

World Headquarters Taper Lock Tooling Helox-Shelox®

**Taper Lock Tooling
and Applications**



**TAPER LOCK
DEPTH SENSOR
SYSTEMS**
Pg Q10 - Q13



**COUNTERSINK
SUPER SENSOR
SYSTEMS**
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SENSOR
SYSTEMS**
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FASTENERS
STORY**
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**HELOX® SHANK
INSERTS**
Pg Q33



**HELOX®
ADAPTERS**
Pg Q32

Helox and
Shelox are
UNITED's
registered
trademark
names.



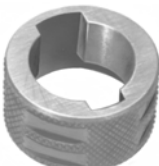
**490000 SERIES
HELOX® SHANK
INSERTS**
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SHELOX® SPRING Pg Q30



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HEAD UP**
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Taper Lock Information

The Taper Lock Fastening System

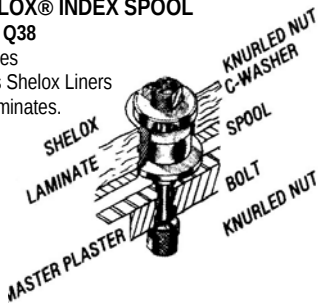


TAPER LOCK FASTENERS
PRECISION GROUND
CLOSE TOLERANCES
INTERFERENCE FIT
AUTOMATIC ALIGNMENT
FULL BEARING
UNIFORM LOADING
.0208 TOTAL TAPER PER INCH

SHELOX® INDEX SPOOL

Page Q38

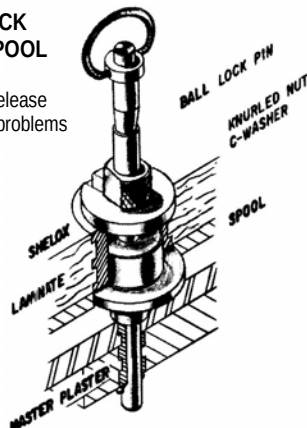
Locates
Holds Shelox Liners
In Laminates.



BALL LOCK INDEX SPOOL

Page Q38

For quick release
For space problems



World Headquarters

TAPER LOCK FASTENERS

1. Greatly increase structural joint fatigue life.
2. Save weight through structural thickness, fastener size and pattern density.
3. Are self-contained and self-locking.
4. Install faster and reduce costs.
5. Are self-sealing, providing a positive fuel seal by its simple proven geometry.
6. Have military approval for this type of application without the use of a sealant.



CONVENTIONAL FASTENER

IMBALANCED STRESS

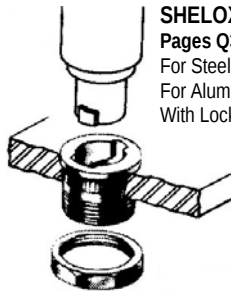
TAPER LOCK FASTENER
BALANCED STRESS
GREATER WEAR STRENGTH



SHELOX® LINERS

Pages Q34 - Q35

For Steel
For Aluminum
With Lock Nuts



Helox and Shelox are
UNITED's registered
trademark names.

SHELOX® LINERS

Page Q36

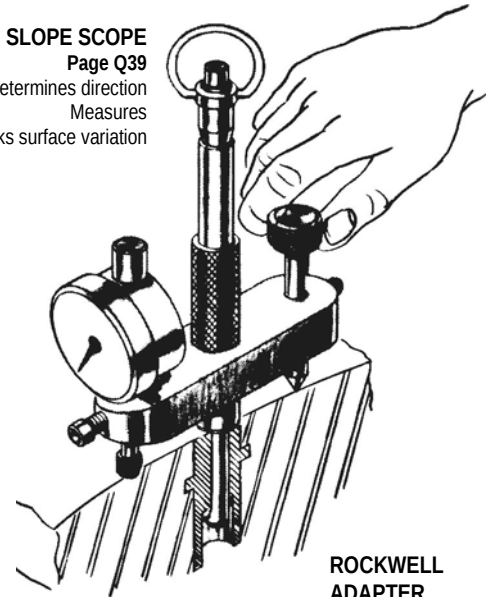
For Plastics
For Soft tools



SLOPE SCOPE

Page Q39

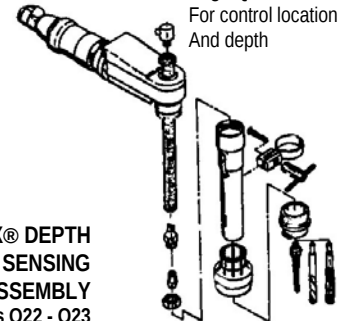
Determines direction
Measures
Marks surface variation



ROCKWELL ADAPTER

Page Q24

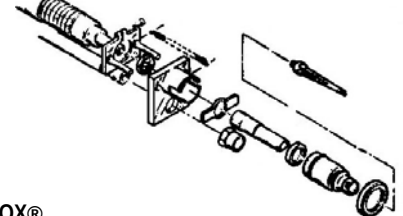
For control location
And depth



HELOX® DEPTH SENSING ASSEMBLY

Pages Q22 - Q23

For Spacematic
motors



HANDLE HELOX® ADAPTERS

Page Q37

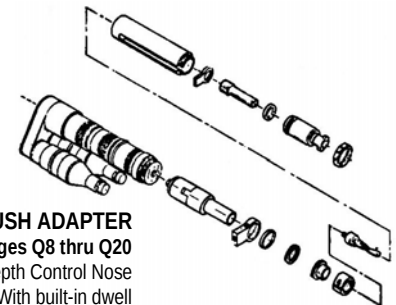
HELOX® ADAPTERS AND INSERTS
Pages Q2 thru Q33

HELOX® ADAPTERS WITH RENEWABLE BUSHINGS
Page Q37
FOR SHANK INSERTS
Page Q32

QUACKENBUSH ADAPTER

Pages Q8 thru Q20

Depth Control Nose
With built-in dwell



Taper Lock Tooling

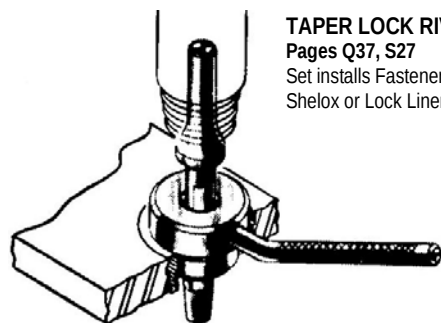
UNITED's COMPLETELY INTER-RELATED SYSTEM

1. Patent Numbers 3,829,977; 3,742,584; Patents Pending 3,756,736; 3,762,827.
2. Fixturing of many types.
3. Locating with precision.
4. Holding and Guiding systems.
5. Gauging precisely.
6. Installing Taper Lock and similar high performance systems.

Taper Lock Applications

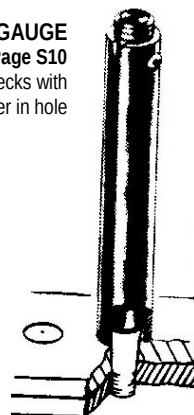
Helox and Shelox are UNITED's registered trademark names.

Helox® - Shelox® Gauge & Guidance

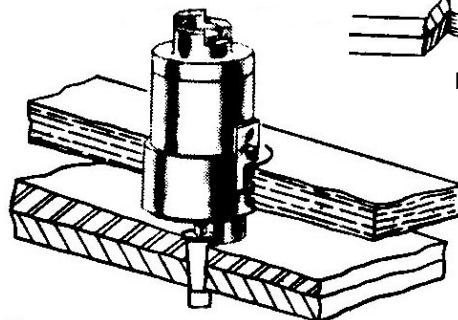


TAPER LOCK RIVET SET
Pages Q37, S27
Set installs Fastener thru
Shelox or Lock Liners

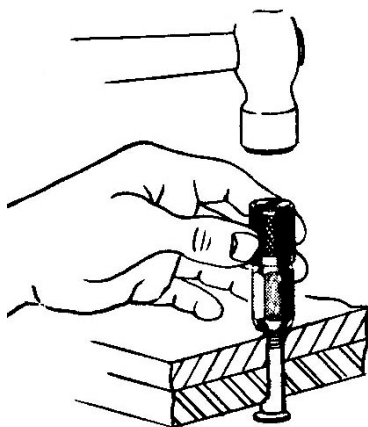
PROTRUSION GAUGE
Page S10
Checks with
Fastener in hole



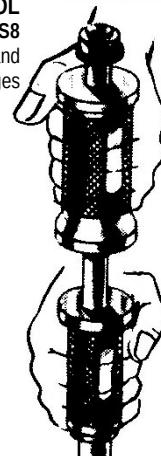
HELOX® PROTRUSION GAUGE
Page S10
Inspects through Shelox Liner



TAPER LOCK REMOVAL & KNOCKOUT TOOL Page Q41
Removes damaged or improperly set Fasteners.



IMPACT TOOL
Page S8
Inserts and
removes Gauges

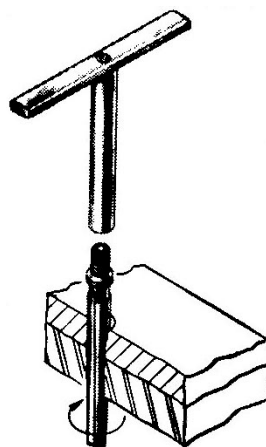


TAPERED HOLE CLEANER
Page Q40
Avoids pollution
in holes



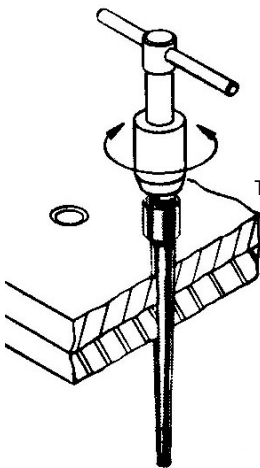
T-HANDLE and SINGLE FLUTED REAMER
Page R25

Removes only a few thousandths of material when required.



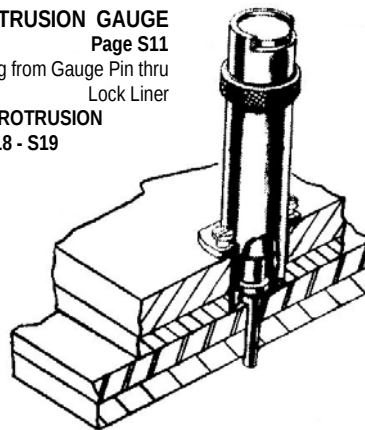
TAPERED PRECISION LAP
Page S26

To finish and size tapered holes



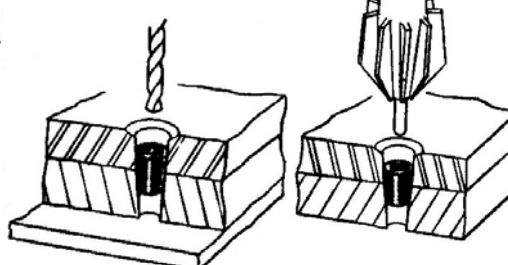
PROTRUSION GAUGE
Page S11
Checking from Gauge Pin thru
Lock Liner

4-WAY PROTRUSION
Pages S18 - S19



TAPERED BUSHINGS
Page Q41

To countersink, counterbore and transfer holes



TAPERED COUNTERSINK GAUGE
Pages S9, S15, S21 - S25

Checks countersink depth on tapered holes

TAPERED GAUGES
Pages S7, S12 - S17, S20

Precision to inspect hole bearing



THE TAPER LOCK STORY and HELPFUL TIPS

The Taper Lock Fastener System builds structures together and simultaneously adds greatly to their fatigue life. Taper Lock is a complete system of tapered drills, tapered fasteners and tapered gauges.

Taper Lock Fastener holes can be accomplished quickly with a high degree of accuracy, confidence and security.

It is essential that the Taper Lock System be accompanied by excellent craftsmanship. Regardless of the higher degree of accuracy, engineering and quality, the ultimate result depends on who builds the product.

The Taper Lock System has its own built-in quality controls. Reasonable care installations will ensure proud finished products. By following this exceptional system, each conscientious craftsman will receive great satisfaction knowing that each Fastener has been installed accurately. The obvious results obtained from excellence is gratification.



Taper Locks have changed the equations in structural life computations. These Fasteners and Systems are composed of tapered conical shank fasteners. Tapered precision holes, together with preloads and interference are all uniformly controlled.

The advancement of the interference fit effectively impacts preload. Radial compression, static preload and peripheral tension, effectively reduce stress and

proportionately improve fatigue life.

The high performance of Taper Lock Fasteners will continually provide structural integrity in existing and future designed vehicles and products.

The term *Taper Lock* is derived from the fact that this tapered fastener is self-locking. When the tapered fastener is inserted into a correctly tapered hole, the interference fit secures the fastener and locks it. This prohibits it from turning, eliminating wrenches, other types of holding and special costly operations.

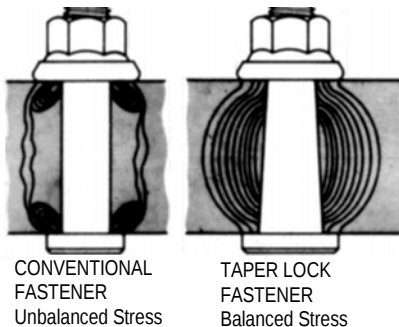
Taper Lock Fasteners have accurately ground

precision shanks inserted with a mating precision tapered hole and a mating Washernut® assembly. A washer and free turning nut make up the assembly that provides automatic washer centering. The "Washer Nut" is extremely strong. **The washer is captured to the nut while allowing the nut to turn freely.** These features eliminate the loss of washers or handling inventory and installations. Fumbling is eliminated.

Taper Lock's superiority is its controlled interference fit. Preload is induced at the wall of the hole and progresses through the material, diminishing to zero at some distance from the hole's edge.

Regular Fasteners must be driven or pressed the full length of the hole when attempting interference fits. This procedure forces the walls outward, tending to promote seizure, galling, plating damage and broaching the hole. The result is non-uniform preloading. This action creates areas of concentrated and near zero stress. Thus the fastener purpose is defeated.

The Taper Lock Fastener fits freely into the greatest portion of the hole and need travel only a short distance to become full interference, uniformly preloading as the walls expand. This provides longer wear and greater strength. This allows Taper



Locks to be removed without damage to the fastener or the hole.

Taper Lock's superior joint strength occurs through even load distribution and requires fewer fasteners. Closer hole spacing than other conventional fasteners is allowed. Nut height is reduced allowing greater wrenching freedom in inaccessible or tight places.

Two types of Taper Lock Fasteners exist—threaded and non-threaded. All threaded fasteners use the mating Washernut®.

Taper Lock Fasteners are available in grip lengths of 1/16 or 1/32 increments. Charts are provided by fastener manufacturers for the ranges of thickness for

The Taper Lock System

Depth Control, Guiding, Gauging & Fastener Installations

**Taper Lock
Drilling System**

each grip length.

The 100° Flush Head type fasteners are measured from the top of the head to the end of the full conical portion of the shank. The Protruding Head type fasteners are measured from under the head to the end of the conical shank.

The Taper Lock Drilling System has many qualified positive feed power and motor drilling units available. Quackenbush provides In Line, Right Angle and Self Colleting tools. They compete favorably for business with Cooper Tools, Rockwell, Buckeye, Gardner Denver, Peck Drill, Doler, Dotco, Chicago Pneumatic and Winslow Spacematic products.

Quackenbush offers Q-Matic to Spacematic customers. Quackenbush has gained fairly broad acceptance for use with drilling Taper Lock holes. *UNITED's Helox® Shelox®* and Nurlock Adapter Systems complement Quackenbush Positive Feed Motors. *Helox® Shelox®* assures the user drilling accuracy and precision depth control with total SPC Gauging for Taper Lock drilling and installation.



UNITED Taper Lock Tooling Components adapt to Spacematic, Quackenbush, Chicago Pneumatic, Rockwell, Cooper, Keller, Buckeye, Dotco, Doler, and Gardner Denver drill motors.

UNITED's Helox® Shelox® Depth Control and Sensor System designed for space saving drilling on irregular or contoured surfaces. *Helox® Shelox®* also adapts to these motors accurately guiding and directing cutters, coolant and controls to assure safe, secure and accurate Taper Lock drilling and fastener installation.



The **Spacematic**, a fast positive feed motor, is air operated with depth control. It requires ample operating room, but does not require pilot holes. Details are available in this section.

Chicago Pneumatic Power Motors are small air operated units and have maximum capability of 3/16

group 3 Taper Lock holes. These units can be used with *UNITED's* Micro Controlled Countersink Super Stops, also in this section. The Chicago Pneumatic Unit operates at 15000 r.p.m. Pilot holes are required for reaming.

Buckeye Power Units are medium size and air operated. Their units operate at 500 r.p.m. or more. Use *UNITED's* Micro Controlled Countersink Super Stop with Buckeye. They are shown in this section

Taper Lock Coolant and Cutting Fluids were explained by P.F.S. Omark Applications Engineering Laboratory as follows:

"ALUMINUM cutting fluids for drilling and reaming aluminum and other soft metals with high speed steel cutters are air, air and water mist, soluble oil in either mist or flooding forms, refrigerated air, liquefied Freon and light mixtures of mineral or lard oil. Soluble oil is most popular for a broad variety of applications when mixed in a ratio of 1:30 with water. Liquefied Freon is to be used with great care in well ventilated areas. This is due to high toxicity levels. Cetyl alcohol is suitable for hand reaming."

"TITANIUM and ALLOY STEEL Drilling and Reaming with M33 or M42 Cobalt high speed cutting uses air, air and water mist or flooding and liquefied Freon. Use liquefied Freon with great care and only in well ventilated areas. Beware of its high toxicity levels. For heavy duty drilling, sulphurized cutting oil containing only up to 2% active sulphur may be successfully used."

All types of Taper Lock Fasteners, with the exception of low interference type, do not require wrenching, sockets or other holding tools.

All Taper Locks are installed into a tapered hole simultaneously locking the fastener in the hole.

Seating the Taper Lock Threaded Fastener occurs through the transfer of torque onto the mating nut. Taper Lock Collars are swaged sealed with a rivet gun.

P.B. Fastener, Deutsch, SPS, Voi Shan and BlancAero all provide full and complete Taper Lock techniques and details for their respective fastener installation and removal.

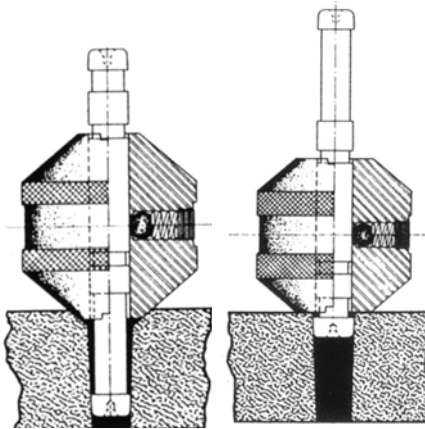
Taper Lock Gauging & Reaming

Taper Lock Tooling and For Drilling, Reaming, Countersinking, Tolerancing,

UNITED's commitment is to provide our industry Taper Lock quality tooling in line with our goal —

FIRST - ON TIME - FASTER - LOWER COST!

Taper Lock Gauges are provided by **UNITED** for checking hole diameters, countersinks, bearing, finish and depth.



The **UTLG-5100-A and -B Gauge Assemblies** check the hole diameter at two points for 100° countersink holes. Sleeve and Pin check 'B' charted diameter (lower check point) in the countersink hole. Reverse the bushing sleeve

UTLG-5100-A

UTLG-5100-B

and pin and check the upper 'B' diameter.

The **UTLG-5120 Countersink Depth Gauge** checks the depth at countersink holes and is used in setting up all drilling equipment to accurate depths.

Each Gauge is simple, accurate and a fast method of inspecting Taper Lock holes.

One advantage of the Taper Lock System is that the fastener itself acts as a gauge. Simply place this fastener in the hole by firm hand pressure and measure the protrusion of the head above the material. Divide the measurement by 48. The result is the exact interference between the fastener and the hole. **It is not possible to install the incorrect fastener in a Taper Lock hole.**

UNITED's Taper Lock Tooling System includes Air Motors, Depth Sensors, Drills, Drill Reamers, Micro Stop Cages, Guide Bushings, Fastener Installation and Removal Devices and all Product and Installation Gauges. **UNITED** conversion spindles



UTLG-5120

are available to adapt Spacematic, Q-matic and other air-powered tools to all **UNITED** tooling.

Selecting the correct Drill, Reamer, Countersink and hole sizes for Flush Head Fasteners or Protruding Head holes requires simple efficient operations.



Tapered tooling is provided for every Taper Lock size fastener.

The tapered tools are relieved on backout which eliminates chip galling and adds accuracy and smooth hole finishes. The famous Taper Lock Drill Reamer has cutting lips at the end of the tool and reamer flutes on the sides.

UNITED Taper Lock tools are manufactured to the highest standards of quality, precision and accuracy with the longevity required to complete your products on time the first time.

By using UNITED's precision tapered Depth Control and Gauge tooling, operator excellence can avoid these common pitfalls:

- A. Eccentricity from worn power tools, spindles or countersink cages
- B. Improper support of the power feed tools
- C. Forced feeding and excessive tool pressure
- D. Chip overload and galling
- E. Improperly sized pilot holes
- F. Incorrect tool feeds and speeds
- G. Dull tools causing crooked starts
- H. Improper drill alignment
- I. Inaccurate power feed, speed or stop adjustments
- J. Excessive dwell in the hole at the correct hole depth causing poor finish and oversized holes.

UNITED recommends these installation techniques:

- A. Hold the workpieces together clamped securely in place.
- B. Accurately drill pilot holes through precision Blocks and Drill Bars.
- C. Use correct Taper Drills, Drill Reamer Tools, Countersinks, Super Stop Cages and accurate Depth Control Units.
- D. Free the holes of chips and coolant before and after reaming.
- E. Press the fastener head down securely by hand

The Taper Lock System

Depth Control, Guiding, Gauging & Fastener Installations

TL Installation, Removal
& Final Gauge Check

- after placing in the hole.
- F. Check the head protrusion with the UTLG-5130 Gauge before installing the nut.
 - G. If head protrusion is accurate, install and tighten the nut with a rivet gun and bar.
 - H. Seat the fastener using a rivet gun and bucking bar with a hollow phenolic insert.
 - I. Place the aluminum swage collar over the fully seated grooved fastener end.
 - J. Place the gun with a rivet set over the collar with a bucking bar placed against the fastener head.
 - K. Apply rivet driving pressure and form the collar into the grooved end of the fastener.
 - L. When the fastener is fully seated, trim off any excess material.
 - M. The Taper Lock should now be fully swaged with a trimmed collar and tightly seated head.
 - N. The protrusion of the Taper Lock's fastener's threaded end must be within the specific protrusion limits.

The Taper Lock Fastener Removal Tool provides an easy means of removing the fastener. If the collar is improperly formed, cracked or loose, remove the fastener by first using a power tool with a hollow mill cutter until the cutter is seated on the fastener's end.



Remove the fastener with a sharp tap on **UNITED's Taper Lock Knock Out Tool** installed on the

fastener's threaded end without damaging the thread. (Refer to Taper Lock Knock Out Tool UDB-710255 in this section.) Clean the hole and reseal the fastener following **UNITED's** installation steps.

UNITED Micro Super Stop Drill Cages have indexing graduations which assure depth control within .001 inch. A Drill Bar Foot is provided which is placed flush to the workpiece surface to guide this Micro Super Stop precisely. This assures straight holes on size and normal to the workpiece.

When using **UNITED's Micro Controlled Countersink Super Stop**, be sure to keep the drill cage and drill bar perfectly flat against the structure before reaming commences.

Hold the unit firmly but allow a light feed pressure. Allowing your drill to dwell after the hole is completed will cause oversized holes. Withdraw while the motor is running.



Withdraw frequently to remove chips. Abnormal cutting or wobbling will also cause oversized holes. **When hand reaming or drilling, the pressure is of great importance. Less pressure and a "different feel" are required as compared to straight drilling.**

RECOMMENDED SPEEDS for DRILLING and REAMING			
GROUP	DIAMETER	RPM	CYCLE TIME
1	3/16 - 1/4	3000	8 - 12
1	5/16 - 3/8	1500	14 - 18

See the following speed recommendations in the chart. **UNITED Single Flute Taper Reamer—The Taper Scraper — The Final Finishing Tool** — is used to correct any slight irregularity in shape, size or finish of



Taper Lock holes drilled in sandwiched materials and checked with **UNITED** Taper Hole Gauges. The Single Flute Taper Reamer is best used with a T-Handle and is designed to remove only a few thousandths of material and creates a fine hole finish.

This tool should not be used where an actual hole enlargement is needed. If the tool needs to be sharpened, send it to us for re-sharpening.

Continue to check the hole with a UNITED Taper Hole Gauge. If it is found to be accurate, proceed with installation.



UTLG-5130-A

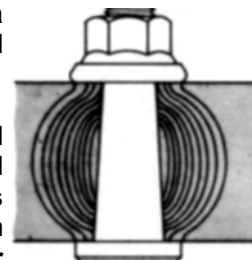


UTLG-5130-B

The UTLG-5130 Protrusion Gauges determine that the fasteners accurately fit the holes and have proper interference, flushness or protrusion.

When your fastener checks within protrusion limits, you have a successful, secure and positive installation!

Operator excellence coupled with UNITED experience and quality in Taper Lock products gives your application balanced stress, greater strength and longer wear!



***In-Line and Right
Angle Positive Feed***

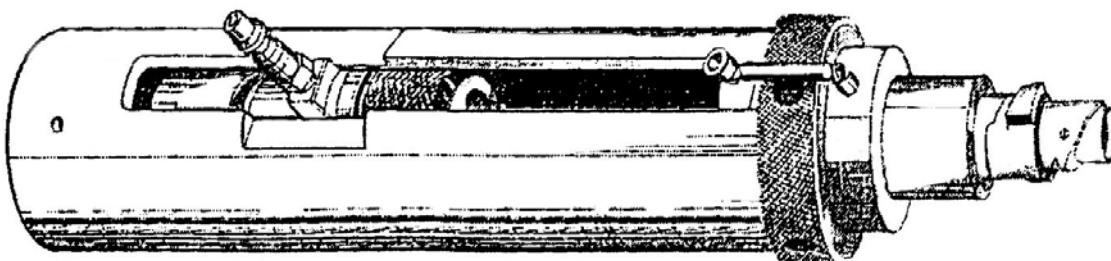
Precision Depth Sensors for Controlled Drilling

For In-Line and Right Angle Positive Feed Motors By Major Manufacturers

ARO, QUACKENBUSH, ROCKWELL and ZEPHYR TYPES



Full Scale Charts are available on request.



Precise Depth - Applications Coolant - Spindle - Dwell

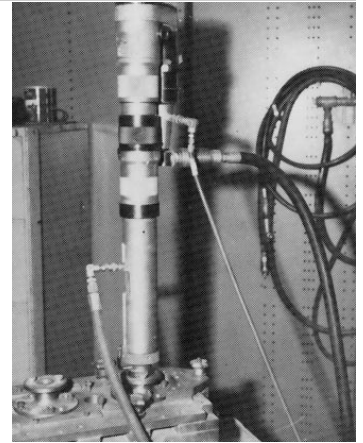
Technical
Information

DEPTH CONTROLLED - COOLANT APPLICATION - PRECISION SPINDLE - BUILT-IN DWELL

**UNITED'S FINEST
NOSE DEPTH SENSING
AND BUILT-IN DWELL ASSEMBLIES**
For use with Controlled Speed and Feed Drill Motors

- Precise depth within .0001★
- Built-in long wear coolant inducer
- Controlled Drill mechanism

Patent number 3,762,827



Features and Applications

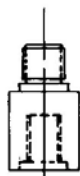
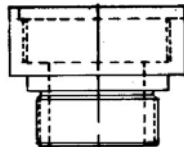
- The UDB-756170 series was **designed to fit** Dresser-Quackenbush QDA-11, QDA-12, QDA-13 and QDP-27 models.
- Specify UDB-756171 for use with QDA-11, UDB-756173 for QDA-13 and UDB-756177 for QDP-27A, Rockwell 61-PA-PD and ARO models FP08 and FP02. These motors have **controlled feeds and speeds**.
- **Floating sensing sleeve** makes contact with the work surface regardless of fixture deflection.
- ★ The **angular sensing sleeve** will contact irregular or contoured surfaces and control drill and countersink depth within .0001 when using *UNITED's* Super Stop Fine adjusting nut.
- These depth sensing units are **self-compensating** with plus or minus 3/16" (a total of 3/8").
- The units herein can be equipped **with UNITED's Helox® Adapters for use with Shelox® Liners. UNITED's Nurlock Adapters and Bushing Tips** (Keller style) are also adaptable to these units.
- For best performance, **air-line pressure** should be 90 - 100 PSI. Maximum hose and fitting I.D.s are recommended.
- **Built-in coolant inducer** supplies coolant through the spindle to the cutting tools. Inducers incorporate fittings to suit "mistmatic" spray units which are recommended for use during drill-ream cycles.
- These units have **built-in dwell**. Each incorporates a precision adapter spindle which is internally threaded to suit standard Taper Lock drills, reamers and related cutting tools. Units are **positive locking and positioning**.
- A **two-step method** is generally used with these units when preparing holes for tapered fasteners: A pilot hole is first pre-drilled; then the pilot hole is taper drilled and reamed to full size. Suggested pre-drill holes sizes are available on request.
- A **four-step method** for tapered fastener hole preparation may also be used. Recommended sequence is as follows:
 1. Pre-drill pilot hole.
 2. Ream pilot hole to suit pilot on taper drill/ream cutters.A
 3. Rough taper drill to approximately 90% of full size.
 4. Finish taper ream to full size.
- Detailed information is available by calling *UNITED*.

Taper Lock Sensors

ADAPTER QDP 27A SENSOR TO QDA 11 OR QDA 12 SENSOR



UDB-731206-A ADAPTER
QDA 11 or QDA 12
DWELL to QDP 27A SENSOR



UDB-731205 ADAPTER
QDP 27A
DWELL to QDA 11 or QDA 12
SENSOR

DETERMINING LENGTH

To determine lengths of sensing sleeves and spindles.

EXAMPLE: QDA 12 Motor 1/2" cutter group 3 AR
with 2-5/8 standoff

SPINDLE

Deduct cutter body length 'G' (1.00) from standoff (2.625).

Add the 'A' (4.6) spindle dimension in the QDA 12 column block to the result of standoff minus 'G' (1.625) for a minimum spindle length of (6.225).

SENSING SLEEVE

Add the standoff (2.625) to the 'B' (3.00) dimension for (5.625) minimum sleeve length.

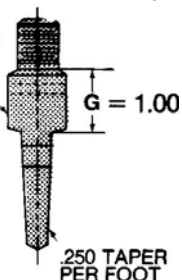
SENSING SLEEVE

2.625 Standoff
3.00 'B' dimension
5.625 Min. Sleeve

SPINDLE

2.625 Standoff
1.00 'G' dimension
1.625
4.6 'A' dimension
6.225 Min. Spindle

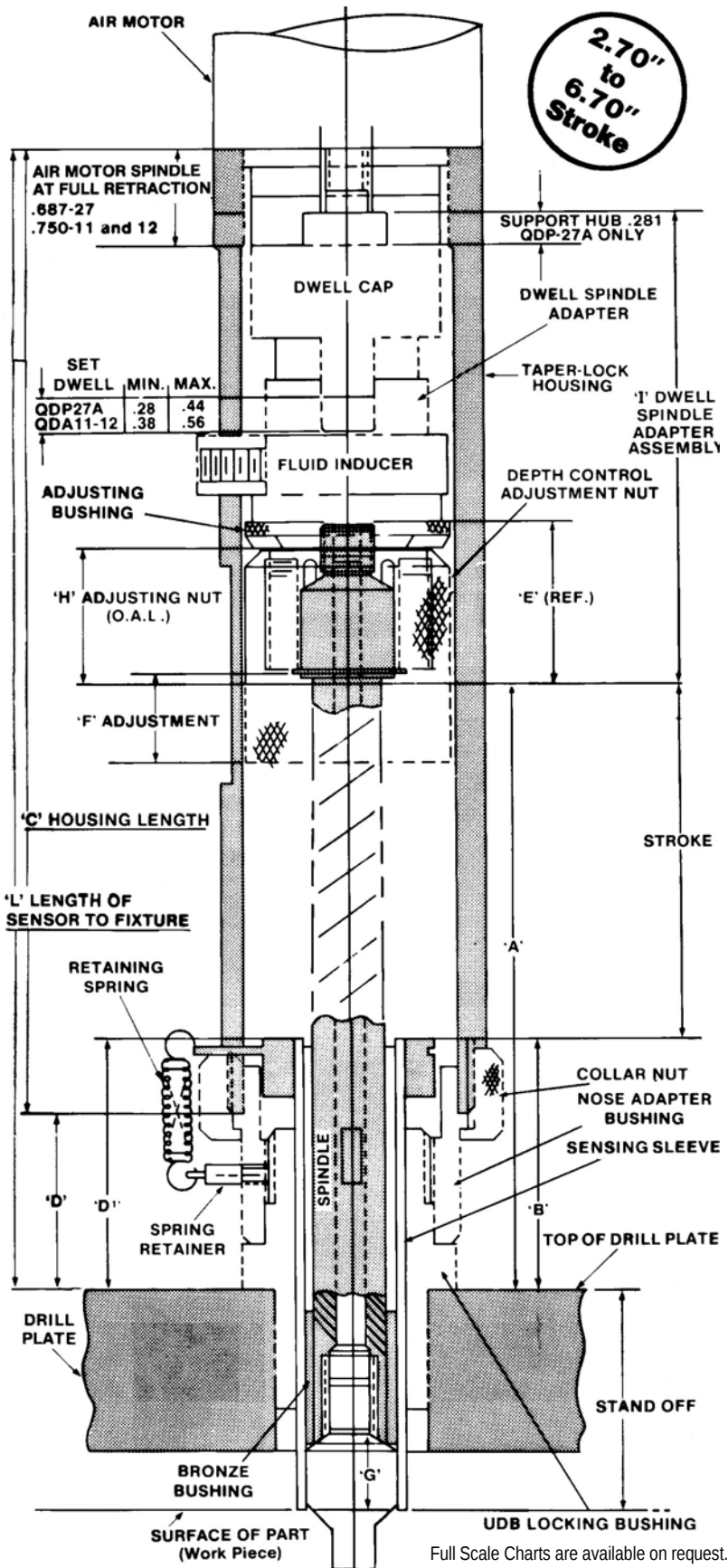
CUTTER BODY



EXAMPLE

.250 TAPER
PER FOOT

Taper Lock Sensor Systems



Full Scale Charts are available on request.

Taper Lock Sensor Systems

Ordering Taper Lock Sensors

QDA 11, QDA 12 OR QDP 27A TAPER LOCK SENSORS

ORDERING EXAMPLE

BASE NO.	LOCK SERIES HELOX OR KELLER	FIXTURE HOLE	STAND OFF	SENSING SLEEVE I.D.	SENSING SLEEVE O.D.	LENGTH SENSING SLEEVE	SPINDLE LENGTH	SERIES CUTTER
UDB-756173	K-26	2.375	2.625	1.721	1.922	6.325	3.825	12-3AR

- All dimensions listed are with motor spindle fully extended and depth control adjustment nut in pre-adjusted position.
- 'A' and 'B' dimensions have been increased by 1/4" to assure adequate motor stroke for dwell and to compensate for standoff tolerances.
- Available stroke for retracting spindle reduces as 'A' and 'B' dimensions increase.
- Sleeve length must be sufficient so spindle guide will remain inside sleeve when cutter is fully retracted. If spindle guide is not inside sleeve at start of cut, coolant loss will occur.
- For larger diameters, if the cutter length exceeds available stroke of unit, cutters must be shortened by tool design.
- Capacities noted are for steel or titanium. Larger sizes can be accommodated for aluminum within stroke and sleeve/bushing diameter limitations.
- When cutter dimension is added to spindle length, the sleeve-spindle relationship must be within reference 'E' and within the 'F' adjustment.
- To determine sensing sleeve and spindle length, know your standoff and cutter dimensions.
- Standoff can also be altered by changing the length of the nose adapter bushing. Changes in this component will alter the lengths of the spindle 'A' dimension and sensing sleeve 'B' dimension. Additional nose adapter bushing lengths are available.
- The stroke can be altered by changing the lengths of the adjusting nut. If alterations are required in excess of the maximum adjustment, the adjusting bushing must be changed accordingly. Additional lengths are available.
- UDB-756172 sensors for QDA 12 have a longer stroke and will adapt to the QDA 13 motor for longer cutters.

BUSHING O.D. DRILL PLATE HOLE ASSEMBLY NO.	MOTOR KELLER SERIES HELOX SERIES	MAX. STROKE	A SPINDLE LENGTH	B SLEEVE LENGTH	C HOUSING LENGTH	D ADAPTER FIXTURE	E SPINDLE INSIDE ADAPTER	F ADJUSTMENT NUT	H ADJUSTMENT NUT OVERALL	I DWELL SPINDLE ADAPTER ASSY	L LENGTH OF SENSOR TO FIXTURE	MAX. CAPACITY
.875 UDB-756177-5-23-.875	QDP 27A UDB-A23000 UDB-A530000	2.7	4.3 BRONZE BUSHING .687 I.D. .687 O.D.	3.0 .687 I.D. .781 O.D.	8.87 ALUM BLUE	2.0	1.3	.75	1.5	4.6	10.87	3/16 GP-1, 2, 3 1/4 GP-1, 2 ★5/16 GP-1, 2
1.125 UDB-756177-5-23-1.125	QDP 27A UDB-A23000 UDB-A530000	2.7	4.3 BRONZE BUSHING .875 I.D. .875 O.D.	3.0 .875 I.D. 1.00 O.D.	8.87 ALUM BLUE	2.0	1.3	.75	1.5	4.6	10.87	1/4 GP-1, 2, 3 5/16 GP-1, 2, 3▲
1.000 UDB-756177-4-24-1.000	QDP 27A UDB-A24000 UDB-A540000	2.7	4.3 BRONZE BUSHING .750 I.D. .750 O.D.	3.0 .750 I.D. .875 O.D.	8.87 ALUM BLUE	2.0	1.3	.75	1.5	4.6	10.87	1/4 GP-1, 2, 3 ★5/16 GP-1, 2, 3▲
1.250 UDB-756177-5-24-1.250	QDP 27A UDB-A24000 UDB-A540000	2.7	4.3 BRONZE BUSHING .750 I.D. .750 O.D.	3.0 .750 I.D. 1.00 O.D.	8.87 ALUM BLUE	2.0	1.3	.75	1.5	4.6	10.87	1/4 GP-1, 2, 3 ★5/16 GP-1, 2, 3▲
1.375 UDB-756177-6-24-1.375	QDP 27A UDB-A24000 UDB-A540000	2.7	4.3 BRONZE BUSHING .875 I.D. .875 O.D.	3.0 .750 I.D. 1.00 O.D.	8.87 ALUM BLUE	2.0	1.3	.75	1.5	4.6	10.87	1/4 GP-1, 2, 3 ★5/16 GP-1, 2, 3▲ ★3/8 GP-1, 2
1.375 UDB-756177A-6-24-1.375	QDP 27A UDB-A24000 UDB-A540000	2.7	4.3 BRONZE BUSHING 1.00 I.D. 1.00 O.D.	3.0 1.00 I.D. 1.125 O.D.	8.87 ALUM BLUE	2.0	1.3	.75	1.5	4.6	10.87	5/16 GP-1, 2, 3▲ 3/8 GP-1, 2, 3▲
1.250 UDB-756171-5-24-1.250	QDA 11 UDB-A24000 UDB-A540000	4.0	4.6 BRONZE BUSHING .750 I.D. .750 O.D.	3.0 .750 I.D. 1.00 O.D.	10.88 ALUM GOLD	2.0	1.6	1.5	1.8	5.3	12.88	1/4 GP-1, 2, 3 ★5/16 GP-1, 2, 3
1.375 UDB-756171-9-24-1.375	QDA 11 UDB-A24000 UDB-A540000	4.0	4.6 BRONZE BUSHING 1.125 I.D. 1.125 O.D.	3.0 1.125 I.D. 1.250 O.D.	10.88 ALUM GOLD	2.0	1.6	1.5	1.8	5.3	12.88	1/4 GP-3 5/16 GP-3 3/8 GP-1, 2, 3, 4 7/16 GP-1, 2 1/2 GP-1, 2 ★9/16 GP-1
2.000 UDB-756171-12-25-2.000	QDA 11 UDB-A24000 UDB-A540000	4.0	5.6 BRONZE BUSHING 1.750 I.D. 1.750 O.D.	4.0 1.750 I.D. 1.875 O.D.	10.88 ALUM GOLD	2.75 D ¹ 3.75	1.6	1.5	1.8	5.3	13.63	9/16 GP-1 5/8 GP-1 3/4 GP-1
1.375 UDB-756172-9-24-1.375	QDA 12 UDB-A24000 UDB-A540000	4.0	4.6 BRONZE BUSHING 1.125 I.D. 1.125 O.D.	3.0 1.125 I.D. 1.250 O.D.	13.50 STEEL GREEN	2.0	1.6	1.5	1.8	5.3	15.50	7/16 GP-3 1/2 GP-3 ★9/16 GP-1, 2
2.000 UDB-756172-14-25-2.000	QDA 12 UDB-A25000 UDB-A550000	4.0	5.6 BRONZE BUSHING 1.750 I.D. 1.750 O.D.	4.0 1.750 I.D. 1.875 O.D.	13.50 STEEL GREEN	2.75 D ¹ 3.75	1.6	1.5	1.8	5.3	16.25	9/16 GP-1, 2 5/8 GP-1, 2 3/4 GP-1, 2 ★7/8 GP-1, 2▲

★ O.D. Reduced ▲ Alter Length

Manufactured as Required.

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800) 421-3466 IN CA / (800) 486-3466 • FAX (562) 803-6898 / (800) 486-3465

7-7-00

EMAIL united@ucc-udb.com WEBSITE www.ucc-udb.com

Q11

Taper Lock Sensors

Right Angle Motor Depth Sensor Systems

RIGHT ANGLE MOTOR DEPTH SENSORS



Use with
Quackenbush,
Rockwell
and Zephyr
Right-Angle
Motors

DETERMINING LENGTH

To determine lengths of sensing sleeves and spindles.

EXAMPLE: QCQ-C2AA Motor 3/8" countersink cutter with 2-5/8 standoff

SPINDLE

Deduct cutter body length 'G' from standoff (2.625). Add the 'A' (3.4) spindle dimension in the sensor column block to the result of standoff minus 'G' (1.505) for a minimum spindle length of (4.905).

SENSING SLEEVE

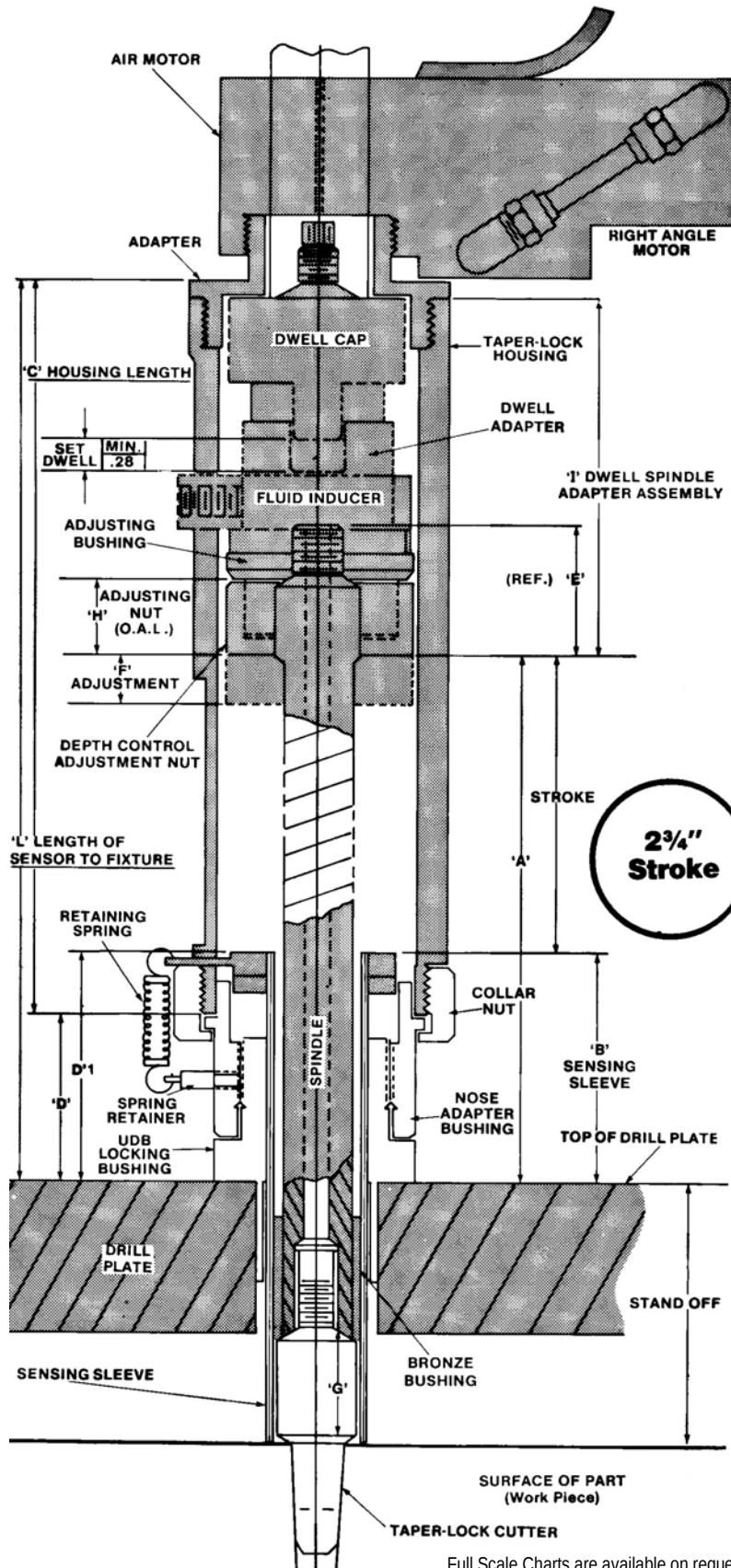
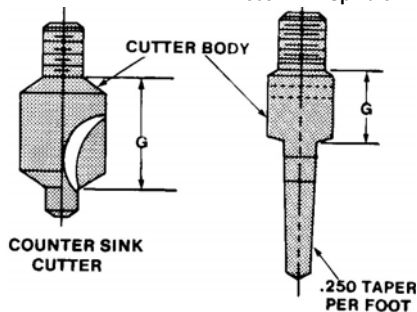
Add the standoff (2.625) to the 'B' (2.4) dimension for (5.025) minimum sleeve length.

SENSING SLEEVE

2.625 Standoff
2.40 'B' dimension
5.025 Min. Sleeve

SPINDLE

2.625 Standoff
1.12 'G' dimension
1.505
3.4 'A' dimension
4.905 Min. Spindle



Full Scale Charts are available on request.

Taper Lock Sensor Systems

Ordering Right Angle Depth Sensors

RIGHT ANGLE MOTOR TAPER LOCK DEPTH SENSORS

ORDERING EXAMPLE

BASE NO.	LOCK SERIES HELOX OR KELLER	FIXTURE HOLE	STAND OFF	SENSING SLEEVE I.D.	SENSING SLEEVE O.D.	LENGTH SENSING SLEEVE	SPINDLE LENGTH	SERIES CUTTER
UDB-756162A	K-24	1.375	2.625	1.000	1.187	5.025	4.905	3/8 C'SINK

- All dimensions listed are with motor spindle fully extended and depth control adjustment nut in pre-adjusted position.
- 'A' and 'B' dimensions have been increased by 1/4" to assure adequate motor stroke for dwell and to compensate for standoff tolerances.
- Available stroke for retracting spindle reduces as 'A' and 'B' dimensions increase.
- Sleeve length must be sufficient so spindle guide will remain inside sleeve when cutter is fully retracted. If spindle guide is not inside sleeve at start of cut, coolant loss will occur.
- For larger diameters, if the cutter length exceeds available stroke of unit, cutters must be shortened by tool design.
- Capacities noted are for steel or titanium. Larger sizes can be accommodated for aluminum within stroke and sleeve/bushing diameter limitations.
- When cutter dimension is added to spindle length, the sleeve-spindle relationship must be within reference 'E' and within the 'F' adjustment.
- To determine sensing sleeve and spindle length, know your standoff and cutter dimensions.
- Standoff can also be altered by changing the length of the nose adapter bushing. Changes in this component will alter the lengths of the spindle 'A' dimension and sensing sleeve 'B' dimension. Additional nose adapter bushing lengths are available.
- The stroke can be altered by changing the lengths of the adjusting nut. If alterations are required in excess of the maximum adjustment, the adjusting bushing must be changed accordingly. Additional lengths are available.
- Manufactured as required.

BUSHING O.D. DRILL PLATE HOLE ASSEMBLY NO.	MOTOR KELLER SERIES HELOX SERIES	MAX. STROKE	A SPINDLE LENGTH	B SLEEVE LENGTH	C HOUSING LENGTH	D ADAPTER FIXTURE	E SPINDLE INSIDE ADAPTER	F ADJUSTMENT NUT	H ADJUSTMENT NUT OVERALL	I DWELL SPINDLE ADAPTER ASSY	L LENGTH OF SENSOR TO FIXTURE	MAX. CAPACITY
.750 UDB-756172A-4-22-.750	QCQ-C2AA QCQ-B2 ZT802 UDB-A22000 UDB-A520000	3.0	3.4 BRONZE BUSHING .500 O.D.	2.4 .500 I.D. .625 O.D.	7.4 ALUM RED	1.5	1.0	.50	.75	3.6	8.9	★ 3/16 GP-1, 2 ★ 1/4 GP-1, 2
.875 UDB-756172A-5-23-.875	QCQ-C2AA QCQ-B2 ZT812 UDB-A23000 UDB-A530000	3.0	3.4 BRONZE BUSHING .687 O.D.	2.4 .687 I.D. .781 O.D.	7.4 ALUM RED	1.5	1.0	.50	.75	3.6	8.9	3/16 GP-1, 2, 3 1/4 GP-1, 2 ★ 5/16 GP-1, 2
1.125 UDB-756172A-5-23-1.125	QCQ-C2AA QCQ-B2 ZT812 UDB-A23000 UDB-A530000	3.0	3.4 BRONZE BUSHING .875 O.D.	2.4 .875 I.D. 1.00 O.D.	7.4 ALUM RED	1.5	1.0	.50	.75	3.6	8.9	1/4 GP-1, 2, 3 5/16 GP-1, 2, 3
1.250 UDB-756172A-8-24-1.250	QCQ-C2AA QCQ-B2 ZT812 UDB-A24000 UDB-A540000	3.0	3.4 BRONZE BUSHING .875 O.D.	2.4 .875 I.D. 1.062 O.D.	7.4 ALUM RED	1.5	1.0	.50	.75	3.6	8.9	1/4 GP-1, 2, 3, 4 5/16 GP-1, 2, 3, 4 3/8 GP-1, 2, 3, 4 7/16 GP-1, 2, 3▲, 4▲ ★ 1/2 GP-1
1.375 UDB-756172A-8-24-1.375	QCQ-C2AA QCQ-B2 ZT812 UDB-A24000 UDB-A540000	3.0	3.4 BRONZE BUSHING 1.00 O.D.	2.4 1.000 I.D. 1.187 O.D.	7.4 ALUM RED	1.5	1.0	.50	.75	3.6	8.9	1/4 GP-1, 2, 3, 4 5/16 GP-1, 2, 3, 4 3/8 GP-1, 2, 3▲, 4▲ ★ 1/2 GP-1, 2
2.000 UDB-756172A-10-25-2.000	QCQ-C2AA ZT812 UDB-A25000 UDB-A550000	3.2	3.75 BRONZE BUSHING 1.500 O.D.	2.75 1.500 I.D. 1.750 O.D.	8.2 ALUM RED	1.5 D ¹ 2.437	1.0	.50	.75	3.6	9.7	1/2 GP-1, 2, 3▲, 4▲ 9/16 GP-1, 2▲, 3▲ 5/8 GP-1-AR-BR
2.375 UDB-756172A-14-26-2.375	QCQ-C2AA UDB-A26000 UDB-A560000	4.0	3.75 BRONZE BUSHING 1.500 O.D.	2.75 1.500 I.D. 1.750 O.D.	8.7 ALUM RED	1.5 D ¹ 2.437	1.0	.50	.75	3.6	10.2	1/2 GP-1, 2, 3, 4 9/16 GP-1, 2, 3 5/8 GP-1, 2▲, 3▲ ★ 3/4 GP-1 ★ 7/8 GP-1

RIGHT ANGLE SENSORS FOR COUNTERSINK ONLY

1.250 UDB-756162A-6-24-1.250	QCQ-C2AA UDB-A24000 UDB-A540000	1.0	3.4 BRONZE BUSHING .750 O.D.	2.4 .875 I.D. 1.062 O.D.	5.4 ALUM RED	1.5	1.0	.50	.75	3.6	6.9	1/4 C'SINK 5/16 ★ 3/8
1.375 UDB-756162A-6-24-1.375	QCQ-C2AA UDB-A24000 UDB-A540000	1.0	3.4 BRONZE BUSHING 1.125 O.D.	2.4 .875 I.D. 1.188 O.D.	5.4 ALUM RED	1.5	1.0	.50	.75	3.6	6.9	1/4 C'SINK 5/16 ★ 3/8

★ O.D. Reduced ▲ Alter Length

Manufactured as Required.

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Q13

Taper Lock Super Sensors

UNITED Countersink Super Sensor Systems

COUNTERSINK SUPER SENSORS



Use with ARO
Quackenbush,
Rockwell
and Zephyr
Motors

DETERMINING LENGTH

To determine lengths of sensing sleeves and spindles.

EXAMPLE: QDA 12 Motor 1/2" cutter Group 3 AR
with 2-5/8 standoff

SPINDLE

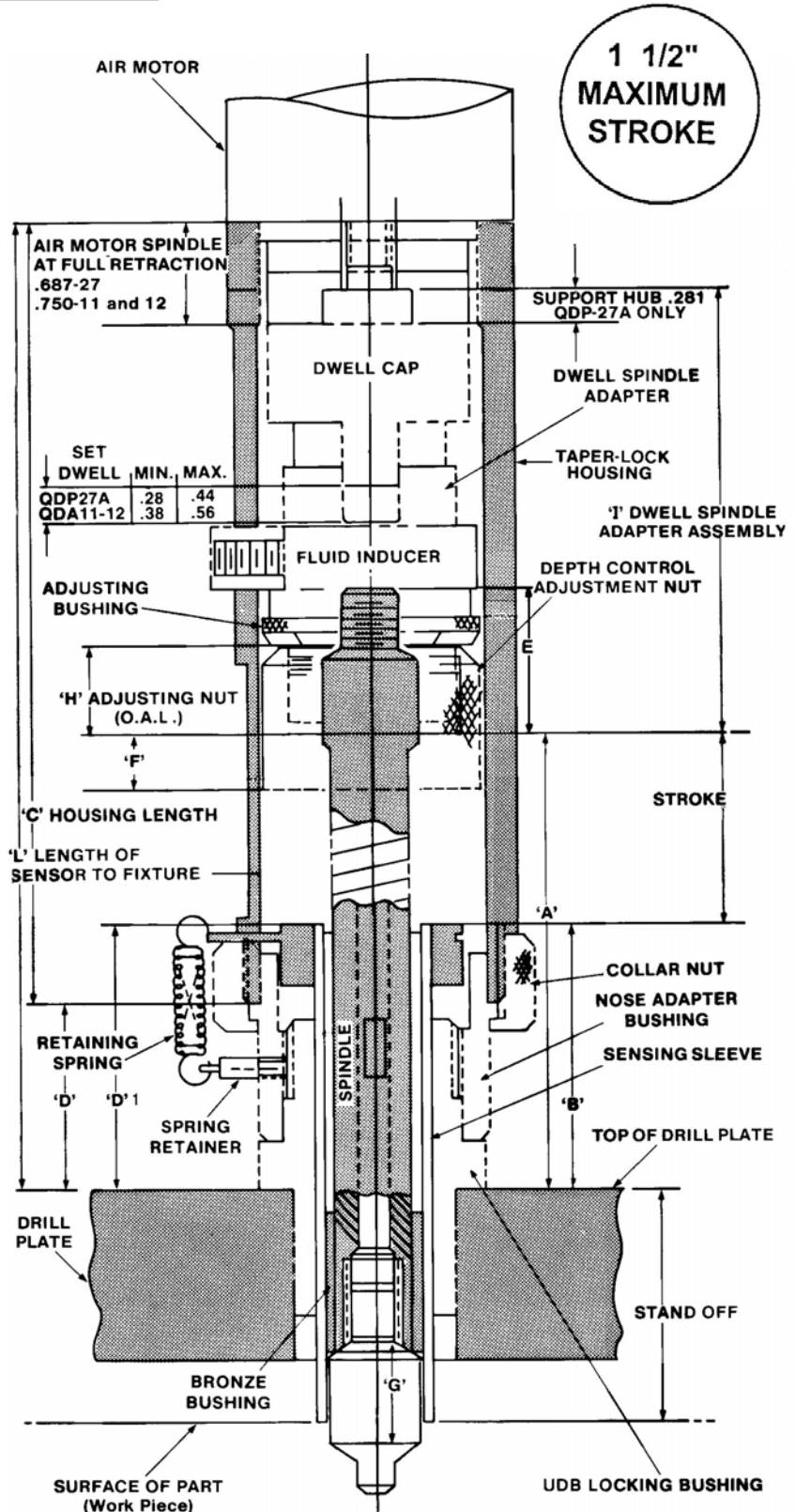
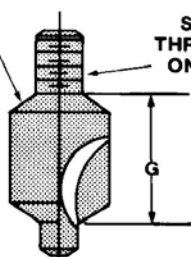
Deduct cutter body length 'G' from standoff (2.625).
Add the 'A' (4.0) spindle dimension in the QDA 12
column block to the result of standoff minus 'G' (1.505)
for a minimum spindle length of (5.505).

SENSING SLEEVE

Add the standoff (2.625) to the 'B' (3.0) dimension for
(5.625) minimum sleeve length.

SENSING SLEEVE	SPINDLE
2.625 Standoff	2.625 Standoff
3.00 'B' dimension	1.12 'G' dimension
5.625 Min. Sleeve	1.505
	4.0 'A' dimension
	5.505 Min. Spindle

COUNTERSINK CUTTER BODY



Full Scale Charts are available on request.

Taper Lock Super Sensor Systems

Ordering Countersink
Super Sensors

COUNTERSINK
SUPER SENSORS

ORDERING EXAMPLE

BASE NO.	LOCK SERIES HELOX OR KELLER	FIXTURE HOLE	STAND OFF	SENSING SLEEVE I.D.	SENSING SLEEVE O.D.	LENGTH SENSING SLEEVE	SPINDLE LENGTH	SERIES CUTTER
UDB-756162	K-24	1.375	2.625	1.125	1.250	5.625	6.225	8-3AR

- All dimensions listed are with motor spindle fully extended and depth control adjustment nut in pre-adjusted position.
- 'A' and 'B' dimensions have been increased by 1/4" to assure adequate motor stroke for dwell and to compensate for standoff tolerances.
- Available stroke for retracting spindle reduces as 'A' and 'B' dimensions increase.
- Sleeve length must be sufficient so spindle guide will remain inside sleeve when cutter is fully retracted. If spindle guide is not inside sleeve at start of cut, coolant loss will occur.
- For larger diameters, if the cutter length exceeds available stroke of unit, cutters must be shortened by tool design.
- Capacities noted are for steel or titanium. Larger sizes can be accommodated for aluminum within stroke and sleeve/bushing diameter limitations.
- When cutter dimension is added to spindle length, the sleeve-spindle relationship must be within reference 'E' and within the 'F' adjustment.
- To determine sensing sleeve and spindle length, know your standoff and cutter dimensions.
- Standoff can also be altered by changing the length of the nose adapter bushing. Changes in this component will alter the lengths of the spindle 'A' dimension and sensing sleeve 'B' dimension. Additional nose adapter bushing lengths are available.
- The stroke can be altered by changing the lengths of the adjusting nut. If alterations are required in excess of the maximum adjustment, the adjusting bushing must be changed accordingly. Additional lengths are available.
- UDB-756172 sensors for QDA 12 have a longer stroke and will adapt to the QDA 13 motor for longer cutters.

BUSHING O.D. DRILL PLATE HOLE ASSEMBLY NO.	MOTOR KELLER SERIES HELOX SERIES	MAX. STROKE	A SPINDLE LENGTH	B SLEEVE LENGTH	C HOUSING LENGTH	D ADAPTER FIXTURE	E SPINDLE INSIDE ADAPTER	F ADJUSTMENT IN NUT	H ADJUSTMENT NUT OVERALL	I DWELL SPINDLE ADAPTER ASSY	L LENGTH OF SENSOR TO FIXTURE	MAX. CAPACITY
.875 UDB-756167-5-23-.875	QDP 27A UDB-A23000 UDB-A530000	1.0	3.6 BRONZE BUSHING .687 I.D. .687 O.D.	2.6 .687 I.D. .781 O.D.	6.2 ALUM BLUE	1.68	1.0	.50	.75	3.8	7.88	3/16 GP-1, 2, 3 1/4 GP-1, 2 ★5/16 GP-1, 2
1.125 UDB-756167-5-23-1.125	QDP 27A UDB-A23000 UDB-A530000	1.0	3.6 BRONZE BUSHING .875 I.D. .875 O.D.	2.6 .875 I.D. 1.00 O.D.	6.2 ALUM BLUE	1.68	1.0	.50	.75	3.8	7.88	1/4 GP-1, 2, 3 5/16 GP-1, 2, 3
1.000 UDB-756167-4-24-1.000	QDP 27A UDB-A24000 UDB-A540000	1.0	3.6 BRONZE BUSHING .750 I.D. .750 O.D.	2.6 .750 I.D. .875 O.D.	6.2 ALUM BLUE	1.68	1.0	.50	.75	3.8	7.88	1/4 GP-1, 2, 3 ★5/16 GP-1, 2, 3
1.250 UDB-756167-5-24-1.250	QDP 27A UDB-A24000 UDB-A540000	1.0	3.6 BRONZE BUSHING .750 I.D. .750 O.D.	2.6 .750 I.D. 1.00 O.D.	6.2 ALUM BLUE	1.68	1.0	.50	.75	3.8	7.88	1/4 GP-1, 2, 3 ★5/16 GP-1, 2, 3
1.375 UDB-756167A-6-24-1.375	QDP 27A UDB-A24000 UDB-A540000	1.0	3.6 BRONZE BUSHING 1.00 I.D. 1.00 O.D.	2.6 1.00 I.D. 1.125 O.D.	6.2 ALUM BLUE	1.68	1.0	.50	.75	3.8	7.88	5/16 GP-1, 2, 3 3/8 GP-1, 2
1.250 UDB-756161-5-24-1.250	QDP 11 UDB-A24000 UDB-A540000	1.0	4.0 BRONZE BUSHING .750 I.D. .750 O.D.	3.0 .750 I.D. 1.00 O.D.	6.2 ALUM GOLD	2.0	1.0	.50	.75	3.8	8.2	1/4 GP-1, 2, 3 ★5/16 GP-1, 2, 3
1.375 UDB-756161-9-24-1.375	QDP 11 UDB-A24000 UDB-A540000	1.0	4.0 BRONZE BUSHING 1.125 I.D. 1.125 O.D.	3.0 1.125 I.D. 1.250 O.D.	6.2 ALUM GOLD	2.0	1.0	.50	.75	3.8	8.2	1/4 GP-3 5/16 GP-3 3/8 GP-1, 2, 3, 4 7/16 GP-1, 2 1/2 GP-1, 2
2.000 UDB-756161-12-25-2.000	QDP 11 UDB-A24000 UDB-A540000	1.0	4.2 BRONZE BUSHING 1.750 I.D. 1.750 O.D.	3.2 1.750 I.D. 1.875 O.D.	6.2 ALUM GOLD	2.00 D ¹ 3.00	1.0	.50	.75	3.8	8.2	9/16 GP-1 5/8 GP-1 3/4 GP-1
1.375 UDB-756162-9-24-1.375	QDP 12 UDB-A24000 UDB-A540000	1.0	4.0 BRONZE BUSHING 1.125 I.D. 1.125 O.D.	3.0 1.125 I.D. 1.250 O.D.	6.2 ALUM GREEN	2.0	1.0	.50	.75	3.8	8.2	7/16 GP-3 1/2 GP-3 ★9/16 GP-1, 2
2.000 UDB-756162-14-25-2.000	QDA 12 UDB-A25000 UDB-A550000	1.0	4.2 BRONZE BUSHING	3.2 1.750 I.D. 1.875 O.D.	6.2 ALUM GREEN	2.00 D ¹ 3.00	1.0	.50	.75	3.8	8.2	9/16 GP-1, 2 5/8 GP-1, 2 3/4 GP-1, 2 7/8 GP-1, 2

★ Alter O.D.

Manufactured as Required.

Taper Lock QDA 13 Sensors

UNITED Taper Lock Sensor Systems

TAPER LOCK QDA 13 SENSORS



Use ARO,
Quackenbush
with QDA 13
Taper Lock
Sensors.

6 3/4"
STROKE

DETERMINING LENGTH

To determine lengths of sensing sleeves and spindles.

EXAMPLE: QDA 13 Motor 3/4" cutter Group 3 AR
with 2-5/8 standoff

SPINDLE

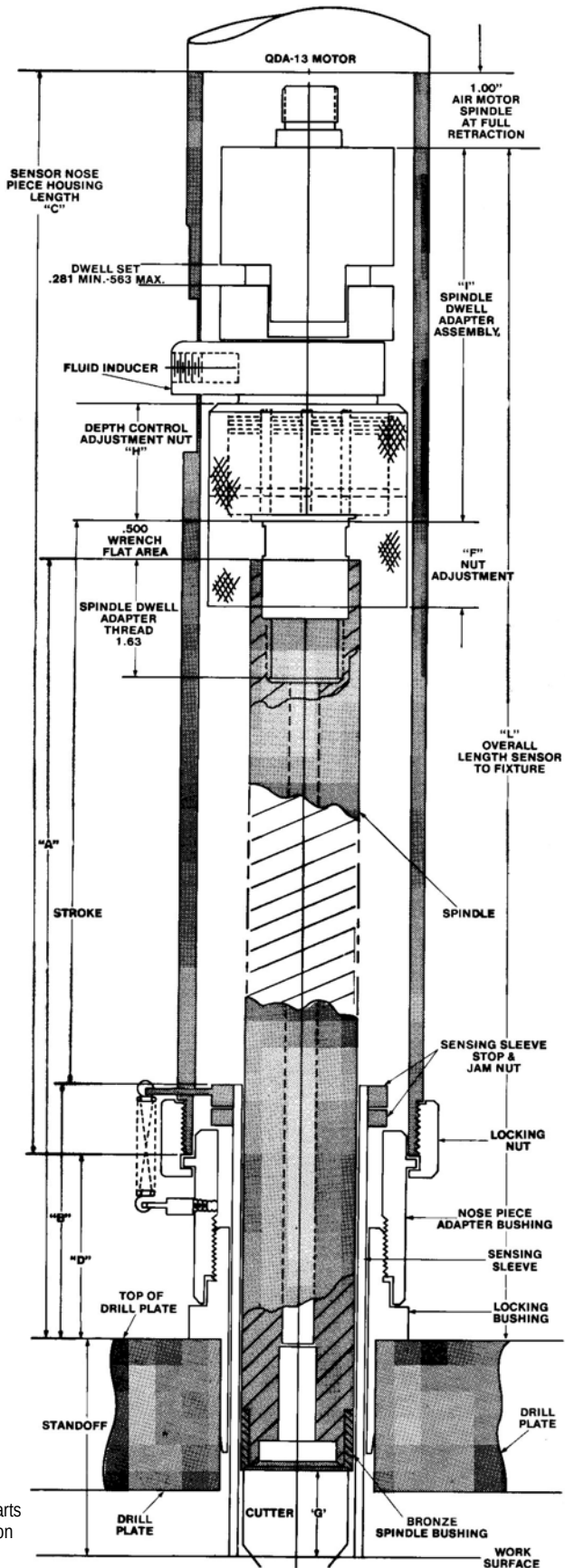
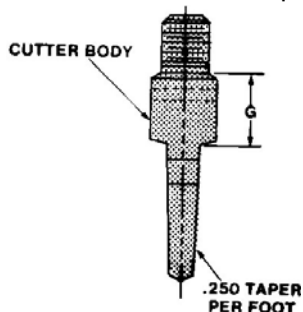
Deduct cutter body length 'G' (2.00) from standoff (2.625).

Add the 'A' (3.2) spindle dimension in the QDA 13 column block to the result of standoff minus 'G' (.625) for a minimum spindle length of (3.825).

SENSING SLEEVE

Add the standoff (2.625) to the 'B' (3.7) dimension for (6.325) minimum sleeve length.

SENSING SLEEVE	SPINDLE
2.625 Standoff	2.625 Standoff
3.70 'B' dimension	2.00 'G' dimension
6.325 Min. Sleeve	.625
	3.2 'A' dimension
	3.825 Min. Spindle



Full Scale Charts
are available on
request.

Taper Lock QDA 13 Sensor Systems

Ordering QDA 13
Sensors

**TAPER LOCK
QDA 13 SENSORS**

ORDERING EXAMPLE

BASE NO.	LOCK SERIES HELOX OR KELLER	FIXTURE HOLE	STAND OFF	SENSING SLEEVE I.D.	SENSING SLEEVE O.D.	LENGTH SENSING SLEEVE	SPINDLE LENGTH	SERIES CUTTER
UDB-756173	K-26	3.375	2.625	1.721	1.922	6.325	3.825	13-3AR

- All dimensions listed are with motor spindle fully extended and depth control adjustment nut in pre-adjusted position.
- 'A' and 'B' dimensions have been increased by 1/4" to assure adequate motor stroke for dwell and to compensate for standoff tolerances.
- Available stroke for retracting spindle reduces as 'A' and 'B' dimensions increase. Sleeve length must be sufficient so spindle guide will remain inside sleeve when cutter is fully retracted. If spindle guide is not inside sleeve at start of cut, coolant loss will occur.
- For larger diameters, if the cutter length exceeds available stroke of unit, cutters must be shortened by tool design.
- Capacities noted are for steel or titanium. Larger sizes can be accommodated for aluminum within stroke and sleeve/bushing diameter limitations.
- When cutter dimension is added to spindle length, the sleeve-spindle relationship must be within reference 'E' and within the 'F' adjustment.
- To determine sensing sleeve and spindle length, know your standoff and cutter dimensions.
- Standoff can also be altered by changing the length of the nose adapter bushing. Changes in this component will alter the lengths of the spindle 'A' dimension and sensing sleeve 'B' dimension. Additional nose adapter bushing lengths are available.
- The stroke can be altered by changing the lengths of the adjusting nut. If alterations are required in excess of the maximum adjustment, the adjusting bushing must be changed accordingly. Additional lengths are available.
- UDB-756172 sensors for QDA 12 have a longer stroke and will adapt to the QDA 13 motor for longer cutters.

BUSHING O.D. DRILL PLATE HOLE ASSEMBLY NO.	MOTOR KELLER SERIES HELOX SERIES	MAX. STROKE	A SPINDLE LENGTH	B SLEEVE LENGTH	C HOUSING LENGTH	D BUSHING ADAPTER TO FIXTURE	F ADJUSTMENT IN NUT	H ADJUSTMENT NUT OVERALL	I SPINDLE DWELL ASSY LENGTH	L LENGTH OF SENSOR TO FIXTURE	MAX. CAPACITY
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UNITED Sensors are delivering Precision Tapered Holes at McDonnell-Douglas — Now Boeing.

2.000 UDB-756173-10-25-2.000	QDP 13 UDB-A25000 UDB-A550000	6.8	3.2 BRONZE BUSHING 1.500 O.D.	3.70 1.500 I.D. 1.750 O.D.	14.12	2.38	1.00	STD 1.500 ALSO AVAILABLE 2.25 4.50	5.00	16.50	9/16 GP-2-AR 5/8 GP-2, 3-AR SHORTEN
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UNITED Sensors are providing Precision Countersinks at AVCO.

2.375 UDB-756173-18-26-2.375	QDP 13 UDB-A26000 UDB-A560000	6.7	3.32 BRONZE BUSHING 2.125 O.D.	3.82 2.125 I.D. 2.375 O.D.	14.12	2.50	1.00	1.50	5.00	16.62	★ 1/8 GP-2-BR SHORTEN
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UNITED Sensors are controlling Tapered Holes Tolerances at North American Rockwell — Now Boeing.

2.375 UDB-756173A-18-26-2.375	QDP 13 UDB-A26000 UDB-A560000	6.7	3.32 BRONZE BUSHING 2.062 O.D.	3.82 2.062 I.D. 2.250 O.D.	14.12	2.50	1.00	1.50	5.00	16.62	3/4 GP-1, 2-AR 7/8 GP-2-AR 1" GP-2-AR 1" GP-3-BR
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UNITED Sensors are drilling Exact Depths at LTV.

2.375 UDB-756173-14-26-2.375	QDP 13 UDB-A26000 UDB-A560000	6.8	3.30 BRONZE BUSHING 1.721 O.D.	3.70 1.721 I.D. 1.922 O.D.	14.12	2.38	1.00	1.50	5.00	16.50	3/4 GP-2, 3-AR SHORTEN 7/8 GP-1-AR O.D. REDUCED 7/8 GP-1, 2, 3-BR SHORTEN
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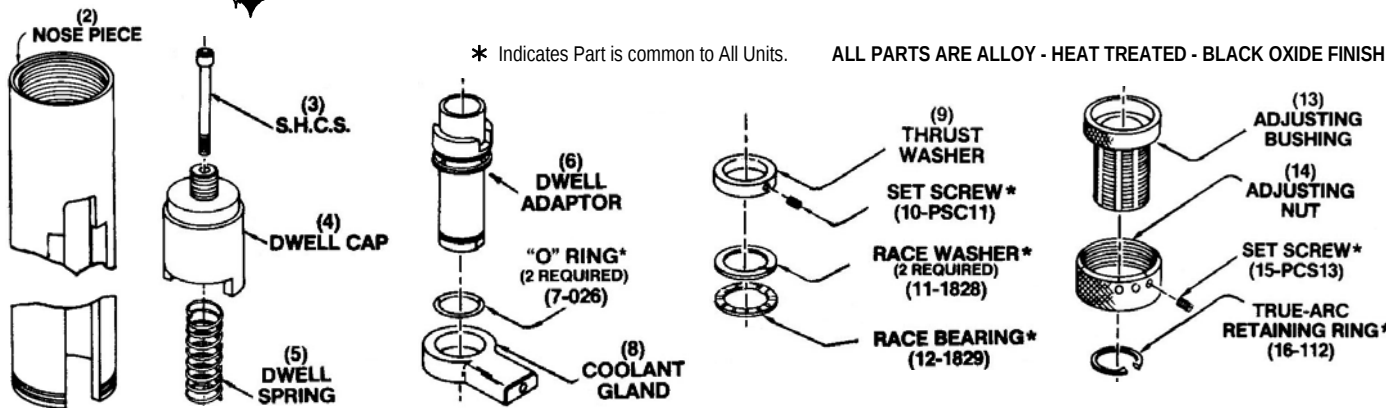
★ O.D. REDUCED

Manufactured as Required.

Depth Sensor Units Replacement Parts

Replacement Parts for

See Page Q20 for Parts Explosion View.

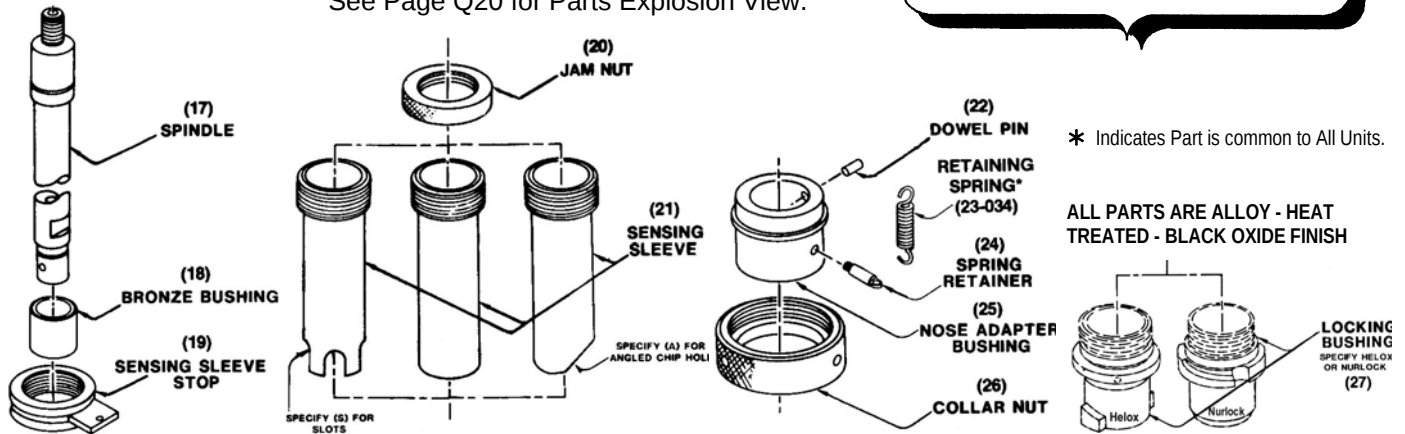


UNIT NO.	1 MOTOR ADAPTER (NOT SHOWN)	2 NOSE PIECE	3 CAP SCREW	4 DWELL CAP	5 DWELL SPRING	6 DWELL ADAPTER	8 COOLANT GLAND	9 THRUST WASHER	13 ADJUSTING BUSHING	14 ADJUSTING NUT
UDB-756161-5-24-1.250	—	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756161-9-24-1.3750	—	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756161-12-25-2.000	—	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756162-9-24-1.375	—	2-216	3-108	4-210	5-221	6-211	8-213	9-113	13-212	14-215
UDB-756162-14-25-2.000	—	2-216	3-108	4-210	5-221	6-211	8-213	9-113	13-212	14-215
UDB-756167-5-23-.875	—	2-225	3-109	4-214	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756167-5-23-1.125	—	2-225	3-109	4-214	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756167-5-24-1.000	—	2-225	3-109	4-214	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756167-5-24-1.250	—	2-225	3-109	4-214	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756167-8-24-1.375	—	2-225	3-109	4-214	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756171-5-24-1.250	—	2-16	3-109	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756171-8-24-1.375	—	2-16	3-109	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756171-9-24-1.375	—	2-16	3-109	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756171-9-25-2.000	—	2-16	3-109	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756171-12-25-2.000	—	2-16	3-109	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172-8-24-1.375	—	2-216	3-109	4-210	5-21	6-211	8-213	9-113	13-212	14-215
UDB-756172-9-24-1.375	—	2-216	3-109	4-210	5-21	6-211	8-213	9-113	13-212	14-215
UDB-756172-10-25-2.000	—	2-216	3-109	4-210	5-21	6-211	8-213	9-113	13-212	14-215
UDB-756172-14-25-2.000	—	2-216	3-109	4-210	5-21	6-211	8-213	9-113	13-212	14-215
UDB-756172A-3-22-.750	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-5-22-.750	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-3-23-.875	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-5-23-.875	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-5-23-1.125	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-8-24-1.250	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-8-24-1.375	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-8-25-2.000	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-10-25-2.000	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-8-26-2.375	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-10-26-2.375	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-14-26-2.375	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-6-24-1.250	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756172A-6-24-1.375	1-114	2-16	3-108	4-10	5-21	6-11	8-13	9-113	13-12	14-15
UDB-756173-10-25-2.000	—	2-145	3-109	4-103	5-31	6-107	8-111	9-113	13-115	14-117
UDB-756173-14-26-2.375	—	2-145	3-109	4-103	5-31	6-107	8-111	9-113	13-115	14-117
UDB-756173-18-26-2.375	—	2-145	3-109	4-103	5-31	6-107	8-111	9-113	13-115	14-117
UDB-756177-3-23-.875	—	2-225	3-441	4-214	5-449	6-215	8-221	9-325	13-217	14-219
UDB-756177-5-23-.875	—	2-225	3-441	4-214	5-449	6-215	8-221	9-325	13-217	14-219
UDB-756177-5-23-1.125	—	2-225	3-441	4-214	5-449	6-215	8-221	9-325	13-217	14-219
UDB-756177-5-24-1.000	—	2-225	3-441	4-214	5-449	6-215	8-221	9-325	13-217	14-219
UDB-756177-5-24-1.250	—	2-225	3-441	4-214	5-449	6-215	8-221	9-325	13-217	14-219
UDB-756177-5-24-1.375	—	2-225	3-441	4-214	5-449	6-215	8-221	9-325	13-217	14-219
UDB-756177-5-24-1.375A	—	2-225	3-441	4-214	5-449	6-215	8-221	9-325	13-217	14-219

Depth Sensor Units

See Page Q20 for Parts Explosion View.

Replacement Parts Depth Sensors

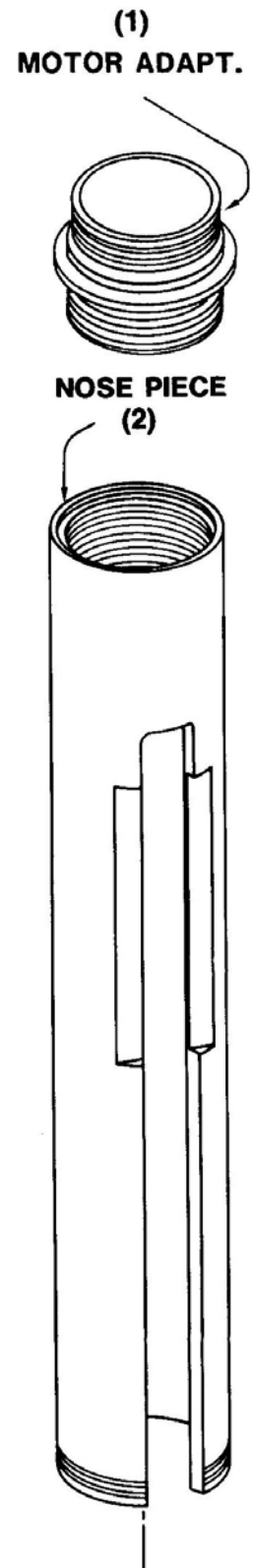
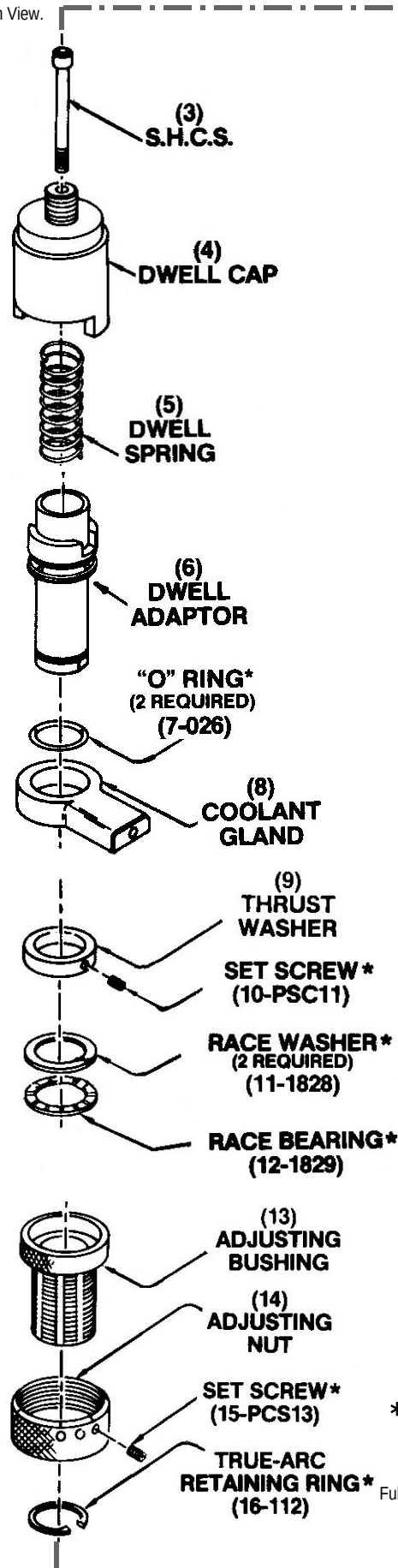
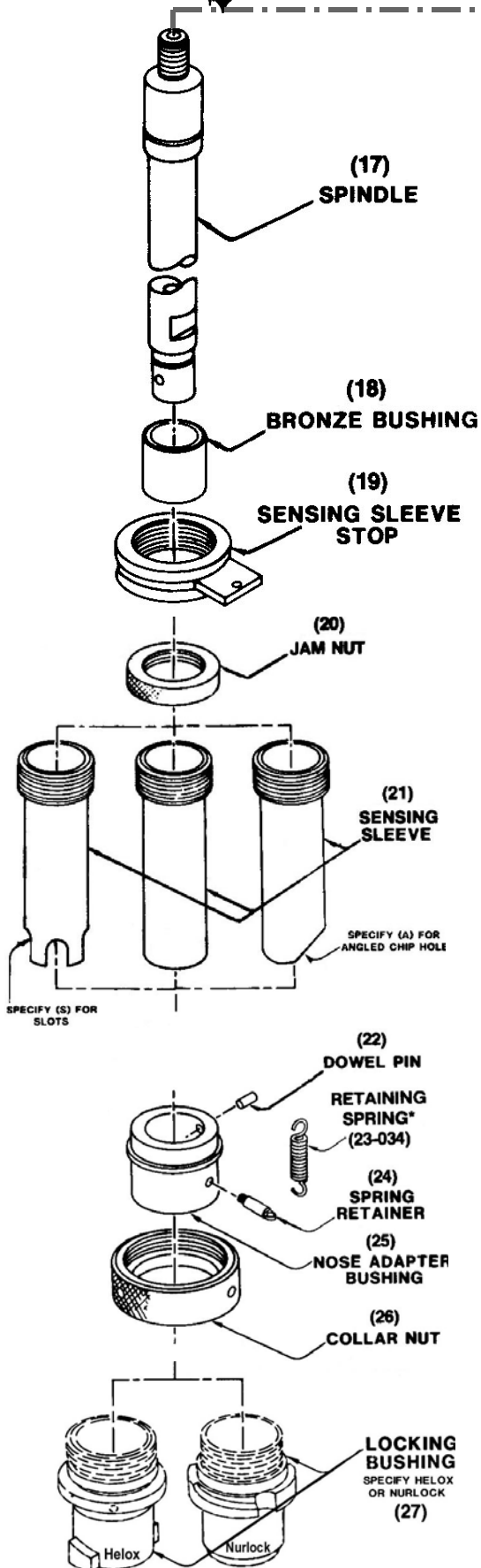


17 SPINDLE	18 BRONZE BUSHING	19 SENSING SLEEVE STOP	20 JAM NUT	21 SENSING SLEEVE	22 DOWEL PIN	24 SPRING RETAINER	25 NOSE BUSHING ADAPTER	26 COLLAR NUT	27 LOCKING BUSHING	UNIT NO.
17-4B	18-74	19-419	20-421	21-74B	22-3/16 D.P.	24-6	25-53A	26-7	27-56I	UDB-756161-5-24-1.250
17-4B	18-75	19-57JN	20-57	21-71T	22-3/16 D.P.	24-6	25-53A	26-7	27-56X	UDB-756161-9-24-1.3750
17-205B	18-75F	19-57AJN	20-57A	21-51B	22-3/16 D.P.	24-6	25-53A	26-7	27-606A	UDB-756161-12-25-2.000
17-204B	18-275	19-257JN	20-257	21-271T	22-3/16 D.P.	24-206	25-253A	26-207	27-256X	UDB-756162-9-24-1.375
17-205B	18-275F	19-257AJN	20-257A	21-251B	22-3/16 D.P.	24-206	25-253A	26-207	27-606A	UDB-756162-14-25-2.000
17-525B	18-526	19-419	20-421	21-429B	22-3/16 D.P.	24-6	25-445A	26-223	27-56C	UDB-756167-5-23-.875
17-227B	18-528	19-419	20-421	21-426B	22-3/16 D.P.	24-6	25-445A	26-223	27-56D	UDB-756167-5-23-1.125
17-227B	18-73B	19-419	20-421	21-72B	22-3/16 D.P.	24-6	25-445A	26-223	27-56H	UDB-756167-5-24-1.000
17-227B	18-74B	19-419	20-421	21-74B	22-3/16 D.P.	24-6	25-445A	26-223	27-56I	UDB-756167-5-24-1.250
17-227B	18-443	19-419X	20-421X	21-425B	22-3/16 D.P.	24-6	25-445A	26-223	27-56E	UDB-756167-8-24-1.375
17-4B	18-74	19-419	20-421	21-74B	22-3/16 D.P.	24-6	25-53A	26-7	27-56I	UDB-756171-5-24-1.250
17-4B	18-75	19-57JN	20-57	21-71T	22-3/16 D.P.	24-6	25-53A	26-7	27-56X	UDB-756171-8-24-1.375
17-205B	18-75X	19-57JN	20-57	21-71T	22-3/16 D.P.	24-6	25-53A	26-7	27-56X	UDB-756171-9-24-1.375
17-205B	18-75F	19-57AJN	20-57A	21-51B	22-3/16 D.P.	24-6R	25-7	26-203X	27-203AB	UDB-756171-9-25-2.000
17-520B	18-525B	19-57AJN	20-57A	21-51B	22-3/16 D.P.	24-6R	25-7	26-203AX	27-203AB	UDB-756171-12-25-2.000
17-204B	18-275	19-257JN	20-257	21-271T	22-3/16 D.P.	24-206	25-253A	26-207	27-256X	UDB-756172-8-24-1.375
17-205B	18-275X	19-257JN	20-257	21-271T	22-3/16 D.P.	24-206	25-253A	26-207	27-256X	UDB-756172-9-24-1.375
17-205B	18-275F	19-257AJN	20-257A	21-251B	22-3/16 D.P.	24-206R	25-207	26-203AX	27-203AB	UDB-756172-10-25-2.000
17-520B	18-525B	19-257AJN	20-257A	21-251B	22-3/16 D.P.	24-206R	25-207	26-203AX	27-203AB	UDB-756172-14-25-2.000
17-525B	18-61	19-419	20-421	21-60B	22-3/16 D.P.	24-6	25-601	26-7	27-50J	UDB-756172A-3-22-.750
17-227B	18-62	19-419	20-421	21-60B	22-3/16 D.P.	24-6	25-601	26-7	27-56J	UDB-756172A-5-22-.750
17-525B	18-526	19-419	20-421	21-429B	22-3/16 D.P.	24-6	25-602	26-7	27-56C	UDB-756172A-3-23-.875
17-227B	18-527	19-419	20-421	21-429B	22-3/16 D.P.	24-6	25-602	26-7	27-56C	UDB-756172A-5-23-.875
17-227B	18-528	19-419	20-421	21-426B	22-3/16 D.P.	24-6	25-602	26-7	27-56D	UDB-756172A-5-23-1.125
17-4B	18-62	19-57JN	20-57	21-63B	22-3/16 D.P.	24-6	25-603	26-7	27-56N	UDB-756172A-8-24-1.250
17-4B	18-65	19-57JN	20-57	21-64B	22-3/16 D.P.	24-6	25-603	26-7	27-56L	UDB-756172A-8-24-1.375
17-4B	18-67	19-57AJN	20-57A	21-66B	22-3/16 D.P.	24-6		26-7	27-604	UDB-756172A-8-25-2.000
17-205B	18-67A	19-57AJN	20-57A	21-66B	22-3/16 D.P.	24-6		26-7	27-604	UDB-756172A-10-25-2.000
17-4B	18-65A	19-57AJN	20-57A	21-66B	22-3/16 D.P.	24-6		26-7	27-605	UDB-756172A-8-26-2.375
17-205B	18-67A	19-57AJN	20-57A	21-66B	22-3/16 D.P.	24-6		26-7	27-605	UDB-756172A-10-26-2.375
17-520B	18-69	19-57AJN	20-57A	21-66B	22-3/16 D.P.	24-6		26-7	27-605	UDB-756172A-14-26-2.375
17-4B	18-62	19-57JN	20-57	21-63B	22-3/16 D.P.	24-6	25-603	26-7	27-56N	UDB-756172A-6-24-1.250
17-4B	18-65	19-57A	20-57A	21-64B	22-3/16 D.P.	24-6	25-603	26-7	27-56L	UDB-756172A-6-24-1.375
17-123B	18-174	19-135	20-133	21-176B	22-1/4 D.P.	24-141	25-139	26-143	27-182	UDB-756173-10-25-2.000
17-123B	18-125B	19-135	20-133	21-131B	22-1/4 D.P.	24-141	25-139	26-143	27-159	UDB-756173-14-26-2.375
17-123B	18-190B	19-188	20-187	21-186B	22-1/4 D.P.	24-141	25-139	26-143	27-191A	UDB-756173-18-26-2.375
17-525B	18-526	19-419	20-421	21-429B	22-3/16 D.P.	24-405	25-445A	26-223	27-56	UDB-756177-3-23-.875
17-227B	18-527	19-419	20-421	21-429B	22-3/16 D.P.	24-405	25-445B	26-223	27-56C	UDB-756177-5-23-.875
17-527B	18-528	19-419	20-421	21-426B	22-3/16 D.P.	24-405	25-53A	26-223	27-56D	UDB-756177-5-23-1.125
17-227B	18-73	19-419	20-421	21-72B	22-3/16 D.P.	24-405	25-53A	26-223	27-56X	UDB-756177-5-24-1.000
17-227B	18-74	19-419	20-421	21-74B	22-3/16 D.P.	24-405	25-53A	26-223	27-56I	UDB-756177-5-24-1.250
17-227B	18-443	19-419X	20-421X	21-425B	22-3/16 D.P.	24-405	25-53A	26-223	27-56E	UDB-756177-5-24-1.375
17-227B	18-528	19-419X	20-421X	21-426B	22-3/16 D.P.	24-405	25-53A	26-223	27-56B	UDB-756177-5-24-1.375A

Depth Sensor Units Parts

Parts Explosion View

Parts Explosion View.



* Indicates Part is common to All Units.

Full Scale Charts are available on request.

ALL PARTS ARE ALLOY - HEAT TREATED - BLACK OXIDE FINISH

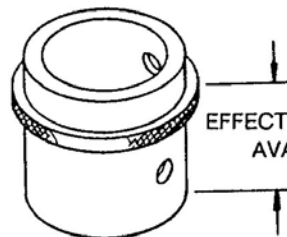
Optional Accessories for All QDA Drill Assemblies

Accessories for All QDA Drill Assy

See Page Q20 for Parts Explosion View.

PART NO.	SERIES	LENGTH	THREAD
UDB-756177-445	24000	1.25	1-1/2 - 12 LH
UDB-756177-445A	23000	1.25	1-1/4 - 12 LH
UDB-756171-53A	24000	1.56	1-1/2 - 12 LH
UDB-756171-53	24000	1.31	1-1/2 - 12 LH
UDB-756172-2003A	26000	2.31	2-1/4 - 16 LH
UDB-756172-203	25000	2.31	2 - 16 LH
UDB-756172-203 (FOR 1.875 SLEEVE)	25000	1.25	2 - 16 LH
UDB-756171-3	23000	2.84	1-1/4 - 12 LH
UDB-756171-73	24000	2.84	1-1/2 - 12 LH

Connects Sensor Housing to Adapter Tip and Sensing Sleeve.



EFFECTIVE LENGTH AVAILABLE

Additional lengths and locking series can be manufactured quickly to accommodate your special requirements.



These assemblies can be equipped with **UNITED's** Helox® Adapters that fit Shelox® Liners. Nurlock Adapters and Bushing Tips (or 'Kellers') are also adaptable to these units.

Angular Sensing Sleeve will contact irregular and contoured surfaces to control drill depth to within .0005 or even .0001. The Depth Sensing Assembly is self-compensating plus or minus 3/16 thru 1-1/4 Fastener sizes. Detailed information is available.

UNITED's Sensors are versatile. They can quickly be increased or decreased in standoff by changing the Adapter Nose Bushing.

ALLOY STEEL—HEAT TREATED—TOUGH—PRECISION GROUND—BLACK OXIDE FINISH

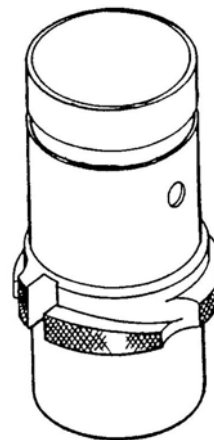
COMBINATION NOSE ADAPTER AND LOCKING BUSHINGS

UNITED's Super Sensors can also be adjusted in stroke by using the full range of the Adjusting Nuts. Please refer to UDB Set Up Charts.

ALLOY STEEL—HEAT TREATED—TOUGH—PRECISION GROUND—BLACK OXIDE FINISH

PART NO.	FITS MOTOR	LENGTH
UDB-756177-219	QDA-27	1.25
UDB-756171-15	QDA-11	1.80
UDB-756171-9573	QDA-11	3.00

Connects Sensor Housing to Sensing Sleeve



ADJUSTING NUT AND BUSHINGS

UNITED's Super Adjustable Nut changes an ordinary Air Tool into a Depth Gauge. Finer adjustment with fewer holes.

ALLOY STEEL—HEAT TREATED—TOUGH—PRECISION GROUND—BLACK OXIDE FINISH

Adjusts to within .0001

FITS MODEL NO.	STANDARD ADJUSTER ADJ. RANGE .0013 - .0050		FINE ADJUSTER ADJ. RANGE .0001 - .0007	
	BUSHING	NUT	BUSHING	NUT
QDA-11	UDB-756171-13-12	UDB-756171-14-15	UDB-756171-13-12N	UDB-756171-14-15N
QDA-12	UDB-756172-13-212	UDB-756172-14-215	UDB-756172-13-212N	UDB-756172-14-215N
QDA-13	UDB-756173-13-115	UDB-756173-14-117	UDB-756173-13-115N	UDB-756173-14-117N
QDA-27	UDB-756177-13-217	UDB-756177-14-219	UDB-756177-13-217N	UDB-756177-14-219N



**Helox® Depth Sensor
Spacematic Motors**

Helox® Depth Sensor Assemblies

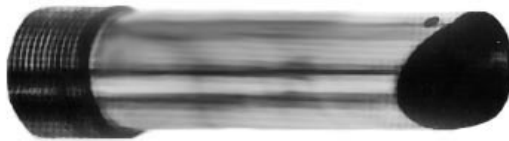
Fits OMARK-WINSLOW HS-2



**LOCKING
WING PLATE**



LOCK RING



**SENSING SLEEVE
UDB-755200**



**NOSEPIECE
BUSHING BARREL**

**HELOX® TIP
PATENT NO. 3,762,827**

★ Built-in Depth Sensor

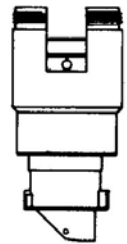
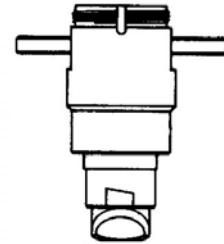
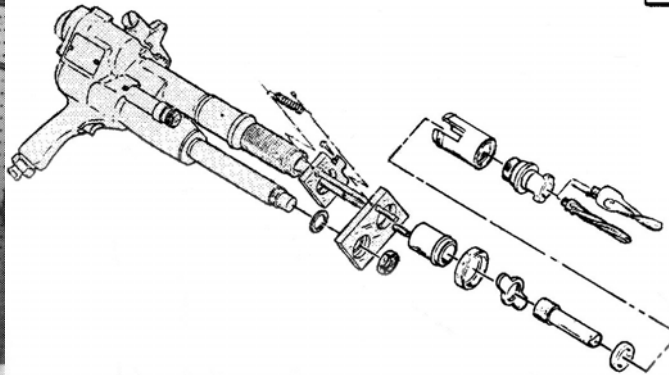
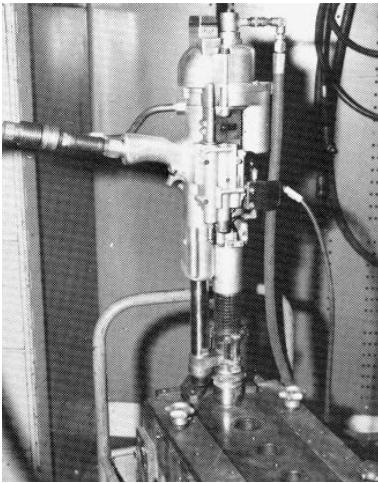
★ Helox® Adapter Nose fits

★ Drills for 3/16 Group 1 thru 3/8

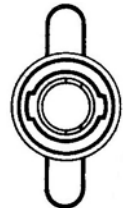
POSITIVE LOCKING!

POSITIVE POSITIONING!

CONTROLLED FEED AND SPEED!



**HS-2
ADAPTER**



This accurate drilling assembly is ideal for tapered fastener hole preparation and depth sensing. This assembly is manufactured to adapt to **Omark-Winslow HS-2 automatic feed drills**. Its Helox® Nose is made in sizes to fit most of **UNITED's** Shelox® Liners. Nurlock adapter tips or 'Kellers' are available. Adapters are manufactured from the finest tool steels.

This adapter and the Omark-Winslow drilling unit were designed for drilling 3/16 diameter, Group 1 thru 3/8 diameter, Group 1 Taper Lock Fasteners. It will guide any Taper Cutter, Reamer or Drill made for the preparation of holes in this range.

Consult with **UNITED** or one of **UNITED's** authorized distributors for an adapter best suited for your needs. Detailed specifications are available.

For Spacematic Air Motors

**Helox® Depth Sensor
Spacematic Motors**

Fits OMARK-WINSLOW J-200

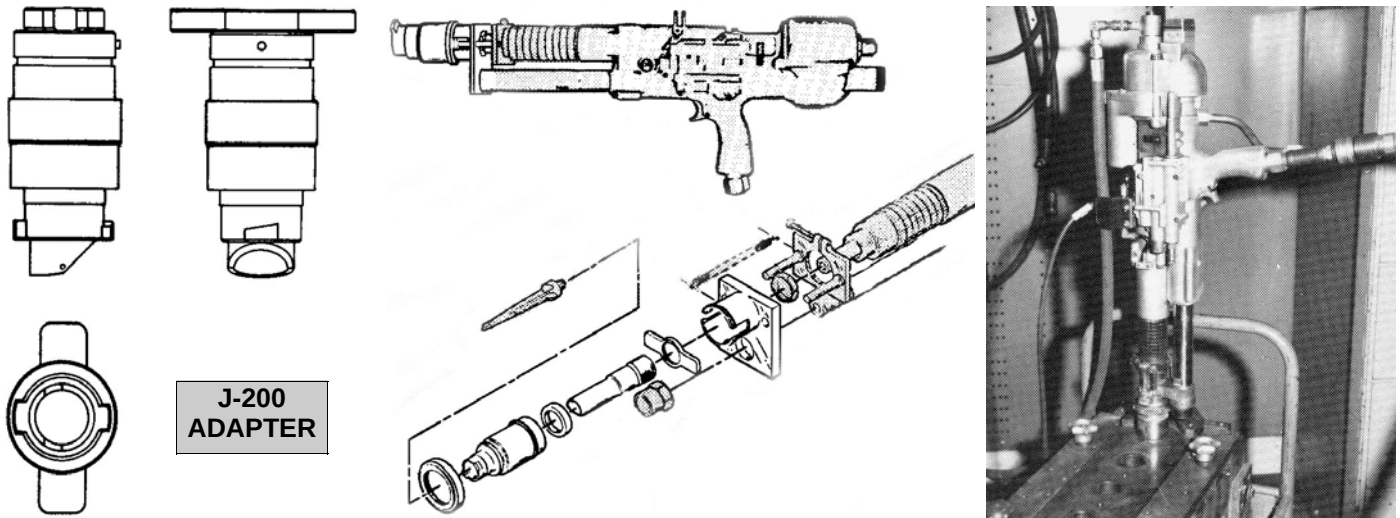


★ Drills for 3/16 Group 1 thru 3/8 ★ Helox® Adapter Nose fits ★ Senses Depths accurately

POSITIVE LOCKING!

POSITIVE POSITIONING!

CONTROLLED FEED AND SPEED!



This precise drilling assembly for tapered fastener hole preparation and depth sensing has a larger capacity. Similar to the HS-2, this assembly is designed to fit the **Omark-Winslow J-200** automatic feed drills. Its Helox® Nose will adapt to corresponding **UNITED's** Shelox® Liners. Nurlock adapter tips or 'Kellers' are available. Adapters are manufactured from the finest tool steels.

This adapter and the Omark-Winslow drilling unit were designed for drilling larger capacity 3/8 diameter, Group 3 Taper Lock Fasteners for standard holes. It will guide any Taper Cutter, Reamer or Drill made for the preparation of holes in this range.

Consult with **UNITED** or one of **UNITED's** authorized distributors in your area for the adapter assembly to fill your needs. Detailed specifications are available.

Boeing Adapter Assemblies

Rockwell (Boeing) Adapter Assemblies

THE ROCKWELL ADAPTER (Now BOEING)



UDB-754820

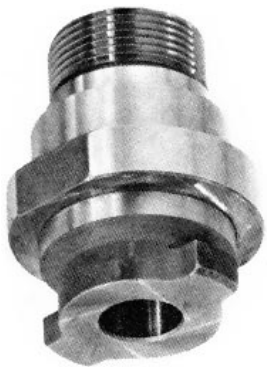
PATENT NO. 3,762,827

★ Positive locking, positive positioning, controlled feed and speed.

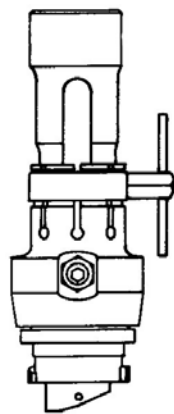
★ Made to fit right into *UNITED's* Shelox Liners.

★ Adjusts to varying depths and surfaces.

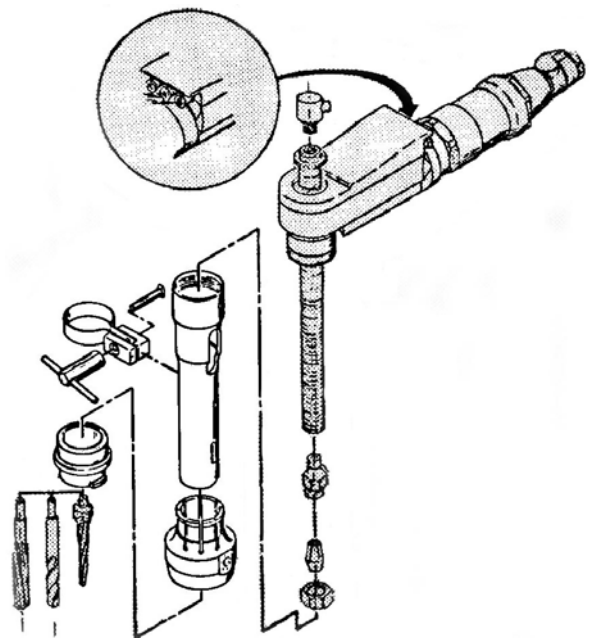
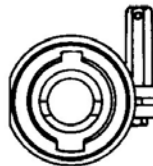
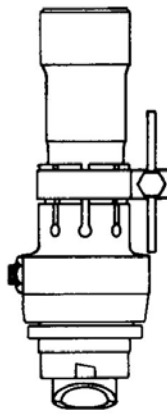
NOSE PIECE



Call *UNITED*
FOR THE
BEST IN
DRILLING
ADAPTERS!



ROCKWELL
ADAPTER
UDB-754820



This accurate drilling Adapter is designed for the Rockwell #61PA Drill Motor and provides accurate location and depth control. This Nosepiece can be provided to fit any of *UNITED's* Shelox® Liners. The Nosepiece can be provided with conventional adapter tips to fit locking liners. They are manufactured from hardened and ground tool steel for a long and trouble-free life.

The combination of this Adapter and the Rockwell 61PA motor (160-265 rpm) will drill such tough jobs as the Taper Lock Fastener holes 7/16 Group 1 thru 5/8 Group 3. It can be used to guide taper cutters, reamers and standard drills.

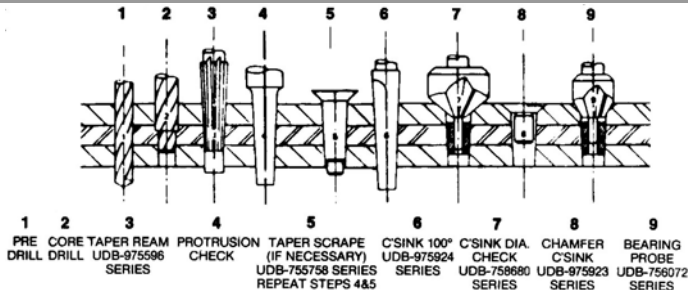
Call *UNITED* or one of *UNITED's* authorized distributors for the design best suited for your needs. You'll be glad you did!

UNITED Taper Lock Hole Preparation

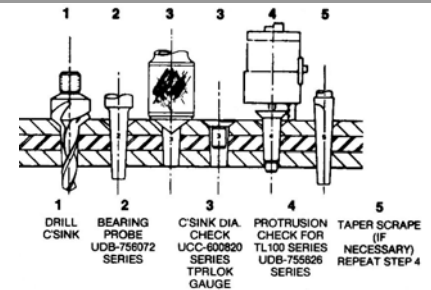
Flush and Protruding Holes

FLUSH FASTENER — ALUMINUM STRUCTURE

1. SEQUENCE FOR FREE HAND TOOLS

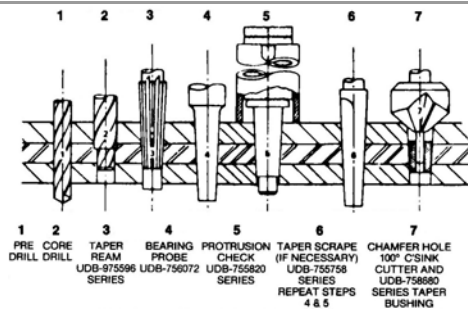


2. SEQUENCE FOR POSITIVE FEED EQUIPMENT

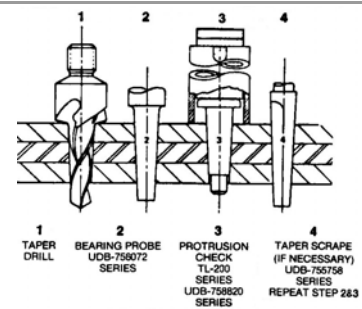


PROTRUDING FASTENER — ALUMINUM STRUCTURE

3. SEQUENCE FOR FREE HAND TOOLS



4. SEQUENCE FOR POSITIVE FEED EQUIPMENT



SEQUENCES FOR TAPER LOCK HOLE REWORK

Step 1. Predrill using UDB-758680 Series Taper Drill Bushing.	
NOM. SIZE FASTENER	PREDRILL SIZE
5/32	.0937 DIA.
3/16	.1250 DIA.
1/4, 5/16	.1875 DIA.
3/8	.2500 DIA.
7/16, 1/2	.3125 DIA.
9/16, 5/8, 3/4	.3750 DIA.

Step 2. Pilot Core Drill to suit piloted Taper Pin Reamer.

Step 3. Ream using UDB-975596 Series with appropriate Pilot. Allow clean-up material for Step 4.

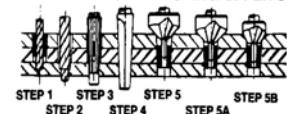
Step 4. Scrape the using UDB-755758 Series Single Flute Scraper. Remove minimum amount of material. Probe hole for bearing and check for proper protrusion.

Step 5. Protruding Head Fastener: Chamfer edge of hole using 100° Countersink Cutter and appropriate UDB-758680 Series Bushing to Pilot Cutter.

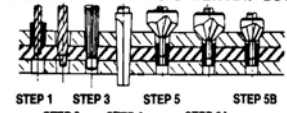
Step 5A. Flush Head Fastener: Countersink using 100° Cutter and suitable UDB-758680 Series Bushing to Pilot Cutter.

Step 5B. Chamfer juncture of countersink and tapered hole with 60° Cutter using same bushing as above for piloting. Check Countersink diameter.

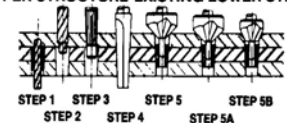
NEW LOWER STRUCTURE-EXISTING UPPER STRUCTURE



NEW CENTER STRUCTURE-EXISTING UPPER AND LOWER STRUCTURE



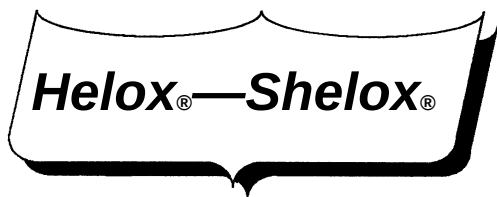
NEW UPPER STRUCTURE-EXISTING LOWER STRUCTURE



ADDITIONAL SEQUENCES — Charts available at your request.

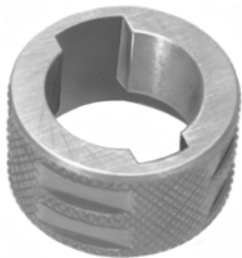
- Flush Fastener — Aluminum structure — For two-step Drill-Ream using positive feed motors and drill bar using 6 Tools.
- Protruding Fastener Aluminum Structure — Sequence for tow step Drill-Ream using positive feed equipment and Drill Bar using 6 Tools.
- Flush Fastener — Aluminum/Titanium structure — Sequence for two-step Drill-Ream using positive feed motors and Drill Bar using 7 Tools.
- Protruding Fastener — Titanium or Aluminum/Titanium structure — Sequence for two-step Drill-Ream using positive feed motors and Drill Bar using 6 Tools.
- Flush Fastener — Aluminum structure — Rework to first and second oversize for Flush Head Fasteners using positive feed equipment and Drill Bar with 5 Tools.

- Flush Fastener — Aluminum or Titanium structure — Rework to first and second oversize for Flush Head Fasteners using positive feed equipment and Drill Bar with 5 Tools.
- Flush Fastener — Aluminum or Titanium structure — Rework to first and second oversize for Flush Head Fasteners using Free Hand Tools using 6 Tools.
- Protruding Fastener — Aluminum or Titanium structure — Rework to first and second oversize using Free Hand Tools using 4 Tools.
- Drill using UDB-758680 Series Taper Drill Bushing for either Flush or Protruding Fasteners using 5 or 6 Tools.
- Thru 23. Individual Data Sheets for cutter sequence for 5/32, 3/16, 1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8 and 3/4 Flush and Protruding Fasteners.



UNITED HELOX®
UNITED SHELOX®

Helox®—Shelox® Guidance System



- ★ No Repairs
- ★ No Clamps
- ★ No Reworks
- ★ No Lock Screws
- ★ No Strip Mounting
- ★ No Massive Lock Liners
- ★ No Big Money Worries

Helox and Shelox are
UNITED's registered
trademark names.

PATENT 3,756,736

★ **LESS SPACE**

★ **BIG COST SAVINGS**

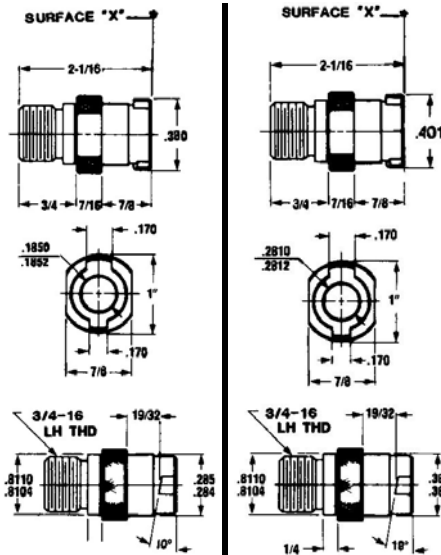
Helox®—Shelox® Guidance

Helox® Shank Inserts

490000 Series
3/4-16 2A L.H.

500000 Series
3/4-16 2A L.H.

51000 THRU 60000 ON FOLLOWING PAGES.



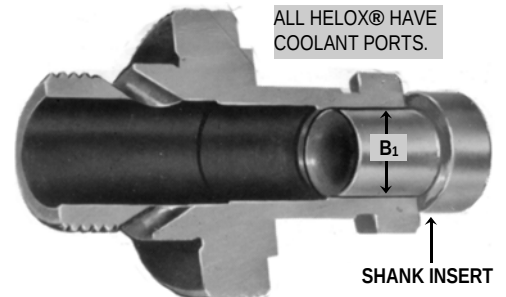
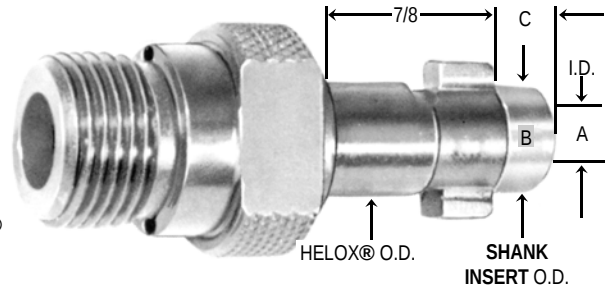
Shank Insert Information

Shank Inserts for UNITED's HELOX® Adapters are similar to the standard shank for the Nurlock Adapters. They are supplied pressed into the HELOX® Adapter or they may be purchased separately.



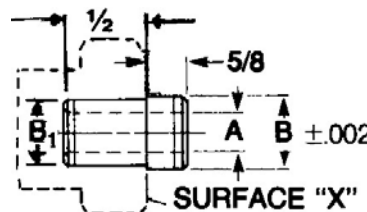
When your fixture is mounted flush to the workpiece and you are using the Knurled SHELOX® for plastic tooling, specify 'FLUSH' insert and leave the bushing to us.

HELOX® SHANK INSERTS

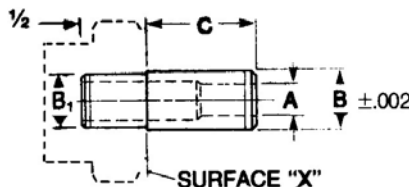


Shank Inserts: 490000 & 500000

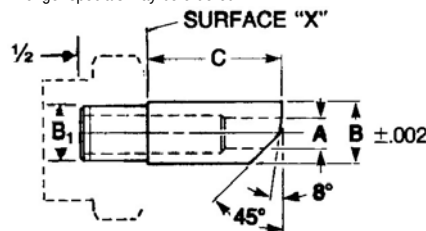
A DRILL SIZE	MIN. 1/16 (.0625) MAX 7/64 (.1094)	1/16 (.0625) 13/16 (.2031)
B	.259	.363
B ₁	.1863	.2823
C LENGTH SHANK EXTENDS FROM HELOX® (INCHES)	FLUSH	UDB-A490100 UDB-A501100
	1/4	UDB-A490100A UDB-A501100A
	3/8	UDB-A490101 UDB-A501101
	1/2	UDB-A490102 UDB-A501102
	5/8	UDB-A490103 UDB-A501103
	3/4	UDB-A490104 UDB-A501104
	7/8	UDB-A490105 UDB-A501105
	1"	UDB-A490106 UDB-A501106
	1-1/16	UDB-A490107 UDB-A501107
	1-1/8	UDB-A490108 UDB-A501108
	1-3/16	UDB-A490109 UDB-A501109
	1-1/4	UDB-A490110 UDB-A501110
	1-3/8	UDB-A490111 UDB-A501111
	1-7/16	UDB-A490112 UDB-A501112
	1-1/2	UDB-A490113 UDB-A501113
	1-5/8	UDB-A490114 UDB-A501114
	1-3/4	UDB-A490115 UDB-A501115
	1-7/8	UDB-A490116 UDB-A501116
	1-15/16	UDB-A490117 UDB-A501117
	2"	UDB-A490118 UDB-A501118
	2-1/8	UDB-A490119 UDB-A501119
	2-1/4	UDB-A490120 UDB-A501120
	2-3/8	UDB-A490121 UDB-A501121
	2-1/2	UDB-A490122 UDB-A501122
	2-5/8	UDB-A490123 UDB-A501123
	2-3/4	UDB-A490124 UDB-A501124
	3"	UDB-A490125 UDB-A501125
	3-1/4	UDB-A490126 UDB-A501126
	3-1/2	UDB-A490127 UDB-A501127
	3-3/4	UDB-A490128 UDB-A501128
	4"	UDB-A490129 UDB-A501129
	5"	UDB-A490130 UDB-A501130
	6"	UDB-A490131 UDB-A501131



With 1-1/2" style 'S' SHELOX® Liners, use shank inserts 5/8" long in order to be flush with bottom of



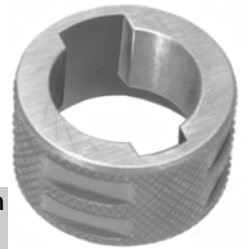
In applications where the workpiece is located some distance from the fixture, shanks up to 6" in length or longer specials may be ordered.



UNITED's Contour Surface Shank may be ordered for drilling sloped or contoured surfaces. The Contour Shank is assembled with the ground angles in 'Clocked' position with the HELOX.

A.N.S.I. STANDARD TOLERANCE ON 'A' DIMENSION OF INSERT SHANK	
UP TO 1/4	+0.001 TO +0.004
OVER 1/4 TO 3/4	+0.001 TO +0.005
OVER 3/4 TO 1-1/2	+0.002 TO +0.006

Shelox® Style 'P'
(Plastics or Soft Tooling)



Shelox® Style 'A' Head Down
(Aluminum or Steel Tooling)



Shelox® Style 'S' Head Up
(Aluminum or Steel Tooling)



HELOX ONLY	UDB-490000	UDB-500000
Shelox® Style 'A' Ring, Retaining	UDB-521049 (.286 ID x .499 OD) UDB-521549	UDB-521050 (.390 ID x .625 OD) UDB-521550
Shelox® Style 'S' Ring, Lock	UDB-521349 (.286 ID x .499 OD) UDB-521449	UDB-521350 (.390 ID x .625 OD) UDB-521450
Shelox® Style 'P'	UDB-521149 (.286 ID x .499 OD)	UDB-521150 (.390 ID x .625 OD)



Adapters-Shank Inserts-Liners

49000 THRU 50000
ON PREVIOUS
PAGE.

510000 Series
3/4-16 2A L.H.

520000 Series
3/4-16 2A L.H.

530000 Series
1"-14 2A L.H.

540000 Series
1"-14 2A L.H.

550000 Series
1-1/4-12 2A L.H.

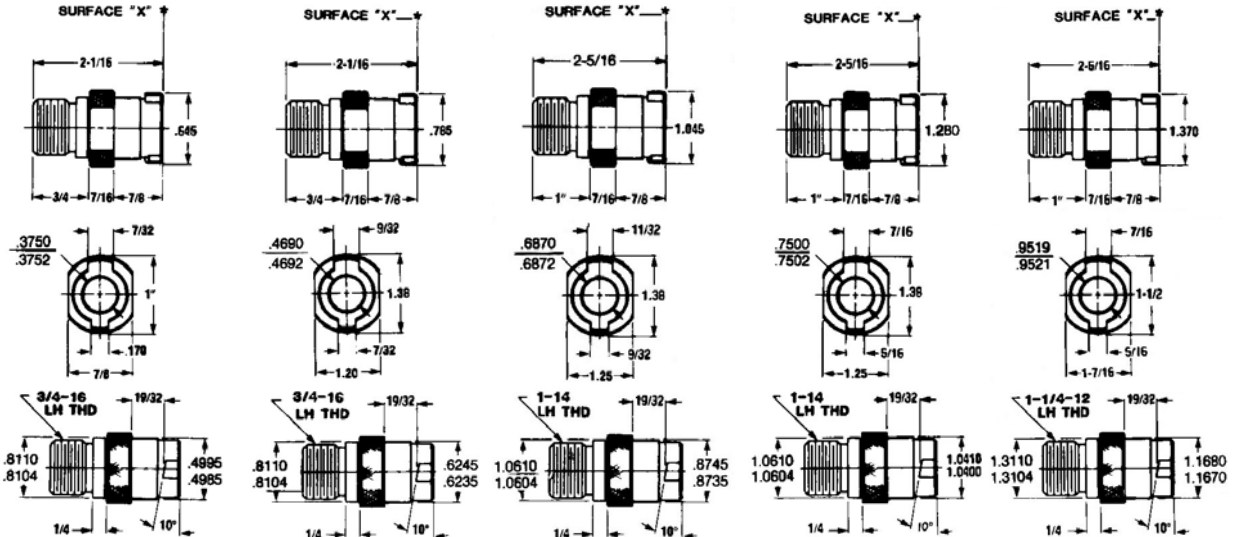
PATENT:
3,756,736

**UNITED
HELOX®**

**Shank
Inserts**

**51000
THRU
55000**

**SHELOX®
Liners**



A DRILL SIZE	MIN. 1/16 (.0625) MAX 19/64 (.2969)	1/16 (.0625) 23/64(.3594)	3/32 (.0938) 13/32(.4062)	3/32(.0938) 5/8 (.6250)	1/4 (.2500) 3/4(.7500)	
B	.473	.598	.848	1.000	1.093	
B ₁	.3763	.4703	.6883	.7516	.9535	
'C' LENGTH SHANK EXTENDS FROM HELOX® (INCHES)	FLUSH	UDB-A511100	UDB-A521200	UDB-A531300	UDB-A542400	UDB-A553400
	1/4	UDB-A511100A	UDB-A521200A	UDB-A531300A	UDB-A542400A	UDB-A553400A
	3/8	UDB-A511101	UDB-A521201	UDB-A531301	UDB-A542401	UDB-A553401
	1/2	UDB-A511102	UDB-A521202	UDB-A531302	UDB-A542402	UDB-A553402
	5/8	UDB-A511103	UDB-A521203	UDB-A531303	UDB-A542403	UDB-A553403
	3/4	UDB-A511104	UDB-A521204	UDB-A531304	UDB-A542404	UDB-A553404
	7/8	UDB-A511105	UDB-A521205	UDB-A531305	UDB-A542405	UDB-A553405
	1"	UDB-A511106	UDB-A521206	UDB-A531306	UDB-A542406	UDB-A553406
	1-1/16	UDB-A511107	UDB-A521207	UDB-A531307	UDB-A542407	UDB-A553407
	1-1/8	UDB-A511108	UDB-A521208	UDB-A531308	UDB-A542408	UDB-A553408
	1-3/16	UDB-A511109	UDB-A521209	UDB-A531309	UDB-A542409	UDB-A553409
	1-1/4	UDB-A511110	UDB-A521210	UDB-A531310	UDB-A542410	UDB-A553410
	1-3/8	UDB-A511111	UDB-A521211	UDB-A531311	UDB-A542411	UDB-A553411
	1-7/16	UDB-A511112	UDB-A521212	UDB-A531312	UDB-A542412	UDB-A553412
	1-1/2	UDB-A511113	UDB-A521213	UDB-A531313	UDB-A542413	UDB-A553413
	1-5/8	UDB-A511114	UDB-A521214	UDB-A531314	UDB-A542414	UDB-A553414
	1-3/4	UDB-A511115	UDB-A521215	UDB-A531315	UDB-A542415	UDB-A553415
	1-7/8	UDB-A511116	UDB-A521216	UDB-A531316	UDB-A542416	UDB-A553416
	1-15/16	UDB-A511117	UDB-A521217	UDB-A531317	UDB-A542417	UDB-A553417
	2"	UDB-A511118	UDB-A521218	UDB-A531318	UDB-A542418	UDB-A553418
	2-1/8	UDB-A511119	UDB-A521219	UDB-A531319	UDB-A542419	UDB-A553419
	2-1/4	UDB-A511120	UDB-A521220	UDB-A531320	UDB-A542420	UDB-A553420
	2-3/8	UDB-A511121	UDB-A521221	UDB-A531321	UDB-A542421	UDB-A553421
	2-1/2	UDB-A511122	UDB-A521222	UDB-A531322	UDB-A542422	UDB-A553422
	2-5/8	UDB-A511123	UDB-A521223	UDB-A531323	UDB-A542423	UDB-A553423
	2-3/4	UDB-A511124	UDB-A521224	UDB-A531324	UDB-A542424	UDB-A553424
	3"	UDB-A511125	UDB-A521225	UDB-A531325	UDB-A542425	UDB-A553425
	3-1/4	UDB-A511126	UDB-A521226	UDB-A531326	UDB-A542426	UDB-A553426
	3-1/2	UDB-A511127	UDB-A521227	UDB-A531327	UDB-A542427	UDB-A553427
	3-3/4	UDB-A511128	UDB-A521228	UDB-A531328	UDB-A542428	UDB-A553428
	4"	UDB-A511129	UDB-A521229	UDB-A531329	UDB-A542429	UDB-A553429
	5"	UDB-A511130	UDB-A521230	UDB-A531330	UDB-A542430	UDB-A553430
	6"	UDB-A511131	UDB-A521231	UDB-A531331	UDB-A542431	UDB-A553431
HELOX® ONLY	UDB-510000	UDB-520000	UDB-530000	UDB-540000	UDB-550000	
Shelox® Style 'A' Ring, Retaining	UDB-521051 (.500 ID x .780 OD) UDB-521551	UDB-521052 (.625 ID x .999 OD) UDB-521552	UDB-521053 (.875 ID x 1.249 OD) UDB-521553	UDB-521054 (1.042 ID x 1.436 OD) UDB-521554	UDB-521055 (1.169 ID x 1.561 OD) UDB-521555	
Shelox® Style 'S' Ring, Lock	UDB-521351 (.500 ID x .8748 OD) UDB-521451	UDB-521352 (.625 ID x .9998 OD) UDB-521452	UDB-521353 (.875 ID x 1.2498 OD) UDB-521453	UDB-521354 (1.042 ID x 1.4998OD) UDB-521454	UDB-521355 (1.169 ID x 1.6248 OD) UDB-521455	
Shelox® Style 'P'	UDB-521151 (.500 ID x .837 OD)	UDB-521152 (.625 ID x 1.085 OD)	UDB-521153 (.875 ID x 1.335 OD)	UDB-521154 (1.042 ID x 1.563 OD)	UDB-521155 (1.169 ID x 1.688 OD)	

Adapters-Shank Inserts-Liners



49000 THRU 55000
ON PREVIOUS
PAGES.

560000 Series
1-1/4-12 2A L.H.

570000 Series
1-1/2-12 2A L.H.

580000 Series
2"-16 2A L.H.

590000 Series
2"-16 2A L.H.

600000 Series
2-1/2-16 2A L.H.

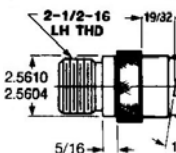
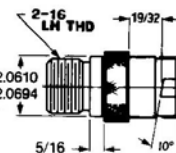
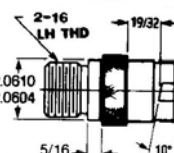
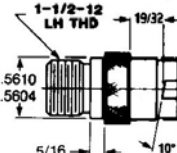
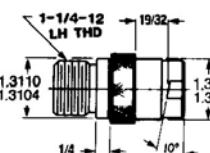
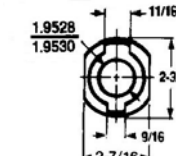
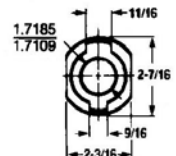
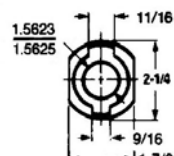
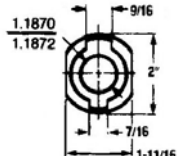
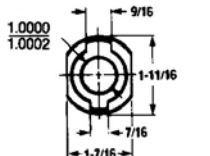
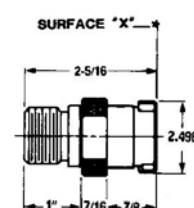
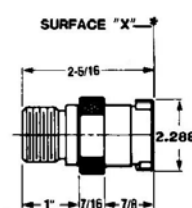
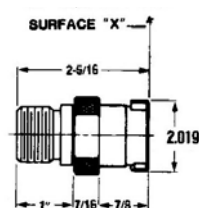
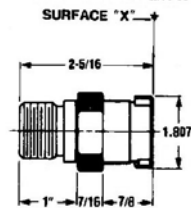
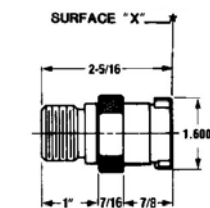
PATENT:
3,756,736

**UNITED
HELOX®**

**Shank
Inserts**

**56000
THRU
60000**

**SHELOX®
Liners**



A DRILL SIZE	MIN. 1/4 (.2500) MAX 7/8 (.8750)	5/16 (.3125) 1-7/64 (1.1093)	5/16 (.3125) 1-11/64 (1.1719)	3/8 (.3750) 1-9/16 (1.5625)	3/8 (.3750) 1-3/4 (1.7500)
B	1.281	1.406	1.500	1.875	2.125
B ₁	1.0020	1.1892	1.5645	1.7212	1.9549
C LENGTH SHANK EXTENDS FROM HELOX® (INCHES)	FLUSH	UDB-A563400	UDB-A574700	UDB-A584700	UDB-A595400
	1/4	UDB-A563400A	UDB-A574700A	UDB-A584700A	UDB-A595400A
	3/8	UDB-A563401	UDB-A574701	UDB-A584701	UDB-A595401
	1/2	UDB-A563402	UDB-A574702	UDB-A584702	UDB-A595402
	5/8	UDB-A563403	UDB-A574703	UDB-A584703	UDB-A595403
	3/4	UDB-A563404	UDB-A574704	UDB-A584704	UDB-A595404
	7/8	UDB-A563405	UDB-A574705	UDB-A584705	UDB-A595405
	1"	UDB-A563406	UDB-A574706	UDB-A584706	UDB-A595406
	1-1/16	UDB-A563407	UDB-A574707	UDB-A584707	UDB-A595407
	1-1/8	UDB-A563408	UDB-A574708	UDB-A584708	UDB-A595408
	1-3/16	UDB-A563409	UDB-A574709	UDB-A584709	UDB-A595409
	1-1/4	UDB-A563410	UDB-A574710	UDB-A584710	UDB-A595410
	1-3/8	UDB-A563411	UDB-A574711	UDB-A584711	UDB-A595411
	1-7/16	UDB-A563412	UDB-A574712	UDB-A584712	UDB-A595412
	1-1/2	UDB-A563413	UDB-A574713	UDB-A584713	UDB-A595413
	1-5/8	UDB-A563414	UDB-A574714	UDB-A584714	UDB-A595414
	1-3/4	UDB-A563415	UDB-A574715	UDB-A584715	UDB-A595415
	1-7/8	UDB-A563416	UDB-A574716	UDB-A584716	UDB-A595416
	1-15/16	UDB-A563417	UDB-A574717	UDB-A584717	UDB-A595417
	2"	UDB-A563418	UDB-A574718	UDB-A584718	UDB-A595418
	2-1/8	UDB-A563419	UDB-A574719	UDB-A584719	UDB-A595419
	2-1/4	UDB-A563420	UDB-A574720	UDB-A584720	UDB-A595420
	2-3/8	UDB-A563421	UDB-A574721	UDB-A584721	UDB-A595421
	2-1/2	UDB-A563422	UDB-A574722	UDB-A584722	UDB-A595422
	2-5/8	UDB-A563423	UDB-A574723	UDB-A584723	UDB-A595423
	2-3/4	UDB-A563424	UDB-A574724	UDB-A584724	UDB-A595424
	3"	UDB-A563425	UDB-A574725	UDB-A584725	UDB-A595425
	3-1/4	UDB-A563426	UDB-A574726	UDB-A584726	UDB-A595426
	3-1/2	UDB-A563427	UDB-A574727	UDB-A584727	UDB-A595427
	3-3/4	UDB-A563428	UDB-A574728	UDB-A584728	UDB-A595428
	4"	UDB-A563429	UDB-A574729	UDB-A584729	UDB-A595429
	5"	UDB-A563430	UDB-A574730	UDB-A584730	UDB-A595430
	6"	UDB-A563431	UDB-A574731	UDB-A584731	UDB-A595431
HELOX® ONLY	UDB-560000	UDB-570000	UDB-580000	UDB-590000	UDB-600000
Shelox® Style 'A' Ring, Retaining	UDB-521056 (1.397 ID x 1.8115 OD) UDB-521556	UDB-521057 (1.607 ID x 2.061 OD) UDB-521557	UDB-521058 (1.819 ID x 2.311 OD) UDB-521558	UDB-521059 (2.088 ID x 2.561 OD) UDB-521559	UDB-521060 (2.298 ID x 2.874 OD) UDB-521560
Shelox® Style 'S' Ring, Lock	UDB-521356 (1.397 ID x 1.8748 OD) UDB-521456	UDB-521357 (1.607 ID x 2.1248 OD) UDB-521457	UDB-521358 (1.819 ID x 2.2498 OD) UDB-521458	UDB-521359 (2.088 ID x 2.6248 OD) UDB-521459	UDB-521360 (2.298 ID x 2.8748 OD) UDB-521460
Shelox® Style 'P'	UDB-521156 (1.397 ID x 1.938 OD)	UDB-521157 (1.607 ID x 2.188 OD)	UDB-521158 (1.819 ID x 2.438 OD)	UDB-521159 (2.088 ID x 2.688 OD)	UDB-521160 (2.298 ID x 2.938 OD)

12200 WOODRUFF AVE. • DOWNEY, CA 90241-5608 • TELEPHONE (562) 803-1521 / (800) 421-3466 IN CA / (800) 486-3466 • FAX (562) 803-6898 / (800) 486-3465

12-19-03

EMAIL united@ucc-udb.com WEBSITE www.ucc-udb.com

Q29

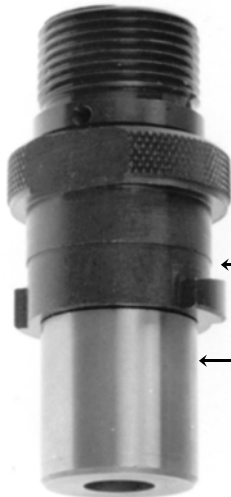
Helox® Telescopic Assy

Helox® Telescoping For Gun Drilling

HELOX® TELESCOPIC ASSEMBLIES

SERIES CONTINUES
NEXT PAGE.
PATENT: 3,756,736

Actual Travel is 5/8"
for 492000 thru
522000.
Actual Travel is 3/4"
for 532000 thru
602000.
Both are rated 1/2"
only.



← ADAPTER

← TELESCOPIC
SHANK

SEALS AGAINST
WORK PIECE.

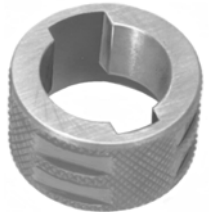
Shelox® Style 'S' Head Up (Aluminum or Steel Tooling)



Shelox® Style 'A' Head Down (Aluminum or Steel Tooling)



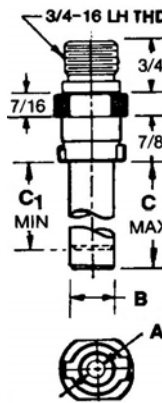
Shelox® Style 'P' (Plastics or Soft Tooling)



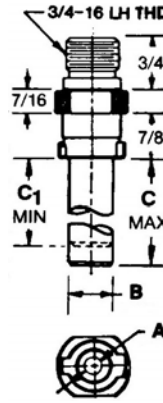
Shelox® Telescoping Spring



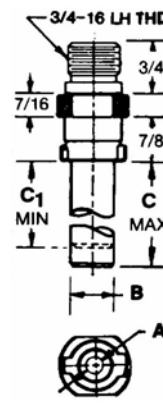
492000 Series 3/4-16 L.H.



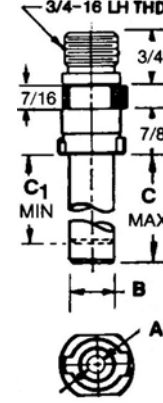
502000 Series 3/4-16 L.H.



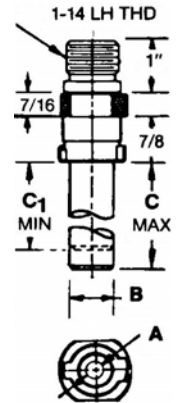
512000 Series 3/4-16 L.H.



522000 Series 3/4-16 L.H.



532000 Series 1"-14 L.H.



	C ₁ MIN LEN	C MAX LEN	A DIA. MIN. MAX	.0625 .1094	.0625 .2031	.0625 .2969	.0625 .3594	.0934 .4062
	B DIA	3/16	9/32	3/8	15/32	11/16		
TELESCOPIC RANGE	FLUSH	1/2	UDB-A492002	UDB-A502002	UDB-A512002	UDB-A522002	UDB-A532002	
	1/2	1"	UDB-A492006	UDB-A502006	UDB-A512006	UDB-A522006	UDB-A532006	
	1"	1-1/2	UDB-A492013	UDB-A502013	UDB-A512013	UDB-A522013	UDB-A532013	
	1-1/2	2"	UDB-A492018	UDB-A502018	UDB-A512018	UDB-A522018	UDB-A532018	
	2"	2-1/2	UDB-A492022	UDB-A502022	UDB-A512022	UDB-A522022	UDB-A532022	
	2-1/2	3"	UDB-A492025	UDB-A502025	UDB-A512025	UDB-A522025	UDB-A532025	
	3"	3-1/2	UDB-A492027	UDB-A502027	UDB-A512027	UDB-A522027	UDB-A532027	
	3-1/2	4"	UDB-A492029	UDB-A502029	UDB-A512029	UDB-A522029	UDB-A532029	
	4"	4-1/2	UDB-A492029B	UDB-A502029B	UDB-A512029B	UDB-A522029B	UDB-A532029B	
	4-1/2	5"	UDB-A492030	UDB-A502030	UDB-A512030	UDB-A522030	UDB-A532030	
	5"	5-1/2	UDB-A492030B	UDB-A502030B	UDB-A512030B	UDB-A522030B	UDB-A532030B	
	5-1/2	6"	UDB-A492031	UDB-A502031	UDB-A512031	UDB-A522031	UDB-A532031	

HELOX®	UDB-492000	UDB-502000	UDB-512000	UDB-522000	UDB-532000
Shelox® Style 'A'	UDB-521049	UDB-521050	UDB-521051	UDB-521052	UDB-521053
Ring, Retaining	.286 ID x .499 OD UDB-521549	.390 ID x .625 OD UDB-521550	.500 ID x .780 OD UDB-521551	.625 ID x .999 OD UDB-521552	.875 ID x 1.249 OD UDB-521553
Shelox® Style 'S'	UDB-521349	UDB-521350	UDB-521351	UDB-521352	UDB-521353
Ring, Lock	.286 ID x .499 OD UDB-521449	.390 ID x .625 OD UDB-521450	.500 ID x .8748 OD UDB-521451	.625 ID x .9998 OD UDB-521452	.875 ID x 1.2498 OD UDB-521453
Shelox® Style 'P'	UDB-521149	UDB-521150	UDB-521151	UDB-521152	UDB-521153
Spring, Telescoping	.286 ID x .499 OD UDB-A492000-S	.390 ID x .625 OD UDB-A502000-S	.500 ID x .837 OD UDB-A512000-S	.625 ID x 1.085 OD UDB-A522000-S	.875 ID x 1.335 OD UDB-A532000-S

ORDERING INSTRUCTIONS:

- To order Telescopic Assembly (Shelox® Liners are ordered separately.):**
Example: UDB-A532002-(Specify I.D.) = Complete Assembly Flush to 1/2.
Example: UDB-A532006-(Specify I.D.) = Complete Assembly 1/2 to 1".
- To order Adapter Only, omit 'A' from Part No.**
Example: UDB-532000 = Adapter only.
- To order Shank Only, omit 'A' and add suffix 'I' and specify I.D.**
Example: UDB-532002-I-.3750(I.D.) = Insert only, 1/2 to 1".
- To order Spring Only, omit 'A' and add suffix 'S' to Adapter Part No.**
Example: UDB-532002-S = Spring only.
- To order Shelox® Liner longer than 7/8", add length to Part No.**
Example: UDB-A521053-Liner 1-1/2 O/L = Shelox® Liner 1-1/2 overall length.

Adapter Assemblies

For Gun Drilling

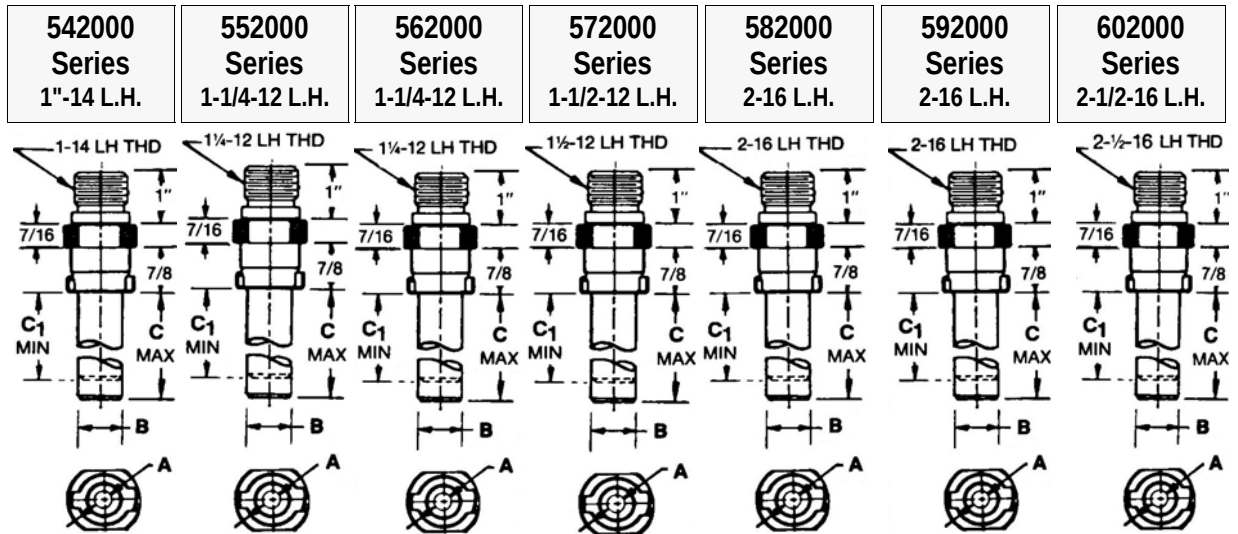
Helox®
Telescopic Assy

**UNITED
HELOX®
ADAPTERS**

with
Telescoping
Shanks

492000
THRU 602000
Both Pages
Q30-Q31.

**SHELOX®
Liners**



	C1 MIN	C MAX	A DIA. MIN.	.0934 MAX .7250	.2500 .7500	.2500 .8750	.3125 1.1093	.3125 1.1719	.3750 1.5625	.3750 1.7500
	LEN		B DIA	3/4	61/64	1"	1-3/16	1-5/16	1-23/32	1-61/64
TELESCOPIC RANGE	FLUSH	1/2	UDB-A542002	UDB-A552002	UDB-A562002	UDB-A572002	UDB-A582002	UDB-A592002	UDB-A602002	UDB-A602002
	1/2	1"	UDB-A542006	UDB-A552006	UDB-A562006	UDB-A572006	UDB-A582006	UDB-A592006	UDB-A602006	UDB-A602006
	1"	1-1/2	UDB-A542013	UDB-A552013	UDB-A562013	UDB-A572013	UDB-A582013	UDB-A592013	UDB-A602013	UDB-A602013
	1-1/2	2"	UDB-A542018	UDB-A552018	UDB-A562018	UDB-A572018	UDB-A582018	UDB-A592018	UDB-A602018	UDB-A602018
	2"	2-1/2	UDB-A542022	UDB-A552022	UDB-A562022	UDB-A572022	UDB-A582022	UDB-A592022	UDB-A602022	UDB-A602022
	2-1/2	3"	UDB-A542025	UDB-A552025	UDB-A562025	UDB-A572025	UDB-A582025	UDB-A592025	UDB-A602025	UDB-A602025
	3"	3-1/2	UDB-A542027	UDB-A552027	UDB-A562027	UDB-A572027	UDB-A582027	UDB-A592027	UDB-A602027	UDB-A602027
	3-1/2	4"	UDB-A542029	UDB-A552029	UDB-A562029	UDB-A572029	UDB-A582029	UDB-A592029	UDB-A602029	UDB-A602029
	4"	4-1/2	UDB-A542029B	UDB-A552029B	UDB-A562029B	UDB-A572029B	UDB-A582029B	UDB-A592029B	UDB-A602029B	UDB-A602029B
	4-1/2	5"	UDB-A542030	UDB-A552030	UDB-A562030	UDB-A572030	UDB-A582030	UDB-A592030	UDB-A602030	UDB-A602030
	5"	5-1/2	UDB-A542030B	UDB-A552030B	UDB-A562030B	UDB-A572030B	UDB-A582030B	UDB-A592030B	UDB-A602030B	UDB-A602030B
	5-1/2	6"	UDB-A542031	UDB-A552031	UDB-A562031	UDB-A572031	UDB-A582031	UDB-A592031	UDB-A602031	UDB-A602031

HELOX®	UDB-542000	UDB-552000	UDB-562000	UDB-572000	UDB-582000	UDB-592000	UDB-602000
Shelox® Style 'A'	UDB-521054	UDB-521055	UDB-521056	UDB-521057	UDB-521058	UDB-521059	UDB-521060
Ring, Retaining	1.042 ID x 1.436 OD UDB-521554	1.169 ID x 1.561 OD UDB-521555	1.397 ID x 1.8115 OD UDB-521556	1.607 ID x 2.061 OD UDB-521557	1.819 ID x 2.311 OD UDB-521558	2.088 ID x 2.561 OD UDB-521559	2.298 ID x 2.874 OD UDB-521560
Shelox® Style 'S'	UDB-521354	UDB-521355	UDB-521356	UDB-521357	UDB-521358	UDB-521359	UDB-521360
Ring, Lock	1.042 ID x 1.4998 OD UDB-521454	1.169 ID x 1.6248 OD UDB-521455	1.397 ID x 1.8748 OD UDB-521456	1.607 ID x 2.1248 OD UDB-521457	1.819 ID x 2.2498 OD UDB-521458	2.088 ID x 2.6248 OD UDB-521459	2.298 ID x 2.8748 OD UDB-521460
Shelox® Style 'P'	UDB-521154	UDB-521155	UDB-521156	UDB-521157	UDB-521158	UDB-521159	UDB-521160
Spring, Telescoping	1.042 ID x 1.563 OD UDB-A542000-S	1.169 ID x 1.688 OD UDB-A552000-S	1.397 ID x 1.938 OD UDB-A562000-S	1.607 ID x 2.188 OD UDB-A572000-S	1.819 ID x 2.438 OD UDB-A582000-S	2.088 ID x 2.688 OD UDB-A592000-S	2.298 ID x 2.938 OD UDB-A602000-S

- No Repairs
- No Clamps
- No Lock Screws
- No Reworks
- No Strip Mounting
- No Massive Lock Liners
- No Big Money Worries

Less Space — Big Results!

TOLERANCE on INSIDE Diameter	
I. D. Range	Tolerance over NOM.
Up to .2500	+.0001 to +.0004
Over .2500 to .7500	+.0001 to +.0005
Over .7500 to 1.5000	+.0002 to +.0006
Over 1.5000 to 1.8750	+.0003 to +.0007

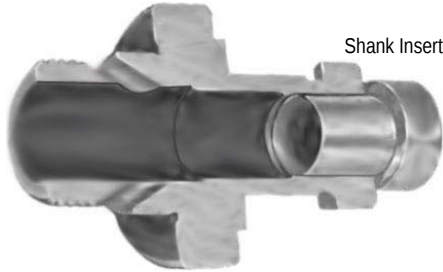
Helox® Adapters

Helox® Adapters for Shank Inserts

HELOX® ADAPTERS



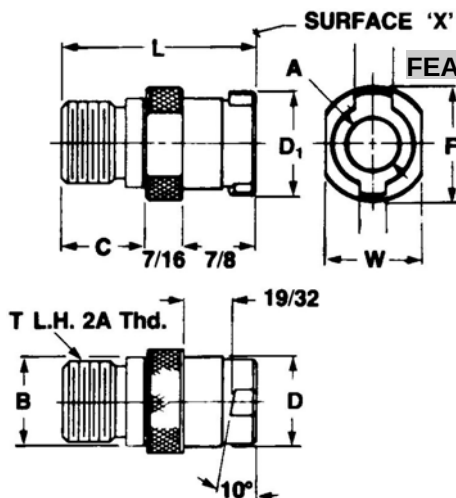
Helox® Adapter



Shank Insert

UNITED's Helox® Adapter Tips and Accessories fit all standard automatic feed drill motors as manufactured by Gardner-Denver (Keller), Buckeye, ARO, Quackenbush, Ingersoll Rand, Rockwell. The threaded end of the Helox® fits into the nose piece of the motor. The male locking ears of the Helox® positively engage the helical inside ramp surfaces of the Shelox® Liner. Locking always occurs at 45° of rotation. This positive lock results in greater accuracy in depth control than previously realized with other conventional adapter tip and lock liner configurations. Shelox® Liners are manufactured for both plastic and steel fixture tooling.

Rc 60-64 (Shank Drawn)
ALLOY STEEL—BLACK OXIDE FINISH



1. Locking ears provide full bearing with helical internal Shelox® ramps.
2. Helox® outside diameter is knurled to prevent grip slip..
3. Chip clearance counterbore prevents jam ups.
4. Helical ground locking ramps lock positively faster. A 45° turn locks with full bearing and repeats within one degree.
5. Square shoulders, concentric diameters, and precision ground helical ramps assure accurate alignment of drill with axis.
6. Heat treated for strength and wear resistance. Black oxide rust preventative finish.
7. Internal and external diameters are finished to ANSI and UNITED specifications.
8. Locking helical ramps width vary to assure angular control orientation.
9. Absorbs maximum thrust and resists drill torque.
10. Eliminates vibration from powerful, high speed drill motors.

Ordering Information:

HELOX ASSEMBLIES
(Helox Adapter with Shank Installed)

ADD PREFIX "A"
Select the HELOX and the insert shank required. Specify the part number and name. Add the drill size to the part number. The drill size should be specified as a decimal to four places.

EXAMPLE:
UDB-A542401 (.6250)
HELOX ADAPTER TIP
COMPLETE ASSY.

HELOX ONLY

Specify HELOX part number only and part name.

EXAMPLE:
510000 HELOX ADAPTER

ADAPTER
WITHOUT SHANK

SHANK INSERT ONLY

OMIT PREFIX "A"
Determine the shank insert size required to fit the appropriate HELOX omit the "A" from the call-out and specify the drill size to four places.

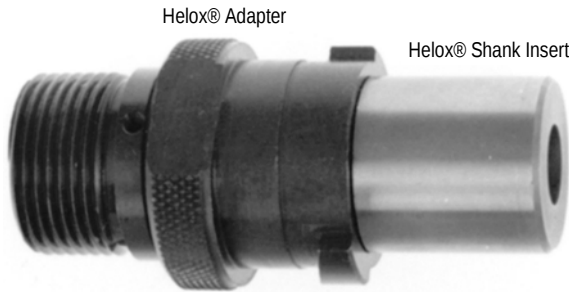
EXAMPLE:
521201 (.2500)
HELOX SHANK INSERT ONLY

DRILL SIZE RANGE (WITH INSERT)	PART NO.	A +.0002 -.0000	B +.0000 -.0006	T THD	C	D	D ₁	F	L	W	FITS SHELOX NO.
.062 - .1094	UDB-490000	.1850 .1852	.8110 .8104	3/4 - 16	3/4	.285 .284	.380	1	2-1/16	7/8	521049 521149 521349
.062 - .2031	UDB-500000	.2810 .2812	.8110 .8104	3/4 - 16	3/4	.3896 .3886	.491	1	2-1/16	7/8	521050 521150 521350
.062 - .2969	UDB-510000	.3750 .3752	.8110 .8104	3/4 - 16	3/4	.4995 .4985	.645	1	2-1/16	7/8	521051 521151 521351
.062 - .3594	UDB-520000	.4690 .4692	.8110 .8104	3/4 - 16	3/4	.6245 .6235	.785	1-3/8	2-1/16	1-1/4	521052 521152 521352
.0937 - .4062	UDB-530000	.6870 .6872	1.0610 1.0604	1 - 14	1"	.8745 .8735	1.045	1-3/8	2-5/16	1-1/4	521053 521153 521353
.0937 - .6250	UDB-540000	.7500 .7502	1.0610 1.0604	1 - 14	1"	1.0410 1.0400	1.280	1-3/8	2-5/16	1-1/4	521054 521154 521354
.2500 - .7500	UDB-550000	.9519 .9521	1.3110 1.3104	1-1/4 - 12	1"	1.1680 1.1670	1.370	1-1/2	2-5/16	1-7/16	521055 521155 521355
.2500 - .8750	UDB-560000	1.0000 1.0002	1.3110 1.3104	1-1/4 - 12	1"	1.3960 1.3950	1.600	1-11/16	2-5/16	1-7/16	521056 521156 521356
.3125 - 1.1093	UDB-570000	1.1870 1.1872	1.5610 1.5604	1-1/2 - 12	1"	1.6060 1.6050	1.807	2	2-5/16	1-11/16	521057 521157 521357
.3125 - 1.1719	UDB-580000	1.5623 1.5625	2.0610 2.0604	2 - 16	1"	1.8180 1.8170	2.019	2-1/4	2-5/16	1-7/8	521058 521158 521358
.3750 - 1.5625	UDB-590000	1.7185 1.7187	2.0610 2.0604	2 - 16	1"	2.0870 2.0860	2.288	2-7/16	2-5/16	2-3/16	521059 521159 521359
.3750 - 1.7500	UDB-600000	1.9528 1.9530	2.5610 2.5604	2-1/2 - 16	1"	2.2970 2.2960	2.498	2-3/4	2-5/16	2-7/16	521060 521160 521360

Ordering Information: Special sizes are supplied only at extra cost. Drill guide hole tolerances closer than standard are special orders.

Helox® Shank Inserts for Helox® Adapters

Helox®
Shank Inserts



Helox® Shank Inserts
are configured
for your needs.
See below right.

HELOX® SHANK INSERTS

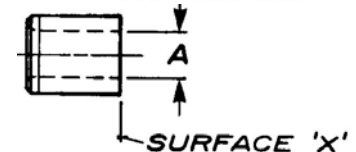
INSERT INFORMATION

Shank Inserts for **UNITED's** Helox® Adapters are the same configuration as the Standard Shank for the Nurlock Adapters.

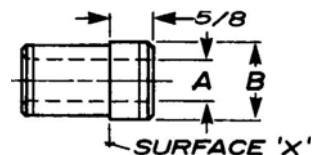
Rc 60-65	
TOLERANCE ON 'A' DIMENSION	
UP TO 1/4	+0.001 TO +0.004
OVER 1/4 TO 3/4	+0.001 TO +0.005
OVER 3/4 TO 1-1/2	+0.002 TO +0.006

They are supplied pressed into the Helox® Adapter, or they may be purchased separately.

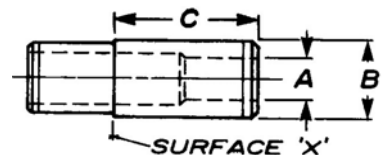
FITS HELOX®	490000	500000	510000	520000	530000	540000	550000	560000	570000	580000	590000	600000
A DIA MAX	7/64	13/64	19/64	23/64	13/32	5/8	3/4	7/8	1-7/64	1-11/64	1-9/16	1-3/4
A DIA MIN	1/16	1/16	1/16	1/16	3/32	3/32	1/4	1/4	5/16	5/16	3/8	3/8
B DIA	.259	.363	.473	.598	.848	1.000	1.093	1.281	1.406	1.500	1.875	2.125
C LENGTH												
FLUSH	491100	501100	511100	521200	531300	542400	553400	563400	574700	584700	595400	605400
3/8	491101	501101	511101	521201	531301	542401	553401	563401	574701	584701	595401	605401
1/2	491102	501102	511102	521202	531302	542402	553402	563402	574702	584702	595402	605402
5/8	491103	501103	511103	521203	531303	542403	553403	563403	574703	584703	595403	605403
3/4	491104	501104	511104	521204	531304	542404	553404	563404	574704	584704	595404	605404
7/8	491105	501105	511105	521205	531305	542405	553405	563405	574705	584705	595405	605405
1"	491106	501106	511106	521206	531306	542406	553406	563406	574706	584706	595406	605406
1-1/16	491107	501107	511107	521207	531307	542407	553407	563407	574707	584707	595407	605407
1-1/8	491108	501108	511108	521208	531308	542408	553408	563408	574708	584708	595408	605408
1-3/16	491109	501109	511109	521209	531309	542409	553409	563409	574709	584709	595409	605409
1-1/4	491110	501110	511110	521210	531310	542410	553410	563410	574710	584710	595410	605410
1-3/8	491111	501111	511111	521211	531311	542411	553411	563411	574711	584711	595411	605411
1-7/16	491112	501112	511112	521212	531312	542412	553412	563412	574712	584712	595412	605412
1-1/2	491113	501113	511113	521213	531313	542413	553413	563413	574713	584713	595413	605413
1-5/8	491114	501114	511114	521214	531314	542414	553414	563414	574714	584714	595414	605414
1-3/4	491115	501115	511115	521215	531315	542415	553415	563415	574715	584715	595415	605415
1-7/8	491116	501116	511116	521216	531316	542416	553416	563416	574716	584716	595416	605416
1-15/16	491117	501117	511117	521217	531317	542417	553417	563417	574717	584717	595417	605417
2"	491118	501118	511118	521218	531318	542418	553418	563418	574718	584718	595418	605418
2-1/8	491119	501119	511119	521219	531319	542419	553419	563419	574719	584719	595419	605419
2-1/4	491120	501120	511120	521220	531320	542420	553420	563420	574720	584720	595420	605420
2-3/8	491121	501121	511121	521221	531321	542421	553421	563421	574721	584721	595421	605421
2-1/2	491122	501122	511122	521222	531322	542422	553422	563422	574722	584722	595422	605422
2-5/8	491123	501123	511123	521223	531323	542423	553423	563423	574723	584723	595423	605423
2-3/4	491124	501124	511124	521224	531324	542424	553424	563424	574724	584724	595424	605424
3"	491125	501125	511125	521225	531325	542425	553425	563425	574725	584725	595425	605425
3-1/4	491126	501126	511126	521226	531326	542426	553426	563426	574726	584726	595426	605426
3-1/2	491127	501127	511127	521227	531327	542427	553427	563427	574727	584727	595427	605427
3-3/4	491128	501128	511128	521228	531328	542428	553428	563428	574728	584728	595428	605428
4"	491129	501129	511129	521229	531329	542429	553429	563429	574729	584729	595429	605429
5"	491130	501130	511130	521230	531330	542430	553430	563430	574730	584730	595430	605430
6"	491131	501131	511131	521231	531331	542431	553431	563431	574731	584731	595431	605431



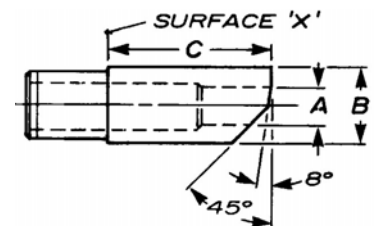
When your fixture is mounted flush to the work piece and you are using the Knurled Shelox® for plastic tooling, specify 'FLUSH' Insert and leave the bushing to us.



When one and one half inch long Threaded Shelox® Liners are used, an Insert with a Shank 5/8 inch long should be ordered to be flush with the end of the Liner. These are non-counterbored.



In applications where the work piece is located some distance from the fixture, Shanks up to 6" in length or longer specials may be ordered. These may be NCB per the counterbore tables.



UNITED's Contour Surface Shank may be ordered for drilling sloped or contoured surfaces. The Contour Shank is assembled with the ground angles in 'Clocked' position with the Helox®. Add suffix 'CS' to Part No. for these orders.

Shelox® Liners Head Down Styles

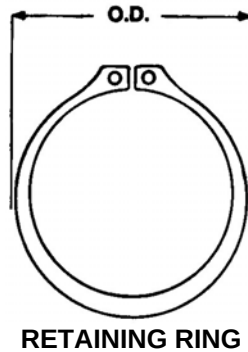
Shelox® Liners in Steel and Aluminum

SHELOX® LINERS STYLE 'A' - HEAD DOWN



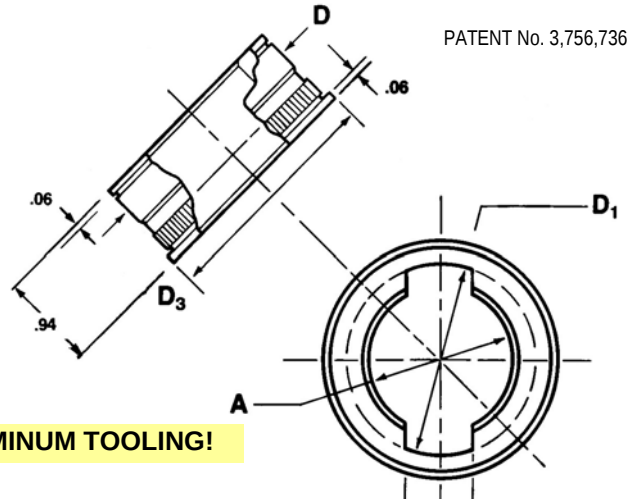
RETAINING
RING

LINER



RETAINING RING

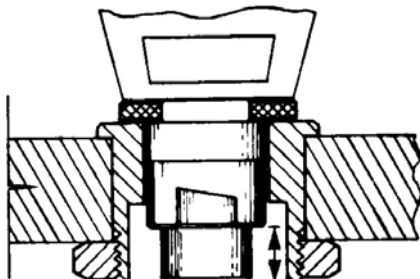
IDEAL FOR METAL AND ALUMINUM TOOLING!



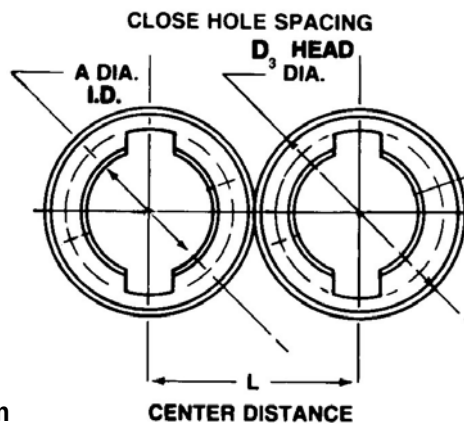
PATENT No. 3,756,736

Serrations raised nominally .008
per side above precision body
O.D. 'D.'

See Page Q36 for Slot Dimensions.



5/8" Length Shank is necessary to
fit Helox® Adapter flush with bottom
of 1-1/2" length Threaded Shelox®
Liner.



Style 'A' is designed to insert from
the bottom of the jig plate.
The Retaining Ring secures it in
position to prevent accidental
removal. The serrated diameter
locks into the aluminum plate and
prevents spin out.

SAVE TIME, SPACE AND MONEY!

Using Shelox® Style 'A' results in a
60% reduction in space.

Shelox® Liners are less expensive
than the older conventional double
eared lockscrew liners.

I.D. 'A' TOLERANCE NOMINAL SHOWN PLUS .001.

* PART NO.	D	D ₁	A	D ₃ HEAD	L	RETAINING	O.D.	FITS HELOX
UDB-521049	.499	.386	.286	5/8	.635	UDB-521549	.574	490000
UDB-521050	.624	.500	.390	3/4	.760	UDB-521550	.715	500000
UDB-521051	.780	.700	.500	29/32	.916	UDB-521551	.883	510000
UDB-521052	.999	.835	.625	1-1/8	1.135	UDB-521552	1.122	520000
UDB-521053	1.249	1.085	.875	1-3/8	1.406	UDB-521553	1.396	530000
UDB-521054	1.436	1.302	1.042	1-9/16	1.610	UDB-521554	1.600	540000
UDB-521055	1.561	1.429	1.169	1-11/16	1.750	UDB-521555	1.740	550000
UDB-521056	1.811	1.657	1.397	1-15/16	2.020	UDB-521556	2.010	560000
UDB-521057	2.061	1.888	1.607	2-3/16	2.285	UDB-521557	2.275	570000
UDB-521058	2.311	2.119	1.819	2-7/16	2.538	UDB-521558	2.528	580000
UDB-521059	2.561	2.388	2.088	2-11/16	2.802	UDB-521559	2.792	590000
UDB-521060	2.874	2.618	2.298	3"	3.132	UDB-521560	3.122	600000

* THE LAST TWO NUMBERS OF EACH SHELOX® LINER INDICATE THE HELOX® ADAPTER TO BE USED, FOR EXAMPLE,
UDB-521049 = UDB-490000 SERIES HELOX®.

Shelox® Liners in Steel and Aluminum

Shelox® Liners
Head Up Styles

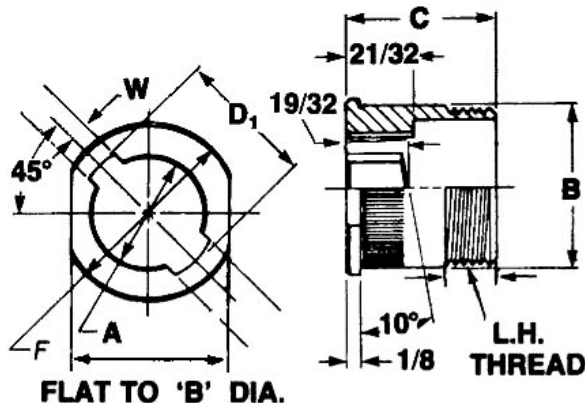
Shelox® Liners Save Space!

These Compact Liners can be mounted in up to 50% less fixture space by eliminating surface locking mechanisms.

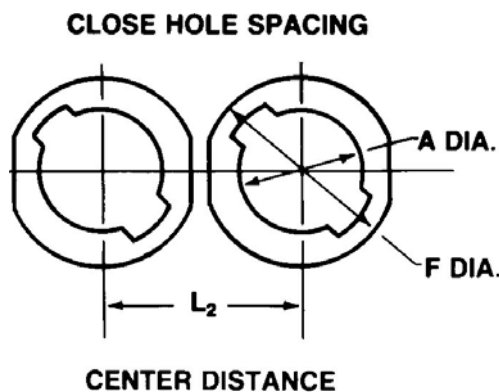
UNITED's Shelox® Liners make other weaker locking accessories obsolete, including lockscrews, clamps, strip mountings and all objectionable obstructions protruding above the fixture.

SHELOX® LINERS FOR METAL AND ALUMINUM TOOLING

Shelox® Liners lock securely with a 45° turn. They repeat within one degree which permits accurate orientation of Helox® Adapters in the event of abnormal surfaces.

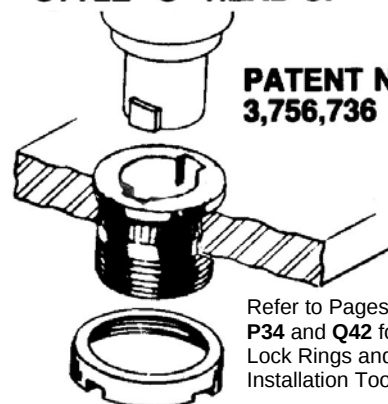


*See Page P34 for Lock Rings



STYLE 'S' HEAD UP

PATENT NO.
3,756,736



Refer to Pages
P34 and Q42 for
Lock Rings and
Installation Tools.

* See Page Q36 for additional Slot Dimensions.

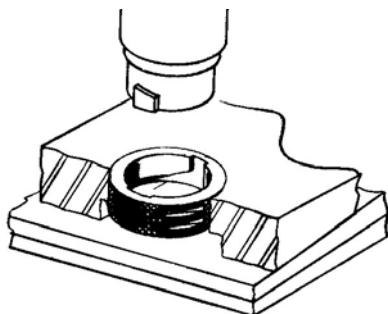
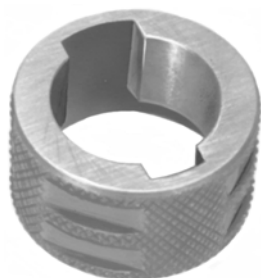
PART NO.	A I.D.	B O.D.	D ₁	F HEAD DIA	* W	C	L ₁	L ₂	L.H. THD	FITS HELOX	LOCK RING No.	B ₁	C ₁
UDB-521349	.2860 .2870	.4990 .4987	.386	5/8	3/32	3/4	7/16	.760	1/2 - 20	490000	UDB-521449	3/4	1/4
UDB-521350	.3906 .3916	.6248 .6245	.500	3/4	3/32	3/4	7/16	.885	5/8 - 18	500000	UDB-521450	7/8	1/4
UDB-521351	.500 .501	.8748 .8744	.700	1"	3/32	7/8	7/16	1.260	7/8 - 14	510000	UDB-521451	1-1/4	1/4
UDB-521352	.625 .626	.9998 .9994	.835	1-1/8	1/8	7/8	7/16	1.385	1 - 14	520000	UDB-521452	1-3/8	1/4
UDB-521353	.875 .876	1.2498 1.2494	1.085	1-3/8	5/32	7/8	7/16	1.760	1-1/4 - 12	530000	UDB-521453	1-1/2	5/16
UDB-521354	1.042 1.043	1.4998 1.4994	1.302	1-5/8	3/16	1-1/2	1/2	1.760	1-1/2 - 12	540000	UDB-521454	1-3/4	5/16
UDB-521355	1.169 1.170	1.6248 1.6244	1.429	1-3/4	3/16	1-1/2	1/2	2.135	1-5/8 - 16	550000	UDB-521455	2-1/8	1/4
UDB-521356	1.397 1.398	1.8748 1.8744	1.657	2"	1/4	1-1/2	1/2	2.385	1-7/8 - 16	560000	UDB-521456	2-3/8	1/4
UDB-521357	1.607 1.608	2.1248 2.1242	1.888	2-1/4	1/4	1-1/2	1/2	2.635	2-1/8 - 16	570000	UDB-521457	2-5/8	5/16
UDB-521358	1.819 1.820	2.2498 2.2492	2.119	2-3/8	5/16	1-1/2	1/2	2.760	2-1/4 - 16	580000	UDB-521458	2-3/4	5/16
UDB-521359	2.088 2.089	2.6248 2.6242	2.388	2-3/4	5/16	1-1/2	1/2	3.135	2-5/8 - 16	590000	UDB-521459	3-1/8	3/8
UDB-521360	2.298 2.299	2.8748 2.8742	2.618	3"	5/16	1-1/2	1/2	3.385	2-7/8 - 16	600000	UDB-521460	3-3/8	3/8

UNITED Shelox®

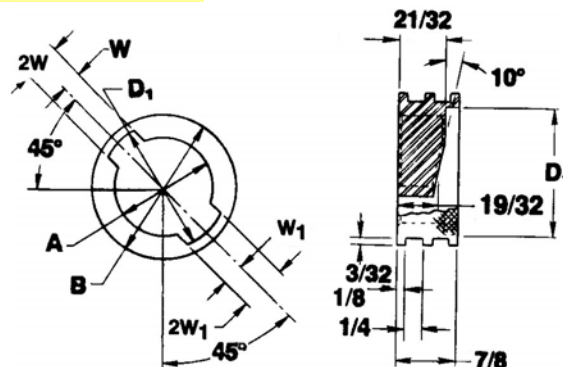
Shelox® in Plastic and Soft Tools

SHELOX® NURLOCK LINERS FOR PLASTIC AND SOFT TOOLING

STYLE 'P'



PATENT No. 3,756,736



UNITED's SHELOX® NURLOCK LINERS are better for these reasons:

1

New positive lock Shelox® Nurlock Liners provide full bearing. The mating Helox® locking ears replace weaker, less sophisticated single point contract.

2

Tough Shelox® Nurlock Liners assure precision alignment and stop vibration while absorbing the thrust and resisting the torque of modern powerful, higher speed drill motors.

3

Precision knurled Shelox® Nurlock Liners are mounted flush with the top of your fixture. The Helox® Adapters lock inside the Shelox® Nurlock Liners, eliminating the obstructions created by conventional locking mechanisms.

4

Shelox® Nurlock Liners are designed to lock UNITED's Helox® Adapters to precise locations in Fixture Plates or Drill Bars. When this unique combination is used, they provide one of the most accurate and positive methods of automatic feed drilling available.

5

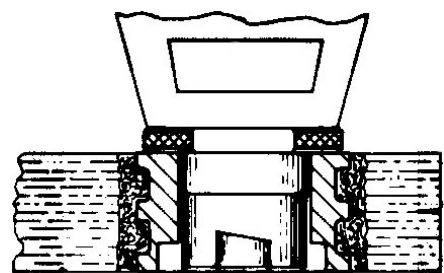
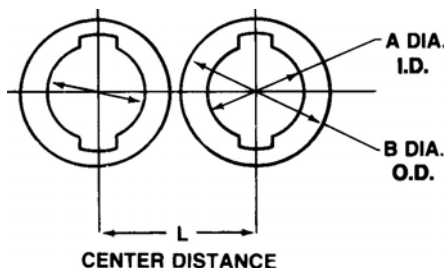
Shelox® Nurlock Liners provide strong positive lock in the same 45° locking position. This allows for more accurate setting of depth control in drilling and countersinking operations.

6

Made for plastic tooling, the Shelox® Nurlock Liners have no protrusion on either side of the Drill Bar. This gives you the cleanest method of fabricating Drill Bars in the industry.

7

Shelox® Nurlock Liners also work with any of the specialized drilling adapters made by UNITED for Taper Lock and other fastener hole preparations.



HELOX® IS FLUSH WITH BOTTOM OF ALL KNURLED AND 7/8" LENGTH THREADED SHELOX® LINERS.

PART NO.	A I.D.	B O.D.	D ₁	L	W (SMALL)	FITS HELOX	W ₁
UDB-521149	.286 .287	.500	.386	.510	3/32	490000	3/32
UDB-521150	.390 .3916	.625	.500	.635	3/32	500000	3/32
UDB-521151	.500 .501	.837	.700	.847	3/32	510000	1/8
UDB-521152	.625 .626	1.085	.835	1.095	1/8	520000	5/32
UDB-521153	.875 .876	1.335	1.085	1.345	5/32	530000	3/16
UDB-521154	1.042 1.043	1.563	1.302	1.573	3/16	540000	1/4
UDB-521155	1.169 1.170	1.688	1.429	1.698	3/16	550000	1/4
UDB-521156	1.397 1.398	1.938	1.657	1.948	1/4	560000	5/16
UDB-521157	1.607 1.608	2.188	1.888	2.198	1/4	570000	5/16
UDB-521158	1.819 1.820	2.438	2.119	2.448	5/16	580000	3/8
UDB-521159	2.088 2.089	2.688	2.388	2.698	5/16	590000	3/8
UDB-521160	2.298 2.299	2.938	2.618	2.948	5/16	600000	3/8

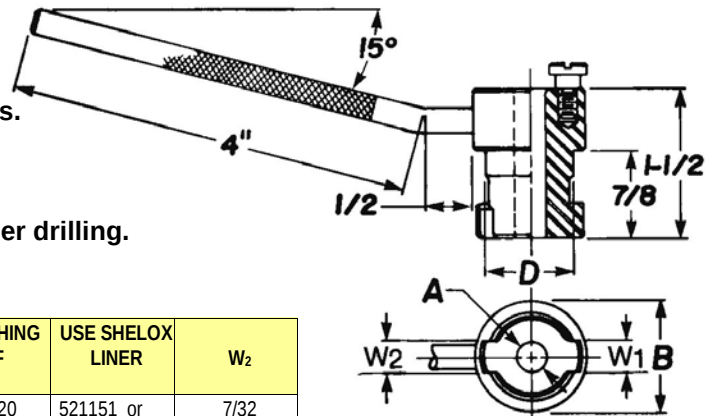
Helox® Adapters with Renewable Bushings

UNITED Helox®

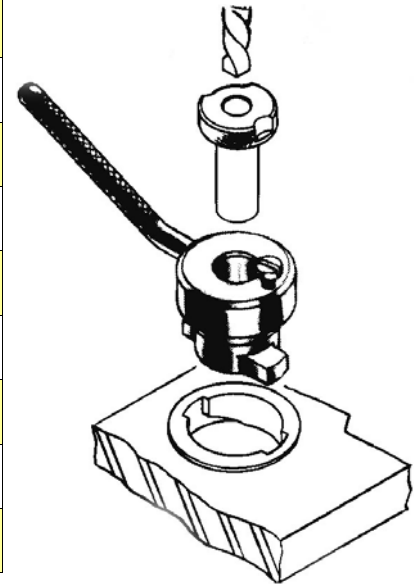
HANDLE HELOX® ADAPTER

USE THE HANDLE HELOX®:

1. When automatic feed drills are not available.
2. Where space will not permit use of large drill motors.
3. For short runs.
4. To drill and/or ream clean-up holes.
5. For pre-drilling or reaming straight hole prior to taper drilling.
6. Because Helox® is better!



PART NO.	A	B	D	W ₁	MATCHING SF	USE SHELOX LINER	W ₂
UDB-511100	.3126 .3129	1-1/4	.4995 .4985	5/32	SF-20 5/16 O.D.	521151 or 521351	7/32
UDB-522200	.3126 .3129	1-1/4	.6245 .6235	7/32	SF-20 5/16 O.D.	521152 or 521352	9/32
UDB-533300	.3126 .3129	1-1/4	.8745 .8735	9/32	SF-20 5/16 O.D.	521153 or 521353	11/32
UDB-544400	.5002 .5005	1-5/8	1.0410 1.0400	5/16	SF-32 1/2 O.D.	521154 or 521354	7/16
UDB-555500	.5002 .5005	1-5/8	1.1680 1.1670	5/16	SF-32 1/2 O.D.	521155 or 521355	7/16
UDB-566600	.7503 .7506	1-7/8	1.3960 1.3950	7/16	SF-48 3/4 O.D.	521156 or 521356	9/16
UDB-577700	.7503 .7506	2-5/32	1.6060 1.6050	7/16	SF-48 3/4 O.D.	521157 or 521357	9/16
UDB-588800	.7503 .7506	2-13/32	1.8180 1.8170	9/16	SF-48 3/4 O.D.	521158 or 521358	11/16
UDB-599900	.7503 .7506	2-5/8	2.0870 2.0860	9/16	SF-48 3/4 O.D.	521159 or 521359	11/16
UDB-606600	1.0004 1.0007	2-7/8	2.2970 2.2960	9/16	SF-64 1" O.D.	521160 or 521360	11/16



Additional sizes are available from our SF Bushings.

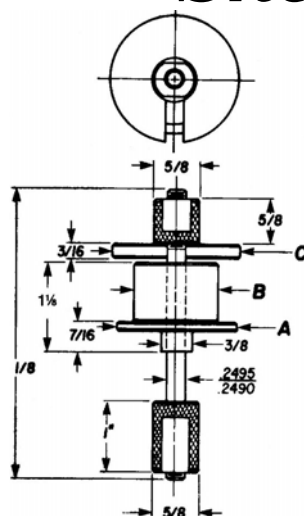
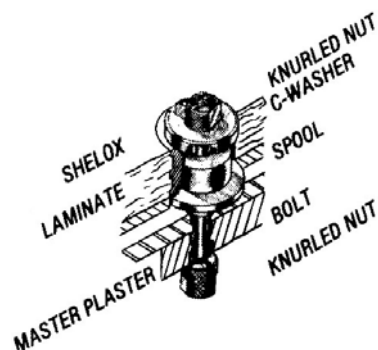
SLIP FIXED RENEWABLE BUSHINGS — SF

I.D. RANGE		O.D. RANGE		LENGTH OF BUSHING					
NOMINAL	ACTUAL	NOM.	ACTUAL	3/4	1"	1-3/8	1-1/2	1-3/4	2-1/8
#80 - #70	.0135-.0280	5/16	.3125-.3123	SF-20-12	SF-20-16	SF-20-22	SF-20-24		
#69 - 3/64	.0292-.0469	5/16	.3125-.3123	SF-20-12	SF-20-16	SF-20-22	SF-20-24		
#55 - 1/16	.0520-.0625	5/16	.3125-.3123	SF-20-12	SF-20-16	SF-20-22	SF-20-24		
#62 - #43	.0635-.0890	5/16	.3125-.3123	SF-20-12	SF-20-16	SF-20-22	SF-20-24	SF-20-28	
#42 - #10	.0935-.1935	5/16	.3125-.3123	SF-20-12	SF-20-16	SF-20-22	SF-20-24	SF-20-28	
#18 - 3/16	.1405-.1875	1/2	.5000-.4998	SF-32-12	SF-32-16	SF-32-22	SF-32-24	SF-32-28	SF-32-34
#12 - 11/32	.1890-.3437	1/2	.5000-.4998	SF-32-12	SF-32-16	SF-32-22	SF-32-24	SF-32-28	SF-32-34
9/32 - 9/16	.2812-.5625	3/4	.7500-.7498	SF-48-12	SF-48-16	SF-48-22	SF-48-24	SF-48-28	SF-48-34
15/32 - 25/32	.4687-.7812	1"	1.0000-.9998	SF-64-12	SF-64-16	SF-64-22	SF-64-24	SF-64-28	SF-64-34

UNITED Shelox®

Hold and Install Shelox® Liners

SHELOX® INDEX SPOOLS STANDARD



SIMPLE INSTALLATION

Shelox® Index Spools locate and hold Shelox® Liners while laying up a laminate from your master.

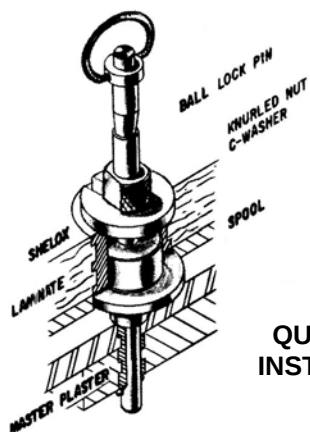
Smaller sizes available on request. PATENTED

After locating and scribing your slope direction on your Master Plaster with UNITED's Slope Indicator, proceed with installations in the following steps:

1. Be sure you Shelox® Liners are clean. Do not mar the top surface of the Shelox® Liner.
2. Slip the Spool into Shelox® Bushing. Keep the Locking Ramps down.
3. Insert the bolt or ball lock pin through the Spool and C-Washer.
4. Thread the knurled nut finger tight or insert the ball lock pin to lock position.
5. Visually check to insure that the Spool is seated flush on the surface of the Liner and the bushing is faired at the low point of the slope.
6. Tighten the knurled nut to a snug fit.
7. Proceed to next Liner and repeat the preceding instructions.
8. When all the Shelox® Liners are in position, laminate around Shelox® and allow to cure.
9. Remove all Lock Pins, bolts, nuts, C-Washer, and Spools. Clean and return the Index Spools to crib for reuse.
10. Remove the drill bar from the Master, clean the drill bar, inspect and make ready for production.

PART NO.	A	B	C	FITS SHELOX®
UDB-5214411-1	7/8	.499	7/8	521151 or 521351
UDB-5214421-1	1-1/8	.624	1-1/8	521152 or 521352
UDB-5214431-1	1-3/8	.874	1-3/8	521153 or 521353
UDB-5214441-1	1-5/8	1.041	1-5/8	521154 or 521354
UDB-5214451-1	1-5/8	1.168	1-5/8	521155 or 521355
UDB-5214461-1	2"	1.396	2"	521156 or 521356
UDB-5214471-1	2-1/8	1.606	2-1/8	521157 or 521357
UDB-5214481-1	2-1/2	1.818	2-1/2	521158 or 521358
UDB-5214491-1	2-5/8	2.087	2-5/8	521159 or 521359
UDB-5214501-1	3"	2.297	3"	521160 or 521360
UDB-5214401-1	5/8	.3896	9/16	521150 or 521350

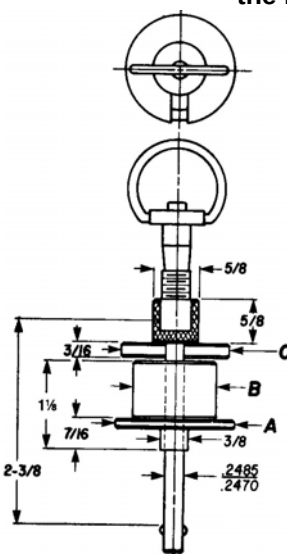
BALL LOCK SHELOX® INDEX SPOOL



**QUICKLY
INSTALLED**

The Ball Lock Shelox® Index Spool is tightened by turning the knurled Thumb Nut under the head of the pin.

It is faster to install and eliminates any problem which may arise in removing the lower knurled nut from the Threaded Shelox® Index Spool.



The Ball Lock Shelox® Index Spool is ideal for duplicating any part or master with a blind hole. It is used to duplicate large Master Plaster Patterns when the hole is blind or the reverse side is hard to reach.

Smaller sizes available on request.

PART NO.	A	B	C	FITS SHELOX®
UDB-521421	7/8	.499	7/8	521151 or 521351
UDB-521422	1-1/8	.624	1-1/8	521152 or 521352
UDB-521423	1-3/8	.874	1-3/8	521153 or 521353
UDB-521424	1-5/8	1.041	1-5/8	521154 or 521354
UDB-521425	1-5/8	1.168	1-5/8	521155 or 521355
UDB-521426	2"	1.396	2"	521156 or 521356
UDB-521427	2-1/8	1.606	2-1/8	521157 or 521357
UDB-521428	2-1/2	1.818	2-1/2	521158 or 521358
UDB-521429	2-5/8	2.087	2-5/8	521159 or 521359
UDB-521430	3"	2.297	3"	521160 or 521360

Slope Indicator and Marker

**Shelox®
Slope Scope**

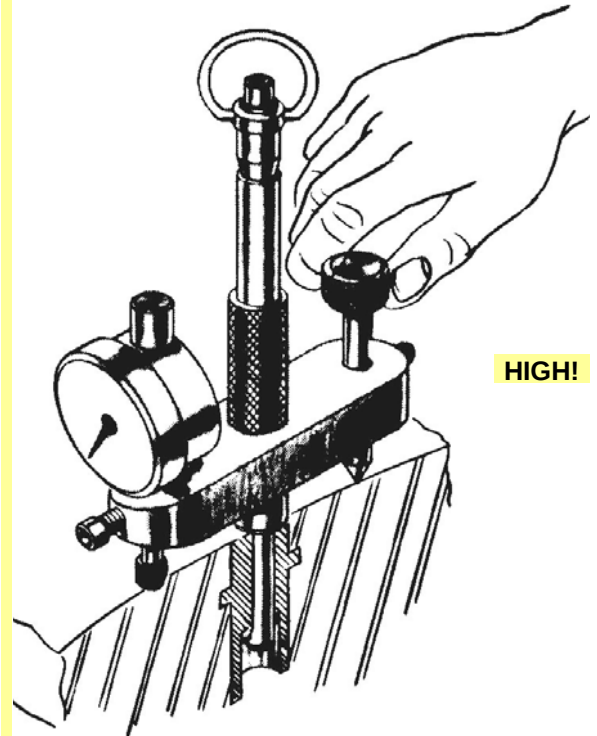
SHELOX® SLOPE SCOPE

To lay out a Shelox® Taper Lock Drill Fixture for bolt holes requires the Shelox® Liner to be installed so that the wide locking ear indicates the lowest point of any incline.

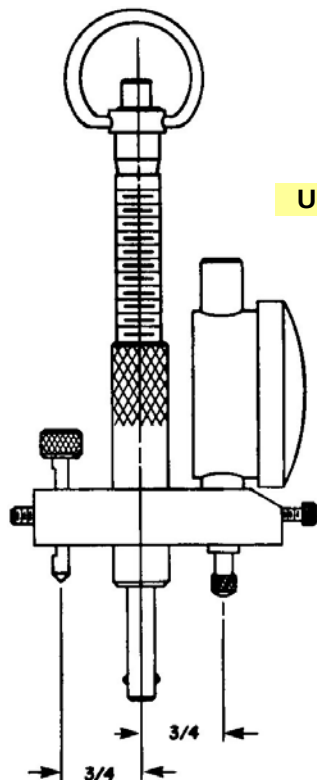
TO FIND THE LOW POINT,
use **UNITED's** Slope Scope and the following simple steps:

1. Clean the work surface and insert the Slope Scope ball lock pin in a 1/4" diameter bushing in the master plaster pattern.
2. Turn the knurled nut until the Scope is snug.
3. Revolve the Slope Scope until the dial indicator registers the lowest point of the incline.
4. Using the scribe, mark opposite the low point.
5. Remove the Scope.
6. Scribe a line from the mark through the center of the bushing showing the axis of the hole and the direction of the slope.

After installation of the Shelox® Liner with its wide locking ear at the lowest point of the axis, all drilling, countersinking and gauging will now be in reference to this same point. You will be assured that at no time will the countersunk head of the bolt protrude above the surface of the production part.



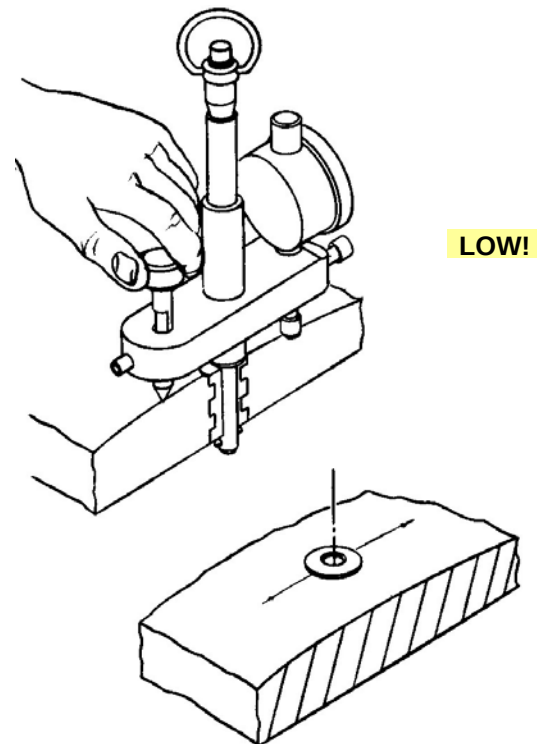
PATENTED



UDB-607800



Slope Indicator has a range of .125 in increments of .0005.



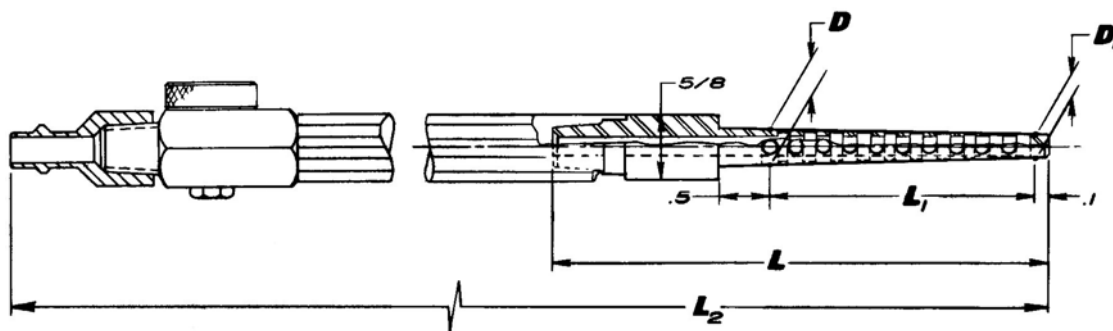
To find the low point of the incline, mark the reverse side. Scribe a line through the center of the bushing. This will indicate the low axis of the hole to be drilled.

For Tapered Holes

Tapered Hole Cleaners

TAPERED HOLE CLEANERS

Clean Holes After Drilling and Before Gauging.



- The Tapered Hole must be free of dirt, chips or foreign matter prior to installing a tapered fastener.
- The purpose of *UNITED*'s Tapered Hole Cleaner is to clean these holes. A fully adjustable air-valve provides the right amount of cleaning air.
- Tubular Gauze can be used over Tapered Hole Cleaner to polish while cleaning. It must be changed frequently.

The Tapered Hole Cleaner is available in sizes ranging from 1/4 thru 5/8 diameter in all Group sizes.

PART NO.	For FASTENER SIZE and GROUP No.	D	D ₁	L	L ₁	L ₂
UDB-756724	1/4 GROUP 1 THRU 5	.292	.240	5"	2.50	13-7/8
UDB-756725	5/16 GROUP 1 THRU 5	.357	.300	5"	2.75	13-7/8
UDB-756726	3/8 GROUP 1 THRU 5	.425	.363	5-1/4	3.00	14-1/8
UDB-756727	7/16 GROUP 1 THRU 5	.503	.430	5-1/2	3.50	14-3/8
UDB-756728	1/2 GROUP 1 THRU 5	.579	.492	6-1/4	4.18	15-1/8
UDB-756729	9/16 GROUP 1 THRU 5	.677	.555	8"	5.87	16-7/8
UDB-756730	5/8 GROUP 1 THRU 5	.749	.615	8-1/2	6.43	17-3/8

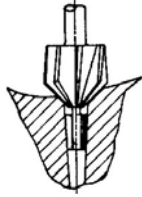
TUBULAR GAUZE is available in 150 ft. lengths.

Specify UDB-756720 Taper Hole Cleaner Gauze and indicate number of feet required

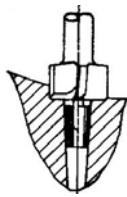
Tapered Guide Bushings

Tapered Guide Bushings

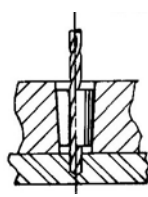
COUNTERSINK GUIDE



COUNTERBORE GUIDE

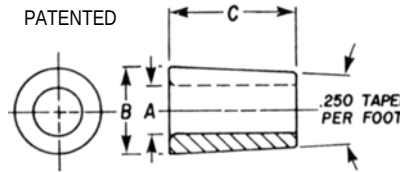


TRANSFER HOLES

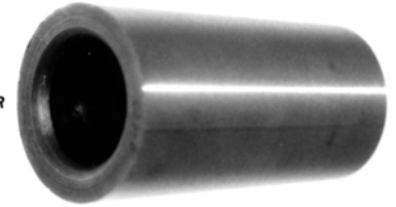


UNITED's precision **TAPERED GUIDE BUSHINGS** guide piloted countersinks, counterbores and spotfacing tools.

PATENTED



TAPERED GUIDE BUSHINGS



UNITED's precision **TAPERED GUIDE BUSHINGS** provide a straight, concentric pilot hole for the guiding of any secondary cutter. Tapered Bushings are ideal to transfer tapered to straight hole patterns.

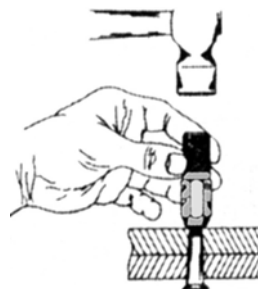
Available in all lengths corresponding with Tapered Fasteners. Also available in aluminum. Add 'A' to Part No. for Aluminum. All Aluminum Bushings are 1" long. Heat Treated Alloy Steel. Precision Ground.

PART NO.	TAPERLOCK FASTENER SIZE & GROUP	A +.0004 +.0001	B +.000 -.001	C +.000 -.015
UDB-758680	5/32 GROUP 1	.0937	.1688	.312
UDB-758685	5/32 GROUP 2	.0937	.1766	.687
UDB-758690	5/32 GROUP 3	.0937	.1844	.750
UDB-758695	5/32 GROUP 4	.0937	.1922	.750
UDB-758700	3/16 GROUP 1	.1250	.1969	.437
UDB-758705	3/16 GROUP 2	.1250	.2073	.750
UDB-758710	3/16 GROUP 3	.1250	.2177	.750
UDB-758715	3/16 GROUP 4	.1250	.2281	.750
UDB-758720	3/16 GROUP 5	.1250	.2385	.750
UDB-758725	1/4 GROUP 1	.1875	.2586	.562
UDB-758730	1/4 GROUP 2	.1875	.2716	.750
UDB-758735	1/4 GROUP 3	.1875	.2846	.750
UDB-758740	1/4 GROUP 4	.1875	.2976	.750
UDB-758745	1/4 GROUP 5	.1875	.3107	.750
UDB-758750	5/16 GROUP 1	.1875	.3216	.625
UDB-758755	5/16 GROUP 2	.1875	.3359	.750
UDB-758760	5/16 GROUP 3	.1875	.3503	.750
UDB-758765	5/16 GROUP 4	.1875	.3646	.750
UDB-758770	5/16 GROUP 5	.1875	.3789	.750
UDB-758775	3/8 GROUP 1	.2500	.3847	.687
UDB-758780	3/8 GROUP 2	.2500	.4003	.750
UDB-758785	3/8 GROUP 3	.2500	.4159	.750
UDB-758790	3/8 GROUP 4	.2500	.4315	.750
UDB-758795	3/8 GROUP 5	.2500	.4472	.750
UDB-758800	7/16 GROUP 1	.3125	.4488	.750
UDB-758805	7/16 GROUP 2	.3125	.4670	.750
UDB-758810	7/16 GROUP 3	.3125	.4852	.750
UDB-758815	7/16 GROUP 4	.3125	.5035	.750
UDB-758820	7/16 GROUP 5	.3125	.5217	.750

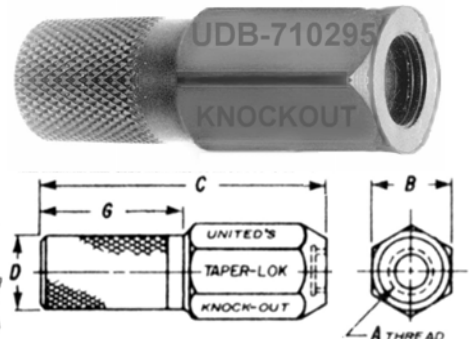
PART NO.	TAPERLOCK FASTENER SIZE & GROUP	A +.0004 +.0001	B +.000 -.001	C +.000 -.015
UDB-758825	1/2 GROUP 1	.3125	.5130	.750
UDB-758830	1/2 GROUP 2	.3125	.5338	.750
UDB-758835	1/2 GROUP 3	.3125	.5547	.750
UDB-758840	1/2 GROUP 4	.3125	.5755	.750
UDB-758845	1/2 GROUP 5	.3125	.5963	.750
UDB-758850	9/16 GROUP 1	.3750	.5849	.750
UDB-758855	9/16 GROUP 2	.3750	.6162	.750
UDB-758860	9/16 GROUP 3	.3750	.6475	.750
UDB-758865	9/16 GROUP 4	.3750	.6786	.750
UDB-758870	9/16 GROUP 5	.3750	.7099	.750
UDB-758875	5/8 GROUP 1	.3750	.6500	.750
UDB-758880	5/8 GROUP 2	.3750	.6839	.750
UDB-758885	5/8 GROUP 3	.3750	.7178	.750
UDB-758890	5/8 GROUP 4	.3750	.7517	.750
UDB-758895	5/8 GROUP 5	.3750	.7855	.750
UDB-758900	3/4 GROUP 1	.3750	.7790	.750
UDB-758905	3/4 GROUP 2	.3750	.8180	.750
UDB-758910	3/4 GROUP 3	.3750	.8571	.750
UDB-758915	3/4 GROUP 4	.3750	.8962	.750
UDB-758920	3/4 GROUP 5	.3750	.9352	.750
UDB-758925	7/8 GROUP 1	.3750	.9118	.750
UDB-758930	7/8 GROUP 2	.3750	.9586	.750
UDB-758935	7/8 GROUP 3	.3750	1.0055	.750
UDB-758940	7/8 GROUP 4	.3750	1.0524	.750
UDB-758945	7/8 GROUP 5	.3750	1.0993	.750
UDB-758950	1" GROUP 1	.3750	1.0420	.750
UDB-758955	1" GROUP 2	.3750	1.0941	.750
UDB-758960	1" GROUP 3	.3750	1.1461	.750
UDB-758965	1" GROUP 4	.3750	1.1982	.750
UDB-758970	1" GROUP 5	.3750	1.2503	.750

PART NO.	A THD	B HEX	C LEN	D HANDLE	G HANDLE LEN
UDB-710255	6-40	3/8	1-1/2	11/32	3/4
UDB-710260	8-36	3/8	1-1/2	11/32	3/4
UDB-710265	10-32	7/16	1-5/8	13/32	7/8
UDB-710270	12-32	7/16	1-5/8	13/32	7/8
UDB-710275	1/4-28	7/16	1-5/8	13/32	7/8
UDB-710280	5/16-24	9/16	1-7/8	17/32	15/16
UDB-710285	3/8-24	9/16	1-7/8	17/32	15/16
UDB-710290	7/16-20	3/4	2-1/8	11/16	1"
UDB-710295	1/2-20	3/4	2-1/8	11/16	1"
UDB-710300	9/16-18	3/4	2-1/8	11/16	1"
UDB-710305	5/8-18	1"	2-1/4	15/16	1-1/16
UDB-710310	3/4-16	1"	2-1/4	15/16	1-1/16
UDB-710315	7/8-14	1-1/4	2-1/2	1-3/16	1-1/8
UDB-710320	1"-14	1-1/4	2-1/2	1-3/16	1-1/8

TAPER LOCK KNOCKOUT grips the protruding Taper Lock Thread and aligns the Knockout securely to the Fastener. A sharp blow from a hammer knocks out the Taper Lock Fastener without damaging the Thread.



TAPER LOCK KNOCKOUT



Install/Remove Lock Rings

Installation / Removal Tools for Lock Rings

UDB-RT-5 HANDLE



HANDLE
FOR
SOCKETS
UDB-
521449-
RTS

thru
UDB-
521453A-
RTS

**HANDLE
ONLY
UDB-RT-5**

Handle is
1/4" O.D.
and
6" Long.

ORDER
INDIVIDU-
ALLY

RTS SOCKETS.

SOCKET NO.	I.D.	D ₁	O.D.	LEN
UDB-521449A-RTS	0.75	1.000		
UDB-521449-RTS	0.75	1.000		
UDB-521450-RTS	0.87	1.120		
UDB-521450A-RTS	1.00	1.250		
UDB-521450B-RTS	1.00	1.250		
UDB-521451A-RTS	1.18	1.430		
UDB-521451B-RTS	1.18	1.430		
UDB-521451-RTS	1.25	1.500		
UDB-521451C-RTS	1.25	1.500		
UDB-521452A-RTS	1.37	1.620		
UDB-521452-RTS	1.37	1.620		
UDB-521452B-RTS	1.37	1.620		
UDB-521453A-RTS	1.50	1.750		
UDB-521453-RTS	1.75	2.000		



UDB-RT-6 HANDLE



HANDLE
FOR
SOCKETS
UDB-
521453-
RTS

thru
UDB-
521480-
RTS

**HANDLE
ONLY
UDB-RT-6**

Handle is
1 1/16" O.D.
and 6" Long.

ORDER
INDIVIDUALLY
OR IN SIZES.



**USE WITH MATCHING
UNITED LOCK RINGS FOR
DEPENDABLE SERVICE.
SEE BELOW.**

RTS SOCKETS

SOCKET NO.	I.D.	D ₁	O.D.	LEN
UDB-521453B-RTS		2.000		
UDB-521454A-RTS	1.75	2.000		
UDB-521454-RTS	1.75	2.000		
UDB-521454B-RTS	1.75	2.000		
UDB-521455A-RTS	2.06	2.310		
UDB-521455-RTS	2.12	2.370		
UDB-521455B-RTS	2.18	2.430		
UDB-521456A-RTS	2.37	2.620		
UDB-521456-RTS	2.37	2.620		
UDB-521457A-RTS	2.50	2.750		
UDB-521457-RTS	2.62	2.870		
UDB-521458-RTS	2.75	3.000		
UDB-521458A-RTS	3.00	3.250		
UDB-521459-RTS	3.12	3.370		
UDB-521460-RTS	3.37	3.620		
UDB-521470A-RTS	3.50	3.620		
UDB-521472A-RTS	4.00	3.620		
UDB-521474A-RTS	4.50	3.620		
UDB-521480-RTS	5.00	3.620		



AVAILABLE INDIVIDUALLY OR IN SETS

UDB-RTS-5-11 HANDLE & SOCKET SET

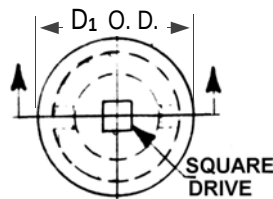


**SET contains
A Handle and
9 Sockets
in a case**

**RTS-5
ASSEMBLIES**
Receive all
Thread Lock Ring
Sizes from
1/2 – 20 thru
1-1/4 – 12 and
HANDLE.

ALL SIZES UDB-521449 THRU UDB-521453.

**SETS
UDB-RTS-5-11**



UDB-RTS-6-16 HANDLE & SOCKET SET

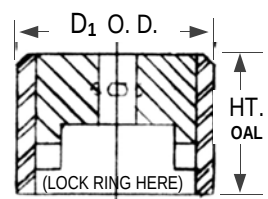


**SET contains
A Handle and
14 Sockets
in a case**

**RTS-6
ASSEMBLIES**
Receive all
Thread Lock
Ring Sizes from
1-3/8 – 16 thru
2-7/8 – 16 and
HANDLE.

ALL SIZES UDB-521454A THRU UDB-521460.

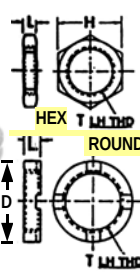
**SETS
UDB-RTS-6-16**



LOCK RINGS



HEX LOCK NUTS are
UDB-14441 thru UDB-14448.



LOCK RING #	T	L/H THD	H or D	L
UDB-14441	1/2 -20	0.75	0.25	
UDB-14442	3/4 -16	1.00	0.25	
UDB-14443	7/8 -14	1.25	0.25	
UDB-14445	1-1/4 -12	1.75	0.37	
UDB-14446	1-1/2 -12	2.00	0.50	
UDB-14447	2 -16	2.50	0.50	
UDB-14448	2-1/2 -16	3.00	0.50	
UDB-521449	1/2 -20	0.75	0.25	
UDB-521450	5/8 -18	0.87	0.25	
UDB-521450A	3/4 -16	1.20	0.25	
UDB-521451A	13/16 -16	1.18	0.25	

LOCK RING #	T	L/H THD	O.D.	L
UDB-521451	7/8 -14	1.25	0.25	
UDB-521452A	15/16 -16	1.37	0.25	
UDB-521452	1 -14	1.37	0.25	
UDB-521453A	1-1/8 -16	1.50	0.25	
UDB-521453	1-1/4 -12	1.75	0.31	
UDB-521454A	1-3/8 -16	1.75	0.31	
UDB-521454	1-1/2 -12	1.75	0.31	
UDB-521454B	1-1/2 -16	1.75	0.25	
UDB-521455A	1-9/16 -16	2.06	0.25	
UDB-521455	1-5/8 -16	2.12	0.25	
UDB-521455B	1-11/16 -16	2.18	0.25	

LOCK RING #	T	L/H THD	O.D.	L
UDB-521456A	1-3/4 -16	2.37	0.25	
UDB-521456	1-7/8 -16	2.37	0.25	
UDB-521457A	2 -16	2.50	0.25	
UDB-521457	2-1/8 -16	2.62	0.31	
UDB-521458	2-1/4 -16	2.75	0.31	
UDB-521458A	2-1/2 -16	3.00	0.31	
UDB-521459	2-5/8 -16	3.12	0.37	
UDB-521460	2-7/8 -16	3.37	0.37	
UDB-521470A	3-1/2 -16	3.50	0.37	
UDB-521472A	3-1/2 -16	4.00	0.37	
UDB-521474A	4 -16	4.50	0.43	
UDB-521480	4-1/2 -16	5.00	0.43	