DB212 Series

25-50 MHz Side Mount Gain Antennas

Assembly and Mounting Instructions

PRODUCT DESCRIPTION

The DB212 Series antennas are specially designed for mounting on the legs of towers. They consist of folded dipole radiating elements phased together through a matching network. Popular models are DB212 (2 dipole), DB212-3 (3 dipole), DB212-4 (4 dipole) and DB212-6 (6 dipole).

The gain and radiation patterns of the DB212 Series depend upon several factors: orientation of the elements with respect to the tower, whether the elements are mounted on the same or on different tower legs, the cross-section size of the tower, and the vertical spacing between dipoles.

The gains provided by the antennas (with respect to a vertical half-wave dipole) and the pattern shapes are shown in Figures 2 through 6. These gains and patterns apply when the antennas are mounted on triangular and square towers measuring 18-24 inches across the face of the tower. Table 1 lists average gain and circularity specifications when the antennas are mounted on larger towers

GENERAL MOUNTING INFORMATION

The tower leg itself is important in the operation of the DB212 Series. When the antennas are mounted, the tower leg must be parallel with the elements. In addition, the top edge of the topmost dipole must be mounted a minimum of 3 feet below the top of the tower. All dipoles should be clear of guy wires or other metal objects by a distance of 2 to 3 feet, or more.

Paint or rust should be cleared from the attachment area to provide good metal-to-metal contact with the tower. To ensure good static drainage, lightning protection, and efficient operation, the tower must be well grounded.

GAIN AND PATTERN SHAPING

To obtain the patterns shown in Figures 2 through 6, the dipoles must be properly positioned around the tower. The small numbers adjacent to the tower symbol in the center of each pattern (see Figures 2 through 6) refer to the antenna dipoles according to the order in which they should be positioned around the tower. For example: The number “1” refers to the topmost dipole. Successive dipoles going down the tower are numbered “2”, “3”, “4”, etc.

To obtain the maximum gain in any pattern shape, the center-to-center vertical spacing between the dipoles should be between 3/4 and 1-1/4 wavelength. A suggested center-to-center vertical separation for the antennas is shown as length “A” in Table 2 on page 4. This spacing between dipoles can be varied a small amount with little change in efficiency. This flexibility of vertical separation may be used to avoid guy wire interference.

INSTALLATION

Installing the DB212-2 (refer to Figure 7):

1. After removing the antenna from the shipping box, inspect it to be sure all parts are on hand and that there is no physical damage.
2. Inspect the antenna feed assembly and the output connector at the end of the flexible transformer lead (marked red) to determine that it mates with the end of the station transmission line. Do not remove any connectors or cables from the antenna feed assembly; they are all part of the antenna.
3. Verify that the frequency to which the antenna has been tuned is the frequency at which the radio system is to operate.
4. Determine the desired pattern shape and the leg of the tower onto which Dipoles 1 and 2 should be mounted.

Warning!

Installation of any antenna near power lines is *dangerous*.
For your safety, follow the installation procedures.

5. Verify that the element marked with the red tape is toward the top and the “UP” arrow is properly oriented. This will position the feeder cable on the top side of the mounting bracket. Failure to mount all dipoles in this manner will result in an out-of-phase condition which will impair the performance of the antennas.

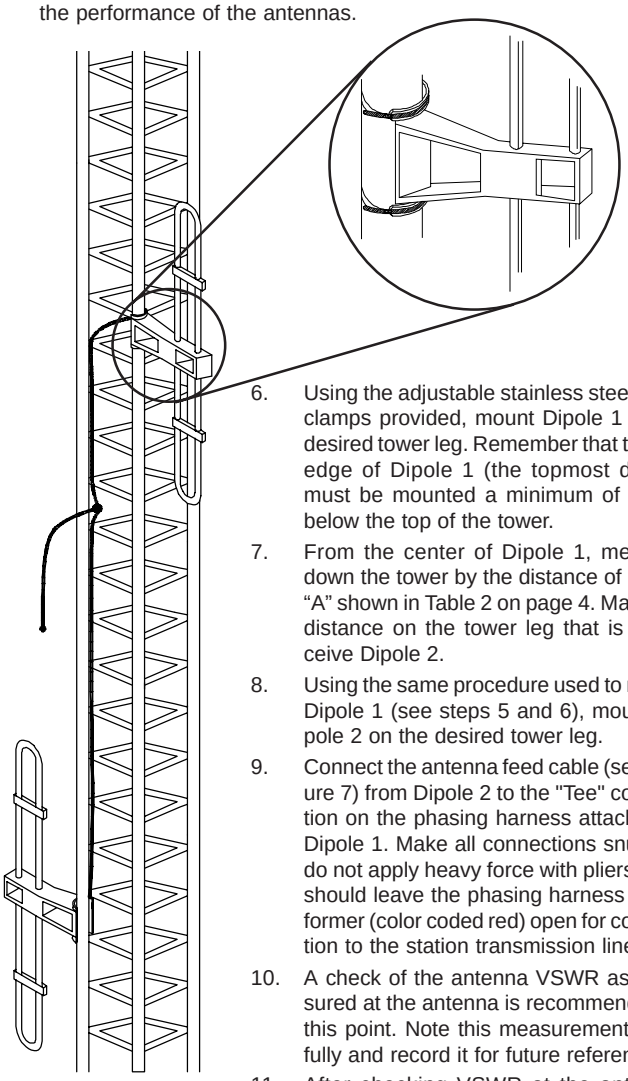

Figure 1 - DB212 Antennas on tower legs. Inset: Band clamp detail.

6. Using the adjustable stainless steel band clamps provided, mount Dipole 1 to the desired tower leg. Remember that the top edge of Dipole 1 (the topmost dipole) must be mounted a minimum of 3 feet below the top of the tower.
7. From the center of Dipole 1, measure down the tower by the distance of length “A” shown in Table 2 on page 4. Mark this distance on the tower leg that is to receive Dipole 2.
8. Using the same procedure used to mount Dipole 1 (see steps 5 and 6), mount Dipole 2 on the desired tower leg.
9. Connect the antenna feed cable (see Figure 7) from Dipole 2 to the "Tee" connection on the phasing harness attached to Dipole 1. Make all connections snug but do not apply heavy force with pliers. This should leave the phasing harness transformer (color coded red) open for connection to the station transmission line.
10. A check of the antenna VSWR as measured at the antenna is recommended at this point. Note this measurement carefully and record it for future reference.
11. After checking VSWR at the antenna, connect the station transmission line to the phasing harness transformer.
12. To avoid moisture problems, carefully wrap all cable connections with Vapor-Wrap. Work the compound into all cracks and smooth it over the outer jackets of the transmission lines. Failure to waterproof the cable connectors will result in improper operation of the antenna.

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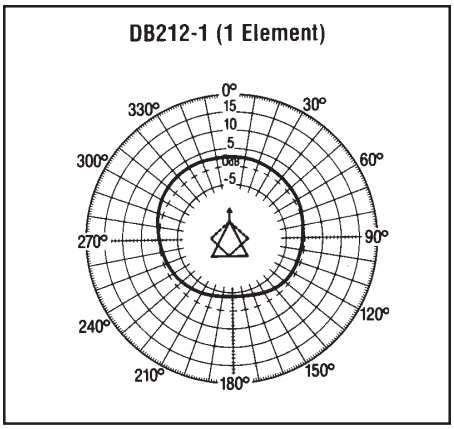

Figure 2 - DB212-1 (1 element)

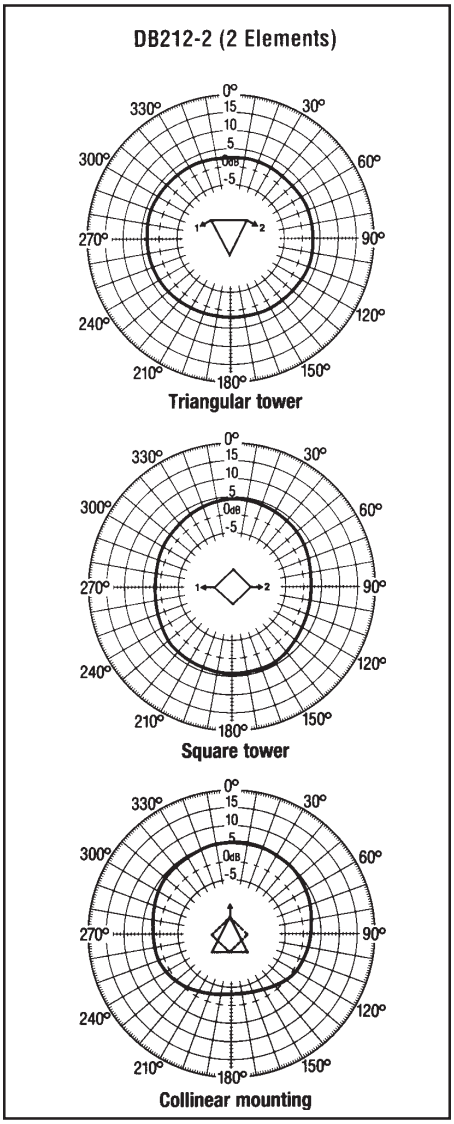

Figure 3 - DB212-2 (2 elements)

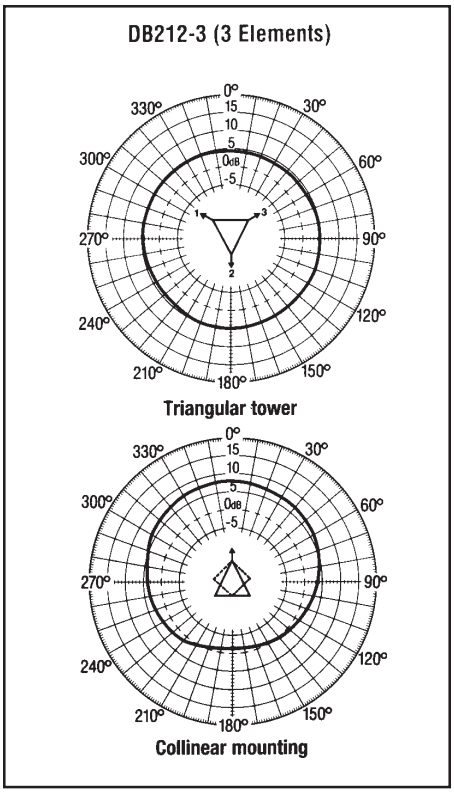

Figure 4 - DB212-3 (3 elements)

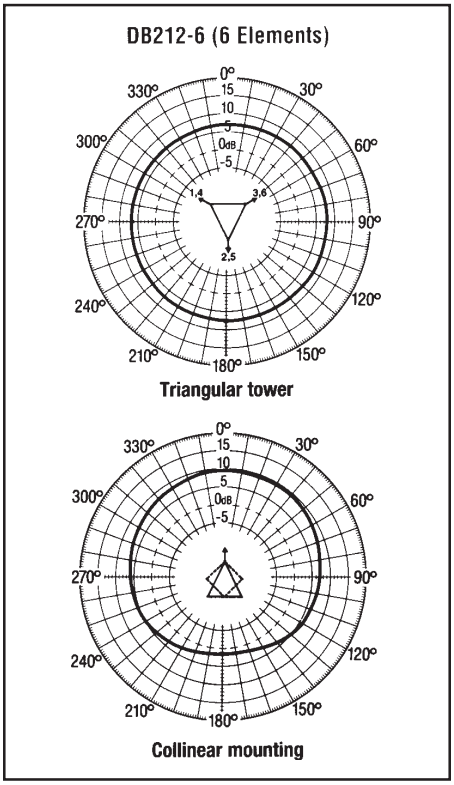

Figure 5 - DB212-4 (4 elements)

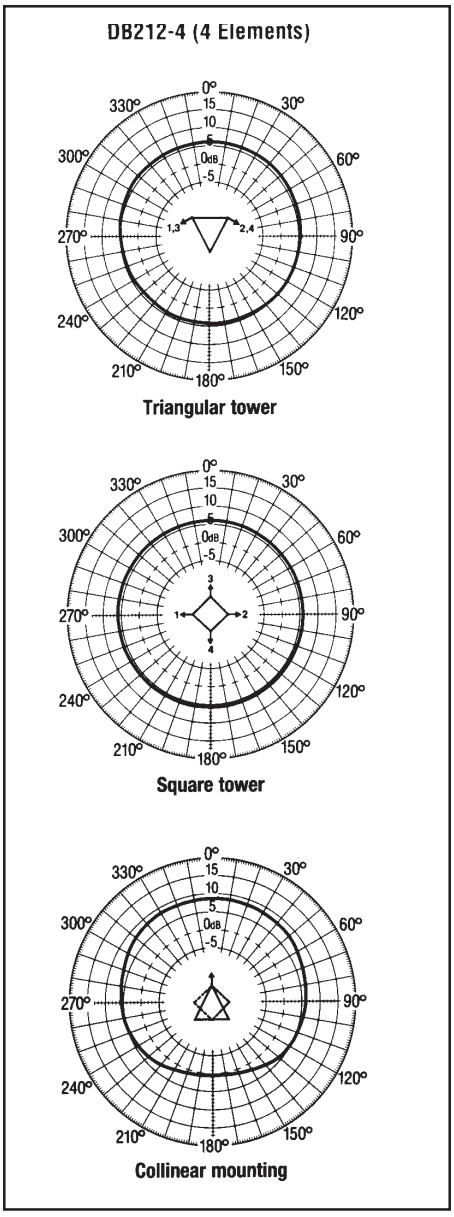

Figure 6 - DB212-6 (6 elements)

The shape in the center of each pattern represents the tower. The small numbers adjacent to the tower symbols refer to the tower symbols refer to the antenna dipoles according to the order in which they should be positioned around the tower (see "Gain and Pattern Shaping" on page 1 for more details).

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13. Secure the phasing harness and transmission line to the tower in the best position to avoid damage to the cables.
14. After the antenna and transmission line have been installed, a careful check should be made to ensure that:
    - All mechanical connections have been securely made.
    - Each dipole is mounted on the proper leg of the tower with sufficient physical clearance.
    - Each dipole is mounted with the proper element pointing “up.”
    - All connections have been carefully wrapped with Vapor-Wrap to prevent moisture problems.

Installing the DB212-3 (refer to Figure 8):

The DB212-3 consists of *three* dipoles with a special phasing harness.

1. Determine the desired pattern shape and the legs of the tower onto which Dipoles 1, 2, and 3 should be mounted (see page 1).
2. Mount Dipoles 1 and 2 as described in steps 5 through 8 of the DB212-2 installation procedure (see page 1).
3. After mounting Dipoles 1 and 2, measure down the tower from the center of Dipole 2 by the distance specified by length “A” in Table 2 on page 4. Mark this distance on the tower leg that is to receive Dipole 3.
4. Using the same procedure used to mount Dipoles 1 and 2, mount Dipole 3 on the desired tower leg.
5 Connect the phasing harness (see Figure 8) to the three dipoles; be sure to match the color codes. Make all connections snug but do not apply heavy force with pliers. This should leave the phasing harness transformer (color coded red) open for connection to the station transmission line.
6. To complete the installation of the DB212-3, check the VSWR and weatherproof the connections as described in steps 10 through 14 of the DB212-2 instructions (see page 1).

Installing the DB212-4 (refer to Figure 9):

The DB212-4 consists of *four* dipoles. It should be thought of as two DB212-2 antennas with a connecting harness for phasing the two DB212-2 units together.

1. Determine the desired pattern shape and the legs of the tower onto which Dipoles 1, 2, 3 and 4 should be mounted (see page 1).
2. Mount Dipoles 1 and 2 as described in steps 5 through 8 of the DB212-2 installation procedures (see page 1).
3. After mounting Dipoles 1 and 2, measure down the tower from the center of Dipole 2 by the distance specified by length “A” in Table 2 on page 4. Mark this distance on the tower leg that is to receive Dipole 3.
4. Using the same procedure used to mount Dipoles 1 and 2, mount Dipoles 3 and 4 on the desired tower legs.
5. Connect the antenna feed cable (see Figure 9) from Dipole 2 to the "Tee" connection on the phasing harness attached to Dipole 1. Make the connections snug but do not apply heavy force with pliers.
6. Connect the antenna feed cable from Dipole 3 to Dipole 4. Make the connections snug but do not apply heavy force with pliers.
7. There should now be two complete DB212-2 antennas mounted with Dipoles 1 and 2 connected together and with Dipoles 3 and 4 connected together.
8. Using the DB212-4 phasing harness, connect the two completed DB212-2 units together (see Figure 9). Be sure to match the color codes. Make all connections snug but do not apply heavy force with pliers. This should leave the phasing harness transformer (color coded red) open for connection to the station transmission line.
9. To complete the installation of the DB212-4, check the VSWR and weatherproof the connections as described in steps 10 through 14 of the DB212-2 instructions (see page 1).

Installing the DB212-6 (refer to Figure 10):

The DB212-6 consists of *six* dipoles. It should be thought of as three DB212-2 antennas with a connecting harness for phasing the three DB212-2 units together.

1. Determine the desired pattern shape and the legs of the tower onto which Dipoles 1, 2, 3, 4, 5, and 6 should be mounted (see page 1).
2. Mount Dipoles 1 and 2 as described in steps 5 through 8 of the DB212-2 installation procedures (see page 1).
3. After mounting Dipoles 1 and 2, measure down the tower from the center of Dipole 2 by the distance specified by length “A” in Table 2 on page 4. Mark this distance on the tower leg that is to receive Dipole 3.
4. Using the same procedure used to mount Dipoles 1 and 2, mount Dipoles 3 and 4 on the desired tower legs.
5. After mounting Dipoles 3 and 4, measure down the tower from the center of Dipole 4 by the distance specified by length “A” in Table 2 on page 4. Mark this distance on the tower leg that is to receive Dipole 5.
6. Using the same procedure used to mount Dipoles 1 and 2, mount Dipoles 5 and 6 on the desired tower legs.
7. Connect the antenna feed cable (see Figure 10) from Dipole 2 to the "Tee" connection on the phasing harness attached to Dipole 1. Make the connections snug but do not apply heavy force with pliers.
8. Connect the antenna feed cables from Dipole 3 to Dipole 4 and from Dipole 5 to Dipole 6. Make the connections snug but do not apply heavy force with pliers.
9. There should now be three complete DB212-2 antennas mounted with Dipoles 1 and 2 connected together, Dipoles 3 and 4 connected together, and Dipoles 5 and 6 connected together.
10. Using the DB212-6 phasing harness, connect the three completed DB212-2 units together (see Figure 10). Be sure to match the color codes. Make all connections snug but do not apply heavy force with pliers. This should leave the phasing harness transformer (color coded red) open for connection to the station transmission line.
11. To complete the installation of the DB212-6, check the VSWR and weatherproof the connections as described in steps 10 through 14 of the DB212-2 instructions (see page 1).

EFFECT OF TOWER SIZE ON GAIN AND CIRCULARITY

Maximum gain and circularity will be obtained when the DB212 Series antennas are mounted on relatively small (cross section) towers. However, larger towers can be effectively utilized if planned properly.

The table below shows the average gain to be obtained and the degree of circularity – that is, the amount of gain above or below average – when the various antennas are mounted on the legs of larger, triangular towers.

The tower size should be measured across the face of the tower. The maximum gain will be measured off of the tower face while the minimum gain will be measured off of the tower leg.

Table 1. Average Gain.

Tower Size	2 ft.	4 ft.	6 ft.	8 ft.
DB212				
Avg. Gain	+2.8 dB	+2.0 dB	+1.6 dB	+0.7 dB
Circularity	±0.7 dB	±1.3 dB	±2.0 dB	±3.5 dB
DB212-3				
Avg. Gain	+4.7 dB	+4.0 dB	+3.0 dB	+2.2 dB
Circularity	±0.3 dB	±0.6 dB	±1.1 dB	±2.0 dB
DB212-4				
Avg. Gain	+6.0 dB	+4.8 dB	+4.2 dB	+3.2 dB
Circularity	±0.7 dB	±1.3 dB	±2.0 dB	±3.5 dB
DB212-6				
Avg. Gain	+7.7 dB	+6.9 dB	+6.3 dB	+4.7 dB
Circularity	±0.3 dB	±0.6 dB	±1.1 dB	±2.0 dB

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COLLINEAR MOUNTING ON LARGER TOWERS

Gains for DB212 Series antennas mounted collinearly (on one tower leg) will vary somewhat with tower size. The figures for 40 Mh operation of antennas collinearly mounted on larger towers are shown in the table below. (0° is the direction from the tower through the antenna elements.)

Tower Size	4 ft.			6 ft.			8 ft.		
Model	0°	90 / 270°	180°	0°	90 / 270°	180°	0°	90 / 270°	180°
DB212	7.6 dB	3.7 dB	-3.5 dB	7.3 dB	3.5 dB	-5.0 dB	7.2 dB	3.3 dB	-7.0 dB
DB212-3	9.1 dB	5.2 dB	-2.0 dB	8.8 dB	5.0 dB	-3.5 dB	8.7 dB	4.9 dB	-5.5 dB
DB212-4	10.6 dB	6.7 dB	-0.5 dB	10.4 dB	7.0 dB	-2.0 dB	10.3 dB	6.5 dB	-4.0 dB
DB212-6	12.1 dB	8.2 dB	1.0 dB	11.9 dB	8.5 dB	-0.5 dB	11.8 dB	7.0 dB	-2.5 dB

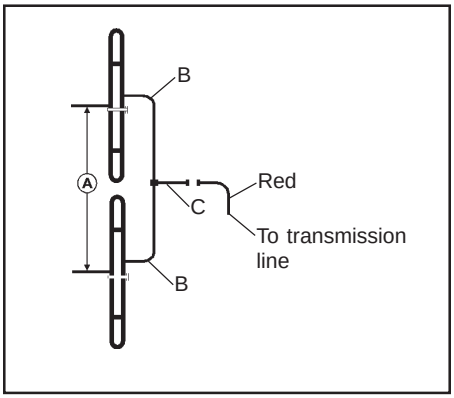

Figure 7 - DB212-2

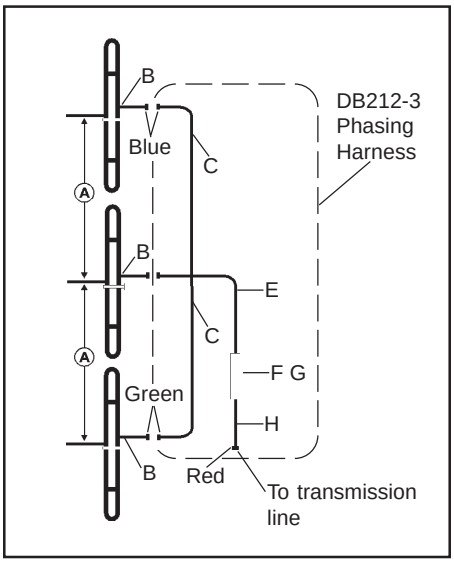

Figure 8 - DB212-3

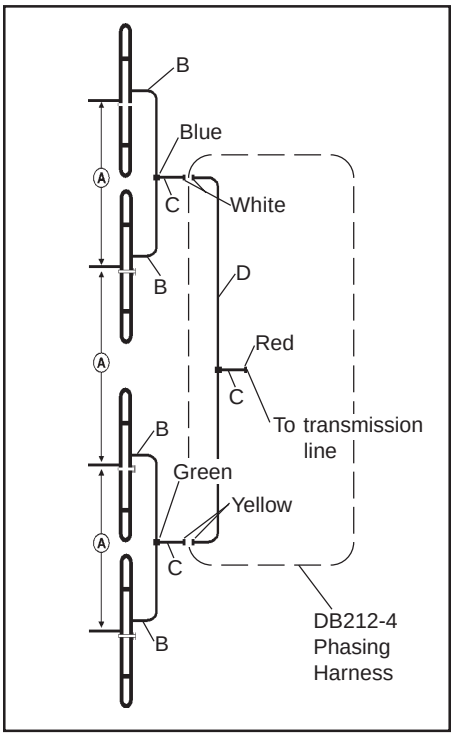

Figure 9 - DB212-4

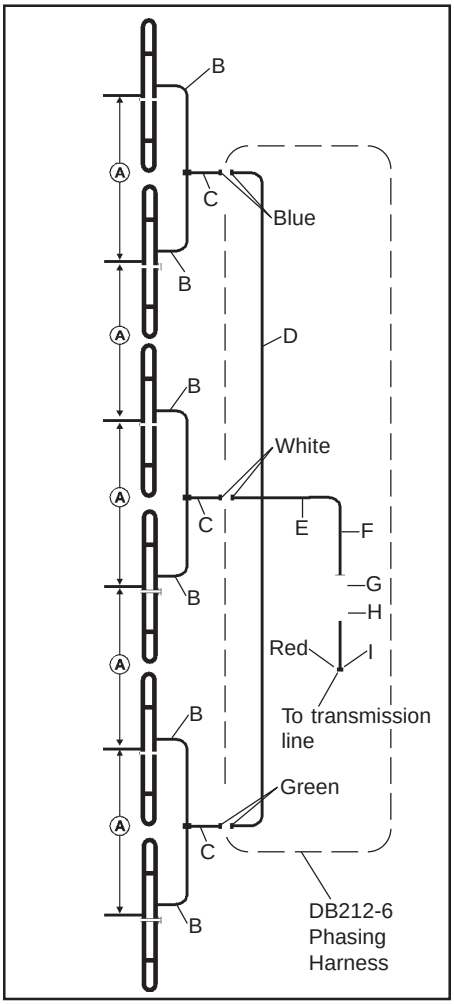

Figure 10 - DB212-6

Table 2. Suggested Center-to-Center Vertical Separations.

A	B	C	D	E	F	FG	GH	I

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