

U S A   S T A N D A R D

# SPINDLE NOSES

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**USAS B5.9 - 1967**

**REAFFIRMED 1986**

**For Tool Room Lathes, Engine Lathes,  
Turret Lathes, and Automatic Lathes**

**REAFFIRMED 1998**

FOR CURRENT COMMITTEE PERSONNEL  
PLEASE SEE ASME MANUAL AS-11

**REAFFIRMED 2004**

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## *Published by*

**THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS**

**United Engineering Center      345 East 47th Street      New York, N. Y. 10017**

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Title of Document: Spindle Noses for Tool Room Lathes, Engine Lathes, Turret Lathes, and Automatic Lathes

Date of Specific Issue Adopted: 1967; Reaffirmed 1972

Releasing Industry Group: American Society of Mechanical Engineers

**Custodians:**

Army — AL  
Navy — SH  
Air Force — 99

**User activities:**

Army — GL  
Air Force — 99

**Review activities:**

Army — AR, ME  
Navy — SH  
Air Force — 99

**Military Coordinating Activity:**  
DLA — IP

(Project 34GP-0005)

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## Foreword

**T**HE first edition of this standard, known as B5.9-1936, was developed by Technical Committee No. 4 on Spindle Noses of Sectional Committee B5 on the Standardization of Small Tools and Machine Tool Elements. The second edition, known as B5.9-1948, broadened the scope of the standard to include five sizes of Type L spindle noses, two smaller sizes of Types A, B and D spindle noses, namely, the 2 in. and 3 in., and a new spindle nose larger than the 20 in. for Types A and B, now known as the 28-in. nose. Similar changes were made in the American Standard for Chucks and Chuck Jaws (ASA B5.8).

The third edition, known as B5.9-1954, incorporated Unified Screw Threads jointly agreed upon by the American Standards Association, the British Standards Institution, and the Canadian Standards Association. For thread designations and specifications see USA Standard for Unified and American Screw Threads (USAS B1.1-1960). Other minor changes were also incorporated to clarify application of certain tolerances for plug gages, and a new paragraph was added to the text to provide balancing instructions.

In the fourth edition, approved by ASA on February 5, 1960 as B5.9-1960, tolerances for length of pilot and depth of pilot holes for the Type A-1 and B-1 spindles were decreased slightly to reflect current actual practice in order to reduce the possibility of distorting the chuck or face plate when mounted on the spindle. For the same reason, pilot bore diameters for some sizes of these chucks, and corresponding gage dimensions, were changed to reduce interference between chuck and spindle pilot diameters. In addition, the method of dimensioning radial hole locations was changed to follow the practice set forth in American Drafting Standards Manual on Dimensioning and Notes (ASA Y14.5-1957) to insure interchangeability.

This Revision supersedes ASA B5.9-1960. Master ring gage inside diameters were slightly increased for some Types A, B and D spindle nose sizes, to coincide with the 1960 master plug gage change made to suit the increased chuck pilot diameters. Counterbores for socket head screws were also changed to provide clearance for the "1960 Series" cap screws. Tables showing assembly of face plates to Type A and B spindles were eliminated, and tables and pages renumbered. Tables 35, 36 and 37 in this edition, reflect the 1963 revision of Handbook H28 - Screw-thread Standards for Federal Services, and the recent USA Standard Gages and Gaging for Unified Screw Threads, USAS B1.2-1966, in changing "NOT GO threaded plug gages" to "HI thread plug gages" and "NOT GO thread ring gages" to "LO thread ring gages."

Following approval by the USA Standards Committee B5 and the sponsors, the revision was approved by the USA Standards Institute on April 21, 1967.

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This USA Standard is one of nearly 3000 standards approved as American Standards by the American Standards Association. On August 24, 1966, the ASA was reconstituted as the United States of America Standards Institute. Standards approved as American Standards are now designated USA Standards. There is no change in their index identification or technical content.

UDC 621.941-229.3

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# SPINDLE NOSES

For Tool Room Lathes, Engine Lathes, Turret Lathes and Automatic Lathes

## Introductory Notes

### 1. Scope and Purpose

1.1 These spindle noses are for use on engine lathes, tool room lathes, turret lathes and automatic lathes and may be used advantageously on other machines wherever chucks or fixtures must be mounted accurately and rigidly on revolving spindles. Complete dimensions for each size and type of nose, as well as for mating backs of chucks, face plates and fixtures, are given in the tables. Also given are dimensions of gages for checking the important dimensions on these spindle noses and the backs of chucks, face plates and fixtures, to insure interchangeability between parts made by different manufacturers.

### 2. Nomenclature

2.1 The accompanying tables give dimensions of Types A, B, D, and L spindle noses. Ten sizes, from 2 in. to 28 in. inclusive, are provided in Types A and B as shown in Tables 1 and 2. Types A and B are subdivided into two divisions, 1 and 2, and noted as Types A1 and B1 or Types A2 or B2. Types A1 and B1 are provided with holes in both the inner and outer bolt circles in sizes 5 in. to 28 in. inclusive as shown on Tables 2 and 3. Types A2 and B2 are provided with holes in the outer bolt circles only in sizes 2 in. to 28 in. inclusive as shown on Tables 1, 2, and 3. The three smaller sizes, 2 in., 3 in. and 4 in., are available only in Types A2 and B2 with holes in the outer bolt circles only. Type D is provided in nine sizes, from 2 in. to 20 in. inclusive, in one series designated as Type D1 as shown on Tables 6, 8, 10, 12, 18, and 19. Type L is provided in five sizes in one series only as shown on Tables 28, 30, and 33.

2.2 In specifying chucks, face plates or fixtures to be made by another manufacturer, the size, as well as the type of the particular nose to be used, must be designated.

2.3 To clearly identify any spindle nose of Types A, B, or D, the terminology used should include first—the size, second—the type, third—the sub-division of the type which indicates the standard elements employed as given in detail in

Tables 1, 2, 6, 8, 10, and 12, and fourth—the words “USA Standard Spindle Nose.” For example, a “6-in. Type A1 USA Standard Spindle Nose” designates a 6-in. nose with the dimensions given in Tables 2 and 3 of Type A of subdivision 1; namely, with 11 tapped holes in the outer bolt circle and 8 tapped holes in the inner bolt circle, equipped with a driving button held in place with a driving screw.

2.4 To clearly identify any spindle nose of Type L, the terminology used should include first—the word “Type,” second—the symbol indicating the type and size, third—the words “USA Standard Spindle Nose.” For example, a “Type L00 USA Standard Spindle Nose” designates the smallest size of Type L nose of the dimensions given on Table 28.

2.5 A detailed description of each type of spindle nose is given below.

2.6 The Type A1 spindle nose is provided with two rows of tapped holes and a driving button as explained in Tables 1, 2, and 3. The inner row of tapped holes provides means for attaching certain sizes of scroll chucks by the use of socket-head cap screws which pass inside the scroll plate between the chuck jaws as shown in Table 4. The outer row of tapped holes provides means for attaching face plates, fixtures and other chucks by the use of socket-head cap screws. Table 4 gives the mating dimensions of chucks and face plates. The Type A1 nose is not available in the 2-in., 3-in. and 4-in. sizes.

2.7 The Type A2 spindle nose is the same as Type A1 except that holes in the inner bolt circle are omitted. The Type A2 may be used when the hole in the spindle is so large that there is no space left for the inner bolt circle and where the class of the work which the machine is to do is so restricted that the inner bolt circle is not required.

2.8 The Type B1 spindle nose is exactly the same as Type A1 except the holes in the outer

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bolt circle are clearance holes for through bolts or studs so that chucks or fixtures may be attached by the use of bolts or studs passing through the flange and employing nuts on the back side of the flange. The Type B1 nose will take any of the chucks, face plates or fixtures that may be mounted on the Type A1 nose, but the Type B1 necessitates extra overhang from the front spindle bearing of the machine to allow room for the nuts on the back of the flange. The Type B1 nose is provided with the tapped holes in the inner bolt circle exactly like the Type A1 nose. The Type B1 nose is available in seven sizes from 5 in. to 28 in. inclusive, and the dimensions are given in Tables 2 and 3, while Table 4 gives mating dimensions of chucks and face plates which may be attached by socket-head cap screws or Type B studs. The dimensions of Type B studs are given in Table 14.

2.9 The Type B2 spindle nose is the same as Type B1 except the holes in the inner bolt circle are omitted. The Type B2 spindle is available in ten sizes from 2 in. to 28 in. inclusive, and the dimensions are given in Tables 1, 2, and 3, while the backs of mating chucks, face plates, and fixtures are given in Table 4.

2.10 The Type D1 spindle nose is equipped with three equally spaced clearance holes in the outer bolt circle in sizes 2 in., 3 in., and 4 in., and six equally spaced clearance holes in the outer bolt circle in sizes 5 in. to 20 in. inclusive. Each such hole is provided with a cam, cam spring and other elements as shown on Tables 6, 8, 10, and 12 and as shown in the assembled position in Table 20. The cams are for the purpose of engaging and locking the cam lock studs mounted in the back of the face plate or chuck as dimensioned in Tables 7, 9, 11, and 13 and shown in assembled position in Table 20. This type of nose is intended for use on machines where the saving of time in changing face plates and chucks is of considerable importance. A portion of a turn of each of the cams releases the cam lock studs and allows the instant removal of the chuck or face plate. Similarly, when mounting chucks on the spindle, the chuck can be locked in place very quickly and easily by turning each cam a portion of a turn. Where the construction permits, chucks or face plates may also be mounted on the Type D1 spindle noses by the use of cam lock nuts as shown on Table 14. The cam lock nuts are first locked in position in the spindle nose with the cams, and the chuck or face plate is then

attached to the spindle with socket head cap screws of the proper length as shown in Table 14.

2.11 The Type L spindle nose is provided with a long, steep taper for locating and centering chucks and face plates, with a key for driving, and with a flanged nut for holding the chuck or face plate on the spindle. This spindle is available in five sizes and is dimensioned in Tables 28 and 30 and shown in assembled position in Table 33. Dimensions of the backs of mating chucks and face plates are shown in Table 29.

### 3. Gages and Gaging for Types A, B, and D, Spindle Noses

3.1 Master gages of the ring and plug type are recommended for inspecting the taper pilots of Types A, B, and D spindle noses and the taper holes in the mating face plates and chucks. Dimensions of such master gages for each size of spindle are given in the accompanying tables.

3.2 The master plug gages, Table 23, are so made that the point at which the taper, if extended, would intersect the flat face, is of dimensions B, Table 23. For convenience in checking these gages, the table lists the correct dimensions over accurate plug gages 0.250 in. in diameter resting against the flat face.

3.3 Each of the master ring gages, Table 22, is made so that the dimensions B corresponds with the dimension B of the mating master plug gage, Table 23, and so that surfaces W and X of the ring gage are a good Prussian blue fit on surfaces Y and Z of the mating plug gage.

3.4 Taper pilots on the spindles may be inspected with a master ring gage either by using depth gages registering from one face of the gage, or by using feelers of thickness Y, Tables 1 and 2, or thickness S26, Table 12. Three feelers of minimum dimensions Y or S26 should be used as "go" feelers and three feelers of the maximum dimension Y or S26 should be used as "not go" feelers. These feelers should be approximately equally spaced around the flange.

3.5 The taper hole in chucks and face plates, Table 4 and Table 13, may be inspected either by depth gages or by using the proper size master plug gage, Table 23. The plug gage should fit the taper hole without shake if the surface Y of the plug gage strikes the face of the chuck or face plate and should not stand away from the face of the chuck or face plate more than the amount of the gage clearance Y of Table 4 or P17, Table 13. This gage clearance may be in-

## SPINDLE NOSES FOR TOOL ROOM LATHES

spected with three feelers equally spaced around the flange.

3.6 Micrometer working gages, Tables 24, 25, 26, and 27, will be found convenient for manufacturing spindle noses as well as chucks or face plates. These gages should be set to the proper master ring and plug gage as explained in Tables 24, 25, 26, and 27 and will then read the pilot diameters direct.

### 4. Gages and Gaging for Type L Spindle Noses

4.1 Table 34 gives dimensions of plug and ring taper gages for inspecting the long taper pilots of Type L spindle noses and for inspecting the long taper holes in mating chucks and face plates. Tolerance B applies to dimension A only. Dimension A is the theoretical diameter of the taper at a plane intersecting the face of the large end of the gage. Tolerance E applies to the rate of taper only. On all taper plug gages the rate of taper shall not be less than  $3\frac{1}{2}$  in. per foot, and shall not be more than  $3\frac{1}{2}$  in. per foot plus E in the length C of the gage.

4.2 The master ring gages, Table 34, should be a good Prussian blue fit on the long taper of the spindle noses, Table 28, and the face of the gage marked "gage line" in Table 34 should stand away from the flange on the spindle an amount equal to the gage clearance CC, Table 28. This gage clearance may be inspected with "go" feelers of the minimum amount of the gage clearance CC and with "not go" feelers of the maximum amount of this gage clearance.

4.3 The location of the key and the height of the key in each spindle nose, Table 28, may be inspected by using this same ring gage, Table 34. Dimension N on this ring gage is made to clear the maximum permissible height G of the key in the spindle nose. The minimum height G, Table 28, may be checked by using the proper feeler between the top of the key and the slot in the ring gage.

4.4 The location and depth of the keyway in the chuck or face plate may be inspected by means of the "go" and "not go" gage blocks, Table 34. The "go" gage block should fit freely the full depth in the keyway of the plug gage when inserted in the taper hole in the chuck or face plate. The "not go" gage either should not enter or should enter without shake.

4.5 The threads on the draw nuts for Type L spindle noses, Table 30, may be inspected by means of the "go" and "not go" HI thread plug

gages, Table 35. The "go" gage should screw into the nut the full distance freely. The "not go" HI gage either should not enter or should screw in without shake.

4.6 The thread on the backs of chucks and face plates for Type L spindle noses, Table 29, may be inspected with a "go" and "not go" LO thread ring gage, Table 37. The "go" gage should screw on freely all the way while the "not go" LO thread gage either should not start or should be on without shake.

4.7 The "go" and "not go" LO thread ring gages, Table 37, may be checked and set properly by means of the setting plugs for thread ring gages, Table 36.

### 5 Chucks

5.1 The dimensions of standard chucks to fit Types A, B, D and L spindle noses are given by USA Standard Chucks and Chuck Jaws (USAS B5.8-1954, Reaffirmed 1959).

5.2 Chucks for Type A and Type B spindle noses shown by the above standard have the backs of the chucks made to the dimensions of Table 4 and are held on the spindle noses with cap screws or bolts. Chucks for Type D spindle noses have the backs of the chucks made to the dimensions of Tables 7, 9, 11, or 13 and are held on the spindle noses by means shown in Tables 18, 19, or 20. Chucks for Type L spindle noses have the backs of the chucks made to the dimensions of Table 29 and are held on the spindle noses by means shown in Table 33.

5.3 All of the regular chuck builders in the United States are in a position to furnish chucks for Types A, B, D, or L spindle noses.

5.4 The Class I chucks covered by that standard are medium-duty, wrench operated chucks with master jaws of the tongue and groove type and are suitable for use on engine lathes or for medium duty on other machines. These chucks may be interchangeable on the Types A1, B1, B2, and D1 spindle noses. They may be attached to the A1 or B1 noses by socket head cap screws or may be attached to the Type B2 noses by using Type D studs, Table 14, and held with nuts on the back of the flange of the nose as shown in Table 14. These chucks may also be attached to the D1 nose by the use of cam lock studs, Table 13, and assembled as shown in Table 20.

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### 6 Spindle Noses Recommended for Different Types of Lathes

**6.1 Bench Lathes.** The 2 in. Type D1 spindle nose is recommended for 6 in. up to and including 8 in. bench lathes, and the 3 in. Type D1 spindle nose or the Type L00 spindle nose is recommended for 9 in. and 10 in. bench lathes.

**6.2** Table 18 shows recommended construction of draw-in collets on 2 in. and 3 in. Type D1 spindle noses for bench lathes, as well as the construction and general dimensions for spindles with American Standard tapers, assembled with face plates and dog plates on 2 in. Type D1 and 3 in. Type D1 spindles for bench lathes in cases where the American Standard taper hole is used in spindles of bench lathes. Table 33 shows the Type L00 nose assembled with dog plate and face plate for 10 in. bench lathes.

**6.3 Tool Room Lathes.** The Type D1 spindle noses or the Type L spindle noses are recommended as alternate standards for tool room lathes. It is recommended that the size of the nose selected for each size of tool room lathe be as follows:

| Tool Room Lathes                    | Noses                    |
|-------------------------------------|--------------------------|
| 10 in.                              | 4 in. Type D1 or Type L0 |
| 12 in. up to and incl. 16 in.       | 6 in. Type D1 or Type L1 |
| Above 16 in. up to and incl. 20 in. | 6 in. Type D1 or Type L2 |

**6.4** In each case the size of the tool room lathe given above is the nominal catalog size. The actual swing over the bed and carriage extensions of each such catalog size lathe has been established by a recent agreement among the American engine lathe builders as being 2½ in. more than the catalog size specified.

**6.5 Engine Lathes.** The Type D1 and the Type L spindle noses are recommended as alternate standards for engine lathes. It is recommended that the size of the nose selected for each size of engine lathe be as follows:

| Engine Lathes                       | Noses                     |
|-------------------------------------|---------------------------|
| 12 in. up to and incl. 16 in.       | 6 in. Type D1 or Type L1  |
| Above 16 in. up to and incl. 20 in. | 8 in. Type D1 or Type L2  |
| Above 20 in. up to and incl. 25 in. | 8 in. Type D1 or Type L3  |
| Above 25 in. up to and incl. 32 in. | 11 in. Type D1 or Type L3 |

**6.6** Tables 18 and 19 show sections through the Type D1 spindle noses for engine lathes and tool room lathes assembled with dog plates, face plates, centers, and sleeves. Table 15 gives the recommended dimensions of sleeves and centers for these spindles, and Tables 16 and 17 give suggested dimensions for the taper holes, counterbores for same, and through holes in these spindles.

**6.7** Tables 31, 32, and 33 give the corresponding sections and dimensions for Type L spindle noses for engine lathes and tool room lathes.

**6.8 Turret Lathes.** The Type A1 spindle nose is recommended for use on turret lathes except that each manufacturer of turret lathes may use the Type D1 nose in preference to the Type A1 if he individually prefers. The size of nose to be selected for each size turret lathe should be determined by the size of the hole in the spindle as follows:

| Spindle Bores                   | Noses            |
|---------------------------------|------------------|
| Up to 1¼ in.                    | 5 in. or smaller |
| Over 1¼ in. up to 2-7/16 in.    | 6 in.            |
| Over 2-7/16 in. up to 3-3/8 in. | 8 in.            |
| Over 3-3/8 in. up to 5-3/8 in.  | 11 in.           |
| Over 5-3/8 in. up to 8-3/8 in.  | 15 in.           |
| Over 8-3/8 in. up to 13 in.     | 20 in.           |
| Over 13 in. up to 21½ in.       | 28 in.           |

**6.9 Single Spindle Automatic Lathes.** The Type A1 nose is recommended for single spindle automatic lathes, size of nose depending upon the size of the heavy-duty chuck the machine normally takes as follows:

|                                          | Noses            |
|------------------------------------------|------------------|
| Machines taking 6 in. chucks or smaller  | 5 in. or smaller |
| Machines taking 8 in. chucks             | 6 in.            |
| Machines taking 10 in. and 12 in. chucks | 8 in.            |
| Machines taking 15 in. and 18 in. chucks | 11 in.           |

**6.10 Other Applications.** In addition to the above, these spindles may be used on other machine tools such as multiple spindle automatic lathes, internal grinding machines, thread grinders and hobbing machines.

**6.11** If these spindles are used on multiple spindle automatic lathes, the Type A1 or Type A2 spindle nose is recommended. The size of the nose depends on the size of the hole in the spindle, or the size of heavy duty chuck the machine normally takes. The size of the nose recom-

## SPINDLE NOSES FOR TOOL ROOM LATHES

ended for multiple spindle chucking machines is as follows:

|                                          | Noses  |
|------------------------------------------|--------|
| Machines taking 4½ in. chucks            | 4 in.  |
| Machines taking 6 in. chucks             | 5 in.  |
| Machines taking 8 in. chucks             | 6 in.  |
| Machines taking 10 in. and 12 in. chucks | 8 in.  |
| Machines taking 15 in. and 18 in. chucks | 11 in. |

6.12 Larger sizes of lathes of any type may be provided with any of the larger spindle noses of Types A1, A2, B1, B2 or D1, depending upon the service for which the lathe is intended, or the size of the hole required in the spindle, or the size of chucks the lathes should take. USA Standard Chucks and Chuck Jaws (USAS B5.8-1954, Reaffirmed 1959), gives dimensions of medium-duty and heavy-duty chucks from 6 in. to 36 in. in diameter and specifies the size of spindle nose for which each chuck is intended. Di-

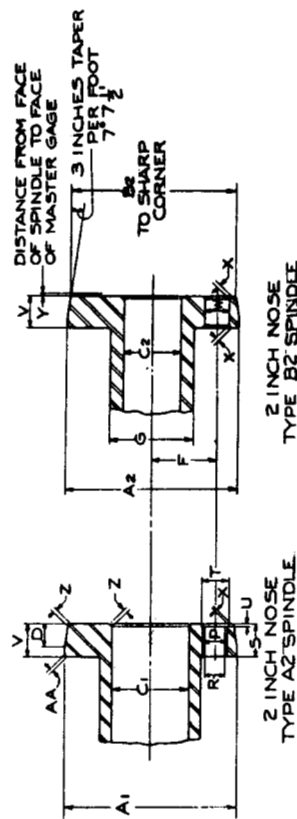
mension C<sub>1</sub>, Table 2, gives the maximum size hole for any size of Type A1 or B1 nose 5 in. to 28 in. inclusive, and dimension C<sub>2</sub>, Table 2, gives the maximum size hole in any Type A2 or B2 nose.

6.13 *Directions for the Balancing of Spindles and Chucks.* Directions for balancing chucks for each of the types of spindles are given in B5.8-1954, Reaffirmed 1959. To run in balance with such chucks at high speeds, a spindle of Type A or Type B should be balanced with a full-size driving button in place, but without any chuck or face plate mounted on the spindle. A method of drilling balancing holes in Type A spindles is shown on Table 5. The Type D spindle should be balanced also without any chuck or face plate mounted thereon. The Type L spindle should be balanced with a partial key that fills the key-seat and has an outside contour that coincides with the taper.

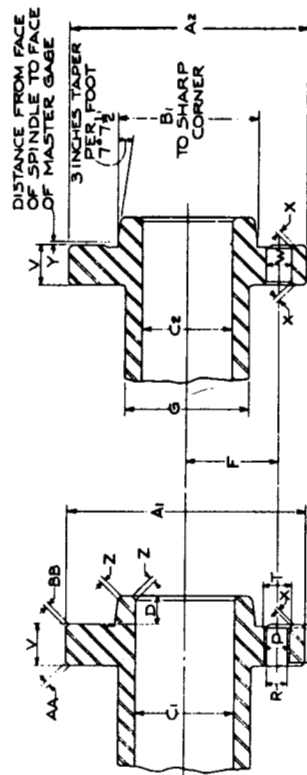
ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE  
UNLESS OTHERWISE SPECIFIED WHEN DIMEN-  
SIONS ARE EXPRESSED IN COMMON FRACTIONS  
SEE TABLE 3 FOR LOCATION AND NUMBER  
OF HOLES AND DRIVING SCREW

| SPINDLE NAME                | 2 INCH NOSE    | 3 INCH NOSE    | 4 INCH NOSE    |
|-----------------------------|----------------|----------------|----------------|
| Dia of Type A Spindles      | A <sub>1</sub> | A <sub>1</sub> | A <sub>1</sub> |
| Dia of Type B Spindles      | A <sub>2</sub> | A <sub>2</sub> | A <sub>2</sub> |
| Pilot Dia                   | B <sub>1</sub> | B <sub>1</sub> | B <sub>1</sub> |
| Dia at Face of Pilot        | B <sub>2</sub> | B <sub>2</sub> | B <sub>2</sub> |
| Max Hole in Type A2 Spindle | C <sub>1</sub> | C <sub>1</sub> | C <sub>1</sub> |
| Max Hole in Type B2 Spindle | C <sub>2</sub> | C <sub>2</sub> | C <sub>2</sub> |
| Length of Pilot             | D              | D              | D              |
| Location of Drive Screw     | E              | E              | E              |
| Radius of Bolt Circle       | F              | F              | F              |
| Max OD Type B2 Spindle      | G              | G              | G              |
| Hole for Driving Screw Head | H              | H              | H              |
| Depth of Counterbore        | I              | I              | I              |
| Maximum Radius              | J              | J              | J              |
| Counterbore                 | K              | K              | K              |
| Depth of Counterbore        | L              | L              | L              |
| Thread UNC-3B               | M              | M              | M              |
| Tap Drill                   | N              | N              | N              |
| Full Depth Thread           | O              | O              | O              |
| Thread UNC-3B               | P              | P              | P              |
| Tap Drill                   | R              | R              | R              |
| Full Depth Thread           | S              | S              | S              |
| Counterbore                 | T              | T              | T              |
| Depth of Counterbore        | U              | U              | U              |
| Minimum Width of Flange     | V              | V              | V              |
| Bolt Hole Type B Spindle    | W              | W              | W              |
| Chamfer                     | X              | X              | X              |
| Gage Clearance              | Y              | Y              | Y              |
| Chamfer                     | Z              | Z              | Z              |
| Chamfer                     | AA             | AA             | AA             |
| Chamfer                     | BB             | BB             | BB             |
| Dia of Undercut             | CC             | CC             | CC             |
| Width of Undercut           | DD             | DD             | DD             |
| Projection of Drive Screw   | EE             | EE             | EE             |
| Dia of Drive Screw Head     | FF             | FF             | FF             |
| Length of Drive Screw Head  | GG             | GG             | GG             |
| Thread UNC-3A               | LL             | LL             | LL             |
| Length Under Head           | MM             | MM             | MM             |
| Full Length Thread          | OO             | OO             | OO             |
| Size of Hex Socket          | XX             | XX             | XX             |

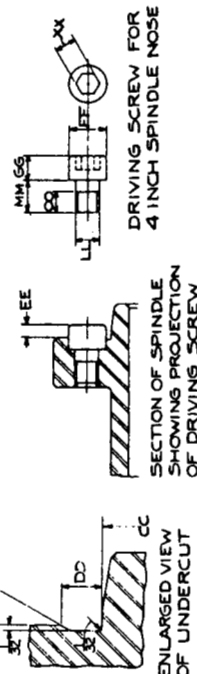
NOTES: 1 - Hole spaced as shown on Table 3, and located within .003R of true position.  
2 - Holes spaced as shown on Table 3, and located within .006R of true position.



2 INCH NOSE  
TYPE B2 SPINDLE



3 INCH NOSE  
TYPE B2 SPINDLE



TYPE A AND TYPE B SPINDLE NOSES  
TYPES 2, 3 AND 4 INCH

4 INCH NOSE

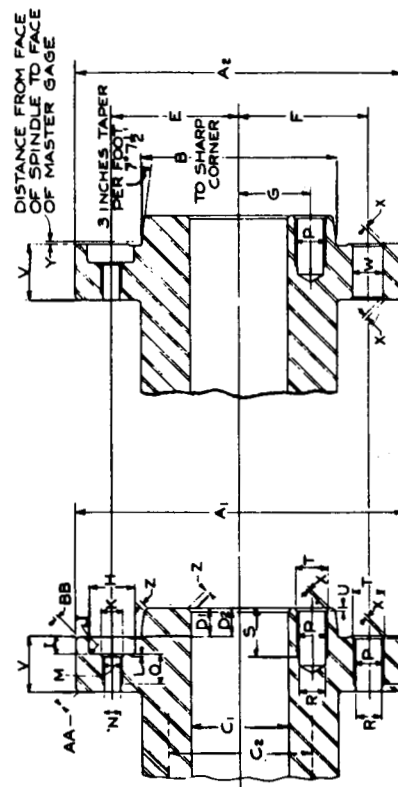
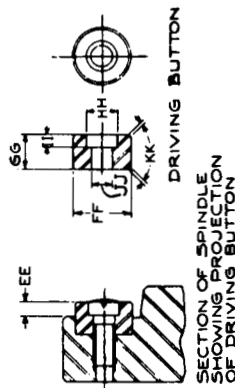
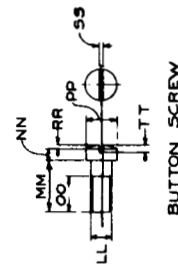
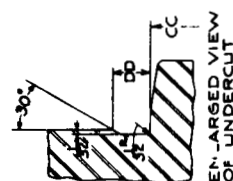
4 INCH NOSE

| SPINDLE NAME                                | 5 INCH NOSE          | 6 INCH NOSE  | 8 INCH NOSE  | 11 INCH NOSE | 15 INCH NOSE | 20 INCH NOSE | 28 INCH NOSE |
|---------------------------------------------|----------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Dia of Type A Spindles                      | A <sub>1</sub> 5-1/4 | 6-1/2        | 8-1/4        | 11           | 15           | 20-1/2       | 28-1/2       |
| Dia of Type B Spindles                      | A <sub>2</sub> 5-1/4 | 6-1/2        | 8-1/4        | 11           | 15           | 20-1/2       | 28-1/2       |
| Pilot Dia                                   | B 3-25/64            | 4-1/8        | 5-1/8        | 6-1/8        | 8-1/8        | 10-1/8       | 12-1/8       |
| Max Hole in Type A1 Spin.                   | C <sub>1</sub> 1-3/4 | 2-7/16       | 3-3/8        | 4-1/8        | 5-3/8        | 6-3/4        | 8-1/4        |
| Max Hole in Type A2 Spin.                   | C <sub>2</sub> 1-3/4 | 2-7/16       | 3-3/8        | 4-1/8        | 5-3/8        | 6-3/4        | 8-1/4        |
| Length of Pilot for Type A1 and B1 Spindles | D <sub>1</sub> .5625 | .625         | .6875        | .750         | .8125        | .875         | 1.000        |
| Location of Drive Button                    | E Note 1             | Note 1       | Note 1       | Note 2       | Note 2       | Note 2       | Note 2       |
| Radius Outer Bolt Circle                    | F 2.0625             | 2.625        | 3.375        | 4.625        | 6.500        | 9.125        | 12.750       |
| Radius Inner Bolt Circle                    | G 2.0625             | 2.625        | 3.375        | 4.625        | 6.500        | 9.125        | 12.750       |
| Hole for Drive Button                       | H .0002              | .0002        | .0002        | .0002        | .0002        | .0002        | .0002        |
| Depth of Counterbore                        | I 1/4                | 5/16         | 3/8          | 7/16         | 1/2          | 5/8          | 13/16        |
| Maximum Radius                              | J 1/64               | 1/64         | 1/64         | 1/64         | 1/64         | 1/64         | 1/64         |
| Counterbore                                 | K 21/64              | 21/64        | 25/64        | 25/64        | 33/64        | 33/64        | 33/64        |
| Depth of Counterbore                        | L 1/16               | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         |
| Thread UNC-3B                               | M 3/16-18            | 3/16-18      | 3/16-18      | 3/16-18      | 3/16-18      | 3/16-18      | 3/16-18      |
| Tap Drill                                   | N 17/64              | 17/64        | 17/64        | 17/64        | 17/64        | 17/64        | 17/64        |
| Full Depth Thread                           | O 1/2                | 9/16         | 5/8          | 5/8          | 7/8          | 7/8          | 7/8          |
| Thread UNC-3B                               | P 3/8-14             | 3/8-14       | 3/8-14       | 3/8-14       | 3/8-14       | 3/8-14       | 3/8-14       |
| Tap Drill                                   | R 27/64              | 27/64        | 27/64        | 27/64        | 27/64        | 27/64        | 27/64        |
| Full Depth Thread                           | S 3/4                | 7/8          | 1-1/16       | 1-1/16       | 1-1/16       | 1-1/16       | 1-1/16       |
| Counterbore                                 | T 29/64              | 33/64        | 41/64        | 49/64        | 57/64        | 1-1/16       | 1-1/16       |
| Depth of Counterbore                        | U 1/16               | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         |
| Min Width of Flange                         | V 7/8                | 1-1/8        | 1-3/8        | 1-5/8        | 1-7/8        | 1-7/8        | 2-1/4        |
| Bolt Hole Type B Spindles                   | W 15/32              | 17/32        | 21/32        | 51/64        | 59/64        | 1-3/64       | 1-19/64      |
| Chamfer                                     | X 1/32               | 1/32         | 1/32         | 1/32         | 1/32         | 1/32         | 1/32         |
| Gage Clearance                              | Y .0008              | .0008        | .0008        | .0008        | .0008        | .0008        | .0008        |
| Chamfer                                     | Z 1/16               | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         |
| Chamfer                                     | AA 1/16              | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         |
| Chamfer                                     | BB 1/16              | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         | 1/16         |
| Diameter of Undercut                        | CC .0002             | .0002        | .0002        | .0002        | .0002        | .0002        | .0002        |
| Width of Undercut                           | DD 3/235             | 4.172        | 5.485        | 7.720        | 11.220       | 16.220       | 22.970       |
| Projection of Button                        | EE 3/16              | 3/16         | 1/4          | 5/16         | 5/16         | 5/16         | 5/16         |
| Dia of Driving Button                       | FF .625              | .750         | .9375        | 1.125        | 1.375        | 1.625        | 2.000        |
| Length of Driving Button                    | GG 7/16              | 1/2          | 5/8          | 3/4          | 13/16        | 15/16        | 1-1/8        |
| Counterbore                                 | HH 29/64             | 29/64        | 37/64        | 37/64        | 49/64        | 49/64        | 49/64        |
| Depth of Counterbore                        | II 13/64             | 13/64        | 1/4          | 1/4          | 21/64        | 21/64        | 21/64        |
| Dia of Hole                                 | IJ 21/64             | 21/64        | 25/64        | 25/64        | 33/64        | 33/64        | 33/64        |
| Chamfer                                     | KK 1/32              | 1/32         | 1/32         | 1/32         | 1/32         | 1/32         | 1/32         |
| Thread UNC-3A                               | LL 3/16-18           | 3/16-18      | 3/16-18      | 3/16-18      | 3/16-18      | 3/16-18      | 3/16-18      |
| Length Under Head                           | MM 5/8               | 3/4          | 7/8          | 1-1/4        | 1-1/4        | 1-1/4        | 1-1/4        |
| Full Length Thread                          | NN 13/64             | 13/64        | 1/4          | 1/4          | 21/64        | 21/64        | 21/64        |
| Dia of Head                                 | OO 1/2               | 5/8          | 3/4          | 3/4          | 1            | 1-1/4        | 1-1/4        |
| Full Length Thread                          | PP 7/16              | 7/16         | 9/16         | 9/16         | 3/4          | 3/4          | 3/4          |
| Dia of Head                                 | RR 3/64              | 3/64         | 3/64         | 1/16         | 5/64         | 5/64         | 5/64         |
| Slot                                        | SS .065 To .079      | .065 To .079 | .074 To .088 | .074 To .088 | .094 To .110 | .094 To .110 | .094 To .110 |
| Depth of Slot                               | TT 3/32              | 3/32         | 1/8          | 1/8          | 5/32         | 5/32         | 5/32         |
| Length of Pilot for Type A2 and B2 Spindles | D <sub>2</sub> 1/2   | 9/16         | 5/8          | 11/16        | 3/4          | 13/16        | 15/16        |

NOTES: 1—Hole spaced as shown on Table 3, and located within .003R of true position.  
2—Holes spaced as shown on Table 3, and located within .006R of true position.  
3—Holes spaced as shown on Table 3, and located within .008R of true position.

TABLE 2  
TYPE A AND TYPE B SPINDLE NOSES  
SIZES 5 INCH TO 28 INCH INCLUSIVE

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  INCH PERMISSIBLE UNLESS OTHERWISE SPECIFIED. WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS, SEE TABLE 3 FOR LOCATION AND NUMBER OF HOLES AND DRILLING ACTIONS



TYPE B SPINDLES

TYPE B1 IS EXACTLY AS SHOWN WITH CLEARANCE HOLES IN OUTER BOLT CIRCLE AND TAPPED HOLES IN INNER BOLT CIRCLE

TYPE B2 IS SAME AS SHOWN EXCEPT OMIT TAPPED HOLES IN INNER BOLT CIRCLE

TYPE A SPINDLES

TYPE A1 IS EXACTLY AS SHOWN WITH TAPPED HOLES IN BOTH INNER AND OUTER BOLT CIRCLES

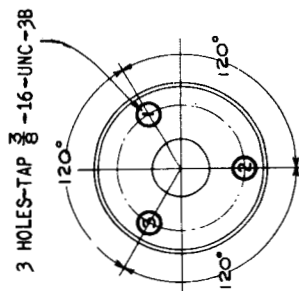
TYPE A2 IS SAME AS SHOWN EXCEPT OMIT HOLES IN INNER BOLT CIRCLE

SPINDLES TYPE A1 HAVE ALL TAPPED HOLES IN BOTH INNER AND OUTER BOLT CIRCLES AS SHOWN

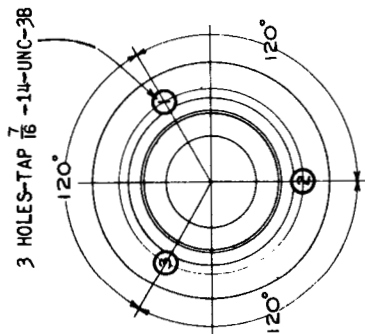
SPINDLES TYPE B1 ARE SAME AS SHOWN EXCEPT ALL HOLES IN OUTER BOLT CIRCLE ARE CLEARANCE HOLES OF DIMENSION W TABLES 1 AND 2

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS

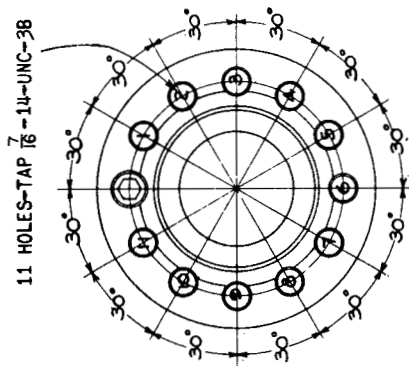
SEE TABLE 1 AND TABLE 2 FOR OTHER DIMENSIONS



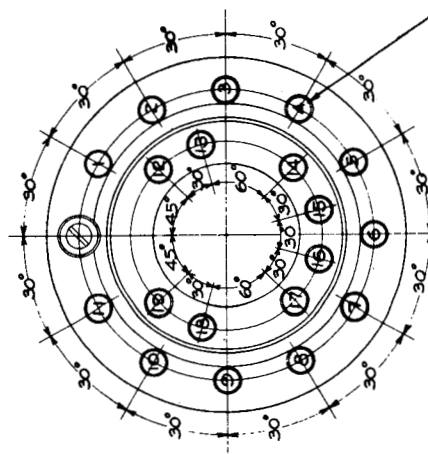
2 INCH NOSE



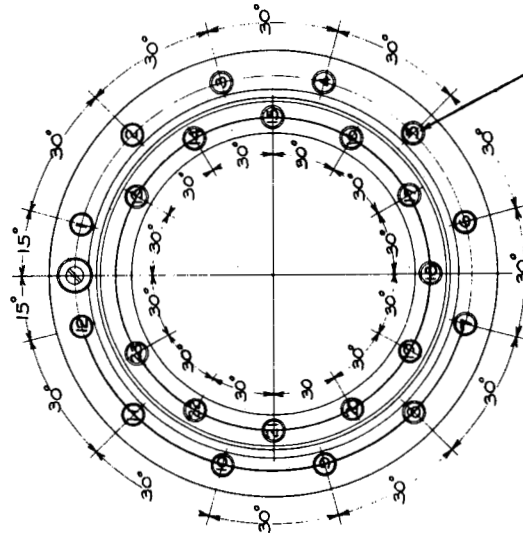
3 INCH NOSE



4 INCH NOSE



| SPINDLE NAME | HOLES | TAP SIZE       |
|--------------|-------|----------------|
| 5 INCH NOSE  | 19    | 7/16-14-UNC-3B |
| 6 INCH NOSE  | 19    | 1/2-13-UNC-3B  |
| 8 INCH NOSE  | 19    | 5/8-11-UNC-3B  |
| 11 INCH NOSE | 19    | 3/4-10-UNC-3B  |



| SPINDLE NAME | HOLES | TAP SIZE       |
|--------------|-------|----------------|
| 15 INCH NOSE | 23    | 7/16-9-UNC-3B  |
| 20 INCH NOSE | 23    | 1-8-UNC-3B     |
| 28 INCH NOSE | 23    | 1 1/4-7-UNC-3B |

LOCATION OF HOLES AND DRIVING BUTTONS  
IN TYPE A AND TYPE B SPINDLE NOSES

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE  
SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS

| SPINDLE NAME                                            | 2 INCH<br>NOSE | 3 INCH<br>NOSE | 4 INCH<br>NOSE | 5 INCH<br>NOSE | 6 INCH<br>NOSE | 8 INCH<br>NOSE | 11 INCH<br>NOSE | 15 INCH<br>NOSE | 20 INCH<br>NOSE | 28 INCH<br>NOSE |
|---------------------------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|
| Minimum Dia. of Flange                                  | A              | 3 3/8          | 4 1/4          | 5 1/4          | 6 1/4          | 8 1/4          | 11              | 15              | 20 1/2          | 28 1/2          |
| Pilot Dia.                                              | B1             | 2.1250         | 2.5005         | 3.2503         | 4.1878         | 5.50055        | 7.75055         | 11.2505         | 16.2505         | 23.000          |
| Pilot Dia.                                              | B2             | .00025         |                |                |                |                |                 |                 |                 |                 |
| Maximum Hole                                            | C1             | 1 1/8          |                |                |                |                |                 |                 |                 |                 |
| Maximum Hole                                            | C2             | 2-1/64         | 2-25/64        | 3 3/8          | 4-3/64         | 5-11/32        | 7-37/64         | 11 1/8          | 16-3/64         | 22-49/64        |
| Depth of Pilot Hole for Type A1 and B1 Spindles         | D1             | 3/8            |                |                |                |                |                 |                 |                 |                 |
| Minimum Depth of Pilot Hole for Type A2 and B2 Spindles | D2             | 1/2            | 1/2            | 9/16           | 5/8            | 11/16          | 3/4             | 13/16           | 7/8             | 1               |
| Location of Driving Button                              | E              | Note 1         | Note 1         | Note 1         | Note 1         | Note 1         | Note 1          | Note 1          | Note 1          | Note 1          |
| Radius Outer Bolt Circle                                | F              | Note 2         | Note 2         | Note 2         | Note 2         | Note 2         | Note 2          | Note 2          | Note 2          | Note 2          |
| Radius Inner Bolt Circle                                | G              | Note 2         | Note 2         | Note 2         | Note 2         | Note 2         | Note 2          | Note 2          | Note 2          | Note 2          |
| Hole for Driving Button                                 | H              |                |                |                |                |                |                 |                 |                 |                 |
| Depth of Driving Button Hole                            | I              |                |                |                |                |                |                 |                 |                 |                 |
| Radius                                                  | J              |                |                |                |                |                |                 |                 |                 |                 |
| Minimum                                                 | K              |                |                |                |                |                |                 |                 |                 |                 |
| Clearance Holes for Bolts                               | L              | 13/32          | 15/32          | 17/32          | 19/32          | 21/32          | 23/32           | 25/32           | 27/32           | 29/32           |
| Counterbore for Bolt Heads                              | M              | 19/32          | 11/16          | 11/16          | 11/16          | 25/32          | 1               | 1-3/16          | 1-3/8           | 1-9/16          |
| Depth of Counterbore                                    | N              | 7/16           | 1/2            | 1/2            | 9/16           | 11/16          | 13/16           | 15/16           | 1-1/16          | 1-5/16          |
| Thread UNC-3B                                           | O              | 3/8-16         | 1/2-14         | 5/8-14         | 3/4-11         | 7/8-11         | 1-11/16         | 1-1/8           | 1-5/8           | 2-1/8           |
| Tap Drill                                               | P              | 5/16           | 3/8            | 3/8            | 7/16           | 1/2            | 5/8             | 3/4             | 7/8             | 1-1/8           |
| Full Depth of Thread                                    | R              | 5/8            | 3/4            | 3/4            | 7/8            | 1-1/8          | 1-1/4           | 1-1/2           | 1-3/4           | 2               |
| Counterbore                                             | S              | 25/64          | 29/64          | 29/64          | 29/64          | 33/64          | 41/64           | 49/64           | 57/64           | 1-1/64          |
| Depth of Counterbore                                    | T              | 1/16           | 1/16           | 1/16           | 1/16           | 1/16           | 1/16            | 1/16            | 1/16            | 1/16            |
| Chamfer                                                 | U              | 1/32           | 1/32           | 1/32           | 1/32           | 1/32           | 1/32            | 1/32            | 1/32            | 1/32            |
| Chamfer                                                 | V              | 1/32           | 1/32           | 1/32           | 1/16           | 1/16           | 1/16            | 1/16            | 1/8             | 1/8             |
| Dia. of Undercut                                        | W              | .004           | .004           | .004           | .004           | .004           | .006            | .006            | .006            | .010            |
| Width of Undercut                                       | X              | 1/8            | 1/8            | 1/8            | 1/4            | 5/16           | 5/16            | 5/16            | 5/16            | 3/8             |
| Gage Clearance                                          | Y              | .001           | .002           | .002           | .002           | .002           | .002            | .002            | .004            | .004            |
| Chamfer                                                 | Z              | 1/16           | 1/16           | 1/16           | 1/16           | 1/16           | 1/16            | 1/16            | 1/8             | 1/8             |
| Length of Pilot                                         | AA             | 1/4            | 3/8            | 3/8            | 7/16           | 1/2            | 9/16            | 5/8             | 11/16           | 3/4             |

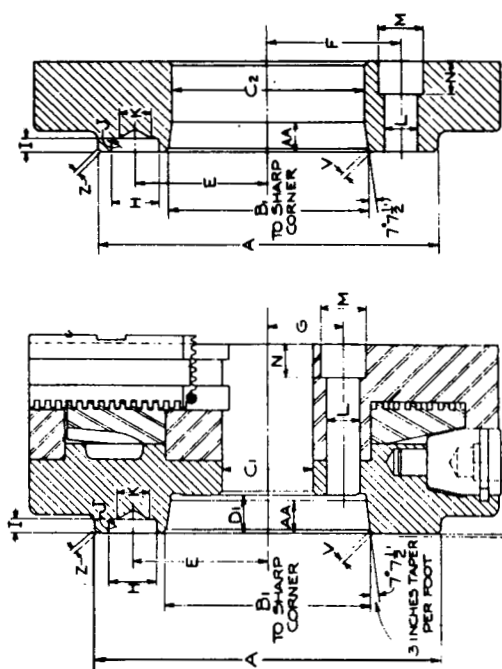
Note: The holes for cap screws used to hold chucks or face plates on spindles must match hole spacing in spindle noses shown on Table 3.

Notes: 1 - Hole spaced as shown on Table 3, and located within .003R of true position.

2 - Holes spaced as shown on Table 3, and located within .006R of true position.

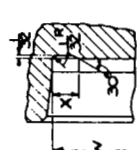
3 - Holes spaced as shown on Table 3, and located within .008R of true position.

TABLE 4  
BACKS OF CHUCKS AND FACE PLATES FOR  
TYPE A AND TYPE B SPINDLE NOSES



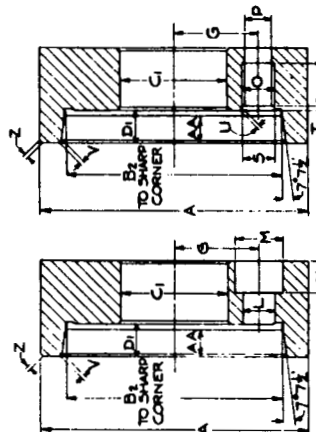
CHUCKS OR FACE PLATES  
HELD BY SOCKET HEAD  
CAP SCREWS ON OUTER  
BOLT CIRCLE

CHUCKS OR FACE PLATES  
HELD BY SOCKET HEAD  
CAP SCREWS ON INNER BOLT CIRCLE



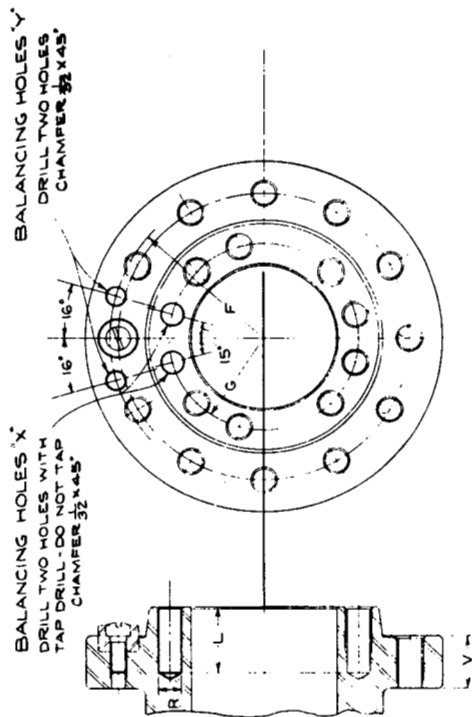
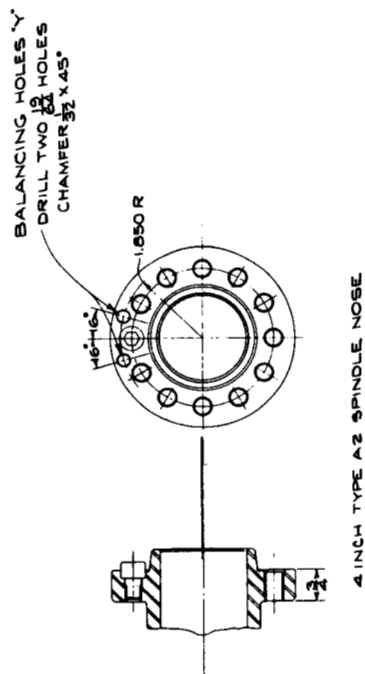
CHUCKS OR FACE PLATES  
HELD BY TYPE B STUDS  
TO TYPE B SPINDLES

ENLARGED VIEW  
OF UNDERCUT  
FOR CHUCKS AND FACE PLATES  
HELD ON INNER BOLT CIRCLE



CHUCKS OR FACE  
PLATES FOR 2 INCH  
SPINDLE NOSE ONLY  
HELD BY SOCKET  
HEAD CAP SCREWS

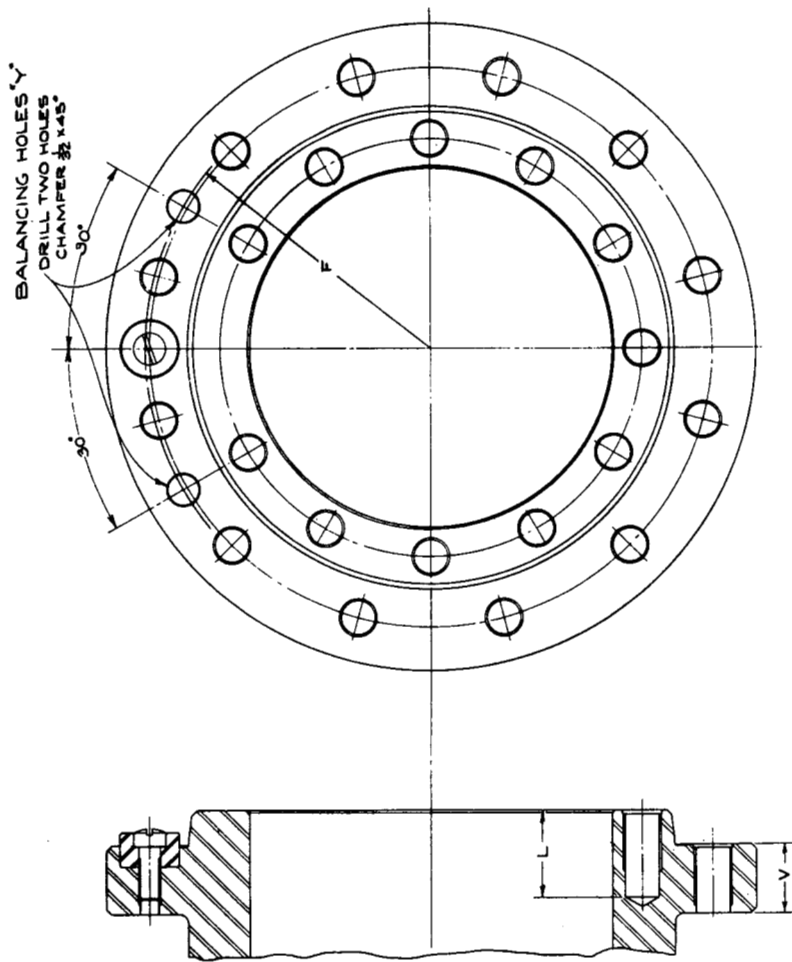
CHUCKS OR FACE  
PLATES FOR 2 INCH  
SPINDLE NOSE ONLY  
HELD BY SOCKET  
HEAD CAP SCREWS



| SPINDLE NAME | BALANCING HOLES "X" |         |          | BALANCING HOLES "Y" |       |          | WIDTH OF FLANGE V |
|--------------|---------------------|---------|----------|---------------------|-------|----------|-------------------|
|              | DIA R               | DEPTH L | RADIUS G | DIA B               | DEPTH | RADIUS F |                   |
| 5 Inch Nose  | 3/8                 | 1-5/32  | 1-7/32   | .290                | Thru  | 2.280    | 7/8               |
| 6 Inch Nose  | 27/64               | 1-5/16  | 1-5/8    | .348                | Thru  | 2.820    | 1                 |
| 8 Inch Nose  | 17/32               | 1-9/16  | 2-3/16   | 29/64               | Thru  | 3.570    | 1-1/8             |
| 11 Inch Nose | 21/32               | 1-13/16 | 3-1/4    | 35/64               | Thru  | 4.660    | 1-3/8             |

ILLUSTRATION OF A METHOD FOR BALANCING  
TYPE A SPINDLE NOSES

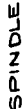
ALL DIMENSIONS IN INCHES  
BALANCING HOLES SHOWN IN THIS TABLE ARE CORRECT ONLY FOR WIDTH OF FLANGE AND DEPTH OF TAP DRILL SHOWN.  
CALCULATIONS FOR THESE HOLES WERE MADE WITH DRIVING BUTTON IN PLACE.  
CHUCKS AND FACE PLATES FOR A BALANCED UNIT SHOULD BE BALANCED SEPARATELY - LOCATION OF BOLTS MUST BE IN BALANCE



| SPINDLE NAME | DEPTH OF TAP DRILL L | BALANCING HOLES "Y" |       | WIDTH OF FLANGE V |
|--------------|----------------------|---------------------|-------|-------------------|
|              |                      | DIA B               | DEPTH |                   |
| 15 Inch Nose | 2-1/16               | 47/64               | Thru  | 6.550             |
| 20 Inch Nose | 2-5/16               | 53/64               | Thru  | 9.380             |
| 28 Inch Nose | 2-3/4                | 1-1/32              | Thru  | 12.780            |

15, 20, & 28 INCH TYPE A1 SPINDLE NOSES

**ALL DIMENSIONS IN INCHES**



MIN. WORKING LENGTH

FREE IN I. HOLE

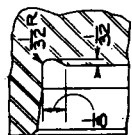
4 TO 6 LBS. LOAD AT 1/2 LENGTH

DETENT SPRING

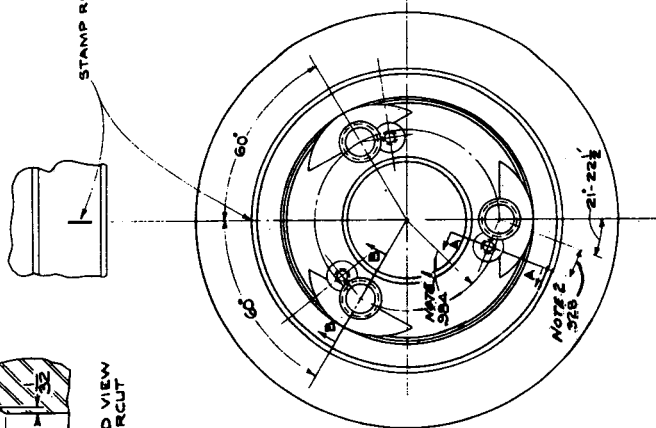


2 INCH TYPE D1 SPINDLE NOSE. CAM.

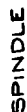
ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE SPECIFIED  
WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS



ENLARGED VIEW OF UNDERCUT

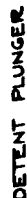


18-00000



OF TRUE POSITION.

**3 INCH TYPE D1 SPINDLE NOSE.**



**DETENT SPRING**

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE SPECIFIED  
WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS

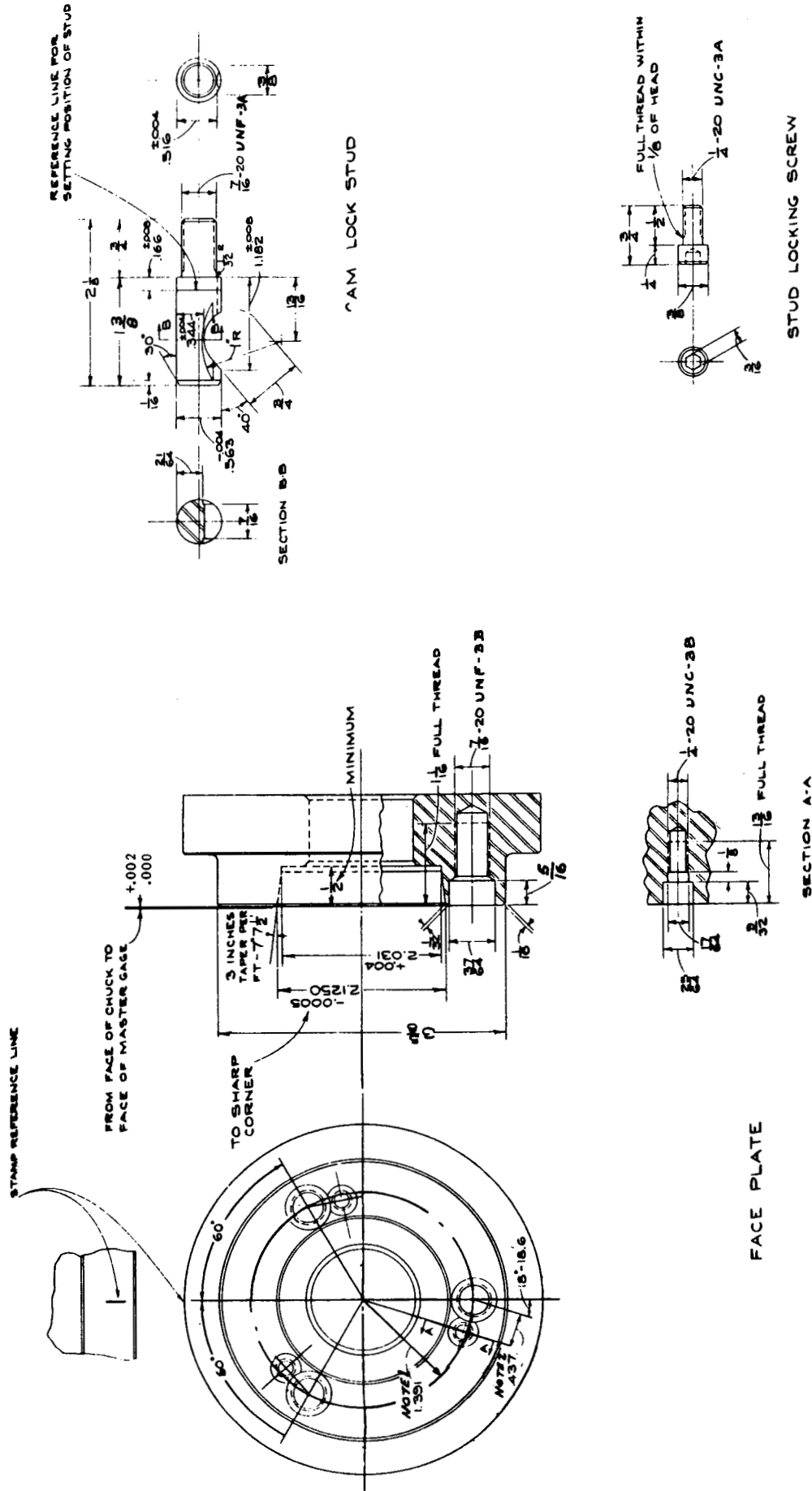
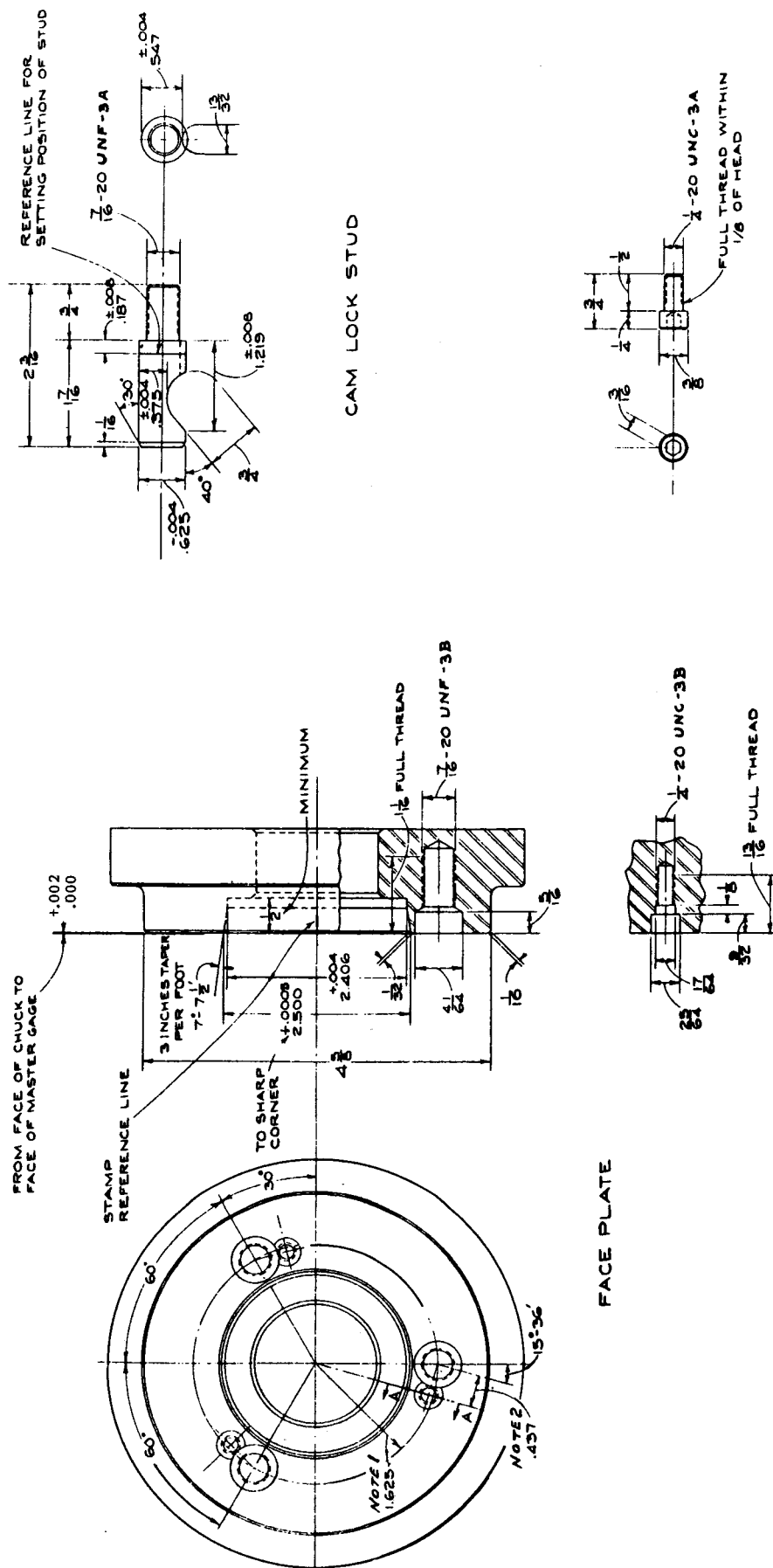


TABLE 9  
BACKS OF CHUCKS AND FACE PLATES, CAM LOCK STUD, AND  
STUD LOCKING SCREW FOR 3 INCH TYPE D1 SPINDLE NOSE



ALL DIMENSIONS IN INCHES  
TOLERANCE OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE  
SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS



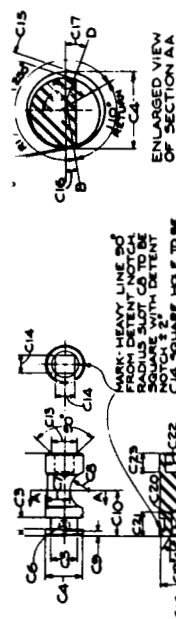
NOTES: #1 - HOLES SPACED AS SHOWN AND LOCATED WITHIN .003R  
OF TRUE POSITION.

#2 - HOLES LOCATED AS SHOWN WITHIN .004R OF TRUE POSITION.

BACKS OF CHUCKS AND FACE PLATES, CAM LOCK STUD, AND  
STUD LOCKING SCREW FOR 4 INCH TYPE D1 SPINDLE NOSE

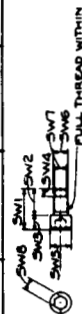
TABLE 11

OTHERWISE SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS



## CAM

| SPINDLE NAME           | 5 INCH NOSE   | 6 INCH NOSE | 8 INCH NOSE | 11 INCH NOSE | 15 INCH NOSE | 20 INCH NOSE |
|------------------------|---------------|-------------|-------------|--------------|--------------|--------------|
| Length of Cam          | C1 1.844±.008 | 2.219±.008  | 2.500±.008  | 2.875±.008   | 3.250±.008   | 3.625±.008   |
| Width of Flange        | C2 1.251±.004 | 1.561±.004  | 1.875±.004  | 2.50±.004    | 2.50±.004    | 2.50±.004    |
| Width of Groove        | C3 .243±.004  | .296±.004   | .296±.004   | .296±.004    | .296±.004    | .296±.004    |
| Dia of Cam             | C4 .871±.002  | .996±.002   | 1.121±.002  | 1.246±.002   | 1.371±.002   | 1.621±.002   |
| Dia Bottom of Groove   | C5 9/16       | 1 1/16      | 1 1/16      | 1 1/16       | 1 1/16       | 1 5/16       |
| Dia of Cutter          | C6 .230±.002  | .283±.002   | .283±.002   | .283±.002    | .283±.002    | .283±.002    |
| Location of Slot       | C7 .5625±.008 | .6406±.008  | .734±.008   | .828±.008    | .922±.008    | 1.078±.008   |
| Radius of Slot         | C8 7/16       | 1/2         | 9/16        | 21/32        | 3/4          | 7/8          |
| To Bottom Detent Notch | C9 .094±.004  | .125±.004   | .156±.004   | .219±.004    | .219±.004    | .219±.004    |
| Location of Slot       | C10 .953±.008 | 1.187±.008  | 1.344±.008  | 1.531±.008   | 1.719±.008   | 1.906±.008   |
| At Section C-D         | C11 9/16      | 23/32       | 13/16       | 29/32        | 1            | 1 1/16       |
| At Section C-D         | C12 1-3/8     | 1-11/16     | 1-7/8       | 2-5/32       | 2-7/16       | 2-3/4        |
| Dia of Center          | C13 19/32     | 11/16       | 25/32       | 7/8          | 31/32        | 1-1/8        |
| Square Hole            | C14 .441±.012 | .504±.012   | .566±.012   | .629±.012    | .691±.012    | .816±.012    |
| At Section C-D         | C15 .061±.012 | .087±.012   | .087±.012   | .087±.012    | .087±.012    | .107±.012    |
| Angle                  | C16 10°       | 10°         | 10°         | 15°          | 15°          | 20°          |
| Angle                  | C17 15°       | 20°         | 20°         | 20°          | 20°          | 20°          |
| Chamfer                | C18 13/16     | 29/32       | 1-1/32      | 1-1/8        | 1-1/4        | 1-1/2        |
| Center                 | C19 3/8       | 7/16        | 7/16        | 7/16         | 7/16         | 7/16         |
| Dia of Hole            | C20 5/16      | 3/8         | 3/8         | 3/8          | 3/8          | 3/8          |
| Depth of Hole          | C21 9/16      | 5/8         | 5/8         | 5/8          | 5/8          | 5/8          |
| Across Corners         | C22 .615±.016 | .700±.016   | .785±.016   | .875±.016    | .960±.016    | 1.135±.016   |
| Depth of Hole          | C23 7/16      | 1/2         | 9/16        | 5/8          | 3/4          | 13/16        |
| Chamfer                | C24 1/16      | 1/16        | 1/16        | 3/32         | 3/32         | 3/32         |
| Rise in 250°           | C25 .075      | .104        | .104        | .104         | .104         | .125         |



## CAM SCREW

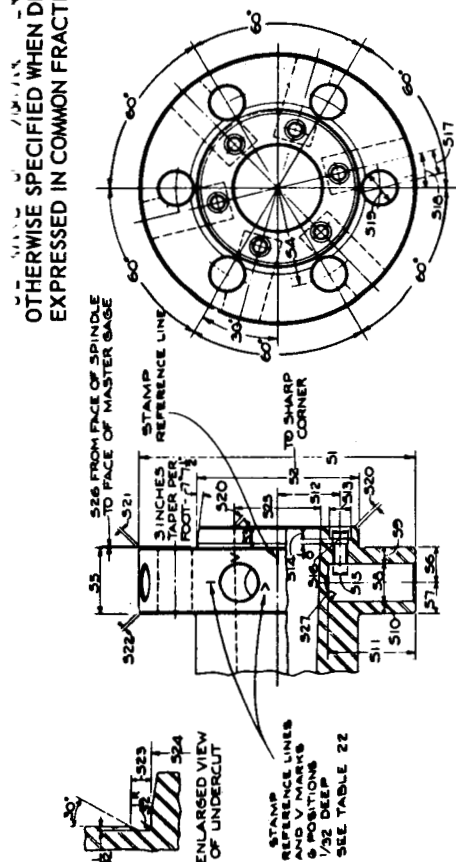
| SPINDLE NAME    | 5 INCH NOSE   | 6 INCH NOSE | 8 INCH NOSE | 11 INCH NOSE | 15 INCH NOSE | 20 INCH NOSE |
|-----------------|---------------|-------------|-------------|--------------|--------------|--------------|
| Length of Screw | SW1 3 1/32    | 1-3/32      | 1-7/32      | 1-13/32      | 1-19/32      | 1-25/32      |
| Under Head      | SW2 2 1/32    | 23/32       | 27/32       | 1- 7/32      | 1- 7/32      | 1-13/32      |
| Head            | SW3 5/16      | 3/8         | 3/8         | 3/8          | 3/8          | 3/8          |
| Length of Pilot | SW4 7/32      | 7/32        | 7/32        | 7/32         | 7/32         | 7/32         |
| Dia of Head     | SW5 15/32     | 9/16        | 9/16        | 9/16         | 9/16         | 9/16         |
| Thread UNC-3A   | SW6 5/16-18   | 3/8-16      | 3/8-16      | 3/8-16       | 3/8-16       | 3/8-16       |
| Dia of Pilot    | SW7 .230±.002 | .283±.002   | .283±.002   | .283±.002    | .283±.002    | .283±.002    |
| Hex             | SW8 1/4       | 5/16        | 5/16        | 5/16         | 5/16         | 5/16         |

## CAM SPRING

| SPINDLE NAME   | 5 INCH NOSE | 6 INCH NOSE | 8 INCH NOSE | 11 INCH NOSE | 15 INCH NOSE | 20 INCH NOSE |
|----------------|-------------|-------------|-------------|--------------|--------------|--------------|
| Dia of Spring  | SP1 9/32    | 11/32       | 11/32       | 11/32        | 11/32        | 11/32        |
| Working Length | SP2 9/16    | 5/8         | 5/8         | 5/8          | 5/8          | 5/8          |
| Free Length    | SP3 13/16   | 7/8         | 7/8         | 7/8          | 7/8          | 7/8          |
| Load Lb        | SP4 8 to 12 | 12 to 16    | 12 to 16    | 12 to 16     | 12 to 16     | 12 to 16     |

TYPE D1 SPINDLE NOSES, SIZES 5 INCH TO 20 INCH INCLUSIVE, CAMS, CAM SCREWS, AND CAM SPRINGS

TABLE 12

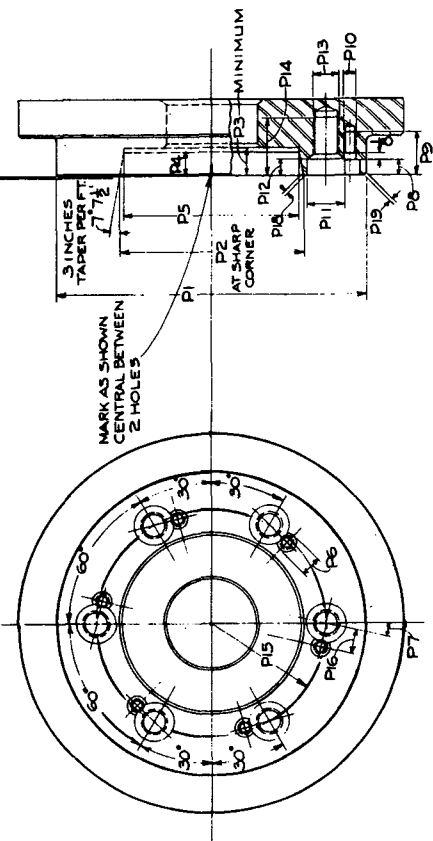


| SPINDLE NAME            | 5 INCH NOSE | 6 INCH NOSE | 8 INCH NOSE | 11 INCH NOSE | 15 INCH NOSE | 20 INCH NOSE |
|-------------------------|-------------|-------------|-------------|--------------|--------------|--------------|
| Dia of Spindle          | S1 5-3/4    | 7-1/8       | 8-7/8       | 11-3/4       | 15-7/8       | 21-1/2       |
| Pilot Dia               | S2 3.2505   | 4.1880      | 5.00075     | 7.75075      | 11.251       | 16.251       |
| Length of Pilot         | S3 1/2      | 9/16        | 5/8         | 11/16        | 3/4          | 13/16        |
| Radius of Holes Note 1  | S4 2.0625   | 2.625       | 3.375       | 4.625        | 6.500        | 9.125        |
| Minimum Width of Flange | S5 1-1/2    | 1-3/4       | 2           | 2-3/8        | 2-3/4        | 3-1/4        |
|                         | S6 13/16    | 15/16       | 1-1/16      | 1-1/4        | 1-7/16       | 1-11/16      |
|                         | S7 11/16    | 13/16       | 1-1/16      | 1-1/8        | 1-5/16       | 1-9/16       |
| Dia of Hole for Cam     | S8 .875     | 1.000       | 1.125       | 1.250        | 1.375        | 1.625        |
|                         | S9 3/8      | 7/16        | 1/2         | 5/8          | 3/4          | 7/8          |
|                         | S10 1/4     | 5/16        | 3/8         | 1/2          | 5/8          | 3/4          |
| Depth of Hole for Cam   | S11 1.875   | 2.250       | 2.531       | 2.9375       | 3.3125       | 3.6875       |
|                         | S12 1.250   | 1.625       | 2.250       | 3.375        | 5.0625       | 7.500        |
| Radius of Cam Screw     | S13 1/2     | 3/4         | 1/2         | 3/4          | 1/2          | 3/4          |
| Dia of Counterbore      | S14 1 1/32  | 1 1/16      | 1 1/16      | 1 1/16       | 1 1/16       | 1 1/16       |
| Depth of Counterbore    | S15 1/8-18  | 1/8-16      | 1/8-16      | 1/8-16       | 1/8-16       | 1/8-16       |
| Thread UNC-3B           | S16 21/64   | 25/64       | 25/64       | 25/64        | 25/64        | 25/64        |
| Counterbore             | S17 .531    | .625        | .719        | .844         | .969         | 1.125        |
|                         | S18 14°55'  | 13°46'      | 12°18'      | 10°30'       | 8°35'        | 7°51'        |
| Angle                   | S19 .78125  | .90625      | 1.03125     | 1.21875      | 1.40625      | 1.65625      |
| Dia of Hole             | S20 1/16    | 1/16        | 1/16        | 1/16         | 1/8          | 1/8          |
| Chamfer                 | S21 1/16    | 1/16        | 1/16        | 1/16         | 1/8          | 1/8          |
| Chamfer                 | S22 1/16    | 1/16        | 1/16        | 1/16         | 1/8          | 1/8          |
| Width of Undercut       | S23 1/4     | 5/16        | 5/16        | 5/16         | 5/16         | 5/16         |
| Dia of Undercut         | S24 3.235   | 4.172       | 5.485       | 7.720        | 11.220       | 16.220       |
|                         | S25 1-3/4   | 2-1/4       | 3-3/8       | 5-3/8        | 8-3/8        | 13           |
| Maximum Hole            | S26 .0008   | .0008       | .0008       | .0008        | .002         | .002         |
| Gage Clearance          | S27 .002    | .002        | .002        | .002         | .004         | .004         |
| Radius                  | S28 1/32    | 1/32        | 1/32        | 1/16         | 1/16         | 1/16         |

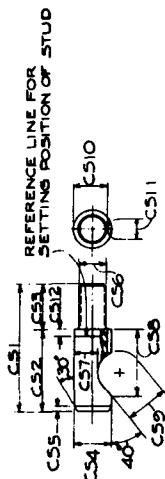
NOTE: 1-Holes spaced as shown and located within .003R of true position.

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE, UNLESS  
OTHERWISE SPECIFIED, WHEN DIMENSIONS ARE  
EXPRESSED IN COMMON FRACTIONS

FROM FACE OF CHUCK  
TO FACE OF MASTER GAGE

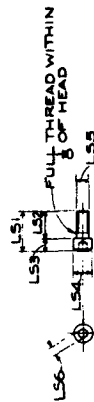


PROVIDE 6-D11 AND 6-D16 HOLES AS SHOWN  
IN BACKS OF CHUCKS AND FACE PLATES WHERE  
CAM LOCK STUDS ARE REQUIRED.  
FEWER HOLES MAY BE PROVIDED TO SUIT LOCATION  
OF FEWER CAM LOCK STUDS WHEN THE DESIGN  
AND SERVICE OF CHUCKS AND FACE PLATES IS  
SATISFACTORY WITH A SMALLER NUMBER OF  
CAM LOCK STUDS



### CAM LOCK STUD

| SPINDLE NAME      | 5 INCH<br>NOSE | 6 INCH<br>NOSE | 8 INCH<br>NOSE | 11 INCH<br>NOSE | 15 INCH<br>NOSE | 20 INCH<br>NOSE |
|-------------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|
| Length of Stud    | CS1 2-9/16     | 3              | 3-3/8          | 4               | 4-9/16          | 5-1/4           |
| Length of Body    | CS2 1-11/16    | 1-15/16        | 2-3/16         | 2-5/8           | 3               | 3-1/2           |
| Threaded End      | CS3 7/8        | 1-1/16         | 1-3/16         | 1-3/8           | 1-9/16          | 1-3/4           |
| Dia of Stud       | CS4 .750       | .875           | 1.000          | 1.1875          | 1.375           | 1.625           |
| Chamfer           | CS5 3/32       | 1/8            | 1/8            | 3/16            | 3/16            | 1/4             |
| Thread UNF-3A     | CS6 1/2-20     | 5/8-18         | 3/4-16         | 7/8-14          | 1-14            | 1 1/8-12        |
| To Bottom of Cut  | CS7 .469       | .562           | .656           | .812            | .969            | 1.125           |
|                   |                | ±.004          | ±.004          | ±.004           | ±.004           | ±.004           |
|                   | CS8 1.406      | 1.594          | 1.750          | 2.094           | 2.312           | 2.719           |
|                   |                | ±.008          | ±.008          | ±.008           | ±.008           | ±.008           |
| Dia of Cutter     | CS9 7/8        | 1              | 1-1/8          | 1-1/4           | 1-3/8           | 1-5/8           |
|                   |                | ±.004          | ±.004          | ±.004           | ±.004           | ±.004           |
| Dia of Cutter     | CS10 .640      | .750           | .875           | 1.062           | 1.250           | 1.500           |
|                   |                | ±.004          | ±.004          | ±.004           | ±.004           | ±.004           |
| To Reference Line | CS11 13/32     | 1/2            | 1/2            | 1/2             | 1/2             | 1/2             |
|                   |                | ±.008          | ±.008          | ±.008           | ±.008           | ±.008           |
|                   | CS12 .1875     | .1875          | .1875          | .250            | .250            | .250            |
|                   |                | ±.008          | ±.008          | ±.008           | ±.008           | ±.008           |



### STUD LOCKING SCREW

| SPINDLE NAME    | 5 INCH<br>NOSE | 6 INCH<br>NOSE | 8 INCH<br>NOSE | 11 INCH<br>NOSE | 15 INCH<br>NOSE | 20 INCH<br>NOSE |
|-----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|
| Length of Screw | LS1 3/4        | 15/16          | 15/16          | 1-1/16          | 1-1/16          | 1-1/16          |
| Under Head      | LS2 1/2        | 5/8            | 5/8            | 3/4             | 3/4             | 3/4             |
| Head            | LS3 1/4        | 5/16           | 5/16           | 5/16            | 5/16            | 5/16            |
| Dia of Head     | LS4 3/8        | 15/32          | 15/32          | 15/32           | 15/32           | 15/32           |
| Thread UNC-3A   | LS5 1/4-20     | 5/16-18        | 5/16-18        | 5/16-18         | 5/16-18         | 5/16-18         |
| Hex             | LS6 3/16       | 1/4            | 1/4            | 1/4             | 1/4             | 1/4             |

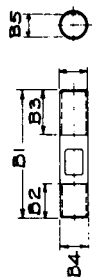
### FACE PLATE

| SPINDLE NAME           | 5 INCH<br>NOSE | 6 INCH<br>NOSE | 8 INCH<br>NOSE | 11 INCH<br>NOSE | 15 INCH<br>NOSE | 20 INCH<br>NOSE |
|------------------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|
| Dia of Flange          | P1 5-3/4       | 7-1/8          | 8-7/8          | 11-3/4          | 15-7/8          | 21-1/2          |
| Pilot Dia              | P2 3.2503      | 4.1878         | 5.50055        | 7.75055         | 11.2505         | 16.2505         |
|                        |                | ±.0005         | ±.0005         | ±.0005          | ±.001           | ±.001           |
| Depth Pilot Hole       | P3 9/16        | 5/8            | 11/16          | 3/4             | 13/16           | 7/8             |
| Length of Pilot        | P4 7/16        | 1/2            | 9/16           | 5/8             | 11/16           | 3/4             |
| Dia of Relief          | P5 3.141       | 4.062          | 5.359          | 7.594           | 11.078          | 16.062          |
|                        |                | ±.004          | ±.006          | ±.006           | ±.006           | ±.006           |
| Counterbore            | P6 25/64       | 1/2            | 1/2            | 1/2             | 1/2             | 1/2             |
| Angle                  | P7 14° 55'     | 13° 46'        | 12° 18'        | 10° 30'         | 8° 35'          | 7° 5'           |
| Depth Counterbore      | P8 9/32        | 11/32          | 11/32          | 11/32           | 11/32           | 11/32           |
| Full Depth Thread      | P9 13/16       | 1              | 1              | 1-1/8           | 1-1/8           | 1-1/8           |
| Thread UNC-3B          | P10 1/4-20     | 5/16-18        | 5/16-18        | 5/16-18         | 5/16-18         | 5/16-18         |
| Counterbore            | P11 49/64      | 57/64          | 1-1/64         | 1-13/64         | 1-25/64         | 1-41/64         |
| Depth Counterbore      | P12 5/16       | 3/8            | 3/8            | 1/2             | 1/2             | 1/2             |
| Thread UNF-3B          | P13 1/2-20     | 5/8-18         | 3/4-16         | 7/8-14          | 1-14            | 1-1/8-12        |
| Full Depth of Thread   | P14 1-3/16     | 1-3/8          | 1-1/2          | 1-3/4           | 1-15/16         | 2-1/8           |
| Rad. Bolt Ctr. Note 1  | P15 2.0625     | 2.625          | 3.375          | 4.625           | 6.500           | 9.125           |
| Lock Screw Loc. Note 2 | P16 .469       | .562           | .625           | .719            | .812            | .937            |
| Gage Clearance         | P17 .000       | .000           | .000           | .000            | .000            | .000            |
|                        |                | ±.002          | ±.002          | ±.002           | ±.004           | ±.004           |
| Chamfer                | P18 1/16       | 1/16           | 1/16           | 1/16            | 1/8             | 1/8             |
| Chamfer                | P19 1/16       | 1/16           | 1/16           | 1/16            | 1/8             | 1/8             |

NOTES: 1 - Holes spaced as shown and located within .004R of true position.  
2 - Holes Located as shown within .004R of true position as defined by P7.

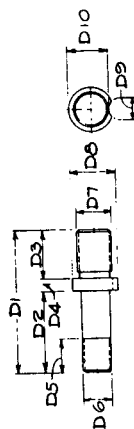
BACKS OF CHUCKS AND FACE PLATES. CAM LOCK STUDS., AND STUD LOCKING  
SCREWS FOR TYPE D1 SPINDLE NOSES. SIZES 5 INCH TO 20 INCH, INCL.

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS  
OTHERWISE SPECIFIED WHEN DIMENSIONS ARE  
EXPRESSED IN COMMON FRACTIONS



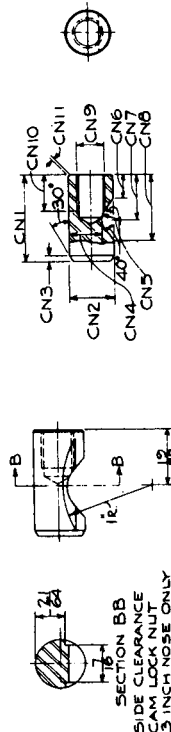
## TYPE B STUD

| SPINDLE NAME     | 2 INCH<br>NOSE | 3 INCH<br>NOSE | 4 INCH<br>NOSE | 5 INCH<br>NOSE | 6 INCH<br>NOSE | 8 INCH<br>NOSE | 11 INCH<br>NOSE | 15 INCH<br>NOSE | 20 INCH<br>NOSE |
|------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|
| Length of Stud   | B1             | 1-1/2          | 1-13/16        | 2-1/16         | 2-3/8          | 2-13/16        | 3-5/16          | 3-13/16         | 4-1/2           |
| Length of Thread | B2             | 1/2            | 9/16           | 9/16           | 5/8            | 3/4            | 7/8             | 15/16           | 1-1/16          |
| Length of Thread | B3             | 9/16           | 11/16          | 11/16          | 13/16          | 1              | 1-3/16          | 1-5/16          | 1-5/8           |
| Thread UNC-3A    | B4             | 3/8-16         | 7/16-14        | 7/16-14        | 1-2-13         | 5/8-11         | 3/4-10          | 7/8-9           | 1-8             |
| Across Flats     | B5             | 1/4            | 5/16           | 5/16           | 5/16           | 3/8            | 1/2             | 3/4             | 7/8             |



## TYPE D STUD

| SPINDLE NAME          | 2 INCH<br>NOSE | 3 INCH<br>NOSE | 4 INCH<br>NOSE | 5 INCH<br>NOSE | 6 INCH<br>NOSE | 8 INCH<br>NOSE | 11 INCH<br>NOSE | 15 INCH<br>NOSE | 20 INCH<br>NOSE |
|-----------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|
| D1 Length of Stud     | 1-11/16        | 2-1/16         | 2-3/16         | 2-7/16         | 2-13/16        | 3-3/16         | 3-25/32         | 4-5/16          | 4-7/8           |
| D2                    | 15/16          | 1-5/32         | 1-9/32         | 1-13/32        | 1-19/32        | 1-27/32        | 2-3/16          | 2-17/32         | 2-29/32         |
| D3                    | 9/16           | 1-1/16         | 1-1/16         | 13/16          | 15/16          | 1-1/16         | 1-3/16          | 1-3/8           | 1-9/16          |
| D4 Width of Flange    | 3/16           | 7/32           | 7/32           | 7/32           | 9/32           | 9/32           | 13/32           | 13/32           | 13/32           |
| D5 Length of Thread   | 1/2            | 9/16           | 9/16           | 9/16           | 5/8            | 5/8            | 7/8             | 15/16           | 1-1/16          |
| D6 Thread UNC-3A      | 3/8-16         | 7/16-14        | 7/16-14        | 7/16-14        | 1/2-13         | 5/8-11         | 3/4-10          | 7/8-9           | 1-8             |
| D7 Thread UNF-3A      | 3/8-24         | 7/16-20        | 7/16-20        | 1/2-20         | 5/8-18         | 3/4-16         | 7/8-14          | 1-14            | 1 1/2-12        |
| D8 Dia of Flange      | .438-.004      | .563-.004      | .625-.004      | .750-.004      | .875-.004      | 1.000-.004     | 1.1875-.004     | 1.375-.004      | 1.625-.004      |
| D9 Cutter             | 5/16           | 3/8            | 13/32          | 13/32          | 1/2            | 1/2            | 1/2             | 1/2             | 1/2             |
| D10 Top Bottom of Cut | .373±.002      | .516±.004      | .547±.004      | .640±.004      | .750±.004      | .875±.004      | 1.062 ±.004     | 1.250 ±.004     | 1.500 ±.004     |

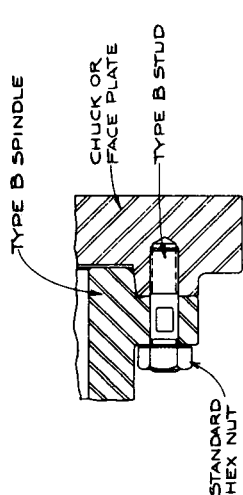


**CAM LOCK NUT**

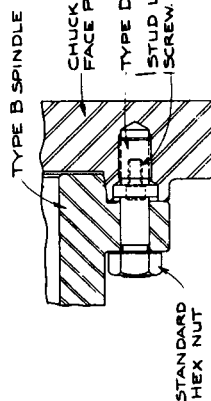
| SPINDLE NAME        | 2 INCH<br>NOSE | 3 INCH<br>NOSE | 4 INCH<br>NOSE | 5 INCH<br>NOSE | 6 INCH<br>NOSE | 8 INCH<br>NOSE | 11 INCH<br>NOSE | 15 INCH<br>NOSE | 20 INCH<br>NOSE |
|---------------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|-----------------|-----------------|
| CN1                 | 1-5/32         | 1-1/8          | 1-3/16         | 1-7/16         | 1-11/16        | 1-15/16        | 2-5/16          | 2-11/16         | 3-3/16          |
| Length of Nut       |                |                |                |                |                |                |                 |                 |                 |
| CN2                 | .438-.004      | .563-.004      | .625-.004      | .750-.004      | .875-.004      | 1.000-.004     | 1.1875-.004     | 1.375-.004      | 1.625-.004      |
| Dia of Nut          |                |                |                |                |                |                |                 |                 |                 |
| CN3                 | 3/64           | 1/16           | 1/16           | 3/32           | 1/8            | 1/8            | 3/16            | 3/16            | 1/4             |
| Chamber             |                |                |                |                |                |                |                 |                 |                 |
| CN4                 | .297±.004      | .390±.004      | .421±.004      | .500±.004      | .625±.004      | .734±.004      | .875±.004       | 1.031±.004      | 1.1875±.004     |
| To Bottom of Cut    |                |                |                |                |                |                |                 |                 |                 |
| CN5                 | 7/32           | 9/32           | 9/32           | 5/16           | 3/8            | 7/16           | 1/2             | 9/16            | 5/8             |
| Radius              |                |                |                |                |                |                |                 |                 |                 |
| CN6                 | 15/32          | 11/32          | 5/16           | 3/8            | 7/16           | 1/2            | 21/32           | 25/32           | 7/8             |
| To Center of Radius |                |                |                |                |                |                |                 |                 |                 |
| CN7                 | 23/32          | 21/32          | 21/32          | 25/32          | 7/8            | 1-1/64         | 1-7/32          | 1-5/8           | 1-5/8           |
| CN8                 | 31/32          | 31/32          | 1              | 1-3/16         | 1-5/16         | 1-1/2          | 1-25/32         | 2               | 2-3/8           |
| Thread              |                |                |                |                |                |                |                 |                 |                 |
| CN9                 | 5/16-.24       | 7/8-16         | 3/8-16         | 7/8-14         | 1/2-13         | 5/8-11         | 3/4-10          | 7/8-9           | 1-8             |
| UNC-3B              |                | UNC-3B         | UNC-3B         | UNC-3B         | UNC-3B         | UNC-3B         | UNC-3B          | UNC-3B          | UNC-3B          |
| Full Depth Thread   |                |                |                |                |                |                |                 |                 |                 |
| CN10                | 7/16           | 7/16           | 7/16           | 9/16           | 11/16          | 13/16          | 15/16           | 1-1/8           | 1-1/4           |
| Chamber             |                |                |                |                |                |                |                 |                 |                 |
| CN11                | 1/32           | 1/32           | 1/32           | 1/32           | 1/32           | 1/32           | 1/16            | 1/16            | 1/16            |

### DIMENSIONS OF CAM LOCK NUTS, AND TYPE B AND TYPE D STUDS

**TABLE 14**  
**DIMENSIONS OF CAM LOCK NUTS,**  
**AND TYPE B AND TYPED STUDS**

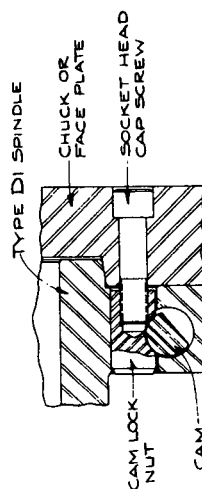


## METHOD OF ATTACHING CHUCKS OR FACE PLATES TO TYPE B SPINDLES USING TYPE B STUDS



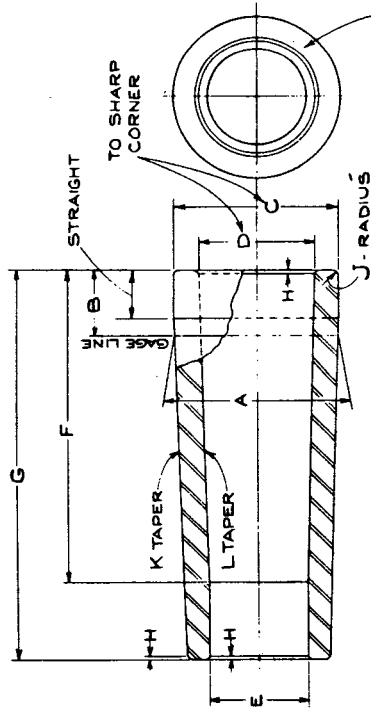
STUD LOCKING  
SCREW: TABLES 9, 11, 13, 15

# METHOD OF ATTACHING CHUCKS OR FACE PLATES TO TYPE B SPINDLES USING TYPE D STUDS

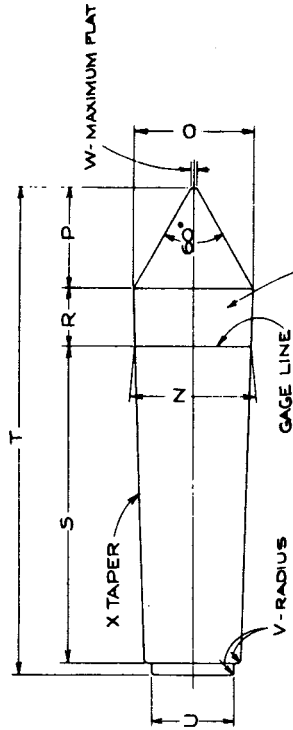


# METHOD OF ATTACHING CHUCKS OR FACE PLATES TO TYPE DI SPINDLES USING CAM LOCK NUTS

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE  
SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS



STAMP SIZES OF AMERICAN STANDARD TAPERS  
EXAMPLE: 3 AM STD TAPER



STAMP SIZE OF AMERICAN STANDARD TAPER  
EXAMPLE: 3 AM STD TAPER

### SLEEVE

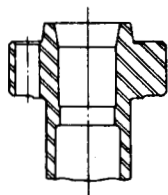
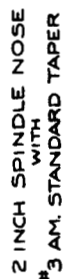
| SPINDLE NAME             | A     | B      | C     | D     | E     | F     | G       | H    | J    | K                    | L                |
|--------------------------|-------|--------|-------|-------|-------|-------|---------|------|------|----------------------|------------------|
| 2 Inch Nose              | .938  | 11/16  | -.005 | -.002 | +.005 | 2     | 3-7/8   | 1/32 | 1/32 | #3 Am.Std. Taper     | #1 Am.Std. Taper |
| 3 Inch Nose              | 1.500 | 1/2    | -.005 | -.002 | +.005 | 2 1/8 | 5       | 1/16 | 1/16 | #4 1/2 Am.Std. Taper | #2 Am.Std. Taper |
| 4 Inch Nose              | 1.500 | 11/16  | -.005 | -.002 | +.005 | 3     | 5-3/16  | 1/16 | 1/16 | #4 1/2 Am.Std. Taper | #3 Am.Std. Taper |
| 4 Inch Nose Small Sleeve | 1.748 | 11/16  | 1.515 | -.938 | .785  | 3     | 5-7/8   | 1/16 | 1/16 | #5 Am.Std. Taper     | #3 Am.Std. Taper |
| 4 Inch Nose Large Sleeve | 1.748 | 7/8    | 1.765 | -.938 | .785  | 3     | 6-1/16  | 1/16 | 1/16 | #5 Am.Std. Taper     | #3 Am.Std. Taper |
| 5 Inch Nose              | 1.748 | 1-1/16 | 1.765 | -.938 | .785  | 3-3/4 | 6-1/4   | 1/16 | 1/16 | #5 Am.Std. Taper     | #4 Am.Std. Taper |
| 6 Inch Nose Small Sleeve | 2.000 | 1-1/16 | 2.020 | 1.231 | 1.035 | 3-3/4 | 5-13/16 | 1/16 | 1/16 | #200 Am.Std. Taper   | #4 Am.Std. Taper |
| 6 Inch Nose Large Sleeve | 2.500 | 1-1/4  | 2.520 | 1.748 | 1.495 | 4-3/4 | 6-3/4   | 1/16 | 1/16 | #250 Am.Std. Taper   | #5 Am.Std. Taper |
| 8 Inch Nose              | 3.500 | 1-7/16 | 3.520 | 2.494 | 2.140 | 6-3/4 | 8-7/16  | 1/16 | 1/16 | #350 Am.Std. Taper   | #6 Am.Std. Taper |

### CENTER

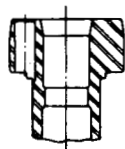
| SPINDLE NAME | N     | O     | P       | R     | S      | T        | U     | V    | W    | X                |
|--------------|-------|-------|---------|-------|--------|----------|-------|------|------|------------------|
| 2 Inch Nose  | .475  | .493  | 27/64   | 23/64 | 2-1/16 | 2-29/32  | 5/16  | 1/64 | 1/64 | #1 Am.Std. Taper |
| 3 Inch Nose  | .700  | .728  | 5/8     | 9/16  | 2-1/2  | 3-13/16  | 7/16  | 1/32 | 1/64 | #2 Am.Std. Taper |
| 4 Inch Nose  | .938  | .982  | 27/32   | 7/8   | 3-1/16 | 4-29/32  | 5/8   | 1/32 | 1/32 | #3 Am.Std. Taper |
| 5 Inch Nose  | .938  | .982  | 27/32   | 7/8   | 3-1/16 | 4-29/32  | 5/8   | 1/32 | 1/32 | #3 Am.Std. Taper |
| 6 Inch Nose  | 1.231 | 1.276 | 1-3/32  | 7/8   | 3-7/8  | 5-31/32  | 3/4   | 1/16 | 1/32 | #4 Am.Std. Taper |
| 8 Inch Nose  | 1.748 | 1.814 | 1 17/32 | 1-1/4 | 4-7/8  | 7-29/32  | 1-1/8 | 1/16 | 1/16 | #5 Am.Std. Taper |
| 11 Inch Nose | 2.494 | 2.559 | 2-5/32  | 1-1/4 | 6-7/8  | 10-17/32 | 1-3/4 | 1/16 | 3/32 | #6 Am.Std. Taper |

\*These centers are the same as for Type L Spindle Noses see Table 31.

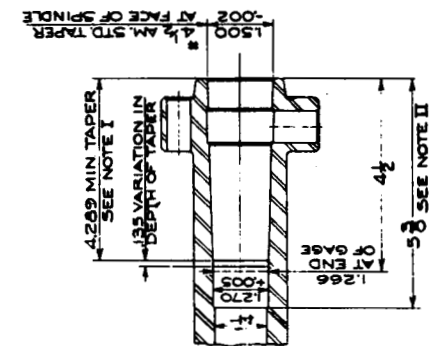
TABLE 15  
SLEEVES AND CENTERS FOR TYPE D1 SPINDLE NOSES  
FOR ENGINE LATHES AND TOOL ROOM LATHES



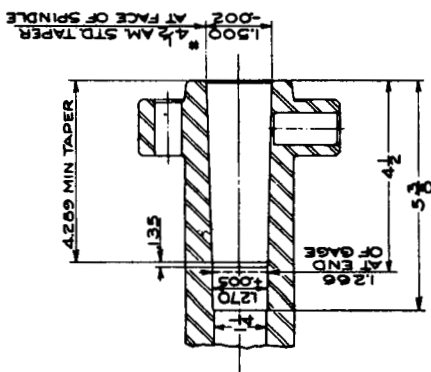
3 INCH SPINDLE NOSE  
FOR  
DRAW-IN COLLET



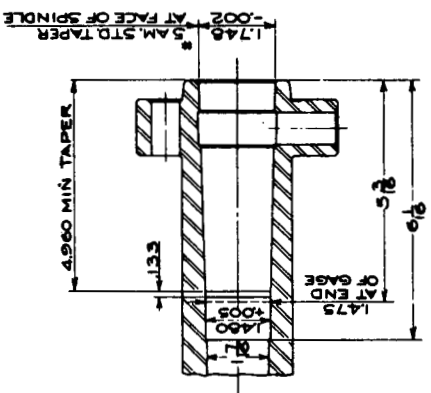
2 INCH SPINDLE NOSE  
FOR  
DRAW-IN COLLET



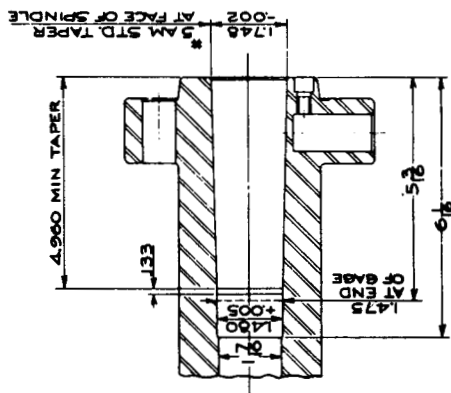
3 INCH SPINDLE NOSE  
WITH  
#4½ AM. STANDARD TAPER



4 INCH SPINDLE NOSE  
WITH  
4 1/2 AM. STANDARD TAPER



4 INCH SPINDLE NOSE  
WITH  
#5 AM. STANDARD TAPER



5 INCH SPINDLE NOSE  
WITH  
#5 AM. STANDARD TAPER

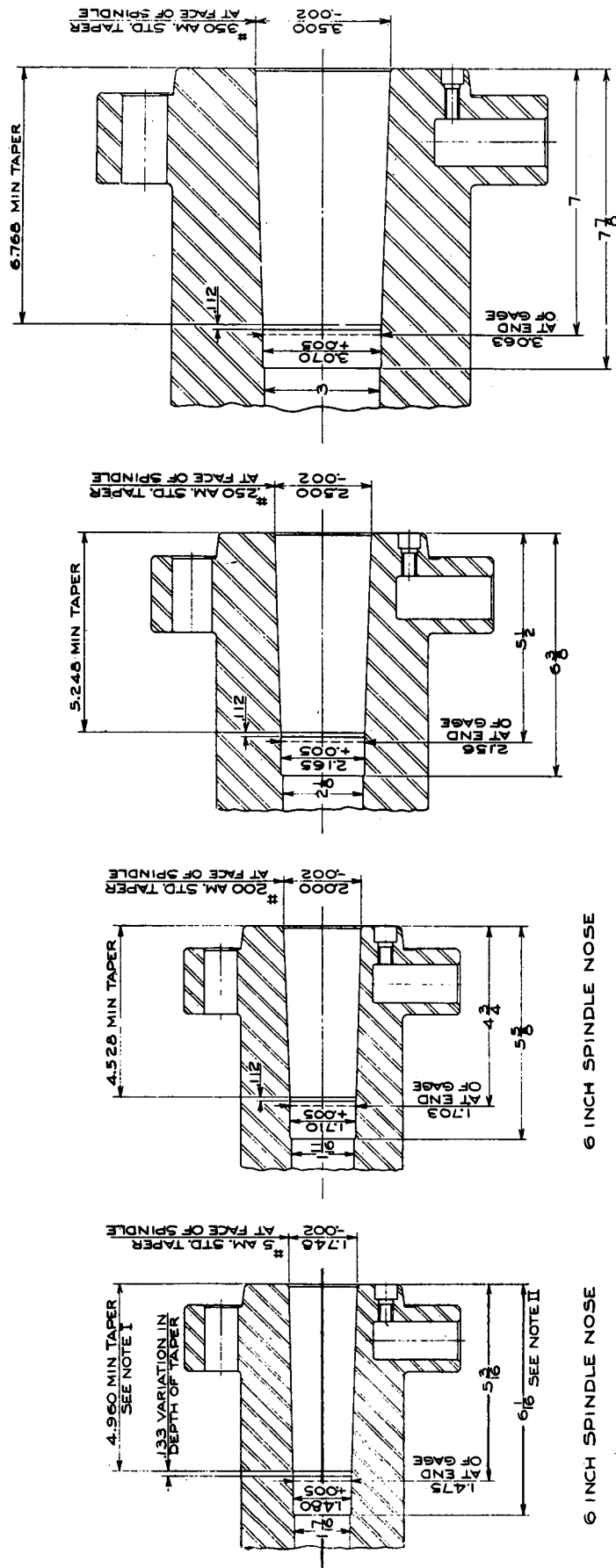
**NOTE 1**  
MINIMUM LENGTH OF TAPER GIVEN CORRESPONDS TO LOW LIMIT OF TAPER  
DIAMETER AND HIGH LIMIT OF STRAIGHT HOLE AT BOTTOM OF TAPER

NOTE II  
STRAIGHT HOLE AT BOTTOM OF TAPER IS OF SUFFICIENT DEPTH TO CLEAR  
AM. STD. PLUG GAGE SHOWN IN ASA B5.10-1963

STAMP SIZE OF AMERICAN STANDARD TAPER HOLE  
ON OUTSIDE DIAMETER OF 2 INCH SPINDLE NOSE  
STAMP SIZE OF AMERICAN STANDARD TAPER HOLE  
IN UNDERCUT FOR ALL OTHER SPINDLE NOSES  
EXAMPLE: 4 1/2 AM STD TAPER HOLE

**TABLE 16**  
TAPER HOLES, COUNTERBORES FOR SAME, AND THRU HOLES IN TYPE D1 SPINDLE NOSES, 2 INCH TO 5 INCH INCLUSIVE, FOR ENGINE LATHES AND TOOL ROOM LATHES

ALL DIMENSIONS IN INCHES



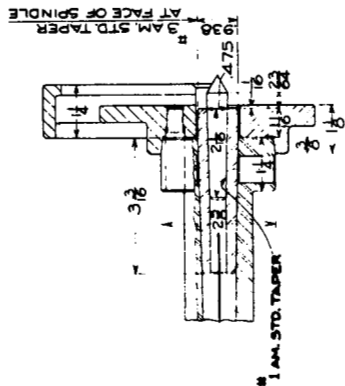
NOTE I  
MINIMUM LENGTH OF TAPER GIVEN CORRESPONDS TO LOW LIMIT OF TAPER  
DIAMETER AND HIGH LIMIT OF STRAIGHT HOLE AT BOTTOM OF TAPER

NOTE II  
STRAIGHT HOLE AT BOTTOM OF TAPER IS OF SUFFICIENT DEPTH TO CLEAR  
USA STANDARD PLUG GAGE SHOWN IN USAS B5.10-1963

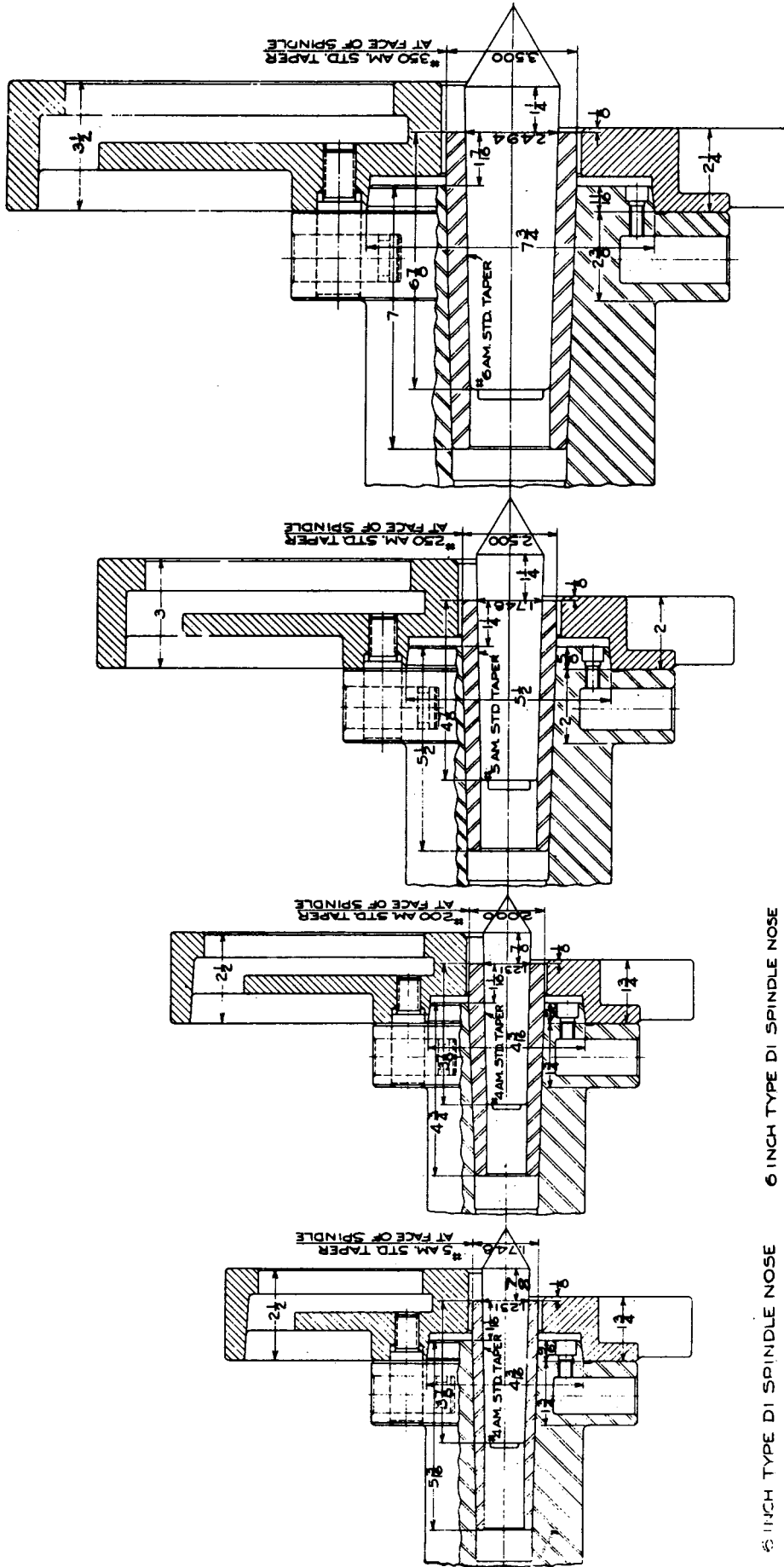
STAMP SIZE OF AMERICAN STANDARD TAPER HOLE IN UNDERCUT  
EXAMPLE: ".250 AM. STD. TAPER HOLE"

TABLE 17  
TAPER HOLES, COUNTERBORES FOR SAME, AND THRU HOLES IN TYPE D1 SPINDLE  
NOSES, SIZES 6 INCH TO 11 INCH INCLUSIVE, FOR ENGINE LATHES AND TOOL ROOM LATHES

ALL DIMENSIONS IN INCHES



ALL DIMENSIONS IN INCHES



5 INCH TYPE DI SPINDLE NOSE

6 INCH TYPE DI SPINDLE NOSE

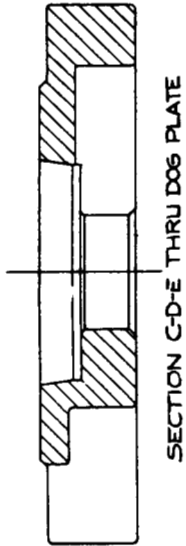
8 INCH TYPE DI SPINDLE NOSE

11 INCH TYPE DI SPINDLE NOSE

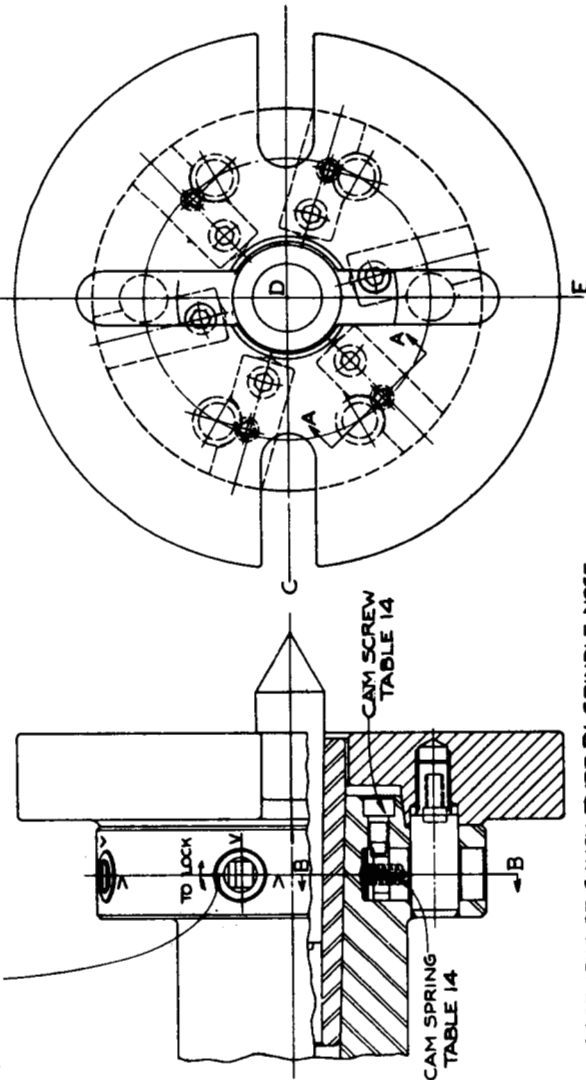
SECTIONS THRU TYPE D1 SPINDLE NOSES, SIZES 6 INCH TO 11 INCH INCLUSIVE, FOR ENGINE LATHES AND TOOL ROOM LATHES, ASSEMBLED WITH DOG PLATES, FACE PLATES, CENTERS, AND SLEEVES

TABLE 19

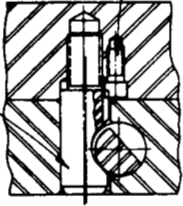
ALL DIMENSIONS IN INCHES



REFERENCE LINE ON CAM IN UNLOCKED POSITION. ADJUST CAM LOCK STUD TO MAKE REFERENCE LINE FALL BETWEEN V-MARKS IN LOCKED POSITION

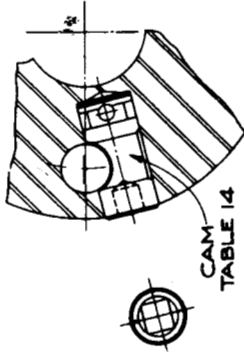


CAM LOCK STUD TABLE 15

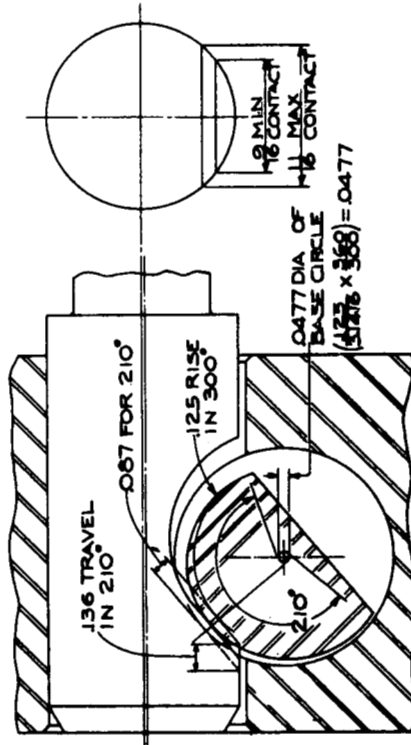


STUD LOCKING SCREW TABLE 15

SECTION A-A THRU CAM AND CAM LOCK STUD WITH CAM IN LOCKED POSITION



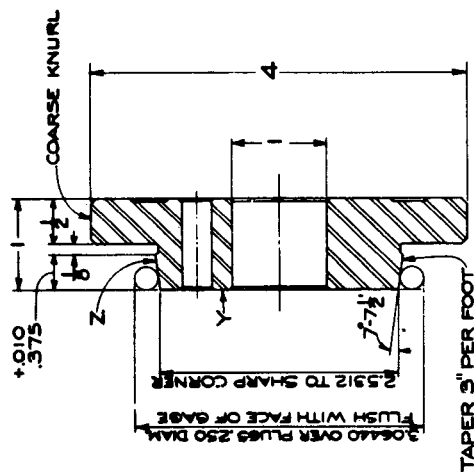
SECTION B-B THRU CAM WITH CAM IN OPEN POSITION



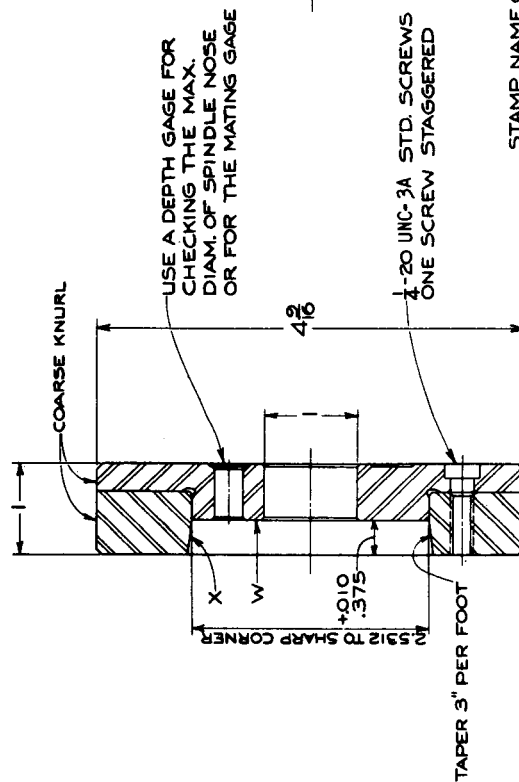
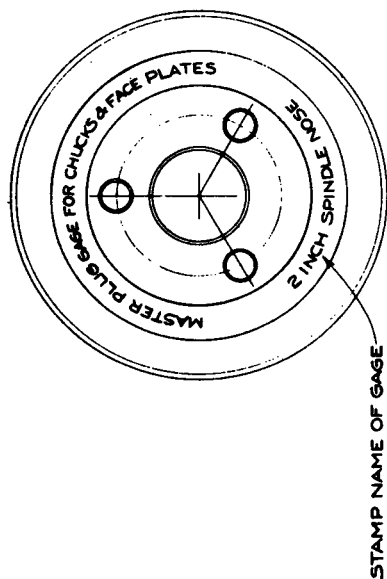
ENLARGED VIEW OF CAM AND CAM LOCK STUD

TABLE 20  
SECTIONS THRU 6 INCH TYPE D1 SPINDLE NOSE ASSEMBLED WITH STUDS, CAMS, DOG PLATE, SLEEVE, AND CENTER

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS  
OTHERWISE SPECIFIED WHEN DIMENSIONS ARE  
EXPRESSED IN COMMON FRACTIONS



TOLERANCE ON DIAMETER OF  
SURFACE Z MEASURED WITH  
REFERENCE TO SURFACE Y IS  
 $\pm .00005$   
SURFACES Y AND Z SHOULD BE  
GOOD PRUSSIAN BLUE FIT ON  
MATING SURFACES OF MATING  
RING GAGE  
GAGES TO BE HARDENED AND  
GROUND, AND SEASONED TO  
PREVENT DISTORTION



TOLERANCE ON DIAMETER OF  
SURFACE X MEASURED WITH  
REFERENCE TO SURFACE W IS  
 $\pm .00005$   
SURFACES W AND X SHOULD BE  
GOOD PRUSSIAN BLUE FIT ON  
MATING SURFACES OF MATING  
PLUG GAGE  
GAGES TO BE HARDENED AND  
GROUND, AND SEASONED TO  
PREVENT DISTORTION

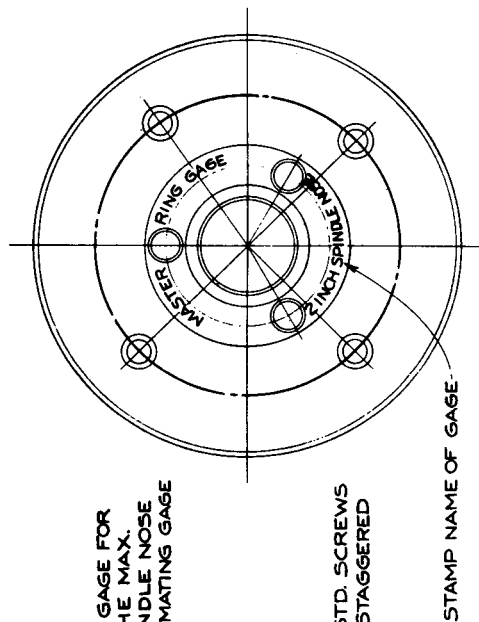
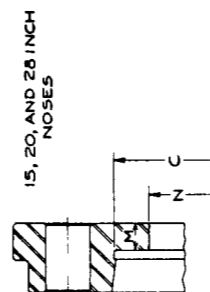
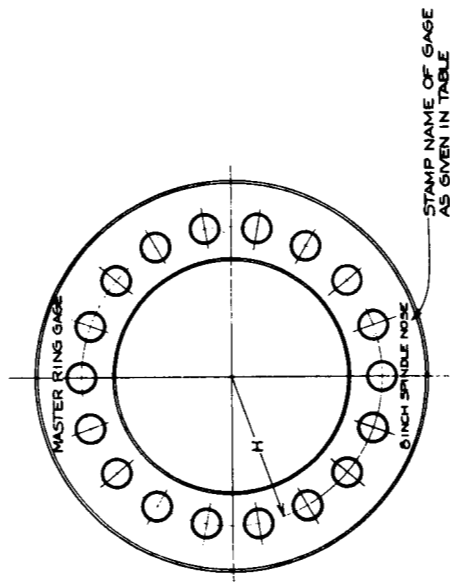
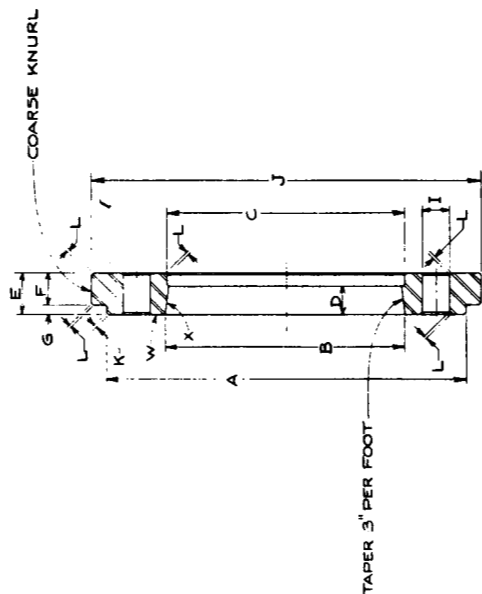


TABLE 21  
MASTER GAGES FOR 2 INCH TYPES A, B, AND D  
SPINDLE NOSES, CHUCKS, AND FACE PLATES

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS  
OTHERWISE SPECIFIED WHEN DIMENSIONS ARE  
EXPRESSED IN COMMON FRACTIONS



TOLERANCE ON DIAMETER OF SURFACE "X", MEASURED  
WITH REFERENCE TO SURFACE "W", IS  $\pm 0.001$   
SURFACES "W" AND "X" SHOULD BE GOOD PRUSSIAN BLUE  
FIT ON MATING SURFACES OF MATING PLUG GAGE SHOWN  
BY TABLE 23  
GAGES TO BE HARDENED AND GROUND AND SEASONED  
TO PREVENT DISTORTION

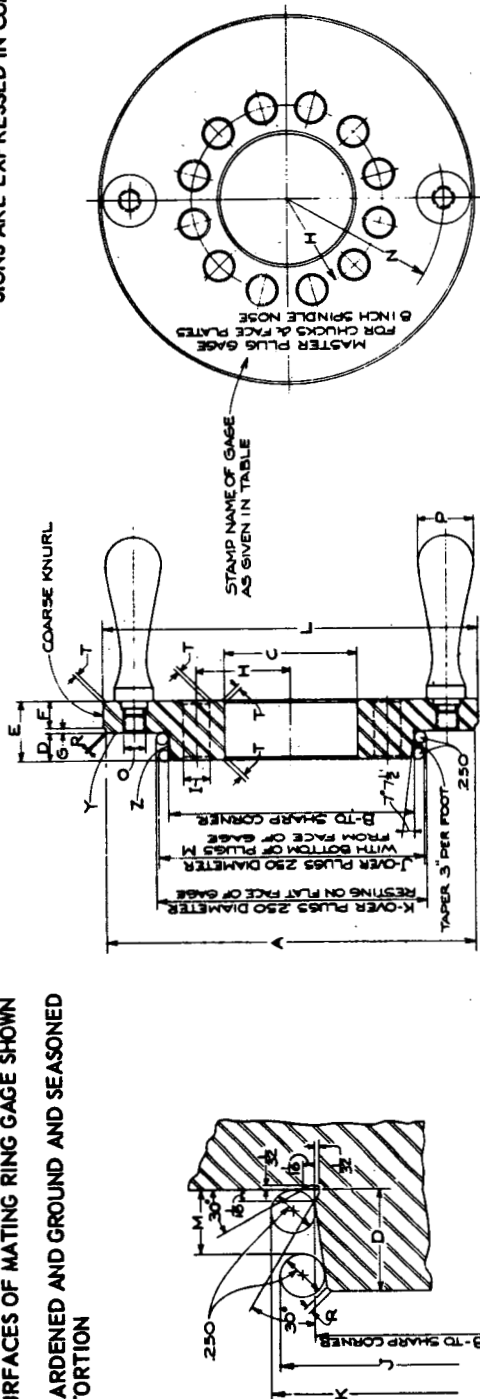


| SPINDLE NAME | A      | B       | C      | D     | E     | F     | G     | H      | I              | J      | K    | L    | M    | N      | STAMP               |
|--------------|--------|---------|--------|-------|-------|-------|-------|--------|----------------|--------|------|------|------|--------|---------------------|
| 3 Inch Nose  | 3 5/8  | 2.125   | 2 1/8  | 15/32 | 3/4   | 5/8   | 1/2   | 1 1/16 | 6-3/16 Holes   | 4 1/2  | 1/64 | 1/16 |      |        | Master Ring Gage    |
| 4 Inch Nose  | 4 1/4  | 2.5005  | 2 1/2  | 15/32 | 3/4   | 5/8   | 1/2   | 1 1/16 | 12-7/16 Holes  | 5      | 1/64 | 1/16 |      |        | 3 Inch Spindle Nose |
| 5 Inch Nose  | 5 1/4  | 3.2503  | 3 3/4  | 17/32 | 3/4   | 5/8   | 1/2   | 2 1/8  | 16-1/2 Holes   | 6      | 1/64 | 1/16 |      |        | Master Ring Gage    |
| 6 Inch Nose  | 6 1/2  | 4.1878  | 4 3/8  | 19/32 | 7/8   | 5/8   | 3/4   | 2 3/4  | 16-9/16 Holes  | 7 1/4  | 1/64 | 1/16 |      |        | 4 Inch Spindle Nose |
| 8 Inch Nose  | 8 1/4  | 5.50055 | 5 1/2  | 21/32 | 1     | 3/4   | 3/4   | 3 7/8  | 18-5/16 Holes  | 9      | 1/64 | 1/16 |      |        | Master Ring Gage    |
| 11 Inch Nose | 11     | 7.75055 | 7 3/4  | 23/32 | 1 1/4 | 3/4   | 3/4   | 4 3/4  | 24-3/8 Holes   | 11 1/4 | 1/64 | 1/16 |      |        | Master Ring Gage    |
| 15 Inch Nose | 15     | 11.2505 | 11 1/4 | 25/32 | 1 5/8 | 7/8   | 3/4   | 6 5/8  | 24-1" Holes    | 15 1/4 | 1/64 | 1/16 | 5/8  | 9 1/2  | Master Ring Gage    |
| 20 Inch Nose | 20 1/4 | 16.2505 | 16 1/4 | 27/32 | 2     | 1     | 1     | 9 3/4  | 30-1 1/8 Holes | 21 1/4 | 1/64 | 1/16 | 13/4 | 13 3/4 | Master Ring Gage    |
| 28 Inch Nose | 28 1/4 | 23.000  | 23     | 31/32 | 2 1/4 | 1 1/4 | 1 1/4 | 13     | 36-1 1/4 Holes | 29 1/4 | 1/64 | 1/16 | 1    | 20     | Master Ring Gage    |

TABLE 22  
MASTER RING GAGES FOR TYPES A, B, AND D SPINDLE NOSES  
SIZES 3 INCH TO 28 INCH INCLUSIVE

TOLERANCE ON DIAMETER OF SURFACE Z MEASURED WITH REFERENCE TO SURFACE Y IS  $\pm .0001$   
SURFACES Y AND Z SHOULD BE GOOD PRUSSIAN BLUE FIT ON MATING SURFACES OF MATING RING GAGE SHOWN BY TABLE 22  
GAGES TO BE HARDENED AND GROUND AND SEASONED TO PREVENT DISTORTION

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS

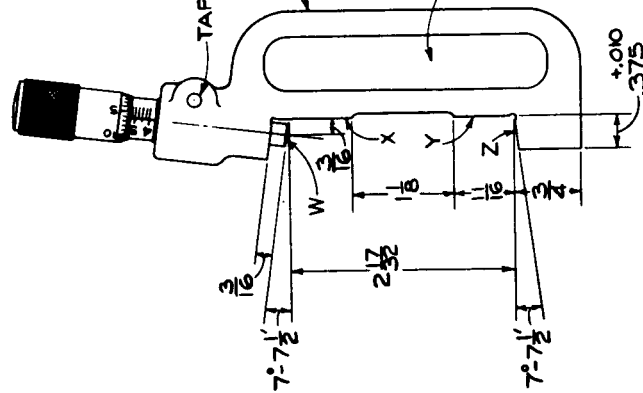


ENLARGED SECTION SHOWING UNDERCUT

| SPINDLE NAME | A      | B       | C      | D     | E       | F     | G    | H      | I              | J        | K        | L      | M     | N       | O           | P     | R    | T    | STAMP                                                                      |
|--------------|--------|---------|--------|-------|---------|-------|------|--------|----------------|----------|----------|--------|-------|---------|-------------|-------|------|------|----------------------------------------------------------------------------|
| 3 Inch Nose  | 3 5/8  | 2.125   | 1      | 15/32 | 31/32   | 7/16  | 1/16 | Omit   | Omit           | 2.53320  | 2.59570  | 3 3/4  | .250  | Omit    | Omit        | Omit  | 1/64 | 1/16 | Master Plug Gage<br>For Chucks and Face Plates<br>For 3 Inch Spindle Nose  |
| 4 Inch Nose  | 4 1/4  | 2.5005  | 1 3/8  | 15/32 | 1 1/32  | 1/2   | 1/16 | Omit   | Omit           | 2.90870  | 2.97120  | 4 3/8  | .250  | 1 11/16 | 3/8-16UNC-3 | 15/16 | 1/64 | 1/16 | Master Plug Gage<br>For Chucks and Face Plates<br>For 4 Inch Spindle Nose  |
| 5 Inch Nose  | 5 1/4  | 3.2503  | 2      | 17/32 | 1 3/32  | 1/2   | 1/16 | Omit   | Omit           | 3.64287  | 3.72100  | 5 3/8  | .3125 | 2 1/2   | 3/8-16UNC-3 | 15/16 | 1/64 | 1/16 | Master Plug Gage<br>For Chucks and Face Plates<br>For 5 Inch Spindle Nose  |
| 6 Inch Nose  | 6 1/4  | 4.1878  | 2 3/8  | 19/32 | 1 5/32  | 1/2   | 1/16 | 1 9/16 | 12-1/2 Holes   | 4.56475  | 4.65850  | 6 5/8  | .375  | 2 3/4   | 3/8-16UNC-3 | 15/16 | 1/64 | 1/16 | Master Plug Gage<br>For Chucks and Face Plates<br>For 6 Inch Spindle Nose  |
| 8 Inch Nose  | 8 1/4  | 5.50055 | 3      | 21/32 | 1 3/8   | 5/8   | 3/32 | 2 1/8  | 12-3/8 Holes   | 5.86187  | 5.97125  | 8 3/8  | .4375 | 3 3/4   | 1/2-13UNC-3 | 1 1/4 | 1/64 | 1/16 | Master Plug Gage<br>For Chucks and Face Plates<br>For 8 Inch Spindle Nose  |
| 11 Inch Nose | 11     | 7.75055 | 3 3/4  | 23/32 | 1 9/16  | 3/4   | 3/32 | 2 7/8  | 12-1 Holes     | 8.09625  | 8.22125  | 11 1/8 | .500  | 4 1/2   | 1/2-13UNC-3 | 1 1/4 | 1/64 | 1/16 | Master Plug Gage<br>For Chucks and Face Plates<br>For 11 Inch Spindle Nose |
| 15 Inch Nose | 15     | 11.2505 | 6 1/4  | 25/32 | 1 1/4   | 7/8   | 3/32 | 4 1/2  | 16-1 1/8 Holes | 11.58057 | 11.72120 | 15 1/8 | .5625 | 6 1/2   | 1/2-13UNC-3 | 1 1/4 | 1/64 | 1/16 | Master Plug Gage<br>For Chucks and Face Plates<br>For 15 Inch Spindle Nose |
| 20 Inch Nose | 20 1/4 | 16.2505 | 11 1/4 | 27/32 | 1 15/16 | 1     | 3/32 | 6 7/8  | 24-1 1/4 Holes | 16.56495 | 16.72120 | 20 5/8 | .625  | 9       | 1/2-13UNC-3 | 1 1/4 | 1/64 | 1/16 | Master Plug Gage<br>For Chucks and Face Plates<br>For 20 Inch Spindle Nose |
| 28 Inch Nose | 28 1/4 | 23.000  | 17 3/8 | 31/32 | 2 3/16  | 1 1/8 | 3/32 | 10 1/8 | 30-1 1/8 Holes | 23.28320 | 23.47070 | 28 3/8 | .750  | 13      | 1/2-13UNC-3 | 1 1/4 | 1/64 | 1/16 | Master Plug Gage<br>For Chucks and Face Plates<br>For 28 Inch Spindle Nose |

TABLE 22 MASTER PLUG GAGES FOR CHUCKS AND FACE PLATES FOR TYPES A, B, AND D SPINDLE NOSES, SIZES 3 INCH TO 28 INCH INCLUSIVE

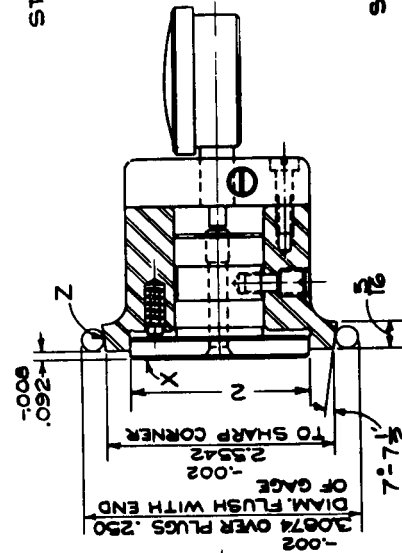
MICROMETER HEAD TO BE GRADUATED  
IN HALF THOUSANDTHS.  
GAGE TO BE HARNED AND GROUND.  
SURFACES W, X, Y, AND Z TO BE A GOOD  
PRUSSIAN BLUE FIT ON MASTER  
PLUG GAGE - TABLE 21



STAMP THIS SIDE - READ 2.5312 ON SPINDLE  
+00025

STAMP OTHER SIDE - SET TO READ 2.5312  
ON MASTER GAGE

STAMP-WORKING GAGE 2 INCH  
/ CHUCKS AND FACE PLATES

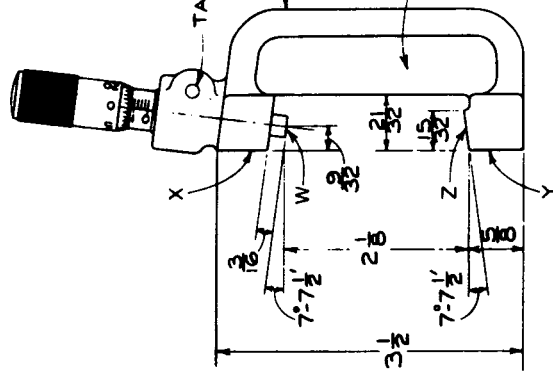


**STAMP-SET INDICATOR TO ZERO  
ON MASTER GAGE**

**STAMP-READ ZERO TO PLUS .001  
ON CHUCKS AND FACE PLATES**

TABLE 24

# OUTSIDE MICROMETER WORKING GAGE



PER PIN FOR LOCKING MICROMETER IN PLACE

STAMP -WORKING GAGE 3 INCH SPINDLE NOS

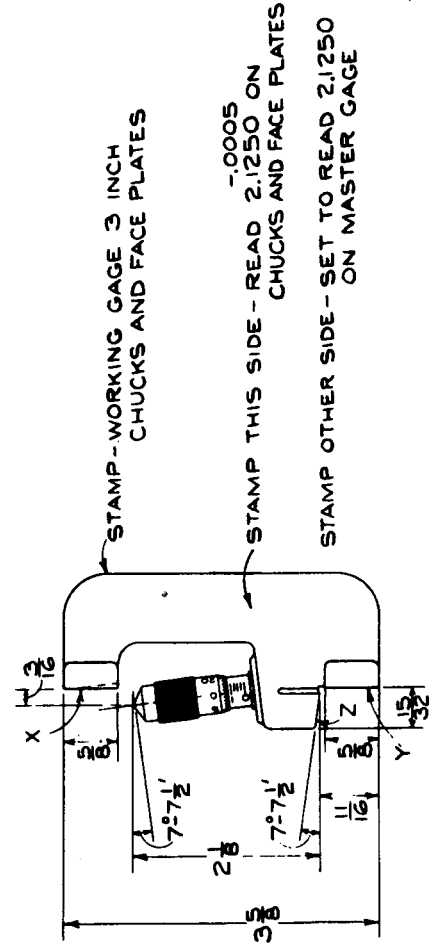
+0.00025

STAMP THIS SIDE - READ 2.1250 ON SPINDLE

STAMP OTHER SIDE - SET TO READ 2.1250  
ON MASTER GAGE

# INSIDE MICROMETER WORKING GAGE

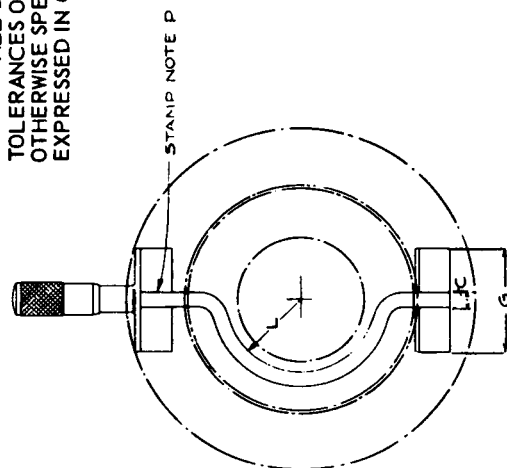
WORKING GAGES FOR 3 INCH  
TYPES A, B, AND D SPINDLE NOSES,  
CHUCKS AND FACE PLATES



STAMP-WORKING GAGE 3 INCH  
CHUCKS AND FACE PLATES

-0005  
STAMP THIS SIDE - READ 2.1250 ON  
CHUCKS AND FACE PLATES  
STAMP OTHER SIDE - SET TO READ 2.1250  
ON MASTER GAGE

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS  
OTHERWISE SPECIFIED WHEN DIMENSIONS ARE  
EXPRESSED IN COMMON FRACTIONS



MICROMETER HEADS TO BE GRADUATED  
IN HALF THOUSANDTHS  
GAGES TO BE HARDENED AND GROUND.  
SURFACES W, X, Y AND Z TO BE GOOD  
PRUSSIAN BLUE FIT ON MASTER PLUG  
GAGE. SEE TABLE 26

| SPINDLE NAME | A      | B     | C   | D      | E     | F      | G     | H   | J    | K    | L     | M     | N                                        | O                                         | P                                    |
|--------------|--------|-------|-----|--------|-------|--------|-------|-----|------|------|-------|-------|------------------------------------------|-------------------------------------------|--------------------------------------|
| 4 Inch Nose  | 2 1/2  | 1/2   | 3/8 | 4      | 1     | 3/4    | 1 1/4 | 1/4 | 1/8  | 3/16 | 3/4   | 1/2   | Set to Read<br>2.5005 on<br>Master Gage  | Read<br>2.5005 $\pm$ .0005<br>On Spindle  | Working Gage<br>4 Inch Spindle Nose  |
| 5 Inch Nose  | 3 1/4  | 9/16  | 3/8 | 4 3/4  | 1     | 3/4    | 1 1/4 | 1/4 | 1/8  | 3/16 | 1     | 1/2   | Set to Read<br>3.2503 on<br>Master Gage  | Read<br>3.2505 $\pm$ .0005<br>On Spindle  | Working Gage<br>5 Inch Spindle Nose  |
| 6 Inch Nose  | 4 3/4  | 5/8   | 3/8 | 6 1/4  | 1 1/8 | 15/16  | 2 1/2 | 3/8 | 3/16 | 3/8  | 1 1/8 | 1/2   | Set to Read<br>4.1878 on<br>Master Gage  | Read<br>4.1880 $\pm$ .0005<br>On Spindle  | Working Gage<br>6 Inch Spindle Nose  |
| 8 Inch Nose  | 5 1/2  | 11/16 | 3/8 | 7 3/8  | 1 1/2 | 15/16  | 2 3/4 | 3/8 | 3/16 | 3/8  | 1 3/4 | 11/16 | Set to Read<br>5.50055 on<br>Master Gage | Read<br>5.50075 $\pm$ .0005<br>On Spindle | Working Gage<br>8 Inch Spindle Nose  |
| 11 Inch Nose | 7 3/4  | 3/4   | 3/8 | 9 3/8  | 1 3/4 | 15/16  | 2 3/4 | 3/8 | 3/16 | 3/8  | 1 3/4 | 11/16 | Set to Read<br>7.75055 on<br>Master Gage | Read<br>7.75075 $\pm$ .0005<br>On Spindle | Working Gage<br>11 Inch Spindle Nose |
| 15 Inch Nose | 11 1/4 | 13/16 | 1/2 | 13 3/8 | 1 3/4 | 1-1/16 | 3     | 1/2 | 3/16 | 7/16 | 2 1/2 | 11/16 | Set to Read<br>11.2505 on<br>Master Gage | Read<br>11.251 $\pm$ .001<br>On Spindle   | Working Gage<br>15 Inch Spindle Nose |
| 20 Inch Nose | 16 1/4 | 7/8   | 1/2 | 18 3/8 | 1 3/4 | 1-1/16 | 3     | 1/2 | 3/16 | 7/16 | 2 3/4 | 11/16 | Set to Read<br>16.2505 on<br>Master Gage | Read<br>16.251 $\pm$ .001<br>On Spindle   | Working Gage<br>20 Inch Spindle Nose |
| 28 Inch Nose | 23     | 1     | 5/8 | 25 1/2 | 1 3/4 | 1-1/4  | 3     | 1/2 | 1    | 1/2  | 2 1/2 | 11/16 | Set to Read<br>23.0000 on<br>Master Gage | Read<br>23.001 $\pm$ .001<br>On Spindle   | Working Gage<br>28 Inch Spindle Nose |

OUTSIDE MICROMETER WORKING GAGES FOR TYPES A, B, AND D SPINDLE NOSES  
SIZES 4 INCH TO 28 INCH INCLUSIVE

TABLE 26

### TYPE OF GAGES FOR 5 INCH AND LARGER NOSES

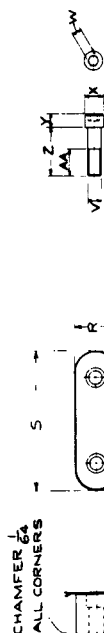
| SPINDLE NAME | A      | B     | C   | D      | E     | F     | G     | H     | J    | K       | L       | M     | N   | O      | P    | R    | S    | T   | U                                         | V                                        | W                                                 |
|--------------|--------|-------|-----|--------|-------|-------|-------|-------|------|---------|---------|-------|-----|--------|------|------|------|-----|-------------------------------------------|------------------------------------------|---------------------------------------------------|
| 4 Inch Nose  | 2 1/2  | 15/32 | 1/4 | 4 1/4  | 13/16 | 1 1/8 | 1 1/2 | 1 1/8 | 5/16 |         | 1 1/2   |       | 7/8 | 3/16   | 1/2  | 9/16 |      |     | Set to Read<br>2.5005 on<br>Master Gauge  | 2.5005— .0005 on<br>Chucks & Face Plates | Working Gages for<br>4 Inch Chucks & Face Plates  |
| 5 Inch Nose  | 3 3/4  | 17/32 | 1/4 | 5 1/4  | 13/16 | 1 1/8 | 1 1/2 | 5/8   | 5/16 | 15/16   | 1 1/4   | 1 1/2 | 3/4 | 1      | 3/16 | 1/2  | 9/16 | 1/2 | Set to Read<br>3.2503 on<br>Master Gauge  | 3.2503— .0005 on<br>Chucks & Face Plates | Working Gages for<br>5 Inch Chucks & Face Plates  |
| 6 Inch Nose  | 4 3/8  | 19/32 | 3/8 | 6 1/2  | 1     | 1 1/8 | 1 3/4 | 7/8   | 3/8  | 1 1/8   | 2-13/16 | 3/4   | 1/2 | 1-5/32 | 1/4  | 3/8  | 3/4  | 3/8 | Set to Read<br>4.1878 on<br>Master Gauge  | 4.1878— .0005 on<br>Chucks & Face Plates | Working Gages for<br>6 Inch Chucks & Face Plates  |
| 8 Inch Nose  | 5 1/2  | 21/32 | 3/8 | 8 1/4  | 1     | 1 1/8 | 1 3/4 | 7/8   | 3/8  | 1-5/32  | 1 1/8   | 3/4   | 1/2 | 1 3/8  | 1/4  | 3/8  | 3/4  | 3/8 | Set to Read<br>5.5005 on<br>Master Gauge  | 5.5005— .0005 on<br>Chucks & Face Plates | Working Gages for<br>8 Inch Chucks & Face Plates  |
| 11 Inch Nose | 7 3/4  | 23/32 | 3/8 | 11     | 1     | 1 1/8 | 1 3/4 | 7/8   | 3/8  | 1-7/32  | 1 1/8   | 3/4   | 1/2 | 1 1/8  | 5/16 | 3/8  | 3/4  | 3/8 | Set to Read<br>7.7505 on<br>Master Gauge  | 7.7505— .0005 on<br>Chucks & Face Plates | Working Gages for<br>11 Inch Chucks & Face Plates |
| 15 Inch Nose | 11 1/4 | 25/32 | 3/8 | 15     | 1 1/4 | 1 1/8 | 2     | 1     | 3/8  | 1-7/32  | 1 1/8   | 3/4   | 1/2 | 1 1/8  | 5/16 | 3/8  | 3/4  | 3/8 | Set to Read<br>11.2505 on<br>Master Gauge | 11.2505— .001 on<br>Chucks & Face Plates | Working Gages for<br>15 Inch Chucks & Face Plates |
| 20 Inch Nose | 16 1/4 | 27/32 | 3/8 | 20 1/2 | 1 3/4 | 1 1/8 | 2     | 1     | 3/8  | 1-9/32  | 1 1/8   | 3/4   | 1/2 | 2 1/8  | 3/8  | 3/8  | 3/4  | 3/8 | Set to Read<br>16.2505 on<br>Master Gauge | 16.2505— .001 on<br>Chucks & Face Plates | Working Gages for<br>20 Inch Chucks & Face Plates |
| 28 Inch Nose | 23     | 31/32 | 1/2 | 28 1/2 | 1 1/2 | 2 1/8 | 2     | 1     | 1/2  | 1-11/32 | 1 1/8   | 3/4   | 1/2 | 2 3/8  | 7/16 | 3/8  | 3/4  | 3/8 | Set to Read<br>23.0000 on<br>Master Gauge | 23.0000— .001 on<br>Chucks & Face Plates | Working Gages for<br>28 Inch Chucks & Face Plates |

**INSIDE MICROMETER WORKING GAGES FOR CHUCKS AND FACE PLATES FOR TYPES A, B, AND D SPINDLE NOSES, SIZES 4 INCH TO 28 INCH INCLUSIVE**

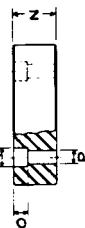
ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS  
OTHERWISE SPECIFIED WHEN DIMENSIONS ARE  
EXPRESSED IN COMMON FRACTIONS

| SPINDLE NAME                              | L00 NOSE | L0 NOSE       | L1 NOSE       | L2 NOSE        | L3 NOSE        |
|-------------------------------------------|----------|---------------|---------------|----------------|----------------|
| Dia of Flange                             | A        | 3-1/2         | 4-1/8         | 5-3/4          | 7-3/8          |
| Dia of Large End of Pilot                 | B        | + .002        | + .002        | + .002         | + .002         |
| Length of Pilot                           | C        | 2             | 2-3/8         | 2-7/8          | 3-3/8          |
| Maximum Hole                              | D        | 1-1/2         | 2             | 2-1/4          | 3              |
| Diameter for Draw                         | E        | - .005        | - .005        | - .005         | - .005         |
| Nut Fit                                   | F        | - .005        | - .005        | - .005         | - .005         |
| Distance from Center To Bottom of Keyseat | G        | .995          | 1.245         | 1.4325         | 1.870          |
| Distance from Center To Top of Key        | H        | + .010        | + .010        | + .010         | + .010         |
| Length of Keyseat                         | I        | 1.500         | 1.750         | 2.375          | 2.875          |
| Width of Flat                             | J        | 1/8           | 1/8           | 1/8            | 1/8            |
| End of Nose to End of Keyseat             | K        | 3/16          | 1/4           | 1/4            | 1/4            |
| Width of Flange                           | L        | 9/32          | 5/16          | 7/16           | 5/8            |
| Thread                                    | M        | #10-32 UNF-3A | #10-32 UNF-3A | 5/16-18 UNC-3B | 5/16-18 UNC-3B |
| Width of Keyseat                          | N        | - .001        | - .001        | - .001         | - .001         |
| Height of Key                             | O        | - .002        | - .002        | - .002         | - .002         |
| Depth of Counterbore                      | P        | .375          | .375          | .625           | .750           |
| Drill                                     | Q        | 7/32          | 7/32          | 9/32           | 11/32          |
| Counterbore                               | R        | 11/32         | 11/32         | 13/32          | 15/32          |
| Width of Key                              | S        | - .001        | - .001        | - .001         | - .001         |
| Length of Key                             | T        | 1.500         | 1.750         | 2.375          | 2.875          |
| Distance Between Screw Holes              | U        | 1             | 1-1/8         | 1-1/2          | 1-3/4          |
| Thread                                    | V        | #10-32 UNF-3A | #10-32 UNF-3A | 5/16-18 UNC-3A | 5/16-18 UNC-3A |
| Hex Socket                                | W        | 5/32          | 5/32          | 3/16           | 7/32           |
| Diameter of Head                          | X        | 5/16          | 5/16          | 3/8            | 7/16           |
| Height of Head                            | Y        | 3/16          | 3/16          | 1/4            | 5/16           |
| Length Under Head                         | Z        | 3/8           | 3/8           | 5/8            | 3/4            |
| Full Length Thread                        | AA       | 1/4           | 1/4           | 7/16           | 1/2            |
| Min Depth of Tapped Holes                 | BB       | 1/4           | 1/4           | 5/16           | 3/8            |
| Gage Clearance                            | CC       | + .007        | + .007        | + .007         | + .007         |

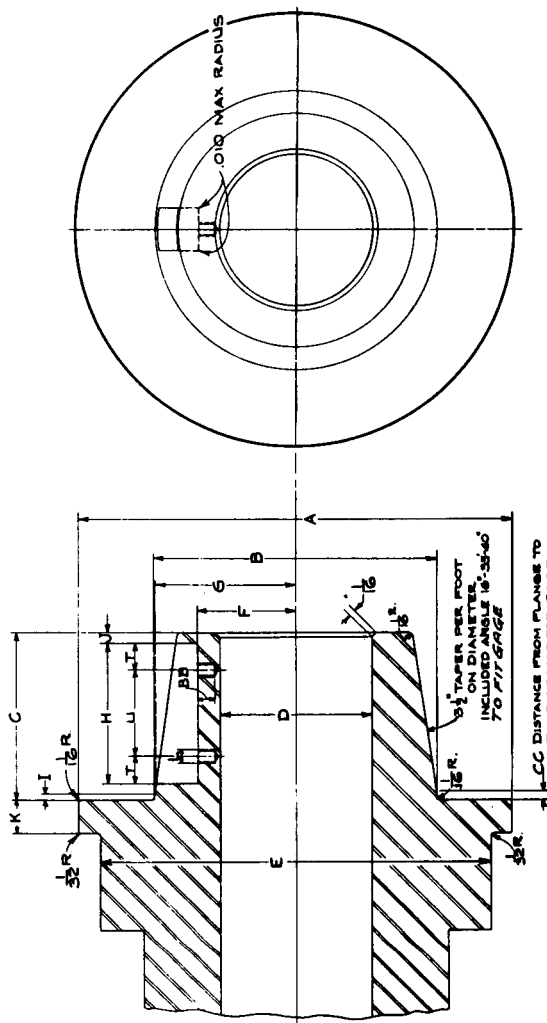
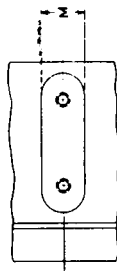
TABLE 28  
TYPE L SPINDLE NOSES, DRIVE KEYS,  
AND RETAINING SCREWS



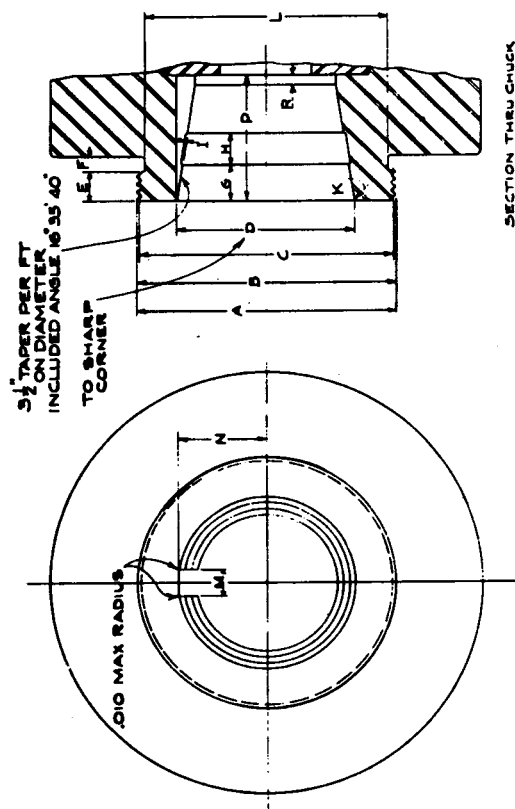
SCREW



KEY  
HARDEN AND GRIND



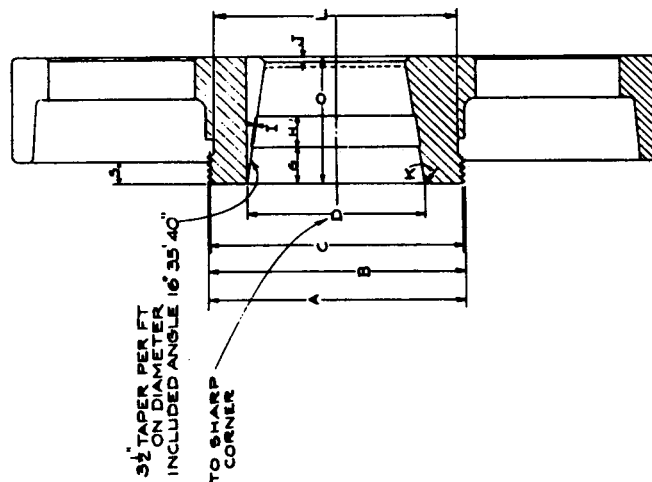
SPINDLE NOSE



ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE  
SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS

| SPINDLE NAME                    | L00 NOSE<br>3 3/4-6 Unified<br>Form-Special | L0 NOSE<br>4 1/2-6 Unified<br>Form-Special | L1 NOSE<br>6-6 Unified<br>Form-Special | L2 NOSE<br>7 1/4-5 Unified<br>Form-Special | L3 NOSE<br>10 3/4-4 Unified<br>Form-Special |
|---------------------------------|---------------------------------------------|--------------------------------------------|----------------------------------------|--------------------------------------------|---------------------------------------------|
| Nominal Thread                  |                                             |                                            |                                        |                                            |                                             |
| Outside Diameter of Thread      | B<br>-.0202<br>3.7450                       | -.0202<br>4.4950                           | -.0202<br>5.9950                       | -.0236<br>7.7450                           | -.0280<br>10.3700                           |
| Pitch Dia of Thread             | C<br>3.6367                                 | -.0083<br>4.3867                           | -.0083<br>5.8867                       | -.0091<br>7.6151                           | -.0134<br>10.2076                           |
| Dia of Large End of Taper       | D<br>2.750                                  | -.002<br>3.250                             | -.002<br>4.125                         | -.002<br>5.250                             | -.002<br>6.500                              |
| Length of Thread                | E<br>9/16                                   | 9/16                                       | 5/8                                    | 7/8                                        | 15/16                                       |
| Width of Neck                   | F<br>1/4                                    | 1/4                                        | 1/4                                    | 5/16                                       | 3/8                                         |
| End of Pilot to Relief          | G<br>5/8                                    | 7/8                                        | 1                                      | 1-3/16                                     | 1-3/8                                       |
| Width of Relief                 | H<br>1/2                                    | 3/4                                        | 7/8                                    | 1                                          | 1-1/8                                       |
| Depth of Relief                 | I<br>1/32                                   | 1/32                                       | 1/32                                   | 1/32                                       | 1/32                                        |
| Chamfer                         | J<br>1/16                                   | 1/16                                       | 1/8                                    | 1/8                                        | 1/8                                         |
| Corner Radius                   | K<br>1/32                                   | 1/32                                       | 1/32                                   | 1/32                                       | 1/32                                        |
| Neck Diameter                   | L<br>3-1/2                                  | 4-1/4                                      | 5-3/4                                  | 7-7/16                                     | 10                                          |
| Width of Keyway                 | M<br>+.002<br>.377                          | +.002<br>.377                              | +.002<br>.627                          | +.002<br>.752                              | +.002<br>1.002                              |
| From Center to Bottom of Keyway | N<br>+.015<br>1.375                         | +.015<br>1.625                             | +.015<br>2.0625                        | +.015<br>2.625                             | +.015<br>3.250                              |
| Length of Hole                  | O<br>2                                      | 2-3/8                                      | 3                                      | 3-1/2                                      | 4                                           |
| Length of Hole Straight Hole    | P<br>2-1/8                                  | 2-1/2                                      | 3                                      | 3-1/2                                      | 4                                           |
| Min Extension                   | R<br>1/4                                    | 1/4                                        | 1/4                                    | 1/4                                        | 1/4                                         |
|                                 | S<br>3/8                                    | 3/8                                        | 1/2                                    | 1/2                                        | 1/2                                         |

SECTION THRU CHUCK

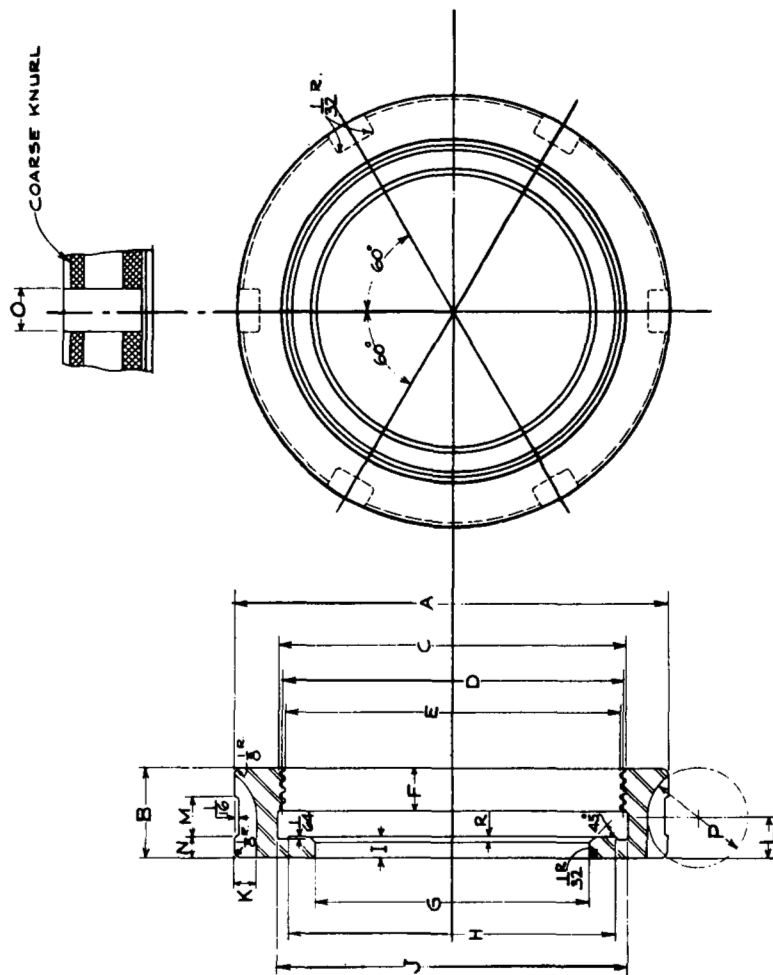


SECTION THRU FACE PLATE

BACKS OF CHUCKS AND FACE PLATES  
FOR TYPE L SPINDLE NOSES

TYPE 29

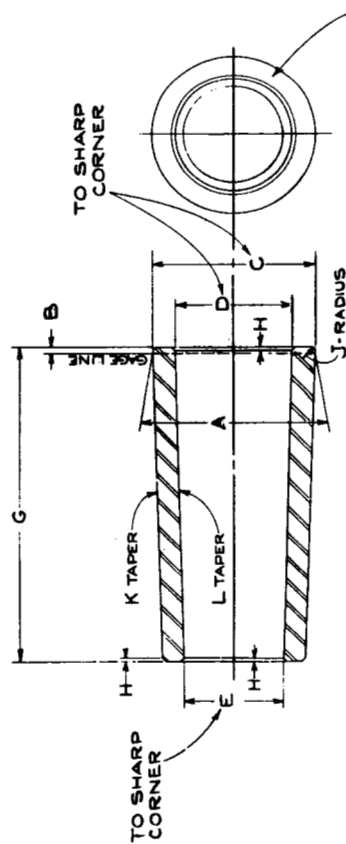
ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE  
SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS



|   | SPINDLE NAME                  |                               |                             |                               |                                  |
|---|-------------------------------|-------------------------------|-----------------------------|-------------------------------|----------------------------------|
|   | L0 NOSE                       | L1 NOSE                       | L2 NOSE                     | L3 NOSE                       |                                  |
| A | 4-5/8                         | 5-1/2                         | 7-1/2                       | 9-3/8                         | 12-5/8                           |
| B | 1-3/16                        | 1-1/4                         | 1-9/16                      | 2-1/4                         | 2-9/16                           |
| C | 3/4-6 Unified<br>Form-Special | 4/4-6 Unified<br>Form-Special | 6-6 Unified<br>Form-Special | 7/4-5 Unified<br>Form-Special | 10 3/4-4 Unified<br>Form-Special |
| D | 3.6417 P.D.<br>+0.0074        | 4.3917 P.D.<br>+0.0083        | 5.8917 P.D.<br>+0.0091      | 7.6201 P.D.<br>+0.0134        | 10.2126 P.D.<br>+0.0270          |
| E | 3.5696 Bore<br>+0.0180        | 4.3196 Bore<br>+0.0180        | 5.8196 Bore<br>+0.0216      | 7.5334 Bore<br>+0.0216        | 10.1044 Bore<br>+0.0270          |
| F | 9/16                          | 5/8                           | 3/4                         | 1                             | 1-1/8                            |
| G | 4.005                         | 4.005                         | 4.005                       | 4.005                         | 4.005                            |
| H | 3-1/2                         | 4-1/8                         | 5-11/16                     | 7-3/8                         | 10                               |
| I | 1/4                           | 1/4                           | 3/8                         | 5/8                           | 3/4                              |
| J | 3-13/16                       | 4-9/16                        | 6-1/16                      | 7-13/16                       | 10-7/16                          |
| K | 3/16                          | 1/4                           | 5/16                        | 3/8                           | 3/8                              |
| L | 9/16                          | 1/2                           | 3/4                         | 1-1/8                         | 1-5/16                           |
| M | 1/2                           | 1/2                           | 11/16                       | 3/4                           | 13/16                            |
| N | 1/4                           | 1/4                           | 5/16                        | 5/8                           | 13/16                            |
| O | 1/2                           | 3/4                           | 7/8                         | 1                             | 1                                |
| P | 1-1/2                         | 1-3/4                         | 2-1/2                       | 3-1/2                         | 3-1/2                            |
| R | 1/16                          | 1/16                          | 1/16                        | 1/16                          | 1/16                             |

TABLE 30 DRAW NUTS FOR TYPE L SPINDLE NOSES

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE  
SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS



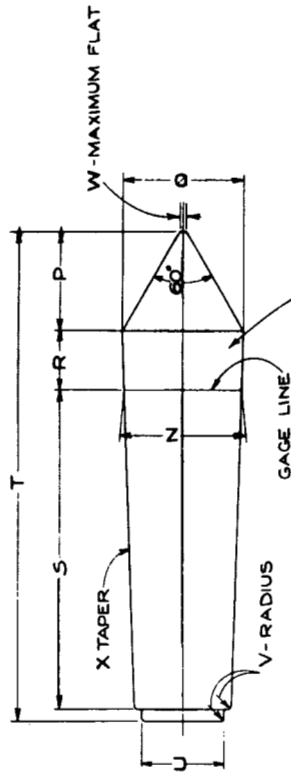
STAMP SIZES OF AMERICAN STANDARD TAPERS  
EXAMPLE: "5 TO 3 AMER STD TAPER"

#### SLEEVE

| SPINDLE NAME            | A     | B    | C      | D              | E      | G     | H    | J    | K                       | L                   |
|-------------------------|-------|------|--------|----------------|--------|-------|------|------|-------------------------|---------------------|
| L00 Nose                | 1.500 | 1/16 | 1.5032 | -.002<br>.938  | .7874  | 3     | 1/16 | 1/32 | #4 1/2 Am.Std.<br>Taper | #3 Am.Std.<br>Taper |
| L0 Nose                 | 1.748 | 1/16 | 1.7513 | -.002<br>.938  | .7874  | 3     | 1/16 | 1/32 | #5 Am.Std.<br>Taper     | #3 Am.Std.<br>Taper |
| L1 Nose<br>Small Sleeve | 1.748 | 1/8  | 1.7546 | -.002<br>1.231 | 1.0364 | 3-3/4 | 1/16 | 1/16 | #5 Am.Std.<br>Taper     | #4 Am.Std.<br>Taper |
| L1 Nose<br>Large Sleeve | 2.000 | 1/8  | 2.0078 | -.002<br>1.231 | 1.0364 | 3-3/4 | 1/16 | 1/16 | #200 Am.Std.<br>Taper   | #4 Am.Std.<br>Taper |
| L2 Nose                 | 2.500 | 1/8  | 2.5078 | -.002<br>1.748 | 1.4980 | 4-3/4 | 1/16 | 1/16 | #250 Am.Std.<br>Taper   | #5 Am.Std.<br>Taper |
| L3 Nose                 | 3.500 | 1/8  | 3.5078 | -.002<br>2.494 | 2.1421 | 6-3/4 | 1/16 | 1/16 | #350 Am.Std.<br>Taper   | #6 Am.Std.<br>Taper |

SLEEVES AND CENTERS FOR TYPE L SPINDLE NOSES  
FOR ENGINE LATHES AND TOOL ROOM LATHES

TABLE 31



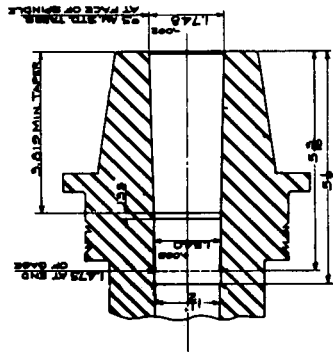
STAMP SIZE OF AMERICAN STANDARD TAPER  
EXAMPLE: "3 AMER STD TAPER"

#### CENTER

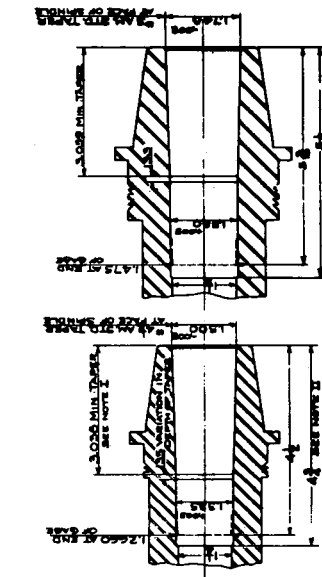
| SPINDLE NAME | N     | O     | P       | R     | S     | T        | U     | V      | W      | X                   |
|--------------|-------|-------|---------|-------|-------|----------|-------|--------|--------|---------------------|
| L00 Nose     | .938  | .982  | 27/32   | 7/8   | 3 1/8 | 4-29/32  | 5/8   | 1 1/32 | 1 1/32 | #3 Am.Std.<br>Taper |
| L0 Nose      | .938  | .982  | 27/32   | 7/8   | 3 1/8 | 4-29/32  | 5/8   | 1 1/32 | 1 1/32 | #3 Am.Std.<br>Taper |
| L1 Nose      | 1.231 | 1.276 | 1-3/32  | 7/8   | 3 7/8 | 5-31/32  | 3/4   | 1 1/16 | 1 1/16 | #4 Am.Std.<br>Taper |
| L2 Nose      | 1.748 | 1.814 | 1-17/32 | 1 1/4 | 4 7/8 | 7-29/32  | 1 1/8 | 1 1/16 | 1 1/16 | #5 Am.Std.<br>Taper |
| L3 Nose      | 2.494 | 2.559 | 2-5/32  | 1 1/4 | 6 1/8 | 10-17/32 | 1 3/4 | 1 1/16 | 1 1/16 | #6 Am.Std.<br>Taper |

CENTERS ARE THE SAME AS  
FOR TYPE D SPINDLE NOSES  
SEE TABLE 15

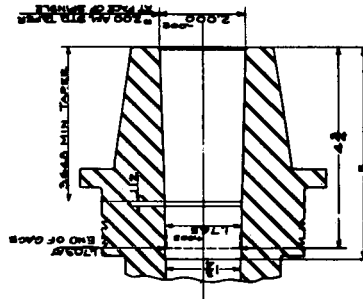
ALL DIMENSIONS IN INCHES



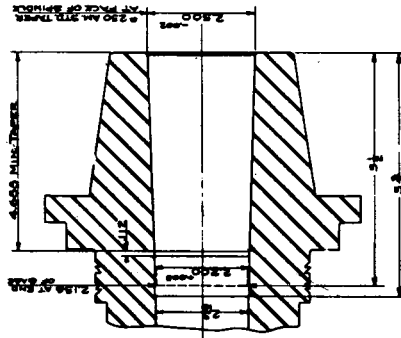
L1 SPINDLE NOSE  
FOR  
15 INCH ENGINE LATHES  
15 INCH TOOL ROOM LATHES



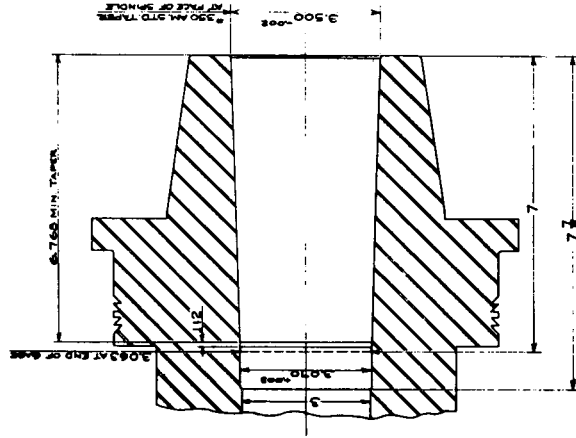
L00 SPINDLE NOSE  
FOR  
10 INCH TOOL ROOM LATHES



L1 SPINDLE NOSE  
FOR  
16 INCH ENGINE LATHES  
18 INCH TOOL ROOM LATHES



L2 SPINDLE NOSE  
FOR  
20 INCH ENGINE LATHES  
20 INCH TOOL ROOM LATHES



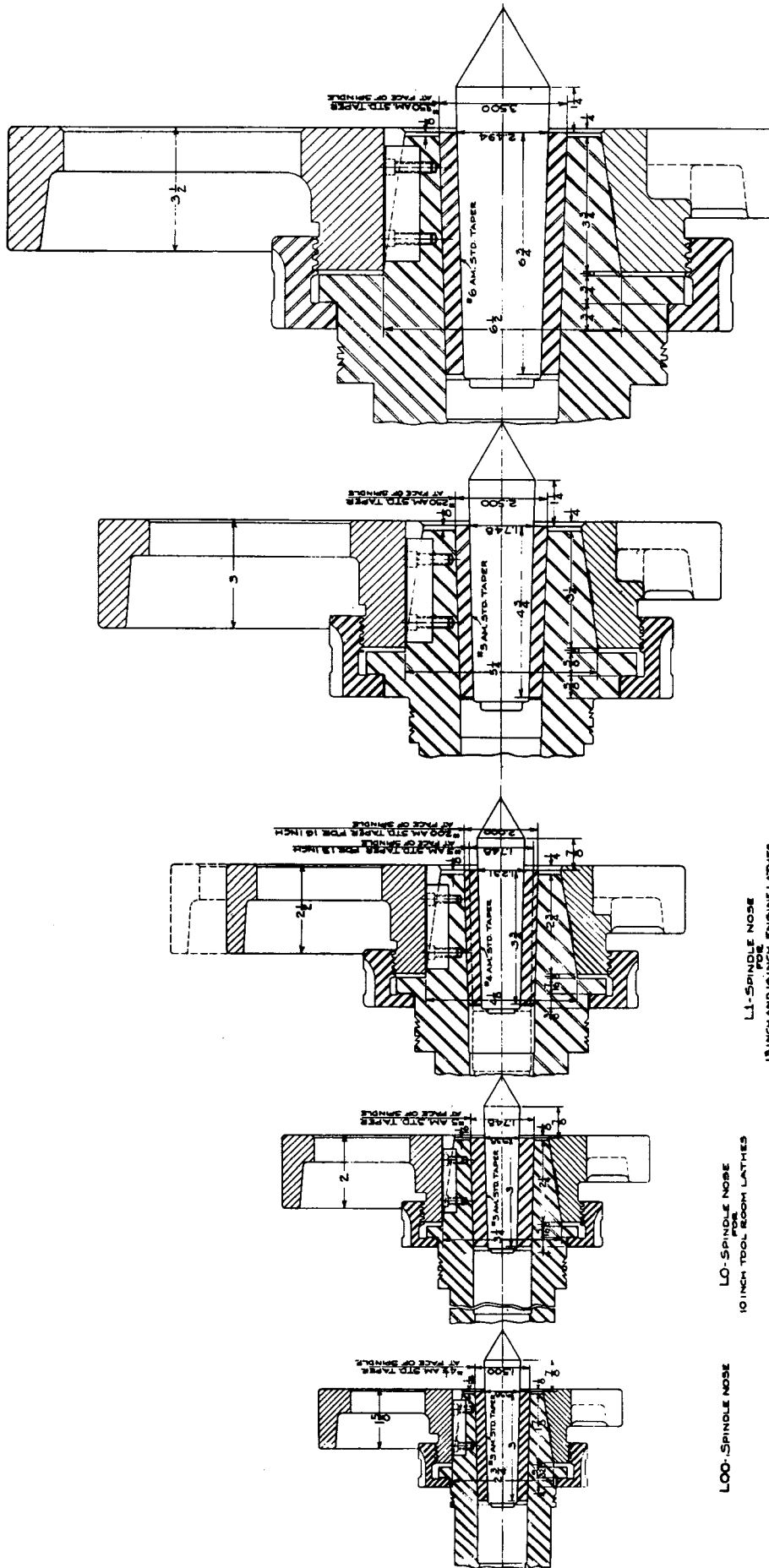
L3 SPINDLE NOSE  
FOR  
25 INCH AND 32 INCH ENGINE LATHES

NOTE I  
MINIMUM LENGTH OF TAPER GIVEN CORRESPONDS TO LOW LIMIT OF  
TAPER DIAMETER AND HIGH LIMIT OF STRAIGHT HOLE AT BOTTOM OF TAPER

NOTE II  
STRAIGHT HOLE AT BOTTOM OF TAPER IS OF SUFFICIENT DEPTH TO CLEAR  
USA STANDARD PLUG GAGE SHOWN IN USAS B5.10 - 1963

TABLE 32  
TAPER HOLES, COUNTERBORES FOR SAME, AND THRU HOLES  
IN TYPE L SPINDLES FOR ENGINE LATHES AND TOOL ROOM LATHES

ALL DIMENSIONS IN INCHES



L00-SPINDLE NOSE

10 INCH TOOL ROOM LATHES

L1-SPINDLE NOSE

13 INCH AND 16 INCH ENGINE LATHES  
13 INCH AND 16 INCH TOOL ROOM LATHES

L2-SPINDLE NOSE

20 INCH ENGINE LATHES  
20 INCH TOOL ROOM LATHES

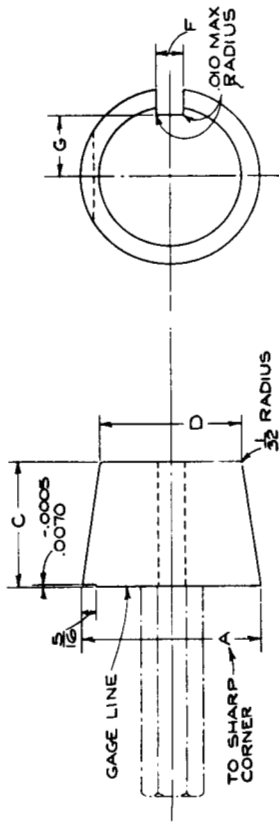
L3-SPINDLE NOSE

22 INCH AND 32 INCH ENGINE LATHES

TABLE 33  
SECTIONS THRU TYPE L SPINDLE NOSES FOR ENGINE LATHES AND TOOL ROOM LATHES,  
ASSEMBLED WITH DOG PLATES, FACE PLATES, CENTERS, AND SLEEVES

TABLE 33

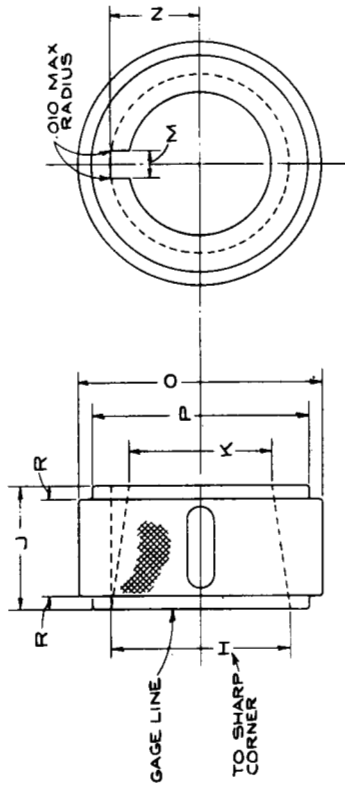
SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS



TAPER  $3\frac{1}{2}$ " PER FOOT  
INCLUDED ANGLE  $16^{\circ}35'40''$

TOLERANCE ON DIA. 'A' NOT TO EXCEED 'B'  
FOR CLASS OF GAGE SPECIFIED

TAPER TOLERANCE NOT TO EXCEED 'E' IN LENGTH  
OF GAGE FOR CLASS OF GAGE SPECIFIED



TAPER  $3\frac{1}{2}$ " PER FOOT  
INCLUDED ANGLE  $16^{\circ}35'40''$

ERROR NOT TO EXCEED 'L' IN LENGTH OF ENGAGEMENT  
WITH MATING PLUG FOR CLASS OF GAGE SPECIFIED

TAPER PLUG GAGE

| SPINDLE<br>NAME | A     | B<br>Tolerance on Dia A |            |            | C                               | D      | E<br>Taper Tolerance |            |            | F              | G               | STAMP                                    |
|-----------------|-------|-------------------------|------------|------------|---------------------------------|--------|----------------------|------------|------------|----------------|-----------------|------------------------------------------|
|                 |       | Class<br>X              | Class<br>Y | Class<br>Z |                                 |        | Class<br>X           | Class<br>Y | Class<br>Z |                |                 |                                          |
| L00 Nose        | 2.750 | +0.001                  | +0.002     | +0.004     | 1 <sup>31</sup> / <sub>32</sub> | 2.1758 | +0.001               | +0.002     | +0.002     | +0.01<br>.376  | -.001<br>1.000  | Taper Plug<br>Gage<br>L00 Nose<br>Class* |
| L0 Nose         | 3.250 | +0.001                  | +0.002     | +0.004     | 2 <sup>11</sup> / <sub>32</sub> | 2.5664 | +0.001               | +0.002     | +0.002     | +0.01<br>.376  | -.001<br>1.250  | Taper Plug<br>Gage<br>L0 Nose<br>Class*  |
| L1 Nose         | 4.125 | +0.001                  | +0.002     | +0.004     | 2 <sup>29</sup> / <sub>32</sub> | 3.2774 | +0.001               | +0.002     | +0.002     | +0.01<br>.626  | -.001<br>1.4375 | Taper Plug<br>Gage<br>L1 Nose<br>Class*  |
| L2 Nose         | 5.250 | +0.001                  | +0.002     | +0.004     | 3 <sup>13</sup> / <sub>32</sub> | 4.2565 | +0.001               | +0.002     | +0.002     | +0.01<br>.751  | -.001<br>1.875  | Taper Plug<br>Gage<br>L2 Nose<br>Class*  |
| L3 Nose         | 6.500 | +0.001                  | +0.002     | +0.004     | 3 <sup>29</sup> / <sub>32</sub> | 5.3607 | +0.001               | +0.002     | +0.002     | +0.01<br>1.001 | -.001<br>2.250  | Taper Plug<br>Gage<br>L3 Nose<br>Class*  |

\*—X, Y, or Z

TAPER RING GAGE

| SPINDLE NAME | H     | J                | K      | Maximum Error |         |         | M      | N      | O              | P              | R              | STAMP                                    |
|--------------|-------|------------------|--------|---------------|---------|---------|--------|--------|----------------|----------------|----------------|------------------------------------------|
|              |       |                  |        | Class X       | Class Y | Class Z |        |        |                |                |                |                                          |
| L00 Nose     | 2.750 | $1\frac{15}{16}$ | 2.1849 | .00005        | .00010  | .00015  | +0.001 | +0.001 | $3\frac{7}{8}$ | $3\frac{1}{2}$ | $3\frac{1}{8}$ | Taper Ring<br>Gage<br>L00 Nose<br>Class* |
| L0 Nose      | 3.250 | $2\frac{5}{16}$  | 2.5755 | .00005        | .00010  | .00015  | +0.001 | +0.001 | $4\frac{1}{4}$ | 4              | $\frac{1}{4}$  | Taper Ring<br>Gage<br>L0 Nose<br>Class*  |
| L1 Nose      | 4.125 | $2\frac{7}{8}$   | 3.2865 | .00005        | .00010  | .00015  | +0.001 | +0.001 | $5\frac{1}{2}$ | 5              | $\frac{3}{16}$ | Taper Ring<br>Gage<br>L1 Nose<br>Class*  |
| L2 Nose      | 5.250 | $3\frac{3}{4}$   | 4.2656 | .00005        | .00010  | .00015  | +0.001 | +0.001 | $7\frac{1}{2}$ | $6\frac{3}{4}$ | $\frac{3}{8}$  | Taper Ring<br>Gage<br>L2 Nose<br>Class*  |
| L3 Nose      | 6.500 | $3\frac{7}{8}$   | 5.3698 | .00005        | .00010  | .00015  | +0.001 | +0.001 | $8\frac{7}{8}$ | 8              | $\frac{7}{16}$ | Taper Ring<br>Gage<br>L3 Nose<br>Class*  |

\*—X, Y, or Z

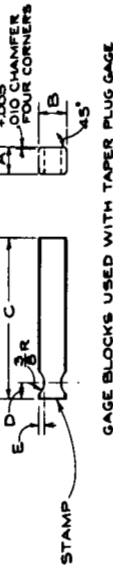
GO GAGE BLOCKS

| SPINDLE NAME | A      | B      | C               | D               | E               | STAMP       |
|--------------|--------|--------|-----------------|-----------------|-----------------|-------------|
| L00 Nose     | -.0005 | -.0005 | $3\frac{1}{16}$ | $5\frac{1}{16}$ | $1\frac{1}{16}$ | .375<br>GO  |
| L0 Nose      | -.0005 | -.0005 | $3\frac{1}{16}$ | $5\frac{1}{16}$ | $1\frac{1}{16}$ | .375<br>GO  |
| L1 Nose      | -.0005 | -.0005 | $3\frac{1}{16}$ | $5\frac{1}{16}$ | $1\frac{1}{16}$ | .625<br>GO  |
| L2 Nose      | -.0005 | -.0005 | $4\frac{1}{4}$  | $5\frac{1}{4}$  | $1\frac{1}{4}$  | .750<br>GO  |
| L3 Nose      | -.0005 | -.0005 | $4\frac{1}{4}$  | $5\frac{1}{4}$  | $1\frac{1}{4}$  | 1.000<br>GO |

NOT GO GAGE BLOCKS

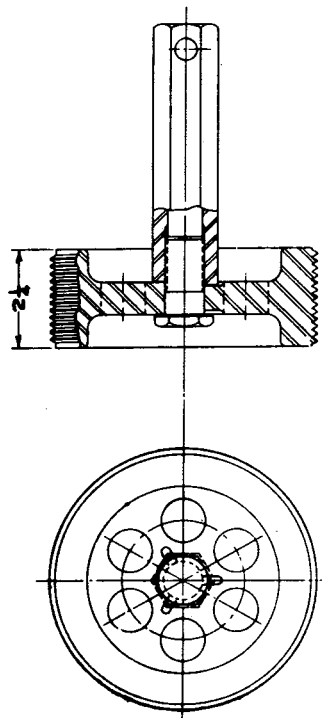
| A      | B      | C              | D              | E              | STAMP           |
|--------|--------|----------------|----------------|----------------|-----------------|
| -.0005 | -.0010 | $2\frac{1}{4}$ | $5\frac{1}{4}$ | $1\frac{1}{4}$ | .390<br>NOT GO  |
| -.0005 | -.0010 | $2\frac{1}{4}$ | $5\frac{1}{4}$ | $1\frac{1}{4}$ | .390<br>NOT GO  |
| -.0005 | -.0010 | 3              | $\frac{1}{4}$  | $\frac{1}{4}$  | .640<br>NOT GO  |
| -.0005 | -.0010 | $3\frac{1}{2}$ | $\frac{3}{4}$  | $\frac{3}{4}$  | .765<br>NOT GO  |
| -.0005 | -.0010 | $4\frac{1}{4}$ | $\frac{3}{4}$  | $\frac{3}{4}$  | 1.015<br>NOT GO |
| -.0005 | -.0010 | 4              | $\frac{3}{4}$  | $\frac{3}{4}$  | 1.015<br>NOT GO |

TAPER GAGES FOR TYPE L SPINDLE NOSES, CHUCKS, AND FACE PLATES

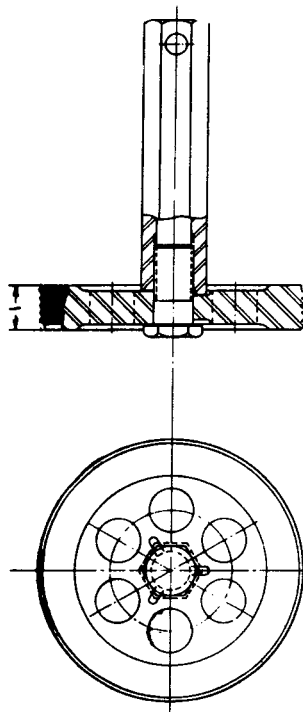


GAGE BLOCKS USED WITH TAPER PLUG GAGE

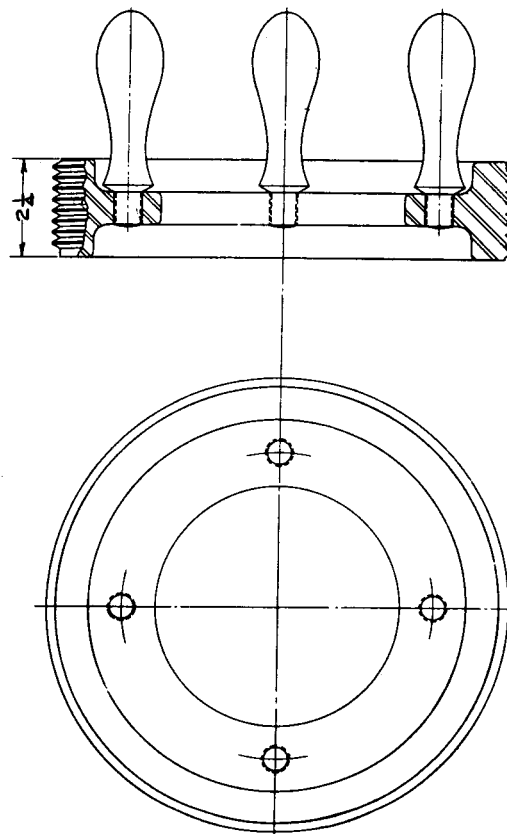
ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS



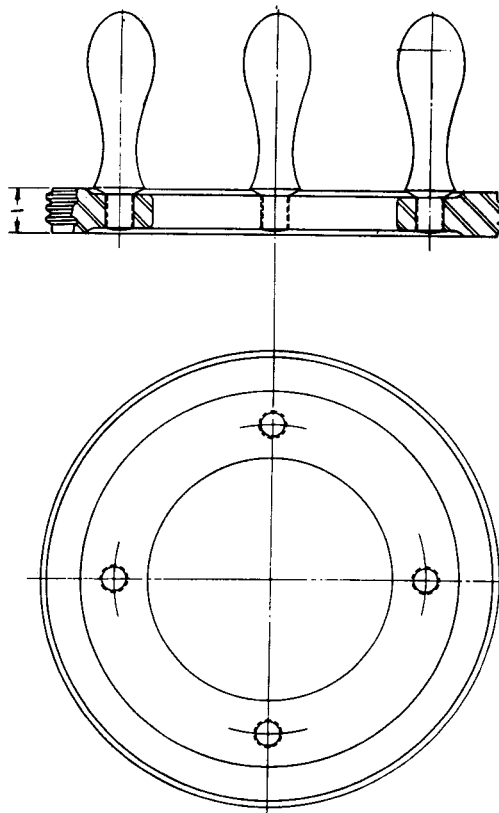
GO THREAD PLUG GAGES FOR LO, LI, & L2 SPINDLE NOSE DRAW NUTS



HI THREAD PLUG GAGES FOR LO, LO, & L2 SPINDLE NOSE DRAW NUTS



GO THREAD PLUG GAGE FOR L3 SPINDLE NOSE DRAW NUTS



HI THREAD PLUG GAGE FOR L3 SPINDLE NOSE DRAW NUTS

WORKING THREAD PLUG GAGES FOR DRAW NUTS  
FOR TYPE L SPINDLE NOSES

53 184

TOLERANCE "Y" GO THREAD PLUG GAGES

| SPINDLE NAME | NOMINAL THREAD                | Outside Dia        | Pitch Dia (New)    | Wire Size | 3 Wire Reading (New) | 3 Wire Reading (Worn-out) | STAMP                                                                                   |
|--------------|-------------------------------|--------------------|--------------------|-----------|----------------------|---------------------------|-----------------------------------------------------------------------------------------|
| L00 Nose     | 3/4-6 Unified Form-Special    | + .0008<br>3.7500  | + .0007<br>3.6420  | .09623    | + .0007<br>3.7863    | 3.7850                    | Thread Plug L00 Spindle<br>Gage Nose<br>3/4-6 Unified 3.6417 P.D.<br>Form-Special GO    |
| L0 Nose      | 4 1/2-6 Unified Form-Special  | + .0013<br>4.5000  | + .0009<br>4.3920  | .09623    | + .0009<br>4.5363    | 4.5350                    | Thread Plug L0 Spindle<br>Gage Nose<br>4 1/2-6 Unified 4.3917 P.D.<br>Form-Special GO   |
| L1 Nose      | 6-6 Unified Form-Special      | + .0013<br>6.0000  | + .0009<br>5.8920  | .09623    | + .0009<br>6.0363    | 6.0350                    | Thread Plug L1 Spindle<br>Gage Nose<br>6-6 Unified 5.8917 P.D.<br>Form-Special GO       |
| L2 Nose      | 7 1/2-5 Unified Form-Special  | + .0013<br>7.7500  | + .0009<br>7.6204  | .11547    | + .0009<br>7.7936    | 7.7923                    | Thread Plug L2 Spindle<br>Gage Nose<br>7 1/2-5 Unified 7.6201 P.D.<br>Form-Special GO   |
| L3 Nose      | 10 3/4-4 Unified Form-Special | + .0015<br>10.3750 | + .0012<br>10.2129 | .14434    | + .0012<br>10.4294   | 10.4281                   | Thread Plug L3 Spindle<br>Gage Nose<br>10 3/4-4 Unified 10.2126 P.D.<br>Form-Special GO |

TOLERANCE "X" HI THREAD PLUG GAGES

| SPINDLE NAME | NOMINAL THREAD                | Outside Dia        | Pitch Dia (New)    | Wire Size | 3 Wire Reading (New) | 3 Wire Reading (Worn-out) | STAMP                                                                                   |
|--------------|-------------------------------|--------------------|--------------------|-----------|----------------------|---------------------------|-----------------------------------------------------------------------------------------|
| L00 Nose     | 3/4-6 Unified Form-Special    | - .0008<br>3.7213  | - .0005<br>3.6491  | .09623    | - .0008<br>3.7213    | 3.7919                    | Thread Plug L00 Spindle<br>Gage Nose<br>3/4-6 Unified 3.6491 P.D.<br>Form-Special HI    |
| L0 Nose      | 4 1/2-6 Unified Form-Special  | - .0013<br>4.4722  | - .0006<br>4.4000  | .09623    | - .0006<br>4.5443    | 4.5427                    | Thread Plug L0 Spindle<br>Gage Nose<br>4 1/2-6 Unified 4.4000 P.D.<br>Form-Special HI   |
| L1 Nose      | 6-6 Unified Form-Special      | - .0013<br>5.9722  | - .0006<br>5.9000  | .09623    | - .0006<br>6.0443    | 6.0427                    | Thread Plug L1 Spindle<br>Gage Nose<br>6-6 Unified 5.9000 P.D.<br>Form-Special HI       |
| L2 Nose      | 7 1/2-5 Unified Form-Special  | - .0013<br>7.7158  | - .0006<br>7.6292  | .11547    | - .0006<br>7.8024    | 7.8008                    | Thread Plug L2 Spindle<br>Gage Nose<br>7 1/2-5 Unified 7.6292 P.D.<br>Form-Special HI   |
| L3 Nose      | 10 3/4-4 Unified Form-Special | - .0015<br>10.3342 | - .0008<br>10.2260 | .14434    | - .0008<br>10.4425   | 10.4407                   | Thread Plug L3 Spindle<br>Gage Nose<br>10 3/4-4 Unified 10.2260 P.D.<br>Form-Special HI |

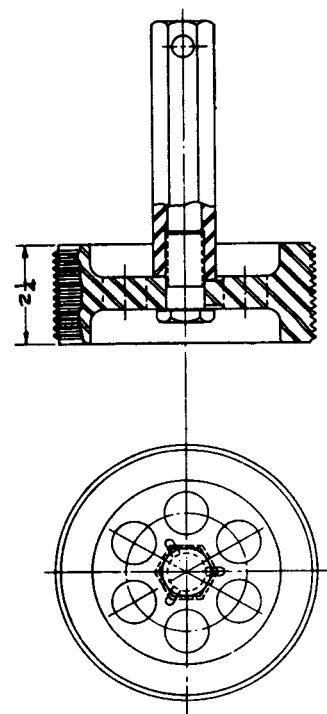
ALL GAGES CONFORM TO GAGE BLANK STANDARD CS8 AND SCREW THREAD STANDARD H28, BOTH ISSUED BY THE NATIONAL BUREAU OF STANDARDS OF THE U.S. DEPARTMENT OF COMMERCE, AND ALSO TO USA STANDARD UNIFIED SCREW THREADS, B1.1-1960, AND USA STANDARD GAGES AND GAGING FOR UNIFIED SCREW THREADS, USAS B1.2-1966

GAGES TO BE HARDENED AND GROUND, AND  
SEASONED TO PREVENT DISTORTION

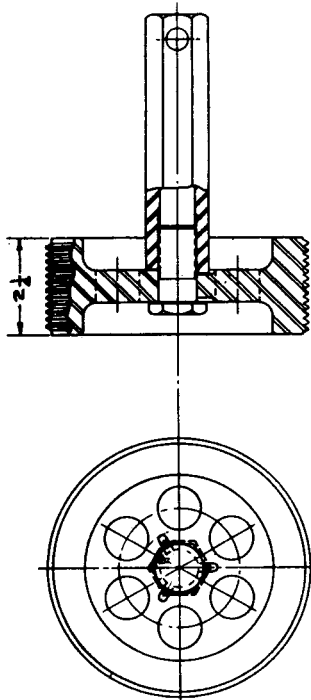
WORKING THREAD PLUG GAGES FOR DRAW NUTS  
FOR TYPE L SPINDLE NOSES

TABLE 35 (Cont.)

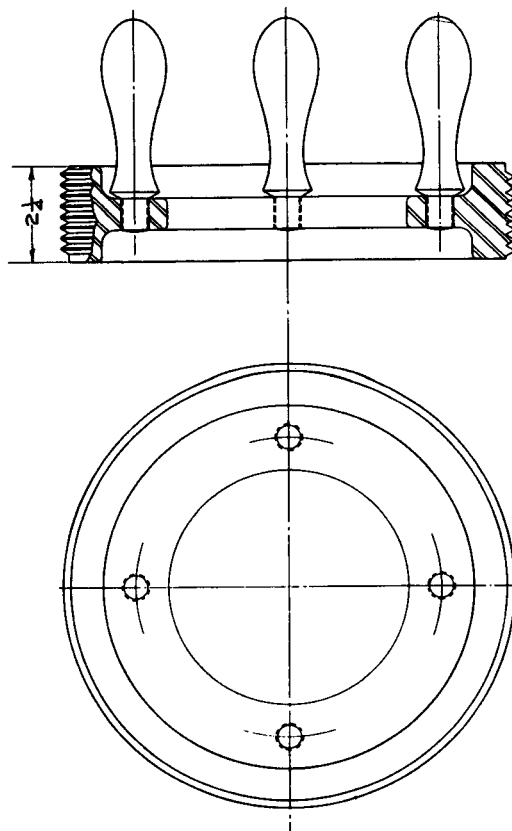
ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS OTHERWISE SPECIFIED WHEN DIMENSIONS ARE EXPRESSED IN COMMON FRACTIONS



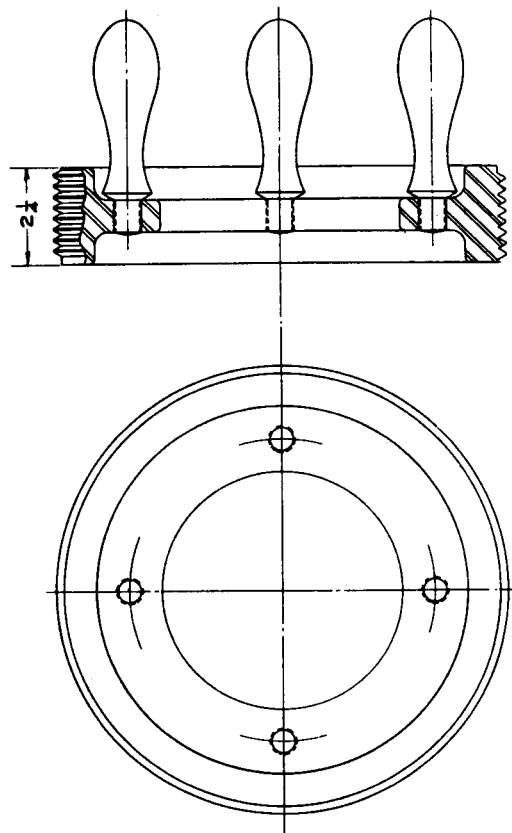
SETTING PLUGS FOR GO THREAD RING GAGES  
FOR LOO & LO SPINDLE NOSES



SETTING PLUGS FOR LO THREAD RING GAGES  
FOR LOO & LO SPINDLE NOSES



SETTING PLUGS FOR LO THREAD RING GAGES  
FOR L1, L2 & L3 SPINDLE NOSES



SETTING PLUGS FOR LO THREAD RING GAGES  
FOR L1, L2, & L3 SPINDLE NOSES

SETTING PLUGS FOR THREAD RING GAGES FOR CHUCKS AND FACE  
PLATES FOR TYPE L SPINDLE NOSES

TABLE 36

TOLERANCE "X" SETTING PLUGS FOR GO THREADING GAGES

| Spindle Name | Nominal Thread              | Outside Dia Full Form | Outside Dia Truncated | Pitch Dia New     | Wire Size | 3 Wire Reading New | 3 Wire Reading Worn-out | Stamp                                                                                                  |
|--------------|-----------------------------|-----------------------|-----------------------|-------------------|-----------|--------------------|-------------------------|--------------------------------------------------------------------------------------------------------|
| L00 Nose     | 3/4-6 Unified Form-Special  | +0.008<br>3.7450      | -0.008<br>3.7240      | -0.005<br>3.6367  | .09623    | -0.005<br>3.7795   | 3.7795                  | Setting Plug for Go Thread<br>Ring Gage L00 Spindle<br>3/4-6 Unified Nose<br>Form-Special 3.6367 P.D.  |
| L0 Nose      | 4/2-6 Unified Form-Special  | +0.013<br>4.4950      | -0.013<br>4.4740      | -0.006<br>4.3867  | .09623    | -0.006<br>4.5294   | 4.5294                  | Setting Plug for Go Thread<br>Ring Gage L0 Spindle<br>4/2-6 Unified Nose<br>Form-Special 4.3867 P.D.   |
| L1 Nose      | 6-6 Unified Form-Special    | +0.013<br>5.9950      | -0.013<br>5.9740      | -0.006<br>5.8867  | .09623    | -0.006<br>6.0294   | 6.0294                  | Setting Plug for Go Thread<br>Ring Gage L1 Spindle<br>6-6 Unified Nose<br>Form-Special 5.8867 P.D.     |
| L2 Nose      | 7/4-5 Unified Form-Special  | +0.013<br>7.7450      | -0.013<br>7.7211      | -0.006<br>7.6151  | .11547    | -0.006<br>7.7883   | 7.7883                  | Setting Plug for Go Thread<br>Ring Gage L2 Spindle<br>7/4-5 Unified Nose<br>Form-Special 7.6151 P.D.   |
| L3 Nose      | 10/4-4 Unified Form-Special | +0.015<br>10.3700     | -0.015<br>10.3419     | -0.008<br>10.2076 | .14434    | -0.008<br>10.4223  | 10.4223                 | Setting Plug for Go Thread<br>Ring Gage L3 Spindle<br>10/4-4 Unified Nose<br>Form-Special 10.2076 P.D. |

TOLERANCE "X" SETTING PLUGS FOR LO THREAD RING GAGES

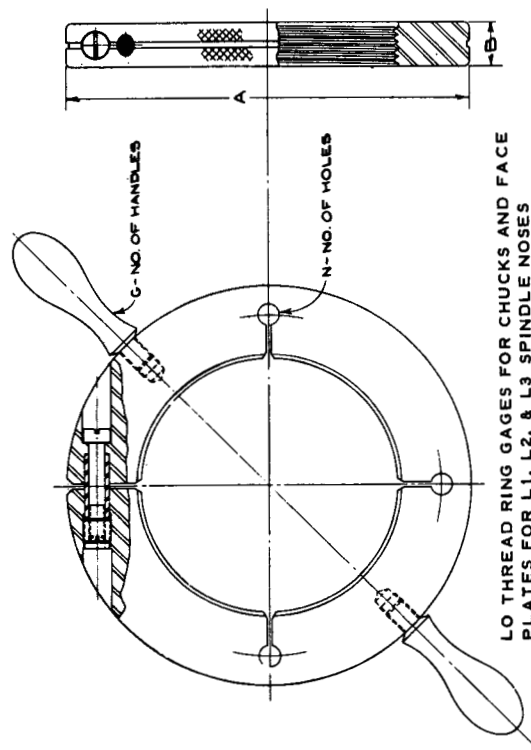
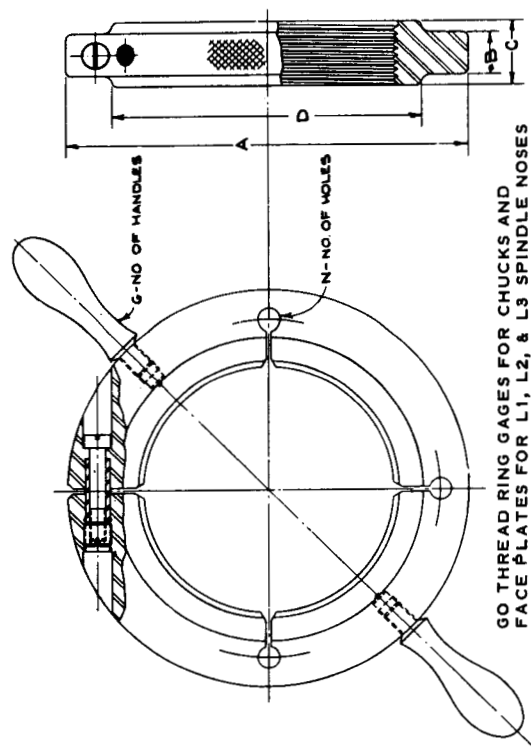
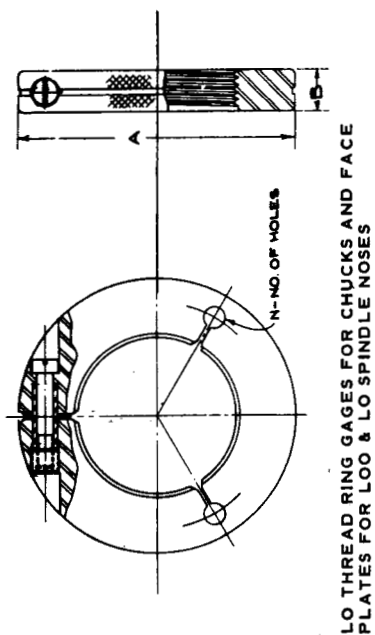
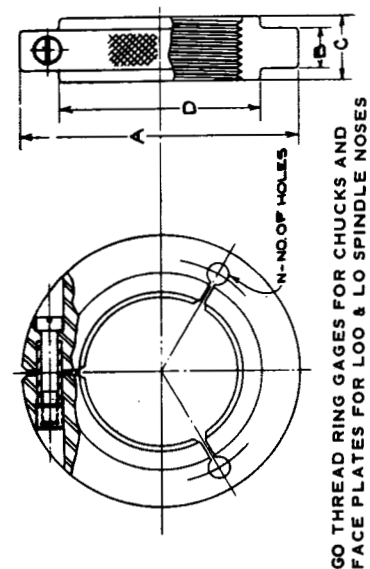
| Spindle Name | Nominal Thread              | Outside Dia Full Form | Outside Dia Truncated | Pitch Dia New     | Wire Size | 3 Wire Reading New | 3 Wire Reading Worn-out | Stamp                                                                                                  |
|--------------|-----------------------------|-----------------------|-----------------------|-------------------|-----------|--------------------|-------------------------|--------------------------------------------------------------------------------------------------------|
| L00 Nose     | 3/4-6 Unified Form-Special  | +0.008<br>3.7450      | -0.008<br>3.7015      | +0.005<br>3.6293  | .09623    | +0.005<br>3.7736   | 3.7726                  | Setting Plug for LO Thread<br>Ring Gage L00 Spindle<br>3/4-6 Unified Nose<br>Form-Special 3.6293 P.D.  |
| L0 Nose      | 4/2-6 Unified Form-Special  | +0.013<br>4.4950      | -0.013<br>4.4506      | +0.006<br>4.3784  | .09623    | +0.006<br>4.5227   | 4.5217                  | Setting Plug for LO Thread<br>Ring Gage L0 Spindle<br>4/2-6 Unified Nose<br>Form-Special 4.3784 P.D.   |
| L1 Nose      | 6-6 Unified Form-Special    | +0.013<br>5.9950      | -0.013<br>5.9506      | +0.006<br>5.8784  | .09623    | +0.006<br>6.0227   | 6.0217                  | Setting Plug for LO Thread<br>Ring Gage L1 Spindle<br>6-6 Unified Nose<br>Form-Special 5.8784 P.D.     |
| L2 Nose      | 7/4-5 Unified Form-Special  | +0.013<br>7.7450      | -0.013<br>7.6926      | +0.006<br>7.6060  | .11547    | +0.006<br>7.7792   | 7.7782                  | Setting Plug for LO Thread<br>Ring Gage L2 Spindle<br>7/4-5 Unified Nose<br>Form-Special 7.6060 P.D.   |
| L3 Nose      | 10/4-4 Unified Form-Special | +0.015<br>10.3700     | -0.015<br>10.3025     | +0.008<br>10.1942 | .14434    | +0.008<br>10.4107  | 10.4097                 | Setting Plug for LO Thread<br>Ring Gage L3 Spindle<br>10/4-4 Unified Nose<br>Form-Special 10.1942 P.D. |

ALL GAGES CONFORM TO GAGE BLANK STANDARD CS8 AND SCREW THREAD STANDARD H28, BOTH ISSUED BY THE NATIONAL BUREAU OF STANDARDS OF THE U.S. DEPARTMENT OF COMMERCE, AND ALSO TO USA STANDARDS UNIFIED SCREW THREADS, B1.1-1960, AND USA STANDARD GAGES AND GAGING FOR UNIFIED SCREW THREADS, USAS B1.2-1966

GAGES TO BE HARDENED AND GROUND, AND SEASONED TO PREVENT DISTORTION

TABLE 36 (Cont.) SETTING PLUGS FOR THREAD RING GAGES FOR CHUCKS AND FACE PLATES FOR TYPE L SPINDLE NOSES

ALL DIMENSIONS IN INCHES  
TOLERANCES OF  $\pm 1/64$  ARE PERMISSIBLE UNLESS  
OTHERWISE SPECIFIED WHEN DIMENSIONS ARE EX-  
RESSED IN COMMON FRACTIONS



TOLERANCE "X" GO THREAD RING GAGES

| Spindle Name | Nominal Thread                | Minor Dia         | Pitch Dia         | A               | B     | C      | D | G | N | Stamp                                                                                   |
|--------------|-------------------------------|-------------------|-------------------|-----------------|-------|--------|---|---|---|-----------------------------------------------------------------------------------------|
| L00 Nose     | 3/4-6 Unified Form-Special    | -.0008<br>3.5645  | -.0005<br>3.6367  | 6 3/16<br>15/16 | 1 1/2 | 4 5/8  | 0 | 2 | 2 | Thread Ring Gage L00 Spindle Nose<br>3/4-6 Unified Form-Special<br>3.6367 P.D.<br>GO    |
| L0 Nose      | 4 1/2-6 Unified Form-Special  | -.0013<br>4.3145  | -.0006<br>4.3867  | 7/4             | 1     | 5 3/8  | 0 | 2 | 2 | Thread Ring Gage L0 Spindle Nose<br>4 1/2-6 Unified Form-Special<br>4.3867 P.D.<br>GO   |
| L1 Nose      | 6-6 Unified Form-Special      | -.0013<br>5.8145  | -.0006<br>5.8867  | 9/4             | 1     | 7 1/8  | 2 | 2 | 2 | Thread Ring Gage L1 Spindle Nose<br>6-6 Unified Form-Special<br>5.8867 P.D.<br>GO       |
| L2 Nose      | 7 1/2-5 Unified Form-Special  | -.0013<br>7.5285  | -.0006<br>7.6151  | 1 1/4           | 1     | 8 7/8  | 2 | 3 | 3 | Thread Ring Gage L2 Spindle Nose<br>7 1/2-5 Unified Form-Special<br>7.6151 P.D.<br>GO   |
| L3 Nose      | 10 3/4-4 Unified Form-Special | -.0015<br>10.0994 | -.0008<br>10.2076 | 1 5/4           | 1     | 11 1/2 | 4 | 5 | 5 | Thread Ring Gage L3 Spindle Nose<br>10 3/4-4 Unified Form-Special<br>10.2076 P.D.<br>GO |

TOLERANCE "X" LO THREAD RING GAGES

| Spindle Name | Nominal Thread                | Minor Dia         | Pitch Dia         | A               | B     | G | N | Stamp                                                                                   |
|--------------|-------------------------------|-------------------|-------------------|-----------------|-------|---|---|-----------------------------------------------------------------------------------------|
| L00 Nose     | 3/4-6 Unified Form-Special    | +.0008<br>3.5932  | +.0005<br>3.6293  | 6 3/16<br>15/16 | 1 1/2 | 0 | 2 | Thread Ring Gage L00 Spindle Nose<br>3/4-6 Unified Form-Special<br>3.6293 P.D.<br>LO    |
| L0 Nose      | 4 1/2-6 Unified Form-Special  | +.0013<br>4.3423  | +.0006<br>4.3784  | 7/4             | 1     | 0 | 2 | Thread Ring Gage L0 Spindle Nose<br>4 1/2-6 Unified Form-Special<br>4.3784 P.D.<br>LO   |
| L1 Nose      | 6-6 Unified Form-Special      | +.0013<br>5.8423  | +.0006<br>5.8784  | 9/4             | 1     | 2 | 2 | Thread Ring Gage L1 Spindle Nose<br>6-6 Unified Form-Special<br>5.8784 P.D.<br>LO       |
| L2 Nose      | 7 1/2-5 Unified Form-Special  | +.0013<br>7.5627  | +.0006<br>7.6060  | 1 1/4           | 1     | 2 | 3 | Thread Ring Gage L2 Spindle Nose<br>7 1/2-5 Unified Form-Special<br>7.6060 P.D.<br>LO   |
| L3 Nose      | 10 3/4-4 Unified Form-Special | +.0015<br>10.1401 | +.0008<br>10.1942 | 1 5/4           | 1     | 4 | 5 | Thread Ring Gage L3 Spindle Nose<br>10 3/4-4 Unified Form-Special<br>10.1942 P.D.<br>LO |

ALL GAGES CONFORM TO GAGE BLANK STANDARD CS8 AND SCREW THREAD STANDARD H28, BOTH ISSUED BY THE NATIONAL BUREAU OF STANDARDS OF THE U.S. DEPARTMENT OF COMMERCE, AND ALSO TO USA STANDARD UNIFIED SCREW THREADS, B1.1-1960, AND USA STANDARD GAGES AND GAGING FOR UNIFIED SCREW THREADS, USAS B1.2-1966

GAGES TO BE HARDENED AND GROUND, AND  
SEASONED TO PREVENT DISTORTION

TABLE 37 (Cont.)  
WORKING THREAD RING GAGES FOR CHUCKS AND FACE  
PLATES FOR TYPE L SPINDLE NOSES



M00010