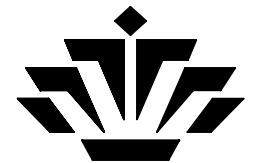


ASSEMBLY

ITEM	DESCRIPTION	QUANTITY
1	BODY - 3/8 X 2.13 CRS	1
2	CYLINDER - 3/8 X 1.25 CRS	1
3	RETAINER - 3/8 X .13 CRS	1
4	NUT - .190-32 UNF	1
5	STUD - 3/16 DRILL ROD	1
6	PISTON - 3/16 DRILL ROD	1
7	PIN - 3/16 DOWEL	1
8	CRANK - 3/8 X .13 CRS	1
9	BASE - .25 X 1.5 X 1.5 ALUM	1
10	FLYWHEEL - 1.0 X .500 CRS	1
11	SHAFT - 3/16 X 1.0 DOWEL	1
12	SPRING - TO SUIT	1
13	SCREW - .190-32 X .50 FHS	1
14	SET SCREW - .138-32 X .25 LNG	1

TOLERANCES - DEC.INCH / FRACTION		
UNLESS OTHERWISE SPECIFIED		
MACHINING:		FRACTIONS: ± 1/64
DECIMAL PLACES	TOL'S	CAD
ONE X.X	± 0.02	
TWO X.XX	± 0.01	
THREE X.XXX	± 0.005	
ANGLES ± 1/2°		THIRD ANGLE PROJECTION
IF IN DOUBT - ASK		CONFORMS TO ANSII14.5-1982

3/8 SQUARE STEAM ENGINE


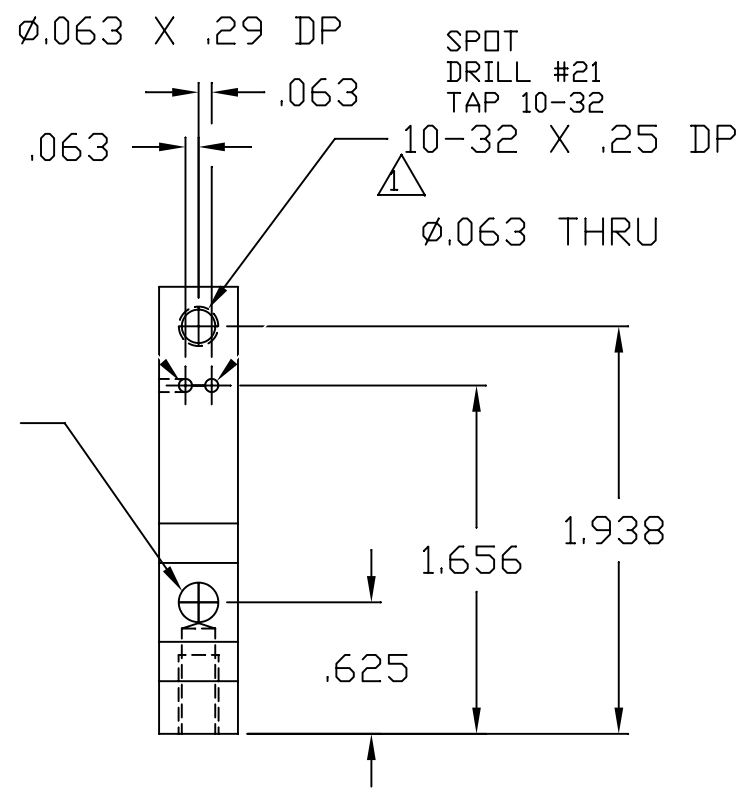
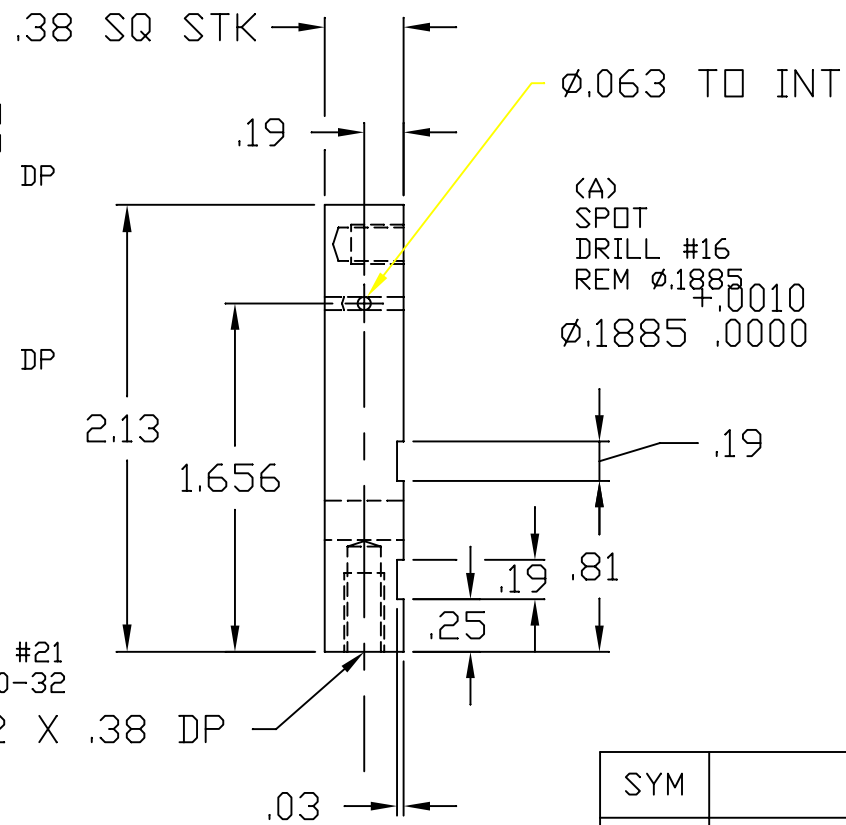


UNC CHARLOTTE

DRAWN 09-05-95	BY R E H	CHECKED 09-05-95	BY RE HEGE	APPROVED	BY
SCALE FULL		FILE NAME ENGINE_3.DWG		A	SHEET 1 of 9
					REV. -


- 1) MILL TO LENGTH
- 2) (A) ϕ .1885 THRU
- 3) (B) 10-32 X .25 DP
- 4) .063 THRU
- 5) .063 X .29 DP
- 6) SKIM SURFACE
- 7) MILL .19 SLOTS
- 8) ϕ .063 TO INT
- 9) (B) 10-32 X .38 DP

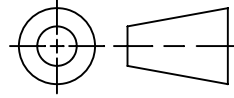
(B)
SPOT
DRILL #21
TAP 10-32
10-32 X .38 DP

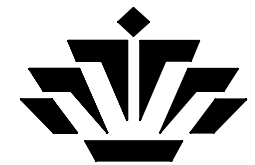
DETAIL 1

MAT: .375 SQ FGS

SYM	REVISION	DATE	BY
	WAS .190 X 32	11-28-00	REH
	ADDED MACHINING NOTES	11-28-00	REH
	DELETED GD&T	11-28-00	REH

TOLERANCES - DEC.INCH / FRACTION			
UNLESS OTHERWISE SPECIFIED			
MACHINING:		FRACTIONS: $\pm 1/64$	
DECIMAL PLACES	TOL'S	CAD	
ONE X.X	± 0.02	 THIRD ANGLE PROJECTION CONFORMS TO ANS1Y14.5-1982	
TWO X.XX	± 0.01		
THREE X.XXX	± 0.005		
ANGLES $\pm 1/2^\circ$			
IF IN DOUBT - ASK			

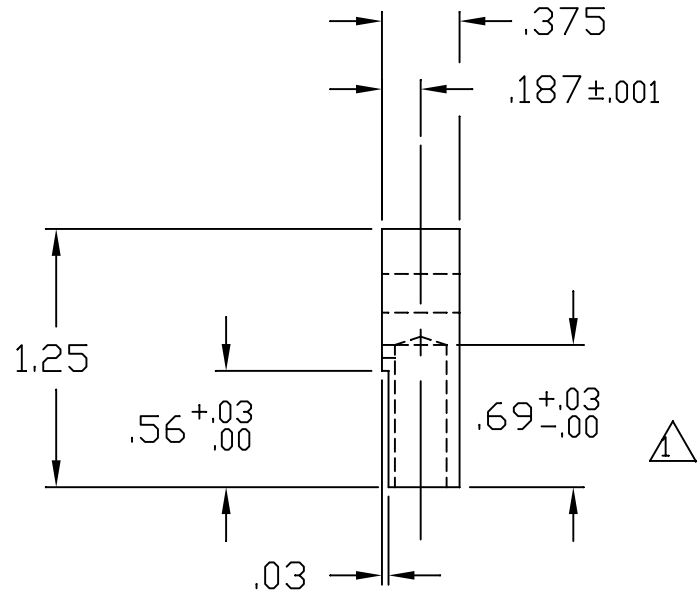
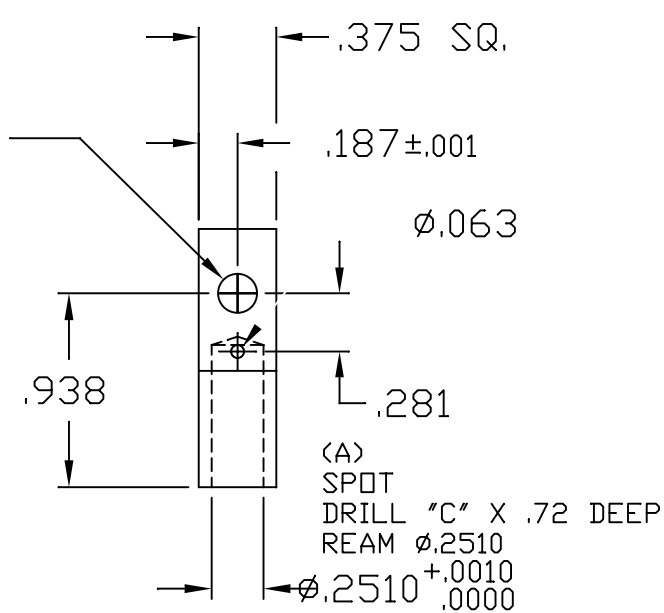
3/8 SQUARE STEAM ENGINE



UNCCO CHARLOTTE

DRAWN 09-05-95	BY REH	CHECKED 09-05-95	BY RE HEGE	APPROVED	BY
SCALE FULL		FILE NAME ENGINE_3.DWG		SHEET 2 of 9	
					REV. -

(B)
SPOT
DRILL #16
REAM ϕ .1885
 ϕ .1885^{+0.0010}/_{.0000}



- 1) MILL TO LENGTH
- 2) (A) ϕ .2510
- 3) (B) ϕ .1885
- 4) ϕ .063 THRU ONE WALL
- 5) SKIM SURFACE
- 6) .03 X .56 UNDERCUT

DETAIL 2

MAT: .375 SQ FGS

SYM	REVISION	DATE	BY
△	RELOCATED .69 DIM.	11-28-00	REH
	ADDED MACHINING NOTES	11-28-00	REH
	DELETED GD&T	11-28-00	REH

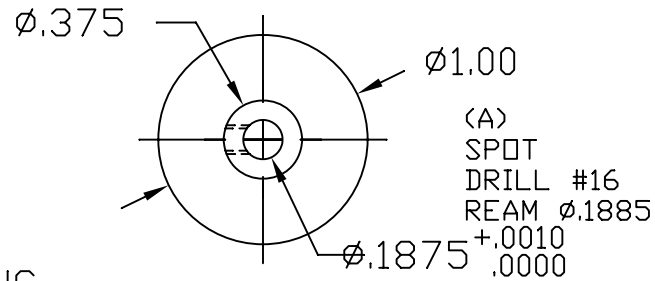
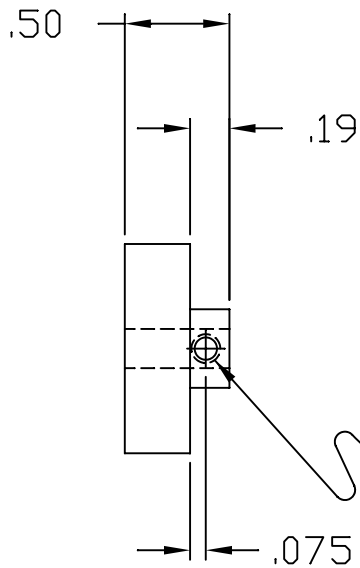
TOLERANCES - DEC.INCH / FRACTION			
UNLESS OTHERWISE SPECIFIED			
MACHINING:		FRACTIONS: \pm 1/64	
DECIMAL PLACES	TOL'S	CAD	
ONE X.X	\pm 0.02	 THIRD ANGLE PROJECTION CONFORMS TO ANSI Y14.5-1982	
TWO X.XX	\pm 0.01		
THREE X.XXX	\pm 0.005		
ANGLES	\pm 1/2°		
IF IN DOUBT - ASK			


3/8 SQUARE
STEAM ENGINE



UNC CHARLOTTE


DRAWN 09-05-95	BY REH	CHECKED 09-05-95	BY RE HEGE	APPROVED	BY
SCALE FULL		FILE NAME ENGINE_3.DWG		SHEET 3 of 9	
					REV. -

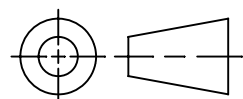


 6-32 UNC
 (B)
 SHORTEN DRILL IN CHUCK
 SPOT
 DRILL #36
 TAP 6-32

DETAIL 10
 MAT: MILD STEEL

- 1) FACE ONE SIDE
- 2) FACE TO LENGTH
- 3) TURN $\phi 0.375 \times .19$
- 4) (A) $\phi 0.1875$ THRU
- 5) MOUNT IN VISE
- 6) FIND CENTER AND EDGE
- 7) (B) 6-32 THRU ONE WALL

SYM	REVISION	DATE	BY
	WAS .138 X 32	11-28-00	REH
	ADDED MACHINING NOTES	11-28-00	REH

TOLERANCES - DEC.INCH / FRACTION			
UNLESS OTHERWISE SPECIFIED MACHINING:		FRACTIONS: $\pm 1/64$	
DECIMAL PLACES	TOL'S	CAD	
ONE X.X	± 0.02	 THIRD ANGLE PROJECTION	
TWO X.XX	± 0.01		
THREE X.XXX	± 0.005		
ANGLES $\pm 1/2^\circ$		CONFORMS TO ANSI Y14.5-1982	
IF IN DOUBT - ASK			

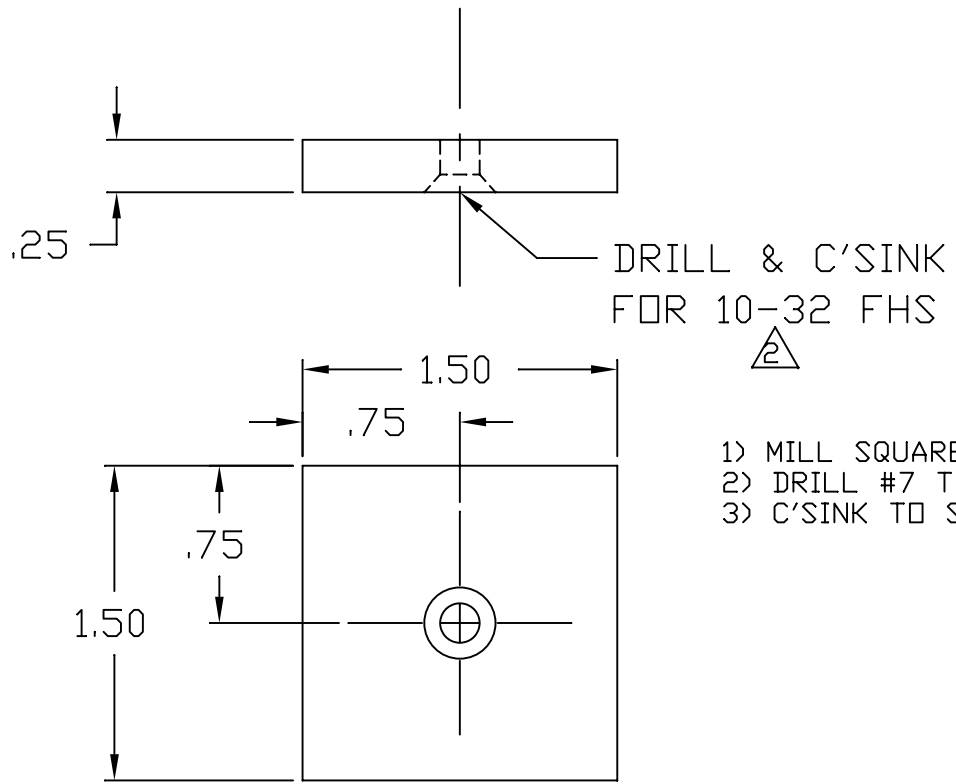
3/8 SQUARE
STEAM ENGINE

DRAWN 09-05-95	BY REH	CHECKED 09-05-95	BY RE HEGE
SCALE FULL		FILE NAME ENGINE_3.DWG	



UNC CHARLOTTE

APPROVED	BY

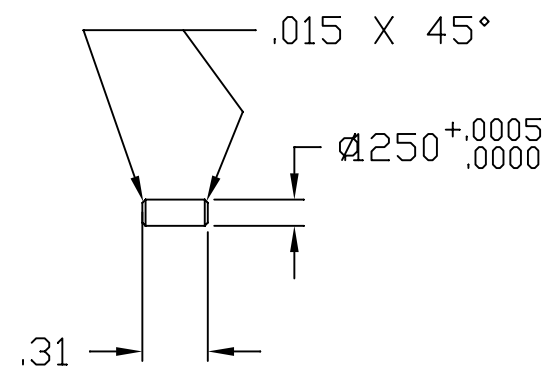


DRILL & C'SINK
FOR 10-32 FHS

- 1) MILL SQUARE
- 2) DRILL #7 THRU
- 3) C'SINK TO SUIT

DETAIL 9

MAT: ALUMINUM



DETAIL 7

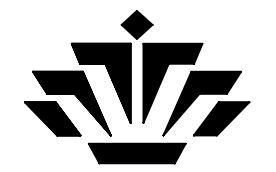
MAT: Ø.125 X 5/16 STD DOWEL

SYM	REVISION	DATE	BY
	WAS Ø.190-32	11-28-00	REH
	WAS Ø.125 DRILL ROD	11-28-00	REH
	ADDED MACHINING NOTES	11-28-00	REH

TOLERANCES - DEC.INCH / FRACTION	
UNLESS OTHERWISE SPECIFIED	
DECIMAL PLACES	TOL'S
ONE X.X	± 0.02
TWO X.XX	± 0.01
THREE X.XXX	± 0.005
ANGLES	± 1/2°
IF IN DOUBT - ASK	

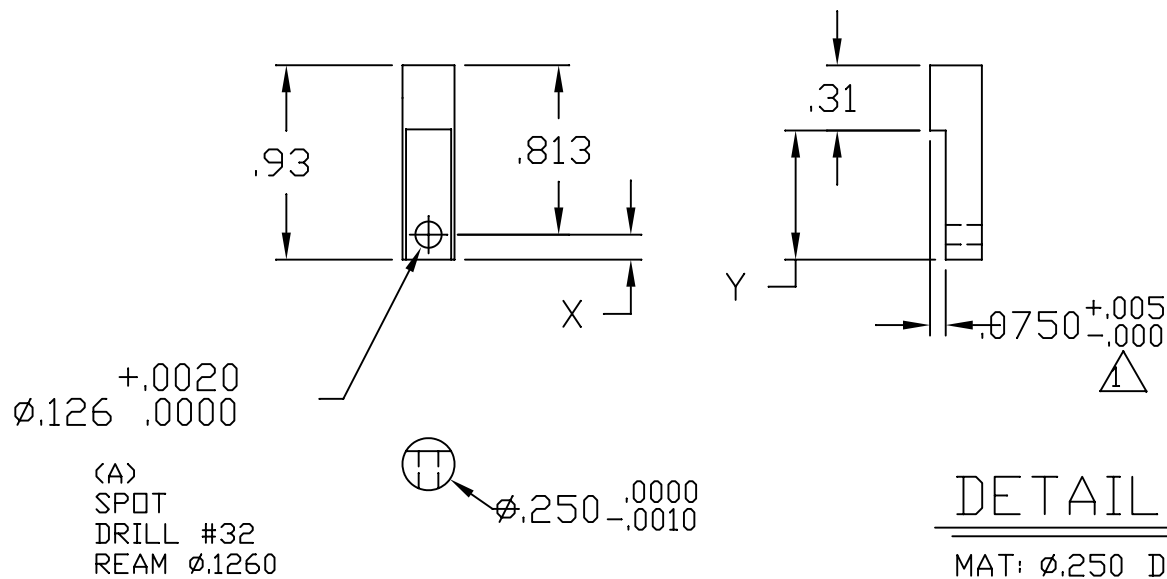
FRACTIONS: ± 1/64	
CAD	
THIRD ANGLE PROJECTION	
CONFORMS TO ANSII14.5-1982	

3/8 SQUARE STEAM ENGINE



UNCHARLOTTE

DRAWN 09-05-95	BY REH	CHECKED 09-05-95	BY RE HEGE	APPROVED	BY
SCALE FULL	FILE NAME ENGINE_3.DWG	A	SHEET 5 of 9	REV. -	

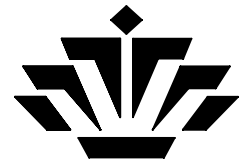


- 1) FACE TO LENGTH
- 2) CALCULATE X&Y TO .XXX
- 3) MOUNT IN 5C COLLET BLOCK
- 4) MILL .075 BY Y LENGTH (.025 DEEP PER PASS) USING $\phi 1/4$ END MILL
- 5) FIND CENTER & MOVE TO X
- 6) (A) $\phi .1260$ THRU

SYM	REVISION	DATE	BY
	ADDED MACHINING NOTES	11-28-00	REH
\triangle	WAS .065 CHANGED TO .075	01-19-99	REH

TOLERANCES - DEC.INCH / FRACTION			
UNLESS OTHERWISE SPECIFIED MACHINING:			
DECIMAL PLACES	TOL'S	FRACTIONS: $\pm 1/64$	
ONE X.X	± 0.02	CAD	
TWO X.XX	± 0.01	 THIRD ANGLE PROJECTION	
THREE X.XXX	± 0.005		
ANGLES	$\pm 1/2^\circ$	CONFORMS TO ANSII Y14.5-1982	
IF IN DOUBT - ASK			

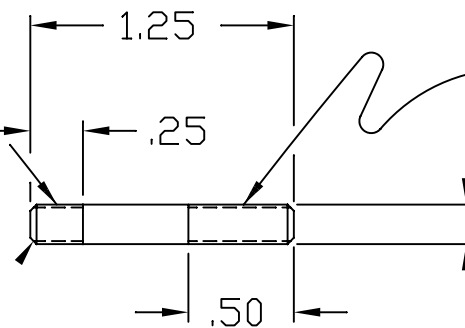
3/8 SQUARE
STEAM ENGINE



UNCHARLOTTE

DRAWN 09-05-95	BY REH	CHECKED 09-05-95	BY RE HEGE	APPROVED	BY
SCALE FULL	FILE NAME ENGINE_3.DWG	A	SHEET 6 of 9	REV. -	

10-32 UNF
GUIDE DIE WITH TAILSTOCK
THREAD USING 10-32 DIE

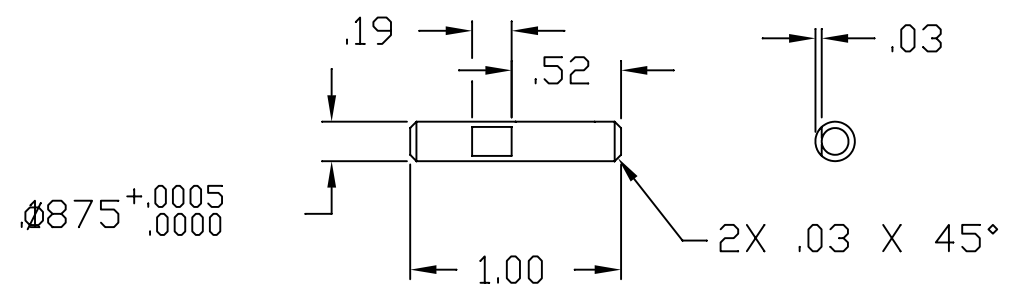


10-32 UNF
GUIDE DIE WITH TAILSTOCK
THREAD USING 10-32 DIE

- 1) FACE TO LENGTH
- 2) CHAMFER BOTH SIDES
- 3) THREAD BOTH SIDES

DETAIL 5

MAT: ϕ .1875 DRILL ROD



- 1) FACE TO LENGTH
- 2) CHAMFER BOTH SIDES

DETAIL 11

MAT: ϕ .1875 DRILL ROD

SYM	REVISION	DATE	BY
\triangle	WAS .190 X 32	11-28-00	REH
	ADDED MACHINING NOTES	11-28-00	REH
\triangle	CHANGED ϕ .250 TO ϕ .1875	01-19-99	REH

TOLERANCES - DEC.INCH / FRACTION		CAD	
UNLESS OTHERWISE SPECIFIED			
MACHINING:		FRACTIONS: \pm 1/64	
DECIMAL PLACES	TOL'S	 THIRD ANGLE PROJECTION CONFORMS TO ANSII Y14.5-1982	
ONE X.X	\pm 0.02		
TWO X.XX	\pm 0.01		
THREE X.XXX	\pm 0.005		
ANGLES	\pm 1/2°		
IF IN DOUBT - ASK			

3/8 SQUARE
STEAM ENGINE

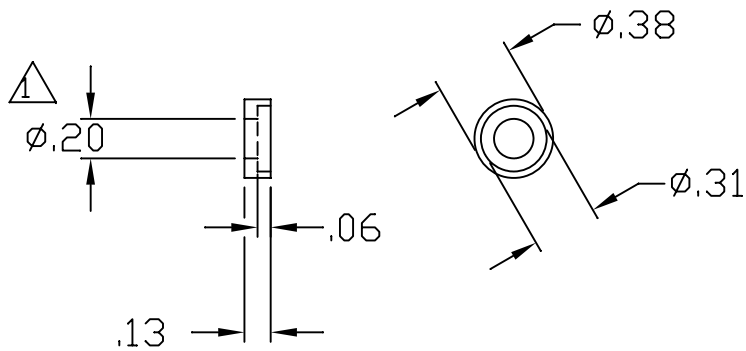
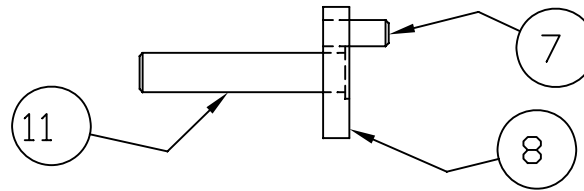


DRAWN 09-05-95	BY REH	CHECKED 09-05-95	BY RE HEGE	APPROVED	BY
SCALE FULL	FILE NAME ENGINE_3.DWG	A	SHEET 7 of 9	REV. -	

ACAD-R14

CRANKSHAFT ASSEMBLY

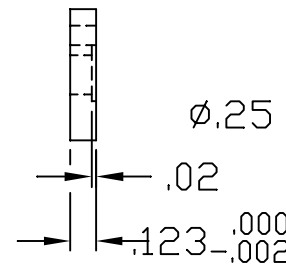
- 1) PRESS DET 11 INTO DET 8 USE LOCTITE
- 2) MOUNT DET 11 IN CHUCK
- 3) FACE BACKSIDE OF DET 8 TO CLEAN UP
- 4) FACE FRONT OF DET 8 TO .123 THICKNESS
- 5) FIND CENTER OF DET 8 IN MILL
- 6) MOVE .188
- 7) (B) ϕ .124 THRU
- 8) PRESS DET 7 INTO DET 8 USE LOCTITE



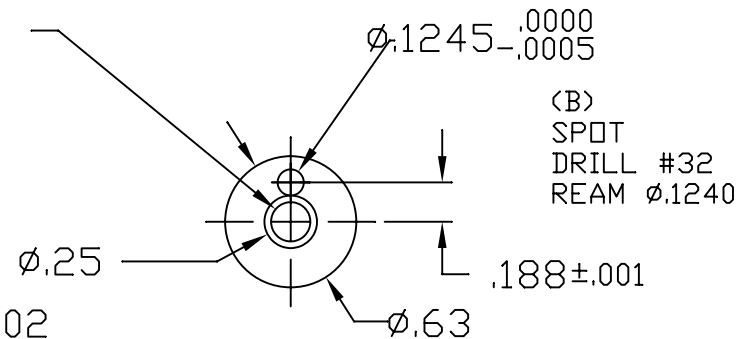
DETAIL 3
MAT: MILD STEEL

- 1) FACE
- 2) SPOT
- 3) DRILL #7 X .25 DP
- 4) C-BORE WITH ϕ 5/16 END MILL X .06 DP
- 5) START PARTING
- 6) DEBURR ALL OVER
- 7) FINISH PARTING

(A) ϕ .1870^{+.0000}_{-.0005}
SPOT
DRILL #16 X .25 DP
REAM ϕ .1855



- 1) FACE
- 2) (A) ϕ .1870
- 3) PART .15 WIDE

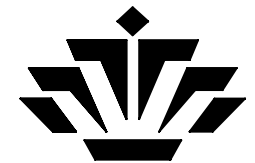


DETAIL 8
MAT: MILD STEEL

SYM	REVISION	DATE	BY
	ADDED MACHINING NOTES	11-28-00	REH
	DELETED GD&T	11-28-00	REH
\triangle	ENLARGED DIA OF HOLE WAS ϕ .19	01-19-99	REH

TOLERANCES - DEC.INCH / FRACTION			
UNLESS OTHERWISE SPECIFIED			
MACHINING:		FRACTIONS: \pm 1/64	
DECIMAL PLACES	TOL'S	CAD	
ONE X.X	\pm 0.02		
TWO X.XX	\pm 0.01		
THREE X.XXX	\pm 0.005		
ANGLES	\pm 1/2°	THIRD ANGLE PROJECTION	
IF IN DOUBT - ASK			
CONFORMS TO ANSIIY14.5-1982			

3/8 SQUARE
STEAM ENGINE


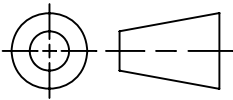


DRAWN 09-05-95	BY REH	CHECKED 09-05-95	BY RE HEGE	APPROVED	BY
SCALE FULL	FILE NAME ENGINE_3.DWG	A	SHEET 8 of 9		REV. -

ACAD-R14

ITEM	DESCRIPTION	QUAN	ROUGH CUT LENGTH
1	BODY - □.38 X 2.13 CRS	1	3/8 X 3/8 X 2 1/4
2	CYLINDER - □.38 X 1.25 CRS	1	3/8 X 3/8 X 1 3/8
3	RETAINER - ∅.38 X .13 CRS	1	CUT OFF IN LATHE
4	NUT - .190-32 UNF	1	STOCK
5	STUD - ∅.1875 DRILL ROD	1	∅3/16 X 1 3/8
6	PISTON - ∅.2500 DRILL ROD	1	∅ 1/4 X 1 1/16
7	PIN - ∅.125 DOWEL	1	STOCK
8	CRANK - ∅.63 X .13 CRS	1	CUT OFF IN LATHE
9	BASE - .25 X 1.5 X 1.5 ALUM	1	1/4 X 1 5/8 X 1 5/8
10	FLYWHEEL - ∅1.0 X .500 CRS	1	∅ 1 X 5/8
11	SHAFT - ∅.1875 X 1.0 DOWEL	1	∅3/16 X 1 1/8
12	SPRING - TO SUIT	1	STOCK
13	SCREW - .190-32 X .50 FHS	1	STOCK
14	SET SCREW - .138-32 X .25 LNG	1	STOCK

CUT LIST

TOLERANCES - DEC.INCH / FRACTION				3/8 SQUARE STEAM ENGINE				 UNCHARLOTTE							
UNLESS OTHERWISE SPECIFIED MACHINING:								FRACTIONS: ± 1/64				APPROVED			
DECIMAL PLACES	TOL'S			CAD		DRAWN 09-08-99		BY REH		CHECKED 09-08-99		BY RE HEGE		BY	
ONE X.X	± 0.02					SCALE FULL		FILE NAME ENGINE_3.DWG				A		SHEET 9 of 9	
TWO X.XX	± 0.01			THIRD ANGLE PROJECTION		CONFIRMS TO ANSII Y14.5-1982		REV.		-		-		-	
THREE X.XXX	± 0.005														
ANGLES ± 1/2°															
IF IN DOUBT - ASK															