



TECHNICAL MANUAL

VTM-98-006/I

OPERATION AND INSTALLATION INSTRUCTIONS

HF BROADBAND ANTENNA MODEL VBBA 2-30

Valcom Manufacturing Group, Inc

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RECORD OF CHANGES

CHANGE NUMBER	DATE	TITLE OF BRIEF DESCRIPTION	ENTERED BY
--	Jan 2001	- Original Issue	H.D.
- A -	May 2002	- Added additional cable and connector information - Fixed minor typing errors	J.S.
- B -	Sept 2002	- Deleted reference to LC-N type and 7/8" Heliac adapters as being included - They are options to be ordered separately by the customer	J.S.
- C -	Nov 2003	- Added detail to Figure 4-1	J.S.
- D -	Aug 2006	- Change to 7/8 EIA Connector and related parts	HD..
- E -	Aug 2007	Added Maintenance Section	J.Soper
- F -	April 2009	Fixed power rating spec from 2kW to 3kW	J.Soper
- G -	July 2012	- Added Power vs Frequency Table - Added improved maintenance procedures and installation torque suggestions - Added cosmetic repair section - Added contact info section	J.Soper
- H -	September 2013	- Replaced Silicone grease with Silicone sealant - Changed p/n of anti-seize - Added list of basic tools req'd - Re-worded installation and maintenance sections	J.Soper
- I -	April 2016	Update new 7/8 EIA Connector and related parts (replace obsoleted parts)	Haitu Duong

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SECTION 1**GENERAL INFORMATION AND SAFETY PRECAUTIONS**

- 1-1 **GENERAL 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 many phases 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 electrical 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 voltages should be familiar with modern methods of resuscitation.

- 1.2 **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 the test equipment is properly grounded, to prevent electric shock.

CAUTION

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

CAUTION

Do not coat the insulator with any substance; do not paint with lead base paints.

- 1-3 INTRODUCTION. This manual provides general information, operating and functional description, and installation data for Valcom's VBBA 2-30 broadband antenna.
- 1-4 EQUIPMENT DESCRIPTION. The VBBA 2-30 Broadband Antenna (see figure 1-1) is a whip antenna for general use with HF communications equipment. The antenna provides vertically polarized, omnidirectional azimuth radiation from 2 to 30 MHz when the antenna is operated with a HF transceiver. It is designed for use under the severe environmental conditions encountered aboard Naval vessels. It is used for either receiving or transmitting high frequency signals. The antenna is a two section antenna and is base mounted. The mounting flange and insulator is a single integral part made from fibreglass.
- 1-5 RELATIONSHIP TO OTHER EQUIPMENT. The VBBA 2-30 Antenna interfaces with the HF receiving and transmitting equipment.
- 1-6 REFERENCE DATA. Table 1-1 lists the reference data for the antenna.
- 1-7 EQUIPMENT ACCESSORIES, AND DOCUMENTS SUPPLIED. Table 1-3 lists the equipment and documents supplied.

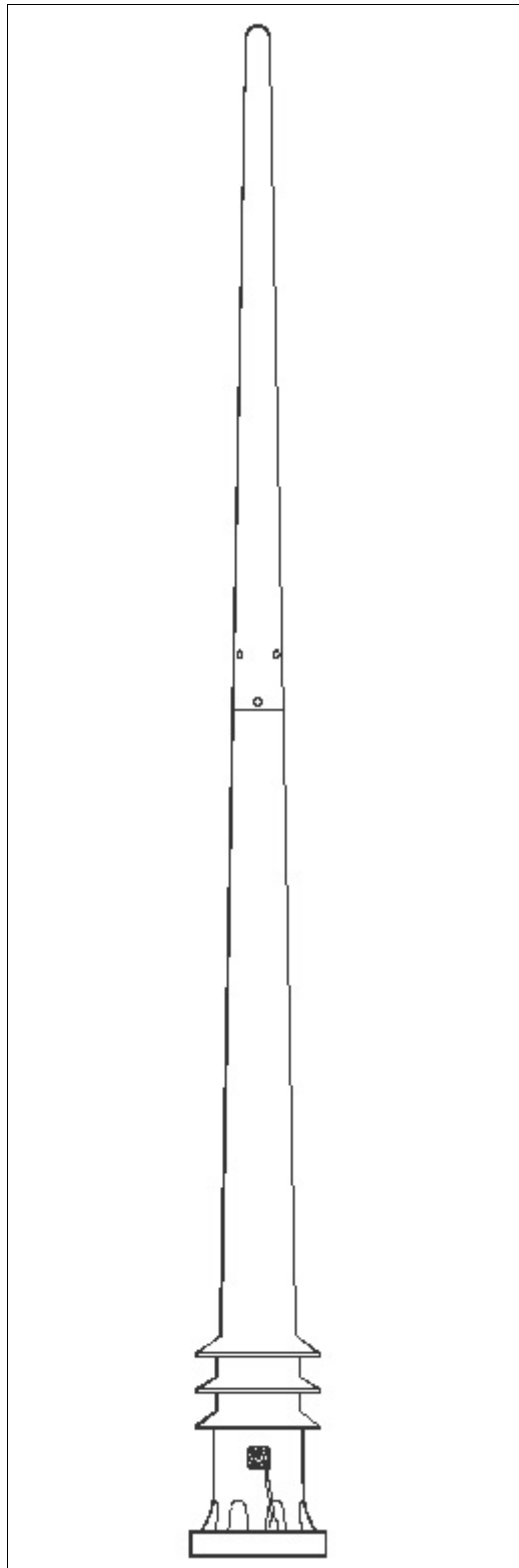


Figure 1-1 Antenna VBA2-30

Table 1-1 Reference Data

PARAMETER	SPECIFICATION
Nomenclature	Antenna, VBBA 2-30
Manufacturer	35736
Frequency Range	2-30 MHz
VSWR	2.0:1 Maximum
Polarization	Vertical
Power Rating	See Table 1-2 below
Azimuth Coverage	Omnidirectional
Input Connection	7/8 EIA Flange (see Note 1)
Temperature	-50°C to 65°C (-60°F to 150°F)
Wind Velocity	115 mph (185 kph) (51.4 m/s) (100 knots)
Humidity	0 - 100 %
Shock	MIL-S-901D Grade A
Vibration	MIL-STD-167-1A Type 1

NOTES: 1. For 1 kW operation, an 7/8 EIA to N adapter can be supplied (optional)

Table 1-2 Power Handling vs. Frequency Table

Frequency Range	Maximum Power Continuous-Duty	Maximum Power Intermittent Duty¹
2.000 to 5.999 MHz	1000 W	3000 W for 5 minutes
6 to 10.999 MHz	1500 W	3000 W for 10 minutes
11 to 20.999 MHz	2000 W	3000 W for 15 minutes
21 to 29.999 MHz	2000 W	3000 W for 30 minutes

1. Duration for continuous-duty transmission, allowing antenna to cool to ambient between transmissions

Table 1-3 Equipment, Accessories and Documents Supplied

QTY	NOMENCLATURE	OVERALL DIMENSIONS (INCHES)				WEIGHT (POUNDS) UNCRATED
		CRATED		UNCRATED		
		HEIGHT	DIA	HEIGHT	DIA	
1	ANTENNA VBBA 2-30 P/N VD-97-00061-1	---	---	421	13.0 Base	260
1	TECHNICAL MANUAL FOR VBBA 2-30 ANTENNA VTM-98006					
1	SILICONE SEALANT					
12	MS24693-C140 3/8-16 X .75 L FLAT HD SCREW					
1	MIL-A-907E ANTI-SEIZE COMPOUND					
1	GROUND STRAP P/N VC-97-00069-1					
1	7/8-EIA to N-Type ADAPTER VC-06-00142-1 (NOTE: Optionally installed for 1 kW or less operation)					
-	1/2" HELIAX CABLE (LDF4-50A) CONNECTOR COMMSCOPE P/N: L4E78-PS (NOTE: Optionally supplied for 1kW or more operation)					

SECTION 2**OPERATION**

- 2-1 INTRODUCTION. This chapter provides operating instructions for the antenna.
- 2-2 CONTROLS AND INDICATORS. The antenna contains no controls or indicators.
- 2-3 OPERATING PROCEDURES.
 - 2-3.1 Operator Turn-On. No operator turn-on procedures apply since no power is required to operate the antenna. However, the antenna is coupled to RF equipment (transmitter/receiver) and to associated systems which may require energizing. For operating instructions, consult the appropriate technical manuals.
 - 2-3.2 Modes of Operation. The antenna operates automatically, and no operator intervention is required other than interconnecting the associated transmitter or receiver with the antenna.
 - 2-3.3 Operation Under Interfering Conditions. No additional or alternate instructions are necessary to operate the antenna under interfering conditions.
 - 2-3.4 Operator Turn-off. Since no power is required to operate the antenna, no operator turn-off is required. However, the specific equipment connected to the antenna may require operator turn-off. Consult the associated technical manuals for turn-off procedures.
 - 2-3.5 Emergency Operation. No additional or alternate steps are necessary to operate the antenna under emergency conditions.
 - 2-3.6 Emergency Turn-off. The antenna requires no emergency turn-off. For emergency turn-off of specific equipment connected to the antenna, consult the associated technical manuals.

SECTION 3**FUNCTIONAL DESCRIPTION**

- 3-1 **FUNCTIONAL DESCRIPTION.** The VBBA 2-30 Broadband Antenna is a base mounted, high-power antenna which provides omnidirectional coverage for general purpose communications use from 2 to 30 MHz. The antenna consists of a radiating element, and a fibreglass base insulator/mounting flange. The radiating element tapers from approximately 8.25 inches in diameter at the insulator to 2.17 inches at the top. The antenna base insulator electrically isolates the radiating section of the antenna from the ground and physically supports it. The insulator/mounting base is constructed of high-strength, laminated epoxy fibreglass material. When assembled, the overall length of the antenna is approximately 35 feet. The antenna disassembles into 2 sections. The broadband feature of the antenna means no antenna coupler is required. The transmitter or receiver only is required to be connected to the antenna.

SECTION 4

INSTALLATION

- 4-1 **SITE INFORMATION.** Valcom's VBBA 2-30 HF Antenna is designed primarily for shipboard installation. The antenna can also be used at shore installations. The antenna should be installed in a non-obstructed environment, clear from any contiguous structures, such as masts, bulkheads, or other metal objects.
- 4-2 **TOOLS AND MATERIALS REQUIRED.**
15/16" (normally) wrenches for 5/8" hardware for antenna base bolts (not provided).
7/16" wrenches for EIA-flange connector (nothing for N-type connector)
#4 Phillips screwdriver for joint screws
No other special tools and materials are required for installation.
- 4-3 **UNPACKING AND REPACKING.** Table 1-3 gives data on the overall dimensions, volume, and weight of the un-crated antenna. To unpack, carefully pry off the cover, and remove the antenna from the container. Save the container to pack the antenna for reshipment. No special handling procedures are required; observed normal precautions when handling the antenna.
- 4-4 **FOUNDATION.** The antenna should be installed vertically on a mounting plate that has bolt holes matching those in the antenna base (see figure 4-1).
- 4-5 **INPUT REQUIREMENTS.** The antenna has an rf power handling capability of 3 kW in the 2 to 30 MHz frequency range.
- 4-6 **INSTALLATION PROCEDURES.** After unpacking the antenna, proceed with its installation as follows:
- a. Examine the exterior of the antenna for damage; make sure that the top of the lower section and the bottom of the upper section has not been damaged, misaligned, or fractured.
 - b. Before assembling the two sections together, the sleeve at top of the bottom section must be coated with a thin layer of electrically conducting nickel-based anti-seize compound MIL-A-907E (supplied). A small dab of anti-seize in each of the eight threaded holes will assist with installing the screws later.
 - c. Place the bottom section of the antenna on two saw horses. After applying the anti-seize compound to the mating sleeve, carefully slide the antenna top section over the sleeve making sure the arrows on each section are aligned.

d. Ensure the eight holes are in line between the two sections. Install the eight countersink flat head screws to the two sections. It is recommended to install all eight screws 3 or 4 turns before tightening any of them.

e. Begin tightening the screws one by one. A minimum torque of 10-20 in-lbs is required to install the screws. If less than this torque is used, the thread-locking inserts may be damaged and need to be replaced. Contact the factory for assistance. A final torque between 55-75 in-lbs is acceptable for the screws, providing the screw head sits flush or slightly below the antenna surface. After installation, seal the screw heads using the RTV sealant.

f. Carefully lift the antenna to its mounting platform. Align the mounting holes of the base flange with the mounting holes in the platform.

g. Secure the antenna to its mounting plate with using eight 5/8-11 hex head cap screws (not provided), along with two flat-washers, a split-lock-washer and a nut. Bolt length will need to be determined by the installing activity. A final torque between 90-100 ft-lbs is acceptable for the bolts.

h. Make sure the ground strap supplied with the antenna is connected to one of the mounting bolts directly below the input connector on the antenna as shown in Figure 4-1.

i. The VBBA 2-30 antenna input is an 7/8 EIA Flange and is found on the base insulator below the drip shields. Prior to connecting the system feedline, ensure the equipment has been de-energized and proper lock out procedures followed. Once the lockout procedures have been performed, connect the system feedline to the antenna. For 1 kW operation with the antenna, an 7/8 EIA to N Adapter can be supplied for connecting to an N type feedline cable connector. For more than 1 kW operation, a 7/8 EIA Flange can be supplied for the feedline used. Ensure the ground wire supplied has a secure connection at the input connector on one end and the other end to the antenna mounting bolt. Seal the ground connection at both ends using the RTV sealant provided.

4-7 CABLES AND CONNECTORS. Other types of cables and connectors can be used to connect the antenna's input connector to the radio equipment. Some suggestions can be found in table 4-1.

Table 4-1 Cable and Connector Group Suggestions

Group 1 (Helix Cable)	Cable: LDF4-50A (COMMSCOPE) (1/2" Dia., 50 ohm, 6.5 kW @ 30 MHz) Connector: 7/8 EIA Flange L4E78-PS (COMMSCOPE)
Group 2 (Helix Cable)	Cable: FSJ2-50 (COMMSCOPE) (3/8" dia., 50 ohm, 3 kW @ 30 MHz) Connector: N-TYPE MALE F2TNM-PL (COMMSCOPE)
Group 3 (1kW)	Cable: RG-214/U Connector: N-type UG-21E/U

- 4-8 INSTALLATION CHECKOUT. Checkout of the antenna after installation can only be accomplished by operating the receiving and transmitting equipment that is used with the antenna.

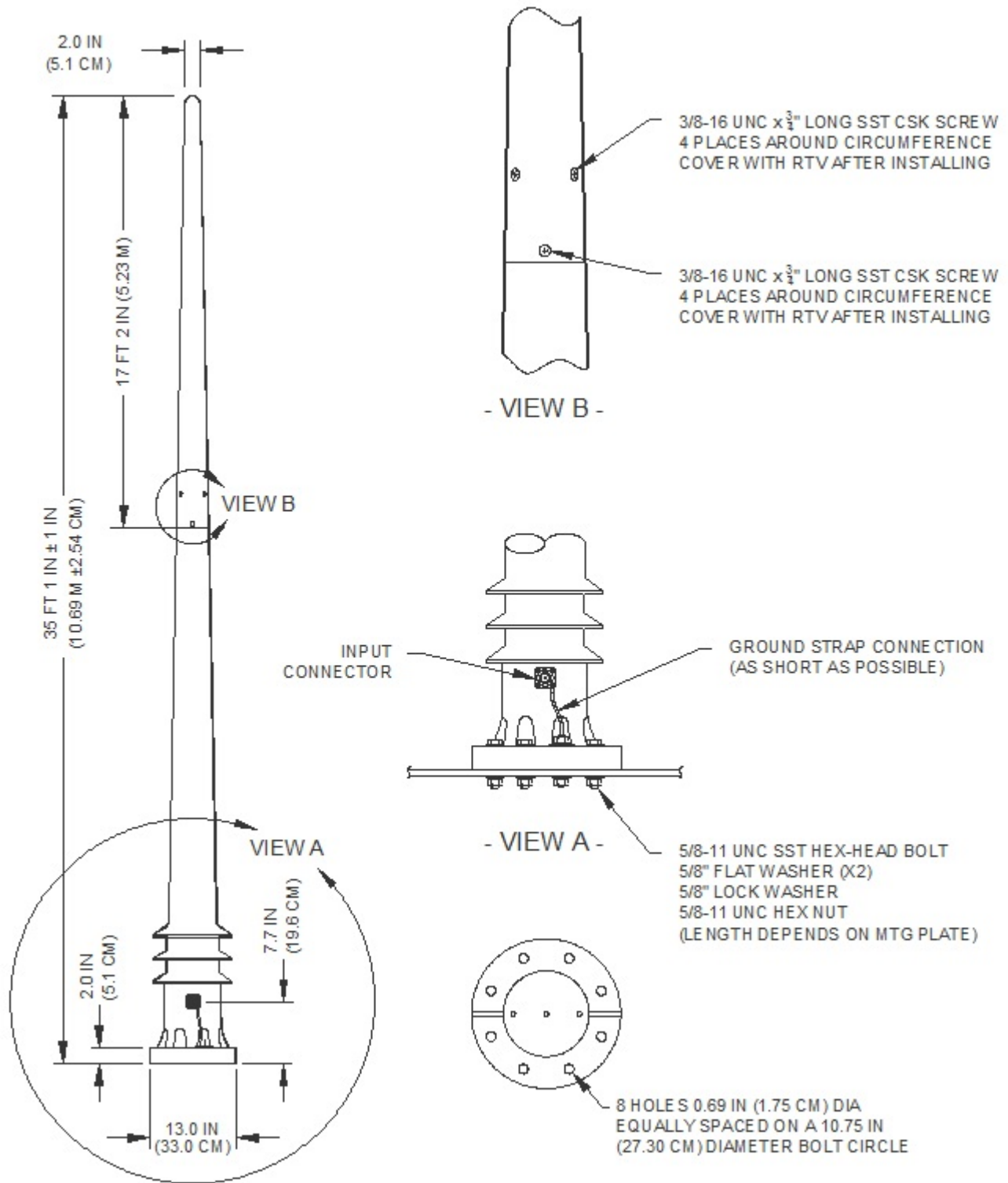


Figure 4-1 - Outline Drawing

SECTION 5**MAINTENANCE****5-1 Scheduled Maintenance**

The antenna is virtually maintenance free. The external finish is a silicone alkyd paint. The minimum finish life before showing signs of deterioration should be at least six years under normal climate conditions.

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 must be performed on a monthly basis, when exposed to sea-spray.

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

All threaded hardware, including the base mounting bolts, the countersunk screws at the joint and the input power connector should be inspected for signs of damage and to ensure proper tightness (suggested torque settings can be found on pages 8 and 9). In most cases a quick visual inspection is all that is required. This must be performed on a monthly basis or whenever practical.

5-2 Corrective Maintenance**5-2.1 General Repairs**

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 and/or aluminum construction may attempt the repair of minor surface damage if practicable.

NOTE

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

5-2.2 Cosmetic Repairs

The antenna has been designed to meet and tested to pass Naval Shock and Vibration requirements (MIL-S-901 and MIL-STD-167 respectively). Under and beyond normal expected environmental stresses onboard ships, this antenna will not suffer mechanical or electrical failure. However, over the life of the antenna a seam may become visible just above the top drip shield. This may appear to be a “crack” in the antenna. However, this is only a surface crack in the paint layers and the filler material. This location is where the aluminum radiator meets the fiberglass base and since these materials have different coefficients of expansion, under high mechanical stress(es), the paint may crack under the normal flexural movement of the materials. An example can be seen in the below photograph.

IT IS IMPORTANT TO NOTE IN NO WAY WHATSOEVER IS THIS CRACK RELATED TO A MECHANICAL FAILURE OF THE ANTENNA.

Should this occur, repairing is not considered to be necessary. Otherwise, to restore the antenna’s cosmetic appearance, it can be refinished as follows:

- use a small scraper to remove all the loose paint flakes;
- lightly sand the area down;
- re-coat with a durable ship-board grade paint;
- if excessive filler material has fallen out, the groove can be filled back in with a quality acrylic or silicone sealant after painting.



SECTION 6**QUICK REFERENCE DATA****6-1 General**

Manufacturer's contact information can be found in Section 6-2.

6-2 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 Guelph, Ontario Canada N1G 3M5
Or directly at:	
Phone : (519) 824 - 3220 Fax : (519) 824 - 3411 e-mail : enquiries@valcom-guelph.com Internet : www.valcommfg.ca	