



TECHNICAL MANUAL and INSTALLATION INSTRUCTIONS

V33075AM-CL2 ANTENNA

Valcom Manufacturing Group, Inc.

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REVISION SHEET

<i>Revision</i>	<i>Description</i>	<i>Date</i>
A	Original Issue	March 29, 2001
B	Various model number modifications	September 27, 2006
C	Amended Maintenance Section	August 16, 2007
D	Added Lock Setscrews in Installation process	September 17, 2012

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1.0 GENERAL INFORMATION

1.1 Introduction

This manual describes the electrical and mechanical properties of the V33075AM-CL2 antenna. It also provides the information necessary to install, operate and maintain the antenna system.

1.2 Technical Reference Data

<i>Electrical Properties</i>	
<i>Frequency Range</i>	100 kHz to 30 MHz (with capacity of the antenna tuner)
<i>Resonant Frequency</i>	540 kHz to 1700 kHz (as specified by customer)
<i>Power Rating</i>	5 kW +
<i>Dry Withstanding Voltage</i>	30 kV
<i>Electrical Length</i>	Varies with Loading Coil Section

V33075AM-CL2

<i>Mechanical Properties</i>	
<i>4th Section Length</i>	18.3 feet (5.6 meter)
<i>3rd Section Length</i>	18.3 feet (5.6 meter)
<i>Loading Coil (2nd) Section Length</i>	18.3 feet (5.6 meter)
<i>Bottom Section Length</i>	17.4 feet (5.3 meter)
<i>Typical Assembly Length (including Valcosphere)</i>	75 feet (22.7 meter)
<i>Weight</i>	Approximately 1013 lbs (460 kg)
<i>Material</i>	Copper wire and strips embedded in the fiberglass and thermo-setting epoxy resin composite
<i>Finish</i>	Epoxy polyamide paint
<i>Mounting Position</i>	Vertical
<i>Base Diameter</i>	17.5 inches (44.45 cm)
<i>Mounting Hole Diameter</i>	0.718 inches (1.82 cm)
<i>Mounting Holes Dimensions</i>	12 places equal spaced on a 14.625 inch (37.15 cm) diameter bolt circle
<i>Storage Temperature</i>	-95°C to +70°C (-140°F to +158°F)
<i>Operating Temperature</i>	-50°C to +65°C (-76°F to +140°F)
<i>Wind Loading Test</i>	Up to 150 mph (240 km/hr) relative
<i>Abrasion Resistance</i>	Very Good
<i>Water absorption</i>	After 24 hours immersed: 0.2% After 48 hours immersed: 0.6% After 168 hours immersed: 2.0%
<i>Optional Accessories</i>	VHB-17AM Steel Hinge Plate or VTGS-20BH AM Steel Tower VGP-17AM Gin Pole VGS-120XXXAM Ground Screen

2.0 FUNCTIONAL DESCRIPTION

2.1 General

The V33075AM-CL2 is intended to be used as part of an overall communication system which consists of a transmitter (or receiver or transceiver), an antenna coupler and the antenna. It is used around the world in many applications with requirements in the 100 kHz to 1700 kHz bands for marine and aeronautical radio beacon and AM broadcast communication systems.

2.2 Electrical Description

The Valcom, Model V33075AM-CL2 is a field proven, coil loaded, 75-foot antenna. The second section is inductively loaded to a resonant frequency slightly higher than the operating frequency specified by the customer.

2.3 Mechanical Description

Fourth and Third Sections. These are hollow tapered cylinders made of circumferentially and longitudinally wound fiberglass filaments using a thermosetting epoxy resin matrix. Embedded in the composite are multiple beryllium copper strips laid in a single-turn spiral and secured at the top end to a hemispherical corona ball and at the bottom to a threaded female ferrule into which the next section is secured. The surface is smoothed, primed and painted with a polyamide epoxy surface coating.

Coil Loaded Section (Second Section) The coil loaded section is constructed in the same manner as the Third section. The coil is wound using enamel copper wire and is also embedded in the fiberglass. The ends of the coil are braised to the respective ferrules.

Bottom Section. The construction and finish are the same as for the other sections except that the diameter expands out to meet the mounting base. The ferrule is threaded to fit into the bottom of the Coil Loaded section. Multiple parallel conductors are connected to the ferrule at the top and to a conducting ring near the bottom. The feed terminal extends from the bottom ring to the surface of the antenna approximately 18.0 inches from the bottom of the base flange. The base can withstand a flash-over voltage of 30 kV.

NOTE: The sections of the antenna cannot be interchanged with other antennas due to the unique locations of the locking screw holes.

3.0 MAINTENANCE

3.1 *Scheduled Maintenance*

The antenna is virtually maintenance free. The external finish is an epoxy polyamide two part compound paint. The minimum finish life before showing signs of deterioration should be at least six years under normal climate condition.

When used in salt-water environments, it is recommended to wash the antenna base with fresh water to remove any build-up of dried salt residue. This should be performed on a monthly basis or after prolonged exposure to sea-spray.

3.2 *Corrective Maintenance*

Generally, no corrective maintenance is possible or required. If one section is severely damaged, it must be replaced by a new section. Workshops having experience in handling epoxy fibreglass composite structures may attempt the repair of minor surface damage if practicable.

Use a small wire brush to clear any debris from the drain groove found in the bottom of the antenna base.

NOTE

DO NOT USE LEAD BASE PAINT TO TOUCH-UP OR REPAINT THE ANTENNA. USE ONLY EPOXY BASE PAINT.

4.0 INSTALLATION

4.1 *Unpacking*

Open the shipping crates and remove the antenna sections. Remove all packing material including the male ferrule protectors on the antenna sections. The V33075AM-CL2 antenna as shipped consists of the items listed in Table 5.1. Check that all of the items are present and in good condition.

4.2 *New Site Preparation*

- (1) Check to see that the underside of the steel base plate at the site is free of cables and other obstructions.
- (2) Excavation and pouring of concrete pad to new site (see Foundation Details for VHB-17AM Hinge Plate/ VTGS-20AM Steel Tower).
- (3) Install Ground Screen to Valcom's Specification in accordance with VGS-120XXXAM Ground Screen.

4.3 *Assembly and Installation Antenna on the site*

The following steps should be followed to assemble the V33075AM-CL2 antenna (see Figure 4.1).

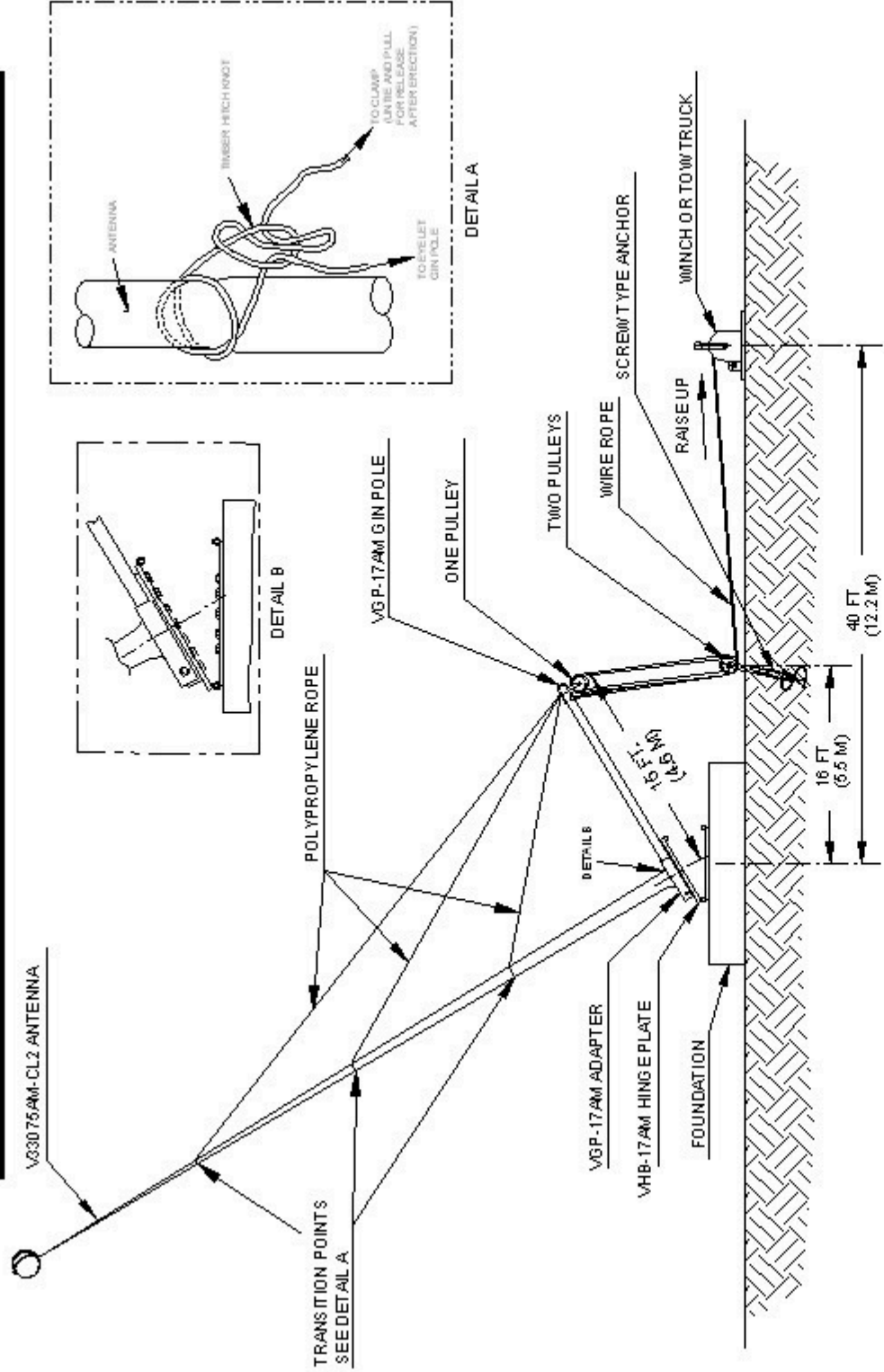
- (1) Remove retainer pin on the hinge plate and open top plate to 90 degrees, mount the bottom plate of the hinge plate on the anchor bolts. Secure with hardware (flat washer, lockwasher, and nut) on each bolt.
- (2) Obtain six saw horses or other supports that will hold the complete antenna horizontally at a convenient working height and place them in the assembly area. The assembly area must be a cleared working space approximately 90 feet long and 20 feet wide.
- (3) Support the base section (item 1, Table 5.1) on two of the saw horses.
- (4) Align mounting holes in the plate with holes of the antenna flange and gin pole adapter, secure base section to the plate with hardware, fed through from underside.
- (5) Tie a rope (3/4" diameter polypropylene) to one eye of the gin pole, tie two another ropes as the same type to one eye of the gin pole. Slide gin pole into the pipe attachment and secure.

- (6) Support the second section (item 2, Table 5.1) on the other two saw horses so that the two sections lie in the same straight line.
- (7) Make sure the threads of the male ferrule on the base section are clear of foreign material and free of burrs.
- (8) Assemble the second antenna section onto the base section and tighten to align the arrows at the joint using the strap wrench supplied (item 8, Table 5.1). Install the setscrews and seal with the sealant provided.
- (9) Assemble the third section (item 3, Table 5.1) to the second section by repeating steps 6 to 8.
- (10) Assemble the fourth section (item 4, Table 5.1) by repeating steps 6 to 8.
- (11) After all sections are assembled, assemble the Valcosphere to the top of the fourth section and secure by setscrews and sealant.
- (12) The antenna now is ready to raise to its final position.
- (13) Tie one rope (from gin pole eye) to the transition points on antenna (see Figure 4.1). A timber hitch knot is recommended.
- (14) Erect antenna by applying a gradual and constant pull on the rope referred to as the "Pulling Force" (a winch or vehicle is recommended).
- (15) Once the antenna is in the vertical position, insert retainer pin back into hinge plate, secure with tension pin. Use bolts (supplied) to secure upper and lower plates of the hinge plate together.
- (16) Remove the gin pole. Electrical connections can now be made.

4.4 *Electrical Installation*

Very carefully secure the lead from the transmitter or transceiver to the antenna by means of the acorn screw and lock-washer provided.

GIN POLE ARRANGEMENT
FOR V33075AM-CL2 ANTENNA



5.0 PARTS LIST

5.1 General

A list of parts shipped with the V33075AM-CL2 antenna appears in Table 5.1.

Table 5.1 - List of Parts for the V33075AM-CL2 Antenna

Item No.	Part Number	Description	Qty	Notes
1	VD-99-00085	Base Section (V33075AM-CL2)	1	
2	VD-99-00086 VD-99-00076	Section 2 (Strap only) Section 2 (Coil Loaded)	1	
3	VD-99-00087 VD-99-00077	Section 3 (Strap Only) Section 3 (Coil Loaded)	1	
4	VD-99-00088	Section 4	1	
5	VD-77-00132	Valcosphere	1	
6		Strap Wrench	1 ea	
7		Silicone Sealant	1	
8		Hardware Package (Washer, Lock-Spring, Helical, 3/8 inch nominal, Phosphor Bronze, Lock setscrews)	1 set	

6.0 QUICK REFERENCE DATA

6.1 General

Quick reference engineering data for use during planning and installation activities for the V33075AM-CL2 antenna is presented on the following page.

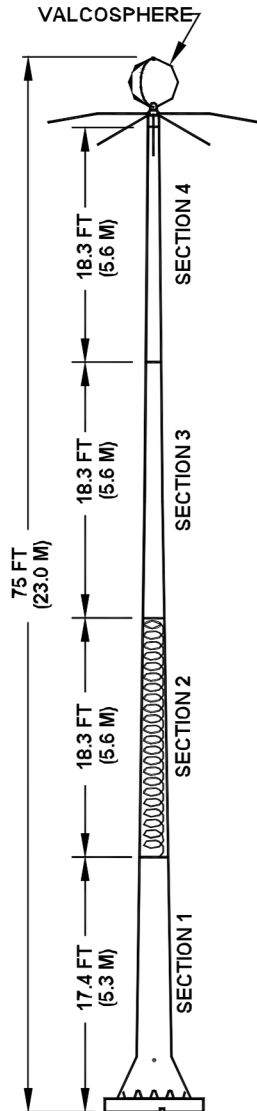
- S Quick Reference Data - V33075AM-CL2 Antenna
- S Foundation Details For VHB-17AM Hinge Plate or VTGS-20BH AM Steel Tower
- S Quick Reference Data - VHB-17AM Hinge Plate
- S Quick Reference Data - VTGS-20BH AM Steel Tower
- S Quick Reference Date - VGS-120XXXAM Ground Screen
- S AM Antenna Ground Screen Installation

6.2 Manufacturer's Address

<i>Postal address:</i>
Valcom Manufacturing Group, Inc. P.O. Box 603 Guelph, Ontario Canada N1H 6L3

<i>Shipping address:</i>
Valcom Manufacturing Group, Inc. 175 Southgate Drive Hanlon Industrial Park Guelph, Ontario Canada N1G 3M5

V33075AM-CL2 QUICK REFERENCE DATA



ELECTRICAL CHARACTERISTICS

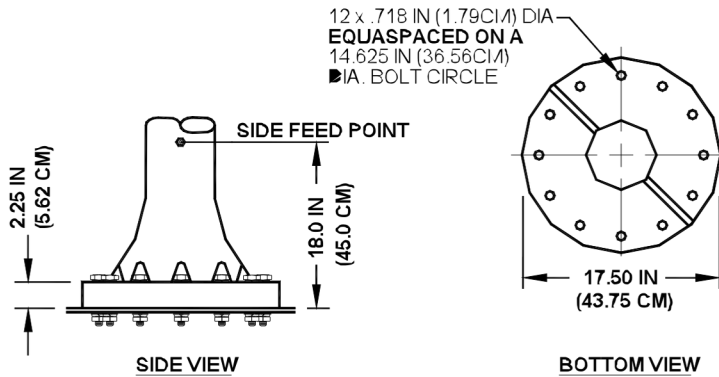
RESONANT FREQUENCY (f_0)	540 - 1700 KHZ (SPECIFIED BY CUST)
POWER RATING	2 KW FOR FREQ OF 540 - 1000 KHZ 5 KW FOR FREQ OF 1000 - 1700 KHZ
DRY WITHSTANDING VOLTAGE	30 KV
ELECTRICAL LENGTH	DEPENDANT ON f_0
POSITION OF LOADING COIL	2ND SECTION
INPUT IMPEDANCE AT f_0	DEPENDANT ON f_0
Q AT SELF-RESONANCE	DEPENDANT ON f_0

MECHANICAL CHARACTERISTICS

MECHANICAL LENGTH	75 FT (23 M)
TOP TERMINATION	VALCOSPHERE
VALCOSPHERE	32 IN (81 CM) DIA
ANTENNA MATERIAL	FILAMENT WOUND EPOXY/FIBREGLASS
JOINTS	BRONZE FERRULE C/W LOCKING PIN AND BANANA PLUG
FINISH	EPOXY POLYAMIDE PAINT
WIND LOADING TEST	150 MPH (241 KPH)
TEMPERATURE	-60°F TO 150°F (-50°C TO 65°C)
WEIGHT	800 LBS (362 KG) MAX

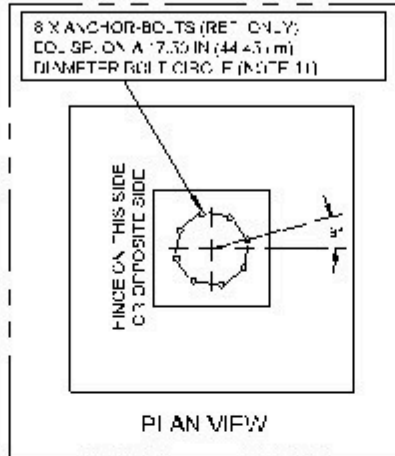
NOTES:

1. THE ADVANTAGE OF THE CENTRE LOADING COIL IN SECTION TWO IS TO PROVIDE REDUCED RESONANCE OVER A STRAIGHT VERTICAL WHIP, THEREFORE REDUCING BASE FEED VOLTAGE AND PROVIDING A GREATER POWER HANDLING CAPABILITY.
2. DO NOT USE LEAD BASE PAINT TO TOUCH-UP OR REPAINT ANTENNA.



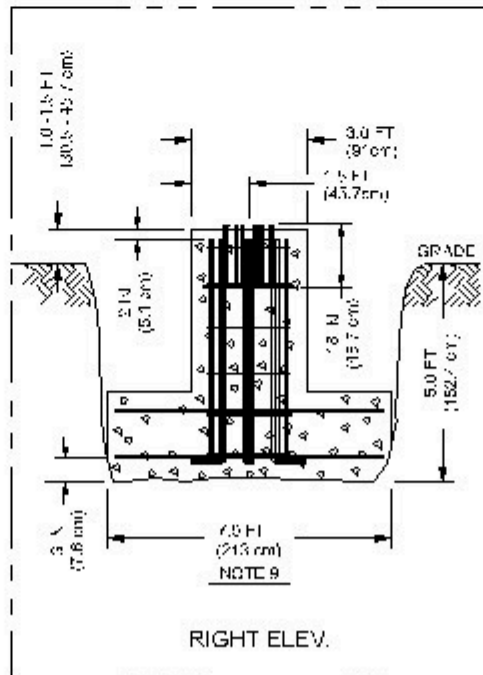
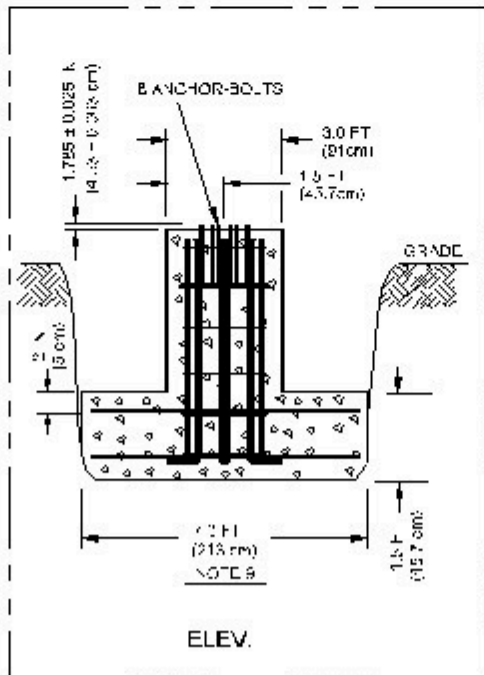
P.O. BOX 603 GUELPH, ONTARIO, CANADA, N1H 6L3
 TEL 519-824-3220 FAX 519-824-3411
 INTERNET: www.valcom-guelph.com EMAIL: enquiries@valcom-guelph.com

FOUNDATION DETAILS FOR VHB-17AM HINGE PLATE OR VTGS-20BH AM STEEL TOWER

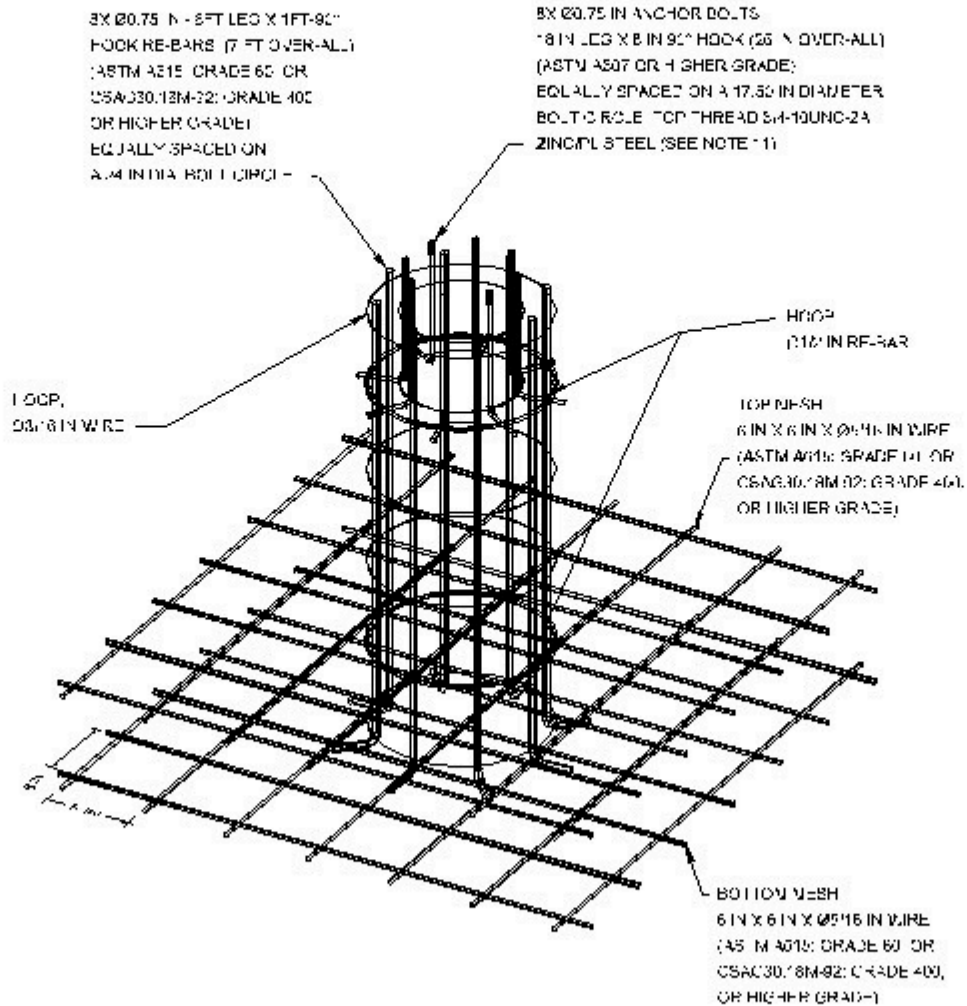


NOTES:

1. FOUNDATION BASE TO BE ON UNDISTURBED SOIL
2. FOUNDATION EXCAVATION MUST BE FREE OF WATER BEFORE PLACEMENT OF CONCRETE
3. DURING PLACEMENT OF CONCRETE, MAXIMUM FREE FALL DISTANCE SHALL NOT EXCEED FOUR FEET (1.22m)
4. ALL CONCRETE PLACED DURING FREEZING TEMPERATURES SHALL BE PRE-HEATED AND PROPERLY PROTECTED DURING CURING. ALL HANDLING AND PLACEMENT TO BE IN ACCORDANCE WITH GOOD CONSTRUCTION PRACTICE.
5. MINIMUM 28 DAY COMPRESSIVE STRENGTH 8,000 PSI
6. AIR ENTRAINED CONCRETE #4 + 1
7. SETTING RANGE OF CONCRETE DURING PLACEMENT: +5 TO +45 INCHES (127 TO 1125mm)
8. BACKFILL MATERIAL SHALL BE FREE FROM DEBRIS OF ANY KIND INCLUDING ICE, SNOW OR FROZEN MATERIAL.
9. THIS DIMENSION IS THE MINIMUM VALUE USED WITH THE 74 FT ANTENNA, FOR THE 112 FT ANTENNA THE MINIMUM DIMENSION WOULD BE 8 FT.
10. WHERE THE SOIL CONDITIONS WARRANT, THEN SULFUR RESISTANCE CONCRETE SHOULD BE USED.
11. REQUIREMENT: THE USE OF PLYWOOD AS A TEMPLATE FOR 8 ANCHOR-BOLTS BEFORE PLACEMENT OF CONCRETE



**FOUNDATION DETAILS FOR
VHB-17AM HINGE PLATE
OR VTGS-20BH AM STEEL TOWER**

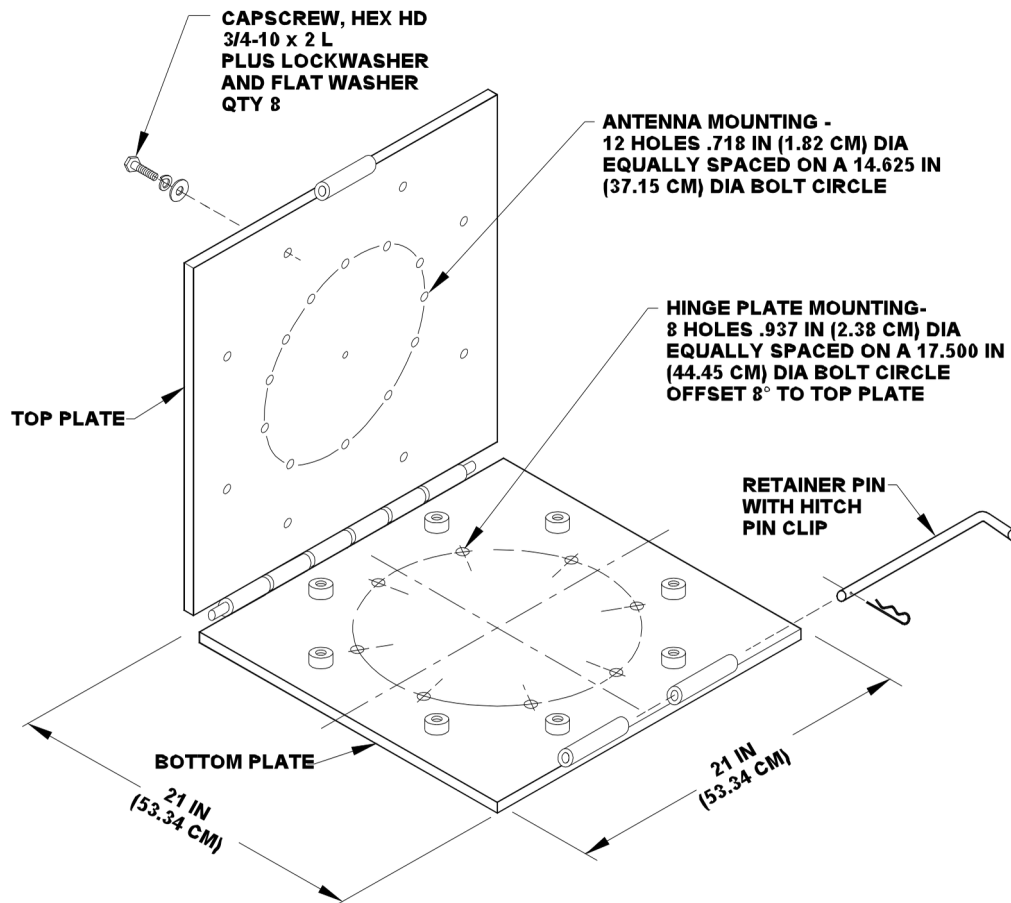


REINFORCING OF CONCRETE



P.O. BOX 603 QUELPH, ONTARIO, CANADA, N1H 6L3
TEL 519-824-3220 FAX 519-824-3411
INTERNET: www.valcom-aucph.com EMAIL: enquiries@valcom-queph.com

VHB-17AM HINGE PLATE QUICK REFERENCE DATA



THE FOLLOWING ARE SUPPLIED AS LOOSE ITEMS:

1. CAPSCREW, HEX HD, 5/8-11 X 4 1/4 L, ZINC/PL STEEL, QTY 12
2. FLATWASHER, 5/8 NOM, ZINC/PL STEEL, QTY 24
3. WASHER, LOCK-SPRING, HELICAL, 3/4 NOM, ZINC/PL STEEL, QTY 12
4. NUT, HEX, 3/4-10 UNC, ZINC/PL STEEL, QTY 8



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SEP 9/03- CHANGED TEXT TO ARIAL
 REV B, GBROWN

BR223A
 REV: B

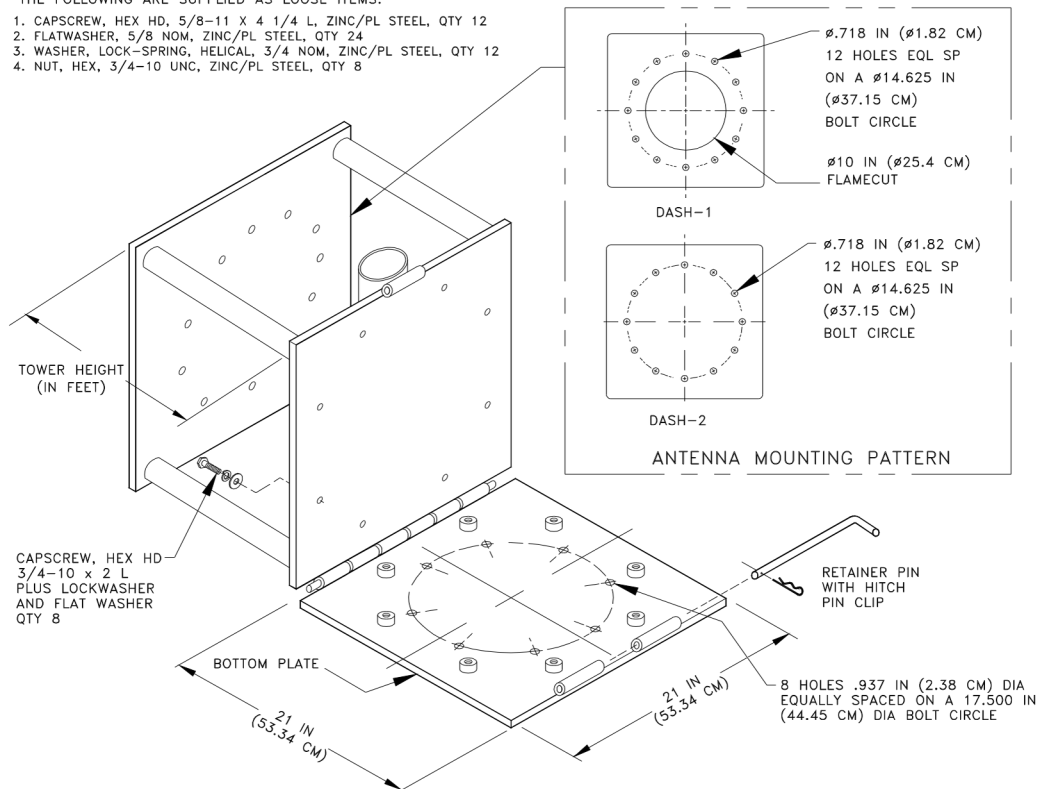
VTGS-20BH AM STEEL TOWER QUICK REFERENCE DATA

VTGS-20BH AM IS THE STANDARD MODEL NUMBER FOR VALCOM'S HEAVY DUTY AM STEEL HINGED TOWER. THE ANTENNA MOUNTING PLATE COMES IN TWO DIFFERENT CONFIGURATIONS AS SHOWN BELOW. SUBSTITUTE "X" IN THE MODEL NUMBER FOR THE MOUNTING PLATE THAT IS REQUIRED. SUBSTITUTE "Y" IN THE MODEL NUMBER FOR THE HEIGHT OF TOWER REQUIRED IN 2 FOOT INCREMENTS. UNLESS OTHERWISE SPECIFIED THE STANDARD NOMINAL HEIGHT IS 8 FEET (2.44 M)

VT	GS	- 20	BH	AM	- X	- Y
VALCOM TOWER	GALVANIZED STEEL	EACH SIDE LENGTH	BOTTOM HINGED	ANTENNA TYPE	ANTENNA MOUNTING PATTERN	TOWER HEIGHT IN FEET

THE FOLLOWING ARE SUPPLIED AS LOOSE ITEMS:

1. CAPSCREW, HEX HD, 5/8-11 X 4 1/4 L, ZINC/PL STEEL, QTY 12
2. FLATWASHER, 5/8 NOM, ZINC/PL STEEL, QTY 24
3. WASHER, LOCK-SPRING, HELICAL, 3/4 NOM, ZINC/PL STEEL, QTY 12
4. NUT, HEX, 3/4-10 UNC, ZINC/PL STEEL, QTY 8



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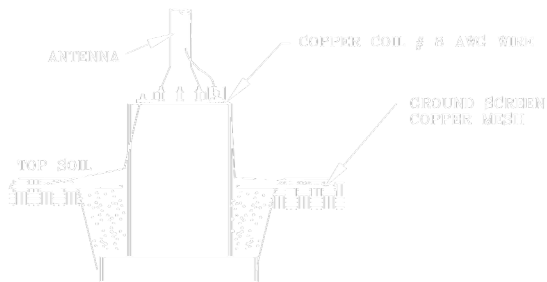
BR224a
REV1A

World's Leading Manufacturer Of Fibreglass AM Broadcasting Antennas



VGS-120120AM Broadcast Antenna Ground Screen

VALCOM'S VGS-120120AM GROUND SCREEN CONSISTS OF 120 RADIALS EACH 114 FEET LONG JOINED TO A CENTER RING AT THE BASE OF THE ANTENNA. THE RING IS PLACED ON A 12 X 12 FOOT COPPER MESH GRID. THE RADIAL ENDS ARE TERMINATED BY 10 FOOT LONG GROUND RODS POSITIONED 6.25 FEET APART AROUND THE CIRCUMFERENCE. THE GROUND SCREEN FEATURES ALL COPPER CONSTRUCTION. THE MOUNTING PAD, ANTENNA AND ANTENNA COUPLER ARE FOR REFERENCE ONLY.



THIS PARTICULAR SETUP IS USED IN AREAS OF GOOD TO AVERAGE GROUND CONDUCTIVITY AND MEETS THE MINIMUM REQUIREMENTS OF 120 RADIALS WITH LENGTHS EQUAL TO, OR GREATER THAN, THE PHYSICAL HEIGHT OF THE ANTENNA. IN AREAS WHERE SOIL CONDUCTIVITY IS POOR, THE GROUND RADIALS SHOULD BE EXTENDED TO THE DISTANCE EQUIVALENT TO A QUARTER WAVELENGTH OF THE OPERATING FREQUENCY, IF ENOUGH SPACE IS AVAILABLE. THIS DISTANCE CAN BE FOUND USING THE CALCULATIONS LISTED BELOW:

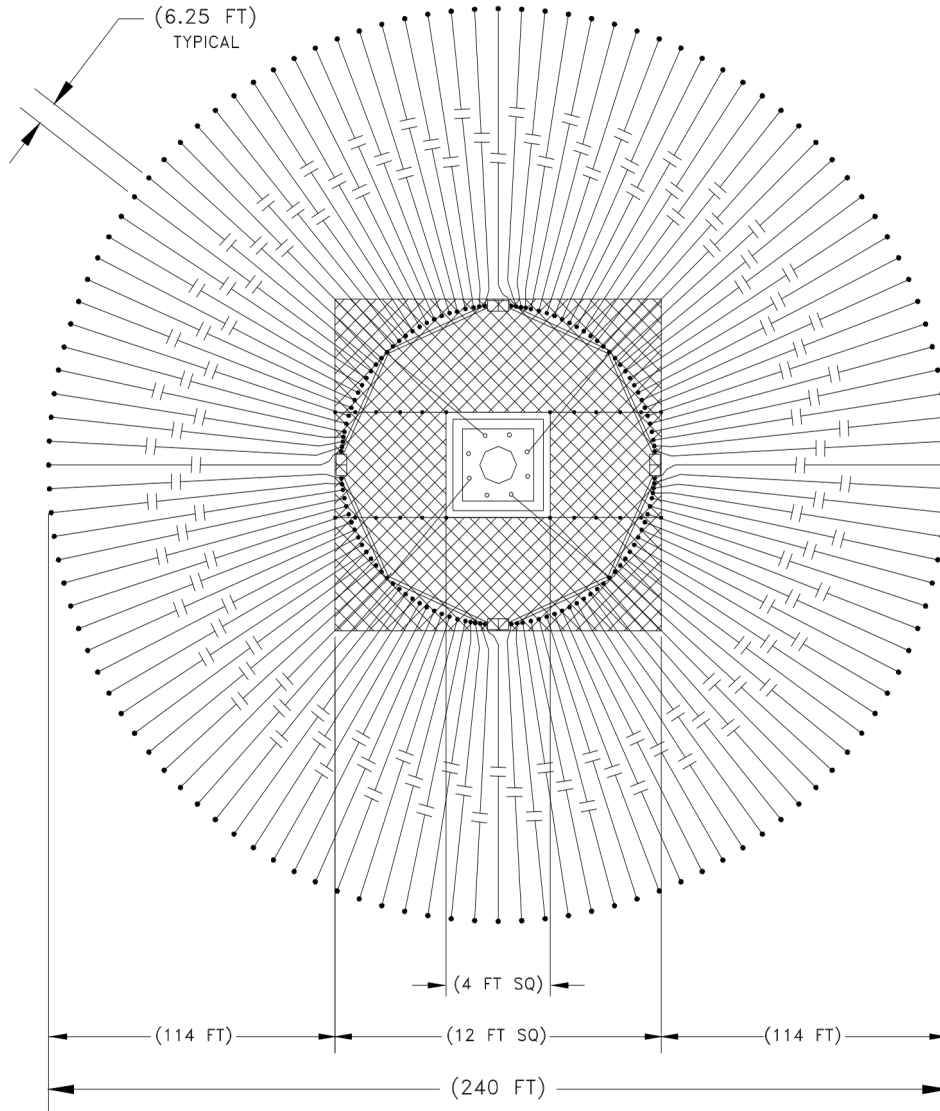
QUARTER WAVELENGTH IN FEET:

$$1/4 \lambda = \frac{245.89}{\text{operating frequency (in MHz)}}$$

QUARTER WAVELENGTH IN METERS:

$$1/4 \lambda = \frac{73.48}{\text{operating frequency (in MHz)}}$$

VGS-120120AM GROUND SCREEN QUICK REFERENCE DATA




P.O. BOX 603 GUELPH, ONTARIO, CANADA, N1H 6L3
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BR216
VER: B

V33075AM-CL2

APPLICATION/USAGE		LTR	REVISION	DATE	PREP	CKD	APP
VCS-120XXXAM AM ANTENNA		A	FIRST ISSUE	-	-	-	-
		B	IMPROVED GROUND SCREEN	JUNE 2, 2000	J.P.		
		C	IMPROVED GROUND SCREEN FURTHER	AUG. 2, 2000	J.S.		
		D	CHANGED FROM 120 FT TO 30X FT	APR. 28 2004	J.S.		

REV	D	D	D	D															
SHT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

DESIGN AGENT: VALCOM LIMITED	NSCM/CAOP 35738		VALCOM LIMITED GUELPH, ONTARIO, CANADA
PREPARED H. DUONG	TITLE/ TITRE AM ANTENNA GROUND SCREEN INSTALLATION		
CKD/VER	DOCUMENT NO. VED-99-0001		
INSPECT/INSPECTE D. BRANDI	A	SCALE/ECHELLE N/A	SHEET FEUILLE 1 OF DE 4
APPROVAL DATE D'APPROB 25 OCTOBER, 1999			

AM Broadcast Antenna Ground Screen Installation

Materials:

- Refer to VGS-12DXXXAM (AM Ant. Ground Screen) Brochure
- 3 X 100 feet of #10 AWG copper wire
- Two Different Colours of Spray Paint
- Up to 500 feet of 1/2" Polypropylene Rope
- Brazing Rod and Torch

Pre Installation:

1. Find a suitable area to mark the centre point. There should not be any obstacles within the distance of Point (C). Place a stake firmly in the ground at this centre point, and tie one end of the rope around the stake using a loose knot. This end of the rope will now become point (A).

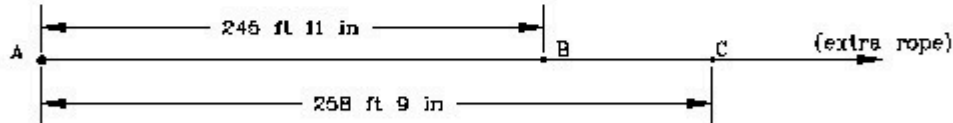
2. Use the following equation to determine the length of point (B) on the rope. This will be the same as the wavelength of the operating frequency.

$$\text{Point (B)} = \frac{245.89}{\text{operating frequency (in MHz)}}$$

3. Use the following formula to determine the length of point (C) on the rope. This will be the same as the wavelength of the operating frequency plus the arc length between radials.

$$\text{Point (C)} = \text{Point (B)} + (0.0624 \times \text{Point(B)})$$

For example, if operating frequency = 1.0 MHz,
 then Point (B) = 245.89/1.0 = 245.89 ft.
 and Point (C) = 245.89 + (0.0624 x 245.89) = 258.77 ft



On Site Installation:

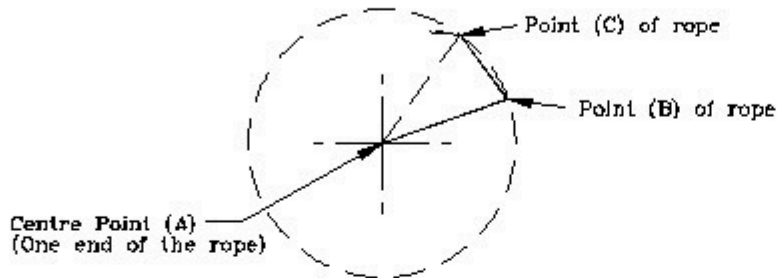
3. With the stake firmly placed in the ground and the rope still tied to it, stretch the rope out to point (B) (eg 245.89 ft mark). Make a mark on the ground using the spray paint.
4. Have a person hold the rope at Point (C) (eg 254.77 ft mark) and get them to stand on the first mark that was just painted on the ground.
5. Get the person holding the rope at Point (B) to walk away from the first mark on the ground until both sections of rope are taut. Make a new mark on the ground at this point.

TITLE/ TITRE	AM ANTENNA GROUND SCREEN INSTALLATION	A	DOCUMENT NO VED-99-0001	
DESIGN AGENT	VALCOM LIMITED	NSCM/CAOP 35736	SCALE/ECHELLE N/A	REV LTR D
			SHEET FEUILLE 2	OF DE 4

AM Broadcast Antenna Ground Screen Installation

6. The person holding the rope at Point (C) should now walk to the new mark on the ground and stand there while the Point (B) person walks away again to mark the next point.

7. Repeat steps 4 to 6 until the first mark is reached again.

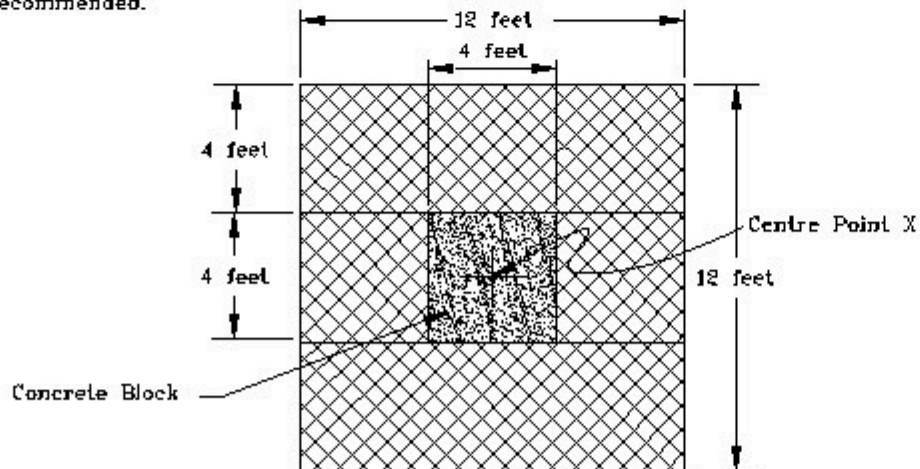


8. You will need to dig holes at each of the marks that have been painted on the ground. The holes should be 2 inches in diameter and 10 feet in depth. A contractor may need to be hired for this operation.

9. The centre point on the ground needs to be excavated so the pouring of the concrete pad can be completed (see Foundation Details for VHB-17AM Hinge Plate/ VTGS-20 BH AM Steel Tower)

10. With the concrete pad poured and cured, the three pieces of copper mesh must be tied together.

11. Tie the mesh pieces together every one-inch with the extra #10 copper wire. Trying not to overlap the pieces. Once the mesh is tied together, brazing the joints is recommended.

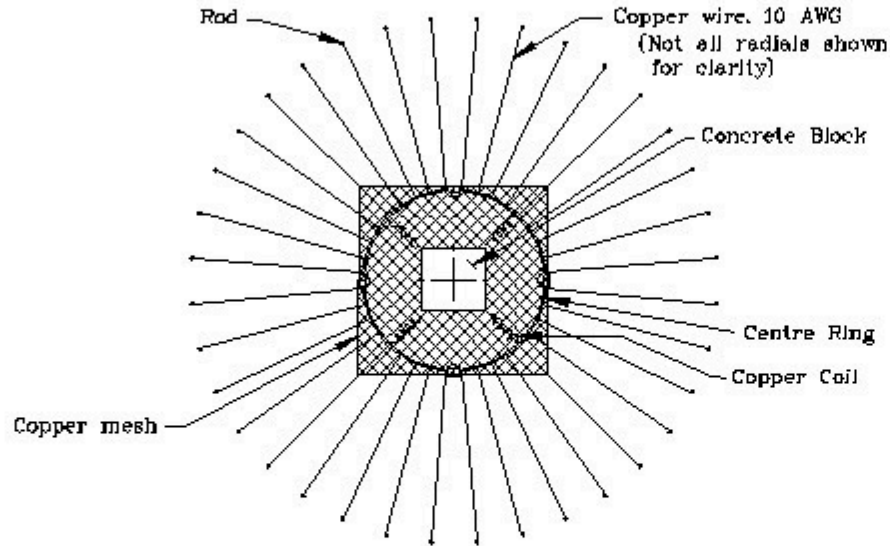


TITLE/ TITRE	AM ANTENNA GROUND SCREEN INSTALLATION	DOCUMENT NO A	VED-99-0001	
DESIGN AGENT	VALCOM LIMITED	NSCM/CAOF 35736	SCALE/ECHELLE N/A	REV LTF
			D	SHEET FEUILLE 3
				OP DE 4

AM Broadcast Antenna Ground Screen Installation

12. When brazing the copper mesh is complete, centre the mesh over the centre point of the pad. A space for the concrete block must be cut out of the copper mesh. The average size of the area to cut out is 4 feet x 4 feet but other sizes are acceptable.

13. Clear a 12 foot by 12 foot area around the concrete pad by 3 to 6 inches deep and lay the assembled mesh into the cleared area.



14. The centre ring which should be in four pieces needs to be assembled. The pieces with the coils should be centred over the centre ground pad. Now stretch each copper wire #10 onto each separate copper rod. There should be 120 copper wires attached to 120 copper rods. The part of the copper wire, which is on top of the copper mesh, should be tied and brazed to the copper mesh by using the extra copper wire.

15. Trenches must be dug for each of the 120 copper wire radials. These trenches should be a minimum of 3 inches in depth and any desired width, as long as it is wider than the copper wire. Once again a contractor may need to be used for this duty.

16. After the trenches have been dug, take the ground rod connectors and attach the copper wire to the copper rods. Brazing this connection is recommended. Now drop the rod with the wire attached into the hole for the designated copper rod.

18. Now with everything laid out properly, cover up any exposed ground screen with the excess dirt from digging the holes and trenches and/or fresh topsoil.

Note: The entire installation can also be accomplished by laying all wires and meshing on top of the surface of the ground and covering everything with 3 to 6 inches of fresh topsoil.

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