

SpaceCom Antennas for the MSAT Network Installation Manual

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1. Introduction

The SpaceCom MSAT antenna is designed for use with Westinghouse Series 1000 and Mitsubishi ST100/200 series mobile satellite terminals. It is a self-contained tracking antenna that uses patented beamsquint technology, which ensures that the antenna always points towards the satellite, regardless of vehicle or ship movements.

The antenna includes onboard LNA (low noise amplifier); HPA (high power amplifier) and tracking receiver circuitry to ensure communications even in adverse circumstances. The SpaceCom MSAT antenna is available in two versions: 2-axis tracking (SPACMSV2) and 3-axis tracking (SPACMSV3).

2. Unpacking

After opening the box check the contents:

- One SpaceCom tracking antenna (2-axis or the 3-axis version)
- One Junction Box for connecting the antenna, the terminal and DC power (12V DC).
- One additional tracking IC (satellite frequency chip) with extra label. The complementary IC is already installed in the antenna.
- One DC power cord
- One installation manual (this document)

NOTE: Cables are not included in the basic antenna package. The following are approved cabling configurations:

SPAC-MSV 3 (3 Axis)

Cable Length Antenna to Junction Box	Cable Type Antenna to Junction Box	Cable Length Junction Box to AEU	Cable Type Junction Box to AEU
25 ft	LMR 240	1 ft	LMR 240
25 ft	LMR 300	1 ft	LMR 240
60 ft	LMR 600	1 ft	LMR 240
100 ft	LMR 600	1 ft	LMR 240
100 ft	LMR 900	1 ft	LMR 240

SPAC-MSV 2 (2 Axis)

Cable Length Antenna to Junction Box	Cable Type Antenna to Junction Box	Cable Length Junction Box to AEU	Cable Type Junction Box to AEU
11 ft	LMR 240	1 ft	LMR 240
19 ft	LMR 240	1 ft	LMR 240
40 ft	LMR 500	1 ft	LMR 240



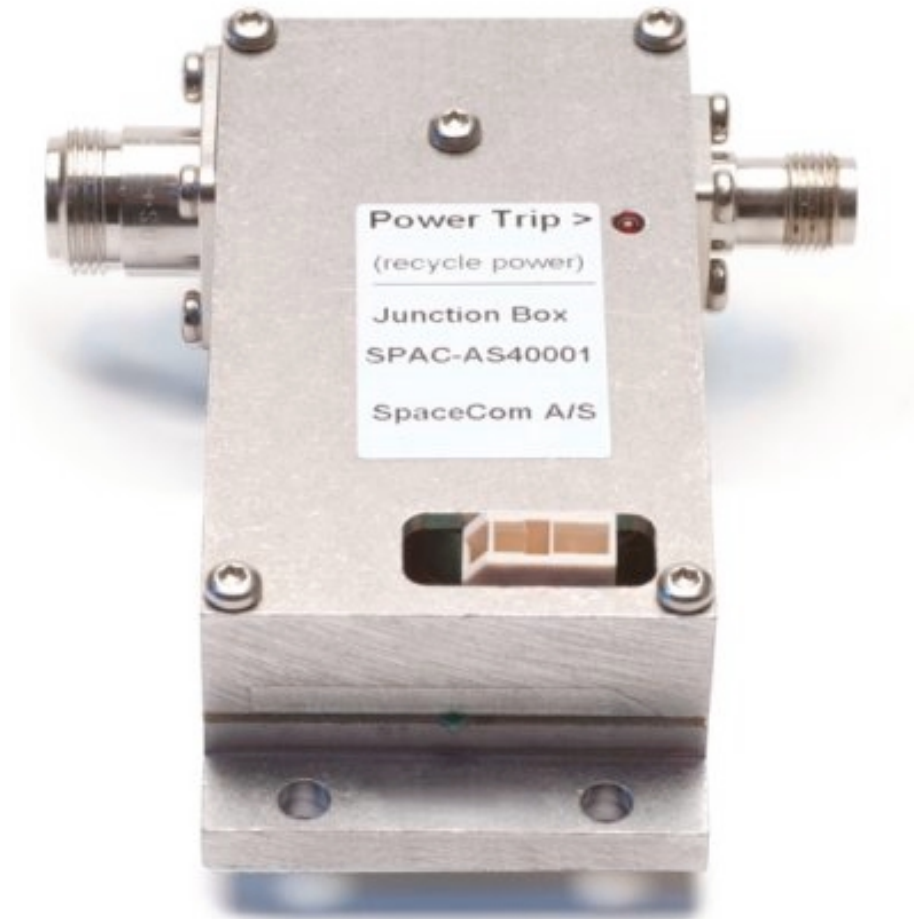
SpaceCom MSV3 antenna with Mitsubishi ST 100/200 Mobile Terminal



SpaceCom MSV3 antenna with Westinghouse Series 1000 Mobile Terminal

3. Connecting To The Mobile Terminal

Connections are done via the Junction Box.



Right coaxial connector (TNC) connects to the transceiver/RF unit. Left coaxial connector (N) connects to the antenna. Molex plug in center is for 12 V DC. The DC cord is included.

Note that operation with Mitsubishi Mobile ST100/200 series terminals requires the use of the Mitsubishi RF unit (AU110A).

WARNING. Avoid exposure to microwave radiation. Keep a safe distance of min. 1 meter to the side and above the antenna.

Keep a clear line of sight to the satellite. Preferably avoid all obstructions within 3 meter of the antenna. Obstructions less than 15 cm in diameter can be ignored beyond this distance.

Do not locate the antenna close to interfering signal sources or receivers.

Power up

After all coax cable connections are made, insert plug with 12 V DC into the Junction Box. The red LED in the Junction Box will flash briefly and the antenna will initiate a search for the satellite.

In case of an overload the Junction Box Protection Circuit will trip, leaving the LED continuously lit. An overload can be triggered by a short circuit in either coaxial cables or connectors. Check cables and connectors for faults.

To reset the Junction Box you must cycle the power (disconnect and reconnect 12 V DC)

Setting of antenna type

Several antenna types can be selected from the setup menu of Westinghouse or Mitsubishi terminals.

Westinghouse: set antenna type to WEC MAST.

Mitsubishi: set antenna type to 07 for Fixed Site.

4. Antenna mounts

For permanent mounting, a special Pole Mount Installation Kit is available. SpaceCom part no.: SPAC-AC-1005. Designed for easy installation it ensures proper drainage of the antenna, galvanic insulation and is able to withstand the rigid mechanical stress encountered on a vehicle or ship. See drawing of pole mount kit in annex A.

For temporary use – or where drilling of holes is to be avoided – a Magnetic Mount Installation Kit for the 2-axis antenna is offered. SpaceCom part no: SPAC-AC-1007.



The 2-Axis antenna on the magnetic mount.

5. Changing the Tracking IC (satellite frequency chipset).

Tracking of either the MSAT1 or MSAT2 satellite is controlled by a programmable IC within the tracking receiver (inside the antenna radome).

The antenna contains a tracking IC for each of the MSV satellites, one installed and one spare. When ordering the antenna it is recommended that you indicate the satellite network (MSAT1 or MSAT2) on which the unit will operate, thus ensuring delivery of the antenna with the proper IC installed as the default.

However, if tracking of the alternate satellite is required, installation of the corresponding Tracking IC is necessary:

WARNING. Changing of tracking IC's involves opening the antenna radome and changing components on printed circuit boards. This must be done by qualified personnel only, trained in handling static sensitive electronic components. Failure to observe these precautions can damage the antenna, causing problems in operation and void the warranty

To swap the Tracking IC:

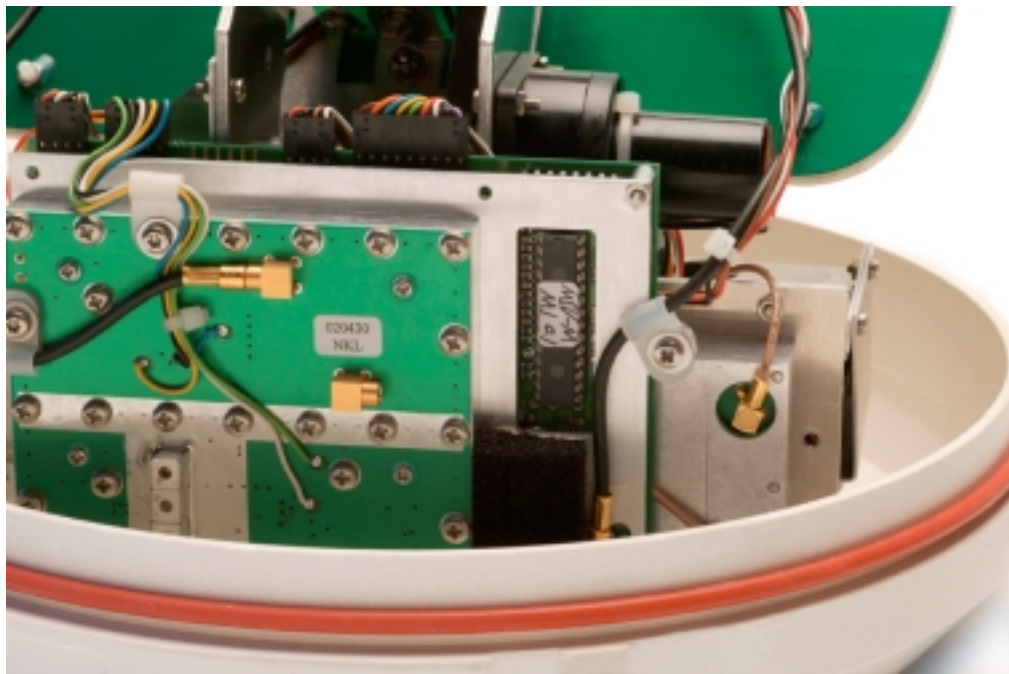
- open the radome
- locate the tracking IC
- remove the current IC from it's socket and insert the alternate IC
- assemble the radome

Opening the radome:

3-axis antenna – unscrew the 3 set screws placed around the lower edge of the radome. Turn the upper part ccw (as seen from above) about 60 degree. This is a bayonet type lock, so there will be initial resistance. You must have the bottom part firmly fixed and use some amount of force to twist the upper part.

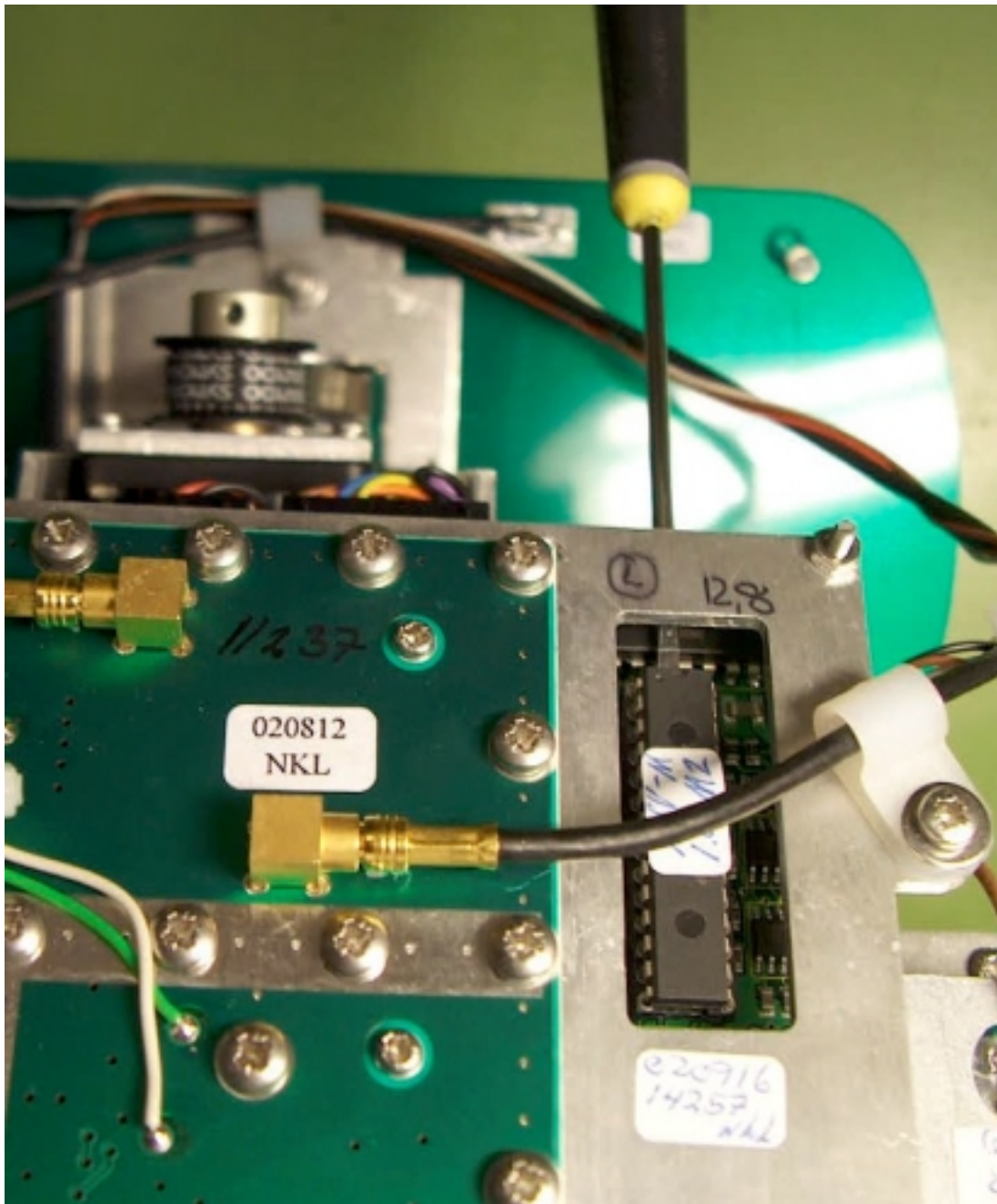
2-axis antenna – peel the sealing tape. (5 cm wide white adhesive tape around the radome). Then lift off the upper part.

Locate the tracking IC:



Tracking IC. The 28-pin DIL located in the middle of the picture.

The tracking receiver has an access hole above the Tracking IC. You can remove the IC from the socket by gently inserting an ordinary small screwdriver from above into the narrow end - between the IC and the socket - and gently twist while pushing the screwdriver further under the IC.



Now insert the new tracking IC. Note orientation of the IC.

Assembling the radome:

3-axis antenna – prior to assembling top and bottom, the rubber gasket must be cleaned from residue of old sealing material. Apply a bead of Dow Corning DC3140 silicone to fasten the gasket around the base of the antenna. Align top and bottom – a small index on the top above a square tap on the bottom - see picture – then lower the upper part

and tighten the bayonet lock. Finally tighten the 3 set screws – but only to the point that they are flush with the radome!



2-axis antenna – install the upper portion. Seal the two parts using sealing tape. As the seal provides long-term protection over a wide range of temperatures, humidity, UV radiation etc., only the approved sealing tape: 3M Scotch Tape 471 White can be used (SpaceCom part no.: SPAC-M30-10018). Failure to follow this guideline will void warranty.

Attach the label – included with the Tracking IC - on top of the old label on the underside of the radome, so that tracking information can be read correctly from the outside!

6. Basic maintenance

SpaceCom MSV antennas are designed for long, maintenance free life. However it is important to install the antenna correct, not blocking the drainage holes in the bottom and keep the associated cables free from damage and water ingress. Proper sealing of coax connectors and fastening of cables will ensure long and trouble free service.

7. Limits of operation

The antenna is designed to perform properly within these operational limits.

Temperature:	-30 to +43 degree C
Supply voltage:	11.5 V to 15.6 V
Input power (from transceiver):	10 W max.

Environmental conditions – survival. Exposure outside these limits may cause permanent damage.

Temperature:	-45 to +49 degree C
Supply voltage:	10.5 V to 16.0 V

8. Warranty

SpaceCom limited warranty statement.

SpaceCom warrants that SpaceCom MSV antenna hardware, accessories and software will be free from defects in materials and workmanship after the date of purchase for a period of one year.

If SpaceCom receives notice of such defects during the warranty period, SpaceCom will, at its option, either repair or replace products which prove to be defective. Replacement products may be either new or equivalent in performance to new.

The warranty does not apply to defects resulting from (a) improper or inadequate installation or maintenance, (b) unauthorized modification or misuse, (c) operation outside the published supply voltage and environmental specification for the product or (d) improper site preparation or maintenance.

SpaceCom products may contain remanufactured parts equivalent to new in performance or may have been subject to incidental use.

IN NO EVENT WILL SPACECOM BE LIABLE FOR LOSS OF DATA OR FOR DIRECT, INCIDENTAL, CONSEQUENTIAL (INCLUDING LOST PROFIT OR DATA), OR OTHER DAMAGE, WHETHER BASED IN CONTRACT, TORT OR OTHERWISE.

ANNEX A

Installation of SpaceCom Maritime- and Land Mobile Antenna using The Standard Pole Mount Kit

READ THIS CAREFULLY !

1. General

When installing a SpaceCom Maritime Antenna on a vessel or Land Mobile Antenna on a vehicle (or vessel) the following important guidelines must be followed in order to ensure that the antennas will operate trouble free throughout its service life. Warranty will be void if guidelines are not followed.

2. Pole Mount Kit Characteristics

The installation is based on a Pole Mount Kit supplied by SpaceCom. This kit is common to the Maritime as well as the Land Mobile Antenna. Installation using the "Pole Mount Kit" is shown in FIG.1 and FIG.2 enclosed in this document.

The kit consist of the following components:

- 1) 1pcs. Mounting Pole, Part No. SPAC-M00424
- 2) 1pcs. Rubber Gasket, Part No. SPAC-M00425
- 3) 6pcs. Plastic Bushings, Part No. SPAC-M00227
- 4) 6pcs. Washer, Part No. SPAC-M90-10062
- 5) 6pcs. Screw, Part No. SPAC-M90-10102
- 6) 2pcs. Clamp, Part No. SPAC-M00428
- 7) 2pcs. Clamp, Part No. SPAC-M00429
- 8) 8pcs. Nuts M8, Part No. SPAC-M90-10105
- 9) 2pcs. Flange, Part No. SPAC-M00430
- 10) 1pcs. Plug for Mounting Pole, Part No. SPAC-M00233
- 11) 1pcs. Screw M5*10, Part No. SPAC-M90-10104

These components are shipped in one separate box. The installer, upon receipt of a box is required to check the contents.

3: Component Description

- 1) Mounting Pole Part No. SPAC-M00424 is a piece of standard tube with a mounting flange welded onto it. The component is made from a stainless steel alloy that is easy to cut, machine and weld. It is part of the ventilating system for the dome. The standard length is 400mm and must not be shortened in maritime application. Shorter versions for e.g. land mobile application may be supplied on special request.
- 2) Rubber Gasket, Part No. SPAC-M00425 is used to ensure that water or dust does not enter into the area around the centre hole in the bottom of the dome. The centre hole is part of the ventilating system for the dome and **MUST NOT BE BLOCKED**. Also the gasket will protect the N-type connector from water and dust and hence ensure long life time.
- 3) Bushings, Part No. SPAC-M00227 are used to ensure **NO** electric contact between the mechanical parts of the antenna (in the dome) and the Mounting Pole. This isolation is not required in vehicle installations but is required in maritime installations, where the antenna and coaxial cable to the antenna must be isolated from ship's structure in order to avoid any circulating DC current that could cause uncontrolled corrosion.
- 4) Washers, Part No. SPAC-M90-10062 are used to protect the plastic bushings SPAC-M00227 when the screws SPAC-M90-10102 are tightened to the specified torque (refer to FIG.1 and 2). The washers **MUST** be used.
- 5) Screws, Part No. SPAC-M90-10102 are M6 (metric), 25mm long screws made from stainless steel (A4) are used for fastening the antenna to the flange on the Mounting Pole so that the installation will endure vibrations and heavy loads due to wind or surges from rough sea. **DO NOT CHANGE THE LENGTH OF THE SCREWS**.
- 6) Clamps, Part No. SPAC-M00428 are used to fasten the flanges SPAC-M00430 to the Mounting Pole, refer to FIG.1 and 2.
- 7) Clamps, Part No. SPAC-M00429 are used to fasten the Mounting Pole to any post with a diameter between 35 and 50 mm, refer to FIG.1 and 2.
- 8) Nuts, Part No. SPAC-M90-10105 are M8 nut used for the clamps, refer to FIG.1 and 2. Nuts are to be tightened to 5Nm.
- 9) Flange, Part No. SPAC-M00430 are used for linking the clamp holding forces.
- 10) Plug, Part No. SPAC-M00233 is used for partly closing the bottom of the Mounting Pole so that no surge of water will fill the tube or damage any part of the antenna. Any condensing water within the antenna and/or tube will drop out by the plug. The plug will also prevent the coaxial cable from vibrating in the tube.
- 11) Screw, M5*10, Part No. SPAC-M90-10104 is used to secure the plug.

The kit offers the following advantages:

1. Flexible and ease of installation with no or little preceding work e.g. on board a vessel.
2. Ventilation of the antenna and at the same time makes it comply with its relevant IP class.

3. Protects the coaxial cable going to the antenna and its N-type connector.
4. Isolating the antenna from the structure on which it is installed, this is a must in maritime installations where no DC-current is allowed to circulate in any part of the ship.

3. Installation Guide

Installation of the 2- and 3 axis antenna on a post is done according to FIG.1 and FIG2 respectively. The diameter of the post shall preferably be between 35 and 50 mm using the standard clamp supplied in the kit. FIG.1 and FIG.2 are self explaining. Notice the TORQUES for bolts and nuts.

A small loop should be made on the coax cable near to the plug SPAC M00233 in order to be able to pull the cable about 15 cm up through the Mounting Pole, when the antenna is installed or removed.

If a long (e.g. 3m) post is used onboard a ship it is recommended that this is fastened to the ship using standard clamps rather than welding. This will enable the post to be laid down in case removal of the antenna is required.

4. Vibration

The antennas (2-and 3 axis versions) are designed to meet the following operating vibration levels in any of 3 perpendicular directions measured at the mounting base of the radome i.e. at the flange of the standard Mounting Pole described above:

Random Vibration

1.05 Grms with the following spectral density
 5-20 Hz.....0.02G²/Hz
 20-150 Hz.....-3dB/octave

And further,

Single Frequency Vibration

5-10 Hz with amplitude 2.54 mm
 10-15 Hz with amplitude 0.76mm
 15-25 Hz with amplitude 0.40mm
 25-33 Hz with amplitude 0.23mm

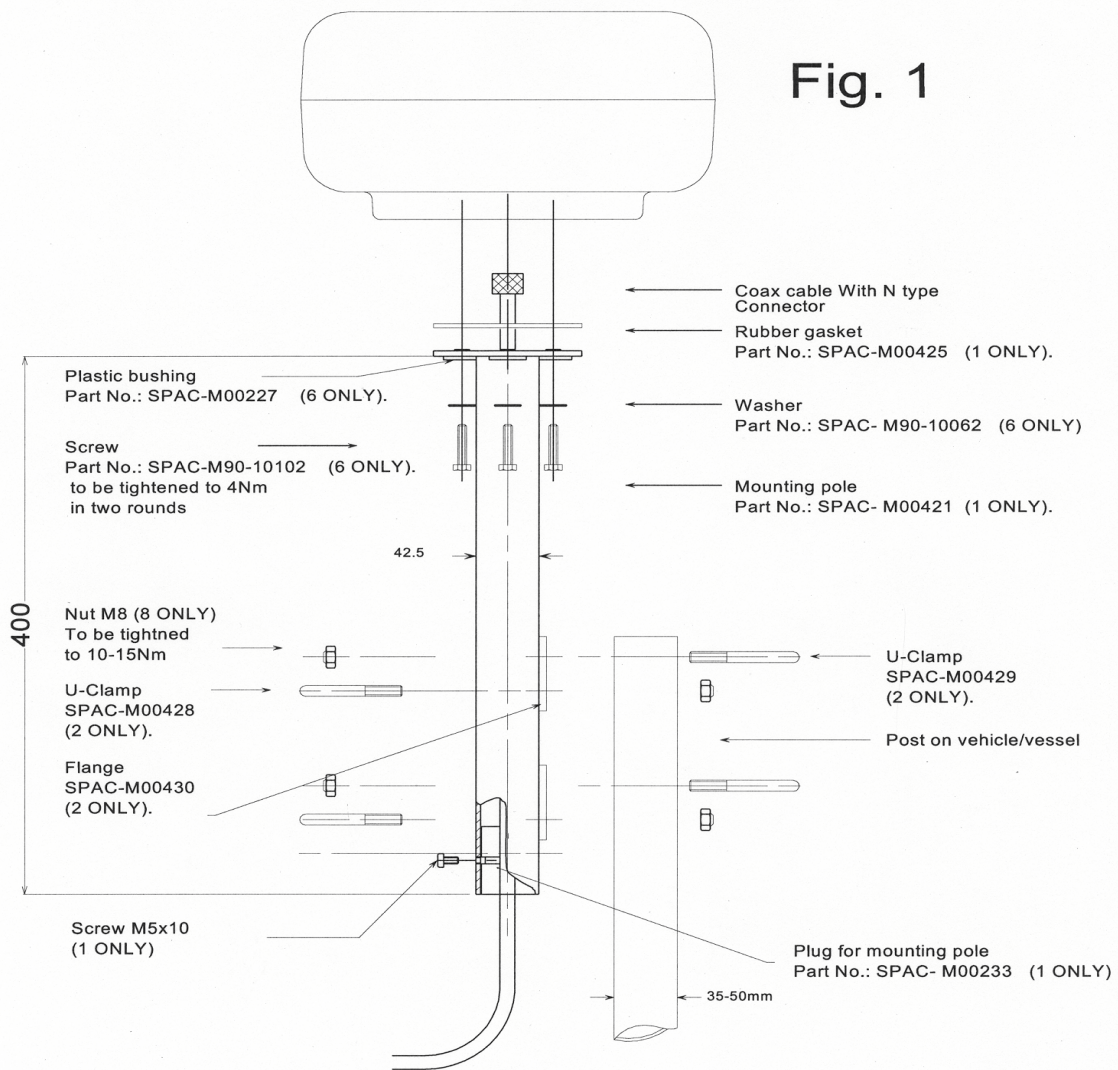
Vibration levels in a typical installation are usually much less than to the above mentioned values. It is however the responsibility of the installer to verify, that the cited levels are not exceeded in any mode of operation of the vehicle/vessel. In case of abnormal vibration, typically at a resonance frequency, measures must be taken in order to displace the resonance frequency or to dampen the vibration amplitude.

5. Alternative installation kits

SpaceCom can assist in designing alternative Mounting Kits in case it should be needed e.g. in places where space is limited. Any new design should take into consideration the functional requirements listed in 2.

Installation of Land Mobile Antenna using standard Pole Mount Kit

Fig. 1



Installation of Maritime Antenna using standard Pole Mount Kit

Fig. 2

