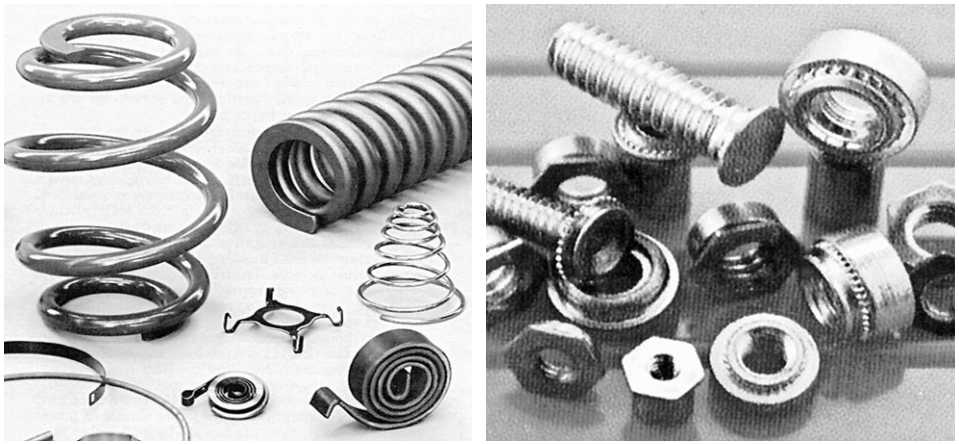


(a) (b)

Figure 13-0.1

(a) Springs. (b) Screws and Fasteners. From Machine Design: An Integrated Approach by Robert Norton, © 1996. *Reprinted by permission of Prentice-Hall, Inc.*

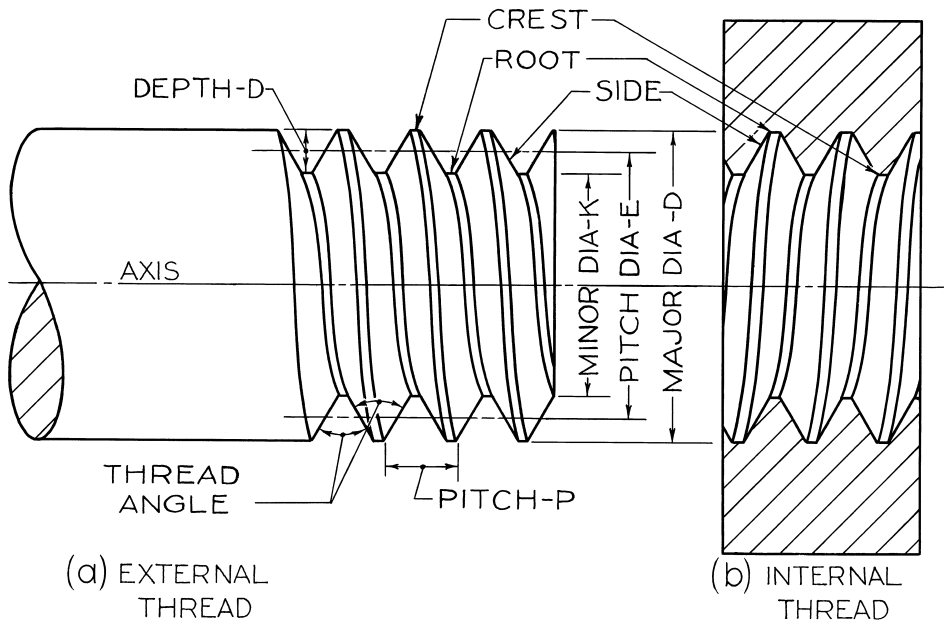



Figure 13-1

Screw Thread Nomenclature.

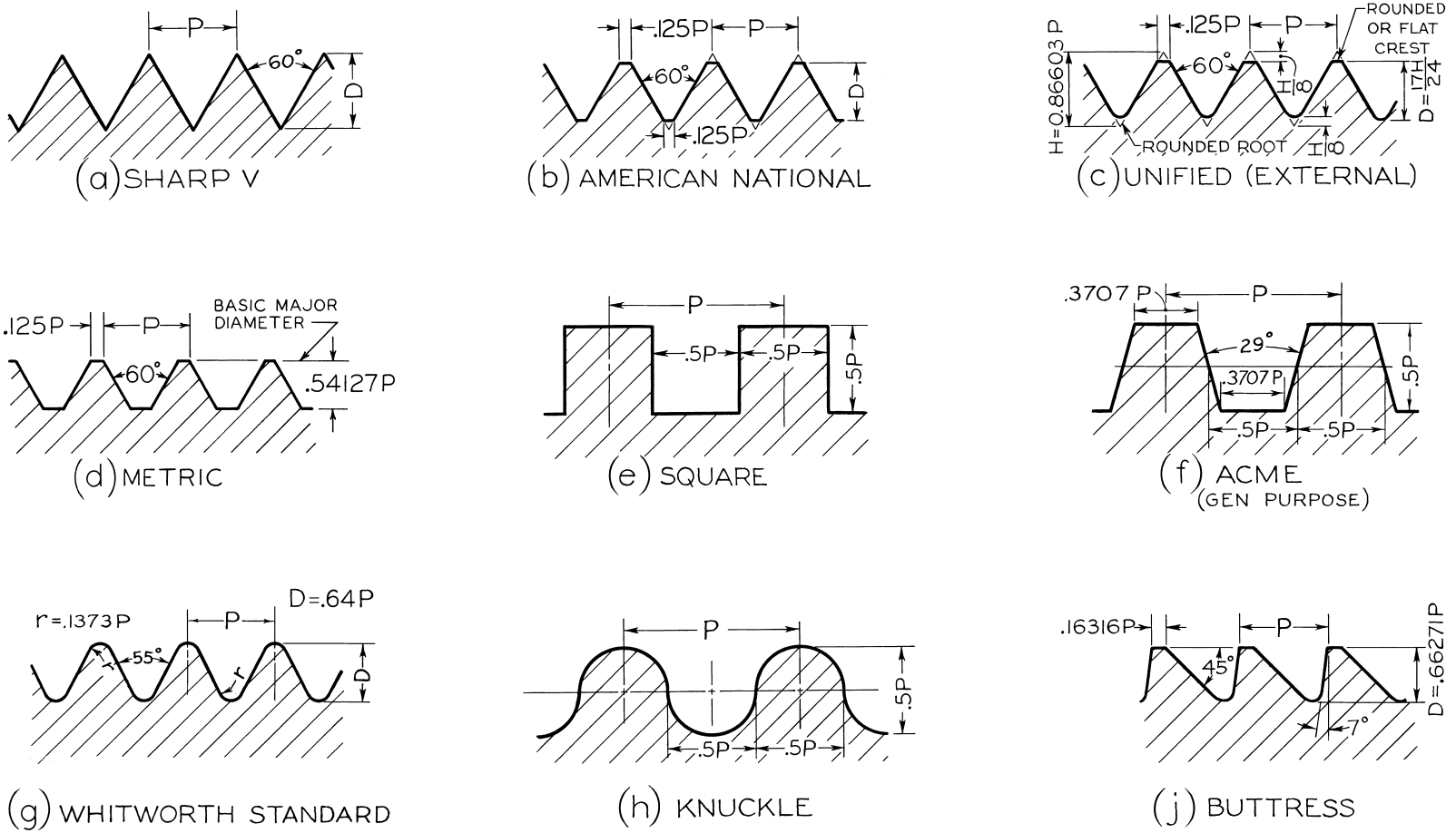



Figure 13-2

Screw Thread Forms.

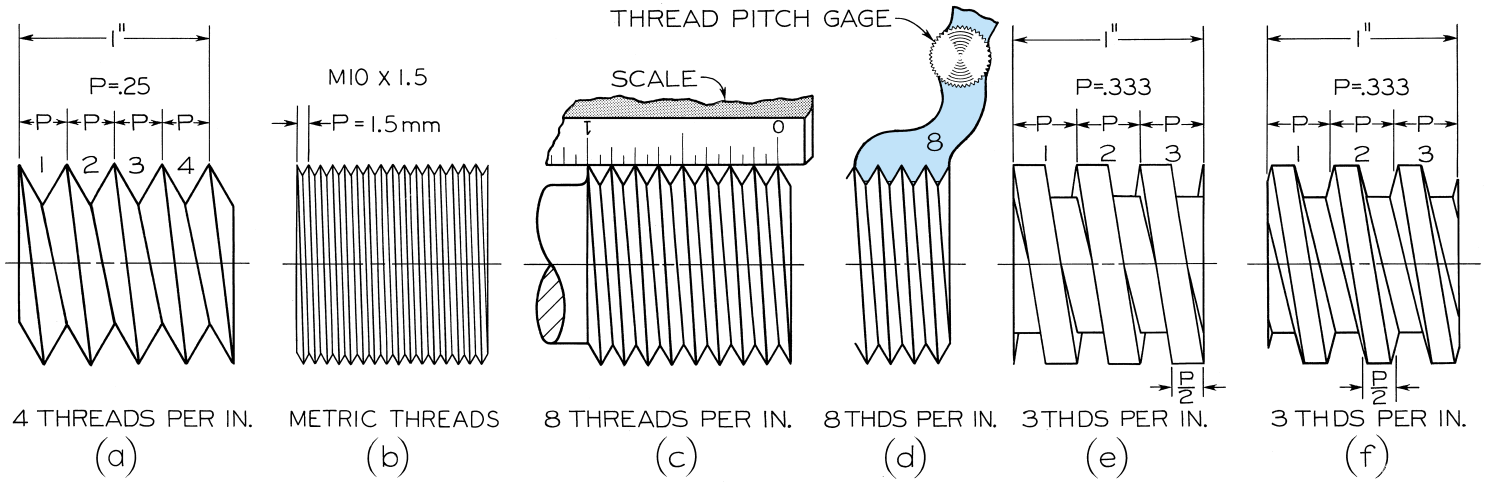



Figure 13-3

Pitch of Threads.

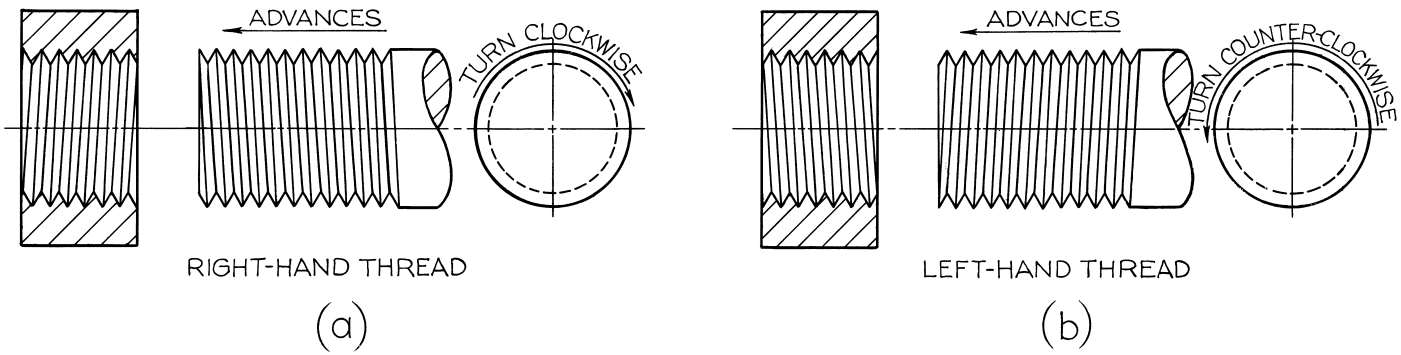



Figure 13-4

Right-Hand and Left-Hand Threads.

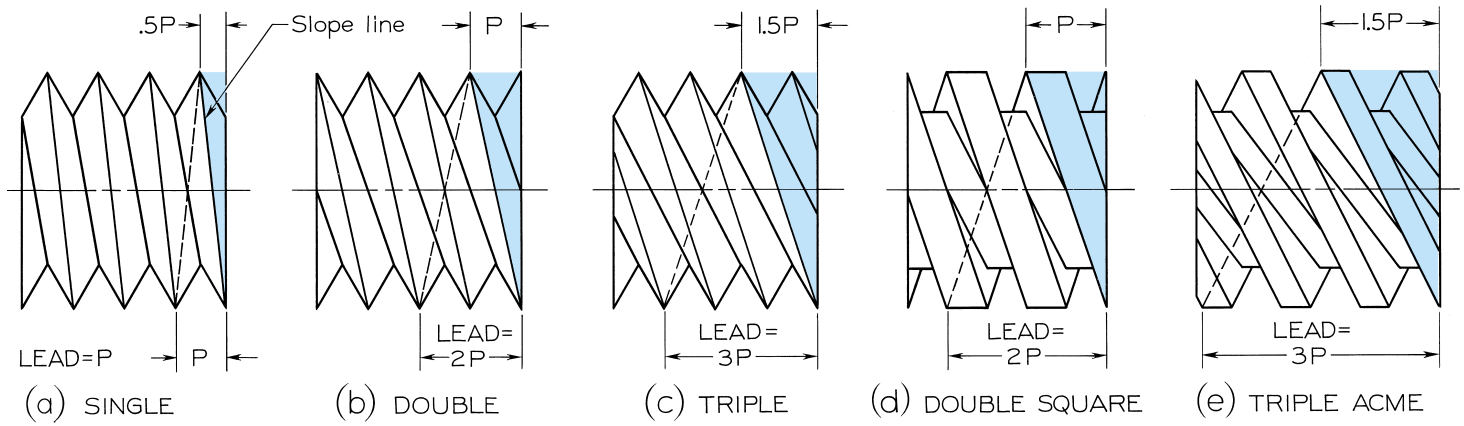



Figure 13-5

Multiple Threads.

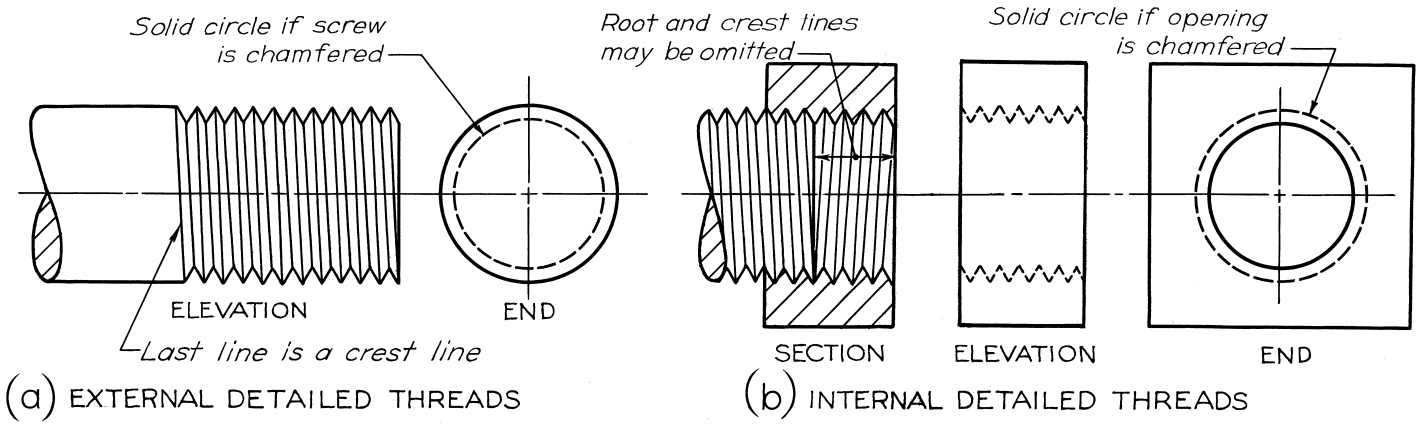



Figure 13-6

Detailed Metric, American National, and Unified Threads.

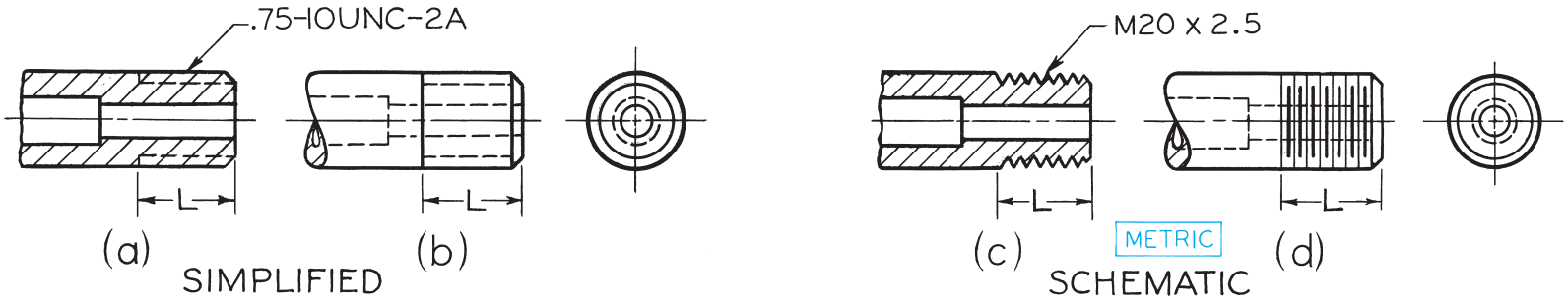



Figure 13-7

External Thread Symbols.

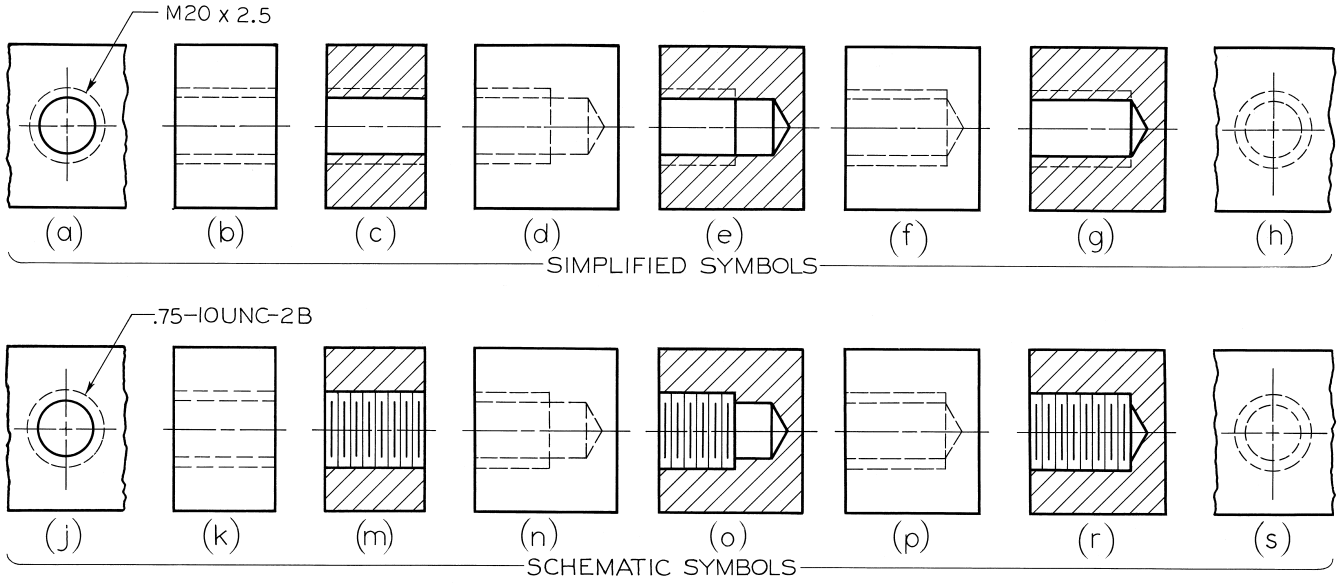



Figure 13-8

Internal Thread Symbols.

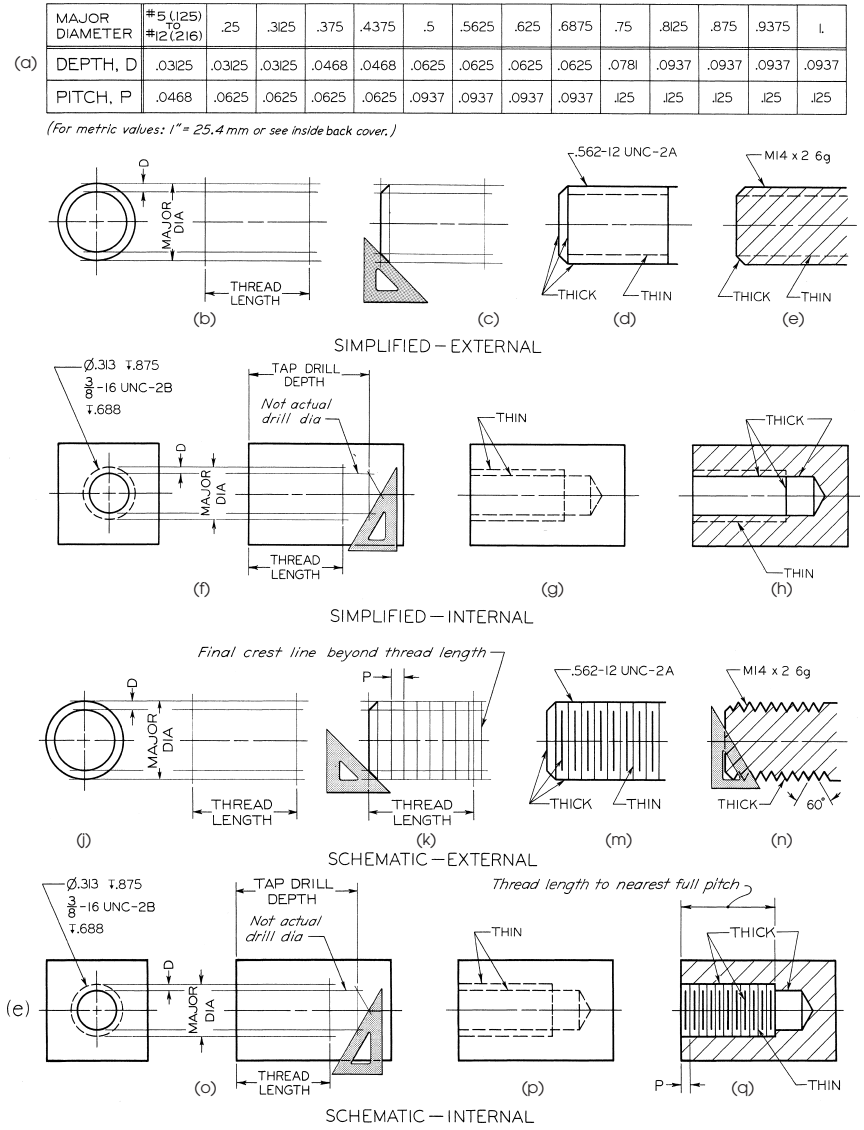



Figure 13-9

To Draw Thread Symbols—Simplified and Schematic.

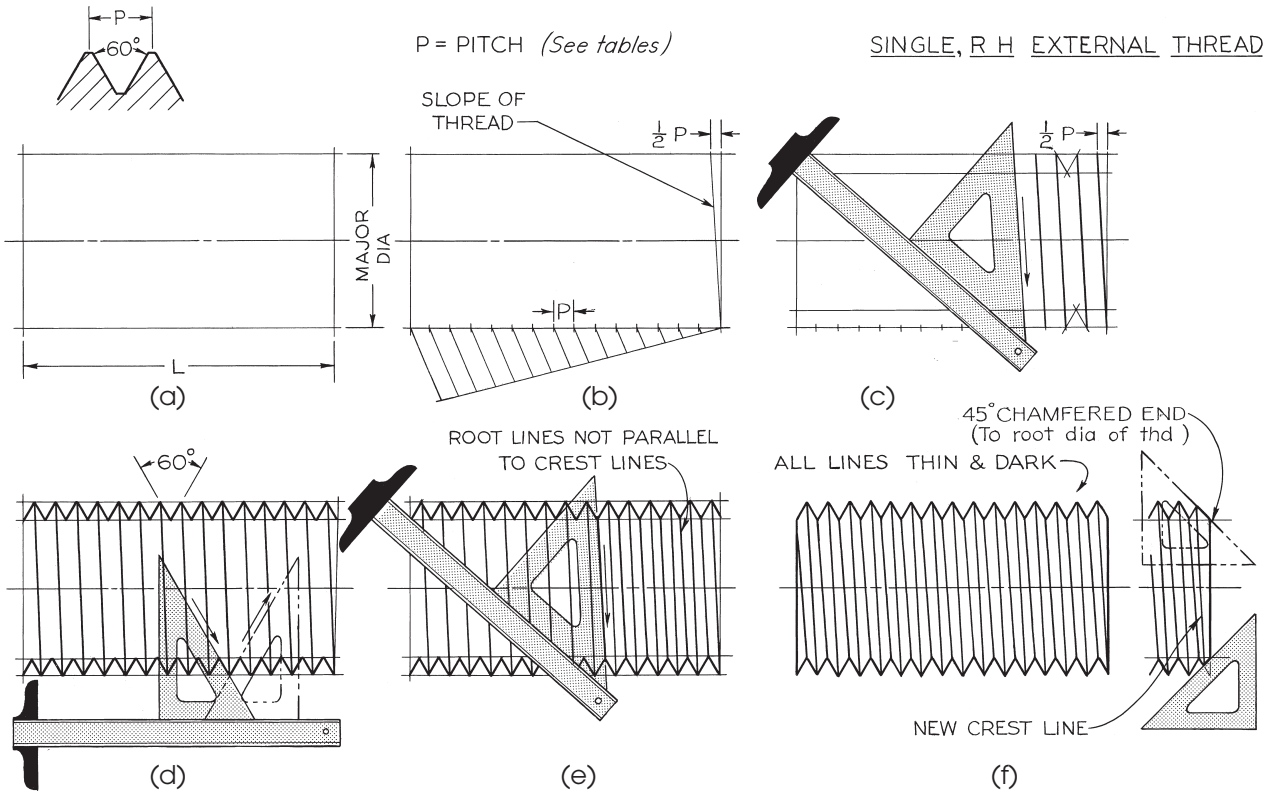



Figure 13-10

Detailed Representation—External Metric, Unified, and American National Threads.

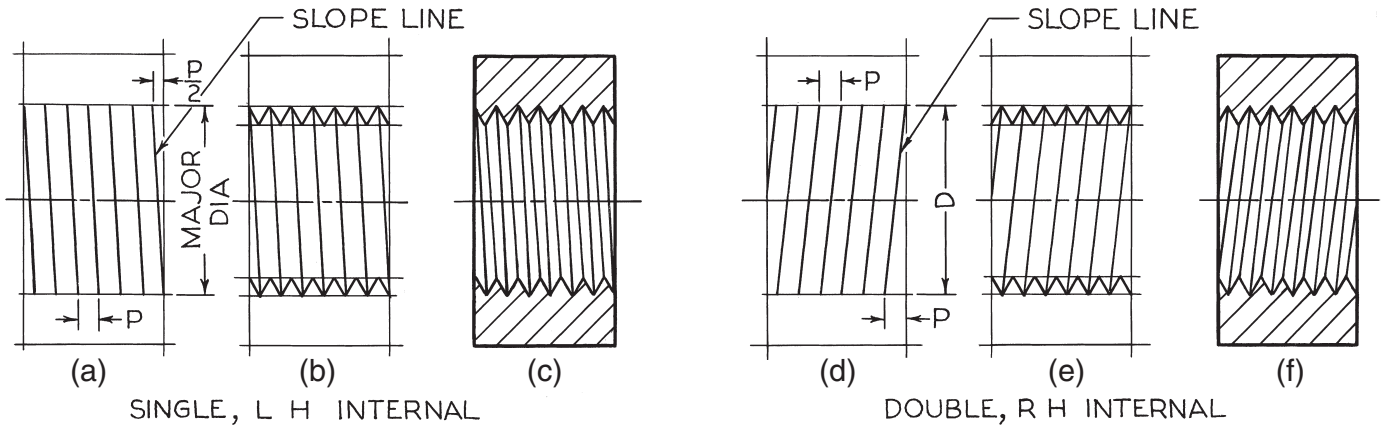



Figure 13-11

Detailed Representation—Internal Metric, Unified, and American National Threads.

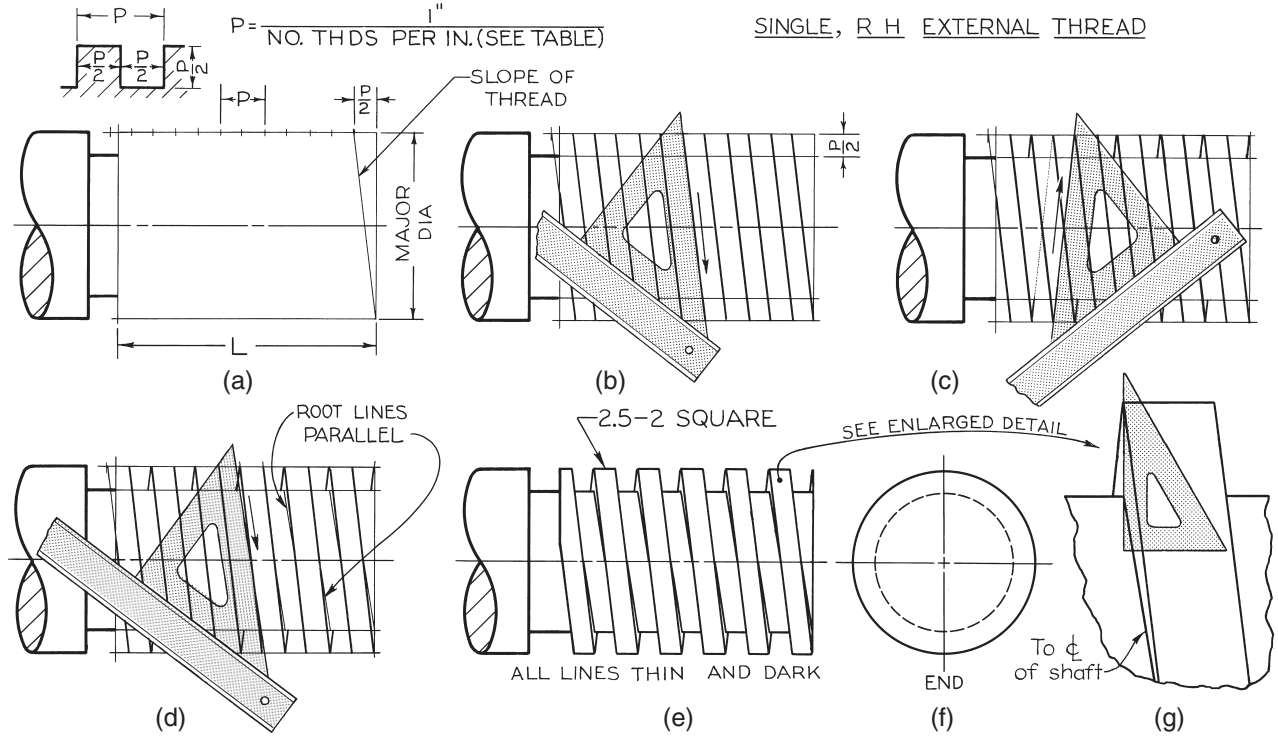



Figure 13-12

Detailed Representation—External Square Threads.

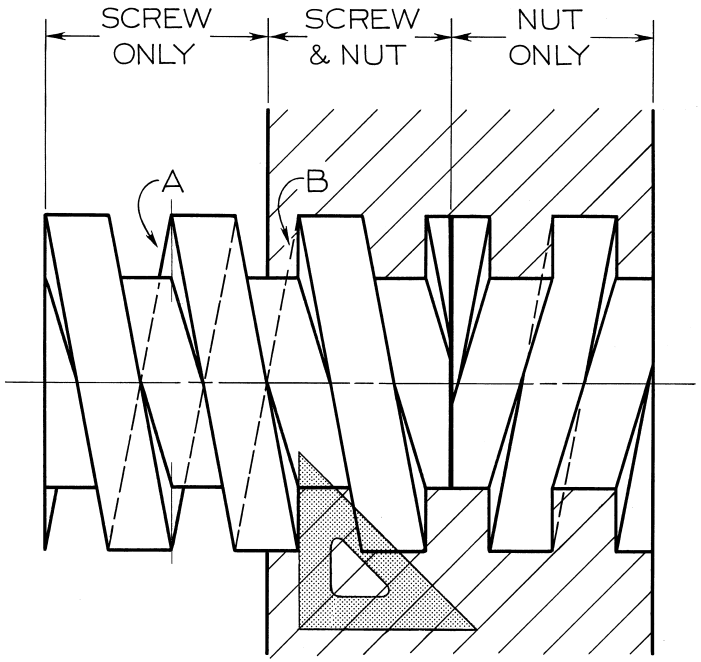



Figure 13-13

Square Threads in Assembly.

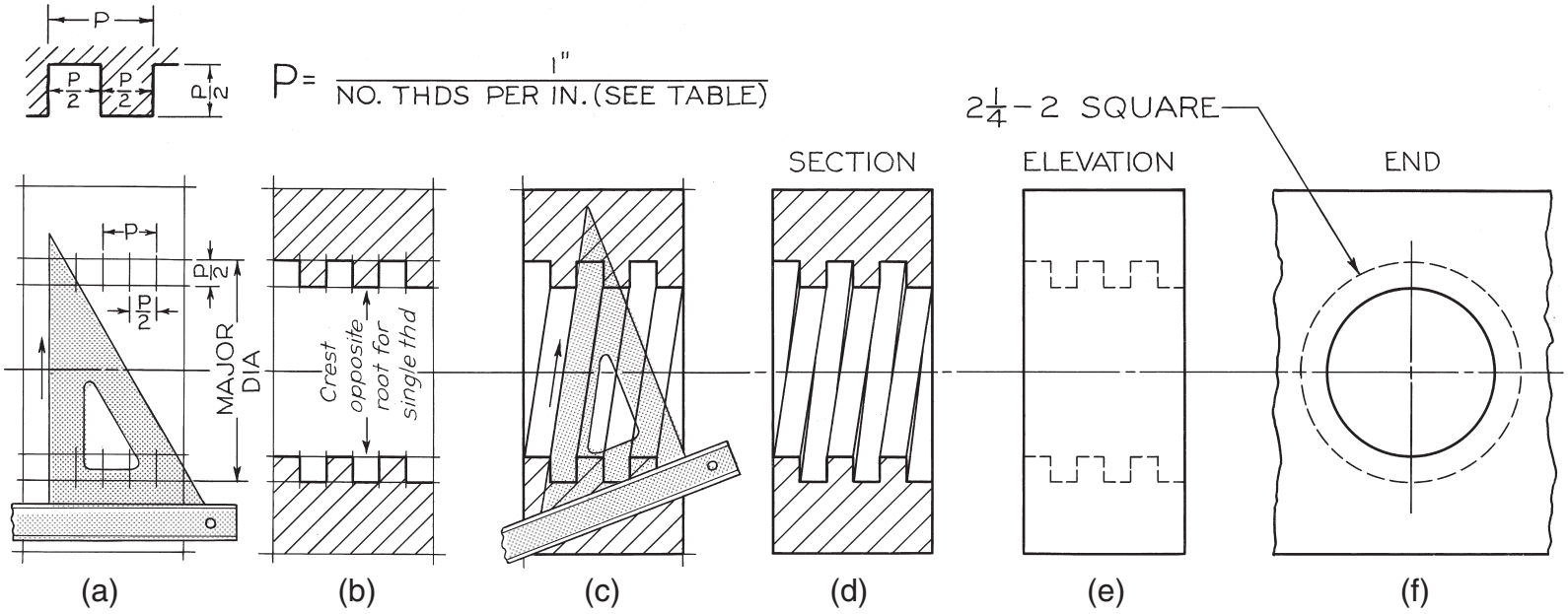



Figure 13-14

Detailed Representation—Internal Square Threads.

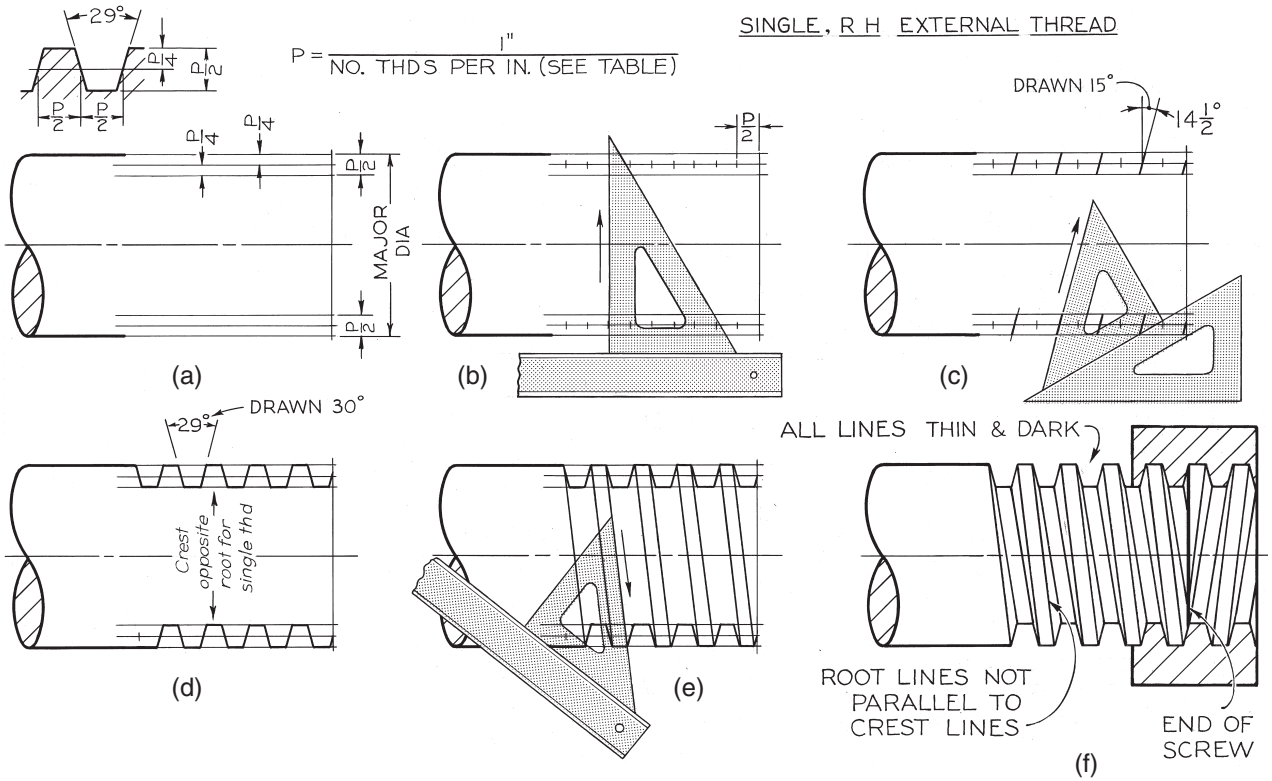



Figure 13-15

Detailed Representation—Acme Threads.

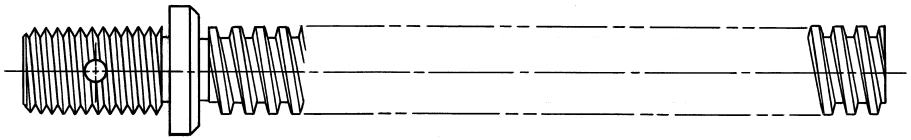


Figure 13-16

Use of Phantom Lines.

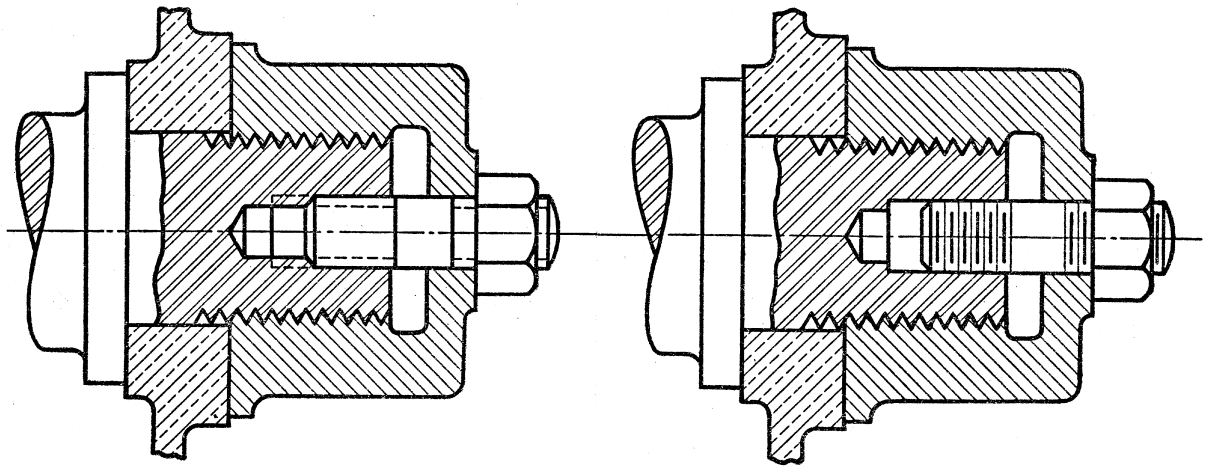



Figure 13-17

Threads in Assembly.

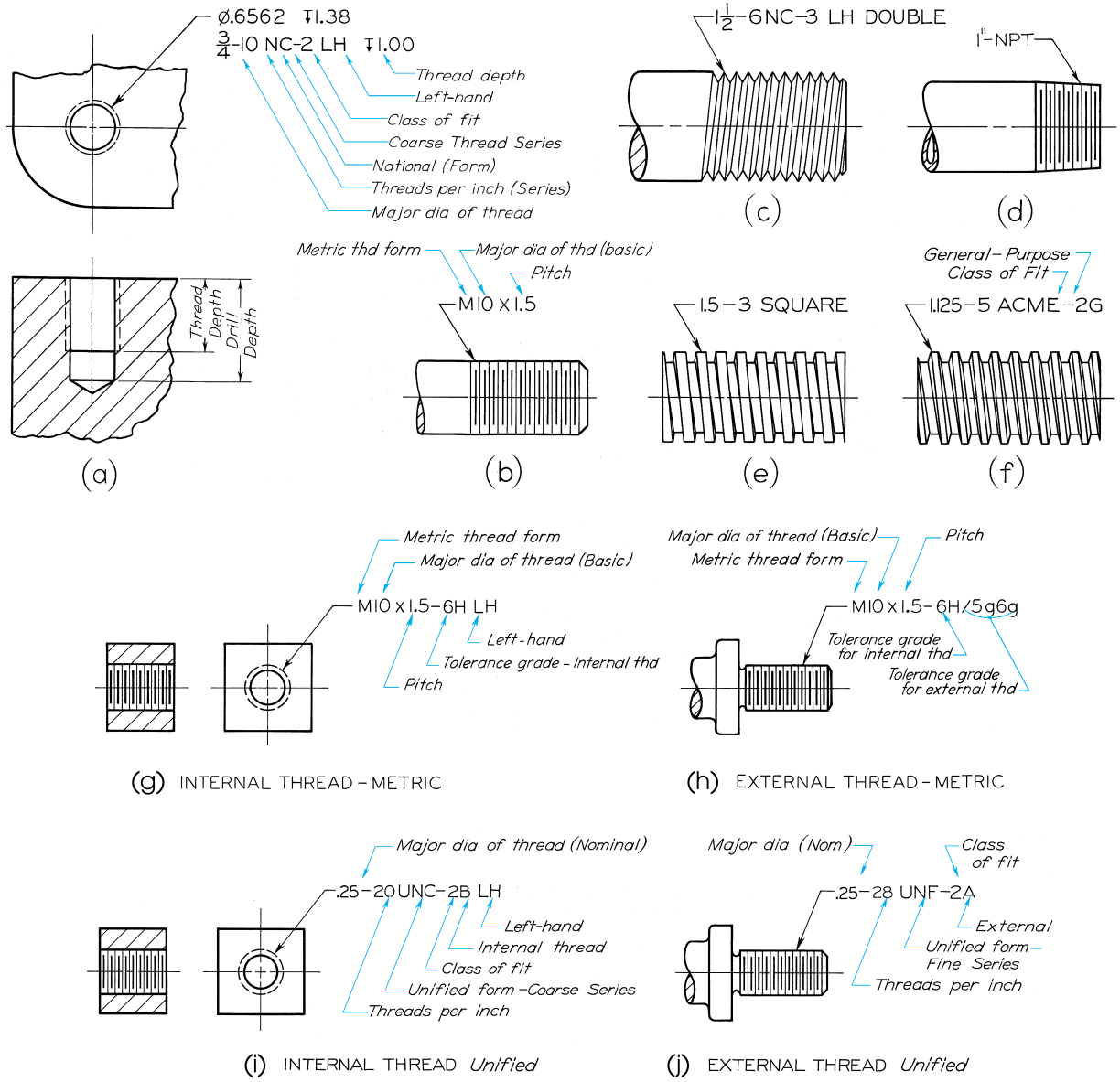



Figure 13-18

Thread Notes.

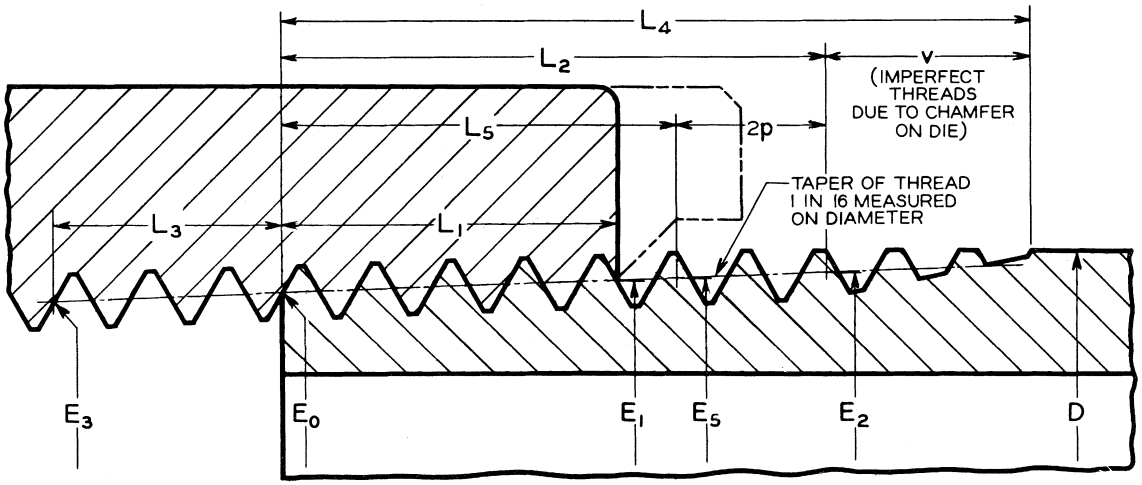



Figure 13-19

American National Standard Taper Pipe Thread [ANSI/ASME B1.20.1–1983 (R1992)].

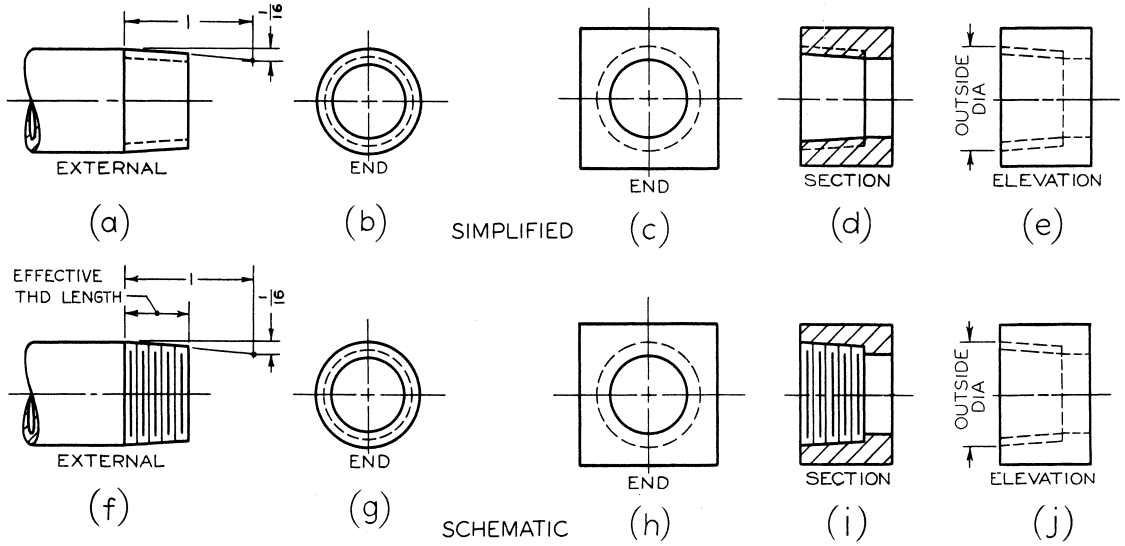



Figure 13-20

Conventional Pipe Thread Representation.

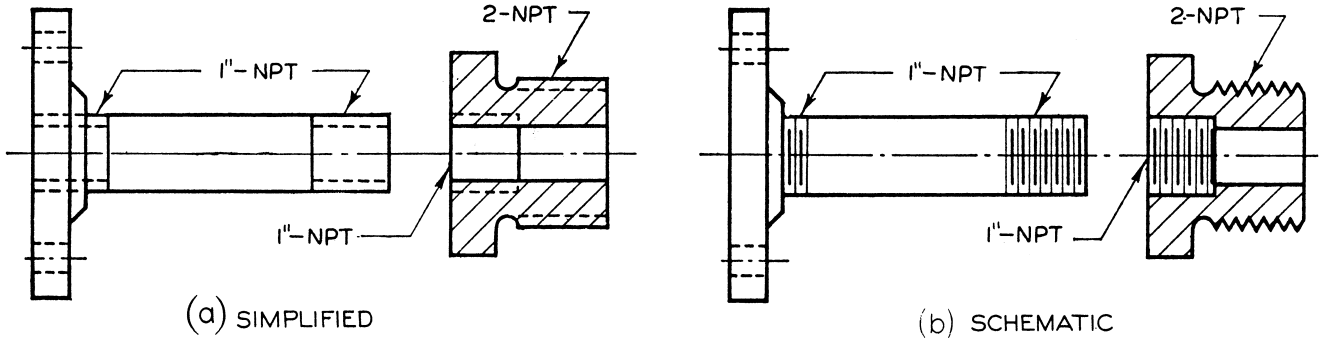



Figure 13-21

Conventional Representation of Pipe Threads.

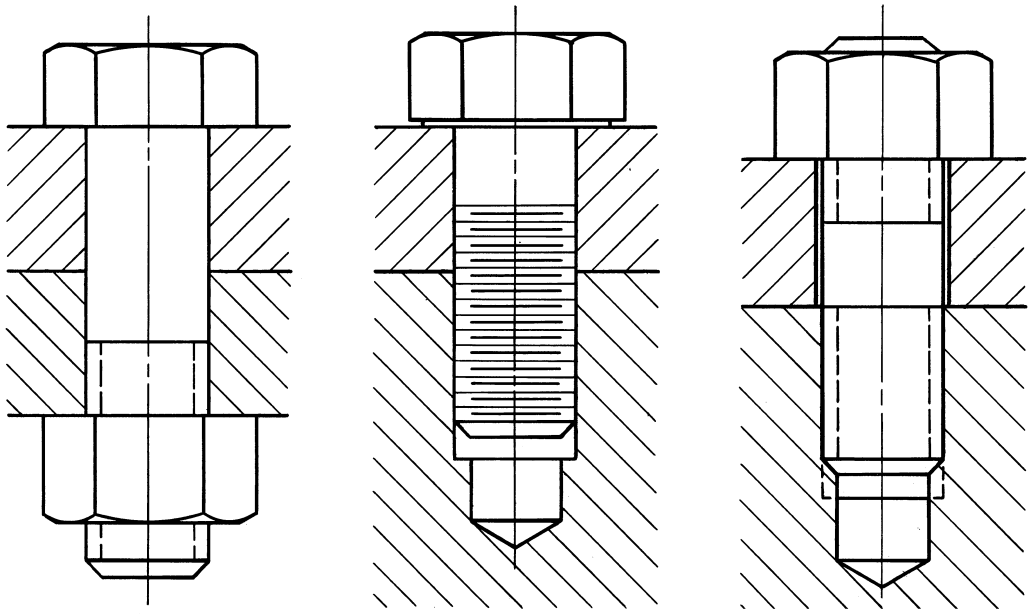



Figure 13-22

Bolt, Cap Screw, and Stud.

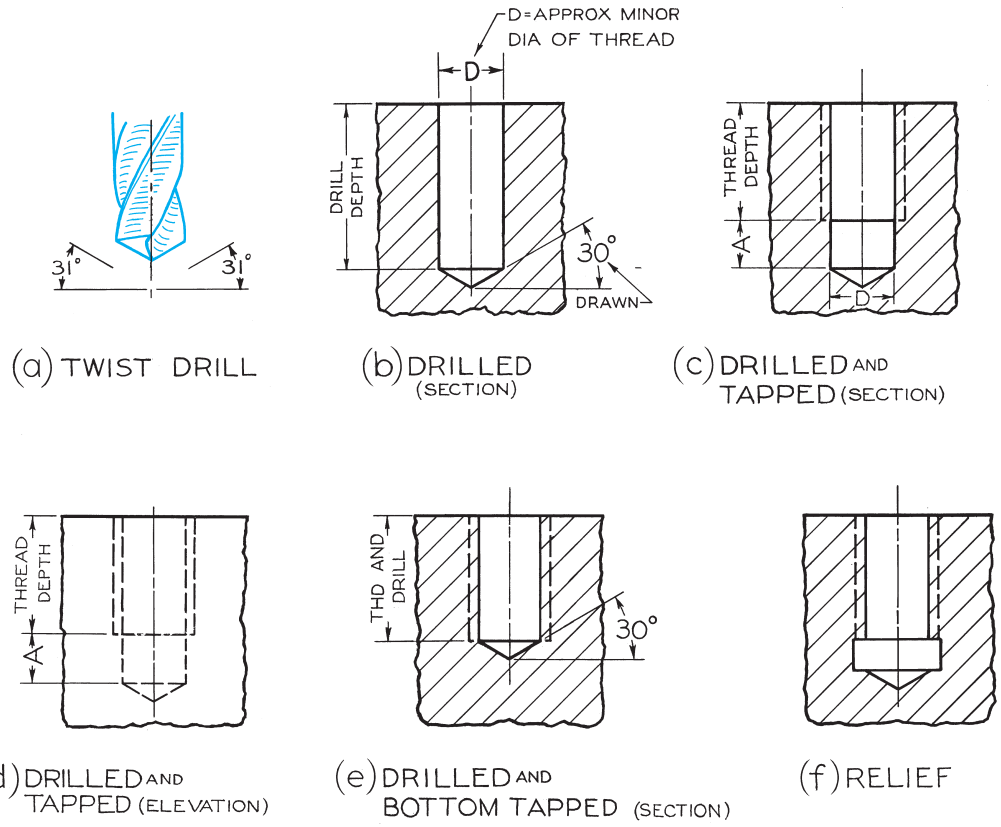



Figure 13-23

Drilled and Tapped Holes.

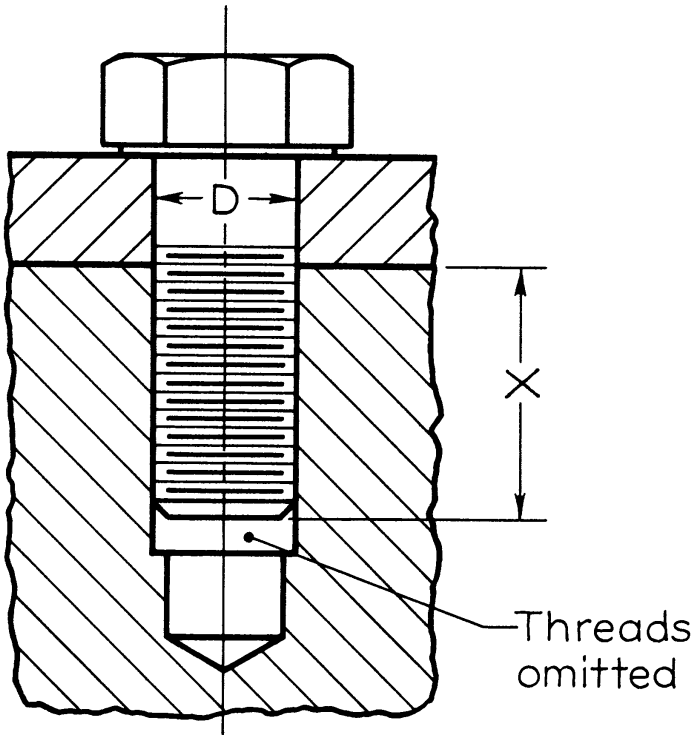



Figure 13-24

Tapped Holes.

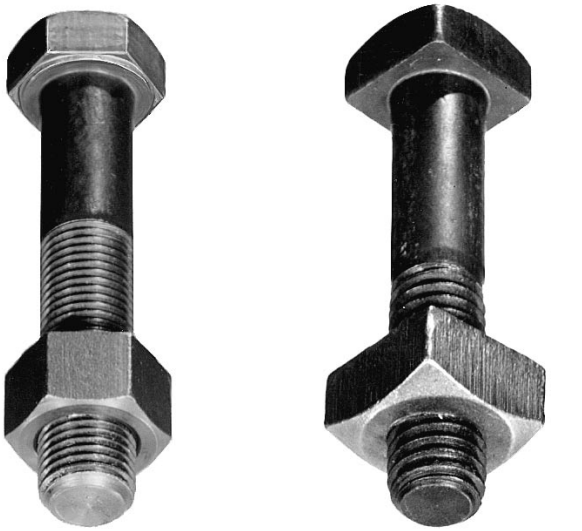



Figure 13-25

Standard Bolts and Nuts. *Courtesy of Cordova Bolt Inc., Buena Park, CA.*

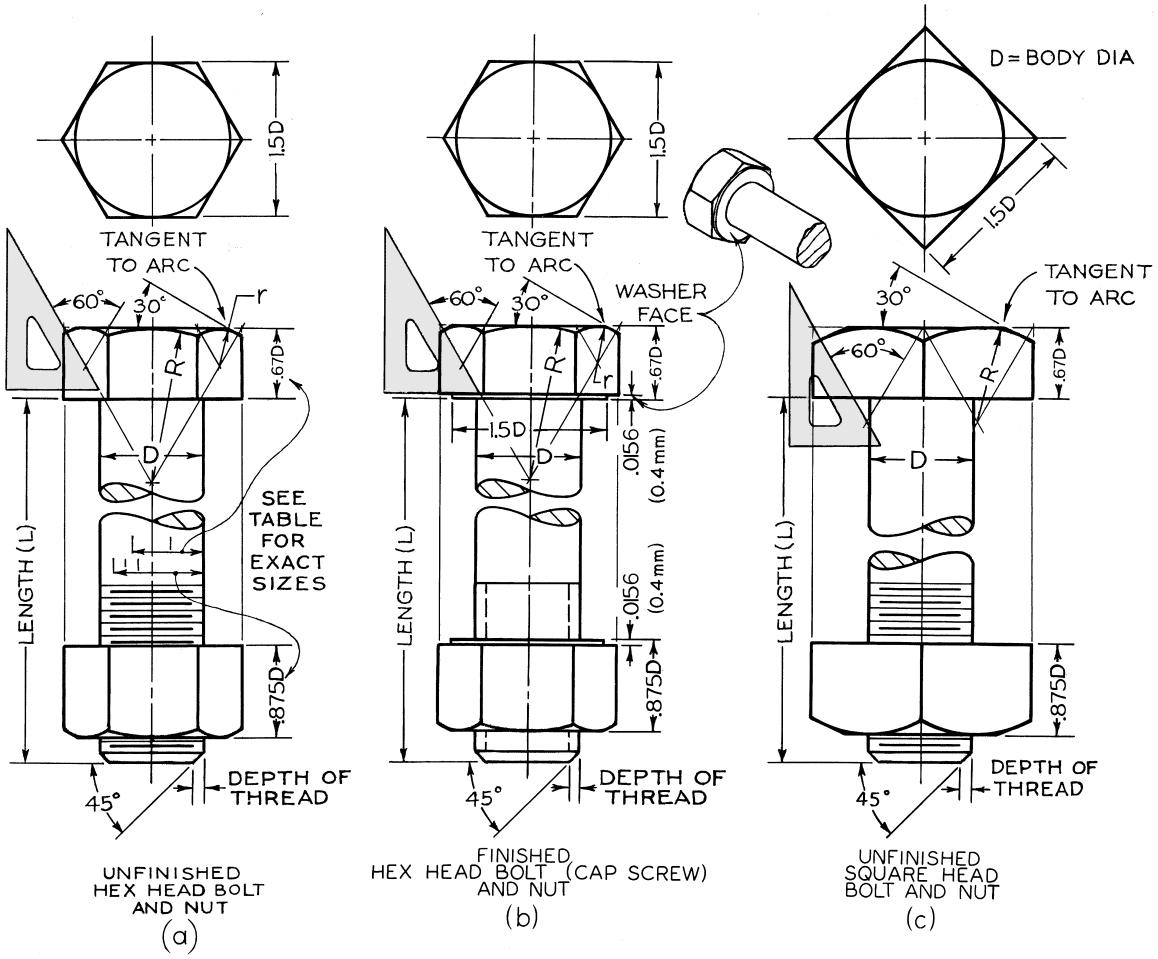



Figure 13-26

Bolt Proportions (Regular).

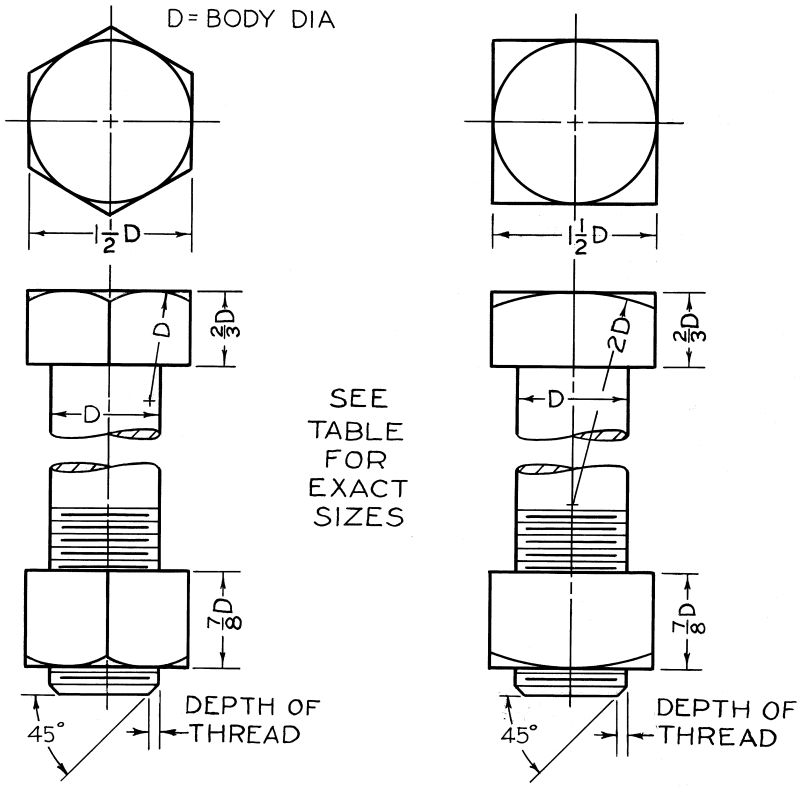



Figure 13-27

Bolts “Across Flats.”

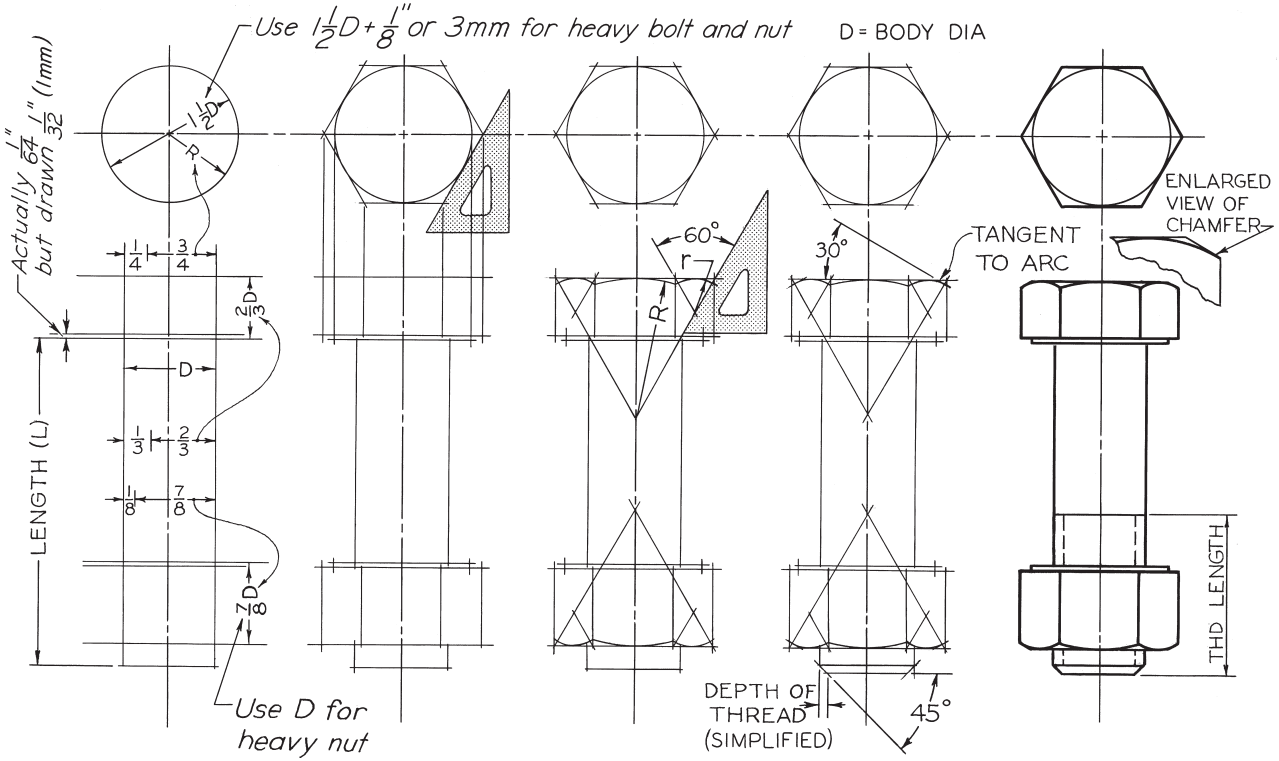



Figure 13-28

Steps in Drawing Finished Hexagon Head Bolt (Cap Screw) and Hexagon Nut.

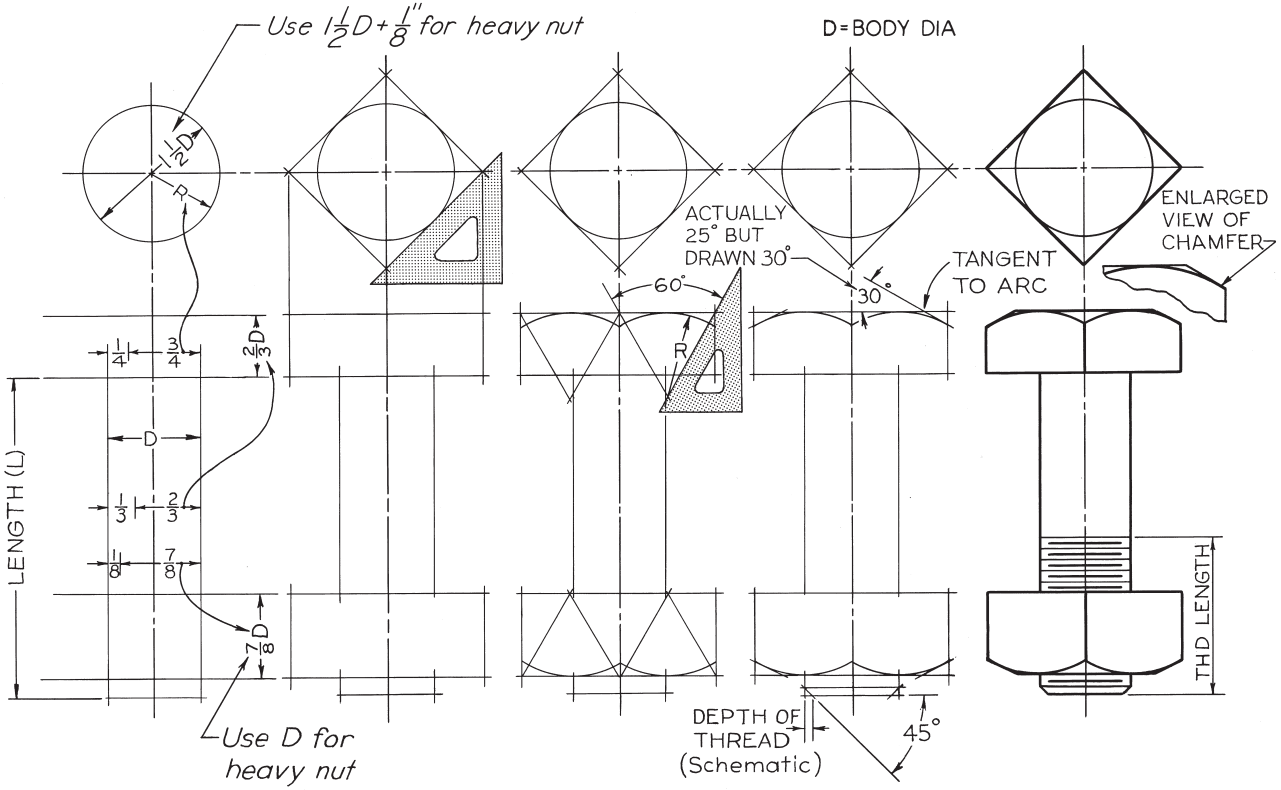



Figure 13-29

Steps in Drawing Square-Head Bolt and Square Nut.

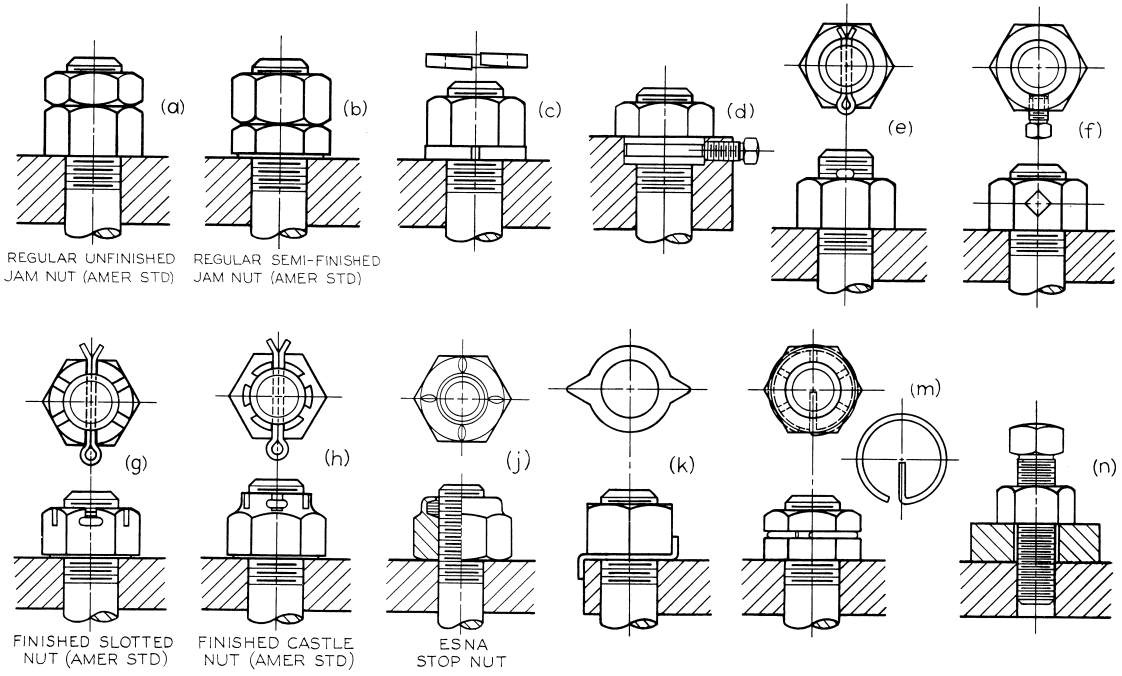



Figure 13-30

Locknuts and Locking Devices.

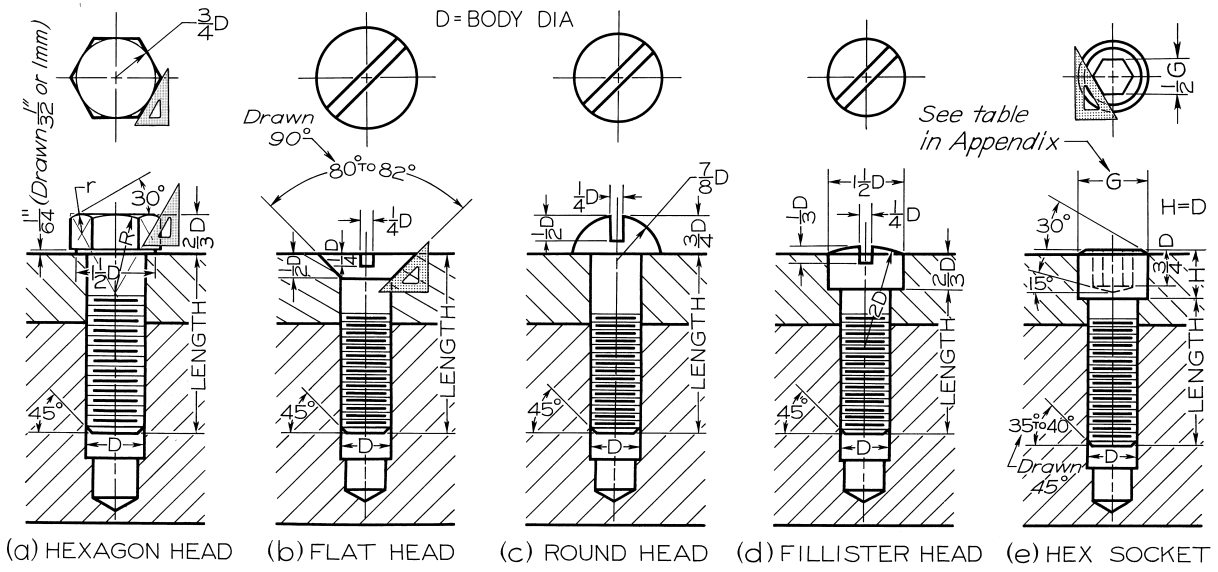



Figure 13-31

Standard Cap Screws. See Appendixes 18 and 19.

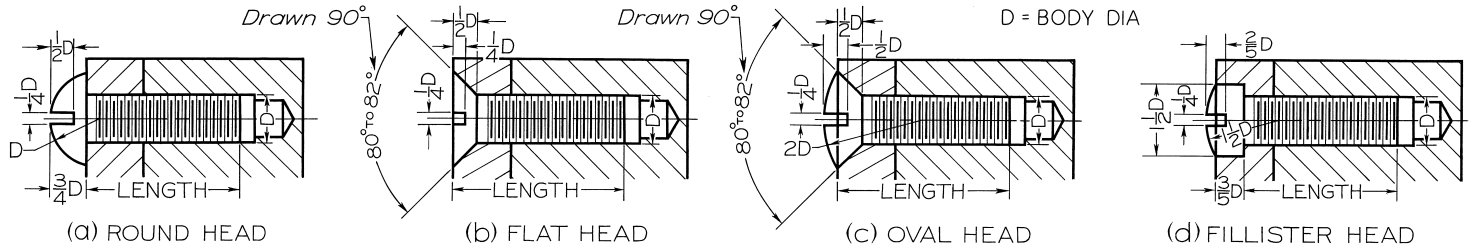



Figure 13-32

Standard Machine Screws. See Appendix 20.

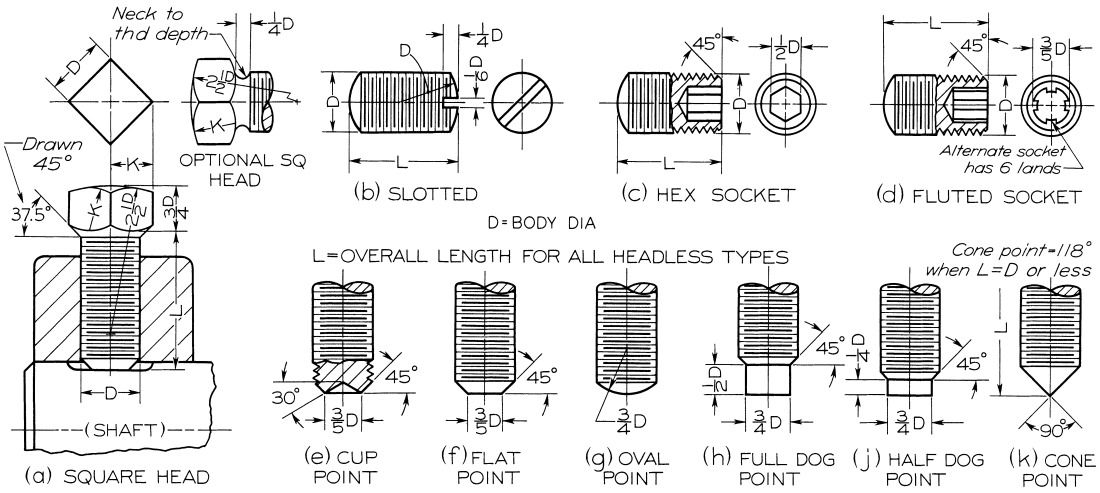



Figure 13-33

American National Standard Set Screws.

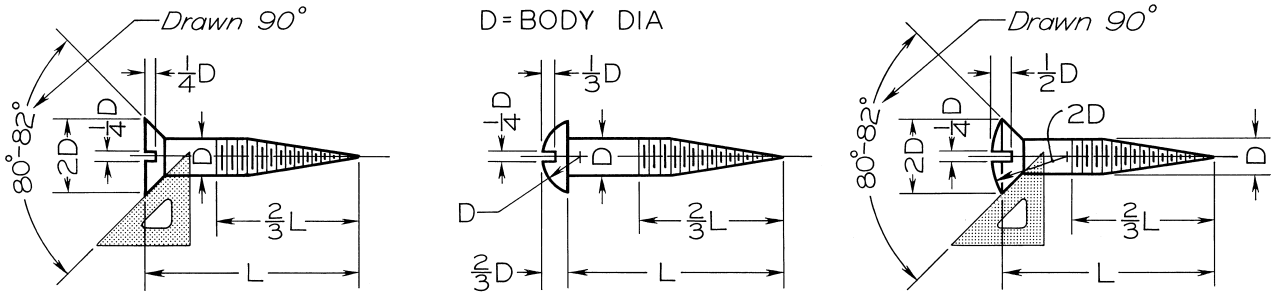



Figure 13-34

American National Standard Wood Screws.

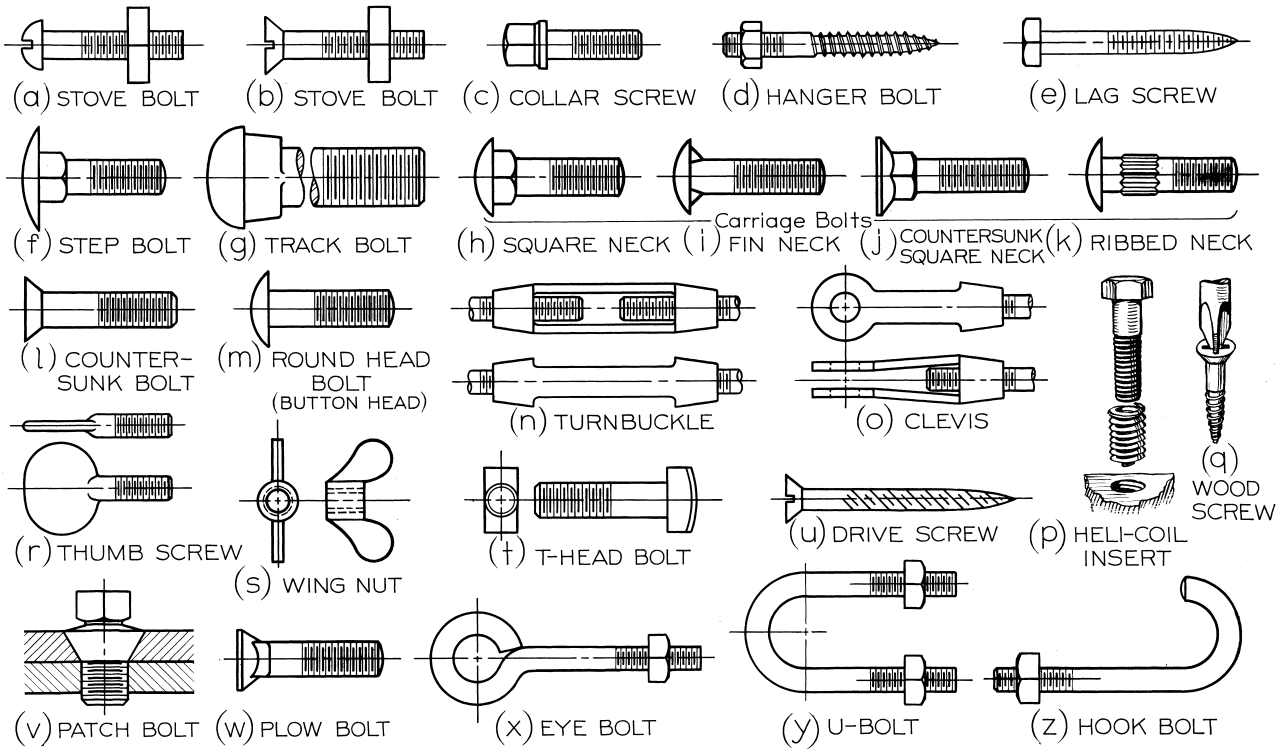



Figure 13-35

Miscellaneous Bolts and Screws.

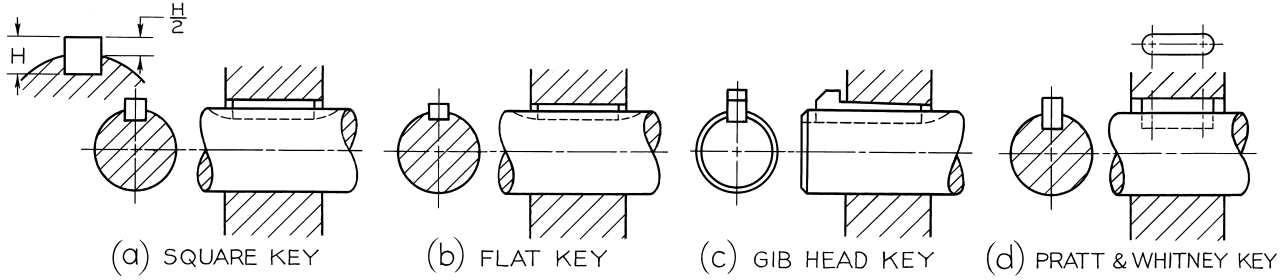



Figure 13-36

Square and Flat Keys.

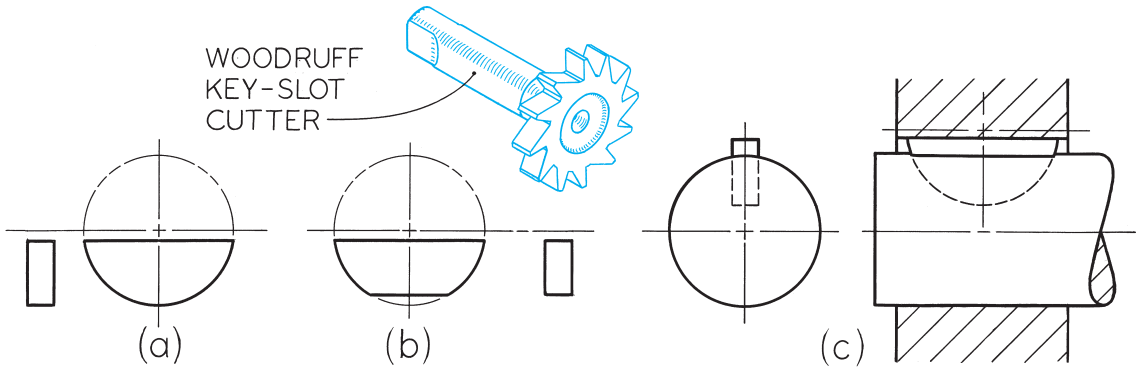



Figure 13-37

Woodruff Keys and Key-Slot Cutter.

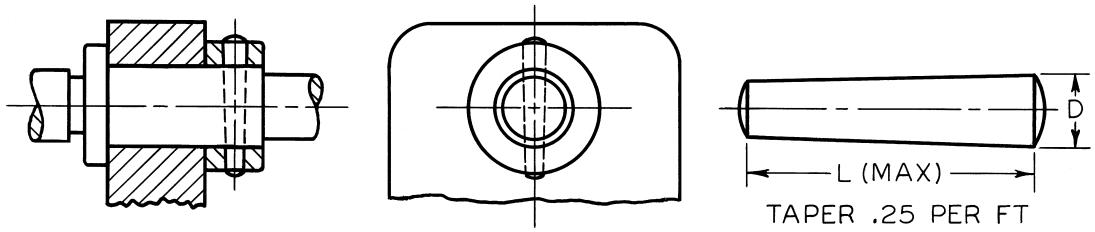



Figure 13-38

Taper Pin.

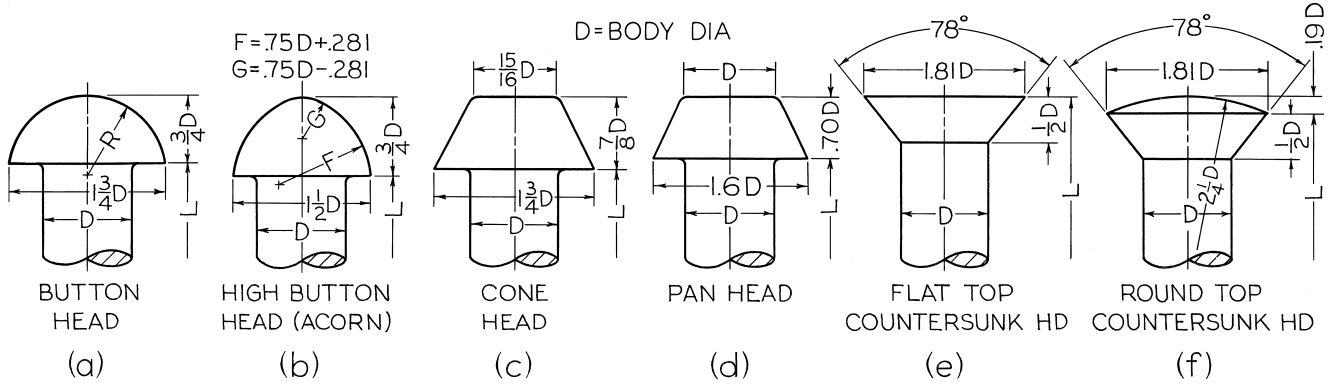



Figure 13-39

Standard Large Rivets.

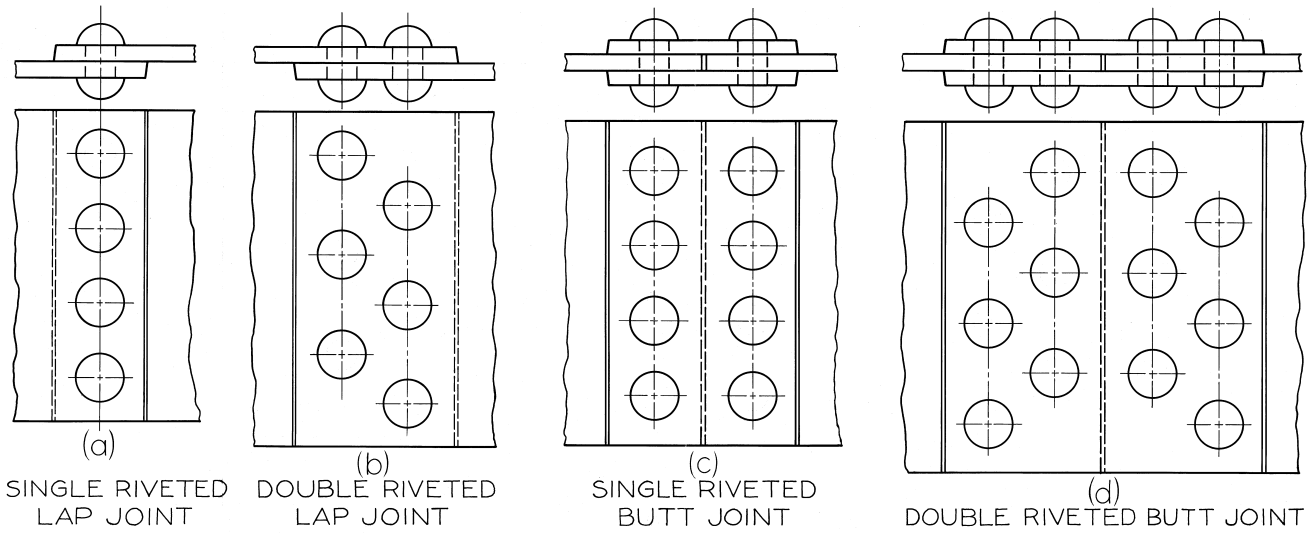



Figure 13-40

Common Riveted Joints.

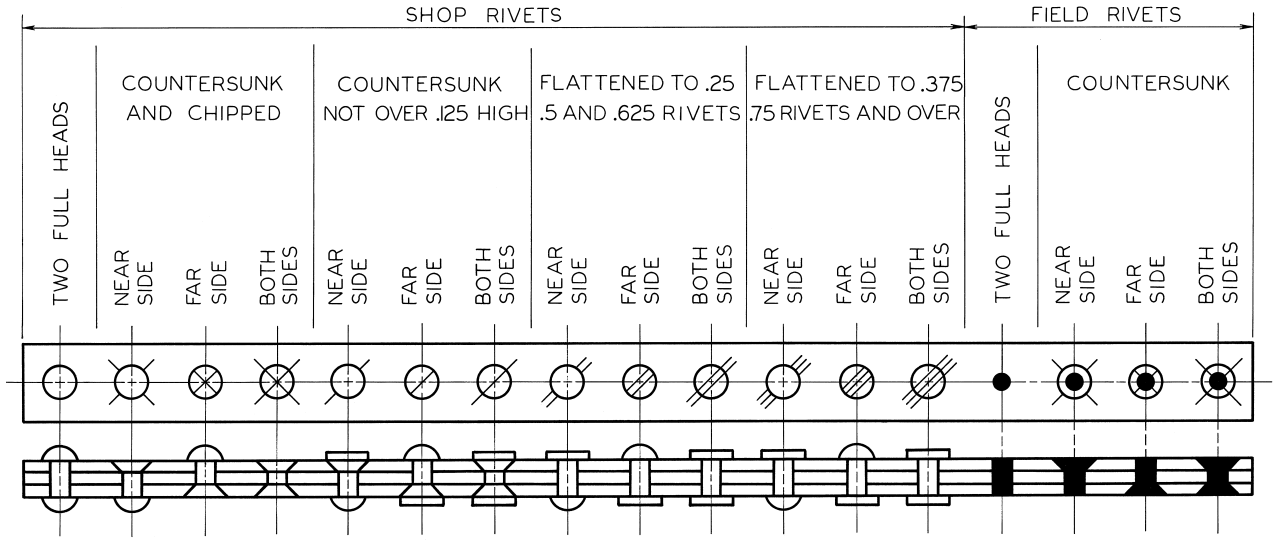



Figure 13-41

Conventional Rivet Symbols.

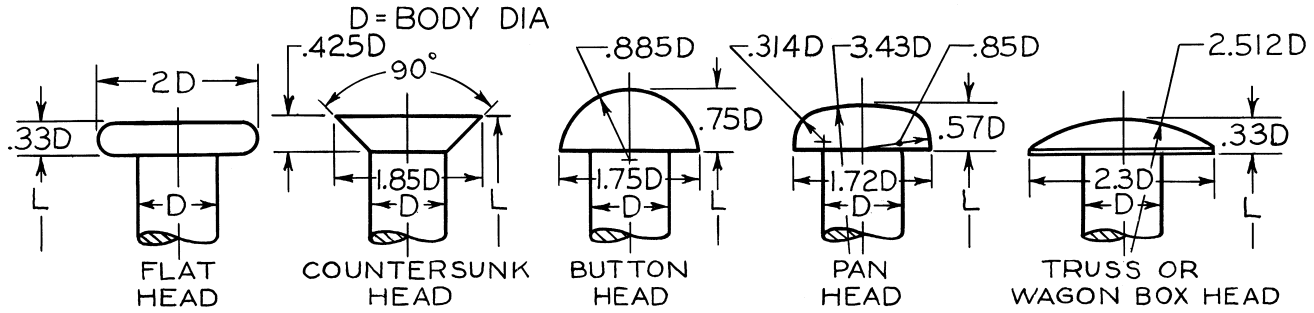



Figure 13-42

American National Standard Small Solid Rivet Proportions.

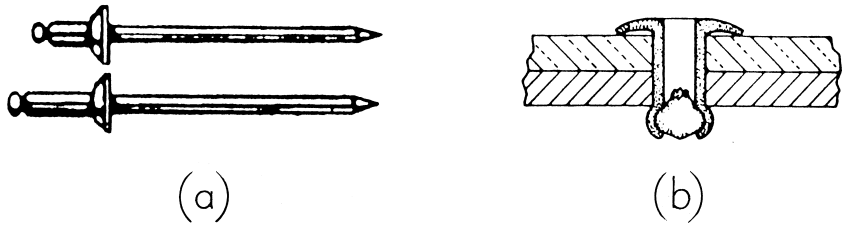



Figure 13-43

Blind Rivets (a) Before Installation,
and (b) Installed.

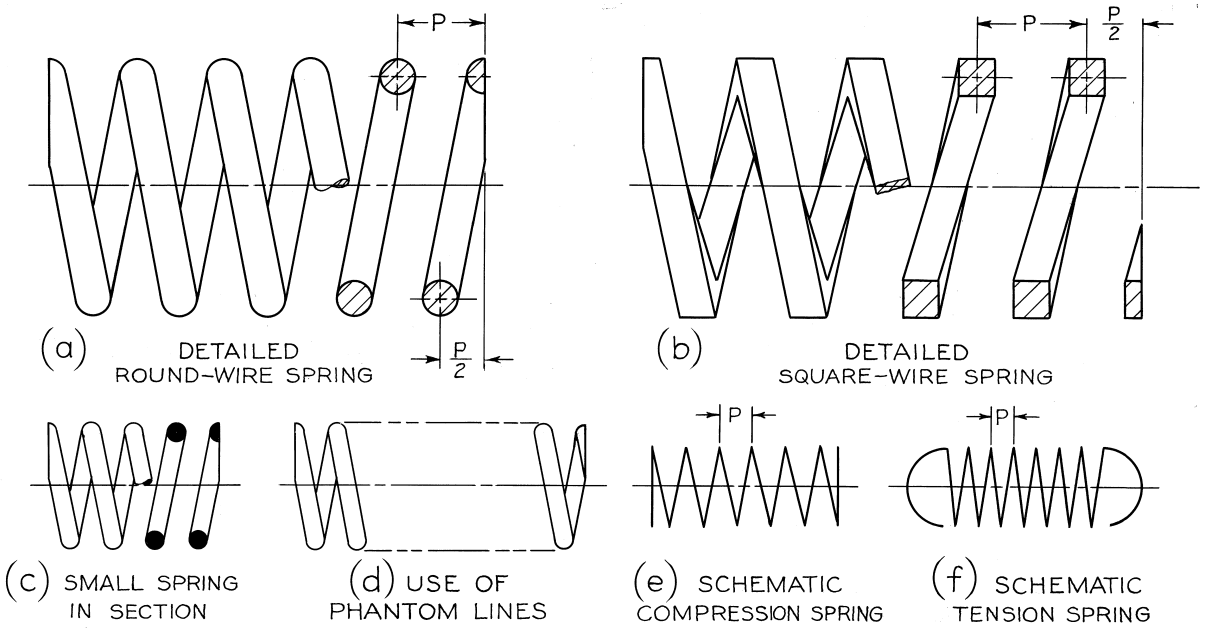



Figure 13-44

Helical Springs.

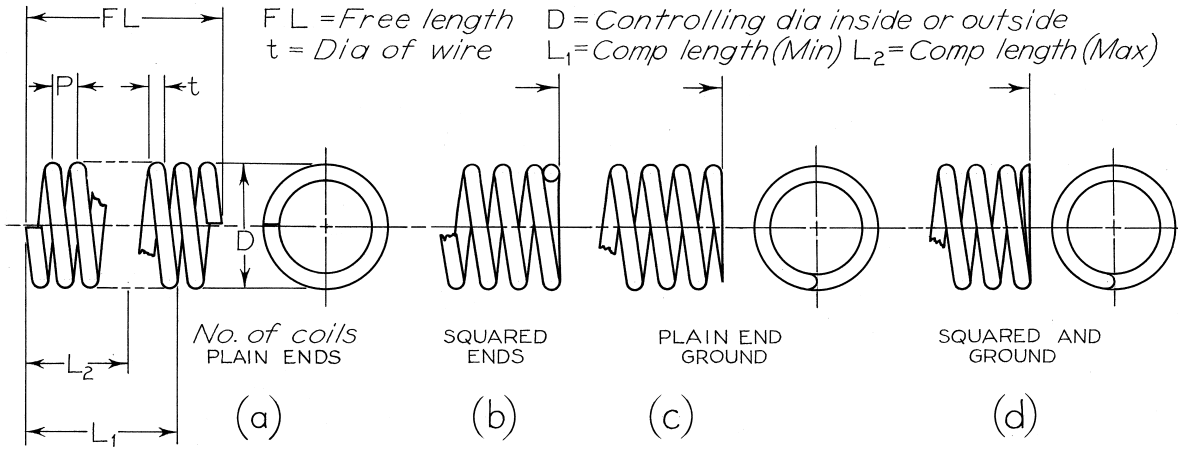
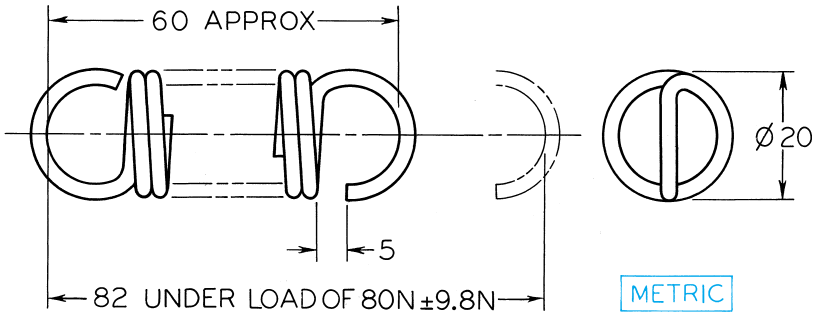



Figure 13-45

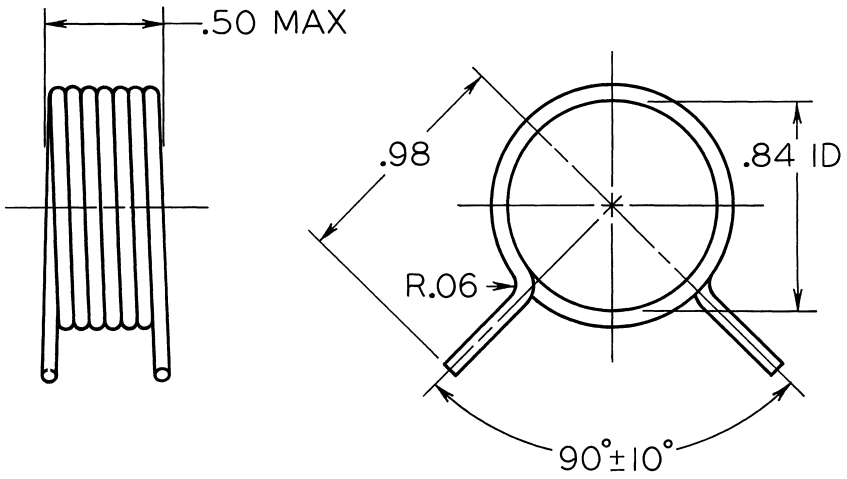
Compression Springs.




MATERIAL: 2.00 OIL TEMPERED SPRING STEEL WIRE
14.5 COILS RIGHT HAND
MACHINE LOOP AND HOOK IN LINE
SPRING MUST EXTEND TO 110 WITHOUT SET
FINISH: BLACK JAPAN

Figure 13-46

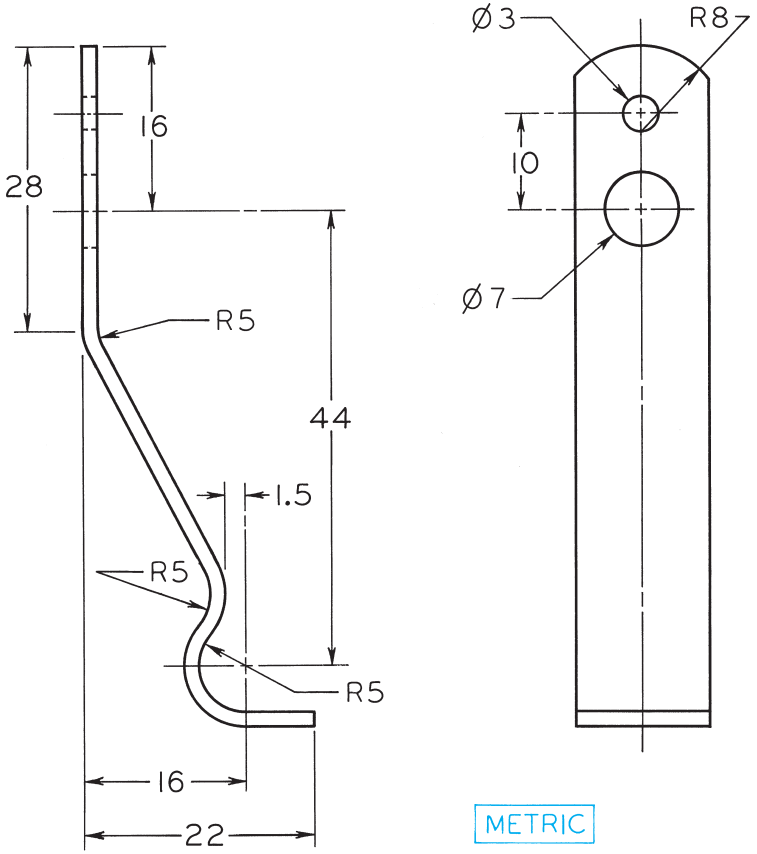
Extension Spring Drawing.




MATERIAL : .059 MUSIC WIRE
6.75 COILS RIGHT HAND NO INITIAL TENSION
TORQUE : 2.50 INCH LB AT 155° DEFLECTION SPRING MUST DEFLECT 180° WITHOUT PERMANENT SET AND MUST OPERATE FREELY ON .75 DIAMETER SHAFT
FINISH : CADMIUM OR ZINC PLATE

Figure 13-47

Torsion Spring Drawing.




MATERIAL : 1.20 X 14.0 SPRING STEEL
HEAT TREAT : 44-48 C ROCKWELL
FINISH : BLACK OXIDE AND OIL

Figure 13-48

Flat Spring.

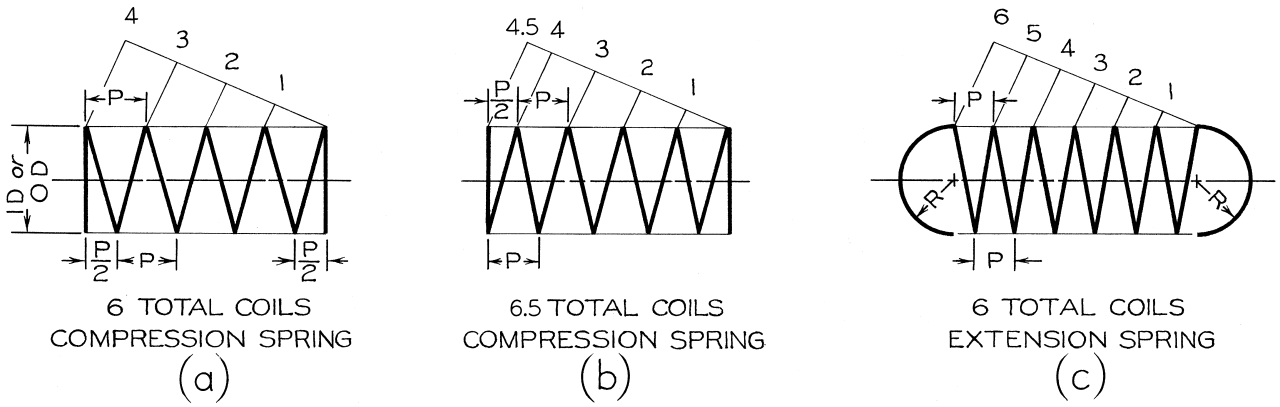



Figure 13-49

Schematic Spring Representation. *Courtesy of SDRC, Milford, OH.*

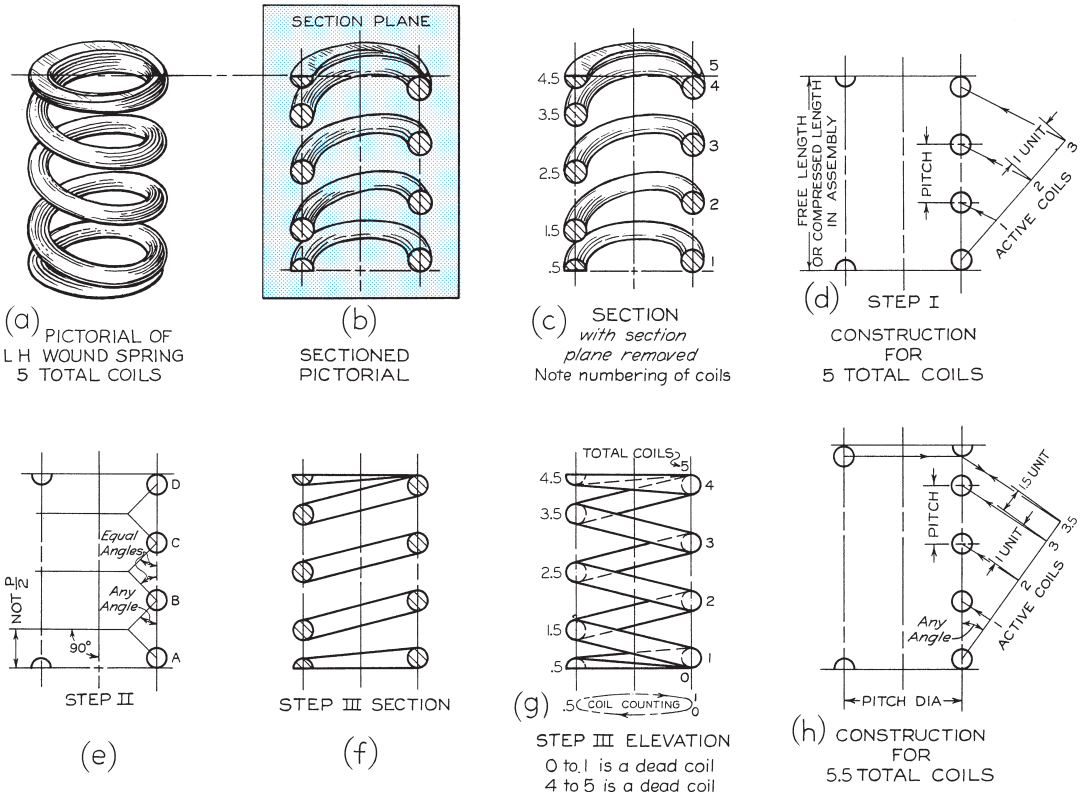



Figure 13-50

Steps in Detailed Representation of Spring.

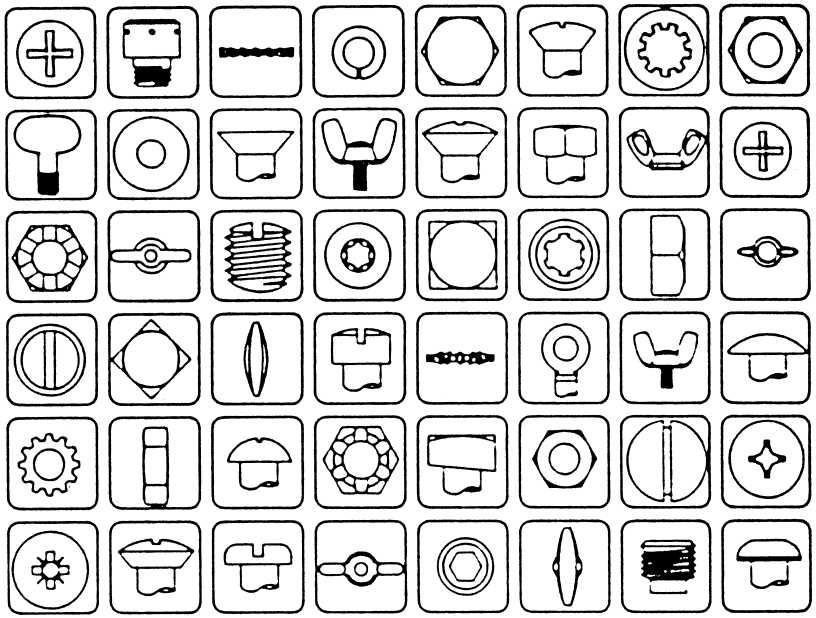


Figure 13-51

Examples of Fastener Symbols Available for Use with AutoCAD in SPOCAD's Autofasteners Library. *Courtesy SPOCAD.*