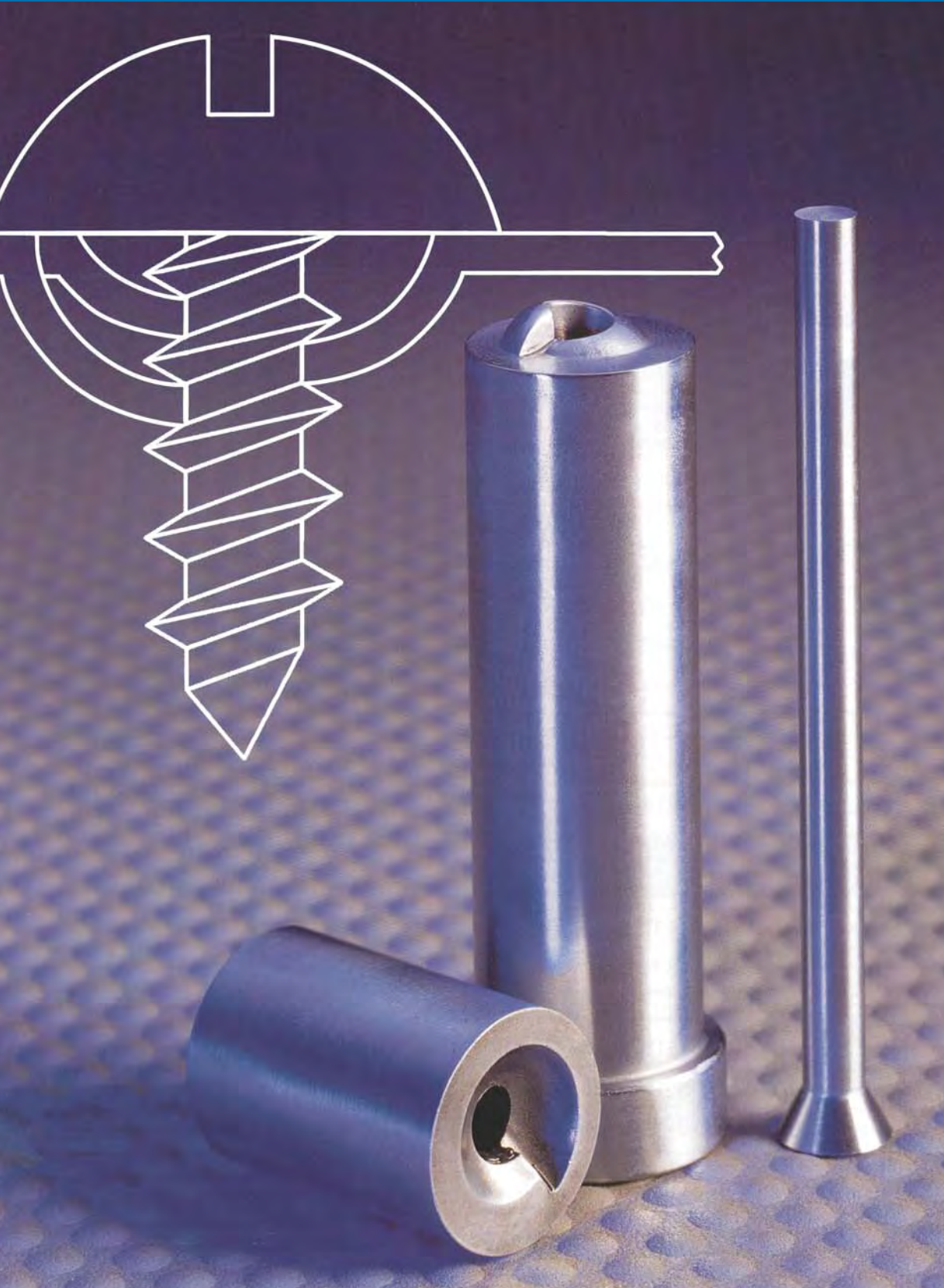




# THREAD FORMS



## BALL LOCK AND BASIC TOOLS

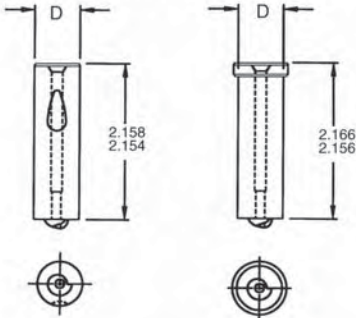
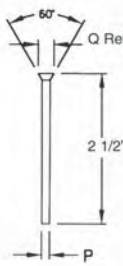
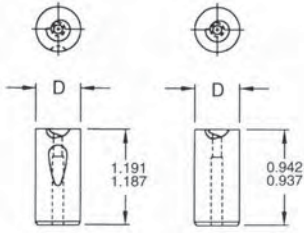
- ◆ FORM A  
SELF-LOCKING  
FASTENER  
WITH YOUR  
DIE TOOLING
- ◆ IDEAL FOR  
THINNER  
MATERIALS
- ◆ UNIQUE DESIGN  
USES METAL  
TENSION TO  
LOCK SCREWS  
IN PLACE
- ◆ SPEEDS  
PRODUCTION,  
CUTS COSTS
- ◆ STANDARD  
FORMS FOR  
SCREW TYPE  
AND THREADS  
AVAILABLE



### BALL LOCK AND BASIC TOOLS

**How to Order:**

*Please specify Catalog Number*

| <div> <div>  <p><b>FORM PUNCH</b></p> <p><b>Ball Lock      Basic</b></p> </div> <div>  <p><b>PIERCE PUNCH</b></p> </div> <div>  <p><b>DIE BUTTON</b></p> <p><b>Ball Lock      Basic</b></p> </div> </div> <div> <p><b>Pre-Engineered Thread Form Set Includes:</b></p> <ul style="list-style-type: none"> <li>• Form Punch</li> <li>• Pierce Punch</li> <li>• Die Button</li> </ul> </div> |             |                |                |                |                |                |                |                |            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------|
| Screw Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Thread Size | Form Set       |                | Form Punch     |                | Pierce Punch   | Die Button     |                | Diameter D |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             | Ball Lock      | Basic          | Ball Lock      | Basic          |                | Ball Lock      | Basic          |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |             | Catalog Number | Catalog Number | Catalog Number | Catalog Number | Catalog Number | Catalog Number | Catalog Number |            |
| <br><b>A</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 6-18        | 6-18-LBTS      | 6-18-TS        | 803-LBTP       | TP-6A          | 8031-P         | 813-LBTD       | TD-6A          | 3/8        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 8-15        | 8-15-LBTS      | 8-15-TS        | 804-LBTP       | TP-8A          | 8042-P         | 814-LBTD       | TD-8A          | 1/2        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10-12       | 10-12-LBTS     | 10-12-TS       | 824-LBTP       | TP-10A         | 8243-P         | 834-LBTD       | TD-10A         | 1/2        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 12-11       | 12-11-LBTS     | 12-11-TS       | 845-LBTP       | TP-12A         | 8454-P         | 855-LBTD       | TD-12A         | 5/8        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 14-10       | 14-10-LBTS     | 14-10-TS       | 865-LBTP       | TP-14A         | 8655-P         | 875-LBTD       | TD-14A         | 5/8        |
| <br><b>B</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 20-9        | 20-9-LBTS      | 20-9-TS        | 886-LBTP       | TP-20A         | 8866-P         | 896-LBTD       | TD-20A         | 3/4        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 6-20        | 6-20-LBTS      | 6-20-TS        | 1803-LBTP      | TP-6B          | 18031-P        | 1813-LBTD      | TD-6B          | 3/8        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 8-18        | 8-18-LBTS      | 8-18-TS        | 1804-LBTP      | TP-8B          | 18042-P        | 1814-LBTD      | TD-8B          | 1/2        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10-16       | 10-16-LBTS     | 10-16-TS       | 1824-LBTP      | TP-10B         | 18243-P        | 1834-LBTD      | TD-10B         | 1/2        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 12-14       | 12-14-LBTS     | 12-14-TS       | 1845-LBTP      | TP-12B         | 18454-P        | 1855-LBTD      | TD-12B         | 5/8        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1/4-14      | 1/4-14-LBTS    | 1/4-14-TS      | 1865-LBTP      | TP-14B         | 18655-P        | 1875-LBTD      | TD-1/4B        | 5/8        |
| <br><b>AB</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 5/16-12     | 5/16-12-LBTS   | 5/16-12-TS     | 1886-LBTP      | TP-20B         | 18866-P        | 1896-LBTD      | TD-5/16B       | 3/4        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 6-32        | 6-32-LBTS      | 6-32-TS        | 2803-LBTP      | TP-6C          | 28031-P        | 2813-LBTD      | TD-6C          | 3/8        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 8-32        | 8-32-LBTS      | 8-32-TS        | 2804-LBTP      | TP-8C          | 28042-P        | 2814-LBTD      | TD-8C          | 1/2        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10-24       | 10-24-LBTS     | 10-24-TS       | 2824-LBTP      | TP-10C         | 28243-P        | 2834-LBTD      | TD-10C         | 1/2        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 10-32       | 10-32-LBTS     | 10-32-TS       | 2845-LBTP      | TP-10CF        | 28454-P        | 2855-LBTD      | TD-10CF        | 5/8        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1/4-20      | 1/4-20-LBTS    | 1/4-20-TS      | 2865-LBTP      | TP-1/4C        | 28655-P        | 2875-LBTD      | TD-1/4C        | 5/8        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5/16-18     | 5/16-18-LBTS   | 5/16-18-TS     | 2886-LBTP      | TP-5/16C       | 28866-P        | 2896-LBTD      | TD-5/16C       | 3/4        |
| <br><b>C</b><br>(Machine Screws)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |             |                |                |                |                |                |                |                |            |



# THREAD FORMS



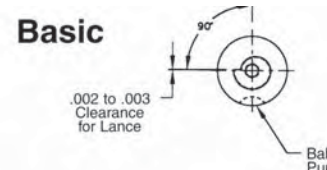
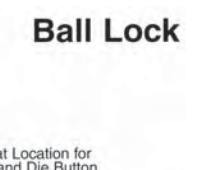
## THREAD FORM DATA

The diagram illustrates the geometry of a screw head and its thread profile. Key dimensions and labels include:

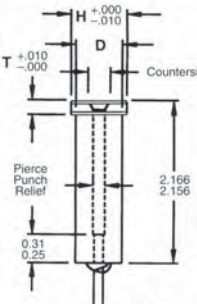
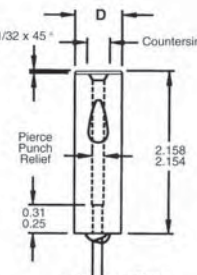
- Minimum Form Diameter (Reference):** Indicated by a horizontal double-headed arrow across the top of the screw head.
- Material Thickness:** Indicated by a vertical double-headed arrow on the right side of the head.
- Pitch:** Indicated by two vertical double-headed arrows on the right side of the thread, showing the distance between adjacent thread peaks.
- Approx. 1.25 x Pitch Plus Material Thickness:** Indicated by a vertical double-headed arrow on the left side of the head, representing the total height of the head.
- Minor Diameter of Screw (Pitch Dia. of a type "C" Screw):** Indicated by a horizontal double-headed arrow at the base of the thread.

| Thread Size                             | Material Thickness | Pitch (Ref.) | Max. Minor Diameter of Screw | Minimum Form Diameter |
|-----------------------------------------|--------------------|--------------|------------------------------|-----------------------|
| <b>TYPE "A" SCREWS</b>                  |                    |              |                              |                       |
| 6 - 18                                  | .020 – .030        | 0.0556       | 0.102                        | 0.276                 |
| 8 - 15                                  | .025 – .040        | 0.0667       | 0.123                        | 0.306                 |
| 10 - 12                                 | .030 – .045        | 0.0833       | 0.133                        | 0.352                 |
| 12 - 11                                 | .035 – .054        | 0.0909       | 0.162                        | 0.406                 |
| 14 - 10                                 | .038 – .060        | 0.1000       | 0.185                        | 0.442                 |
| 20 - 9                                  | .050 – .060        | 0.1111       | 0.234                        | 0.556                 |
| <b>TYPE "B" AND "A B" SCREWS</b>        |                    |              |                              |                       |
| 6 - 20                                  | .020 – .030        | 0.0500       | 0.104                        | 0.208                 |
| 8 - 18                                  | .020 – .030        | 0.0556       | 0.122                        | 0.296                 |
| 10 - 16                                 | .020 – .030        | 0.0625       | 0.141                        | 0.374                 |
| 12 - 14                                 | .030 – .040        | 0.0714       | 0.164                        | 0.400                 |
| 1/4 - 14                                | .030 – .040        | 0.0714       | 0.192                        | 0.400                 |
| 5/16 - 12                               | .030 – .040        | 0.0833       | 0.244                        | 0.552                 |
| <b>TYPE "C" SCREWS (MACHINE SCREWS)</b> |                    |              |                              |                       |
| 6 - 32                                  | .010 – .020        | 0.0313       | 0.118                        | 0.290                 |
| 8 - 32                                  | .010 – .020        | 0.0313       | 0.144                        | 0.324                 |
| 10 - 24                                 | .015 – .025        | 0.0417       | 0.163                        | 0.370                 |
| 10 - 32                                 | .010 – .020        | 0.0313       | 0.170                        | 0.348                 |
| 1/4 - 20                                | .020 – .030        | 0.0500       | 0.218                        | 0.478                 |
| 5/16 - 18                               | .020 – .030        | 0.0556       | 0.276                        | 0.490                 |

## DIE BUTTONS

|                  |                                                                                    | Body Diam. D Norm. | Ball Lock Body Diam. D Actual | Ball Size | Press Flt Body Diam. D Actual | Thread Size | P Diam. | R Diam. |
|------------------|------------------------------------------------------------------------------------|--------------------|-------------------------------|-----------|-------------------------------|-------------|---------|---------|
| <b>Basic</b>     |  | 3/8                | .3748/.3746                   | 1/4       | .3758/.3755                   | 6-18        | 0.108   | 0.141   |
|                  |                                                                                    |                    |                               |           |                               | 6-20        | 0.111   | 0.141   |
| <b>Ball Lock</b> |  | 1/2                | .4998/.4996                   | 5/16      | .5008/.5005                   | 6-32        | 0.118   | 0.136   |
|                  |                                                                                    |                    |                               |           |                               | 8-15        | 0.125   | 0.166   |
|                  |                                                                                    | 5/8                | .6248/.6246                   | 5/16      | .6264/.6260                   | 8-18        | 0.125   | 0.166   |
|                  |                                                                                    |                    |                               |           |                               | 8-32        | 0.144   | 0.156   |
|                  |                                                                                    | 3/4                | .7498/.7496                   | 3/8       | .7514/.7510                   | 10-12       | 0.134   | 0.173   |
|                  |                                                                                    |                    |                               |           |                               | 10-16       | 0.142   | 0.173   |
|                  |                                                                                    |                    |                               |           |                               | 10-24       | 0.164   | 0.177   |
|                  |                                                                                    |                    |                               |           |                               | 10-32       | 0.171   | 0.188   |
|                  |                                                                                    |                    |                               |           |                               | 12-11       | 0.162   | 0.196   |
|                  |                                                                                    |                    |                               |           |                               | 12-14       | 0.162   | 0.196   |
|                  |                                                                                    |                    |                               |           |                               | 14-10       | 0.187   | 0.228   |
|                  |                                                                                    |                    |                               |           |                               | 1/4-14      | 0.192   | 0.228   |
|                  |                                                                                    |                    |                               |           |                               | 1/4-20      | 0.218   | 0.234   |
|                  |                                                                                    |                    |                               |           |                               | 20-9        | 0.238   | 0.281   |
|                  |                                                                                    |                    |                               |           |                               | 5/16-12     | 0.245   | 0.281   |
|                  |                                                                                    |                    |                               |           |                               | 5/16-18     | 0.277   | 0.290   |

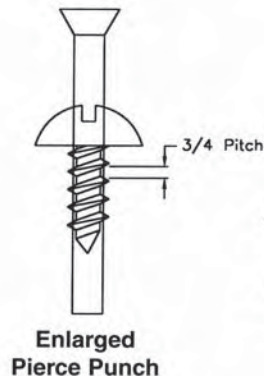
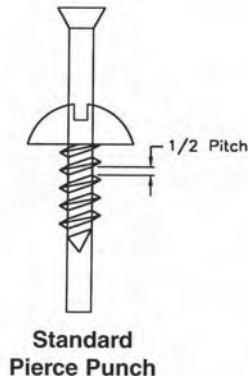
## PUNCHES

|           |                                                                                     | Shank<br>Diam.<br>D<br>Norm. | Ball Lock Only             |              | Basic Only                 |                    |             | Thread<br>Size | Form Punch    |                 |                    | Pierce Punch |            |
|-----------|-------------------------------------------------------------------------------------|------------------------------|----------------------------|--------------|----------------------------|--------------------|-------------|----------------|---------------|-----------------|--------------------|--------------|------------|
|           |                                                                                     |                              | Shank<br>Diam.<br>D Actual | Ball<br>Size | Shank<br>Diam.<br>D Actual | Head<br>Diam.<br>H | Thick.<br>T |                | Hole<br>Diam. | Relief<br>Diam. | Sink<br>Diam.<br>C | Diam.<br>P   | Diam.<br>Q |
| Basic     |  | 3/8                          | .3748/.3746                | 1/4          | .3755/.3752                | 1/2                | 3/16        | 6-18           | .1045         | 0.116           | 0.188              | 0.104        | 0.188      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 6-20           | .1075         | 0.120           | 0.193              | 0.107        | 0.193      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 6-32           | .1155         | 0.125           | 0.208              | 0.115        | 0.208      |
| Ball Lock |  | 1/2                          | .4998/.4996                | 5/16         | .5005/.5002                | 5/8                | 3/16        | 8-15           | .1205         | 0.136           | 0.217              | 0.120        | 0.217      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 8-18           | .1205         | 0.136           | 0.217              | 0.120        | 0.217      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 8-32           | .1415         | 0.156           | 0.255              | 0.141        | 0.255      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 10-12          | .1285         | 0.141           | 0.231              | 0.128        | 0.231      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 10-16          | .1385         | 0.150           | 0.250              | 0.138        | 0.250      |
|           |                                                                                     | 5/8                          | .6248/.6246                | 5/16         | .6255/.6252                | 3/4                | 1/4         | 10-24          | .1605         | 0.172           | 0.289              | 0.160        | 0.289      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 10-32          | .1675         | 0.187           | 0.302              | 0.167        | 0.302      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 12-11          | .1565         | 0.166           | 0.282              | 0.156        | 0.282      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 12-14          | .1585         | 0.170           | 0.286              | 0.158        | 0.286      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 14-10          | .1805         | 0.191           | 0.325              | 0.180        | 0.325      |
|           |                                                                                     | 3/4                          | .7498/.7496                | 3/8          | .7505/.7502                | 7/8                | 1/4         | 1/4-14         | .1885         | 0.201           | 0.340              | 0.188        | 0.340      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 1/4-20         | .2135         | 0.234           | 0.385              | 0.213        | 0.385      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 20-9           | .2315         | 0.242           | 0.418              | 0.231        | 0.418      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 5/16-12        | .2415         | 0.250           | 0.436              | 0.241        | 0.436      |
|           |                                                                                     |                              |                            |              |                            |                    |             | 5/16-18        | .2725         | 0.281           | 0.492              | 0.272        | 0.492      |

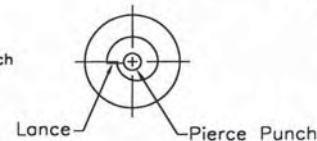


## EXCESSIVE MATERIAL – THICKNESS RECOMMENDED SOLUTIONS

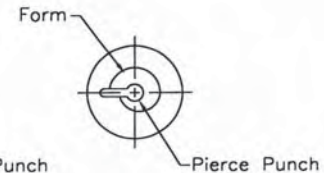
1. Revise screw thread specifications (preferred).  
Substitute a screw with a “pitch” suitable for material thickness.
2. Enlarge center hole by enlarging pierce punch size.



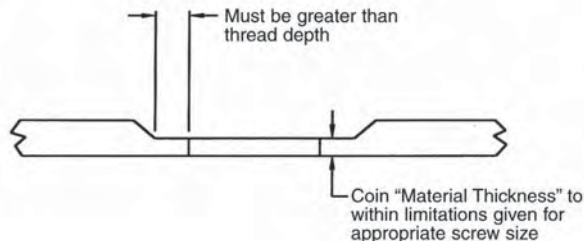
(With Lance)  
For 200,000 Pieces or less



(Without Lance)  
Suggested for greater than  
200,000 pieces



3. Thin material in a previous station.



For design flexibility, inverted  
form is available.

