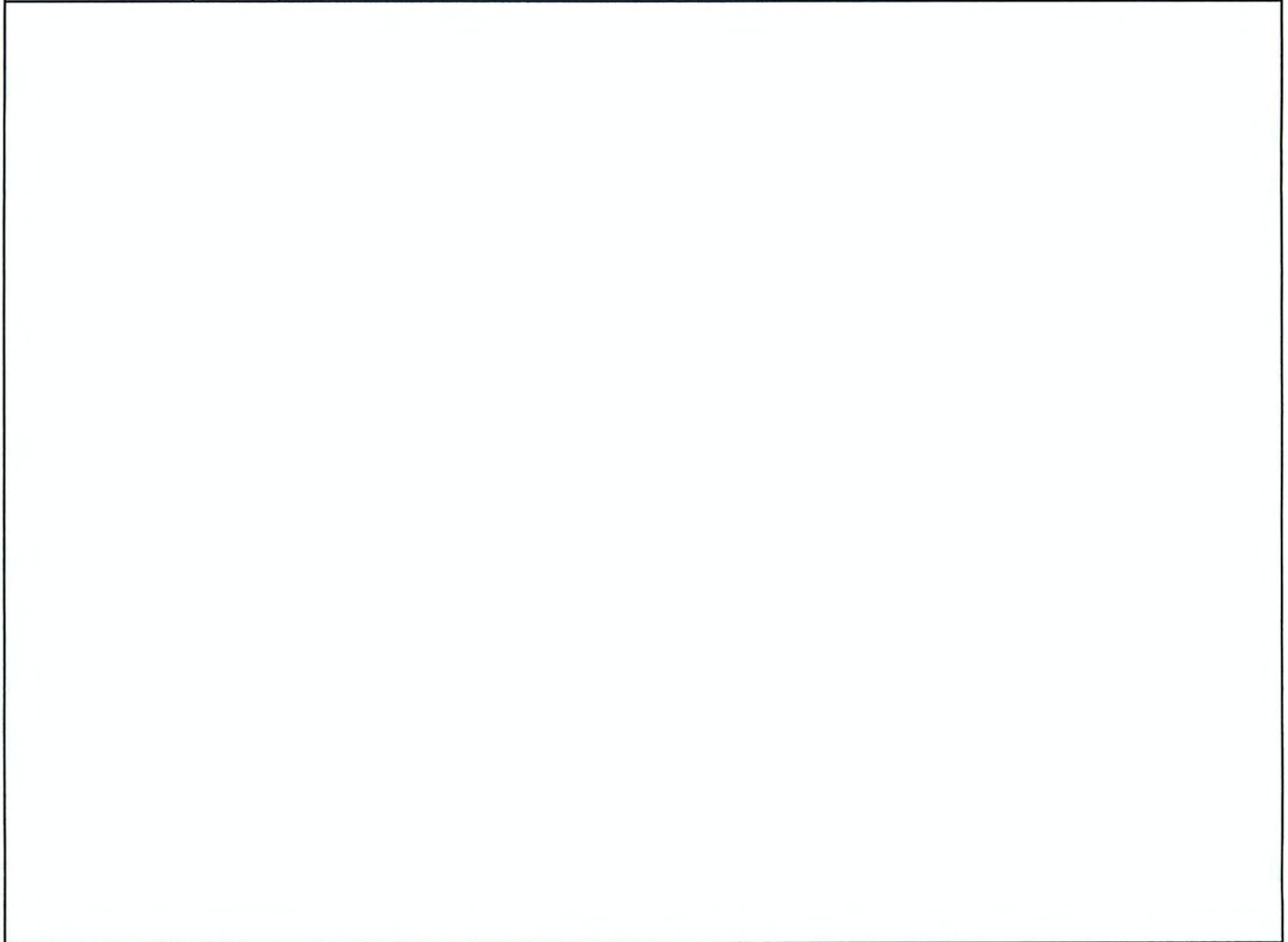


REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE PER ECO 36-764	6/24/97	WFM



	NAME	DATE	MASSACHUSETTS INSTITUTE OF TECHNOLOGY CENTER FOR SPACE RESEARCH		
	DRAWN P. C. TAPPAN	9/5/96	FOCAL PLANE ALIGNMENT MEASUREMENT PROCEDURE		
	CHECKED <i>J. Kasparian</i>	6/23/97			
	APPROVED <i>W. Mayer</i>	6/24/97			
	RELEASED <i>D. Sage</i>	6/27/97			
		SIZE A	CODE IDENT. NO. 80230	DRAWING NO. 36-02032	REV. A
				SHEET 1 OF 7	

Focal Plane Alignment Measurement Procedure

1.0 **Scope**

This procedure defines the process for measuring the alignment of the CCDs, Focal Plane Reference Mirror, and the two (2) Alignment Reference Mirrors (ARM) mounted in the ACIS Detector Assembly. Data reduction is not a part of this procedure.

2.0 **Applicable Documents**

MIT Drawings:

LL 427851	CCD ARRAY ASSEMBLY, ACIS
CSR 36-10100	DETECTOR HOUSING ASSEMBLY
CSR 36-10115	SPECTROMETER OBF ASSEMBLY
CSR 36-10116	IMAGER OBF ASSEMBLY
CSR 36-60101	CCD SHORTING PLUG SET
CSR 36-60203	GLASS CLAMP
CSR 36-60204	ARRAY COVER
CSR 36-60212	BACK PLATE FIXTURE

LMA Drawings:

849AC110027-001	SEAL RETAINER
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3.0 **Requirements**

3.1 **Equipment**

The following equipment shall be used in performing this procedure:

Autocolimator	Davidson D-656
Measuring Microscope	NEAT
Surface Plate	Starrett
Transfer Mirror	Ealing 23-6208
CCD Shorting Plug Set	MIT/CSR 36-60101
Glass Clamps (6)	MIT/CSR 36-60203
Array Cover	MIT/CSR 36-60204
Back Plate Fixture	MIT/CSR 36-60212
Array Cover Mask	MIT/CSR

3.2 **Location**

This procedure shall be performed in the Clean Room located in NE80-6042.

3.3 **Coordinate System**

The coordinate system shall be that of the ISIM. However, zero is not established until the data is reduced. The axes are defined on the data sheets at the end of this procedure.

3.4 **Procedures**

The Detector Housing Assembly 36-10100; less the Optical Blocking Filters, 36-10115 and 36-10116; Seal Retainer, 849AC110027-001; and associated Screws and O-Rings: shall be protected by the Array Cover and Shorting Plug Set. These shall have been installed in the Clean Bench and with the use of the required ESD protection. The following two procedures may be done in either order.

3.4.1 Linear Alignment Measurement Procedure

3.4.1.1 Measurements shall be made and recorded in x.xxxx inches on the data sheets provided at the end of this procedure. The readout resolution is 0.0001 inches and the accuracy is better than 0.00025 inches.

3.4.1.2 The Detector Housing Assembly shall be attached to the Measuring Microscope using the Back Plate Fixture. Upward travel of the microscope is +X. Movement of the table to the left is +Y. Movement of the table toward the operator is +Z. Zero the readouts at the center of the Imaging Array for X, and at the -Y Alignment Reference Mirror (ARM) for Y and Z. This insures that most measurements will be positive.

3.4.1.3 The location of the center of the cross hairs on each ARM shall be measured and recorded.

3.4.1.4 The X offset, caused by measuring through the glass, shall be determined by measuring the height of the Housing through the glass near the edge and again directly, as near as possible to the first measurement.

3.4.1.5 The location of each CCD shall be measured and recorded at four (4) locations as follows:

I0 & I2	0	Centerline of and at the end of the +Z outer trace.
	1	Centerline of +Z outer trace, near Frame Store Shield.
	2	Centerline of -Z outer trace, near Frame Store Shield.
	3	Centerline of and at the end of the -Z outer trace.
I1 & I3	0	Centerline of +Z outer trace, near Frame Store Shield.
	1	Centerline of and at the end of the +Z outer trace.
	2	Centerline of and at the end of the -Z outer trace.
	3	Centerline of -Z outer trace, near Frame Store Shield.
S0 - S5	0	Centerline of -Y outer trace, near Frame Store Shield.
	1	Centerline of +Y outer trace, near Frame Store Shield.
	2	Centerline of and at the end of the +Y outer trace.
	3	Centerline of and at the end of the -Y outer trace.

This order of measurement is consistent with the specified active area coordinates and will facilitate data entry into the Data Reduction Spread Sheet. Other orders may be used as long as care is taken to record the data in the proper location.

3.4.1.5 The outer traces are located .0013 inches from either side of the active area of the CCD and the ends of the traces (EoT) are .0007 inches back from the outer corner pixel.

3.4.2 Angular Alignment Measurement Procedure

3.4.2.1 Measurements shall be made and recorded in arc minutes and arc seconds on the data sheet provided at the end of this procedure. The readout resolution is .2 arc seconds but recording may be limited to the nearest arc second. Accuracy is 3 arc seconds over its 20 arc minutes of range.

3.4.2.2 The Detector Assembly is positioned on one end of the Surface Plate and is resting on its +Z face. The Autocollimator is positioned at the other end of the Surface Plate. The Array Cover Mask and the Transfer Mirror are located near the Detector Assembly.

3.4.2.3 Set the dial of the Autocollimator to 10 arc minutes (mid-range). Place the Array Cover Mask in front of the Detector Assembly such that the mirrors are visible to the Autocollimator. Align the Autocollimator to the Focal Plane Mirror, measure, and record the azimuth and elevation of that mirror on the data sheet found at the end of this procedure.

3.4.2.4 Remove the Array Cover Mask, measure and record the azimuth and elevation of the Array Cover. This is a measurement of the plane of the Fiducial Light mounting surface relative to the Focal Plane. Replace the Array Cover Mask.

3.4.2.4 Place the Transfer Mirror in front of the Detector Assembly and align it approximately normal to the Autocollimator. Measure and record the azimuth and elevation of the Transfer Mirror.

3.4.2.5 Move the Autocollimator to be in line with the normal of the Alignment Reference Mirror (ARM) M0. Measure and record the azimuth and elevation of the Transfer Mirror.

3.4.2.6 Remove the Transfer Mirror, measure and record the azimuth and elevation of the ARM M0.

3.4.2.7 Place the Transfer Mirror in front of the Detector Assembly and align it approximately normal to the Autocollimator. Measure and record the azimuth and elevation of the Transfer Mirror.

3.4.2.5 Move the Autocollimator to be in line with the normal of the ARM M1. Measure and record the azimuth and elevation of the Transfer Mirror.

3.4.2.6 Remove the Transfer Mirror, measure and record the azimuth and elevation of the ARM M1. If any measurements exceed the range of the Autocollimator, back up to the setting of the Transfer Mirror. Offset the Transfer Mirror such as to provide the necessary range for the next measurement.

Focal Plane Alignment Measurements

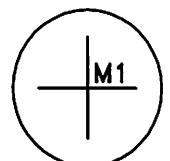
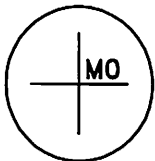
Focal Plane S/N _____ Date _____ Inspector _____

Location	Location	X	Y	Z
M0	--			
M1	--			
X Offset			through the glass cover	
			beside the glass cover	
I0	0			
	1			
	2			
	3			
I1	0			
	1			
	2			
	3			
I2	0			
	1			
	2			
	3			
I3	0			
	1			
	2			
	3			
S0	0			
	1			
	2			
	3			
S1	0			
	1			
	2			
	3			

Location	Location	X	Y	Z
S2	0			
	1			
	2			
	3			
S3	0			
	1			
	2			
	3			
S4	0			
	1			
	2			
	3			
S5	0			
	1			
	2			
	3			

	3	2	1	0	
	10			11	
	0	1	2	3	
	3	2	1	0	
	12			13	
	0	1	2	3	

2	1	2	1	2	1	2	1	2	1
S0		S1		S2		S3		S4	
3	0	3	0	3	0	3	0	3	0



Focal Plane to Alignment Reference Mirror Offsets

Mirror	Unit:	Date:	Measurements	
	Measured by:		arc minutes	arc seconds
M_{FP}	R_Y	Elevation		
	R_Z	Azimuth		
Array Cover	R_Y	Elevation		
	R_Z	Azimuth		
Ref. M_{FP}	R_Y	Elevation		
	R_Z	Azimuth		
Ref. M_0	R_Y	Elevation		
	R_Z	Azimuth		
M_0	R_Y	Elevation		
	R_Z	Azimuth		
M_{FP}	R_Y	Elevation		
	R_Z	Azimuth		
Ref. M_{FP}	R_Y	Elevation		
	R_Z	Azimuth		
Ref. M_1	R_Y	Elevation		
	R_Z	Azimuth		
M_1	R_Y	Elevation		
	R_Z	Azimuth		

