BULLETIN 30-S

Preis PANTO ENGRAVER

"FAITHFUL REPRODUCTION IN THREE DIMENSION"

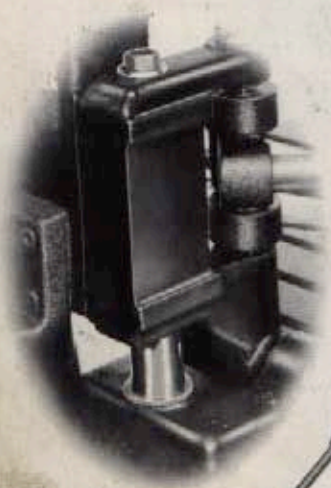
for-

STEEL
other METALS
PLASTICS

Preis

PANTO ENGRAVER
THREE DIMENSIONAL
Model 3D-5

A high precision Three-Dimensional Engraving Machine at the price of a two-dimensional engraver for cutting steel stamps, medallion dies, jewelry dies or any bas-relief design in steel, any other metal, wood, plastic, etc. It will also engrave two-dimensional lettering in nameplates, signs, steel dies and molds.

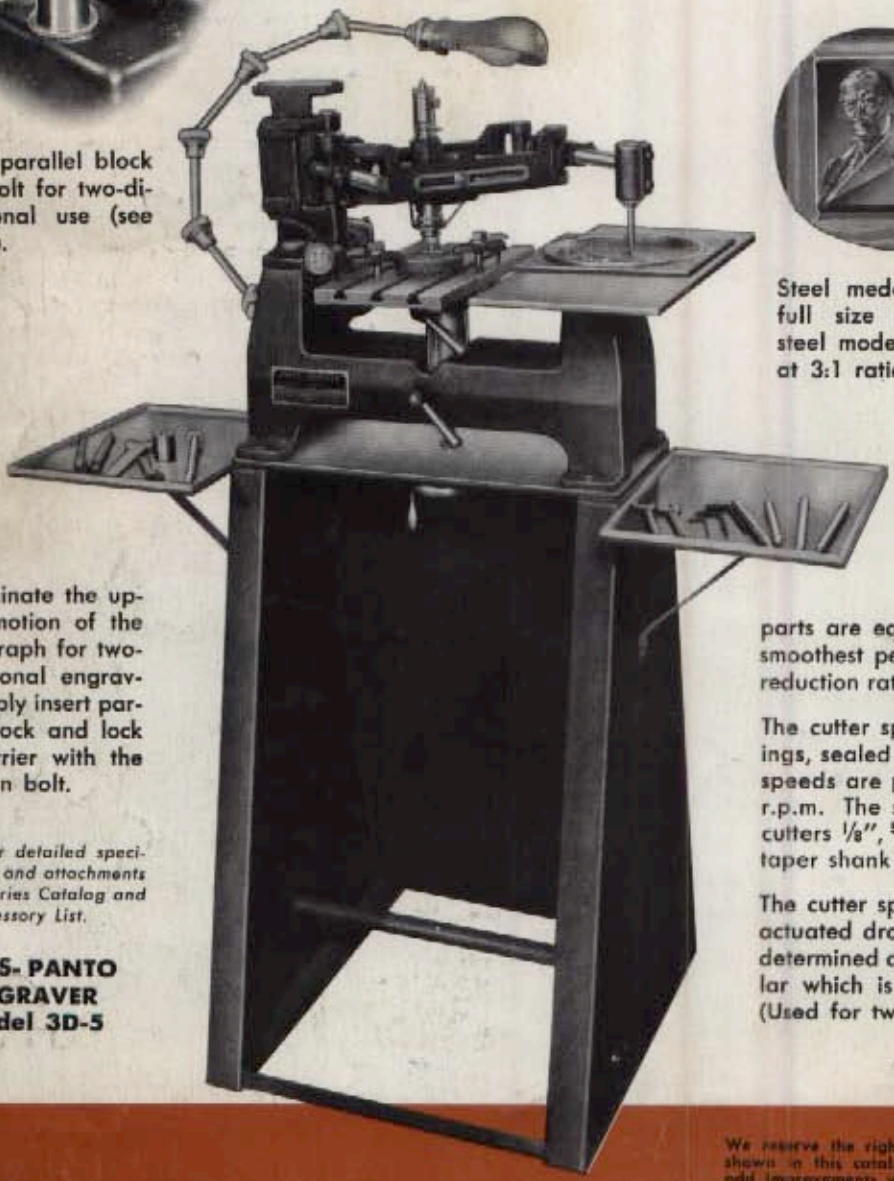


Plastic Molded Panto Master Copy Type for letter and number engraving is available from stock in various sizes and styles.

Steel stamp (left) engraved from standard ½" high three-dimensional Panto Master Copy Type (above) completely finished with sharp inner corners at 3:1 ratio.

Steel medallion die full size cut from steel model at right at 3:1 ratio.

Insert parallel block and bolt for two-dimensional use (see below).



To eliminate the upward motion of the pantograph for two-dimensional engraving simply insert parallel block and lock the carrier with the hexagon bolt.

For other detailed specifications and attachments see U-Series Catalog and 103 Accessory List.

PREIS- PANTO ENGRAVER Model 3D-5

The Preis Panto Engraver Model 3D-5 is a combination two and three-dimensional engraving machine mounted on a heavy steel stand with two shelves attached. The pantograph is of heavy construction and all moving or rotating parts are equipped with precision ball bearings for smoothest performance and greatest accuracy at all reduction ratios which range from 1.6:1 to 7:1.

The cutter spindle runs in super-precision ball bearings, sealed and lubricated for life, and four spindle speeds are provided ranging from 8,000 to 20,000 r.p.m. The spindle can be used with straight shank cutters 1/8", 5/32", and 3/16" diameter or with standard taper shank cutters.

The cutter spindle is lowered to the work by a cam-actuated drop lever after having been set to a predetermined depth with the micrometer adjustment collar which is graduated in thousandths of an inch. (Used for two-dimensional operation only.)

STEEL STAMP and DIE Production

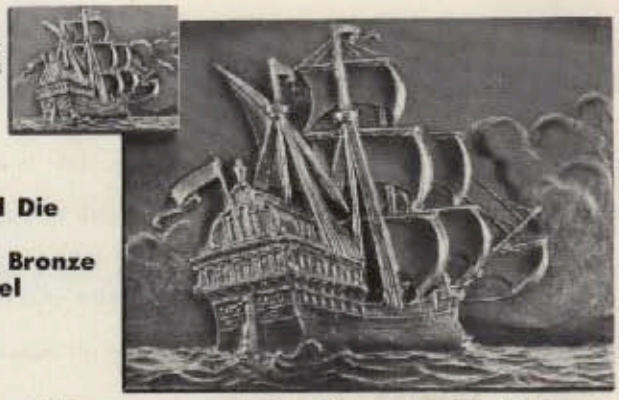
STAMPS and DIES

Three-Dimensional Brass Master Pattern

Lettering, Numbers, Design
Three-dimensional or two-dimensional lettering and design, either raised (relief) or sunken are all done on the Model 3D-5 Panto Engraver to the same accuracy as on much larger and more expensive die cutting and engraving machines.
The 3D-5 Panto Engraver is especially useful to makers of jewelry dies, medallion dies or hubs, steel stamps and for small cavities in plastic molds and die casting dies.

Engraved Steel Stamps, branding and embossing dies are made to any required reduction as shown by these examples.

The Steel Branding Die (right) was made from the special brass master (left) using a 3:1 reduction ratio.
There was no hand finishing required when the stamp was removed from the 3D-5 Panto Engraver.
Where a two-dimensional master of a special trade mark or design is already on hand the pantograph is simply locked for two-dimensional engraving. This requires that the sharp inner corners be finished by hand.



Steel Die and Cast Bronze Model

The steel die was engraved from Bronze Model at 3:1 ratio in four hours. Overall length of steel die 2", model 6".

Steel Ring Hub. One-half actual size, engraved from plastic model at 3:1 ratio. The enlarged model was engraved in a block of plastic by tracing from a gold ring after reversing the cutter spindle and tracing stylus.

Steel Medallion Die. One-half actual size engraved from hardwood model at 4:1 ratio.

ENGRAVED from ORIGINAL MODELS

ENGRAVINGS

Engravings may be made from any master or model having a surface hard enough to withstand the slight pressure of the tracing stylus. A model with very fine detail and thin sections should have a harder surface than a model with less detail.
A hardwood model may be used where a die or mold cavity with irregular shape but without very fine detail is to be cut. A harder model such as cast bronze, brass or plastic should be used for very fine detail and thin sections.

Steel Die full size engraved at 4:1 ratio in two and one-half hours.

Steel Medallion Die full size, engraved at 4:1 ratio in two hours.

Brass Die one-half actual size engraved at 3:1 ratio in one hour.

Brass Die full size engraved at 3:1 ratio in less than one hour.

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H. P. PREIS ENGRAVING MACHINE COMPANY
TRADEMARK
651 U. S. HIGHWAY 22 PANTO HILLSIDE, NEW JERSEY
"Since 1923 the Finest Engraving Equipment"

Panto Engraver Model 3D-5 shown in actual operation engraving a bas-relief medallion die in tool steel.

Easy to use . . .

- Copy Holder and Work Table, side by side, right in front of the operator.
- The Pantograph is counterbalanced, adjustable to suit the individual operator.
- With Forming Guide Attachment, the same model shown can be used to cut a die on the outside diameter of a cylinder or on any other curved surface.
- Four cutter speeds to choose from for cutting all materials.

STANDARD EQUIPMENT FURNISHED

1 Basic Machine with floor stand and feed screw unit including the following:
2 Shelves with brackets.
1 Work Table 6" x 12".
2 Work Table Clamps.
1 Work Table Fence.
1 Copy Holder Unit with three adjustable copy slides 18" long.
6 Copy Holder Clamps.
1 Tracing Stylus Holder.
1 Pointed Tracing Stylus.
1 Ball Bearing Cutter Spindle.
1 Cutter Spindle Collet.
2 Cutters to fit collet.
1 Ball Bearing Motor 115-volt AC 60-cycle, ⅛ H.P., 3400 R.P.M.
1 Two-Step Motor Pulley.
2 Round Endless Belts.
1 Set of Wrenches.
1 Plastic Machine Cover
1 Set of Operating Instructions.

EXTRA EQUIPMENT

1 Forming Guide Attachment with One Blank Form.
1 Set of 5 double ended Tracing Styles for three-dimensional raised letter engraving, with 35°, 40°, 45°, 50° and 55° side angle.
1 Set of 10 Conical Tracing Styles, ground on each end, 20 sizes ranging from .020" to .375" diameter round nose for bas-relief work.
1 Adjustable Machine Lamp.

EXTRA EQUIPMENT REQUIRED FOR MAKING ENLARGEMENTS

1 Tracing Stylus Bracket.
1 Enlargement Belt.
1 Enlargement Belt Connecting Rod.

DIMENSIONS AND WEIGHTS

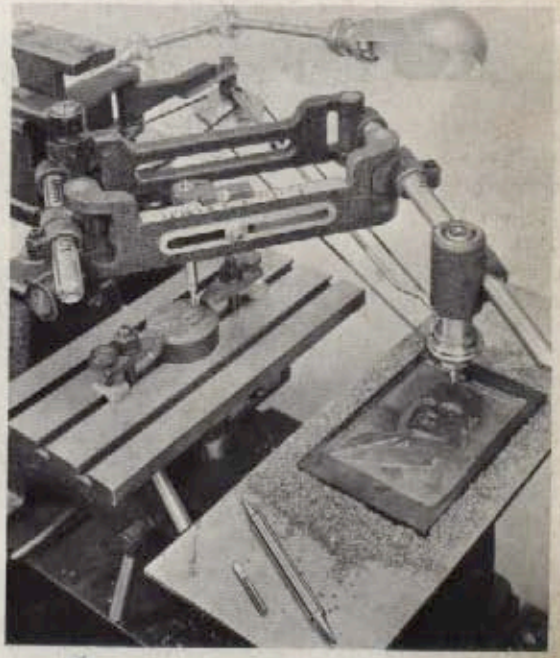
Overall dimensions: Length 23", height 48", depth 17".
Net weight 170 lbs., shipping weight 250 lbs.

THE WORK TABLE is 6" x 12" with three T-slots for ⅜" bolts. It is raised or lowered by a feed screw with a 5" diameter hand wheel located beneath the work table directly in front of the operator. Maximum distance from cutter point to work table is 3 inches but this can be increased by placing elevating blocks under the Pantograph carrier and copy holder.

THE COPY HOLDER UNIT (patented) consists of a flat copy holder plate, 6" x 16" (for mounting flat templates or models) and a set of three adjustable copy holder slides for holding standard master copy type.

A FORMING GUIDE attachment is available for engraving on convex, concave or spherical surfaces from a flat template or model for either two or three dimensional engraving. (See Page 4—U-Series Catalog)

ENLARGING — While the Model 3D-5 Engraver is primarily intended for engraving on a reduction principle from an enlarged template or model it can also be used for making models from an old die or from a finished sample part. By simply reversing the position of the cutter spindle and tracing stylus an enlarged model can be cut in hardwood or several types of plastic materials which in turn can then be used as a model for cutting a new steel die or hub (see below).



CATALOG NO. 67

OPERATING MANUAL AND PARTS LIST FOR ALL

PREIS PANTO ENGRAVERS

(EXCEPT MODEL 2D-4)

TABLE OF CONTENTS

HOW TO ORDER PARTS

The following pages fully describe the basic functions of the PREIS PANTO BENCH ENGRAVERS. The construction and basic design, with parts identified for simple and rapid replacement have been prepared for your convenience. They are subject to change without notice whenever improved features can be engineered.

When ordering replacement parts, be sure to specify serial number of machine shown on nameplate, also on end post under copy holder plate. This information will enable us to promptly forward the correct replacement parts.

H. P. PREIS ENGRAVING MACHINE COMPANY

TRADEMARK

651 U.S. HIGHWAY 22 — PANTO — HILLSIDE, NEW JERSEY

"Since 1923 the Finest Engraving Equipment"

QP-867-1M

ILLUSTRATION 1
Unpacking of
engraving machine.

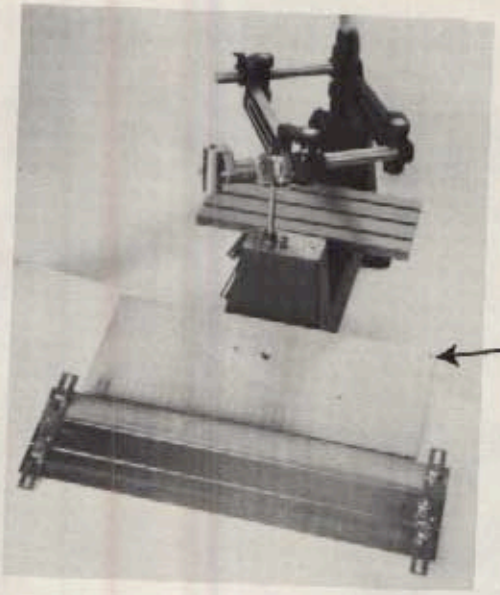


ILLUSTRATION 2
Remove packing
strap and mount
copy holder plate.

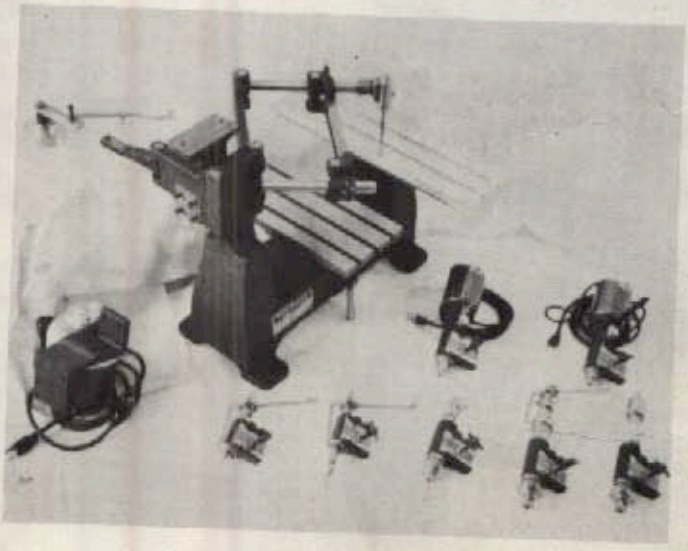


ILLUSTRATION 3
Spindle mountings for all models.
Also shown mounting of motor
and idler pulley assemblies
for Models UE-3 and 3D-5.

1. UNPACKING AND SETTING UP PANTO-ENGRAVER: See Illustration 1.

Examine the packing case carefully. If the case shows any sign of damage, it may have been mishandled or dropped in shipment. Report any damage at once to the carrier and to us. Even though the machine itself may not show any visible signs of damage on examination, the possibility remains that damage has been done which may not show until the machine is in actual operation.

Remove machine from the case and unpack all parts and check with packing slip. Examine all small packages and wrapping material and do not discard anything until all parts are checked and accounted for. Wipe all parts with clean rag dipped in kerosene or varsol. Do not dip parts in cleaning fluid.

2. SETTING UP MACHINE:

Set the machine on a solid floor or bench, depending on the model. Place a level on the work table and, if necessary, place shims under the legs until the engraver is level and stands solid in all directions. Where there is excessive vibration in the building or when mounting the machine on a metal bench, it is advisable to set it on a suitable rubber or cushioned pad. Bolting to floor or bench is optional.

3. ASSEMBLING ENGRAVER, ALL MODELS:
See Page 2, Illustration 2.
Remove packing clamp from pantograph arm by first unscrewing 2 round head screws. Remove clamp strap and slide pantograph bar off the plate of shipping strap. Unlock hexagon nut and unscrew threaded stud from base. Mount copy holder plate with 2 dowel pins in holes provided in base and lock with flat head allen screw. Although copy holder plate is reversible, it is usually positioned with hole in corner of plate placed toward the back of the engraver. This will swing the pantograph clear of work table and permit easy loading and unloading of parts to be engraved as well as inspection of part while it is in the machine. Attach copy holder slides so that bevel clamp on center slide fits against bevel on underside of plate. Be sure that bevel clamp seats in cut-out of cross bar. Mount UE-2 Cutter Spindle unit with motor or appropriate spindle on front pantograph arm 265 with lock screw 844-1. (See Page 11)

4. MODELS UE-3, 3D-5, UE-3DR, UE-3PC:
See Page 2, Illustration 3, also Page 19.
Mount motor with motor bracket 269 onto motor drive support bracket 267 with 4 bolts.

Attach intermediate pulley unit 284A as shown with bolt provided. Mount motor belt #519 onto pulleys, set to proper tension and lock allen screw. Mount cutter spindle unit onto front pantograph arm 265 and lock with lock screw 844-1 provided. Insert brass fork over knurled ring on cutter spindle carefully. Mount spindle belt #426 on pulleys, set to proper tension and lock knurled screw. Plug motor cord into receptacle and turn on switch. If either belt vibrates or whips, apply more tension until belt runs smooth in all positions of pantograph.

5. SETTING REDUCTION RATIOS ON THE PANTOGRAPH:
The front pantograph arm and long and short pantograph bars are engraved with 22 reduction ratios ranging from 1.6:1 up to 7:1. The numbers engraved on these bars are reduction ratios. When the pantograph is being set for any pre-determined ratio the 3 bars must be set exactly on the same number. Use 3X power loupe as an aid for careful setting of bars. The height or size of letter to be engraved depends on the size of the master letter being used on the copy table. For example, to engrave a 1/2" high letter from a 1" high master letter set all bars on line 2. This will reduce the master letter 2 times, resulting in a 1/2" high engraved letter. To engrave a 1/4" high letter from the same master letter set all bars on line 4. This will reduce the master letter 4 times, resulting in a 1/4" high engraved letter. When the height of the letter to be engraved is specified as overall height (including the width of cutter stroke) it is also necessary to compensate for the cutter tip or width of stroke, since the height of all single line master letters is measured from center to center of stroke.

Consequently, to engrave a letter with an overall height of 1/2" with a 1/16" wide stroke, using a 1" high master letter simply deduct the width of stroke 1/16" from the overall height (1/2") and base the pantograph setting on a 7/16" high letter. Set the pantograph at 2.3:1 ratio and the resulting letter will measure 1/2" high overall including the width of stroke. For exact pantograph settings for most common sizes consult your Pantograph Ratio and Cutter Selector. Any deviation or missetting of the pantograph will produce irregularities which can be adjusted according to instruction shown in B.P. 319 on Page 5.

6. TRACING STYLUS: See No. 103 Attachment & Accessory List.
The #126-11 pointed stylus is used for tracing standard vee groove masters. When stylus shows signs of wear it should be resharpened. For increased stylus life, use 126-11 TC. For other shape grooves use stylus ground to suit. Cylindrical stylus is required for following flat bottom grooves or raised masters, available in sets of ten, each stylus ground on both ends in steps of .005" from .035" to .080" and in steps of .010" from .080" to .180" diameter. Larger sizes are made in rollers, in steps of .050" from .250" to .800" diameter. These rollers have .125" diameter holes and fit onto the ground end of a stylus furnished with the set.

7. CUTTERS AND CUTTER GRINDING:

It is very important that the proper cutter is used for each job and that the cutter is ground with the correct angle and chip clearance. Cutters should be selected from No. 103 Accessory List and grinding instructions will be found in the operations manual for Panto Cutter Grinder. Taper shank and straight shank cutters may be inserted into spindle as per instructions on Page 7.

RECOMMENDED CUTTER SPEEDS FOR SINGLE LIP HIGH SPEED STEEL CUTTERS

CUTTER DIAMETER AT CUTTING POINT	1/32	1/16	3/32	1/8	5/32	3/16	1/4
ENGRAVERS BRASS, ALUMINUM, ACRYLIC PLASTIC, CELLULOID WOOD, NYLON, TEFLON 300-600 FT. PER MIN.	20,000 and up	18,000 and up	12,000 to 20,000	9,000 to 18,000	7,000 to 14,000	6,000 to 12,000	4,500 to 9,000
COMMERCIAL BRASS, SOFT BRONZE, GOLD, HARD RUBBER 200-400 FT. PER MIN.	20,000 and up	12,000 to 20,000	8,000 to 16,000	6,000 to 12,000	5,000 to 10,000	4,000 to 8,000	3,000 to 6,000
PHENOLIC PLASTIC, HARD BRONZE, CAST IRON, MILD STEEL 150-300 FT. PER MIN.	18,000 and up	9,000 to 18,000	6,000 to 12,000	4,500 to 9,000	3,800 to 7,000	3,000 to 6,000	2,250 to 4,500
MACHINE STEEL, CAST STEEL, ANNEALED TOOL STEEL 75-150 FT. PER MIN.	9,000 to 18,000	4,500 to 9,000	3,000 to 6,000	2,250 to 4,500	1,800 to 3,500	1,500 to 3,000	1,200 to 2,400
TOUGH ALLOY STEEL, STAINLESS STEEL 50-100 FT. PER MIN.	6,000 to 12,000	3,000 to 6,000	2,000 to 4,000	1,500 to 3,000	1,250 to 2,500	1,000 to 2,000	750 to 1,500

USE LOWER SPEEDS FOR HEAVY CUTS AND ROUGHING.
USE HIGHER SPEEDS FOR LIGHT CUTS AND FINISHING.
FOR MULTI-FLUTE CUTTERS REDUCE CUTTER SPEEDS.

FOR TUNGSTEN CARBIDE CUTTERS SPEEDS MAY BE INCREASED CONSIDERABLY.
FOR DIAMOND CUTTERS USE SPEEDS GIVEN FOR ENGRAVERS BRASS ON ALL MATERIALS.

8. MASTER TEMPLATES AND MASTER COPY TYPE:

For cutting sunk lines into soft materials where no quantities are involved a master template can be made from hard cardboard. Simply trace a design on the cardboard and follow with a hard pencil, ball point pen, or scriber with the point slightly rounded off until the groove in the cardboard appears deep enough to hold the tracing stylus on your engraver from sliding or jumping out. A coat of shellac can be applied to harden the surface. These master templates should be enlarged as much as possible to minimize any inaccuracies on the finished engraving.

A more permanent template can be made from rigid vinyl or linoleum by tracing a design on the surface or, on transparent rigid vinyl by taping a drawing on the underside of the vinyl. The lines must then be cut with a hand graver having an 80° to 90° included angle. If the template is to be used for taking heavy cuts in hard materials and large production quantities it is advisable to reproduce the original template double size and engrave 2:1 reduction in engravers brass. For extra large production, the brass master may then be hard chrome plated or, instead of brass, a steel master can be made and hardened.

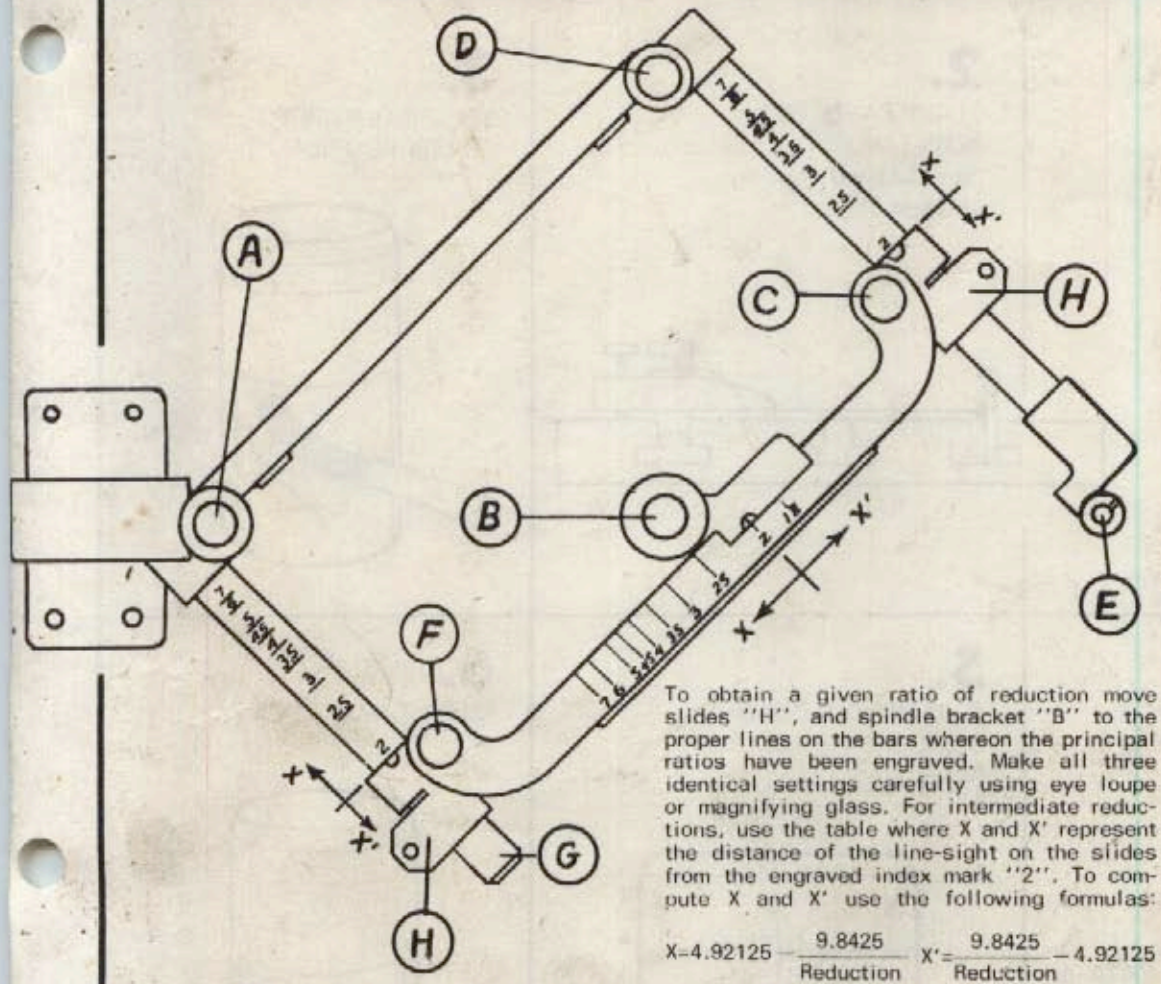
For trademarks or other intricate designs, a zinc etching or dycril plate can be made by a Photo-Engraver. With this method, a drawing or a printed design can be etched in zinc to any size required, either positive or negative, to obtain a master with either raised or sunk lettering as required. The etching should be deeper than the average zinc cut to prevent the tracing style from slipping out of the design. The etching should then be cleaned out with a hand graver to smooth out all rough edges. We also make up any special designs or trade-marks for those who have no facilities or experience in the making of master templates.

STANDARD PREIS-PANTO MASTER COPY TYPE is available in numerous styles and sizes as shown in No. 103 Attachment and Accessory List. They are individual characters, engraved on beveled brass or steel blanks and fit into the dove-tailed grooves of your copy holder. Most standard type is self-spacing, so that when a line of letters is set up on the copy holder, it is only necessary to insert one or more of the small brass spacers between words and initials of names. If it is desired to spread the letters out to cover a longer space, a small brass spacer may be inserted between all characters. Then simply lock the line of letters together with the copy holder clamps furnished.

9. COPY HOLDERS: See No. 103 Attachment & Accessory List.

There are several styles and sizes of copy holders available with dove-tail grooves to hold all sizes of PANTO master copy type. Large master templates, that do not fit into any of the dove-tailed grooves, may be clamped across the copy holder and locked down with the flat template clamps, furnished with some of the standard copy holders. The adjustable copy holder with variable copy slides will hold any beveled master copy type blanks ranging in sizes from 3/4" to 7" wide or high. For larger templates the slides are simply removed and the template is clamped onto the flat copy holder plate with C-clamps. Copy slides are available in 18", 26" and 36" lengths. Cross slides are available for engraving perpendicular or across the copy holder plate.

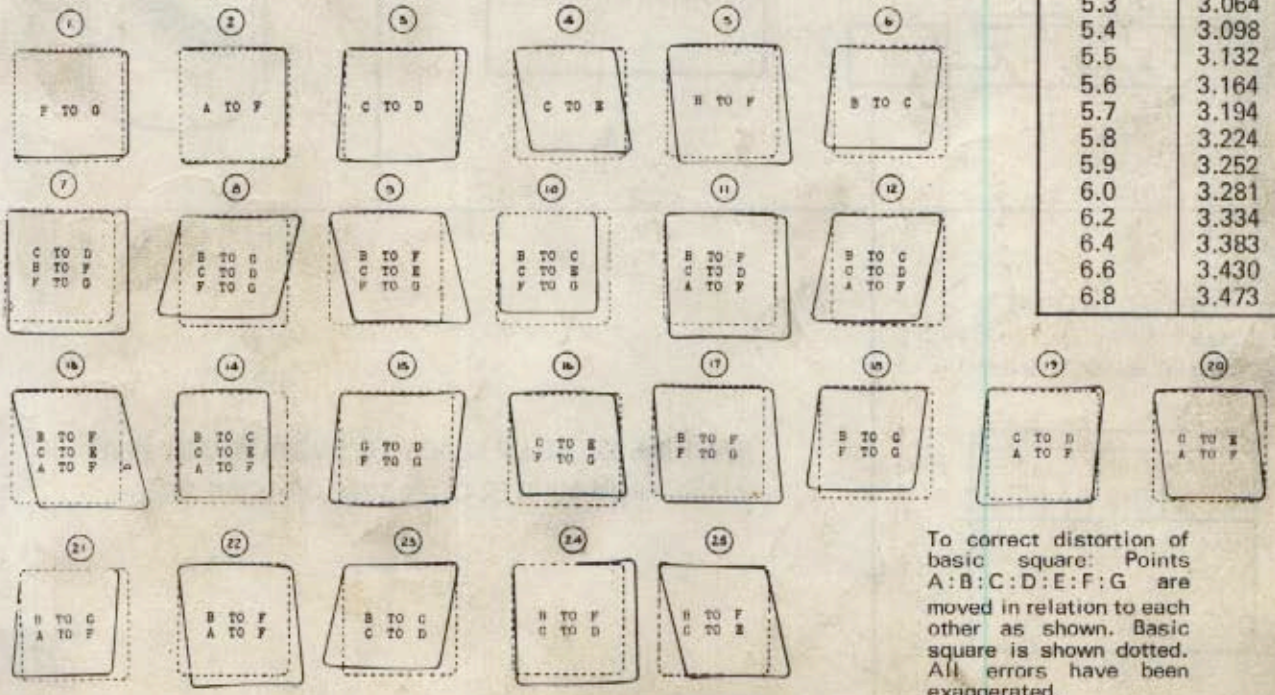
6-67	PANTOGRAPH RATIO CHART WITH INSTRUCTIONS FOR ADJUSTING PANTOGRAPH SETTINGS	319-808



To obtain a given ratio of reduction move slides "H", and spindle bracket "B" to the proper lines on the bars whereon the principal ratios have been engraved. Make all three identical settings carefully using eye loupe or magnifying glass. For intermediate reductions, use the table where X and X' represent the distance of the line-sight on the slides from the engraved index mark "2". To compute X and X' use the following formulas:

$$X = 4.92125 - \frac{9.8425}{\text{Reduction}} \qquad X' = \frac{9.8425}{\text{Reduction}} - 4.92125$$

Reduction	Distance X
1.7	.869 X'
1.8	.547 X'
1.9	.259 X'
2.0	0. X'
2.1	.234
2.2	.447
2.3	.642
2.4	.820
2.5	.984
2.6	1.136
2.7	1.276
2.8	1.406
2.9	1.527
3.0	1.641
3.1	1.746
3.2	1.845
3.3	1.939
3.4	2.026
3.5	2.109
3.6	2.187
3.7	2.261
3.8	2.330
3.9	2.398
4.0	2.461
4.1	2.520
4.2	2.578
4.3	2.632
4.4	2.684
4.5	2.734
4.6	2.782
4.7	2.827
4.8	2.871
4.9	2.913
5.0	2.953
5.1	2.991
5.2	3.028
5.3	3.064
5.4	3.098
5.5	3.132
5.6	3.164
5.7	3.194
5.8	3.224
5.9	3.252
6.0	3.281
6.2	3.334
6.4	3.383
6.6	3.430
6.8	3.473



To correct distortion of basic square: Points A:B:C:D:E:F:G are moved in relation to each other as shown. Basic square is shown dotted. All errors have been exaggerated.

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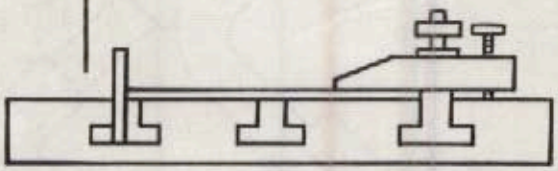
6-67	SIMPLE PROCEDURES IN THE USE OF PREIS PANTO ENGRAVERS	

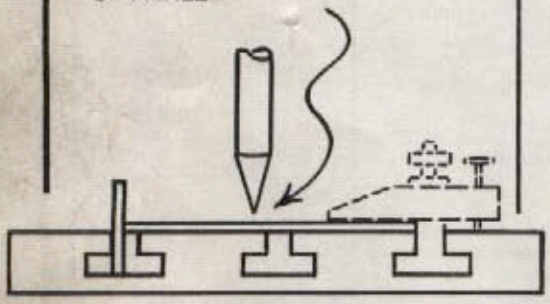
1.
PLACE CUTTER
IN SPINDLE
(See detailed drawing
on page 7)

2.
CLAMP PANEL TO
WORK TABLE
(See detailed drawing
on page 8)

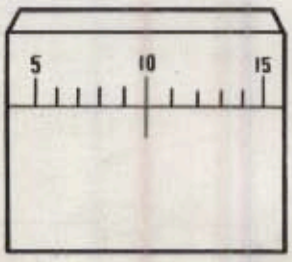


3.
SET SPINDLE DROP
TO LOW POSITION

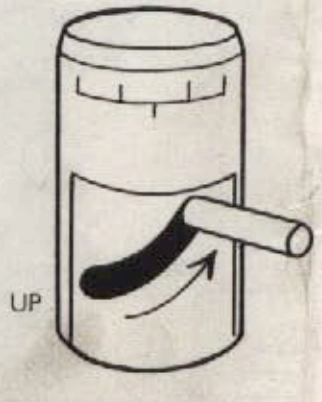
4.
RAISE WORK TABLE
SLOWLY UNTIL CUTTER
IS WITHIN 1/16 INCH
OF PANEL



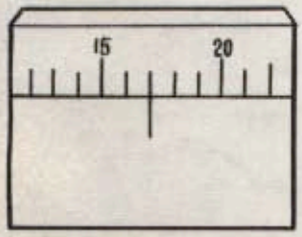
5.
FEED SPINDLE DOWN
UNTIL CUTTER TOUCHES
PANEL



6.
RELEASE FAST DROP



7.
INCREASE FEED SETTING
BY 6 TO 8 LINES (Equal to
engraving .006-.008" deep)



MACHINE IS SET UP READY TO ENGRAVE ANY FLAT PANEL FROM MASTER COPY TYPE OR TEMPLATE.

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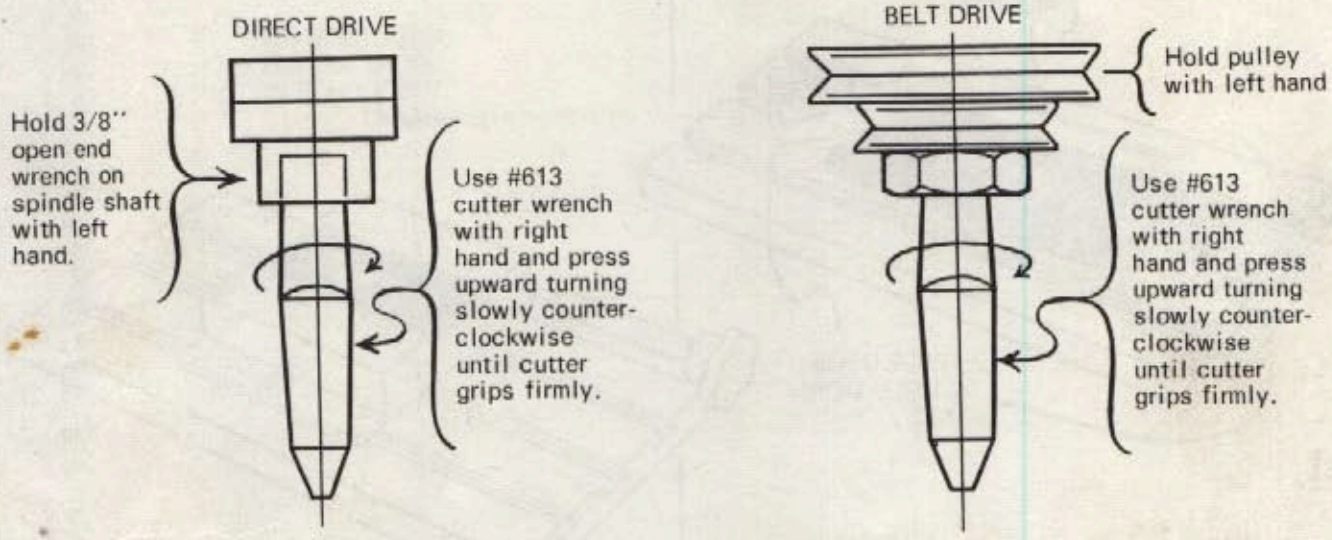
ENGRAVERS' FAVORITE FOR NAME PLATE ENGRAVING . . .

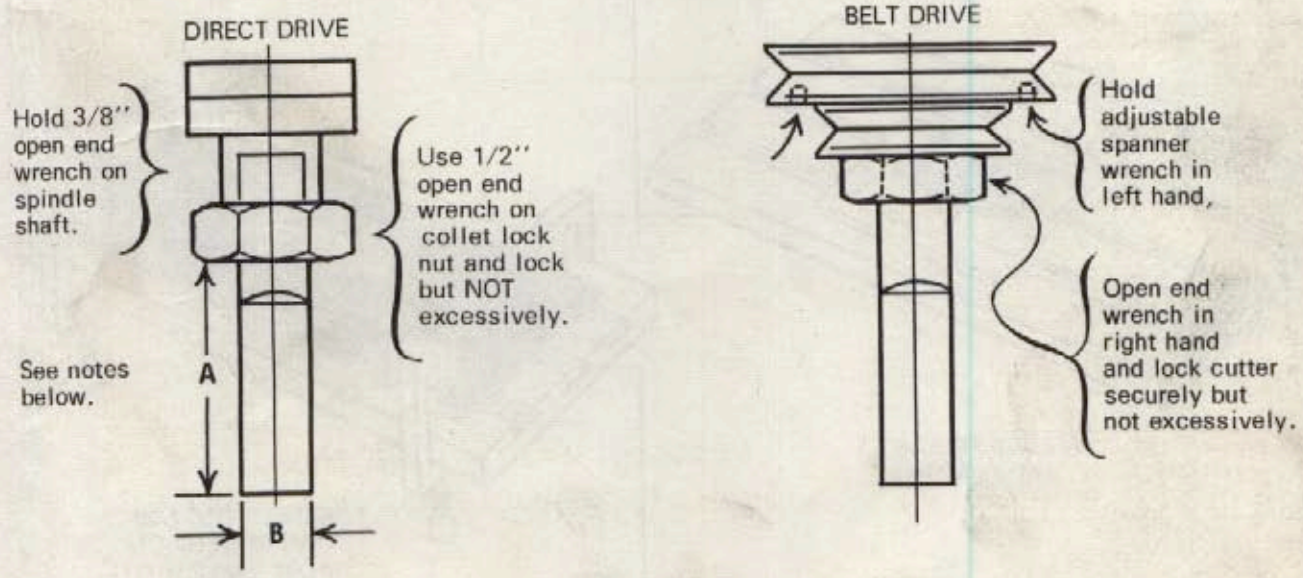
TAPER SHANK CUTTERS



TO RELEASE CUTTER, TURN CUTTER DOWNWARD CLOCKWISE.

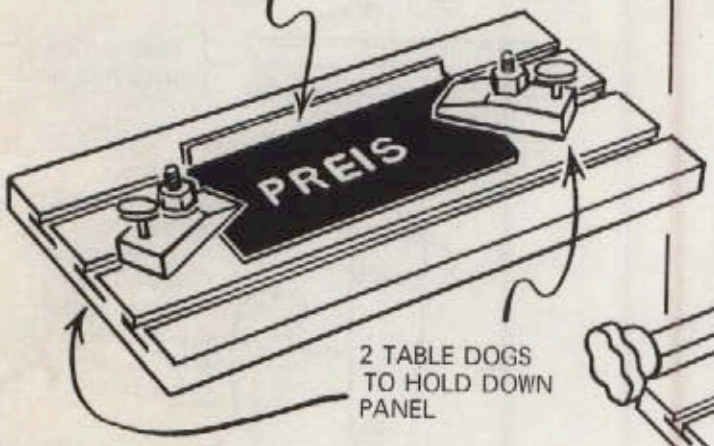
PROFILING – ROUTING – REQUIRES . . .

STRAIGHT SHANK CUTTERS

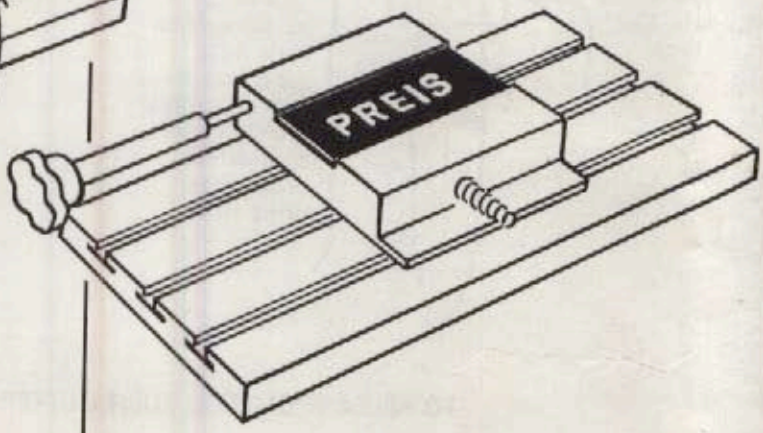


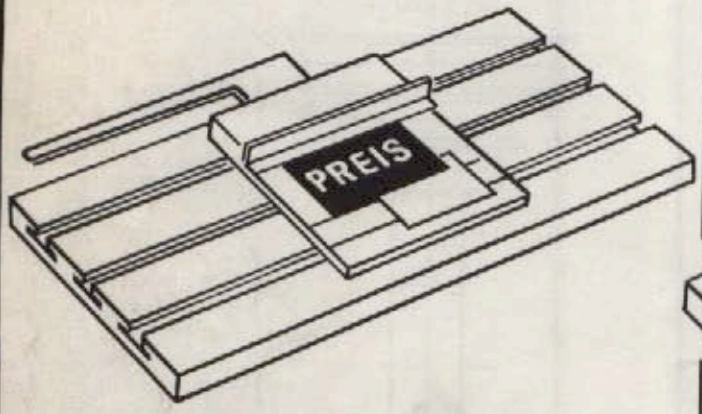
NOTES:
A – Cutter should not extend more than 1/2" beyond spindle nose.
B – Cutter diameter should be within +.0000" -.0005" of collet bore size.

SIMPLE AND REFINED HOLDING FIXTURES

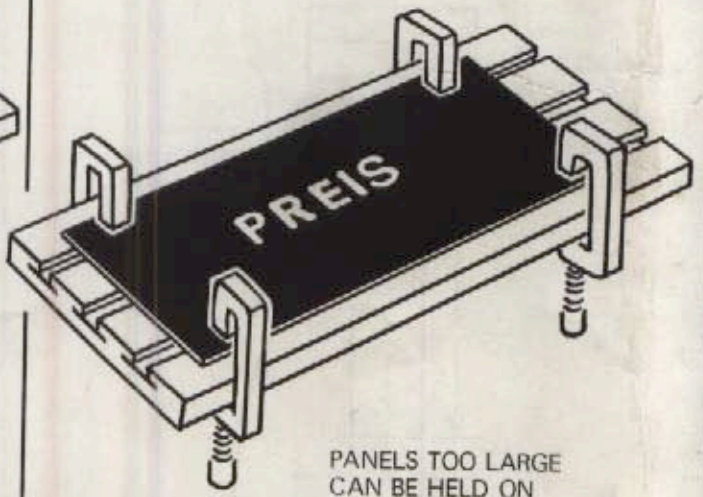


MULTI-GRIP VISE LOCKS SECURELY THROUGH BEVEL GEARS



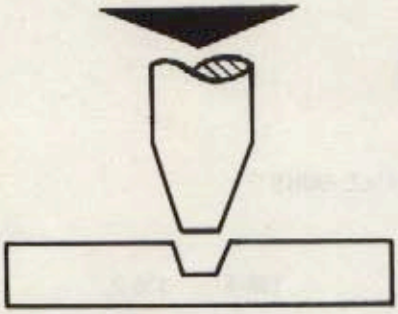


QUICK RELEASE SPRING ACTION



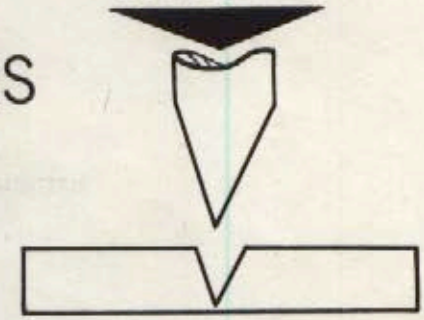
PANELS TOO LARGE CAN BE HELD ON WORK TABLE WITH "C" CLAMPS

RIGHT



CUTTERS

WRONG



RECOMMENDATION: Each cutter should be tipped off with a flat which is appropriate to the size of character being engraved. Refer to Cutter Ratio Chart for determining size of flat.

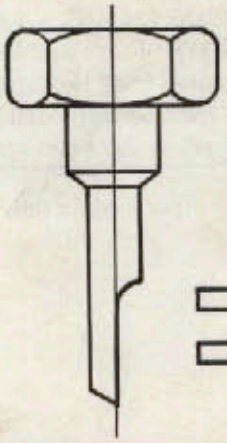
WRONG: This deep cut does nothing except break cutters. It is improper to increase depth to obtain proper stroke or width of cut. Refer to Cutter Grinder Operating Manual for sharpening instructions.

TRACING STYLUS

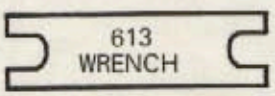
RECOMMENDATION: Sharpen stylus 80° conical once every 200 hours. Stone off extreme sharp point.

WRONG: Stylus point has worn off and can only be harmful to your master copy type and templates.

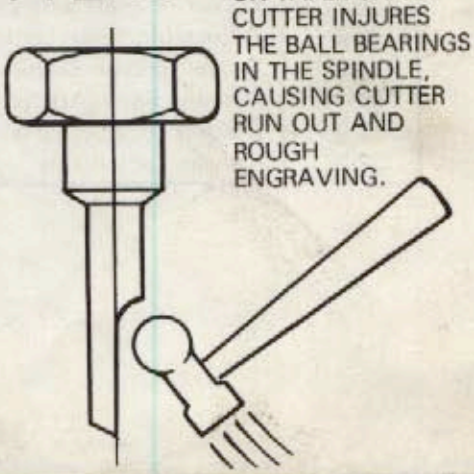
TAPER SHANK CUTTERS



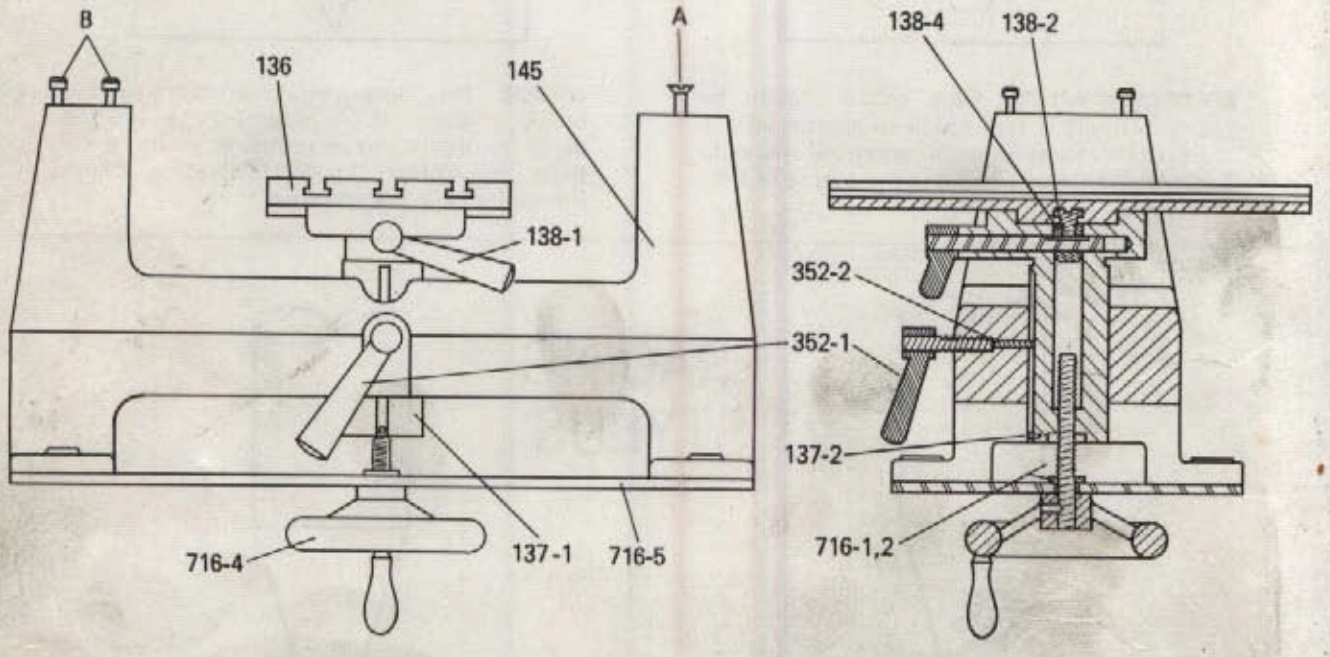
PROPER WRENCH MUST BE USED AT **ALL** TIMES. NO SUBSTITUTE!



ANY TAPPING ON TAPER SHANK CUTTER INJURES THE BALL BEARINGS IN THE SPINDLE, CAUSING CUTTER RUN OUT AND ROUGH ENGRAVING.



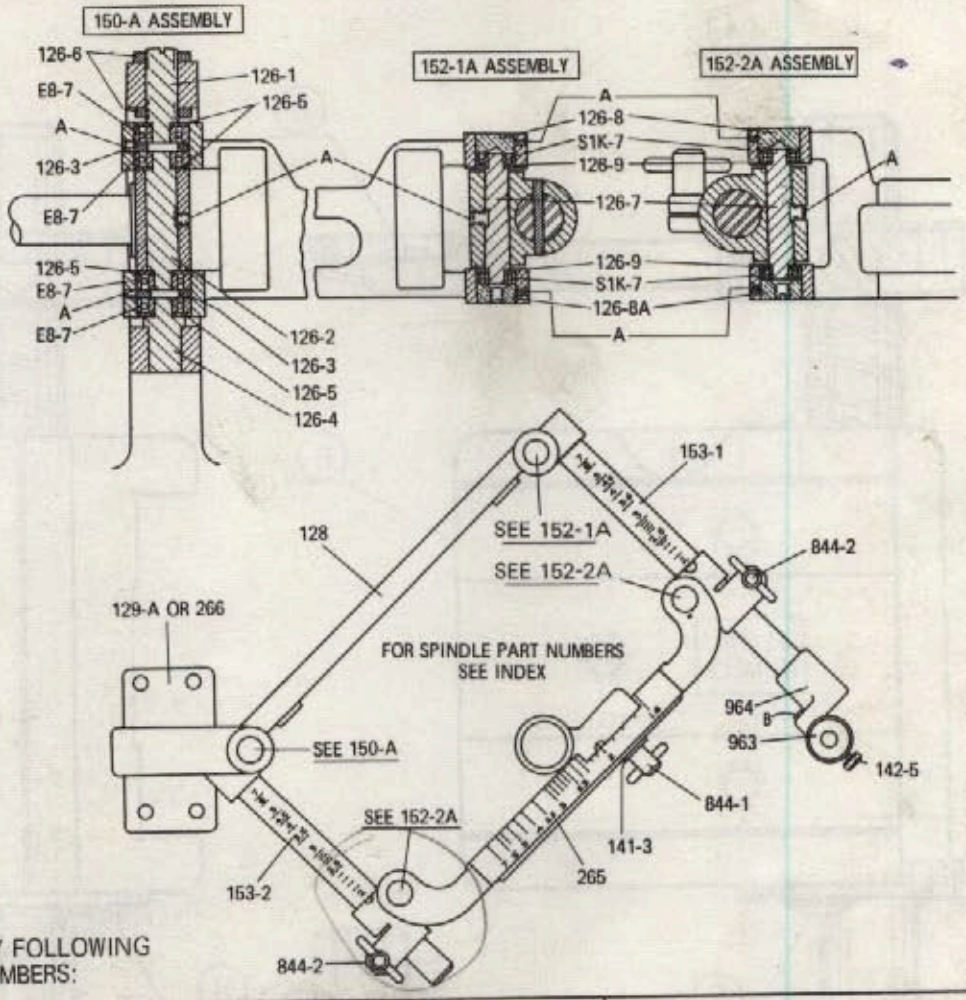
MACHINE BASE AND WORK TABLE PARTS



ORDER BY FOLLOWING PART NUMBERS:

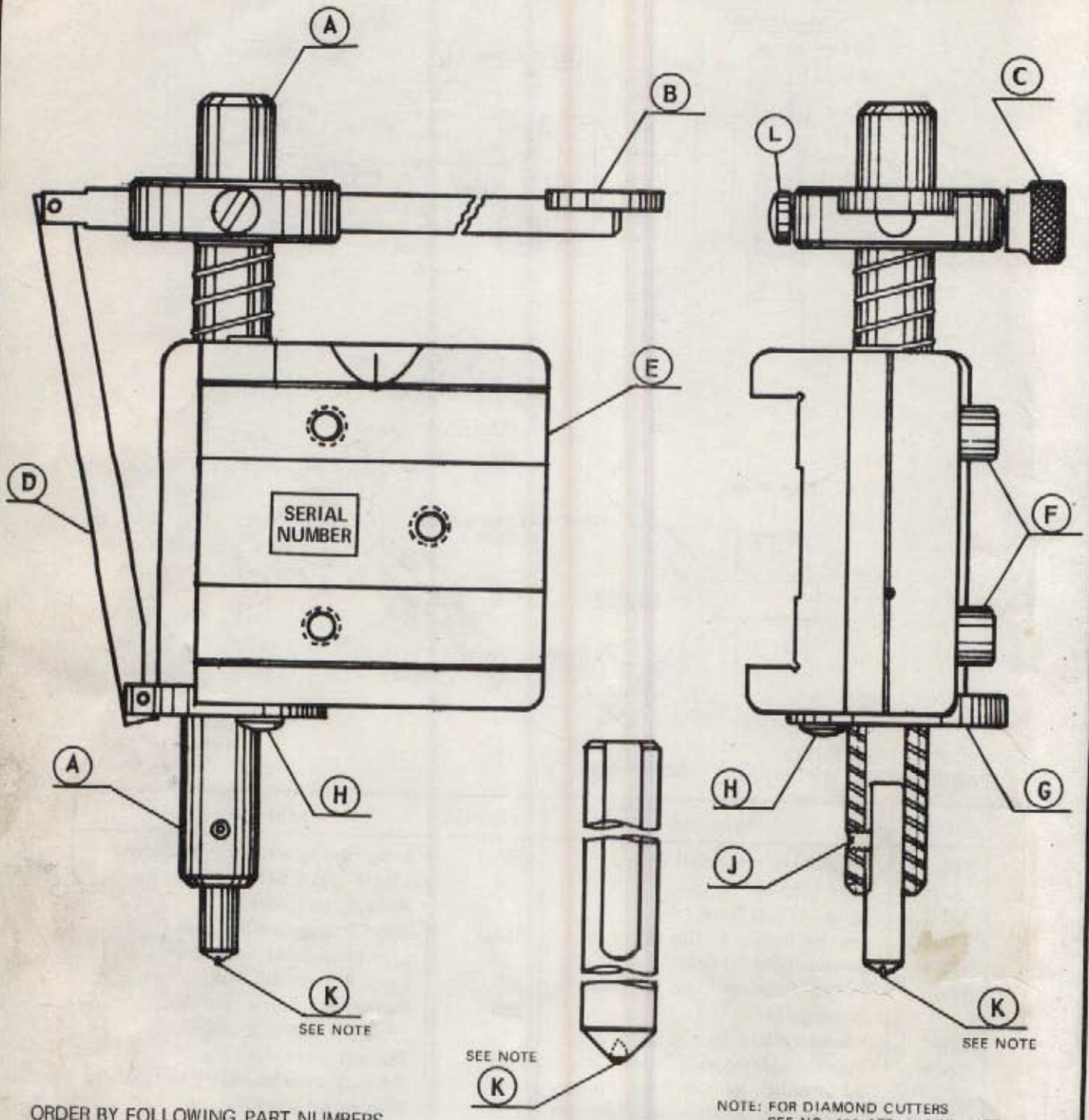
PART NO.	PART NAME	PART NO.	PART NAME
136	Work Table, 6"x 12 with 3 T-Slots	*713	Floor Stand and Shelves (as shown on front cover)
137-1	Work Table Column		
137-2	Work Table Column Limit Screw	*716-1&2	Feed Screw and Collar
138-1	Eccentric Shaft with Handle	*716-4	Hand Wheel
138-2	Adjustable Table Lock Screw	*716-5	Mounting Plate 1/4 x 9" x 19"
138-4	Eccentric Lock Bushing	A	1/4 x 20 x 5/8" Flat Head Cap Screw (requires 5/32 Hexagon Key)
145	Machine Base (All 'U' Series)		
352-1	Column Lock Screw with Handle	B	5/16-18 x 7/8" Socket Head Cap Screws (requires 7/32 Hexagon Key)
352-2	Column Lock Screw Stud		

*Standard with floor models only.



ORDER BY FOLLOWING PART NUMBERS:

PART NO.	PART NAME	PART NO.	PART NAME
126-1	Adjustable Pivot Bolt with 2 Nuts (126-6)	153-1	Long Pantograph Bar with Center Link & 964 Bracket (Available Assembled Only)
126-2	Main Bearing Shaft		
126-3	Bearing Spacer Collar (2)	153-2	Short Pantograph Bar with Center Link (Available Assembled Only)
126-4	Stationary Pivot Bolt		
126-5	Grease Retainer Plate for Main Bearings (4)	265	Front Pantograph Arm
		266	Pantograph Carrier for Models UE-3, UE-3DR, UE-3PC
126-6	Hexagon Nuts for 126-1		
126-7	Intermediate Bearing Shaft	963	Tracing Style Housing
126-8	Intermediate Bearing Plug, Plain	964	Tracing Style Bracket (Starting With Serial #3480)
126-8A	Intermediate Bearing Plug With Set Screw		
		844-1	Long Thumb Screw
126-9	Grease Retainer Plate for Inter-Mediate Bearings (2)	844-2	Short Thumb Screw
		E8-7	Main Ball Bearing (4)
128	Rear Pantograph Arm	S1K7	Intermediate Ball Bearing (2)
129-A	Pantograph Carrier for All Models Except UE-3 or 3D-5	A	10-32 x 3/16 Set Screw (Requires 3/32'' Hexagon Key)
141-3	Washer for 844-1	B	10-32 x 3/8'' Cap Screw (Requires 5/32'' Hexagon Key)
142-5	Knurled Lock Screw	C	604-3/4 Wrench for 126-6



ORDER BY FOLLOWING PART NUMBERS

NOTE: FOR DIAMOND CUTTERS SEE NO. 103 ATT. & ACC. LIST

Item No.	Part Number	Part Name
A	427-1	Spindle Shaft
B	693-2	Extension Lever
C	694-4	Knurled Lock Screw
D	694-3	Connecting Link
E	130-A2	Marking Bracket
F	130-A4	Spindle Adjusting Screws
G	694-1	Swivel Plate

Item No.	Part #	Part Name
H	130-A-3	8-32 x 1/2 Button Head Screw
J	427-4	8-32 x 1/8 Set Screw
K	368	Diamond Cutter, see note
L	694-5	Slotted Lock Screw
A-B-C-D-H-L		Extension Lever Unit

The non-rotating diamond cutter (diamond drag marking) is used principally for engraving or marking hardened tools, gages, trophy plates and jewelry items. The part to be engraved is clamped on the work table with table clamps or held in a vise on the work table. Flat plates up to 3¼" wide can be clamped in the steel jaws of the No. 700 or No. 710 vise, included as standard equipment on Models UM-T or CNP-J Panto Engravers. When engraving very thin plates use one or more of the aluminum support blocks under the plate to prevent bending or buckling.

Most jewelry items can be held in the plastic jig plates furnished with each vise. Select any 2 cut-outs best suited to clamp the part and mount the jig plates on the steel jaws with 2 flat-head screws. Larger parts can be clamped with the four (4) plastic jig bushings inserted in any 4 holes in the steel jaws and very large plates or panels are mounted directly on the work table (except on Model CNP-J). No. 950 plastic jaws with brass inserts are available for holding thin charms. These reversible brass jaws have cut outs which are 1/32 and 1/16" deep. Special jaws of any description may be made to order for that one job which cannot be held otherwise.

Insert diamond cutter "K" into spindle shaft "A" and lock with set-screw "J". Open knurled screw "C", lower spindle shaft "A" until cutter point touches surface to be engraved. Push down on button "B" until extension lever is approximately at right angles to spindle shaft and lock knurled screw "C". Set up a name from individual master letters in the dovetail grooves of the copy holder and lock with a copy holder clamp on each end of name. Insert tracing stylus into groove of master letters and press down on button "B" while tracing through the template.

In most cases the engraving can be done in one cut by tracing only once through the template. This is especially true with soft metals such as gold, silver, brass, copper, etc. On items with very thin metal such as watch cases, compacts and others, where the metal may collapse under the diamond pressure, or, if very deep engraving is desired, especially in steel, it is advisable to trace through the template several times with light pressure rather than cutting the full depth in one cut with excessive pressure on the handle.

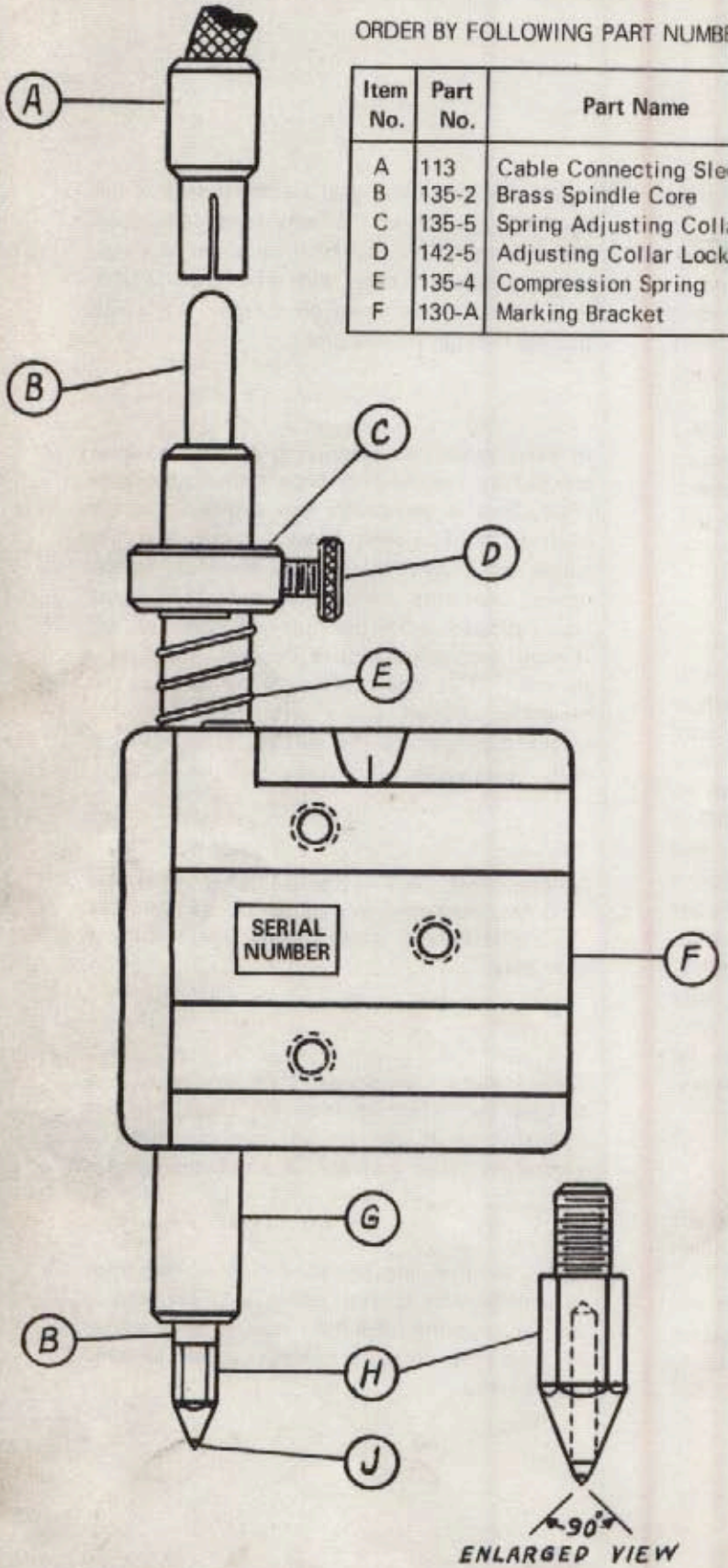
Spindle shaft "A" may be adjusted in bracket "E" by loosening or tightening cap screws "F" until spindle shaft moves freely without side play.

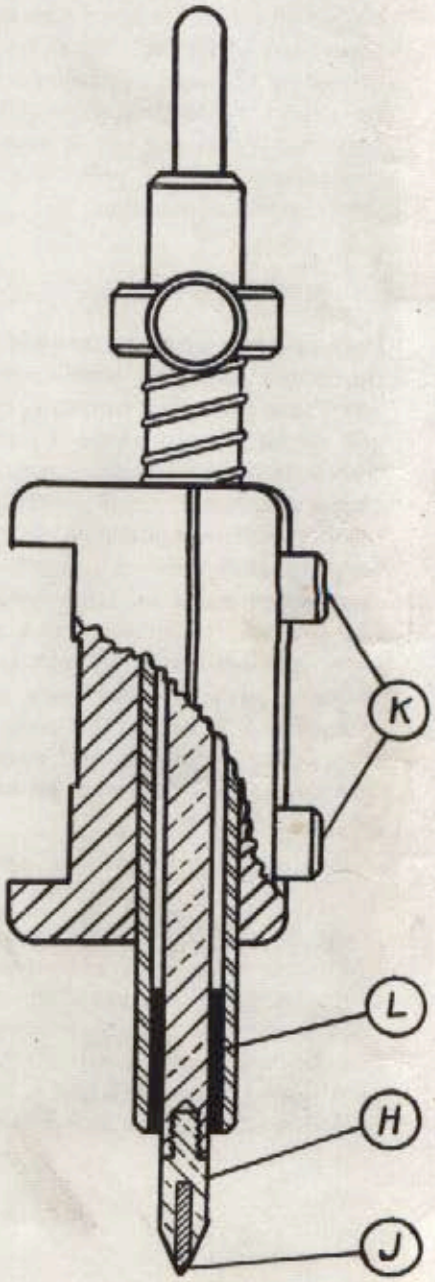
Swivel plate lock screw "H" may be locked to keep the extension lever "B" facing in one direction or it can be adjusted so that the extension lever swivels in a 90 degree arc.

When the diamond becomes dull or the point is accidentally broken, return it to the factory for resharpening. For this reason it is advisable to keep an extra diamond cutter on hand at all times.

ORDER BY FOLLOWING PART NUMBERS:

Item No.	Part No.	Part Name	Item No.	Part No.	Part Name
A	113	Cable Connecting Sleeve	G	135-1	Spindle Sleeve
B	135-2	Brass Spindle Core	H	135-6	Marking Point Holder
C	135-5	Spring Adjusting Collar	J	135-7	Marking Point
D	142-5	Adjusting Collar Lock Screw	K	130-A2	Spindle Adjusting Screws
E	135-4	Compression Spring	L	135-3	Bakelite Insulating Bushing
F	130-A	Marking Bracket			





Electro Marker is arranged for Alternating Current, 60 cycles, 115 volt.

For Direct Current, a rotary converter or motor generator set must be used for converting to alternating current.

Clamp part to be marked on work table. Fasten ground clamp securely to work (as shown in "U" Series Brochure), clamping fixture, if any or work table. Raise work table to proper level. For stationary ground connection, cable may be fastened onto work table or holding fixture with a screw after removing clamp from cable.

Adjust collar "C" for correct spring tension and tighten screw "D". Tension should be sufficient to break contact of point "J" with surface being marked when each continuous design or character has been traced. Always raise marking point "J" from work before moving tracing style out of master copy type groove.

Connect cable sleeve "A" to brass core "B" and turn switch of Electro Marker to the stage best suited for the job.

Stage #1 is low . . . Stage #10 is high . . .

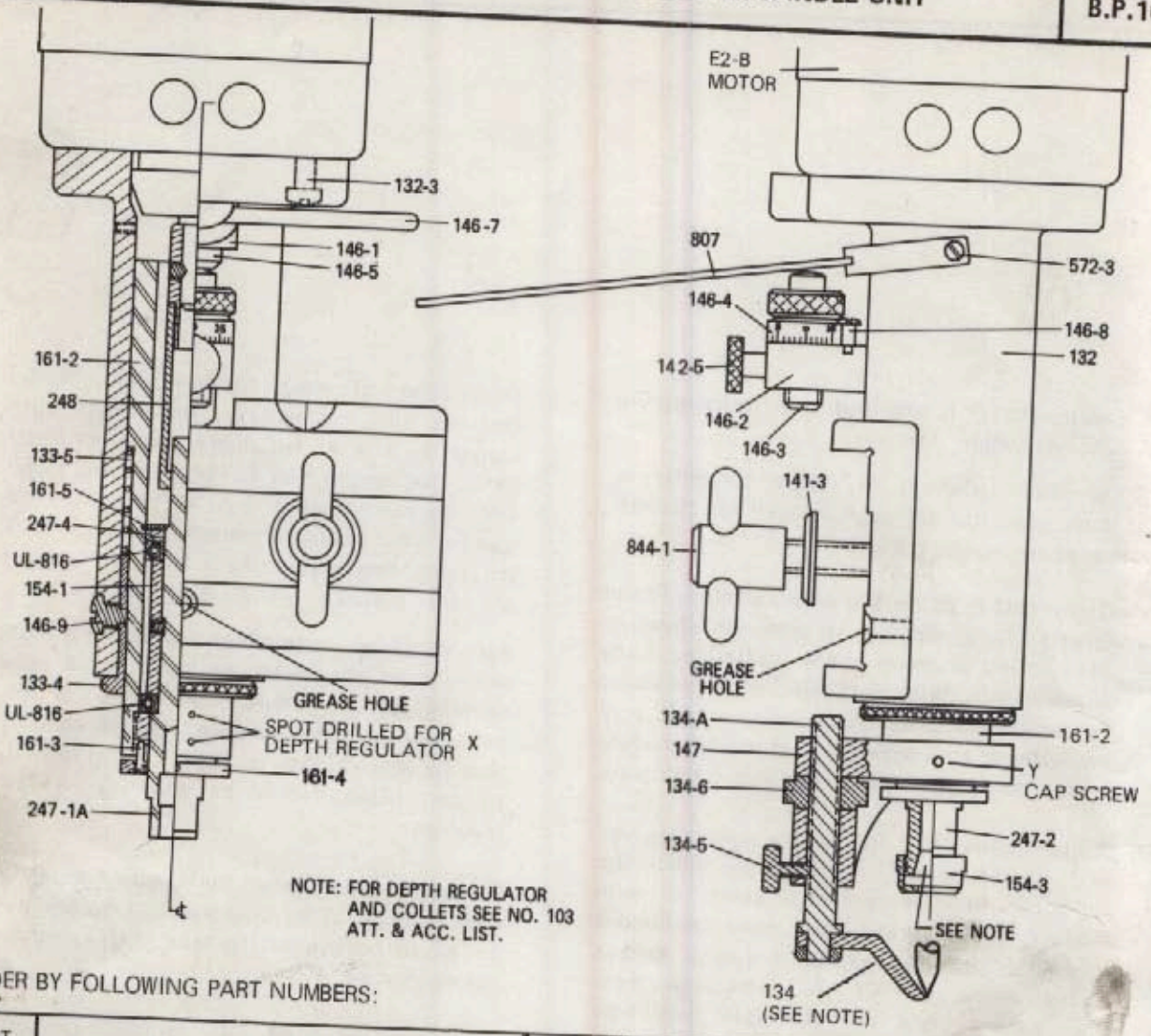
Steel shims thinner than .015" (1/64) in thickness should be marked with stage 1 or penetration of mark becomes too heavy. Heavier steel shims may be marked with stages 2, 3 or 4. For pliers and other steel tools, use stages 5 or 6. For gears and rough castings use stages 8, 9 or 10. Very often the surface mark becomes extremely broad and by polishing this surface with fine emery cloth a very distinct black mark will appear.

For odd shape parts which cannot be marked or held on the engraving machine, a hand marking pencil #209-A is available for free hand marking. For improved ground connection fix ground plate or "CEE" clamp directly to part being marked as shown in #103-A brochure.

For best results, clean surface to be marked with Benzine or an equivalent cleaning fluid so as to remove oil, grease or fingerprints before starting.

When marking point "J" becomes dull, unscrew holder "H", sharpen point and replace. For best results and longer life, the point "J" should be sharpened at a 90 degree included angle.

Spindle "G" may be adjusted in bracket "F" by loosening or tightening cap screw "K" until spindle moves freely without play.



ORDER BY FOLLOWING PART NUMBERS:

PART NO.	PART NAME
132	Spindle Bracket
132-3	Motor Mounting Screws (3)
133-4	Knurled Spindle Bushing
133-5	Compression Spring (Standard)
134-7	Compression Spring for Depth Regulator
134	Depth Regulator Foot (See Note)
134-A	Depth Regulator Feed Screw with 134-6 and Hex Nut
134-5	Knurled Lock Screw
134-6	Knurled Adjusting Nut
141-3	Washer for 844-1
142-5	Knurled Lock Screw
146-1A	Depth Adjusting Cam Unit including 146-1, 146-5, 146-7
146-1	Depth Adjusting Cam Housing
146-2A	Depth Adjusting Bracket Unit including 146-2, 146-3, 146-4, 146-8, 142-5
146-2	Depth Adjusting Bracket
146-3	Depth Adjusting Screw
146-4	Graduated Collar
146-5	Depth Adjusting Cam Stud
146-7	Depth Adjusting Cam Lever
146-8	Retainer Screw for Graduated Collar

PART NO.	PART NAME
146-9	Retainer Screw for Knurled Bushing
147	Depth Regulator Bracket (See Note)
154-1	Bearing Spacer Bushing with Set Screw
154-3	Cutter Lock Nut for 247-2
161-2	Cutter Spindle Housing
161-3	Lock Screw for 161-4
161-4	Spindle Adjusting Collar
161-5	Retainer Ring or Spring Clip
247-1	Spindle Shaft for Taper Shank Cutters
247-1A	Shaft Assembly including 247-1, 247-4, 154-1 and Two UL-816 Ball Bearings
247-2	Spindle Shaft for Straight Shank Cutters
247-2A	Shaft Assembly including 247-2, 247-4, 154-1, 154-3 and Two UL-816 Ball Bearings
247-4	Bearing Retainer Washer
248	Spindle Drive Bushing
572-3	Fulcrum Screw for 807
807	Extension Hand Lever
844-1	Long Thumb Screw
UL-816	Ball Bearings (2)
613	Cutter Wrench
700	Wrench for 247-1 and 247-2
601	Wrench for 154-3

UE-2 CUTTER SPINDLE #163

The UE-2 spindles are self-contained units with motor attached for direct drive application and can be added to any PREIS-PANTO ENGRAVER which is not motorized.

The depth mechanism shown is graduated in .001 inch in either the cam (146) operated or the lever (807) operated spindles.

For general engraving the taper shank spindle offers the greatest range in cutting tools. See Accessory List 103.

For routing and profiling, the straight shank spindle is more suitable.

DEPTH ADJUSTING MECHANISM, SEE PAGE 6.

To obtain a required depth of cut, proceed as follows: Push lever 146-7 or 807 down until it reaches its positive stop, raise work table to within 1/16 inch of the cutter point. Turn graduated collar 146-4 counter-clockwise while spindle is running, until cutter point touches surface of work. Release lever 146-7 or 807, turn graduated collar 146-4 counter-clockwise to the required depth, and lock knurled screw 142-5. Each line equals .001 inch, total drop 3/8".

While engraving, always raise cutter from work before lifting tracing style out of master copy type groove.

LUBRICATION

The 163 Spindle should be lubricated once every 250 working hours. This can be done by removing the spindle unit from the Pantograph. Raise the feed screw to its highest position by turning the graduated collar clockwise, with lever in upper position until grease hole in spindle bracket 132 lines up with hole in spindle housing 161-2. Apply ball bearing grease through grease hole in spindle bracket with tube of grease furnished. Excessive lubrication will overheat the ball bearings and consequently force the grease out through the top and bottom of the spindle shaft. This may require disassembly of the spindle unit to remove any excess grease.

BEARING ADJUSTMENT

If play should develop in spindle ball bearings, loosen set screw 161-3 in threaded bushing 161-4. Insert 1/8" diameter pin into hole on shoulder of bushing 161-4 and turn clockwise to tighten bearings and counterclockwise to loosen bearings. If adjusted too tight, spindle will slow down and bearings will heat up. Lock set screw 161-3 after adjustment has been completed. For best results, the motor should be removed from the spindle bracket. The E2B Motor with teflon motor bushing #248 should be locked directly onto the flange mounting of the engraving spindle with three fillister head screws. Should the vertical motion of either the depth adjustment or spindle become sluggish, a little extra light oil will ease this movement. Repairs should be made by an experienced mechanic or the spindle returned to the factory for service.

DEPTH REGULATOR ATTACHMENT

(Extra Equipment)

A) The No. 163 cutter spindle unit may be equipped with the No. 147 depth regulator attachment when engraving is required on uneven or curved surfaces and any objects varying in thickness. It is recommended for engraving in plastics only, since the foot, gliding over the work surface, may scratch or mark a finished metal surface.

B) The No. 163-TL or 163-SL cutter spindles with extension hand lever are best suited for this attachment. To attach the depth regulator, remove screw 141-2, pull out knurled bushing 133-4 and replace standard spring with 134-7 spring supplied with depth regulator. Replace the knurled bushing, taking care that dog point of screw enters the hole in bushing.

C) After selecting the most convenient position, attach depth regulator bracket No. 147 to cutter spindle housing 161-2 with cap screw "Y" in one of the three tapped holes provided. Lock cap screw "Y" in one of the two spot drilled holes "X", using the lower spot for long cutters, the higher spot for short cutters.

(CONT.)

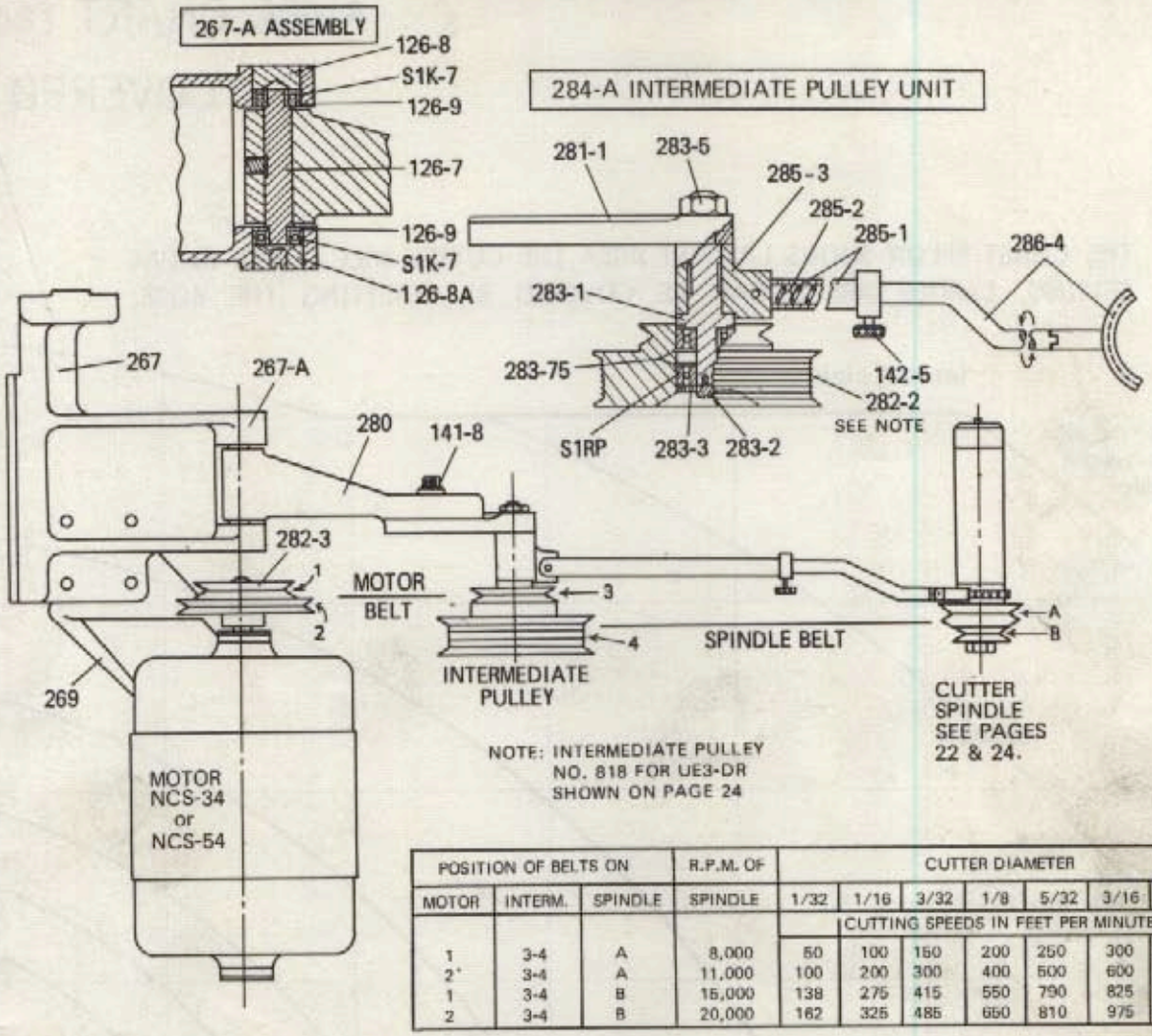
DEPTH REGULATOR ATTACHMENT

D) Loosen knurled screw 134-5, swing foot 134 to side and insert cutter into spindle or collet. Return foot to center position and return knurled screw so that dog point enters slot in 134A and lock lightly. Adjust knurled nut 134-6 until point of cutter is about even with bottom surface of foot 134.

E) Raise work table until depth regulator foot touches lowest surface to be engraved with hand lever 807 in down position. Make final adjustment with graduated collar 146-4. With cutter spindle running and hand lever down, adjust knurled nut 134-6 until desired depth of cut is obtained and lock knurled screw 134-5. When attached and adjusted properly the cutter will now cut an even depth over all irregular surfaces. Always raise hand lever 807 before lifting tracing stylus out of master letter groove.

F) If a depth regulator is to be attached to spindles No. 163-TC or 163-SC, having depth cam units, proceed as above but replace cap screw at "Y" with extra long screw or handle screw and use the latter for raising and lowering cutter while cam lever 146-7 remains in notch provided in cam housing 146-1.

G) Several styles of depth regulator feet are available for various surfaces. The standard foot No. 134-1 is usually sufficient for engraving all irregular flat surfaces. Where engraving runs close to the edge, either No. 134-3 or 134-4 foot are required where the cutter point passes through the hole in the foot which prevents it from dropping off the edge of a plate. The No. 134-2 must be used for engraving small letters on round surfaces such as small plastic tubes, pen barrels, bingo balls, etc. For illustration, see Accessory List 103.



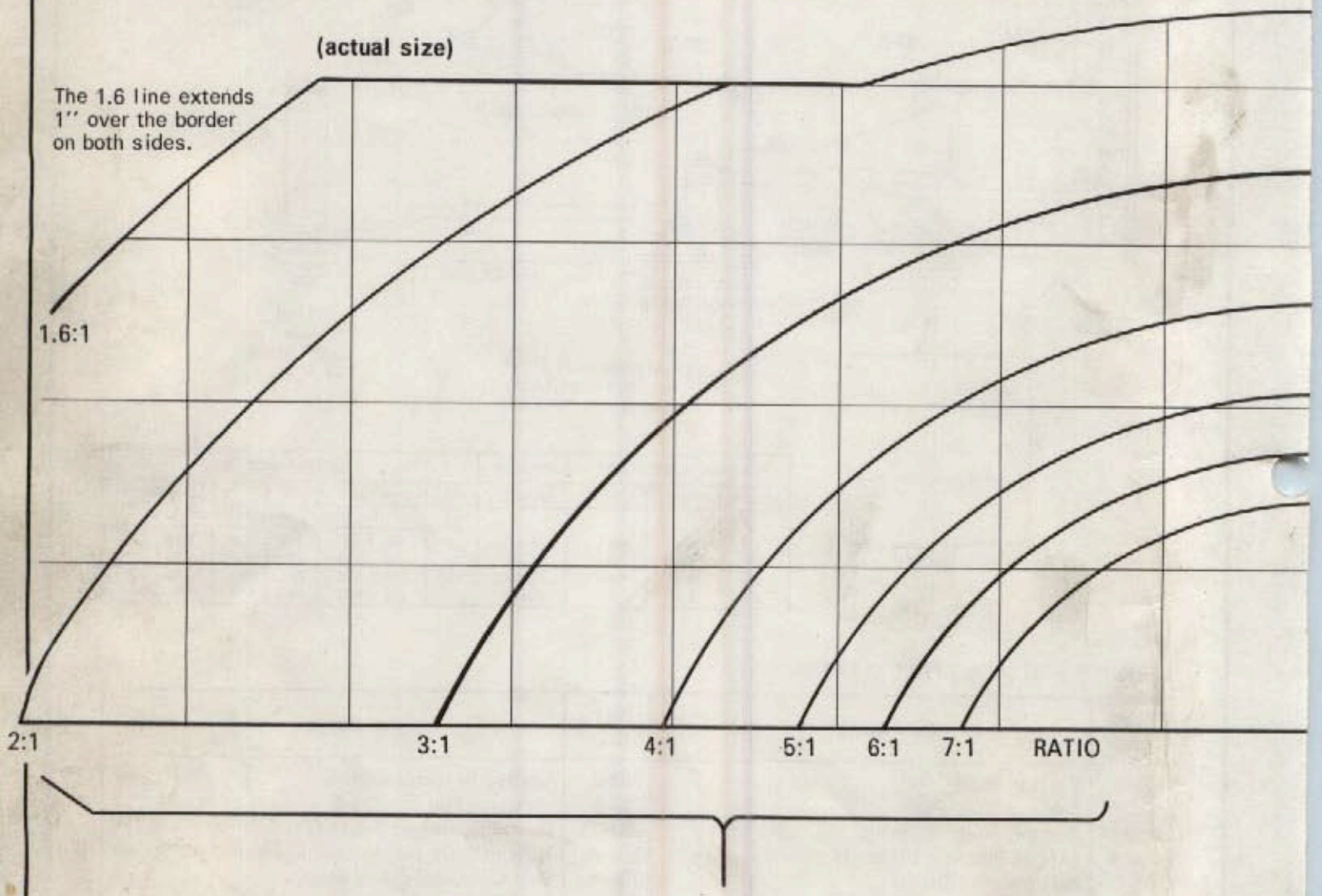
POSITION OF BELTS ON			R.P.M. OF	CUTTER DIAMETER						
MOTOR	INTERM.	SPINDLE	SPINDLE	1/32	1/16	3/32	1/8	5/32	3/16	1/4
				CUTTING SPEEDS IN FEET PER MINUTE						
1	3-4	A	8,000	50	100	150	200	250	300	400
2	3-4	A	11,000	100	200	300	400	500	600	800
1	3-4	B	16,000	138	275	415	550	790	825	1100
2	3-4	B	20,000	162	325	485	650	810	975	1300

ORDER BY FOLLOWING PART NUMBERS:

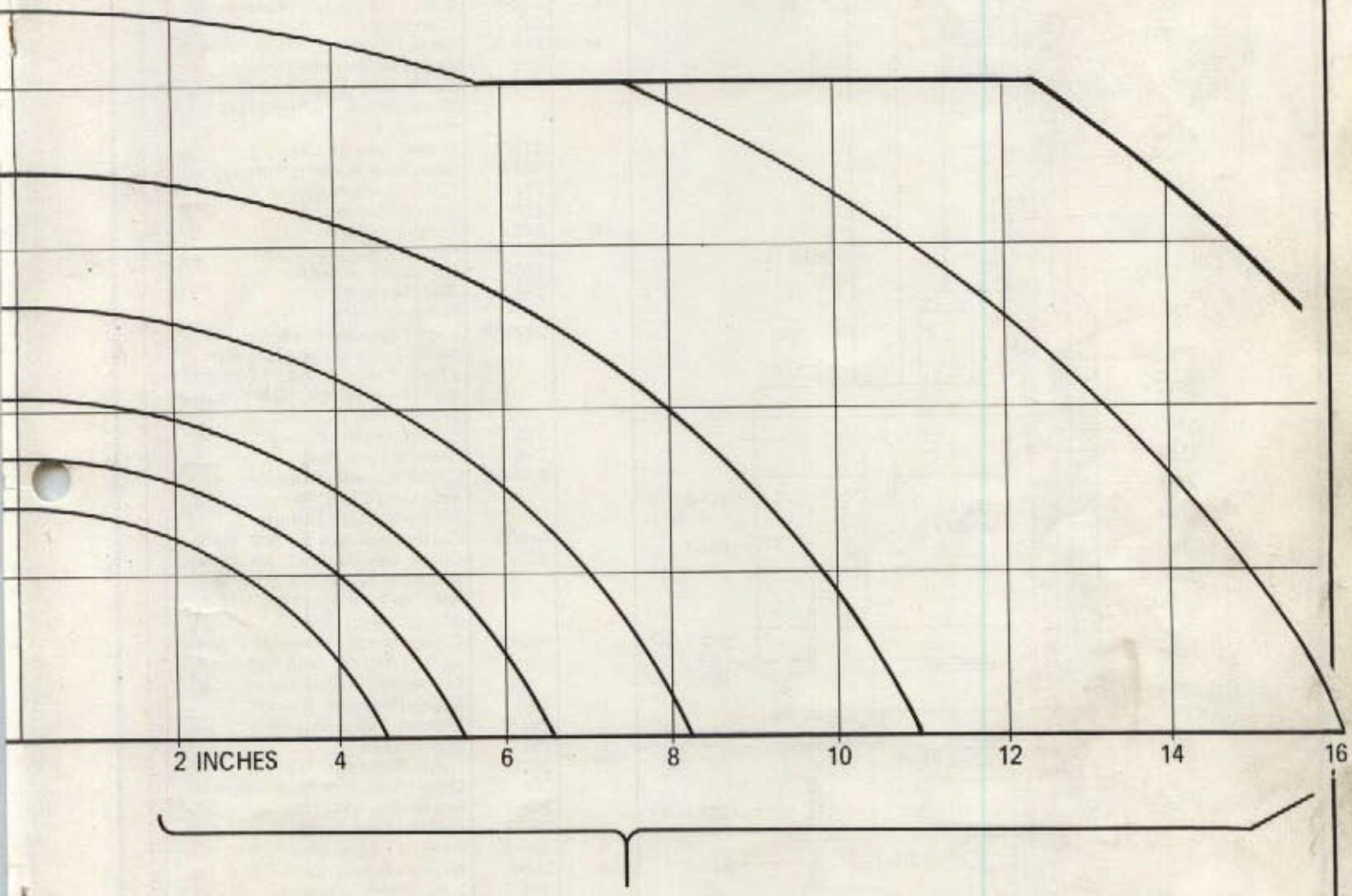
Part No.	Part Name	Part No.	Part Name
126-7	Bearing Shaft	283-3	Grease Retainer Plate
126-8	Bearing Plug, Plain	283-5	Hexagon Nut for 283-1
126-8A	Bearing Plug, Threaded	283-75	Bearing Retainer Rings (2)
126-9	Grease Retainer Plate (2)	284-A	Intermediate Pulley Unit Complete As Shown
S1K7	Ball Bearing (2)	285-1	Belt Connecting Rod Sleeve
141-8	Cap Screw and Washer	285-2	Belt Tension Spring
142-5	Knurled Lock Screw	285-3	Belt Connecting Rod Bracket
267	Motor Drive Support Bracket	286-4	Belt Connecting Rod with Fork
269	Motor Bracket	NCS-34	Motor 1/6 H.P. 115 V., 60 Cycle, Single Phase, 3400 R.P.M. (Standard Equipment)
280	Intermediate Pulley Swivel Arm		
281-1	Swivel Arm Extension	NCS-54	Motor 1/6 H.P., 115 V., 60 Cycle, Single Phase, 3400 R.P.M. (Totally Enclosed)
282-2	Intermediate Pulley (see note)		
282-3	Motor Pulley	NCS-34	Motor 1/6 H.P., 230 V., 50-60 Cycle, Single Phase, 3400 R.P.M.
283-1	Intermediate Pulley Shaft		
S1RP	Ball Bearing for 283-1 (2)	519-EP	3/16 x 19-1/4 Motor Belt
283-2	Lock Screw for 283-3	426-EP	1/8 x 26 Spindle Belt

AREA CHART (actual size
COVERED IN THIS

THE CHART BELOW SHOWS LARGEST AREA THE CUTTER WILL COVER IN ONE SETTING. LARGER AREAS CAN BE COVERED BY RESETTING THE WORK.

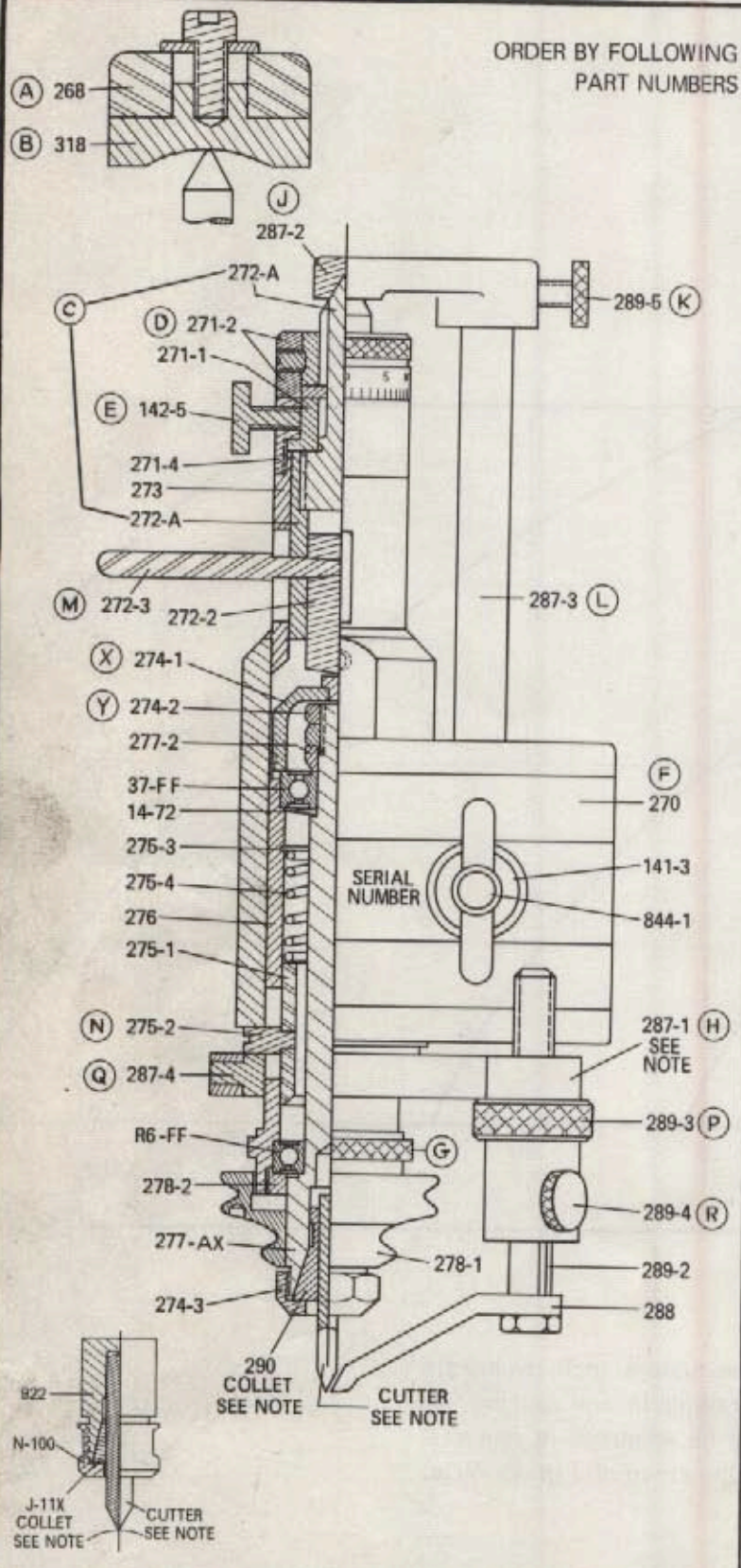


Above numbers are pantograph ratios (reductions) below their respective curves. The cutter will cover total area within each curve in one setting when pantograph is set at the proper ratio.



Each square above equals one square inch. Numerals represent total length of engraving in one setting. To find largest rectangle that can be engraved in one setting, count the squares within the curve of a given ratio.

ORDER BY FOLLOWING PART NUMBERS



NOTE: These parts are available in several styles and sizes and should be selected from No. 103 Attachment and Accessory List.

Item No.	Part No.	Part Name
	141-3	Washer for 844-1
E	142-5	Knurled Lock Screw
	14-72	Disc Spring (2)
A	268	Forming Guide Bracket
B	318	Forming Guide Blank
F	270	Spindle Bracket
	271-1	Depth Adjusting Sleeve
D	271-2	Graduated Collar
	271-4	Depth Mechanism Lock Ring
C	272-A	Cam Housing with Feed Screw
	272-2	Cam Stud
M	272-3	Hand Lever
	273	Depth Mechanism Housing
	273-A	Depth Mechanism Assembly Complete, including 271-1 through 273
	274-1	Cutter Spindle Cap
	274-2	Spindle Adjusting Nuts (2)
	274-3	Collet Lock Nut
	275-1	Spring Sleeve
N	275-2	Retaining Screw
	275-3	Retainer Ring for 275-4
	275-4	Compression Spring
G	276	Spindle Housing
	277-2	Spacing Collar
	277-AX	Cutter Spindle Shaft for Preis-Panto Collets Complete with 274-3, 274-2, 277-2, 14-72 and R6-37FF Bearings, (Starting with Serial #1465)
	278-1	Cutter Spindle Pulley
	278-2	Bearing Lock Ring
	279-AX	Cutter Spindle Assembly including 274-1 through 278-2 for Preis-Panto Collets
	N-100	Collet Lock Nut for 922 Shaft
	922	Cutter Spindle Shaft for Jacobs Rubber-Flex Collets complete with R6-37FF Bearings, 274-2, 277-2, 14-72, N100
	922-J	Cutter Spindle Assembly, same as 279-AX, but with 922 Shaft for Jacobs Rubber-Flex Collet
H	287-1	Depth Regulator Bracket
J	287-2	Support Arm with 289-5
L	287-3	Support Rod
Q	287-4	Depth Regulator Key
	288	Depth Regulator Foot (See Note)
	289-2	Feedscrew with Hex Nut
P	289-3	Knurled Feed Screw Nut
R	289-4	Knurled Screw, Dog Point
K	289-5	Knurled Screw, Cone Point
	844-1	Long Thumb Screw
	37-FF	Upper Ball Bearing
	R6-FF	Lower Ball Bearing
		WRENCHES (Not Shown)
	452	Pin Spanner Wrench, for 274-1
	482	Adjustable Spanner Wrench for 278-1
	601	For 274-2 Nuts
	604-A	For 274-3 Nut
	613	Cutter Wrench
	622	For N100 Nut
	290	Preis-Panto Collet for #279 Spindle Shaft (See Note)
	J11X	Jacobs Rubber-Flex Collet for #922 Spindle Shaft (See Note)

The 279AX spindle is designed for holding Preis-Panto collet sizes 1/8", 5/32", 3/16" and standard engraving taper.

The 922J spindle is designed for holding Jacobs Rubberflex Collets ranging from diameters .094" – .146" (J112), .146" – .198" (J113) to .198" – .250" (J114).

All spindles have been pretested prior to shipment. Should fault be found with a new spindle, it should immediately be returned for replacement. This warranty applies only if spindle has not been misused.

1. LUBRICATION

All cutter spindles starting with spindle No. A-1465 are equipped with sealed, super-precision ball bearings. They are pre-lubricated and do not require any additional lubrication for the life of the bearings. Under normal operating conditions the ball bearings should be replaced after 2000-3000 hours actual running time (12 to 18 months based on 40-hour week). This, however, should only be done by a competent mechanic, or the complete unit should be returned to the factory for service.

To remove the cutter spindle from bracket "F" proceed as follows: Turn collar "D" counter-clockwise until it reaches a stop which movement raises the spindle to its highest position; insert a pin into hole in knurled ring "G" and turn clockwise until screw "N" enters vertical slot in bracket. The spindle can then be pulled out. Should vertical movement become sluggish, remove spindle and wipe oil from spindle housing and hole of spindle bracket using a clean rag.

2. ADJUSTMENT OF SPINDLE BEARINGS

Before shipment, all cutter spindles are adjusted accurately and filled with a sufficient quantity of high-grade ball bearing grease. For readjustment, unscrew spindle cap "X" and adjust hexagon nuts "Y" so that all play is eliminated but that the spindle shaft rotates freely on its bearings without binding.

3. DEPTH ADJUSTING MECHANISM (See Page 6)

To obtain a required depth of cut, proceed as follows: Push cam lever "M" down until it reaches its positive stop; raise work table to within about 1/16 inch of the cutter point; loosen screw "E" & turn collar "D" until cutter point just touches the surface of the work; return lever "M" to its original position to raise the cutter point from the working surface. Now turn collar "D" to the depth required and lock knurled screw "E". Each line of graduation equals .001 inch with total drop of 11/32". When engraving always raise cutter from work before moving tracing style out of master copy type.

4. USE OF FORMING GUIDE ATTACHMENT

When engraving is to be done on radial, spherical or beveled surfaces, the forming guide arm "A" is attached to the top of the pantograph carrier. A hardened steel form "B", an exact counterpart of the surface to be engraved, is then attached to the arm and centered with the spindle, so that the cutter point follows the exact shape of the working surface when tracing from a flat master template. It is advisable to make the radius of a concave steel form 1/32 inch larger, and the radius of a convex form 1/32 inch smaller than the radius of the work piece, so as to compensate for the radius on point "C". To obtain depth of cut follow instructions in Paragraph 3.

5. ATTACHING THE DEPTH REGULATOR

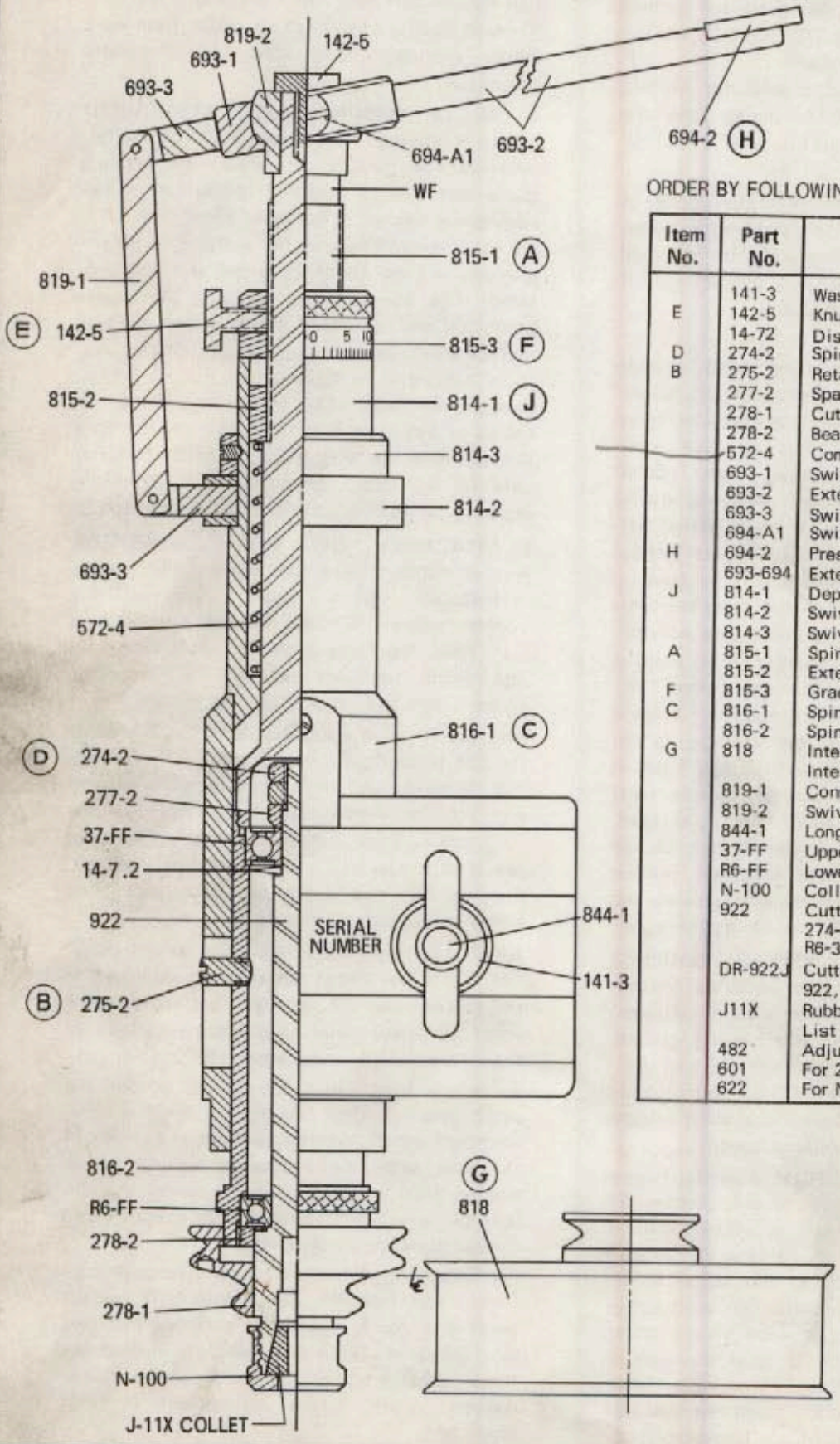
Remove cutter spindle from bracket "F" as per instructions given under "Lubrication". Loosen screw "K" and remove support arm "J" from depth regulator rod. Insert spindle into depth regulator bracket "H" so that screw "N" fits into V-groove of key "Q".

Now insert spindle together with depth regulator into bracket "F" with screw "N" and key "Q" entering slot in bracket. Replace support arm "J" as shown, and lock knurled screw "K", taking care that screw point enters hole provided in rod "L". When properly attached, the spindle and depth regulator will float freely in the spindle bracket.

After inserting cutter into spindle and lever "M" is in its lowest position, adjust foot 288 by turning knurled nut "P" until the cutter point is about even with bottom surface of foot. Then lock knurled screw "R".

Raise the work table about 1/16 beyond the point where the foot touches the surface to be engraved which assures continuous contact of the foot with the engraving surface. When tracing from a flat master, the cutter spindle will be raised and lowered over irregular and curved surfaces by gravity only.

For engraving cylindrical and spherical surfaces, use foot No. 288-1 with ball contact point and, for irregular flat surfaces use foot No. 288-2 or 288-3 with slightly domed but larger contact points. To set the cutter to the required depth, follow instructions in Paragraph 3.



694-2 (H)

ORDER BY FOLLOWING PART NUMBERS:

Item No.	Part No.	Part Name
	141-3	Washer for 844-1
E	142-5	Knurled Lock Screw
	14-72	Disc Spring (2)
D	274-2	Spindle Adjusting Nuts (2)
B	275-2	Retaining Screw
	277-2	Spacing Collar
	278-1	Cutter Spindle Pulley
	278-2	Bearing Lock Ring
	572-4	Compression Spring
	693-1	Swivel Collar
	693-2	Extension Lever
	693-3	Swivel Stud (2)
	694-A1	Swivel Lock Screw (2)
H	694-2	Pressure Button
	693-694	Extension Lever Unit
J	814-1	Depth Housing
	814-2	Swivel Ring
	814-3	Swivel Lock Ring
A	815-1	Spindle Extension Shaft
	815-2	Extension Lock Nut
F	815-3	Graduated Collar
C	816-1	Spindle Bracket
	816-2	Spindle Housing
G	818	Intermediate Pulley. All Other Parts Interchangeable with 284 — Page 19
	819-1	Connecting Link
	819-2	Swivel Knuckle
	844-1	Long Thumb Screw
	37-FF	Upper Ball Bearing
	R6-FF	Lower Ball Bearing
	N-100	Collet Lock Nut
	922	Cutter Spindle Shaft, complete with 274-2, 277-2, N-100, 14-72 and R6-37-FF Ball Bearings.
	DR-922J	Cutter Spindle Assembly, including 922, 275-2, 816-2, 278-2, 278-1
	J11X	Rubber-Flex Collet (See sizes in List 103)
	482	Adjustable Spanner Wrench for 278-1
	601	For 274-2 Nuts and WF
	622	For N100 Nut

1. LUBRICATION

All Cutter Spindles starting with spindle No. A-1465, are equipped with sealed, super-precision ball bearings. They are pre-lubricated and do not require any additional lubrication for the life of the bearings. Under normal operating conditions the ball bearings should be replaced after 2000-3000 hours actual running time (12 to 18 months based on 40-hour week). This, however, should only be done by a competent mechanic, or the complete unit should be returned to the factory for service.

2. ADJUSTMENT OF SPINDLE BEARINGS

On Model UE-3DR, unscrew spindle extension shaft "A" counter-clockwise, applying 1/2" open end wrench at "WF", unscrew Retaining Screw "B" and spindle will fall free from spindle bracket "C". Then adjust hexagon nuts "D" so that all play is eliminated, but that the spindle shaft rotates freely on its bearings without binding. Wipe oil from spindle housing and hole of spindle bracket with clean rag, replace spindle in spindle bracket and lock retaining screw "B" in place. Tighten spindle extension shaft "A" with wrench at WF and cutter spindle is ready for use.

3. DEPTH ADJUSTING MECHANISM

To obtain required depth of cut proceed as follows:

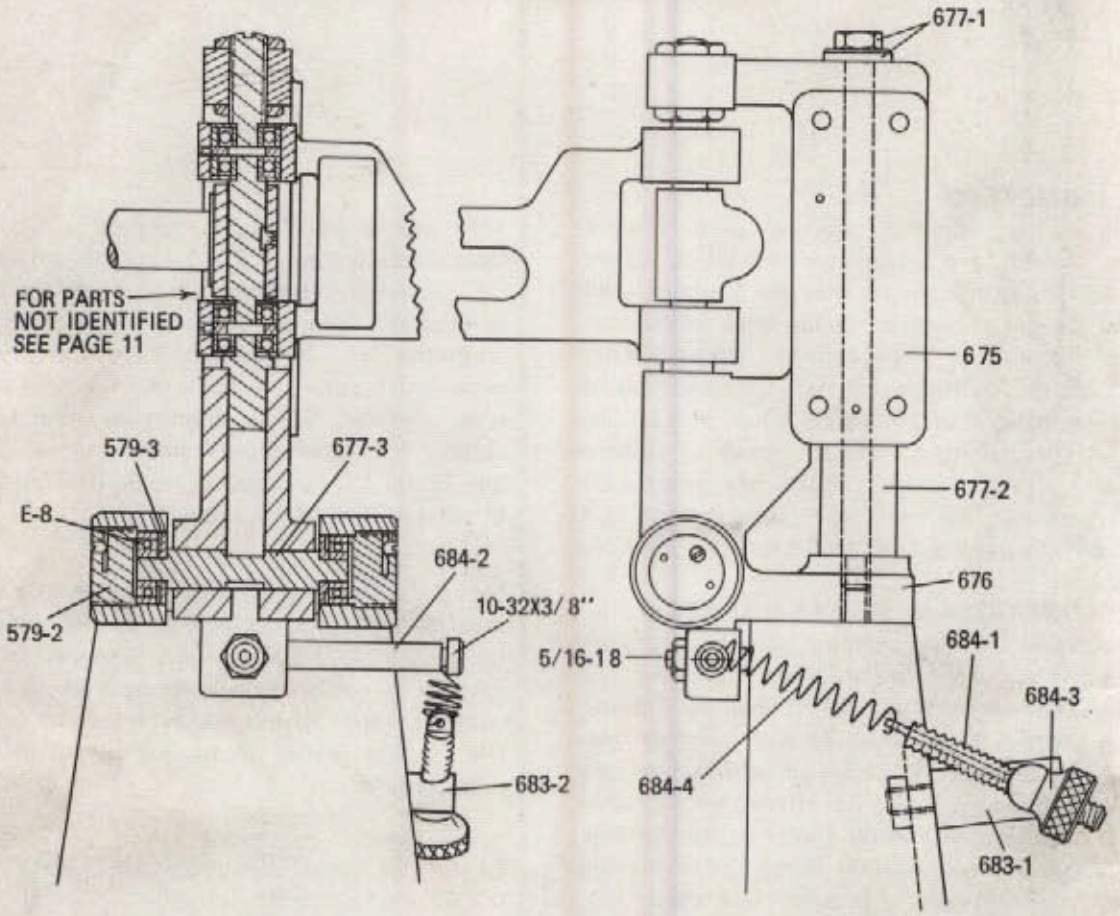
With cutter spindle in its highest position, raise work table until cutter or drill are about 1/4" above part to be engraved or drilled. Open knurled screw "E", turn graduated collar "F" counter-clockwise until it almost contacts depth housing "J". With light pressure on button "H", turn collar "F" counter-clockwise until cutter or drill point touches the work surface. Check micrometer reading on collar "F", release pressure on button "H", turn collar "F" clockwise to the desired depth of cut and lock knurled screw "E".

Each line on the graduated collar equals .001 inch (1/1000") in depth, one turn equals .050 inch (50/1000") and maximum vertical feed of spindle is one inch. Always be sure to raise cutter or drill from work by releasing button "H" before lifting tracing stylus out of template groove.

Follow the same procedure for drilling. The JO 15 keyless precision Albrecht chuck features miniature drill sizes which cannot be held in Rubber Flex collet. The one-inch spindle drop permits drilling through laminates or layers of material. The special intermediate pulley "G" permits the endless spindle belt to follow the reciprocal motion of the spindle in order to maintain the belt parallel to the work table at all times.

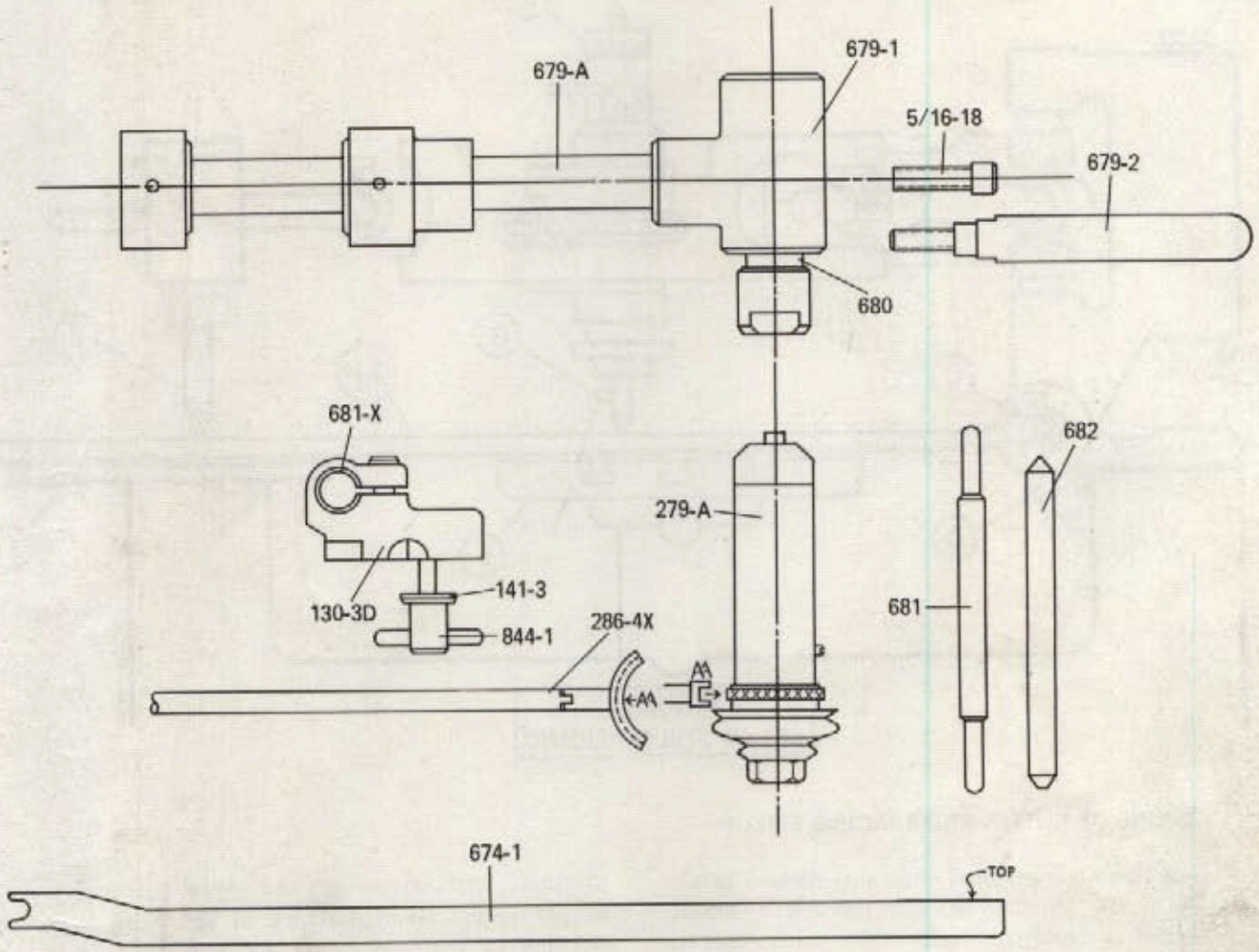
Neither depth regulator nor forming guide may be adapted to the UE3-DR Cutter Spindle head.

675-A PANTOGRAPH CARRIER ASSEMBLY



ORDER BY FOLLOWING PART NUMBERS:

Part No.	Part Name	Part No.	Part Name
579-2	Bearing Adjusting Plugs (2)	683-2	Spring Balance Swivel Stud
579-3	Bearing Washer (2)	684-1	Tension Adjusting Screw
675-1	Pantograph Carrier	684-2	Spring Holder Stud with Cap Screw
676	Pantograph Carrier Swivel Base	684-3	Knurled Nut
677-2	Parallel Block	684-4	Balance Spring
677-4	2-Dimensional Locking Bolt	683-A	Counter Balance Unit – Including 683-1 & 2, 684-1 & 3
677-3	Swivel Bearing Shaft		
677-1	Lock Bolt and Washer for 2-D Work	E8	Ball Bearing for Swivel Base (2)
677-2	Parallel Block	10-32x3/8	Cap Screw
683-1	Spring Balance Anchor Stud	5/16-18x1	Leveling Screw with Hex Nut



ORDER BY FOLLOWING PART NUMBERS:

Part No.	Part Name	Part No.	Part Name
130-3D	Enlarging Bracket with Sleeve	679-2	Handle Bar-Lock Screw (Use in Place of Lock Screw for Enlarging)
141-3	Washer for 844-1		
279-A	Cutter Spindle (See Page 22)	5/16-18x1	Lock Screw for Tracing Style Holder
286-4X	Belt Connecting Rod for Enlarging	680	Master Tracing Stylus Holder with Lock Nut
440	Enlarging Belt (not shown) (5/32x40'')		
130-68X	Enlarging Unit, Including 130-3D, 844-1, 141-3, 681X, 2864X, 440 Belt	681-X	Split Bushing for Part 130-3D
		681	Ball Nose Tracing Stylus (See Accessory List No. 103)
674-1	Cutter Aligning Bar		
679-A	Long Pantograph Bar with Center Link and 679-1 Tracing Style Bracket (Available Assembled Only)	682	Conical Stylus for Stamp Work (See Accessory List No. 103)
		844-1	Long Thumb Screw
679-1	Tracing Style Holder Bracket		

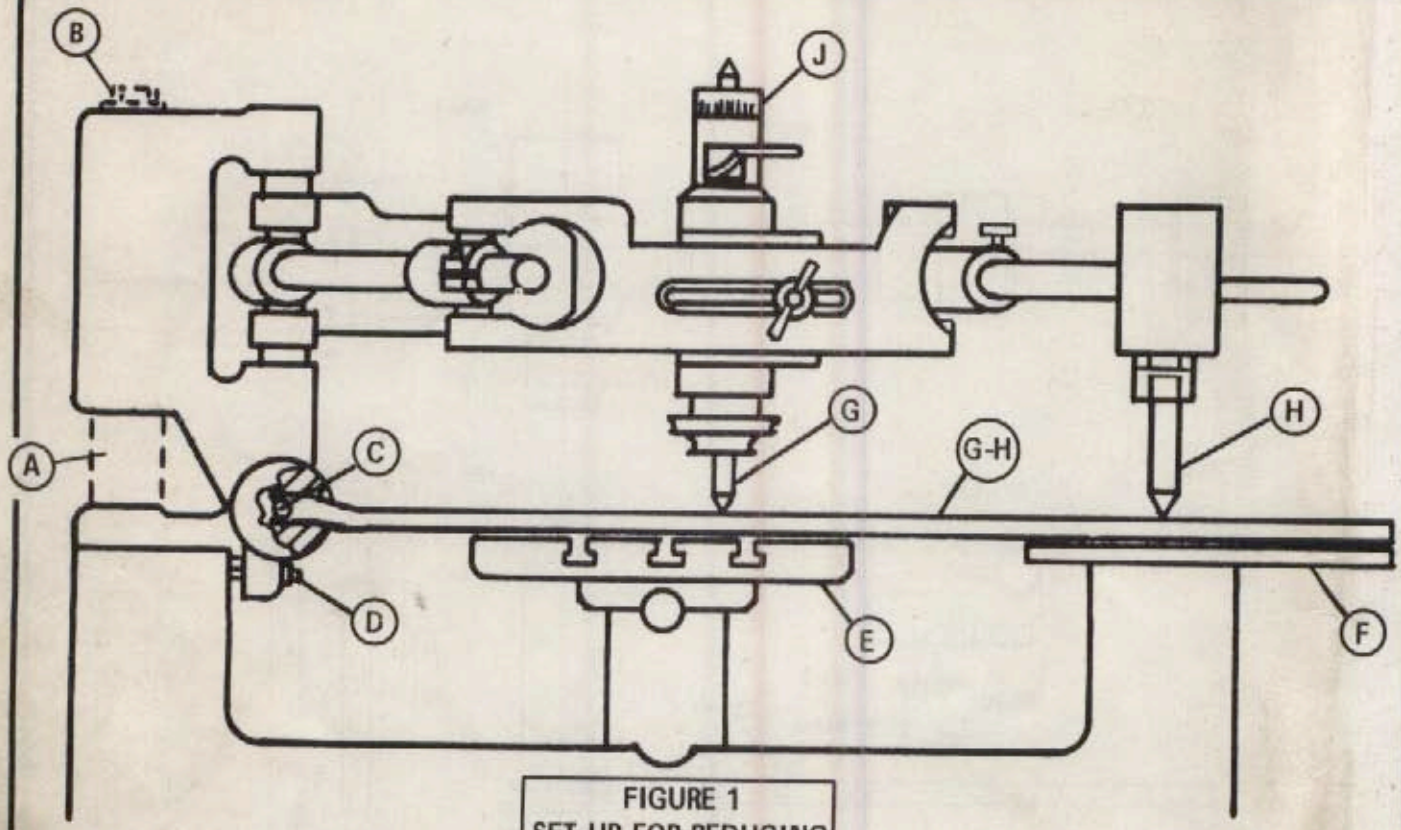


FIGURE 1
SET-UP FOR REDUCING

1. LINE UP CUTTER AND TRACING STYLUS:

For Three-Dimensional engraving remove parallel block "A" and hexagon bolt "B". Mount model or pattern on table "F", insert tracing stylus "H" and with the pantograph in a level plane lower the tracing stylus until it touches the lowest part of the model. Then lock tracing stylus in its holder.

With the surface marked "TOP" facing up, insert leveling bar "G-H" into slot "C" so that the slotted end straddles the bearing shaft "C" and the other end of the bar rests on the model. Lower the pantograph until the tracing stylus touches the leveling bar and while holding it in that position lower cutter "G" with the micrometer feed screw collar "J" until the point just touches the bar.

The cutter and tracing stylus are now exactly in line with bearing shaft "C" and will swing in a true arc when the pantograph is raised or lowered. This is only necessary for the initial set-up on each die. All subsequent cutters and tracing styles may be locked in the same position without using the leveling bar. Adjust spring counterbalance at left side of machine so that the pantograph remains in a level or down position without excessive pressure on the model. Start engraving with the tracing stylus on the lowest part of the model. Raise the work table gradually, locking it each time until the complete design on the model appears in the die. Remove roughing cutter and tracing stylus and select a finishing tracer that will enter the smallest detail on the model. Grind a cutter in proportion to the tracing stylus and lock in collet with point slightly above the roughed-out surface when the tracing stylus rests on the model. Without unlocking the work table, lower the cutter spindle with the micrometer feed screw collar "J" until the cutter just barely touches the surface of the die without actually cutting. Finish all details and do not remove die from machine until inspection shows that all details have been covered and the engraving is clean and ready for hand finishing.

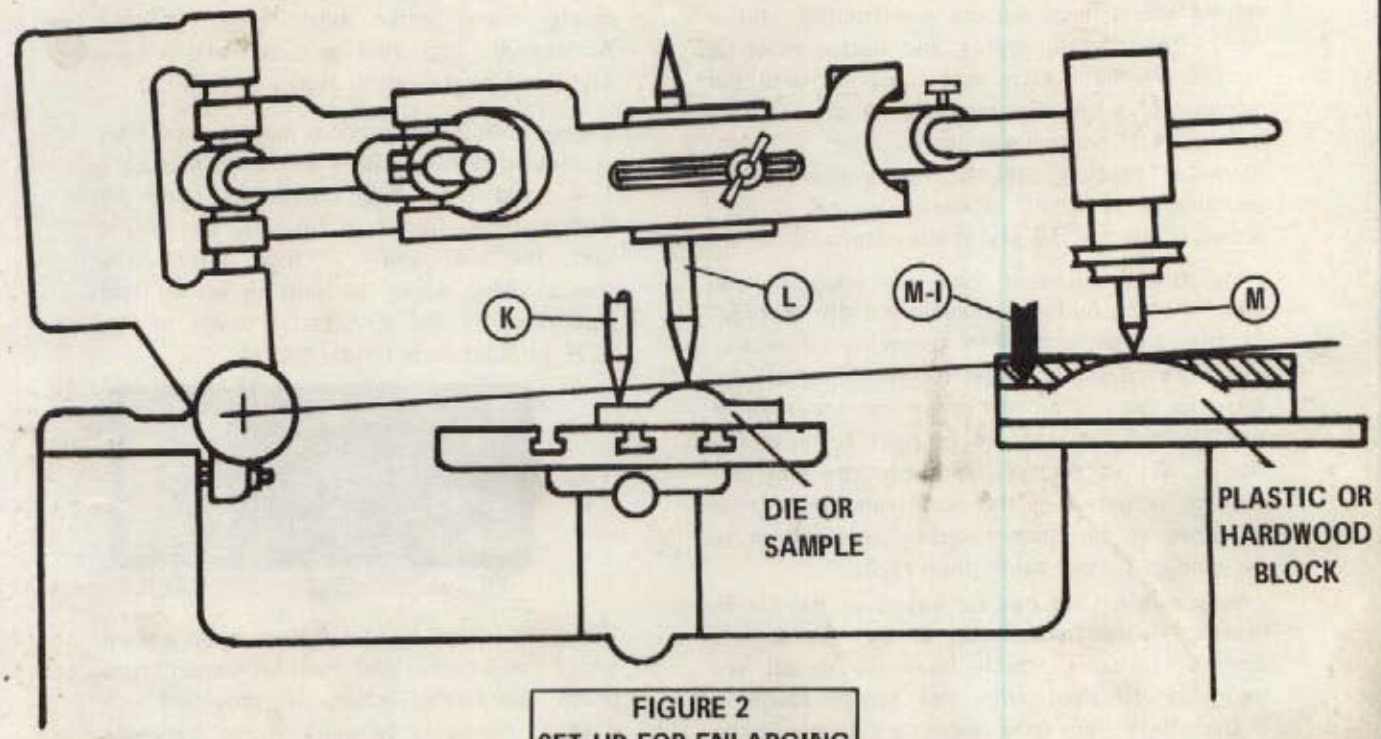


FIGURE 2
SET-UP FOR ENLARGING

2. ENLARGING:

Remove cutter spindle unit and attach enlarging bracket (extra equipment). Reverse position of cutter spindle and tracing stylus. Select proper cutter and tracing stylus to suit the individual job. In this case, the cutter must be proportionally larger than the tracer since the work is to be enlarged. Line up cutter and tracing stylus as explained on Page 28.

Mount die or sample part to be enlarged on the work table. Raise work table until tracing stylus touches lowest surface of die as shown at "K". Move pantograph so that tracing stylus touches highest point of die as at "L". Mount plastic or hardwood block on copy holder plate so that cutter "M" just contacts top surface when tracer is at "L". If the plastic block is too thin to contact the cutter point, it should be raised on blocks until it reaches the necessary height. Raise the work table until the cutter point "M" is slightly above the surface of the plastic block when tracing stylus is at low point "K".

Start the cutter spindle, lower the work table gradually, locking it each time while tracing over the complete design until every detail from highest part "M" to lowest part "M-1" appearing on the original has been cut into the model. Change to finishing cutter and tracing stylus, if required, and carefully go over the complete design again to finish the small details. Remove the finished model and file or polish out any objectionable tool marks. The model is now ready for reproduction. Reverse cutter spindle and tracing stylus, mount model and die blank on engraver and proceed to cut the die or hub as explained on Page 28.

3. SELECTION OF CUTTERS AND TRACING STYLES:

Three-Dimensional die and mold cutting requires round nose cutters and tracing stylus #681. The tracing stylus and cutter must be of proportionate size to correspond with the pantograph ratio. For example: A die is to be cut at 4:1 pantograph ratio using a .200" diameter tracing stylus. The cutter should be ground to .050" diameter which is one-fourth of the tracing stylus diameter.

It usually requires at least one roughing and one finishing cutter to complete a die or mold. A larger cutter is used for removing all excess stock and a small cutter for finishing all details in the design. To determine the size of the finishing cutter, it is best to select a tracing stylus that will fit into the smallest crevice or detail of the model and then grind a cutter to the proportionate size which is determined by the pantograph ratio.

Considerable time can be saved in the finish cutting if the background of the die or any smooth surfaces which have no detail are carefully finished with the larger roughing cutter. It is then only necessary to cover the fine details with the small finishing cutter.

4. THREE-DIMENSIONAL STAMP CUTTING:

A) Prepare steel stamp blank by milling or routing away all excess material to the full depth "X", leaving only the section where the letters or design are to be engraved. The remaining section or raised bands "Y" should be about 1/64" larger than the finished letters to assure full bevels on all letters throughout. This can be done on the 3D-5 Panto-Engraver with a conical-flat cutter or on a vertical milling machine, if available. Round steel stamps with circular engraving should be prepared on a lathe.

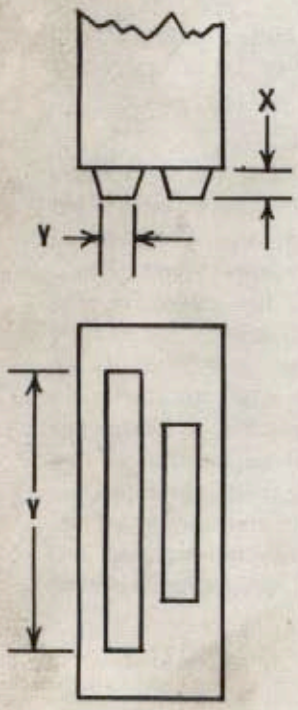


FIGURE 3

B) Clamp prepared blank on work table or in vise and set up 3-dimensional master letters (see paragraph C) in grooves of appropriate copy holder table (see No. 103 Accessory List), line up cutter and tracing stylus as explained in figure 1, Page 28.

C) Preis-Panto 3-dimensional master copy type is plastic molded and is available in 5/32", 1/4" and 1/2" high characters, in plain Gothic type, listed in No. 103 Accessory List. The 1/4" and 1/2" high letters have two beveled edges for setting up straight line copy in the dove-tail grooves of No. 3225 or 3250 copy holder tables.

FIG. 4

FRONT SIDE BACK

The 5/32" high master letters have square edges (no bevels) and must be cemented in place. All master letters are provided with a stud, centrally located on the back for circular, curved or irregular shaped alignment. Simply cut a groove of the desired contour into a metal or plastic plate and cement the letters into place with an acetate or epoxy cement. For best results cover the complete set-up with a thin cardboard and apply a weight, or keep under pressure until the cement has dried. (See Figure 5 below.) After the stamp has been cut, the master letters may be removed with a suitble solvent, cleaned thoroughly and used for the next set-up.

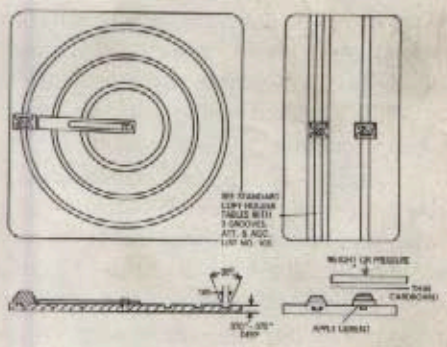
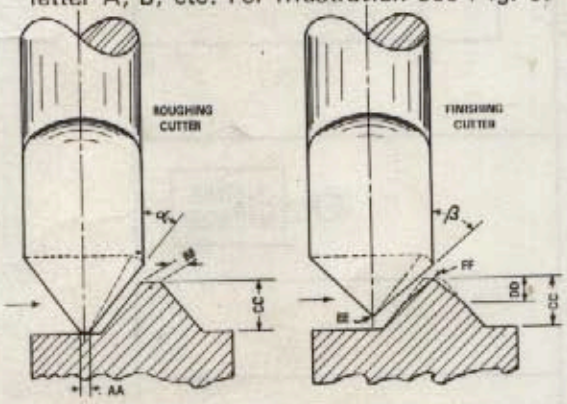


FIGURE 5

D) All 3-dimensional letters have double bevels, 20° at the bottom for close spacing and 35° at the top for added strength. They

are suitable for cutting any steel stamp having 35° or more side angle. All steel stamps must be cut in 2 steps, one roughing and one finishing cut. We recommend using a roughing cutter and stylus having 10° less side angle than the angle required on the finished stamp. The No. 682 tracing styles are double ended, one end conical flat for roughing, the other end conical pointed for finishing, with angles ranging from 35° to 55° in steps of 5°. Select the tracing stylus with the side angle required and sharpen 2 cutters, one conical flat for roughing, the other conical pointed for finishing, with side angles identical to the tracing stylus. Cut complete stamp with roughing cutter to the full depth required, leaving only the sharp inner corners and close spaces where the tracing stylus does not pass through. Reverse the tracing stylus and set pointed finishing cutter so that the point does not touch the bottom surface nor the top of the stamp when the tracing stylus is guided around and over the letters. For best results and ,longer cutter life, do all finish cutting by guiding the cutter from the bottom up through the inner comers and over the top. Down cutting should only be used where the roughing cutter could not enter small spaces, as for instance, the inside of a letter A, B, etc. For illustration see Fig. 6.



Angle "α" of roughing cutter must be 10 degrees less than angle "β" of finishing cutter. Cutting angles must correspond with angles of tracing stylus #682. Stone or grind off "AA" to suit each individual job. This changes with each ratio and variation of depth "CC". Leave sufficient stock at "BB" so that, when finishing cutter is used, "FF" is sharp and "DD" is approximately one-half of "CC". "CC", depth of characters as required. Stone off point "EE" to .001" – .005" width, depending upon size of characters. Point "EE" must never touch bottom surface of roughed out stamp but is adjusted so that it finished sharp inner corners of characters.

FIGURE 6

E) Steel stamp with special design or trademarks may also be cut in the same manner if equipment is available for making the 3-dimensional model required. Simply make a sunk engraving of the design into a Dow metal or brass plate to the full depth required, using a cutter with the exact side angle as the stamp to be cut. If a molding press is available, the raised letter may be molded by using either uncured sheet plastic or pellets over the surface of the engraved plate and applying the required heat and pressure. Where this is not practical the raised model can be made from epoxy as explained under models below.

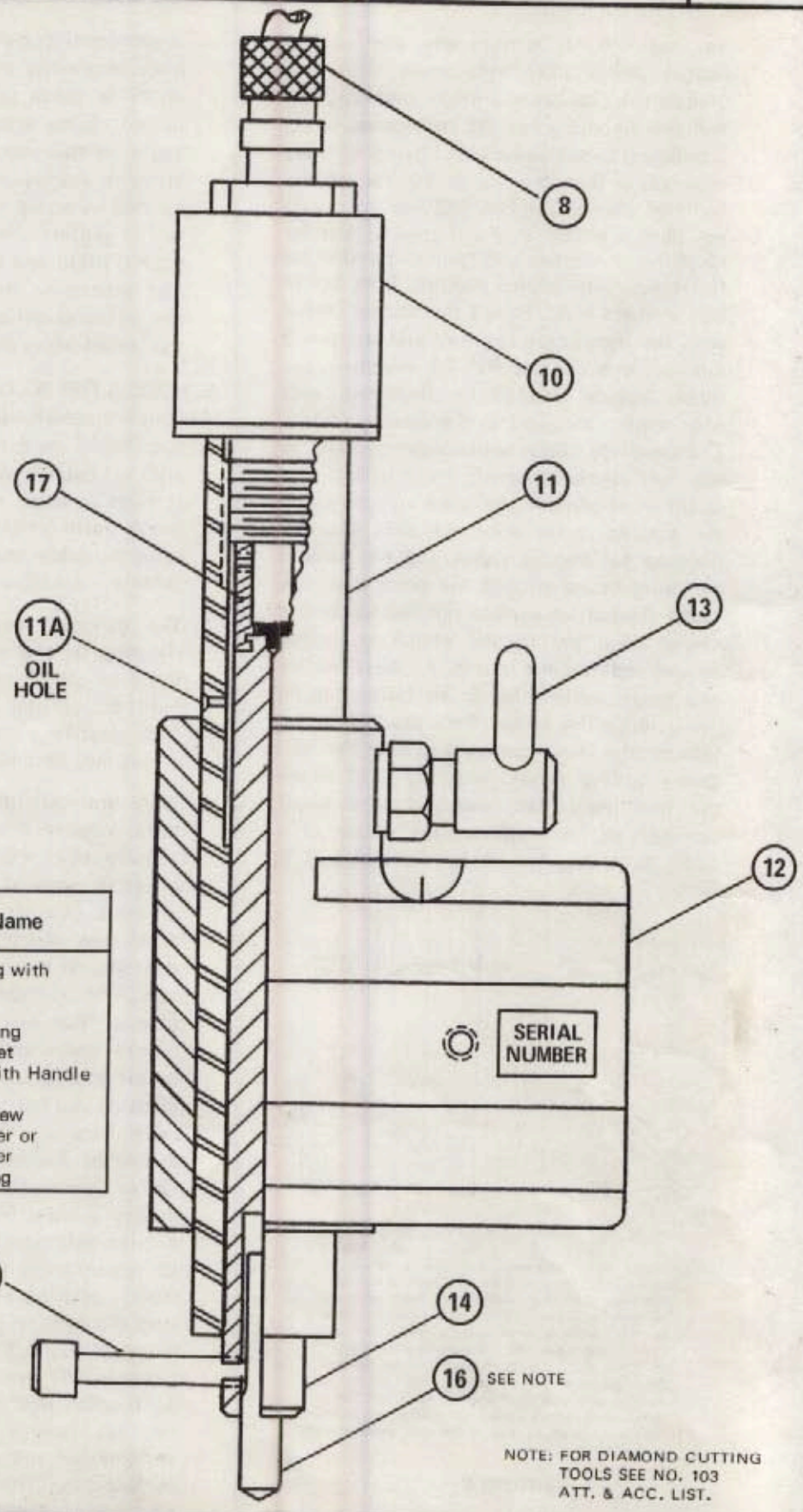
5. MODELS FOR REDUCING OR ENLARGING

A) Three dimensional Engraving or die cutting requires a model having the exact shape with all details required in the finished die. It must be made in proportion to the Pantograph ratio selected, for instance at 4:1 ratio the model must be 4 times larger in all details, including depth.

B) The material used for making the model depends on the details of design. A Hardwood or plastic model will be sufficiently hard for cutting a simple design with no fine details since a fairly large tracing stylus may be used.

C) More intricate designs, having small details, require a very small tracing stylus, consequently, the model must be made from a harder material which will withstand the pressure of a small stylus without obliterating the design details. This material depends on the equipment available to the user. An ordinary plaster model for instance, can be used for casting a hard bronze model and also a hard nickel model by the electro-forming process. Where these methods are not available the model can be made from any of the new epoxy materials available for this purpose (See Marblette Co. or Devcon Co.)

Simply build a frame around the plaster or similar soft model, mix the epoxy according to instructions and pour slowly over the model, starting at the lowest point and letting the mixture rise over the surface until even with the top of the frame. Tap the frame lightly from all sides to eliminate any air bubbles from the design. After the epoxy has set, remove the model from the frame and plaster and check for air holes or imperfections. These can be filled and smoothed out with the same epoxy. Dry to manufacturer's instructions. Most epoxies can be used after a 12 hour period or less.



Item No.	Part No.	Part Name
8	44-P-¼	Plastic Tubing with Fittings
10	V-100	Air Cylinder
11	917-1	Spindle Housing
12	916-1	Spindle Bracket
13	844-1	Lock Screw with Handle
14	917-2	Spindle Shaft
15	8-32x1¼	Allen Cap Screw
16	368-L-25	Diamond Cutter or
	368-H-25	Diamond Cutter
17	917-3	Brass Coupling

NOTE: FOR DIAMOND CUTTING TOOLS SEE NO. 103 ATT. & ACC. LIST.

Part No. — Description

No. 3* — Pressure Regulator with 60 lb. gage. Adjust valve No. 3A* to pressure required. Pressure varies with materials and depth of engraving desired. We suggest using the following table as a guide only:

Material To Be Engraved	Light Cut	Medium Cut	Heavy Cut
Gold, Silver, Copper, Brass, Aluminum, Nickel Silver	10-15	15-25	20-40
Steel, Monel, Stainless Steel	15-25	20-30	30-50
Hardened Steel, Tungsten Carbide, Titanium	20-30	30-40	40-60

No. 10 — Air Cylinder.

No. 11 — Spindle Housing. Maximum vertical movement 2". Adjust position so that diamond point is 1/8" to 1/4" above surface to be engraved and lock screw No. 13 in slot of housing.

No. 12 — Spindle Bracket. Mount on front pantograph arm of engraving machine.

No. 13 — Lock Screw for Spindle Housing.

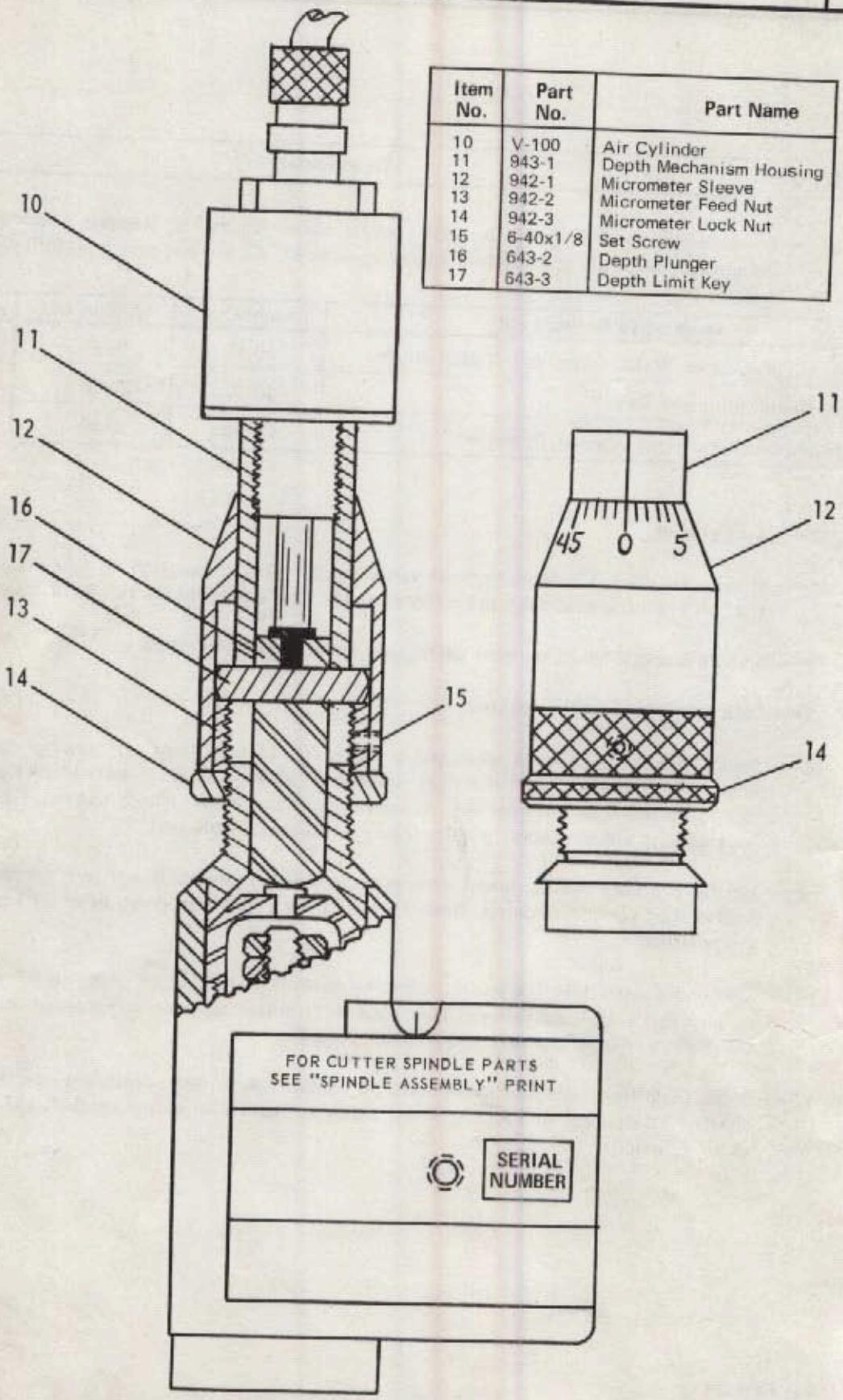
No. 14 — Spindle Shaft. Once each week put a few drops of very light oil (sewing machine oil) in hole 11A. If spindle shaft does not return upon release of micro switch* remove lock screw No. 15, unscrew air cylinder No. 10 and remove complete unit from housing. Clean shaft and housing with solvent, apply a little light oil and reassemble unit.

No. 15 — Handle and Lock Screw. Insert diamond cutter in spindle shaft and lock screw with wrench against flat surface of cutter. When setting up for engraving, press down on screw for locating position.

No. 16 — Diamond Cutter. Use #368-L-25 cutter for general engraving on gold, silver, brass, copper or any soft metal and alloys. Use #368-H-25 cutter for soft or hardened steel, stainless steel, monel metal, titanium and tungsten carbide.

No. 17 — Brass Coupling. Connects air cylinder to spindle shaft. When replacing coupling, pull down shaft of air cylinder and lock with set screw so that nylon button on shaft #14 touches shaft of air cylinder.

*See Page 36



Item No.	Part No.	Part Name
10	V-100	Air Cylinder
11	943-1	Depth Mechanism Housing
12	942-1	Micrometer Sleeve
13	942-2	Micrometer Feed Nut
14	942-3	Micrometer Lock Nut
15	6-40x1/8	Set Screw
16	643-2	Depth Plunger
17	643-3	Depth Limit Key

Item	Part No.	Description
No. 3*	1482-12	Pressure Regulator with No. 12107-1 (0-60) Gage. Adjust valve No. 3A* to pressure most suitable for material being cut. Since the cutter spindle and air cylinder both have internal return springs, a minimum setting of 20 lbs. pressure is required to lower the spindle. Any additional air pressure depends on the material being engraved. It requires more air pressure to maintain accurate depth of cut on hard metal than it does on soft plastic material. Consequently a setting of 25 lbs. may be sufficient for cutting soft plastics but, it may require 30 to 40 lbs. to maintain full depth of cut in steel.

No. 10 Air Cylinder.
No. 11 Depth Mechanism Housing.
No. 12 Micrometer Sleeve (Each line = .001", each full turn = .050" maximum travel 15/32" approximately.
No. 13 Micrometer Feed Nut.
No. 14 Micrometer Lock Nut.
No. 15 6-40 x 1/8" Set Screw.
No. 16 Depth Mechanism Plunger.
No. 17 Depth Limit Key.
For Cutter Spindle Parts, see "Spindle Assembly" Print, Page 22.

HOW TO OPERATE DEPTH MECHANISM UNIT

a) After complete unit has been assembled and tested for air leaks, set gage No. 3* to 25 lbs. pressure.

b) Turn micrometer sleeve No. 12 clockwise (down) for maximum vertical travel and depress micro-switch No. 6* several times to test the spindle travel.

c) Now turn micrometer sleeve No. 12 counter-clockwise (up) until the cutter spindle travels about 1/8 inch or less for shallow engraving.

d) With micro-switch* depressed, raise work table until the cutter point is about 1/16 inch above the work.

e) With the cutter spindle running and micro-switch depressed feed down on the micrometer sleeve until the cutter point just touches the surface to be engraved.

f) Release micro-switch*, add required depth of cut to the present reading on the micrometer scale and lock knurled nut No. 14.

g) On Panto Engravers equipped with floor stand and vertical feed screw unit turn micrometer sleeve as explained in paragraph (c) above but zero set on index line.

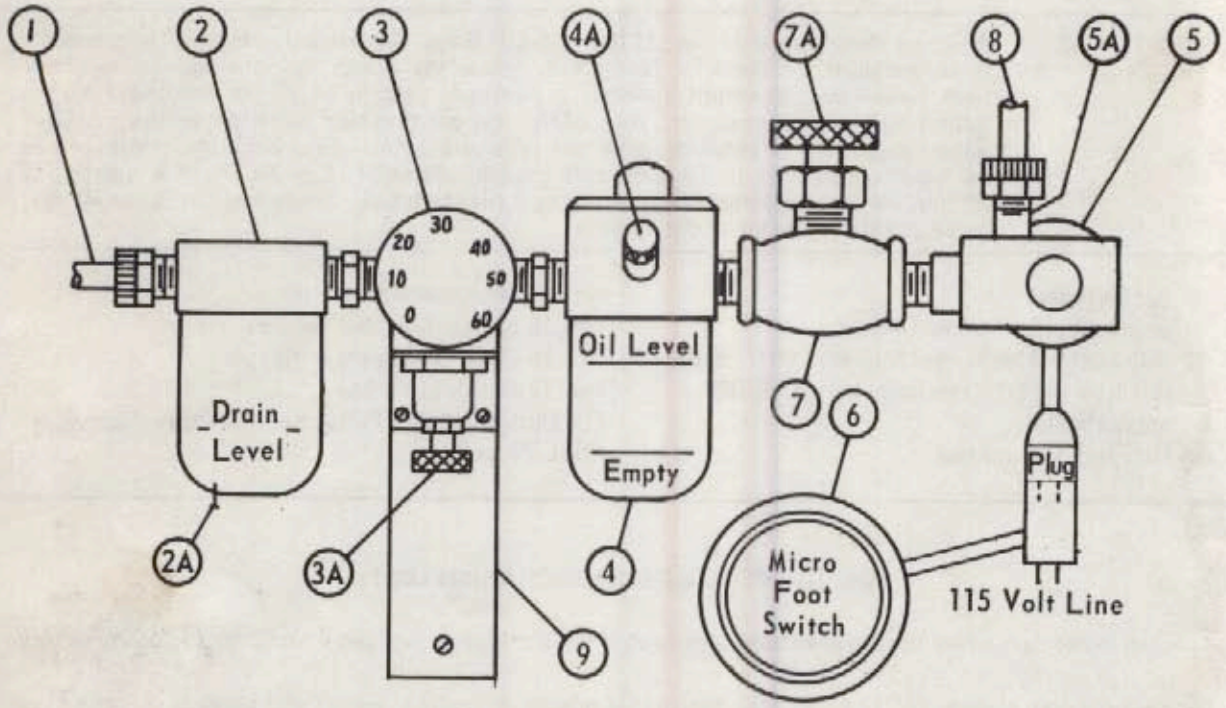
With micro-switch* depressed and cutter spindle running, raise work table until cutter just touches the surface to be engraved, then lock work table. Release micro-switch button* and turn micrometer sleeve to desired depth of cut, then lock knurled nut No. 14.

h) Set air gage to pressure required (See Item 3*) and adjust flow control valve as explained under Item 7*

The cutter will now engrave an even depth on all flat surfaces of identical thickness whenever the micro-switch button* is depressed.

Always release micro-switch* before lifting tracing stylus out of master template groove.

*See Page 36



ORDER BY FOLLOWING PART NUMBERS:

Item	Part No.	Description
No. 1	14052	Air Hose with Fittings. Connect to part No. 2 and to air compressor or air line. Check for leaks.
No. 2	3102	Air Filter. Incoming air pressure must not exceed 125 lbs. Open valve No. 2A occasionally to drain water, if any.
No. 3	1482-12	Pressure Regulator with No. 12107-1 (0-60) Gage. Refer to UM-PC page 33 and UE3-PC page 35 for further instructions.
No. 4	605	Lubricator. Unscrew cap No. 4A and fill to level shown with light machine oil. This lubricates the piston of the air cylinder, - BP 919-10 or 944-10.
No. 5	831424	Solenoid Valve with Cord and Plug. Raises and lowers cutter by pressure on micro switch. Plug cord into special receptacle of micro-switch, part No. 6.
No. 6	HB-2	Micro Switch with Cord and Receptacle Plug. Plug into 115 volt wall outlet. Use finger or foot pressure to actuate cutter descent.
No. 7	17-1-6	Flow Control Valve. Adjusts the speed of the cutter descent. Turn knob No. 7A clockwise to slow down, counter-clockwise to speed up cutter descent. This valve does not alter the pressure set on the air gage. It simply controls the speed at which the cutter point enters the work.
No. 8	44-P-1/4	Plastic Tubing with Fittings. Connect one end to part No. 5A, other end to air cylinder, B.P. 919-10 or 944-10.
No. 9	923	Mounting Bracket. Mount on Pantograph Carrier.

INTRODUCTION TO ENGRAVING

When engraving is required on any item, either square, rectangular, round, oval or odd shaped, it must be flat and parallel to the surface of the work table. Should the top surface buckle, warp or be irregular due to the characteristics of the material, it would require the assistance of a depth regulator. An assortment of feet that fit this attachment are available for following irregular surfaces of one shape or another. (See 103 Attachment and Accessory List.) Standard holding fixtures are available for holding the items flat on the work table. Special holding fixtures should be made for bulky items which can be locked upward into a fixed position in order to maintain the surface to be engraved, parallel to the work table.

Straight lines of lettering can be engraved using standard copy holder. Circular lines of lettering require the use of a circular copy dial holder or universal copy dial. Any designs and trademarks will require special masters and templates.

ENGRAVING METHODS:

Diamond drag (130-427) engraving, burnishes a highly polished groove in any metal. This motorless method pushes the metal down and to either side of the diamond tool, leaving a slight burr which in most cases is not objectionable. This polished groove will not hold an engraver's filler.

When a leverage of ten pounds is applied to the lever handle, forty pounds will be exerted at the point of contact, equal to a mechanical leverage of four times. For positive depth control, use the pneumatic attachment 919 and refer to the chart which prescribes the exact pressure that must be applied for any designated material. (See Page 33.)

SUGGESTION:

For surgical tools, machine tools and gages apply about ten pounds of hand pressure or forty pounds of pneumatic using 368-H diamond cutter.

Cigarette lighters, western buckles, silver flatware, trophy plates, and jewelry items, apply a maximum of five pounds hand pressure or twenty pounds pneumatic, using 368-L diamond cutter. See also pressure chart on Page 33.

Wedding rings are held on the 856 ring holder, engraved with sixty pounds pressure pneumatic, using 368-L diamond cutter.

Wine cups, (beer mugs, use index fixture) napkin rings and bangle bracelets should be engraved on a special engraver with P100-7 cylindrical roller attachment which can be made to order.

The *Spencerian* Cutter simulates hand engraving and can be engraved in precious and nonferrous metals. This free-hand method will initial or make ornamental flourishes on casket plates and any flat jewelry item.

General Name Plate Engraving motorized models with direct drive at 12,000 R.P.M. belt driven models with four spindle speeds from 8,000 up to 20,000 R.P.M. are available for either taper shank or straight shank cutters which provide fast and expedient engraving.

Phenolic plastic and fiberglas materials are very abrasive and require tungsten carbide taper shank cutters #346, 347 or 348. Black surface or wood grain surface with a glossy finish and white core make very attractive signs. Sharpen cutters from 40 degrees to 60 degrees included angle with 40 degrees side clearance and tip cutter with a flat, equal to 1/8 the height of the character and engrave to a depth of .006" or to the depth required to penetrate the top lamination.

Some of the new vinyl plastics have a very low melting point and the slightest heat created by the cutter point melts and fuses the chips onto the cutter point. Cutters should be sharpened with 45-50 degrees side clearance, cutting edge and tip must be highly polished and engraving should be done very carefully. Free-cutting brass containing 3% lead or free-cutting aluminum 24ST or equal can be easily engraved with high speed steel cutters #345. Sharpen cutters the same as for phenolic plastic and engrave to a depth equal to 1/10 of the letter size but not more than .025" deep and fill with engravers crayon filler or enamel.

Free hand engraving of signatures for making rubber stamps may be accomplished at 4:1 reduction in zinc, dow metal and plastic. First, furnish your customer with a ruled rec-

tangle and then request that they affix their John Hancock therein. Remove the adjustable slides and tape the signature onto the copy holder plate. Trace the signature carefully as you cannot retrace the same piece. Sharpen #315 high speed cutter 30 degrees included angle, 30 degrees side clearance with about .005" flat. Engrave about .100" deep.

Stencil master letters are required for engraving stencils, used in spray painting or sand blasting of glass, metals or plastic panels. Thin plastic or hard rubber shims are used as templates for sand blasting, while brass shims are used for spray painting cartons, signs and panels. Sharpen #310 or #315 high speed steel cutters 40 degree included angle, 40 degrees side clearance, with a flat equal to 1/10 the height of the character. Place sheet of protective metal or plastic between work table and part to be engraved and set the cutter point to cut about .002 to .003" through the stencil material.

Irregular shapes – Index wheels, dials, numbering wheels, cylinders, and spherical surfaces, require either a forming guide or a depth-of-cut regulator with a ball foot for engraving. The forming guide attachment requires a hardened steel form for each corresponding shape, in order to maintain an even depth of cut over the curved surface. The engraved area should not exceed 1/6 of the circumference or distortion in cutting will occur. Sharpen #310 high speed steel cutters 50 degrees included angle, 40 degrees side clearance with .005" flat. Engrave .005" to .006" deep. No. 387-13 midget chuck with 1315-HT tungsten carbide cutter will extend cutter life by ten times.

Drilling by pantograph is phenomenal as holes can be drilled almost next to one another depending upon the pantograph reduction. No other drilling method can boast of this possibility. The template required consists of a series of #1 center drilled holes, as per specifications, into which the pointed tracer would be positioned. Either manually or with pneumatic action, each hole would be methodically drilled quickly and accurately.

Profiling and *Routing* require a greater amount of skill than in general name plate engraving, for these items must be engraved to very close tolerances. The following procedures are basic and apply to all engraving.

1. The Master Template must be accurate and smooth. The vee groove is the simplest of masters to make and requires a conical pointed stylus to follow the design. The square bottom groove offers several advantages over the vee groove. Should the cutter wear a least bit but still be sharp, you can select a smaller diameter cylindrical stylus and follow the straight walls of either side of the templates, in order to maintain the desired width of cut.

2. The Pantograph Reduction or ratio of master template to the finished engraving is important. All Preis Panto Engravers reduce. Therefore, the original design must be made larger and square bottom masters should be made in exact proportions to the ratio width of the stylus and cutter selected. Should the finished part be 1" in diameter, we would suggest making the master three to five times larger and for 4" diameter, two times larger. You will quickly realize that an error of .010" at 5:1 is reduced to .002", while the same error at 2:1 is reduced only to .005". Therefore, we gather that the maximum accuracy is achieved at the highest reduction.

3. A selection of engraving cutters is available in high speed steel, super high speed steel, tungsten carbide and diamond tipped. The easiest to maintain, for all-purpose use, is the high speed steel cutter. For engraving nickel alloy steel, the tougher super high speed steel cutter is preferred. Tungsten carbide offers the maximum cutter life; however, when used in cutting steel, it is not suitable for points smaller than .010" in diameter. This is due to the nature of the material, as the steels are made from molten metal and tungsten carbide is made from compressed powder, making it very hard but brittle.

4. The sharpening of engraving cutters for each material varies. Refer to the cutter grinder operating manual instructions regarding recommended cutter angles and clearances. For particular tough jobs, double clearances will increase cutter life. Sometimes the circles at the bottom of a cut become pronounced and these can be controlled by reducing the

5 degree end cutting rake across the tip of the cutter. Ball nose cutters must have ample end cutting relief which is obtained by setting the scale B1 on the swivel bracket of the model CG-21 to approximately 20 degrees. The additional clearance required must then be set on the clearance ring of the swivel arm.

5. The movement of the Pantograph is important and depends upon the reduction ratios and materials being engraved. On the higher ratios and softer materials the master template can be traced at a faster rate of speed then on the lower ratios and tough or hard metals.

Always trace the template or letter with a smooth uninterrupted movement throughout the design to avoid excessive chatter and distortion. It is good practice to develop a habit of always tracing templates in the same direction of motion. When cutting raised letters, profiling or piercing metal always follow the pattern in a clockwise direction on the inside and counter-clockwise on the outside of a circle, oval, rectangle or any similar design.

PROCEDURES RECOMMENDED FOR ENGRAVING VARIOUS ARTICLES, ITEMS & OBJECTS

(INTENDED AS GUIDE LINE ONLY)

Item to be Engraved	Material	Size of Letter or Design	Panto Ratio	CUTTER H.S.S. – High Speed Steel T.C. – Tungsten Carbide O.R. – Quarter Round H.R. – Half Round	HOW TO SHARPEN CUTTERS		
					Included Angle	Tip Diameter	Side Clearance
Nameplates, Signs, Panels	Soft Plastic Brass & Aluminum	Up to 1/8"	3-6:1	H.S.S. O.R.	40° – 60° for all Material	To Suit. See also Panto Ratio Cutter Selector	40°
		Over 1/8"	2-4:1	H.S.S. H.R.			40°
	Phenolic Plastic or Fiberglas	Up to 1/8"	3-6:1	T.C.			40°
		Over 1/8"	2-4:1	T.C.			40°
	Steel	Up to 1/8"	3-6:1	H.S.S. or T.C.			30° – 35°
		Over 1/8"	3-4:1	H.S.S. or T.C.			30° – 35°
Dies – Sunk Letters Stamps – Raised Letters	Brass	Up to 1/8"	3-5:1	H.S.S. H.R.	20° – 60°	.002"	30° – 40°
Dies – Sunk Letters Stamps – Raised Letters	Steel	Any Size	4-6:1	H.S.S. or Cobalt	20° – 60°	.002"	30° – 35°
			4-5:1	H.S.S. or Cobalt	30° – 90°	Up	30° – 35°
Skeleton Letters or Cut Out Letters	Brass, Soft Plastic, Phenolic Plastic	Over 1/2" High	2-4:1	H.S.S. H.R.	All Cylindrical	.040" Up	25° – 30°
			2-4:1	H.S.S. H.R.			30° – 35°
			2-4:1	T.C. H.R.			30° – 35°
Drafting Templates & French Curves	Vinyl or Acrylic Plastic	All Sizes	2-4:1	H.S.S. H.R.	Cylindrical	.040" – .060"	30° – 35°
Stencil Letters (Cut through Material)	Hard Rubber or Plastic	Small Letters	3-6:1	H.S.S. H.R.	20° – 30° Cylindrical	.005" Up .040" Up	35° – 40°
		Large Letters	2-4:1	H.S.S. H.R.			25° – 30°
	Brass or Aluminum	Small Letters	3-6:1	H.S.S. H.R.	20° – 30° Cylindrical	.005" Up .040" Up	35° – 40°
		Large Letters	2-4:1	H.S.S. H.R.			25° – 30°

PANTOGRAPH RATIO CHART

HEIGHT OF LETTER	HEIGHT OF MASTER COPY TYPE								
	1/4	5/16	3/8	1/2	3/4	1"	1½"	2"	3"
	PANTOGRAPH RATIOS								
3/64	5.3	6.6	-	-	-	-	-	-	-
1/16	4	5	6	-	-	-	-	-	-
5/64	3.2	4	4.8	6.4	-	-	-	-	-
3/32	2.7	3.3	4	5.3	-	-	-	-	-
7/64	2.3	2.9	3.4	4.6	6.9	-	-	-	-
1/8	2	2.5	3	4	6	-	-	-	-
9/64	1.8	2.2	2.7	3.5	5.3	7	-	-	-
5/32	1.6	2	2.4	3.2	4.8	6.4	-	-	-
11/64	-	1.8	2.2	2.9	4.4	5.8	-	-	-
3/16	-	1.7	2	2.7	4	5.3	-	-	-
7/32	-	-	1.7	2.3	3.4	4.6	6.9	-	-
*1/4	-	-	-	2	3 *	4	6	-	-
9/32	-	-	-	1.8	2.7	3.5	5.3	7	-
5/16	-	-	-	1.6	2.4	3.2	4.8	6.4	-
11/32	-	-	-	-	2.2	2.9	4.4	5.8	-
3/8	-	-	-	-	2	2.7	4	5.3	-
7/16	-	-	-	-	1.7	2.3	3.4	4.6	6.9
1/2	-	-	-	-	-	2	3	4	6
9/16	-	-	-	-	-	1.8	2.7	3.5	5.3
5/8	-	-	-	-	-	1.6	2.4	3.2	4.8
11/16	-	-	-	-	-	-	2.2	2.9	4.4
3/4	-	-	-	-	-	-	2	2.7	4
7/8	-	-	-	-	-	-	1.7	2.3	3.4
1*	-	-	-	-	-	-	-	2	3
1-1/8	-	-	-	-	-	-	-	1.8	2.7
1-1/4	-	-	-	-	-	-	-	1.6	2.4
1-1/2	-	-	-	-	-	-	-	-	2
1-3/4	-	-	-	-	-	-	-	-	1.7

This Pantograph Ratio Chart has been prepared to assist the users of our Panto Engravers to select the proper height of master copy type, and to find the proper pantograph ratios required for engraving various heights of characters.

To use the chart correctly, locate the size of your master copy type in the top row, and the size of character to be engraved in the left column. Follow down from the top row and across from the left until the two columns meet, where the correct ratio is given. For example (see asterisks), master copy type is 3/4", character to be engraved is ¼", pantograph ratio is 3:1. Set all pantograph bars on line "3". All sizes of master copy type and characters to be engraved are measured from center to top stroke to center of bottom stroke. When overall dimensions are given for the size of characters to be engraved, deduct the width of the stroke to determine the correct ratio. For example, a letter with an overall height of 1/8" is to be engraved with a 1/64" wide stroke. Deduct 1/64" from 1/8" leaving a 7/64" character to be engraved. For exact reduction ratios and width of cutter tip, for all letters ranging from 1/16" up to 3½" overall height, consult your Pantograph Ratio - Cutter Selector furnished with all Panto-Engravers.

The pantograph ratios are shown in tenths only, intended for general-purpose engraving. Where the height of characters must be held to very close tolerances, the ratios may have to be carried to two decimals. Where ratios are shown in tenths, not engraved on pantograph bars, consult the table on B. P. No. 319 page 5. For finding the pantograph ratio for sizes not shown in the above chart, use the following formula:

$$\frac{\text{Height of master copy type}}{\text{Height of character to be engraved}} = \text{Pantograph ratio}$$

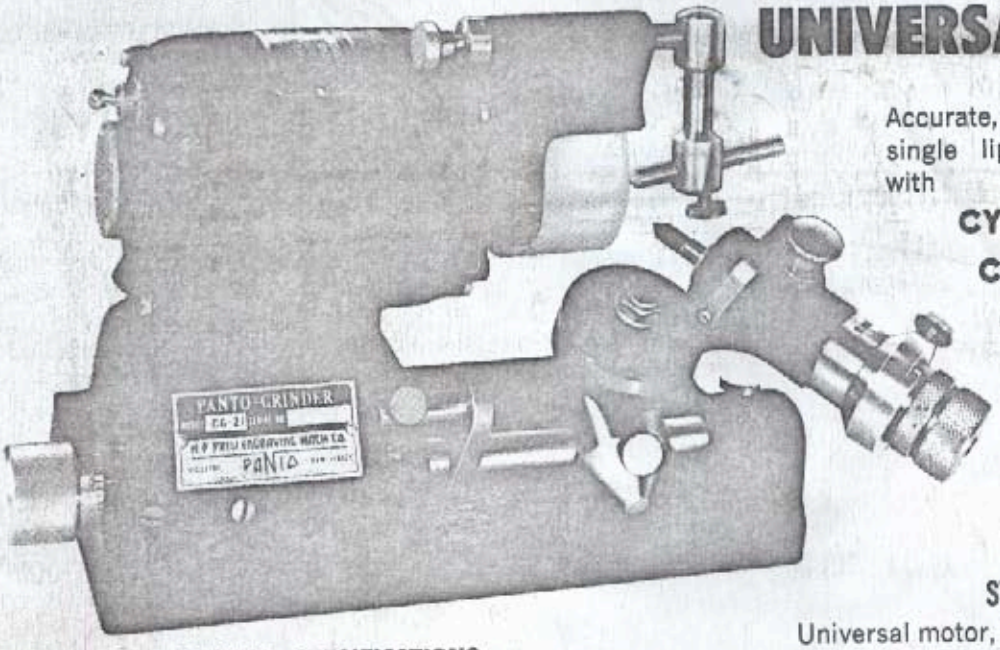
Average length of 10 engraved letters in plain gothic styles No. 1S through 8S.

To use chart at right count the number of letters in the name or line to be engraved. Each space between words and space between initial and last name count as one letter, including the period. For best results count letters "M" and "W" as 1½ letters and letter "I" as ½ letter. Multiply the total number of letters and spaces in a line by the dimensions given in the above table for the letter style and letter height and move decimal point one digit to left.

For example: To engrave a name having 18 letters, *¼" high with Style No. *4S master type multiply *2.546" x 18 = 45.810": move decimal point to left which leaves 4.581" or 4-37/64" for the total engraved length.

STYLE OF TYPE	HEIGHT OF ENGRAVED LETTERS										
	1/16"	3/32"	1/8"	3/16"	*1/4"	3/8"	1/2"	3/4"	1"	1-1/2"	2"
	LENGTH OF ENGRAVING WITH 10 AVERAGE LETTERS IN INCHES										
1S	.344	.516	.688	1.031	1.375	2.063	2.750	4.125	5.500	8.250	11.000
2S	.526	.789	1.052	1.578	2.104	3.156	4.209	6.313	8.417	12.625	16.833
3S	.581	.871	1.166	1.742	2.323	3.484	4.646	6.969	9.292	13.938	18.584
*4S	.636	.955	1.273	1.909	*2.545	3.818	5.091	7.637	10.182	15.274	20.364
5S	.758	1.137	1.516	2.273	3.031	4.549	6.063	9.094	12.125	18.188	24.249
6S	.868	1.302	1.736	2.603	3.471	5.206	6.942	10.413	13.884	20.825	27.767
7S	1.025	1.538	2.051	3.076	4.102	6.152	8.203	12.305	16.406	24.609	32.812
8S	1.174	1.711	2.348	3.522	4.695	7.043	9.391	14.086	18.781	28.177	37.562

PREIS-PANTO CUTTER GRINDER WITH PLAIN OR UNIVERSAL CUTTER HEAD



Accurate, inexpensive, for sharpening all single lip engraving and routing cutters with

CYLINDRICAL-FLAT, CONICAL-POINTED, CONICAL-FLAT, or BALL-NOSE CUTTING TIPS.

GENERAL SPECIFICATIONS

Universal ball bearing motor, totally enclosed.

Grinding cup wheel 2¼" diameter mounted directly on motor.

Cutter head graduated from 0 - 90° for grinding any side angle, equipped with index unit for grinding also 2, 3 or 4 sided cutters.

Collet capacity up to ¼" straight shank and standard taper bore.

Feed screw knob graduated in 1/1000 inch for accurate cross feed.

Total length - 9½", width - 4½", height - 6".

Net weight 13 pounds. Shipping weight 16 pounds.

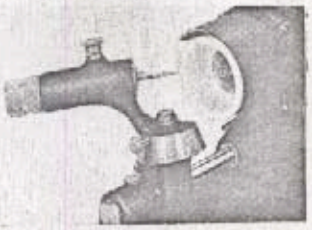
STANDARD EQUIPMENT

Universal motor, 115 volt with toggle switch, cord and plug ■ Plain wheel guard ■ Vitrified grinding wheel, medium (80 grit) ■ Cutter head with collet spindle, index unit and collet draw bar (Plain cutter head with model CG-2. Universal cutter head with model CG-21.) ■ Adjustable in-feed stop on swivel shaft ■ Wheel wrench ■ Cutter wrench ■ Wheel truing diamond ■ Operating instructions.

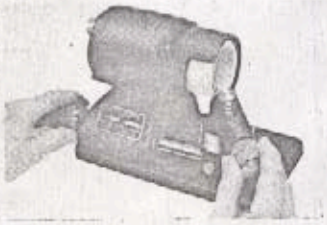
EXTRA EQUIPMENT

Collets, see page 11 ■ Grinding wheels, see page 7 ■ No. 1061 wheel guard with built-in wheel truing diamond, see photo above.

MODEL CG-2



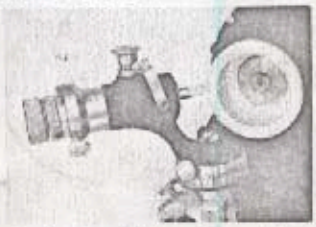
Model CG-2 with plain cutter head for sharpening taper shank or straight shank cutters.



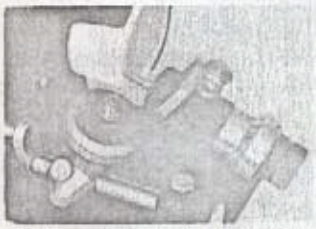
Left hand controls depth of grinding while right hand rotates the cutter.

Model CG-2 Cutter Grinder for sharpening single lip engraving cutters used for general engraving on name plates, signs, panels and other surface engraving. This model has a plain cutter head with swivel bracket graduated from 0 to 90° for sharpening cutters to any desired side angle. Adjustable stop on swivel shaft controls length of cutting tip and side cutting clearance is determined by the operator's discretion.

MODEL CG-21



Conical pointed cutter being sharpened with correct side angle and pre-set side clearance on Model CG-21.



Ball-nose cutter being sharpened in one single set-up with correct side and end-cutting relief on Model CG-21.

Model CG-21 Cutter Grinder has a Universal Cutter Head for sharpening all cutters, including ball-nose cutters with pre-set side and end-cutting relief in one single application.

The cutter head has a cutter aligning bar for positioning cutter in collet. The swivel bracket is graduated from 0 to 90° for sharpening cutters to any desired side angle.

The swivel arm is graduated from 0 to 45° for positive side cutting clearance and the swivel knuckle has graduations from 0 to 35° for grinding end-cutting relief or rake on flat tipped or ball-nose cutters. Adjustable stop is provided on swivel arm for controlling length of cutting tip.

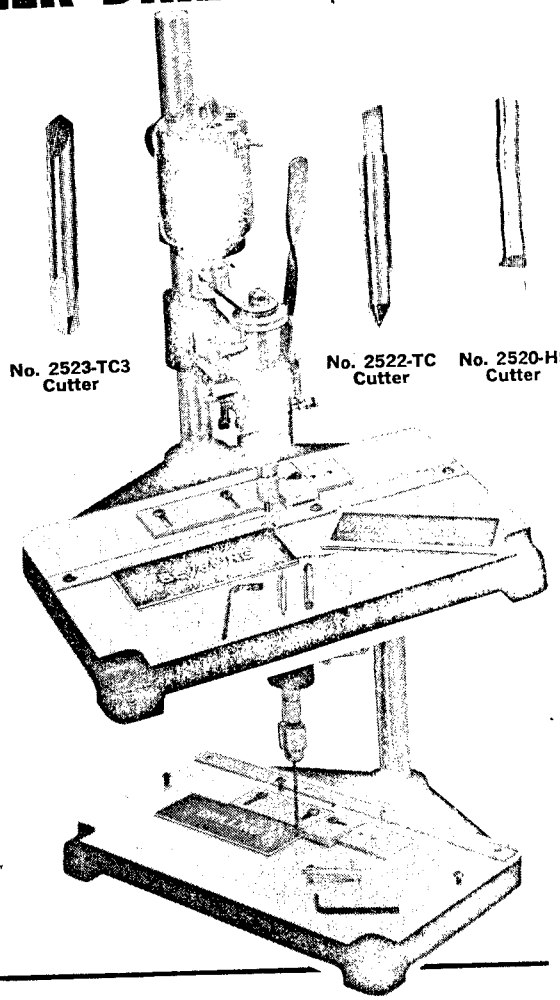
PREIS-PANTO TWO-IN-ONE BEVELER-DRILL PRESS

MODEL FD-925 for plastic or metal name plates, panels, strips and tags requiring bevels, borders or drilled holes.

Does the work of two machines. Cuts bevels or flat borders by sliding a plate along the straight edge. Converts in minutes to a drill press by replacing the straight edge and cutter with a drill jig and drill chuck. The heavy duty ball bearing spindle takes ¼" diameter cutters.

Depth of cut is set accurately with the adjustable stop and a hand lever with automatic spring return is provided for drilling while the spindle is locked in its housing for beveling.

The vertical column permits the cutter spindle to be raised for a maximum of 6" clearance under the cutter. Three drill chucks for drills up to 5/32" diameter are available.



No. 2523-TC3 Cutter

No. 2522-TC Cutter

No. 2520-HS Cutter

SPECIFICATIONS

Work table surface, 8 x 12 inches.
Distance from column to center of cutter, 5 inches.
Maximum height from table surface to cutter point, 6 inches.
Cutter spindle with precision, prelubricated ball bearings with two speeds of 10,000 and 15,000 rpm.
Universal ball bearing motor, 115 volt with switch, cord and plug.
Vertical spindle travel up to ½ inch with adjustable stop.
Overall dimensions 11" x 12" x 14" high.
Net weight 14 pounds. Shipping weight 18 pounds.

STANDARD EQUIPMENT

Basic machine with cutter spindle assembly, motor unit assembly and vertical column.
Two endless round belts.
12" long adjustable straight edge.
Adjustable drill jig unit.
One #2522-TC double end tungsten carbide cutter for plastic plates.
One #2520-HS cutter for metal plates.
One set of 4 wrenches.
One set of operating instructions.

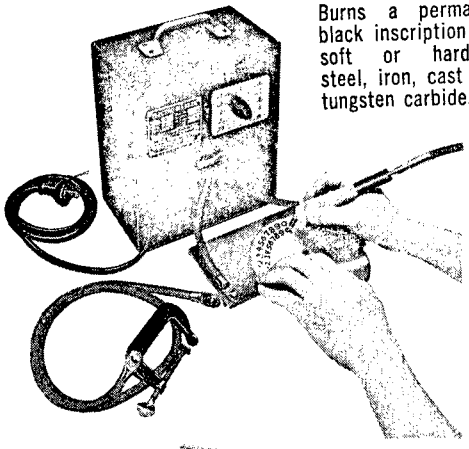
EXTRA EQUIPMENT

No. 2523-TC3 Double end, 3 flute tungsten carbide cutter for beveling plastic plates.
No. 0 Jacobs drill chuck, 5/32" capacity with key.
No. J0-15-25 Albrecht precision keyless chuck, .008" to .063" capacity.
No. J0-30-25 Albrecht precision keyless chuck, .013" to .125" capacity.

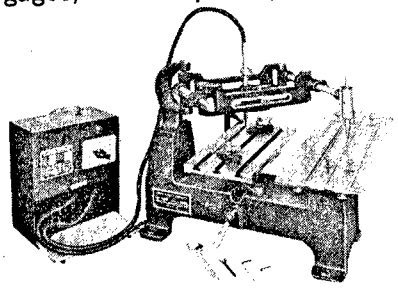
(For drill chucks see page 11)

FREE-HAND, PORTABLE ELECTRO-MARKER

The Preis Electro-Marker closes into a convenient carrying unit that can be taken right to the work in any part of the plant.
Free-Hand Marking is done as easily as writing with a pencil. Ten different stages of marking intensity provide a fine or bold line by simply turning the dial switch.
The marking point is made of a special heat resisting alloy to give extra long service between re-grinds.
The design of the marking pencil permits the point to stand perpendicular when used like a pencil. A cooling fin dissipates the heat and heavy cork insulation assures comfort to the operator even in prolonged usage at maximum marking intensity.
Very useful for marking sizes, part- serial- or code numbers on tools, gages, machine parts, jigs and fixtures.



Burns a permanent black inscription into soft or hardened steel, iron, cast iron, tungsten carbide.



The Electro-Marker used for pantographic marking with No. 130-135A Electrical Marking unit attached to a Preis-Panto Engraver.
Also see U-Series Catalog.

No. 135-6 Special Alloy marking point.

No. 135-7 Cooling fin for Marking Pencil.

No. 209 Hand Marking Pencil with cooling fin and marking point.

MADE IN TWO MODELS

Model EM-60, 500 watt, standard duty for marking finish machined or ground parts and tools.
Model EM-120, 1000 watt, heavy duty for marking also through scale or dirt on heat treated or rough parts and tools.

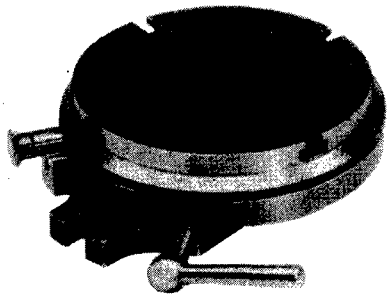
SPECIFICATIONS

Model	Electrical Specifications	Watts	Size	Net Wgt.	Ship. Wgt.
EM-60	115 or 230 v. AC - 50 to 60 cyc.	500	8-1/2" x 10" x 6"	20	25
EM-120	115 or 230 v. AC - 50 to 60 cyc.	1000	8-1/2" x 10" x 6"	25	30

 PREIS ENGRAVING MACHINE COMPANY • HILLSIDE, NEW JERSEY

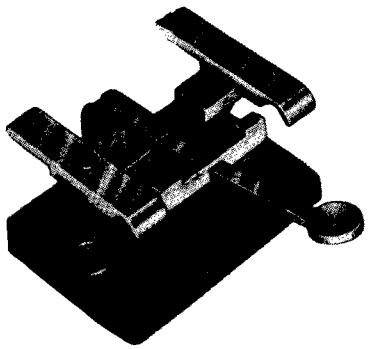
PREIS-PANTO WORK HOLDING DEVICES

FOR ALL PANTO-ENGRAVERS



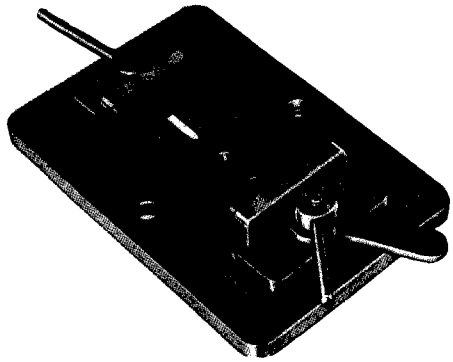
ROTARY WORK TABLE

Part No. RW-5 . . . 5" Diameter Top Plate with four 1/4" T-Slots and 5/8" Center Hole. Has 360 Notches in Rim with Index Unit and Cam Lock. Overall Height 1-3/4".



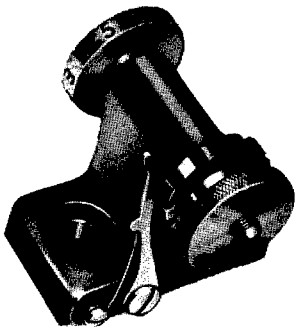
PEN HOLDING FIXTURE

Part No. 178 . . . For clamping Pens, Pencils and other cylindrical parts up to 3/4" diameter in Vee-Grooves of Jaws. Reverse Jaws for clamping flat or rectangular parts. Opening between Jaws adjustable from 1" to 2-1/4". Overall Height 2-1/4", Width 2-3/4", Length 4".



UNIVERSAL WORK HOLDER

Part No. 172 . . . Adjustable Swivel Jaws have interchangeable Hard Rubber Inserts and Cam Lock. Jaws are 3/4" high, 2" long and Maximum Opening is 3-1/4".
Overall Height 1-1/16", Width 4", Length 6".



TYPE WHEEL HOLDER

Part No. 216 . . . For rapid indexing when engraving Type Wheels, Collars and Rings up to 3" diameter. Has 1/4" diameter arbor for holding work. Index Disks are available with up to 50 Notches.
Height 1½" to Center of Arbor, Width 2¾", Length 3½".

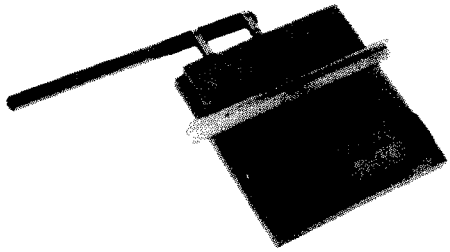
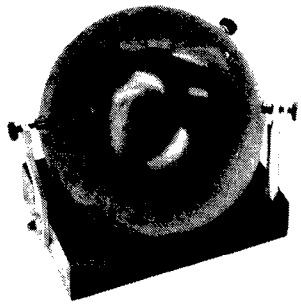


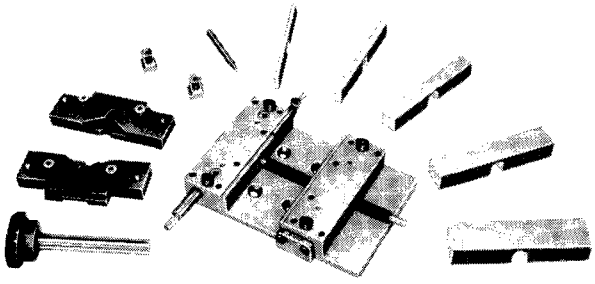
PLATE CLAMPING VISE

Part No. 840-6 . . . 6" x 6" long Base plate for clamping plates from 1/4" up to 3" wide by 6" long.
Part No. 840-12 . . . 6" x 12" long Base plate for clamping plates from 1/4" up to 3" wide by 12" long.
Part No. 840-125 . . . 8" x 12" long Base plate for clamping plates from 1/4" up to 5" wide by 12" long. (For Model 2D-4 Panto Engraver or larger machines.)
Ideal for production engraving of plastic name plates. Simply pull handle, insert plate to be engraved and release handle. Consists of ½" x 1½" x 5½" long spring clamping unit mounted on ⅜" Base plate with adjustable straight edge and end stop.



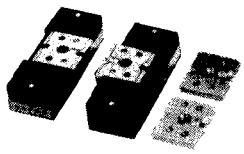
BOWLING BALL HOLDER

Part No. 910 . . . Bowling Ball fits into Nest of plastic Base Plate, against two Back Stops. Front Clamp swivels out of the way for insertion and removal of Ball. Requires minimum of 9" Height from Work Table to Cutter Point.



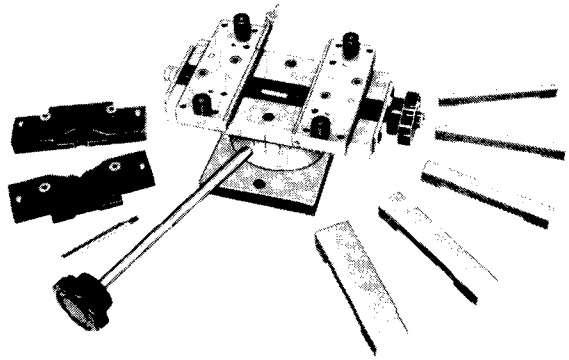
MULTI-GRIP PLAIN VISE

Part No. 700 . . . Can be locked directly from Feed Screw or from geared Drive Shaft. Jaws are 3/4" high. Overall Height of Vise 1-1/16", Width 4", Length 6".



SPECIAL PLASTIC JIG PLATES WITH DROP-ON INSERTS

Part No. 950 . . . Extra Equipment for No. 700 or No. 710 Multi-Grip Vise. Inserts made in Plastic or Brass for holding Cuff Links, Tie Clasps, small Medallions, Charms and similar shaped Items. Inserts for other Shapes made to Order.



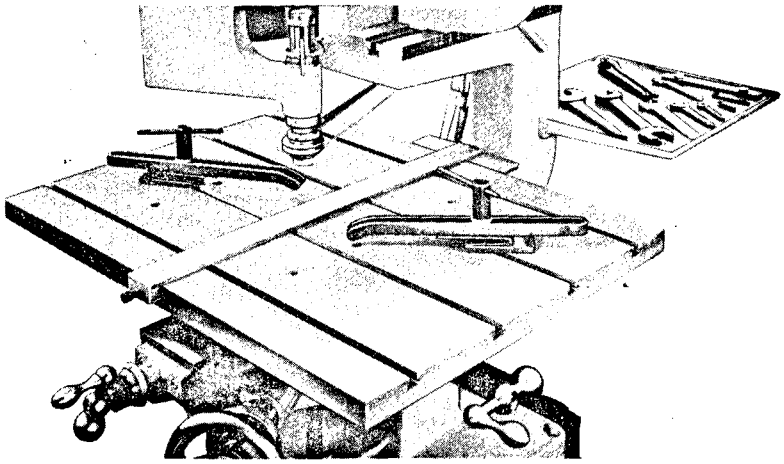
MULTI-GRIP SWIVEL VISE

Part No. 710 . . . Has self-centering screw, Swivel Base graduated every 15° with quick action Cam Lock. Jaws are 1/2" high. Overall Height of Vise 2-1/8", Width 4", Length 7".

Both MULTI-GRIP vises have dovetail Grooves in Jaws for clamping flat Plates, adjustable stops for centering work, and Parallel Blocks to hold thin Plates flat in Jaws. Maximum Opening between Jaws 3". Plastic Jig Plates are mounted on Jaws; they have different shaped cutout on each side for clamping various shaped articles. Jaws are drilled with a series of 3/16' Holes to insert Plastic Jig Bushings for clamping Plates up to 5-1/2" wide or round Disks up to 6-1/2".

PREIS-PANTO WORK HOLDING DEVICES

FOR MODEL 2D-4 PANTO-ENGRAVER



AUXILIARY WORK TABLE

Part No. 594-A . . . 18" x 24" x 1" high with four 3/8" tee-slots, complete with 4 Bolts and Tee-Nuts, two 10" long Spring Clamps, one Tee-Square and Crank Handle Extension.
Net weight 60 Lbs., Shipping weight 85 Lbs.

Made of seasoned Meehanite casting, machined accurately flat, it mounts on the standard work table of the model 2D-4 Panto-Engraver as shown or at right angles. Large signs are easily lined up straight against the Tee-Square and held flat with the large spring clamps close to the cutter.

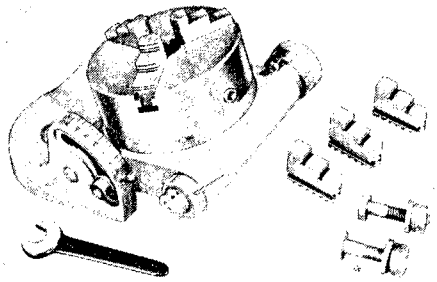
Part No. 697 . . . 10" long Spring Clamp with 3/8" x 2-1/4" long bolt.

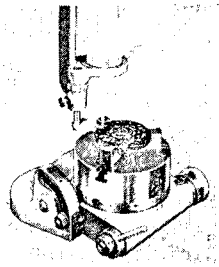
Part No. 610 . . . 18" long Tee-Square.

Part No. 695 . . . Crank Handle Extension, 5" long.

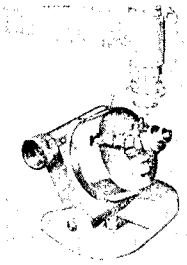
DIVIDING HEAD

Part No. DH-4 . . . An important accessory for engraving, light milling, profiling and layouts on dials, cams, templates, round dies, cylindrical parts or any work requiring circular or semi-circular divisions and angular set-ups.
The back plate of the keyless 3-jaw chuck is graduated in 360 degrees. The chuck is rotated by a worm gear which can be disengaged with a hand lever for free-hand turning. The base is graduated from 0 to 90 degrees and can be locked at any angle from a vertical to a horizontal position.





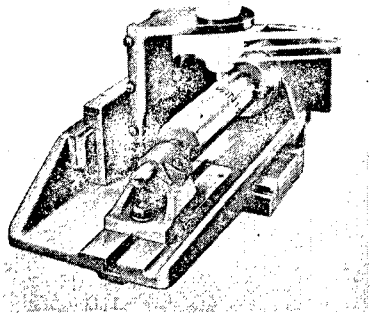
In vertical position for engraving flat dials.



In angular position for engraving bevel dials.

SPECIFICATIONS
Height of chuck in vertical position (at 0 degree) 3-1/4".
Center line of chuck in horizontal position (at 90 degrees) 2-1/4".
Overall dimensions 7-1/2" x 7-1/2" x 4" high.
Net weight 15 Lbs., Shipping weight 20 Lbs.

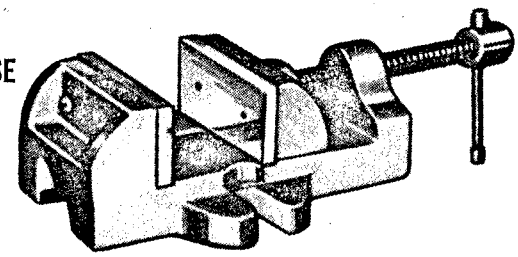
CYLINDER-ROLLER ATTACHMENT



Part No. P-100-7 . . . Permits engraving around the circumference of cylinders or straight dials up to 4" diameter.
It attaches to the extension of the cutter spindle bracket and automatically turns the cylinder or dial while tracing from a flat master template. Cylinders up to 1-5/8" diameter can be engraved completely around their circumference in one set-up, larger diameters must be sub-divided. The keyless 3-jaw chuck is driven by a spur gear having the same diameter as the work for accurate reproduction from the master template. A larger or smaller spur gear will result in condensed or extended engraving and the engraving can be reversed by inverting the gear rack.
All moving and turning parts are equipped with adjustable precision ball bearings assuring minimum resistance without any play or backlash.

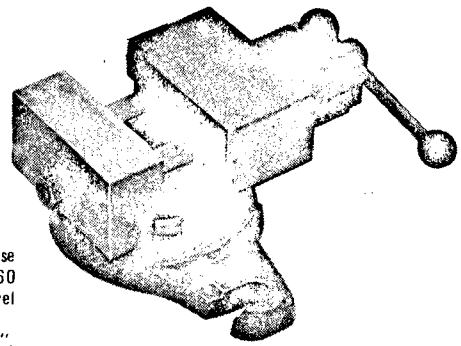
SPECIFICATIONS
Min. & Max. diameter of work ..... 3/4" to 4"
Maximum length of work ..... 7"
Net weight 55 Lbs., Shipping weight 75 Lbs.

PLAIN VISE



Part No. 320-P . . . For use on engraving or milling machines. Handy general purpose vises which every shop needs. Highly recommended for use on engraving machines. They have strong fine thread adjusting screws and ground steel jaws grooved for holding name plates. Bolt lugs are provided for riged mounting on machine table.
Jaws are 3" wide, 1-1/2".deep and open to 3".
Overall Height 2-1/4", Width 5", Length 8".
Net weight 8 lbs., Shipping weight 11 lbs.

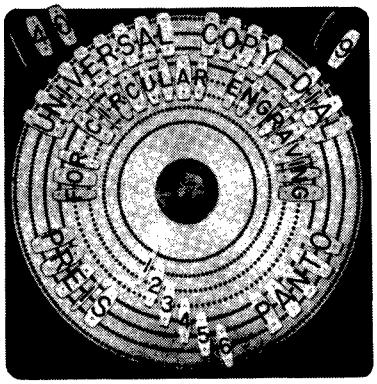
SWIVEL VISE



Part No. 3749-S . . . Similar to Plain Vise but with swivel base graduated for 360 degree turn. May be removed from swivel base for use as plain vise.
Jaws are 4" wide, 1" deep and open to 4".
Overall Height 3-3/4", Width 4", Length 9".
Net weight 17 lbs., Shipping weight 20 lbs.

PREIS-PANTO COPY DEVICES FOR ALL PANTO-ENGRAVERS

UNIVERSAL COPY DIAL For circular engraving



Part No. 140-9 . . . . . Consists of a base plate and a rotating dial, 9″ diameter, with 6 sets of drilled circles. Letters are engraved on circular copy blanks with 2 pin studs which can be inserted into the holes of any circle diameter.
Engrave small circles with large letters or large circles with small letters by selecting the pantograph setting and circle diameter.

SPECIFICATIONS

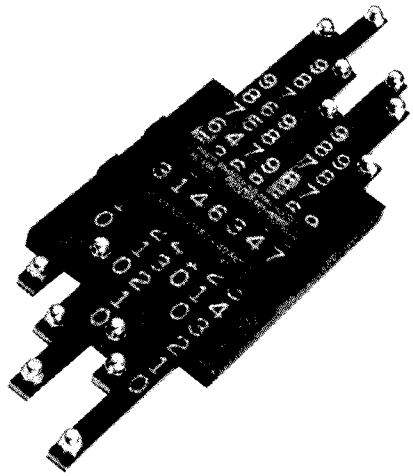
Pitch diameters of circles, measured from center to center of copy blanks, with numerals in position as illustrated:

Numeral 1 – 4-3/32″ diameter
Numeral 2 – 4-7/8″ diameter
Numeral 3 – 5-11/16″ diameter
Numeral 4 – 6-15/32″ diameter
Numeral 5 – 7-1/4″ diameter
Numeral 6 – 8-1/32″ diameter

Circular copy type is furnished in sunk vee-groove, reading right or reverse, in plain gothic style as follows.
Styles No. 1S to 4S in 3/8″, 1/2″, or 5/8″ high letters.
Styles No. 5S or 6S with 3/8″ or 1/2″ high letters only.

For specimen of plain gothic letters see page 16.
Other styles upon request.

SERIAL NUMBERING COPY HOLDER



This copy device consists of a base plate with 7 steel slides, each engraved with 10 numerals from 0 through 9. An index notch is provided for each numeral for quick selection of any combination required when engraving consecutive serial numbers, part numbers or any item where numbers change frequently.

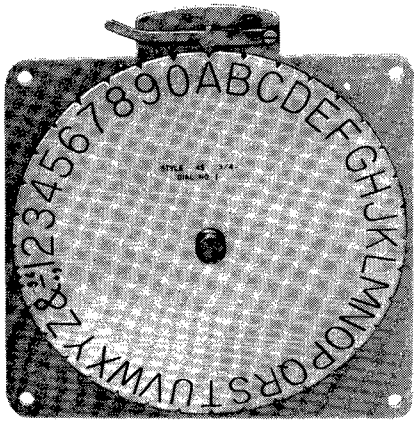
AVAILABLE IN 2 SIZES

Part No. 139-50 . . . 7 slides, 7/16″ wide, in style No. 2S, condensed gothic, 1/2″ high or style No. 4S, normal gothic, 3/8″ high.

Part No. 139-75 . . . 7 slides, 5/8″ wide, in style No. 2S, condensed gothic, 3/4″ high or style No. 4S, normal gothic, 5/8″ high.

For specimen of plain gothic letters see page 16.

COPY DIAL HOLDER shown with 10″ diameter copy dial.

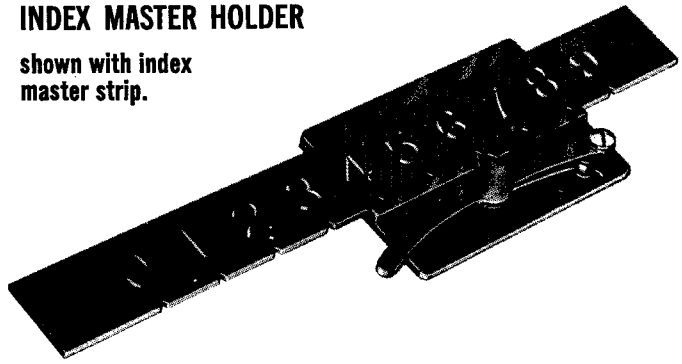


Part No. 317 . . . For rapid selection of master letters when engraving circular lines on dials, around wheels or cylinders. Work is usually held on type wheel holder, rotary work table or dividing head. Copy dials are interchangeable and can be furnished with various styles of lettering.

For standard copy dials see page 16.

INDEX MASTER HOLDER

shown with index master strip.



Part No. 313-1 . . . 4″ long with 1-1/4″ dove-tail groove.

Part No. 314-2 . . . 6″ long with 2-1/4″ dove-tail groove.
Will hold master strips with index notches for quick selection of numerals when engraving numbering wheels, dials or rings held on type wheel holder, rotary work table or dividing head. Master strips are usually furnished with plain gothic numerals from 0-9 but can be made to order with any copy required.

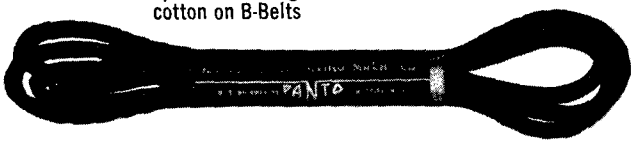
For specimen of plain gothic letters see page 16

PREIS-PANTO GRINDING WHEELS, BELTS *and miscellaneous items*

ENDLESS ROUND BELTS

GRADE-A Endless Nylon belts for extra long life.

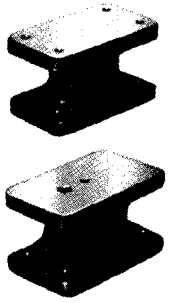
GRADE-B Special "O" rings on "EP" belts, Braided cotton on B-Belts



Part No. A	Part No. Grade B	Size	FOR PANTO-ENGRAVER MODEL
519-A	519-EP	19-1/4" x 5/32"	UE-3 & 3D5 Motor Belt
426-A	426-EP	26" x 1/8"	UE-3 & 3D5 Spindle Belt
440-A	440-B	40" x 1/8"	3D-5 Enlarging Belt
632-A	632-B	32" x 5/32"	2D-4 Motor, 3450 RPM
634-A	634-B	34" x 5/32"	2D-4 Motor, 2850 RPM
776-A	776-B	76" x 1/8"	2D-4 Spindle Belt
498-A	498-B	98" x 1/8"	Deckel G1U Spindle
4105-A	4105-B	105" x 1/8"	Deckel G1L Spindle

Grade "B" Belts are also stocked for other makes of engraving machines. When ordering, state make, model and length required. Special sizes made to order in lots of 10 or more belts of one size.

ELEVATING BLOCKS



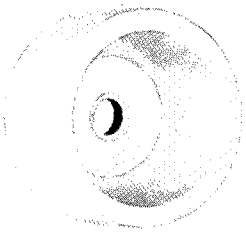
are used as a means of increasing the height between the cutter spindle and work table surface. Top and bottom surfaces are ground parallel. They are sold in sets of 2 blocks for raising the pantograph and the copy holder plate to any desired height.

FOR ALL PREIS-PANTO ENGRAVERS EXCEPT MODEL 2D-4

Part No.	Height
718-1	1" high steel blocks
718-2	2-1/4" high cast iron blocks
718-3	3" high cast iron blocks
718-4	4" high cast iron blocks

GRINDING WHEELS FOR PREIS PANTO CUTTER GRINDERS

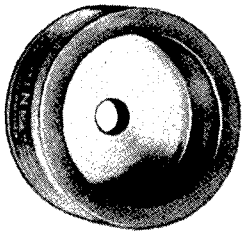
VITRIFIED ALUNDUM WHEELS FOR SHARPENING HIGH SPEED STEEL CUTTERS



VITRIFIED ALUNDUM WHEEL

Part No.	Size	Hole	Rim	Grit	RECOMMENDED USES
260-V	2-1/4" x 1-1/4"	3/8"	3/8"	60-J COARSE	For fast stock removal and halving cutters.
280-V	2-1/4" x 1-1/4"	3/8"	3/8"	80-J MEDIUM	For general purpose cutter sharpening.
2100-V	2-1/4" x 1-1/4"	3/8"	3/8"	100-J FINE	For fine points and smooth finishes.
2150-V	2-1/4" x 1-1/4"	3/8"	3/8"	150-J X-FINE	For fine points and extra smooth finishes.
480-V†	4" x 2"	20mm	3/8"	80-J MEDIUM	For general purpose cutter sharpening.
4100-V†	4" x 2"	20mm	3/8"	100-J FINE	For fine points and extra smooth finishes.
454-CR†	4" x 2"	20mm	1/2"	54 COARSE	For general grinding of cobalt cutters.
460-CF†	4" x 2"	20mm	1/2"	60 MEDIUM	For finer finishes on cobalt cutters.

CRYSTOLON AND DIAMOND IMPREGNATED WHEELS FOR SHARPENING TUNGSTEN CARBIDE CUTTERS.



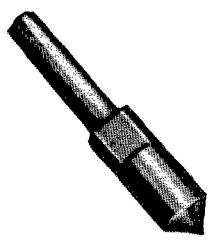
DIAMOND IMPREGNATED WHEEL

Part No.	Size	Hole	Rim	Grit	RECOMMENDED USES
2120-CR	2-1/4" x 1-1/4"	3/8"	3/8"	120-MC MEDIUM	**Crystolon wheel** for rough grinding only.
4120-CR†	4" x 2"	20mm	3/8"	120-MC MEDIUM	**Crystolon wheel** for rough grinding only.
2215-DF	2-1/4" x 1"	3/8"	1/4"	*100-50 COARSE	**Diamond impregnated wheel** for fast stock removal and halving cutters.
2245-DF	2-1/4" x 1"	3/8"	1/4"	*240-50 MEDIUM	**Diamond impregnated wheel** for general sharpening.
2255-DF	2-1/4" x 1"	3/8"	1/4"	*500-50 FINE	**Diamond impregnated wheel** for extra smooth finishes.

*All above diamond wheels have diamond in rim 1/16" deep, 50 concentration. Other wheels made to order.
†For Deckel and Alexander cutter grinders only.

WHEEL TRUING DIAMONDS

For dressing Vitrified Alundum or Crystolon grinding wheels. Each dresser has double diameter shank and can be used in 2 different collets. Each diameter is ¾" long, total length 1½".



Part No.	Shank Diameter
115-59	1/8" and 5/32" shank
187-25	3/16" and 1/4" shank
250-50	5/16" and taper shank
106-25	1/4" for part no. 1061

ENGRAVERS CRAYON FILLER

Color impregnated parafin sticks, 4" long, for color filling engravings. Not as permanent as paint or lacquer, but easier to use especially on plastics. Available in colors listed below.

*GOLD
*SILVER
BLACK
WHITE

GREEN
YELLOW
RED
BLUE

*Sold individually. All other colors in dozen lots only, assorted or all one color.

PREIS-PANTO COPY HOLDERS

ADJUSTABLE COPY HOLDER UNITS

Standard Copy Holder consists of:
1 Flat Copy Holder Plate
1 Center Copy Slide with Double T-Square
2 Single Copy Slides
6 Copy Holder Clamps

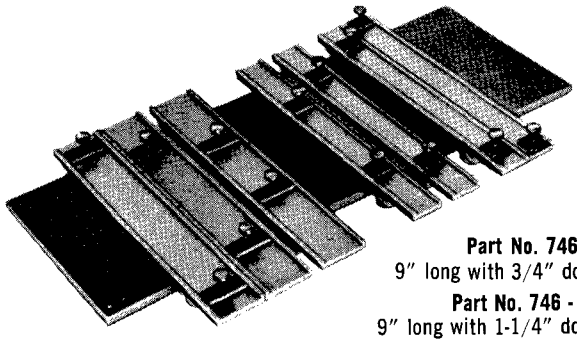
Adjustable Copy Holders permit individual spacing of each slide for multiple line engraving. The flat copy holder plate is mounted onto the machine and the center slide with double ended T-square locks on the plate. The single copy slides attach to the cross bars of the center slide and can be adjusted to any desired spacing. The complete unit can then be moved across the flat plate and locked in any position without disturbing the spacing between the individual slides.

1 Part Number	2 Size of Copy Holder Plate	3 W and L of Copy Slides	4 Dove-Tail Groove	5 Slides on Unit	6 Fits Panto Models
149A - 3/4	1/4" x 6" x 8½"	1" x 9-3/4"	3/4"	up to 5	all models except model 2D-4
116A - 3/4	1/4" x 6" x 16"	1" x 18"	3/4"	up to 7	
116A - 1-1/4	1/4" x 6" x 16"	1-1/2" x 18"	1-1/4"	up to 5	
622A - 1-1/4	1/4" x 6" x 16"	1-1/2" x 26"	1-1/4"	up to 5	
622A - 2-1/4	1/4" x 6" x 16"	2-1/2" x 26"	2-1/4"	up to 3	
655A - 1-1/4	1/4" x 12" x 22"	1-1/2" x 26"	1-1/4"	up to 7	model 2D-4 only
655A - 2-1/4	1/4" x 12" x 22"	2-1/2" x 26"	2-1/4"	up to 5	

For use with other engraving machines specify make and model.

CROSS COPY SLIDES

. . . clamp across the 6" wide copy holder plate at right angles to the standard copy slides. Available in two sizes.



Part No. 746-3/4"
9" long with 3/4" dove-tail groove

Part No. 746 - 1-1/4"
9" long with 1-1/4" dove-tail groove

SINGLE COPY SLIDES

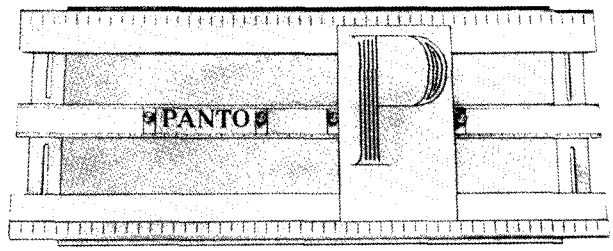
MANY SIZES

SINGLE COPY SLIDES

Single copy slides attach to the adjustable copy holder units when additional slides are required. They may also be used as individual copy slides on other engraving machines. Made with all standard dove-tail grooves in sizes listed below.

1 Part Number	2 Width and Length	3 Dove-Tail Groove	4 Fits Copy Holder Unit
149-2	1" x 9-3/4"	3/4"	149 only
416 - 3/4	1" x 18"	3/4"	116, 622
416 - 1-1/4	1-1/2" x 18"	1-1/4"	116, 622
626 - 1-1/4	1-1/2" x 26"	1-1/4"	116, 622
656 - 1-1/4	1-1/2" x 26"	1-1/4"	655 only
612 - 1-1/4	1-1/2" x 36"	1-1/4"	116, 622, 655
416 - 2-1/4	2-1/2" x 18"	2-1/4"	116, 622
627 - 2-1/4	2-1/2" x 26"	2-1/4"	116, 622
656 - 2-1/4	2-1/2" x 26"	2-1/4"	655 only
623 - 2-1/4	2-1/2" x 36"	2-1/4"	116, 622, 655
635 - 3-1/2	4" x 36"	3-1/2"	116, 622, 655
645 - 4-1/2	5" x 36"	4-1/2"	116, 622, 655

VARIABLE COPY SLIDES



A set of two variable copy slides will adjust to any template size up to the maximum opening shown in column 5. They attach to the copy holder unit in place of single copy slides, one on each side of the center copy slide.

Adjust and lock both slides in position, slide in letters or master plate and hold with copy holder clamps in center copy slide as shown.

1 Part Number	2 Width and Length	3 Fits Copy Holder Unit	4 Minimum Opening	5 Maximum Opening
459-2	1" x 9-3/4"	149A-3/4"	1-1/4"	5-3/4"
459-1	1-1/2" x 18"	116A-3/4" 116A-1-1/4"	1-1/4" 1-3/4"	7" 7"
629	2" x 26"	622A-1-1/4"	2"	6-5/8"
657	2" x 26"	655A-1-1/4" 655A-2-1/4"	2" 3"	10-1/2" 10-1/2"

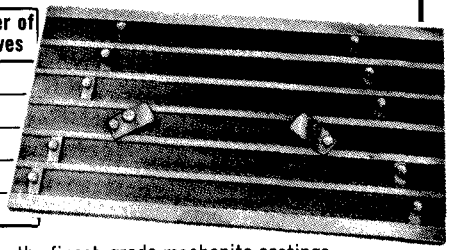
Variable copy slides will only fit copy holder units shown in column 3.

All above copy slides are engraved with graduations at intervals of 1/2" and numbered, starting with zero (0) at the center for centering all master copy.

COPY HOLDER TABLES

For Model 2D-4 Panto Engraver. Can be furnished with flange to fit other makes of engraving machines. Specify make and model when ordering.

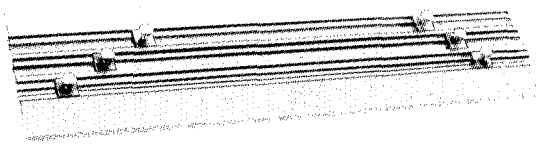
Part No.	Width & Length	Sizes of Grooves	Number of Grooves
1815-6	10" x 18"	1-1/4"	6
2615-3	6" x 26"	1-1/4"	3
2625-2	6" x 26"	2-1/4"	2
2635-1	6" x 26"	3-1/2"	1
2645-1	6" x 26"	4-1/2"	1



All copy holder tables are made from the finest grade meehanite castings. The dove-tail grooves are machined accurately to fit all standard sizes of master copy blanks.

COPY HOLDER TABLES

. . . for holding three-dimensional, plastic molded master copy type illustrated on page 17. The ground steel plate may be mounted on the standard copy table of any three-dimensional engraving or die cutting machine. Made in two sizes.



Part No. 32-25 . . . 3/8" x 4" x 12" long with three dove-tail grooves, 17/32" wide for holding 1/4" high plastic molded letters only.

Part No. 32-50 . . . 3/8" x 5" x 18" long with three dove-tail grooves, 25/32" wide for holding 1/2" high plastic molded letters only.

DEPTH REGULATORS, COPY HOLDER CLAMPS *and miscellaneous items*

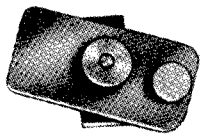
COPY HOLDER CLAMPS

Part No. 45A for locking master copy type in dove-tail grooves of all standard copy tables and copy slides listed on page 8.

Part No.	for dove-tail grooves
45A-25*	17/32"
45A-50*	25/32"
45A-3/4	3/4"
45A-1-1/4	1-1/4"
45A-2-1/4	2-1/4"
45A-3	3"
45A-3-1/2	3-1/2"
45A-4	4"
45A-4-1/2	4-1/2"

*For 32-25 or 32-50 Copy Holder Tables only

TEMPLATE CLAMPS

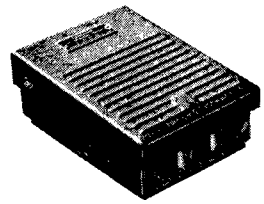


Part No. 45-L . . . for holding large templates on standard copy tables with 1¼" dove-tail grooves only.

FOOT SWITCHES

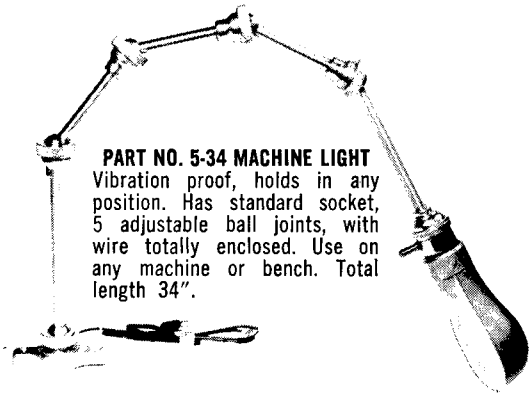
Ideal for starting and stopping any 115-230 volt, single phase motor or electrical appliance by foot pressure. Simply plug into electrical outlet and plug motor or appliance into series plug of switch.

Part No. HB-2 . . . momentary contact switch, press to start—release to stop. Standard equipment with models UM-PC and UE3-PC Panto-Engravers for activating solenoid switch.

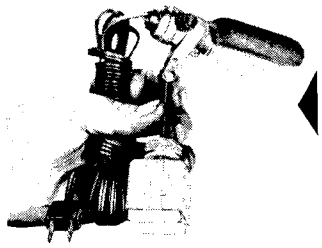


Part No. HT-52 . . . maintained contact switch, press to start — press again to stop. Use on engraving machine, cutter grinder, drill press or any small motor driven machine to turn motor on and off by foot pressure.

MACHINE LIGHTS

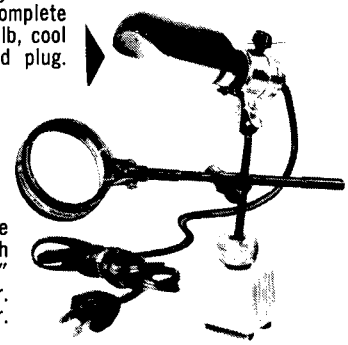


PART NO. 5-34 MACHINE LIGHT
Vibration proof, holds in any position. Has standard socket, 5 adjustable ball joints, with wire totally enclosed. Use on any machine or bench. Total length 34".



Part No. 200 . . . Handilite for pin-point lighting.

MAGNA-BASE LIGHTS
Handilites with magnetic base and magnifier will hold on any steel part of machine. Each unit complete with one 25 and 40 watt bulb, cool shade and 6 foot cord and plug. Total height 7".



Part No. 220 . . . Handilite for pin-point lighting with 5x power, 2" diameter, 2" focal length magnifier. Also for mounting indicator.

DEPTH REGULATOR ATTACHMENTS

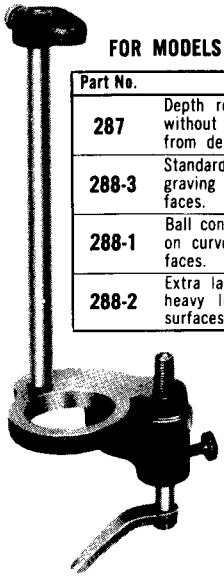
This attachment assures cutting of a uniform depth on curved or irregular flat surfaces, or on objects varying in thickness. Generally recommended for engraving on plastics or other non-metallic materials.

The depth regulator attaches to the cutter spindle of the Panto engraver and the foot glides over the curvatures or irregularities of the working surface either by hand pressure or gravity depending on the model. Micrometer feed is provided to adjust the foot in relation to the cutter point.

Several styles of feet are available for engraving on differently shaped surfaces. Standard foot will be supplied unless otherwise specified on order. (Illustration shows standard foot).

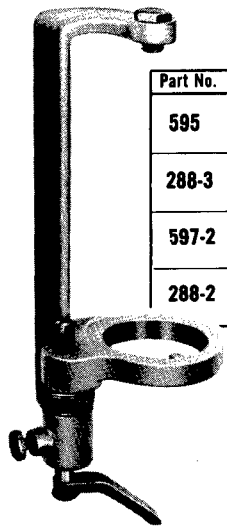
FOR MODELS UE-2T AND UE-2S

Part No.	Description
147	Depth regulator complete, but without foot. Select proper foot from description below.
134-1	Standard foot for engraving on irregular flat surfaces.
134-2	Ball foot with 3/64" hole through center for engraving fine lines up to 1/64" on curved surfaces.
134-3	Ball foot with 3/32" hole through center for engraving lines up to 1/16" on curved or flat surfaces.
134-4	Ball foot with 5/32" hole through center for engraving lines up to 1/8" on curved or flat surfaces.



FOR MODELS UE-3 AND 3D-5

Part No.	Description
287	Depth regulator complete, but without foot. Select proper foot from description below.
288-3	Standard foot for general engraving on irregular flat surfaces.
288-1	Ball contact foot for engraving on curved and cylindrical surfaces.
288-2	Extra large foot for engraving heavy lines on irregular flat surfaces.



FOR MODEL 2D-4

Part No.	Description
595	Depth regulator complete, but without foot. Select proper foot from description below.
288-3	Standard foot for general engraving on irregular flat surfaces.
597-2	Ball contact foot for engraving on curved and cylindrical surfaces.
288-2	Extra large foot for engraving heavy lines on irregular flat surfaces.

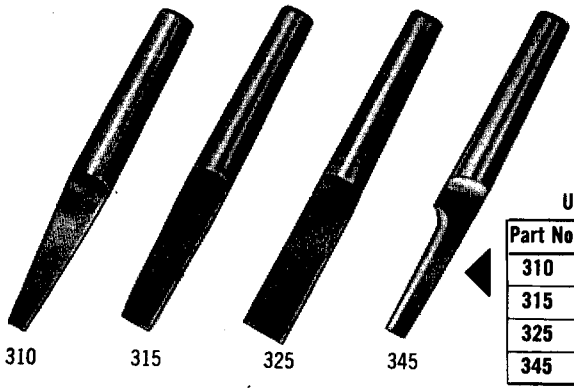
Taper shanks on all cutters are accurately ground to limits of .0002" and blend into the outside diameter with no flange or shoulder to interfere with a tight fit into any spindle or collet with taper bore.

HIGH SPEED STEEL CUTTERS

Made from selected grade of high speed steel. Heat treated and tempered to Rockwell C 64-66 in their full round form to assure uniform hardness throughout. Overall length 1-7/8", flats ground 7/8" long from solid blanks to plus .001" above center.

Half round cutters are made with 3 tip sizes for general engraving in any material. The cutter No. 345 is quarter round to allow for more chip clearance for fine engraving in non-ferrous metals and soft plastics.

Tips on all cutters are left flat for sharpening to any angle or shape required. When ordering sharpened cutters be sure to follow sharpening instructions on page 11. When angle is not specified cutters will be sharpened at 60° included angle to a sharp point.



310 315 325 345

Unsharpened cutters

Part No.	Cutter	Size at tip
310	No. 1	1/10"
315	No. 2	3/16"
325	No. 3	1/4"
345	No. 4	3/16"

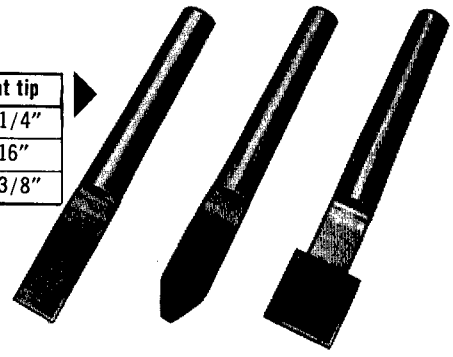
TUNGSTEN CARBIDE CUTTERS

Taper shank Tungsten Carbide Cutters are excellent for engraving in tough plastics such as phenolics, Fibre-glas or any abrasive material and will outlast high speed steel cutters up to 50:1 at maximum cutter speeds.

They are made in 3 sizes, 1/4" and 3/8" wide tip with full flat and 1/4" wide preformed tip with 1/16" flat to save time when grinding small tips or pointed cutters.

Unsharpened cutters

Part No.	Insert	Size at tip
346	1/4" x 1/2"	full 1/4"
347	1/4" x 1/2"	1/16"
348	3/8" x 3/8"	full 3/8"



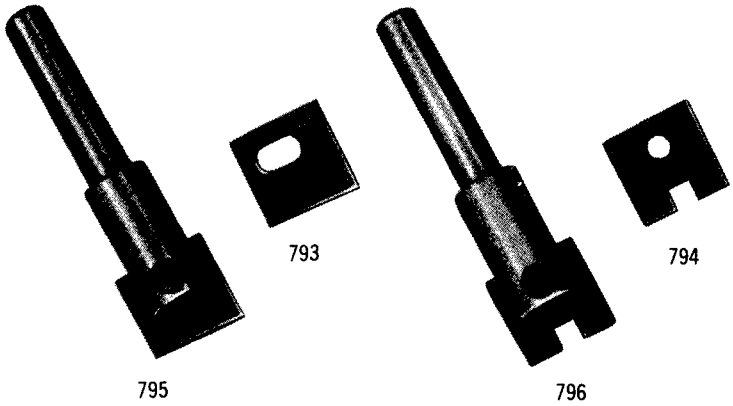
346 347 348

EXTRA WIDE TUNGSTEN CARBIDE CUTTERS WITH ADJUSTABLE BLADES

Cutter Holders with adjustable tungsten carbide blades are available in 2 styles. Tungsten carbide blades are ground and diamond-lapped on both sides, ready for sharpening to size.

Suitable for cutting lines or slots up to 3/4" wide, excellent for profiling or routing in all tough plastic and abrasive materials.

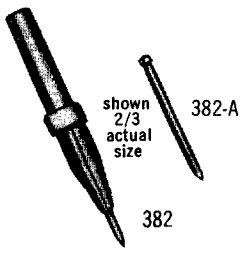
Holders are heat-treated and ground overall; made with 3/16" or 1/4" straight shank and standard taper shank. When using taper shank, insert 1/8" pin in hole through holder and use in place of wrench.



793 794

795 796

Part No.	Shank	Description
795-19	3/16"	Tungsten carbide cutter holder with #793 single edge blade for cutting lines up to 3/4" wide.
795-25	1/4"	
795-50	Taper	
793	——	Single edge tungsten carbide blade for #795 holder only.
796-19	3/16"	Tungsten carbide cutter holder with #794 double edge blade for cutting lines up to 1/2" wide.
796-25	1/4"	
796-50	Taper	
794	——	Double edge tungsten carbide blade for #796 holder only.

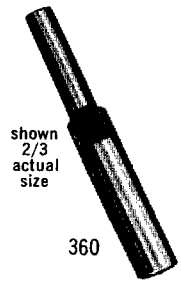


ETCHING POINT

No. 382 Etching Point with taper shank is spring-loaded for scribing through wax coating on steel or glass in preparation for acid etching.

Also ideal in layout work for scribing on any surface through layout ink or dye.

No. 382-A Replacement Point for above.



360

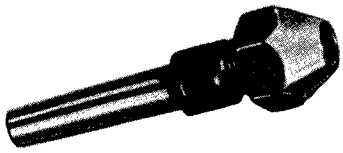
EXTENSION SLEEVE

No. 360 Extension Sleeve has taper shank and fits into any tapered cutter spindle. Holds all standard taper shank cutters and increases distance from cutter point to spindle nose to 2-1/2" for reaching into deep cavities or recesses where the spindle pulley would otherwise interfere.

PREIS-PANTO COLLETS AND CHUCKS

FOR ALL PANTO-ENGRAVERS AND CUTTER GRINDERS

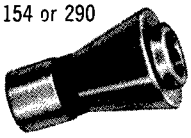
TAPER SHANK COLLETS (midget chucks) will hold 1/10" or 1/8" diameter cutter blanks listed on page 13. Collets and nuts are hardened and taper shanks are ground accurate to fit into cutter spindles with standard taper bore. Cutter blanks must be sharpened in collet to assure perfectly true running cutter point.



Part No. 387-10 . . . 1/10" (.100") bore **Part No. 387-13** . . . 1/8" (.125") bore

CUTTER SPINDLE COLLETS FOR MODELS UE-2S, UE-3, UE3-PC and 3D-5 PANTO-ENGRAVERS

154 or 290



290-50

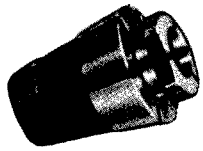
For Model UE-2S Panto-Engraver.	
Part No.	**Bore**
154-13	1/8" (.125")
154-16	5/32" (.1565")

For Models UE-3, UE3-PC and 3D-5 Panto-Engravers equipped with No. 279-A cutter spindle.	
Part No.	**Bore**
290-13	1/8" (.125")
290-16	5/32" (.1565")
290-19	3/16" (.1875")
290-50	taper bore

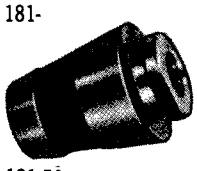
Cutter spindle collets are ground accurately to assure true running cutters. Collets for straight shank cutters are slotted three ways. Taper bore collet is solid (not slotted) for holding standard taper shank cutters and No. 387 collets.

CUTTER SPINDLE COLLETS FOR MODEL 2D-4 PANTO-ENGRAVER

(will also fit Deckel and Alexander No. 1 cutter spindles)



181-



181-50

Part No.	Bore
181-06	1/16" (.0625")
181-10	1/10" (.100")
181-13	1/8" (.125")
181-16	5/32" (.1565")
181-19	3/16" (.1875")
181-25	1/4" (.250")
181-50	taper bore

2D-4 Cutter Spindle Collets are hardened and ground accurately and split from both ends to hold straight shank cutters firmly through their full length. Collet with taper bore is not slotted and will hold all standard taper shank cutters and No. 387 collets. Collets eject automatically when cutter lock nut is opened.

JACOBS RUBBER-FLEX COLLETS for models UE-3, UE3-PC and UE3-DR Panto-Engravers equipped with No. 922-J cutter spindle.

Part No.	Capacity Minimum		Maximum
J-112	.094"	to	.146"
J-113	.146"	to	.198"
J-114	.198"	to	.250"

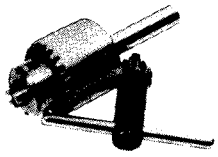
Collets are flexible and a set of only 3 collets will hold any cutter or drill ranging from 3/32" to 1/4" diameter. Ideal for decimal and metric size cutters for which standard split collets are not available.

DRILL CHUCKS

PRECISION KEYLESS CHUCKS

No. J0-15 chuck has .008" to .0625" capacity, size 3/4" x 1-7/16" long without arbor.

No. J0-30 chuck has .013" to .125" capacity, size 15/16" x 1-3/4" long without arbor.



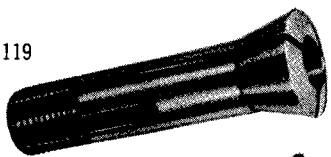
JACOBS CHUCK

Part No. 0 - 5/32" capacity, with key and 1/4" straight arbor

Part No.	Arbor Size
J0-15-25 } J0-30-25 }	1/4" straight shank arbor
J0-15-31 } J0-30-31 }	Collet adapter and lock nut, fits into No. 279-A cutter spindle shaft only.

COLLETS FOR PANTO CUTTER GRINDER AND MODEL 2D-4 TRACING STYLE HOLDER

119



119-30H

119-50

Preis-Panto Cutter Grinders, models CG-2 and CG-21 are equipped with collet spindle and draw bar and will take standard split collets for holding straight shank cutters up to 1/4" diameter.

No. 119-30H collet has 1/4" hexagon bore, 1/4" deep only for grinding No. 135-6 Special Alloy Point.

No. 119-24 Collet has 6mm hole ground through full length for holding tracing stylus in pantograph of model 2D-4 Panto-Engraver.

No. 119-50 Collet is solid and has taper bore for holding all taper shank cutters and No. 387 collets.

Part No.	Bore
119-6	1/16" (.0625")
119-9	3/32" (.0937")
119-13	1/8" (.125")
119-16	5/32" (.1565")
119-19	3/16" (.1875")
119-25	1/4" (.250")
119-10	1/10" (.100")
119-20	2/10" (.200")
119-30H	1/4" Hex. bore,
119-24	6 m/m for 2D-4 tracing stylus
119-50	taper bore

PREIS-PANTO ENGRAVING CUTTERS, TAPER SHANK

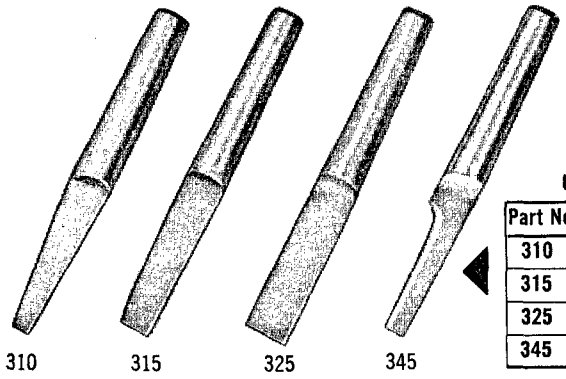
Taper shanks on all cutters are accurately ground to limits of .0002" and blend into the outside diameter with no flange or shoulder to interfere with a tight fit into any spindle or collet with taper bore.

HIGH SPEED STEEL CUTTERS

Made from selected grade of high speed steel. Heat treated and tempered to Rockwell C 64-66 in their full round form to assure uniform hardness throughout. Overall length 1-7/8", flats ground 7/8" long from solid blanks to plus .001" above center.

Half round cutters are made with 3 tip sizes for general engraving in any material. The cutter No. 345 is quarter round to allow for more chip clearance for fine engraving in non-ferrous metals and soft plastics.

Tips on all cutters are left flat for sharpening to any angle or shape required. When ordering sharpened cutters be sure to follow sharpening instructions on page 13. When angle is not specified cutters will be sharpened at 60° included angle to a sharp point.



310 315 325 345

Unsharpened cutters

Part No.	Cutter	Size at tip
310	No. 1	1/10"
315	No. 2	3/16"
325	No. 3	1/4"
345	No. 4	3/16"

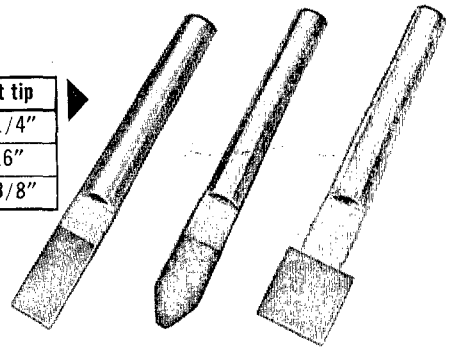
TUNGSTEN CARBIDE CUTTERS

Taper shank Tungsten Carbide Cutters are excellent for engraving in tough plastics such as phenolics, Fibre-glas or any abrasive material and will outlast high speed steel cutters up to 50:1 at maximum cutter speeds.

They are made in 3 sizes, 1/4" and 3/8" wide tip with full flat and 1/4" wide preformed tip with 1/16" flat to save time when grinding small tips or pointed cutters.

Unsharpened cutters

Part No.	Insert	Size at tip
346	1/4" x 1/2"	full 1/4"
347	1/4" x 1/2"	1/16"
348	3/8" x 3/8"	full 3/8"



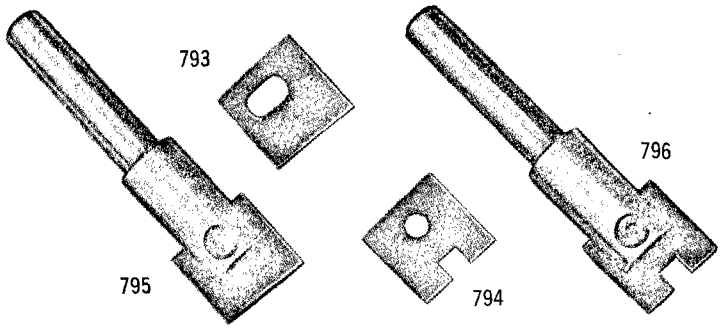
346 347 348

EXTRA WIDE TUNGSTEN CARBIDE CUTTERS WITH ADJUSTABLE BLADES

Cutter Holders with adjustable tungsten carbide blades are available in 2 styles. Tungsten carbide blades are ground and diamond-lapped on both sides, ready for sharpening to size.

Suitable for cutting lines or slots up to 3/4" wide, excellent for profiling or routing in all tough plastic and abrasive materials.

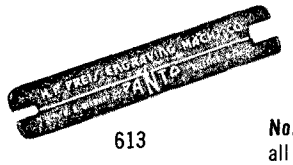
Holders are heat-treated and ground overall; made with 3/16" or 1/4" straight shank and standard taper shank. When using taper shank, insert 1/8" pin in hole through holder and use in place of wrench.



793 795 794 796

Part No.	Shank	Description
795-19	**3/16"**	Tungsten carbide cutter holder with #793 single edge blade for cutting lines up to 3/4" wide.
795-25	**1/4"**	
795-50	**Taper**	
793	——	Single edge tungsten carbide blade for #795 holder only.
796-19	**3/16"**	Tungsten carbide cutter holder with #794 double edge blade for cutting lines up to 1/2" wide.
796-25	**1/4"**	
796-50	**Taper**	
794	——	Double edge tungsten carbide blade for #796 holder only.

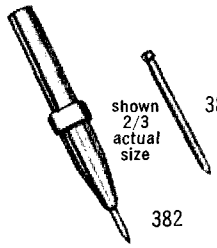
CUTTER WRENCH



613

No. 613 CUTTER-WRENCH double ended, fits all Preis-Panto taper shank cutters and No.387 collets. Openings are milled and wrench is hardened to last a life-time.

ETCHING POINT



shown 2/3 actual size

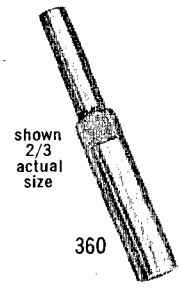
382-A 382

No. 382 Etching Point with taper shank is spring-loaded for scribing through wax coating on steel or glass in preparation for acid etching.

Also ideal in layout work for scribing on any surface through layout ink or dye.

No. 382-A Replacement Point for above.

EXTENSION SLEEVE



shown 2/3 actual size

360

No. 360 Extension Sleeve has taper shank and fits into any tapered cutter spindle. Holds all standard taper shank cutters and increases distance from cutter point to spindle nose to 2-1/2" for reaching into deep cavities or recesses where the spindle pulley would otherwise interfere.

PREIS-PANTO ENGRAVING CUTTERS, STRAIGHT SHANK

All Straight Shank Cutters are made from the finest grade steels available. High speed steel cutters are heat treated to Rc 64-66, Cobalt Super high speed steel cutters to Rc 68-69 in their full round form to assure uniform hardness throughout.

Body diameters are ground to minus .0005" and flats are then ground from the solid to plus .001" above center and to a length equal to 3 times the body diameter but not over 1/2" long.
Tips on all unsharpened cutters are left blank, ready for sharpening to any angle or shape.

FULL ROUND CUTTER BLANKS in standard and extra long blanks are usefull for a large variety of applications. Use them for special reamers, drills, punches, gage pins or any tool requiring hardened and ground blanks.

1/10" and 1/8" diameter blanks can be used in No. 387 collet (see page 11.)

HALF ROUND CUTTERS for engraving, die cutting, profiling and milling. Fast cutting, easy to resharpen to any shape or angle required.
Use high speed steel cutters for cutting mild steels and other metals.
Use Super high speed steel cutters for tough alloy steels and abrasive castings.
Use Tungsten carbide cutters for abrasive Plastics, cast iron and stainless steels.

QUARTER ROUND CUTTERS same as half round cutters, but ground in quarter to allow for more chip clearance when engraving very fine lines in non-ferrous metals and plastics.

Not recommended for cutting steel

HIGH SPEED STEEL—COBALT SUPER HIGH SPEED STEEL

Straight shank cutters are economical, fast cutting, easy to sharpen. Use on engraving, die-sinking, high speed milling and routing machines in place of expensive multi-flute end mills.

HIGH SPEED STEEL

Diameter & Length	Full Round	Half Round	Quarter Round
1/10" x 1-3/4"	1017-RS	1018-HS	—
1/8" x 1-3/8"	—	1214-HS	—
1/8" x 1-3/4"	1217-RS	1218-HS	—
5/32" x 1-3/8"	—	1514-HS	—
5/32" x 1-3/4"	1517-RS	1518-HS	1519-QS
5/32" x 2-1/2"	—	1525-HS	—
3/16" x 1-3/4"	1817-RS	1818-HS	1819-QS
3/16" x 2-1/2"	—	1825-HS	—
1/4" x 2"	—	2520-HS	—
1/4" x 3"	2529-RS	2530-HS	2531-QS

COBALT SUPER HIGH SPEED STEEL

Diameter & Length	Full Round	Half Round
1/8" x 1-3/4"	1216-CR	1219-CH
3/16" x 1-3/4"	1918-CR	1919-CH
3/16" x 2-1/2"	1923-CR	1926-CH
1/4" x 2"	2519-CR	2521-CH
1/4" x 3"	2528-CR	2532-CH
5/16" x 2-1/2"	3124-CR	3125-CH
3/8" x 2-1/2"	3824-CR	3825-CH
1/2" x 2-1/2"	5024-CR	5025-CH

HIGH SPEED STEEL

EXTRA LONG CUTTER BLANKS, 6 inches long, full round only.

Diameter & Length	Full Round
1/10" x 6"	1060-RS
1/8" x 6"	1260-RS
5/32" x 6"	1560-RS
3/16" x 6"	1860-RS
1/4" x 6"	2560-RS

TUNGSTEN CARBIDE

Straight shank solid tungsten carbide cutters; excellent for cutting tough plastics, cast-iron, alloy steels and any abrasive material where high speed steel cutters usually fail to cut.

Diameter & Length	Full Round	Half Round	Quarter Round
1/8" x 1-1/2"	1314-RT	1315-HT	—
5/32" x 1-1/2"	1614-RT	1615-HT	1616-QT
3/16" x 1-1/2"	1914-RT	1915-HT	1916-QT
3/16" x 2-1/2"	1924-RT	1925-HT	1926-QT
1/4" x 2-1/2"	2524-RT	2525-HT	2526-QT
1/4" x 2"	double end	2522-HT	—

SPECIAL PURPOSE CUTTERS

These cutters are used only with non-rotating spindles. They are intended specifically for cutting on lead casket plates, jewelry or trophy items. See also diamond tipped cutters.

427

428 or 429

HIGH SPEED STEEL

Part No.	Shank Size	Description
427-18	3/16"	Spencerian cutter for simulating hand engraving on lead casket plates.
427-25	1/4"	
428-18	3/16"	120° cone point for drag marking on lead casket plates, jewelry, trophy plates and all soft metals.
428-25	1/4"	

TUNGSTEN CARBIDE

Part No.	Shank Size	Description
429-18T	3/16"	Same as No. 428, but made from tungsten carbide for longer wear.
429-25T	1/4"	

— see also diamond tipped cutters —

DIAMOND TIPPED CUTTERS

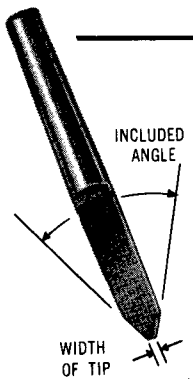
STRAIGHT SHANK

TAPER SHANK

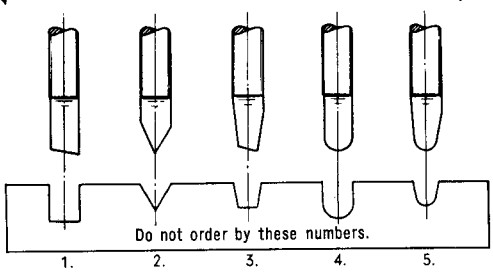
368-L-2512 See Note

Part No.	Shank Size	Description
368-A-18 368-A-25 368-A-50	3/16" 1/4" taper shank	6 flats, 120° included angle for cutting hardened steel; will cut .002" - .003" deep. Use maximum cutter spindle speeds.
368-B-18 368-B-25 368-B-50	3/16" 1/4" taper shank	3 flats, 90° included angle for cutting tough plastics, fibre-glas and other abrasive materials. Use maximum cutter spindle speeds. **NOT SUITABLE FOR CUTTING STEEL.**
368-F-18 368-F-25 368-F-50	3/16" 1/4" taper shank	90° Conical point for scribing fine lines in hardened steel, glass and general layout work. Use with non-rotating spindle only.
368-L-18 368-L-25 368-L-2512 368-L-50	3/16" 1/4" 1/4" taper shank	120° conical point for diamond drag marking on jewelry, trophy plates and other soft metals. Use with non-rotating spindle only.
368-H-18 368-H-25 368-H-50	3/16" 1/4" taper shank	140° conical point for diamond drag marking on hardened steel and tungsten carbide. Also for bold lines on soft metals. Use with non-rotating spindle only.

Note: Tip reduced to 1/8" diameter x 1/4" long for marking close to borders or walls.



HOW TO ORDER SHARPENED CUTTERS



When ordering sharpened cutters or when returning cutters for resharpening be sure to specify material to be cut as well as included angle, width or diameter of tip depending on the shape of cutters.

The drawing illustrates the five standard shapes generally used on engraving and die cutting machines.

No. 1: Cylindrical flat cutters, used for profiling and slotting. Specify diameter and length of tip.

No. 2 and 3: Conical pointed or conical flat cutters. Used for most general engraving on all metals and plastics. Specify included angle and width of tip, if any. For proper width of tip consult your pantograph ratio and cutter selector chart. (See back page)

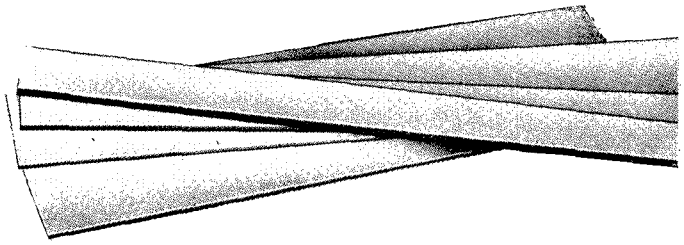
No. 4 and 5: Round nose cutters, used principally for 3 dimensional die work or for cutting round bottom grooves. Specify diameter of round nose, length of tip and included angle, if any.

PREIS-PANTO MASTER COPY TYPE GENERAL INFORMATION

All Preis-Panto master copy type illustrated on the following pages is engraved on special engravers' brass, a free cutting extra hard alloy which, under normal conditions should be suitable for many thousands of reproductions.

All copy blanks have a 20° bevel machined on both top and bottom edges to fit into the corresponding dove-tail grooves of your Panto copy holder or copy slides.

For those who have occasions to make their own master letters or special master templates, engravers' brass is also available in plain or beveled brass strips in all standard sizes by 24″ long.



PLAIN BRASS STRIPS, 1/16″ thick, 24″ long

have clean, sheared edges and widths are held to minus 1/32″ from sizes listed.

Width	Part No.	Width	Part No.
13/16″	PL-413	4-9/16″	PL-473
1-5/16″	PL-421	6-1/16″	PL-497
2-5/16″	PL-437	7-1/16″	PL-4112
3-1/16″	PL-449	8-1/16″	PL-4128
3-9/16″	PL-457	10-1/16″	PL-4161
4-1/16″	PL-465	12-1/16″	PL-4293

BEVELED BRASS STRIPS, 24″ long

are machined with a smooth 20° bevel on each edge and widths are held accurate to plus .0, minus .001″ to fit into the dove-tail grooves of your Preis-Panto copy tables.

Width	Thickness	Part No.	Width	Thickness	Part No.
3/4″	1/16″	BV-412	2-1/4″	1/16″	BV-436
3/4″	3/32″	BV-612	2-1/4″	5/32″	BV-1036
1-1/4″	1/16″	BV-420	3″	1/16″	BV-448
1-1/4″	5/64″	BV-520	3-1/2″	1/16″	BV-456
1-1/4″	9/64″	BV-920	4″	1/16″	BV-464
			4-1/2″	1/16″	BV-472

SELECTION OF MASTER COPY TYPE

The most economical way to purchase master copy type is in the standard fonts listed on page 15. These fonts are made in several combinations depending on the style of letter and the requirement of the individual user. For combinations other than standard fonts, prices will be quoted upon request.

HOW TO SELECT

Select the particular style of master copy type required. All specimens shown are actual photographs of engraved name plates.

Select the correct size or height of letters and be sure that the pantograph range of your engraver covers the various sizes of letters to be engraved. The best pantograph range on most engraving machines is between 2:1 and 6:1 ratio of reduction. For soft and free cutting materials, and large letters, the lower ranges are most practical and economical; for hard materials, especially steel, and small letters, the higher ranges will result in cleaner engraving.

Preis-Panto Master Copy Type is engraved on the various sizes or heights of copy blanks most suitable for the particular style. Copy holder units or single copy holder slides to fit your Preis-Panto Engraver are available in all sizes illustrated on page 8.

HOW TO ORDER

When ordering Master Copy Type, be sure to specify font assortment required. Order by style number, give height of letters and size of copy blanks, and order only in sizes and combinations shown in price list. Height of letters given is measured from center of top stroke to center of bottom stroke; overall height of beveled brass blank includes bevel on both sides.

When ordering in any other assortment, be sure to specify the quantity of each character required. Due to the numerous styles and sizes of master copy type available it is impossible to maintain a complete stock. Most fonts are engraved upon receipt of your order and cannot be returned for credit or replacement.

EXAMPLE FOR ORDERING MASTER COPY TYPE.

Required: One font master copy type, style No. 206, having sunk vee-groove lines. An assortment of large and small letters, numerals, punctuation marks, special characters and spacers with 3/4″ high letters reading right, engraved on 1-1/4″ beveled brass blanks.

Order should read: One 6A font, style No. 206-VC, 3/4″ high on 1-1/4″ blanks, sunk, reading right.

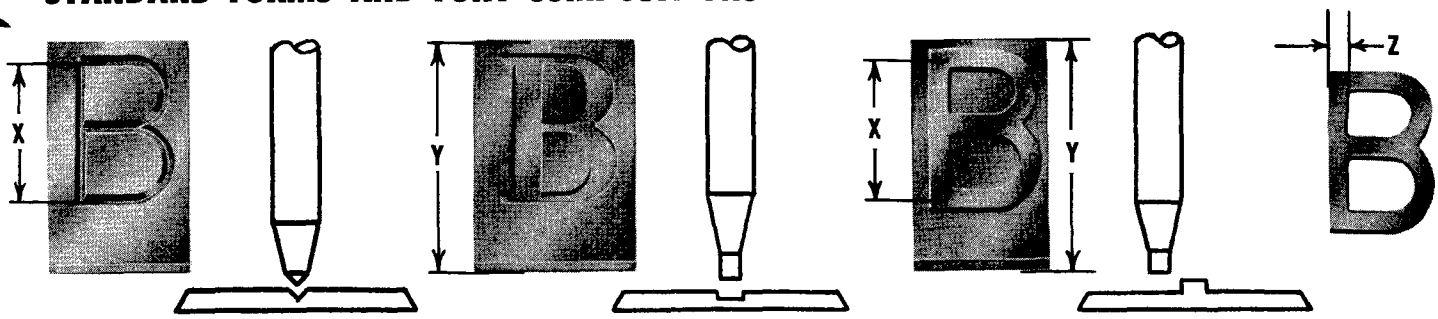
SPECIAL MASTER TEMPLATES

For special master templates, trade marks or combination templates, send us a drawing, photostat or finished engraving. Specify size of template required, or actual size of engraving and ratio of reduction desired. State whether template is to be sunk or raised, reading right or reversed, engraved on brass or hardened steel plate.

On trade marks or trade names, state whether the design must be accurate to the smallest detail, or if a simplified design, following the principal contours, is more important for legibility and production purposes. On small trade names and signatures it is advisable to make a template with a single vee-groove, even though the original may show shaded lettering. On larger templates it is optional, depending on whether speed of engraving or exact reproduction is of more importance.

PREIS-PANTO MASTER COPY TYPE

STANDARD FORMS AND FONT COMPOSITIONS



SUNK VEE-GROOVE, used on all single line lettering (example No. 4S, 20, 64 etc.) and all styles where the letter V follows the style number (example 76-VC, 205-V, 206-VC, etc.) Vee-grooves are cut with 85° included angle, approximately 1/32" deep depending on the size of letter. Master letters cut with vee-grooves last longer than any other groove when used with a pointed tracing stylus sharpened at 80°-85° included angle (see tracing styles on page 10).

Any desired stroke or width of line can be engraved by simply tipping the cutter point off to the proper width or flat. See also "Pantograph ratio and cutter selector chart" on back page.

SUNK FLAT-BOTTOM GROOVE, used on all styles where a letter F follows the style number (example No. 80-FC, 204-F, 205-FC etc.). These grooves require a cylindrical tracing stylus of the proper diameter in place of the pointed tracing stylus (see tracing styles on page 10).The width of the grooves varies to suit the style and size of master letter.

RAISED (relief) AND SKELETON MASTER LETTERS

Used principally for engraving raised lettering on dies, molds, and stamps; also for name plates or signs requiring raised lettering. The shank or face of the letter can be cut to any desired shape or size by grinding the cutter to the required angle and selecting a cylindrical tracing stylus with the correct tip diameter (see tracing styles on page 10).

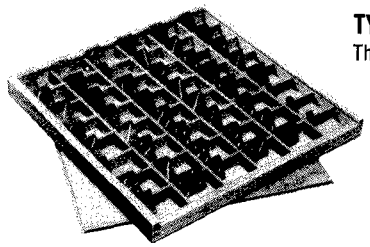
SKELETON LETTERS are reversible and may be arranged in any position by cementing or soldering on a back plate.

Plastic molded, raised master copy type for use on 3-dimensional pantographs illustrated on page 17.

X — Height of letter from center to center of stroke

Y — Overall height of beveled brass blank

Z — Width of stroke on raised and skeleton letters



TYPE STORAGE BOX

This type storage box has 48 compartments with sliding cover. Keeps master copy type in order and prevents losses. Will hold complete fonts engraved on 3/4" or 1-1/4" beveled blanks only.

KEY TO LETTERS FOLLOWING STYLE NUMBERS

Blank — (No letter after style number), single line vee-groove only.

S — Standardized gothic styles, all capital letters only.

V — Open face letters with outline vee-grooves and additional lines through body of character wherever possible. They can be used for engraving outline letters as shown and also for engraving solid or flat-bottom characters as shown on specimens designated by letter F.

F — Flat-bottom groove letters engraved with square nose cutter. They require a cylindrical tracing stylus, and can be used only to engrave solid letters with center cut out as shown in specimen following style number.

C — Combination master copy type consisting of large and small capital letters or capital and lower case letters, as shown in specimen following style number.

COMPOSITION OF FONTS (FONT SIZES)

MASTER COPY TYPE is available in several different combinations known as Fonts. Each font consists of a certain number or combination of characters to suit most requirements. All styles contain the exact number of letters and numerals as shown in the various fonts below.

Punctuation marks and special characters vary with some styles depending upon their usefulness with certain styles of letters.

1A FONT...

consists of 54 characters, one of each only as shown below. Suitable only for engraving single characters (not for names or word combinations).

ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890 . , : ; ' " " - & + — / x ° ₀ AC^C

2A FONT...

consists of 78 characters including capital letters and lower case letters (or small capital letters depending on style of letter), one of each only as shown.

ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 1234 567890 . , : ; ' " "-& + — / x ° ₀ C

3A FONT...

consists of 72 letters only, for those who require no numerals or punctuation marks.

Ideal also as an addition to a 4A or 6A font to increase the number of letters in those fonts. Furnished either in capital or lower case letters depending on the style of letter shown in type specimens on the following pages and in quantities shown below.

AAA BBB CCC DDD EEEE FFF GGG HHH III JJ KK LLL MMM NNNN OOO PPP QQ RRR SSSS TTT UU VV WW XX YY ZZ

4A FONT...

recommended for general engraving of names plates, signs, panels etc., consists of 78 capital letters, 30 numerals, 15 punctuation marks, 10 special characters and an assortment of 60 spacers, total 193 pieces as shown below.

AAAA BBB CCC DDD EEEEEE FFF GGG HHH III JJ KKK LLLL MMM NNNN OOO PPP Q RRR SSSS TTTT UUU VV WW XX YY ZZ 111 222 333 444 555 666 777 888 999 000 ..... ,,, : ; ' " "--& + — / x ° ₀ AC^C

6A FONT...

for general engraving with capital letters and lower case letters, contains 237 pieces, consisting of 52 capital letters, 72 lower case letters (or small capital letters depending on style of letter), 30 numerals, 15 punctuation marks, 8 special characters and 60 spacers as follows:

AA BB CC DD EE FF GG HH II JJ KK LL MM NN OO PP QQ RR SS TT UU VV WW XX YY ZZ aaaa bbb ccc ddd eeee fff ggg hhh iii jj kk lll mmm nnnn ooo ppp qq rrr sss ttt uu vv ww xx yy zz 111 222 333 444 555 666 777 888 999 000 ..... ,,, : ; ' " "--& + — / x ° ₀ C

2B FONT...

consists of 48 letters and 2 periods as shown.

Used principally for engraving initials on such items as jewelry, silverware, cigarette lighters, belt buckles etc.

AA BB CC DD EE FF GG HH II JJ KK LL MM NN OO PP Q RR SS TT UU VV WW X Y Z ..

PREIS-PANTO MASTER COPY TYPE

PLAIN GOTHIC, SUNK VEE-GROVE

The eight widths of plain gothic master copy type shown on this page meet the most exacting requirements for industrial and commercial surface engraving on name plates, instruments, panels, tools, machine parts or any item requiring engraving or marking in a plain, easily read copy.

All characters are carefully designed for easy reading and a pleasing modern appearance. They are engraved on self spacing beveled brass blanks which slide into your copy holder grooves and do not require any additional spacing between letters.

For composition of fonts turn to pages 14 and 15.

STYLES NO. 1S through **8S**
Capital letters only
1A, 3A, 4A or **2B** Fonts

1S D.A.BERLINGER
2S R.O.ANGEVINE
3S S.G.HEILNER
4S M.Q.BOLTEN
5S D.K.PAULI
6S C.P.RYAN
7S I.T.RAE
8S F.GAY

For lower case letters to match see page 19, styles No. 221 to 225.

All styles illustrated on this page are available in sunk vee-groove, either reading right or reading reverse in the following letter heights.

1/4", 5/16", 3/8" or 1/2" high letters on 3/4" high beveled brass blanks.

1/4", 5/16", 3/8", 1/2", 3/4" or 1" high letters on 1-1/4" high beveled brass blanks.

1", 1-1/2" or 2" high letters on 2-1/4" high beveled brass blanks.

2", or 2-1/2" high letters on 3-1/2" high beveled brass blanks.

2-1/2", 3", or 4" high letters on 4-1/2" high beveled brass blanks.

6" high letters on 7" plain edge brass blanks.

STYLES NO. 1SC through **8SC**
Large and Small capital letters
2A or **6A** fonts only

M. S. VANDERHOFFER 1SC
J. N. BRADSTREET 2SC
E. X. RANDOLPH 3SC
B. U. DOMINGER 4SC
M. Z. FARCUS 5SC
F. L. ADAMS 6SC
H. DOWD 7SC
V. CARD 8SC

For lower case letters to match see page 19, styles No. 221 to 225.

STENCIL MASTER LETTERS

ABCDEFGHIJK
LMNOPQRSTU
VWXYZ 12345
67890 "" .,:;'-
&+—/×°¢CAC

Plain gothic master copy type on this page is also available for cutting stencils with the stays or stops positioned exactly as shown above. Length of stays equals 10% of height of letter when engraved with a cutter tip of same percentage. For outline stencil copy see page 19. For stencil letters with stops located other than shown submit print for quotation.

Sunk Vee-Groove,
Reading Right (forward)

Sunk Vee-Groove,
Reading Reverse (backward)

PROPORTIONS OF WIDTH TO HEIGHT OF LETTERS

For your convenience we list below the width in comparison to the height of all sunk master copy on this page and all raised master copy on page 17. All dimensions apply to the letter **N** measured from center to center of stroke.

Letter Description	Style Numbers	Percentage of Width to Height
Extra Condensed	1S, 1SC, 1SR	35%
Condensed	2S, 2SC, 2SR, 2SM	45%
Semi-Condensed	3S, 3SC, 3SR,	54%
NORMAL	4S, 4SC, 4SR, 4SM	63%
Semi-Extended	5S, 5SC, 5SR	83%
Extended	6S, 6SC, 6SR, 6SM	100%
Extra-Extended	7S, 7SC, 7SM	125%
Maximum Extended	8S, 8SC,	150%

BRASS MASTER COPY DIALS

Standard master copy dials are 10" in diameter, 1/8" thick and mount on the No. 317 copy dial holder, shown on page 6. All copy dials have an index notch centered with each letter and standard dials are furnished as illustrated.

Dial No.
317-4S

Part No. 317-4S — style No. 4S, 3/4" letters sunk vee-groove, total 41 characters.

Also available in styles and sizes as follows.
3/8" high letters in styles No. 1S through 8S
1/2" high letters in styles No. 1S through 6S
3/4" high letters in styles No. 1S through 4S

Part No. 317-2S — style No. 2S, 3/4" letters, sunk vee-groove, total 53 characters.

Also available in styles and sizes as follows.
3/8" high letters in styles No. 1S through 6S
1/2" high letters in styles No. 1S through 5S
3/4" high letters in styles No. 1S through 3S

Dial No.
317-2S

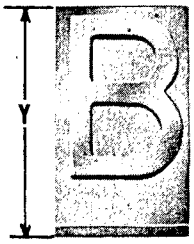
PREIS-PANTO MASTER COPY TYPE

PLAIN GOTHIC, RAISED (relief)

Raised (relief) master copy is available in the 3 forms shown below, suitable for all phases of raised letter engraving on stamps, dies, molds, embossing dies, or anything requiring raised, relief lettering.

The characters are designed with well proportioned contours and space distribution with maximum openings for pleasing appearance and easy reading on the smallest stampings or molded products. The relationship between width and height of characters is identical with the sunk plain gothic master copy on page 16 and all heights given are measured from center of top stroke to center of bottom stroke.

All raised master copy type is



This is 2-dimensional raised master copy, engraved on beveled brass blanks, which slide into the dove-tail grooves of your standard copy holder. It is the most practical form of raised copy for engraving single letters, names, or any word combinations on single or multiple straight line dies or stamps, and is suitable for any Pantograph Engraving machine.

All characters are engraved with straight walls for use with cylindrical tracing styles (see page 10). Raised letters with any side angle can be engraved by grinding the cutter to the desired angle and the face can be varied by changing the diameter of the cutter or tracing stylus.

This is 2-dimensional raised skeleton master copy cut through 1/16" thick brass. Ideal for engraving raised characters in semi-circular or other odd shapes when a more flexible arrangement is required.

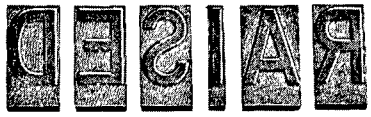
Simply solder or cement the characters onto a suitable back plate in the shape required and use in the same manner as the standard raised copy blanks. Skeleton copy can be used for either reading right or reverse by just turning the letters over.

X — Height of letter from center to center of stroke

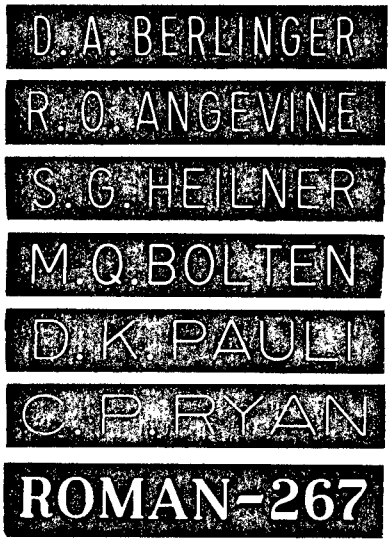
Y — Overall height of beveled brass blank

Z — Width of stroke on raised and skeleton letters

READING RIGHT (FORWARD)



READING REVERSE (BACKWARD)



Two-dimensional raised master copy and skeleton copy is available in 1A, 3A and 4A fonts, in styles No. 1SR through 6SR in the following sizes:

1/2" high letters
on 3/4" beveled brass blanks.

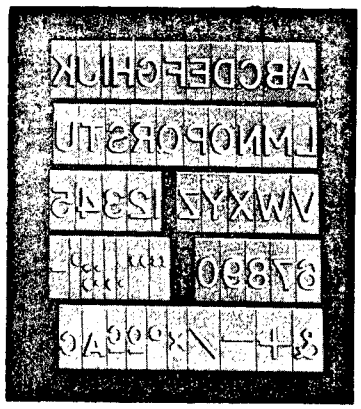
1/2", 3/4" or 1" high letters
on 1-1/4" beveled brass blanks.

1" or 1-1/2" high letters
on 2-1/4" beveled brass blanks.

Note: Skeleton letters are cut through the brass plate and therefore have no base or copy blank.

The width of stroke varies with the height of letter and unless otherwise specified will be standard as follows:
In style 1SR thru 6SR:

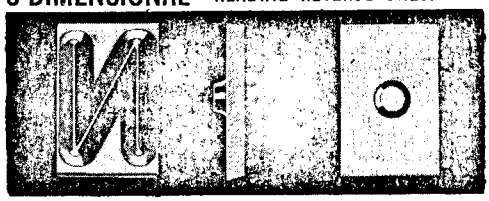
.062" wide stroke on 1/2" high letters
.080" wide stroke on 3/4" high letters
.100" wide stroke on 1" high letters
.125" wide stroke on 1-1/2" high letters



This is style No. 4SR, 2-dimensional, raised master copy type

Be sure to specify: Font Size, Style Number, height of letter, height of blank, reading right or reading reverse. For skeleton letters add "SKELETON" to the style number.

3-DIMENSIONAL READING REVERSE ONLY.



FRONT SIDE BACK

This is 3-dimensional raised master copy (patented), suitable only for use on 3-dimensional Engraving and Die Cutting machines. With this master copy type hand finishing is entirely eliminated and finished stamps with sharp inside corners can be cut in a minimum of time. Side wall angles can be varied from 35° to 55° by using a cutter and tracing stylus with identical side angles. For tracing styles see page 10.

3-dimensional raised master copy type is molded from durable plastic material and with ordinary care will last a long time. The characters are molded with double angles, the lower part *with 20°* side angle to permit close spacing between letters and the upper part with 35° side angle for added strength. The 3 heights of letters listed below are molded on 3 different size blanks to permit a minimum of spacing between lines.

All characters have a stud centrally located on the back for aligning them in circles, curves or irregular shaped contour lines. *Simply cut a groove into a brass* or dow metal plate, apply cement or double edge adhesive tape and press letters into place.

The 1/4" and 1/2" high letters also have two beveled edges for setting up straight lines of copy in the dove-tail grooves of the No. 3225 or No. 3250 copy holder tables illustrated on page 8. The *5/32" high* letters are not furnished with beveled edges.

A set of 7 fractions, from 1/8 to 7/8 in steps of 1/8" are available in styles No. 2SM and 4SM, 1/2" high only.

Made only in styles and sizes listed here	Style No.	Height of Letters
R.O.ANGEVINE	2SM	1/4" or 1/2"
M.Q.BOLTEN	4SM	1/4" or 1/2"
C.P.RYAN	6SM	5/32", 1/4" or 1/2"
D.K.PAULI	7SM	5/32", 1/4" or 1/2"

This is style No. 4SM, 3-dimensional raised master copy type.

Sold in 4A fonts or individual characters only.

PREIS-PANTO MASTER COPY TYPE

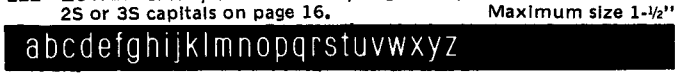
SPECIAL TYPE FACES MADE TO ORDER ONLY

All Master copy type on this page is made to order only in sunk, reading right or reading reverse up to the maximum size listed after each specimen. 1A fonts include one of each character shown.

LOWER CASE LETTERS

221 LOWER CASE, EXTRA CONDENSED, single vee groove. Use with No. 1S or 2S capitals on page 16. Maximum size 3"

222 LOWER CASE, CONDENSED, single vee groove. Use with No. 2S or 3S capitals on page 16. Maximum size 1-½"



223 LOWER CASE, SEMI-CONDENSED, single vee groove. Use with No. 3S or 4S capitals on page 16. Maximum size 3"

224 LOWER CASE, NORMAL, single vee groove. Use with No. 4S or 5S capitals on page 16. Maximum size 1-½"

225 LOWER CASE, EXTENDED, single vee groove. Use with No. 5S or 6S capitals on page 16. Maximum size 1-½"

251V LOWER CASE, ROMAN CONDENSED, outline vee groove. Use with style No. 204 capitals on page 18. Maximum size 4"

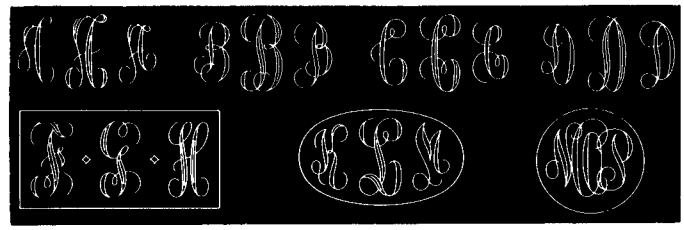
252V LOWER CASE, ROMAN MEDIUM, outline vee groove. Use with style No. 205 capitals on page 18. Maximum size 4"

INCLINED GOTHIC, CURSIVE, SCRIPT, MONOGRAM

211 INCLINED GOTHIC, single vee groove. Maximum size 3"

249 CURSIVE, single vee groove (see also No. 64, page 18, for letters up to 1" high) Maximum size 4"

250V SCRIPT, outline vee grooves (see also style No. 91, page 18, for letters up to 1" high) Maximum size 4"



239V MONOGRAM SCRIPT, for initials or monograms. Maximum size 4"

CHAMFER GOTHIC

241 CHAMFER GOTHIC, EXTRA CONDENSED, single vee-groove. Maximum size 6"

242 CHAMFER GOTHIC, CONDENSED, single vee groove. Maximum size 6"

244 CHAMFER GOTHIC, NORMAL, single vee groove. Maximum size 6"

OPEN FACE GOTHIC

213V OPEN FACE GOTHIC, CONDENSED, outline vee groove. For stencil letters order 213V Stencil. Maximum size 4"

214V OPEN FACE GOTHIC, NORMAL, outline vee groove. For stencil letters order 214V Stencil. Maximum size 4"

215V OPEN FACE GOTHIC, EXTENDED, outline vee groove. For stencil letters order 215V Stencil. Maximum size 4"

SQUARE CORNER GOTHIC

232F SQUARE CORNER GOTHIC, CONDENSED, flat-bottom groove only. Maximum size 3"

234F SQUARE CORNER GOTHIC, NORMAL, flat-bottom groove only. Maximum size 3"

236F SQUARE CORNER GOTHIC, EXTENDED, flat-bottom groove only. Maximum size 3"

PREIS-PANTO MASTER COPY TYPE

SPECIAL TYPE FACES

All Master copy type on this page is **made to order only** in sunk, reading right or reading reverse up to the maximum size listed after each specimen. 1A fonts include one of each character shown.

211 Inclined Gothic, single vee-groove. Maximum size **3″**.

212 Air Force-Navy Design Standard (MS-33558-ASG), single vee-groove. Maximum size **3″**.

221 Lower Case, Extra Condensed, single vee-groove. Use with 1S or 2S capitals on page 16. Maximum size **3″**.

222 Lower Case, Condensed, single vee-groove. Use with 2S or 3S capitals on page 16. Maximum size **1-1/2″**.

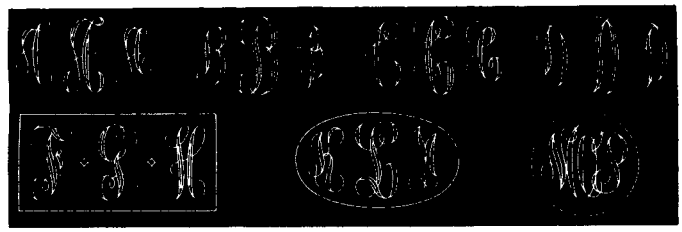
223 Lower Case, Semi-Condensed, single vee-groove. Use with 3S or 4S capitals on page 16. Maximum size **3″**.

224 Lower Case, Normal, single vee-groove. Use with 4S or 5S capitals on page 16. Maximum size **1-1/2″**.

225 Lower Case, Extended, single vee-groove. Use with 5S or 6S capitals on page 16. Maximum size **3″**.

226 Modern Gothic, Capitals, single vee-groove. Maximum size **3″**.

227 Modern Gothic, Lower Case, single vee-groove. Maximum size **3″**.



239V Monogram Script, for initials or monograms. Maximum size **4″**.

241 Chamfer Gothic, Extra Condensed, single vee-groove. Maximum size **6″**.

242 Chamfer Gothic, Condensed, single vee-groove. Maximum size **6″**.

244 Chamfer Gothic, Normal, single vee-groove. Maximum size **6″**.

213V Open Face Gothic, Condensed, outline vee-groove. For stencil letters order **213V-Stencil.** Maximum size **4″**.

214V Open Face Gothic, Normal, outline vee-groove. For stencil letters order **214V-Stencil.** Maximum size **4″**.

215V Open Face Gothic, Extended, outline vee-groove. For stencil letters order **215V-Stencil.** Maximum size **4″**.

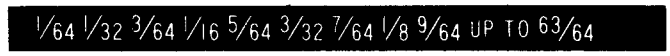
216 Greek Capitals, single vee-groove. Maximum size **1-1/2″**.

217 Greek Lower Case, single vee-groove. Maximum size **1-1/2″**.

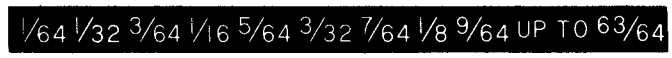
218V Greek Capitals, outline vee-groove. Maximum size **3″**.
218F . . . same style with flat-bottom groove.

219 Russian Capitals, single vee-groove. Maximum size **1-1/2″**.

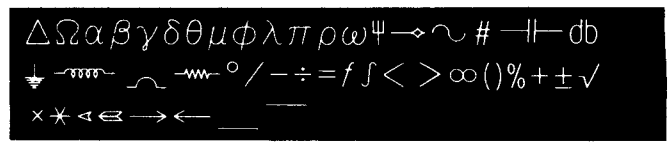
220 Roman Numerals, single vee-groove. Maximum size **1-1/2″**.



228 Fractions, condensed, single vee-groove. Use with 1S, 2S or 3S plain gothic on page 16. Maximum size **2-1/4″**.

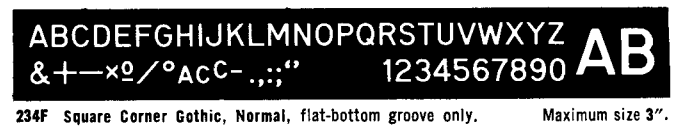


229 Fractions, normal, single vee-groove. Use with 3S, 4S or 5S plain gothic on page 16. Maximum size **2-1/4″**.

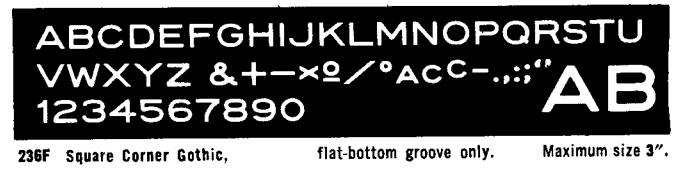


230 Electrical-Technical Symbols, single vee-groove. Maximum size **1-1/2″**.

232F Square Corner Gothic, Condensed, flat-bottom groove only. Maximum size **3″**.



234F Square Corner Gothic, Normal, flat-bottom groove only. Maximum size **3″**.



236F Square Corner Gothic, flat-bottom groove only. Maximum size **3″**.

PREIS-PANTO MASTER COPY TYPE

SPECIAL TYPE FACES — MADE TO ORDER ONLY

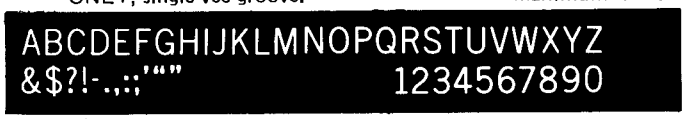
All Master copy type on this page is made to order only in sunk, reading right or reading reverse up to the maximum size listed after each specimen. 1A fonts include one of each character shown.

COMPARABLE TYPE FACES (see type marked with asterisk)

*226 MODERN GOTHIC, CAPITALS, single vee groove. Comparable to Futura. Maximum size 3"

*227 MODERN GOTHIC, LOWER CASE, single vee groove. Comparable to Futura. Maximum size 3"

*237 Comparable to NEWS GOTHIC CONDENSED, CAPITALS ONLY, single vee groove. Maximum size 3"



*238 Comparable to NEWS GOTHIC MEDIUM, CAPITALS ONLY, Single vee groove. Maximum size 3"

*247 Comparable to FOLIO CONDENSED, CAPITALS ONLY, Single vee groove. Maximum size 1-½"

*248 Comparable to FOLIO EXTENDED, CAPITALS ONLY, Single vee groove. Maximum size 1-½"

*254V Comparable to HELVETICA MEDIUM, CAPITALS, Outline vee groove. Maximum size 4"

*255V Comparable to HELVETICA MEDIUM, LOWER CASE, Outline vee groove. Maximum size 4"

FOREIGN TYPE FACES

216 GREEK CAPITALS, single vee groove. Maximum size 1-½"

217 GREEK LOWER CASE, single vee groove. Maximum size 1-½"

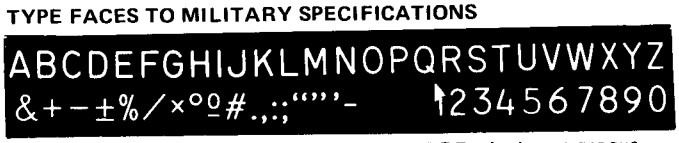
218V GREEK CAPITALS, outline vee groove. 218F....same style with flat-bottom groove. Maximum size 3"

219 RUSSIAN CAPITALS, single vee groove. Maximum size 1-½"

245V HEBREW, MEDIUM, outline vee groove. Maximum size 3"

246V HEBREW, CONDENSED, outline vee groove. Maximum size 3"

TYPE FACES TO MILITARY SPECIFICATIONS

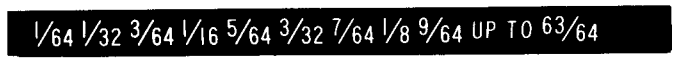


212 AIRFORCE-NAVY DESIGN STANDARD, single vee groove. (MS-33558-ASG) Maximum size 3"

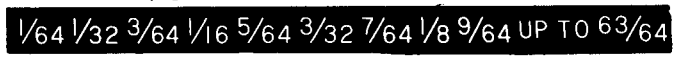
240 BUREAU OF SHIPS, single vee groove. (No. 73687, 6-18-51) Numbers only, (Use with letters from style No. 212). Maximum size 3"

ROMAN NUMERALS, FRACTIONS, TECHNICAL SYMBOLS

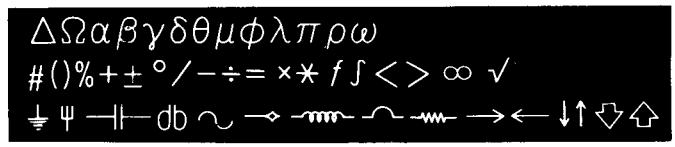
220 ROMAN NUMERALS, single vee groove. Maximum size 1-½



228 FRACTIONS, CONDENSED, single vee groove. Use with 1S, 2S, or 3S on page 16. Maximum size 2-¼"



229 FRACTIONS, NORMAL, single vee groove. Use with 3S, 4S,or 5S on page 16. Maximum size 2-¼"



230 ELECTRICAL-TECHNICAL SYMBOLS, single vee groove. Maximum size 1-½"

253 EXTRA CONDENSED NUMERALS, outline vee groove. Maximum size 6"

256 SPECIAL CHARACTERS Maximum size 3"

ASSORTED ARROWS (See Price List for Lengths)