

MRO Delay Line ICD

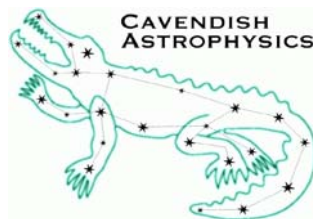
Delay Line to Beam Relay System

ICD INT-406-VEN-0008

The Cambridge Delay Line Team

rev 0.2

28 May 2009



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1 ICD Description

Specific entry from the ICD N² Table contained in FDR document:

ICD Number	Sub-systems		Org	Owner	Brief description and preliminary contents
INT-406- VEN-0008	Delay line	Beam Relay system	MRAO	MF	Defines the mechanical interface between the delay line pipe and the beam relay pipe. <ul style="list-style-type: none"> • Requires one drawing of the specified flange arrangement. • Requires drawing of allowable space envelope for the beam relay pipe.

2 Change Record

Revision	Date	Authors	Changes
0.1	2007-08-10	MF	First draft version
0.2	2009-05-28	MF	Final interface design

Notification List

The following people should be notified by email that a new version of this document has been issued:

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**MRAO: Chris Haniff
David Buscher
Martin Fisher**

Table of Contents

1	ICD Description	2
2	Change Record.....	2
3	Notification List	2
4	Scope.....	3
5	Acronyms and Abbreviations.....	3
6	Applicable Documents.....	3
7	Introduction.....	4
8	Requirements	4
9	Design	4
10	Appendix.....	4

4 Scope

This document details the flange fitting requirements for the beam relay pipe. It does not describe nor detail the replacement science window.

5 Acronyms and Abbreviations

BCA	Beam Combining Area	MRAO	Mullard Radio Astronomy Observatory
BCF	Beam Combining Facility	NMT	New Mexico Tech
BRS	Beam Relay System	OPD	Optical Path Delay
DL	Delay Line	TBC	To be confirmed
DLA	Delay Line Area	TBD	To be determined
ICD	Interface Control Document		
ICS	Interferometer Control System		
MROI	Magdalena Ridge Observatory Interferometer		

6 Applicable Documents

AD1 Drawing MROI-125 ‘Coupling pipe section’

REFERENCE DOCUMENTS

- RD1 Delay line to BCF infrastructure (building) (INT-406-VEN-0009)
- RD2 Delay line to metrology system (INT-406-VEN-0010)
- RD3 Metrology System to BCF (INT-406-VEN-0012)
- RD4 Metrology System to Beam Relay System (INT-406-VEN-0013)
- RD5 BCF Area (M3 architectural drawing (AR100)
- RD6 MROI Beam Combining Facility (Delay Line Metrology System)
- RD7 MROI Infrastructure (Delay Line System)
- RD8 MROI Delay Line Near End-Plate drawing set

7 Introduction

The interface between the delay line pipe and the beam relay pipe resides on the end-plate of the delay line pipe closest to the metrology system. The beam relay pipe connects to end-plate at a flange arrangement around the upper science aperture. The flange arrangement allows for removal of the beam relay pipe and its temporary replacement with a science grade window to allow the delay line to be evacuated and operation to be resumed.

The temporary window will have a compatible flange fitting and will also be fitted with a fail-safe closing device to protect the delay line in the event of a catastrophic window failure.

The beam relay pipe should incorporate a compliant coupling somewhere along its length to ensure that:

1. Undue stresses due to thermal expansion/contraction of the beam relay pipe or the length of delay line pipe between the anchor and the BCF area are not transmitted to the delay line.
2. Vibrations, which may be induced in the beam relay pipe from disturbances outside the building, are sufficiently rejected.

8 Requirements

The requirements of the interface are:

1. The interface flange on the DL end-plate should be of sufficient diameter to accommodate the six inch diameter beam relay pipe without obstructing the returning science beam or fouling the science beam or metrology window mounts.
2. The method of coupling the BRP to the DL interface flange must provide good vacuum sealing whilst allowing the pipe to be easily unbolted, removed and replaced by the protective window.
3. There should be sufficient access to the interface area to allow personnel to uncouple the pipe without disturbing the metrology system on the optical table which is immediately below the pipe and in front of the DL pipe. This requirement also impinges on other ICDs described in RD1, RD2, RD3 and RD4.

9 Design

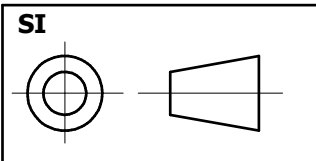
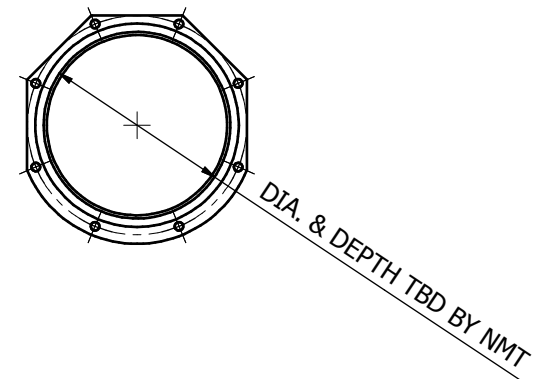
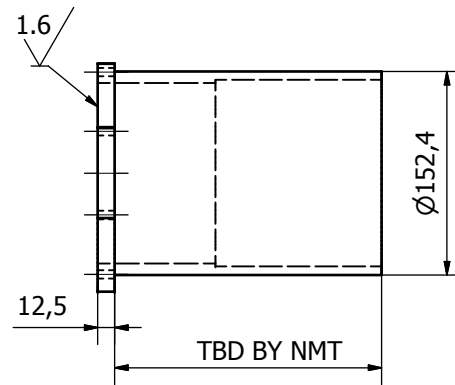
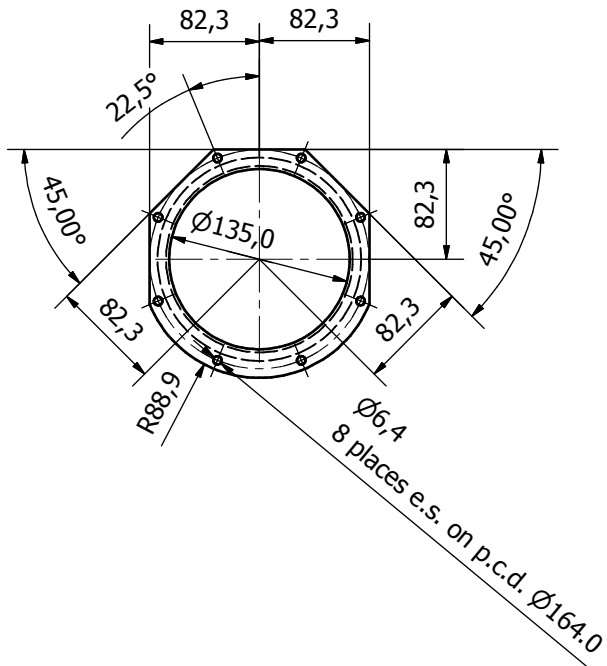
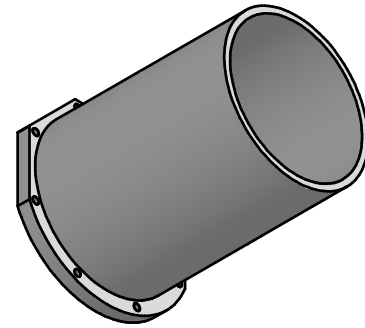
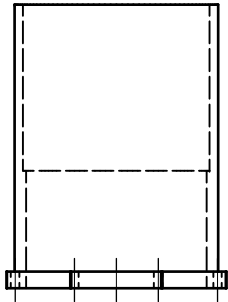
The beam relay pipe is to be connected via a flexible coupling to a flanged pipe which mounts onto the delay line end plate. The details of this coupling are given in the drawing AD1. When the beam relay pipe section is removed the flanged coupling is also removed and a science window is fitted to the end plate in its place. A fast-acting valve, similar to the one on the lower science window is also mounted is also mounted over the upper science window. The designs for these items are given in RD8.

The layout of beam relay pipe with respect to the metrology system is given in RD6 and RD7.

10 Appendix

Drawing MROI-125 'Coupling pipe section'

3.2/Unless stated



Material: Aluminium 6061	Tolerances unless stated: ± 0.1	Drawn by: DS	Date: 14/05/09	Quantity: 1	Drg. No. MROI-125
University of Cambridge, Department of Physics CAVENDISH LABORATORY		Title: Coupling pipe section			
Project: MROI			Scale: 1:4	Size: A4	