenna is factory pretuned to the customer's frequency, assuring optimum on-the-air performance. Mounting brackets are supplied as a standard item. The Cycloid antenna is available with any number of bays from one to sixteen and with 1 $\frac{1}{8}$ -inch or 3 $\frac{1}{8}$ -inch line. See Gates' catalog (#99) price list for complete listing.

SPECIFICATIONS

FREQUENCY RANGE: Factory tuned to specified frequency in 88-108 MHz band.

POLARIZATION: Horizontal.

HORIZONTAL PATTERN: Circular, ± 1.0 dB in free space.

INPUT IMPEDANCE: 50 ohms, on 1 $\frac{1}{8}$ " or 3 $\frac{1}{8}$ " coax.

FEED POINT: 1 to 8 bays inclusive—end feed. 9 to 16 bays inclusive—center feed.

POWER RATING: 3 kW per section on 1 $\frac{1}{8}$ " line.

VSWR: (With field tuning) Top mounting, 1.1 to 1. Side mounting, 1.1 to 1. (Factory tuned) Top mounting 1.2 to 1. Side mounting, 1.5 to 1.

WINDLOAD: 20 lbs. per square foot.

DIMENSIONS: (One bay): Height (over-all), 6 inches. Ring diameter, approx. 18 inches (depends on frequency).

WEIGHT: Antenna, 25 lbs. per ring. 1 $\frac{1}{8}$ " line, 12 $\frac{1}{2}$ lbs. per 10 ft. section. 3 $\frac{1}{8}$ " line, 27 $\frac{1}{2}$ lbs. per 10 ft. section.

EQUIPMENT FURNISHED: Antenna mounting hardware (specify tower make, height and type number when ordering). Correct number of antenna elements as ordered. Interconnecting rigid coax (1 $\frac{1}{8}$ " or 3 $\frac{1}{8}$ ") as ordered. Standard EIA (1 $\frac{1}{8}$ " or 3 $\frac{1}{8}$ ") flanges as ordered.

ACCESSORY EQUIPMENT (Optional): Deicers: 300 watts (FMH-300). 600 watts (FMH-600). Antenna Heater Control.



TYPE 300G

The 300G vertically polarized FM antenna enables an FM station to transmit a supplemental vertically polarized signal to achieve elliptical or circular polarization as authorized in the FCC Rules and Regulations. It may be used in combination with any type of horizontally polarized FM antenna.

Both the 1 $\frac{1}{8}$ -inch and 3 $\frac{1}{8}$ -inch vertical antennas carry type number 300G. As these antennas are usually ordered as a system of several bays with connecting lines and breakers, the Gates price list is employed for more complete listings. Power division networks, both variable and fixed, are available to combine vertical and horizontal antennas, and are listed in Gates' catalog (#99) price list.

SPECIFICATIONS

FREQUENCY RANGE: Factory tuned to specified frequency in 88-108 MHz band.

POLARIZATION: Vertical.

POWER GAIN: Approximately equal to number of dipoles.

HORIZONTAL LINEARITY: Dipole circular ± 1 dB in free space.

INPUT IMPEDANCE: 50 ohms on 1 $\frac{1}{8}$ " or 3 $\frac{1}{8}$ " coax.

FEED POINT: For 9 bays or less, the antenna is end fed. For 10 bays or more, the antenna is center fed where number of bays is even, and for odd number of bays feed point is $\frac{1}{2}$ bay length below center.

POWER RATING: 3 kW per dipole.

VSWR: Tuned to 1.1:1 or less; less than 1.5:1 when mounted on side of tower.

WINDLOAD: 60 psf. on flat surfaces, 40 psf. on cylindrical surfaces (123 mph actual wind velocity).

DIMENSIONS: Length of dipole—3.75 ft. From center of transmission line to center of dipole—2.83 ft.

WEIGHT: 1 $\frac{1}{8}$ " dipole—26.5 lbs. 3 $\frac{1}{8}$ " dipole—34.0 lbs. Typical mounting bracket—22.0 lbs. per bay.

DEICERS: Not required.

FM Isolation Transformers, Antenna Accessories



25 kW ISOLATION TRANSFORMER.

The FM isolation transformer is designed to couple FM transmitter power across the base of an insulated tower used jointly as an AM and FM radiator, without objectionable mismatch being introduced into the FM transmission line. Single AM antennas and antennas which are part of an AM directional antenna system are not affected when the isolation transformer is used.

SPECIFICATIONS

(7.5, 10 and 25 kW Units)

FREQUENCY: 88 to 108 MHz (adjusted to the customer's operating frequency at the factory).

VSWR: Less than 1.05 to 1 on specified frequency, ± 0.5 MHz when terminated in a matched 50 ohm load.

POWER RATING: (Into matched 50-ohm load)

Model 620-0397—7.5 kW
Model 620-0415—10 kW
Model 620-0444—25 kW

INSERTION LOSS: 0.10 dB or less.

INPUT AND OUTPUT: (7.5 kW unit) EIA 1 $\frac{1}{2}$ " flange, male* or female. (10 kW unit) EIA 3 $\frac{1}{8}$ -inch flange, female. (25 kW unit) 3 $\frac{1}{8}$ -inch 50 ohm EIA male flange will mate with the 3 $\frac{1}{8}$ -inch female flange such as the Andrew type 78-AR-F used on 3 $\frac{1}{8}$ -inch Heliax cable, or the flange on Andrew type 562A 50 ohm 3 $\frac{1}{8}$ -inch rigid coaxial transmission line.

*Box has EIA male connector. The male to male adapter may be removed if box connects to female fitting. Subtract 6" from flange to flange length for each adapter if removed.

WEIGHT: (7.5 and 10 kW units) 48 lbs. (25 kW unit) 255 lbs.

LENGTH: (7.5 and 10 kW units) 20" flange to flange. (25 kW unit) 39" flange to flange.

MOUNTING: (7.5 and 10 kW units) 2" pipe flange on bottom of box. (25 kW unit) Separate 3" pipe flange on bottom. Two stainless steel straps secure tank to cradle.

PRESSURIZATION: Designed for use in a pressure system with gas passing through the unit. (Normal pressure 3 to 5 lbs. per square inch using dry air or dry gas.)

ORDERING INFORMATION

7.5 kW Isolation Transformer, adjusted to the customer's operating frequency at the factory. Standard EIA 1 $\frac{1}{2}$ " flanges. For use with a maximum transmitter power of 7.5 kW 620-0397

10 kW Isolation Transformer, adjusted to the customer's operating frequency at the factory. Standard EIA 3 $\frac{1}{8}$ " flanges. For use with a maximum transmitter power of 10 kW 620-0415

25 kW Isolation Transformer, adjusted to the customer's operating frequency at the factory. Standard EIA 3 $\frac{1}{8}$ " flanges. For use with a maximum transmitter power of 25 kW 620-0444

FM ANTENNA ACCESSORIES



AUTOMATIC ANTENNA HEATER CONTROL SYSTEM: (shown above). Fully automated control of FM, TV and other types of electrically operated broadcast and communications antenna heater systems. Suitable alarms indicate visually and aurally existing weather conditions and register partial and total heater failure.

SPECIFICATIONS

POWER INPUT: 115 VAC, 60 Hz.

INPUTS: Temperature sensors; precipitation sensor; heater failure sensor.

INDICATORS: Rain, freeze, low temperature, heaters, heater fail. Selectable aural alarm for any or all of those listed.

MOUNTING: Standard 3 $\frac{1}{2}$ " x 19" rack panel. 8 inches deep.

OPTIONS: 12 VDC function outputs for telemetering status data. Model 2570-CA calibration box. Power contactors and enclosures.

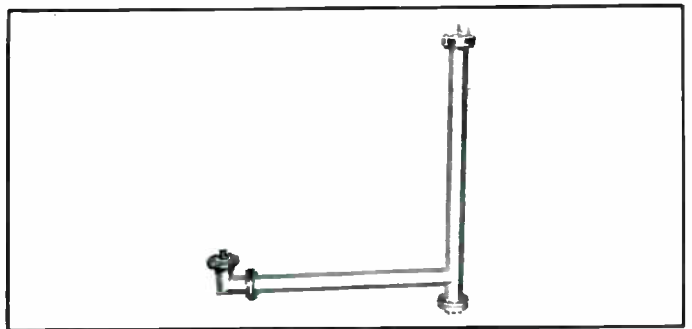
ORDER NUMBER: (Antenna heater control system) 710-0139

REPLACEMENT ANTENNA HEATER ELEMENTS:

Dual-Cycloid Antennas (2 elements per bay) 710-0136
Dual-Cycloid II (2 elements per bay) 710-0137
Cycloid Antenna (2 elements per bay) 710-0138

AC HEATER CABLE AND CONDUIT:

Includes installation. Only available when a tower or FM antenna is being installed.



FIXED POWER DIVIDER: (shown above). Custom designed to divide power for vertical and horizontal antennas to customer's specifications. Special order.

With 3 $\frac{1}{8}$ " EIA input and 3 $\frac{1}{8}$ " EIA output for both horizontal and vertical antennas.

With 1 $\frac{1}{2}$ " EIA input and 3 $\frac{1}{8}$ " EIA output for both horizontal and vertical antennas.

With 3 $\frac{1}{8}$ " EIA input and 1 $\frac{1}{2}$ " EIA output for both horizontal and vertical antennas.

With 1 $\frac{1}{2}$ " EIA input and 1 $\frac{1}{2}$ " EIA output for both horizontal and vertical antennas.

HARRIS



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