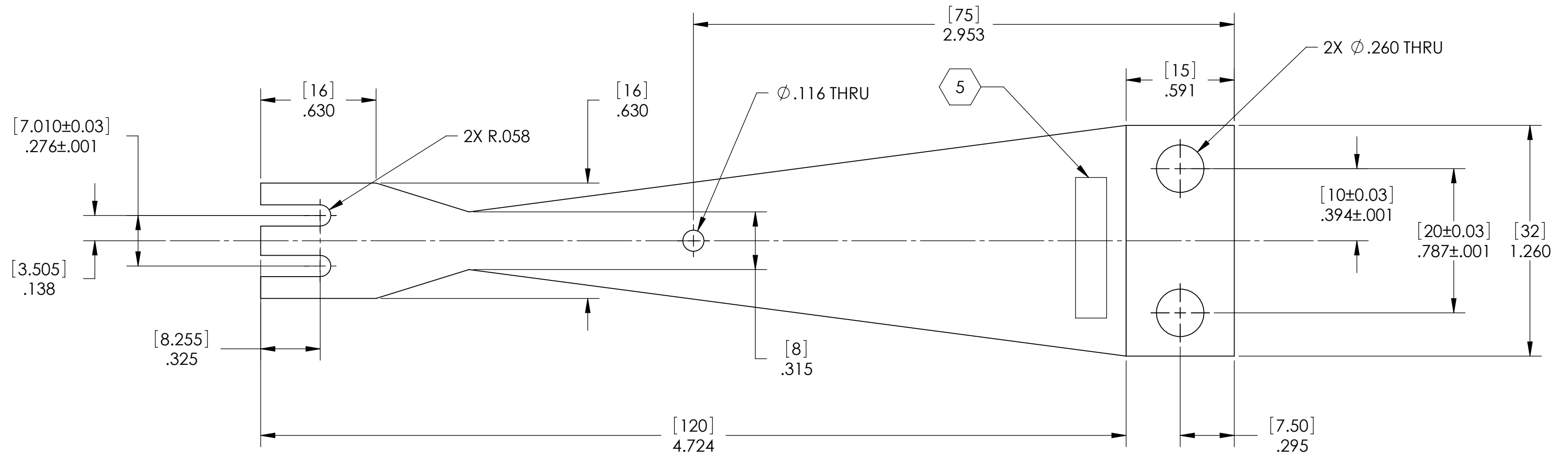


- NOTES:**
1. INTERPRET DRAWING PER ASME Y14.5-1994.
  2. REMOVE ALL SHARP EDGES, R.02 MIN.
  3. DO NOT SCALE FROM DRAWING.
  4. ALL MACHINING FLUIDS MUST BE FULLY SYNTHETIC, FULLY WATER SOLUBLE AND FREE OF SULFUR, SILICONE, AND CHLORINE.
  5. SCRIBE, ENGRAVE, OR MECHANICALLY STAMP (NO INKS OR DYES) DRAWING PART NUMBER, REVISION (AND VARIANT OR "TYPE" IF APPLICABLE) ON NOTED SURFACE OF PART FOLLOWED ON THE NEXT LINE WITH A THREE DIGIT SERIAL NUMBER. SERIAL NUMBERS START AT 500 FOR THE FIRST ARTICLE AND PROCEED CONSECUTIVELY. USE MINIMUM 0.12" HIGH CHARACTERS, UNLESS THE SIZE OF THE PART DICTATES SMALLER CHARACTERS. A VIBRATORY TOOL MAY BE USED. EXAMPLE: DXXXXXX-VY, TYPE-XX, S/N XXX
  6. ALL PARTS SHALL BE MANUFACTURED IN ACCORDANCE WITH LIGO SPECIFICATION E0900023.

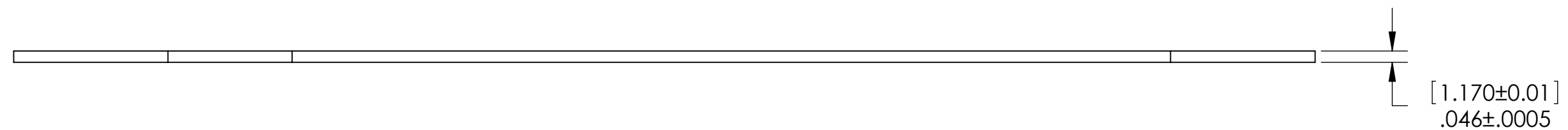
REV.	DATE	DCN #	DRAWING TREE #
A	28 MAR 2008	E080113-00	-
B	17 APR 2008	E080169-00	-
C	24 APR 2008	E080179-00	-
v1	03 AUG 2009	E0900226	-
v2	28 JUL 2010	E1000255	E080191
v3	11 OCT 2010	E1000575	E080191
v4	18 JAN 2011	E1100047	E080191



← MATERIAL GRAIN DIRECTION →

**INTERNAL LIGO NOTES:**

1. EXCEL SPREADSHEET REF T1000353-v3
2. SHAPE FACTOR FOR LOWER BLADE = 1.48 AND YOUNGS MODULUS USED IS 1.86e11 Pa.
3. LOAD ON LOWER BLADE (FLAT) = 6.0875 kg AND UNCOUPLED LOAD = 3.0525 kg.
4. PREDICTED UNCOUPLED SUSPENSION FREQUENCY = 2.78 Hz.
5. PREDICTED FIRST BLADE INTERNAL FREQUENCY = 306 Hz.
6. MAXIMUM STRESS = 982 MPa
7. EXCEL SPREADSHEET VALUES OF A MID TO MID DISTANCE OF 64.1 mm AND A RADIUS OF CURVATURE OF 99.3 mm GIVES A FLAT BLADE ON LOADING FROM THE EXCEL EQUATIONS. ANSYS PREDICTS WITH THESE MID-TO MID AND ROC VALUES A DEFLECTION OF 58.1 mm, HENCE 6 mm ABOVE FLAT WHEN LOADED.
8. FOR A MID TO MID DISTANCE OF 59.92 mm AND A RADIUS OF CURVATURE 107.8 mm, ANSYS PREDICTS A DEFLECTION OF 59.53 mm. i.e. VERY CLOSE TO FLAT.
9. THE CURRENT BLADE IS DESIGNED WITH A MID TO MID DISTANCE OF 62.01 AND RADIUS OF CURVATURE OF 103.15 mm, ANSYS PREDICTS A DEFLECTION OF 59.2 mm. THIS MID TO MID DISTANCE OF 62.01 mm IS HALF WAY BETWEEN THE EXCEL VALUE (64.1 MM) AND THE ANSYS VALUE (59.92 mm) FOR WHICH THE TWO DIFFERENT METHODS PREDICT A FLAT BLADE WHEN LOADED, AND IS A COMPROMISE DESIGN.
10. LENGTH IS 120 mm (135 mm INCLUDING CLAMPING LENGTH), THICKNESS IS 1.17 mm AND WIDTH IS 32 mm.
11. IN THE CURVED SKETCH IN SW PART ADD MID TO MID DEFLECTION AND ADJUST RADIUS UNTIL DESIRED LENGTH IS ATTAINED.
12. IN SW PART, BLADE IS DRAWN WITH SHEET METAL AND EXTRUDED VERTICALLY DOWNWARDS.
13. ON SW DRAWING, SOLIDWORKS RADIUS VALUE IS THE VALUE MEASURED DIRECT FROM SW USING THE DIMENSION TOOL.



VIEWS PRIOR TO FORMING

**NOTES AND TOLERANCES: (UNLESS OTHERWISE SPECIFIED)**

DIMENSIONS ARE IN INCHES [MM]

TOLERANCES:  
 .XX ± .01  
 .XXX ± .005

ANGULAR ± 0.5°

**MATERIAL**  
 MARAGING STEEL C250

**FINISH**  
 32 μinch

**LIGO** CALIFORNIA INSTITUTE OF TECHNOLOGY  
 MASSACHUSETTS INSTITUTE OF TECHNOLOGY

**SYSTEM** ADVANCED LIGO **SUB-SYSTEM** SUS

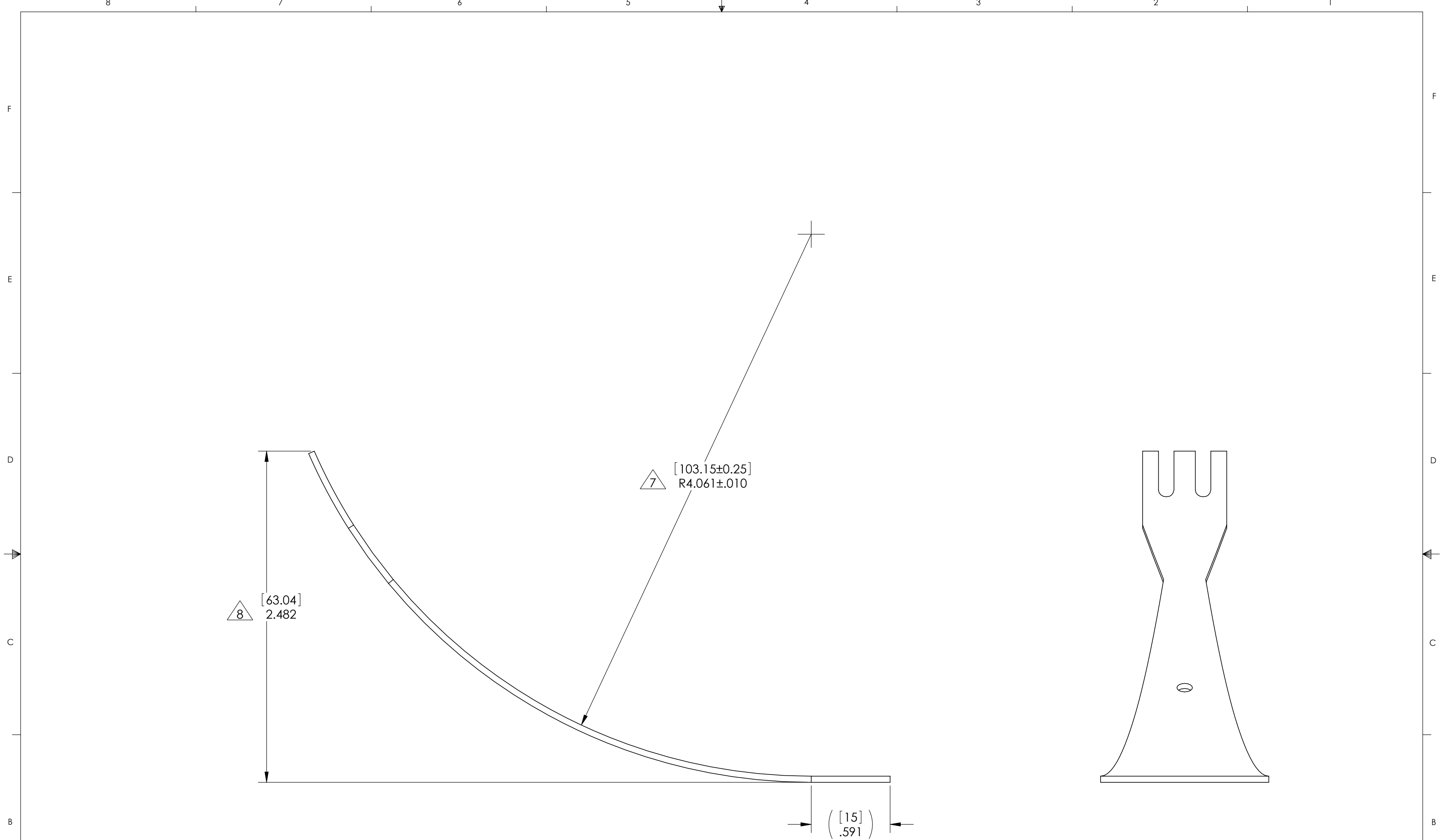
**NEXT ASSY** HLTS UPPER MASS ASSY

**PART NAME**



HLTS LOWER BLADE



**DESIGNER**  
**DRAFTER** B. KIRSNER 18 JAN 2008  
**CHECKER** CIT JUL 2008  
**APPROVAL**

**SIZE** DWG. NO. **REV.**  
 c **D020615** v4  
**SCALE:** 2:1 **PROJECTION:** **SHEET 1 OF 2**



VIEWS AFTER FORMING AND HEAT TREATMENT

-  THE RADIUS OF THE CURVATURE IS THE INSIDE RADIUS
-  THE OVERALL DEFLECTION IS MEASURED FROM THE BOTTOM OF THE BASE POINT TO THE HIGHEST POINT ON THE TIP

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SIZE <b>C</b>	DWG. NO. D020615	REV. v4
SCALE: 2:1	PROJECTION: 	SHEET 2 OF 2