



high gain  
broad band  
fm  
antennas

J | A | M | P | R | O

ANTENNA COMPANY  
SACRAMENTO, CALIFORNIA

## JAMPRO FM ANTENNAS

### GENERAL

The exclusive JAMPRO FM feed system provides an antenna for broadcasters that has excellent VSWR characteristics, together with high gain. The JA-A series of broadband FM antennas are of sectionalized construction; each section consists of one radiating element, and interbay transmission line. A TV type of power divider common to all bays is used, with equal length inter-bay line to each bay. In the 13 to 20 bay antennas, two power dividers are used.

ALL JAMPRO antennas are factory tuned to the channel in the frequency range of 88 to 108 megacycles. A tower section simulating the customer's tower is used for tuning purposes to insure lowest VSWR when installed on the broadcaster's tower. This process assures the broadcaster of a completely checked out antenna that will provide a VSWR of under 1.2 to 1 for 400 kilocycle bandwidth.

Because of stringent electrical requirements imposed by multiplex stereo, broadcasters can meet this need by using a JAMPRO FM antenna.

### DESCRIPTION

The JA-A series of JAMPRO FM antennas utilizes the patented\* and time proven "V" element design, with modifications to improve the bandwidth and the aperture efficiency. The elements consist of two inch diameter heavy wall brass tubes, backed by a mounting plate of high conductivity. The 15 to 1 element length to diameter ratio provides excellent bandwidth.

The semi-flexible inter-bay cable, type RG-218, is made to U.S. Military specification MIL-C-17, and is covered with a heavy poly-vinyl-chloride jacket. It is weatherproof, operates under extreme temperature changes and has low electrical loss at the FM frequencies.

The various bays (up to 12) are fed from a single broadband power divider. Antennas with bays over 12 are fed through two power dividers. These are similar to those used in television batwing antennas. They have wide bandwidth, extremely low VSWR, and are capable of high power operation. The power dividers are available in 1-5/8 or 3-1/8 50 ohm inputs. This corporate method of feeding power to the various bays of an FM antenna is exclusive with JAMPRO.

Installation of the JAMPRO FM antennas is very easy. All necessary mounting hardware is included with the antenna at no additional charge. The power divider is the heaviest single component, weighing about 65 pounds. These antennas can be easily and quickly installed on a tower with one rigger and a helper.

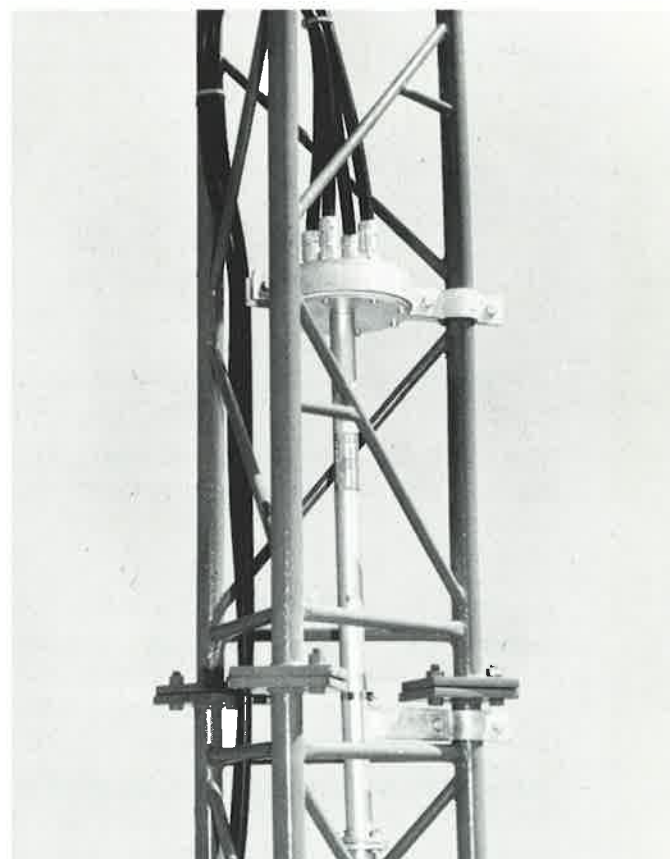
### HORIZONTAL PATTERN

The ideal mounting for a very circular horizontal pattern is a small diameter pole. However, practical limitations make tower leg mounting very desirable. The horizontal pattern with tower leg mounting depends on several factors. The face width of the tower, the type and size of the tower bracing material, frequency of operation and other factors contribute to the circularity. The number of bays, in the antenna is also important. As a general rule, the more bays, the more circular the pattern. With eight or more bays, pattern circularities of  $\pm 2$  DB have been measured with JAMPRO broadband antennas on towers with widths from 12 to 36 inches. Tapered self supporting towers also provide excellent circular patterns. This is the result of averaging of the patterns from the individual bays.

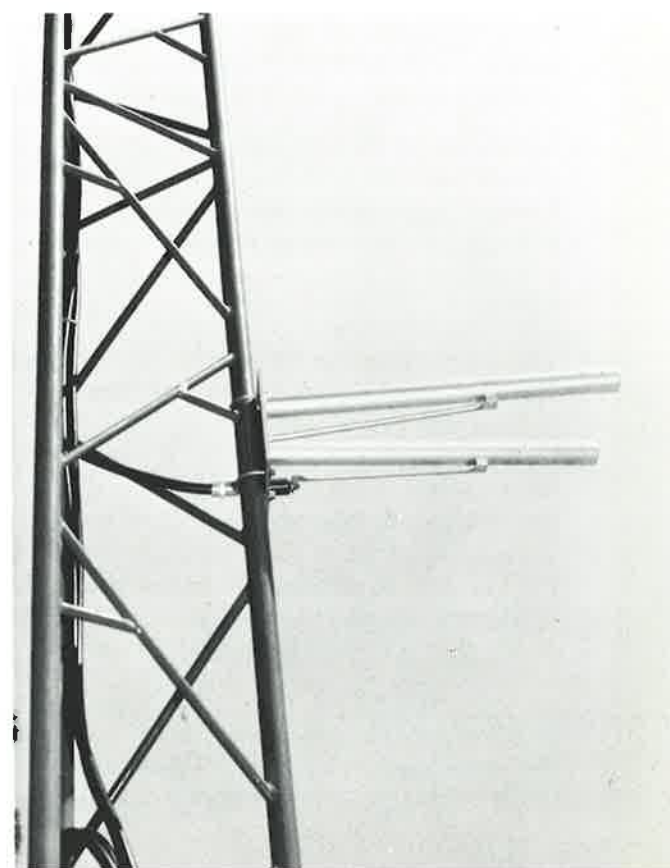
In some installations it may be desirable to mount the antenna inside of a large tower to protect it from falling ice. Where tower widths are over six feet this is quite feasible. Here again the horizontal pattern is the result of several factors including the tower width, tower member size and frequency of operation.

\* U.S. Patent 2,637,533

Four bay  
JA-4A  
JAMPRO  
power divider  
with 1-5/8"  
input and  
four 50 ohm  
inter-bay  
feed  
cables



Single  
bay JAMPRO  
broadband  
FM element,  
using tower  
leg mounting  
on a 24 inch  
wide uniform  
guyed  
tower.



## MOUNTING

### side mounting:

Because of its light weight and sectionalized construction, the JAMPRO JA-A FM antenna is easy and quick to install. Erection time is saved because there is no heavy hoisting. JAMPRO fabricates special mounting hardware for each customer's mounting requirements. Mounting hardware is included with the antenna thus saving extra charges and minimizing erection problems.

JAMPRO FM antennas are available in the popular tower leg mounting as well as top or pole mounting.

### pole mounting:

Tower leg mounting or side mounting to the tower has several advantages. Guyed towers and self-supporting towers of modest strength can be used, resulting in economy. Nearly all standard AM towers will support a side mounted JAMPRO JA-A broadband antenna. The horizontal pattern is affected by the presence of the tower, but not adversely.

Pole or top mounting antennas, are available from JAMPRO on special order. They may be mounted on top of existing towers, both guyed and self-supporting. Pole mounting is extremely useful in situations where the antenna is to be mounted on top of a building where the esthetic qualities are to be maintained. JAMPRO engineers will be pleased to provide quotations on special installation requirements, using either steel or aluminum poles.

## BUILT-IN DE-ICERS

Where over a quarter inch of ice is routine, de-icing is recommended. The simplicity of the JAMPRO elements, allows maximum efficiency in ice removal. Long strip heaters are inserted into the element arms, providing excellent heat transfer to ice sensitive members of the radiating element. Depending on type of connection, either 250 watts, or 1,000 watts of heat is available from a 110 volt AC source. 220 volts may also be used.

An automatic control unit, that operates the de-icers when temperatures fall below preset levels and turns them off when temperatures rise again, is supplied with each de-icer kit. Inter-bay de-icing cable, conduit and electrical junction boxes are provided to meet local electrical codes and to insure years of trouble-free operation.

The use of internal de-icer strips, does not affect the VSWR or RF operation of the JAMPRO broadband FM antenna in any way. De-icers are factory installed.

## VERTICAL PATTERN

The need for higher gain than can be obtained with a single bay antenna requires stacking the bays, one above the other. This procedure sharpens the vertical pattern. Where nulls are a problem because of antenna height and gain, JAMPRO can provide antennas with null fill-in. Antennas with beam tilting are also available, using phase delay techniques, without additional charge.

## BANDWIDTH AND VSWR

The exclusive JAMPRO corporate type feed system not only provides a high gain antenna, but insures a low VSWR for a given bandwidth. 400 kilocycles ( $\pm 200$  KC) is specified as the FM standard. Due to the inherent bandwidth of the individual elements and the feed system, JAMPRO FM antennas can maintain a VSWR of better than 1.2 to 1. A representative VSWR plot of an installed antenna is shown. Slug tuners or line matching transformers are not necessary with the JAMPRO broadband JA-A series of antennas.

The VSWR of this antenna is not affected by heavy fog or rain. Where heavy icing occurs, it is recommended that de-icers be ordered with the antenna. De-icers, consisting of electrical strip heaters are mounted inside the element arms, and they do not affect the VSWR of the antenna in any way.

## EXCLUSIVE CORPORATE FEED SYSTEM

In the corporate type of antenna feed systems, the transmitter power is fed into a power divider located near the center of the antenna array. Individual 50 ohm flexible cables, all equal length, are used to carry power to each bay. In antennas with 13 or more bays, two power dividers are used with one half of the bays connected to each divider. The phase and current in each bay is equal. This produces a uniformly illuminated antenna aperture, exclusive in JAMPRO FM antennas. Unlike common feedline antennas, the phase and current values of all the bays remain constant with modulation. The corporate feed system used in JAMPRO broadband FM antennas prevents any phase or amplitude change in the bay currents with modulation. The feed system is not frequency sensitive. This flat non-reactive load gives the broadcaster an antenna system meeting the highest requirements necessary in stereo multiplexing.

## POLARIZATION

While the majority of the radiation from the JAMPRO JA-A series is horizontally polarized, about four percent is vertically polarized. This vertical polarization is useful for automobile FM reception. Where greater vertical polarization is desired, JAMPRO can manufacture special antennas with up to 50 percent of the gain available in vertically polarized radiation.

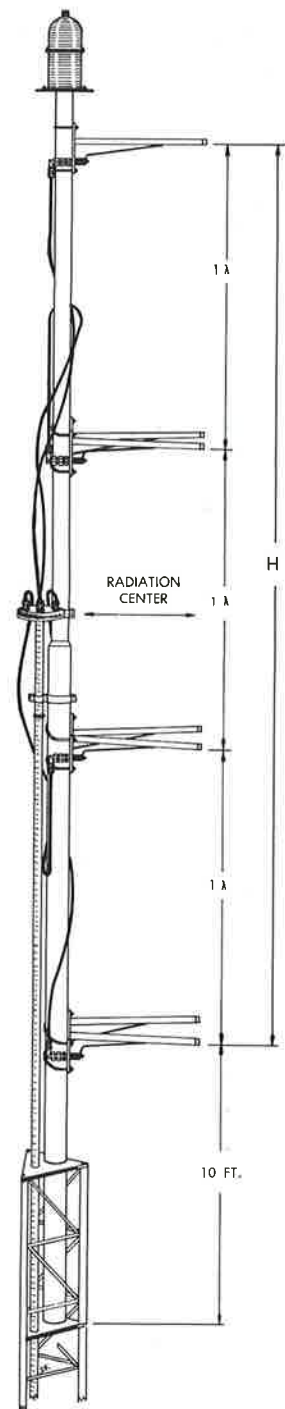
## MULTIPLEXING AND STEREO

The exclusive JAMPRO corporate type of feed system was designed to provide a flat non-reactive load so necessary for stereo requirements. Factory quality control specifications require all JAMPRO antennas to meet or exceed -27 DB return loss (1.09 to 1 VSWR) for  $\pm 200$  KC bandwidth. This is another exclusive JAMPRO test procedure insuring the highest quality antenna for FM, multiplexing and multiplex-stereo.

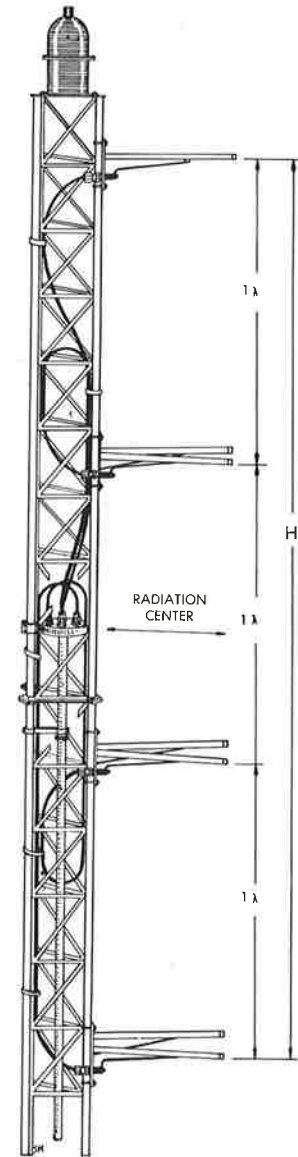


Four bay  
JAMPRO type  
JA-4A antenna  
showing typical tower  
leg mounting on a  
uniform cross section  
tower. Semi-flexible  
transmission line is  
used here to feed  
the 1-5/8" antenna  
input thru an adapter.  
Uniform length  
inter-bay cable  
is dressed inside  
the tower.

# JAMPRO FM ANTENNAS

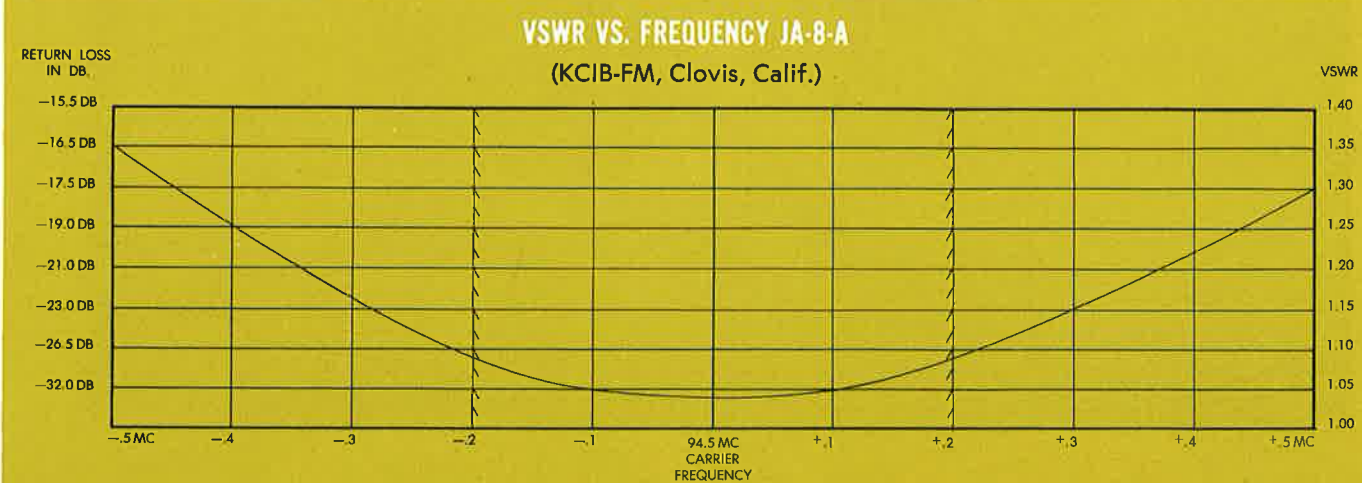


POLE MOUNTING



TOWER LEG MOUNTING

JAMPRO TYPE	NR. OF BAYS	GAIN			POWER RATING		INPUT CONNECTOR	HEIGHT ON TOWER (H)	WEIGHT IN LBS.	HORIZONTAL WINDLOADING	
		POWER	DB	FIELD	KW	DBK				Less Deicers	With Deicers
JA-1-A	1	0.9	0.5	0.95	10	10	LC	—	22	60	60
JA-1-AE	1	0.9	0.5	0.95	.05	-13.0	LC, N	—	19	58	58
JA-2-A	2	2.0	3.0	1.41	10	10	1-5/8"	10 ft.	90	116	140
JA-3-A	3	3.0	4.8	1.73	10	10	1-5/8"	20 ft.	125	175	265
JA-4-A	4	4.1	6.1	2.02	15	11.8	3-1/8"	30 ft.	175	260	380
JA-5-A	5	5.2	7.15	2.28	18	12.6	3-1/8"	40 ft.	225	340	490
JA-6-A	6	6.3	8.0	2.51	21	13.3	3-1/8"	50 ft.	275	460	640
JA-7-A	7	7.3	8.63	2.70	25	14.0	3-1/8"	60 ft.	325	565	775
JA-8-A	8	8.4	9.25	2.90	28	14.5	3-1/8"	70 ft.	375	695	935
JA-9-A	9	9.4	9.72	3.07	32	15.5	3-1/8"	80 ft.	425	900	1170
JA-10-A	10	10.5	10.2	3.25	35	15.5	3-1/8"	90 ft.	500	1080	1380
JA-11-A	11	11.5	10.6	3.39	38	15.8	3-1/8"	100 ft.	590	1260	1590
JA-12-A	12	12.5	11.0	3.55	42	16.5	3-1/8"	110 ft.	675	1470	1830
JA-13-A	13	13.6	11.33	3.69	46	16.7	3-1/8"	120 ft.	640	1190	1580
JA-14-A	14	14.6	11.65	3.83	50	17.0	3-1/8"	130 ft.	675	1410	1830
JA-15-A	15	15.6	11.93	3.95	50	17.0	3-1/8"	140 ft.	770	1580	2030
JA-16-A	16	16.6	12.20	4.07	50	17.0	3-1/8"	150 ft.	950	1750	2230
JA-20-A	20	21.0	13.22	4.59	50	17.0	3-1/8"	190 ft.	1600	2680	3280



- 1) Weight shown is net for complete antenna with standard mounting hardware but less any de-icing equipment. Add 10 pounds per bay for de-icing equipment.
- 2) Horizontal thrust based upon 30 pounds per square foot of projected round surface areas. (85 MPH wind).
- 3) The power gains are those compared to a half wave dipole.
- 4) The type JA-1-AE is designed for use in low power or educational applications.
- 5) Antennas with 13 or more bays use a "T" feed at the center of the array, and two power dividers.
- 6) Antennas with 2 through 12 bays have inputs located 36" below array center. 13 to 20 bays are fed at array center.
- 7) Height on tower or pole, (H), is computed for 98 Megacycles. (one wavelength spacing between bays)
- 8) VSWR is 1.2 to 1 or better for  $\pm 200$  KC when installed according to instructions.
- 9) Antenna radiation center is equal to one half of (H) height. See mounting sketches.