

Composite Messenger Antenna Array 8 (MAA8)

COBHAM

15 dB, 8.1 – 8.5 GHz, Seven-Panel Array Plus Up-look Antenna Family

The most important thing we build is trust.

Applications

- Long Distance A/V Mobile Links
- Airborne Surveillance Links
- Electronic News Gathering (ENG)
- Repeaters
- UAV/UGV Applications

Key System Features

(when used with COBHAM' ProRX Receiver)

- Low-Cost Tracking Antenna
- Provides 8.1 – 8.5 GHz Hemispherical Coverage (w/BDCC 8.1 -8.5 GHz)
- Fully Electronic Tracker
 - No moving parts!
 - High Reliability!
- Fully Automatic & Self-Contained
 - No GPS required!
 - No special equipment needed on the remote TX!
- Track multiple objects with one CMAA!
- Integral Block Down Converters or Low Noise Amplifiers optional
- Rugged Weather Proof Enclosure
- Optional Lightning Protection



COBHAM' Composite Messenger Antenna Arrays (CMAA) provides a reliable, cost effective alternative to conventional electro-mechanical Dual-Axis or Single-Axis Auto-Tracking Antenna Systems. When used with COBHAM's COFDM Professional Receiver (ProRX) [Sold Separately], this linear-polarized, wide-bandwidth (8.1 – 8.5 GHz) antenna array provides auto-tracking over an Hemispherical-pattern for one or multiple DVB-T COFDM Audio/Video compliant transmissions with 15 dB gain. It is a fully electronic system, designed for harsh outdoor environments!

The CMAA8, when used in conjunction with the high-performance ProRX, provides Maximal-Ratio Pre-Detection Diversity Combining that effectively sums the RF energy presented to any of the antennas. This capability, in conjunction with the equally spaced high-gain panel antennas, automatically provides reliable tracking of airborne transmission. At the crossover points between any two panel antennas, the ProRX's Pre-Detect Combining eliminates the dip in the receive pattern by adding an additional 2.5 dB gain through this region. Additionally, the CMAA8 has an up-look antenna to ensure coverage when the aircraft flies over the CMAA8.

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Another key attribute of the Composite Messenger Antenna Array/ProRX combination is that, unlike other systems that use GPS for positioning, there is no special equipment required at the transmitter. This capability greatly simplifies the implementation in the airborne vehicle.

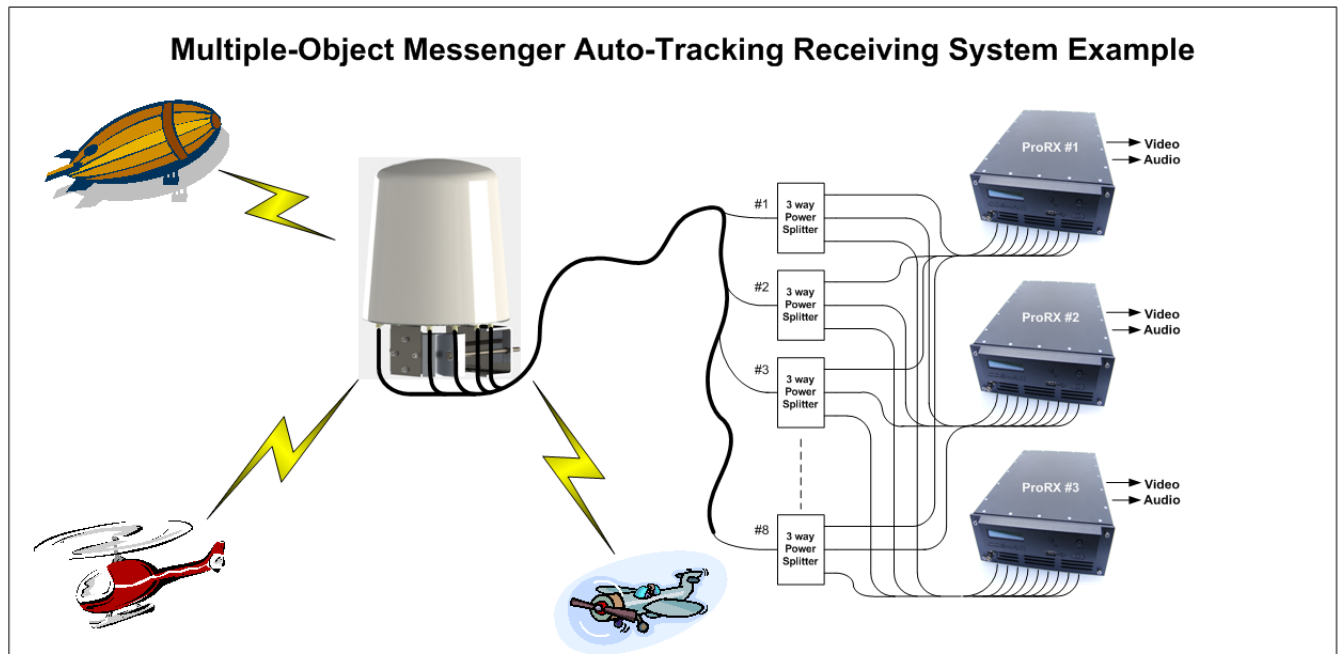


Figure 1: Multiple-Object Auto-Tracking Configuration

As shown in Figure 1, a single CMAA8 can be used to simultaneously track multiple transmitters. This is accomplished by adding commercial UHF/VHF splitters to the IF output of each Antenna Array Element and then distributing the split IF signals to multiple ProRXs, one ProRX for each tracked vehicle. This capability is not possible with conventional electro-mechanical tracking systems!

The CMAA8 consists of seven vertically polarized panel antennas each with 15 dB gain arranged in a uniform periphery (7 elements) for omni-directional coverage. Plus a RHCP Bifilar Helical Up-Look antenna to cover flight patterns above the array. All the antennas are contained in a single splash-proof, all-weather housing.

There are two basic configurations available “Radio Frequency” (RF) and “Intermediate Frequency” (IF) with multiple bands available for the “IF” models.

Radio Frequency (RF): RF-only models can be supplied with internal Low Noise Amplifiers (LNAs) for each antenna element or no internal electronics. RF-only models will output RF through 50-Ohm, N-FM connectors for all 8 antenna elements.

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Intermediate Frequency (IF): The “IF” CMAA8 models contain internally mounted Block Down-Converter Cards (BDCCs) for each antenna element. Note that the BDCC limits the systems frequency range to 8.1 – 8.5 GHz. The system antenna elements will output “IF” signals 400 – 800 MHz through a set of 75-Ohm, TNC-FM connectors.

The 3dB Beamwidth of each panel antenna is ~47 - ~56 degrees in azimuth and ~14 - ~20 degrees in elevation. Each of these antennas is tilted upward by 5 degrees to optimize antenna maximum gain to just above the horizontal plane.

Figure 2 is representative of the elevation pattern of the array. Gain is 15 dBi at 5 degrees elevation. It will be observed that gain on the horizon is about 14 dBi. The up-look antenna provides 4 dB of gain directly overhead with higher gain at lower elevations to provide optimum coverage of overhead passes.

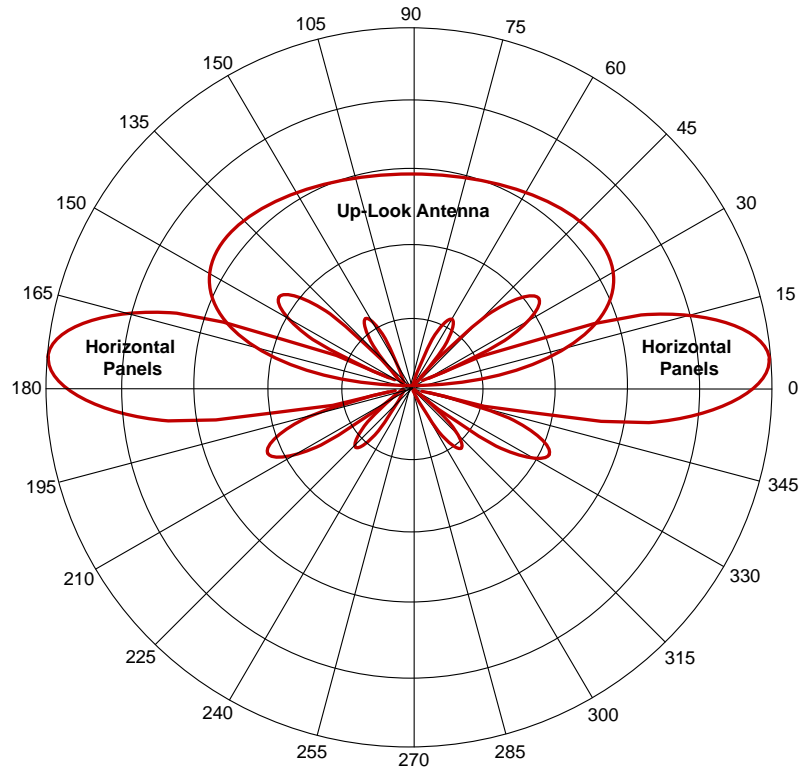


Figure 2: CMAA8 Elevation Pattern

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Likewise, Figure 3 is representative of the azimuth pattern at 5 degrees elevation. The gain on the horizon is expected to be 14 dBi and the pattern is identical.

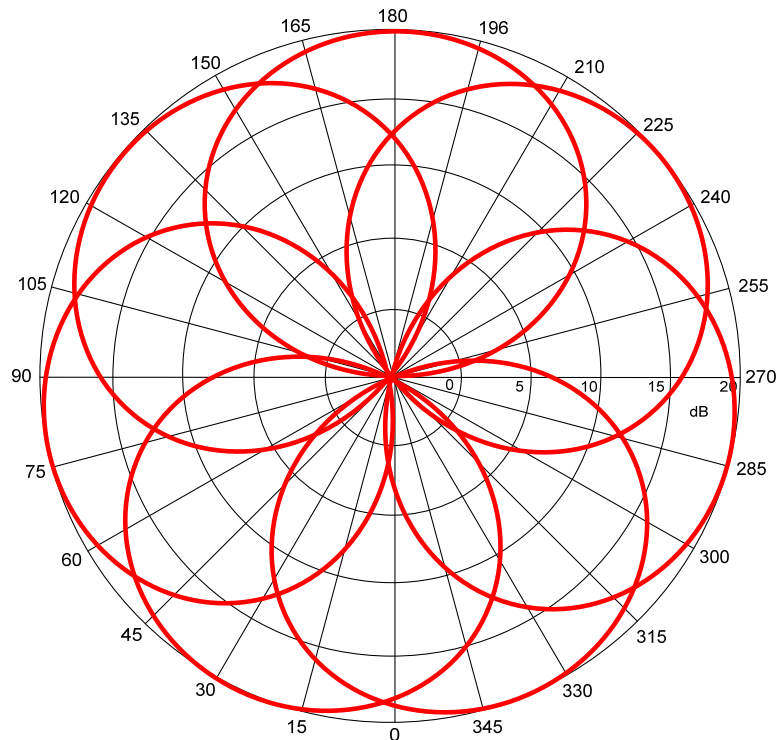


Figure 3: Projected Panel Antenna Azimuth Pattern

The net effect of these eight antennas and the diversity properties of the COFDM receivers are to provide unbroken aircraft coverage over a hemispherical-pattern without resort to moving parts (mechanical auto trackers). Note that from a system standpoint the dip at the cross-over point between any of the two antenna elements will be eliminated due to the Pre-Detect Diversity Combining gain of the PRORX receiver. This provides excellent coverage over a modified OMNI pattern.

The internal pipe mount bracket can accommodate pipe sizes from 2" to 6". We also offer offset-mount and magnetic mount options. The offset-mount option is shown in Figure 4.

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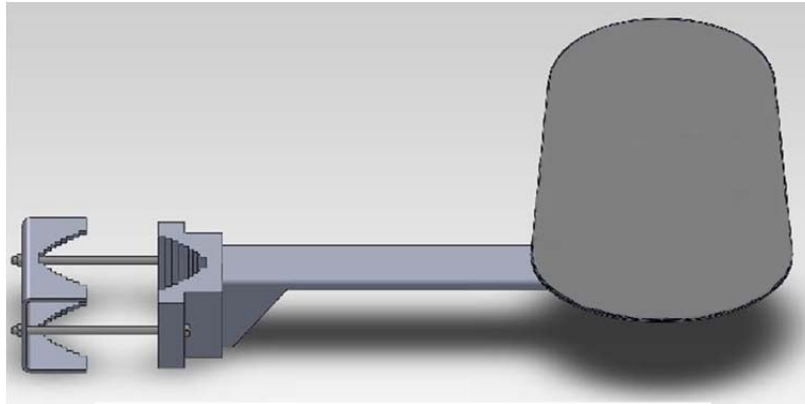


Figure 4: Offset-Arm Mounting Option

The tracking ability of the CMAA8 and PRORX combination is enabled by the PRORX's Multiple-Input Maximal-Ratio Diversity Combining ability that sums the signals of up to eight independent receive paths. Maximal-Ratio Diversity Combining can increase the Signal to Noise Ratio (SNR) by 2.5 dB or 78% for two inputs if the antennas are getting the same signal from a transmitter.

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Specifications:

Model Number: CMAA8X515XX1

Electrical Specifications:

Horizontal Panels

Number of Panels: 7
 Panel Spacing: 51.4 Deg
 Up Tilt: 5 Deg
 Frequency: 8.1 – 8.5 GHz
 Polarization: Linear
 Gain: 15.1 dBi @ 8.1 GHz
 15.4 dBi @ 8.3 GHz
 15.7 dBi @ 8.5 GHz
 HPBW: Vert: 14.1°, Horiz: 62.5° @ 5.9 GHz
 Vert: 14.7°, Horiz: 62.0° @ 6.65 GHz
 Vert: 15.3°, Horiz: 61.5° @ 7.4 GHz
 Z / VSWR: 50 Ohms / <= 1.5:1
 Power: 10 Watt (Max)
 Connectors: Type 'N-FM'

Up-Look Antenna

Frequency: 8.1 – 8.5 GHz
 Polarization: RHCP
 Gain: at Frequency and Angle

		Frequency (GHz)		
		8.1	8.3	8.5
Angle	20	6.13	6.32	6.52
	35	0.53	0.33	0.13
	50	-2.02	-2.35	-2.69
	90	-0.75	-0.97	-1.19

Z / VSWR: 50 Ohms / <= 1.5:1
 Power: 10 Watt (Max)
 Connector: Type 'N-FM'

Mechanical Specifications:

Weight: 15.62 lbs (7.1 kg)
 Dimensions:
 Antenna Only
 12.12" max diameter x 13.22" high
 30.78 cm max diameter x 33.58 cm high
 Pipe mounting Bracket

Composite Messenger Antenna Array 8 (CMAA8)



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4.69 “ (11.91 cm) high
Clamping Diameter Range: 2” to 6”
(5.1 cm to 15.24 cm)

Construction: White UV tolerant Kydex Radome
Aluminum Ground Plane
Mounting: 4 each 10-32 Studs
Rating: Outdoor, Fixed or Mobile

Environmental:

Operational Temperature: -20 to 70 deg C
Humidity: Up to 100%
Wind Loading: Designed to 100 mph

Model Number: CMAA8XB15TBD3**

Electrical Specifications:

Horizontal Panels

Number of Panels: 7
Panel Spacing: 51.4 Deg
Up Tilt: 5 Deg
Frequency: 8.1 – 8.5 GHz
Polarization: Linear
Gain: 15.1 dBi @ 8.1 GHz
15.4 dBi @ 8.3 GHz
15.7 dBi @ 8.5 GHz
HPBW: Vert: 14.1°, Horiz: 62.5° @ 8.1 GHz
Vert: 14.7°, Horiz: 62.0° @ 8.3 GHz
Vert: 15.3°, Horiz: 61.5° @ 8.5 GHz
Z / VSWR: 50 Ohms / <= 1.5:1
Power: 10 Watt (Max)
Connectors: Type 'N-FM'

Up-Look Antenna

Frequency: 8.1 – 8.5 GHz
Polarization: RHCP
Gain: at Frequency and Angle
Frequency (GHz)

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	8.1	8.3	8.5
20	6.13	6.32	6.52
35	0.53	0.33	0.13
50	-2.02	-2.35	-2.69
90	-0.75	-0.97	-1.19

Z / VSWR: 50 Ohms / <= 1.5:1
 Power: 10 Watt (Max)
 Connector: Type 'N-FM'

Low Noise Amplifier (LNA) Characteristics

Noise Figure: 2.5 dB**
 Gain: TBD dB min / TBD dB typical**
 DC Power: 12 VDC via IF connector @ 80 mA each
 Full Specs: Refer to LNA Data Sheet #: 100-DS0077**
 ** In Development

Mechanical Specifications:

Weight: 15.62 lbs (7.1 kg)
 Dimensions:
 Antenna Only
 12.12" max diameter x 13.22" high
 30.78 cm max diameter x 33.58 cm high
 Pipe mounting Bracket
 4.69" (11.91 cm) high
 Clamping Diameter Range: 2" to 6"
 (5.1 cm to 15.24 cm)

Construction: White UV tolerant Kydex Radome
 Aluminum Ground Plane

Mounting: 4 each 10-32 Studs

Rating: Outdoor, Fixed or Mobile

Environmental:

Operational Temperature: -20 to 70 deg C
 Humidity: Up to 100%
 Wind Loading: Designed to 100 mph

Composite Messenger Antenna Array 8 (CMAA8)



15 dB, 8.1 – 8.5 GHz, Seven-Panel Array Plus Up-Look Antenna Family

Model Number: CMAA8X5158S2**

Electrical Specifications:

Horizontal Panels

Number of Panels: 7
Panel Spacing: 51.4 Deg
Up Tilt: 5 Deg
Frequency: 8.1 – 8.5 GHz
Polarization: Linear
Gain: 15.1 dBi @ 8.1 GHz
15.4 dBi @ 8.3 GHz
15.7 dBi @ 8.5 GHz
HPBW: Vert: 14.1°, Horiz: 62.5° @ 8.1 GHz
Vert: 14.7°, Horiz: 62.0° @ 8.3 GHz
Vert: 15.3°, Horiz: 61.5° @ 8.5 GHz
Z / VSWR: 75 Ohms / <= 1.5:1
Connectors: Type 'TNC-FM'

Up-Look Antenna

Frequency: 8.1 – 8.5 GHz
Polarization: RHCP
Gain: at Frequency and Angle

		Frequency (GHz)		
		8.1	8.3	8.5
Angle	20	6.13	6.32	6.52
	35	0.53	0.33	0.13
	50	-2.02	-2.35	-2.69
	90	-0.75	-0.97	-1.19

Z / VSWR: 50 Ohms / <= 1.5:1
Connector: Type 'TNC-FM'

Block Down Converter Card (BDCC) Characteristics

RF Range: 8.1 – 8.5 GHz**
Noise Figure: 3.5 dB**
IF Frequency: 400 – 800 MHz**
DC Power: 12 VDC via IF connector or DB-25
Full Specs: Refer to BDCC Data Sheet #: 100-DS0333**
** In Development

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Additional Array Electrical Specifications

Connector: DB-25F with water resistant cover
(Used for Control and optional BDCC
powering)

<u>Pin</u>	<u>Signal</u>
1 – 4	+12V (@ 2.5A max)
5	TX1*
6	RX1*
7	TX3*
8	RX3*
9	TX5*
10	RX5*
11	TX7*
12	RX7*
13	NC
14 - 17	GND
18	TX2*
19	RX2*
20	TX4*
21	RX4*
22	TX6*
23	RX6*
24	TX8*
25	RX8*

* 3 wire RS-232C control (Use TX, RX &
GND) for each BDC #1 - #8

LEDs DC Power Indicator - one for each BDCC
at the bottom of the Array housing

Mechanical Specifications:

Weight: 18.8 lbs (8.5 kg)

Dimensions:

Antenna Only

12.12" max diameter x 13.22" high

30.78 cm max diameter x 33.58 cm high

Pipe mounting Bracket

4.69 " (11.91 cm) high

Clamping Diameter Range: 2" to 6"

(5.1 cm to 15.24 cm)

Construction: White UV tolerant Kydex Radome
Aluminum Ground Plane

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Mounting: 4 each 10-32 Studs
Rating: Outdoor, Fixed or Mobile

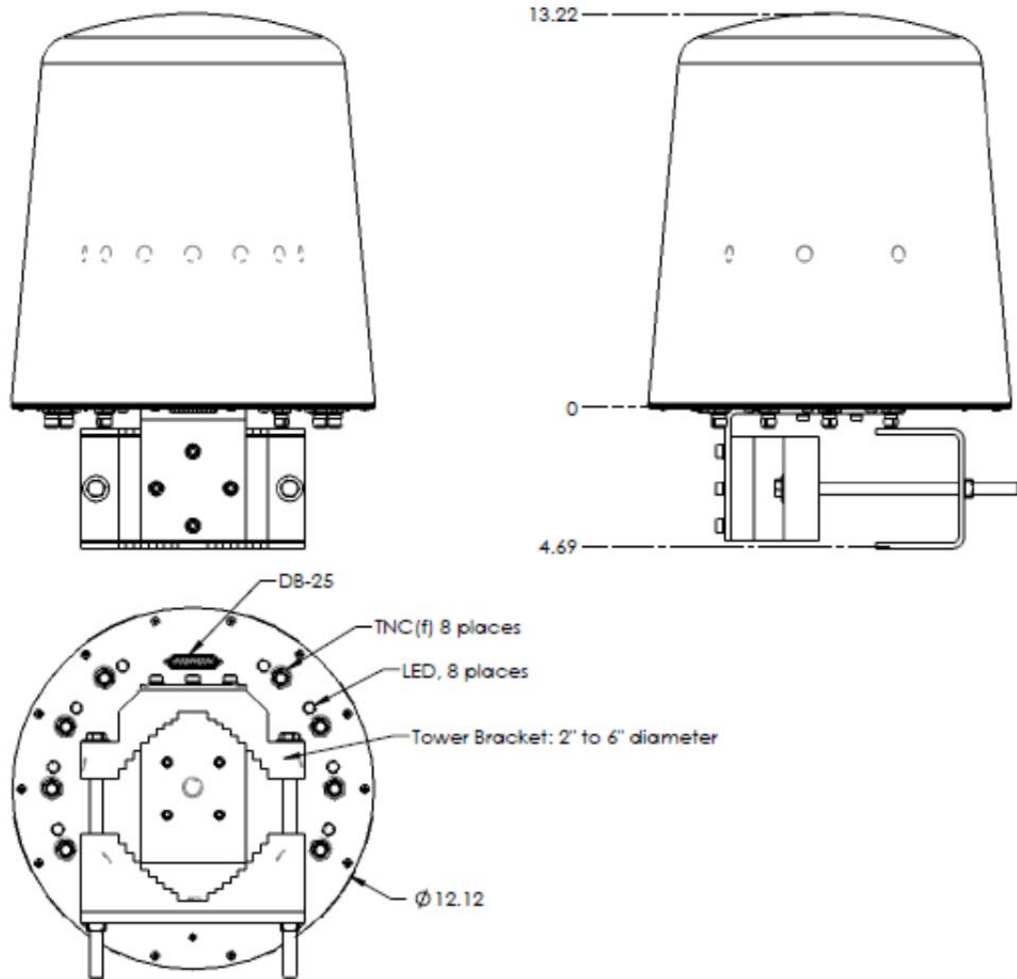
Environmental:

Operational Temperature: -20 to 70 deg C
Humidity: Up to 100%
Wind Loading: Designed to 100 mph

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DB-25 is not installed for RF out versions and N-FM connectors are used in-place of TNC-FM conn shown.