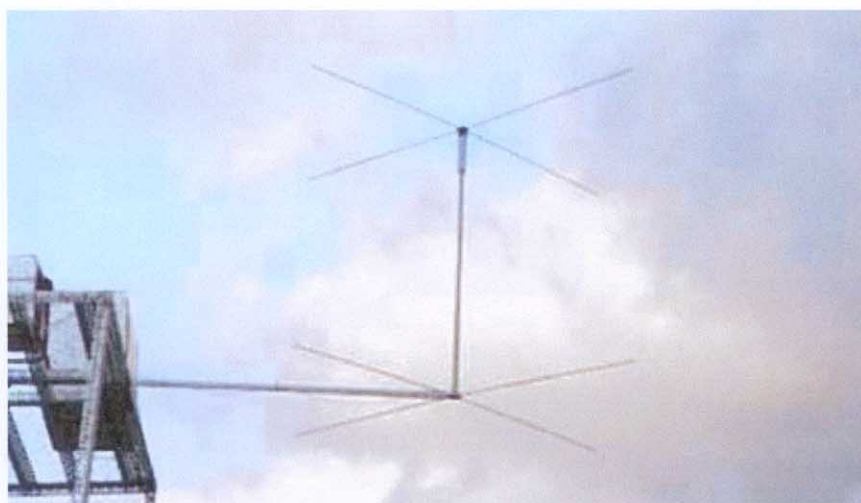


PROCEDURE FOR ASSEMBLY
OF
CONCERT MOCK-UP ORBITER ANTENNA
FOR
ESA RF-TEST

4 Feb 2000



Prepared by M. L. Richards

Michael L Richards / 21.02.2000

Signature/ Date

Approved by Technical Department: J. Wedekind

J. Wedekind / 21.02.2000

Signature/ Date

Approved by CONCERT Management: E. Nielsen

Nielsen / 21.02.2000

Signature/ Date

Approved by QA/PA: W. Boogaerts

W. Boogaerts / 27/2/2000

Signature/ Date

	Max Planck Institut für Aeronomie Germany	CONCERT Orbiter Antenna		ASSEMBLY PROCEDURE MOCKUP - 1 RO-OCN-RFMOCKUP-0010	Date: 17.02.00 page 2 of 10
--	---	--	--	---	--------------------------------

1.0 OVERVIEW

1.1 PURPOSE

This assembly procedure is intended for the Mock-Up Antenna Number 1, only. It includes mechanical assembly of two booms (or antenna masts), dipole and reflector elements, attachment of dipole electronics and feeding of cable through masts from dipole to mounting plate.

The procedure shall be carried out as preliminary for the RF-test referred to in reference PR/2706/GJ, G. Jung, ESTEC, 16 July 1999. When the procedure is completed the Mock-Up Antenna shall be ready for mechanical mounting to ROSETTA Orbiter model, and electrical and signal connection to ground support equipment.

This procedure includes an electrical functional test to be performed before mechanical integration with Orbiter model.

1.2 PRECAUTIONS

Clean room handling: 3m by 3m clean clear floor area for assembly

Normal torsion for fasteners, with due care for steel fasteners in aluminium

The antenna is hand cleaned using isopropyl alcohol and stored in plastic bags for transport in a wooden transport container.

1.3 PARTS LIST FOR MOCK-UP ANTENNA 1

Part	Number	Name	Description
MU1-HS	1	Horizontal mast with reflector flange	Al, 20 mm square section, length 1164 mm
MU1-RE	4	Reflector elements	Al, 777 mm length, 1 mm wall thickness
MU1-DH	1	Dipole head	
MU1-EB	1	Electronics board	Impedance matching unit
MU1-VS	1	Vertical mast	Al, 1000 mm length with dipole head
MU1-SC	1	Signal Cable	Length 2320 mm (1 λ in Teflon), female Lepra connector
MU1-AD	1	Adapter Cable for GSE	Signal Cable to GSE Adapter (male Lepra to male SMA connector)
MU1-DE	4	Dipole elements	Al, 747 mm length, 1 mm wall, threaded to fasten to dipole head
MU1-MF	1	Mounting flange (at Support-1)	connects horizontal mast to Orbiter at Support-1 location, same fastener mounting template as the STM Support-1 holes template
MU1-FN	4	M4 by 12 screws	to mount antenna flange to Orbiter



Fig 1: Antenna as shipped. From top, [a] dipole elements (4), [b] vertical mast with dipole-head and reflector-flange with reflector element screws (4) and horizontal mast assembly screws (4), [c] horizontal mast with orbiter mounting flange with (4) screws, [d] reflector elements (4) and [e] adapter cable.

1.4 CONTENTS OF TRANSPORT CONTAINER

The wooden transport container contains the following:

- Cleaned antenna parts and Lepra/SMA cable adapter as in Fig. 1 in plastic bags
- Allen key set
- (this) Assembly Procedure Mock-Up 1 (RO-OCN-RFMOCKUP-0010)
- Cable ties

1.5 MGSE AND EGSE


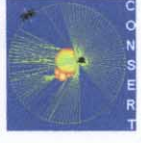
No special tools or supports are required.

Electrical continuity tests will be carried out using an ohmmeter.

A Network Analyser is required as part of the electrical functional test, and will be supplied by MP Ae-CONSERT team.

Tools:

Item OCN	Description
01	Allen key set
02	Network Analyser

	Max Planck Institut für Aeronomie Germany	CONSERT Orbiter Antenna		ASSEMBLY PROCEDURE MOCKUP - 1 RO-OCN-RFMOCKUP-0010	Date: 17.02.00 page 4 of 10
---	---	--	---	---	--------------------------------

2.0 ASSEMBLY

2.1 HORIZONTAL MAST, DIPOLE HEAD, VERTICAL MAST, AND SIGNAL CABLE

The vertical mast, dipole head, reflector flange and signal cable are delivered as a single unit. If the dipole head must be disassembled and reassembled, use the procedures in Appendix A (qualified CONSERT MPAE personnel only).

The horizontal mast has a square cross-section. One end of the mast fits onto a square cross section extension of the reflector flange. The mast is fastened to the reflector flange extension with two (2) screws through each side (4 total). See Fig. 2.

The signal cable runs from the dipole head through the inside of the vertical mast and out through a hole in the mast above the reflector flange.

Attach the signal cable along the outside of the horizontal mast by means of plastic ties.

CAUTION *The signal cable connector at the orbiter mounting flange is small. In the next steps take due care to prevent damage.*

The adapter cable is delivered attached to the signal cable in order to protect the signal cable connector.

Remove the adapter cable. Then pass the cable connector through the gap between horizontal mast and orbiter mounting flange.

Insert the two fibre washers into the hole in the side of the flange. These provide an electrically insulated sleeve for the Lepra connector.

Put the signal cable connector into the electrically insulated sleeve in the side of the mounting flange and fasten the connector to the flange using the washer and nut that are provided.

At this stage the antenna appears as in Fig. 2.



Fig. 2: Dipole head, vertical and horizontal masts and cable assembled

2.2 REFLECTOR ELEMENTS

Reflector elements are slightly longer than dipole elements (30mm longer).

The four reflector elements are identical. One end of each element is machined for good electrical contact to reflector flange and masts. The four reflector elements are fastened to the reflector head by passing the machined end into a hole in the head, and fastening with the provided screw. See Fig. 3.

When the reflector elements are attached to the reflector head, the construction is stable enough to stand unsupported on the floor.

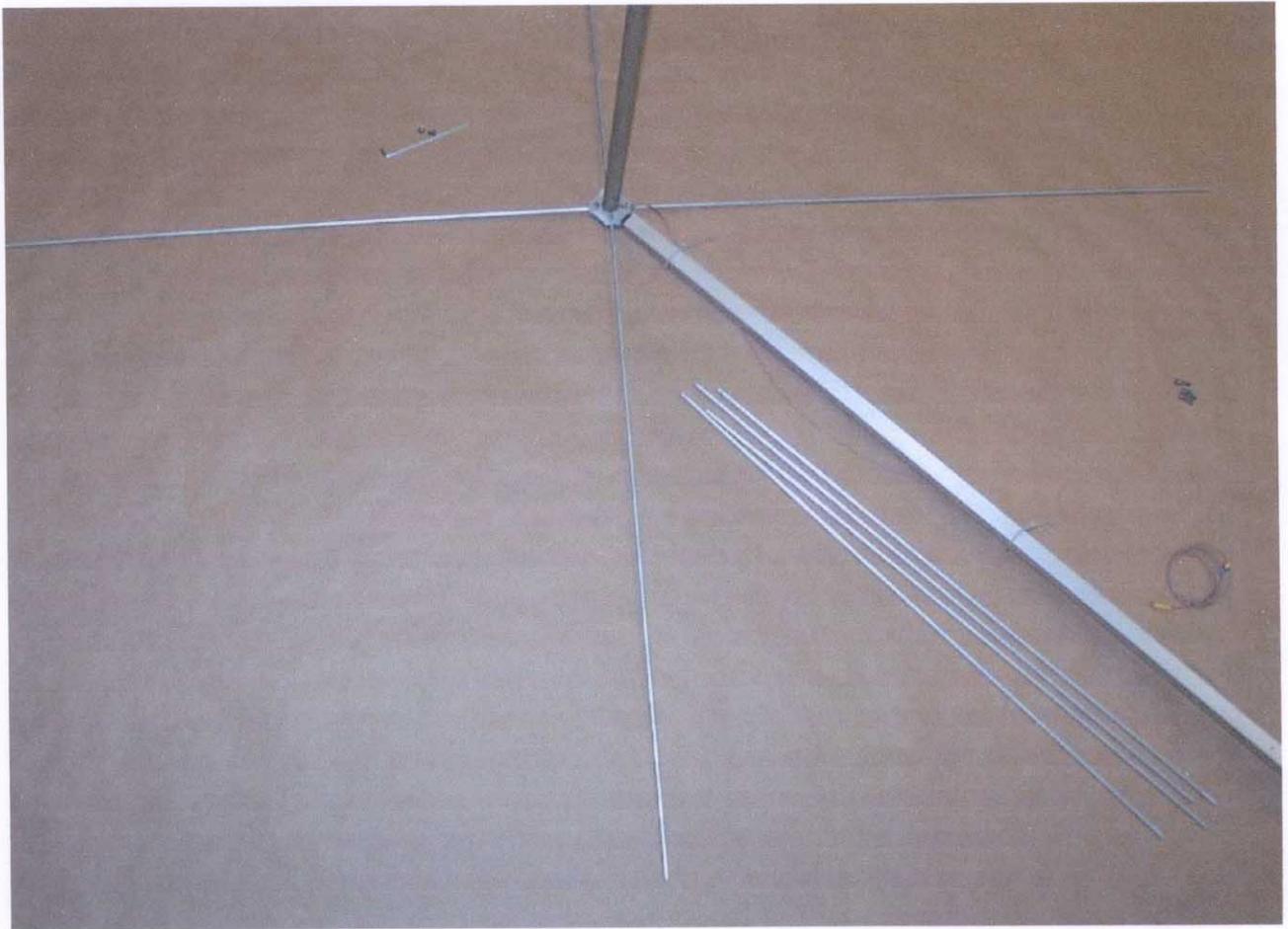


Fig. 3 Reflector assembled

2.3 DIPOLE ELEMENTS

All dipole elements are identical. One end of each dipole rod is threaded internally. This end of each rod (aluminium) is screwed onto an adapter (brass) in the dipole head (see Fig. 4).

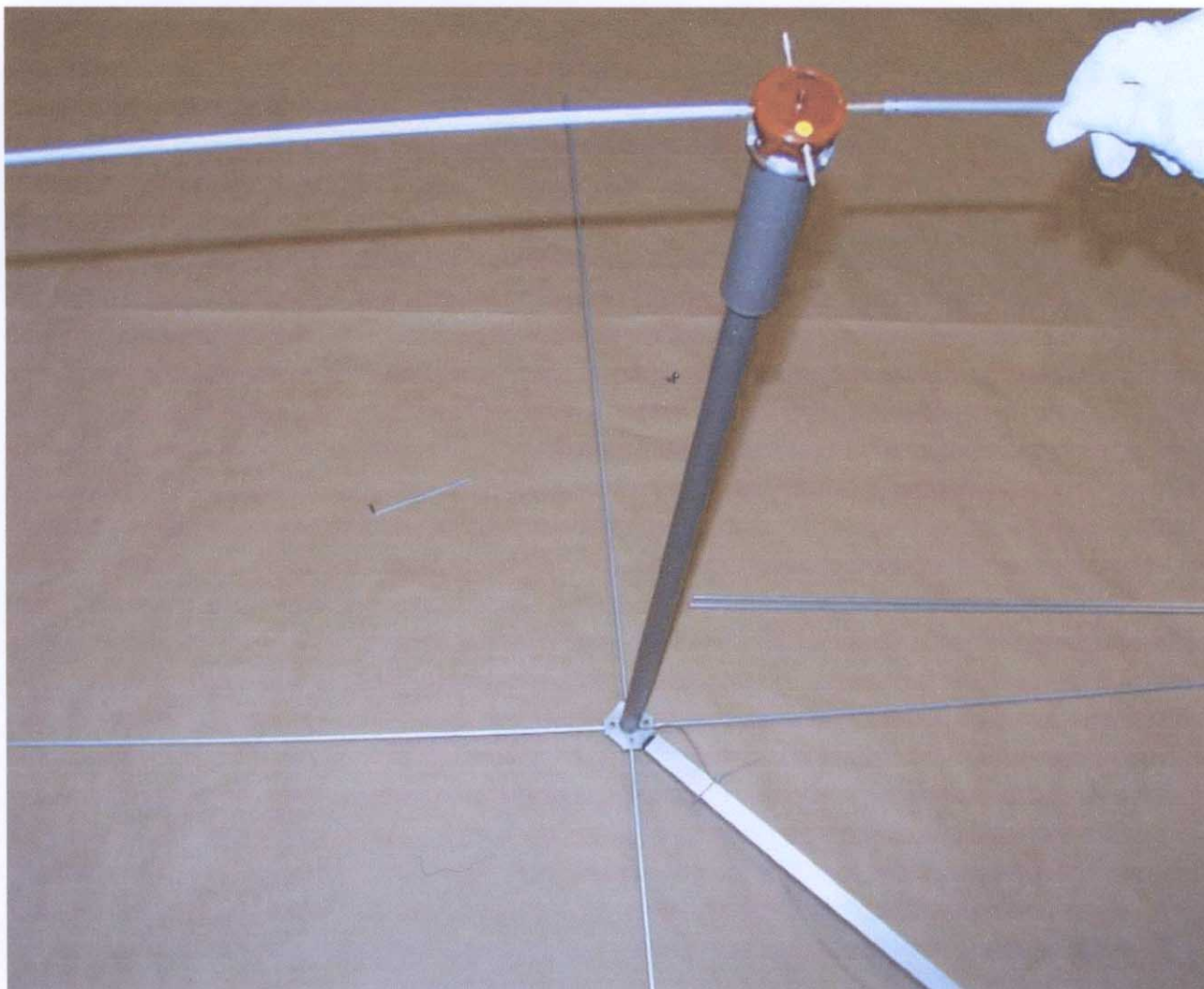

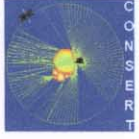


Fig. 4 Attaching dipole elements

2.4 DIPOLE AND REFLECTOR ALIGNMENT

The reflector flange is welded to the vertical mast, fixing the reflector element alignment relative to horizontal mast. The dipole head alignment is set at time of assembly (Appendix A) which also fixes the alignment of dipole elements relative to horizontal mast.

No further alignment of dipole and reflector elements is required as part of this assembly procedure.

	Max Planck Institut für Aeronomie Germany	CONCERT Orbiter Antenna		ASSEMBLY PROCEDURE MOCKUP - 1 RO-OCN-RFMOCKUP-0010	Date: 17.02.00 page 8 of 10
--	---	--	--	---	---

3.0 ELECTRICAL FUNCTIONAL TEST

These tests are to be performed by the CONCERT team after assembly and before mounting the antenna on the Orbiter.

Antenna connectivity will be tested by Ohmmeter. This check is to assure element-to-element electrical continuity of dipoles and continuity of reflector elements to masts.

Antenna functionality will be checked by means of a Network Analyser. The antenna impedance measured in this circumstance can indicate whether the antenna functions as such, but is not a true measure of the impedance in operating circumstances.

Appendix A (FOR INFORMATION ONLY)

A. ASSEMBLY OF VERTICAL MAST, DIPOLE HEAD AND SIGNAL CABLE UNIT

NOTE This procedure is to be undertaken by qualified CONSERT project personnel only.

A.1 DESCRIPTION

The dipole head consists of the electronics board, the aluminium tube in which the electronics fit, and a plastic flange with brass feeds to which the dipole rods are attached. In the Mock-Up Antenna the dipole element adapters have no springs and provide a stiff connection to the dipole head.

The electronics board is connected to the plastic dipole flange (Fig. A-1). At the top, wires from the board are soldered to the brass feeds in the plastic dipole flange. At the bottom, the signal cable connects to the board via LEPRA connector (Fig A-2); the ground cable is soldered to the electronics.

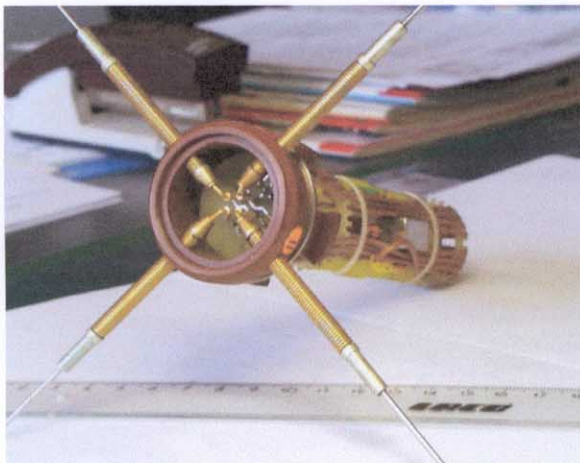


Fig A-1 Dipole head showing brass dipole feeds

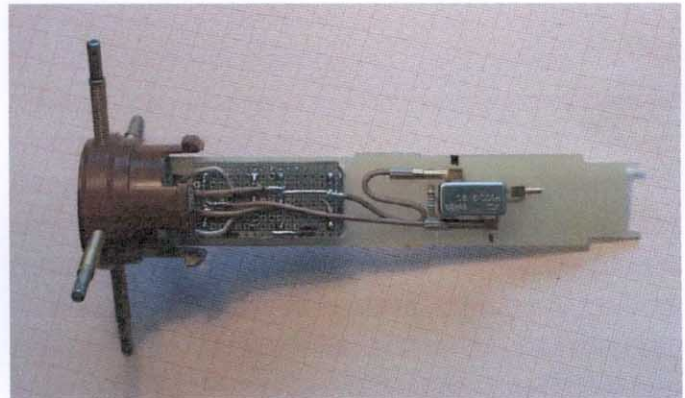


Fig A-2 Dipole head showing signal and ground cable connections

The dipole head slides into the aluminium tube, with the signal and ground cables coming out the bottom.

The signal cable passes down through the vertical mast, emerging at a hole above the reflector mounting point. The dipole elements screw onto the brass screws in the dipole flange (see section 2.3).

	Max Planck Institut für Aeronomie Germany	CONSERT Orbiter Antenna		ASSEMBLY PROCEDURE MOCKUP - 1 RO-OCN-RFMOCKUP-0010	Date: 17.02.00 page 10 of 10
---	---	--	---	---	---------------------------------

There is enough slack in the grounding cable to allow for the connection of the ground cable to the vertical mast before the dipole tube is fitted to the vertical mast. The grounding cable passes through a hole in the side of the vertical mast and is fastened by a screw to the vertical mast.

The grounding cable can be seen in Fig. 2 on the right hand side of the vertical mast just below the dipole head unit.

The purpose of the grounding cable is to provide an Orbiter ground for the antenna, separate from the signal ground (which is the outer conductor of the signal cable). In order for this to work, the vertical and horizontal masts must be electrically connected at the reflector flange. Furthermore, the horizontal mast must be connected electrically to the Orbiter through the mounting flange.

Now, fit the tube in which the dipole electronics board is held into the vertical mast. There are two screws to fasten the tube to the mast. There are four possible orientations, of which the correct one is determined by the yellow mark on the dipole head (see Fig 4).

NOTE *Care must be taken not to disconnect signal or grounding cable from the electronics board while sliding the dipole aluminium tube into the vertical mast.*

This completes the assembly of the vertical mast, dipole head and signal cable unit.

Assembly of the Mock-Up Antenna can now proceed from Section 2.1.