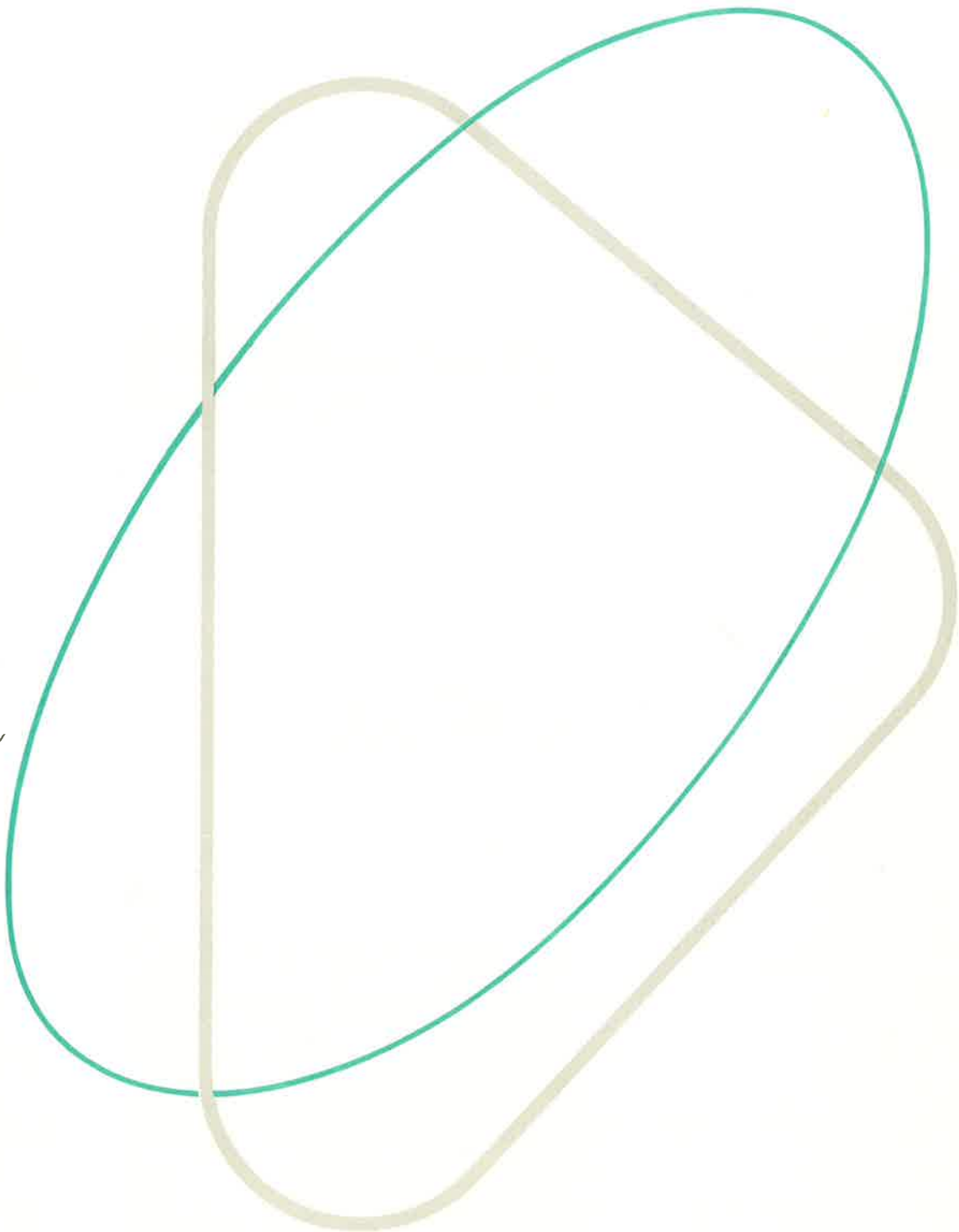




**it's easy
to bend
with**

di-acro

**precision
bending
machines**












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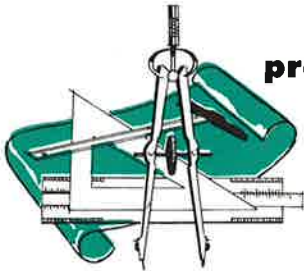
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it's easy to bend . . .

Increased knowledge of the cold bending of metals and improvements in bending machines during the past decade have opened new horizons in the manufacturing field as many forming operations not considered practical some years ago can now be readily performed.

Technically metal bending is rather involved due to the physical change that occurs within the material during the bending operation and also because the numerous types of alloys available each react differently when formed.

Rather than discuss these technical problems the purpose of this booklet is to illustrate and describe the multitude of bending operations that can easily be accomplished without special engineering knowledge provided a few elementary principles are observed.



product design

Design of the formed parts in a product generally determines whether or not they can be efficiently and economically produced. Give careful consideration to these suggestions.

Selection of material is of first importance as it must be sufficiently ductile to produce a satisfactory bend of the smallest radius required and still be strong enough to provide the rigidity which the product demands.

It is usually desirable to designate the largest practical radius as this gives wider latitude in choice of material and often assures a better bend in both strength and appearance.

By using the same size material and designating identical radii for each bend whenever possible, the tooling of the bending machine can be simplified and the highest possible production obtained as a number of successive bends can then be progressively made in a part, thereby completing it before it is removed from the machine.

Compound bends or adjacent bends in different planes should be avoided if possible because of conflict that may occur between the bends which might necessitate special tooling. This is especially true in tubing but also holds for solid materials.

Generally the smallest recommended radius for tubing, measured to the exact center of the tube, is $1\frac{1}{2}$ times the outside diameter of the tube provided an inside mandrel is used when bending. This minimum centerline radius should be increased to at least $2\frac{1}{2}$ times the outside diameter of the tube if the bend is to be made without an inside mandrel.

In making a bend near the end of a tube a straight length equal to at least the diameter of the tube should extend beyond the bend. If a bend is required to the very end of the tube a straight length should be allowed and trimmed after forming.



selection of material

From the numerous types of material available in tubing, extrusions, mouldings, channel and solid bars, the most suitable material for production of a part can usually be chosen.

In making this selection the ductility of the material should be given prime consideration and before a decision is made a sample should be formed to the smallest required radius or assurance obtained from the supplier that the bend can be satisfactorily made.

Elasticity of the material, which causes it to spring back after it has been bent, must also be considered as it may be impossible to form a closed eye or a complete circle in some alloys.

If tubing is to be bent without an inside mandrel the heaviest practical wall should be used. As a rule, in non-ferrous metals, one quarter to half hard tubing provides best results.

When bending channels, angles, mouldings and extrusions the centerline radius of the bend should usually be at least three times the width of the flange to be formed edgewise.

choice of bending machine

A number of bending machines are offered on the market today and your choice of the most suitable bender can largely be determined by the range of your bending requirements.

These machines are available in both small and large manually operated models as well as power driven units; some designed for one specific application and others capable of performing a wide variety of operations.

Should your work consist only of one specialized operation such as the bending of thin wall tubing on a high speed basis, obviously a completely automatic bender is the answer.

If on the other hand your jobs are so varied that you are called on to form a variety of materials such as tubing, angle, channel, extrusions, mouldings and bus bars in addition to solid materials, a universal all-purpose bender will best serve your needs.

Oftentimes small parts can be formed faster and cheaper with manually operated benders provided production quantities do not warrant completely automatic equipment.

Careful study of specifications, capacities and working range of the various benders under consideration will enable you to choose the most logical unit for your own operations.



tooling the bender

All bending machines merely provide a means of applying power either manually or mechanically to perform the bending operation and supply mountings for the bending tools.

These tools consist of a form or radius collar having the same shape as the desired bend, a clamping block or locking pin that securely grips the material during the bending operation and a forming roller or follow block which moves around the bending form.

When bending materials of open cross section such as tubing, channel, angle and extrusions, the bending form should exactly fit the contour of the material to provide support during the forming operation. This is also true of the clamping block and forming roller as only by completely confining the material can a perfect bend be obtained.

Since all metals are somewhat elastic, they will spring back more or less after they are formed and for that reason the bending form must usually have a smaller radius than the required bend. The amount of springback is dependent upon the type of material, its size and hardness, as well as the radius of the bend and it is usually necessary to experiment somewhat to determine the exact size of the bending form.

Bending is no different than any machining operation in that the results obtained will be in direct proportion to the care taken in properly tooling the bender for the job to be done.

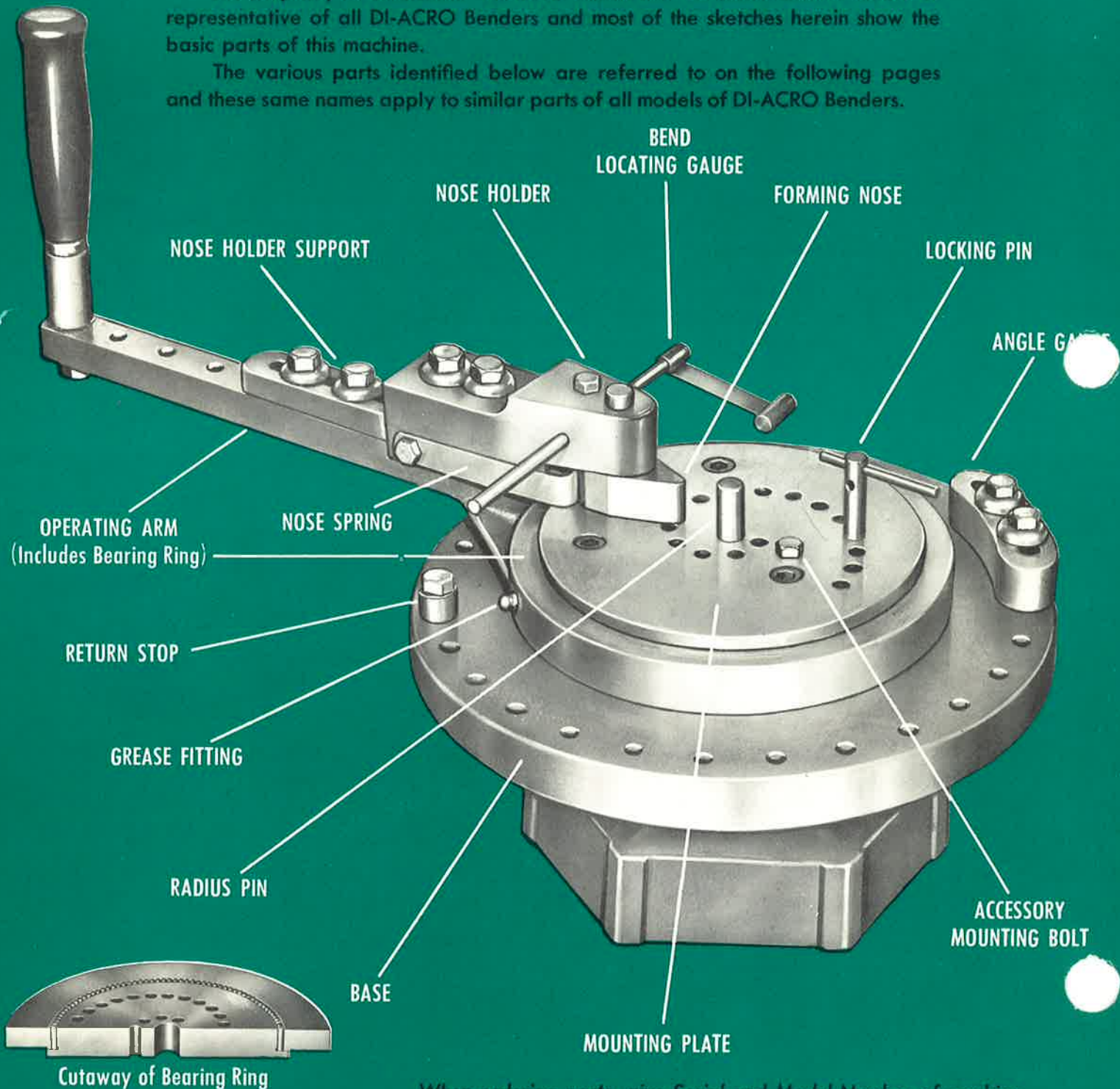


the DI-ACRO BENDER

As all DI-ACRO Benders—both hand and power operated—are identical in operating characteristics and extreme flexibility, the instructions throughout this booklet cover the entire line of these machines.

For simplicity of illustration we have chosen the 1A model shown below as representative of all DI-ACRO Benders and most of the sketches herein show the basic parts of this machine.

The various parts identified below are referred to on the following pages and these same names apply to similar parts of all models of DI-ACRO Benders.



When ordering parts, give Serial and Model Number of machine.

DI-ACRO BENDER No. 1

Although it is the "midget" of the DI-ACRO Bender family, this precision machine is a high speed production unit for all materials within its range. Small parts can often be formed at rates in excess of 750 bends per hour. Weighing only 22 pounds, it has a material capacity of 3/16" round steel bar and 5/16" diameter steel tubing. Radius Capacity 2".

DI-ACRO BENDER No. 1A

This model is ideal for forming large radius bends in the lighter weight materials as it can be operated at practically the same speed as the smaller No. 1 size Bender. It has a material capacity of 5/16" round steel bar and 1/2" diameter steel tubing. Radius Capacity 6". Net weight 55 pounds.

DI-ACRO BENDER No. 2

For many years this has been the most popular DI-ACRO Bender for the heavier operations. Its rugged construction assures continuous day in and day out production in materials as heavy as 1/2" round steel bar and 3/4" diameter steel tubing. Although production varies with different jobs and materials it is not unusual to obtain 200 to 250 bends per hour with this unit. Radius Capacity 9". Net Weight 130 pounds.

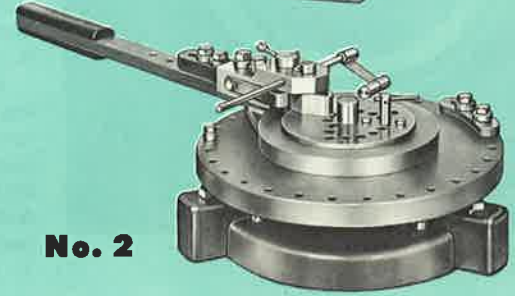
DI-ACRO BENDER No. 3

Primarily designed for large radius bends in heavy materials, this model is continually gaining in popularity because of its wide range of application. Torrington Roller Bearings in the main pivot assure maximum output with a minimum of effort. Capacity—5/8" round steel bar—1" diameter steel tubing. Radius capacity 12". Net weight 215 pounds.

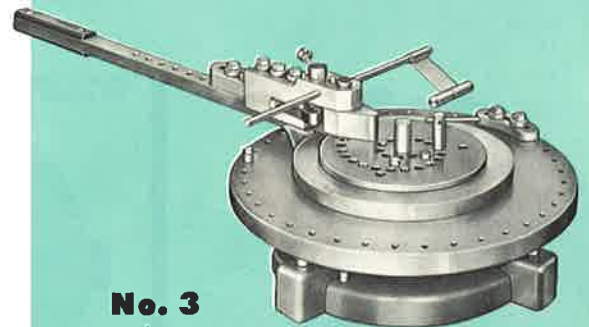
DI-ACRO BENDER No. 4

The new DI-ACRO Bender No. 4 is ideal for bending the heavier materials where high speed production is not a factor as its ratchet lever greatly multiplies the operators efforts. It can also be operated by direct drive for the lighter materials. Capacity—1" round steel bar—1 1/2" diameter steel tubing. Radius Capacity 12"—Net weight 240 pounds.

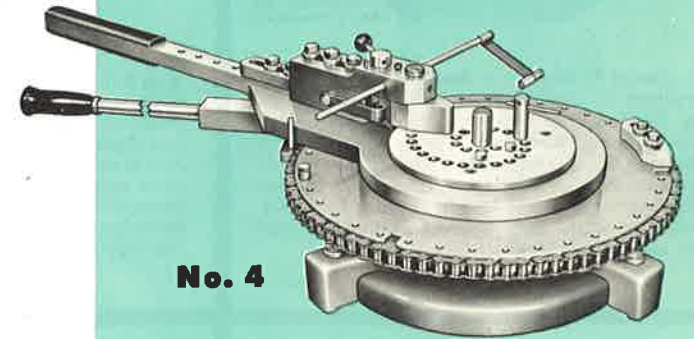
No. 1



No. 2



No. 3



No. 4

Specifications

Di-Acro BENDER	No. 1	No. 1A	No. 2	No. 3	No. 4
Radius Capacity	2"	6"	9"	12"	12"
Height of Std. Forming Nose	1/2"	3/4"	1"	1 1/2"	1 1/2"
Built-up Nose available	1"	2"	3"	4"	4"
Center Pin Hole—Diameter	3/8"	1/2"	1"	1"	1"
Operating Leverage	8"	16"	29"	40"	40"
Weight—Net	22 lbs.	55 lbs.	140 lbs.	215 lbs.	250 lbs.

Material Capacities

Round Mild Steel Bar	3/16"	5/16"	1/2"	5/8"	1"
Square Mild Steel Bar	1/8"	1/4"	3/8"	1/2"	3/4"
Steel Tubing—16 gauge	3/16"	1/2"	3/4"	1"	1 1/4"
Standard Iron Pipe			3/8" I.D.	1/2" I.D.	1" I.D.
Flat Steel Bar (Bent flat)	1/8" x 3/4"	3/16" x 1"	1/4" x 1 1/2"	1/4" x 2"	3/8" x 4"
Flat Steel Bar (Edgewise)	3/16" x 1/2"	1/8" x 1/2"	1/8" x 3/4"	1/8" x 1"	1/4" x 1"
Angle	3/16" x 1/2" x 1/2"	1/8" x 1/2" x 1/2"	1/8" x 3/4" x 3/4"	1/8" x 1" x 1"	3/16" x 1" x 1"
Channel	3/16" x 1/4" x 1/2"	3/16" x 1/2" x 1/2"	1/8" x 3/8" x 3/4"	1/8" x 1/2" x 1"	3/16" x 1/2" x 1"



CENTERED EYE BENDING . . . standard DI-ACRO Bending Procedure



Detailed illustrations below show procedure for cold forming a standard bend in solid material with the DI-ACRO Bender.

Bending a completely centered eye, containing two bends, in one forming cycle is one of the many valuable operations possible with all DI-ACRO Benders. The diameter of the eye can be easily varied by merely using a different size Radius Pin or Collar. See listing of Standard Radius Accessories offered on page 26.

In figure 1 below, the automatic Forming Nose is shown set for the exact material thickness and this adjustment is necessary when bending centered eyes as the Forming Nose must be in close contact with the material when the eye centering bend, shown in Figure 6, is made. To eliminate work marking, Forming Nose can be grooved to fit material. See figure 6 on page 16. Lubricating the Forming

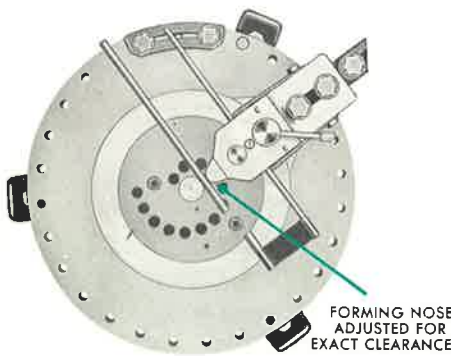
Nose also reduces marking.

When the material to be formed is sufficiently rigid and the required bend is somewhat less than 360°, it is often desirable to leave considerable clearance between the material and the Forming Nose, as this reduces the bending effort.

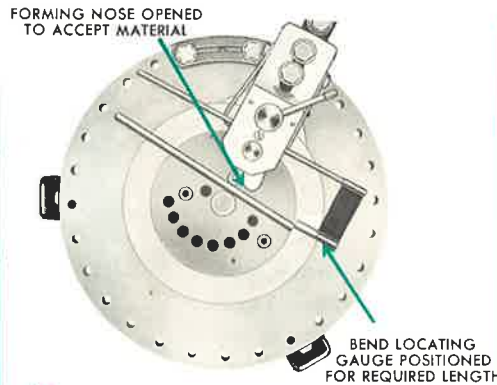
Under these conditions it is also possible to use a Forming Roller as illustrated in figures 1 to 3 on page 7 and its use is especially recommended when it is desirable to reduce work marking.

Flattening on the inside of a bend, which occurs when round materials are formed to a small radius, can be eliminated by grooving the Radius Pin or Collar to exactly fit the Bar. If the bend is in excess of 180°, the grooved pin or collar must be split horizontally so the formed material can be removed.

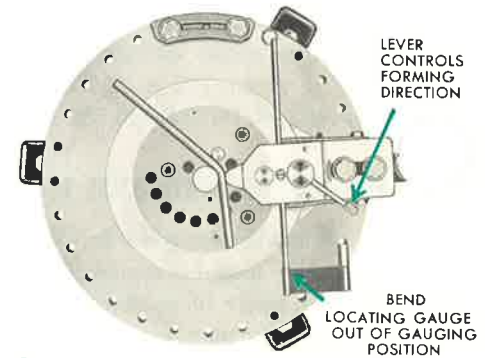
The Locking Pin supplied with each



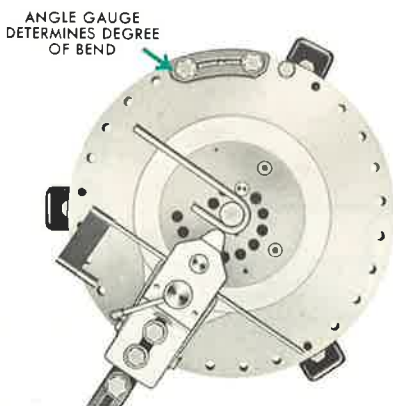
1. Mount Radius Pin or Radius Collar, of size required for desired bend, in center of Mounting Plate. Adjust automatic Forming Nose by moving Nose Holder so material will fit snugly between Nose and Radius Pin as illustrated, set Nose Holder Support against Nose Holder and tighten all bolts. Locate Locking Pin in the Mounting Plate hole nearest Radius Pin that will enable it to securely lock material.



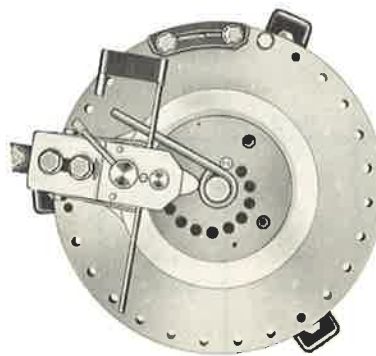
2. Adjust Angle Gauge for degree of bend and set Return Stop to limit opening of Forming Nose. Set Bend Locating Gauge to position Bend. See figure 7, on page 16. Move Operating Arm in counter clockwise direction until Forming Nose opens, as illustrated. Then insert material between Locking Pin and Radius Pin and against Bend Locating Gauge. Lock material securely. See figure 1, page 25.



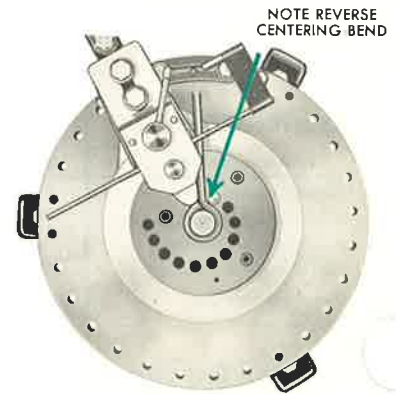
3. Move Bend Locating Gauge upward and begin bending operation by advancing Operating Arm in clockwise direction. When desirable to form in counter clockwise direction with No. 2, No. 3, or No. 4 DI-ACRO Bender, move Control Lever, shown above, to opposite side of Nose Holder. Figure 8 on page 16 illustrates how bending direction of the No. 1 and No. 1A models can be reversed.



4. At this point a "U" bend has been completed. Any degree of bend can be accurately obtained and duplicated by adjustment of the Angle Gauge mounted in the outer rim of holes in the base casting.



5. A 360° bend has now been produced. In order to obtain a centered eye of a greater diameter or a bend of a larger radius, it is only necessary to use a Radius Pin or Collar of the proper diameter.



6. An accurately centered eye is illustrated, completed in one operation. The centering or reverse bend is obtained simultaneously as the eye is being closed by forcing the rod against the Locking Pin.

OFF-CENTER EYE BENDING

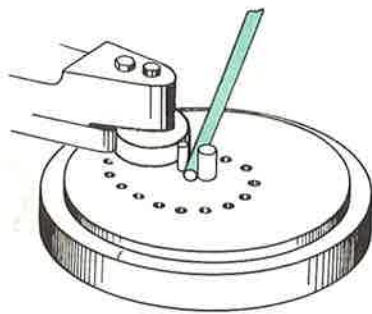
ACRO Bender should be used whenever possible as it provides a positive means of clamping the material against the Radius Pin or Collar so it will not slip when bending pressure is applied. See figure 1 on page 25.

When multiple bends are required in one part, the most logical sequence of bends should first be determined by completely forming one experimental piece to eliminate the possibility of interference. Confiction between bends can often be removed by reversing the forming direction of the Bender.

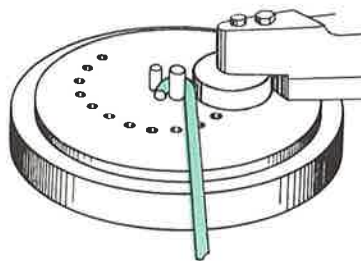
After the bending sequence has been determined, highest production is usually obtained by setting the DI-ACRO Bender for one particular bend and forming that bend in the entire production run of parts. Bender should be reset for each successive series of bends.

As all metals are somewhat elastic they will spring back, more or less, after they are formed and the bending pressure is released. To compensate for this, it is often necessary to overbend a few degrees beyond the desired angle. After springback has been determined, the Angle Gauge can be set so that all bends will be exactly duplicated.

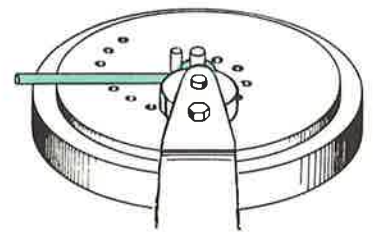
In addition to overbending to obtain the required shape, it is often necessary to form the material around a Radius Pin or Collar that has a smaller radius than that of the desired bend. This is equally true whether the material is tubing, angle, channel or a solid bar. The actual size of the Radius Pin or Collar can be best determined by experiment as the amount of springback is dependent upon the kind of material, its hardness and thickness as well as the radius of the bend.



1. To reduce work marking and ease bending effort install a Forming Roller as offered on page 26. Standard Forming Nose can also be used for this operation. Follow instructions in figure 1 on page 6.

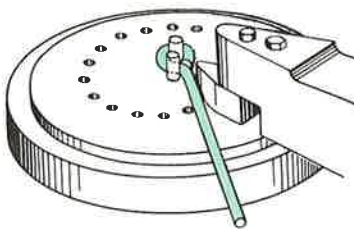


2. Insert material between Locking Pin and Radius Pin and set Forming Roller against material. Lock material against Radius Pin as illustrated in figure 1. Advance Operating Arm until it strikes Angle Gauge.



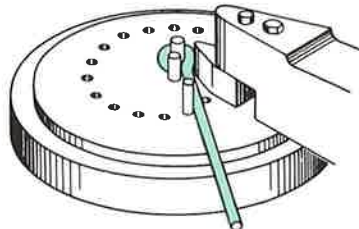
3. An off-center eye has now been completed in one operation and additional parts can be rapidly and exactly duplicated by following the same procedure. This same shape can be readily formed in all types of solid materials.

ALTERNATE METHODS OF CENTERED EYE BENDING



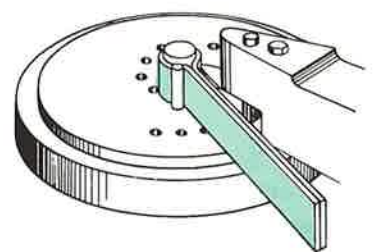
4. Centering Eye in Second Operation

When the material is too heavy to be formed in a centered eye in one operation, an off-center eye should first be produced as shown in figures 1 to 3. The eye should then be placed over the Locking Pin and the centering bend made around a Radius Pin of the desired size as illustrated.



5. Centering Eye Using Two Locking pins

It is sometimes possible to form a centered eye in heavy materials in one operation by following the procedure in figures 1 to 3. The centering bend is obtained by forcing the material against a pin remotely located in a Mounting Plate hole as shown. If necessary, this pin can be mounted from the Bender Base.



6. Forming Pipe Strap in One Operation

A pipe strap containing three individual bends can be formed in one operating cycle by following the procedure outlined on page 6. The only difference is that the material must be gauged so that both ends will extend beyond the Locking Pin and thereby be formed during the centering operation.

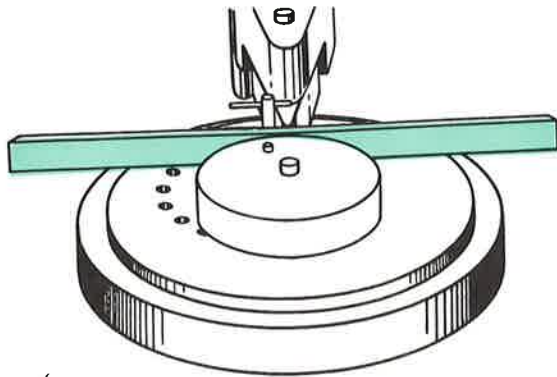
CIRCLE BENDING



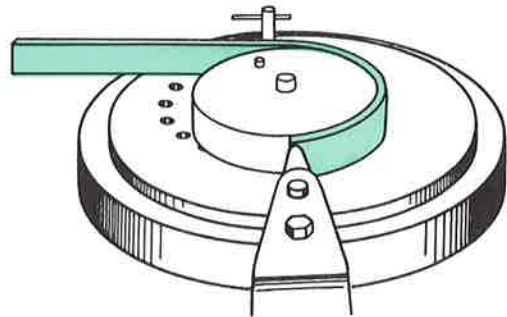
Although a circle can be readily formed with DI-ACRO Benders, this operation is somewhat involved by the fact that most materials "springback" after they have been formed. To compensate for this, it is often necessary to use a Radius Collar having a smaller diameter than that of the circle required. Actual size can best be determined by experiment, as the "springback" varies in different materials. Material should be precut to exact length before forming.

A complete circle can also be formed in one operation by clamping the material at one end and revolving the Operating Arm 360°, however this method produces longer unformed lengths of material where the ends meet than when using the two operation method illustrated.

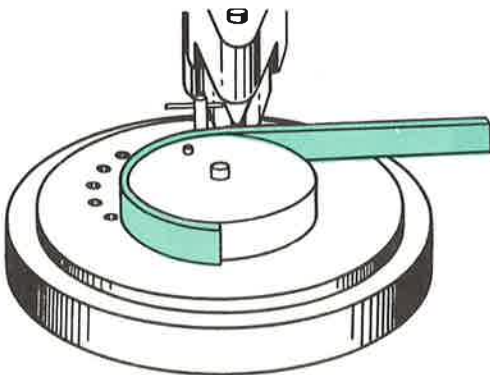
It is sometimes desirable to preform both ends of material. Then, by clamping one formed end, circle can be closed in a third operation.



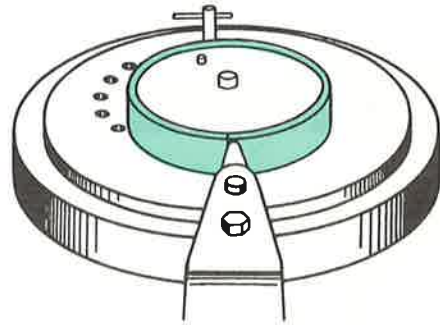
1. Set Forming Nose against material and clamp material against Radius Collar with Locking Pin.



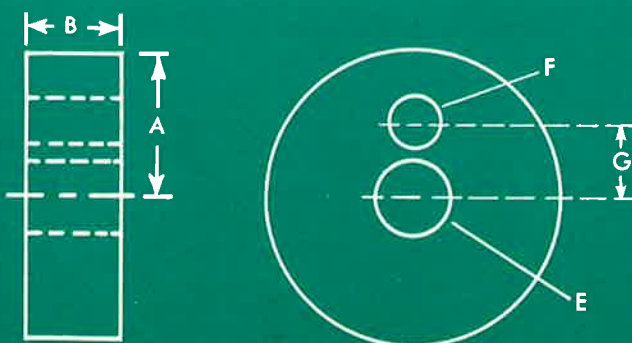
2. Advance Operating Arm until Forming Nose reaches extreme end of material.



3. Relocate material and clamp with Locking Pin at a point where radius is already formed.



4. Advance Operating Arm until Forming Nose again reaches extreme end of material.



DI-ACRO BENDER

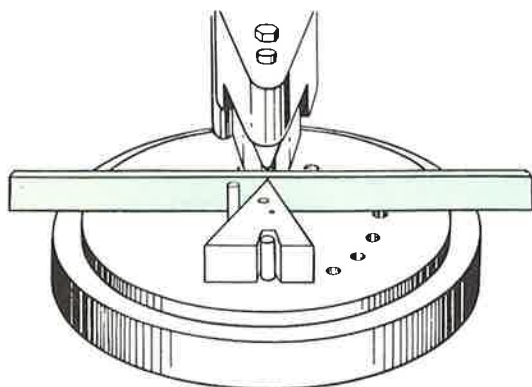
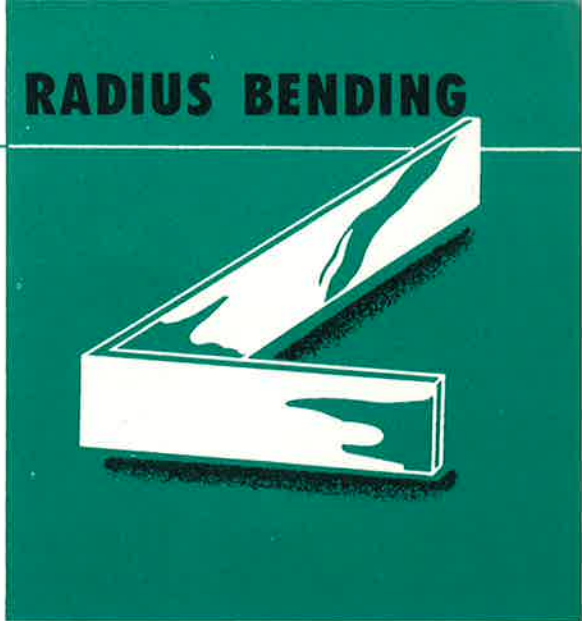
NO.	1	1A	2	3	4
A	RADIUS OF PART LESS SPRINGBACK				
B	1/2	3/4	1	1 1/2	1 1/2
E	3/8	1/2	1	1	1
F	1/4	3/16	1/2	3/8	3/4
G	1 1/32	3/16	7/8	1 5/16	1 1/16

ZERO RADIUS BENDING

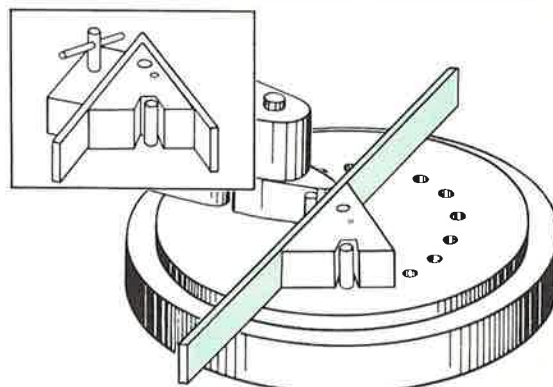
A sharp zero radius bend can be easily formed with DI-ACRO Benders by using a Zero Radius Block similar to the one illustrated. Although the sketches below show the forming of strip stock, this operation can be performed equally as well in round, square and other solid, ductile materials.

When forming heavy materials to a zero radius, their ductile limits must be taken into consideration and it is often desirable to provide a small radius on the bending edge of the block to avoid fracture or marking on inside of the bend.

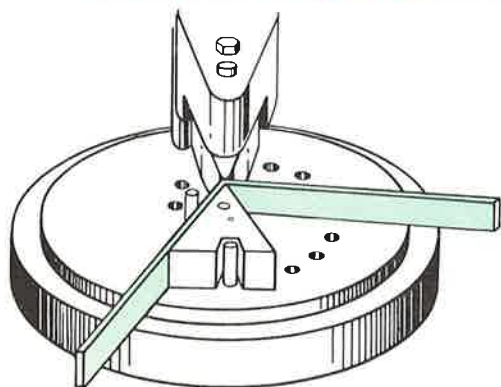
By using a Built-up Forming Nose and mounting two or more Zero Radius Blocks on each other, the forming width capacity of all DI-ACRO Benders can be increased considerably on this type of operation. Parts are offered on page 26, or they can be easily made in your own plant to meet your specific requirements.



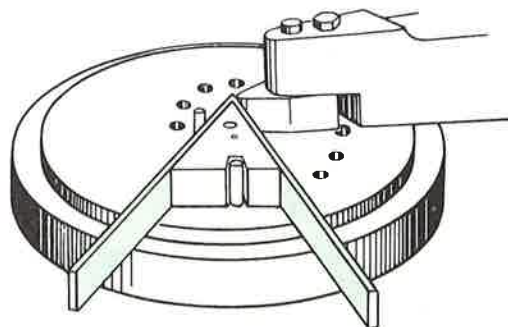
1. Adjust Forming Nose so material will fit snugly between Nose and apex of Zero Radius Block.



2. Clamp material close to bending edge using Locking Pin or Holding Block illustrated.



3. Advance Operating Arm until it strikes Angle Gauge, thereby establishing exact degree of bend.

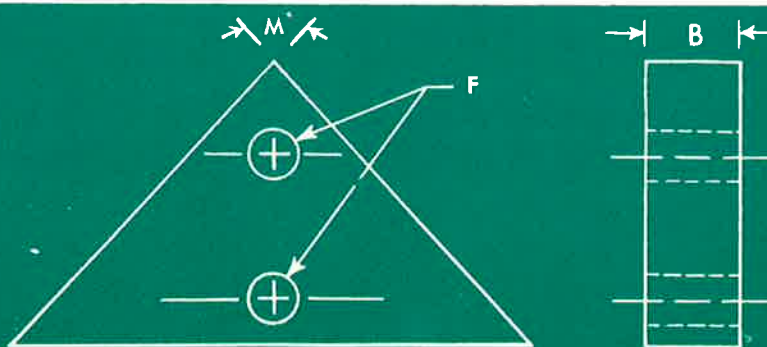


4. Bend is now completed and additional parts can be exactly duplicated by repeating cycle.

DI-ACRO BENDER

NO.	1	1A	2	3	4
B	1/2	3/4	1	1 1/2	1 1/2
F	1/4	5/16	1/2	3/4	3/4
M*	60°	78°	78°	82°	82°

*DEGREE OF ANGLE IS ONLY LIMITED BY THE AMOUNT OF MATERIAL THAT MUST BE LEFT AROUND MOUNTING HOLES F FOR STRENGTH.



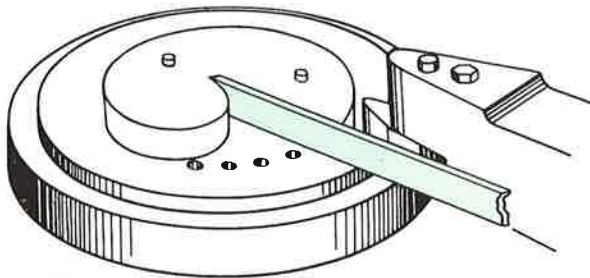
SCROLL BENDING



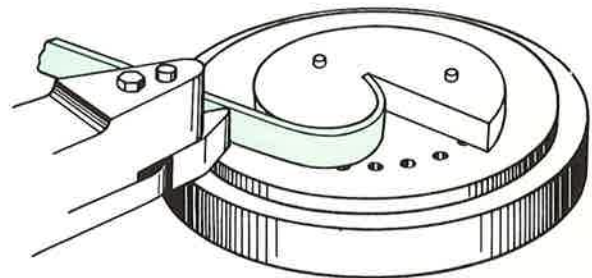
Scrolls and other shapes of irregular radii can be readily formed with DI-ACRO Benders in rigid materials even though the Forming Nose of the Bender revolves in a perfect circle.

This type of forming is accomplished by using a collar having the same contour as the shape to be formed, as illustrated below, and adjusting the Forming Nose so it is located only the material thickness away from the "high point" of the contour collar.

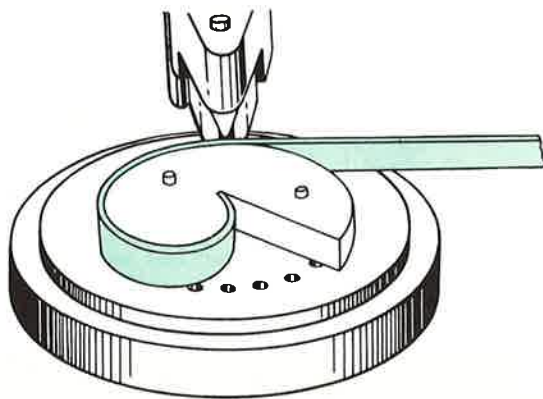
As the material will only bend where this contour collar offers resistance, the Forming Nose can lead the material around until it contacts the "high point" and exerts sufficient pressure to force it into the shape of the collar.



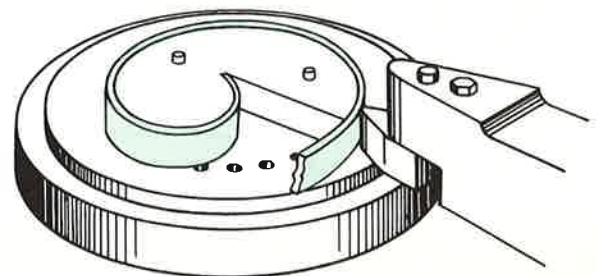
Adjust Forming Nose so material will fit snugly between Nose and "high point" of contour collar and insert material as shown.



2. Advance Operating Arm with a steady even pressure. Note how material bends only where resistance is offered by contour collar.



3. Material continues to bend and take shape of contour collar as Operating Arm is advanced.



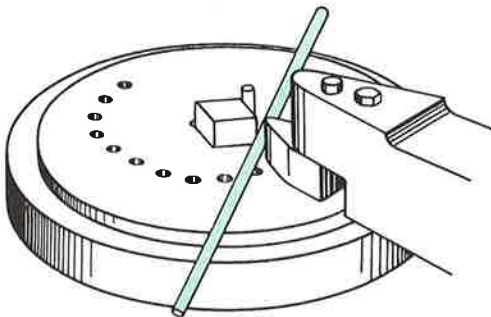
4. As Forming Nose reaches "high point" of contour collar, material is "set" in new shape.

SQUARE BENDING

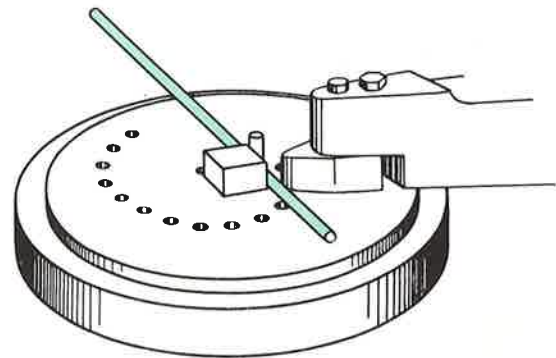
Forming zero radius bends around square, rectangular, or other multi-sided blocks employs the same principle used in scroll bending. Forming Nose "leads" material between corners of the block.

Any number of zero radius bends can be obtained in one operation by this method in all types of solid materials. Both a centered and off-center square eye can also be formed by following the same procedure outlined on pages 6 and 7.

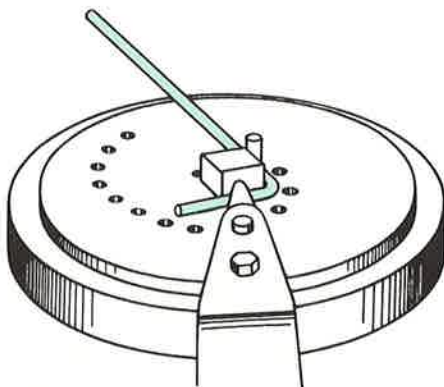
This method of bending is limited by the size of the square block and the ductility of the material. In general, when squares larger than 1" are needed, they should be formed in progressive operations using the zero radius block shown on page 9.



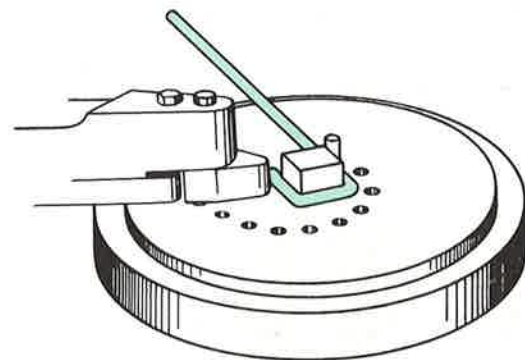
1. Adjust Forming Nose so material will fit snugly between Nose and any edge of Square Block.



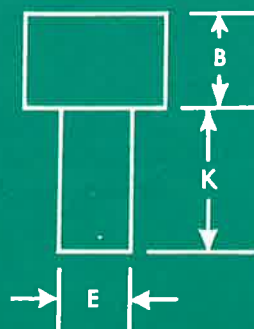
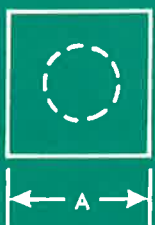
2. Clamp material between Locking Pin and Square Block and then advance Operating Arm.



3. Note how material remains straight between corners of block as Forming Nose moves into position for second bend.



4. Two bends have now been completed. A third bend can be obtained by merely advancing the Operating Arm.



DI-ACRO BENDER

NO.	1	1A	2	3	4
A	DESIRED DIMENSION BETWEEN BENDS				
B	1/2	3/4	1	1 1/2	1 1/2
E	3/8	1/2	1	1	1
K	1 1/8	1 1/8	1 1/8	1 1/4	1 1/4

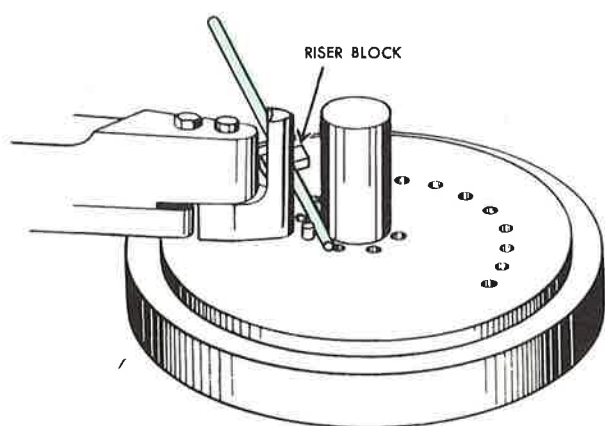
SPRING OR COIL BENDING



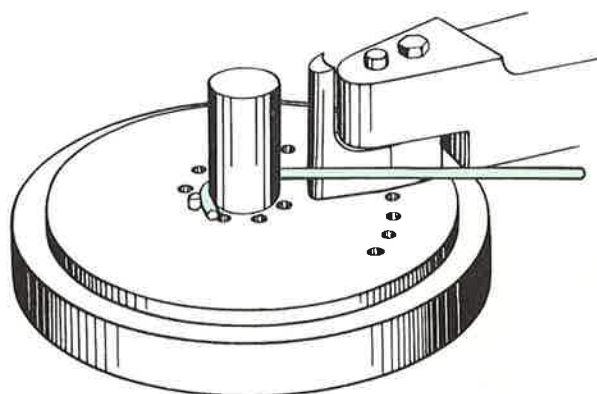
A spring or coil can be easily made in all solid materials with DI-ACRO Benders by following the method illustrated below.

The number of turns in the coil is only limited by the height of the Forming Nose and Radius Pin and these can be made in any reasonable dimensions dependent on the size and ductility of the material.

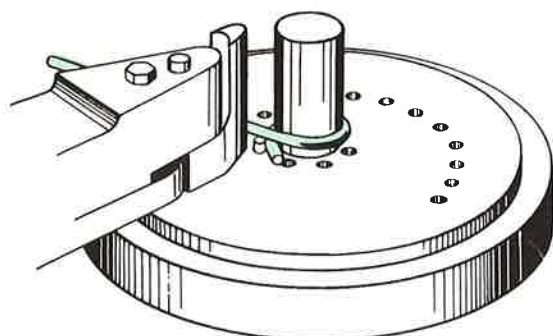
The Forming Nose must be set so it will clear the end of the material held by the Locking pin. The maximum length of this end is determined by the ductile limits of the material as it must be sufficiently rigid so it will not bow between the Forming Nose and the Radius Pin.



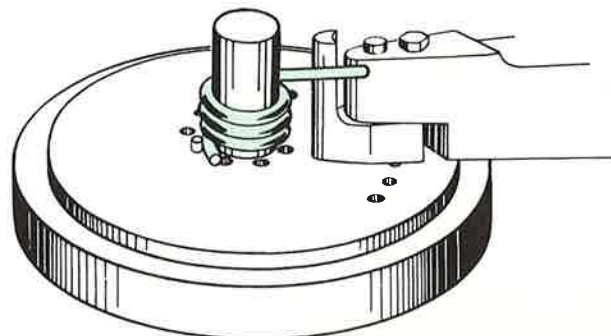
1. Use Locking pin short enough to allow material to pass over it as first coil is made and set Built-Up Forming Nose to clear end of material.



2. Tilt material to obtain the desired pitch of coil using riser block on Mounting Plate as illustrated to duplicate the pitch.



3. Note how Forming Nose clears end of the material and how material spirals as first revolution of operating arm is made.



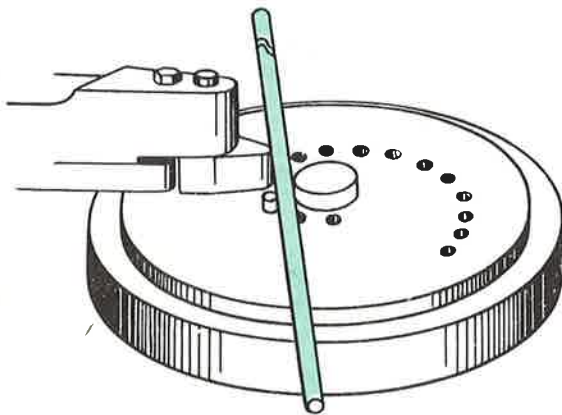
4. The desired number of turns in the coil are readily and easily obtained by merely revolving the Operating Arm.

LOOP AND SPIRAL BENDING

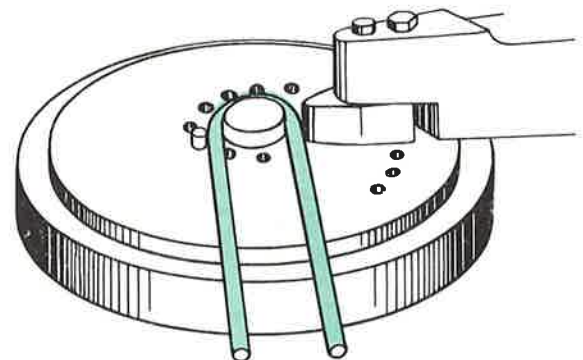
Either a single loop or a spiral bend can be readily formed at any point in a length of material with DI-ACRO Benders as shown below.

First a 180° bend is made, and the material is then advanced and set at the required angle. As the Operating Arm is revolved, the previously formed bend will spiral over the Radius Pin completing the loop. Numerous loops can be made by duplicating this procedure.

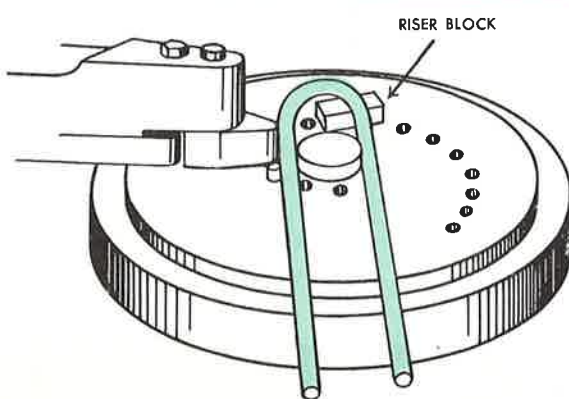
This forming method should only be employed when the position of the loop is so far from the end of the material that its ductile limits will not allow following the procedure shown on page 12.



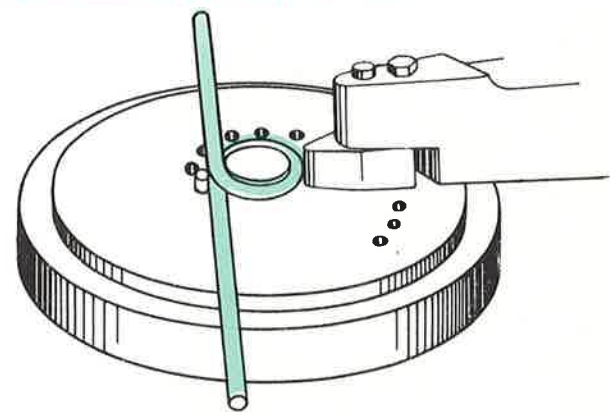
1. Use both a Holding Pin and Radius Pin short enough to allow material to pass over them as first loop is made. Set Forming Nose so material will fit snugly between nose and Radius Pin.



2. Set angle stop for a 180° bend. Revolve Operating Arm until it strikes angle stop thereby completing a U bend. This is the first step in loop and spiral bending.



3. Advance material a distance equal to one half the circumference of Radius Pin and tilt material using Riser Block as shown on Mounting Plate to duplicate pitch.



4. Previously formed section will now spiral over center pin completing loop. By continuously advancing material as shown in Figure 3 and repeating cycle, any number of coils can be formed.

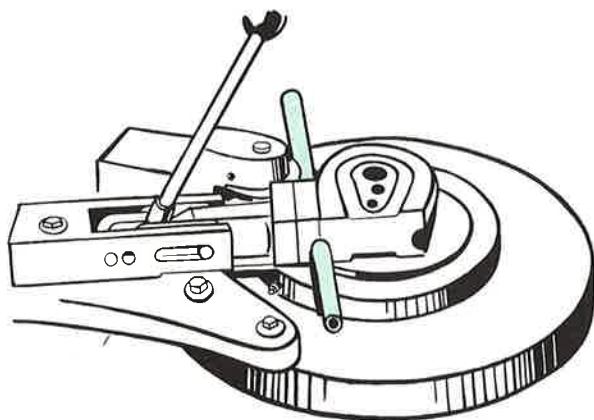
TUBE BENDING . . . Forming Roller Method



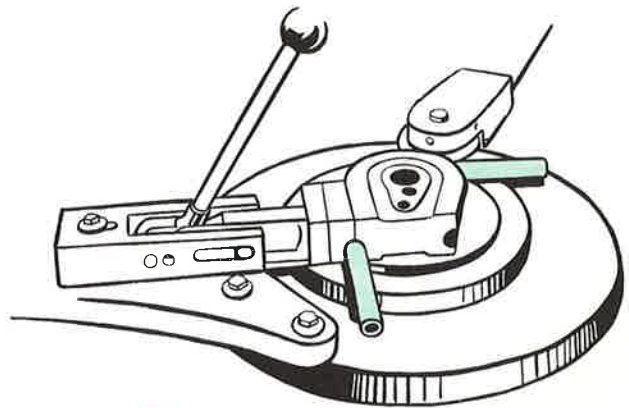
The Forming Roller method of tube bending is recommended for all large bends where the centerline radius is at least 4 times the outside diameter of the tube. It can also be successfully employed for bending pipe or heavy wall tubing to smaller radii and is the most practical method of bending very small diameter tubing.

The Forming Roller and Radius Collar must be grooved to exactly fit the tube and the tube must not be allowed to slip during the bending operation as even a slight amount of slippage will cause distortion.

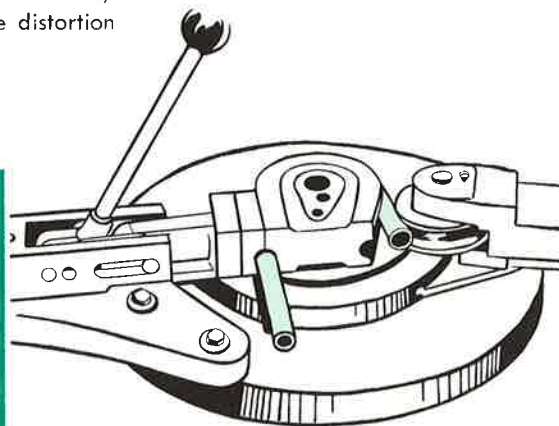
A number of methods of tube clamping are shown on page 25 where the new DI-ACRO Quik-Lok Clamp, available for all models, is also illustrated. Also see tube bending accessories on page 27.



1. Set Forming Roller approximately $\frac{1}{8}$ " away from Radius Collar as this will eliminate distortion on the inside contour of the tube.

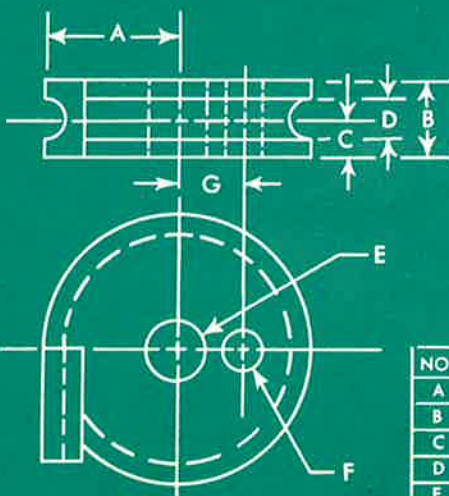


2. Clamp tube tightly so it cannot slip and advance Operating Arm with a steady even pressure until it strikes Angle Stop.



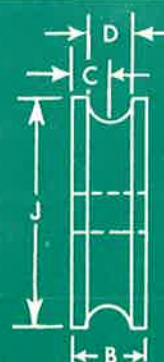
3. Return Operating Arm to starting position, release clamp and remove tube. Bends greater than 180° sometimes open up sufficiently so they can be sprung off the Radius Collar. A bend considerably greater than 180° can be removed if a $\frac{2}{3}$ segment of the Radius Collar is used. The part must then be formed in two operations. If the formed part cannot be released by the above procedures, the Radius Collar must be split horizontally so the upper section can be removed to release the tube.

RADIUS COLLAR

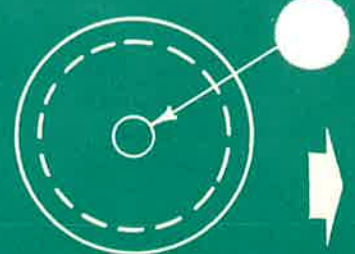


DI-ACRO BENDER

NO.	1	1A	2	3	4
A	CENTERLINE RADIUS OF DESIRED BEND				
B	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$
C	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$
D	DIA. OF TUBE TO BE FORMED				
E	$\frac{3}{8}$	$\frac{1}{2}$	1	1	1
F	$\frac{1}{4}$	$\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{8}$
G	$1\frac{1}{32}$	$\frac{9}{16}$	$\frac{7}{8}$	$1\frac{1}{16}$	$1\frac{1}{16}$



FORMING ROLLER

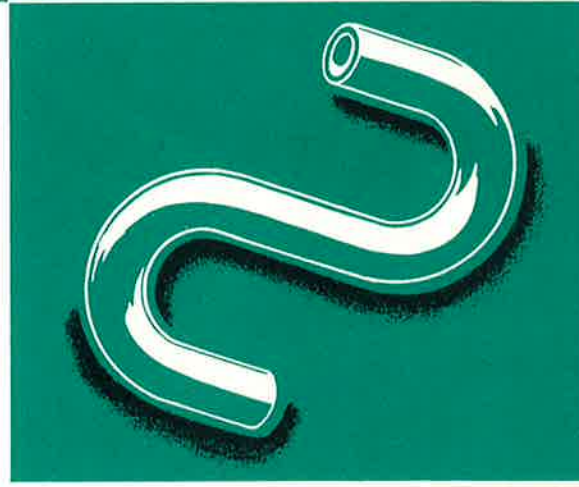


Follow Block Method...TUBE BENDING

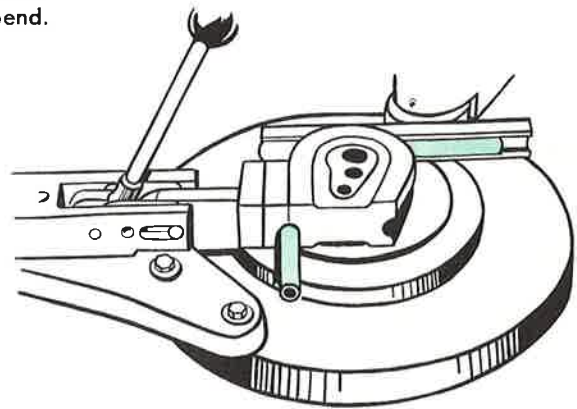
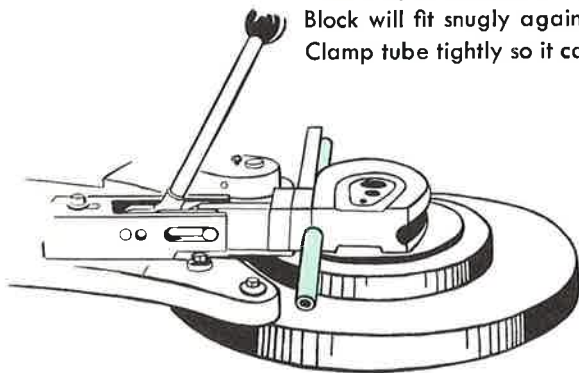
By supporting the tube over a wide area through the use of a Follow Block, as illustrated, thin wall tubing can often be satisfactorily formed to a centerline radius as small as $2\frac{1}{2}$ times its outside diameter without the use of inside mandrels or fillers.

As there are many variable factors in the bending quality of tubing, the smallest practical radius to which it can be formed can be best determined by experiment. Our Engineering Department will gladly give you recommendations if you will send us samples of your material together with prints showing the required bends.

The Follow Block eliminates marring of material as it rolls around with the tube without friction or sliding action.

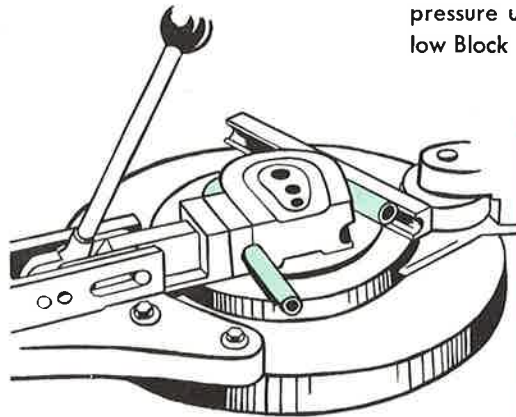


1. Adjust standard Forming Roller so Follow Block will fit snugly against tube at start of bend. Clamp tube tightly so it cannot slip.



2. Advance Operating Arm with a steady even pressure until it strikes Angle Stop. Note how Follow Block rolls around the tube without friction.

3. Remove Follow Block, return Operating Arm to starting position, release clamp and remove tube. Bends greater than 180° sometimes open up sufficiently so they can be sprung off the Radius Collar. A bend considerably greater than 180° can be removed if a $\frac{2}{3}$ segment of the Radius Collar is used. The part must then be formed in two operations. If formed part cannot be released by above procedures, Radius Collar must be split horizontally so upper section can be removed to release the tube.

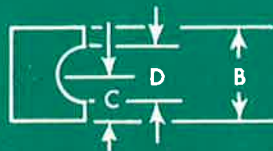


DI-ACRO BENDER

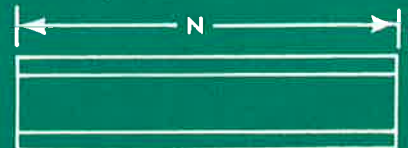
NO.	1	1A	2	3	4
B	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$
C	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$
D	DIA. OF TUBE TO BE FORMED				
N	$3\frac{1}{2}$ X RADIUS FOR 180° BEND				

DI-ACRO BENDER

NO.	1	1A	2	3	4
B	$\frac{1}{2}$	$\frac{3}{4}$	1	$1\frac{1}{2}$	$1\frac{1}{2}$
C	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$
D	DIA. OF TUBE TO BE FORMED				
I	$\frac{3}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	1	1
J	$1\frac{1}{4}$	$1\frac{3}{8}$	3	3	3



FOLLOW BLOCK



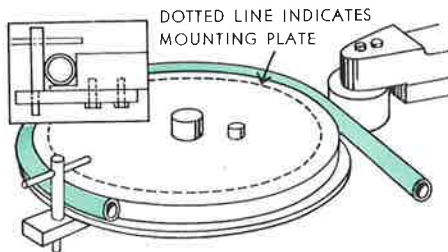
SPECIAL SET-UPS



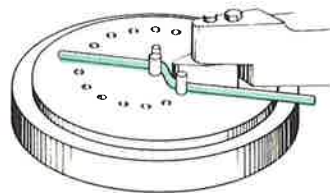
The forming range of DI-ACRO Benders is considerably greater than the many operating illustrations shown throughout this booklet may indicate, as the information contained herein is necessarily quite general in its scope.

By studying the bending rules and principles outlined, the operator will soon become well acquainted with the various factors involved in arranging the DI-ACRO Bender for a particular application and the below illustrations may provoke additional ideas that will provide the solution for many difficult bending problems.

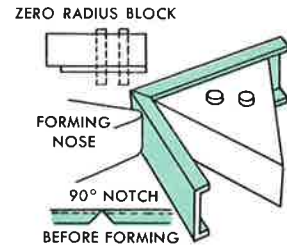
Fullest value from DI-ACRO Benders will only be realized when they are tooled in your own plant as bending jobs arise, since knowing the desired production, delivery requirements and tolerances that must be held, you are in the best position to determine the type of tooling that should be prepared to facilitate manufacture of the part.



1. LARGE RADIUS FORMING. Radius collar can be of any size within capacity of bender. If larger than Mounting Plate, it must have built-in Locking Pin as shown. Also see page 25 figure 5.

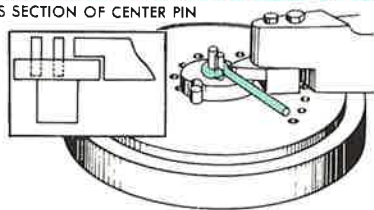


2. OFFSET BEND EASILY FORMED. By locating a second Locking Pin in a Mounting Plate hole as illustrated, it is often possible to form two closely adjacent bends in one operation.

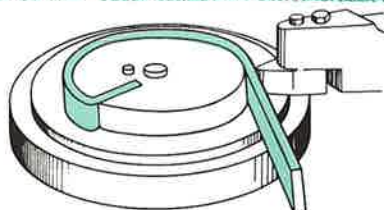


3. ZERO RADIUS BEND IN CHANNEL. A right angle zero radius bend can be made in channel with flanges either in or out by notching the flanges and forming around a Zero Radius Block as shown.

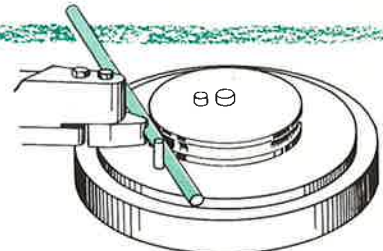
CROSS SECTION OF CENTER PIN



4. SMALL DIAMETER EYE BEND. To form a very small eye, a Radius Pin should be prepared in which the Locking Pin can be mounted as shown in the cross section view above. The Forming Nose should also be cut away so that it can reach over the edge of Center Pin.



5. TWO BENDS IN ONE OPERATION. Obtained by inserting one end of the material in a slot at any angle in the Radius Collar. Any number of coils can be made by setting Forming Nose to allow space for material and rotating the Operating Arm.



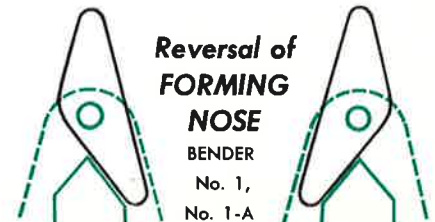
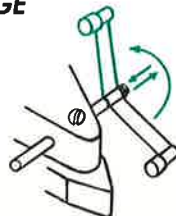
6. GROOVED NOSE AND COLLAR. Round materials can be formed without work marking on outside of bend by grooving the Forming Nose or Forming Roller to exactly fit the contour of the rod. Flattening on inside of bend can be eliminated by grooving the Radius Collar.

How to use the BEND POSITIONING GAUGE



7.

To adjust the Bend Positioning Gauge, loosen set screw on Nose Holder, move Gauge Rod to desired position and tighten set screw. If bend is more than 180°, move Gauge Arm upward after gauging as shown above so it will not strike material. Gauge Arm can be returned to original position without losing accuracy of adjustment.



8. The forming direction of the DI-ACRO Bender No. 1 and No. 1A can be reversed by removing the Nose Holder, lifting the Nose from the Bearing Pin and turning it over as shown above. The Nose Spring should then be relocated on the opposite side of the Nose Holder.

EDGEWISE BENDING

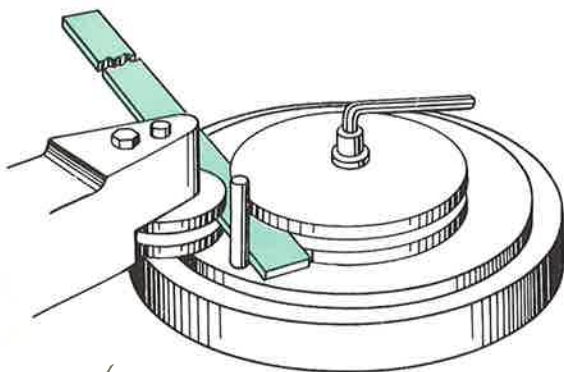
All flat materials can be readily formed edgewise with DI-ACRO Benders to any degree of angularity by following the procedure illustrated.

When performing this type of bend, the outside edge stretches while the inside edge is compressed and therefore the material must be closely confined to prevent distortion.

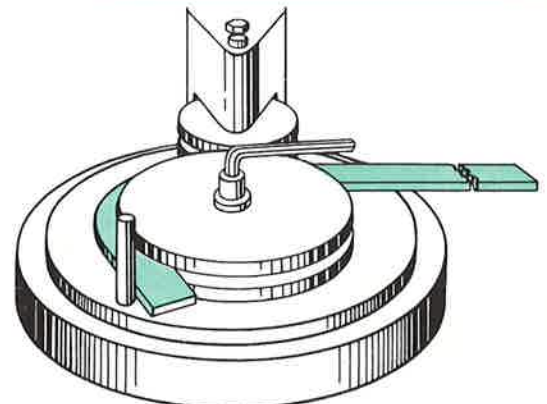
Although a radius of three to four times the material width is desirable to allow for this expansion and contraction, it is often possible to reduce this ratio to less than twice the width if the metal is sufficiently ductile.

The prints below are offered as a guide to assist the user in preparing the accessories required for edgewise bending of his parts.

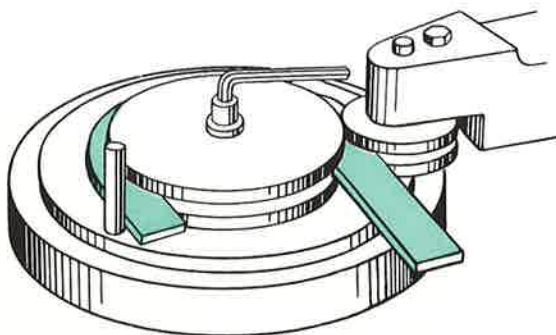
Material should be closely confined in Radius Collar as only .002" or .003" variation in clearance can make a great difference in quality of bend. Clearance is increasingly important in thinner materials.



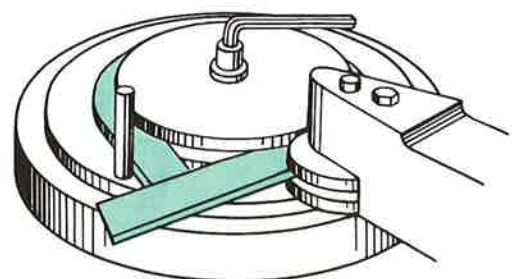
1. Insert material in slots in Forming Roller and Radius Collar and tighten center bolt.



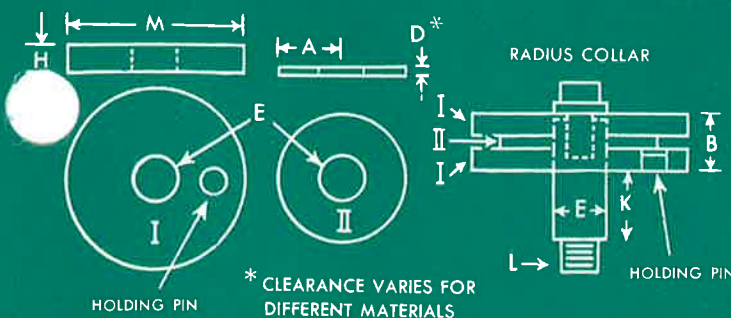
2. Advance Operating Arm with a steady, even pressure as thin or low ductile materials may otherwise fracture.



3. A 180° bend has now been formed and material can be easily slipped out of Radius Collar by merely loosening center bolt.

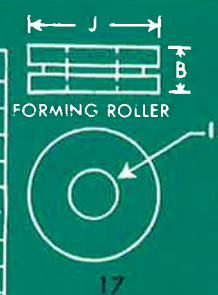


4. An off-center eye has now been completed. To release part, remove top of Radius Collar.



DI-ACRO BENDER

NO	1	1A	2	3	4
A	RADIUS OF DESIRED BEND				
B	1/2	3/4	1	1 1/2	1 1/2
E	3/8	1/2	1	1	1
D	MATERIAL THICKNESS + CLEARANCE				
H	1/2 (B-D)				
I	3/16	1/2	3/4	1	1
J	1 1/4	1 1/2	3	3	3
K	1 1/8	1 1/8	1 1/8	1 1/4	1 1/4
L	3/8 NC 16	3/8 NC 14	3/8 NC 11	3/8 NC 11	3/8 NC 11
M	DIA. OF BEND PLUS 1/2 MATERIAL WIDTH				



CHANNEL BENDING... Flanges Out

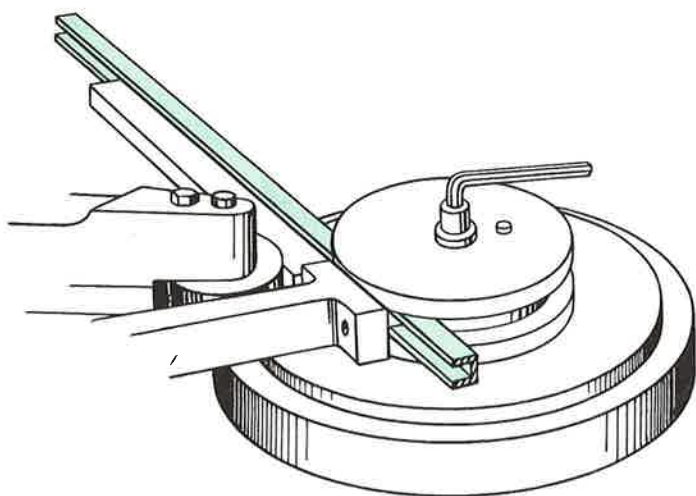


DI-ACRO Benders will successfully form channel provided the flanges are adequately confined during the bending operation so they will not buckle or distort.

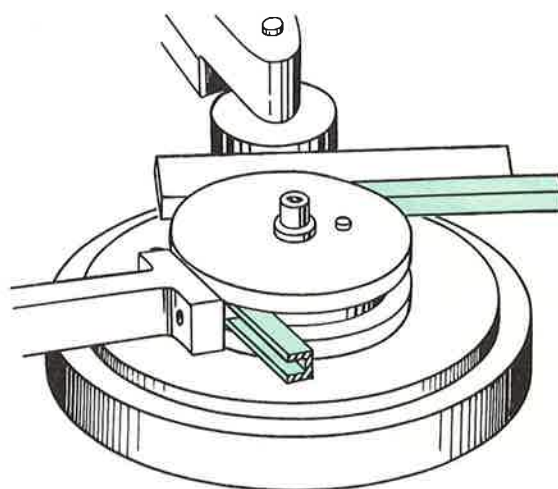
It is generally recommended that the radius of the bend be three to four times the width of the flange to allow for stretching of the metal, although this ratio is primarily determined by the thickness and ductility of the material and can often be reduced considerably.

As the different dimensions of channel vary with almost every requirement, it is impractical to offer a standard group of accessories for this type of forming. It is suggested that the user prepare these parts and the cross-section view in figure 4 below, as well as the prints on page 17 which cover all edgewise bending are given as a guide.

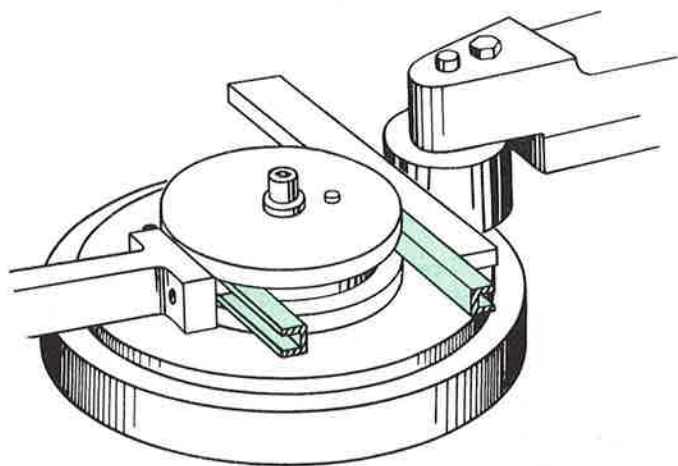
Flanges should be closely confined in Radius Collar as .002" or .003" variation in clearance makes a big difference in the quality of bend. Clearance is increasingly important in thinner materials.



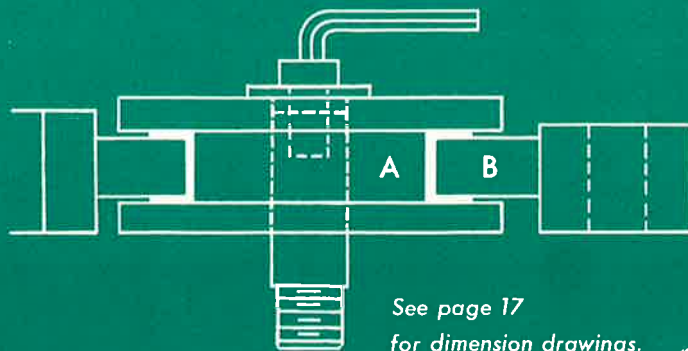
1. Position material in the Radius Collar. Insert Follow Block in the channel and tighten center bolt as illustrated in drawing.



2. Clamp channel tightly. Advance Operating Arm with a steady, even pressure until it strikes stop pre-set for angle of bend.



3. Loosen center bolt, release clamp, and slide material out of Radius Collar. Remove Follow Block.



See page 17
for dimension drawings.

4. Cross-section view shows how Radius Collar supports material. By changing size of spacer "A" in Radius Collar and Follow Block "B", different sizes of channel can be formed.

Flanges In... CHANNEL BENDING

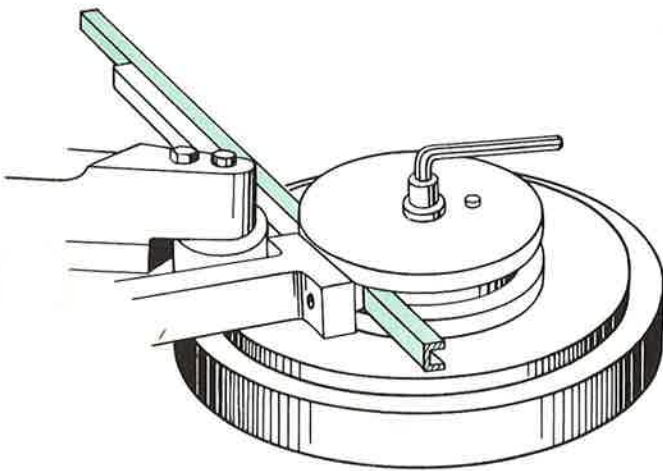
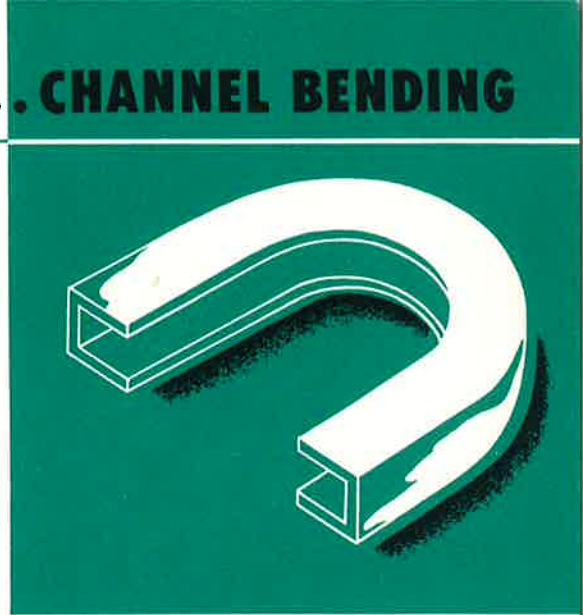
The same general bending rules which cover the forming of channel with "flanges out" also apply when it is formed with "flanges in".

Since it is necessary to compress the flanges as they are bent inward, the operation shown below requires considerably more bending pressure than when forming with the "flanges out", and it is recommended that the largest possible radius be used to allow for compression of the material.

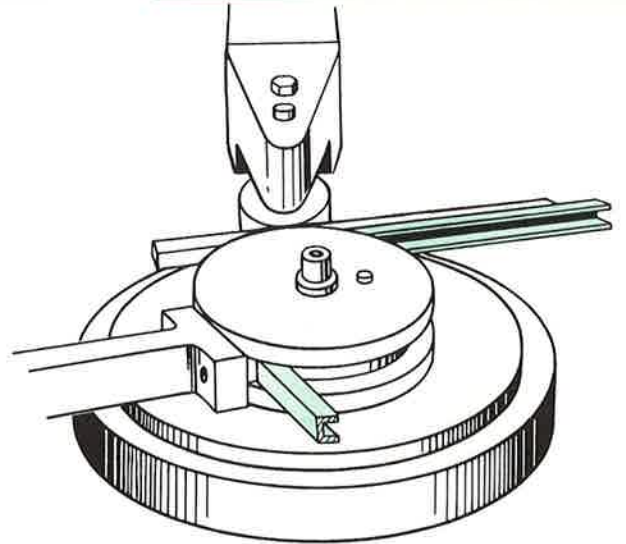
If a sharp 90° bend is desired, it can be obtained by cutting a notch out of the channel flanges before forming around a special Zero Radius Block as illustrated on page 16 figure 3.

It is sometimes possible to make a circle in channel by using a segment of a Radius Collar similar to sketch in figure 4 below. By following the procedure outlined on page 8, the circle can be formed in three operations.

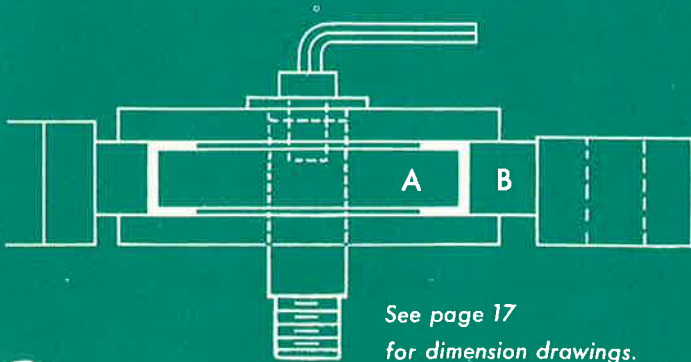
To form channel with the flanges facing upward it is necessary to first fill it with Cerrobend or some other commercial filler as it is not possible to support the flanges in this position with a Radius Collar.



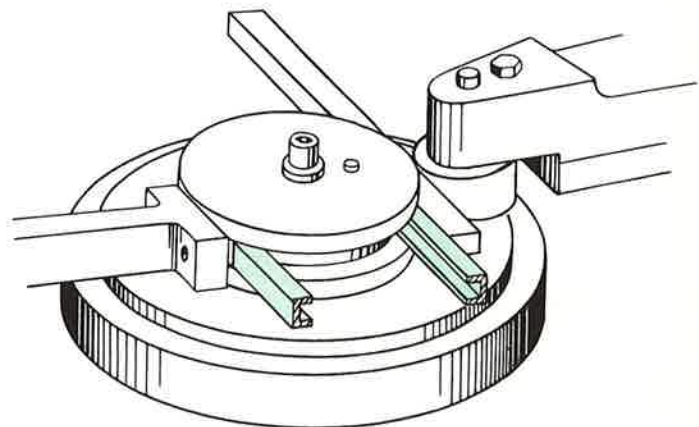
1. Insert material in slots in Radius Collar, position Follow Block between channel and Forming Roller and tighten center bolt.



2. Clamp channel tightly. Advance Operating Arm with a steady, even pressure until it strikes stop pre-set for angle of bend.



4. Cross-section view shows how Radius Collar supports material. By changing size of spacer "A" in Radius Collar and Follow Block "B", different sizes of channel can be formed.



3. Loosen center bolt, release clamp, remove Follow Block and slide material out of Radius Collar.

ANGLE BENDING... Flange Out

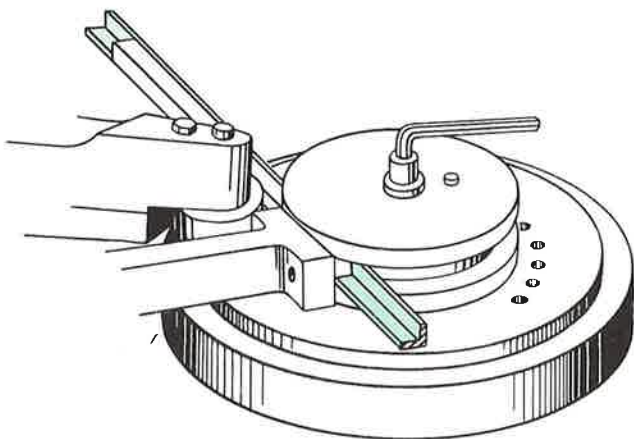


Although angle with "flange out" can be readily formed with DI-ACRO Benders, this type of bending presents a problem in that stresses and strains set up within the material often cause it to twist out of plane after it has been formed.

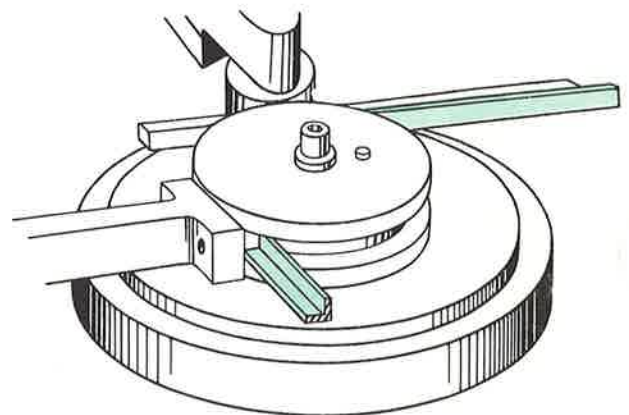
This twisting is generally more pronounced in fabricated angle than in standard mill rolled angle. When the flange bent edgewise is less than half the width of the vertical flange, tendency to twist is greatly reduced.

As the dimensions of angle and radius of bend vary with almost every requirement, it is impractical to offer a standard group of accessories for this type of forming. It is suggested that the user prepare these parts and the cross-section view in figure 4 below, as well as the prints on page 17 which cover all edgewise bending, are given as a guide.

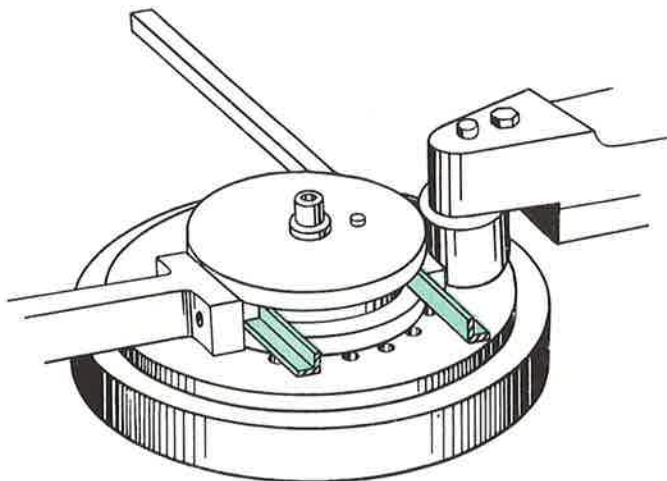
Flange should be closely confined in Radius Collar as .002" or .003" variation in clearance can make a great difference in quality of bend. Clearance is increasingly important in thinner materials.



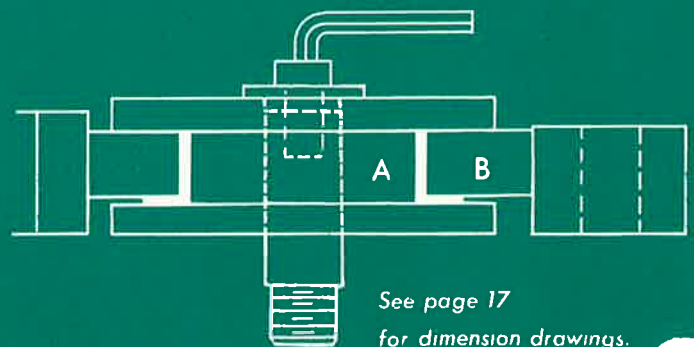
1. Position material in Radius Collar, insert Follow Block and tighten center bolt.



2. Clamp angle tightly. Advance Operating Arm with steady even pressure until it strikes Angle Stop.



3. Loosen center bolt, release clamp, and slide material out of Radius Collar. Remove Follow Block.



See page 17
for dimension drawings.

4. Cross section view shows how Radius Collar supports material. By changing size of spacer "A" in Radius Collar and Follow Block "B", different sizes of angle can be formed.

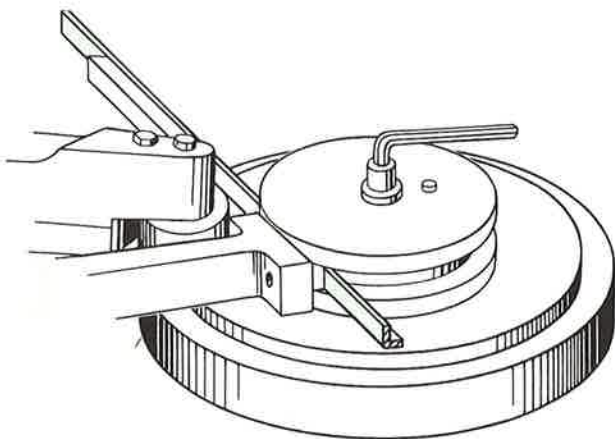
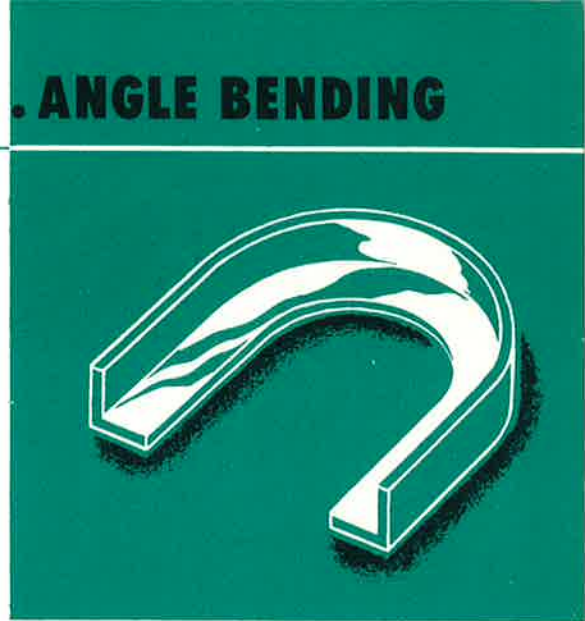
Flange In... ANGLE BENDING

When bending angle with the "flange in", the same problems are encountered as when it is formed with the "flange out", although in either case any twist which develops can be removed in an additional hand or press operation.

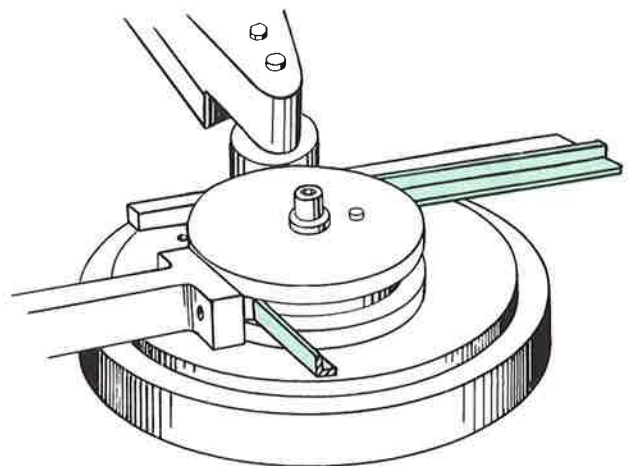
Since it is necessary to compress the flange as it is bent inward the operation shown below requires considerably more bending pressure than when forming with the "flange out" and it is recommended that the largest possible radius be used to allow for compression of the material.

A sharp 90° bend can be formed in angle by first notching the horizontal flange, placing it on top of a Zero Radius Block and then forming the vertical flange in the same manner as shown on page 9.

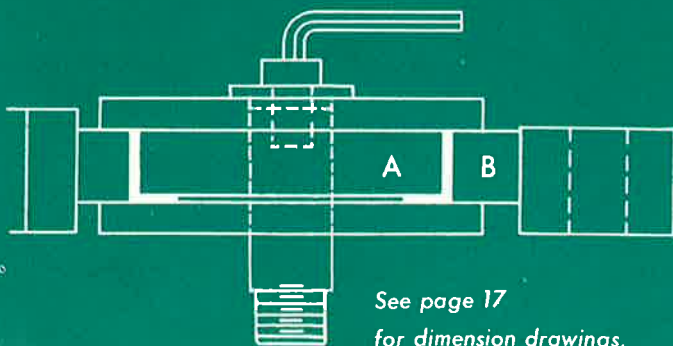
Angle can be formed to a complete circle by following the procedure outlined on page 8. Accessories similar to those illustrated below in figure 4 should be used so that when the bend is completed the top section of the Radius Collar can be removed to release the finished part.



1. Insert material in slot in Radius Collar, position Follow Block between angle and Forming Roller and tighten center bolt.

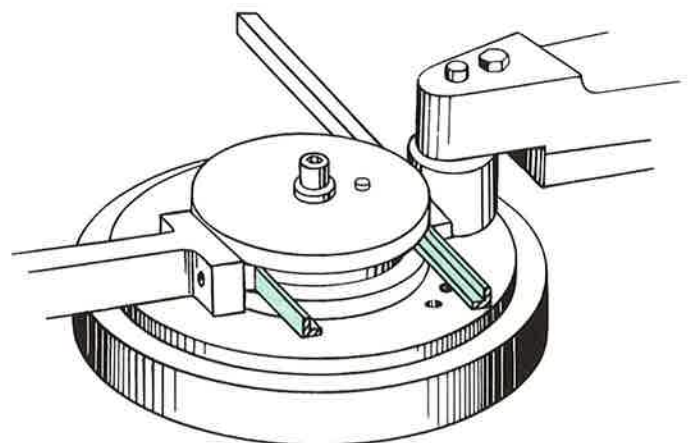


2. Clamp angle tightly. Advance Operating Arm with steady even pressure until it strikes Angle Stop.



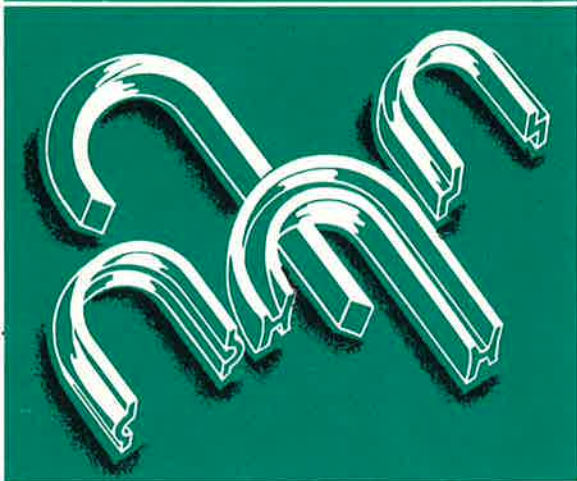
See page 17
for dimension drawings.

4. Cross-section view shows how Radius Collar supports material. By changing size of spacer "A" in Radius Collar and Follow Block "B", different sizes of angle can be formed.



3. Loosen center bolt, release clamp, remove Follow Block and slide material out of Radius Collar.

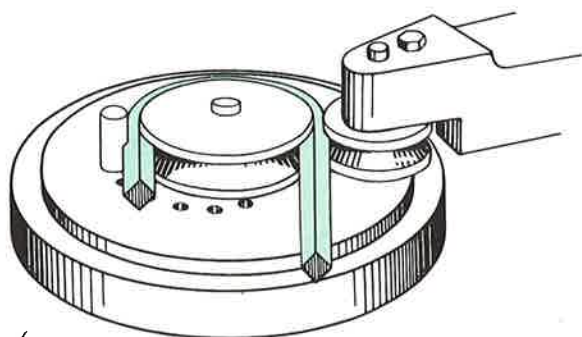
SPECIAL SHAPED MATERIAL



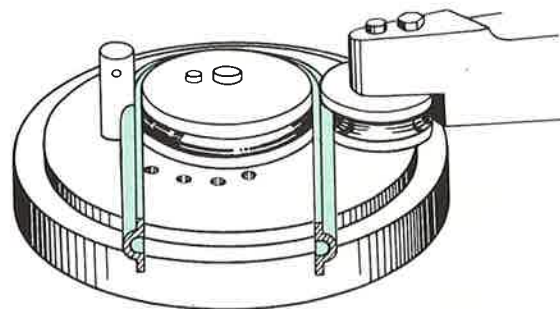
All ductile materials, of any shape that can be supported or confined in the bending rolls, can be readily formed with DI-ACRO Benders.

The illustrations below show how the Radius Collar and Forming Roller can be shaped to exactly fit the contour of the material to support its cross section during the bending operation.

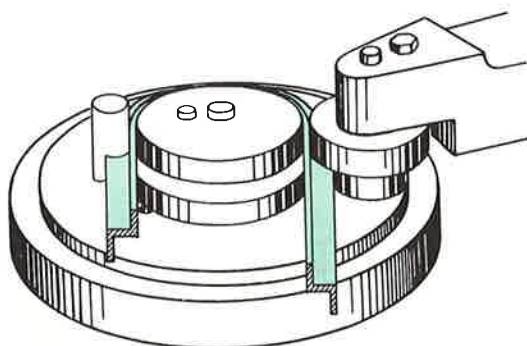
When the shape of the material is such that it cannot be supported, it can often be successfully formed by first filling it or imbedding the entire part in Cerrobend or some other commercial filler as illustrated in figure 4.



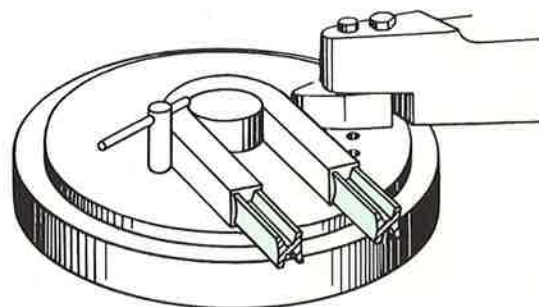
1. To form square material on edge it is only necessary to machine a 90° V groove in the Radius Collar and Forming Roller to eliminate twisting or marking of the material.



2. A convex shape has been turned on the Radius Collar while a concave groove has been machined in the Forming Roller to adequately support the contour of this extrusion.



3. By turning shoulders on both the Radius Collar and Forming Roller it is possible to apply bending pressure against both vertical legs of this part and also confine the horizontal member which must be bent edgewise. The Locking Pin should also be shaped to fit the material.



4. The contour of this aluminum extrusion cannot be supported or confined and has therefore been entirely imbedded in Cerrobend and formed as though it were a solid bar. As Cerrobend melts at 158° , it can be removed after the part is formed by merely placing the piece in hot water.

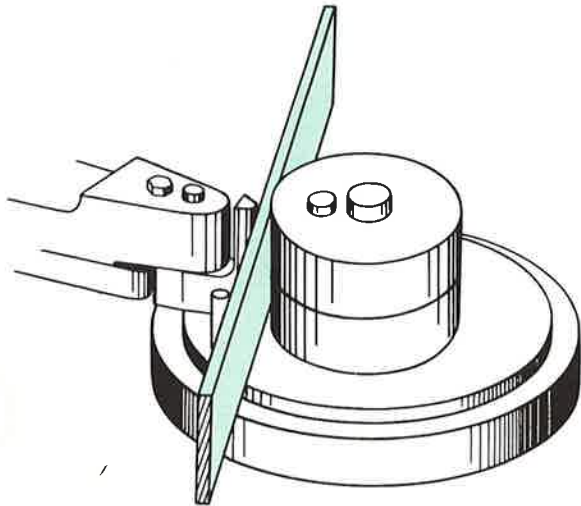
WIDE MATERIAL BENDING



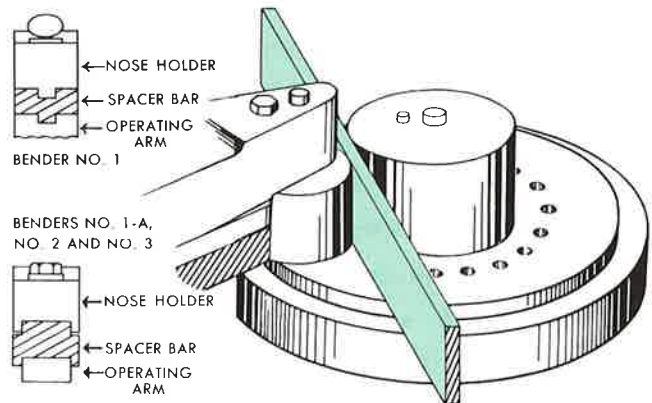
Although each size DI-ACRO Bender has a maximum width capacity determined by the height of the standard Forming Nose, it is possible to form much wider materials by following the various suggestions given below.

The simplest method of increasing the material width capacity of DI-ACRO Benders is by using the Built-up Forming Nose offered on page 26.

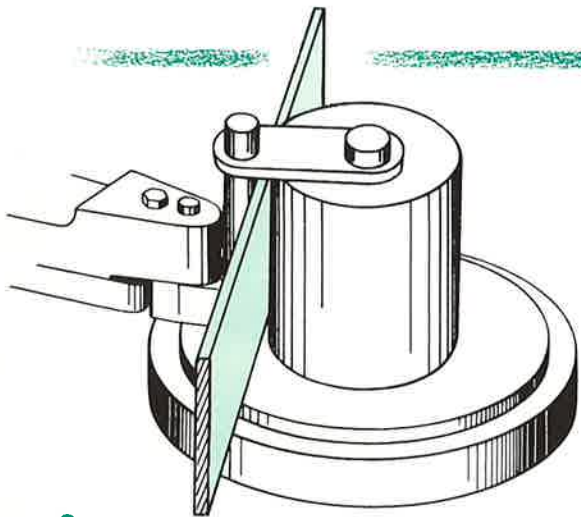
As the actual width capacity of DI-ACRO Benders is unlimited, the illustrations below are offered as a guide with the type and thickness of the material determining the set-up most practical for a particular operation.



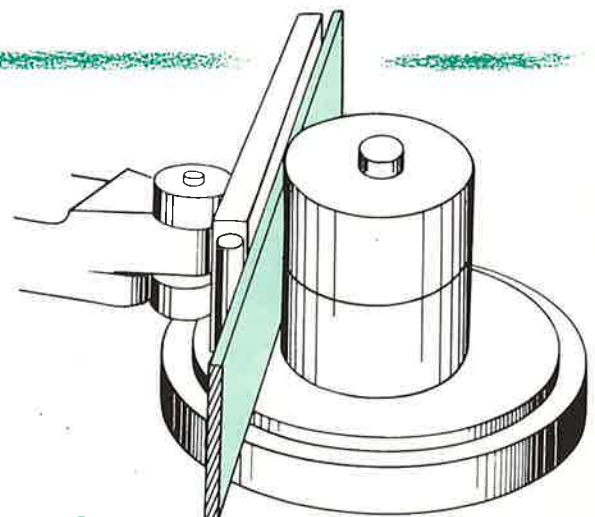
1. The Built-up Forming Nose illustrated above is available for all models of DI-ACRO Benders as shown on page 26. Two or more standard Radius Collars of the same size can also be placed on top of each other to provide the required height.



2. It is sometimes desirable to use a Forming Roller higher than the Nose Holder will accommodate. This can be accomplished by mounting a Spacer Bar of the desired dimension between the Operating Arm and the Nose Holder as illustrated.



3. When forming very wide or heavy materials the Forming Nose and Radius Collar should be linked together as shown above to maintain rigidity and assure the same radius over the entire width of the part. The Locking Pin should also be linked to the Radius Collar.



4. By using a longer Bearing Pin that extends above the top of the Nose Holder, a second Roller can be used to apply pressure against a wide Follow Block as illustrated. Heavy materials can often be formed by using double rollers without a Follow Block.

Mounting of the DI-ACRO Bender

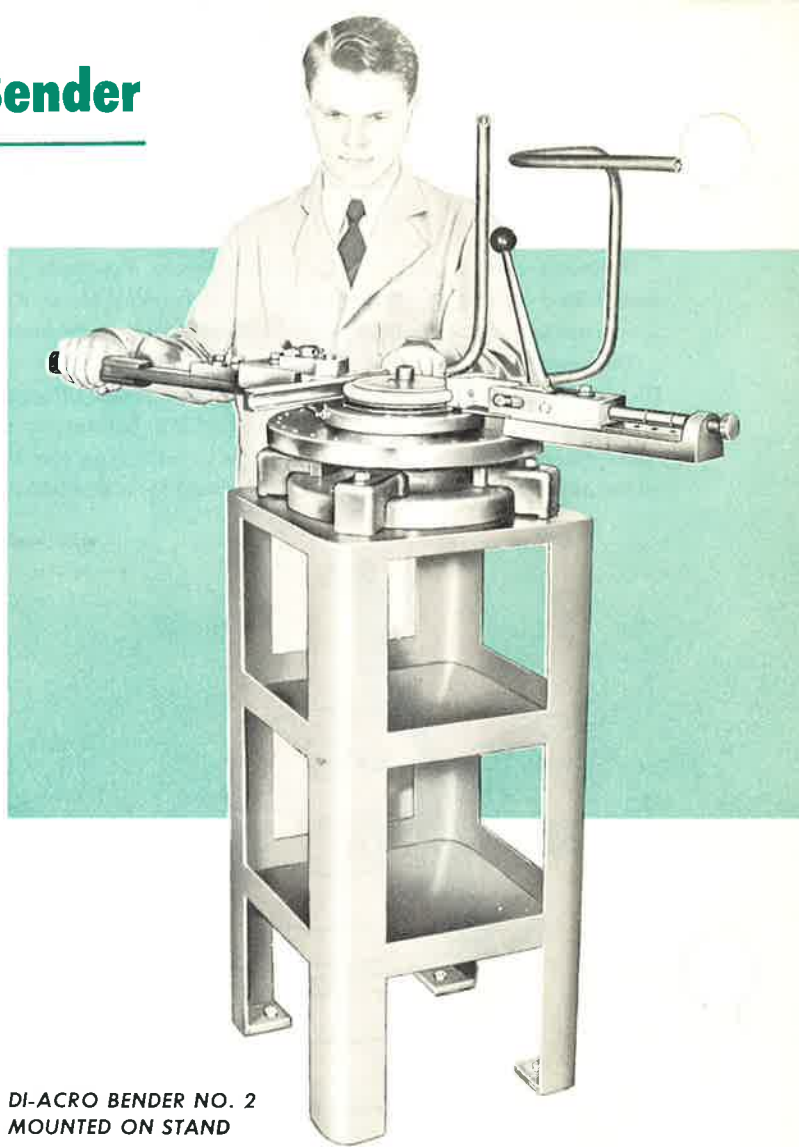
The most practical method of mounting a DI-ACRO Bender depends on the model of the machine and also the type of operations for which it is to be used.

Both the DI-ACRO Bender No. 1 and No. 1A can be held in a vise as shown in figure 1 below or mounted on a bench as the swing of the Operating Arm requires only a limited amount of space.

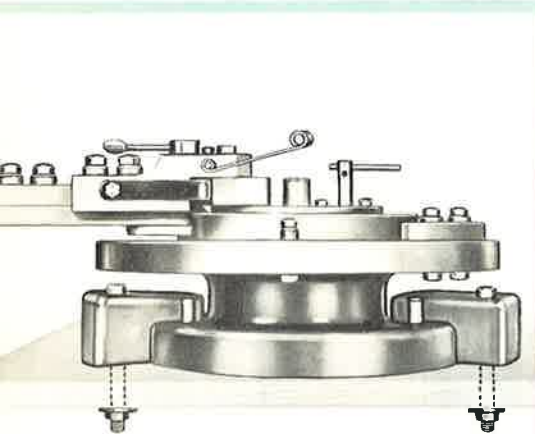
For greatest versatility, DI-ACRO Bender No. 2, No. 3 and No. 4 should be mounted on a stand that has been bolted to the floor in a location which will allow the operator freedom around the entire machine when forming eyes or complete circles.

The DI-ACRO Bender Stand shown at the right is ideal for this purpose as its very rugged construction allows it to withstand extreme bending pressure and its design places the Bender at the most convenient operating height.

If the bends to be made with either of these models are not in excess of 180°, they can be mounted on a bench as provision is made to allow them to be readily located in the most convenient operating position as illustrated in figure 2.

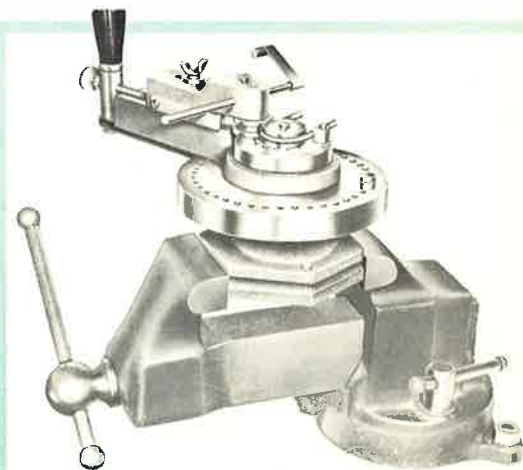


DI-ACRO BENDER NO. 2 MOUNTED ON STAND



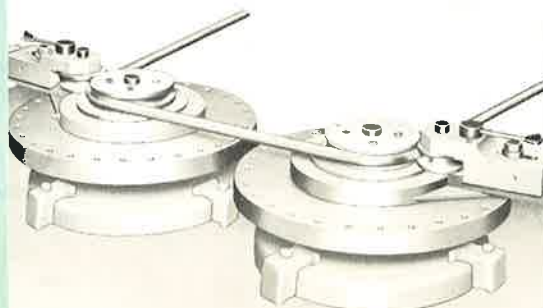
1. VISE MOUNT

The hexagonal shape of the base of the DI-ACRO Bender No. 1 and No. 1A allows these models to be held in a vise in six different positions without tipping. This method of mounting is often desirable when the machines are only used for an occasional job. For continuous production operations, they should usually be bolted to a bench.



2. BENCH OR STAND MOUNT

When mounting DI-ACRO Benders No. 2, 3, or 4 on the DI-ACRO Stand or on a bench, the three Hold-down Lugs supplied with the machine should be used as illustrated above. The Bender Base can then be turned to any convenient operating position desired by merely loosening the Lug Bolts and relocating the two pins shown in the base casting so they will lock against any two of the Lugs.



3. DUAL MOUNT

It is sometimes practical to mount two DI-ACRO Benders next to each other on a bench as shown at the left, and by providing spacing between them, produce two bends in a part simultaneously. There is no need for a holding fixture in a set-up of this type since the pressure exerted by the Forming Rollers of each machine prevents the material from slipping or creeping during the bending operation.

Quik-Lok Clamp



Quik-Lok Clamp for No. 2 and 3 Benders illustrated.

AVAILABLE FOR ALL DI-ACRO BENDERS

DI-ACRO Quik-Lok Clamp can be mounted on all Benders. This accessory is especially valuable when bending tubing, angle, channel and extrusions as it locks the material securely and can be instantly released for removal of the formed part.

Quik-Lok is easily adjusted for any radius to 9". All Type A Radius Collars for tube forming listed on page 26 have been designed for use with Quik-Lok Clamps.

When ordering, diameter of the tube to be formed should be specified. Additional Clamp Blocks are offered on page 27 of this manual.

LOCKING FIXTURES

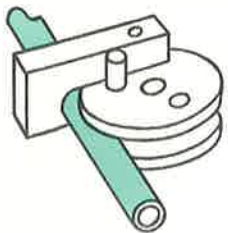
To obtain a perfect bend, the material must not be allowed to slip during the forming operation.

The illustrations on this page suggest various methods of locking the material before bending, however the type of fixture used should be largely determined by the desired production and the amount of slippage encountered.

1. STANDARD LOCKING PIN

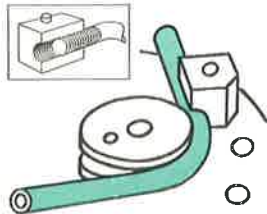


This cam action Locking Pin is supplied with each DI-ACRO Bender. To lock, turn opposite to bending direction.



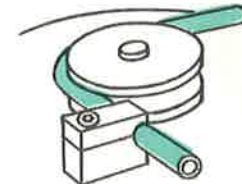
2. CLEVIS TUBE CLAMP

Ideal for clamping light weight tubing for large radius bends with No. 1 and No. 1A Benders. Offered on page 27.



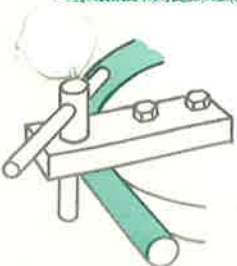
3. SWIVEL TUBE CLAMP

Same as figure 2 at left except for smaller radii. Threads can be cut in clamp to lock threaded bars.



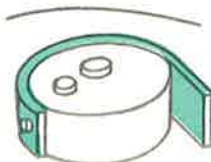
4. SPLIT BLOCK TUBE CLAMP

Practical method of locking tubing if production is not a factor. Mount from Bender Base or Mounting Plate.



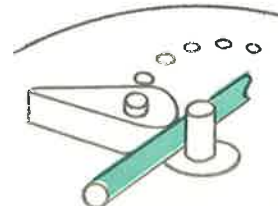
5. CAM LOCK FOR LARGE RADII

For large radius bends a Locking Pin can be mounted from a plate bolted to top or bottom of Radius Collar.



6. INSET LOCK PIN

Strip stock can often be held in this manner if there is a hole at one end of material. Eliminates gauging.



7. CAM LOCK FOR SMALL EYES

Cam Lock is suggested when Radius Pin is so small that material cannot be held with standard Locking Pin.

BENDER TOOLING

■ SPECIAL TOOLING FOR YOUR SPECIAL BENDING NEEDS

When you have a bending problem in production or design, Di-Acro can aid you at no obligation. Just send blueprints, dimensioned sketches, or the part you wish to produce to our Applications Engineering Department and your plans will receive prompt attention.

Special tooling? Here is some tooling we have available: Crush-bend tooling, automatic follow-bar return, wiper dies and ball mandrels for thin-walled tight radius tube bending, power clamping for high speed application, pneumatic mandrel extractor.

■ STANDARD RADIUS ACCESSORIES



Available hardened or un-hardened to facilitate your own custom modifications. Radius selection shown on price sheet. When ordering accessories for Benders, state model number and radius desired. Special radii available.

SPRING-BACK – When determining the size of the Radius Pin or Collar, spring-back should be compensated for. A frequent way is by overbending slightly beyond the required angle. After the amount of spring-back has been determined, the Angle Gauge can be set so that all bends will be duplicated. In addition to overbending, it may be necessary in some cases to form the material around a Radius Pin or Radius Collar of smaller radius than the desired bend. The actual size of the Radius Pin or Collar can best be determined by experiment for the material and conditions.

FORMING ROLLER – To eliminate work marking and reduce operator effort, it is often desirable to replace the Forming Nose (furnished as standard equipment), with a Forming Roller.

BUILT-UP FORMING NOSE – This is used to increase the material width range of Di-Acro Benders. Must be used with wider or stacked radius collars.

Material and radius specifications on price sheet. Special radii available.

■ TUBE FORMING ACCESSORIES



There are two tube bending methods:

1. The "Forming Roller" method is recommended for (a) all large bends where centerline radius is at least 4 times the outside diameter (O.D.) of the tube, (b) pipe and heavy wall tubing, and (c) very small diameter tubing.

2. The "Follow Block" method, which allows forming thin wall tubing to a centerline radius as small as 2-1/2 times the O.D. without using inside mandrels or fillers.

Guard against spring-back (see above). To prevent the tube from slipping during forming, the Quik-Lok Clamp is recommended, used with Type A Radius Collar. For locking smaller size tubing the Clevis and Swivel Clamps with Type B Radius Collars are used on No. 1 and No. 1A Benders.

PARTS REQUIRED FOR "FORMING ROLLER" BENDING METHOD. – See Illustrations above. ■ A or B Grooved Radius Collar – one for every radius and tube size. ■ J – Grooved Forming Roller – one for each tube size only. ■ P – Clamp Block – for use with Quik-Lok Clamp on all Di-Acro Benders. One for each tube size. ■ S or R – Swivel and Clevis Clamps – for No. 1 and No. 1A Benders. One for each tube size.

PARTS REQUIRED FOR "FOLLOW-BLOCK" BENDING METHOD ■ A or B – Grooved Radius Collar – one for every radius and tube size. ■ T – Forming Roller – one covers all "Follow-Block" operations. ■ N – Follow-Block – one for each tube size only. Listed length will accommodate a 180° bend. ■ P – Clamp Block – for use with Quik-Lok Clamp on all Di-Acro Benders. One for each tube size. ■ S or R – Swivel and Clevis Clamps – for No. 1 and No. 1A Benders. One for each tube size. Style B collars only.

FOR PRICING INFORMATION,
ASK FOR BENDER TOOLING
PRICE LIST 104.

"Crush" Bending

ROUND and SQUARE TUBING with DI-ACRO BENDERS

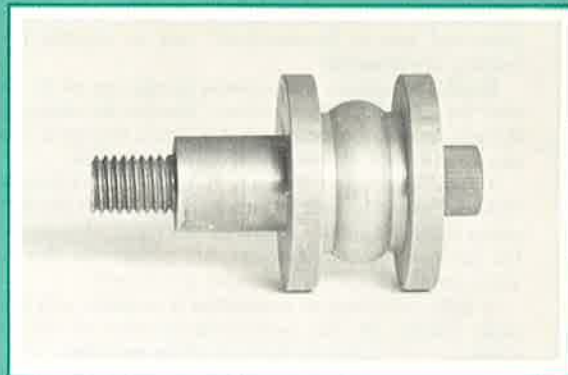
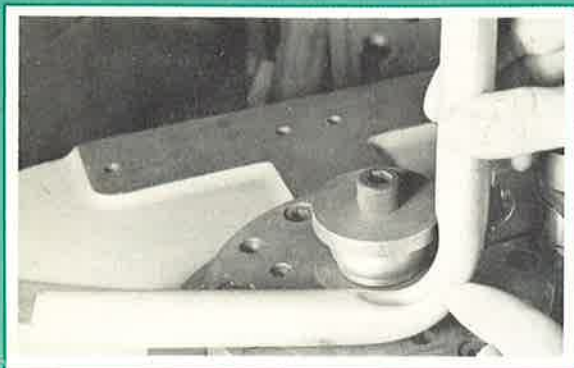
Oftentimes, the bending of thin wall aluminum, mild steel and other tubing with both square and round shapes presents a problem because of the tight radius of bend which is desired with relationship to both the outside diameter and the wall thickness of the tubing.

If it is not necessary to have the formed section of tubing the same size as the straight length, the tubing can be purposely distorted during bending by using special tooling which allows a controlled

"crush" of the metal on the inside radius.

Where "crush" bends are satisfactory, from the standpoint of both design and appearance, the customer often saves the cost of purchasing expensive mandrel equipped benders.

All costs for "crush" bend tooling are quoted on special request. Blueprints and samples of the material must be furnished when quotation is desired. Prompt recommendations can be made.

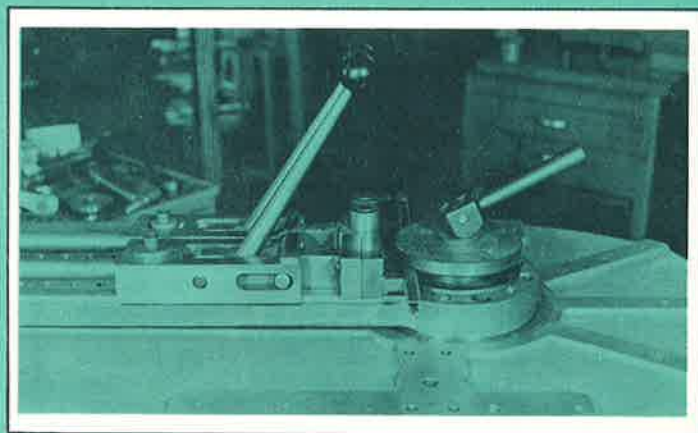


TO "CRUSH" BEND ROUND OR SQUARE TUBING ----- YOU NEED THIS TYPE OF TOOLING.

QUICK-RELEASE, CRUSH BEND TOOLING

Increase your crush bend production with "Quick-Release, Crush Bend Tooling." The cam lever arrangement makes it possible by instantly releasing the material without an additional wrench when disengaging the three piece collar.

The illustration to the right shows the complete set of tooling on a Di-Acro, No. 6 Power Bender.



Specifications You Must Supply on Tube Bending Applications

1. Type of tubing — mold steel, stainless, copper, aluminum, etc?
2. Hardness of the material — is it soft, half-hard, hard?
3. Outside diameter of each size tubing you wish to bend.
4. Wall thickness of each size of tubing.
5. Centerline radius of each bend that you want to make. For example, if you are bending 5/16 inch O.D. copper tube with .049 inch wall thickness to a 3/4 inch centerline radius, this should be stated.
6. Degree or angle of bend.

7. Production required — how many bends do you expect per hour? Also, is this a short-run or a long-run production job that is liable to be repeated several times during the year?

It is best to provide blueprints of each bending job you wish to perform where there may be doubt about the ability of the equipment to do the job. In the absence of blueprints, complete dimensioned sketches will be satisfactory. Here is a rough rule of thumb to follow in tube bending — you cannot bend to a radius less than 2-1/2 times the outside diameter of the tubing without the use of an inside support or mandrel. Mandrel applications are more costly and nearly always involve power operated machines.

Presenting the Versatile, **DI-ACRO**

A Universal Bending Machine "Custom-Built" for Every Job

The DI-ACRO Hydra-Power Bender has been designed to provide a simple, trouble-free hydraulic power unit which will perform not only one or two specialized operations, but all of the multitude of bending jobs which might arise in a metal working plant from day to day.

It is a revolutionary bending machine of virtually universal application, for this ONE standard machine can be easily converted into a "custom-built" unit to exactly fit each forming requirement.

Simple, compound and reverse bends can all be formed with the DI-ACRO Hydra-Power Bender in tubing, angle, channel, extrusions, moldings, strip stock, bus bars, round or square rods and all other solid ductile materials.

A smooth even flow of power is assured at all times by the Vickers Hydraulic System incorporated in this flexible machine. Correct bending speed for all types of material is at the command of the operator thru a variable flow control valve which allows infinite speed adjustment.

A high daily rate of production is possible with this precision bender as the centralized location of all controls eliminates lost motion on the part of the operator.

Engagement of the control lever starts the bending cycle leaving the operator's hands free until the bend is completed and the bending motion is automatically stopped. A flick of the lever returns the machine at high speed to loading position, regardless of speed used in bending cycle.

The sturdy steel body and all other parts of the DI-ACRO Hydra-Power Bender have been designed to withstand loads much heavier than they will normally be subjected to with all components made to exacting tolerances to assure continuous and lasting accuracy. Both Timken and Torrington bearings insure many years of trouble-free service.

An Automatic Angle Control is provided which allows a series of bends of varying degrees to be progressively made in a single part without removing the piece from the machine. Large quantities of identical parts can be accurately duplicated through the use of a Multiple Length Gauge with which the machine is equipped.

Although the normal forming method of this precision bender is drawing the material around a rotating bending form, it will also perform "Compression Bending" by wrapping the material around a stationary form. This latter method is often advantageous when forming channel, molding and extrusions.

One of the valuable features of this universal machine is that the bending motion can be operated in either direction, thereby eliminating interference which often results when forming parts containing numerous bends.

It is possible to form two bends simultaneously in one piece by "teaming up" two DI-ACRO Hydra-Power Benders and the machines can be located to provide bends as close as 18" center to center with no limitation as to the maximum distance between bends.

The DI-ACRO Hydra-Power Bender can be delivered completely tooled for your job or it can easily be set up in your own plant as your various requirements arise.

DI-ACRO HYDRA-POWER BENDER NO. 6

With Toggle Clamp and Forming Roller

The basic design of the DI-ACRO Hydra-Power Bender provides a driving spindle on which either of the two different set-ups shown on page 29 can be easily mounted.

Standard tooling for tube bending is illustrated at right. A similar arrangement is also extremely practical for angle, channel, moulding and extrusion bending operations as the toggle release of both the clamp block and forming roller speeds the feeding and unloading operations.

Many other ductile materials including solid round, square and rectangular bars can also be formed with this set-up although the degree of bend is limited to 280° thereby making the Mounting Plate set-up necessary when bending centered and off-center eyes.

Tubing can be accurately formed to an inside radius as small as twice the outside diameter of the tube with a minimum of distortion without the use of inside mandrels.

For smaller radius bends or thin wall tubing an inside mandrel is usually required to provide internal support at the point of bend and the DI-ACRO Hydra-Power Bender can be equipped at the factory for this type of forming.

Motor—220-440 Volt A.C. Three Phase 60 Cycle	3 H.P.
Bending Speed (Other speeds optional)	6 RPM to 12 RPM
Hydraulic Cylinder	3½" bore*
Hydraulic Pump—Flow Control Valve	Vickers
Radius Capacity (Can be increased)	9"
Hydraulic Pressure	1000 P.S.I.
Floor Space	18" x 54"
Weight — Net 950 lbs., Crated 1,150 lbs., Export 1,250 lbs.	

* Hydraulic Cylinders larger and smaller are available. Ask for special quotation.

DI-ACRO HYDRA-POWER BENDER NO. 8

With Mounting Plate and Forming Nose

The set-up shown at right is similar to the arrangement used so successfully with all DI-ACRO hand Benders.

The material is locked between the radius collar and locking pin and, as the Mounting Plate rotates, the material is drawn past the forming nose or a forming roller which can be used for many operations.

This arrangement is ideal for a wide variety of forming requirements in most solid materials and is especially valuable for bending eye bolts as it will form both centered and off-center eyes in one operating cycle.

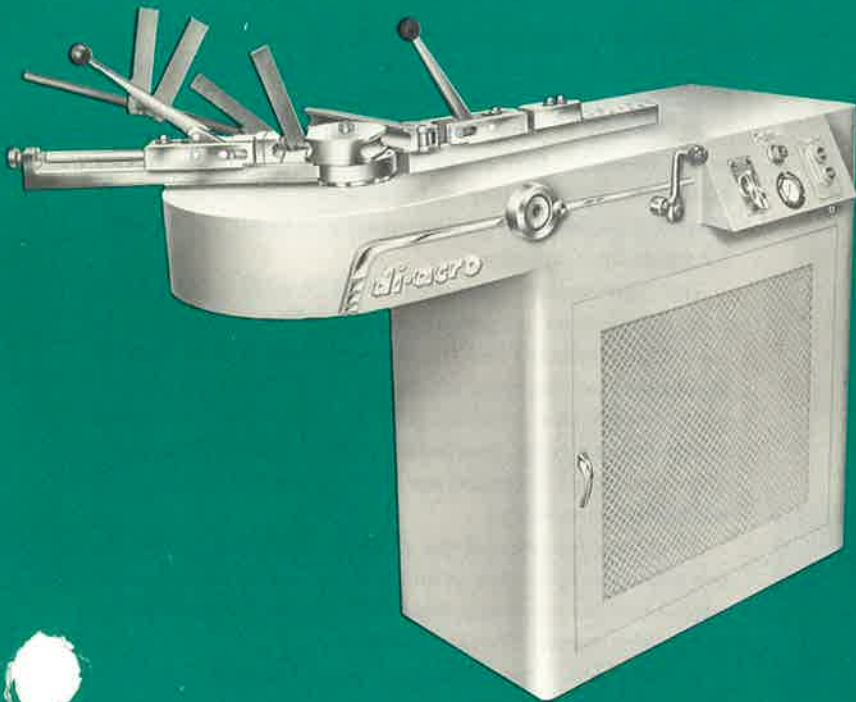
The radius capacity of this unit is unusually large and any radius desired can be obtained by merely placing a collar of the required size on the Mounting Plate. A complete assortment of standard radius accessories is available as listed on page 26 or they can be prepared in your plant.

Since the Mounting Plate allows bending a full 360°, it is necessary to use this set-up when forming tubing, angle, channel, mouldings and extrusions in excess of the 280° angle range of the Toggle Clamp Set-Up. This can be easily accomplished through the use of the proper accessories.

Motor—220-440 Volt A.C. Three Phase 60 Cycle	3 H.P.
Bending Speed (Other speeds optional)	6 RPM to 12 RPM
Hydraulic Cylinder	3½" bore*
Hydraulic Pump—Flow Control Valve	Vickers
Radius Capacity (Can be increased)	24"
Hydraulic Pressure	1000 P.S.I.
Floor Space	18" x 54"
Weight — Net 1,000 lbs., Crated 1,200 lbs., Export 1,300 lbs.	

* Hydraulic Cylinders larger and smaller are available. Ask for special quotation.

HYDRA-POWER BENDER



TUBE FORMING WITH DI-ACRO HYDRA-POWER BENDER NO. 6

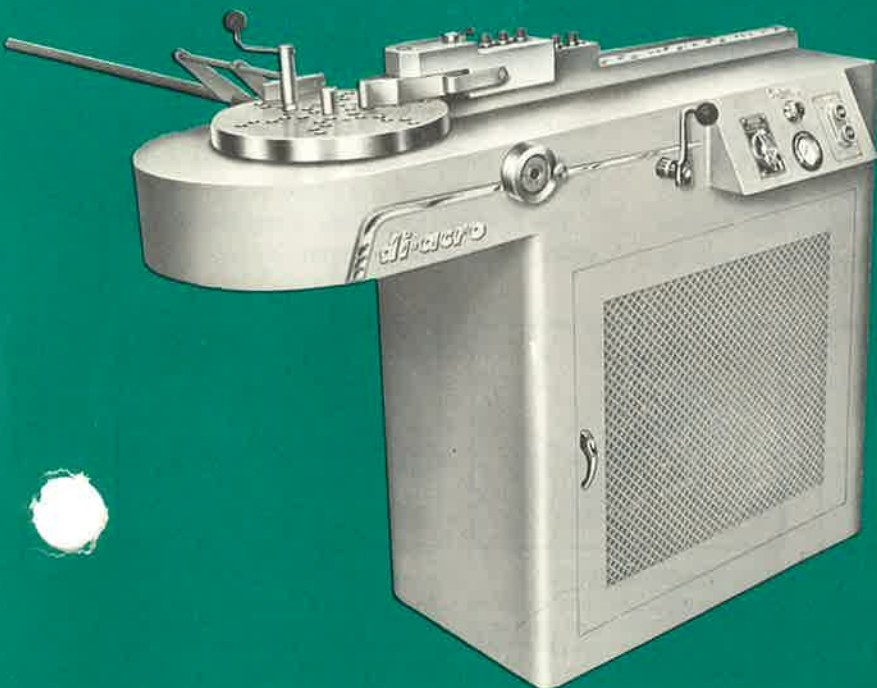


TUBE FORMING WITH DI-ACRO HYDRA-POWER BENDER NO. 6

MATERIAL CAPACITY

Steel Tubing—16 gauge	..... 1 1/4" O.D.
Standard Iron Pipe	..... 3/4" I.P.S.
Flat Steel Bar—edgewise	..... 1/4" x 1"
Angle	..... 1/8" x 1" x 1"
Channel	..... 1/8" x 1/2" x 1"

NOTE: Send samples to our Engineering Department for test and recommendation.



LARGE RADIUS FORMING WITH DI-ACRO HYDRA-POWER BENDER NO. 8



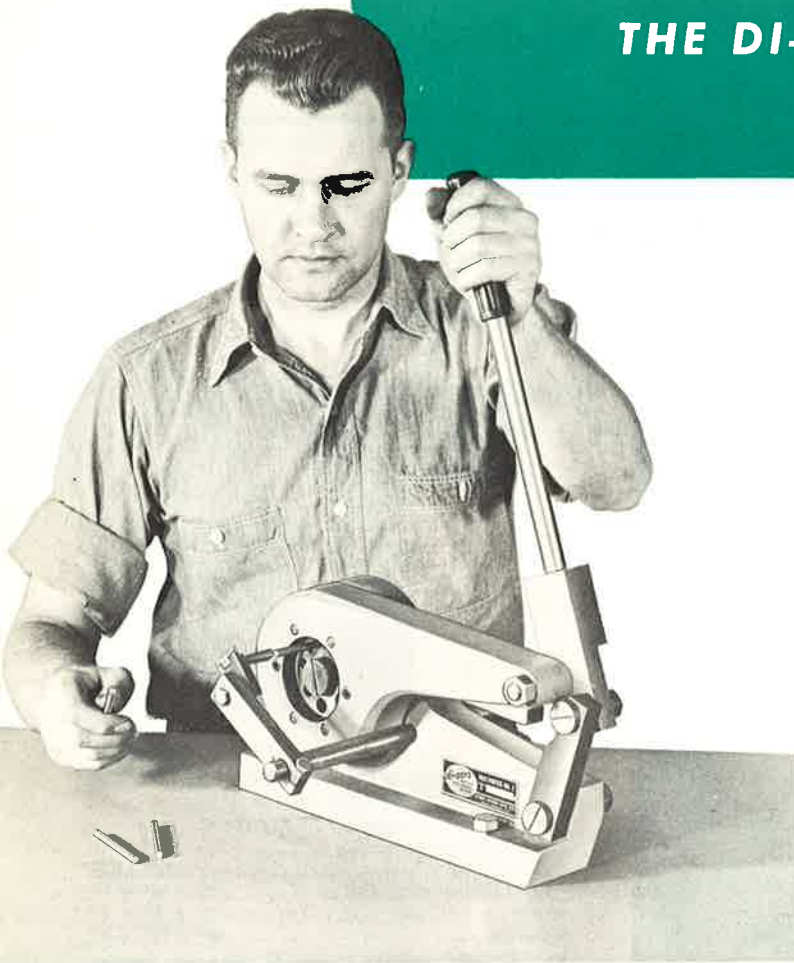
LARGE RADIUS FORMING WITH DI-ACRO HYDRA-POWER BENDER NO. 8

Standard Iron Pipe*	..... 1 1/4" I.P.S.
Centered Eye—Round Mild Steel Bar (one operation)	..... 3/4"
Centered Eye—Round Mild Steel Bar (two operations)	..... 1"
Square Mild Steel Bar	..... 3/4"
Flat Steel Bar—Bent Flat	..... 3/8" x 4"
Flat Steel Bar—Bent Edgewise	..... 3/8" x 1"
Other materials same as No. 6 Bender	

NOTE: Send samples to our Engineering Department for test and recommendation.

* Requires cylinder with 4" bore.

THE DI-ACRO PRECISION ROD PARTER



The DI-ACRO Rod Parter is a rugged precision machine scientifically designed and exactly manufactured for accurately cutting or "parting-off" rods and bars without distorting their roundness or crushing the material.

The cutting principle employed in this precision machine

provides the highest possible production rate for "parting-off" rods and bars. It is therefore an extremely valuable companion unit for the DI-ACRO Bender.

A powerful multiple leverage arrangement incorporated in the DI-ACRO Rod Parter provides exceptional ease of operation. Three heavy duty Sleeve Type Bearings employed throughout the machine greatly reduced friction thereby speeding production.

The "parting-off" operation of all DI-ACRO Rod Parters is a combination shearing-breaking action. Although most shearable materials can be accurately cut without burr by these precision machines, the squareness of the cut is largely determined by the breaking quality of the material. The rod can always be easily inserted in a hole of its same diameter after parting and the end can be threaded or riveted without further processing.

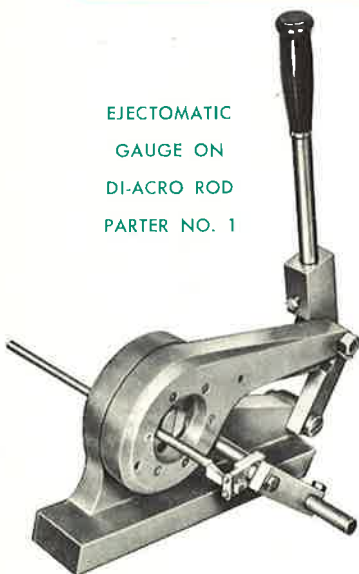
All of the features of the popular DI-ACRO Rod Parter are now incorporated in an entirely new power operated unit which provides extremely high speed production required in many jobs, without operator fatigue.

The DI-ACRO Power Parter is equipped with a flywheel drive for quiet and efficient operation. Each cutting cycle is instantly obtained through a foot lever leaving both hands of the operator free to handle the material.

Scope of operations of the DI-ACRO Power Parter ranges from small diameter rods required in many precision products to heavy bars used in the manufacture of agricultural and road construction machinery.

The NEW EJECTOMATIC GAUGE . . . and how to use it

EJECTOMATIC
GAUGE ON
DI-ACRO ROD
PARTER NO. 1

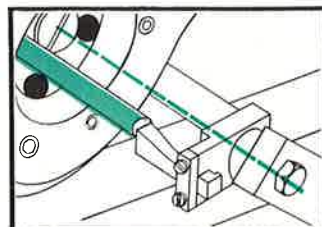


A valuable accessory now supplied as standard equipment with all DI-ACRO Rod Parters is the new Ejectomatic Gauge.

Production output of DI-ACRO Rod Parters is greatly increased by use of this gauge as

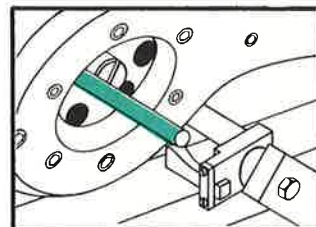
it allows the three separate operations of gauging, parting and ejecting to be automatically obtained in a single working cycle.

The Ejectomatic Gauge is especially valuable when cutting lengths under 6".



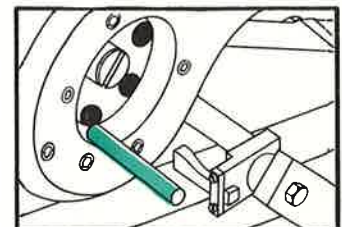
1. POSITIVE GAUGE STOP

Set Gauge Arm so bolt lines up with Pivot Bolt of Rod Parter, then adjust Gauge for desired hole and length of piece. Only portion of rod should contact gauge.



2. PRECISION PARTING

Advance material until stopped by Gauge. Note how rod slips off end of Gauge when Handle is pulled down and rod is cut.



3. AUTOMATIC EJECTION

As handle is returned and material advanced, the cut piece is automatically ejected and the next piece is gauged.

SPECIFICATIONS AND CAPACITIES DI-ACRO POWER PARTER

New DI-ACRO Power Parter with flywheel drive will cut as fast as the foot-actuated clutch can be operated.

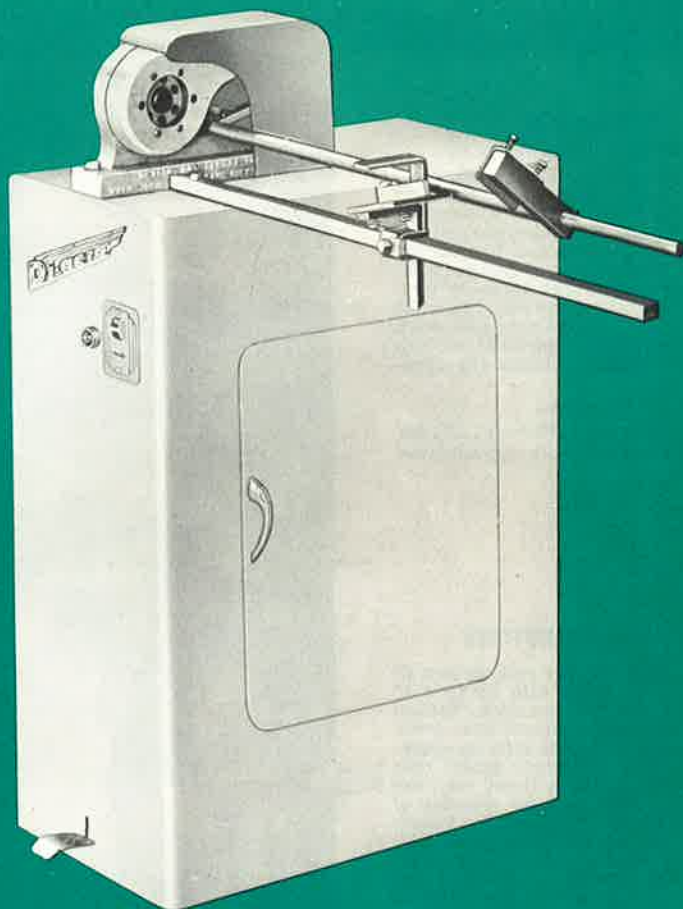
Cutting heads of the DI-ACRO Power Parter are provided with ten holes graduated in size from 1/16" to 5/8" diameter in steps of 1/16"; this allows choice of cutting hole of exact material size. Holes are .003 to .004" oversize to provide the best possible cut on all standard cold finish bars.

Power Parter can be equipped for cutting square, rectangular, hexagon and other shaped bars. Heads with special size round holes can be supplied for cutting hot rolled and other over-size rods. Write for quotation.

Cutting heads of heavy alloy tool steel 1" thick, properly hardened and precision ground, assure a high degree of accuracy. Heads are reversible offering double service. They are easily removed for resharpening, are quickly replaced.

A power operated material length gauge is supplied as standard equipment. An Adjustable Stock Stand, which facilitates feeding of material; and a Speed-Matic Gauge that cuts any desired length "automatically", and as fast as operator can feed stock through the machine, are available as accessory items.

Maximum material capacity—steel bar.....	5/8"
Cutting head thickness.....	1"
Weight of flywheel.....	85 lbs.
Strokes per minute.....	180
Standard motor (optional 110-220 volt a.c. single phase, 220-440 volt a.c. three phase).....	1/2 H.P.
Motor speed.....	1750 R.P.M.
Operating height.....	40"
Working space.....	17" x 28"
Weight, net.....	450 lbs.



SPECIFICATIONS AND CAPACITIES DI-ACRO ROD PARTER

DI-ACRO ROD PARTER	No. 1	No. 2
Weight, net.....	25 lbs.	60 lbs.
Maximum capacity, round steel bar.....	3/8"	5/8"
Cutting Head Thickness.....	1/2"	1"

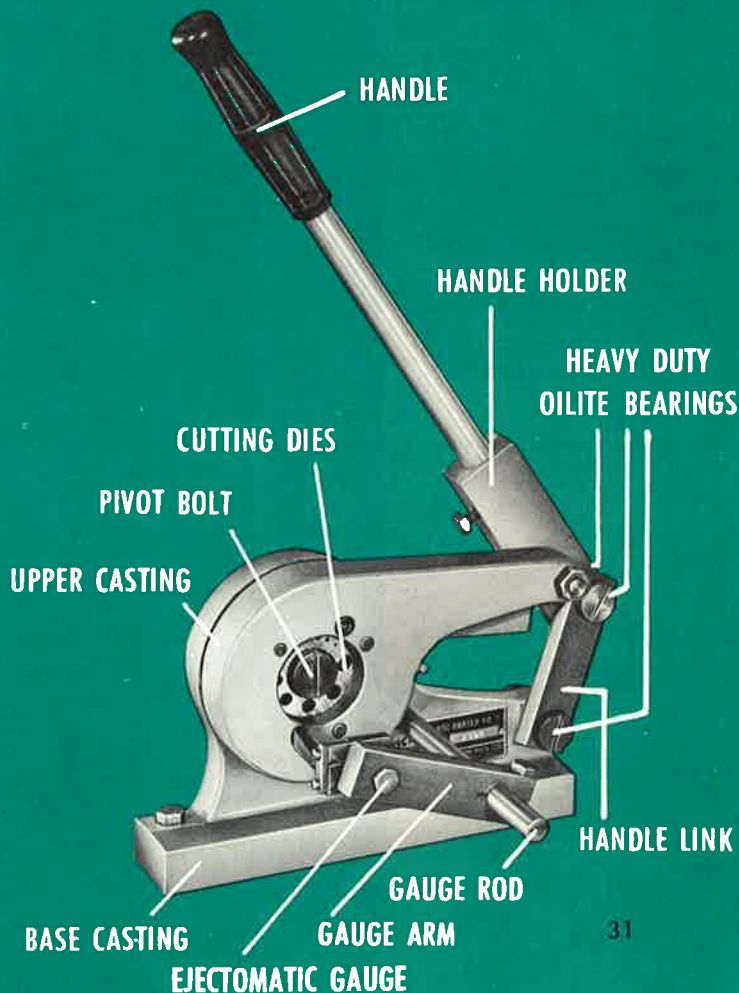
Cutting heads of DI-ACRO Rod Parter No. 1 are provided with eleven holes graduated in size from 1/16" to 3/8" dia. in steps of 1/32". There are ten holes from 1/16" to 5/8" dia. graduated by 1/16" in the DI-ACRO Rod Parter No. 2. This makes possible the choice of a cutting hole of the exact material size, rod is parted without loss of concentricity.

DI-ACRO Rod Parters equipped for cutting square, rectangular, hexagon and other shaped bars are also available. Write for quotation.

Cutting heads of heavy alloy tool steel, properly hardened and precision ground, assure a high degree of accuracy. Reversible heads offer double service. They are easily removed for resharpening, quickly replaced.

Two operating handles are provided to efficiently cover the complete material range of the DI-ACRO Rod Parter. Short handle allows rapid cutting of small diameter bars. Long offset handle reduces operator effort to a very minimum on heavy "parting-off" operations.

Three heavy duty Sleeve Type Bearings employed in the powerful multiple lever arrangement of the DI-ACRO Rod Parter provide extreme ease of operation.

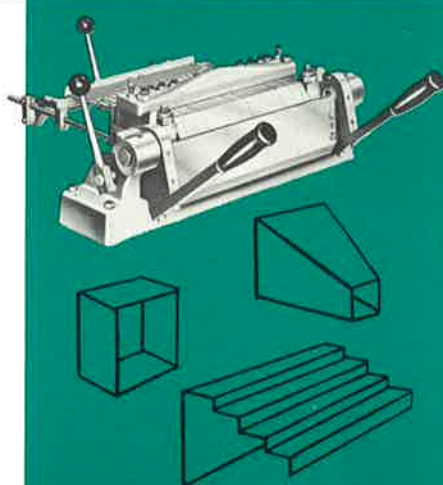


other DI-ACRO machines for duplicating precision parts

DI-ACRO BOX FINGER BRAKES

6 machines in 1 that allow unlimited forming possibilities. Can be used as a standard brake, bar folder, box and pan brake, open end former, tab former and radius former. Replaces dies on many duplicating operations. 12 and 24 inch models available with undercut fingers and one inch clearance through top opening.

Three models:
Forming widths—6", 12", 24"
Capacity—16 gauge mild steel



DI-ACRO ROLLER

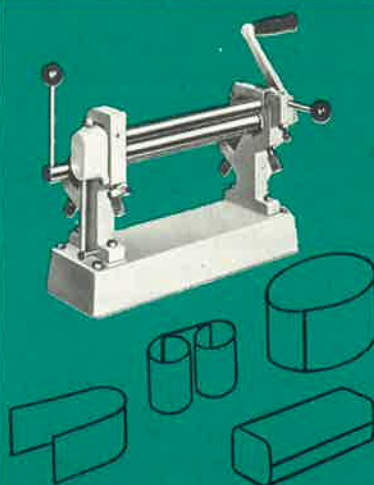
Cam operated idler roll, an exclusive feature, enables forming of small diameter circles in one pass through the forming rolls, larger circles in two passes. Also, bends can be located at any point in a sheet of material with straight sections on both sides of the bend.

Eight models.
Widths—6", 12", 18", 24", 36", 42"

Capacities—16 through 24 gauge steel

Power Driven Models:
Widths—12", 18", 24", 30", 36" and 42"

Capacities—16 through 24 gauge steel.



DI-ACRO NOTCHER

Tab Notcher cuts up to a 6" x 6" notch with up to a 1" tab in one operation. Tabbed corners eliminate bead welding in chassis forming operations. Standard model cuts 90° notch without tab, can also be used for shearing of narrow strip stock. Both models feature work table with squaring gauges for accurate duplication. Both hand and power models available in standard and tab notcher.

Size—Tab Notcher, 6x6 inch notch with 1 inch tab; Standard Notcher, 6x6 inch notch
Capacity—16 gauge mild steel

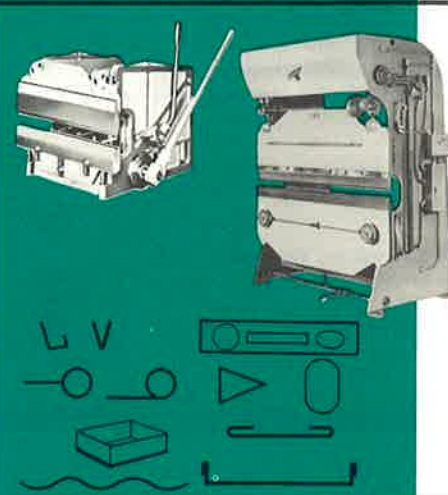


DI-ACRO PRESS BRAKE

Eight models in power capacities of 12, 17, 25 and 35 tons. Stroke adjustment and dual speed operating stroke give operator complete control over entire forming cycle. 8 ton hand operated model too. Complete line of precision press brake dies available.

Capacities:

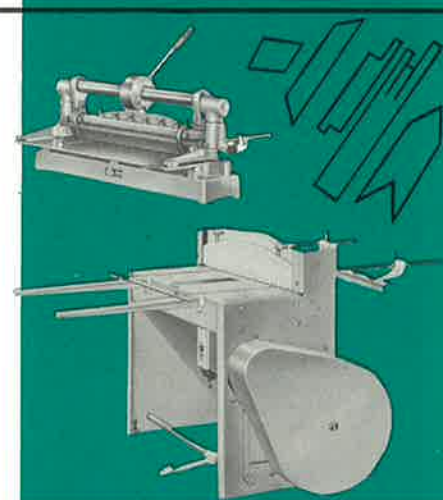
No.	Size	Power	Capacity
16-24	24"	8 tons	16 ga. steel
16-36	36"	12 tons	16 ga. steel
18-48	48"	12 tons	16 ga. steel
14-48	48"	17 tons	16 ga. steel
16-72	72"	25 tons	16 ga. steel
18-96	96"	25 tons	18 ga. steel
14-72	72"	35 tons	14 ga. steel
16-96	96"	35 tons	16 ga. steel



DI-ACRO SHEAR

Accurately cuts a wide variety of materials to exacting tolerances. Hand models feature micrometer back gauge as standard equipment. Model 36P Powershear is the lowest cost, high speed production shear on the market.

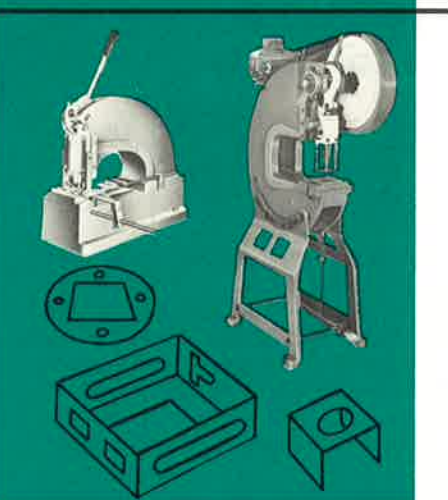
Hand models:
Size—6", 12", 24", 36"
Capacity—16 gauge mild steel
Power models:
Size—24", 36", 48"
Capacity—16 gauge mild steel



DI-ACRO PUNCH PRESS

Single station hand operated models with throat depths of 6 and 12 inches. Horn punch press for punching holes in chassis and shaped material—converts to standard single station press with addition of table accessory. OBI punch press provides 5 tons of power—cycling up to 190 strokes per minute.

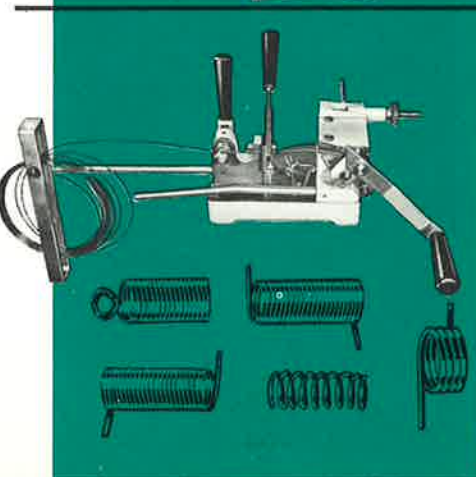
Capacities:
Hand punch presses—4 tons
OBI punch press—5 tons



DI-ACRO SPRING WINDER

Winds one or hundreds of torsion, compression and extension springs with the same degree of accuracy. TENSION CONTROL assures accurate duplication of springs—WIRE-CUT-OFF quickly snips off end of spring—CAM LOCK clamps wire to arbor without threading.

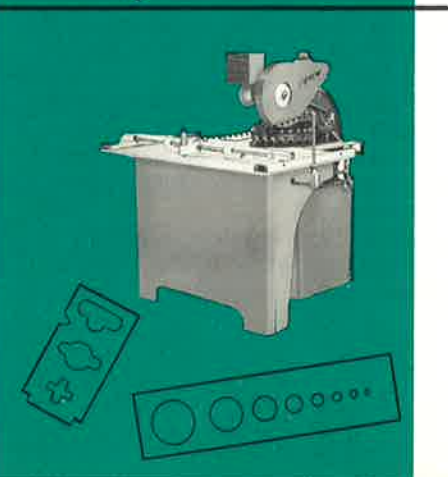
Handles round, flat, rectangular wire to .100" diameter. Accommodates arbors from 1/16" to 1 1/2" O.D.



DI-ACRO TURRET PUNCH PRESS

Stylus operated press features high speed punching—up to a hole a second. 18 punching stations are at the operator's fingertips through a rotation control panel. Can also operate without stylus operation. 12 and 18 station hand operated turret punch presses provide versatility for short production runs. Complete line of punches and dies available.

Capacities:
Model 18 Stylus—7 1/2 tons
Model 18 Power—7 1/2 tons
12, 18 hand operated—4 tons



* **DI-ACRO engineering service . . . available without obligation**

The experience accumulated by DI-ACRO Engineers over a period of many years in solving thousands of duplicating problems enables them to be of real assistance to our customers.

If you will send us blueprints, sketches, or samples of your parts, our Engineering Department will submit detailed recommendations for your consideration.

DI-ACRO  **HOUDAILLE**

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