

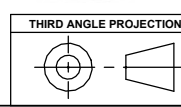
REVISIONS				
REV	SHEET/ZONE	DESCRIPTION	DATE	APPROVED
A	4/B5	600 PROFILE TOLERANCE WAS .800	03/22/07	E. WILLIAMS
	5/D3	200 POSITIONAL TOLERANCE WAS .300		
B	1/B1	CORRECTED SPELLING IN PARTS LIST	03/26/07	E. WILLIAMS
	5/MULT	DISPLAYED SEVERAL MOVING ASSEMBLY COMPONENTS PREVIOUSLY MISSING		
C	MULT	UPDATED AND EXTENSIVELY REVISED ENTIRE DRAWING TO REFLECT CURRENT SSA DESIGN. ADDED SHEETS 3 AND 8, AND RENUMBERED OTHER SHEETS ACCORDINGLY	01/14/09	J. HUNDHAUSEN
	1/B3, C3	ADDED ITEMS 13 THROUGH 22. EXTENSIVELY REVISED PARTS LIST		
	1/MULT	EXTENSIVELY REVISED NOTES. ADDED NOTES 16 THROUGH 21		
	10/C1, C2	REMOVED "M" FROM FEATURE CONTROL FRAME. PERPENDICULARITY WAS .150, ADDED PROJECTED TOLERANCE ZONE		
	10/C5	"S" CALLOUT IN FEATURE CONTROL FRAME WAS "M"		
10/D3	"0.250+/-0.050 EACH BOND PAD" WAS "0.250+/-0.100"			

NOTES UNLESS OTHERWISE SPECIFIED

- ALL DIMENSIONS IN MILLIMETERS.
- DIMENSIONS AND TOLERANCING PER ANSI Y14.5M-1994
- THIS DRAWING IS COMPLETE ONLY WHEN USED IN CONJUNCTION WITH THE POLISHED SEGMENT SPECIFICATION (TMT.OPT.SPE.07.002) AND THE SEGMENTATION DATABASE (TMT.OPT.TEC.07.044).
- AS AN INPUT TO THE ASSEMBLY DESCRIBED BY THIS DRAWING, A SEGMENT SUPPORT KIT CONTAINING ITEMS 8 AND 9 (MOVING ASSEMBLY AND TOWER ASSEMBLY) SHALL BE SUPPLIED. THE SEGMENT SUPPORT WILL BE TUNED FOR A SPECIFIC SEGMENT TYPE (1 THROUGH 82). A SEGMENT OF A GIVEN TYPE MUST BE ASSEMBLED TO THE SEGMENT SUPPORT OF THE SAME TYPE.
- DATUMS -A-, -B- AND -C- DEFINE THE THEORETICAL REFERENCE SYSTEM FOR THE POLISHED SEGMENT AND THE POLISHED MIRROR ASSEMBLY. THE SEGMENT GEOMETRY AND OPTICAL SURFACE ARE DEFINED RELATIVE TO THESE DATUMS PER THE FINISHED PRIMARY MIRROR SEGMENT SPECIFICATION (TMT.OPT.SPE.07.002) AND THE SEGMENTATION DATABASE (TMT.OPT.TEC.07.044).  
  
FOR EACH SEGMENT, THE REFERENCED DOCUMENTS DEFINE A THEORETICAL OPTICAL SURFACE, ORIGIN, AND COORDINATE SYSTEM. THE Z<sub>PSA</sub> AXIS IS THE NORMAL OF THE THEORETICAL OPTICAL SURFACE AT THE ORIGIN. THE PLANES OF THE THEORETICAL PSA COORDINATE SYSTEM ARE SPECIFIED AS DATUMS -A-, -B- AND -C- AS FOLLOWS:  
  
DATUM -A- SHALL BE THE X<sub>PSA</sub>- Y<sub>PSA</sub> PLANE  
DATUM -B- SHALL BE THE X<sub>PSA</sub>- Z<sub>PSA</sub> PLANE  
DATUM -C- SHALL BE THE Y<sub>PSA</sub>- Z<sub>PSA</sub> PLANE
- AXIAL FLEXURE LOCATIONS SPECIFIED IN TABLE-A.
- PREPARE THE BONDING SURFACES OF THE POLISHED MIRROR SEGMENT (ITEM 1) FOR BONDING, AND APPLY PRIMER (ITEM 14). BOND AXIAL FLEXURE ASSEMBLIES (ITEM 2) TO M1 POLISHED MIRROR SEGMENT (ITEM 1) CONVEX SURFACE USING ADHESIVE (ITEM 13) PER PROCEDURE TBD. AXIAL FLEXURES SHALL BE FIXTURED RELATIVE TO SEGMENT TO ACHIEVE THE TOLERANCES SHOWN.
- AXIAL FLEXURE BONDLINE THICKNESS WILL VARY OVER BONDLINE DUE TO CURVATURE OF MIRROR BACK SURFACE. NOMINAL BONDLINE AT CENTERLINE OF FLEXURE SHALL BE 0.300+/-0.050mm.
- PREPARE THE BONDING SURFACES OF THE POLISHED MIRROR SEGMENT (ITEM 1) FOR BONDING, AND APPLY PRIMER (ITEM 14). BOND CENTRAL DIAPHRAGM ASSEMBLY (ITEM 6) TO M1 POLISHED MIRROR SEGMENT (ITEM 1) USING ADHESIVE (ITEM 13) PER PROCEDURE TBD. USE BONDING FIXTURE TO CONTROL THE DIAPHRAGM AND BONDLINE TO THE TOLERANCES SHOWN.
- INSPECTION STAND DUPLICATES FIXED FRAME KINEMATIC INTERFACE ON TELESCOPE. INSPECTION STAND TO BE INSTALLED AT COORDINATE MEASURING MACHINE (CMM) OR SIMILAR INSPECTION STATION PERMITTING MEASUREMENT OF INDICATED FEATURES AS DESCRIBED IN NOTES 11 AND 12.
- AFTER ASSEMBLY, VERIFY OVERALL HEIGHT FROM BASE OF TOWER TO MIRROR SURFACE AT X<sub>PSA</sub>-Y<sub>PSA</sub> ORIGIN. MEASUREMENT SHALL BE MADE WITH SSA LOCKED, OPTICAL SURFACE UP, MOUNTED TO THE INSPECTION STAND DESCRIBED IN NOTE 10. DIMENSION "h" SHALL BE 334.125+/- 0.200 mm.
- AFTER ASSEMBLY, VERIFY USING A CMM OR SIMILAR, THE POSITION OF THE SEGMENT EDGES. MEASUREMENT SHALL BE MADE WITH SSA LOCKED, OPTICAL SURFACE UP, MOUNTED TO THE INSPECTION STAND DESCRIBED IN NOTE 10. SEE PMA ASSEMBLY PROCEDURE. POSITION OF THEORETICAL VERTICES IS GIVEN IN THE SEGMENTATION DATABASE (TMT.OPT.TEC.07.044). EDGES SHALL FALL WITHIN THE PROFILE TOLERANCE SPECIFIED.
- THE PMA SHALL BE MOUNTED TO THE OPTICAL TESTING FIXTURE DESCRIBED IN SPECIFICATION TMT.OPT.SPE.07.002 PRIOR TO FINAL FIGURING. THE OPTICAL TESTING FIXTURE ATTACHES TO THE PMA AT THE BASE OF THE TOWER AND AT THE THREE ACTUATOR ATTACHMENT LOCATIONS ON THE MOVING FRAME. PMA PISTON TIP/TILT SHALL BE ADJUSTED AS INDICATED IN THE SPECIFICATION WITH THE SSA LOCKS RELEASED.
- THE OPTICAL ORIGIN FOR ACCEPTANCE TESTING SHALL BE LOCATED ON THE OPTICAL SURFACE AT A POINT PROJECTED FROM THE CENTER OF DATUM D, PERPENDICULAR TO DATUM E. THE OPTICAL AXIS FOR ACCEPTANCE TESTING (Z<sub>PSA</sub>-FINAL) SHALL BE NORMAL TO THE OPTICAL SURFACE AT THE OPTICAL ORIGIN.
- FINISHED OPTICAL SURFACE SHAPE AND MEASUREMENT REQUIREMENTS ARE SPECIFIED IN THE SEGMENT SPECIFICATION (TMT.OPT.SPE.07.002).
- WITH MOVING ASSEMBLY (ITEM 8) FIXTURED IN THE CORRECT AXIAL POSITION RELATIVE TO THE POLISHED MIRROR SEGMENT (ITEM 1), MEASURE THE GAP BETWEEN THE MOVING ASSEMBLY AND THE CENTRAL DIAPHRAGM (ITEM 6). INSTALL A CENTRAL DIAPHRAGM SHIM (ITEM 7) WITH A THICKNESS WITHIN +/- .025mm OF THE MEASURED GAP.
- LUBRICATE AND TORQUE FASTENERS PER TABLE B.
- INDICATED PIECE PART MAY BE REMOVED TO ACCESS TOOLING FEATURES IN THE MOVING FRAME. IF REQUIRED, TORQUE FASTENERS PER TABLE B.
- INDICATED PART MAY BE LOOSENED OR REMOVED TO INSTALL THE ACTUATOR SIMULATOR. IF REQUIRED, TORQUE FASTENERS PER TABLE B.
- LUBRICATE BEARING SURFACES OF LOCK (ITEM 10) WITH LUBRICANT (ITEM 22). INSERT LOCK INTO ITS DESIGNATED HOLE IN THE TOWER. APPLY LOCTITE (ITEM 21) TO THREADS OF SET SCREW (ITEM 20) AND TIGHTEN SET SCREW UNTIL IT IS SNUG AGAINST THE LOCK. BACK THE SET SCREW OUT 1/8 TURN.
- THE TEMPERATURE OF THE ADHESIVES USED TO BOND THE SEGMENT (ITEM 1) SHALL NOT EXCEED 80°C AT ANY TIME.

22	5	B3		A/R		TBD	TBD LUBRICANT	
21	4	D5		A/R		LOCTITE 242	MEDIUM STRENGTH THREADLOCKER	
20	4	D5		3		MCMaster CARR P/N 92905A314 OR EQUIVALENT	SET SCREW, M8 X 16MM LONG, EXTENDED POINT	ALLOY STEEL, BLACK OXIDE COATED
19	8	C4		6		MCMaster CARR P/N 91290A321 OR EQUIVALENT	SOCKET HEAD CAP SCREW, M6X1.0, 16MM LONG	BLACK OXIDE COATED STEEL, CLASS 12.9
18	8	C4		15	6	MCMaster CARR P/N 91455A120 OR EQUIVALENT	FLAT WASHER, M6, 12MM OD	HIGH-STRENGTH STEEL, ZINC PLATED
17	6	C2		15		MCMaster CARR P/N 91290A326 OR EQUIVALENT	SOCKET HEAD CAP SCREW, M6X1.0, 20MM LONG	BLACK OXIDE COATED STEEL, CLASS 12.9
16	5	B3		54		MCMaster CARR P/N 98035A101 OR EQUIVALENT	FLAT WASHER, M3	CASE-HARDENED STEEL
15	5	B3		54		MCMaster CARR P/N 90685A037 OR EQUIVALENT	HEX NUT, M3	BLACK OXIDE COATED STEEL, GRADE 10
14	10	B1			A/R	DOW CORNING SILANE Z-6020	PRIMER	
13	10	B1			A/R	TBD ADHESIVE	ADHESIVE	
12	2	C4	1			TBD	TMT PMA OPTICAL TESTING FIXTURE	
11	2	C5		1		TBD	TMT PMA INSPECTION STAND	
10	4	D7		3		280-TMT-01-11400	LOCK ASSEMBLY	
9	4	D5		1		280-TMT-01-11300	TOWER ASSEMBLY	
8	8	D7		1		280-TMT-01-11200	MOVING ASSEMBLY	
7	4	B4		1		280-TMT-01-11121	CENTRAL DIAPHRAGM SHIM	
6	10	C4			1	280-TMT-01-11121	CENTRAL DIAPHRAGM	
5	2	D2	1	1		280-TMT-01-11000 A3	POLISHED MIRROR ASSEMBLY	
4	4	B3		1		280-TMT-01-11000 A2	MOVING ASSEMBLY AND BONDED MIRROR ASSEMBLY	
3	8	D8		1		280-TMT-01-11000 A1	BONDED MIRROR ASSEMBLY	
2	10	B1		27		280-TMT-01-11110	AXIAL FLEXURE ASSEMBLY	
1	10	B2		1		280-TMT-01-01000	M1 POLISHED MIRROR SEGMENT	

ITEM NO.	SHT	ZONE	A5	A4	A3	A2	A1	PART/DOCUMENT NUMBER	DESCRIPTION	REFERENCE DESIGNATION	MATERIAL/NOTES
PARTS LIST											



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS -TOLERANCES-

DECIMALS X = +/- 1.0 XX = +/- .30 XXX = +/- .100

ANGULAR = +/- .30° SURFACE FINISH = N/A

CAD GENERATED DRAWING. DO NOT MANUALLY UPDATE DO NOT SCALE DRAWING

FINISH: N/A

DESIGNER: Alan Tubb  
DRAWN: Alan Tubb  
CHECKED: Eric Williams  
ENGINEER: Eric Williams  
APPROVED: Eric Williams

SIGNATURE: Alan Tubb  
DATE: 3/7/2007

SIGNATURE: Eric Williams  
DATE: 3/7/2007

SIGNATURE: Eric Williams  
DATE: 3/7/2007

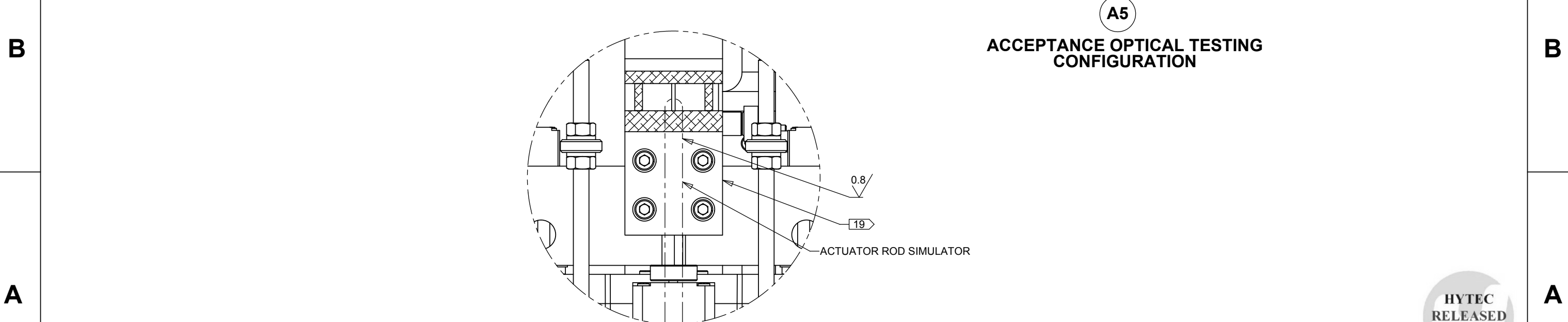
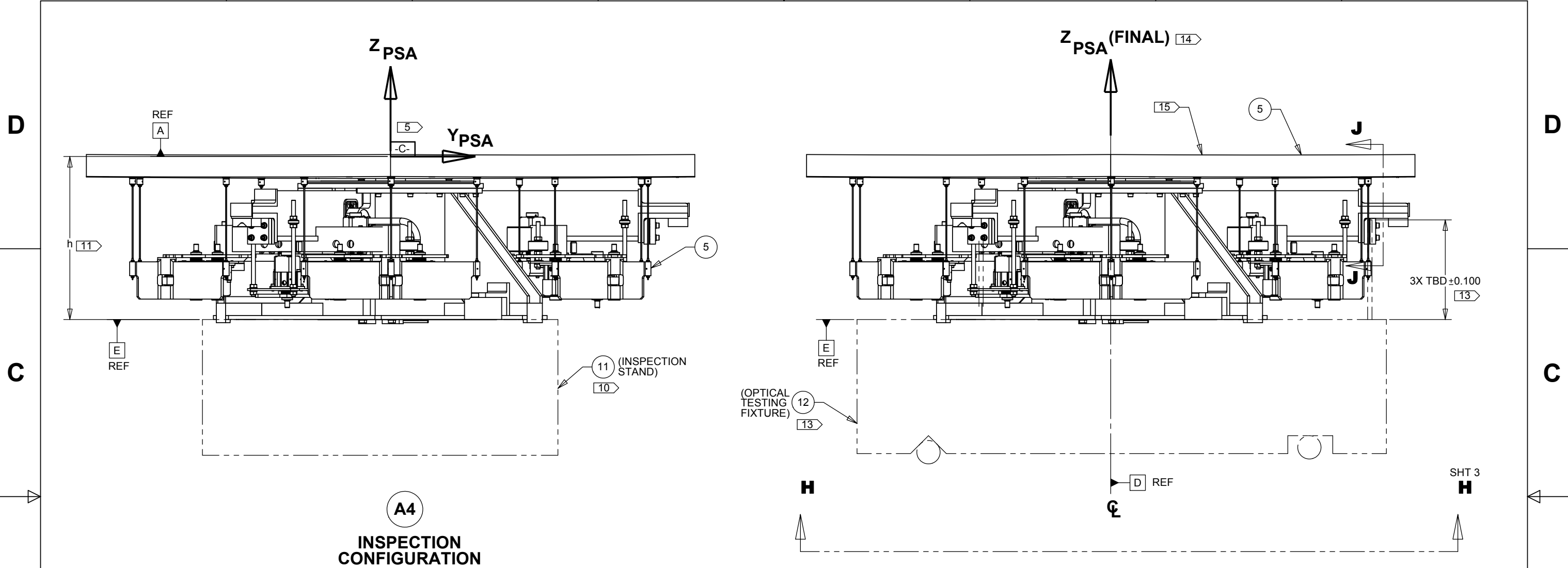
SIGNATURE: Eric Williams  
DATE: 3/7/2007

TITLE: TMT POLISHED MIRROR ASSEMBLY

DWG. NO.: 280-TMT-01-11000  
REV: C  
SHEET NO.: 1 of 11

SCALE: 1:4  
SHEET SIZE: D

8 7 6 5 4 3 2 1



**HYTEC  
RELEASED  
DOCUMENT**

8 7 6 5 4 3 2 1

DWG. NO. <b>280-TMT-01-11000</b>	REV <b>C</b>	SHEET NO. <b>2 of 11</b>
SCALE <b>1:4</b>	SHEET SIZE <b>D</b>	

8 7 6 5 4 3 2 1

D

D

C

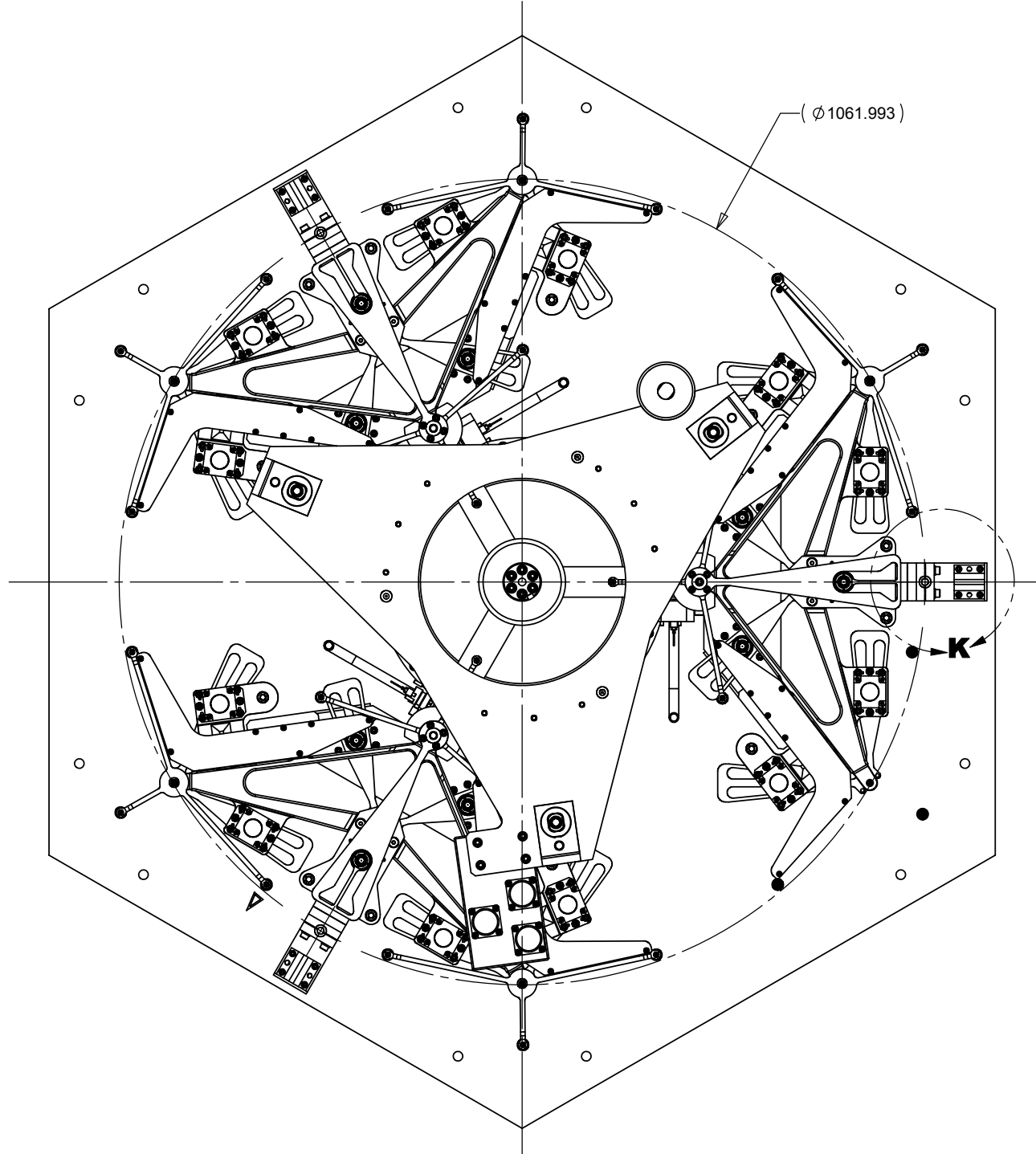
C

B

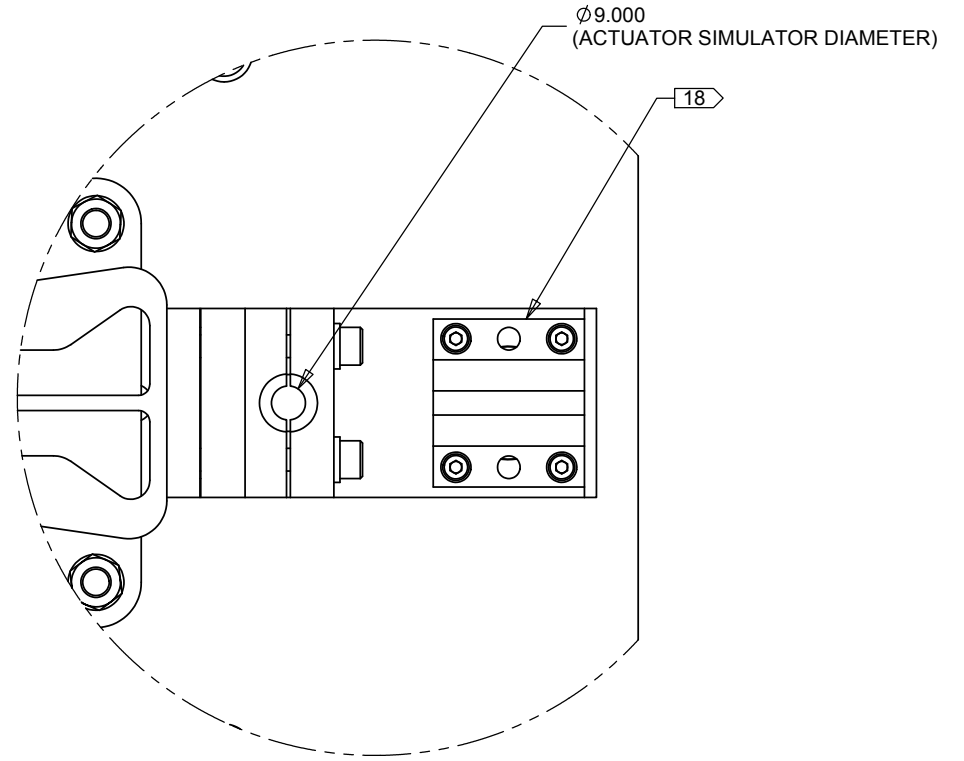
B

A

A



VIEW H-H  
SHEET 2, ZONE B1



DETAIL K  
SCALE 1:1



DWG. NO.	REV	SHEET NO.
280-TMT-01-11000	C	3 of 11
SCALE 1:4	SHEET SIZE D	

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

D

D

C

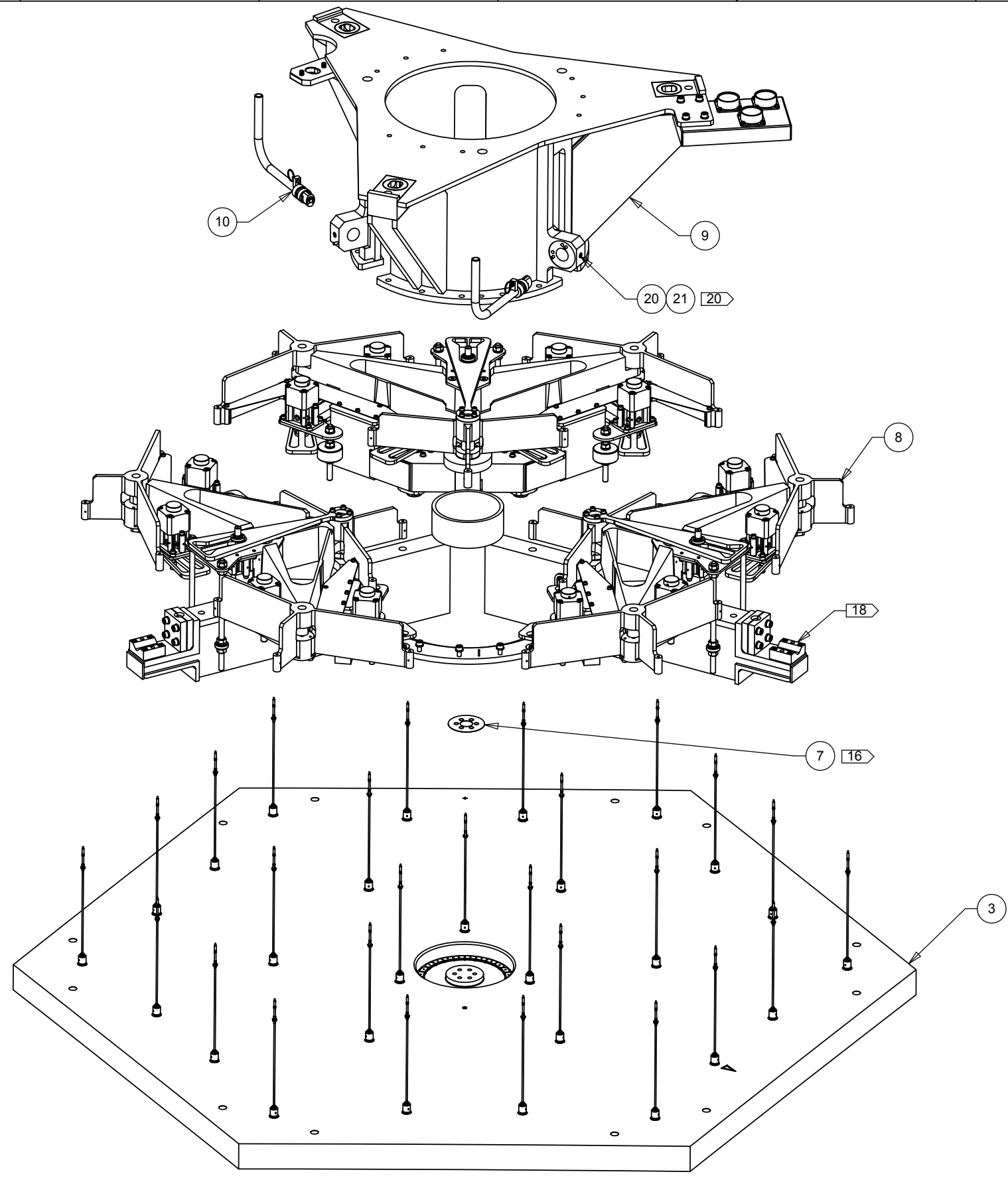
C

B

B

A

A



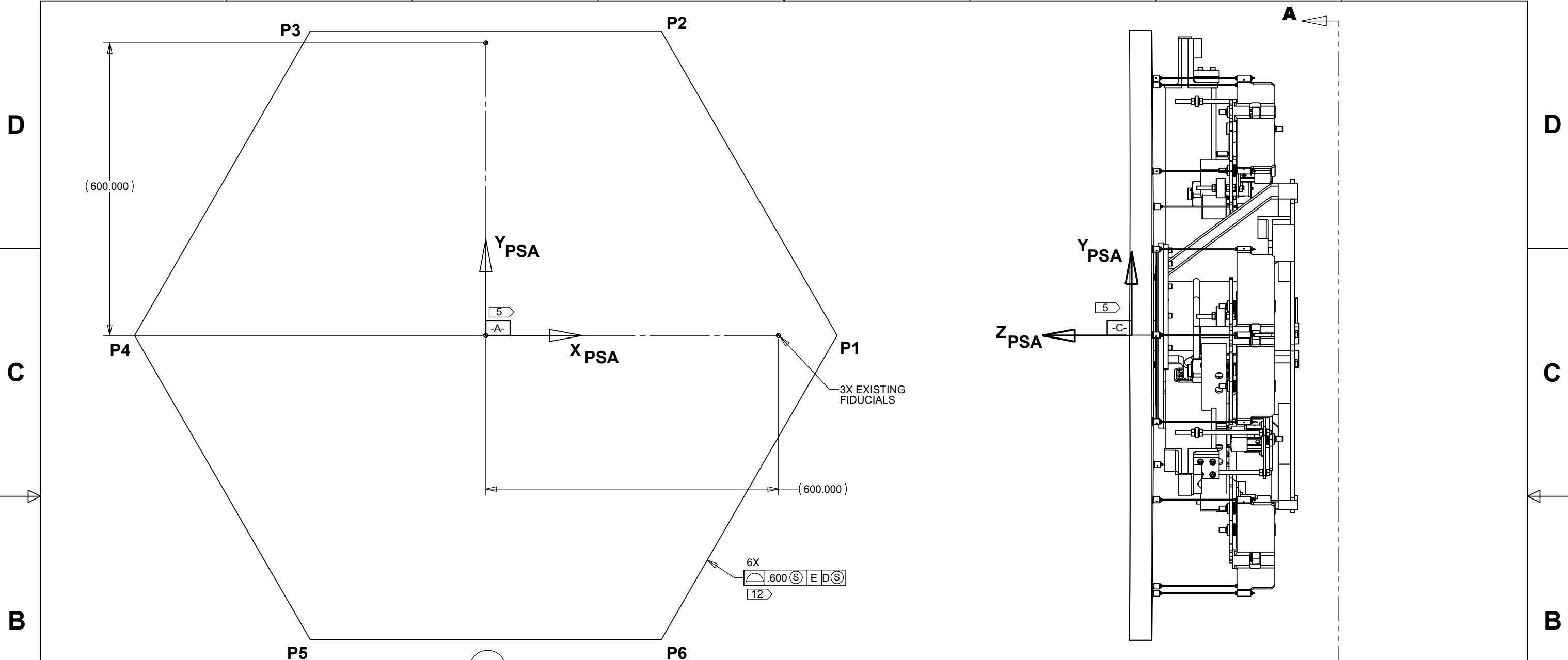
**A3**  
**ISOMETRIC VIEW**  
**(EXPLODED)**

**HYTEC**  
**RELEASED**  
**DOCUMENT**

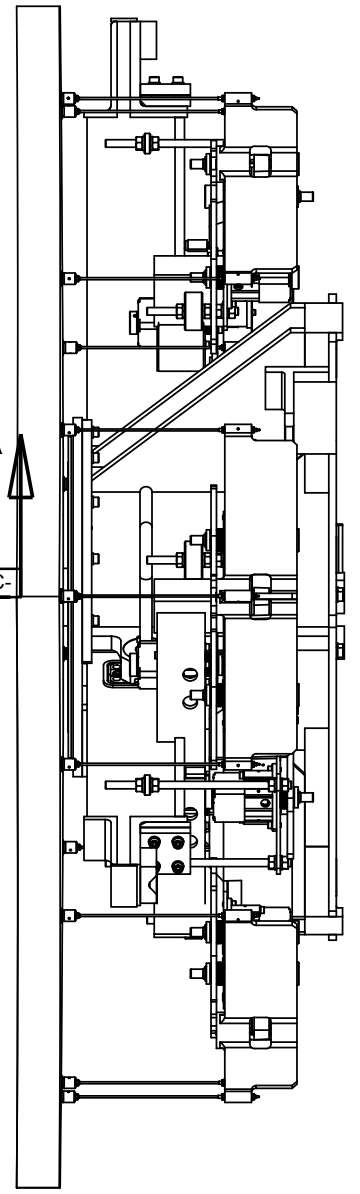
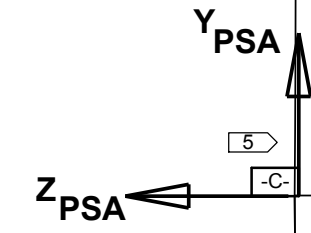
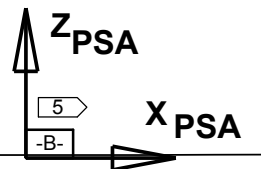
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SCALE <b>1:4</b>	SHEET SIZE <b>D</b>	

8 7 6 5 4 3 2 1

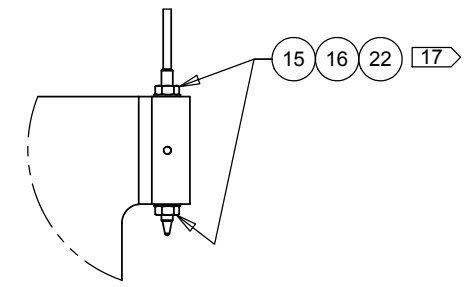
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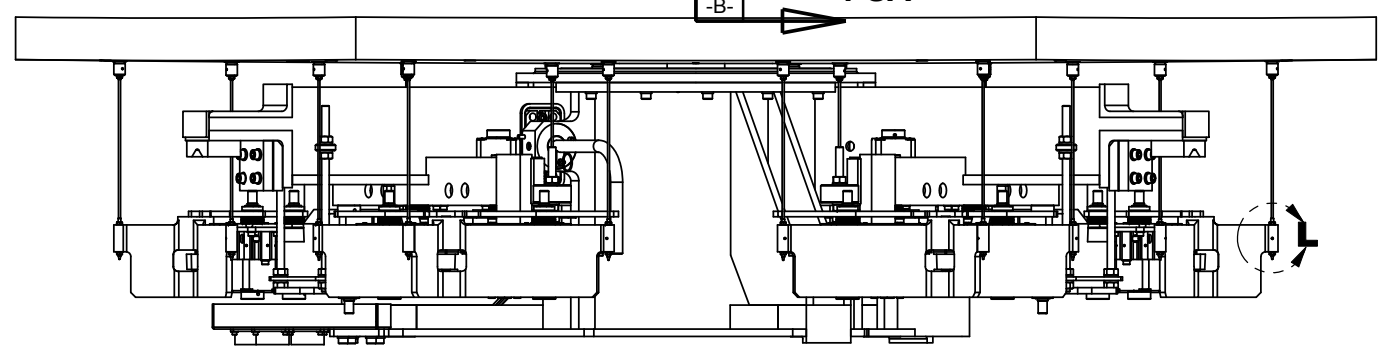
**A3**  
**FRONT VIEW**  
**(OPTICAL SURFACE)**



**A**  
 SHT 6



**DETAIL L**  
**SCALE 1:1**



**HYTEC**  
**RELEASED**  
**DOCUMENT**

DWG. NO.	REV	SHEET NO.
280-TMT-01-11000	C	5 of 11
SCALE 1:4	SHEET SIZE D	

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

D

D

C

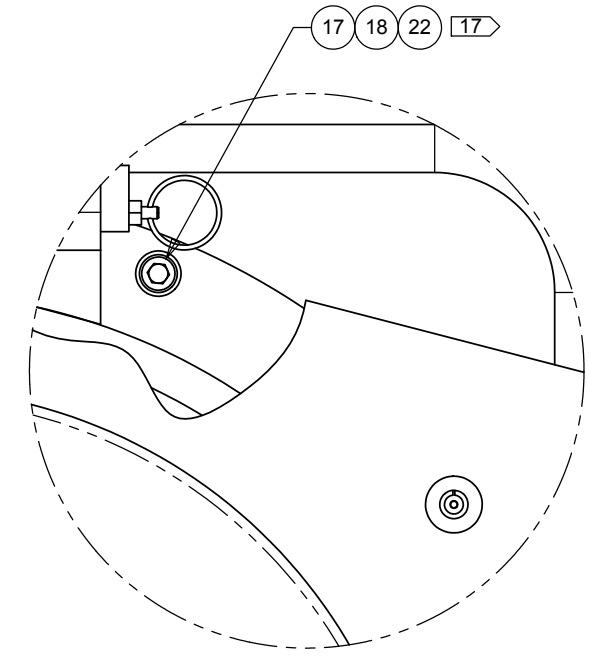
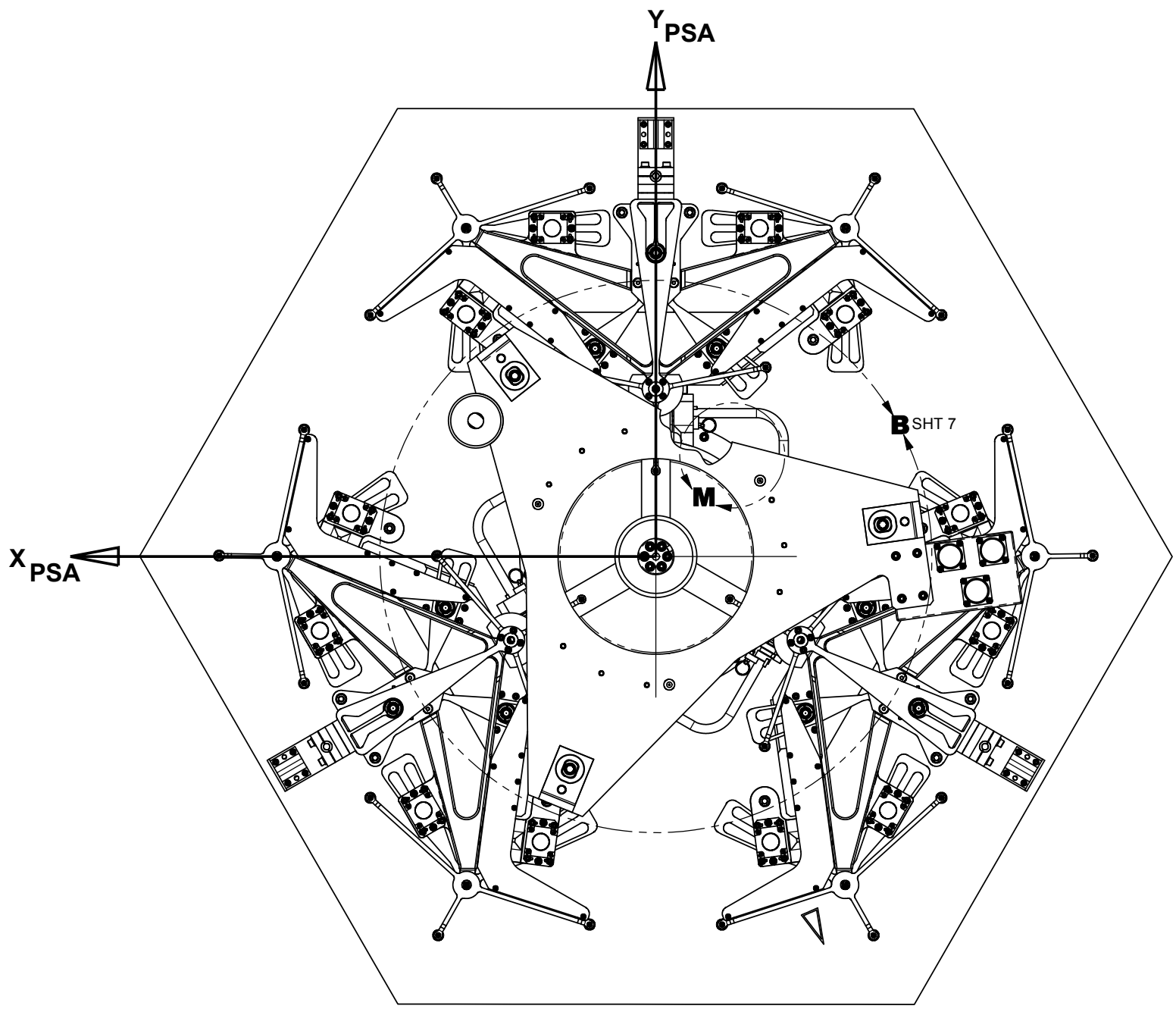
C

B

B

A

A



DETAIL M  
SCALE 1 : 1

VIEW A-A  
(BACK SURFACE)  
SHEET 5, ZONE B2



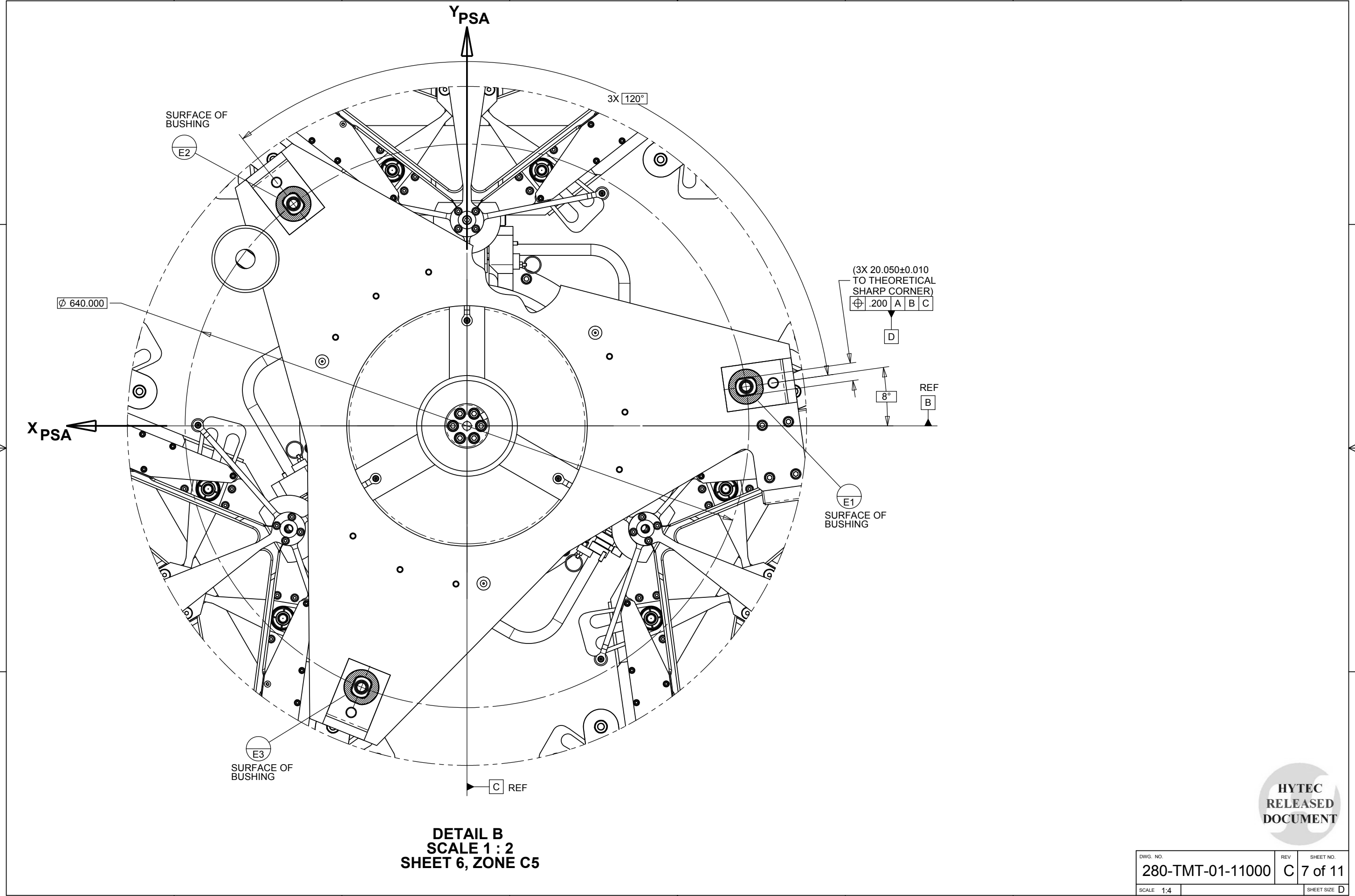
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SCALE 1:4	SHEET SIZE D	

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

D  
C  
B  
A

D  
C  
B  
A



**DETAIL B**  
**SCALE 1 : 2**  
**SHEET 6, ZONE C5**



DWG. NO.	REV	SHEET NO.
280-TMT-01-11000	C	7 of 11
SCALE 1:4	SHEET SIZE D	

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

D

D

C

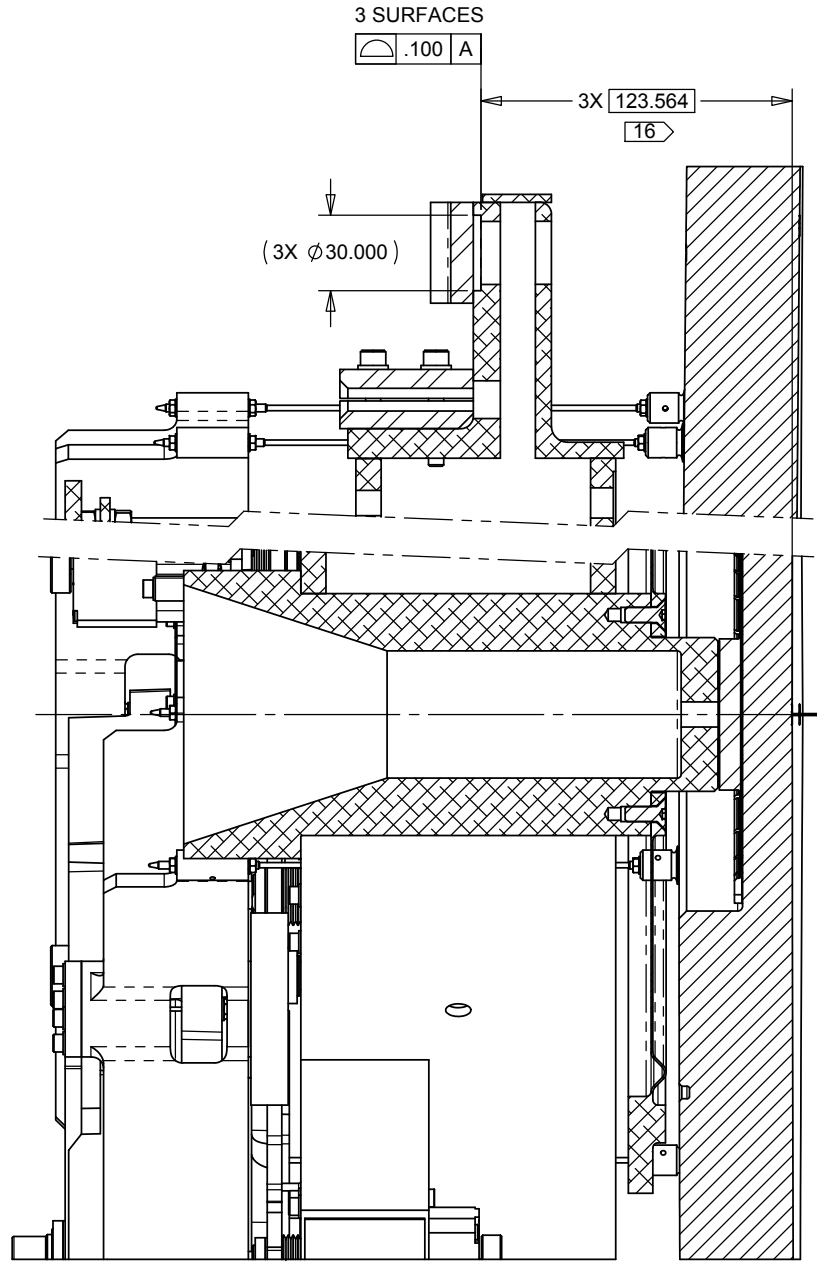
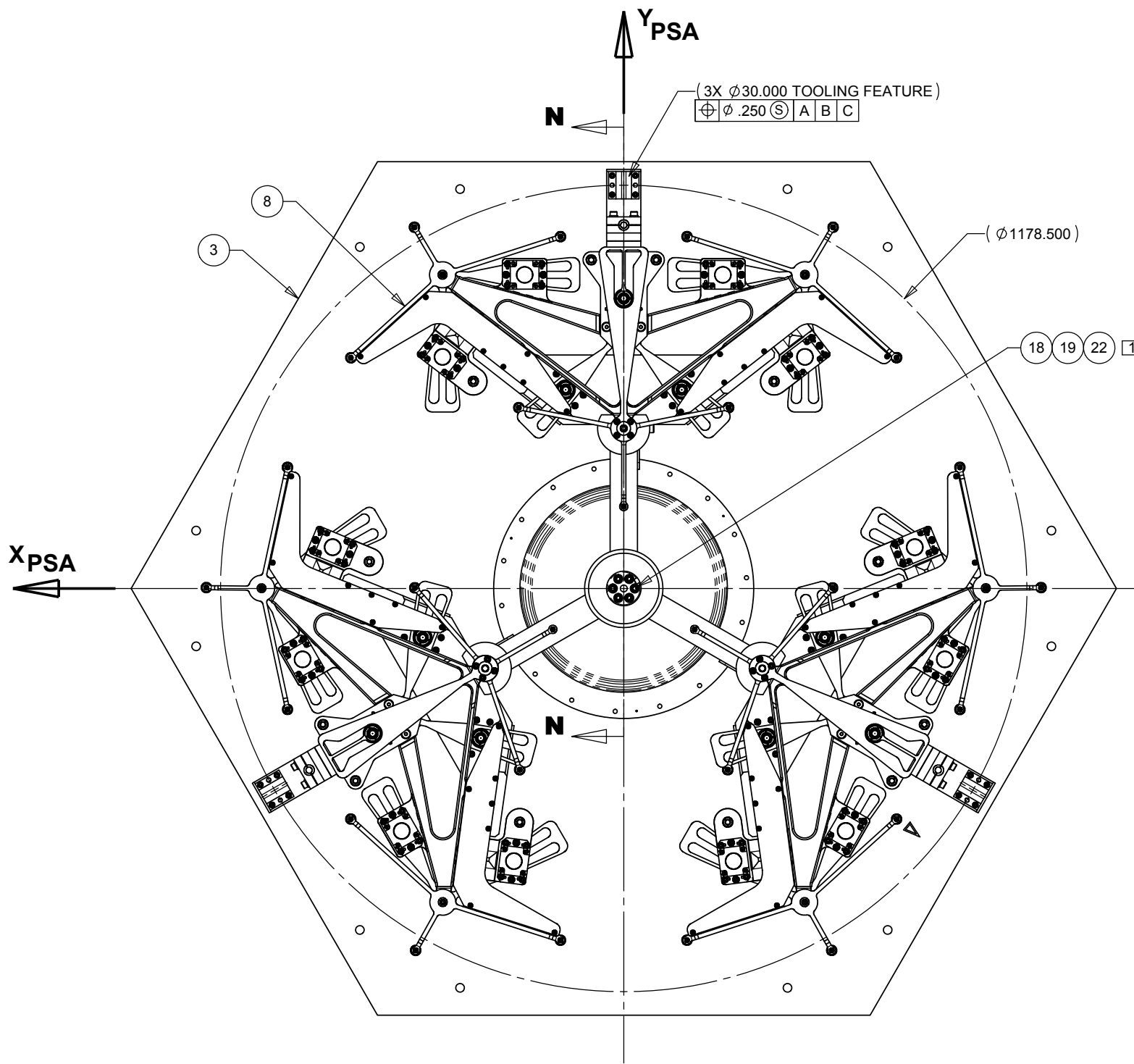
C

B

B

A

A



SECTION N-N  
SCALE 1 : 1.5

A2  
BACK VIEW  
(BACK SURFACE)



DWG. NO. 280-TMT-01-11000	REV C	SHEET NO. 8 of 11
SCALE 1:4	SHEET SIZE D	

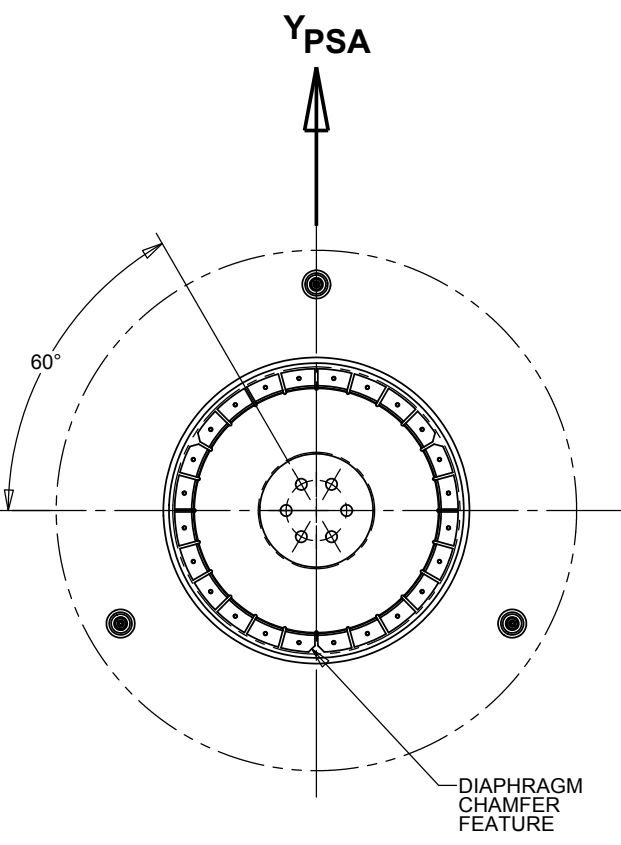
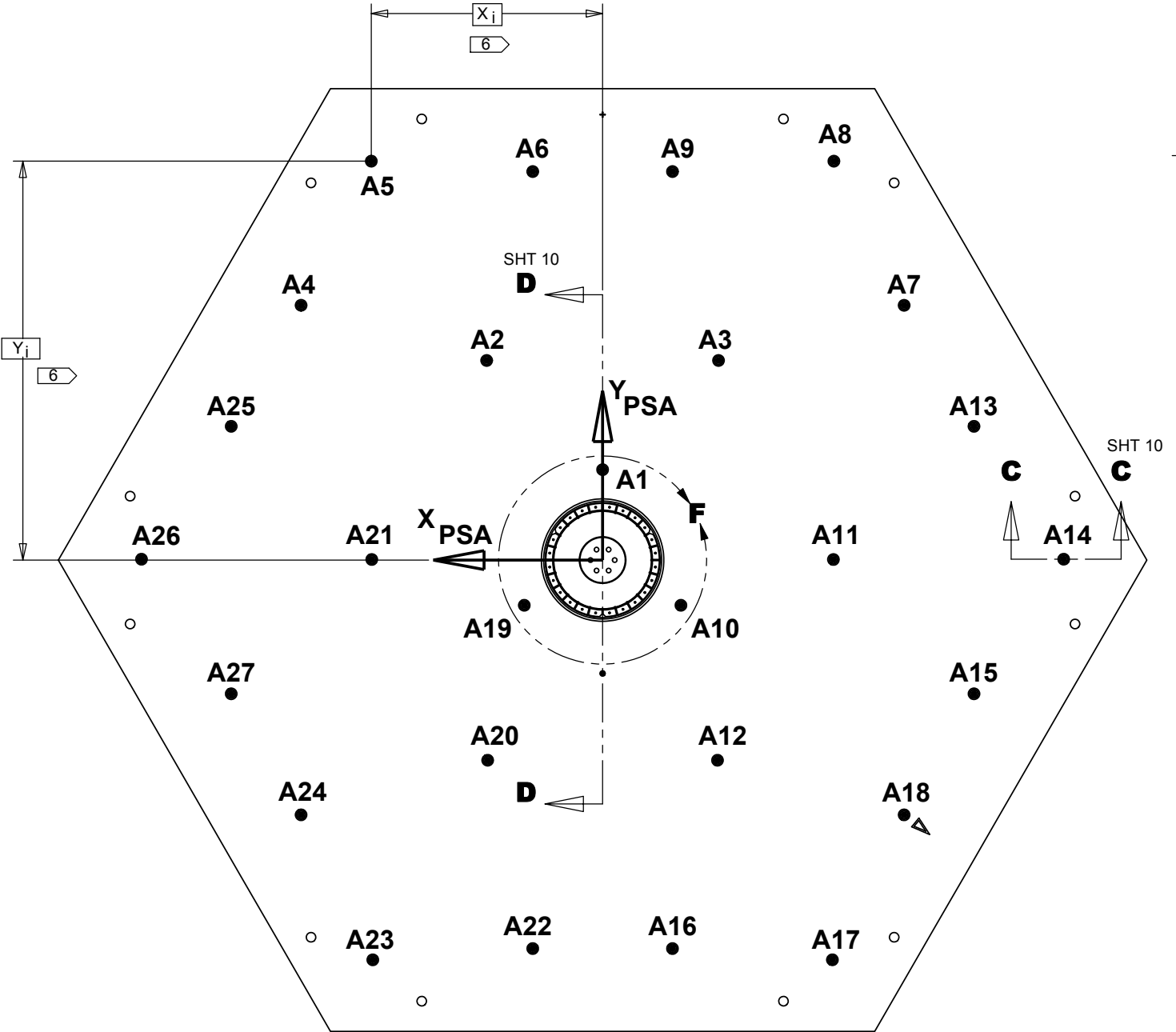
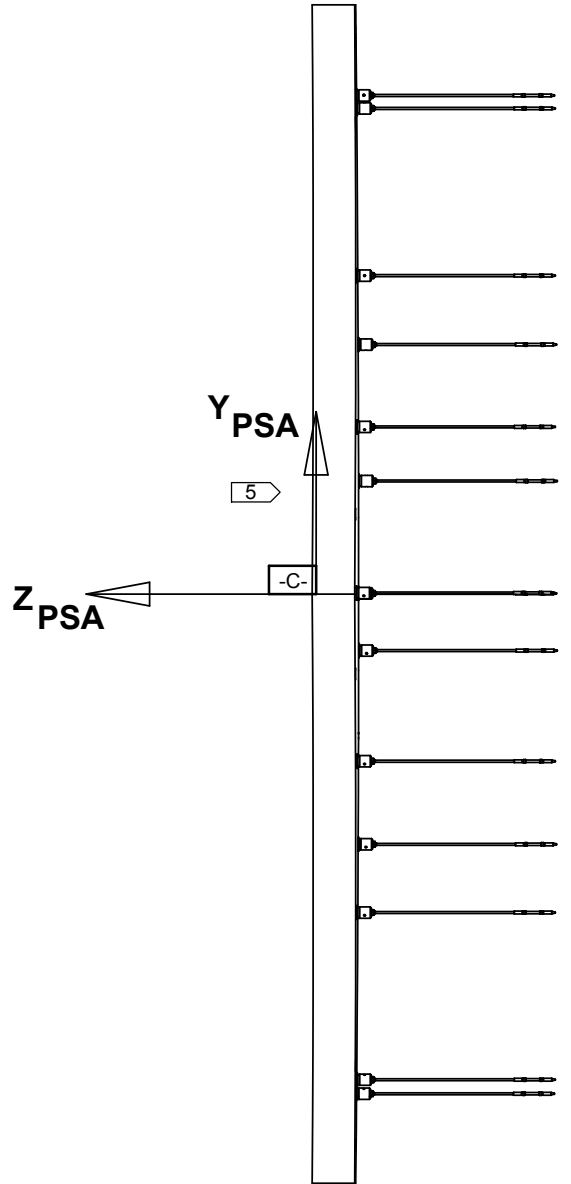
8 7 6 5 4 3 2 1



8 7 6 5 4 3 2 1

D  
C  
B  
A

D  
C  
B  
A



DETAIL F  
SCALE 1 : 2

A1  
BACK VIEW  
(BACK SURFACE)



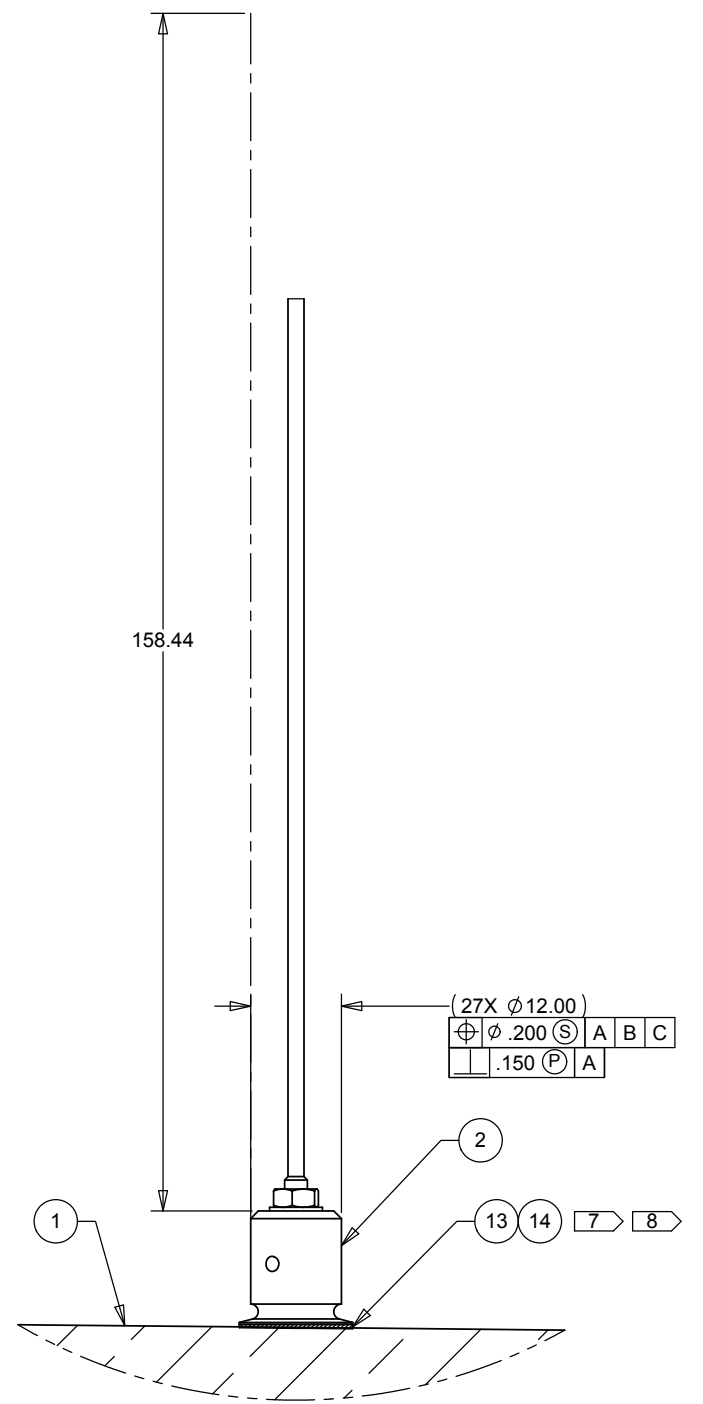
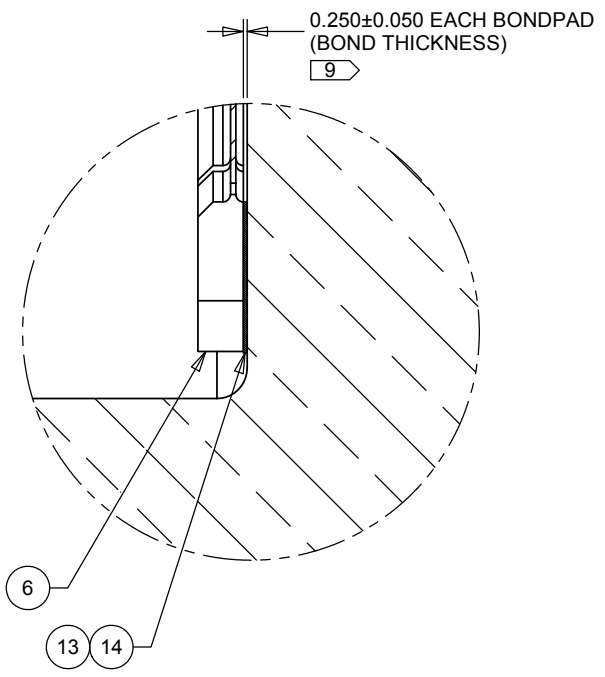
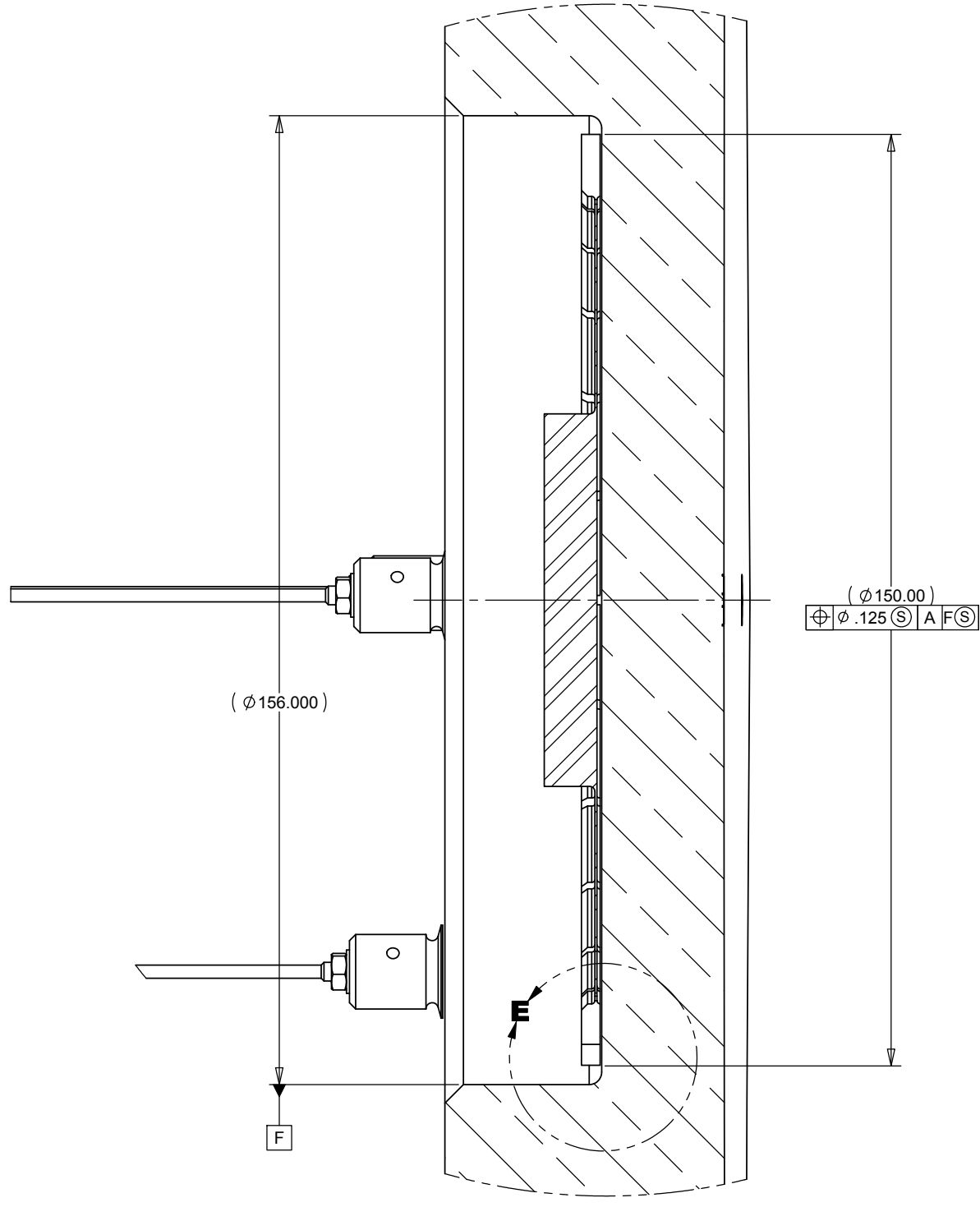
DWG. NO. 280-TMT-01-11000	REV C	SHEET NO. 9 of 11
SCALE 1:4	SHEET SIZE D	

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

D  
C  
B  
A

D  
C  
B  
A



DWG. NO. 280-TMT-01-11000	REV C	SHEET NO. 10 of 11
SCALE 2:1	SHEET SIZE D	

8 7 6 5 4 3 2 1

8

7

6

5

4

3

2

1

D

D

6

**TABLE A  
AXIAL FLEXURE COORDINATES**

Axial Flexure Location	X <sub>PSA</sub> Coord (mm)	Y <sub>PSA</sub> Coord (mm)
A1	0.000	119.642
A2	153.344	264.069
A3	-153.344	264.069
A4	398.879	337.036
A5	305.978	527.705
A6	92.442	513.957
A7	-398.879	337.036
A8	-305.978	527.705
A9	-92.442	513.957
A10	-103.613	-59.821
A11	-305.363	0.765
A12	-152.019	-264.835
A13	-491.321	176.921
A14	-609.995	1.132
A15	-491.321	-176.921
A16	-92.442	-513.957
A17	-304.017	-528.837
A18	-398.879	-337.036
A19	103.613	-59.821
A20	152.019	-264.835
A21	305.363	0.765
A22	92.442	-513.957
A23	304.017	-528.837
A24	398.879	-337.036
A25	491.321	176.921
A26	609.995	1.132
A27	491.321	-176.921

**TABLE B  
INSTALLATION TORQUES**

ITEM OR NOTE	TORQUE (N-m)	NOTES
15	0.75+/-0.1	LUBRICATE MALE THREADS WITH ITEM 22
17	18+/-0.5	LUBRICATE MALE THREADS WITH ITEM 22
19	14+/-0.5	LUBRICATE MALE THREADS WITH ITEM 22
18	5.5+/-0.25	
19	15.3+/-0.5	

C

C

B

B

A

A



8

7

6

5

4

3

2

1