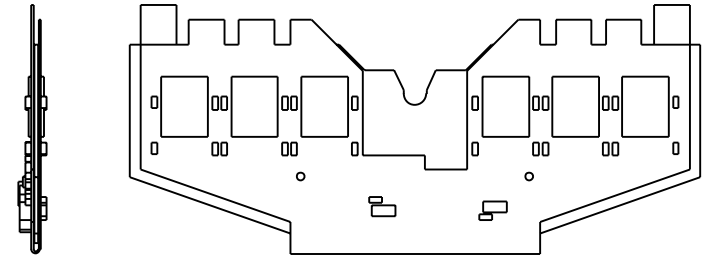
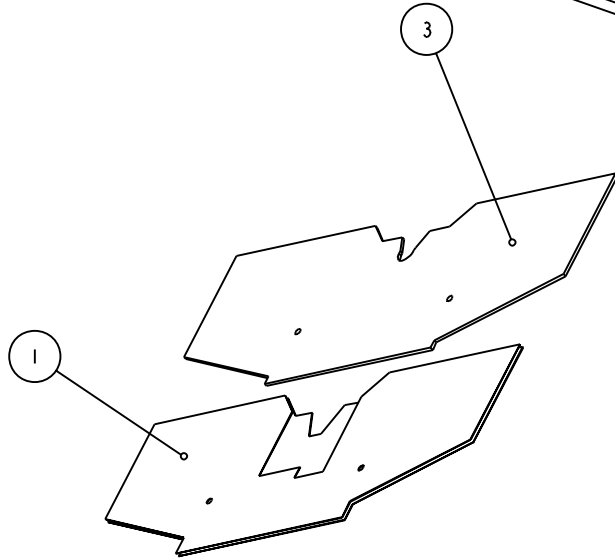


PHI SIDE OF HYBRID

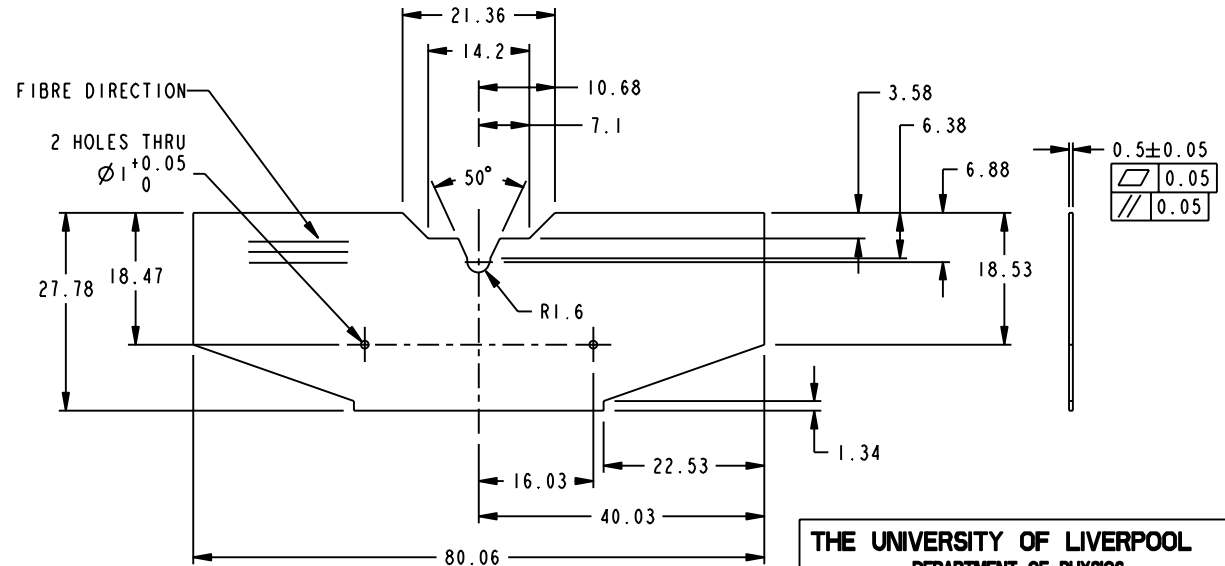


STEREO SIDE OF HYBRID

ITEM	PART/CAD No	DWG TITLE	MATERIAL	REMARK	QTY
1	NP27-05-01-GLUE	HYBRID GLUE LAYER	-	0.1 THICK	1
2	NP27-05-03	KAPTON HYBRID - K5	Cu/KAPTON	0.33 THICK	1
3	NP27-05-02	HYBRID SUBSTRATE - K5	CFRP	0.5mm THICK	1



EXPLODED VIEW SHOWING MAIN COMPONENTS OF HYBRID.

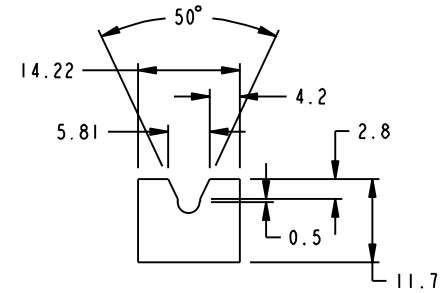
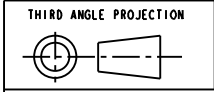


DETAIL OF HYBRID BASE

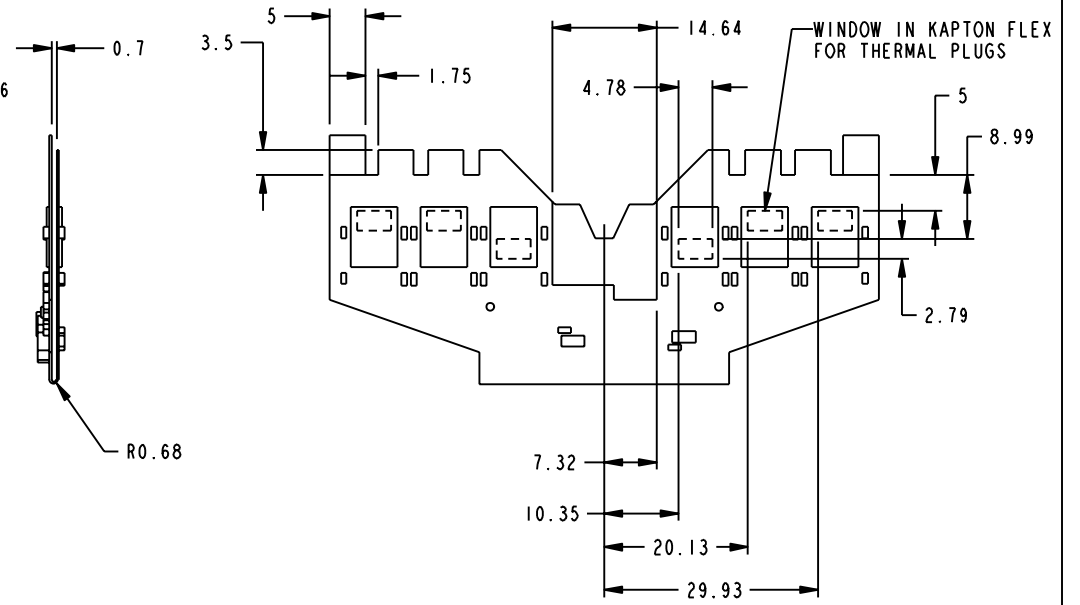
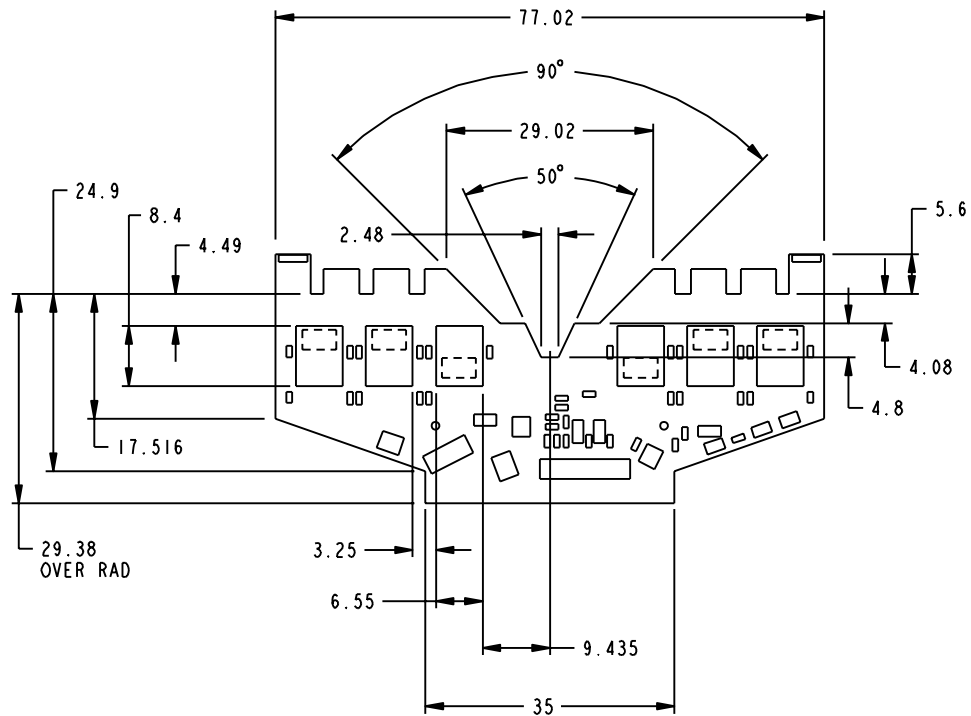
P3	5-July-02	P. SUTCLIFFE	3rd PRELIM ISSUE SHUNT SHIELD REMOVED
P2	29-Apr-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sept-01	P. SUTCLIFFE	1st PRELIM ISSUE
A	28-Sept-00	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE ☒ MACHINE ALL OVER OR WHERE MARKED ☒ REMOVE BURRS AND BREAK SHARP EDGES	METRIC SCREW THREADS TO BS3643 CLASS 6H/6g	DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308		WELDING SYMBOLS TO BS 499	
	TOLERANCES UNLESS OTHERWISE SPECIFIED	MATERIAL	SEE PARTS	DRAWN	P. SUTCLIFFE
	MACHINED	SPEC	SEE PARTS	DATE	15-June-01
	ANGULAR ±	TREATMENT	NONE	CHECKED	P. SUTCLIFFE
	DO NOT SCALE	FINISH	NATURAL	APPROVED	P. SUTCLIFFE

THE UNIVERSITY OF LIVERPOOL DEPARTMENT OF PHYSICS					
PROJECT ATLAS FORWARD TRACKER					
TITLE HYBRID BASE ASSY - K5					
DRAWING NUMBER NP27-05-01				ARRGT. DRAWING	
SHEET 1	OF	3 SHEETS	SCALE: 2:1	A2	



DETAIL OF SHUNT SHIELD Cu LAYER
0.018mm THICK

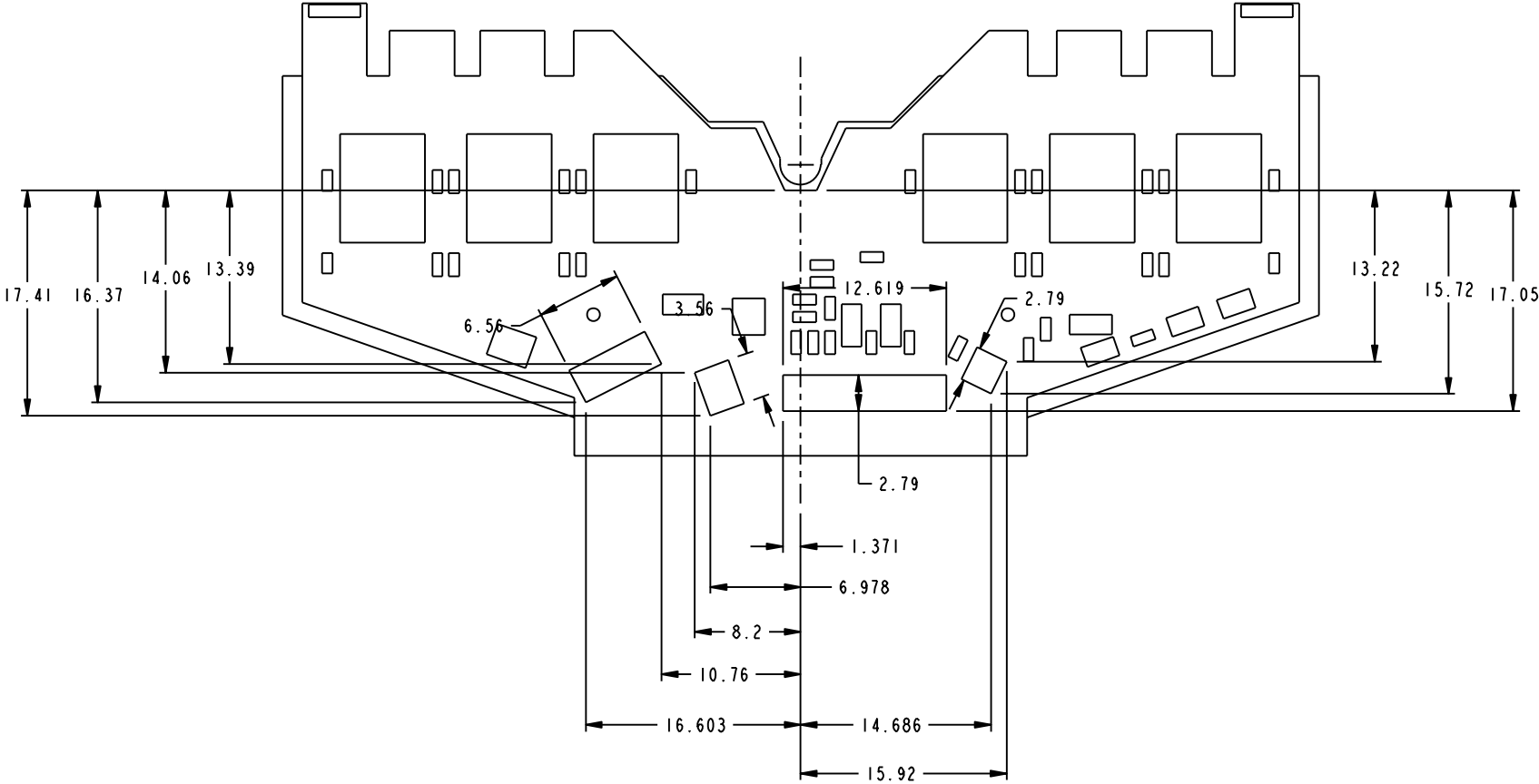
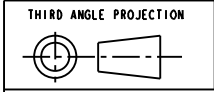


VIEW SHOWING KAPTON FLEX AND OTHER COMPONENTS
THICKNESS OF FLEX 0.33 ± 0.05

P3	5-Jul-02	P. SUTCLIFFE	3rd PRELIM ISSUE SHUNT SHIELD REMOVED
P2	29-Apr-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sept-01	P. SUTCLIFFE	1st PRELIM ISSUE
A	28-Sept-00	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE ☐ ☒ MACHINE ALL OVER OR WHERE MARKED ☒ REMOVE BURRS AND BREAK SHARP EDGES	METRIC SCREW THREADS TO BS3643 CLASS 6H/6g	DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308		WELDING SYMBOLS TO BS 499	
	TOLERANCES UNLESS OTHERWISE SPECIFIED	MATERIAL	SEE PARTS	DRAWN	P. SUTCLIFFE
	MACHINED ☐ ☒	SPEC	SEE PARTS	DATE	28-Sept-00
	ANGULAR ±	TREATMENT	NONE	CHECKED	P. SUTCLIFFE
		FINISH	NATURAL	APPROVED	P. SUTCLIFFE

THE UNIVERSITY OF LIVERPOOL DEPARTMENT OF PHYSICS					
PROJECT ATLAS FORWARD TRACKER					
TITLE HYBRID BASE ASSY - K5					
DRAWING NUMBER NP27-05-01				ARRGT. DRAWING	
SHEET 2	OF	3 SHEETS	SCALE: 2:1	A2	

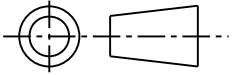


SCALE 4:1

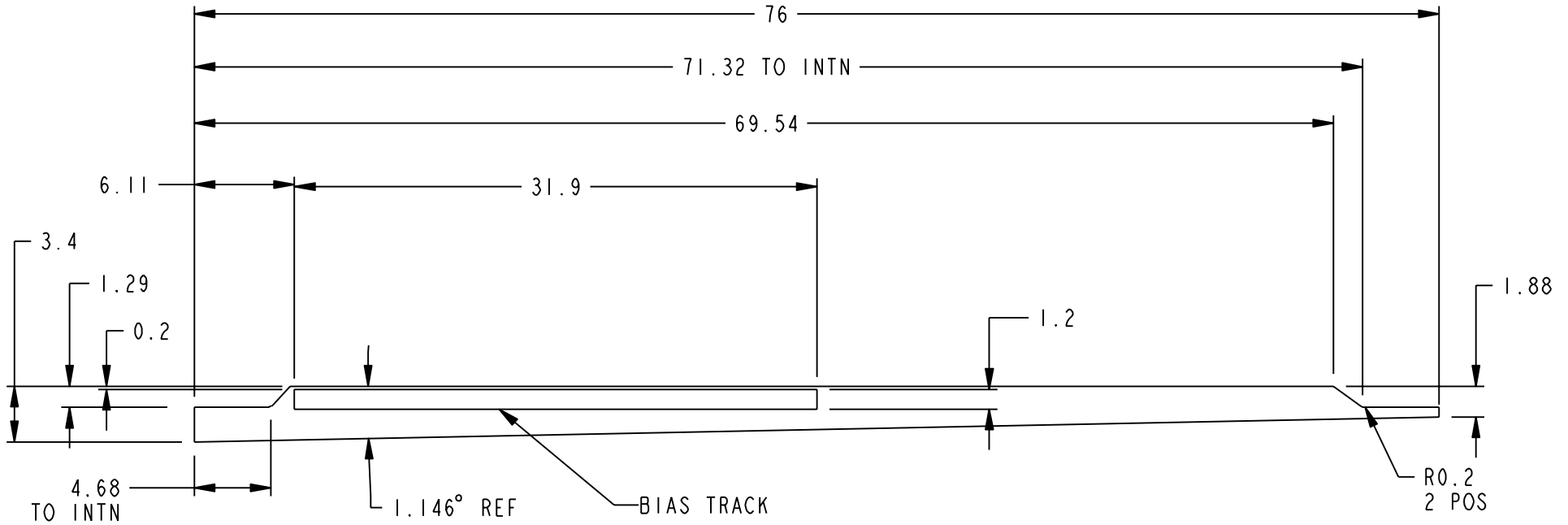
P3	5-July-02	P. SUTCLIFFE	3rd PRELIM ISSUE SHUNT SHIELD REMOVED
P2	29-Apr-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sept-01	P. SUTCLIFFE	1st PRELIM ISSUE
A	04-Dec-00	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE  MACHINE ALL OVER OR WHERE MARKED 	METRIC SCREW THREADS TO BS3643 CLASS 6H/6g	DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308		WELDING SYMBOLS TO BS 499	
	TOLERANCES UNLESS OTHERWISE SPECIFIED	MATERIAL	SEE PARTS	DRAWN	P. SUTCLIFFE
	MACHINED DIMS. ± .	SPEC	SEE PARTS	DATE	04-Dec-00
	ANGULAR ± . °	TREATMENT	NONE	CHECKED	P. SUTCLIFFE
	REMOVE BURRS AND BREAK SHARP EDGES	FINISH	NATURAL	APPROVED	P. SUTCLIFFE

THE UNIVERSITY OF LIVERPOOL DEPARTMENT OF PHYSICS					
PROJECT ATLAS FORWARD TRACKER					
TITLE HYBRID BASE ASSY - K5					
DRAWING NUMBER NP27-05-01				ARRGT. DRAWING	
SHEET 3	OF	3 SHEETS	SCALE:-2:1	A2	



MODIFICATIONS			
ISSUE	DATE	NAME	DESCRIPTION
A	12-Apr-02	P.SUTCLIFFE	FIRST ISSUE
B	28-June-02	P.SUTCLIFFE	THINNED BY 0.19 BIAS TRACK WAS BOTH SIDES

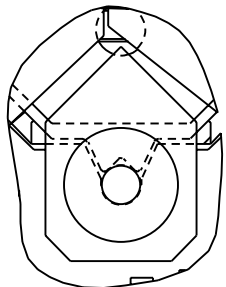
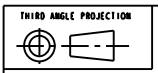


THICKNESS STOCK 0.325
BIAS TRACK ON ONE SIDE OF SPACER ONLY

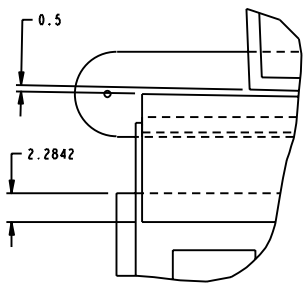
THE UNIVERSITY OF LIVERPOOL
DEPARTMENT OF PHYSICS

PROJECT	ATLAS FORWARD TRACKER
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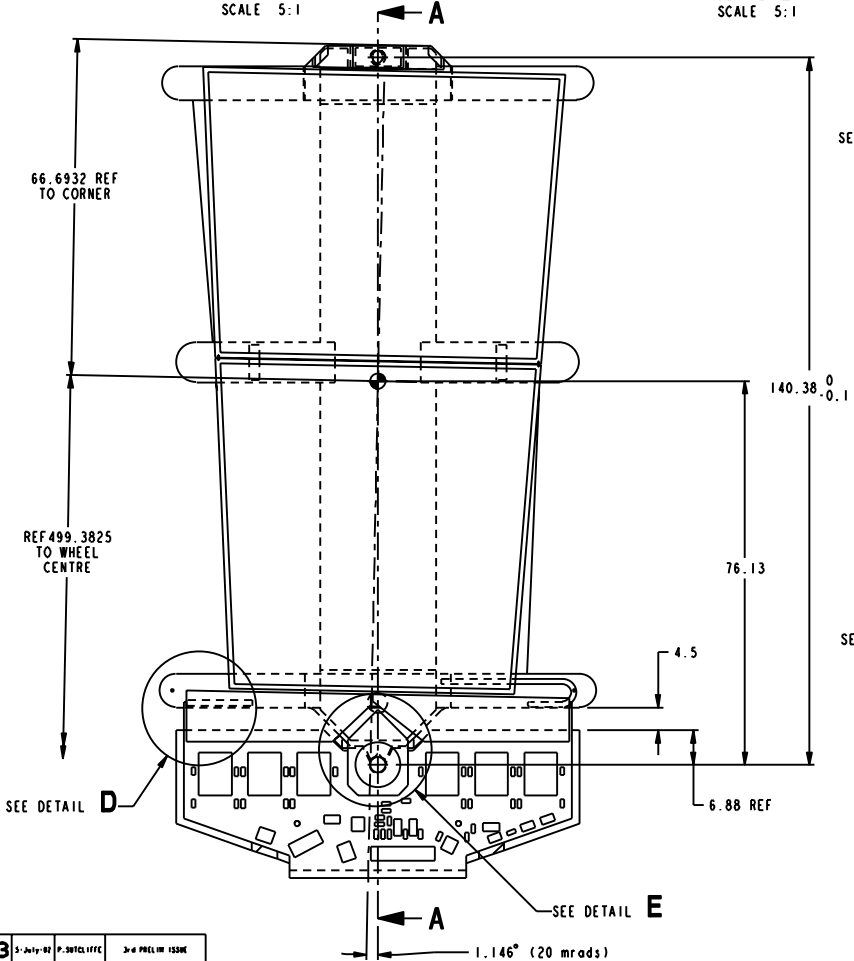
UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE 1.6 ✓ MACHINE ALL OVER OR WHERE MARKED ✓	METRIC SCREW THREADS TO BS3643 CLASS 6H/6g	DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308		WELDING SYMBOLS TO BS 499		TITLE FAN IN SPACER					
	TOLERANCES UNLESS OTHERWISE SPECIFIED	MATERIAL	AIN	DRAWN	P.SUTCLIFFE						
	MACHINED DIMS.± 0.1	SPEC	A1203	DATE	12-Apr -02	DRAWING NUMBER NP27-05-08				ARRGT. DRAWING NP27-05-10,30,50	
	ANGULAR ± °	TREATMENT	NONE	CHECKED	PS						
REMOVE BURRS AND BREAK SHARP EDGES	DO NOT SCALE	FINISH	SEE DWG	APPROVED	P.SUTCLIFFE	SHEET	OF	SHEETS	SCALE:- 4:	A3	



DETAIL E
SCALE 5:1

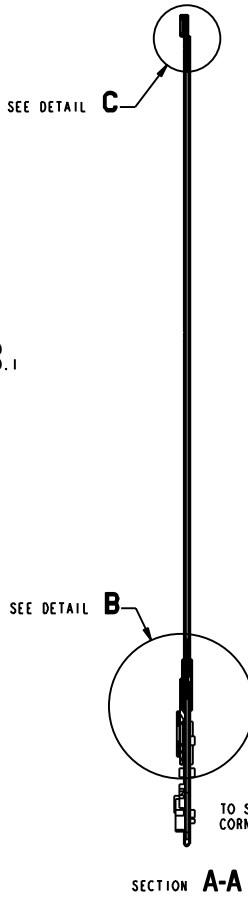


DETAIL D
SCALE 5:1



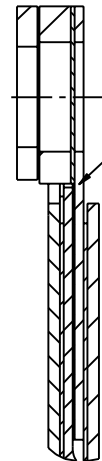
PHI SIDE

DETAIL OF OUTER MODULE
52 OFF PER RING



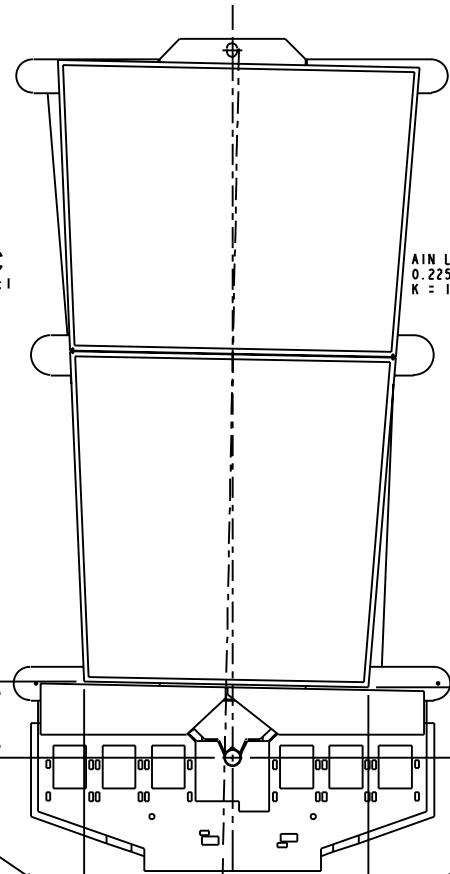
SECTION A-A

LOCATION WASHER



DETAIL C
SCALE 16:1

AIN UPPER SUPPORT
0.225 & 0.5 THICK
K = 165 W/m.K



STEREO SIDE

UNLESS OTHERWISE SPECIFIED:-	
ALL DIMENSIONS IN MILLIMETRES	
SURFACE FINISH VALUES IN MICROMETRES	
SURFACE FINISH TO BE	3.2
MACHINE ALL OVER OR WHERE BARRIED	✓
REMOVE BURRS AND BREAK SHARP EDGES	

METRIC SCREW THREADS TO BS4343 CLASS 6H/6g	
TOLERANCES UNLESS OTHERWISE SPECIFIED	
MACHINED DIMS: ± 0.1	
ANGULAR ± 0.5°	
DO NOT SCALE	

BRIDGING PRACTICE AND TOLERANCE INTERPRETATION TO BS2000	
MATERIAL	SEE PARTS
SPEC	SEE PARTS
TOLERANCE	SEE PARTS
FINISH	SEE PARTS

WELDING SYMBOLS TO BS 499	
DRAWN	P. SUTCLIFFE
DATE	28-Nov-02
CHECKED	PS
APPROVED	P. SUTCLIFFE

TPG HEAT SPREADER
0.5 THICK
K = 1700 X 1700 X 25 W/m.K

TYPICAL GLUE LAYER
0.09 THICK

D263 FAN-IN
0.3 THICK
K = 1.5 W/m.K

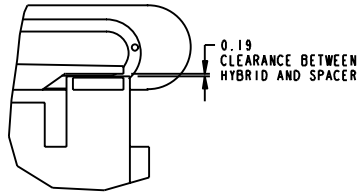
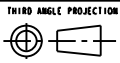
Si WAFERS
0.285 THICK
K = 136 W/m.K

AIN LOWER SUPPORT
0.225 & 0.5 THK
K = 165 W/m.K

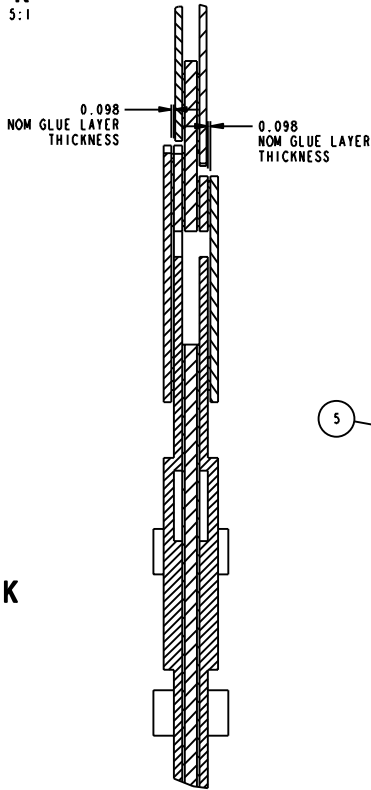
TO Si WAFER CORNER

DETAIL B
SCALE 16:1

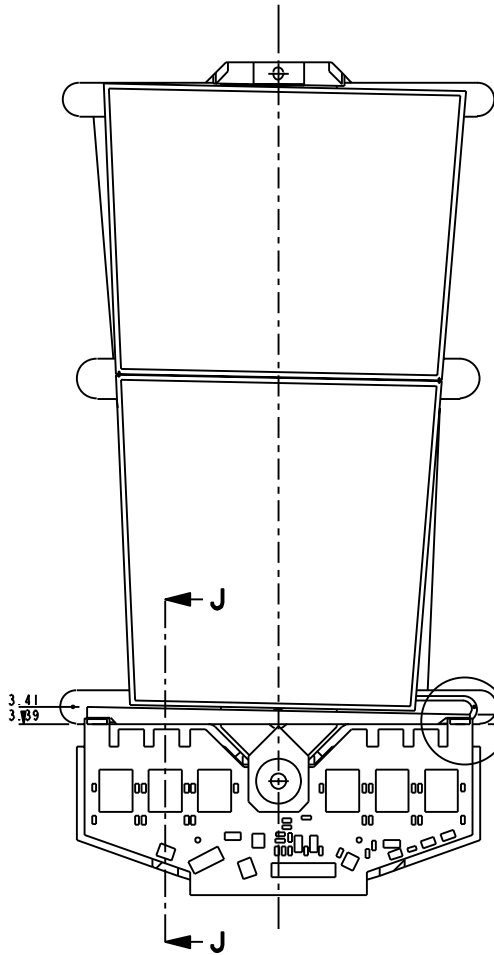
THE UNIVERSITY OF LIVERPOOL	
DEPARTMENT OF PHYSICS	
PROJECT	ATLAS FORWARD TRACKER
TITLE	
OUTER MODULE - K5 HYBRID	
DRAWING NUMBER	NP27-05-10
ARRETT, DRAWING	NP27-03-00
SHEET 1	OF 3 SHEETS SCALE: 2:1
A1	



DETAIL K
SCALE 5:1

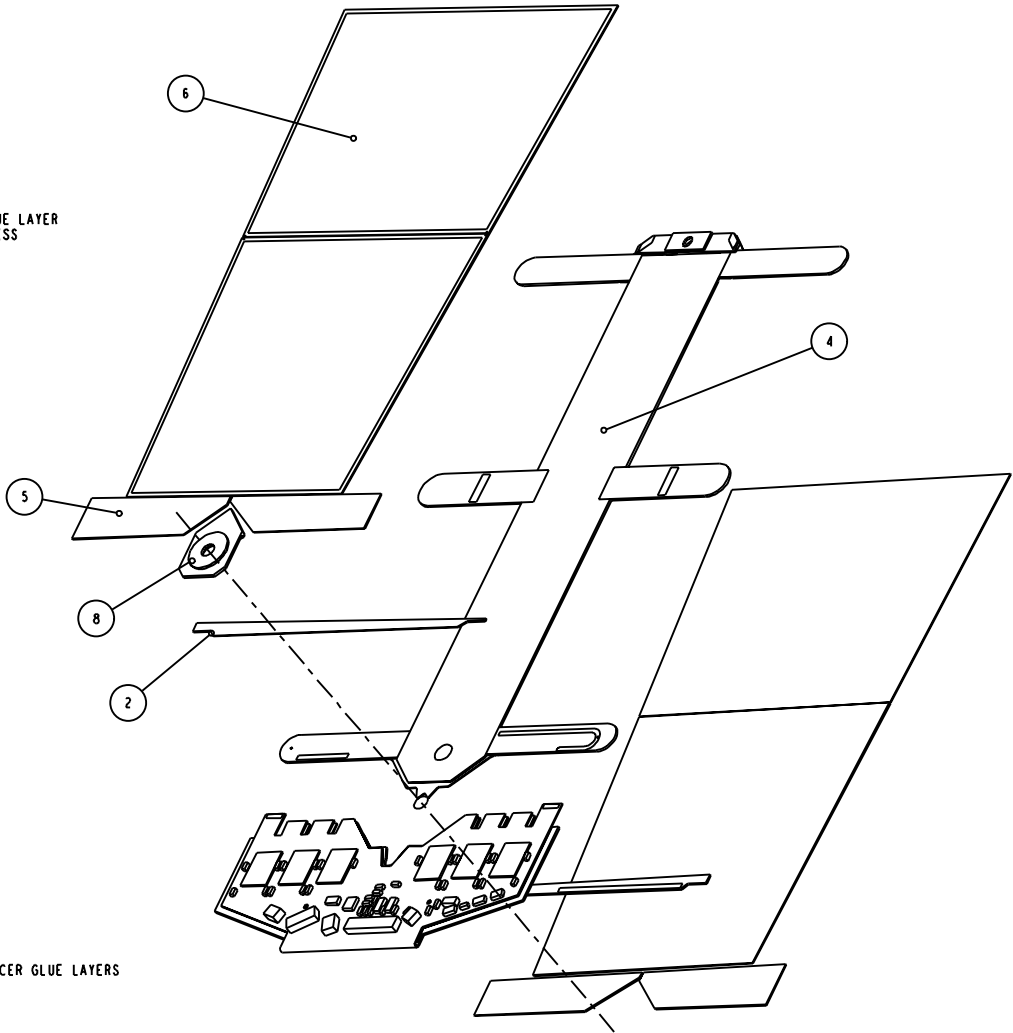


SECTION J-J
SCALE 10:1
SHOWING FAN-IN AND SPACER GLUE LAYERS



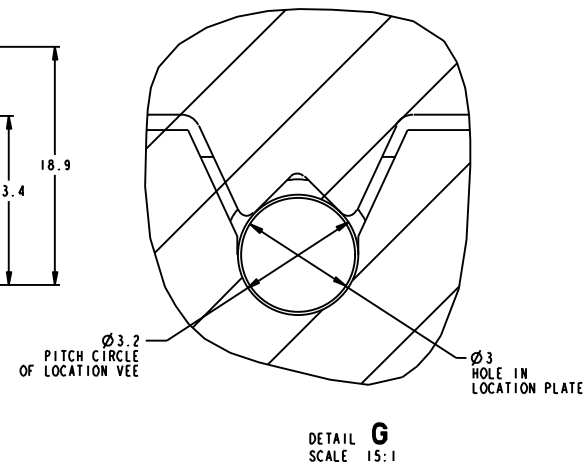
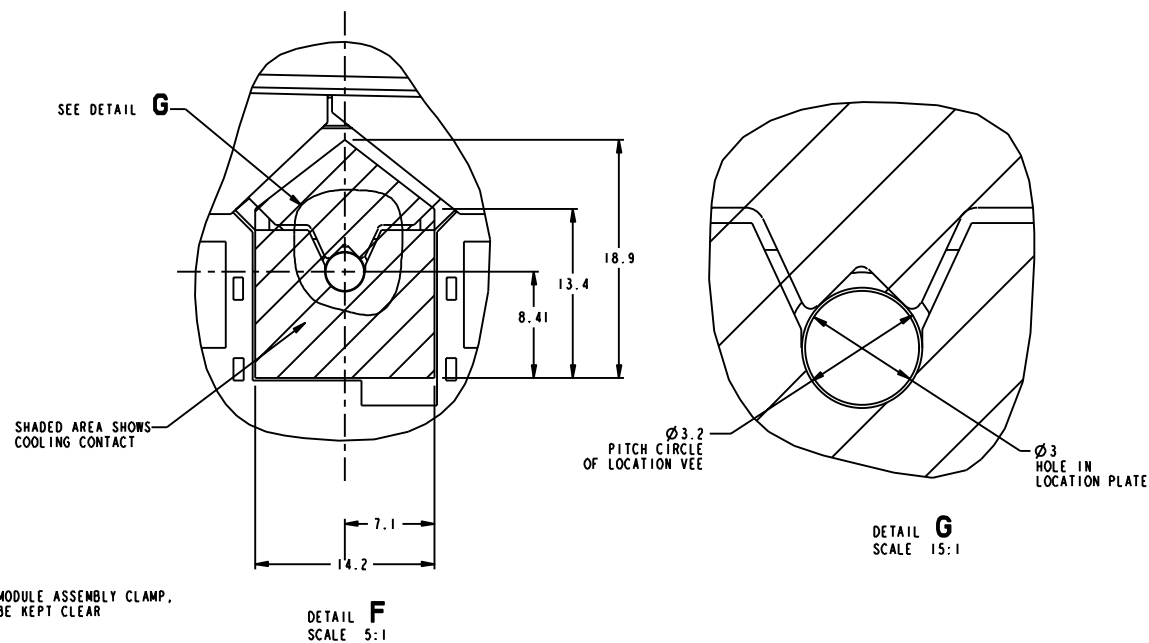
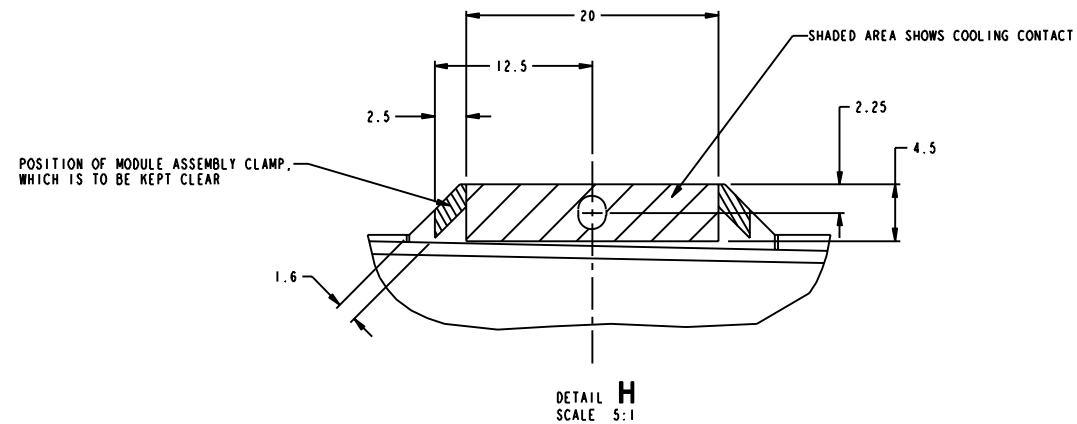
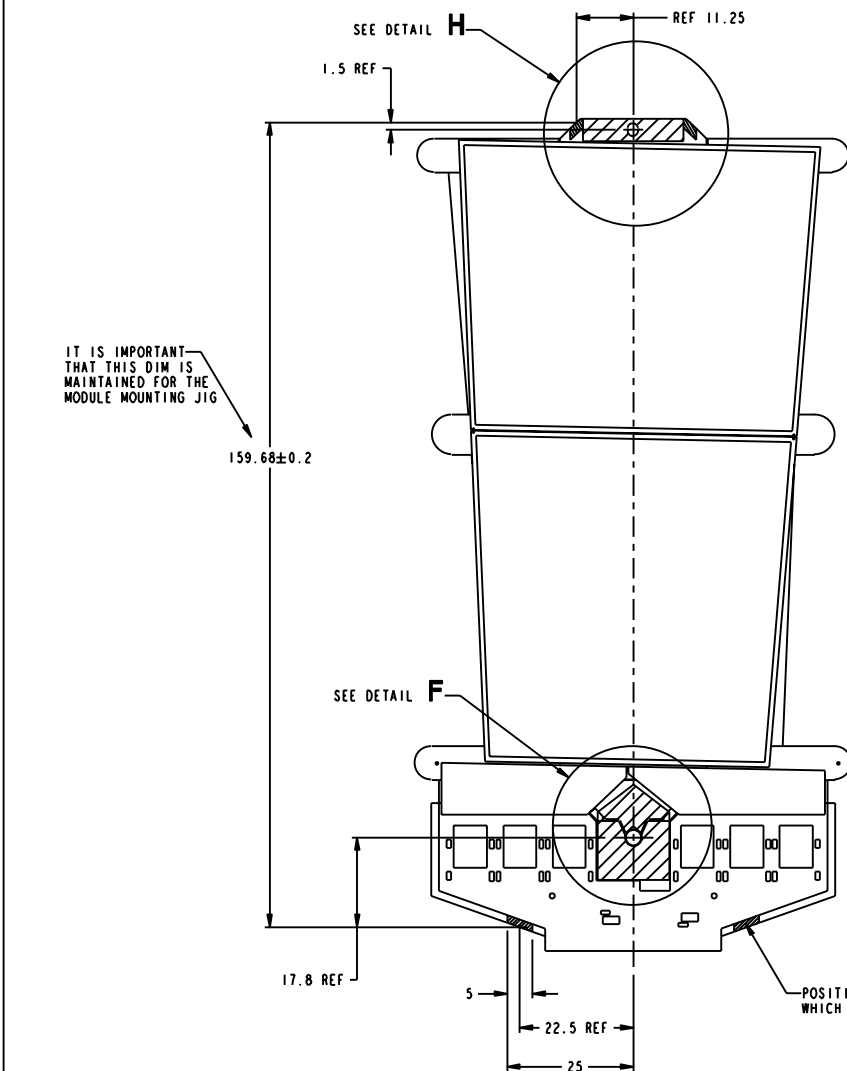
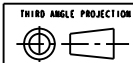
VIE SHOWING MODULE SPACER, WITHOUT FAN-IN

ITEM	PART/CAD No	DWG TITLE	MATERIAL	REMARK	QTY
1	NP27-05-01	HYBRID BASE ASSY - K5	SEE PARTS	-	1
2	NP27-05-08	FAN IN SPACER	AIN	-	2
4	NP27-05-11	OUTER MODULE SPINE ASSY	SEE PARTS	SEE PARTS	1
5	NP27-05-12	OUTER STEREO/PHI FAN-IN	BOROSILICATE GLASS	0.3mm THICK	2
6	NP27-05-13	OUTER SILICON WAFERS - W31 & W32	SILICON	0.3mm THICK	2
7	NP27-05-10-GLUE				1
8	NP27-05-82	LOCATION PAD ASSY	SEE PARTS	-	1



P3	5-Jul-02	P. SUTCLIFFE	3rd PRELIM ISSUE
P2	17-Apr-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sep-01	P. SUTCLIFFE	1st PRELIM ISSUE
A	11-Jun-01	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE ☒ MACHINE ALL OVER OR WHERE MARKED ☒		METRIC SCREW THREADS TO BS643 CLASS 4H/6g TOLERANCES UNLESS OTHERWISE SPECIFIED MACHINED DIMS: ± 0.1 ANGULAR $\pm 0.1^\circ$		DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308 MATERIAL SEE PARTS SPEC SEE PARTS TREATMENT SEE PARTS FINISH SEE PARTS		WELDING SYMBOLS TO BS 499 DRAWN P. SUTCLIFFE DATE 15-May-01 CHECKED PS APPROVED P. SUTCLIFFE		TITLE OUTER MODULE - K5 HYBRID DRAWING NUMBER NP27-05-10 ARDET. DRAWING NP27-03-00	
REMOVE BURRS AND BREAK SHARP EDGES		DO NOT SCALE						SHEET 2 OF 3 SHEETS SCALE: 2:1 A1	



P3	5-Jul-02	P. SUTCLIFFE	3rd PRELIM ISSUE
P2	17-Apr-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sep-01	P. SUTCLIFFE	1st PRELIM ISSUE
A	11-Jun-01	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION

MODIFICATIONS

UNLESS OTHERWISE SPECIFIED:-				METRIC SCREW THREADS TO BS2643 CLASS 6H/6g				DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS2000				WELDING SYMBOLS TO BS 499			
ALL DIMENSIONS IN MILLIMETRES				TOLERANCES UNLESS OTHERWISE SPECIFIED				MATERIAL				SEE PARTS			
SURFACE TEXTURE VALUES IN MICROMETRES				MACHINED DIMS: ±				SPEC				DATE			
SURFACE TEXTURE TO BE				ANGULAR ± °				TREATMENT				CHECKED			
MACHINE ALL OVER OR WHERE MARKED ✓				FINISH				SEE PARTS				APPROVED			
REMOVE BURRS AND BREAK SHARP EDGES				DO NOT SCALE				P. SUTCLIFFE				SHEET 3			

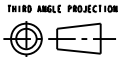
THE UNIVERSITY OF LIVERPOOL
DEPARTMENT OF PHYSICS

PROJECT ATLAS FORWARD TRACKER

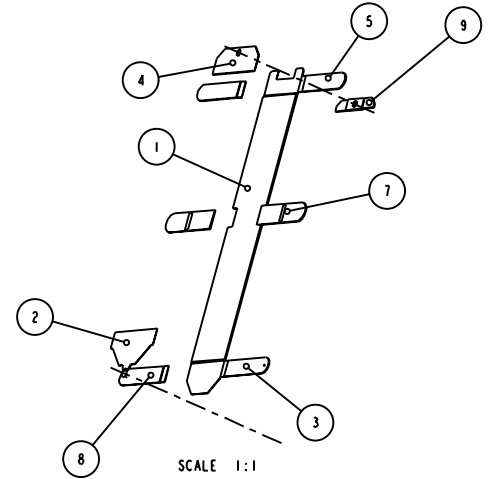
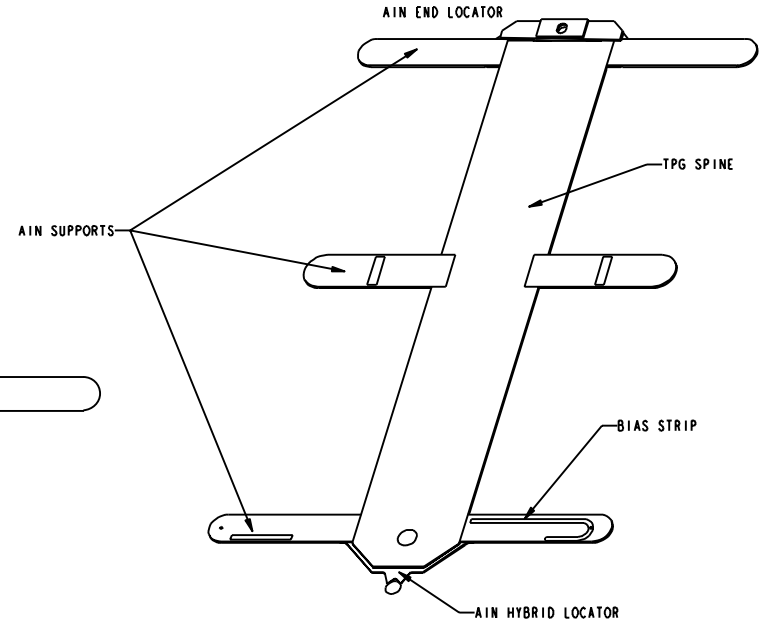
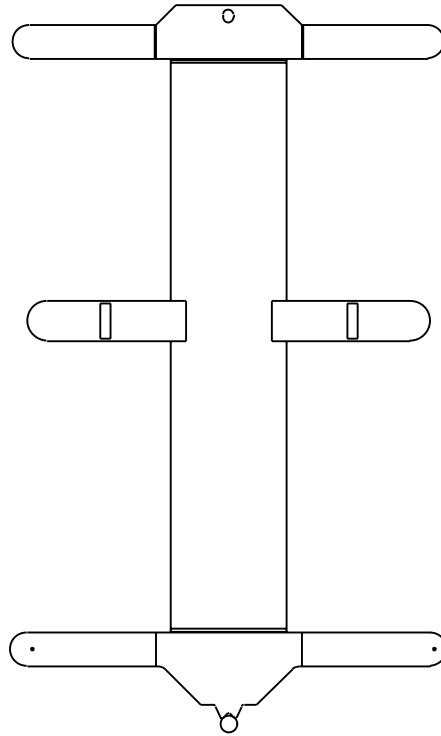
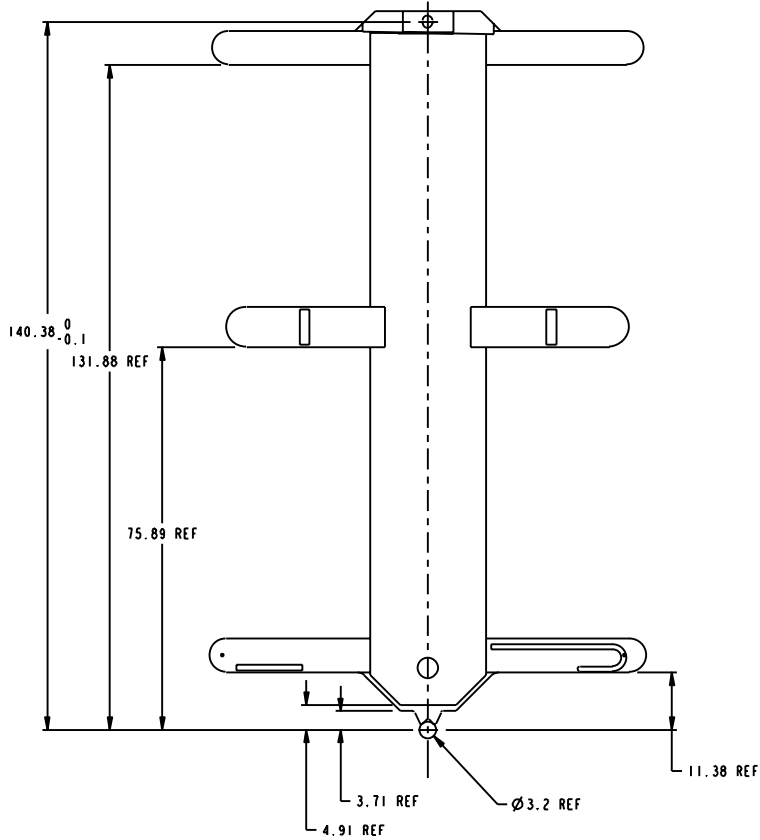
TITLE OUTER MODULE - K5 HYBRID

DRAWING NUMBER
NP27-05-10ARREST. DRAWING
NP27-

SHEET 3 OF 3 SHEETS SCALE: 2:1 A1

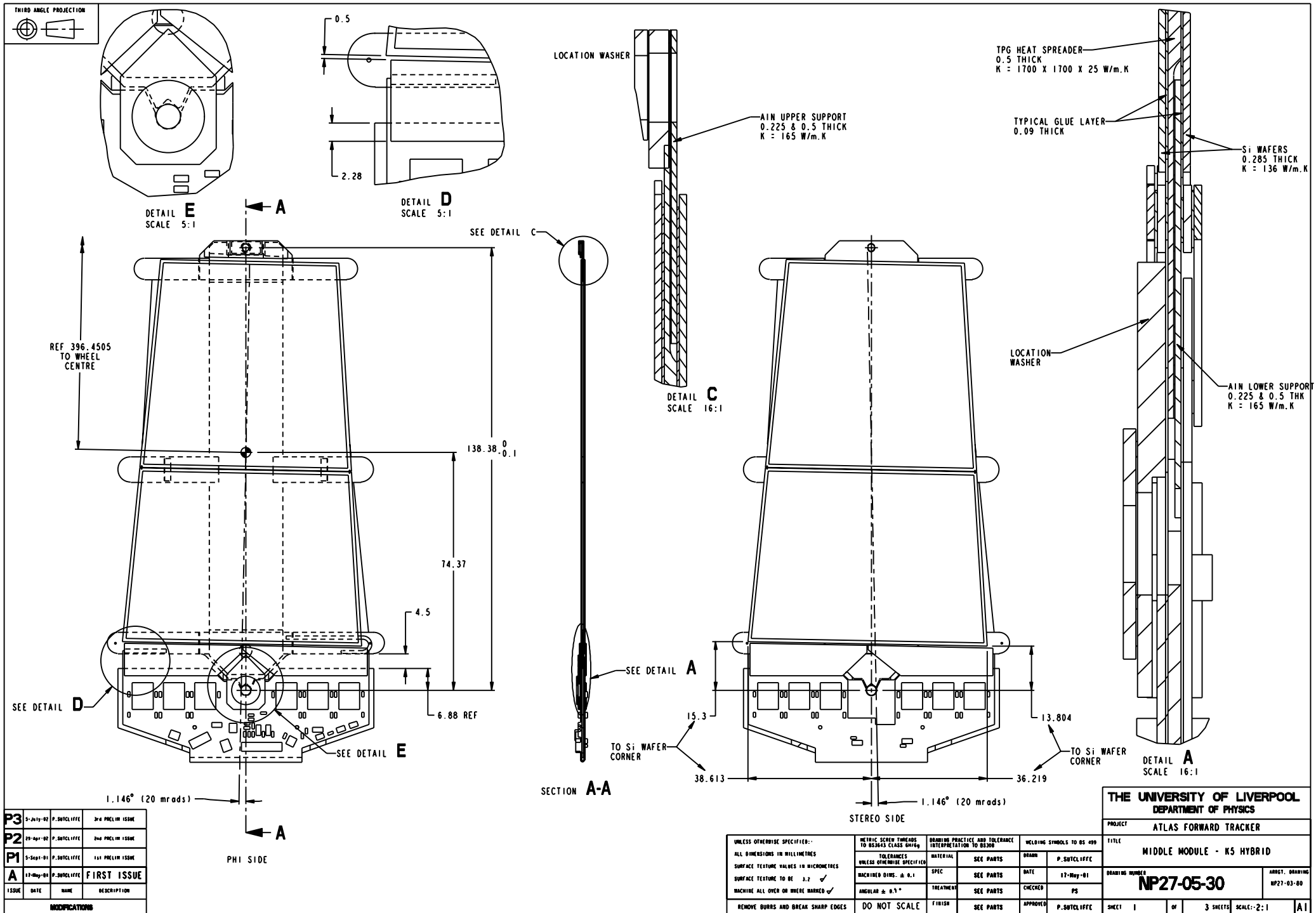


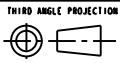
ITEM	PART/CAD No	DWG TITLE	MATERIAL	REMARK	QTY	SURFACE TREATMENT
1	NP27-05-14	SUPPORT SPINE-OUTER MODULE	TPG	0.5mm THICK	1	PARFLUENE COAT ALL OVER 0.02 THICK U.D.S.
2	NP27-05-15	LOCATION SUPPORT-OUTER MODULE	AIN	0.225mm THICK	1	
3	NP27-05-16	FAN-IN SUPP-RH (BIAS)-OUT MODULE	AIN	0.5mm THICK	1	
4	NP27-05-18	END LOCATION SUPPORT -OUTER MOD	AIN	0.225mm THICK	1	
5	NP27-05-19	END SUPPORT-OUTER MODULE	AIN	0.5mm THICK	2	
7	NP27-05-21	MIDDLE SUPPORT-OUTER MODULE	AIN	0.5mm THICK	2	
8	NP27-05-17	FAN-IN SUPP-RH (BIAS)-OUT MODULE	AIN	0.5mm THICK	1	
9	NP27-05-84	END LOCATOR ASSY-OUTER MODULE	SEE PARTS	-	1	
10	NP27-05-11-GLUE				1	



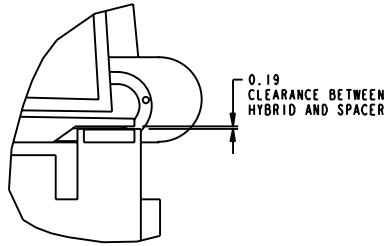
P3	5-Jul-02	P. Sutcliffe	3rd PRELIM ISSUE
P2	1-May-02	P. Sutcliffe	2nd PRELIM ISSUE
P1	5-Sep-01	P. Sutcliffe	1st PRELIM ISSUE
A	12-Apr-01	P. Sutcliffe	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE 3.2 ✓ MACHINE ALL OVER OR WHERE MARKED ✓ REMOVE BURRS AND BREAK SHARP EDGES				METRIC SCREW THREADS TO BS3643 CLASS 6H/6g TOLERANCES UNLESS OTHERWISE SPECIFIED MACHINED DIMS: ± 0.25 ANGULAR ± 0.5° DO NOT SCALE		DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308 MATERIAL SEE PARTS SPEC SEE PARTS TREATMENT SEE PARTS FINISH SEE PARTS		WELDING SYMBOLS TO BS 499 DRAWN P. SUTCLIFFE DATE 12-Apr-01 CHECKED PS APPROVED P. SUTCLIFFE		THE UNIVERSITY OF LIVERPOOL DEPARTMENT OF PHYSICS PROJECT ATLAS FORWARD TRACKER TITLE OUTER MODULE SPINE ASSY DRAWING NUMBER NP27-05-11 SHEET 1 OF 2 SHEETS SCALE: 2:1 A1		
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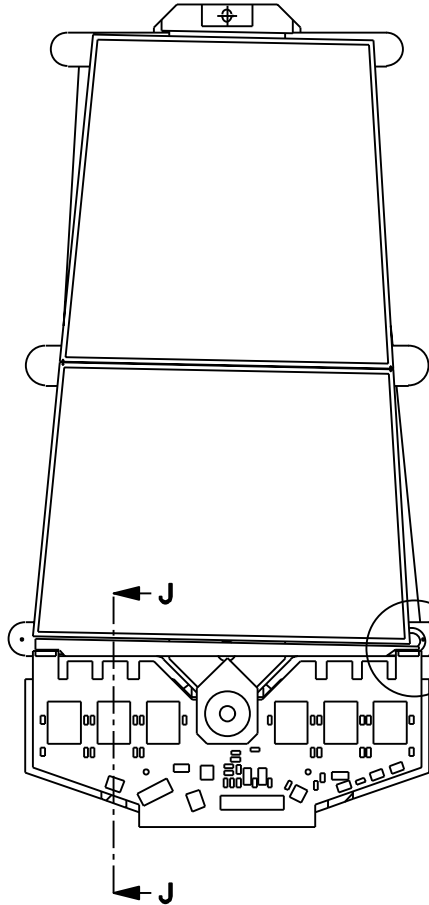




THIRD ANGLE PROJECTION

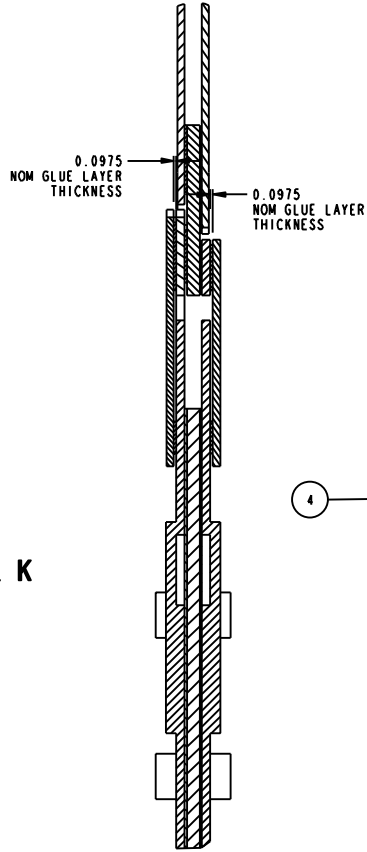


DETAIL **K**
SCALE 5:1



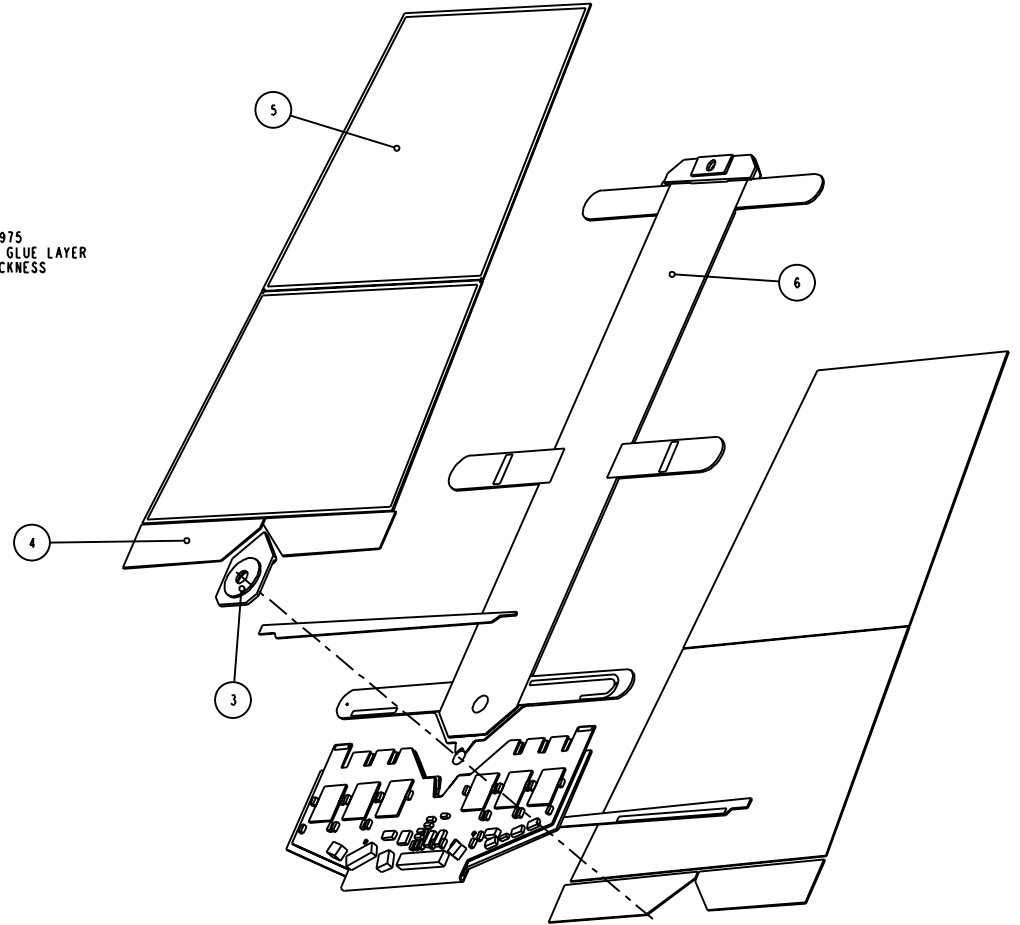
VIEW SHOWING MODULE SPACER, WITHOUT FAN-IN

SEE DETAIL **K**



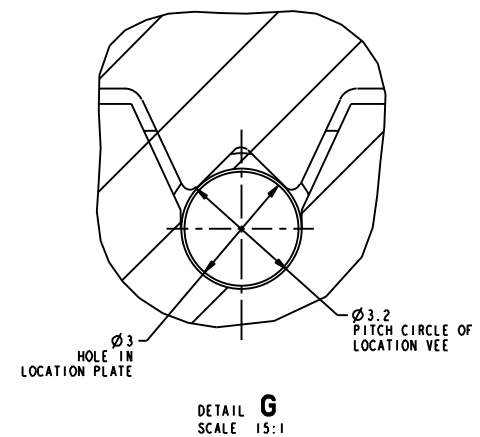
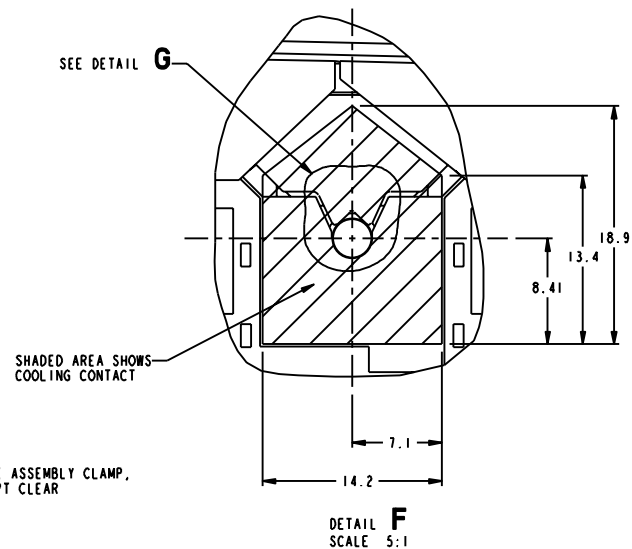
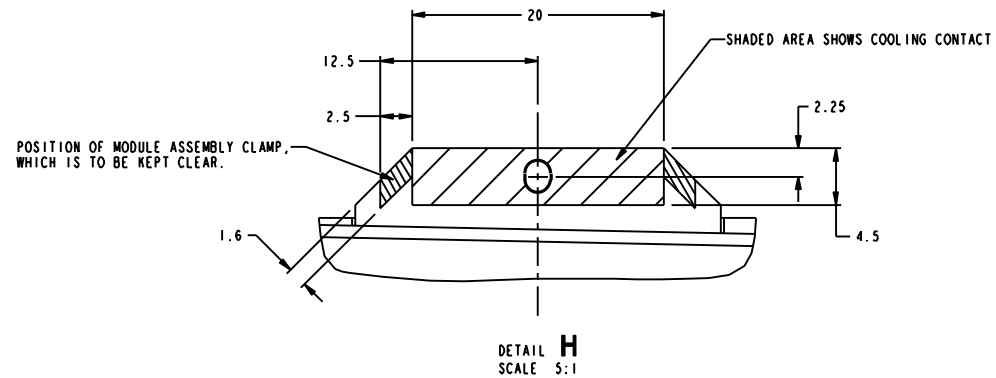
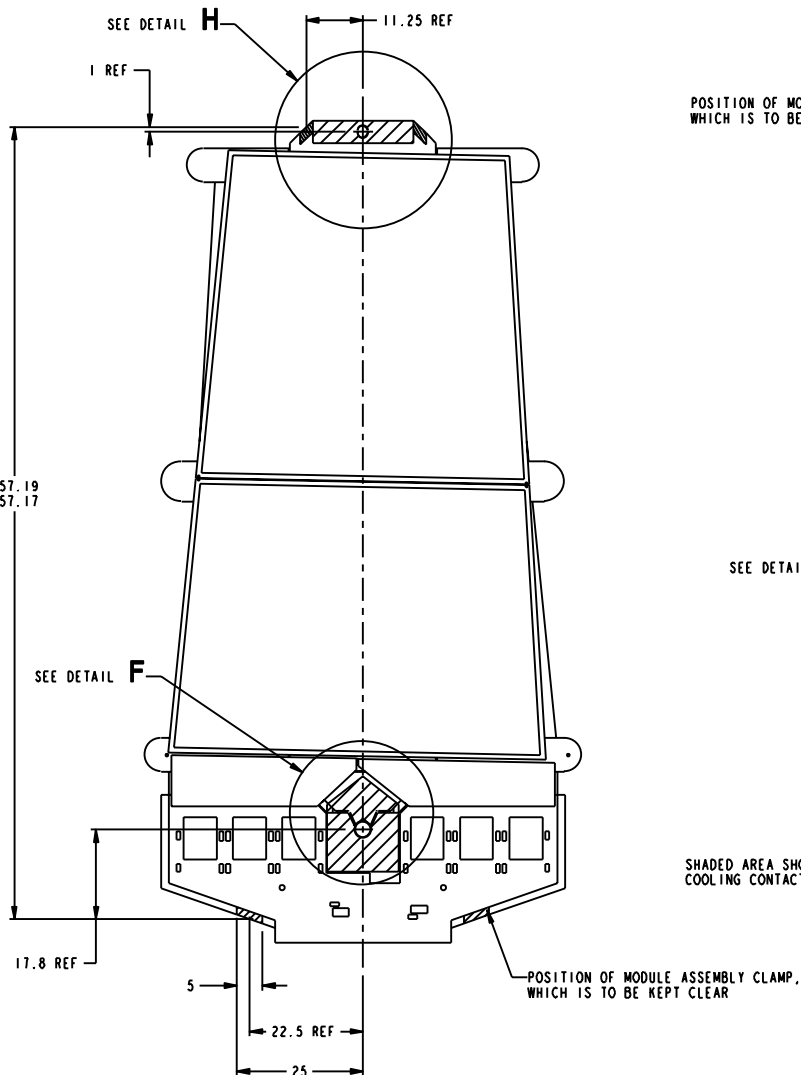
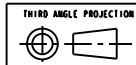
SECTION **J-J**
SCALE 10:1
SHOWING FAN-IN AND SPACER GLUE LAYERS

ITEM	PART/CAD No	DWG TITLE	MATERIAL	REMARK	QTY
1	NP27-05-08	FAN IN SPACER	AIN	-	2
2	NP27-05-01	HYBRID BASE ASSY - K5	SEE PARTS	-	1
3	NP27-05-82	LOCATION PAD ASSY	SEE PARTS	-	1
4	NP27-05-32	MIDDLE STEREO/PHI FAN-IN	BOROSILICATE GLASS	0.3mm THICK	2
5	NP27-05-33	MIDDLE SILICON WAFERS -W21 & W22	SILICON	0.3mm THICK	2
6	NP27-05-31	MIDDLE MODULE SPINE ASSY	SEE PARTS	SEE PARTS	1
7	NP27-05-30-GLUE	GLUE LAYERS-MIDDLE MODULE	GLUE	VARIOUS THICKNESS	1



P3	5-Jul-02	P. SUTCLIFFE	3rd PRELIM ISSUE
P2	29-Apr-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sept-01	P. SUTCLIFFE	1st PRELIM ISSUE
A	14-Jun-01	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE MACHINE ALL OVER OR WHERE MARKED ✓				METRIC SCREW THREADS TO BS3643 CLASS 6H/6g TOLERANCES UNLESS OTHERWISE SPECIFIED MACHINED DIMS: ± 0.1 ANGULAR ± 0.1°		DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308 MATERIAL SEE PARTS SPEC SEE PARTS TOLERANCES SEE PARTS FINISH SEE PARTS		WELDING SYMBOLS TO BS 499 DRAWN P. SUTCLIFFE DATE 12-May-01 CHECKED PS APPROVED P. SUTCLIFFE		THE UNIVERSITY OF LIVERPOOL DEPARTMENT OF PHYSICS PROJECT ATLAS FORWARD TRACKER TITLE MIDDLE MODULE - K5 HYBRID DRAWING NUMBER NP27-05-30 ARREST. DRAWING NP27-03-00			
REMOVE BURRS AND BREAK SHARP EDGES				DO NOT SCALE		FINISH		APPROVED P. SUTCLIFFE		SHEET 2 OF 3 SHEETS SCALE: 2:1		A1	



P3	5-Jul-02	P. Sutcliffe	3rd PRELIM ISSUE
P2	29-Apr-02	P. Sutcliffe	2nd PRELIM ISSUE
P1	5-Sep-01	P. Sutcliffe	1st PRELIM ISSUE
A	14-Jun-01	P. Sutcliffe	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

UNLESS OTHERWISE SPECIFIED:-				METRIC SCREW THREADS TO BS4643 CLASS 6H/6g				DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS200				WELDING SYMBOLS TO BS 499			
ALL DIMENSIONS IN MILLIMETRES				TOLERANCES UNLESS OTHERWISE SPECIFIED				MATERIAL				SEE PARTS			
SURFACE TEXTURE VALUES IN MICROMETRES				MACHINED DIMS: ± 0.1				SPEC				DATE			
SURFACE TEXTURE TO BE 3.2				ANGULAR ± °				TOLERANCE				CHECKED			
MACHINE ALL OVER OR WHERE BARRIED ✓				FINISH				SEE PARTS				APPROVED			
REMOVE BURRS AND BREAK SHARP EDGES				DO NOT SCALE				P. SUTCLIFFE				SHEET 3			
												OF 3 SHEETS			
												SCALE: 2:1			
												A1			

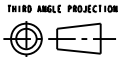
THE UNIVERSITY OF LIVERPOOL
DEPARTMENT OF PHYSICS

PROJECT ATLAS FORWARD TRACKER

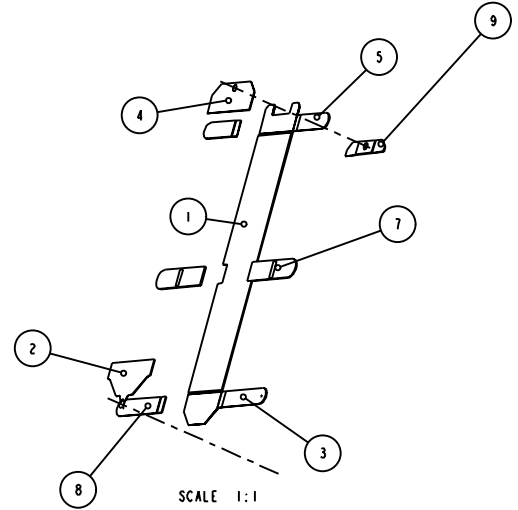
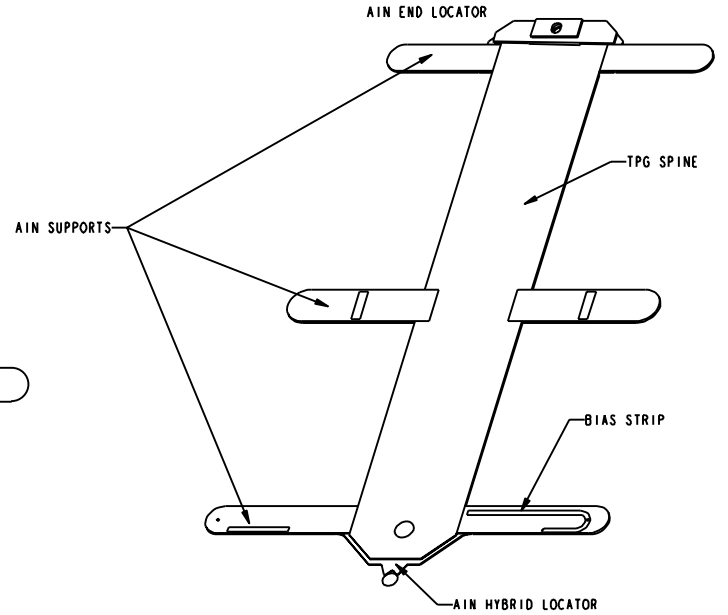
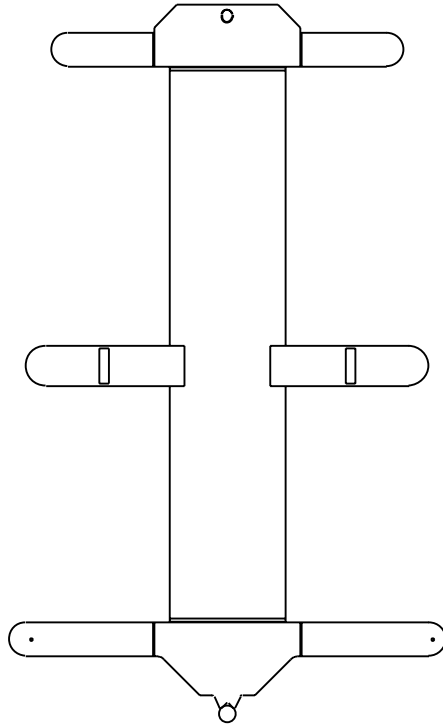
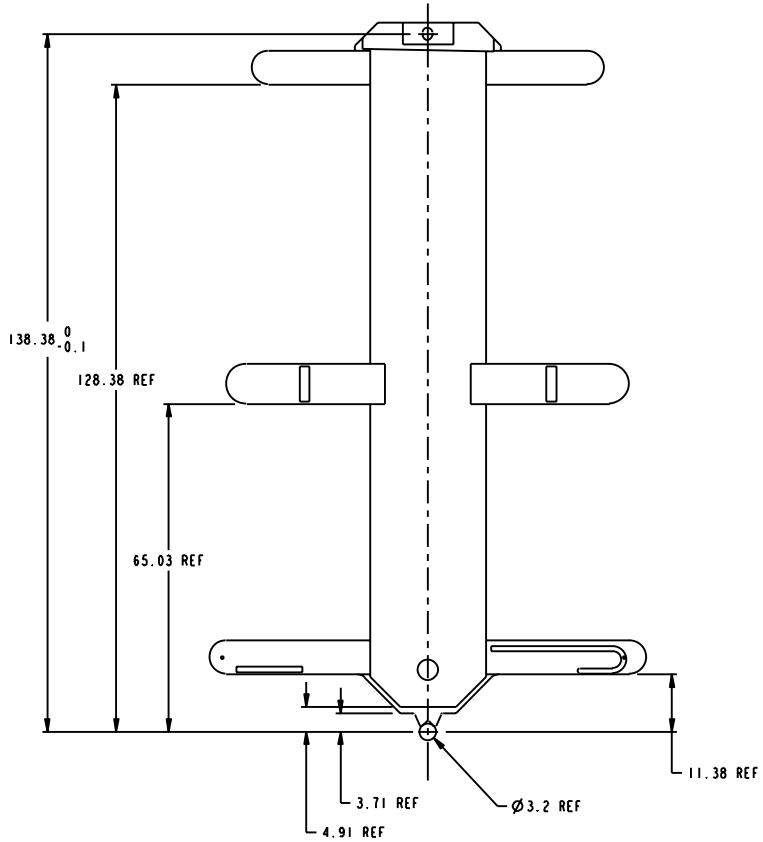
TITLE MIDDLE MODULE - K5 HYBRID

DRAWING NUMBER
NP27-05-30

ARRETT, DRAWING
NP27-03-00



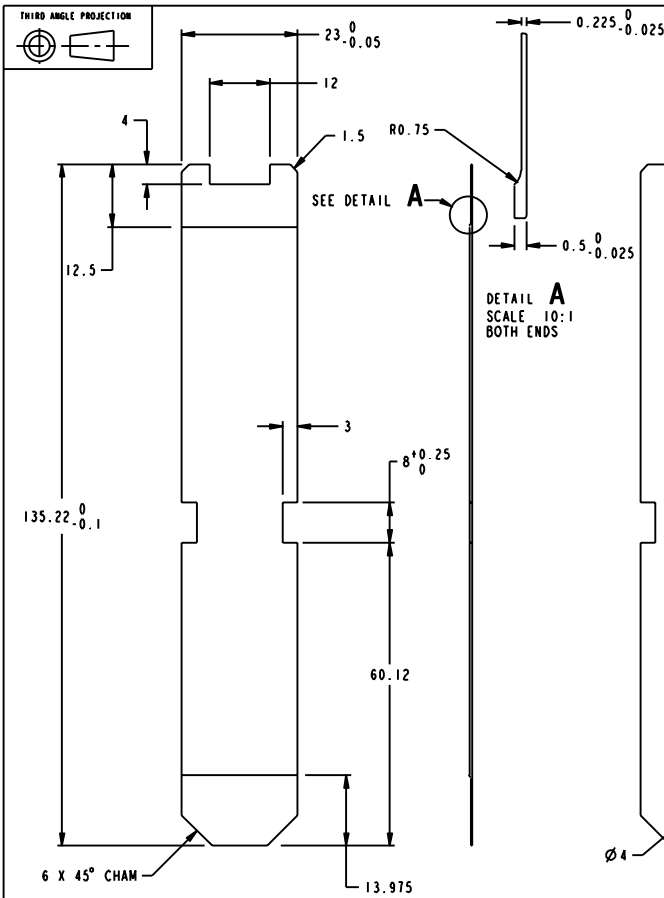
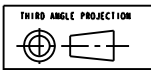
ITEM	PART/CAD No	DWG TITLE	MATERIAL	REMARK	QTY	SURFACE TREATMENT
1	NP27-05-34	SUPPORT SPINE-MIDDLE MODULE	TPG	0.5mm THICK	1	PARALENE COME ALL OVER 0.02 THICK U.O.S.
2	NP27-05-35	LOCATION SUPPORT-MIDDLE MODULE	AIN	0.225mm THICK	1	
3	NP27-05-36	FAN-IN SUPP-RH (BIAS)-OUT MODULE	AIN	0.5mm THICK	1	
4	NP27-05-38	END LOCATION SUPPORT-MIDDLE MOD	AIN	0.225mm THICK	1	
5	NP27-05-39	END SUPPORT-MIDDLE MODULE	AIN	0.5mm THICK	2	
7	NP27-05-41	MIDDLE SUPPORT-MIDDLE MODULE	AIN	0.5mm THICK	2	
8	NP27-05-37	FAN-IN SUPP-RH (BIAS)-OUT MODULE	AIN	0.5mm THICK	1	
9	NP27-05-86	END LOCATOR ASSY-MIDDLE MODULE	SEE PARTS	-	1	
10	NP27-05-31-GLUE	GLUE LAYERS-MIDDLE MODULE SPINE	GLUE	VARIOUS THICKNESS	1	



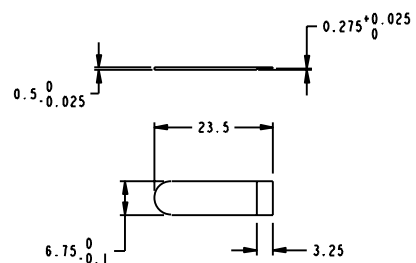
SCALE 1:1

P2	5-Jul-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sep-01	P. SUTCLIFFE	1st PRELIM ISSUE
B	10-May-01	P. SUTCLIFFE	ITEM 2 MODIFIED
A	06-Apr-01	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

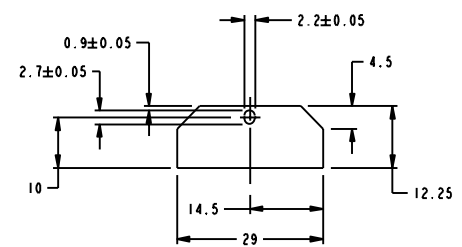
UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE 3.2 ✓ MACHINE ALL OVER OR WHERE MARKED ✓				METRIC SCREW THREADS TO BS643 CLASS 6H/6g TOLERANCES UNLESS OTHERWISE SPECIFIED MACHINED DIMS: ± 0.25 ANGULAR ± 0.5°		DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308 MATERIAL SEE PARTS SPEC SEE PARTS TREATMENT SEE PARTS FINISH SEE PARTS		WELDING SYMBOLS TO BS 499 DRAWN P. SUTCLIFFE DATE 06-Apr-01 CHECKED PS APPROVED P. SUTCLIFFE		THE UNIVERSITY OF LIVERPOOL DEPARTMENT OF PHYSICS PROJECT ATLAS FORWARD TRACKER TITLE MIDDLE MODULE SPINE ASSY DRAWING NUMBER NP27-05-31 ARREST. DRAWING NP27-		SHEET 1 OF 2 SHEETS SCALE: 2:1 A1	
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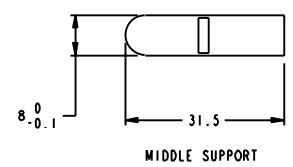
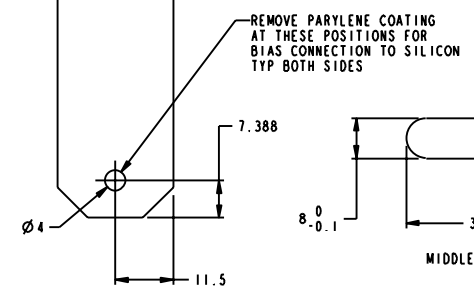
DETAIL A
SCALE 10:1
BOTH ENDS



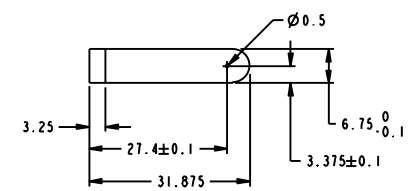
ITEM 5 - UPPER SUPPORT



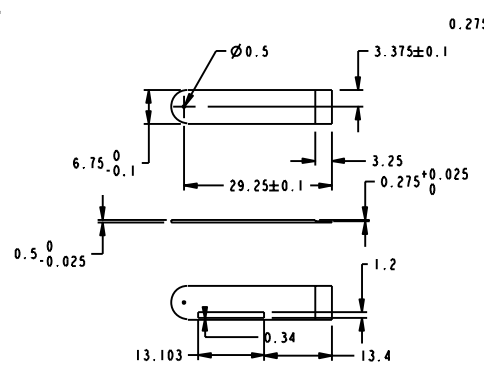
ITEM 4 - UPPER LOCATION SUPPORT
THICKNESS 0.225 ± 0.025



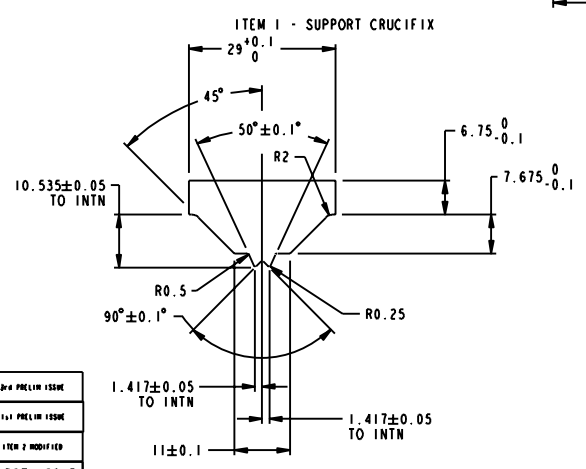
MIDDLE SUPPORT



ITEM 8 - FAN-IN SUPPORT - RH (BIAS TRACK)



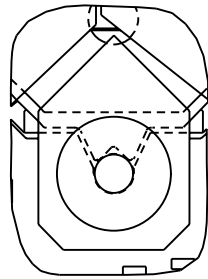
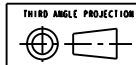
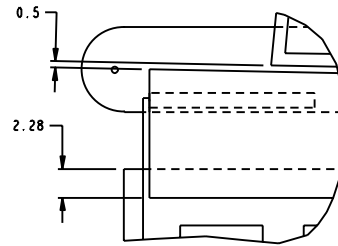
ITEM 3 - FAN-IN SUPPORT - LH



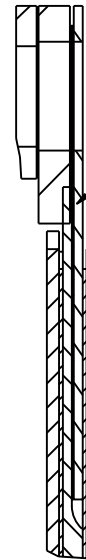
ITEM 2 - LOCATION SUPPORT
THICKNESS 0.225 ± 0.025

P2	5-Jul-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sep-01	P. SUTCLIFFE	1st PRELIM ISSUE
B	10-May-01	P. SUTCLIFFE	ITEM 2 MODIFIED
A	06-Apr-01	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION

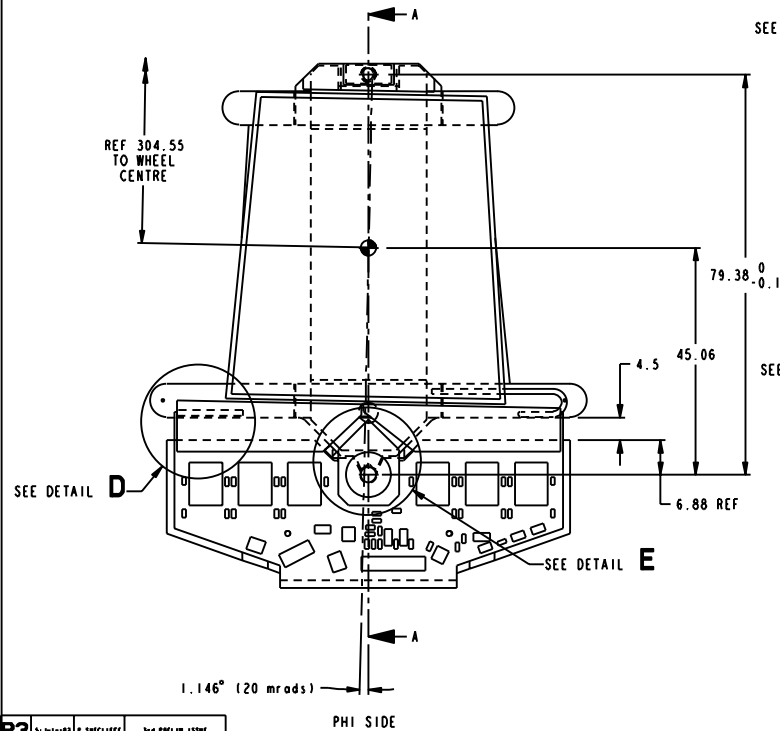
UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE 3.2 MACHINE ALL OVER OR WHERE MARKED ✓ REMOVE BURRS AND BREAK SHARP EDGES				METRIC SCREW THREADS TO BS8463 CLASS 4.6 TOLERANCES UNLESS OTHERWISE SPECIFIED MACHINED DIMS: ± 0.25 ANGULAR ± 0.5° DO NOT SCALE		DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308 MATERIAL SEE PARTS SPEC SEE PARTS TREATMENT SEE PARTS FINISH SEE PARTS		WELDING SYMBOLS TO BS 499 DRAWN P. SUTCLIFFE DATE 06-Apr-01 CHECKED PS APPROVED P. SUTCLIFFE		THE UNIVERSITY OF LIVERPOOL DEPARTMENT OF PHYSICS PROJECT ATLAS FORWARD TRACKER TITLE MIDDLE MODULE SPINE ASSY DRAWING NUMBER NP27-05-31 SHEET 2 OF 2 SHEETS SCALE: 2:1			A1
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DETAIL E
SCALE 5:1DETAIL D
SCALE 5:1

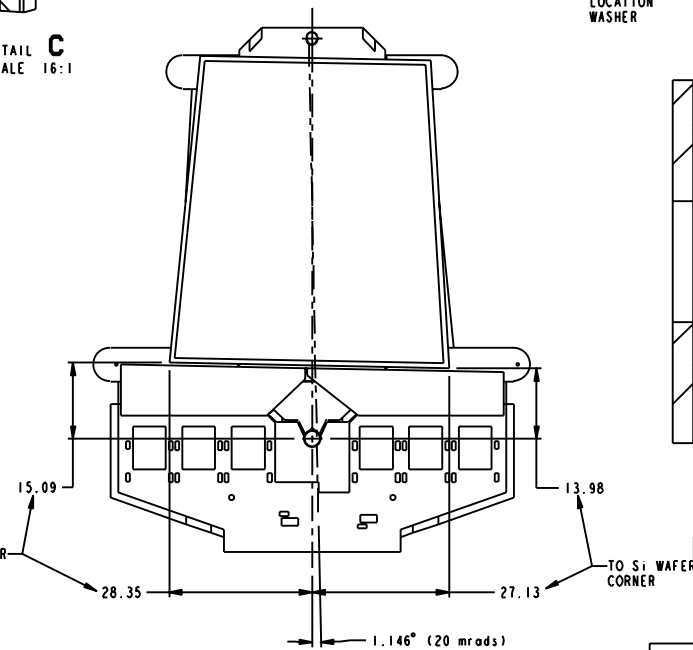
LOCATION WASHER

DETAIL C
SCALE 16:1AIN UPPER SUPPORT
0.225 & 0.5 THICK
K = 165 W/m.KTPG HEAT SPREADER
0.5 THICK
K = 1700 X 1700 X 25 W/m.KTYPICAL GLUE LAYER
0.09 THICKSi WAFERS
0.285 THICK
K = 136 W/m.KAIN LOWER SUPPORT
0.225 & 0.5 THK
K = 165 W/m.K

LOCATION WASHER

DETAIL OF INNER MODULE
52 OFF PER RING

SECTION A-A

TO Si WAFER
CORNER

STEREO SIDE

DETAIL B
SCALE 16:1THE UNIVERSITY OF LIVERPOOL
DEPARTMENT OF PHYSICS

PROJECT ATLAS FORWARD TRACKER

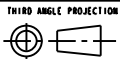
TITLE INNER MODULE - K5 HYBRID

DRAWING NUMBER
NP27-05-50ARRET. DRAWING
NP27-03-00

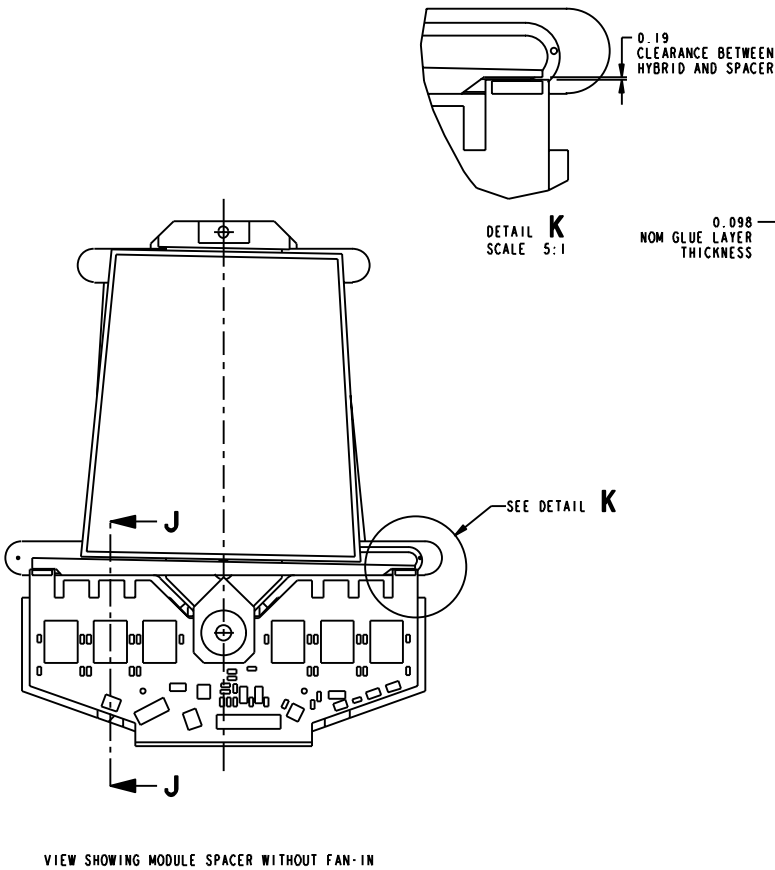
UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE ✓ MACHINE ALL OVER OR WHERE MARKED ✓ REMOVE BURRS AND BREAK SHARP EDGES	METRIC SCREW THREADS TO BS643 CLASS 6H/6g	DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS2000		WELDING SYMBOLS TO BS 499		TITLE INNER MODULE - K5 HYBRID			
	TOLERANCES UNLESS OTHERWISE SPECIFIED	MATERIAL	SEE PARTS	DRAWN	P. SUTCLIFFE	DRAWING NUMBER NP27-05-50		ASST. DRAWING NP27-03-80	
	MACHINED DIMS: ± 0.1	SPEC	SEE PARTS	DATE	10-May-01				
	ANGULAR ± 0.1°	TREATMENT	SEE PARTS	CHECKED	PS				
	DO NOT SCALE	FINISH	SEE PARTS	APPROVED	P. SUTCLIFFE	SHEET 1	OF	3 SHEETS	SCALE: 2:1

SHEET 1 OF 3 SHEETS SCALE: 2:1 A1

P3	5-Jul-02	P. SUTCLIFFE	3rd PRELIM ISSUE
P2	29-Apr-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sep-01	P. SUTCLIFFE	1st PRELIM ISSUE
A	10-May-01	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			



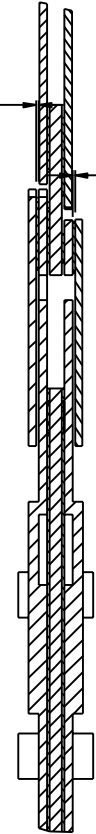
THIRD ANGLE PROJECTION



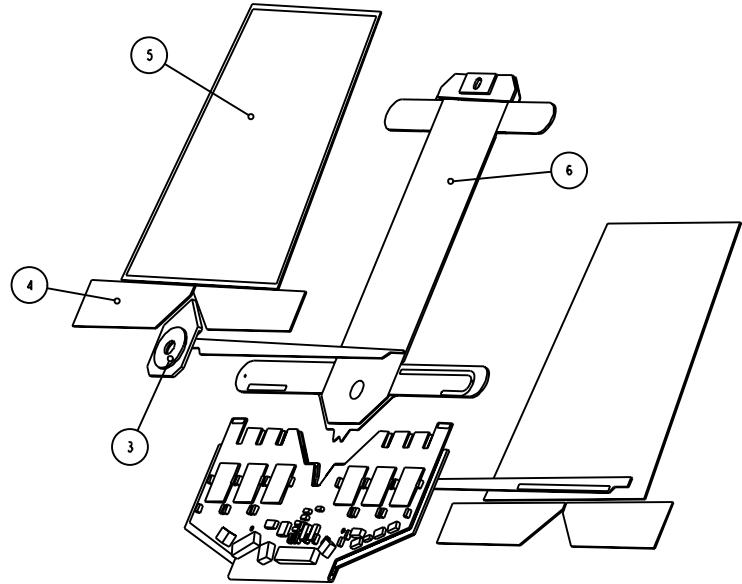
DETAIL **K**
SCALE 5:1

0.098
NOM GLUE LAYER
THICKNESS

0.098
NOM GLUE LAYER
THICKNESS



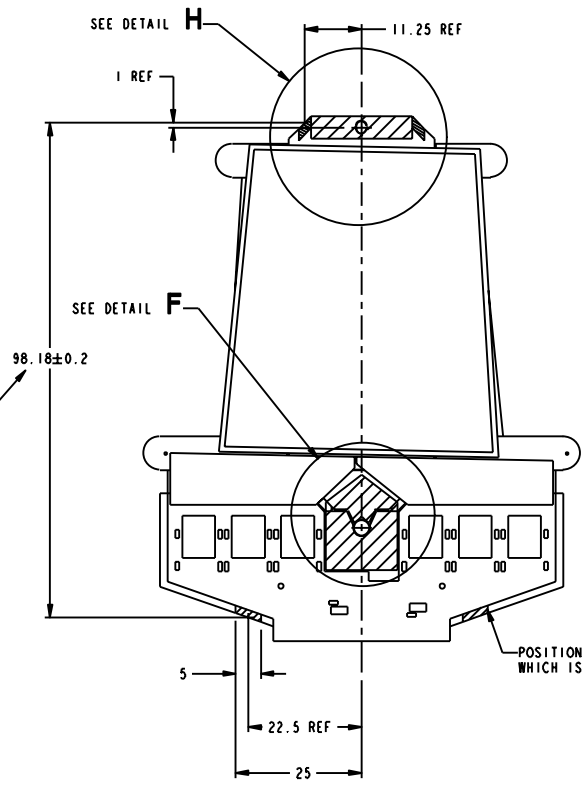
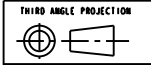
SECTION **J-J**
SCALE 10:1
SHOWING FAN-IN AND GLUE LAYERS



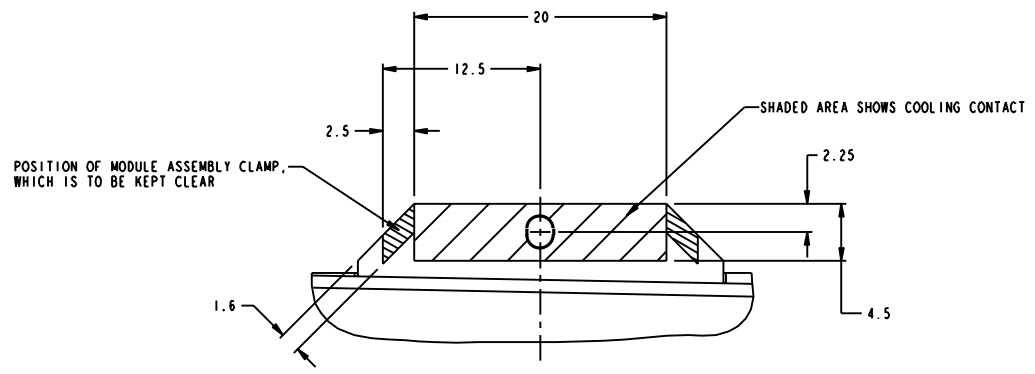
ITEM	PART/CAD No	DWG TITLE	MATERIAL	REMARK	QTY
1	NP27-05-08	FAN IN SPACER	AIN	-	2
2	NP27-05-01	HYBRID BASE ASSY - K5	SEE PARTS	-	1
3	NP27-05-82	LOCATION PAD ASSY	SEE PARTS	-	1
4	NP27-05-52	INNER STEREO/PHI FAN-IN	BOROSILICATE GLASS	0.3mm THICK	2
5	NP27-05-53	INNER SILICON WAFERS - W12	SILICON	0.3mm THICK	2
6	NP27-05-51	INNER MODULE SPINE ASSY	SEE PARTS	SEE PARTS	1
7	NP27-05-50-GLUE	INNER MODULE GLUE LAYERS	GLUE	VARIOUS THICKNESS	1

P3	5-Jul-02	P. SUTCLIFFE	3rd PRELIM ISSUE
P2	29-Apr-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sep-01	P. SUTCLIFFE	1st PRELIM ISSUE
A	18-May-00	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

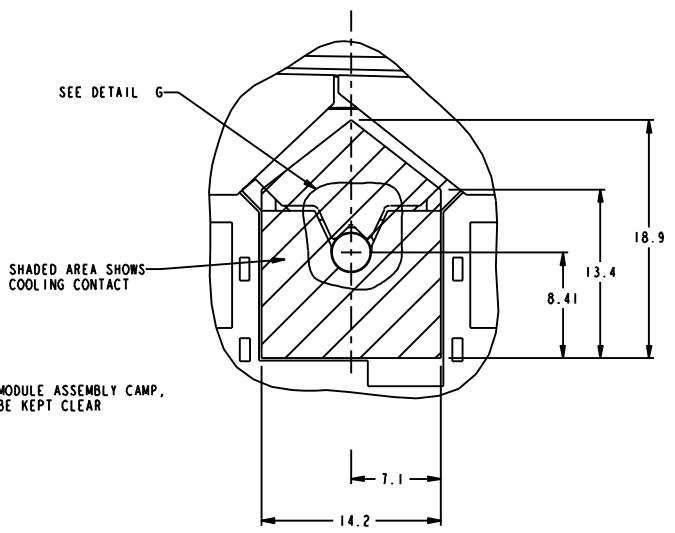
UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE ☒ MACHINE ALL OVER OR WHERE MARKED ☒ REMOVE BURRS AND BREAK SHARP EDGES		METRIC SCREW THREADS TO BS2643 CLASS 6H/6g TOLERANCES UNLESS OTHERWISE SPECIFIED MACHINED DIMS: ± 0.1 ANGULAR $\pm 0.1^\circ$ DO NOT SCALE		DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS2000 MATERIAL SEE PARTS SPEC SEE PARTS TREATMENT SEE PARTS FINISH SEE PARTS		WELDING SYMBOLS TO BS 499 DRAWN P. SUTCLIFFE DATE 10-MAY-01 CHECKED PS APPROVED P. SUTCLIFFE		TITLE INNER MODULE - K5 HYBRID DRAWING NUMBER NP27-05-50 SHEET 2 OF 3 SHEETS SCALE: 2:1 ARREST. DRAWING NP27-03-00	
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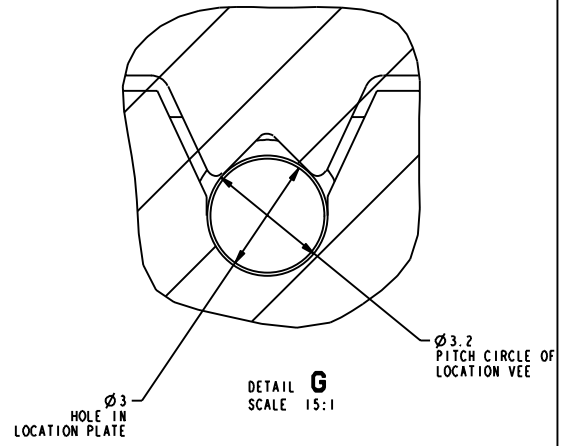
IT IS IMPORTANT THAT THIS DIM IS MAINTAINED FOR THE MODULE MOUNTING JIG



DETAIL H
SCALE 5:1



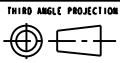
DETAIL F
SCALE 5:1



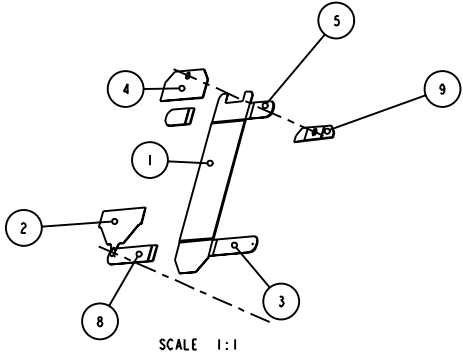
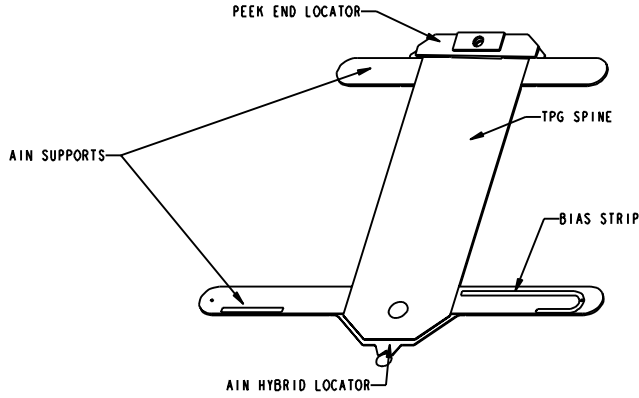
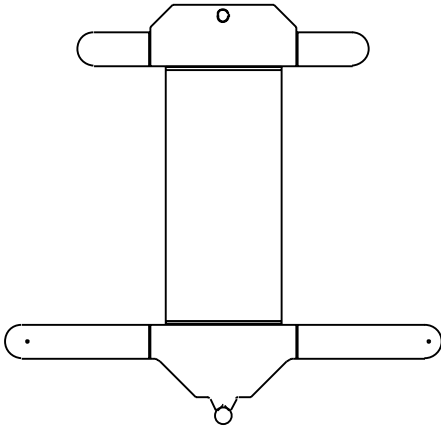
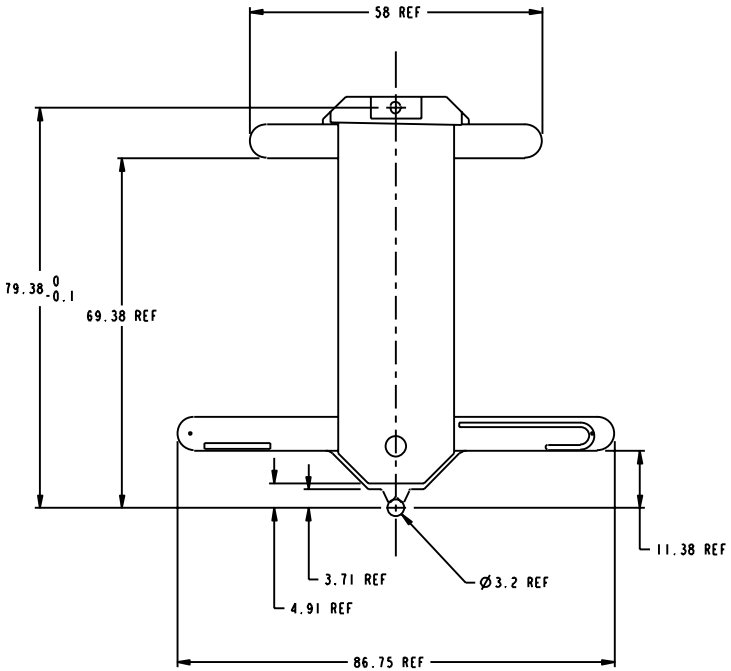
THE UNIVERSITY OF LIVERPOOL DEPARTMENT OF PHYSICS			
PROJECT		ATLAS FORWARD TRACKER	
TITLE		INNER MODULE - K5 HYBRID	
DRAWING NUMBER		NP27-05-50	
SHEET		3	OF 3 SHEETS
SCALE		2:1	A1

P3	5-Jul-02	P. SUTCLIFFE	3rd PRELIM ISSUE
P2	29-Apr-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sep-01	P. SUTCLIFFE	1st PRELIM ISSUE
A	15-Jun-01	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE 3.2 MACHINE ALL OVER OR WHERE MARKED ✓	METRIC SCREW THREADS TO BS2643 CLASS 4H/6g		DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS2000		WELDING SYMBOLS TO BS 499	
	TOLERANCES UNLESS OTHERWISE SPECIFIED		MATERIAL	SEE PARTS	DRAWN	P. SUTCLIFFE
	MACHINED DIMS: ± 0.1		SPEC	SEE PARTS	DATE	15-Jun-01
	ANGULAR ± 0.5°		TOLERANCE	SEE PARTS	CHECKED	PS
	REMOVE BURRS AND BREAK SHARP EDGES		FINISH	SEE PARTS	APPROVED	P. SUTCLIFFE

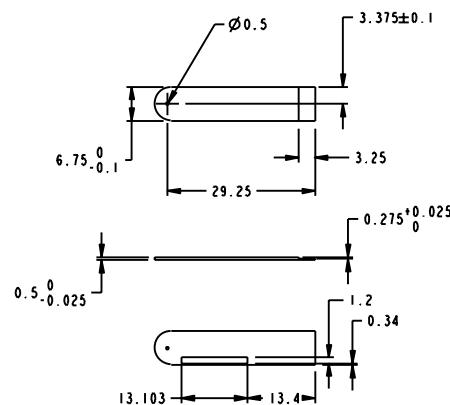
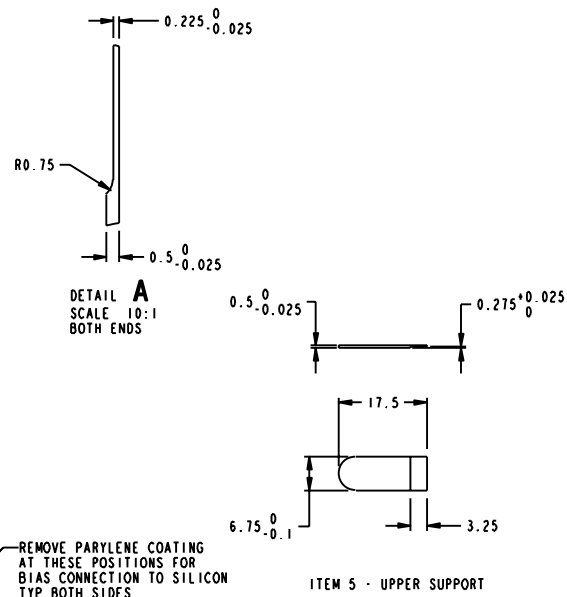
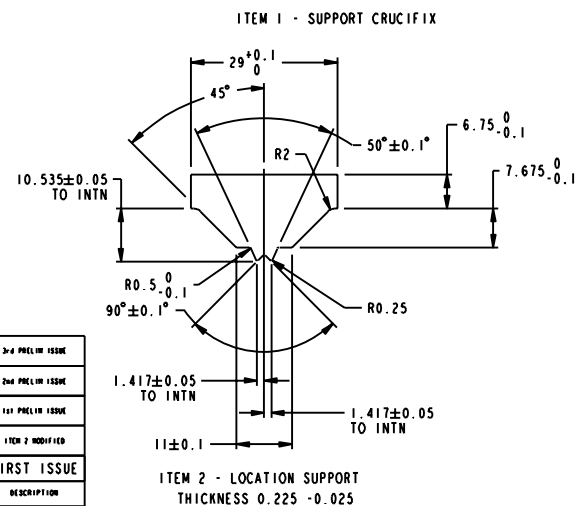
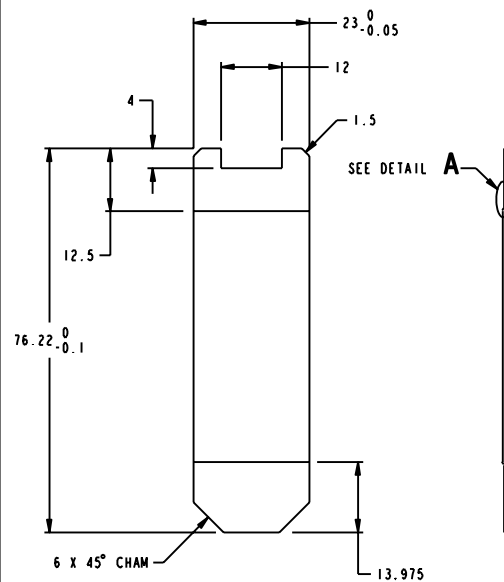
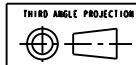


ITEM	PART/CAD No	DWG TITLE	MATERIAL	REMARK	QTY	SURFACE TREATMENT
1	NP27-05-54	SUPPORT SPINE-INNER MODULE	TPG	0.5mm THICK	1	PARTICLE COAT ALL OVER 0.02 THICK 0.0.1.
2	NP27-05-55	LOCATION SUPPORT-INNER MODULE	AIN	0.225mm THICK	1	
3	NP27-05-56	FAN-IN SUPP-RH (BIAS)-OUT MODULE	AIN	0.5mm THICK	1	
4	NP27-05-58	END LOCATION SUPPORT-INNER MOD	AIN	0.225mm THICK	1	
5	NP27-05-59	END SUPPORT-INNER MODULE	AIN	0.5mm THICK	2	
8	NP27-05-57	FAN-IN SUPP-RH (BIAS)-OUT MODULE	AIN	0.5mm THICK	1	
9	NP27-05-88	END LOCATOR ASSY-INNER MODULE	SEE PARTS	-	1	
10	NP27-05-51-GLUE	SUPPORT SPINE GLUE LAYERS	GLUE	VARIOUS THICKNESS	1	

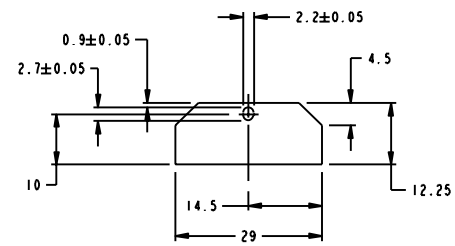
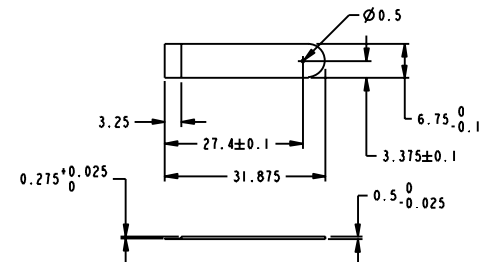


P3	5-Jul-02	P. SUTCLIFFE	3rd PRELIM ISSUE
P2	7-May-02	P. SUTCLIFFE	2nd PRELIM ISSUE
P1	5-Sep-01	P. SUTCLIFFE	1st PRELIM ISSUE
B	10-May-01	P. SUTCLIFFE	1 CH 2 MODIFIED
A	25-Apr-01	P. SUTCLIFFE	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION
MODIFICATIONS			

UNLESS OTHERWISE SPECIFIED:- ALL DIMENSIONS IN MILLIMETRES SURFACE TEXTURE VALUES IN MICROMETRES SURFACE TEXTURE TO BE 3.2 ✓ MACHINE ALL OVER OR WHERE BARRIED ✓ REMOVE BURRS AND BREAK SHARP EDGES				METRIC SCREW THREADS TO BS3643 CLASS 6H/6g TOLERANCES UNLESS OTHERWISE SPECIFIED MACHINED DIMS: ± 0.25 ANGULAR ± 0.5° DO NOT SCALE		DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308 MATERIAL SEE PARTS SPEC SEE PARTS TREATMENT SEE PARTS FINISH SEE PARTS		WELDING SYMBOLS TO BS 499 DRAWN P. SUTCLIFFE DATE 25-Apr-01 CHECKED PS APPROVED P. SUTCLIFFE		THE UNIVERSITY OF LIVERPOOL DEPARTMENT OF PHYSICS PROJECT ATLAS FORWARD TRACKER TITLE INNER MODULE SPINE ASSY DRAWING NUMBER NP27-05-51 ARREST. DRAWING NP27-			SHEET 1 OF 2 SHEETS SCALE: 2:1 A1
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ITEM 3 - FAN-IN SUPPORT - LH

ITEM 4 - UPPER LOCATION SUPPORT
THICKNESS 0.225 ± 0.025

ITEM 8 - FAN-IN SUPPORT - RH (BIAS TRACK)

P3	5-Jul-02	P. Sutcliffe	3rd PRELIM ISSUE
P2	7-May-02	P. Sutcliffe	2nd PRELIM ISSUE
P1	5-Sep-01	P. Sutcliffe	1st PRELIM ISSUE
B	10-May-01	P. Sutcliffe	ITEM 2 MODIFIED
A	25-Apr-01	P. Sutcliffe	FIRST ISSUE
ISSUE	DATE	NAME	DESCRIPTION

MODIFICATIONS

UNLESS OTHERWISE SPECIFIED:-				METRIC SCREW THREADS TO BS2643 CLASS 6H/6g				DRAWING PRACTICE AND TOLERANCE INTERPRETATION TO BS308				WELDING SYMBOLS TO BS 499				TITLE			
ALL DIMENSIONS IN MILLIMETRES				TOLERANCES UNLESS OTHERWISE SPECIFIED				MATERIAL				SEE PARTS				DATE			
SURFACE TEXTURE VALUES IN MICROMETRES				MACHINED DIMS: ± 0.25				SPEC				DATE				25-Apr-01			
SURFACE TEXTURE TO BE 3.2				ANGULAR ± 0.5°				TREATMENT				CHECKED				PS			
MACHINE ALL OVER OR WHERE MARKED ✓				DO NOT SCALE				FINISH				APPROVED				P. SUTCLIFFE			
REMOVE BURRS AND BREAK SHARP EDGES				PROJECT				ATLAS FORWARD TRACKER				INNER MODULE SPINE ASSY				DRAWING NUMBER			
				SHEET				2				OF				2 SHEETS			
				SCALE:-				2:1				A1							