



TECHNICAL MANUAL

OPERATION AND INSTALLATION INSTRUCTIONS

V33035AM-CL2 PORTABLE AM BROADCAST ANTENNA

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REVISION SHEET

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Errors in this publication can be reported to the Manufacturer.
Refer to Section 8 for contact information and address
attention to the Engineering Department.

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1.0 GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides general information on the functional description, as well as, the installation and the operating and maintenance instructions for the V33035AM-CL2 Broadcast Antenna.

1.2 EQUIPMENT DESCRIPTION

The V33035AM-CL2 Broadcast Antenna is a fibreglass whip antenna designed to operate over the AM radio band. The antenna provides vertically polarized, omnidirectional azimuth radiation from 540 to 1,700 kHz when used with an AM transmitter. It is designed for use aboard naval vessels but could easily be used in a land based installation with an appropriate ground screen. The antenna consists of a base section and 6 interchangeable top sections to provide full coverage over the AM band.

1.3 SAFETY PRECAUTIONS

The following general safety precautions are not related to any specific procedures and therefore do not appear elsewhere in this publication. These are recommended precautions that personnel must understand and apply during any phase of operation and maintenance.

WARNING!

Keep away from live circuits. Operating personnel must at all times observe all safety regulations to prevent serious injury or death due to electric shock.

Do not service or adjust alone. Under no circumstances should any person service or adjust the equipment except in the presence of someone who is capable of rendering aid.

Personnel working with or near high voltage should be familiar with modern methods of resuscitation.

1.4 SPECIFIC WARNINGS

The following specific precautions are related to inspecting and removing the antenna.

WARNING!

Ensure that the transmitting equipment is de-energized prior to inspection of the antenna. Make sure any test equipment is properly grounded to prevent shock.

Make sure the antenna is properly supported before removing mounting hardware.

TABLE 1.1 - Electrical Specifications of the V33035AM-CL2

Frequency Range	540 - 1,700 kHz (using multiple top sections)
Input Impedance	See Table 4.2
Polarization	Vertical
Azimuth Coverage	Omnidirectional
Input Connector	3/8-24UNF-2B threaded Terminal Lug
Dry Withstanding Voltage	30 kV - Standard construction 45 kV - With Corona Rings (Dripshield)
Current Handling	24 A _{RMS}
Power Handling	2 kW below 1,500 kHz 5 kW above 1,500 kHz

TABLE 1.2 - Mechanical Specifications of the V33035AM-CL2

Base Insulator Material	Epoxy fibreglass
Joints	Bronze threaded section with locking pins
Wind Loading	< 150 mph (241 km/h)
Ice Loading	0.75" (1.9 cm) ice at 100 mph (161 km/h)
Abrasion Resistance	Good
Centre of Gravity	161" (409 cm) from base
Temperature	-60 °F to 150 °F (-51 °C to 65 °C)
Humidity	0 - 100%
Finish	Epoxy polyamide paint
Approximate Weight	575 lbs (260 kg) (varies with each coil loaded 2 nd section)
Height Overall	36' 3" (11 m)
Shock	MIL-S-901C, Class I, Type A
Vibration	MIL-STD-167-1, Type I
Base	17.5" (44.5 cm) diameter
Mounting Holes	12 holes of 0.718" (1.8 cm) diameter, equally spaced on a 14.625" (37.1 cm) diameter bolt circle

2.0 INSTALLATION

2.1 SITE INFORMATION

The V33035AM-CL2 is designed primarily to be portable and for temporary installations as a backup for the main transmitting antenna. The antenna can be installed in either a shipboard environment or a land based environment. For land base installations the antenna can be mounted to a concrete foundation or it can be mounted and transported on a trailer (see figures 2.1 and 2.2). Here a suitable ground screen must be employed for optimal performance. The antenna should be installed in a non-obstructed environment, clear from any contiguous structures such as masts, bulkheads or other metal objects.

2.2 TOOLS AND MATERIALS REQUIRED

A drive socket for 5/8" hex head bolts, a ratchet and a strap wrench are required. Four 3 foot high sawhorses are also very useful.

2.3 UNPACKING AND RE-PACKING

Remove the screws from the top of the packing crate and carefully remove each antenna section. Remember to save the crate for reshipment purposes. Do not drop any heavy objects on the antenna sections and ensure the sections do not strike any sharp objects when handling.

2.4 INSTALLATION PROCEDURE

- A) Place the 4 sawhorses (or other supports that will hold the complete antenna horizontally at a convenient working height) near the assembly area. The assembly area must be a cleared working space approximately 40' long and 5' wide.
- B) Support the base section on 2 of the sawhorses and tie it in place. If the antenna is being mounted on a hinged base plate, the bottom section may be bolted to the base plate at this time using twelve 5/8" hex bolts along with appropriate nuts, flat washers and lock washers. Be aware of the location of the feedpoint at this time.
- C) Select a top section whose frequency range covers the desired operating frequency. Refer to Chapter 4 for details on this.
- D) Support the top section using 2 sawhorses so that the two sections lie in the same straight line.
- E) Move the top section toward the bottom section and carefully turn the top section with the strap wrench until the top section begins to screw onto the bottom section. Take care not to cross-thread the coupling. Continue threading the two

sections together with the strap wrench until the coupling is fully secure. This is evident when the two arrows are aligned.

- F) When both sections are secured, insert the supplied 1/4-20UNC hex-socket set screws and tighten.
- G) If the antenna has been mounted on a hinged base plate, it may now be carefully erected. Otherwise carefully move the antenna to its mounting location using a crane or other suitable means. Secure the antenna to the base using 5/8" hex bolts and appropriate nuts, flat washers and lock washers. Be aware of the location of the feedpoint at this time.
- H) The antenna is now ready for connection to the matching coupler.



Figure 2.1 V33035AM-CL2 mounted on a trailer.



Figure 2.2 The V33035AM-CL2 disassembled and ready for transportation.

3.0 FUNCTIONAL DESCRIPTION

3.1 DESCRIPTION

The V33035AM-CL2 Broadcasting Antenna is a base mounted, monopole whip antenna which provides omnidirectional coverage from 540 kHz to 1,700 kHz. The antenna consists of a base section and a series of interchangeable coil-loaded top sections. The base insulator has two functions. First, it electrically isolates the radiating section of the antenna from the ground and second, it physically supports the antenna. The overall length of the antenna is approximately 36 feet when fully assembled. Refer to Figure 3.2 for antenna dimensions.

The coil-loaded top sections change the impedance values of the antenna in order for the matching coupler to be tuned for specific operating frequencies. There are six top sections and each one pertains to a specific sub-band within the entire operational band. Refer to Table 4.1 for a cross-reference chart of each antenna section and its corresponding frequency band.

3.2 PERFORMANCE

The theoretical radiation pattern for the V33035AM-CL2 is shown in figure 3.1. The plot depicts a V33035AM-CL2 mounted at the centre of a perfect ground plane.

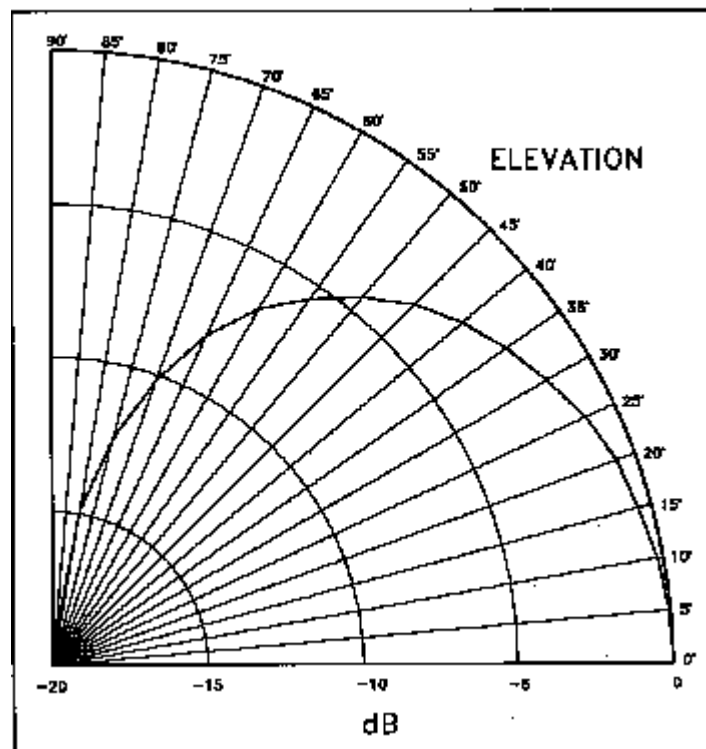
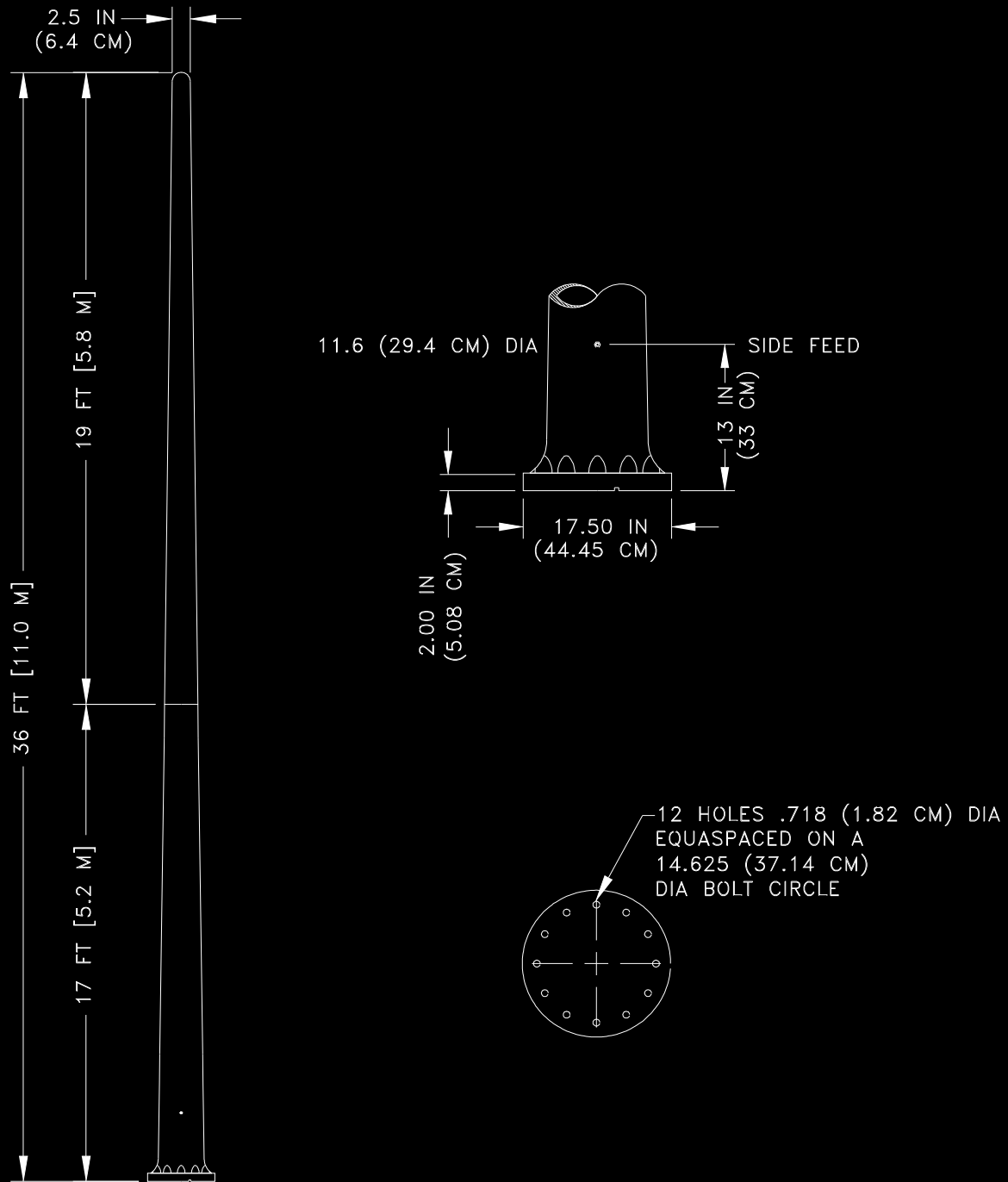


Figure 3.1 Theoretical Radiation Pattern of the V33035AM-CL2 Antenna.



4.0 OPERATION

4.1 UPPER SECTION

The V33035AM-CL2 antenna comes with a series of interchangeable, coil-loaded upper sections. The appropriate upper section must be selected prior to assembly. Table 4.1 is a quick look-up chart which offers the approximate sub-bands each section is capable of operating in when used with a simple L-C type manual coupler.

For other types of couplers or for better control of the impedance matching, Table 4.2 contains list of nominal impedance readings at various frequencies for each section. Consult this chart to determine which upper section has an impedance at the intended operating frequency that is within the range of the matching coupler being used.

To read the chart, find the desired operating frequency and scroll across the columns until there is a section with impedance readings provided. If there is more than one section to choose from, choose the section whose impedance is closest to a 50 Ω real component and preferably with a capacitive imaginary component.

NOTE:

Impedance readings are provided in polar-form complex numbers. The first term is the *real* component and the second “j” term is the *imaginary* component. A positive “j” denotes inductive and a negative “j” denotes capacitive impedances.

4.2 OPERATING PROCEDURES

The antenna has no controls or indicators built into it. No special procedures are required for its operation.

TABLE 4.1 - Section vs. Frequency Quick Look-up Chart

Section	Frequency Sub-band
A	540 kHz to 600 kHz
B	600 kHz to 720 kHz
C	720 kHz to 840 kHz
D	800 kHz to 980 kHz
E	980 kHz to 1,400 kHz
F	1,400 kHz to 1,700 kHz

TABLE 4.2 - Impedance Values of Each Section at Various Frequencies

f (kHz)	Section A	Section B	Section C	Section D	Section E	Section F
550	56.5-j575					
560	43.3-j500					
570	64-j483					
580	72-j354					
590	82-j188	64-j875				
600	94-j14.4	17.5-j800				
610	109+j178	16.3-j740				
620	128+j432	43.0-j655				
630		35.3-j590				
640	192+j890	50-j559				
650	182+j1180	54-j477				
660	280+j1515	59-j360				
670	298+j1880	65-j259				
680	204+j2330	74-j144				
690	137+j2560	84-j1.4				
700	269+j2865	93-j124				
710		108+j295				
720		126+j515				
730		158+j700				
740		247+j1110				
750		249+j1345	28.5-j650			
760		388+j1820	29-j604			
770			31-j564			
780			33-j518			
790			34-j437			
800			36-j382	23-j714		
810			41-j330	24-j685		
820			42-j272	25-j650		

f (kHz)	Section A	Section B	Section C	Section D	Section E	Section F
830			45-j200	26-j623		
840			49-j128	26-j591		
850			53-j51	27-j558		
860			60+j33	29-j525		
870			67+j129	30-j455		
880			76+j238	31-j414		
890			85+j364	33-j376		
900			98+j500	33-j335		
910			113+j694	36-j291		
920				38-j235		
930				41-j187		
940				44-j130		
950				49-j71		
960				53-j8.2		
970				58+j64		
980				62+j141		
990				70+j230		
1000				79+j335	14.8-j729	
1010				89+j438	14.7-j717	
1020				100+j561	14.5-j705	
1030				116+j738	14.4-j693	
1040				136+j899	14.3-j681	
1050					14.2-j669	
1060					14.1-j648	
1070					14.0-j627	
1080					14.0-j606	
1090					13.9-j584	
1100					13.8-j562	
1110					13.8-j548	
1120					13.7-j534	

f (kHz)	Section A	Section B	Section C	Section D	Section E	Section F
1130					13.6-j520	
1140					13.5-j506	
1150					13.5-j492	
1160					13.5-j480	
1170					13.5-j469	
1180					13.5-j457	
1190					13.5-j444	
1200					13.5-j431	
1210					13.0-j416	
1220					12.8-j399	
1230					12.8-j378	
1240					12.8-j358	
1250					12.8-j341	
1260					12.8-j325	
1270					13.2-j300	
1280					13.6-j280	
1290					14.0-j265	
1300					14.4-j255	
1310					14.5-j238	
1320					14.6-j217	
1330					14.7-j198	
1340					14.9-j176	
1350					15.0-j159	
1360					15.6-j136	
1370					16.2-j113	
1380					16.6-j90	
1390					17.1-j66	
1400					17.5-j43	
1410					18.2-j14	
1420					18.9+j16	

f (kHz)	Section A	Section B	Section C	Section D	Section E	Section F
1430					19.7+j47	13.5-j327
1440					20.5+j78	13.7-j316
1450					21.7+j107	13.8-j304
1460					23.1+j135	13.9-j290
1470					24.6+j165	14.0-j277
1480					26.1+j225	14.2-j263
1490					27.4+j270	14.3-j250
1500					29.0+j327	14.5-j243
1510						14.7-j231
1520						14.9-j220
1530						14.1-j208
1540						15.3-j195
1550						15.5-j181
1560						15.8-j165
1570						16.1-j155
1580						16.5-j140
1590						16.7-j112
1600						17.0-j109
1610						17.5-j95
1620						17.8-j80
1630						18.1-j60
1640						18.5-j41
1650						19.3-j20
1660						20.1-j1.2
1670						21.0+j18.9

5.0 MAINTENANCE

5.1 INTRODUCTION

This chapter provides operator and preventive maintenance instructions for the V33035AM-CL2 Broadcast Antenna.

5.2 OPERATOR MAINTENANCE

- A) The V33035AM-CL2 antenna does not contain any moving parts. Operator maintenance is limited to visual inspection of the antenna. Any maintenance of the antenna can be incorporated into the overall scheduled maintenance of the ship or station.
- B) Visually inspect the antenna for dirt or salt build up especially around the input connector. Wash the antenna with soap and clean water.
- C) Visually inspect the antenna surface for wear, chipping or damage. **DO NOT USE LEAD OR OTHER METALLIC PAINT ON THE BASE INSULATOR!**
- D) Visually inspect the drain groove in the bottom of the antenna's base and ensure it is clean and clear of all debris.

WARNING!

Ensure that the transmitting equipment is de-energized before performing any inspections.

5.3 PREVENTIVE MAINTENANCE

The antenna preventive maintenance is limited to ensuring the antenna is free from dirt or salt build up and ensuring the exterior of the antenna and the input connector is not damaged or worn. The preventive maintenance of the antenna can follow the ship or station's preventive maintenance system.

6.0 SHIPMENT AND STORAGE

6.1 SHIPMENT

The V33035AM-CL2 antenna is shipped in a reuseable wooden container. After unpacking the antenna, the container can be saved for later use if the antenna is to be moved. If the original container is not available, it is recommended that a container similar to the original wooden one be constructed and the antenna shipped in that. Care is to be exercised that neither the antenna's exterior or the coupling threads get damaged.

6.2 STORAGE

When not in use, the V33035AM-CL2 antenna itself, or the unused upper sections, should be stored in the original wooden container (or similar) to prevent damage. The antenna has a storage temperature rating of (-51 °F to 65 °F). The antenna does not have a shelf life limit.

7.0 WARRANTY INFORMATION

The warranty covering the V3 3035AM-CL2 Broadcast Antenna includes the period of five years after the date of sale and is restricted only to the replacement of defective material. The warranty is applicable only if the antenna is used within the specifications listed in the tables found on page 2 of this manual.

Note about Corona Discharge - During high corona discharge conditions, damage to the antenna can occur. Valcom cannot warranty damage to the antenna resulting from Corona Discharge due to the unpredictable nature of Corona Discharge. Current and voltage ratings must not be exceeded on the antenna.

8.0 QUICK REFERENCE DATA**8.1 GENERAL**

Manufacturer's contact information can be found in this section.

8.2 MANUFACTURER'S ADDRESS

Postal address:	Shipping address:
Valcom Manufacturing Group, Inc. P.O. Box 603 Guelph, Ontario Canada N1H 6L3	Valcom Manufacturing Group, Inc. 175 Southgate Drive Hanlon Industrial Park Guelph, Ontario Canada N1G 3M5

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