MRO Delay Line ICD

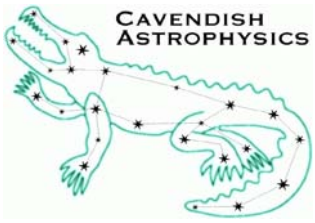
Delay Line to Beam Relay System

ICD INT-406-VEN-0008

The Cambridge Delay Line Team

rev 0.1

10 August 2007



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1 ICD Description

Specific entry from the ICD N^2 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	UoC	MF	Defines the mechanical interface between the delay line pipe and the beam relay pipe. • Requires one drawing of the complete face-plate and the specified flange arrangement

2 Change Record

Revision	Date	Authors	Changes
0.1	2007-08-10	MF	First draft version

Notification List

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

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Table of Contents

4 Scope

This document details the flange fitting requirements for the beam relay pipe. It does not describe or detail the science window and protection mechanism which would replace the beam relay pipe when it is removed from the delay line pipe.

5 Acronyms and Abbreviations

BCA Beam Combining Area
BCF Beam Combining Facility
BRS Beam Relay System
DL Delay Line
DLA Delay Line Area
ICD Interface Control Document
ICS Interferometer Control System
SCS Supervisory Control System
MROI Magdelena Ridge Observatory Interferometer
UoC University of Cambridge
NMT New Mexico Tech
OPD Optical Path Delay
TBC To be confirmed
TBD To be determined

6 Applicable Documents

DRAWINGS

Specific interface drawings(s): – For this initial version of the ICD diagrams are included in the appendix of this document.

7 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)

8 Introduction

The interface between the delay line pipe and the beam relay pipe is at the end-plate of the delay line pipe closest to the metrology system. For each delay line the beam relay pipe connects to the end-plate via 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 to ensure that undue stresses and vibrations are not transmitted to the delay line pipe.

9 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 beam relay pipe 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.
4. The transmission of vibrations, which may be induced in the beam relay pipe from disturbances outside the building, must be minimised.
5. 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 should not be imposed on the delay line.

10 Design

The space available for a flange fitting is very limited. In addition space must be made available to mount a protection mechanism over the lower science window. An interface ‘stub’ of length [TBD] provides a flange to which the beam relay pipe can be fitted see Figure 1. The space in front of this flange and around the beam relay pipe is also limited by the requirements of the metrology system and is defined in RD4.

A 7 inch overall diameter flange is the largest that can be accommodated and this limits the outside diameter of beam relay pipe that can be used to 6 inches. The flange dimensions and fixing details are shown in Figure 2. The length of the interface stub will be determined by the size of window protection mechanism.

11 Appendix

Figure 1: A 3-D view of the delay line pipe end-plate with the flanged stub fitted.

Figure 2: Flange dimensions and fixing details.

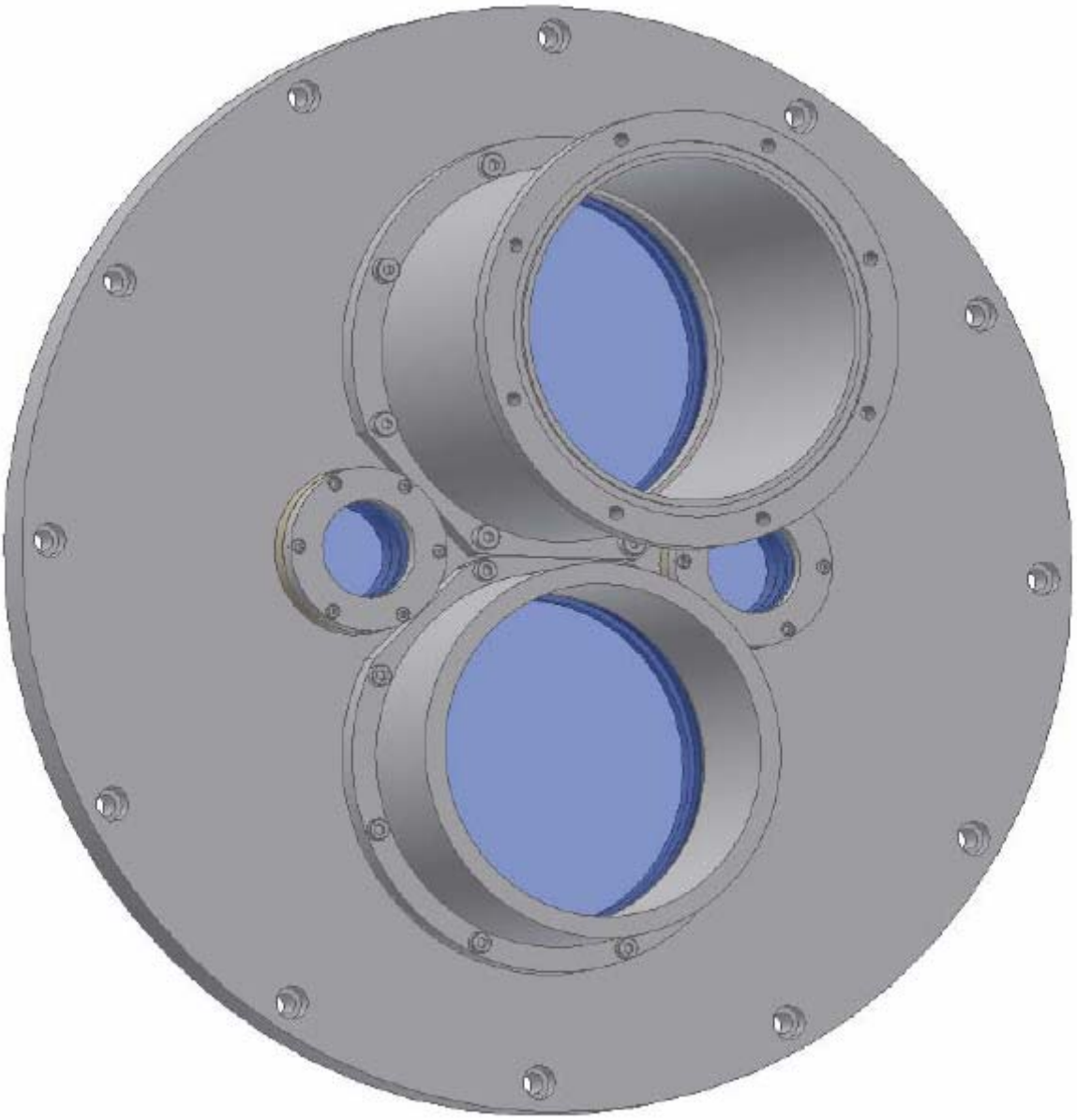

Figure 1 A 3-D view of the delay line pipe end-plate with the flanged stub fitted.

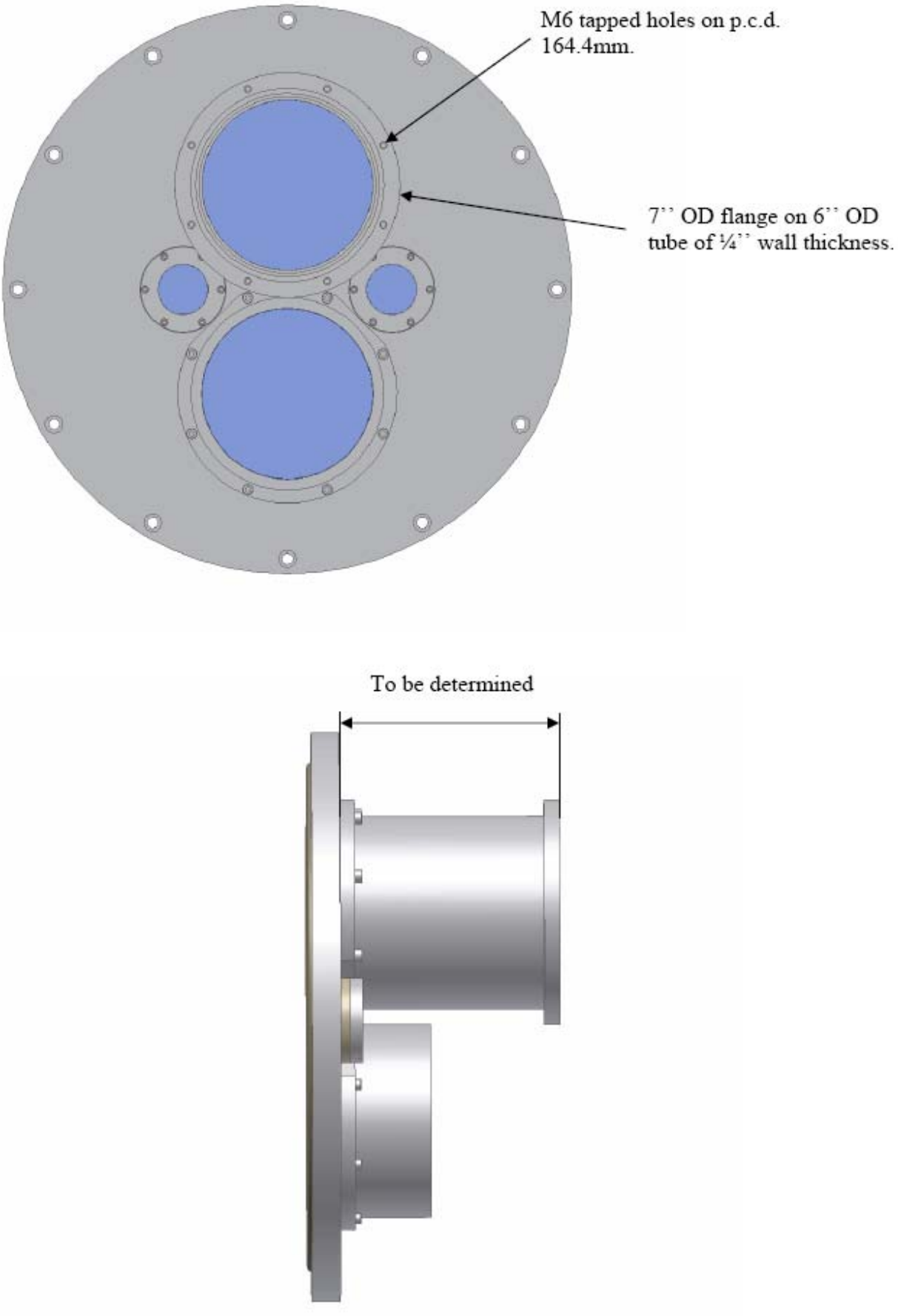

Figure 2 Flange dimensions and fixing details.