

chapter sixteen

Projects

16-1 Introduction

This chapter presents two large projects: the Milling Vise and the Tenon Jig. The projects are intended to serve either as group projects or as large individual projects.

16-2 Project 1: Milling Vise

Figure 16-1 shows a milling vise. The subassemblies, detailed drawings, and BOMs are included.

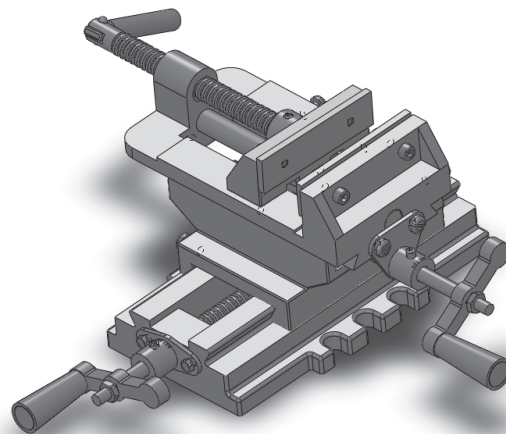
Complete the following or as assigned by your instructor.

1 The Milling Vise

See Figure 16-1.

- A. An assembly drawing
- B. A BOM; include Item Numbers, Part Numbers, Descriptions, and Quantities

Figure 16-1
Milling Vise



2

See Figure 16-2.

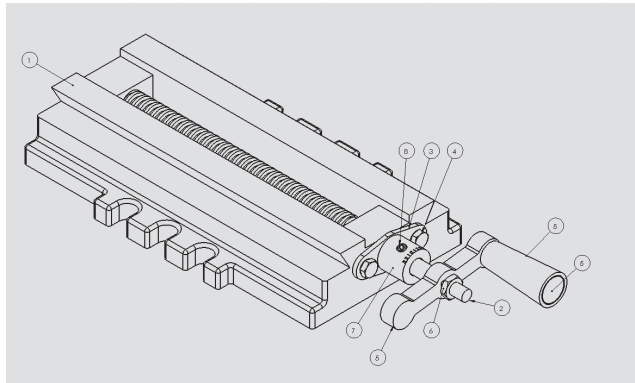
- ### A. An assembly drawing

- ### B. A BOM

- C. Dimensioned drawings of each part that is used in the subassembly

Figure 16-2

Base Subassembly



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	BU2012-B	BASE	1
2	P100-20A	ACME, BASE	1
3	BU-313	PLATE, COVER, BASE	1
4	M6 × 1.0 × 16	SCREW, SLOTTED CAP	2
5	PN311-1A	HANDLE, SUBASSEMBLY	1
6	M8 × 1.25	NUT, HEX	1
7	ENG-2	COLLAR	1
8	M6 × 1.0 × 10	SET SCREW-CONE	1

Dimensioned and toleranced drawings of the parts that make up the base subassembly are as follows.

Base

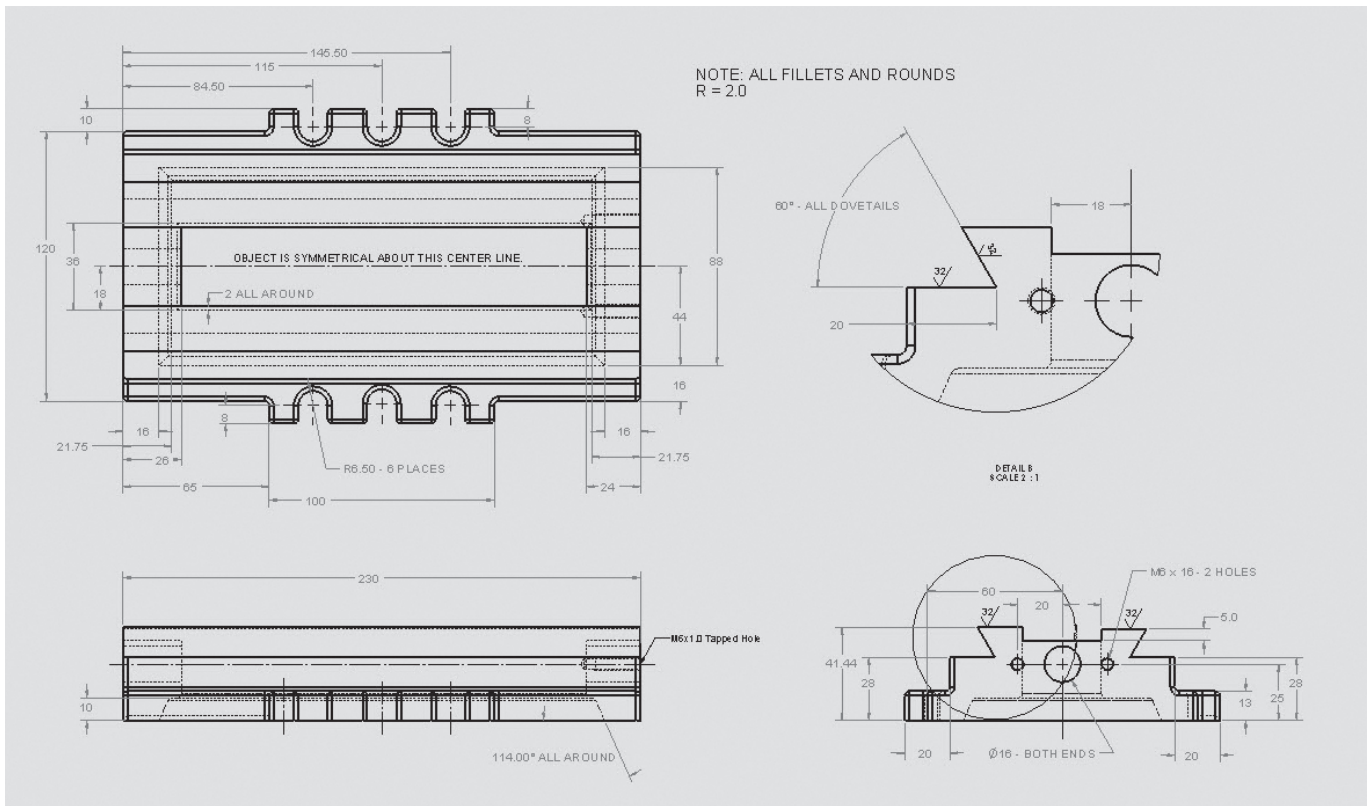


Figure 16-3

Figure 16-4

ACME, Base

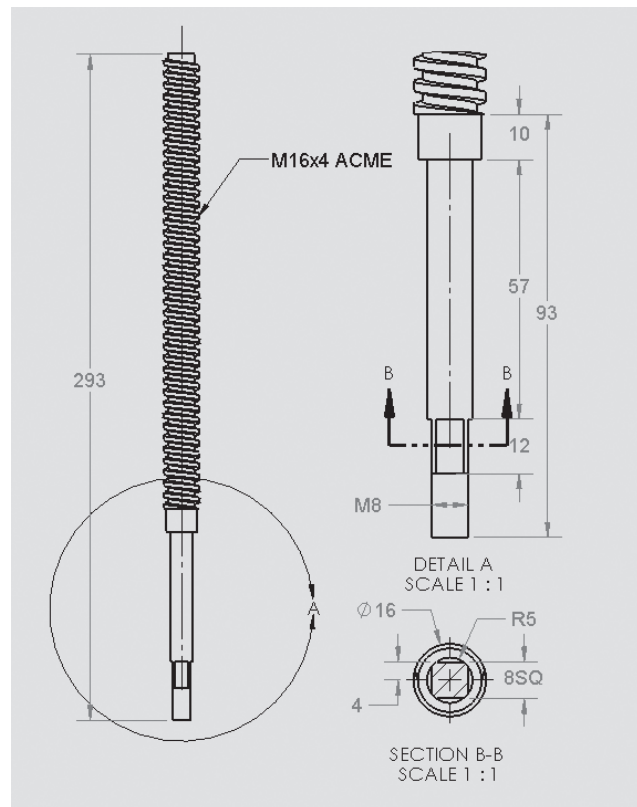


Figure 16-5

Collar

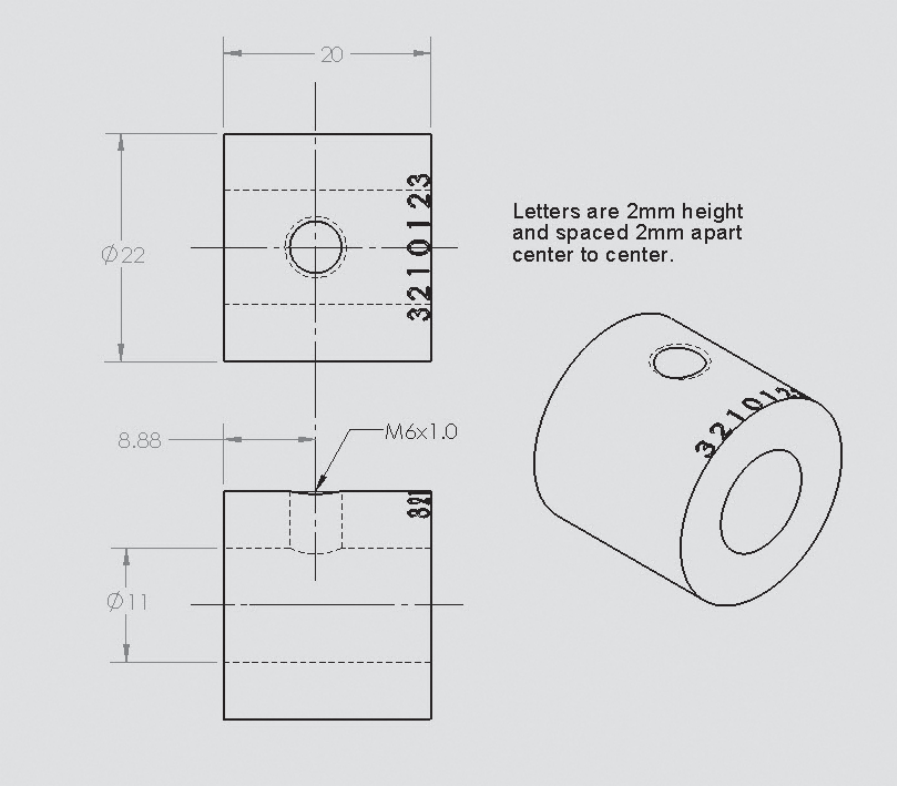


Figure 16-6

Plate, Cover, Base

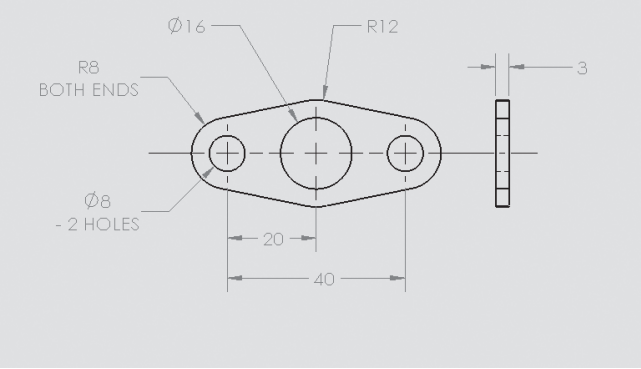
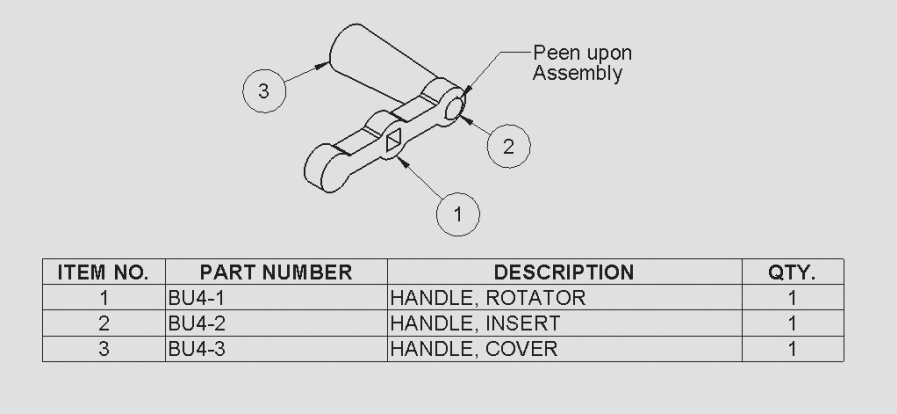


Figure 16-7

Handle Subassembly



Handle, Rotater

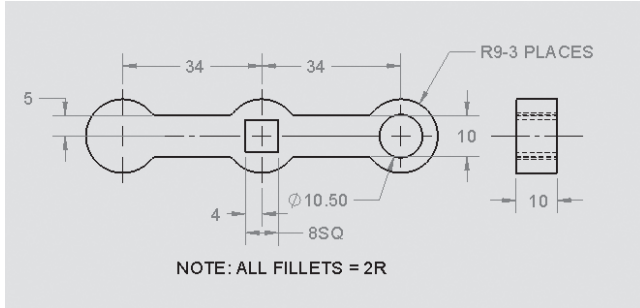


Figure 16-8

Handle, Insert

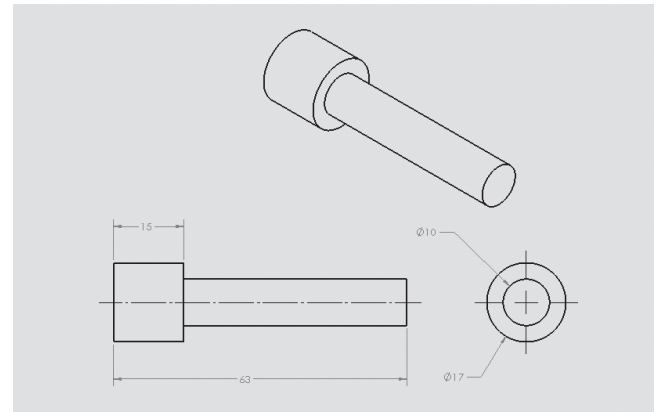
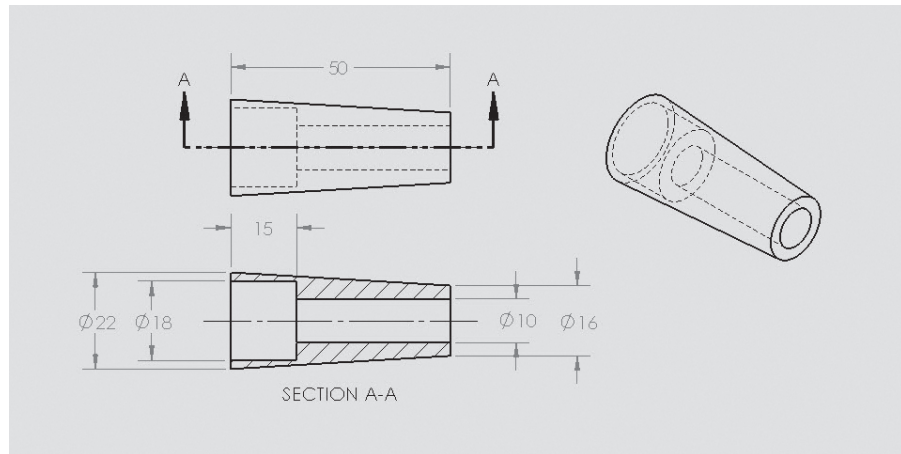


Figure 16-9

Figure 16-10

Handle, Cover

**NOTE**

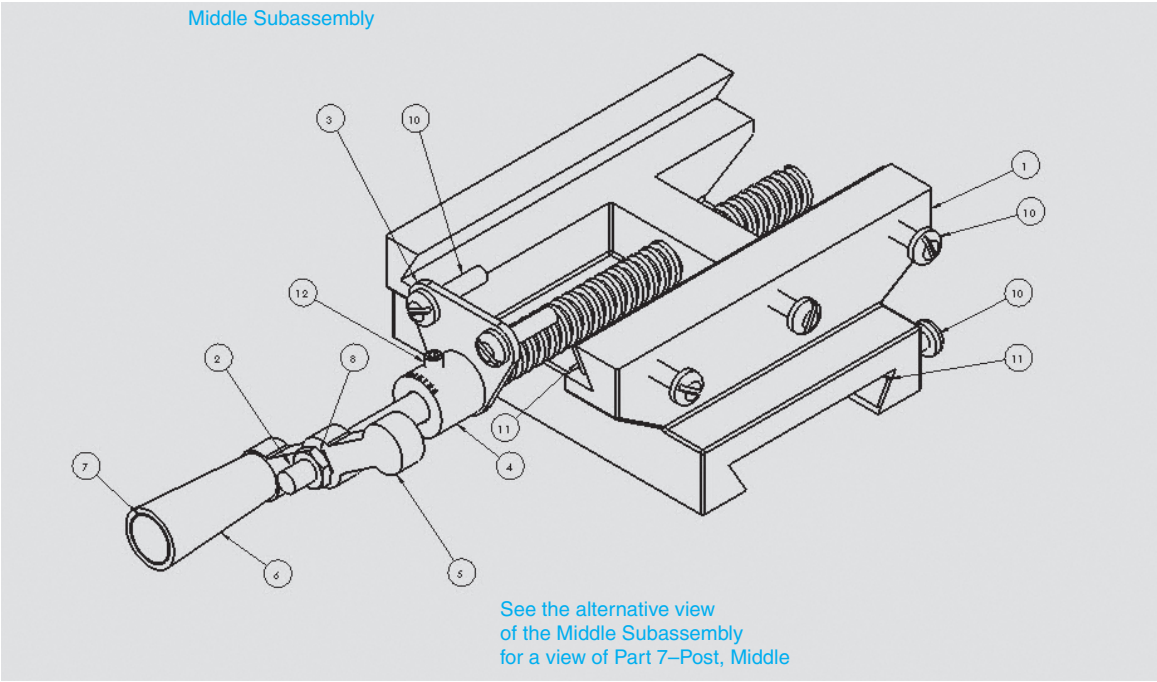
Standard parts do not need drawings, but require manufacturer's part numbers listed in the BOM.

3 Middle Subassembly

See Figure 16-11.

- A. An assembly drawing
- B. A BOM
- C. Dimensioned drawings of each part that is used in the Subassembly

Middle Subassembly



Middle BOM

Middle Subassembly BOM

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	S51-2A	SUPPORT, MIDDLE	1
2	P200-24	POST, ACME, MIDDLE	1
3	WIT-130	PLATE, END	1
4	ENG-2	COLLAR	1
5	PN311-1A	HANDLE, SUBASSEMBLY	1
6	M8 X 1.25	NUT, HEX	1
7	P155B	POST, MIDDLE	1
8	M6 x 1.0 x 25	SCREW, PAN	8
9	SP-33	BAR, SPACER	2
10	M6 x 1.0 x 16	SET SCREW, SOCKET	1

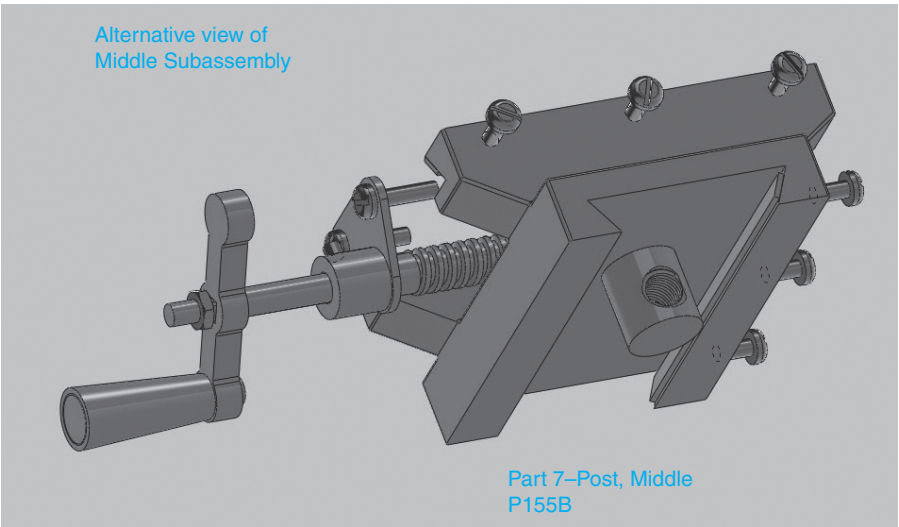


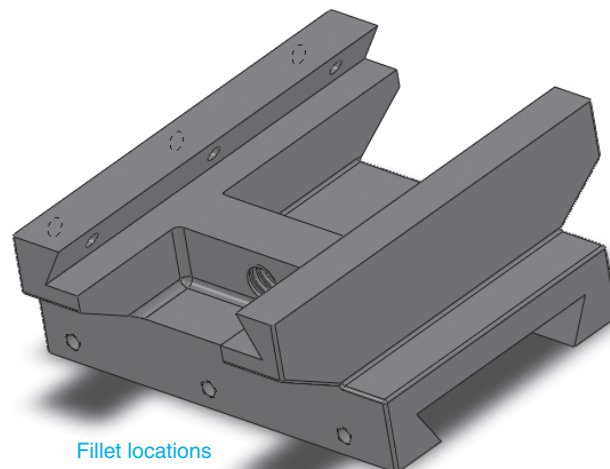
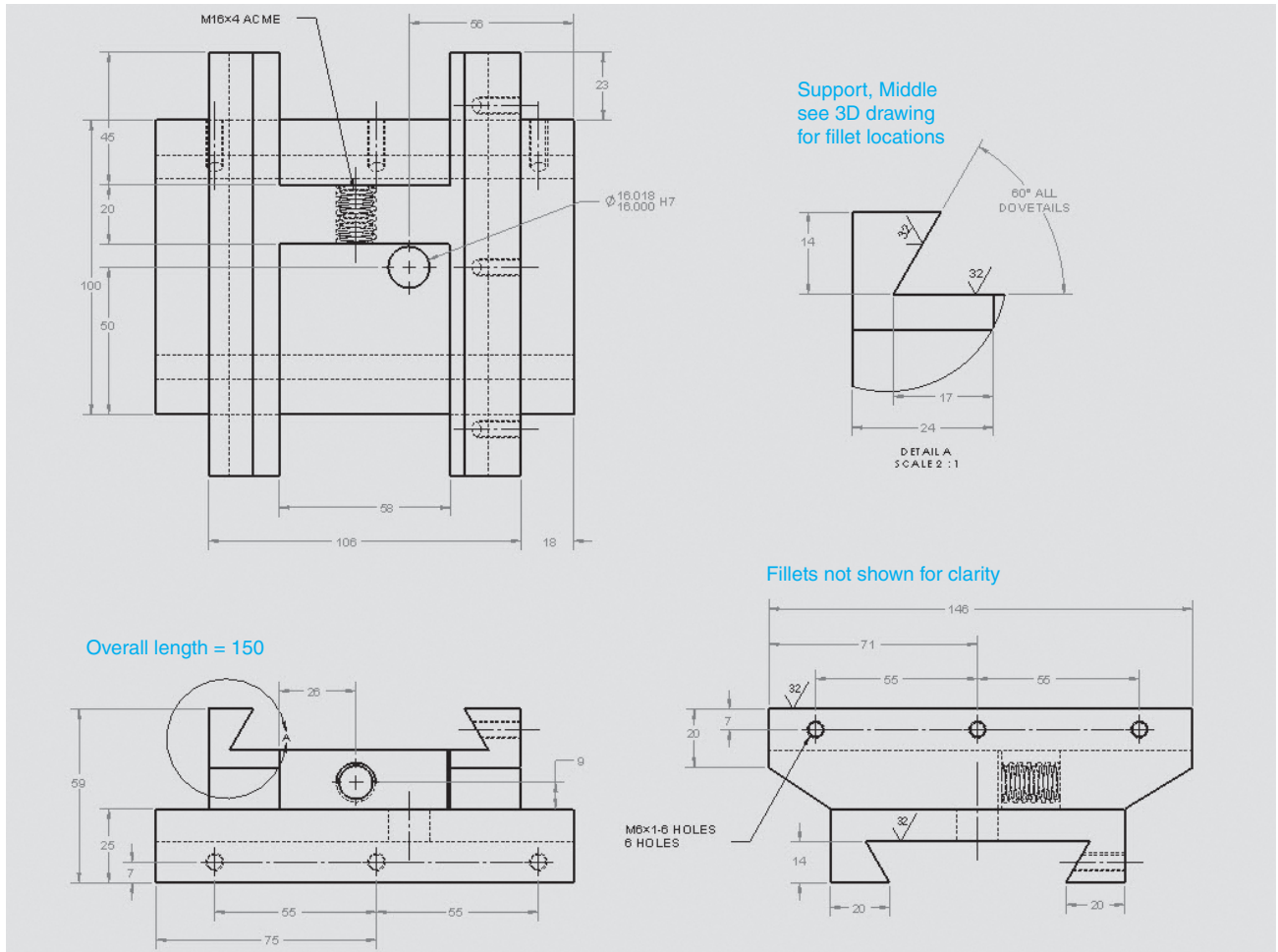
Figure 16-11

Dimensioned and toleranced drawings of the parts that make up the Base Subassembly are as follows:

Figure 16-12A and 16-12B Middle Subassembly

Note that Figure 16-12A shows a dimensioned drawing of the Support, Middle, but does not include any fillets. Fillets were omitted for clarity. Figure 16-12B is a 3D of the Support, Middle, that shows the fillets. Use the fillets shown in Figure 16-12B as a guide to applying fillets.

Middle Subassembly



Fillet locations

Figure 16-12

Post, Acme, Middle

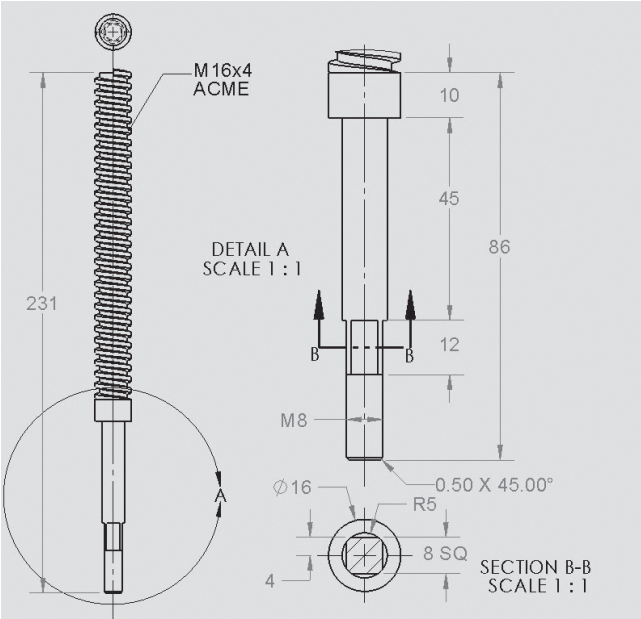


Figure 16-13

Plate, End

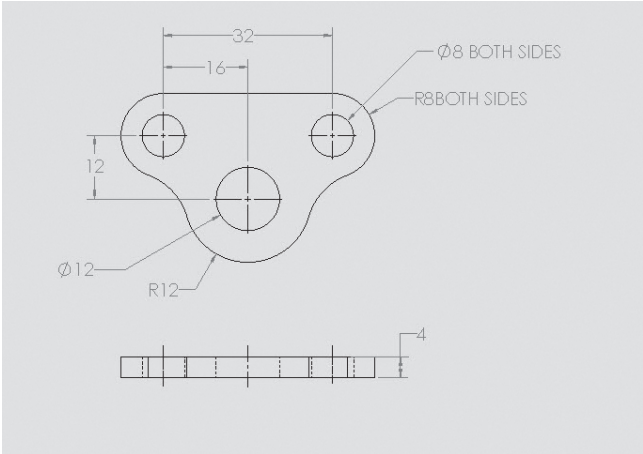
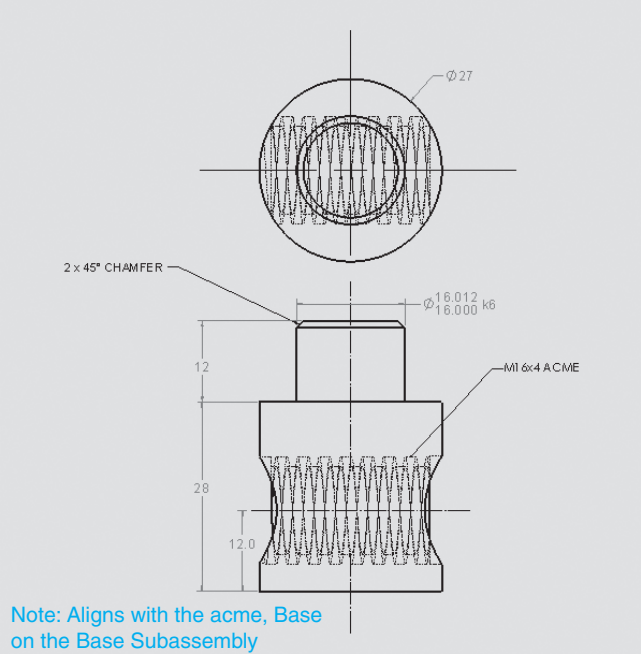


Figure 16-14

Figure 16-15

Post, Middle



4 Top Subassembly

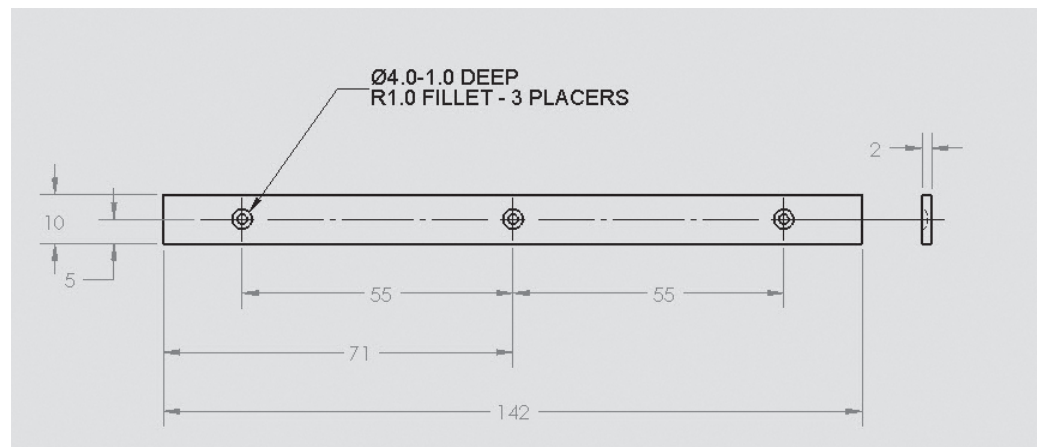
- A. An assembly drawing
- B. A BOM
- C. Dimensioned drawings of each part that is used in the Subassembly

NOTE

Standard parts do not need drawings, but require manufacturer's part numbers listed in the BOM.

Figure 16-16

Bar, Spacer



Dimensioned and toleranced drawings of the parts that make up the base subassembly are as follows:

Figure 16-17A and Figure 16-17B Top Subassembly

ITEM 8 IS NOT VISIBLE ASSEMBLES INTO ITEM 1.

Figure 16-17

Technical drawing of a mechanical part, showing multiple views and dimensions. The main view is a top view with dimensions: 28, 52, 28, 104, 8, 8, 200, 38, 8, 30, 8. Section A-A is indicated. The side view shows dimensions: 22, 26, 26, 60, 21, 12, 32, 16, 32, 60° BOTH SIDES, 32, 3, 16, 16, 13, 26, 20, 10, 16, 13, 26, 20, 10, 16, 13, 26, 20, 10. The bottom view shows dimensions: 30, 13, 27, 10, 15. The drawing includes labels: R14, Ø7.2 HOLES, M6x1.0 Tapped Hole, M16x4 ACME, SECTION A-A, and M6x1.0 Tapped Hole 2 HOLES.

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Figure 16-19

Post, Acme, Top

Post, Acme, Top

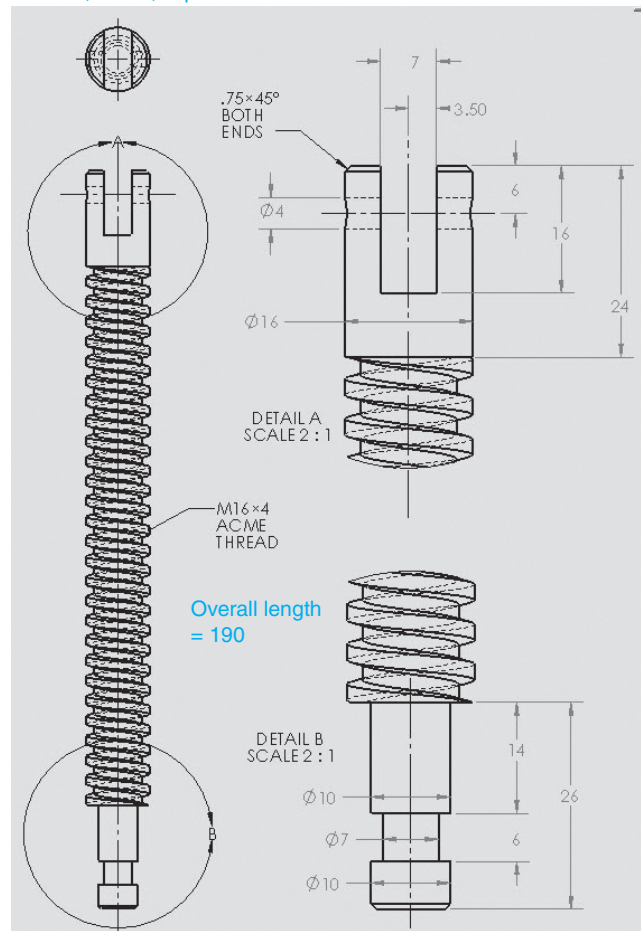


Figure 16-20

Post, Guide

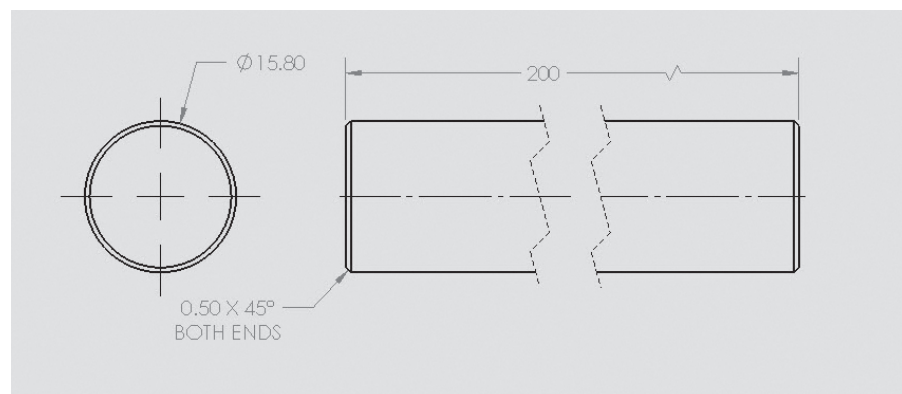


Figure 16-21A and Figure 16-21B Jaw, Movable

Note that Figure 16-21A shows a dimensioned drawing of the Jaw, Movable, but does not include any fillets. Fillets were omitted for clarity. Figure 16-21B is a 3D of the Jaw, Movable, that shows the fillets. Use the fillets shown in Figure 16-21B as a guide to applying fillets.

Jaw, Movable

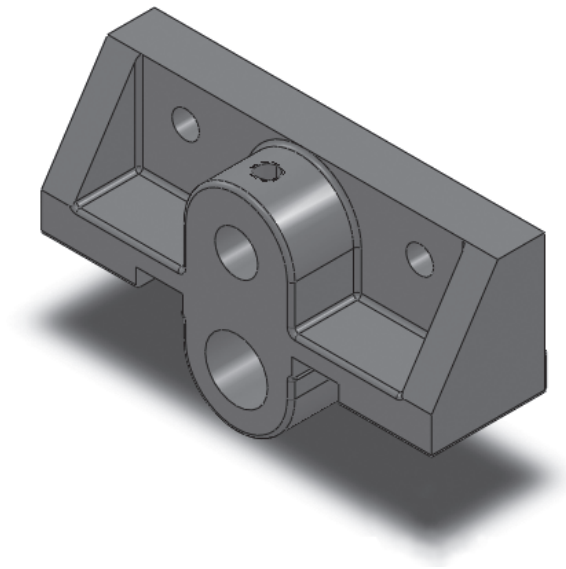
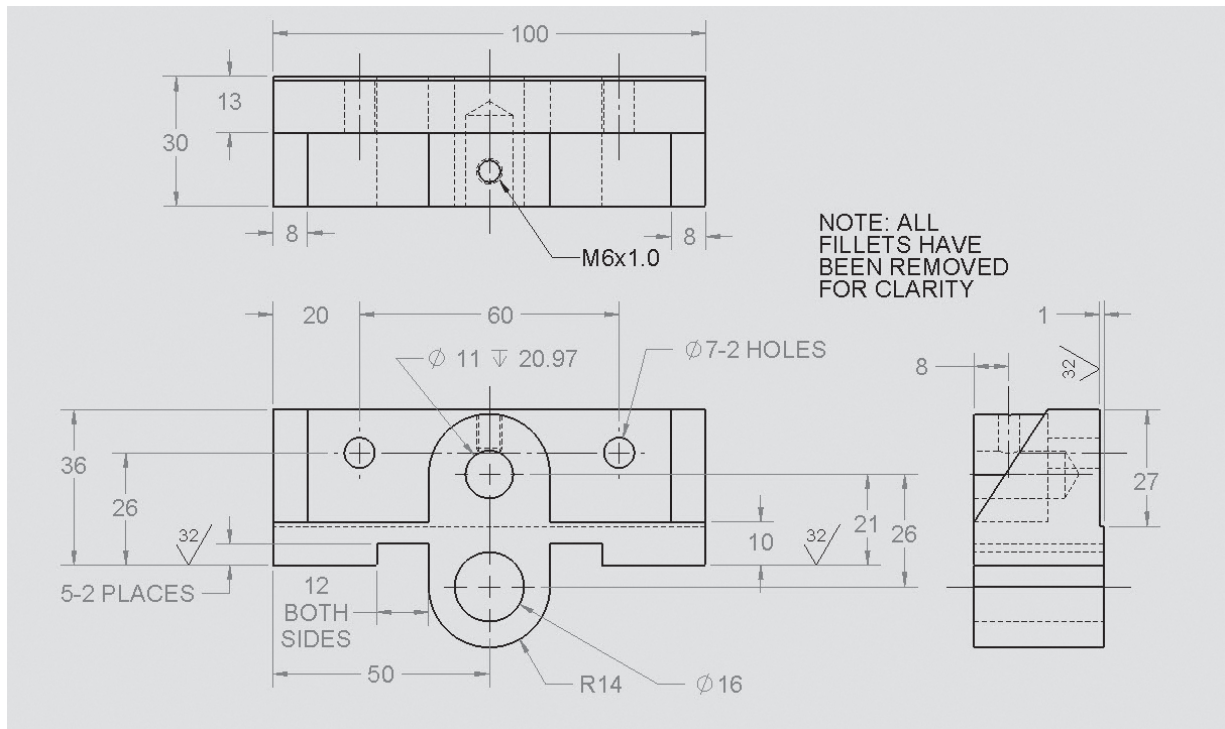


Figure 16-22

Handle

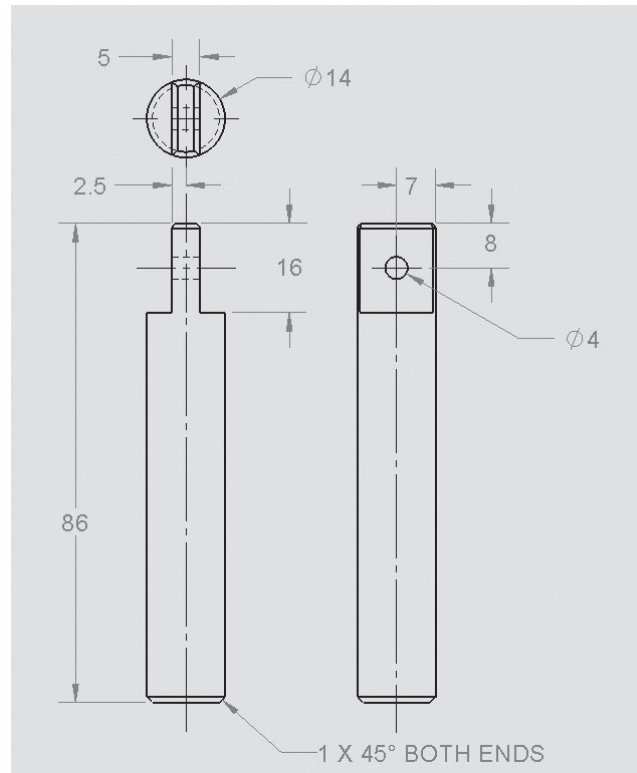
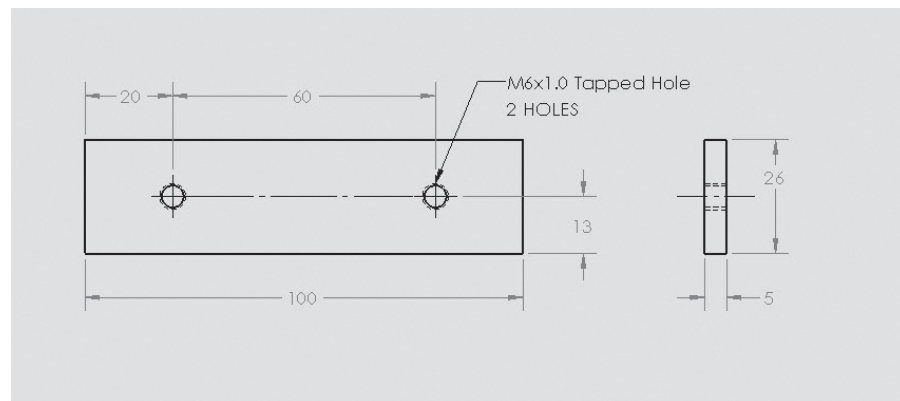


Figure 16-23

Plate, Jaw



16-3 Project 2: Tenon Jig

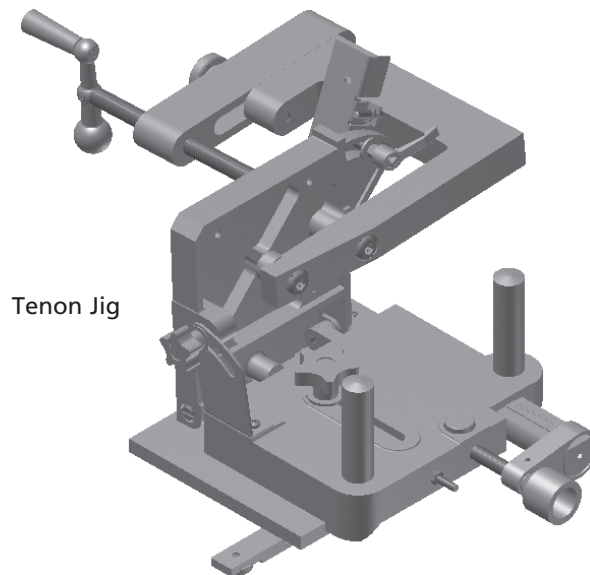
The Tenon Jig has four main subassemblies: Clamping, Vertical, Base Plate, and Guide Plate. There are other parts that are used in the final assembly. This is intended to be a group project, but could be done by one person. Complete the following assignments:

A. Draw the Clamping Subassembly.

- 1 Create a BOM for the Clamping Subassembly.
- 2 Complete drawings for each part.
- 3 Create dimensioned drawings of each part.
- 4 Create an Exploded Assembly drawing with balloons referencing each part to the BOM.

- B. Draw the Vertical Subassembly.
- 1 Create a BOM for the Vertical Subassembly.
 - 2 Complete drawings for each part.
 - 3 Create dimensioned drawings of each part.
 - 4 Create an Exploded Assembly drawing with balloons referencing each part to the BOM.
- C. Draw the Base Plate Subassembly.
- 1 Create a BOM for the Base Plate Subassembly.
 - 2 Complete drawings for each part.
 - 3 Create dimensioned drawings of each part.
 - 4 Create an Exploded Assembly drawing with balloons referencing each part to the BOM.
- D. Draw the Guide Plate Subassembly.
- 1 Create a BOM for the Guide Plate Subassembly.
 - 2 Complete drawings for each part.
 - 3 Create dimensioned drawings of each part.
 - 4 Create an Exploded Assembly drawing with balloons referencing each part to the BOM.
- E. Create an Assembly drawing of the Tenon Jig.
- 1 Create a BOM for the Tenon Jig.

Figure 16-24A



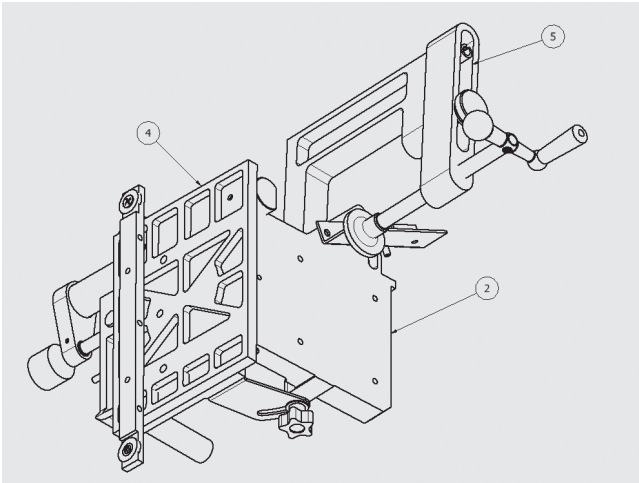


Figure 16-24B

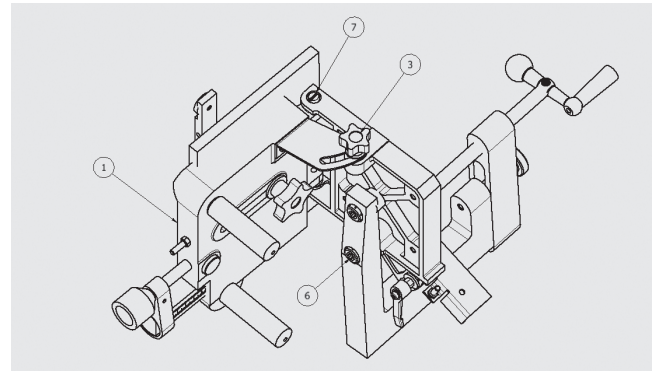


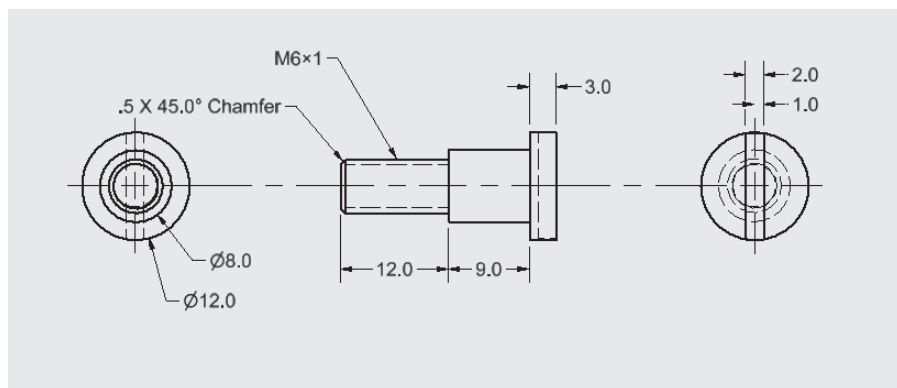
Figure 16-24C

Figure 16-24D

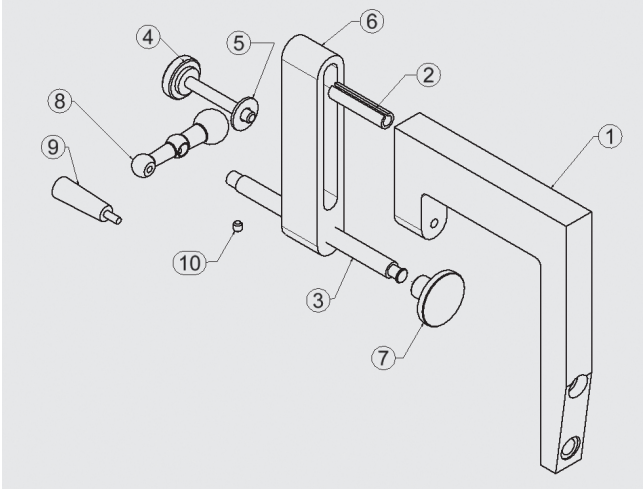
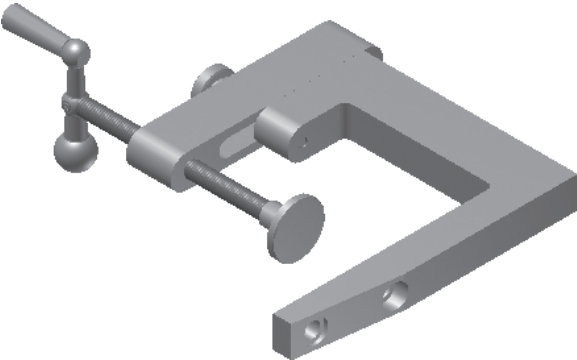
PARTS LIST				
ITEM	PART NUMBER	DESCRIPTION	MATERIAL	QTY
1	SA-1	BASE SUB-ASSEMBLY		1
2	SA-2	VERTICAL SUB-ASSEMBLY		1
3	SA-3	ADJUSTER SUB-ASSEMBLY		1
4	SA-4	GUIDE SUB-ASSEMBLY		1
5	SA-5	CLAMP SUB-ASSEMBLY		1
6	M10x1.5 x 25	DRILLED FORGED HEXAGON SOCKET HEAD CAP SCREW	MILD STEEL	2
7	SA-6B	SLOTTED HEAD MACHINE SCREW	MILD STEEL	2

Figure 16-24E

Slotted Head Machine Screw
PN: SA-6B



Clamp Subassembly
PN: SAS



PARTS LIST				
ITEM NO.	PART NUMBER	DESCRIPTION	MAT'L	QTY
1	BU-121	C-BRACKET	CASTING	1
2	BU-122	PIN	STEEL	1
3	BU-123	POST, THREADED	STEEL	1
4	BU-124	SCREW, THUMB	STEEL	1
5	10×24×2	PLAIN WASHER	STEEL	1
6	BU-125	SLIDER	CASTING	1
7	BU-126	HOLDER	STEEL	1
8	BU-127	PIVOT, HANDLE	CASTING	1
9	BU-128	POST, HANDLE	STEEL	1
10	M6×6	SET SCREW, SOCKET HEAD, FLAT POINT	STEEL	1

Figure 16-25

C-Bracket
PN: BU-121

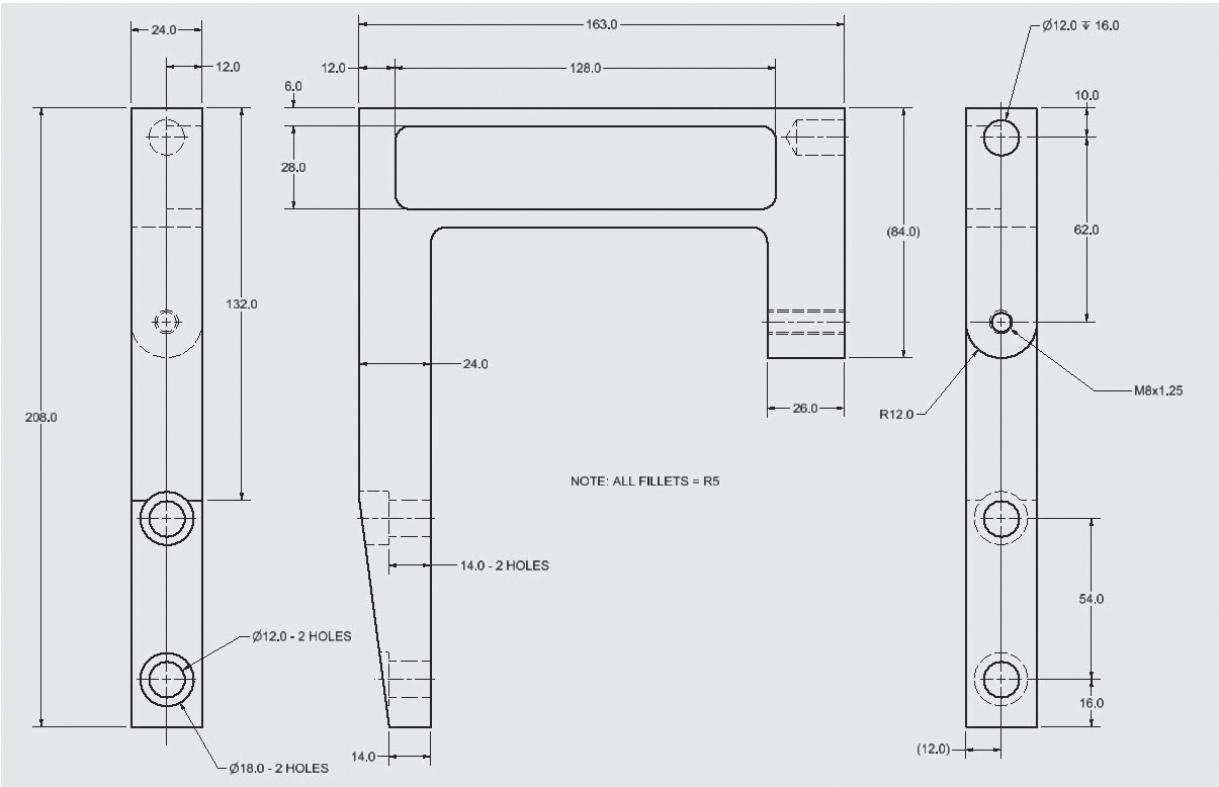


Figure 16-26

Pin
PN: BU-122

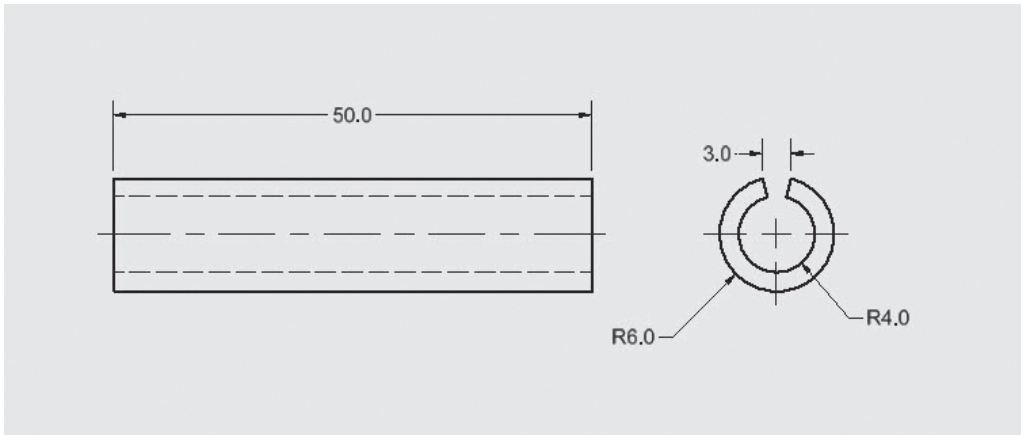


Figure 16-27

Post Threaded
PN: BU-123

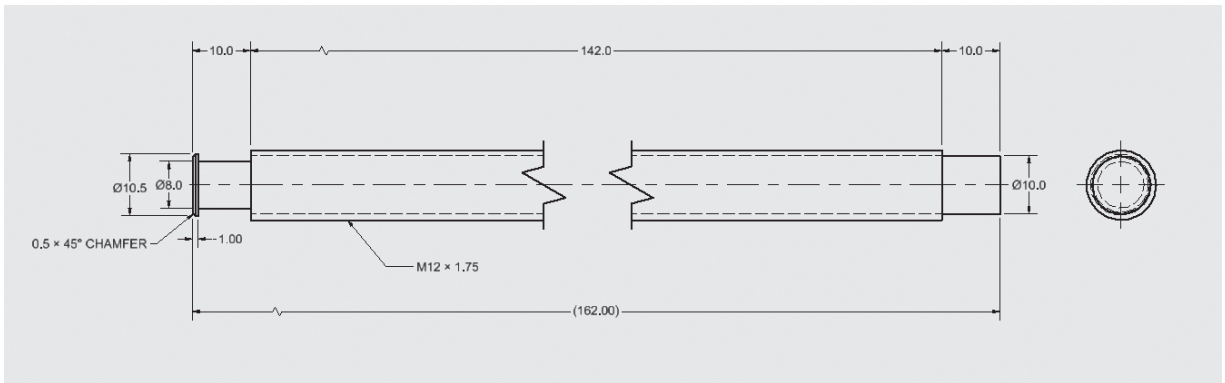


Figure 16-28

Screw, Thumb
PN: BU-124

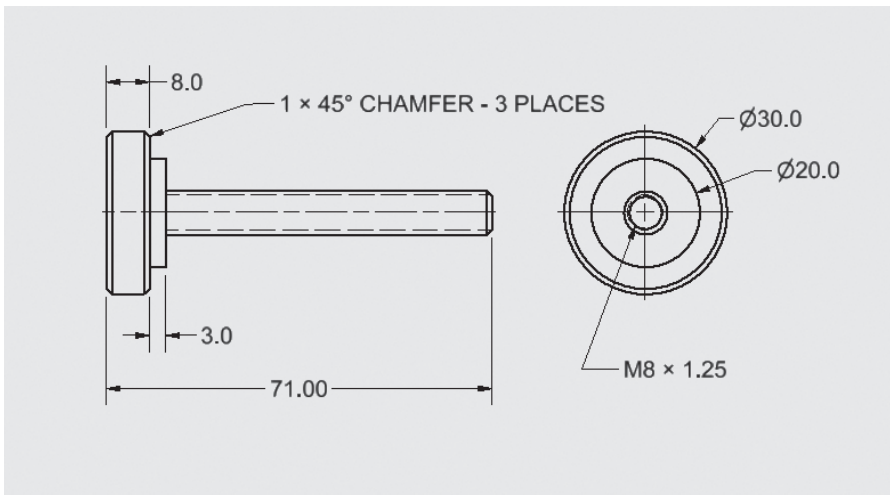


Figure 16-29

Slider
PN: BU-125

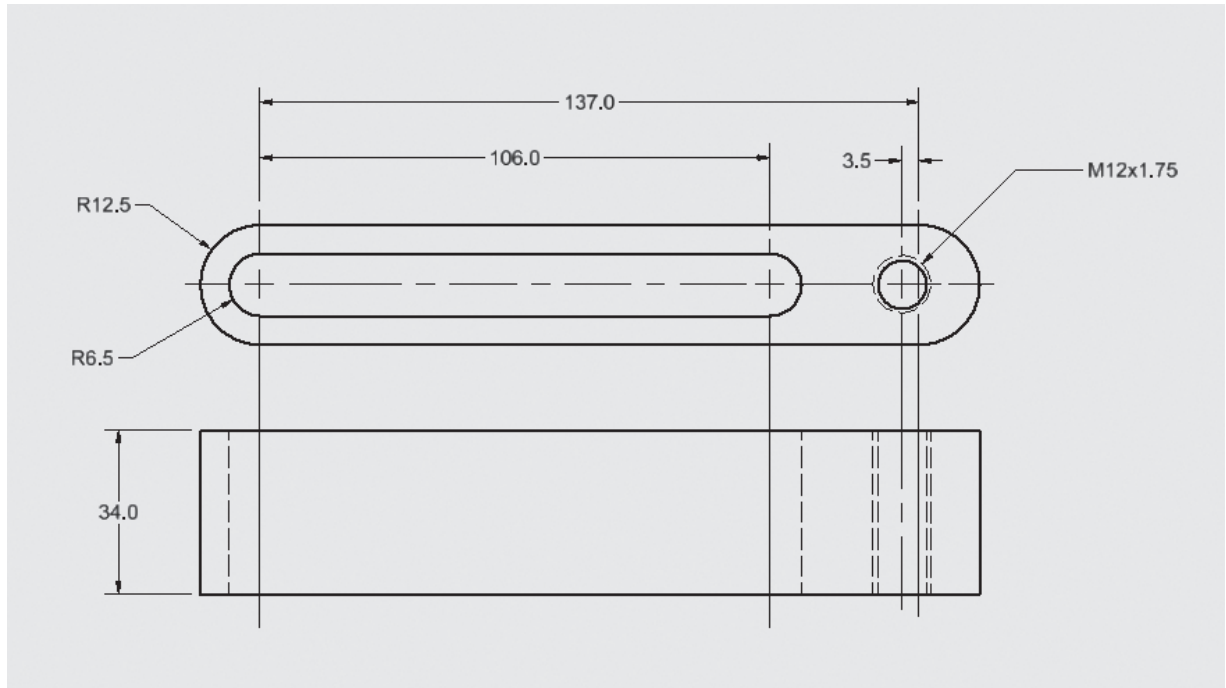


Figure 16-30

Holder
PN: BU-126

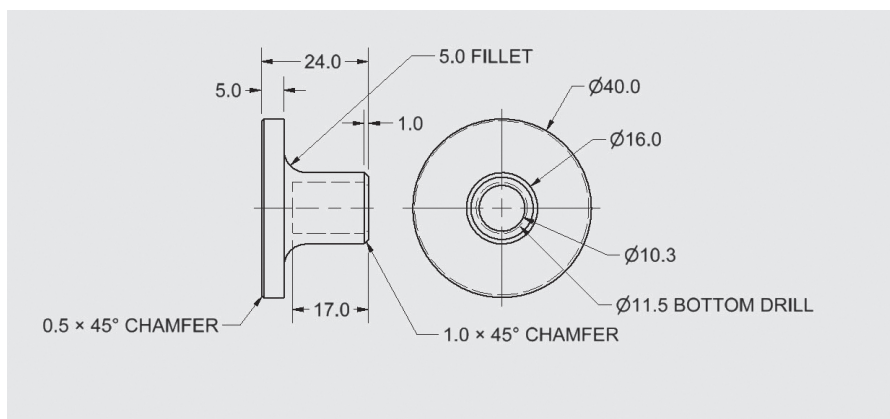
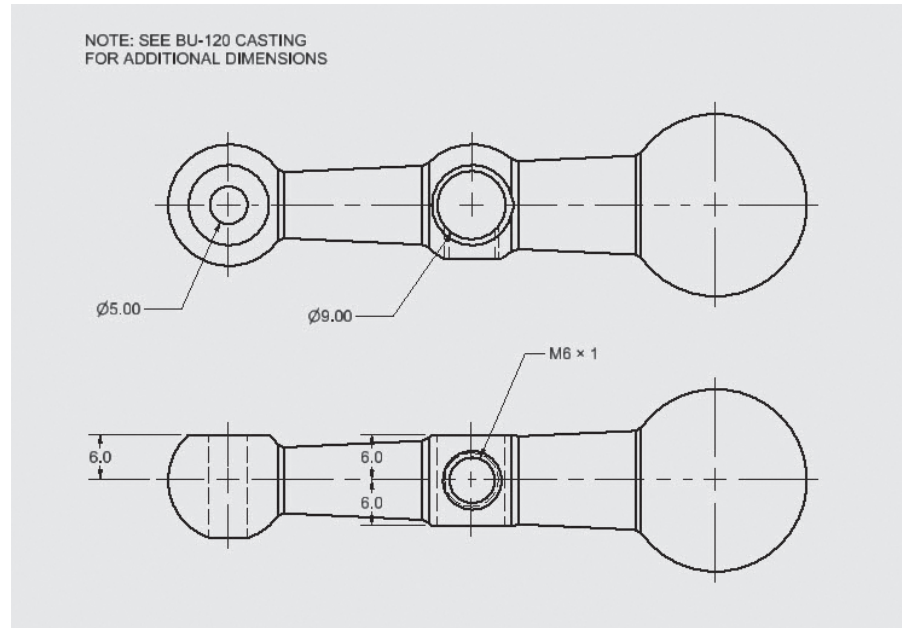


Figure 16-31

Figure 16-32

Pivot, Handle
PN: BU-127



Casting for Pivot, Handle

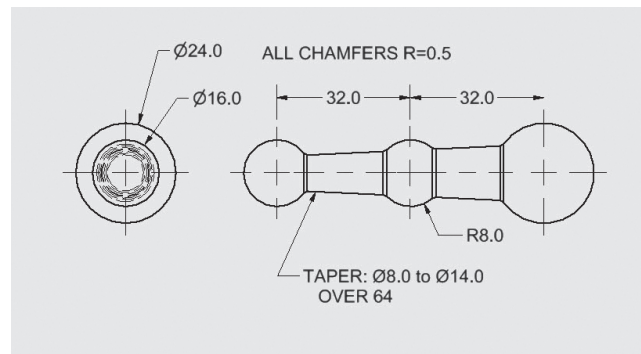


Figure 16-33

Post, Handle
PN: BU-128

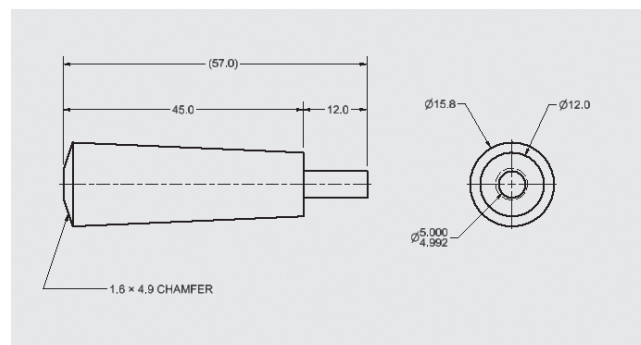
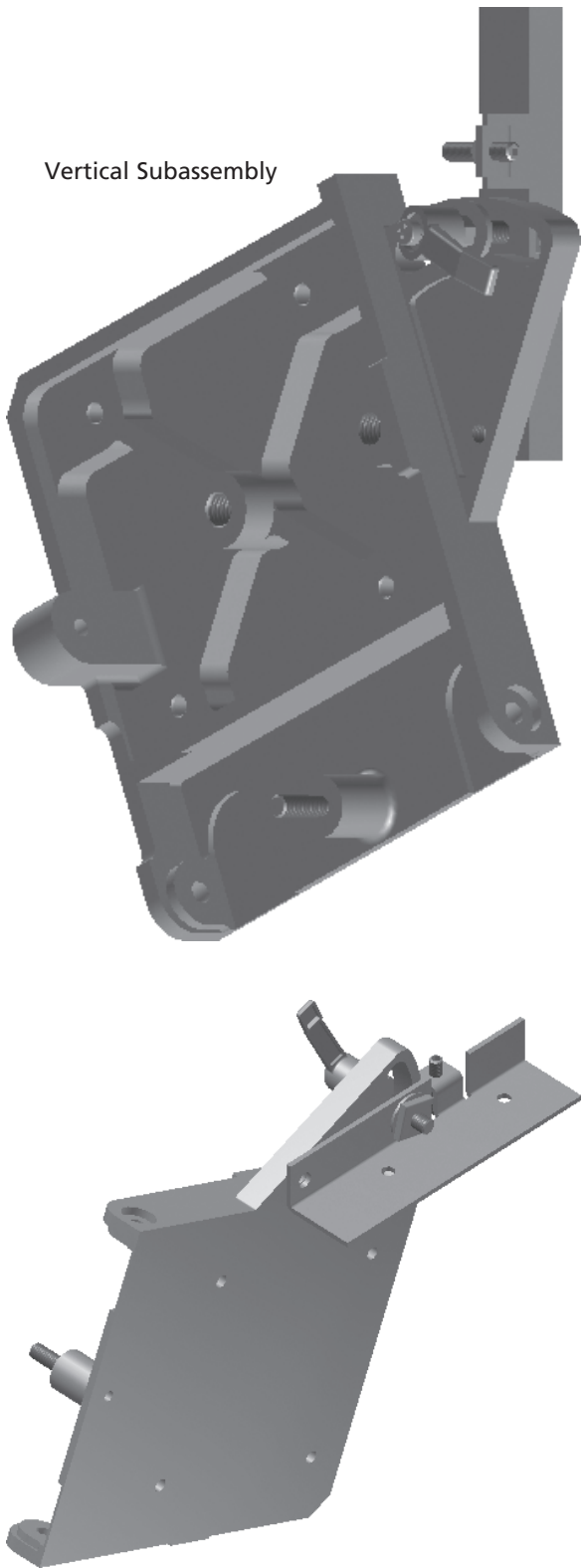


Figure 16-34



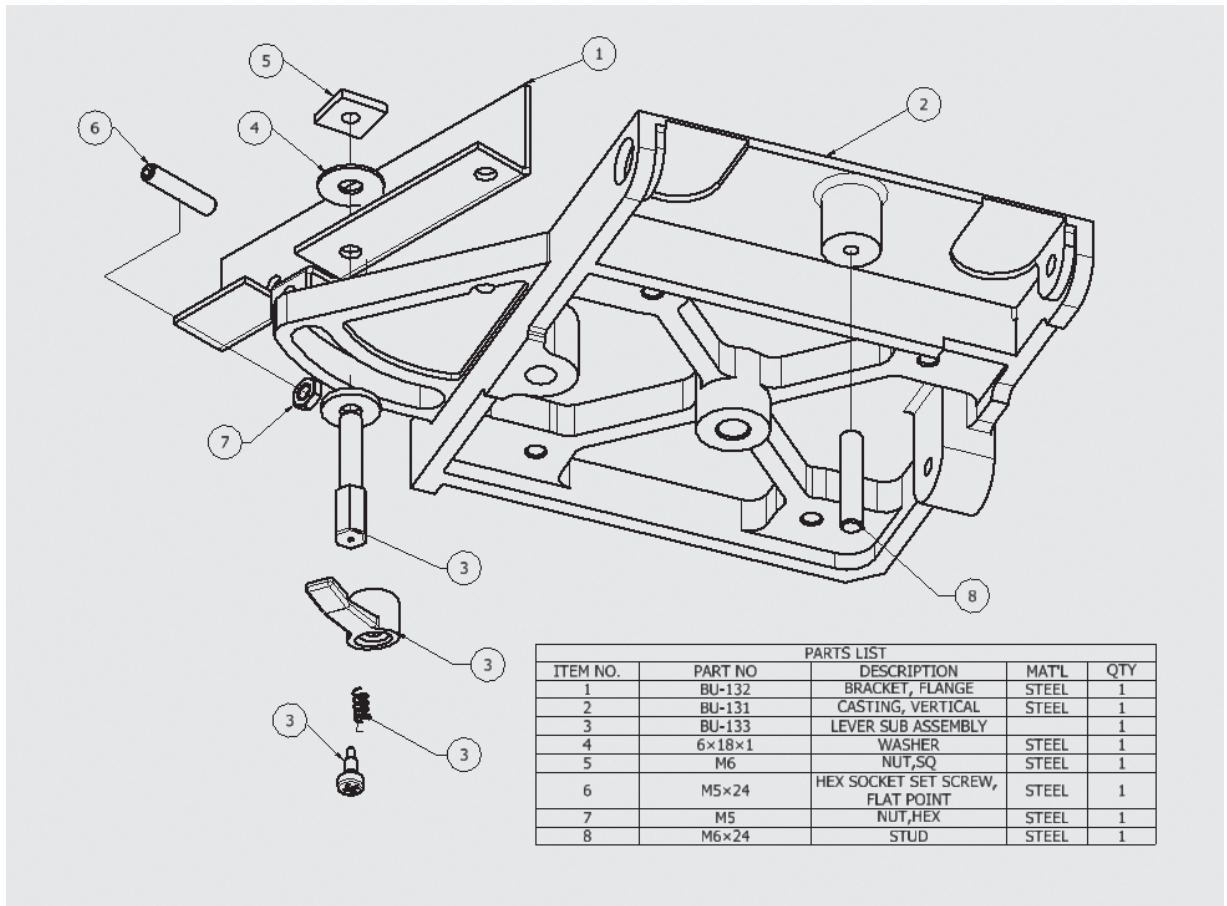


Figure 16-35

Bracket, Flange
PN: BU-132

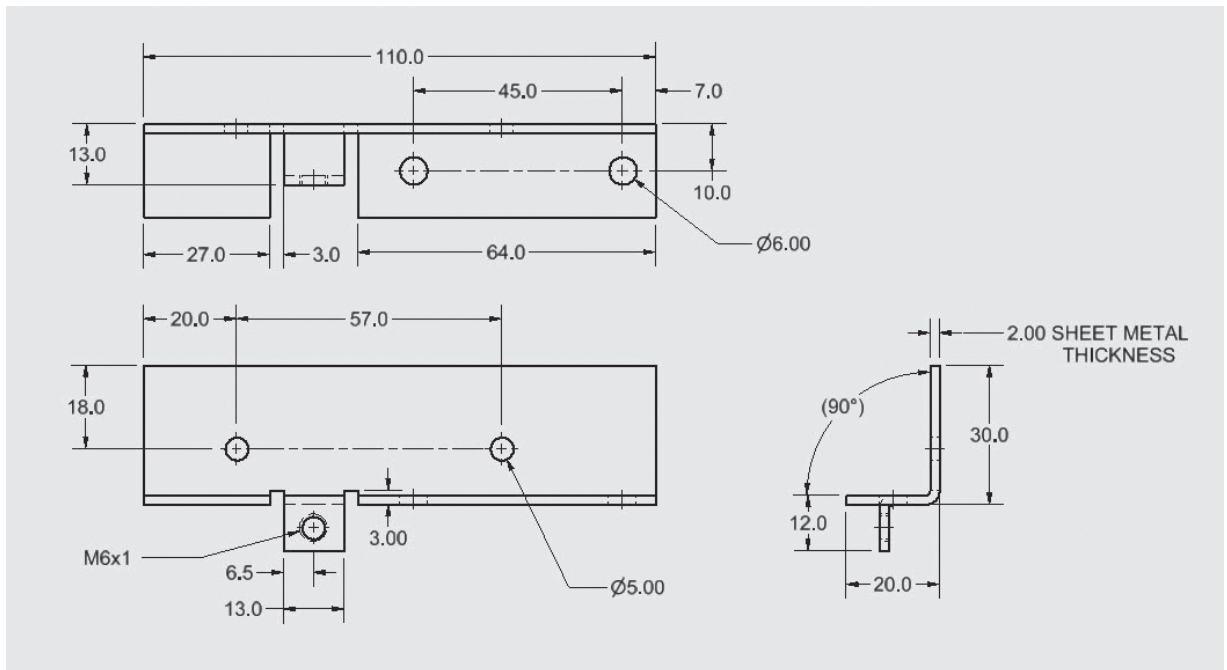
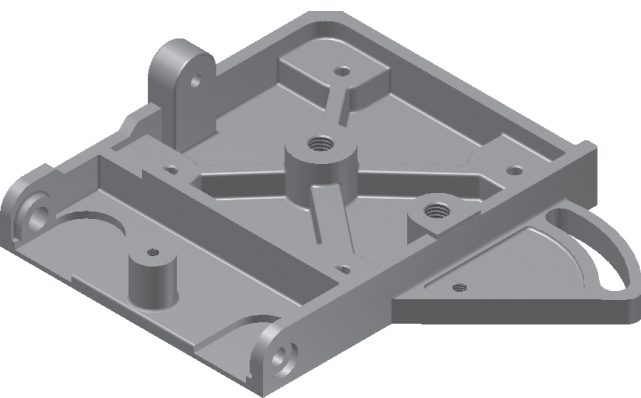


Figure 16-36

Figure 16-37A

Casting, Vertical
PN: BU-131



Casting, Vertical
PN: BU-131

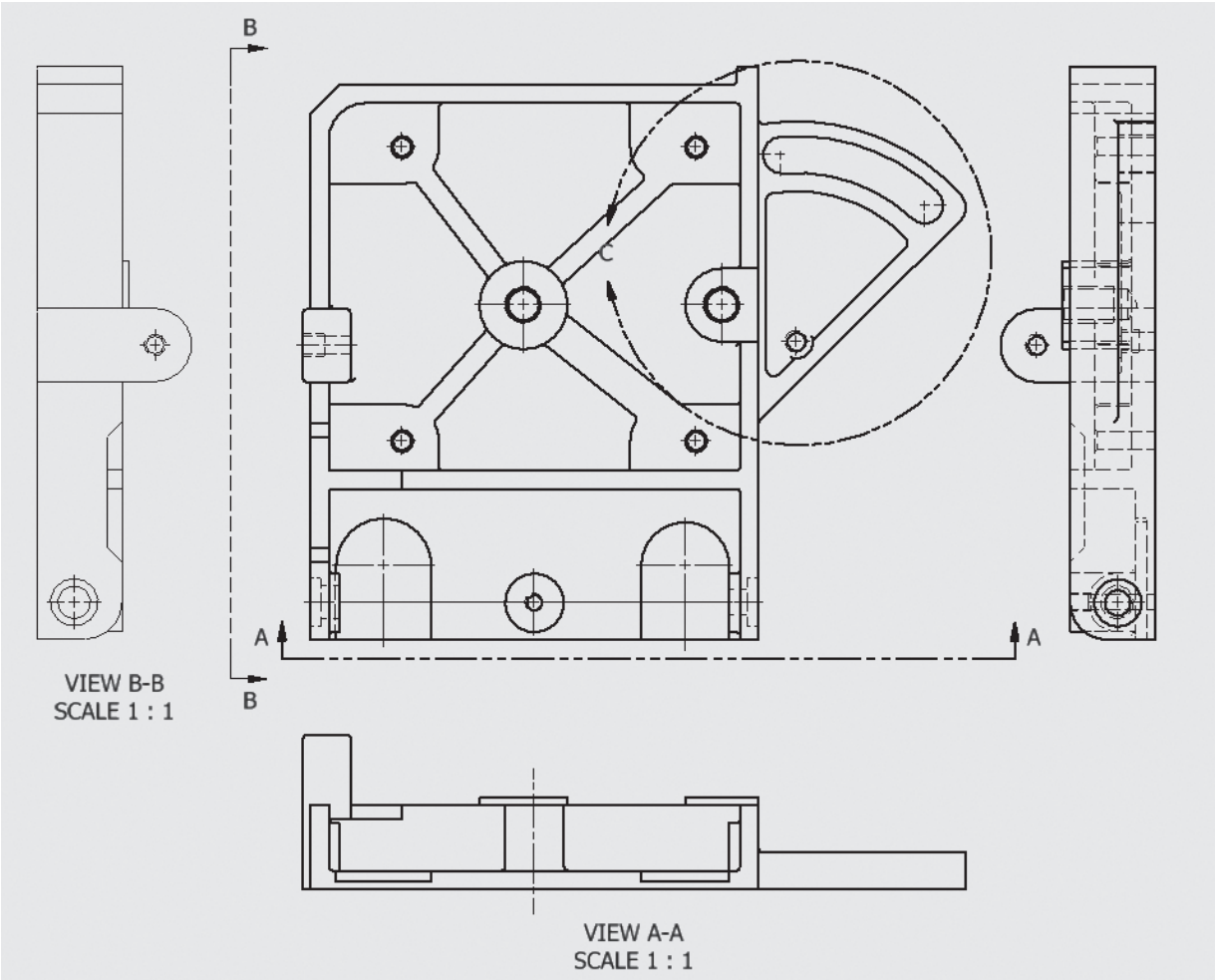


Figure 16-37B

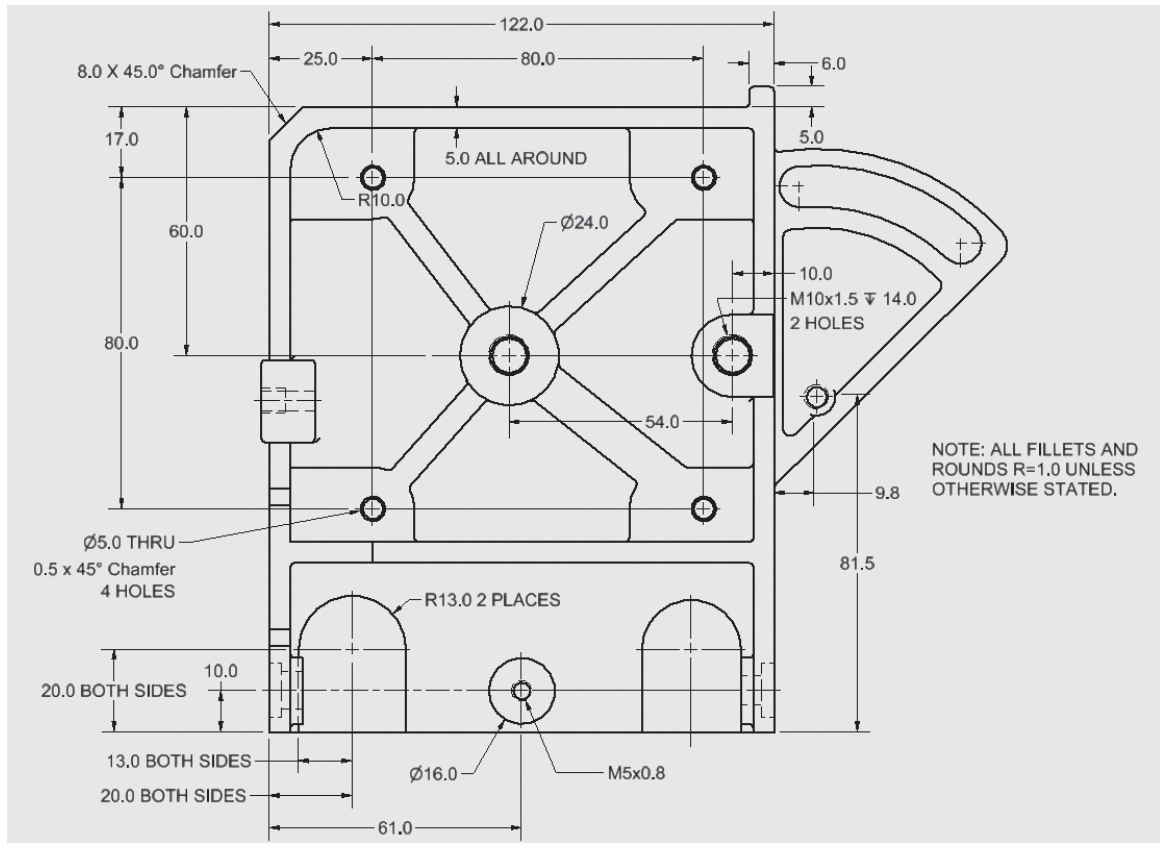


Figure 16-37C

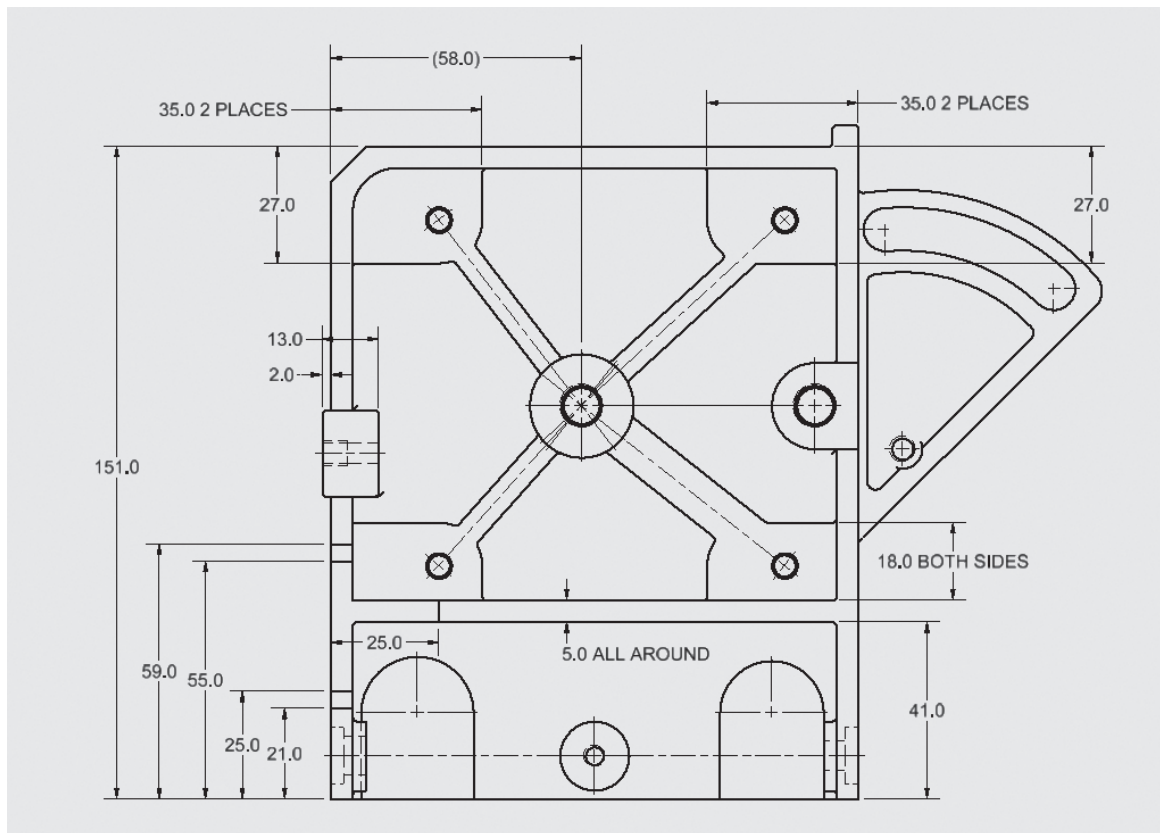


Figure 16-37D

Figure 16-37E

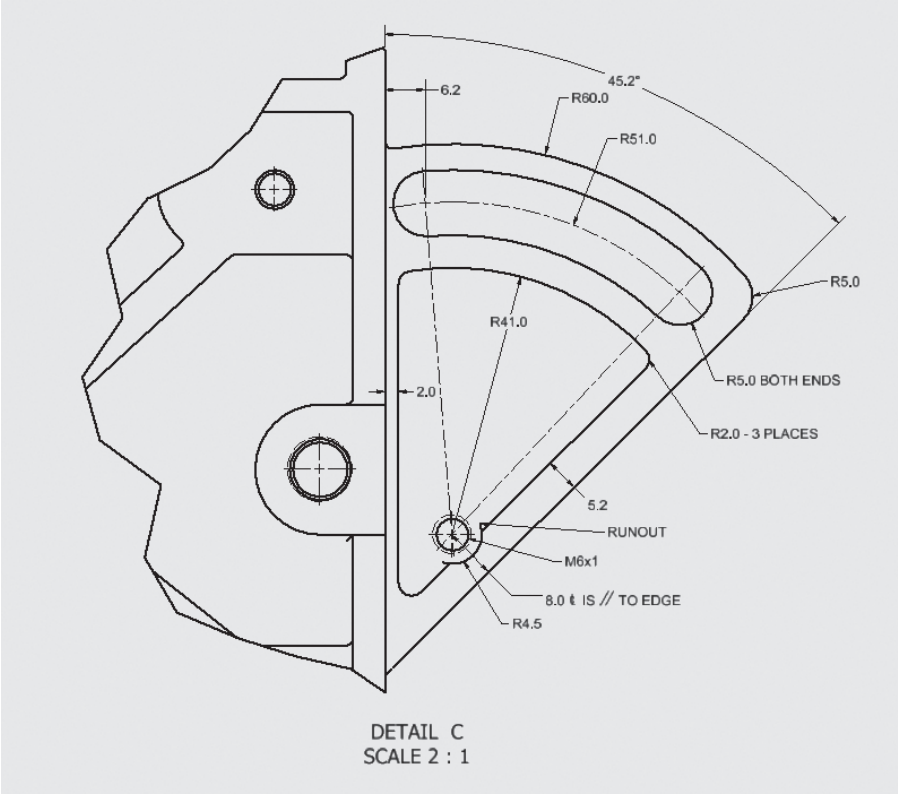
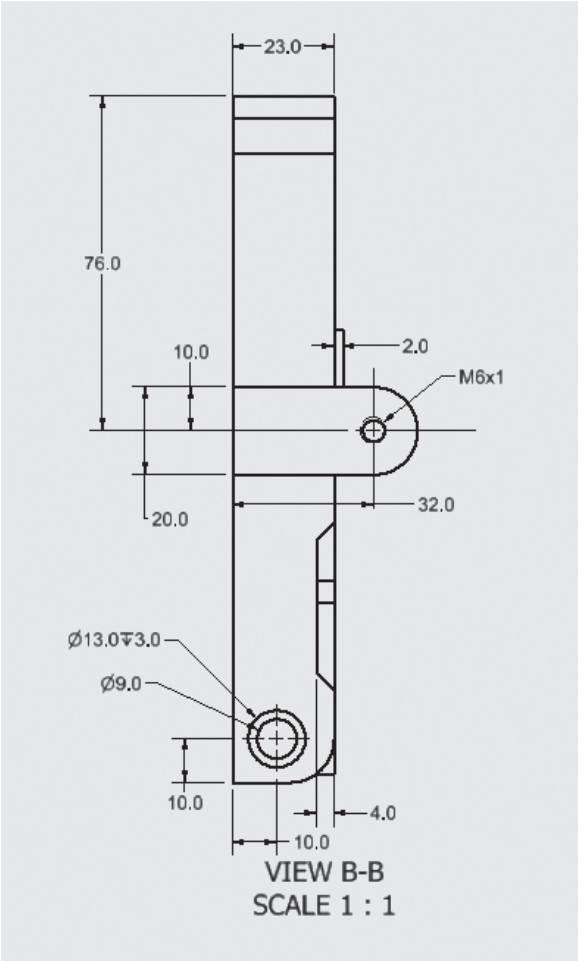


Figure 16-37F



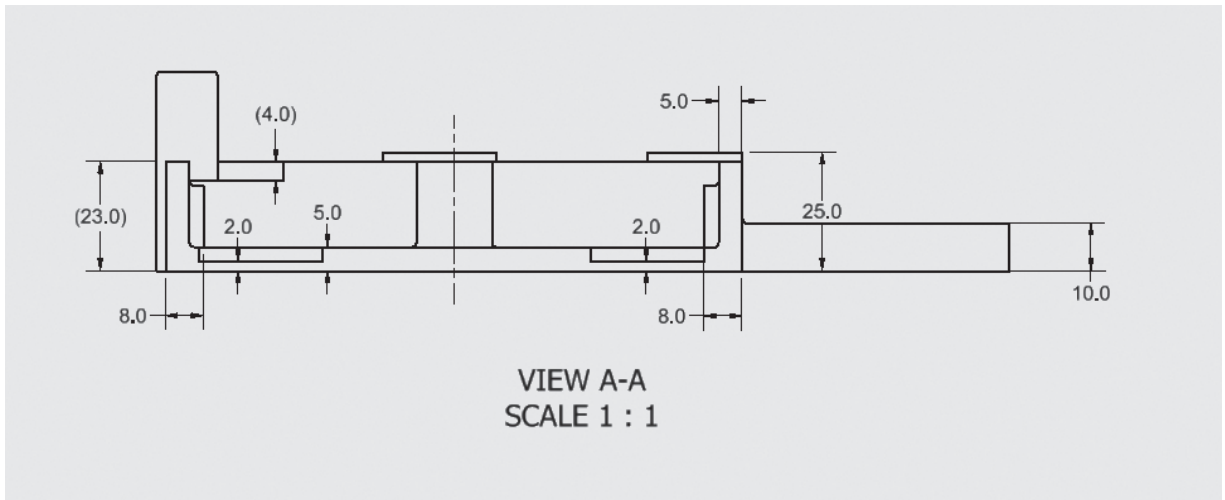
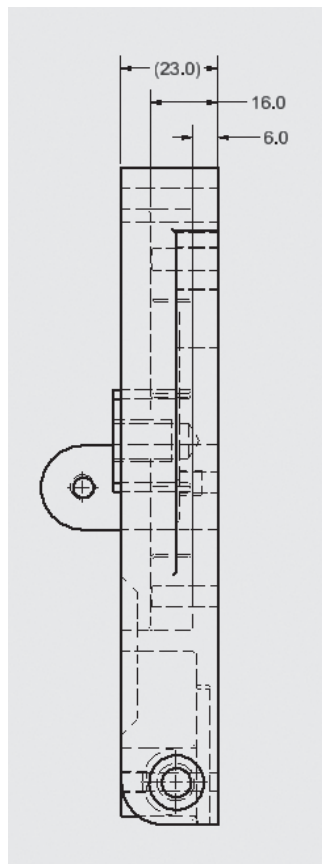


Figure 16-37G

Figure 16-37H

Right Side View



Lever Subassembly
PN: BU-133

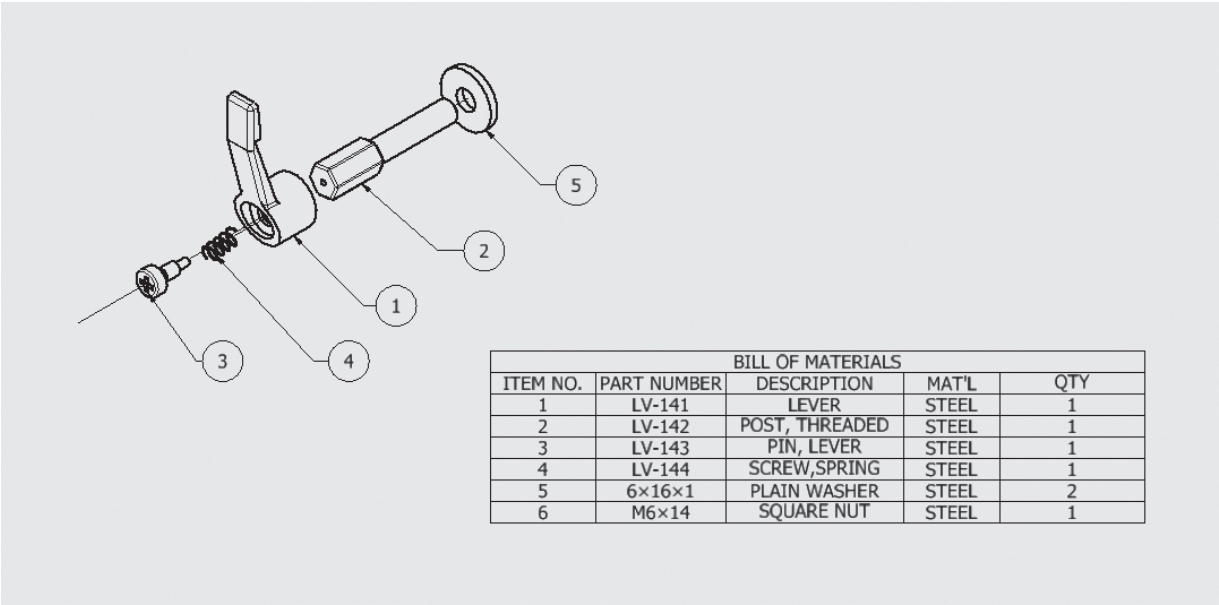


Figure 16-38A

Lever
PN: LV-141

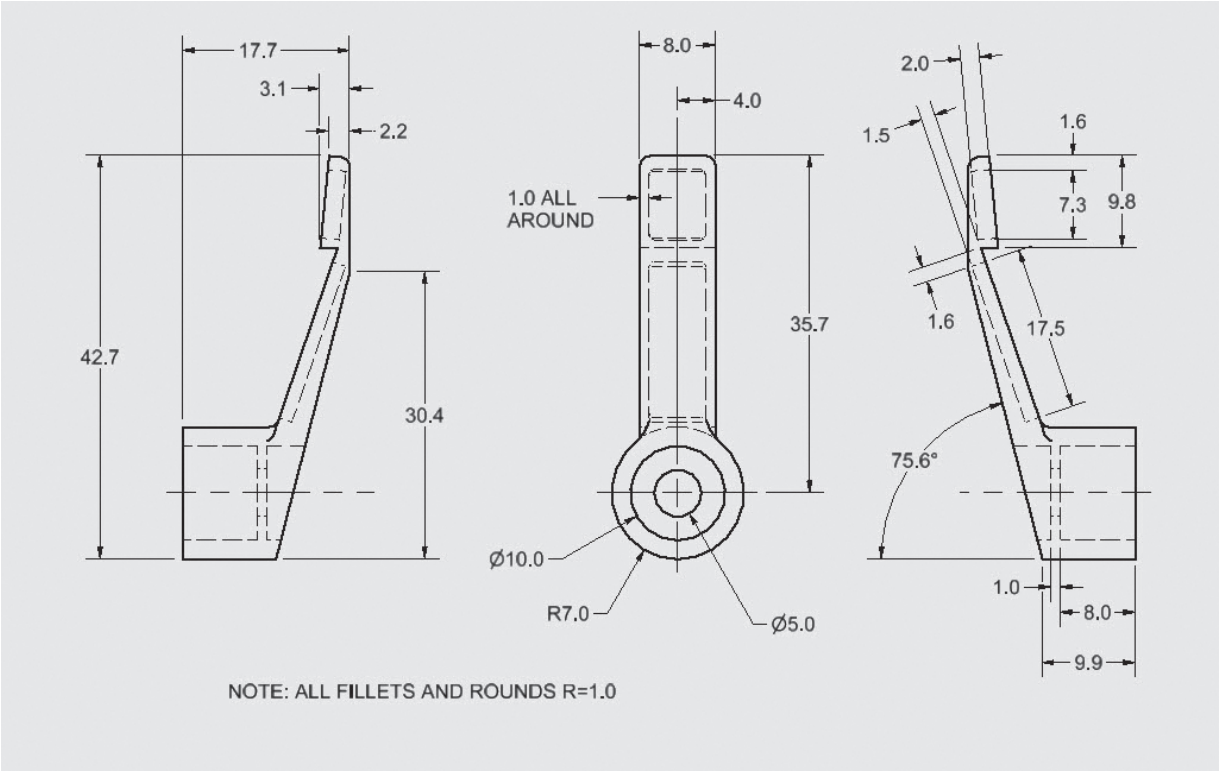


Figure 16-38B

Figure 16-38C

Post, Threaded
PN: LV-142

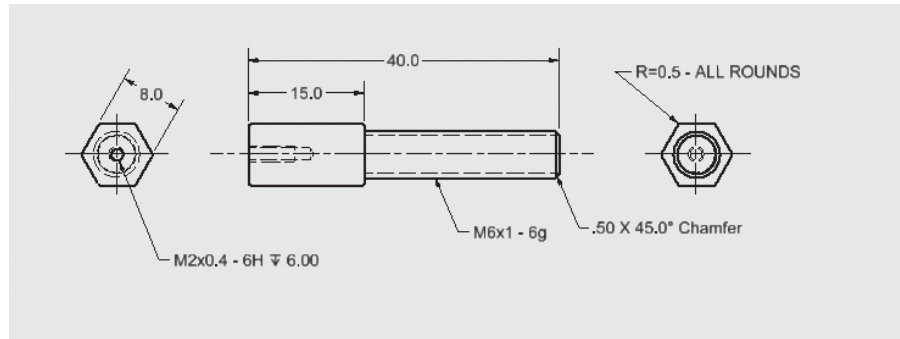


Figure 16-38D

Pin, Lever
PN: LV-143

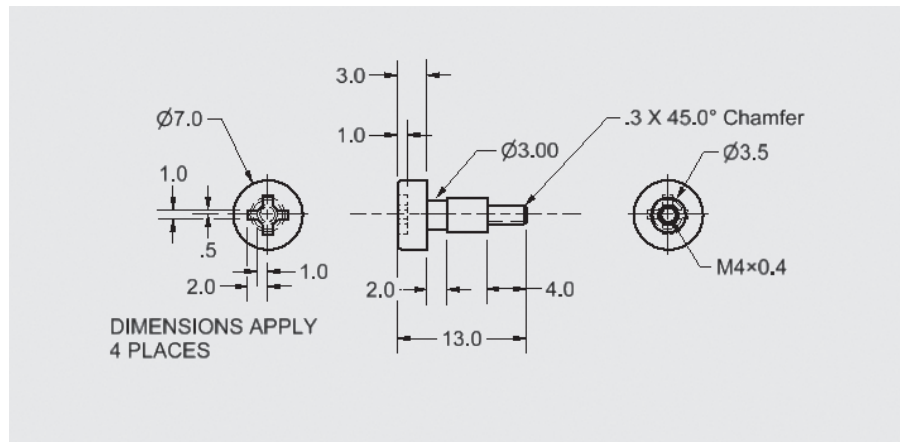


Figure 16-38E

Screw, Spring
PN: LV-144

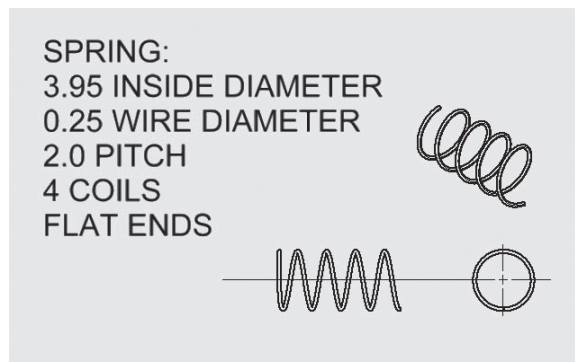


Figure 16-39A

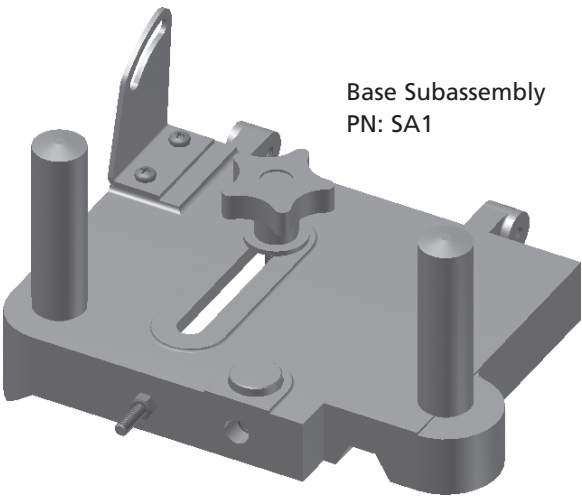


Figure 16-39B

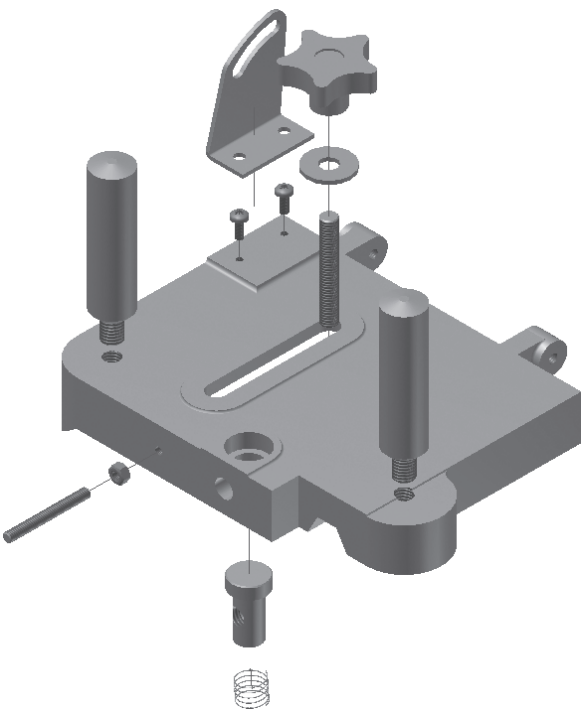


Figure 16-39C

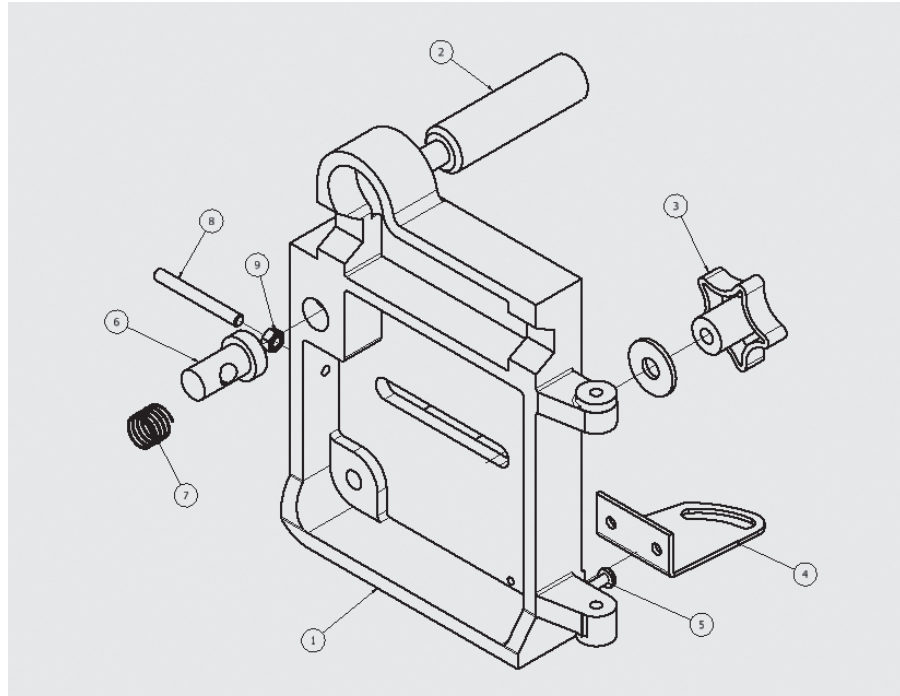


Figure 16-39D

PARTS LIST				
ITEM	PART NUMBER	DESCRIPTION	MATERIAL	QTY
1	BU-306-A	PLATE, BASE	CAST STEEL	1
2	P53-A2	POST, HANDLE, LARGE	STEEL	2
3	H5-21	LARGE KNOB SUB-ASSEMBLY		1
4	BU202	CLIP, BASE	STEEL	1
5	M4x0.7 x 10	Cross Recessed Pan Head Machine Screw	STEEL, MILD	2
6	P23-402	POST, RELEASE	STEEL	1
7	BU-003	SPRING	PIANO WIRE	1
8	M5x45	STUD	STEEL	1
9	M5	HEX NUT	Steel	1

Figure 16-40A

Plate, Base
BU-306-A

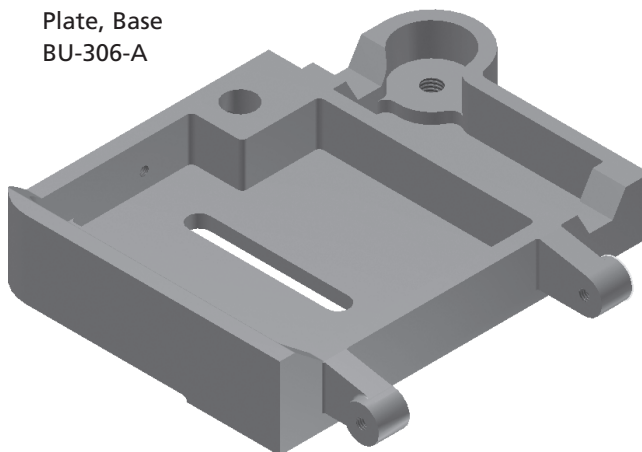


Figure 16-40B

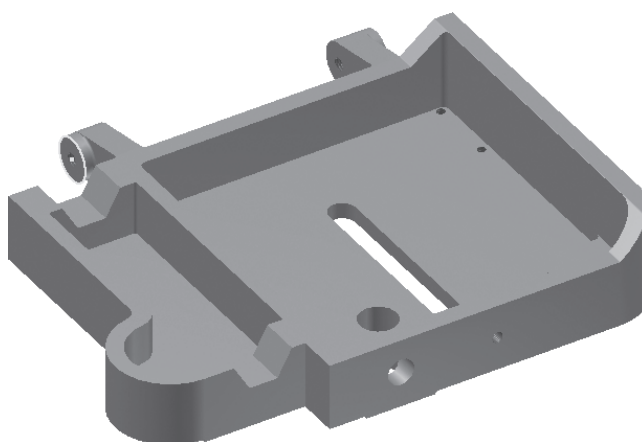
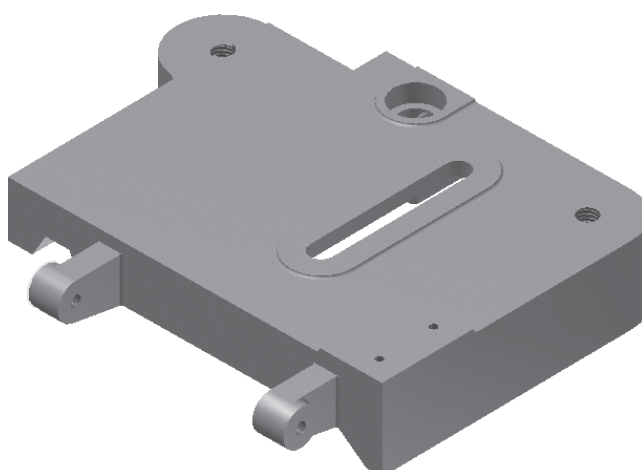


Figure 16-40C





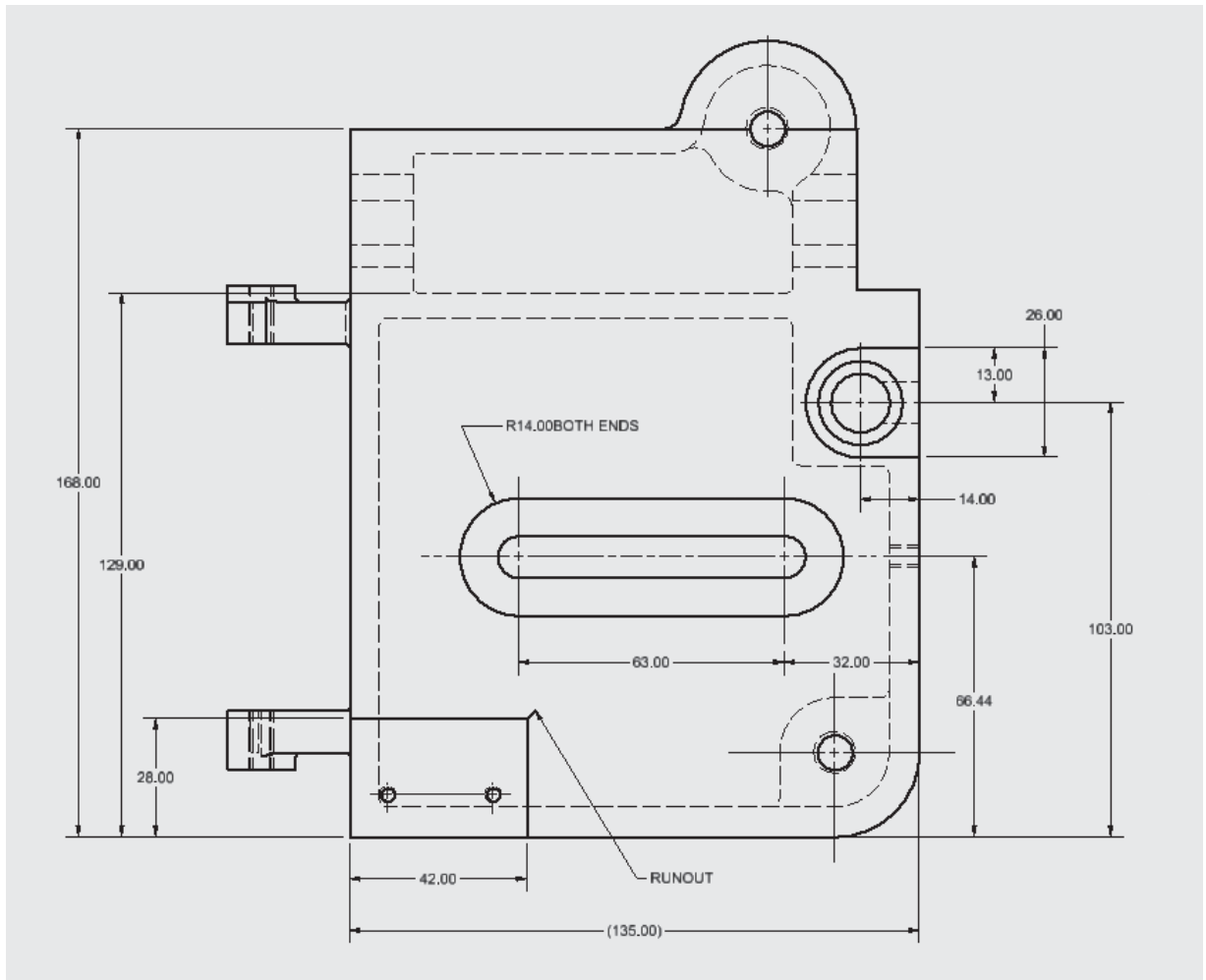
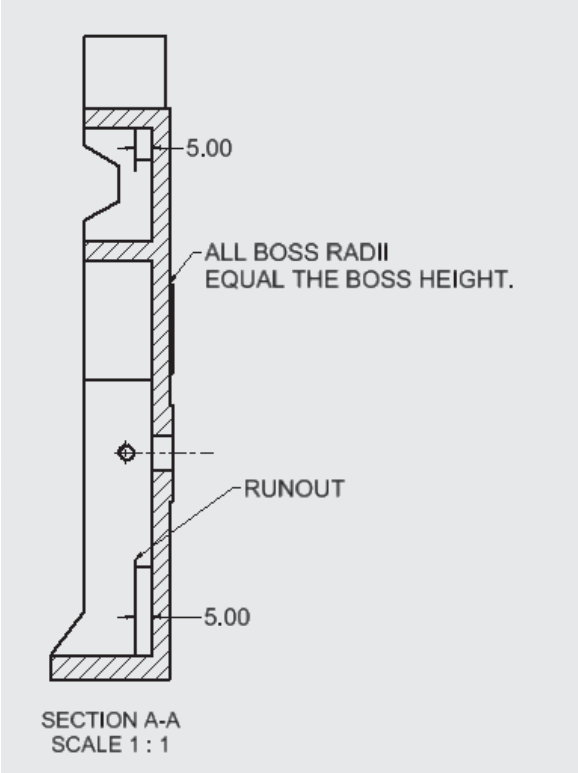


Figure 16-40F

Figure 16-40I



Post Handle, Large
PS3-A2

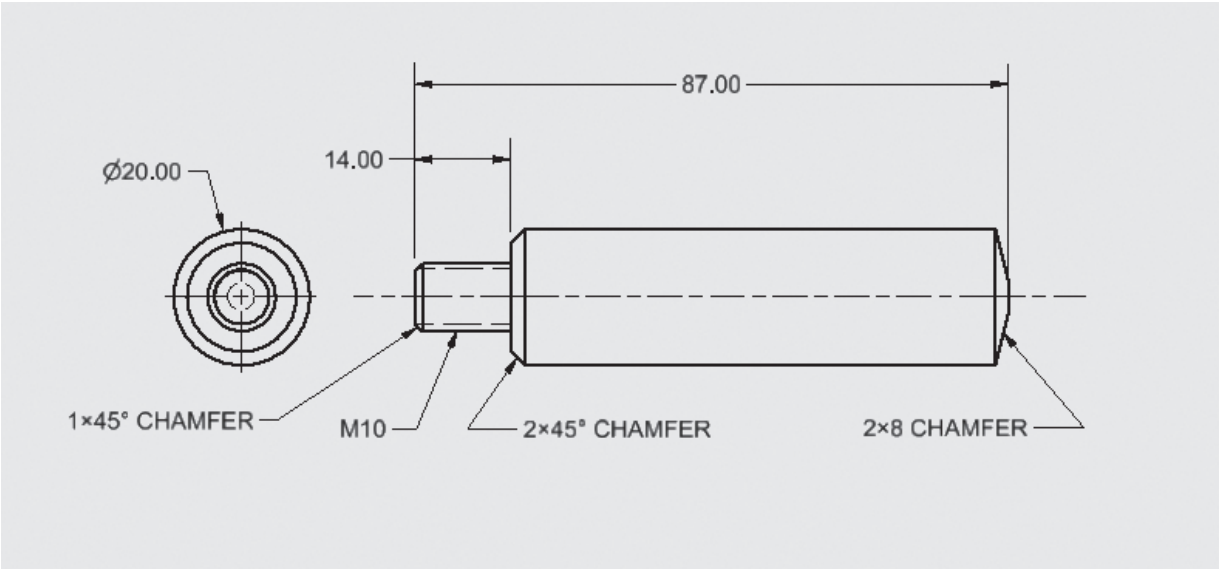


Figure 16-41

Large Knob Subassembly
PN: HS-21

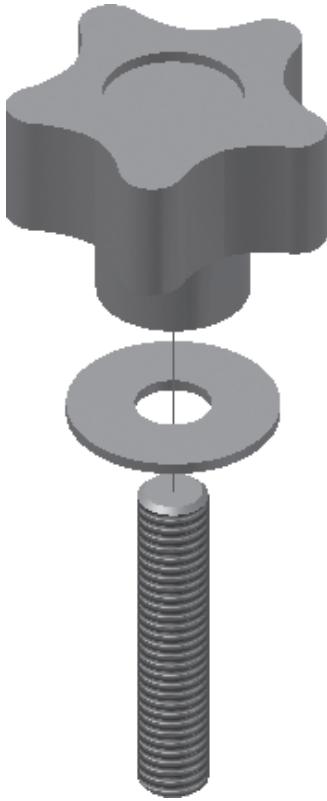


Figure 16-42A

Large Knob Subassembly
PN: HS-21

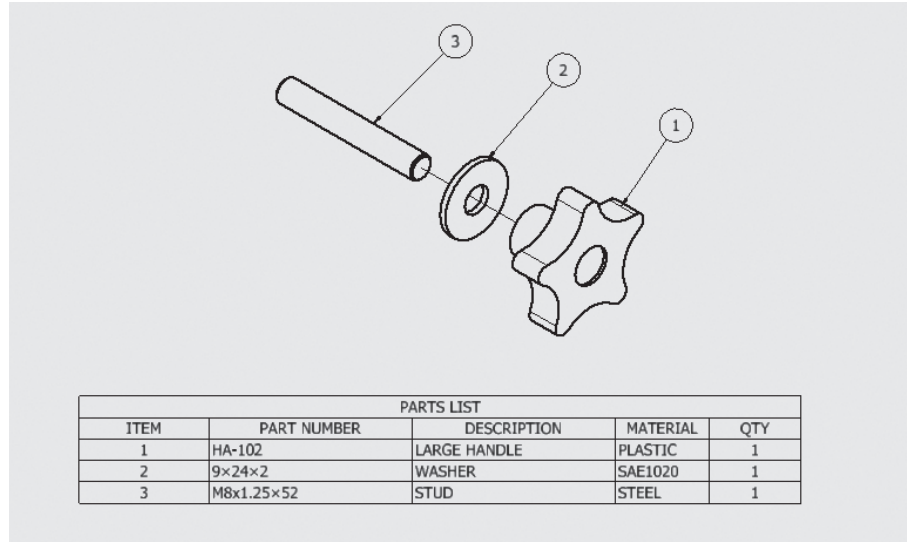
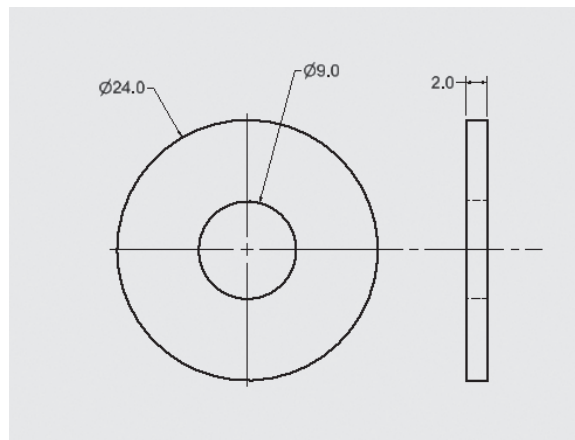


Figure 16-42B

Figure 16-42C

Washer
9 × 24 × 2



Large Handle
PN: HA-102

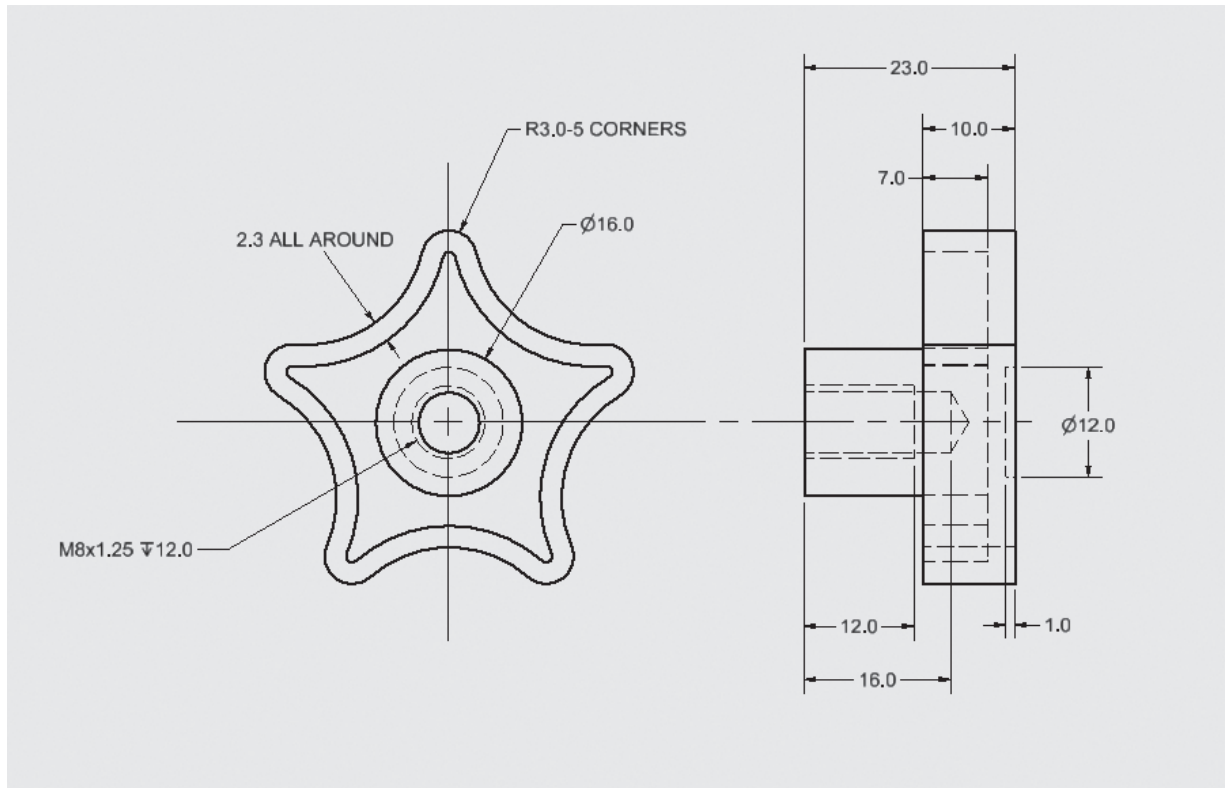
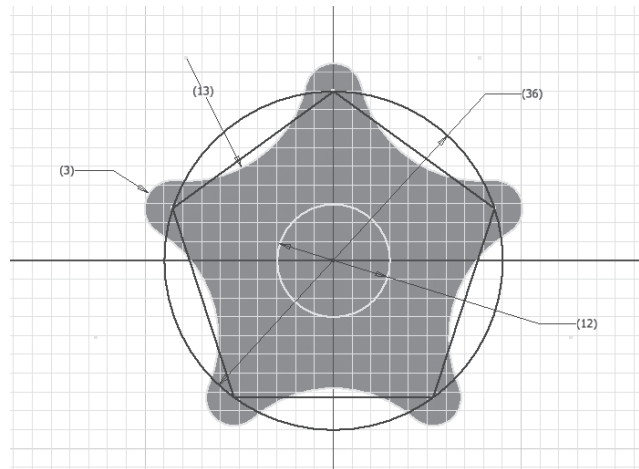


Figure 16-42D

Figure 16-42E

Layout for Large Handle



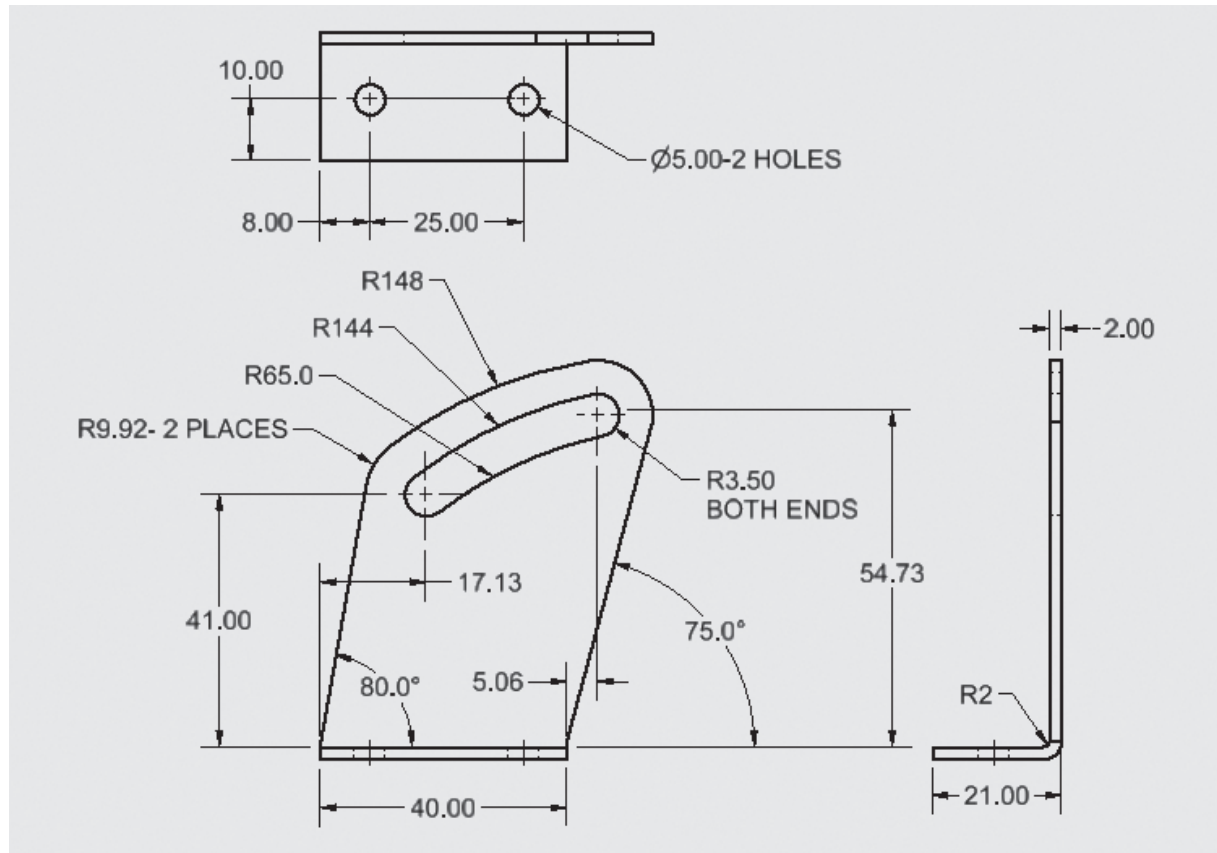
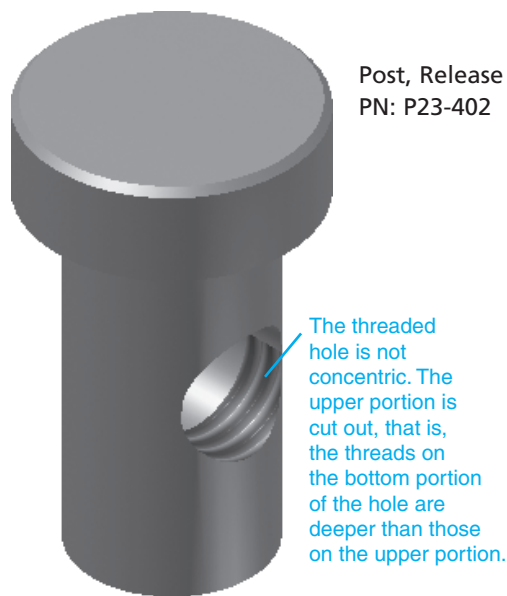


Figure 16-43

Figure 16-44A



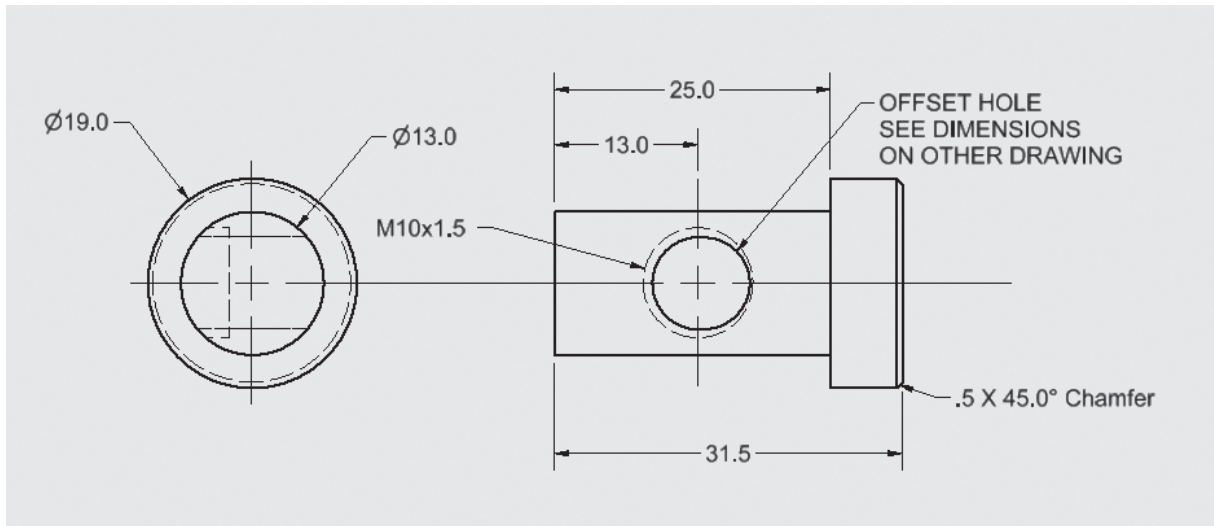


Figure 16-44B

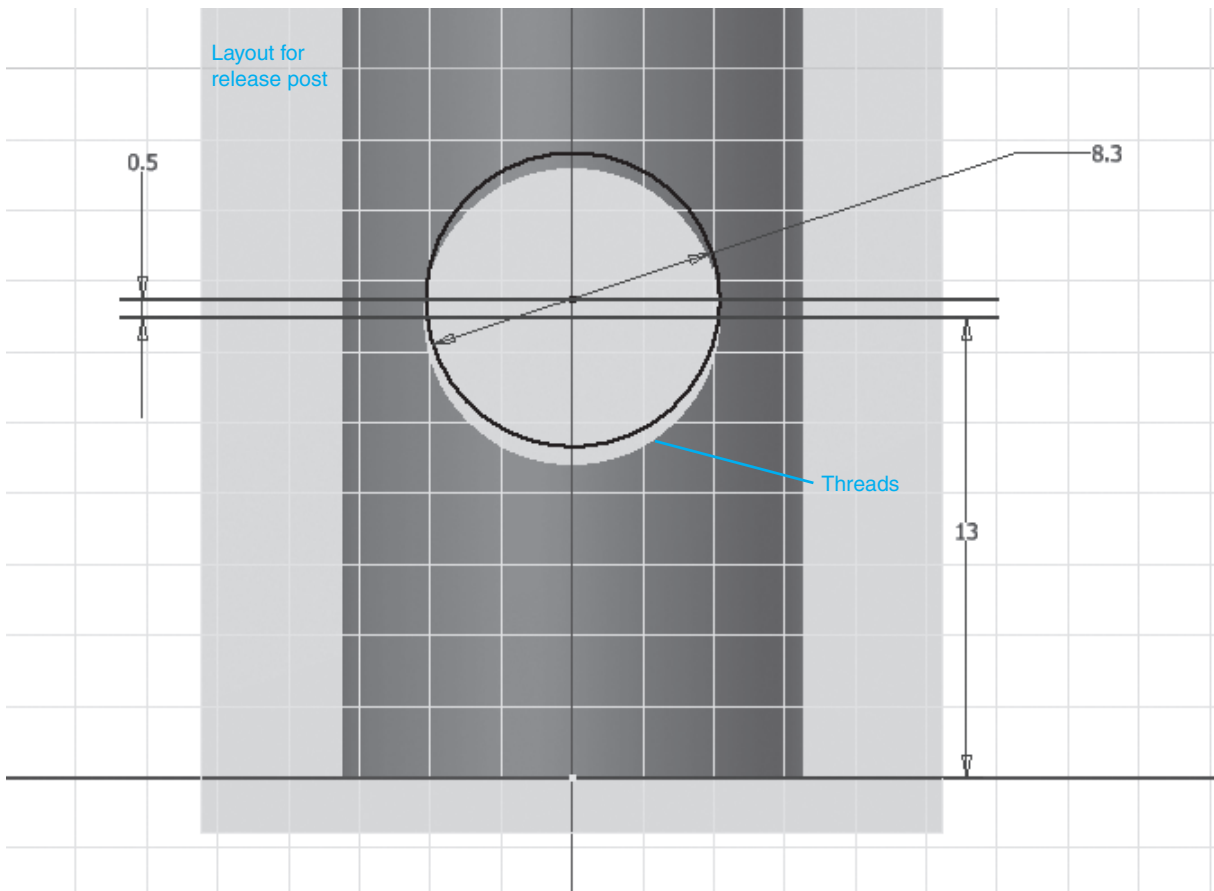
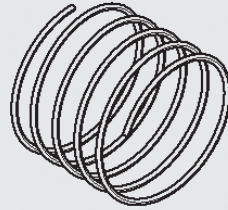


Figure 16-44C

Spring
PN: BU-003

Figure 16-45

SPRING:
6.7 INSIDE DIAMETER
0.50 WIRE DIAMETER
2.5 PITCH
12.0 HEIGHT
FLAT ENDS



Stud
PN: MS × 45

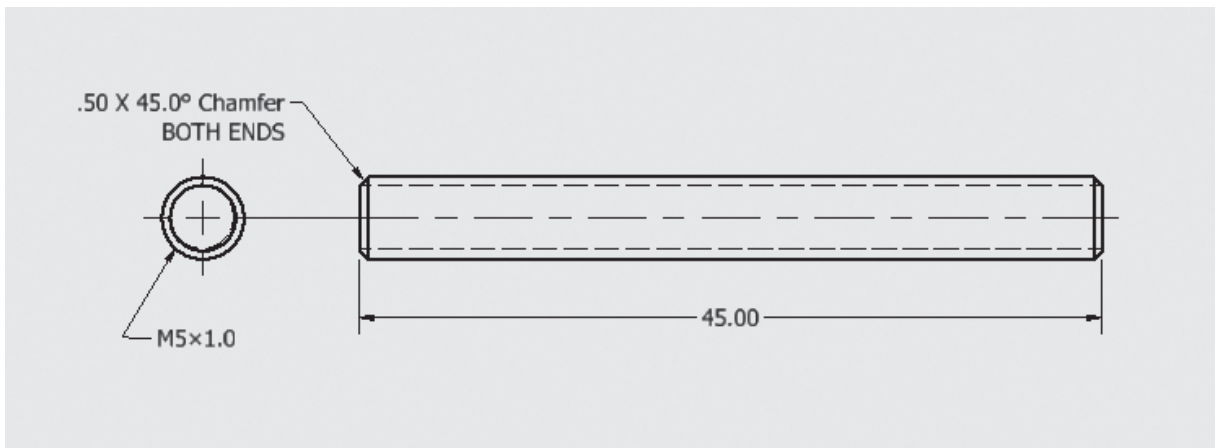


Figure 16-46

Guide Subassembly
PN: SA-4

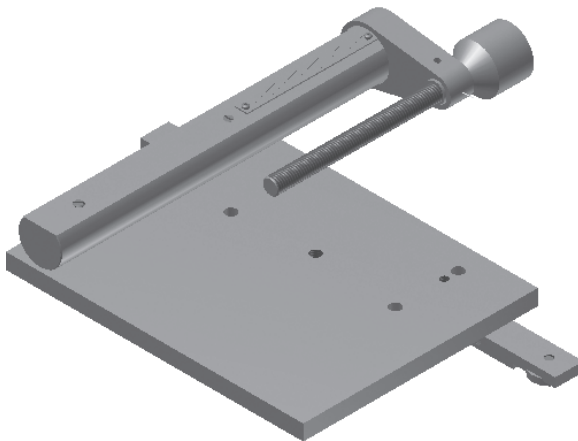


Figure 16-47A

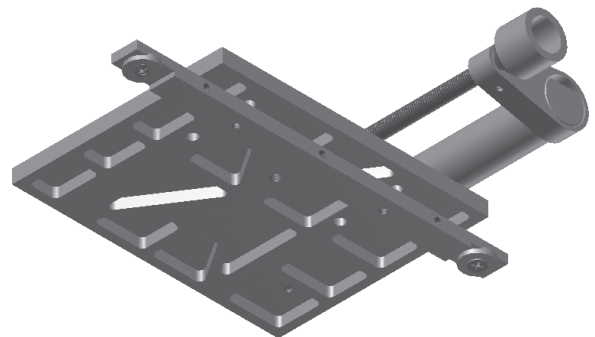


Figure 16-47B

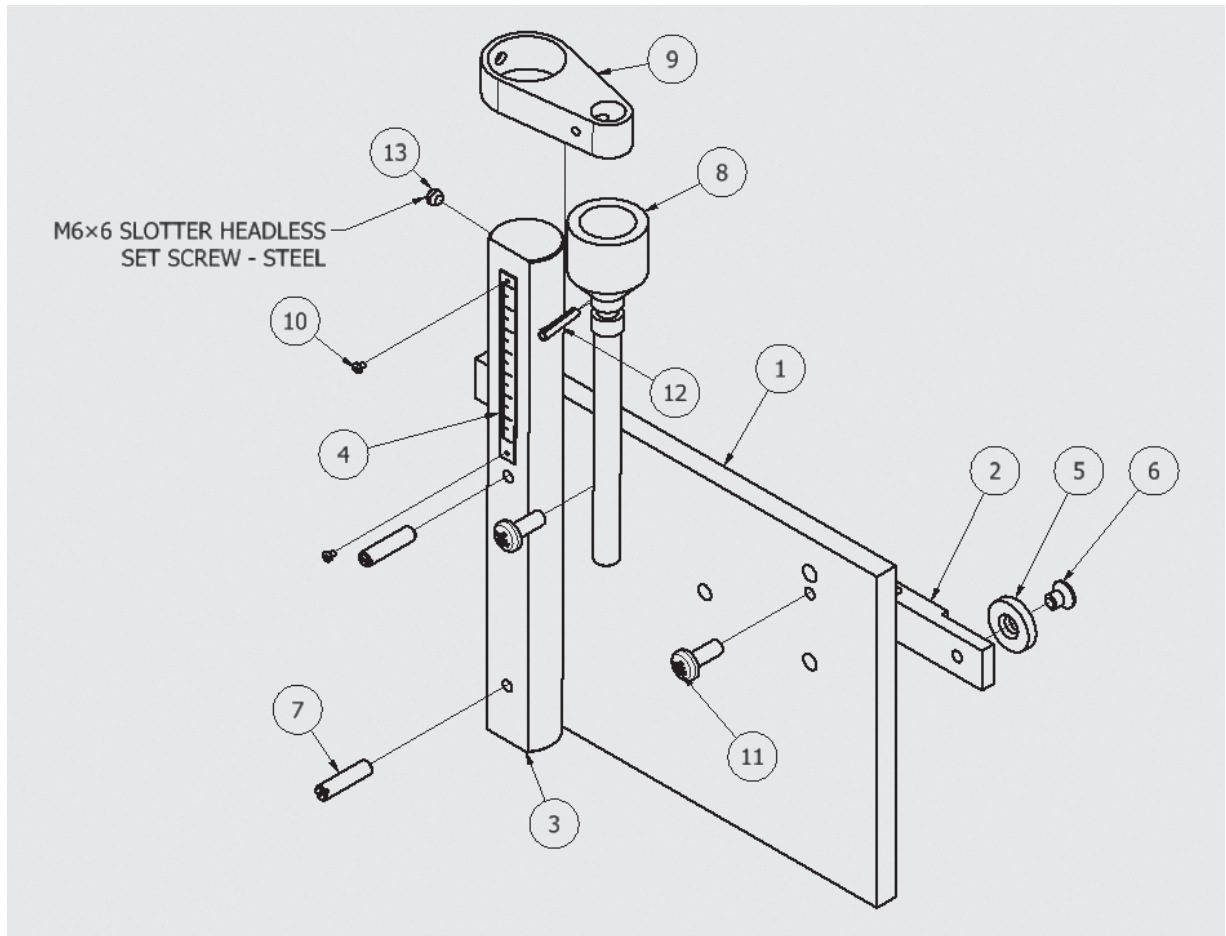


Figure 16-47C

Figure 16-47D

PARTS LIST				
ITEM	PART NUMBER	DESCRIPTION	MATERIAL	QTY
1	G101-A1	PLATE, GUIDE	STEEL	1
2	G101-A2	BAR, GUIDE	STEEL	1
3	G101-A3	POST, GUIDE	STEEL	1
4	RR-6-40	RULER	STEEL	1
5	RG-1005	ROLLER, GUIDE	STEEL	2
6	M6x1 x 8	Cross Recessed Flat Countersunk Head Machine Screw	MILD STEEL	2
7	M6 x 25	Slotted Headless Set Screw - Flat Point	Steel	2
8	G103-2	SCREW, GUIDE	Steel	1
9	G101-4A	PLATE, GUIDE	STEEL	1
10	M2x0.4 x 3	Cross Recessed Pan Head Machine Screw	MILD STEEL	2
11	M6x1 x 16	Cross Recessed Pan Head Machine Screw	MILD STEEL	2
12	G101-63	PIN, HOLDER	STEEL	1

Plate, Guide
PN: G101-A1

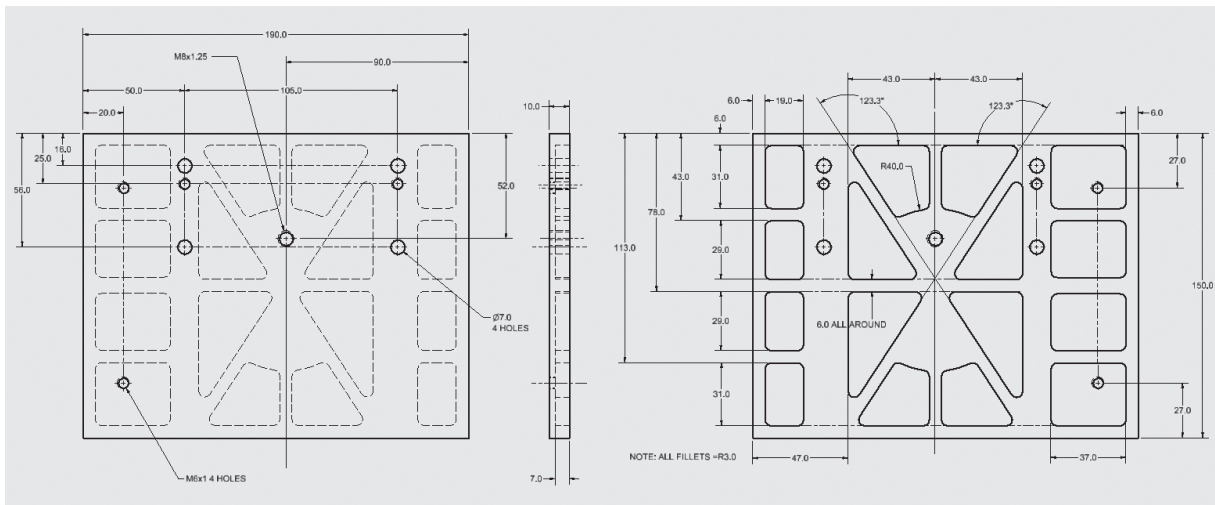


Figure 16-48

Bar, Guide
PN: G101-A2

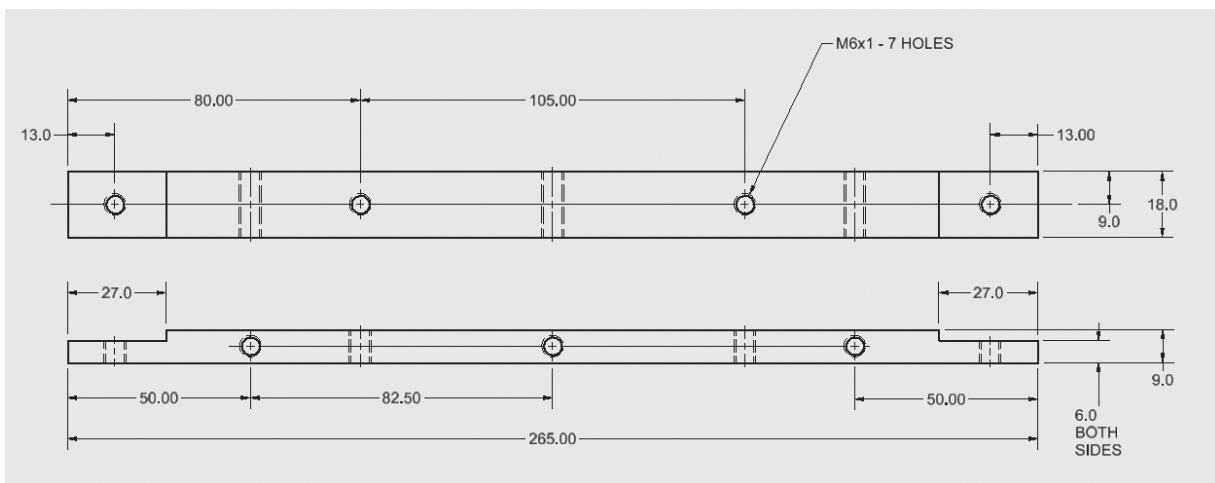


Figure 16-49

Post Guide
 PN: G101-A3

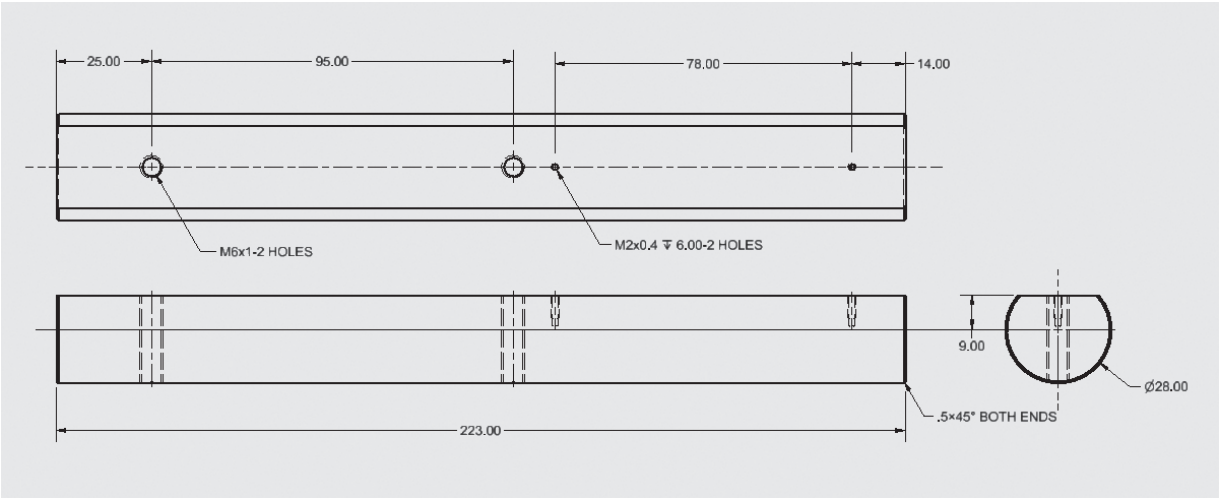


Figure 16-50

Figure 16-51

Ruler
 PN: RR-6-40

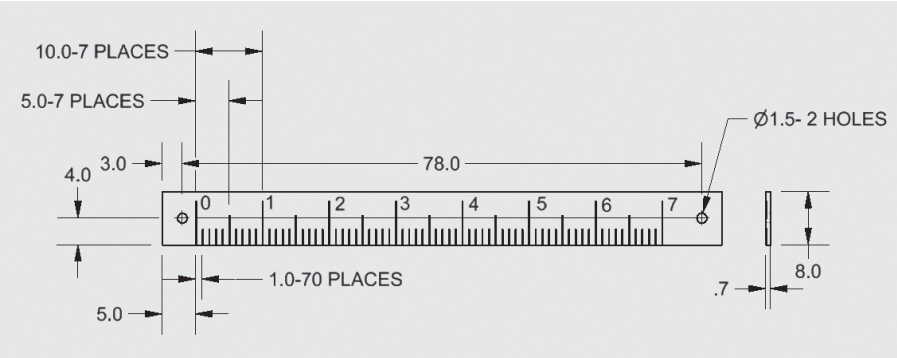
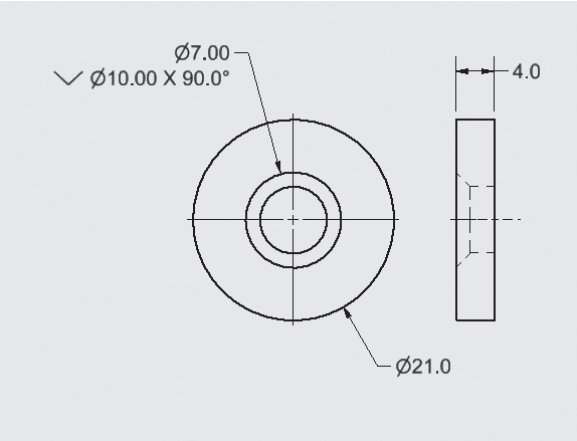


Figure 16-52

Ruler, Guide
 PN: RG-1005



Screw, Guide
PN: G103-2

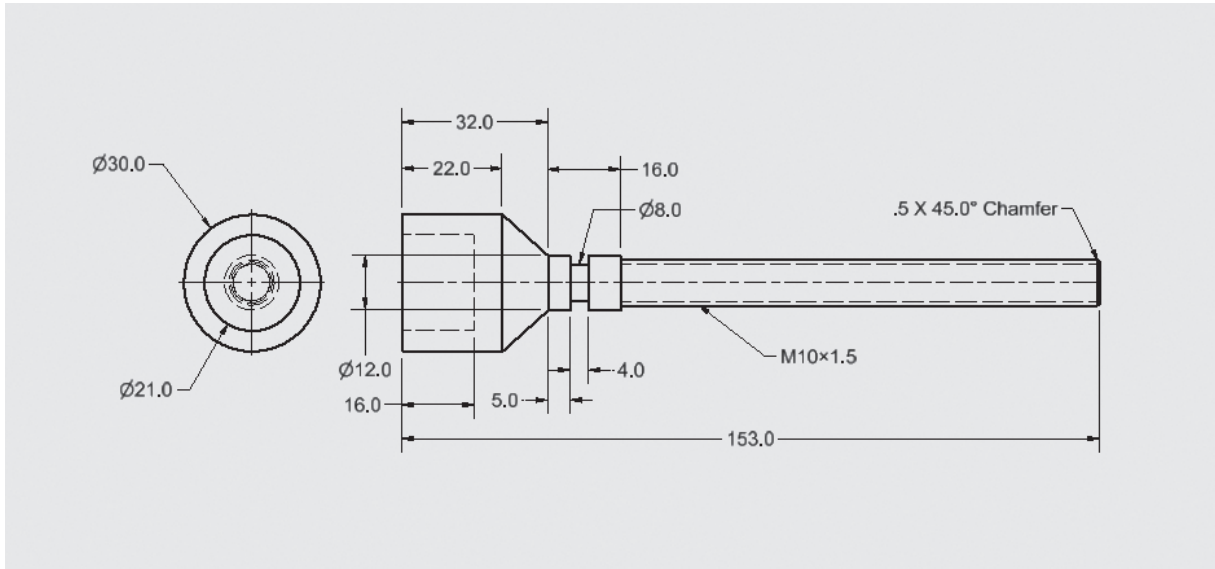


Figure 16-53

Plate, Guide
PN: G101-4A

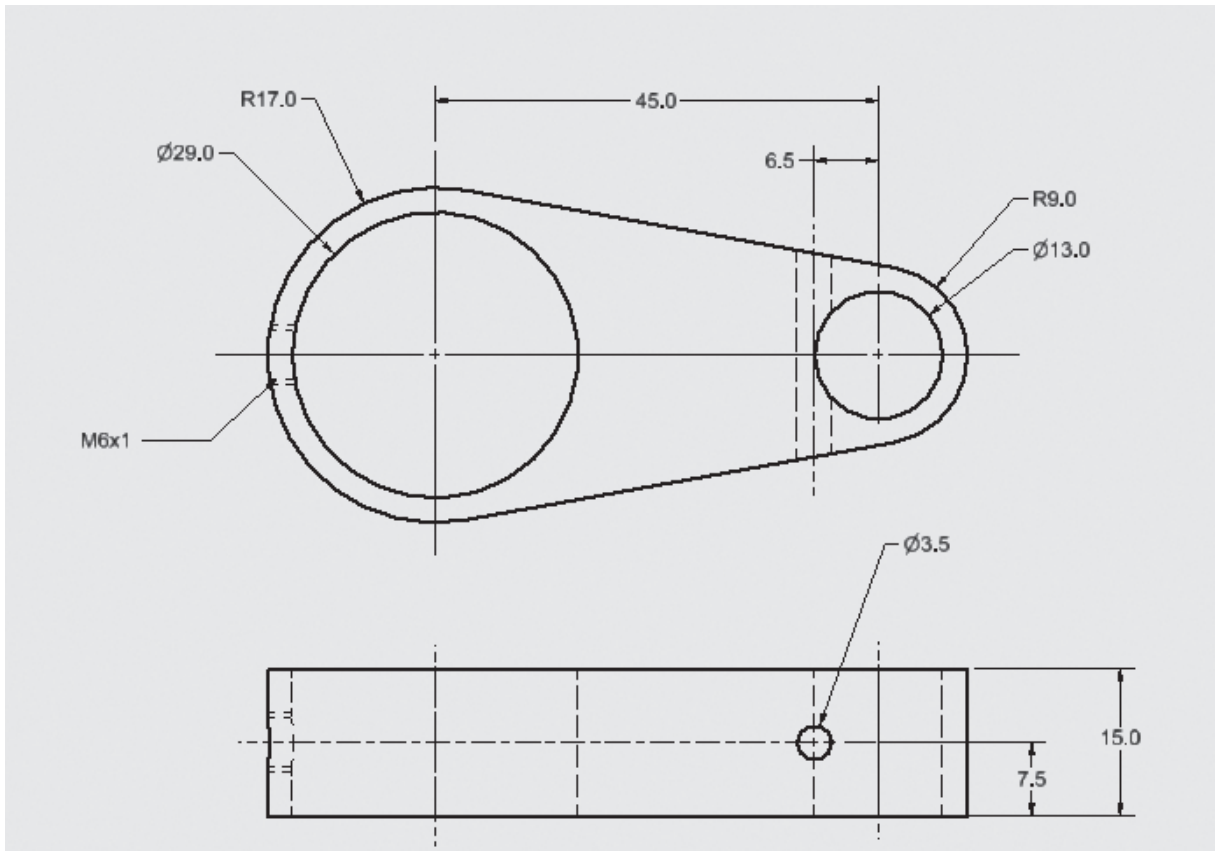


Figure 16-54

Figure 16-55

Pin, Holder
PN: G101-63

