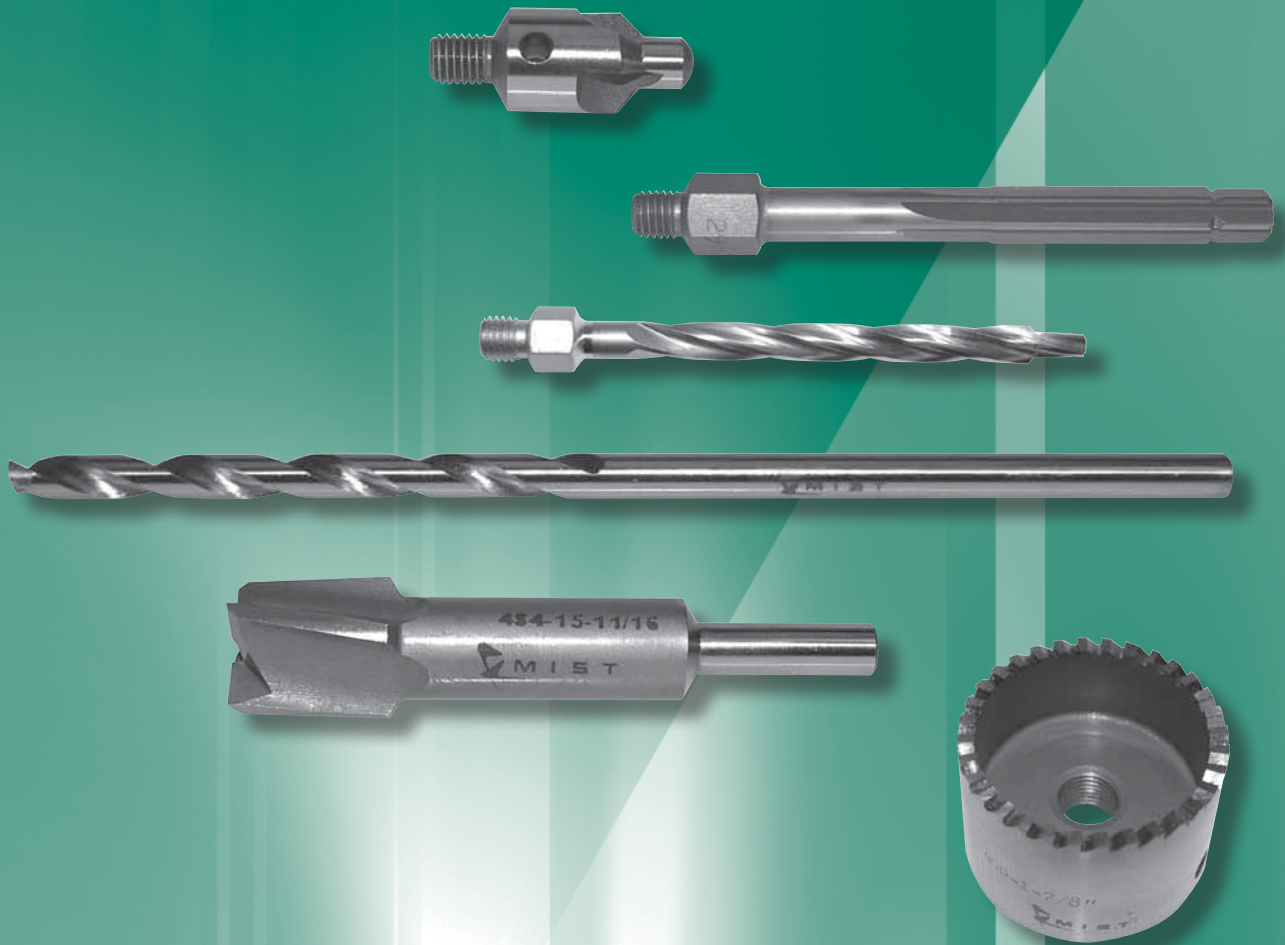




# MIST

INDUSTRIAL TOOLS



**Manufacturer of precision cutting tools**  
**Cutting tool extension service**

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# SPECIAL EXTENSION SERVICE

## DRILLS



Jobbers, silver deming, aircraft or any straight shank drill can be extended to any desired length, including cobalt and carbide tipped.

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## REAMERS



Reamers can be extended to any length, piloted, or O.D. ground to your specifications, including cobalt and carbide tipped.

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## TAPS



Any diameter tap can be extended to any length and squared. Regular, pipe, or helicoil.

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## MISCELLANEOUS TOOLS



Any tool with a straight shank can be extended. Countersinks, counterbores, rotary files and burrs only with steel shanks.



Step pilots can be ground on drills, core drills, or reamers.

## METRIC O.D. GRINDING

# DOUBLE MARGIN DRILLS

**HIGH SPEED STEEL**

**104**



118° CSP

Double margin drills are useful for drilling close tolerance holes. Often their use eliminates the need for a final sizing operation. Double margin construction provides an additional secondary margin on the trailing edge of each land. These secondary margins give four good guide points for improved stability in guide bushings and in the hole.

**HIGH SPEED STEEL**

**104-P**



118° CSP

Double margin step (pilot) drills are used for drilling accurate holes when guide bushings cannot be used. The small diameter portion drills a pilot hole which steadies the drill while the double margin portion finishes the hole to size. Pilot diameter approximately 75% of nominal diameter.

## FRACTIONAL SIZES

DIA.	DECIMAL EQUIVALENT	LENGTH OVERALL	LENGTH OF TWIST
1/8	.1250	2-3/4	1-5/8
9/64	.1406	2-7/8	1-3/4
5/32	.1562	3-1/8	2
11/64	.1719	3-1/4	2-1/8
3/16	.1875	3-1/2	2-5/16
13/64	.2031	3-5/8	1-7/16
7/32	.2188	3-3/4	2-1/2
15/64	.2344	3-7/8	2-5/8
1/4	.2500	4	2-3/4
17/64	.2656	4-1/8	2-7/8
9/32	.2812	4-1/4	2-15/16
19/64	.2969	4-3/8	3-1/16
5/16	.3125	4-1/2	3-3/16
21/64	.3281	4-5/8	3-5/16
11/32	.3438	4-3/4	3-7/16
23/64	.3594	4-7/8	3-1/2
3/8	.3750	5	3-5/8
25/64	.3906	5-1/8	3-3/4
13/32	.4062	5-1/4	3-7/8
27/64	.4219	5-3/8	3-15/16
7/16	.4375	5-1/2	4-1/16
29/64	.4531	5-5/8	4-3/16
15/32	.4688	5-3/4	4-5/16
31/64	.4844	5-7/8	4-3/8
1/2	.5000	6	4-1/2

## LETTER SIZES

LETTER SIZE	DECIMAL EQUIVALENT	LENGTH OVERALL	LENGTH OF TWIST
A	.234	3-7/8	2-5/8
B	.238	4	2-3/4
C	.242	4	2-3/4
D	.246	4	2-3/4
E	.250	4	2-3/4
F	.257	4-1/8	2-7/8
G	.261	4-1/8	2-7/8
H	.266	4-1/8	4-7/8
I	.272	4-1/8	2-7/8
J	.277	4-1/8	2-7/8
K	.281	4-1/4	2-15/16
L	.290	4-1/4	2-15/16
M	.295	4-3/8	3-1/16
N	.302	4-3/8	3-1/16
O	.316	4-1/2	3-3/16
P	.323	4-5/8	3-5/16
Q	.332	4-3/4	3-7/16
R	.339	4-3/4	3-7/16
S	.348	4-7/8	3-1/2
T	.358	4-7/8	3-1/2
U	.368	5	3-5/8
V	.377	5	3-5/8
W	.386	5-1/8	3-3/4
X	.397	5-1/8	3-3/4
Y	.404	5-1/4	3-7/8
Z	.413	5-1/4	3-7/8

## WIRE GAUGE SIZES

WIRE GAUGE NO.	DECIMAL EQUIVALENT	LENGTH OVERALL	LENGTH OF TWIST
1	.2280	3-7/8	2-5/8
2	.2201	3-7/8	2-5/8
3	.2130	3-3/4	2-1/2
4	.2090	3-3/4	2-1/2
5	.2055	3-3/4	2-1/2
6	.2040	3-3/4	2-1/2
7	.2010	3-5/8	2-7/16
8	.1990	3-5/8	2-7/16
9	.1960	3-5/8	2-7/16
10	.1935	3-5/8	2-7/16
11	.1910	3-1/2	2-5/16
12	.1890	3-1/2	2-5/16
13	.1850	3-1/2	2-5/16
14	.1820	3-3/8	2-3/16
15	.1800	3-3/8	2-3/16
16	.1770	3-3/8	2-3/16
17	.1730	3-3/8	2-13/16
18	.1695	3-1/4	2-1/8
19	.1660	3-1/4	2-1/8
20	.1610	3-1/4	2-1/8
21	.1590	3-1/4	2-1/8
22	.1570	3-1/8	2
23	.1540	3-1/8	2
24	.1520	3-1/8	2
25	.1495	3	1-7/8
26	.1470	3	1-7/8
27	.1440	3	1-7/8
28	.1405	2-7/8	1-3/4
29	.1360	2-7/8	1-3/4
30	.1285	2-3/4	1-5/8

Special diameter D.M. drills available in high speed steel or cobalt steel.

Available in sets

# TAPERLOK REAMERS

2040 AR



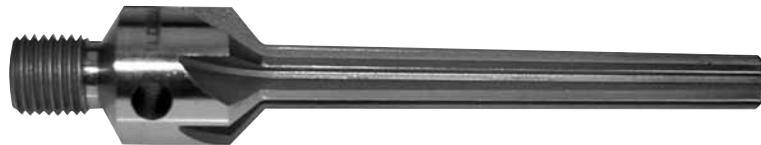
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2040 BR



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2060 AR



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2060 BR



**ALL SIZES AVAILABLE**

# PILOTED DRILLS, REAMERS, CORE DRILLS & GUN BARREL DRILLS

## PILOTED 4 FLUTE CORE DRILLS 390

CORE DRILLS 390	DASH NUMBER
4 flute	-2



Example: 390-2 .375 x .250 x 90° x 3/8 long

## PILOTED DRILLS 391 COBALT PILOTED DRILLS 391-C

DRILLS 391	DASH NUMBER
Jobber	-1
Fast spiral	-2
Slow spiral	-3



Example: 391-2 .250 x .098 x 60° x 1/4 long

## PILOTED REAMERS 392

REAMERS 392	DASH NUMBER
Chucking straight flute	-1
Chucking R.H. spiral	-2
Chucking L.H. spiral	-3
Straight Fl. hand reamer	-4
L.H. spiral hand reamer	-5



Example: 392-1 .3215 x .2968 x 90° x 1/2 long








## GUN BARREL DRILL                    1241FA-C-O



All above reamers, core drills & gun barrel drills available with 1/4-28 thread shanks.

# FOR USE IN ANGLE DRILLS & FLEXIBLE DRILLING ATTACHMENTS

OVERALL LENGTH DOES NOT INCLUDE THREAD

 <p><b>628</b> THREADED SHANK CORE DRILLS</p>	 <p><b>629-P</b> THREADED SHANK REAMER WITH PILOT</p>
 <p><b>628-P</b> THREADED SHANK CORE DRILL WITH PILOT</p>	 <p><b>624-P</b> THREADED SHANK DRILLS (SHORT OR LONG SERIES)</p>
 <p><b>629</b> THREADED SHANK REAMERS</p>	 <p><b>625-P</b> THREADED SHANK DOUBLE MARGIN DRILLS WITH PILOT</p>
 <p><b>1241 FA-A-1</b> THREADED GUN BARREL DRILL</p>	

Available in high speed steel or super cobalt steel. Add "CO" for Cobalt.

Integral hex adaptor 1/4-28 thread with 5/16" x 5/16" hex furnished as standard. Hex lengths from 1/16" available on request. 1/4-28 thread with 3/8" hex adaptor recommended for diameters greater than 5/16". 5/16-24 ground thread with wrench flats recommended on diameters larger than 3/8".

When ordering specify part number, dash number, diameters, shoulder angle, and length of pilot.

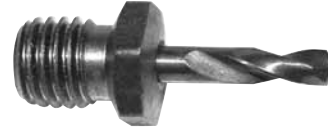
- 628 Available in all sizes #30 thru 7/16"
- 628-P Available in all sizes #30 thru 7/16"
- 629 Available in all sizes 1/8" thru 7/16"
- 629-P Available in all sizes 1/8" thru 3/8"
- 624-P Available in all sizes #50 thru 7/16"
- 625-P Available in all sizes 1/8" thru 1/2"

## THREADED SHANK AIRCRAFT DRILLS (STUB SERIES)



### 1517VS

#10-32 thread sizes available  
1/16" to 3/8" by 64ths  
#50 to #1  
"A" to "W"

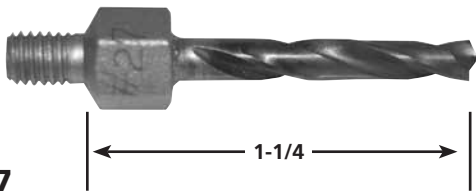


### 1526VS

1/4-28 thread sizes available  
1/16" to 3/8" by 64ths  
#50 to #1  
"A" to "W"

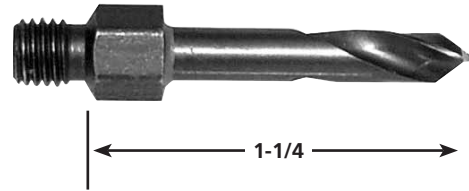
Threaded shank aircraft drills for angle drilling attachments. These are furnished with hex adaptors. Manufactured per NAS 965. Threaded shank core drills and reamers can be furnished upon application.

## THREADED SHANK AIRCRAFT DRILLS (SHORT SERIES)



### 1517

#10-32 thread sizes available  
1/16" to 3/8" by 64ths  
#50 to #1  
"A" to "W"

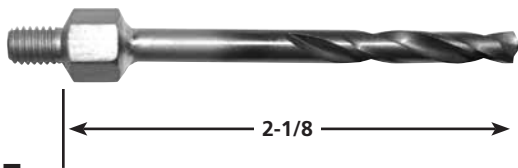


### 1526

1/4-28 thread sizes available  
1/16" to 3/8" by 64ths  
#50 to #1  
"A" to "W"

Threaded shank aircraft drills for angle drilling attachments. These are furnished with hex adaptors. Manufactured per NAS 965. Threaded shank core drills and reamers can be furnished upon application.

## THREADED SHANK AIRCRAFT DRILLS (LONG SERIES)



### 2517

#10-32 thread sizes available  
1/16" to 3/8" by 64ths  
#50 to #1  
"A" to "W"



### 2526

1/4-28 thread sizes available  
1/16" to 3/8" by 64ths  
#50 to #1  
"A" to "W"

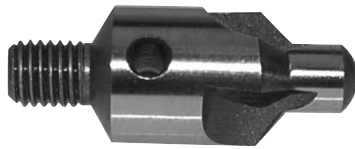
Threaded shank aircraft drills for angle drilling attachments. These are furnished with hex adaptors. Manufactured per NAS 965. Threaded shank core drills and reamers can be furnished upon application.

## METRIC SIZES AVAILABLE



# STOP COUNTERSINK CUTTERS 420

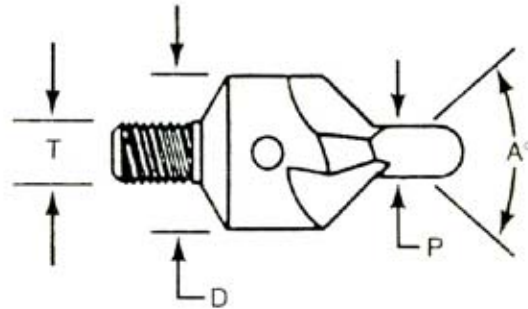
## INTEGRAL PILOT – THREADED SHANK



420



420CT



420 integral pilot male threaded shank countersink cutters are made from high speed tool steel, precision ground in one operation to assure concentricity of pilot, cutting angle and shank. Countersink incorporates a taper between the threaded shank and body of cutter. This seats on a taper in the countersink unit to insure minimum eccentricity.

Cutters are available in 78° – 82° – 90° – 100° – 110° and 120°.

Add "CO" after number for Cobalt. Add "CT" after number for Carbide tipped. For two flute cutters use "S" after part number.

When ordering specify part number, dash number, cutter angle, and pilot diameter.

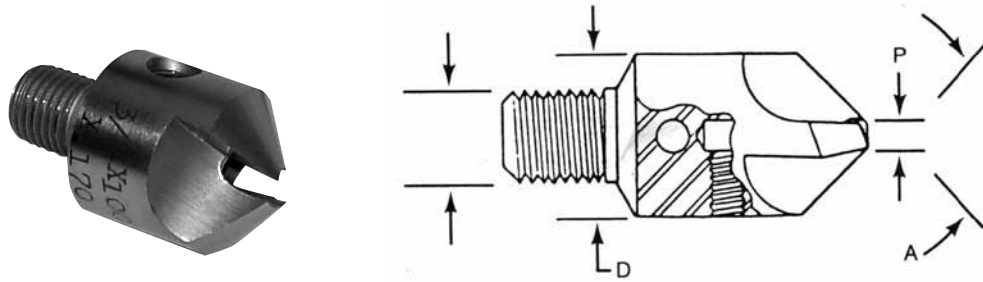
Example: 420-4 100° x #30 pilot

PART NO.	D-DIAMETER	P-PILOT SIZE	T-THREAD
420-1	3/8	#40-#30-#21-#10-3/32-1/8-5/32-3/16	1/4-28
420-2	7/16	#40-#30-#21-#10-3/32-1/8-5/32-3/16-1/4	1/4-28
420-3	1/2	#40-#30-#21-#10-3/32-1/8-5/32-3/16-1/4-F	1/4-28
420-4	5/8	#30-#21-#10-1/8-5/32-3/16-1/4-F-5/16-3/8	1/4-28
420-5	3/4	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	3/8-24
420-6	7/8	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	3/8-24
420-7	1	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	3/8-24
420-8	1-1/8	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	3/8-24
420-9	1-1/4	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	3/8-24
420-10	3/4	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	7/16-20
420-11	7/8	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	7/16-20
420-12	1	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	7/16-20
420-13	1-1/8	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	7/16-20
420-14	1-1/4	#10-3/16-1/4-F-5/16-3/8-7/16-1/2	7/16-20

## METRIC SIZES AVAILABLE

# STOP COUNTERSINK CUTTERS 421

## REMOVABLE PILOT – THREADED SHANK



421 removable pilot male threaded shank countersink cutters are made from high speed tool steel, precision ground in one operation to assure concentricity of pilot hole, cutting angle and shank. Countersink incorporates a taper between the threaded shank and body of cutter. This seats on a taper in the countersink unit to insure minimum eccentricity. Other combinations can be furnished on special order to your specific body diameter and angle use 755-series pilots.

For two flute cutters use "S" after part numbers.  
 Cutters are available in 78° – 82° – 90° – 100° – 110° and 120°.

When ordering specify part number, dash number, cutter angle, and pilot diameter.

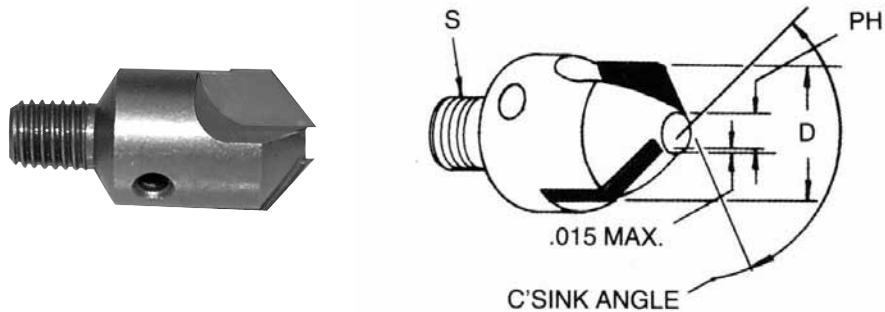
Example: 421-4- 100°

PART NO.	D-DIAMETER	P-PILOT SIZE	T-THREAD
421-1	5/16	.086	1/4-28
421-2	3/8	.086	1/4-28
421-3	7/16	.086	1/4-28
421-4	1/2	.086	1/4-28
421-5	5/8	.086	1/4-28
421-6	3/4	.170 or 3/16	3/8-24
421-7	7/8	.170 or 3/16	3/8-24
421-8	1	.170 or 3/16	3/8-24
421-9	1-1/8	.170 or 3/16	3/8-24
421-10	1-1/4	.170 or 3/16	3/8-24
421-11	3/4	.170 or 3/16	7/16-20
421-12	7/8	.170 or 3/16	7/16-20
421-13	1	.170 or 3/16	7/16-20
421-14	1-1/8	.170 or 3/16	7/16-20
421-15	1-1/4	.170 or 3/16	7/16-20

### METRIC SIZES AVAILABLE

# CARBIDE TIPPED STOP COUNTERSINKS 700

## REPLACEABLE PILOT – THREADED SHANK



**700** carbide countersink cutters excel in cutting highly abrasive materials, and are recommended for countersinking the “difficult to machine” and “exotic” materials in which high speed steel will not perform satisfactorily. Also recommended for any application where longer tool life is desired.

Replaceable pilot construction allows economical replacement of damaged pilots and substitution of various pilot diameters with the same cutter. (For pilot information, see 755). Maximum not-cutting diameter is 1/32 larger than pilot hole. Recommend using cutters with pilot holes 1/32 minimum smaller than desired pilot diameter, see sketch.

Made with heavy carbide tipped cutting edges brazed to a tough steel body. Precision ground and form relieved to insure concentricity. May be used in all popular adjustable-stop or micro-stop type countersinking units utilizing a threaded shank drive.

When ordering specify part number and include countersink angle.

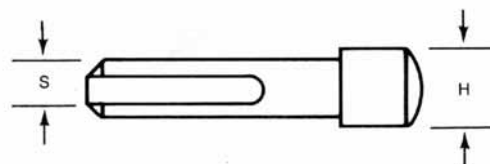
Example: 701-100°.

For pilot information, see 755. Other angles and sizes available.

PART NO.	D-DIAMETER	PH-PILOT HOLE	NUMBER FLUTES	S-SHANK SIZE
700	3/8	5/64 or .086	2	1/4-28
701	7/16	5/64 or .086	2	1/4-28
702	1/2	5/64	2	1/4-28
703	1/2	.086	2	1/4-28
704	1/2	1/8	2	1/4-28
705	5/8	1/8 or .086	2	1/4-28
706	5/8	3/16	2	1/4-28
707A	3/4	3/16	3	3/8-24
707B	3/4	3/16	3	7/16-20
708A	7/8	3/16	3	3/8-24
708B	7/8	3/16	3	7/16-20
709A	1	3/16	3	3/8-24
709B	1	3/16	3	7/16-20
710A	1-1/8	1/4	3	3/8-24
710B	1-1/8	1/4	3	7/16-20
711A	1-1/4	1/4	3	3/8-24
711B	1-1/4	1/4	3	7/16-20

# PILOTS 755

FOR CARBIDE TIPPED STOP COUNTERBORES, CARBIDE TIPPED STOP COUNTERSINKS, H.S. STOP C.B. & STOP C.S.



755 pilots are designed to use with 700 carbide countersinks, 730 carbide counterbores and 421 high speed countersinks. Made from the finest quality tool steel, heat treated throughout and precision ground to exacting size and concentricity tolerances.

When ordering specify part number & dash number.

Example: 755-2

PART NO.	PILOT HEAD NOMINAL DIA	STANDARD SHANK DIAMETERS						
		.086	5/64	3/32	1/8	.170	3/16	1/4
755-1S	3/32(.937)	X	X	X				
755-1	1/8(.125)	X	X					
755-2S	#40(.098)	X	X	X				
755-2	#30(.128)	X	X	X				
755-3S	#21(.159)	X	X	X	X			
755-3	5/32(.156)	X	X	X	X			
755-4	#20(.161)	X	X	X	X			
755-5	3/16(.187)	X	X	X	X			
755-6	#10(.193)	X	X	X	X			
755-7	7/32(.218)	X	X	X	X	X	X	
755-8	1/4(.250)	X	X	X	X	X	X	
755-9	"F"(.257)	X		X	X	X	X	
755-10	9/32(.281)	X			X	X	X	
755-11	5/16(.312)	X			X	X	X	X
755-12	11/32(.343)	X				X	X	
755-13	3/8(.375)	X				X	X	X
755-14	13/32(.406)	X				X	X	
755-15	7/16(.437)	X				X	X	X
755-16	15/32(.468)					X	X	
755-17	1/2(.500)					X	X	X
755-18	17/32(.531)					X	X	
755-19	9/16(.562)					X	X	X
755-20	19/32(.593)					X	X	
755-21	5/8(.625)					X	X	X
755-22	11/16(.687)					X		X
755-23	3/4(.750)					X		X

**GRINDING IS AVAILABLE FOR SPECIAL PILOT DIAMETERS.**

# COUNTERSINKS

## STRAIGHT SHANK



### HIGH SPEED STEEL 503

503 countersinks are designed for use in portable operations and drill presses. Three flute construction assures fast clean cutting of most materials. Wider flutes and special clearance allow chips to clear, helping to eliminate build-up. Greater tool life and cutting efficiency are good reasons to use 503 countersinks.

### SUPER COBALT STEEL 503-CO

When your job calls for countersinking difficult materials, the 503-CO countersink is the tool you need. Special construction of these super cobalt countersinks offers greater cutting efficiency at the reduced cutting speeds required for difficult materials. Because these countersinks are suitable for all materials, they may well be the only countersinks you'll ever need.

Standard angles include 82° – 90° – 100° – 110° – 120°. Special angles on request.

When ordering specify dash number and angle.

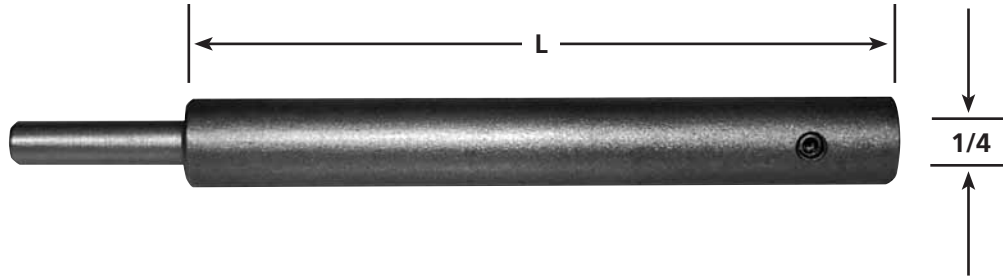
Example: 503-5 90°

PART NO.	BODY DIAMETER	SHANK DIAMETER
503-1	1/4	3/16
503-2	5/16	1/4
503-3	3/8	1/4
503-4	7/16	1/4
503-5	1/2	1/4
503-6	5/8	3/8
503-7	3/4	3/8

PART NO.	BODY DIAMETER	SHANK DIAMETER
503-8	1	1/2
503-9	1-1/8	1/2
503-10	1-1/4	5/8
503-11	1-1/2	3/4
503-12	1-3/4	3/4
503-13	2	3/4

# EXTENSION SHANKS

## FOR COUNTERBORES & COUNTERSINKS WITH 1/4" SHANK 436



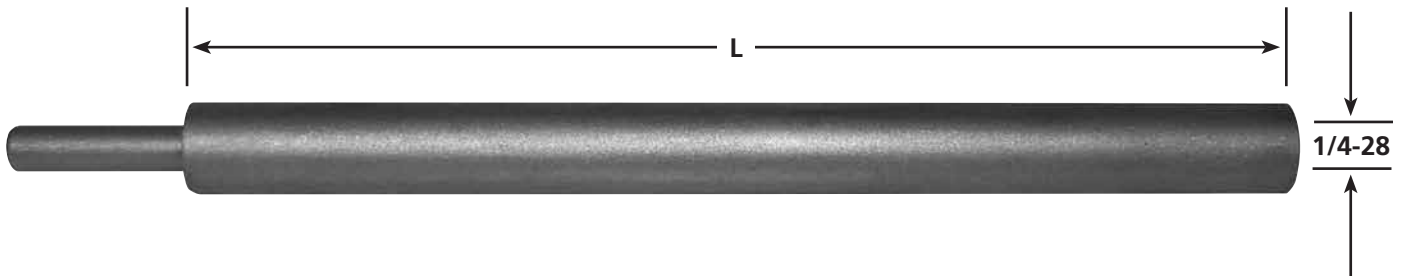
436 extension shanks have 1/2" diameter body and 1/4" diameter shank.

Other sizes can be furnished on special order to your specific body diameter and length.

PART NUMBER	L-LENGTH
436-1	4
436-2	6
436-3	8
436-4	10

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## FOR COUNTERSINKS WITH 1/4-28 THREAD 437



437 extension shanks have 1/2" diameter body and 1/4" diameter shank.

Other sizes can be furnished on special order to your specific body diameter and length.

PART NUMBER	L-LENGTH
437-1	4
437-2	6
437-3	8
437-4	10

# BACK SPOTFACERS

## SINGLE END BAYONET LOCK TYPE 430



**430** four flute single end back spotfacer are made from high speed tool steel properly heat treated. Outside diameter is precision ground with back taper, to assure free cutting clearance and concentricity between hole and diameter. Cutter designed for use in restricted areas where conventional type spotfacing cannot be accomplished. Corner radius available upon request.

## DOUBLE END – BAYONET LOCK TYPE 430D



**430D** three flute double end back spotfacer are primarily the same as 430, with the exception that it is double ended. This doubles the cutter life at a substantial saving. Special diameters and pilot holes available on special order. Corner radius available upon request.

When ordering specify part number and dash number. Example: 430D-1  
\*See PILOT REFERENCE for proper pilot selection.  
†Furnished with "double drive" bayonet lock. Add "D" for double end.

PART NO.	D-CUTTER DIAMETER	PH PILOT HOLE	PILOT REFERENCE*	
			PLAIN PILOT	STEP PILOT
430-1J	1/4	3/32	185-1	186-1
430-1K	1/4	1/8	185-2	186-2
430-2J	5/16	3/32	185-1	186-1
430-2K	5/16	1/8	185-2	186-2
430-2L	5/16	5/32	185-3	186-3
430-3J	3/8	1/8	185-2	186-2
430-3K	3/8	5/32	185-3	186-3
430-3L	3/8	3/16	185-4	186-4
430-4J	7/16	1/8	185-2	186-2
430-4K	7/16	5/32	185-3	186-3
430-4L	7/16	3/16	185-4	186-4
430-5J	1/2	5/32	185-3	186-3
430-5K	1/2	3/16	185-4	186-4
430-5L	1/2	1/4	185-5	186-5
430-6J	9/16	5/32	185-3	186-6
430-6K	9/16	3/16	185-4	186-7
430-6L	9/16	1/4	185-5	186-8
430-7J	5/8	3/16	185-4	186-7
430-7K	5/8	1/4	185-5	186-8
430-7L	5/8	5/16	185-6	186-9
430-8J	11/16	3/16	185-4	186-7
430-8K	11/16	1/4	185-5	186-8
430-8L	11/16	5/16	185-6	186-9
430-9J	3/4	1/4	185-5	186-8
430-9K	3/4	5/16	185-6	186-9
430-9L	3/4	3/8	185-7	186-10
430-10J	7/8	1/4	185-5	186-8
430-10K	7/8	5/16	185-6	186-9
430-10L	7/8	3/8	185-7	186-10
430-11J	1	5/16	185-6	186-9
430-11K	1	3/8	185-7	186-10
430-11L	1	1/2	185-8	186-11
430-11M	1-1/8	3/8	185-7	186-16
430-11N	1-1/8	1/2	185-8	186-17
430-12J	1-1/4	3/8	185-7	186-16
430-12K	1-1/4	1/2	185-8	186-17
430-13J†	1-3/8	5/8	185-9	186-20,21
430-14J†	1-1/2	5/8	185-9	186-20,21
430-15†	1-5/8	3/4	185-10	186-22,23,24
430-16J†	1-3/4	3/4	185-10	186-22,23,24
430-17J†	1-7/8	3/4	185-10	186-22,23,24
430-18J†	2	3/4	185-10	186-22,23,24

**METRIC SIZES AVAILABLE**

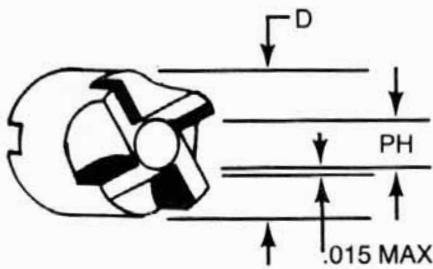
# CARBIDE REVERSE SPOTFACERS 191

Standard in four flutes.

\*See PILOT REFERENCE for proper pilot selection.

†Furnished with "double drive" bayonet lock.

## SOLID CARBIDE & CARBIDE TIPPED



191 carbide reverse spotfacers are similar in design to the 190 high speed steel cutters. They excel in cutting highly abrasive materials, the "difficult to machine" materials, and in cutting any material where longer tool life is desired. 186 step pilots are recommended for use with carbide tipped cutters as tipped cutters have a maximum non-cutting diameter 1/32 larger than pilot hole, see sketch. Special sizes subject to quotation. Corner radius available upon request.

PART NO.	D-CUTTER DIAMETER	PH PILOT HOLE	PILOT REFERENCE*	
			PLAIN PILOT	STEP PILOT
191-1J	1/4	3/32	185-1	186-1
191-1K	1/4	1/8	185-2	186-2
191-2J	5/16	3/32	185-1	186-1
191-2K	5/16	1/8	185-2	186-2
191-2L	5/16	5/32	185-3	186-3
191-3J	3/8	1/8	185-2	186-2
191-3K	3/8	5/32	185-3	186-3
191-3L	3/8	3/16	185-4	186-4
191-4J	7/16	1/8	185-2	186-2
191-4K	7/16	5/32	185-3	186-3
191-4L	7/16	3/16	185-4	186-4
191-5J	1/2	5/32	185-3	186-3
191-5K	1/2	3/16	185-4	186-4
191-5L	1/2	1/4	185-5	186-5
191-6J	9/16	5/32	185-3	186-6
191-6K	9/16	3/16	185-4	186-7
191-6L	9/16	1/4	185-5	186-8
191-7J	5/8	3/16	185-4	186-7
191-7K	5/8	1/4	185-5	186-8
191-7L	5/8	5/16	185-6	186-9
191-8J	11/16	3/16	185-4	186-7
191-8K	11/16	1/4	185-5	186-8
191-8L	11/16	5/16	185-6	186-9
191-9J	3/4	1/4	185-5	186-8
191-9K	3/4	5/16	185-6	186-9
191-9L	3/4	3/8	185-7	186-10
191-10J	7/8	1/4	185-5	186-8
191-10K	7/8	5/16	185-6	186-9
191-10L	7/8	3/8	185-7	186-10
191-11J	1	5/16	185-6	186-9
191-11K	1	3/8	185-7	186-10
191-11L	1	1/2	185-8	186-11
191-11M	1-1/8	3/8	185-7	186-16
191-11N	1-1/8	1/2	185-8	186-17
191-12J	1-1/4	3/8	185-7	186-16
191-12K	1-1/4	1/2	185-8	186-17
191-13J†	1-3/8	5/8	185-9	186-20,21
191-14J†	1-1/2	5/8	185-9	186-20,21
191-15J†	1-5/8	3/4	185-10	186-22,23,24
191-16J†	1-3/4	3/4	185-10	186-22,23,24
191-17J†	1-7/8	3/4	185-10	186-22,23,24
191-17J†	2	3/4	185-10	186-22,23,24

**METRIC SIZES AVAILABLE**



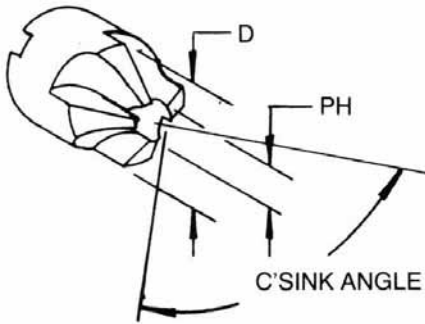
# BACK COUNTERSINK CUTTERS 431

Cutters are available in 78° – 82° – 90° – 100° – 110° – 120°.  
Cobalt and Carbide available upon request.

When ordering specify part number, dash number and cutter angle.  
Example: 431-2L100

\*See PILOT REFERENCE for proper pilot selection.  
For pilots see 185 and 186

## BAYONET LOCK TYPE

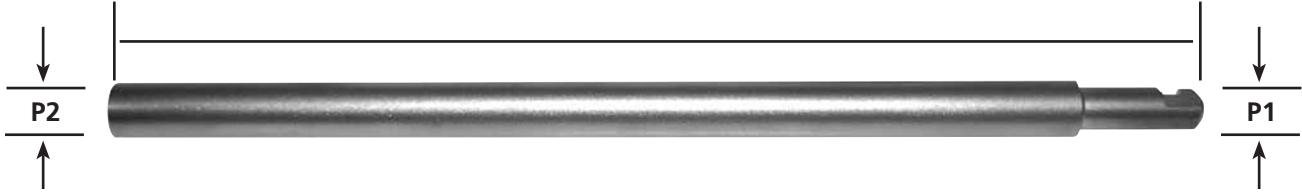


431 back countersink cutters are designed with three and four flutes to give fast free cutting. These cutters are made from high speed tool steel, precision ground with correct cutting angle and radial clearance. For use in restricted areas where conventional type countersinking can not be accomplished. Special diameters and pilot hole size available on special order. Used with bayonet lock pilots 185.

PART NO.	D-CUTTER DIAMETER	PH PILOT HOLE	NUMBER FLUTES	PILOT REFERENCE*	
				PLAIN PILOT	STEP PILOT
431-1J	1/4	3/32	3	185-1	186-1
431-1K	1/4	1/8	3	185-2	186-2
431-2J	5/16	3/32	3	185-1	186-1
431-2K	5/16	1/8	3	185-2	186-2
431-2L	5/16	5/32	3	185-3	186-3
431-3J	3/8	1/8	3	185-2	186-2
431-3K	3/8	5/32	3	185-3	186-3
431-3L	3/8	3/16	3	185-4	186-4
431-4J	7/16	1/8	3	185-2	186-2
431-4K	7/16	5/32	3	185-3	186-3
431-4L	7/16	3/16	3	185-4	186-4
431-5J	1/2	5/32	3	185-3	186-3
431-5K	1/2	3/16	3	185-4	186-4
431-5L	1/2	1/4	3	185-5	186-5
431-6J	9/16	5/32	3	185-3	186-6
431-6K	9/16	3/16	4	185-4	186-7
431-6L	9/16	1/4	4	185-5	186-8
431-7J	5/8	3/16	4	185-4	186-7
431-7K	5/8	1/4	4	185-5	186-8
431-7L	5/8	5/16	4	185-6	186-9
431-8J	11/16	3/16	4	185-4	186-7
431-8K	11/16	1/4	4	185-5	186-8
431-8L	11/16	5/16	4	185-6	186-9
431-9J	3/4	1/4	4	185-5	186-12
431-9K	3/4	5/16	4	185-6	186-13
431-9L	3/4	3/8	4	185-7	186-14
431-10J	7/8	1/4	4	185-5	186-12
431-10K	7/8	5/16	4	185-6	186-13
431-10L	7/8	3/8	4	185-7	186-14
431-11J	1	5/16	4	185-6	186-15
431-11K	1	3/8	4	185-7	186-16
431-11L	1	1/2	4	185-8	186-17
431-12J	1-1/4	3/8	4	185-7	186-18
431-12K	1-1/4	1/2	4	185-8	186-19

## METRIC SIZES AVAILABLE

## STEP PILOTS FOR REVERSE COUNTERSINKS AND SPOTFACERS 186



**186** step pilots are designed for use with 431 and 181 reverse countersinks and 430 and 191 reverse spotfacers. These pilots feature a step (larger than the pilot hole in the reverse cutter being used) to pilot in the workpiece. Ideal for use with the carbide tipped cutters or where special pilot diameters are required. Special "P2" pilot diameters are readily ground from standard. For proper pilot selection refer to reverse cutter tables. 186-20 thru -24 pilots have the "double drive" bayonet lock, a 2 inch long shank with the same diameter at the "P1" drive, and an overall length of 8 inches.

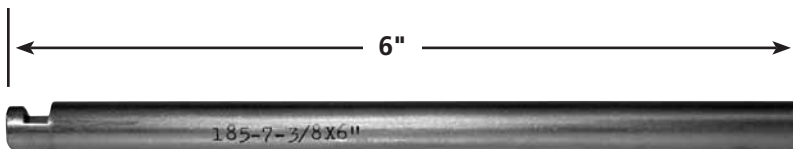
Pilots with special major diameters smaller than standard are readily ground from standard, prices subject to quotation. \*Furnished with "double drive" bayonet lock.

PILOT NUMBER	"P1" MINOR DIAMETER	"P2" MAJOR DIAMETER
186-1	3/32	1/8
186-2	1/8	5/32
186-3	5/32	3/16
186-4	3/16	1/4
186-5	1/4	5/16
186-6	5/32	3/16
186-7	3/16	1/4
186-8	1/4	5/16
186-9	5/16	3/8
186-10	3/8	1/2
186-11	1/2	9/16
186-12	1/4	5/16

PILOT NUMBER	"P1" MINOR DIAMETER	"P2" MAJOR DIAMETER
186-13	5/16	3/8
186-14	3/8	1/2
186-15	5/16	3/8
186-16	3/8	1/2
186-17	1/2	9/16
186-18	3/8	1/2
186-19	1/2	9/16
186-20*	5/8	3/4
186-21*	5/8	7/8
186-22*	3/4	7/8
186-23*	3/4	1
186-24*	3/4	1-1/4

## BAYONET LOCK PILOTS 185

### FOR BACK COUNTERSINKS AND SPOTFACERS



When ordering specify part number and dash number.

PLAIN PILOT NUMBER	"P" PLAIN PILOT DIAMETER
185-1	3/32
185-2	1/8
185-3	5/32
185-4	3/16
185-5	1/4
185-6	5/16
185-7	3/8
185-8	1/2
185-9	5/8
185-10	3/4

**185** pilots are designed for use with 430, 430D and 431 cutters. Pilots are made of a high quality tool steel and precision ground. These pilots give maximum service in high production operations, with free rotation in pilot holes.

**METRIC SIZES AVAILABLE**

# HOLE SAWS

## H.S.S., COBALT & CARBIDE-TIPPED

### FINE TOOTH 400



400 fine tooth hole saws are made from solid high speed steel. Back taper on outside and inside diameters to assure fast, free cutting. Outside diameter is ground concentric with tapped hole to produce close tolerance and perfectly round holes. These fine tooth hole saws are designed primarily for fast cutting through thin skins, steel and other material. Particularly useful for tubular assemblies.

Stock sizes available:

Diameters 3/8" through 1-1/4" – 5/16"-24 thread

Diameters 1-5/16" through 4" – 1/2"-20 thread

For arbors, refer to 402

### COARSE TOOTH 401



401 coarse tooth hole saws are primarily the same as 400, with the exception that it has fewer and deeper teeth. This type is more suitable for thick material and faster cutting where better chip flow is required. Also used on plastics, laminated woods, aluminum, steel or other materials.

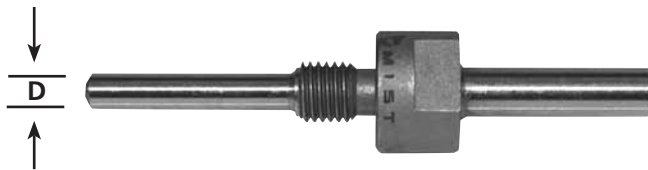
Stock sizes available:

Diameters 3/8" through 1-1/4" – 5/16"-24 thread

Diameters 1-5/16" through 4" – 1/2"-20 thread

For arbors, refer to 402

## HOLE SAW ARBORS 402

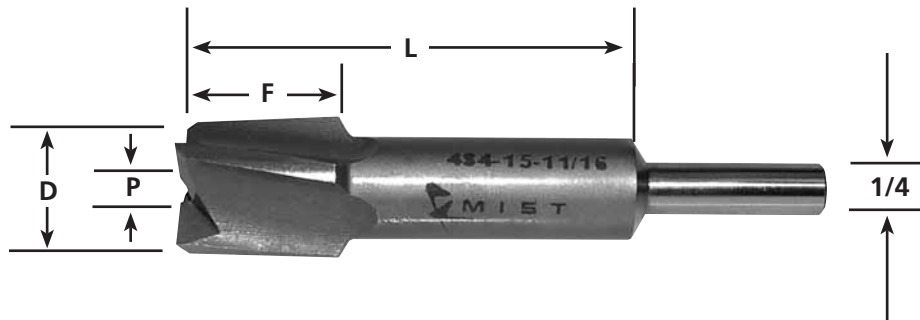


402 hole saw arbors are made of high quality tool steel, properly heat treated and precision ground to insure concentricity between all diameters. Carried in stock in the sizes shown. Special pilot diameters available on special order.

PART NO.	D-PILOT DIAMETER	SHANK DIAMETER	THREAD SIZE
402-0	SPECIAL	1/4	5/16 -24
402-1	3/16	1/4	5/16 -24
402-2	1/4	1/4	5/16 -24
402-3	1/4	1/2	1/2-20
402-4	3/8	1/2	1/2-20

# AIRCRAFT COUNTERBORES 434 & 434CO

H.S.S., COBALT – SHORT TYPE – 1/4" DIAMETER SHANK



434 short type four flute aircraft counterbores are made from high speed tool steel properly heat treated. Outside diameter is precision ground with back taper, to assure free cutting clearance and concentricity between hole and diameter. Corner radii, ground to aircraft standards available upon request.

1/4" diameter shank – high speed – interchangeable pilots.

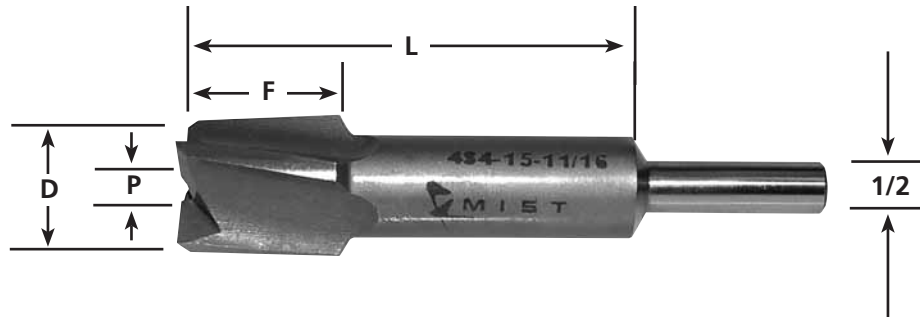
When ordering specify part number.

PART NO.	D-DIAMETER	L-LENGTH	P-PILOT HOLE	F-FLUTE LENGTH
434-1	1/4	2-3/8	3/32	1/2
434-2	9/32	2-3/8	3/32	1/2
434-3	5/16	2-3/8	3/32	1/2
434-4	11/32	2-3/8	3/32	1/2
434-5	3/8	2-3/8	3/32	1/2
434-6	13/32	2-13/16	1/8	1/2
434-7	7/16	2-13/16	1/8	5/8
434-8	15/32	2-13/16	1/8	5/8
434-9	1/2	2-13/16	1/8	5/8
434-10	17/32	2-13/16	1/8	5/8
434-11	9/16	2-13/16	1/8	5/8
434-12	19/32	2-13/16	1/8	5/8
434-13	5/8	2-13/16	1/8	5/8
434-14	21/32	3-1/8	3/16	3/4
434-15	11/16	3-1/8	3/16	3/4
434-16	23/32	3-1/8	3/16	3/4
434-17	3/4	3-1/8	3/16	3/4
434-18	25/32	3-1/8	3/16	3/4
434-19	13/16	3-1/8	3/16	3/4
434-20	27/32	3-1/8	3/16	3/4
434-21	7/8	3-1/8	3/16	3/4
434-22	29/32	3-1/8	3/16	3/4
434-23	15/16	3-1/8	3/16	3/4
434-24	31/32	3-1/8	3/16	3/4
434-25	1	3-1/8	3/16	3/4

**METRIC SIZES AVAILABLE**

# AIRCRAFT COUNTERBORES 434 & 434CO

H.S.S., COBALT – SHORT TYPE – 1/2" DIAMETER SHANK



**434** short type four flute aircraft counterbores 1-1/16" and over are primarily the same as 1" and under counterbores with the exception that it has 1/2" shank. Because they are short in length and have 3/16" pilot hole, many otherwise hard-to-do jobs can be done. Corner radii, ground to aircraft standards available upon request. Special sizes manufactured to specifications.

1/2" diameter shank – high speed – interchangeable pilots.

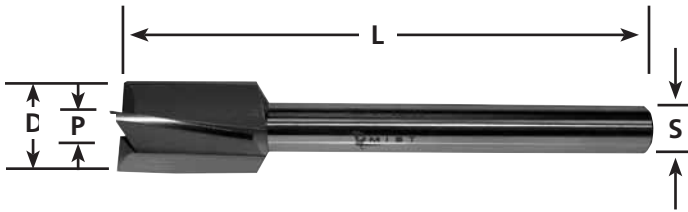
When ordering specify part number.

PART NO.	D-DIAMETER	L-LENGTH	P-PILOT HOLE	F-FLUTE LENGTH
434-26	1-1/16	4	3/16	1-1/16
434-27	1-1/8	4	3/16	1-1/16
434-28	1-3/16	4	3/16	1-1/16
434-29	1-1/4	4	3/16	1-1/16
434-30	1-5/16	4	3/16	1-1/16
434-31	1-3/8	4	3/16	1-1/4
434-32	1-7/16	4	3/16	1-1/4
434-33	1-1/2	4	3/16	1-1/4
434-34	1-9/16	4	3/16	1-1/4
434-35	1-5/8	4	3/16	1-1/4
434-36	1-11/16	4	3/16	1-1/4
434-37	1-3/4	4	3/16	1-1/4
434-38	1-13/16	4-1/2	3/16	1-1/2
434-39	1-7/8	4-1/2	3/16	1-1/2
434-40	1-15/16	4-1/2	3/16	1-1/2
434-41	2	4-1/2	3/16	1-1/2

**METRIC SIZES AVAILABLE**

# AIRCRAFT COUNTERBORES (LONG SERIES) 435

H.S.S., COBALT & CARBIDE-TIPPED



435 long set four flute counterbores with 1/2" maximum shank are made from high speed tool steel properly heat treated. Outside diameter is precision ground with back taper, to assure free cutting clearance and concentricity between hole and diameter. Corner radii, ground to aircraft standards available upon request.

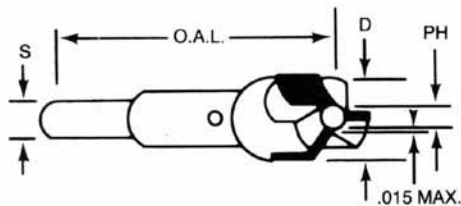
Straight shank – high speed – four flute. When ordering specify part number.

PART NO.	D-DIAMETER	L-LENGTH	P-PILOT HOLE	S-SHANK
435-00	3/16	4	3/32	7/32
435-0	7/32	4	3/32	7/32
435-1	1/4	4	3/32	15/64
435-2	9/32	4	3/32	17/64
435-3	5/16	4	3/32	19/64
435-4	11/32	4	3/32	5/16
435-5	3/8	4	3/32	5/16
435-6	13/32	4	1/8	3/8
435-7	7/16	4	1/8	3/8
435-8	15/32	4-1/4	1/8	7/16
435-9	1/2	4-1/4	1/8	7/16
435-10	17/32	4-1/4	1/8	1/2
435-11	9/16	4-1/4	1/8	1/2
435-12	19/32	4-1/4	1/8	1/2
435-13	5/8	4-1/4	1/8	1/2
435-14	21/32	5-3/8	3/16	1/2
435-15	11/16	5-3/8	3/16	1/2
435-16	23/32	5-3/8	3/16	1/2
435-17	3/4	5-3/8	3/16	1/2
435-18	25/32	5-3/8	3/16	1/2
435-19	13/16	5-3/8	3/16	1/2
435-20	7/8	5-3/8	3/16	1/2
435-21	15/16	5-3/8	3/16	1/2
435-22	1	5-3/8	3/16	1/2
435-23	1-1/16	5-1/2	3/16	1/2
435-24	1-1/8	5-1/2	3/16	1/2
435-25	1-3/16	5-1/2	3/16	1/2
435-26	1-1/4	5-1/2	3/16	1/2
435-27	1-5/16	5-1/2	1/4	1/2
435-28	1-3/8	5-1/2	1/4	1/2
435-29	1-7/16	5-1/2	1/4	1/2
435-30	1-1/2	5-1/2	1/4	1/2
435-31	1-9/16	5-1/2	1/4	1/2
435-32	1-5/8	5-1/2	1/4	1/2
435-33	1-11/16	5-1/2	1/4	1/2
435-34	1-3/4	5-1/2	1/4	1/2
435-35	1-13/16	5-1/2	1/4	1/2
435-36	1-7/8	5-1/2	1/4	1/2
435-37	1-15/16	5-1/2	1/4	1/2
435-38	2	5-1/2	1/4	1/2

**METRIC SIZES AVAILABLE**

# CARBIDE TIPPED AIRCRAFT COUNTERBORES 850

When ordering specify part number and dash number.



## 3 FLUTES

850 carbide counterbores are similar in design to the 434 high speed steel cutters. They excel in cutting highly abrasive materials, and are recommended for counterboring and spotfacing the "difficult-to-machine" and "exotic" materials in which high speed steel will not perform satisfactorily. Also recommended for any application where longer tool life is desired.

Special "D" cutter diameters may be readily ground from standard sizes listed. Special cutters given prompt attention.

Maximum non-cutting diameter is 1/32 larger than pilot hole. Recommend using with pilots with "H" head diameter 1/32 minimum larger than "S" shank diameter. For pilot information see 433.

PART NO.	D-CUTTER DIAMETER	PH PILOT HOLE	SHANK DIAMETER	O.A.L. OVERALL LENGTH
850-1	1/4	3/32	1/4	2-3/8
850-2	9/32	3/32	1/4	2-3/8
850-3	5/16	3/32	1/4	2-3/8
850-4	11/32	3/32	1/4	2-3/8
850-5	3/8	3/32	1/4	2-3/8
850-6	13/32	1/8	1/4	2-3/4
850-7	7/16	1/8	1/4	2-3/4
850-8	15/32	1/8	1/4	2-3/4
850-9	1/2	1/8	1/4	2-3/4
850-10	17/32	1/8	1/4	2-3/4
850-11	9/16	1/8	1/4	2-3/4
850-12	19/32	1/8	1/4	2-3/4
850-13	5/8	1/8	1/4	2-3/4
850-14	21/32	3/16	1/4	2-3/4
850-15	11/16	3/16	1/4	2-3/4
850-16	23/32	3/16	1/4	2-3/4
850-17	3/4	3/16	1/4	2-3/4
850-18	25/32	3/16	1/4	2-3/4
850-19	13/16	3/16	1/4	2-3/4
850-20	27/32	3/16	1/4	2-3/4
850-21	7/8	3/16	1/4	2-3/4
850-22	29/32	3/16	1/4	2-3/4
850-23	15/16	3/16	1/4	2-3/4
850-24	31/32	3/16	1/4	2-3/4
850-25	1	3/16	1/4	2-3/4
850-26	1-1/16	3/16	3/8	2-3/4
850-27	1-1/8	3/16	3/8	2-3/4
850-28	1-3/16	3/16	3/8	2-3/4
850-29	1-1/4	1/4	3/8	2-3/4
850-30	1-5/16	1/4	3/8	2-3/4
850-31	1-3/8	1/4	3/8	2-3/4
850-31B	1-7/16	1/4	3/8	2-3/4
850-32	1-1/2	1/4	3/8	2-3/4
850-33	1-9/16	5/16	1/2	3-1/16
850-34	1-5/8	5/16	1/2	3-1/16
850-35	1-11/16	5/16	1/2	3-1/16
850-36	1-3/4	5/16	1/2	3-1/16
850-37	1-13/16	5/16	1/2	3-1/16
850-38	1-7/8	5/16	1/2	3-1/16
850-39	1-15/16	5/16	1/2	3-1/16
850-40	2	5/16	1/2	3-1/16

## METRIC SIZES AVAILABLE

# COUNTERBORE PILOTS 433



433 interchangeable counterbore pilots are made from high quality tool steel. Heat treated and precision ground to insure concentricity between diameters. Used with 434 or 435 counterbores. Special sizes manufactured to specifications.

When ordering specify part number and dash number.

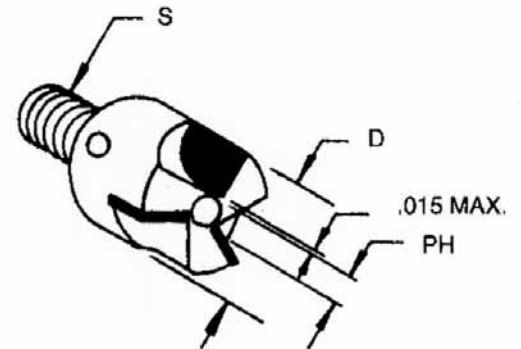
DASH NO.	S-SHANK	P-PILOT	DASH NO.	S-SHANK	P-PILOT	DASH NO.	S-SHANK	P-PILOT	DASH NO.	S-SHANK	P-PILOT
-1	3/32	3/32	-29	5/32	11/32	-57	1/4	3/8	-85	5/16	25/32
-2	3/32	1/8	-30	5/32	3/8	-58	1/4	13/32	-86	5/16	13/16
-3	3/32	5/32	-31	5/32	13/32	-59	1/4	7/16	-87	5/16	7/8
-4	3/32	.161	-32	5/32	7/16	-60	1/4	15/32	-88	5/16	15/16
-5	3/32	3/16	-33	5/32	15/32	-61	1/4	1/2	-89	5/16	1"
-6	3/32	.193	-34	5/32	1/2	-62	1/4	17/32	-90	3/8	3/8
-7	3/32	7/32	-35	3/16	3/16	-63	1/4	9/16	-91	3/8	13/32
-8	3/32	1/4	-36	3/16	.193	-64	1/4	19/32	-92	3/8	7/16
-9	3/32	.257	-37	3/16	7/32	-65	1/4	5/8	-93	3/8	7/16
-10	1/8	1/8	-38	3/16	1/4	-66	1/4	21/32	-94	3/8	1/2
-11	1/8	5/32	-39	3/16	.257	-67	1/4	11/16	-95	3/8	17/32
-12	1/8	.161	-40	3/16	9/32	-68	1/4	23/32	-96	3/8	9/16
-13	1/8	3/16	-41	3/16	5/16	-69	1/4	3/4	-97	3/8	19/32
-14	1/8	.193	-42	3/16	11/32	-70	5/16	5/16	-98	3/8	5/8
-15	1/8	7/32	-43	3/16	3/8	-71	5/16	11/32	-99	3/8	21/32
-16	1/8	1/4	-44	3/16	13/32	-72	5/16	3/8	-100	3/8	11/16
-17	1/8	.257	-45	3/16	7/16	-73	5/16	13/32	-101	3/8	23/32
-18	1/8	9/32	-46	3/16	15/32	-74	5/16	7/16	-102	3/8	3/4
-19	1/8	5/16	-47	3/16	1/2	-75	5/16	15/32	-103	3/8	25/32
-20	5/32	5/32	-48	3/16	17/32	-76	5/16	1/2	-104	3/8	13/16
-21	5/32	.161	-49	3/16	9/16	-77	5/16	17/32	-105	3/8	7/8
-22	5/32	3/16	-50	3/16	19/32	-78	5/16	9/16	-106	3/8	15/16
-23	5/32	.193	-51	3/16	5/8	-79	5/16	19/32	-107	3/8	1"
-24	5/32	7/32	-52	1/4	1/4	-80	5/16	5/8	-108	3/8	1-1/16
-25	5/32	1/4	-53	1/4	.257	-81	5/16	21/32	-109	3/8	1-1/8
-26	5/32	.257	-54	1/4	9/32	-82	5/16	11/16	-110	3/8	1-3/16
-27	5/32	9/32	-55	1/4	5/16	-83	5/16	23/32	-111	3/8	1-1/4
-28	5/32	5/16	-56	1/4	11/32	-84	5/16	3/4	-		

## METRIC SIZES AVAILABLE



# STOP COUNTERBORES 630 & 730

## H.S.S. & CARBIDE-TIPPED – REPLACEABLE PILOT, THREADED SHANK



730 carbide stop counterbore cutters may be used in all popular adjustable-stop or micro-stop type counter-sinking units utilizing a threaded shank drive.

They combine the advantages of 850 carbide aircraft counterbores with the positive stop feature of the adjustable-stop countersinking units.

730 cutters excel in cutting highly abrasive materials, and are recommended for spotfacing the "difficult-to-machine" and "exotic" materials in which high speed steel will not perform satisfactorily. Also recommended for any application where longer tool life is desired.

Special cutter diameters "D" may be readily ground from standard sizes listed. Special cutters given prompt attention. All cutters supplied with 1/64 corner radius. Maximum non-cutting diameter is 1/32 larger than pilot hole, see sketch. Use pilots with "H" head diameter 1/32 minimum larger than "S" shank diameter.

Also available in Cobalt.

H.S.	PART NO.	C.T.	D-DIAMETER	P-PILOT HOLE	S-SHANK SIZE
630-1		730-1	3/8	3/32 OR .086	1/4-28
630-2		730-2	7/16	1/8 OR .086	1/4-28
630-3		730-3	1/2	1/8 OR .086	1/4-28
630-4		730-4	9/16	1/8 OR .086	1/4-28
630-5		730-5	5/8	1/8 OR .086	1/4-28
630-6A		730-6A	11/16	3/16	3/8-24
630-6B		730-6B	11/16	3/16	7/16-20
630-7A		730-7A	3/4	3/16	3/8-24
630-7B		730-7B	3/4	3/16	7/16-20
630-8A		730-8A	13/16	3/16	3/8-24
630-8B		730-8B	13/16	3/16	7/16-20
630-9A		730-9A	7/8	3/16	3/8-24
630-9B		730-9B	7/8	3/16	7/16-20
630-10A		730-10A	15/16	3/16	3/8-24
630-10B		730-10B	15/16	3/16	7/16-20
630-11A		730-11A	1	3/16	3/8-24
630-11B		730-11B	1	3/16	7/16-20
630-12A		730-12A	1-1/8	3/16	3/8-24
630-12B		730-12B	1-1/8	3/16	7/16-20
630-13A		730-13A	1-1/4	3/16	3/8-24
630-13B		730-13B	1-1/4	3/16	7/16-20

# COMPOSITE TOOLS



**SERIES 3000 SOLID CARBIDE DAGGER DRILL**



**SERIES 392 SC SOLID CARBIDE PILOT REAMER**



**SERIES 1257B SOLID CARBIDE TAPERED DRILL-REAMER**



**SERIES 420 SC – TWO FLUTE SOLID CARBIDE COUNTERSINK**

Specify Series No., body type, pilot diameter and C/Sink angle desired.



**SERIES 2000W SOLID CARBIDE KEY-POINT DRILL\***

Designed to produce “fuzz-free” holes in Kevlar® (Aramid Fiber). Available in regular and extended overall lengths.

\*Order by Series No., size and length desired.

# COMPOSITE TOOLS



## DIAMOND COATED C/S

421DC Replaceable pilot type

420DC Integral pilot type



## KEVLAR & GRAPHITE HOLE CUTTERS

Straight shank – MX099 with repl. pilot

Threaded shank – MX099-TS with repl. pilot

Designed to cut burr free holes in Kevlar, glass epoxies, and fiberglass. Also Manufactured in carbide tipped.

# RIVET SHAVER CUTTERS 2800



Rivet shaver cutters are precision made from the finest quality material and have carbide inserts selected to give chatter-free, longer tool life.

The flute configuration of the shaver cutter was specifically designed to give maximum chip clearance and to eliminate the web and dead center. Elimination of the web in the center of this cutter reduces breakage. Elimination of the dead center in the cutter allows for clean rivet shaving to the center, making it possible to shave such rivets as monel, steel and jo-bolts.

2800 series is standard and will adapt to most rivet shavers which accommodate a 1/4-28 threaded shank cutter.

PART NO.	DASH NUMBER								
2800	-1	-2	-3	-4	-5	-6	-7	-8	-9
DIAMETER	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1
THREAD	1/4 – 28								

# HI SHEAR COLLAR CUTTER

## THREADED SHANK



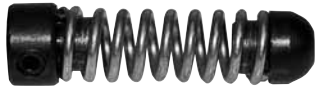
When ordering specify part number, thread size and length desired.

PART NO.	THREAD SIZE	SIZE	NAME OF FASTENER
2221-1	1/4-28	1/8	HI-SHEAR
2221-2	"	5/32	HI-SHEAR
2221-3	"	3/16	HI-SHEAR
2221-4	"	1/4	HI-SHEAR
2221-5	"	5/16	HI-SHEAR
2221-6	"	3/8	HI-SHEAR
2221-7	3/8-24	7/16	HI-SHEAR
2221-8	"	1/2	HI-SHEAR
2221-9	"	9/16	HI-SHEAR
2221-10	"	5/8	HI-SHEAR
2221-11	1/4-28	L6	HUCKLOCK BOLT
2221-12	"	L8	HUCKLOCK BOLT
2221-13	"	OS8	BLIND RIVET
2221-14	"	L10	HUCKLOCK BOLT
2221-15	"	OS10	BLIND RIVET
2221-16	"	L12	HUCKLOCK BOLT
2221-17	"	OS12	BLIND RIVET

### METRIC SIZES AVAILABLE

# HAND TOOLS

## DRILL STOP 3570 SERIES



Primarily designed to control hole depth. This tools will also cushion the break-through of a drill and prevent chuck jaws from coming in contact with the skin surface. Unit locks on drill with a set screw.

When ordering specify part number only.

PART NUMBER	DRILL SIZE
3570-50	#50
3570-40	#40
3570-30	#30
3570-28	#28
3570-21	#21
3570-20	#20
3570-12	#12
3570-11	#11
3570-10	#10
3570-1/4	1/4
3570-5/16	5/16

## CAM LOC PLIER 4P3



## RIVET CUTTER 3501R

Cuts all AN Series aluminum rivets.

1/16" to 1/4" diameter

Cuts 1/4" L to 3/4" L rivets



## SPEED DRIVER 3521B

Accepts all 1/4-28 male threaded cutting tools.

Deburring cutters available.



## CHIP CHASERS 3512

Blade length is 5-7/8".

Made of fine spring steel with plastic handle firmly molded to blade. Designed to remove chips between sheets after holes have been drilled for riveting.



## EDGE BREAKERS 3514

1/4" diameter.

Quickly removes all burrs or roughness from any type of sheet stock, with a shield to prevent injury to operator's hands if tool slips. Supplied with plastic safety grip handles.

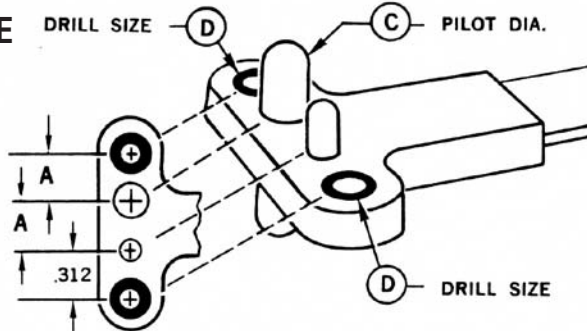


# PLATE NUT DRILL JIGS 3518 SERIES

Designed for accurate drilling of rivet holes for plate nuts.  
 Manufactured with flexible handle to provide hand clearance  
 when jig is in use. CAUTION: Use approved eye protection.

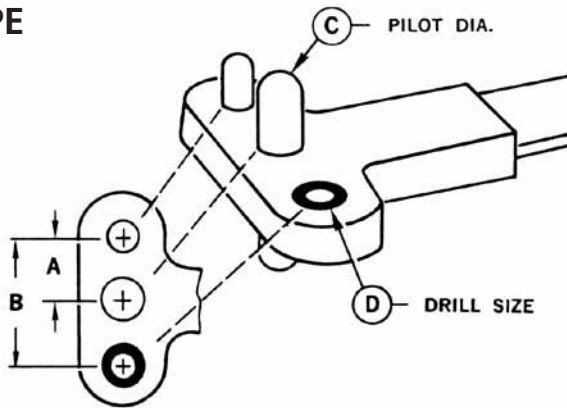


## ONE LUG TYPE (FOR I WING)



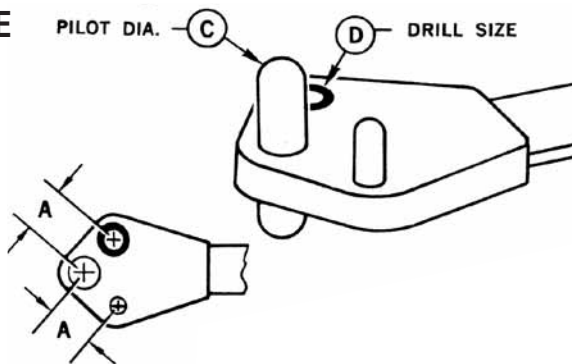
PART NUMBER	BOLT SIZE REF.	A	C	D
3518-G	#6	.344	.139	#40
3518-H	#8	.344	.164	#40
3518-J	#10	.344	.191	#40
3518-K	1/4	.344	.248	#40
3518-L	#10 SPEC.	.344	.213	#40
3518-LF	#8, #10	.344	.281	#40
3518YF	1/4	.500	.343	#40

## TWO LUG TYPE (FOR II WING)



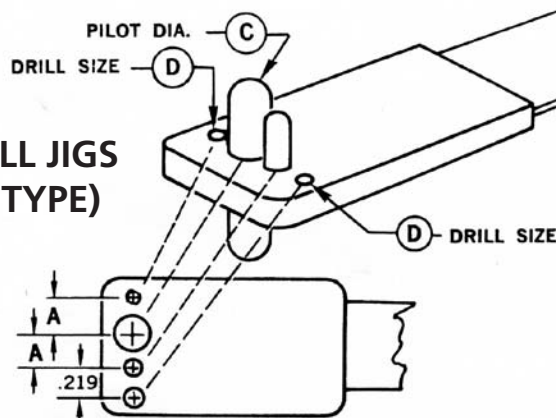
PART NUMBER	BOLT SIZE REF.	A	B	C	D
3518-A	#6	.344	.688	.139	#40
3518-B	#8	.344	.688	.164	#40
3518-C	#10	.344	.688	.191	#40
3518-D	1/4	.500	1.000	.248	#40
3518-E	5/16	.500	1.00	.312	#30
3518-F	3/8	.500	1.000	.372	#30
3518-M	-	.375	.750	.4375	#40
3518-N	-	.500	1.000	.6875	#30
3518-P	-	.6875	1.375	.811	#30
3518-BF	#8, #10	.344	.688	.281	#40
3518-DF	1/4	.500	1.000	.343	#40

## CORNER TYPE



PART NUMBER	BOLT SIZE REF.	A	C	D
3518-R	#6	.344	.139	#40
3518-S	#8	.344	.164	#40
3518-T	#10	.344	.191	#40
3518-U	1/4	.500	.248	#40
3518-V	5/16	.500	.312	#30
3518-W	3/8	.500	.372	#30
3518NAS-C-A5	5/16	.359	.312	#30
3518NAS-C-A6	3/8	.414	.372	#30

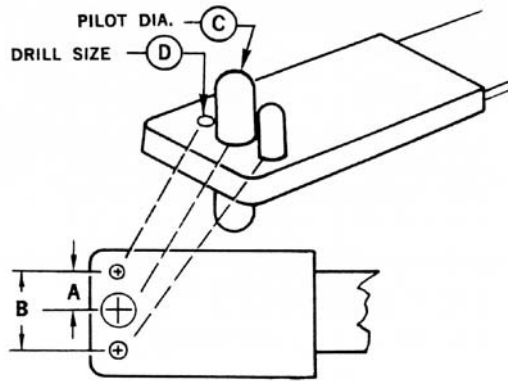
## PLATE NUT DRILL JIGS (FOR ONE LUG TYPE)



PART NUMBER	BOLT SIZE REF.	A	C	D
3518-PA	#4	.203	.112	#40
3518-PB	#6	.218	.139	#40
3518-PC	#8	.234	.164	#40
3518-PD	#10	.250	.191	#40
3518-PE	#1/4	.281	.248	#40
3518NAS-B-A02	#2	.125	.086	#51
3518NAS-B-A03	#3	.133	.099	#51
3518NAS-B-A04	#4	.148	.112	#51
3518NAS-B-A06	#6	.171	.139	#51

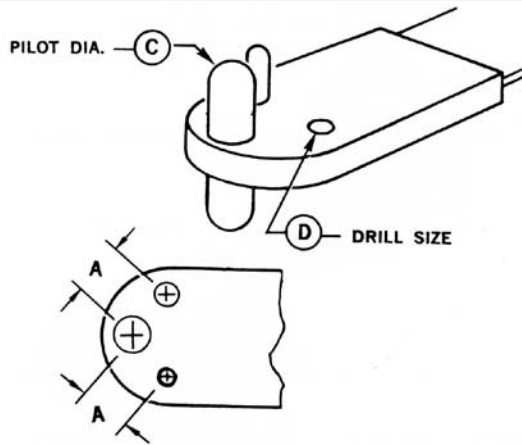
# PLATE NUT DRILL JIGS 3518 SERIES

## TWO LUG TYPE



PART NUMBER	BOLT SIZE REF.	A	B	C	D
3518-NA	#4	.203	.406	.112	#40
3518-NB	#6	.218	.436	.139	#40
3518-NC	#8	.234	.468	.146	#40
3518-ND	#10	.250	.500	.191	#40
3518-NE	1/4	.281	.562	.248	#40
3518-NF	5/16	.3125	.625	.312	#30
3518-NAS-A-A02	#2	.125	.250	.086	#51
3518-NAS-A-A03	#3	.1325	.265	.099	#51
3518-NAS-A-A04	#4	.148	.296	.112	#51
3518-NAS-A-A02	#6	.1715	.343	.139	#51

## CORNER TYPE



PART NUMBER	BOLT SIZE REF.	A	C	D
3518-SA	#4	.203	.112	#40
3518-SB	#6	.218	.139	#40
3518-SC	#8	.234	.146	#40
3518-SD	#10	.250	.191	#40
3518-SE	1/4	.281	.248	#40
3518-SF	5/16	.3125	.312	#30
3518NAS-C-A02	#2	.125	.086	#51
3518NAS-C-A03	#3	.1325	.099	#51
3518NAS-C-A04	#4	.148	.112	#51
3518NAS-C-A06	#6	.1715	.139	#51

# PORTABLE DRILL BUSHING ASSEMBLY

## 3589A – 3589C SERIES

A hand held guide to keep drills and taps 90° to the skin surface. the guide assembly consists of a clear plastic housing and a special screw in type hardened steel bushing. Can be interchanged in one housing within the sizes indicated on ordering in one housing within the sizes indicated on ordering chart.



When ordering complete assembly, specify part number only. Housings or bushings can be ordered separately by specifying individual part number shown on chart. CAUTION: Use approved eye protection.

PART NO. FOR COMPLETE ASSEMBLY OF HOUSING & BUSHINGS	DRILL SIZE REF.	HOUSING PART NO.	BUSHING PART NO.	BUSHING THREAD SIZE
3589A-.098	#40	3589AA	3589AB-.098	1/2-13
3589A-.1285	#30		3589AB-.1285	
3589A-.159	#21		3589AB-.159	
3589A-.1562	5/32		3589AB-.1562	
3589A-.1875	3/16		3589AB-.1875	
3589A-.1935	#10		3589AB-.1935	
3589A-.2187	7/32		3589AB-.2187	
3589A-.250	1/4		3589AB-.250	
3589A-.257	F		3589AB-.257	
3589C-.2812	9/32	3589CA	3589CB-.2812	3/4-16
3589C-.3125	5/16		3589CB-.3125	
3589C-.3437	11/32		3589CB-.3437	
3589C-.375	3/8		3589CB-.375	
3589C-.4375	7/16		3589CB-.4375	
3589C-.500	1/2		3589CB-.500	

NOTE: Manufacturing tolerances on all bushing holes are + .001 and - .000.

# STRAP DUPLICATORS 250 & 255

## DRILL BUSHING TYPE 250-SERIES



This tool provides an accurate method for drilling duplicate matching holes in over-tapping sheets. Hole to be duplicated is drilled through bushing when pilot is in place.

PART NO.	PILOT/DRILL SIZE	LENGTH
250-1	#40	6-1/4
250-2	#30	
250-3	#21	
250-5	#10	
250-8	1/4	

## DRILL BUSHING INVERTED PILOT TYPE 255-SERIES



These tools are identical to the 250 series, except that the pilot is inverted to allow hole duplication in places where the sheets cannot be pried apart.

PART NO.	PILOT/DRILL SIZE	LENGTH
255-1	#40	6-1/4
255-2	#30	
255-3	#21	
255-5	#10	
255-8	1/4	

## MICROSTOP 303-1

ACCEPTS 1/4" – 28 THREADED COUNTERSINKS



Adjustable in increments of .001" for precise countersinking.

5/8" cutter capacity.

## MINIATURE CHUCK 680

ADAPTS TO ALL ANGLE DRILL HEADS  
WITH 1/4" – 28 INTERNAL THREADS



Chuck capacity: Holds standard twist drills 1/4" diameter and smaller.

## COLLET CHUCK 41C

AVAILABLE IN STANDARD  
AND SPECIAL SIZES





## ASSORTED CLAMPS

**K**



The K-type sheet holder clamp is the standard KWIK-LOK clamp. It is plier-actuated, spring-loaded and steel bodied; effective for most space requirements.

**KK**



The KK-type sheet holder clamp is designed for those space requirements which prohibit the use of the standard K-type clamp. The KK-type is a miniature clamp, with a shorter overall body and special effectiveness for more confined areas.

**KL / KEL**



The KL and KEL-type clamps are standard K-type clamps with an extended grip range.

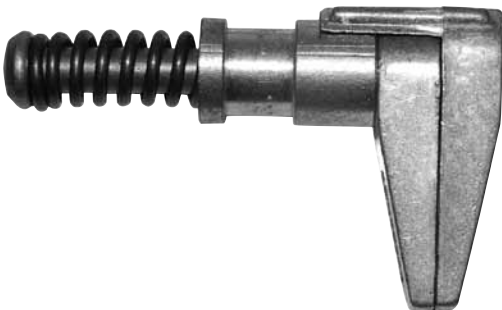
**KHD**



The KHD clamp is designed specifically for applications requiring an extended grip range not available in the standard K through KL series of sheet metal holders.

## KSG SIDE GRIPS

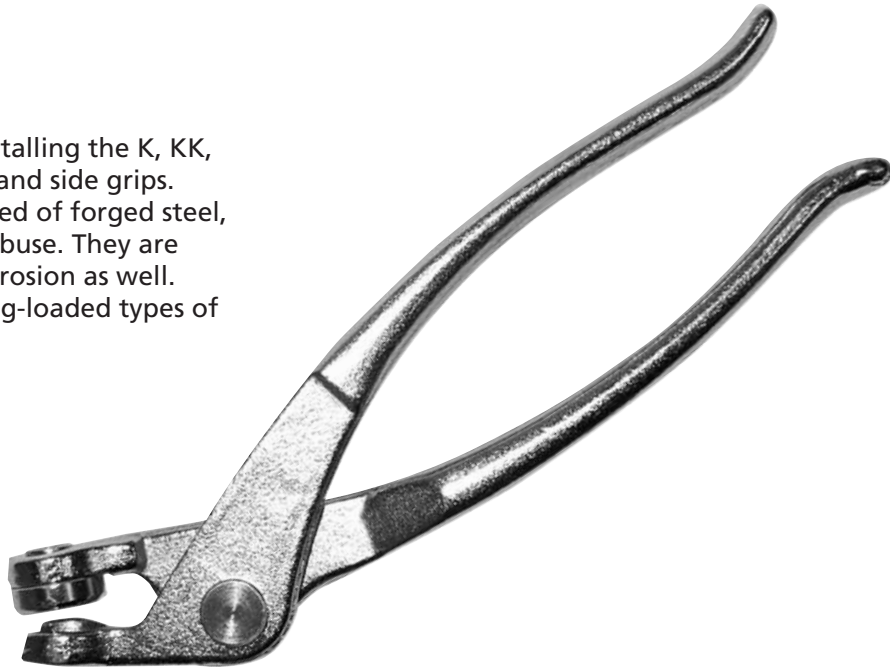
**KSG** side grips – edge clamps to hold materials together where no holes are provided. Plier operated. Suggested for bonding, gluing and sealants.



PART NUMBER	MATERIAL THICKNESS	COLOR CODE
KSG 1/2 X 1/2	0-1/2	COPPER
KSG 3/4 X 1/2	0-1/2	COPPER
KSG 1/2 X 1	0-3/4	BRASS
KSG 3/4 X 1	0-3/4	BRASS

# PLIERS 107M

Specially designed for installing the K, KK, KT, KL, KEL, KHD clamps and side grips. these pliers are constructed of forged steel, thus resisting wear and abuse. They are nickel plated to resist corrosion as well. Compatible with all spring-loaded types of sheet metal clamps.

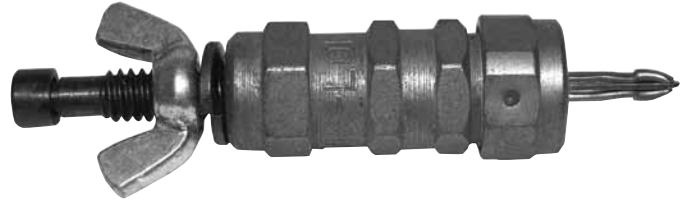


PART NO.	CROSS REFERENCE EQUIVALENT	COLOR CODE	G - GRIP	D-DIAMETER	DRILL SIZE
K-1/16	M-1/16	BLACK	0 - 1/4	1/16	1/16
K-3/32	M-3/32	ZINC		3/32	#40
K-1/8	M-1/8	COPPER		1/8	#30
K-5/32	M-5/32	BLACK		5/32	#20
K-3/16	M-3/16	BRASS		3/16	#10
K-1/4	M-1/4	COPPER		1/4	1/4
KK-3/32	MM-3/32	ZINC	0 - 1/4	3/32	#40
KK-1/8	MM-1/8	COPPER		1/8	#30
KK-5/32	MM-5/32	BLACK		5/32	#20
KK-3/16	MM-3/16	BRASS		3/16	#10
KL-3/32	ML-3/32	ZINC	1/4 - 1/2	3/32	#40
KL-1/8	ML-1/8	COPPER		1/8	#30
KL-5/32	ML-5/32	BLACK		5/32	#20
KL-3/16	ML-3/16	BRASS		3/16	#10
KEL-3/32	MEL-3/32	ZINC	1/2 - 3/4	3/32	#40
KEL-1/8	MEL-1/8	COPPER		1/8	#30
KEL-5/32	MEL-5/32	BLACK		5/32	#20
KEL-3/16	MEL-3/16	BRASS		3/16	#10
KHD-3/32	MHD-3/32	ZINC	0 - 1/2	3/32	#40
KHD-1/8	MHD-1/8	COPPER		1/8	#30
KHD-5/32	MHD-5/32	BLACK		5/32	#20
KHD-3/16	MHD-3/16	BRASS		3/16	#10
KHD-1/4	MHD-1/4	COPPER		1/4	1/4
KHD-7/32	MHD-7/32	ZINC		7/32	7/32

# MANUAL & POWER OPERATED FASTENERS

## WING NUT FREE WHEELING HAND FASTENER

To be used on heavier materials for extra pressure.  
Available in various sizes and different grip ranges.



PART NO.	EQUIVALENT	GRIP RANGE	AVAILABLE SIZES
KWNS-FW	WNXS	0 – 5/16	3/32, 1/8, 5/32, 3/16, 1/4
KWN-FW	WNX	0 – 1/2	3/32, 1/8, 5/32, 3/16, 7/32, 1/4, 5/16
KWNL-FW	WNXL	0 – 1	3/32, 1/8, 5/32, 3/16, 7/32, 1/4, 5/16
KWNEL-FW	WNXEL	1/2 – 1-1/2	3/32, 1/8, 5/32, 3/16, 7/32, 1/4, 5/16
KWNK-FW	WNXK	1-1/2 – 2-1/2	3/32, 1/8, 5/32, 3/16, 1/4, 5/16

## HEX NUT FREE WHEELING

Pneumatically driven for quicker action – time saving fasteners for heavier materials that need higher than average pressure.



PART NO.	EQUIVALENT	GRIP RANGE	AVAILABLE SIZES
KHNS-FW	HNXS-SF	0 – 5/16	3/32, 1/8, 5/32, 3/16, 1/4
KHN-FW	HNX-SF	0 – 1/2	3/32, 1/8, 5/32, 3/16, 7/32, 1/4, 5/16
KHNL-FW	HNXL-SF	0 – 1	3/32, 1/8, 5/32, 3/16, 7/32, 1/4, 5/16
KHNEL-FW	HNXEL-SF	1/2 – 1-1/2	3/32, 1/8, 5/32, 3/16, 7/32, 1/4, 5/16
KHNK-FW	HNXK-SF	1-1/2 – 2-1/2	3/32, 1/8, 5/32, 3/16, 1/4, 5/16

SIZE	3/32	1/8	5/32	3/16	7/32	1/4	5/16
COLOR CODE	SILVER	COPPER	BLACK	BRASS	ZINC	COPPER	BLACK

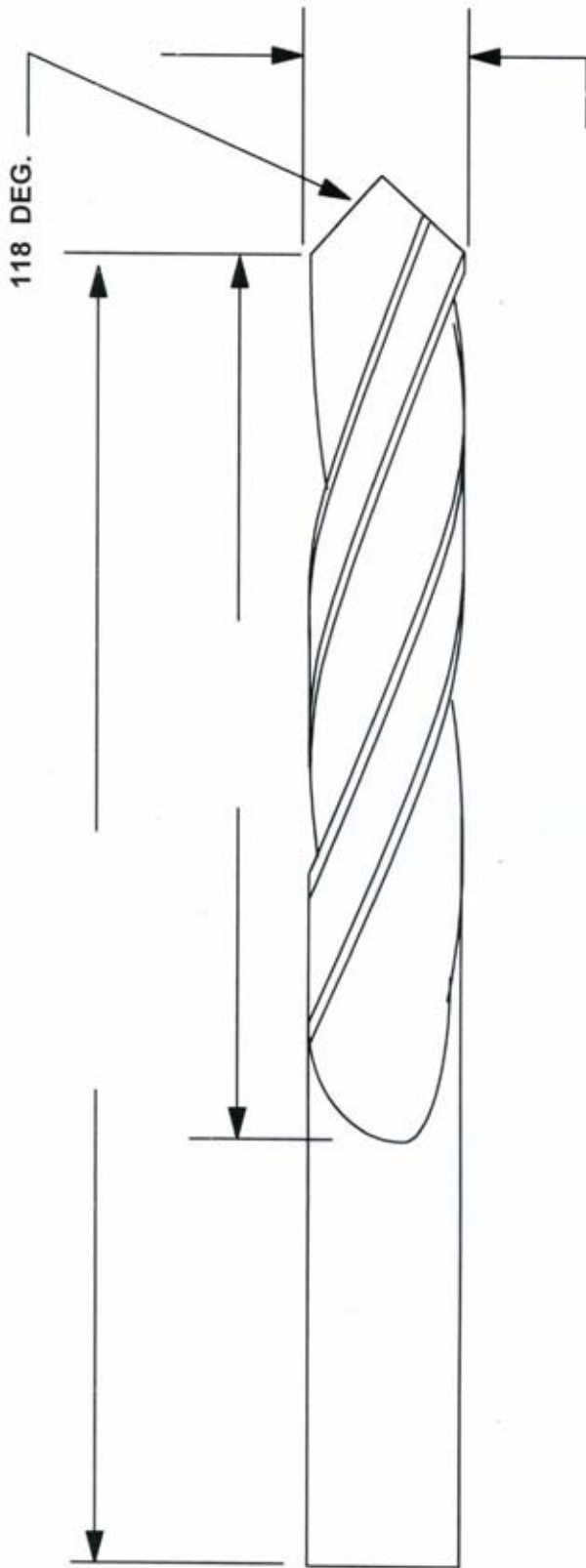
# ORDERING INFORMATION

## POWER OPERATED & MANUAL TEMPORARY FASTENERS

Special callouts: AL = Aluminum body, BO = Black oxide, AC = Aluminum Cap, C = Plastic Cap

HEX NUT PART NO.	CROSS REFERENCE EQUIVALENT	COLOR CODE	G - GRIP	D-DIAMETER	DRILL SIZE
KHNS-FW-3/32	HNXS-SF-3/32	SILVER	0 – 5/16	3/32	#40
KHNS-FW-1/8	HNXS-SF-1/8	COPPER		1/8	#30
KHNS-FW-5/32	HNXS-SF-5/32	BLACK		5/32	#20
KHNS-FW-3/16	HNXS-SF-3/16	BRASS		3/16	#10
KHNS-FW-1/4	HNXS-SF-1/4	COPPER		1/4	1/4
KHN-FW-3/32	HNX-SF-3/32	SILVER	0 – 1/2	3/32	#40
KHN-FW-1/8	HNX-SF-1/8	COPPER		1/8	#30
KHN-FW-5/32	HNX-SF-5/32	BLACK		5/32	#20
KHN-FW-3/16	HNX-SF-3/16	BRASS		3/16	#10
KHN-FW-7/32	HNX-SF-7/32	SILVER		7/32	7/32
KHN-FW-1/4	HNX-SF-1/4	COPPER		1/4	1/4
KHN-FW-5/16	HNX-SF-5/16	BLACK	5/16	5/16	
KHNL-FW-3/32	HNXL-SF-3/32	SILVER	0 – 1	3/32	#40
KHNL-FW-1/8	HNXL-SF-1/8	COPPER		1/8	#30
KHNL-FW-5/32	HNXL-SF-5/32	BLACK		5/32	#20
KHNL-FW-3/16	HNXL-SF-3/16	BRASS		3/16	#10
KHNL-FW-7/32	HNXL-SF-7/32	SILVER		7/32	7/32
KHNL-FW-1/4	HNXL-SF-1/4	COPPER		1/4	1/4
KHNL-FW-5/16	HNXL-SF-5/16	BLACK	5/16	5/16	
KHNEL-FW-3/32	HNXEL-SF-3/32	SILVER	1/2 – 1-1/2	3/32	#40
KHNEL-FW-1/8	HNXEL-SF-1/8	COPPER		1/8	#30
KHNEL-FW-5/32	HNXEL-SF-5/32	BLACK		5/32	#20
KHNEL-FW-3/16	HNXEL-SF-3/16	BRASS		3/16	#10
KHNEL-FW-1/4	HNXEL-SF-1/4	COPPER		1/4	1/4
KHNEL-FW-5/16	HNXEL-SF-5/16	BLACK		5/16	5/16
KHNK-FW-1/8	HNXK-SF-1/8	COPPER	1-1/2 – 2-1/2	1/8	#30
KHNK-FW-5/32	HNXK-SF-5/32	BLACK		5/32	#20
KHNK-FW-3/16	HNXK-SF-3/16	BRASS		3/16	#10
KHNK-FW-1/4	HNXK-SF-1/4	COPPER		1/4	1/4
KHNK-FW-5/16	HNXK-SF-5/16	BLACK		5/16	5/16

WING NUT PART NO.	CROSS REFERENCE EQUIVALENT	COLOR CODE	G - GRIP	D-DIAMETER	DRILL SIZE
KHNS-FW-3/32	WNXS-SF-3/32	SILVER	0 – 5/16	3/32	#40
KHNS-FW-1/8	WNXS-SF-1/8	COPPER		1/8	#30
KHNS-FW-5/32	WNXS-SF-5/32	BLACK		5/32	#20
KHNS-FW-3/16	WNXS-SF-3/16	BRASS		3/16	#10
KHNS-FW-1/4	WNXS-SF-1/4	COPPER		1/4	1/4
KHN-FW-3/32	WNX-SF-3/32	SILVER	0 – 1/2	3/32	#40
KHN-FW-1/8	WNX-SF-1/8	COPPER		1/8	#30
KHN-FW-5/32	WNX-SF-5/32	BLACK		5/32	#20
KHN-FW-3/16	WNX-SF-3/16	BRASS		3/16	#10
KHN-FW-7/32	WNX-SF-7/32	SILVER		7/32	7/32
KHN-FW-1/4	WNX-SF-1/4	COPPER		1/4	1/4
KHN-FW-5/16	WNX-SF-5/16	BLACK	5/16	5/16	
KHNL-FW-3/32	WNXL-SF-3/32	SILVER	0 – 1	3/32	#40
KHNL-FW-1/8	WNXL-SF-1/8	COPPER		1/8	#30
KHNL-FW-5/32	WNXL-SF-5/32	BLACK		5/32	#20
KHNL-FW-3/16	WNXL-SF-3/16	BRASS		3/16	#10
KHNL-FW-7/32	WNXL-SF-7/32	SILVER		7/32	7/32
KHNL-FW-1/4	WNXL-SF-1/4	COPPER		1/4	1/4
KHNL-FW-5/16	WNXL-SF-5/16	BLACK	5/16	5/16	
KHNEL-FW-3/32	WNXEL-SF-3/32	SILVER	1/2 – 1-1/2	3/32	#40
KHNEL-FW-1/8	WNXEL-SF-1/8	COPPER		1/8	#30
KHNEL-FW-5/32	WNXEL-SF-5/32	BLACK		5/32	#20
KHNEL-FW-3/16	WNXEL-SF-3/16	BRASS		3/16	#10
KHNEL-FW-1/4	WNXEL-SF-1/4	COPPER		1/4	1/4
KHNEL-FW-5/16	WNXEL-SF-5/16	BLACK		5/16	5/16
KHNK-FW-1/8	WNXK-SF-1/8	COPPER	1-1/2 – 2-1/2	1/8	#30
KHNK-FW-5/32	WNXK-SF-5/32	BLACK		5/32	#20
KHNK-FW-3/16	WNXK-SF-3/16	BRASS		3/16	#10
KHNK-FW-1/4	WNXK-SF-1/4	COPPER		1/4	1/4
KHNK-FW-5/16	WNXK-SF-5/16	BLACK		5/16	5/16



TOLERANCE UNLESS NOTED

DECIMAL: +/- .010

FRACTION: +/- 1/32

ANGLE: +/- 0 30'

DRAWING NUMBER

**104**

DESCRIPTION:

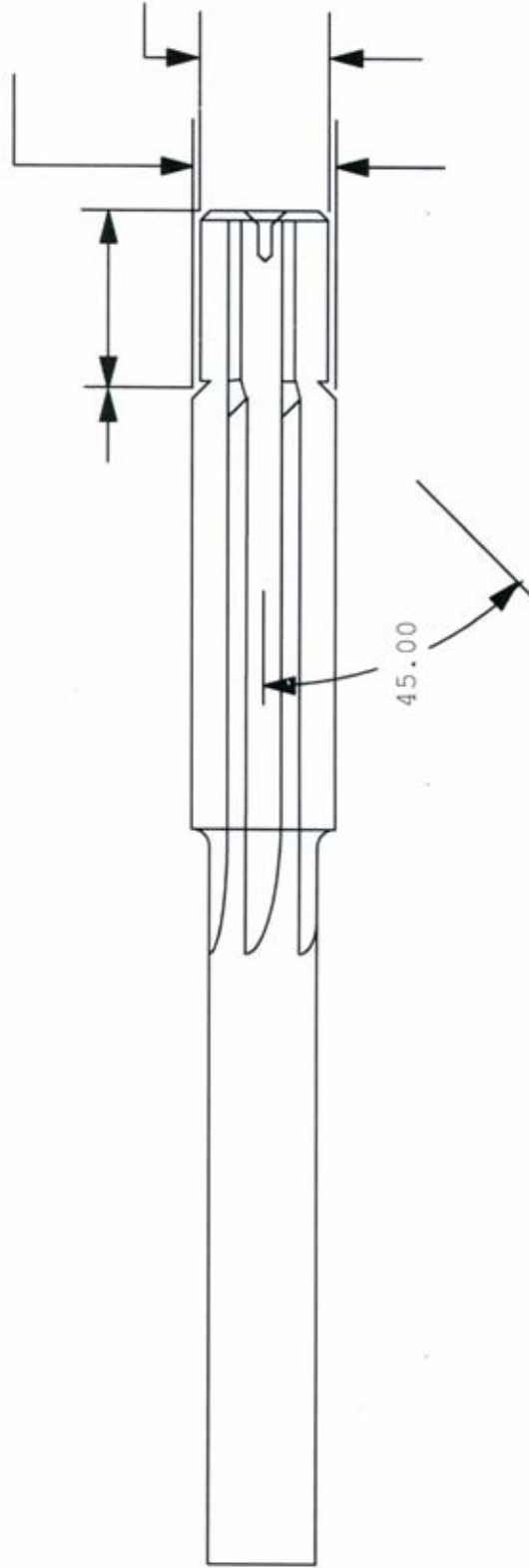
**DOUBLE MARGIN DRILL**

MATERIAL SIZE

MATERIAL: M-2

REV. A

SCALE: NONE



TOLERANCE UNLESS NOTED

DECIMAL: +/- .010  
 FRACTION: +/- 1/32  
 ANGLE: / - 0 30'

DRAWING NUMBER

**392**

DESCRIPTION:

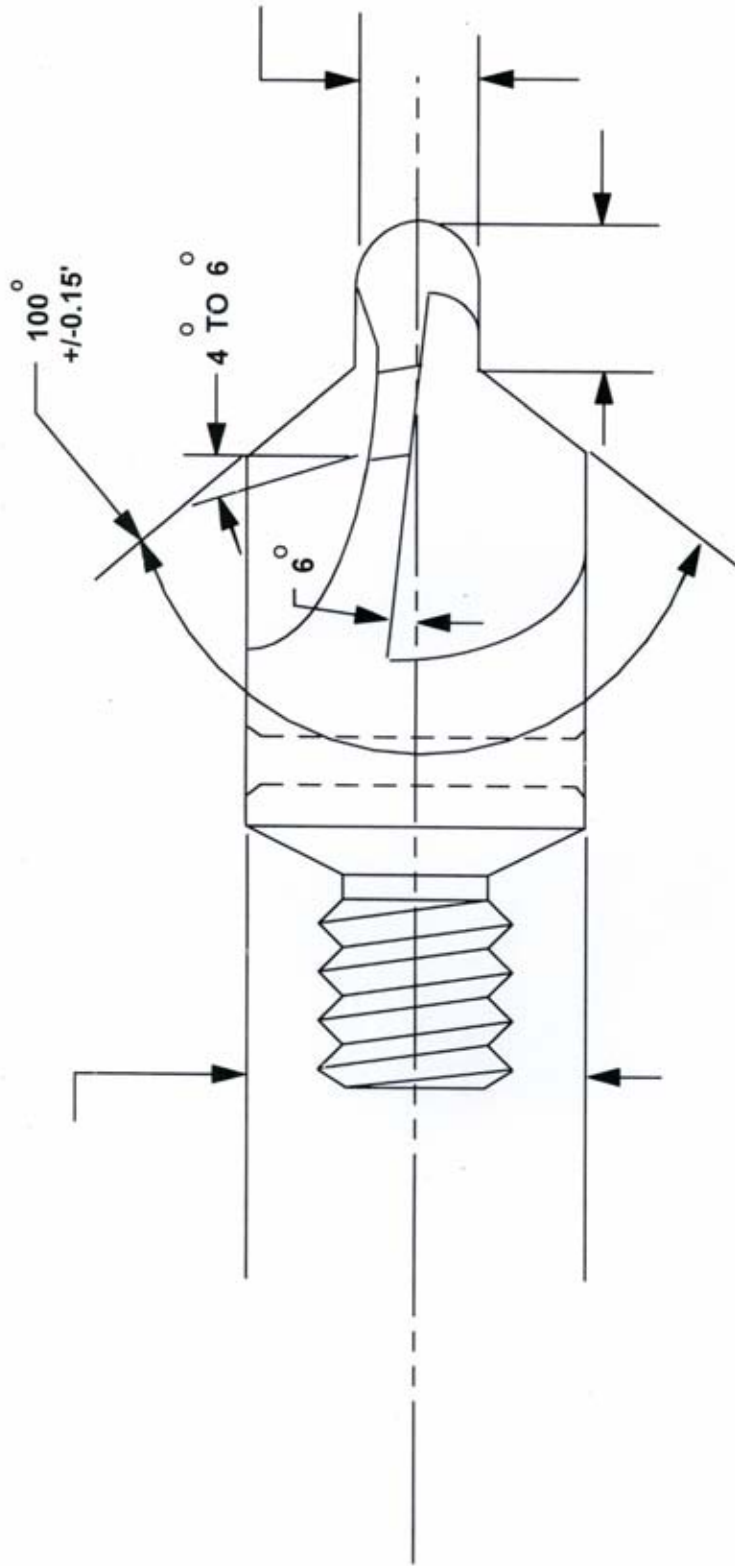
**PILOTED REAMER**

MATERIAL SIZE

MATERIAL: M-7

REV. A

SCALE: NONE



TOLERANCE UNLESS NOTED

DECIMAL: +/- .010

FRACTION: +/- 1/32

ANGLE: /- 0 30'

DRAWING NUMBER

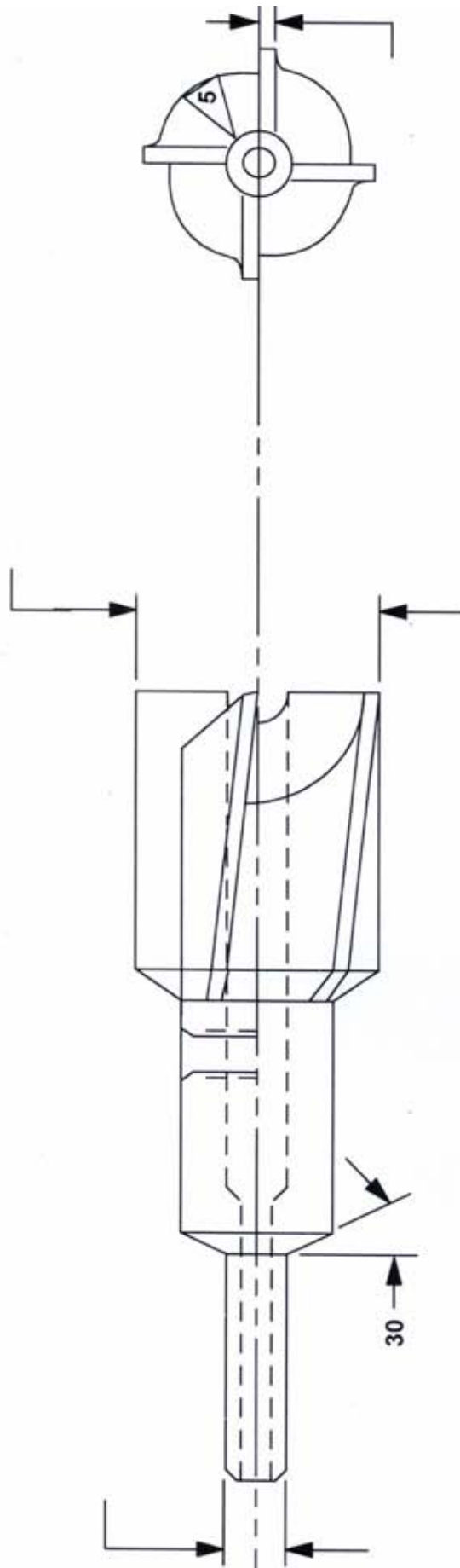
**420-3-100-**

DESCRIPTION:

**PILOTED COUNTERSINK**

SCALE: NONE

MATERIAL: M-7



TOLERANCE UNLESS NOTED

DECIMAL: +/- .010

FRACTION: +/- 1/32

ANGLE: / - 0 30'

DRAWING NUMBER

**434**

DESCRIPTION:

**COUNTERBORE SHORT SET**

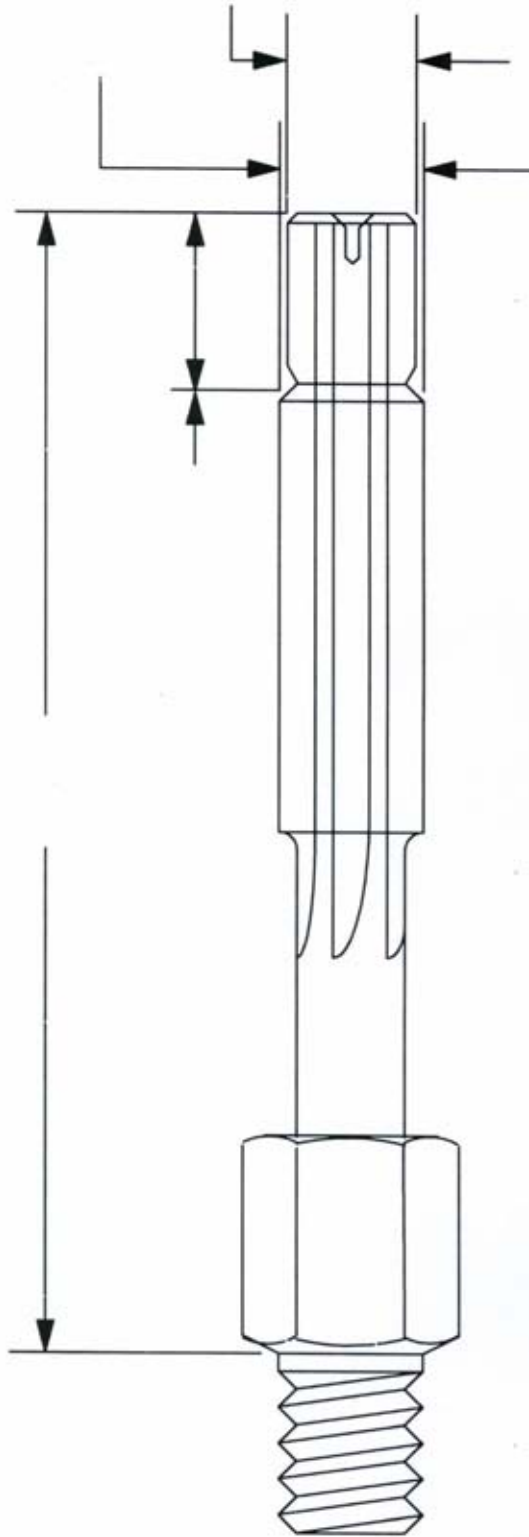
MATERIAL SIZE

MATERIAL: M-7

REV. A

SCALE: NONE





SCALE: NONE

MATERIAL: M-7

REV. A

DESCRIPTION:  
**PILOTED REAMER  
 THREADED SHANK**

TOLERANCE UNLESS NOTED

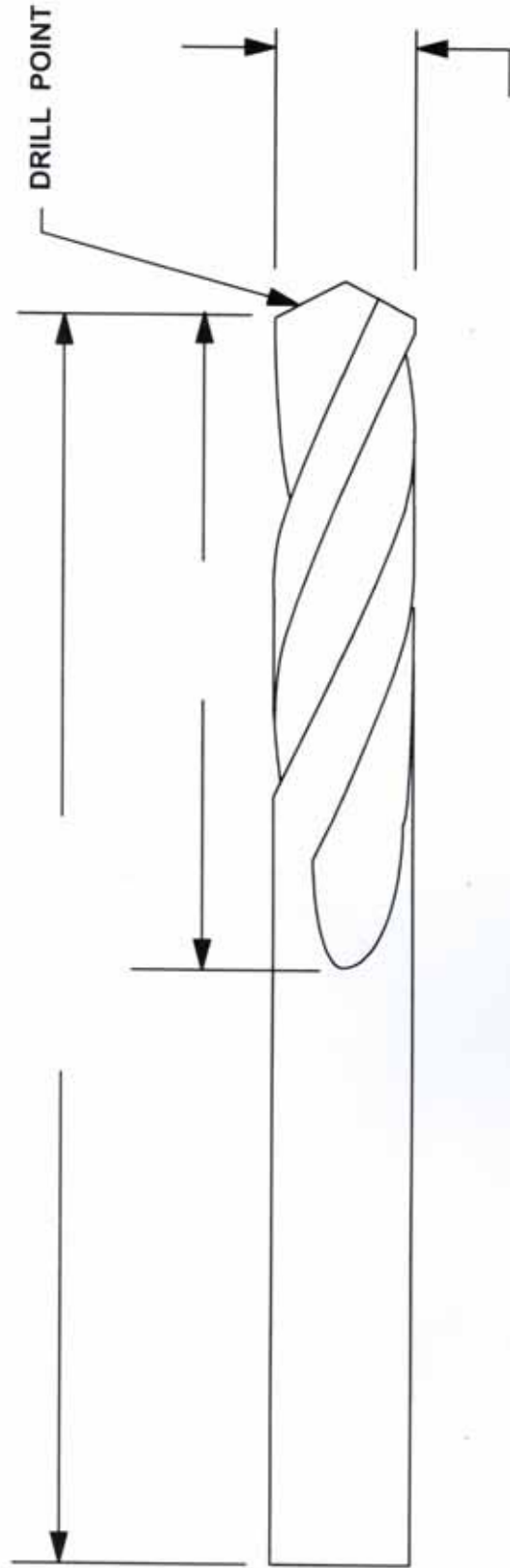
DECIMAL: +/- .010

FRACTION: +/- 1/32

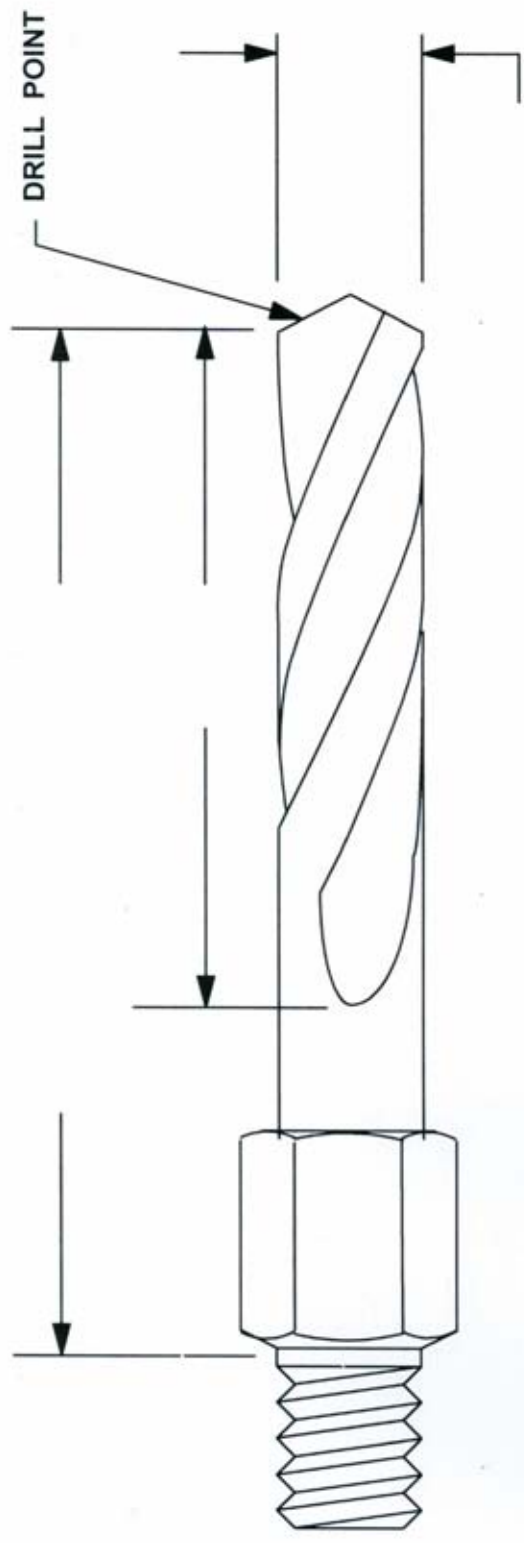
ANGLE: /- 0 30'

DRAWING NUMBER

**629P**



SCALE: NONE		<p>DESCRIPTION:</p> <p><b>UNCLEARED DRILL</b></p>	<p>TOLERANCE UNLESS NOTED</p> <p>DECIMAL: +/- .010</p> <p>FRACTION: +/- 1/32</p> <p>ANGLE: /- 0 30'</p>
MATERIAL:	REV. A		<p>DRAWING NUMBER</p> <p><b>ST1241FA</b></p>



TOLERANCE UNLESS NOTED  
 DECIMAL: +/- .010  
 FRACTION: +/- 1/32  
 ANGLE: /- 0 30'

DRAWING NUMBER  
**ST1241FA**

DESCRIPTION:  
**UNCLEARED DRILL**

SCALE: NONE

MATERIAL:

REV. A

# DECIMAL EQUIVALENTS CHART

## FRACTION, WIRE GAUGE, LETTER & METRIC SIZE DECIMAL EQUIVALENTS

SIZES	DECIMAL INCHES	SIZES	DECIMAL INCHES	SIZES	DECIMAL INCHES	SIZES	DECIMAL INCHES	SIZES	DECIMAL INCHES	SIZES	DECIMAL INCHES
97	.0059	59	.0410	2.75mm	.1083	5mm	.1969	7.6mm	.2992	1/2	.5000
96	.0063	1.05mm	.0413	7/64	.1094	8	.1990	N	.3020	13mm	.5118
95	.0067	58	.0420	35	.1100	5.1mm	.2008	7.7mm	.3031	33/64	.5156
94	.0071	57	.0430	2.8mm	.1102	7	.2010	7.75mm	.3051	17/32	.5312
93	.0075	1.1mm	.0433	34	.1110	13/64	.2031	7.8mm	.3071	13.5mm	.5315
92	.0079	1.15mm	.0453	33	.1130	6	.2040	7.9mm	.3110	35/64	.5469
.2mm	.0079	56	.0465	2.9mm	.1142	5.2mm	.2047	5/16	.3125	14mm	.5512
91	.0083	3/64	.0469	32	.1160	5	.2055	8mm	.3150	9/16	.5625
90	.0087	1.2mm	.0472	3mm	.1181	5.25mm	.2067	O	.3160	14.5mm	.5709
.22mm	.0087	1.25mm	.0492	31	.1200	5.3mm	.2087	8.1mm	.3189	37/64	.5781
89	.0091	1.3mm	.0512	3.1mm	.1220	4	.2090	8.2mm	.3228	15mm	.5906
8	.0095	55	.0520	1/8	.1250	5.4mm	.2126	P	.3230	19/32	.5938
.25mm	.0098	1.35mm	.0531	3.2mm	.1260	3	.2130	8.25mm	.3248	39/64	.6094
87	.0100	54	.0550	3.25mm	.1280	5.5mm	.2165	8.3mm	.3268	15.5mm	.6102
86	.0105	1.4mm	.0551	30	.1285	7/32	.2188	21/64	.3281	5/8	.6250
85	.0110	1.45mm	.0571	3.3mm	.1299	5.6mm	.2205	8.4mm	.3307	16mm	.6299
.28mm	.0110	1.5mm	.0591	3.4mm	.1339	2	.2210	Q	.3320	41/64	.6406
84	.0115	53	.0595	29	.1360	5.7mm	.2244	8.5mm	.3346	16.5mm	.6496
.3mm	.0118	1.55mm	.0610	3.5mm	.1378	5.75mm	.2264	8.6mm	.3386	21/32	.6562
83	.0120	1/16	.0625	28	.1405	1	.2280	R	.3390	17mm	.6693
82	.0125	1.6mm	.0630	9/64	.1406	5.8mm	.2283	8.7mm	.3425	43/64	.6719
.32mm	.0126	52	.0635	3.6mm	.1417	5.9mm	.2323	11/32	.3438	11/16	.6875
81	.0130	1.65mm	.0650	27	.1440	A	.2340	8.75mm	.3445	17.5mm	.6890
80	.0135	1.7mm	.0669	3.7mm	.1457	15/64	.2344	8.8mm	.3465	45/64	.7031
.35mm	.0138	51	.0670	26	.1470	6mm	.2362	S	.3480	18mm	.7087
79	.0145	1.75mm	.0689	3.75mm	.1476	B	.2380	8.9mm	.3504	23/32	.7188
1/64	.0156	50	.0700	25	.1495	6.1mm	.2402	9mm	.3543	18.5mm	.7283
.4mm	.0157	1.8mm	.0709	3.8mm	.1496	C	.2420	T	.3580	47/64	.7344
78	.0160	1.85mm	.0728	24	.1520	6.2mm	.2441	9.1mm	.3583	19mm	.7480
.45mm	.0177	49	.0730	3.9mm	.1535	D	.2460	23/64	.3594	3/4	.7500
77	.0180	1.9mm	.0748	23	.1540	6.25mm	.2461	9.2mm	.3622	49/64	.7656
.5mm	.0197	48	.0760	5/32	.1562	6.3mm	.2480	9.25mm	.3642	19.5mm	.7677
76	.0200	1.95mm	.0768	22	.1570	E	.2500	9.3mm	.3661	25/32	.7812
75	.0210	5/64	.0781	4mm	.1575	1/4	.2500	U	.3680	20mm	.7874
.55mm	.0217	47	.0785	21	.1590	6.4mm	.2520	9.4mm	.3701	51/64	.7969
74	.0225	2mm	.0787	20	.1610	6.5mm	.2559	9.5mm	.3740	20.5mm	.8071
.6mm	.0236	2.05mm	.0807	4.1mm	.1614	F	.2570	3/8	.3750	13/16	.8125
73	.0240	46	.0810	4.2mm	.1654	6.6mm	.2598	V	.3770	21mm	.8268
72	.0250	45	.0820	19	.1660	G	.2610	9.6mm	.3780	53/64	.8281
.65mm	.0256	2.1mm	.0827	4.25mm	.1673	6.7mm	.2638	9.7mm	.3819	27/32	.8438
71	.0260	2.15mm	.0846	4.3mm	.1693	17/64	.2656	9.75mm	.3839	21.5mm	.8465
.7mm	.0276	44	.0860	18	.1695	6.75mm	.2657	9.8mm	.3858	55/64	.8594
70	.0280	2.2mm	.0866	11/64	.1719	H	.2660	W	.3860	22mm	.8661
69	.0292	2.25mm	.0886	17	.1730	6.8mm	.2677	9.9mm	.3898	7/8	.8750
.75mm	.0295	43	.0890	4.4mm	.1732	6.9mm	.2717	25/64	.3906	22.5mm	.8858
68	.0310	2.3mm	.0906	16	.1770	I	.2720	10mm	.3937	57/64	.8906
1/32	.0312	2.35mm	.0925	4.5mm	.1772	7mm	.2756	X	.3970	23mm	.9055
.8mm	.0315	42	.0935	15	.1800	J	.2770	Y	.4040	29/32	.9062
67	.0320	3/32	.0938	4.6mm	.1811	7.1mm	.2795	13/32	.4062	59/64	.9219
66	.0330	2.4mm	.0945	14	.1820	K	.2810	Z	.4130		
.85mm	.0335	41	.0960	13	.1850	9/32	.2812	10.5mm	.4134	23.5mm	.9252
65	.0350	2.45mm	.0965	4.7mm	.1850	7.2mm	.2835	27/64	.4219	15/16	.9375
.9mm	.0354	40	.0980	4.75mm	.1870	7.25mm	.2854	11mm	.4331	24mm	.9449
64	.0360	2.5mm	.0984	3/16	.1875			7/16	.4375	61/64	.9531
63	.0370	39	.0995	4.8mm	.1890	7.3mm	.2874	11.5mm	.4528	24.5mm	.9646
95mm	.0374	38	.1015	12	.1890	L	.2900	29/64	.4531	31/32	.9688
62	.0380	2.6mm	.1024	11	.1910	7.4mm	.2913	15/32	.4688	25mm	.9843
61	.0390	37	.1040	4.9mm	.1929	M	.2950	12mm	.4724	63/64	.9844
1mm	.0394	2.7mm	.1063	10	.1935	7.5mm	.2953	31/64	.4844	1	1.0000
60	.0400	36	.1065	9	.1960	19/64	.2969	12.5mm	.4921		

Chart for reference only – MIST, Incorporated is not liable for accuracy.

# NOTES

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