

## WOODWORK AND ASSOCIATED MATERIALS GENERAL EQUIPMENT REQUIREMENTS

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### 1. GENERAL

#### Scope

1.01 This section covers the general equipment requirements applying to woodwork and associated nonmetallic materials.

1.02 This section is reissued to make changes which are listed under Reasons for Re-issue at the end of this section.

1.03 This section is for the most part informational in character, reflecting current practices, since the uses of the materials discussed herein are generally design matters. Where not positively directed herein, or where the characteristics of the materials for specific equipment are not covered in the design information for the equipment or well established by usage, this section may be considered a guide. In new equipments or in important changes in existing equipments, it is the responsibility of the Bell Telephone Laboratories, Incorporated, engineer to determine the materials to be used.

1.04 Dimensions shown in figures are in inches except molding illustrations M5 and M101 shown in Fig. 7 which are in feet and inches.

### 2. TYPICAL APPLICATIONS AND MATERIAL REQUIREMENTS

#### 2.01 *Common Applications of Lumber Species*

(a) *Ash* is ordinarily specified for wood parts where strength and rigidity are required. Floor molding strips, switchboard roof cleats, and cable turning section posts are among those parts usually made of ash. Apparatus mounting panels having fiber facings are also occasionally made of ash.

(b) *Basswood* is generally used for parts requiring a lightweight straight-grained wood such as the slats of rolling curtains on the larger sizes of switchboards.

(c) *Beech (American)* may be substituted for birch or hard maple for parts shown in Table A.

- (d) *Birch* is generally used for all exterior surfaces of switchboards, desks, etc.
- (e) *Holly* in thin strips is used to indicate the limits of equipment groups in the jack fields of switchboards and desks.
- (f) *Maple* is generally used for cordshelves, plugshelves, some types of piling rails, fanning strips, and parts requiring considerable strength such as cleats. Maple is not ordinarily used for exposed woodwork.
- (g) *Oak* is provided for the exterior woodwork of small switchboards such as PBX switchboards, where it is required to harmonize with the subscriber office furniture and equipment. White oak is preferred for this purpose since either light or dark finishes can be obtained. Red oak is used in jack boxes and extensively used for rolling ladders, since straight-grained timber of the required length is readily obtainable.
- (h) *Pine* is generally provided for unexposed surfaces. Roof boards, floor boards, cleats, and corner braces in switchboards, where strength is important, are usually made of yellow pine.
- (i) *Walnut* has been used occasionally for the exterior woodwork of PBX switchboards where a finish to match walnut furnishings was required.

**2.02 Substitution for Interior Parts:** Since it is not always possible to obtain certain species of wood due to market conditions, the various kinds of wood specified on drawings for interior parts of cabinets, desks, casings, etc. may be substituted in order of their availability in accordance with Table A.

**2.03 Lumber Sizes:** Standard nominal rough lumber thickness sizes are as follows: 1 inch, 1-1/4, 1-1/2, 2, 2-1/4, 2-1/2, 3, and 4 inches. In general, the finished thickness is approximately 3/16 inch less than the nominal rough thickness.

**2.04 Plywood panels** are made up of a combination of several plies of wood glued together so that the grain of any one ply is at right angles to that of the adjacent ply. The outside plies are called "faces" or "back and face;" the center ply or combination of plies is called the "core;" and the intervening plies laid at right angles to the other plies are called "crossbands." Plywood is available in both hardwood and softwood and in several qualities relative to moisture-resistant properties of the glue used. Plywood is used for panels of doors, end panels, and many other flat parts of switchboards and for wide panels which are faced with phenol fiber. The design engineer shall specify

TABLE A

PARTS	CHOICE IN ORDER OF AVAILABILITY						PLYWOOD — ANY TYPE AND NO. OF PLYS
	1ST	2ND	3RD	4TH	5TH	6TH	
	MATERIAL ON DRAWING	BIRCH OR AMERICAN BEECH	MAPLE	ASH	OAK	YELLOW PINE	
Interior cleats, posts, fillets, etc, where a strong heavy wood is specified and the finish is protective only.	X	X	X	X	X	X	
Fiber-covered panels where drillings and cutouts are not so close together that break-throughs might occur.	X	X	X	X*	X*	X	
Unexposed roofs, shelves, floors, etc, where protective finish only is specified.	X					X	X

\* Limited to application where the fiber facing is sufficiently thick to prevent the wood grain printing through.

lumber or plywood core, thickness, number of plies, species of face veneer, and type of adhesive on the requirement drawing.

### 2.05 *Plywood Sizes*

(a) Hardwood plywood shall be specified in accordance with Commercial Standard CS-35, current issue.

(1) For conventional plywood applications in switchboards and the like, lumber core or veneer-type core shall be used.

(2) Panels subject to loads shall be of the "multi-ply" type of plywood.

(3) Equipment shall be designed to compensate for the standard thickness tolerance of +0, -1/32 inch.

(4) The standard thicknesses are: 1/8, 3/16, 1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 13/16, 7/8, and 1 inch.

(b) Douglas Fir plywood shall be specified in accordance with Commercial Standard CS-45, current issue.

(1) Equipment shall be designed to compensate for the standard thickness tolerance of  $\pm 1/64$  inch.

(2) The standard thickness of sanded plywood and the number of plies are: 3/16 inch (3 ply), 1/4 inch (3 ply), 3/8 inch (3 ply), 1/2 inch (5 ply), 5/8 inch (5 ply), 3/4 inch (5 ply). Thicker panels may be specified. These are usually made up by laminating thinner panels.

(c) Softwood plywoods shall be specified in accordance with Commercial Standards CS-122 and CS-157, current issues.

### Requirements for Wood and Associated Materials

**2.06 *Wood:*** All wood shall be thoroughly seasoned, of clear appearance, and free from brashy wood, cracks, splits, and other imperfections. Natural stains, discolorations, and wavy grain that do not materially affect the appearance will be permitted. Conspicuous knots and other defects that affect appearance but are not

detrimental to the strength of the part will be permitted provided such defects appear only in unexposed woodwork.

### 2.07 *Asbestos Lumber*

(a) Asbestos lumber is used for fire-resisting surfaces such as cable hole covers. It has also been used for facing wood panels which mount fuses.

(b) Asbestos lumber shall have a smooth, even surface and its composition shall be such as to render it suitable for machining operations such as drilling, sawing, or shearing.

### 2.08 *Canvas*

(a) Canvas is used where a heavy, durable fabric is required. It is used as the flexible back for slat-type rolling curtains and for the protection of equipment from damage by cord weights in some switchboards. Canvas bags filled with noncombustible material, such as mineral wool, are used for fire stops in cable holes and slots.

(b) The canvas used for the above and similar purposes shall be of a good commercial quality and of the weight specified for the particular purpose.

**2.09 *Fiber Sheet:*** Fiber sheet is principally used in facing wooden surfaces subject to wear such as keyshelves and switchboard lock-rail facings. Phenol fiber is generally used for this purpose; however, where phenol fiber is not suitable, such as in plugshelf assemblies, Spaulding vulcanized fiber, bobbin grade, shall be used.

(a) Use grade 3 phenol fiber where a good appearing black surface is desired.

(b) Use grade 1G phenol fiber where some electrical requirements are to be met.

(c) Where veneered parts are fiber faced on both sides, 1/32- or 1/16-inch phenol backing fiber, Formica Company type X87, shall be specified for the back or unexposed surface. The same thickness of phenol fiber shall be employed on both surfaces.

**2.10 Glass sheet** (window glass) is used in message register casing doors and similar equipments.

**2.11 Window glass** shall be grade AA double thick, and free from defects interfering with clear visibility through the glass. Plate glass, where specified to be rectangular, shall have the opposite edges parallel and adjoining edges perpendicular to the extent that the overall dimensions shall be within  $\pm 1/16$  inch of the specified dimensions.

**2.12 Transparent Plastic — Cast Methacrylate Sheet:** Transparent plastic (Plexiglas, Lucite, or Perspex) per KS-5645 shall be used for bulletin holders. Cast methacrylate sheet is employed on operating room desks as baffles.

**2.13 Linoleum** is generally furnished on the mezzanine platforms of distributing frames, and on operating room and information desks.

**2.14 Rubber Sheet:** Soft rubber sheet, grade 2049, 3/16-inch thick is used as a facing for noise-reduction purposes on surfaces subject to the pounding of cord weights such as at the rear of front door panels of some switchboards.

### 3. GENERAL REQUIREMENTS — FABRICATION

**3.01** Where engineering tolerances are expressed on equipment drawings, it shall be recognized by the designer that manufacturing tolerances on the parts involved are limited to gauging within 24 hours after the part has been machined. The engineering tolerances, therefore, shall include the variations in the material which may occur in the interval between shop gauging and the inspection of the finished product.

**3.02 Drilled surfaces** shall be free from split outs and cracks. Drilled holes shall not be out of round to such an extent as to impair the function or appearance of the hole. The walls shall be smooth and clean cut, particularly in the case of holes for cords in plugshelves, and

the edges shall not be ragged or torn. The finished surface around holes in exposed locations shall not be defaced.

**3.03 Grain in wooden parts** shall, unless otherwise specified, parallel the longer axis of the part, except for short blocks where the direction of grain shall be such as will obviously provide the greater strength for the particular application. With the exception of oak, the exposed grain may be "flat grain" or "edge grain" or any intermediate grain between these extremes, care being used in the selection of pieces for conspicuously exposed places to avoid unsightly contrasts in adjacent parts. Oak used for exposed surfaces shall be quarter sawed.

#### Joints

**3.04** Woodwork joints shall be glued, unless otherwise specified. Glued joints shall be machined and fitted so that after the glue is set, the glued surfaces will, as far as practicable, be in complete contact. The commonly used joints are shown in Fig. 1 to 6, inclusive. When required, they may be specified by the joint number, as for example J-8.

**3.05 The frame corner joints**, shown in Fig. 1 and 2, are used principally for panel and door constructions except the half lap, feathered, and doweled joints which are used occasionally for miscellaneous purposes.

**3.06 The box corner joints**, shown in Fig. 3 and 4, are used principally for wooden turret, small cabinet, and test box construction. The box lock, the lap butt, and the tongue and groove joints are most frequently used.

**3.07 The joints shown in Fig. 5 are used for joining the edges of boards.** Roof boards requiring a joint for expansion and contraction of the roof use an unglued ship lap-type joint.

**3.08 Table leg joints** are shown in Fig. 6.

#### Moldings

**3.09** Moldings commonly used are shown in Fig. 7 to 10, inclusive.

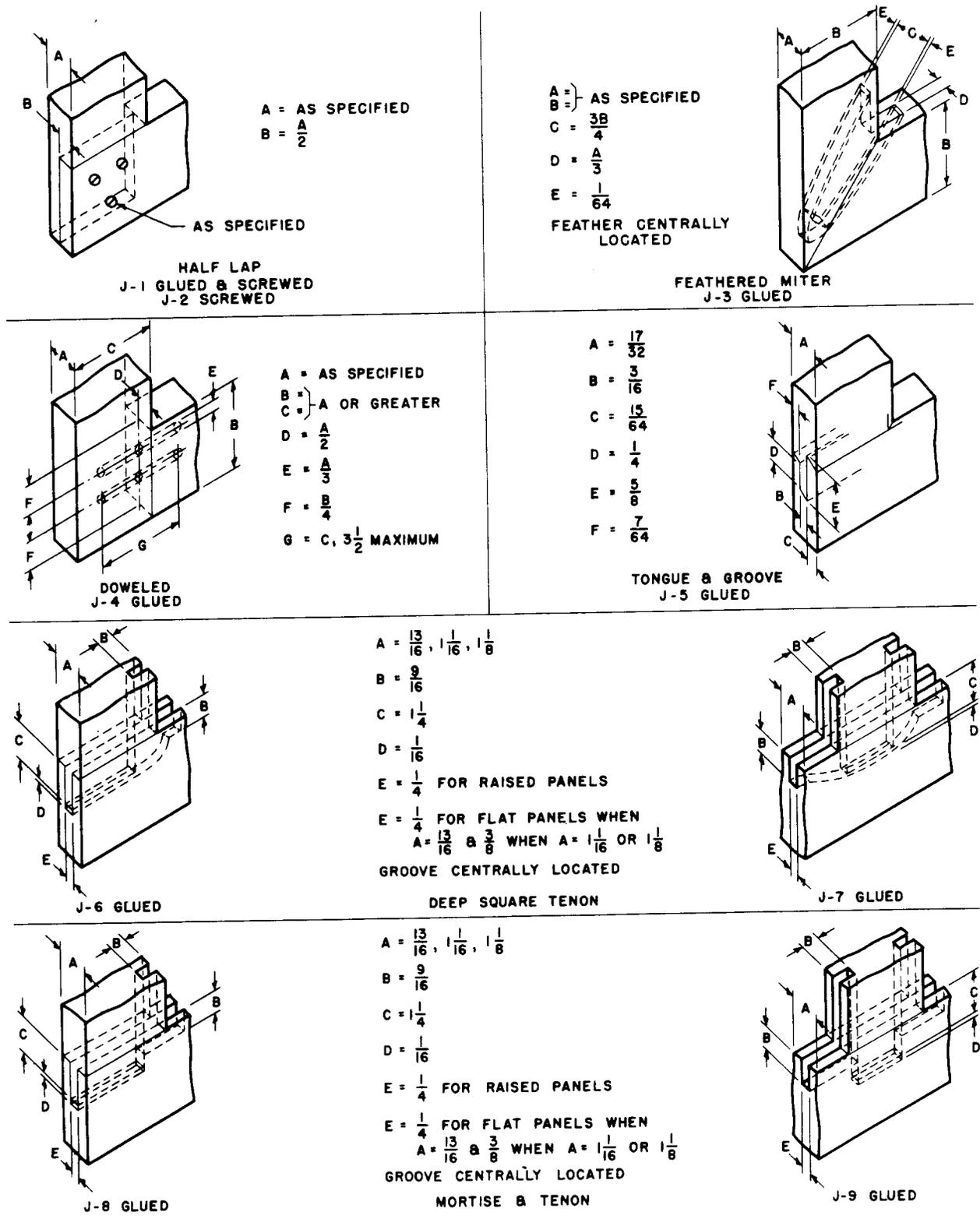
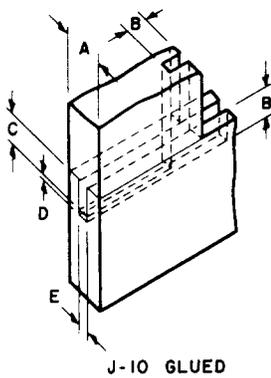
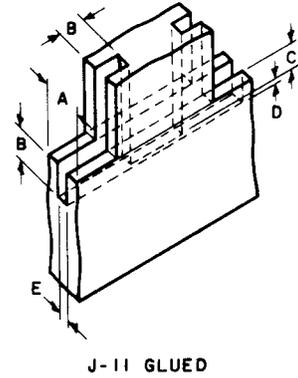


Fig. 1 - Frame Corner Joints 1 to 9



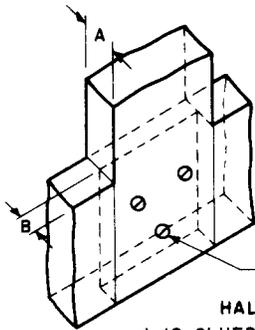
$A = \frac{13}{16}, \frac{1}{16}, \frac{1}{8}$   
 $B = \frac{9}{16}$   
 $C = \frac{1}{2}$   
 $D = \frac{1}{16}$   
 $E = \frac{1}{4}$  FOR RAISED PANELS  
 $E = \frac{1}{4}$  FOR FLAT PANELS WHEN  
 $A = \frac{13}{16}$  &  $\frac{3}{8}$  WHEN  $A = \frac{1}{16}$  OR  $\frac{1}{8}$   
 GROOVE CENTRALLY LOCATED



J-11 GLUED

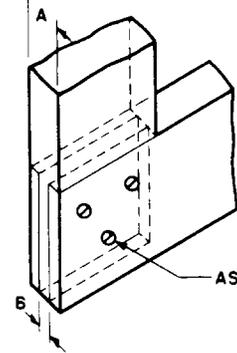
SQUARE TENON

J-10 GLUED



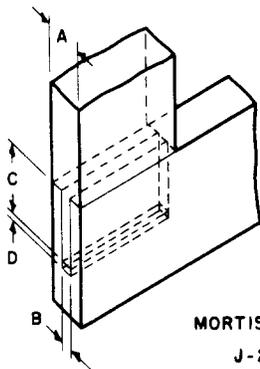
$A = \text{AS SPECIFIED}$   
 $B = \frac{A}{2}$

AS SPECIFIED  
 HALF LAP  
 J-16 GLUED & SCREWED  
 J-17 SCREWED



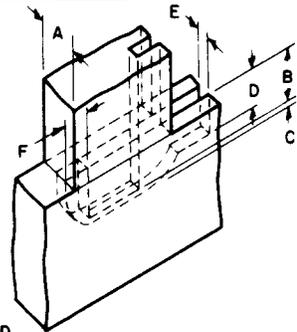
$A = \text{AS SPECIFIED}$   
 $B = \frac{A}{3}$   
 GROOVE CENTRALLY LOCATED

AS SPECIFIED  
 MORTISE & TENON  
 J-18 GLUED & SCREWED  
 J-19 SCREWED



$A = \text{AS SPECIFIED}$   
 $B = \frac{A}{3}$   
 $C = 1$   
 $D = \frac{1}{16}$   
 GROOVE CENTRALLY LOCATED

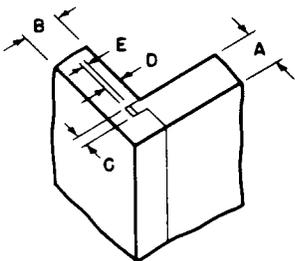
MORTISE & TENON  
 J-20 GLUED



$A = \frac{13}{16}, \frac{1}{16}, \frac{1}{8}$   
 $B = \frac{1}{4}$   
 $C = \frac{1}{16}$   
 $D = \frac{9}{16}$   
 $E = \frac{1}{4}$  FOR FLAT PANELS  
 $F = \frac{3}{8}$   
 GROOVE CENTRALLY LOCATED

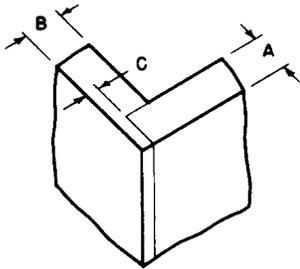
DEEP SQUARE TENON  
 J-21 GLUED

Fig. 2 - Frame Corner Joints 10, 11, and 16 to 21



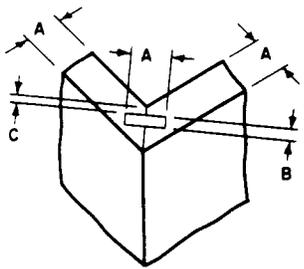
$A =$  } AS SPECIFIED  
 $B =$  }  
 $C = \frac{A}{3}$   
 $D = \frac{B}{3}$   
 $E = \frac{1}{32}$  TO  $\frac{1}{16}$  ACCORDING TO A & B

TONGUE & GROOVE  
J-40 GLUED



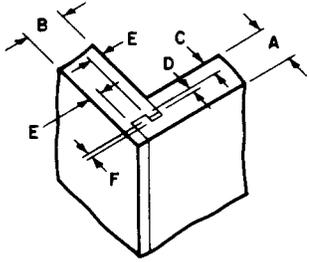
$A =$  } AS SPECIFIED  
 $B =$  }  
 $C = \frac{B}{4}$

LAP & BUTT  
J-41 GLUED



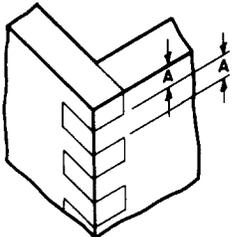
$A =$  AS SPECIFIED  
 $B = \frac{A}{3}$   
 $C = \frac{1}{16}$   
 FEATHER CENTRALLY LOCATED

FEATHERED MITER  
J-42 GLUED



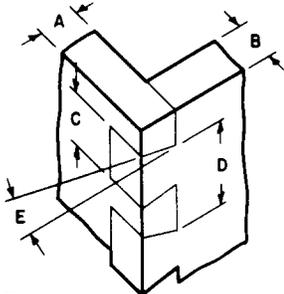
$A =$  } AS SPECIFIED  
 $B =$  }  
 $C = \frac{2A}{5}$   
 $D = \frac{A}{5}$   
 $E = \frac{B}{5}$   
 $F = \frac{1}{32}$  TO  $\frac{1}{16}$  ACCORDING TO A & B

LAP BUTT TONGUE & GROOVE  
J-43 GLUED



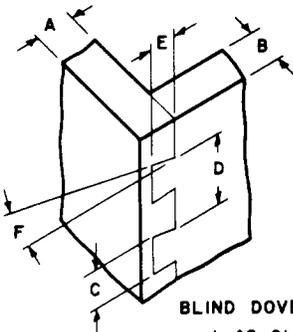
$A = \frac{1}{4}$  OR  $\frac{5}{32}$  FOR LUMBER  
 $A = \frac{1}{4}$  FOR PLYWOOD

BOX LOCK  
J-44 GLUED



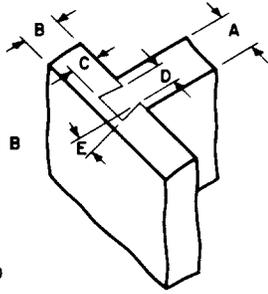
$A =$  } AS SPECIFIED  
 $B =$  }  
 $C = \frac{3A}{2}$   
 $D = \frac{9A}{2}$   
 $E = 10^\circ$

DOVE TAIL  
J-45 GLUED



$A =$  } AS SPECIFIED  
 $B =$  }  
 $C = \frac{9}{16}$   
 $D = 1$   
 $E = \frac{3}{8}$  TO  $\frac{1}{2}$  ACCORDING TO A  
 $F = 10^\circ$

BLIND DOVE TAIL  
J-46 GLUED



$A =$  } AS SPECIFIED  
 $B =$  }  
 $C = \frac{3}{8}$  TO  $\frac{1}{2}$  ACCORDING TO B  
 $D = \frac{A}{2}$   
 $E = 10^\circ$   
 TAIL CENTRALLY LOCATED

DOVE TAIL DADO  
J-47 GLUED

Fig. 3 - Box Corner Joints 40 to 47

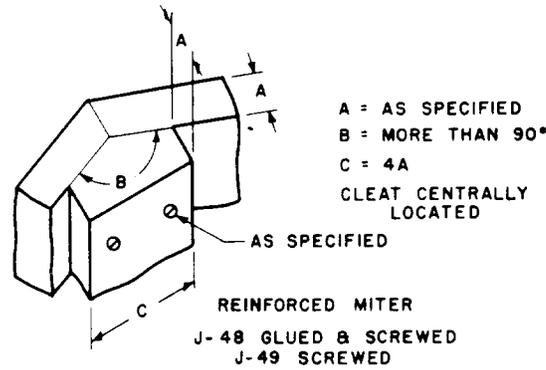


Fig. 4 - Box Corner Joints 48 and 49

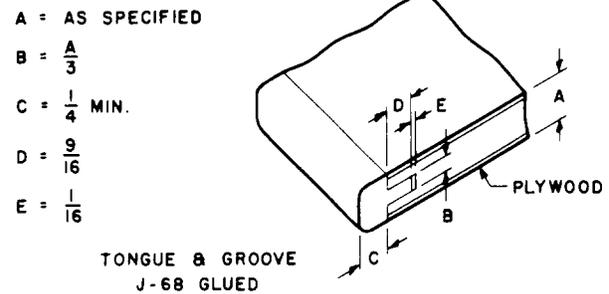
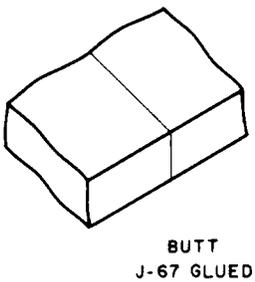
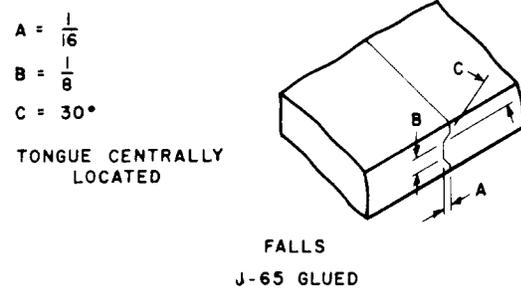
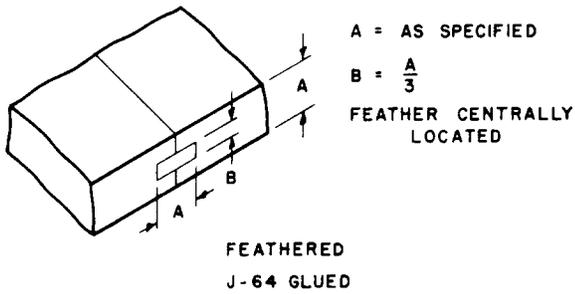
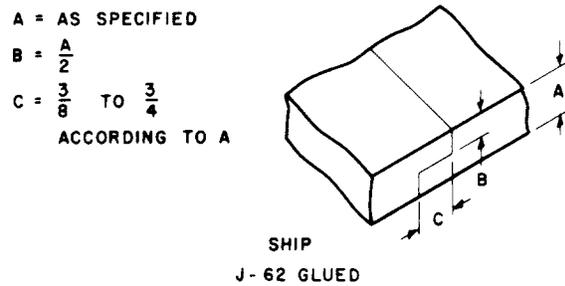
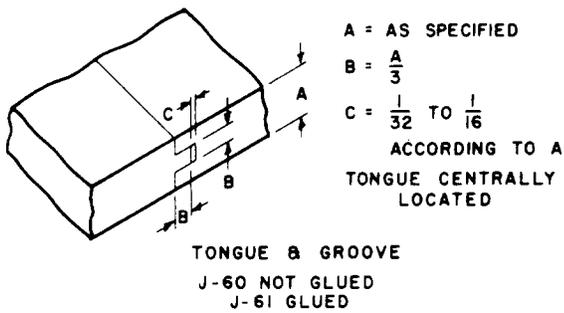


Fig. 5 - Edge Joints 60 to 62, 64, 65, 67, and 68

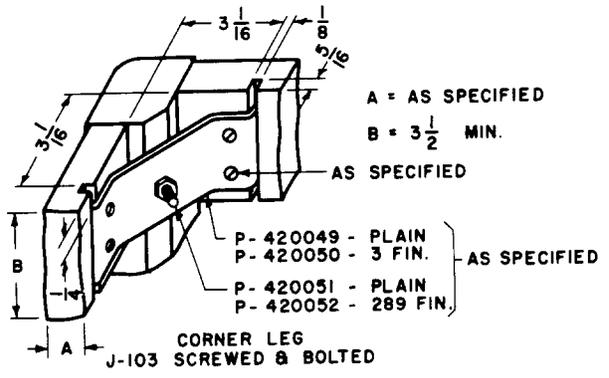
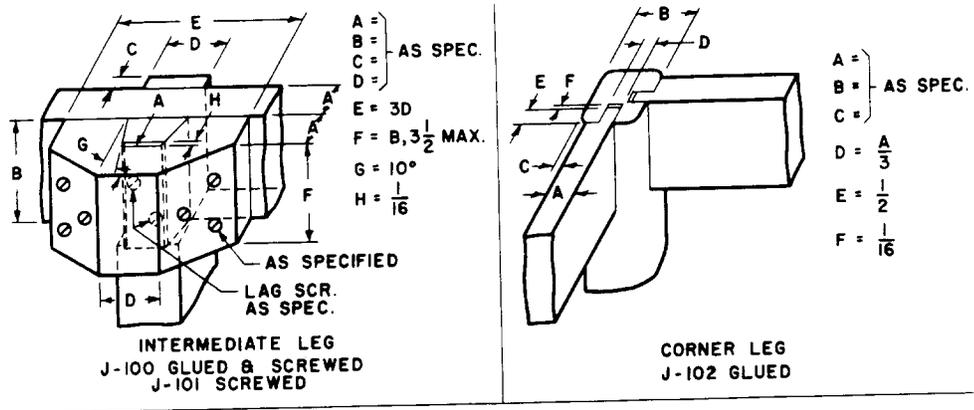
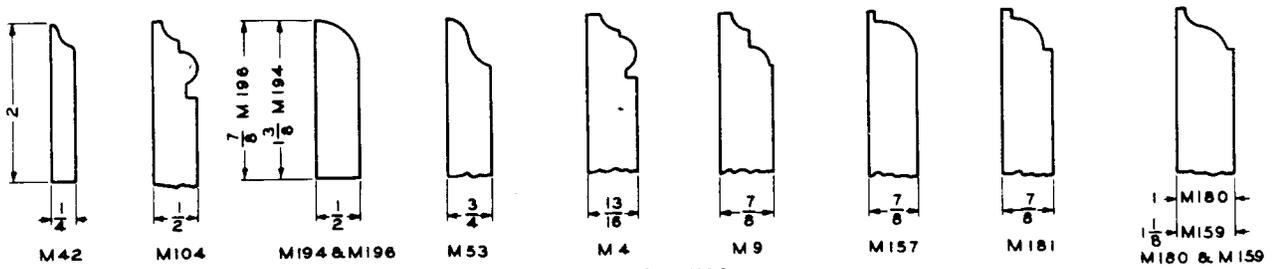
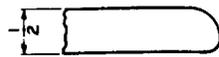


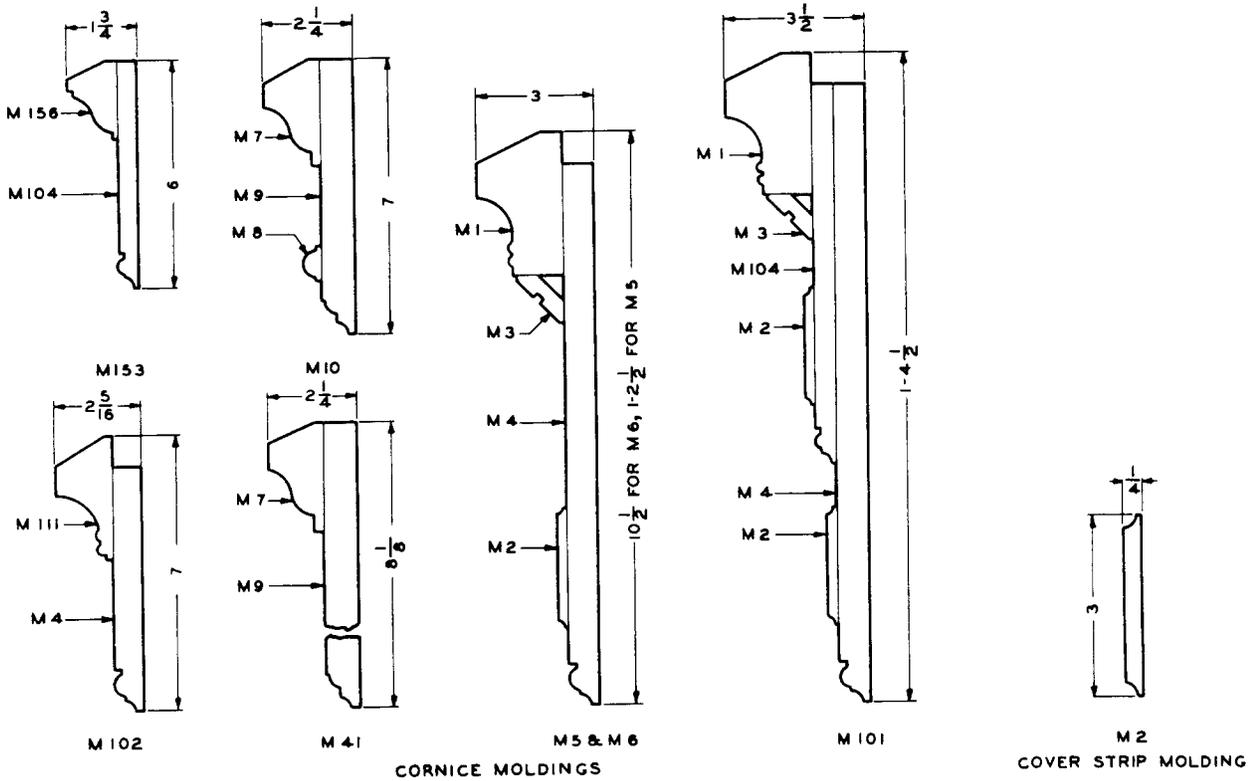
Fig. 6 - Table Leg Joints 100 to 103



BASE MOLDINGS

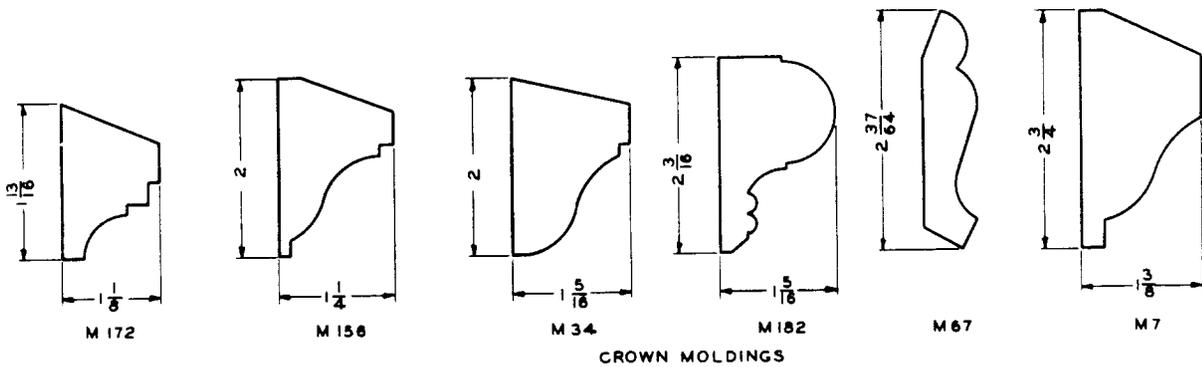


M43  
CABINET MOLDING



CORNICE MOLDINGS

COVER STRIP MOLDING



CROWN MOLDINGS

Fig. 7 - Cabinet, Cornice, and Small Crown Moldings

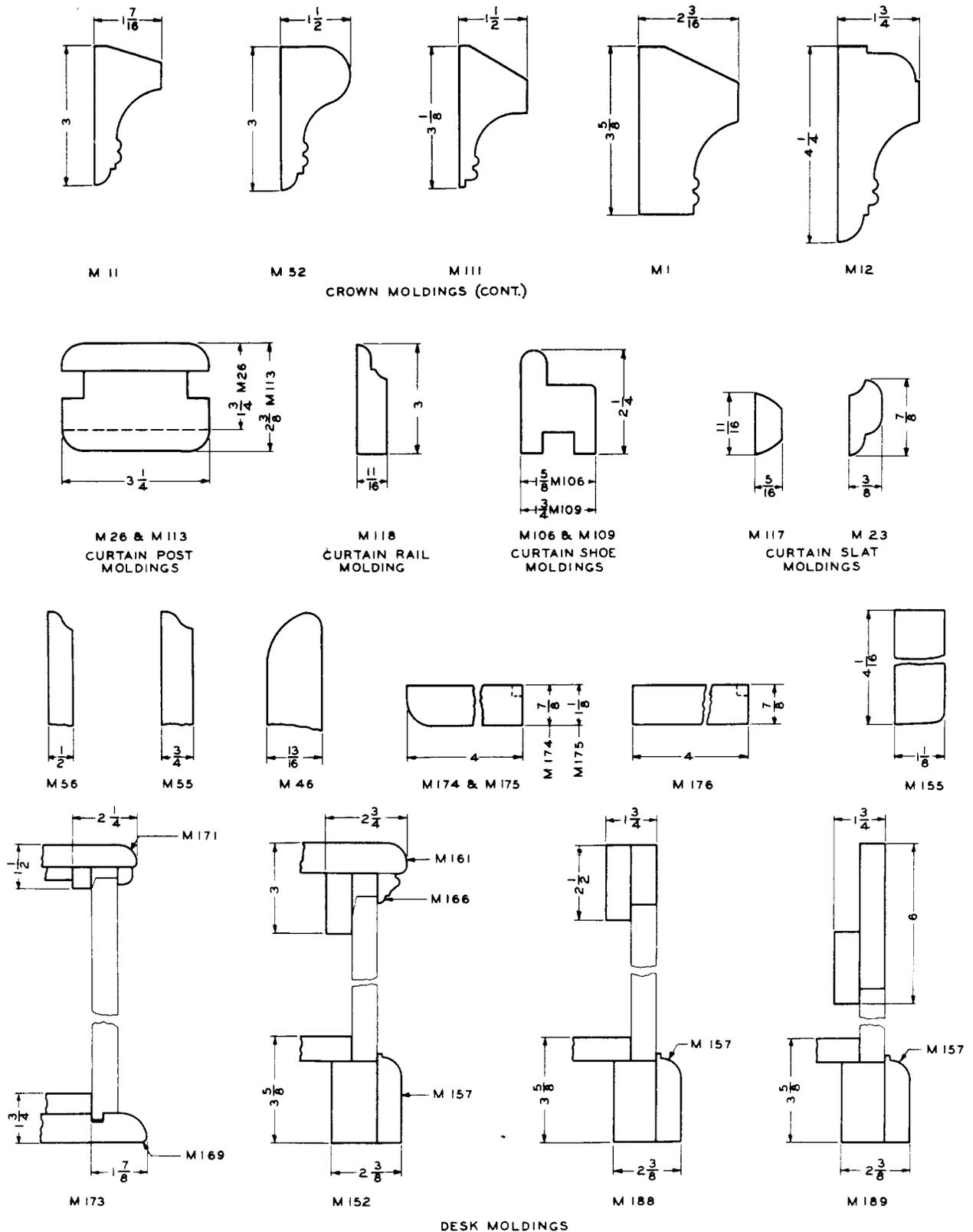


Fig. 8 - Curtain, Large Desk, and Large Crown Moldings

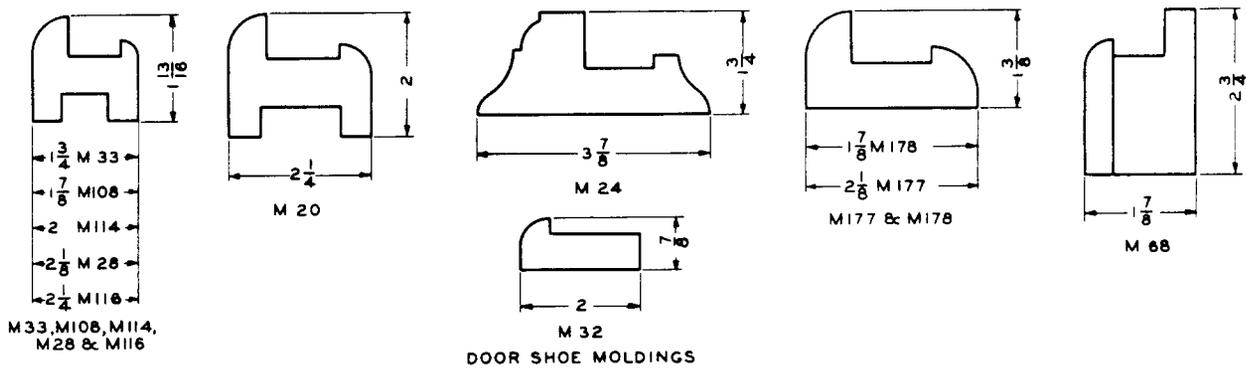
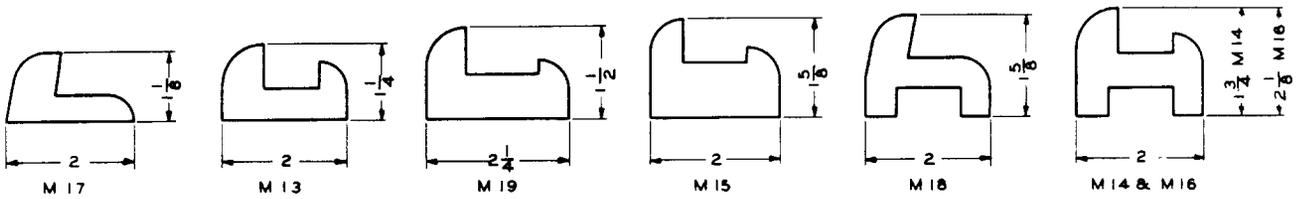
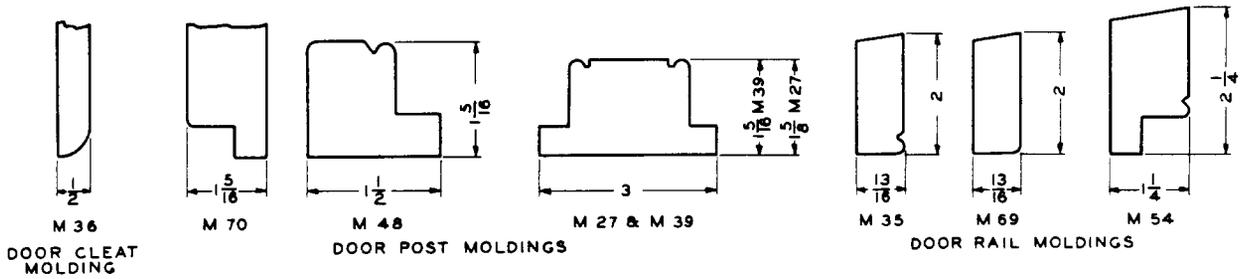
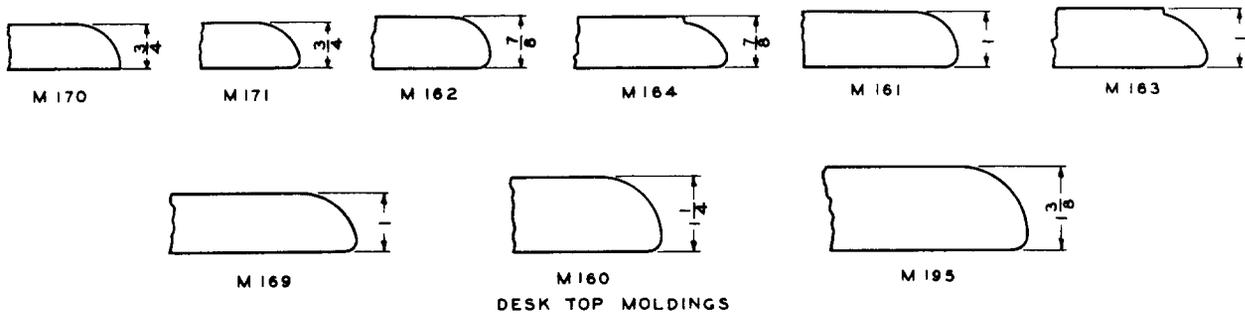
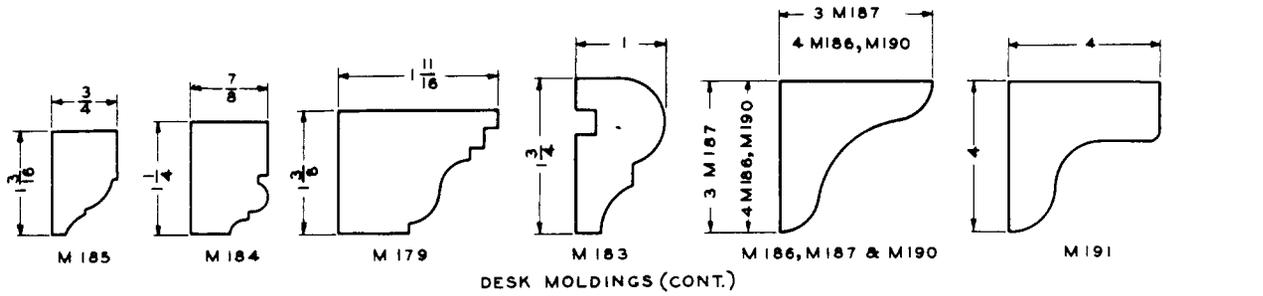


Fig. 9 - Small Desk, Desk Top, and Door Moldings

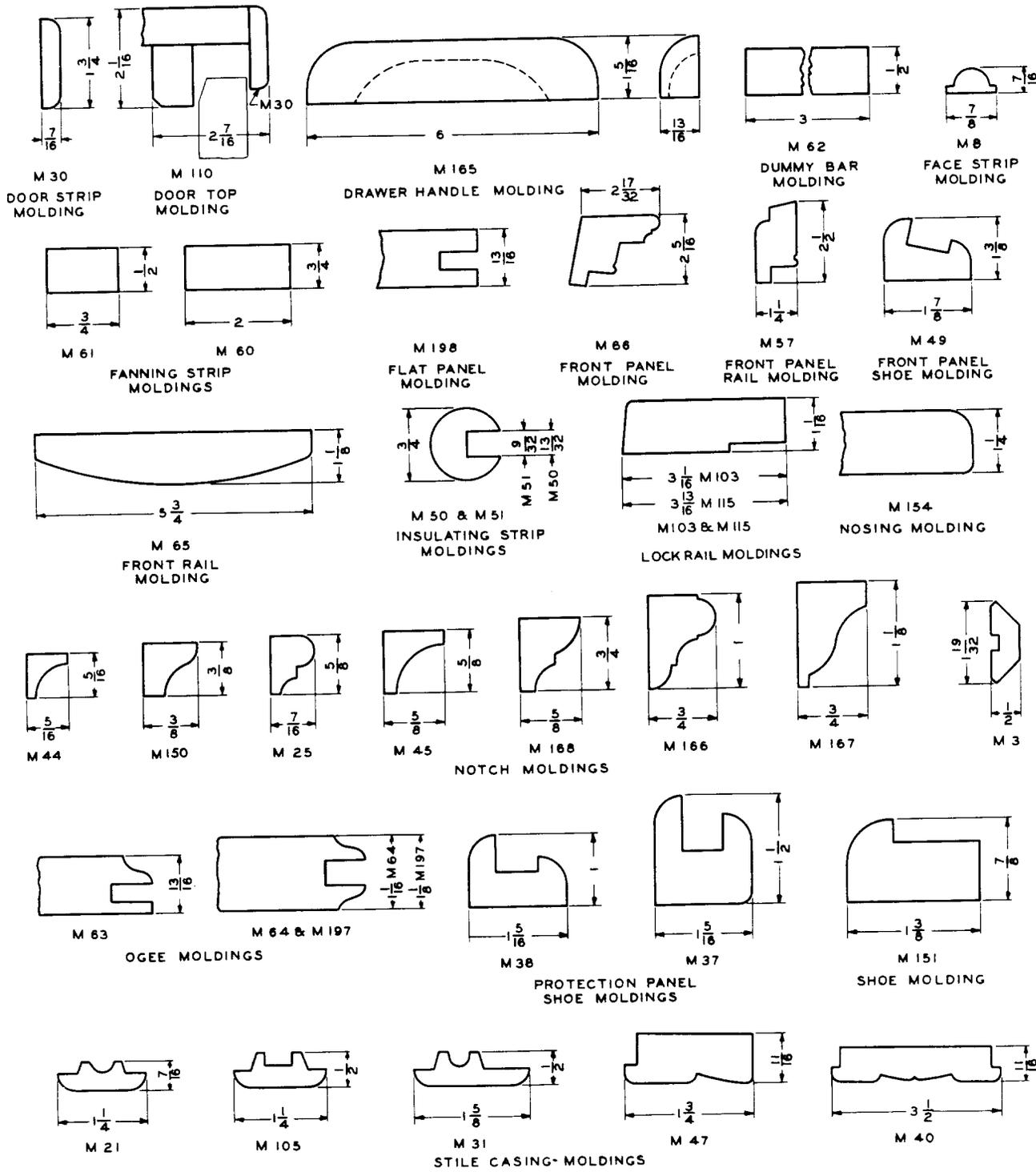


Fig. 10 - Miscellaneous Moldings

**4. REQUIREMENTS FOR ASSEMBLED WOODEN PARTS**

**General**

**4.01** *Assembled framework parts*, except parts designed to be removable, shall be securely fastened in place.

**4.02** *Removable assemblies*, such as doors, drawers, and removable panels, shall have a combined clearance for any two opposite fitted edges of not more than 1/8 inch after finishing. These tolerances apply at the time of assembly to solid lumber panels that do not exceed 12 inches across the grain, and to framed-up or plywood panels made from lumber and plywood that has been conditioned in accordance with approved practices.

**4.03** *Plugshelves and lamp shelves*, where covered with fiber, rubber, or other material, shall have the material securely fastened in place and shall be flush with the surface of the keyshelf, unless otherwise specified.

**Roller Curtains**

**4.04** The clearance between adjacent wood strips glued to the canvas of roller curtains shall be as small as practicable.

**REASONS FOR REISSUE**

1. 1.04 added.
2. 2.01(c) added.
3. In Table A, American Beech was added as an alternate material.
4. 2.09 expanded to include plugshelf assemblies of vulcanized fiber and to specify manufacturer and grade.
5. Information formerly in 2.16 of previous issue superseded by 2.09.