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Port-A-Pierce Port-A-Notch MULTICYL®

**HYDRAULIC HOLE PUNCHING
AND NOTCHING SYSTEMS**

PORT-A-PIERCE

PORT-A-NOTCH

SOURCE CATALOG

MULTICYL®

Port-A-Pierce/Port-A-Notch SYSTEM

The Port-A-Pierce/Port-A-Notch Hydraulic Hole Punching System offers punching power without the need of presses or press brakes.

This low cost system is capable of hole punching, notching, embossing, staking, marking or numbering, counter sinking, extruding, shear tab, knock-outs (single/double) and many other operations. This new line of equipment also lends itself to low, medium and high production applications where work stations can be set up to do more primary and secondary operations on the piece part and the set up left standing until the next requirement or production run. The Port-A-Pierce/Port-A-Notch System does not change the concept of unitized tooling but complements it by adding a series of cages and cylinders that provides an economical and low power source.

BOOSTER/PUMPS

Compact Air-Hydraulic Boosters amplify 100 P.S.I. shop air pressure to 3000 P.S. I. hydraulic force at the punching head. This power source is designed for use in medium sized applications where light gauge material is a factor.

Air-Hydraulic Pumps amplify 100 P.S.I. shop air pressure to 5000 P.S. I. hydraulic force at the punching head. Pumps are recommended where tonnage requirements are greater.

Note: Punching or Notching cycle time depends upon constant flow of air at a fixed rate of pressure.

HYDRAULIC CYLINDER

Mounted on top of the housing or cage, the cylinder has an output from 1 to 25 tons depending upon the power source. This force allows sufficient power to pierce a wide variety of hole sizes thru various material thicknesses in correlation with the cylinders capacity.

CAGES

Port-A-Pierce cages are designed to match up with standard Unittool 'C'-Frame Holders. 'M' series cage (medium duty) with 'M' Series Holders & 'H' series cage (heavy-duty) with 'H' Series Holders. Throat depth of 4⁵/₈" is standard. Special cages for greater throat depth or edge notching units are available. Standard cages are available for 3x3 corner notching units.

EASE OF SET UP

The hole punching units are mounted in the cages and this assembly is mounted on a template or base plate. The pilot pin location on the unit transfers thru the cage to the precision location on the template. Using quick-disconnect on the cages they can quickly be connected to the manifold and pump thus minimizing set up to a matter of minutes. The Port-A-Pierce/Port-A-Notch hydraulic hole punching system lends itself to permanent set ups or work station that can be left on line for immediate use.

ECONOMICS

This system parallels the unitized tooling method as it features quick set up, low capital investment and with its high salvage factor the equipment can be returned to the tool storage department to be used another day.

Multicyl® hole punching SYSTEM

The MULTICYL system combines both hydraulic cylinder and pressure booster into one component to deliver up to 15,000 pounds of power to operate Unittool's hole punching and notching units.

Because this system is completely self-contained and requires no complicated pneumatic circuitry or additional control valves, all that is required to activate MULTICYL is a 3 way air control and shop air pressure of 100 psi.

CYLINDER

In hole punching and notching operations, full pressure is only required when the tool comes in contact with the material being punched.

The MULTICYL unit is unique because of its Two Stage Hydraulic Action. The low pressure advance stage will provide power to compress the stripping springs in the unitized tool while the high pressure working stroke produces the high force to pierce the holes.

CAGES

MULTICYL cages are designed to retain standard Unittool 'C'-Frame Holders. 'M' series cage (medium duty) with 'M' series holders & 'H' series cage (heavy duty) with 'H' series holders. Throat depth of $4\frac{5}{8}$ " is standard. Special cages for greater throat depth, for notching units & for multiple cylinder applications are also available.

SIMPLICITY

The MULTICYL units requires no complicated pneumatics and is completely self-contained, with no external hydraulics involved. Controls for hydraulics when compared to air controls are usually bulkier, more expensive, less flexible, require more maintenance and time, and usually require electrical interface for use with other equipment. Advantages of pneumatic controls over hydraulic controls are evident.

ENERGY SAVER

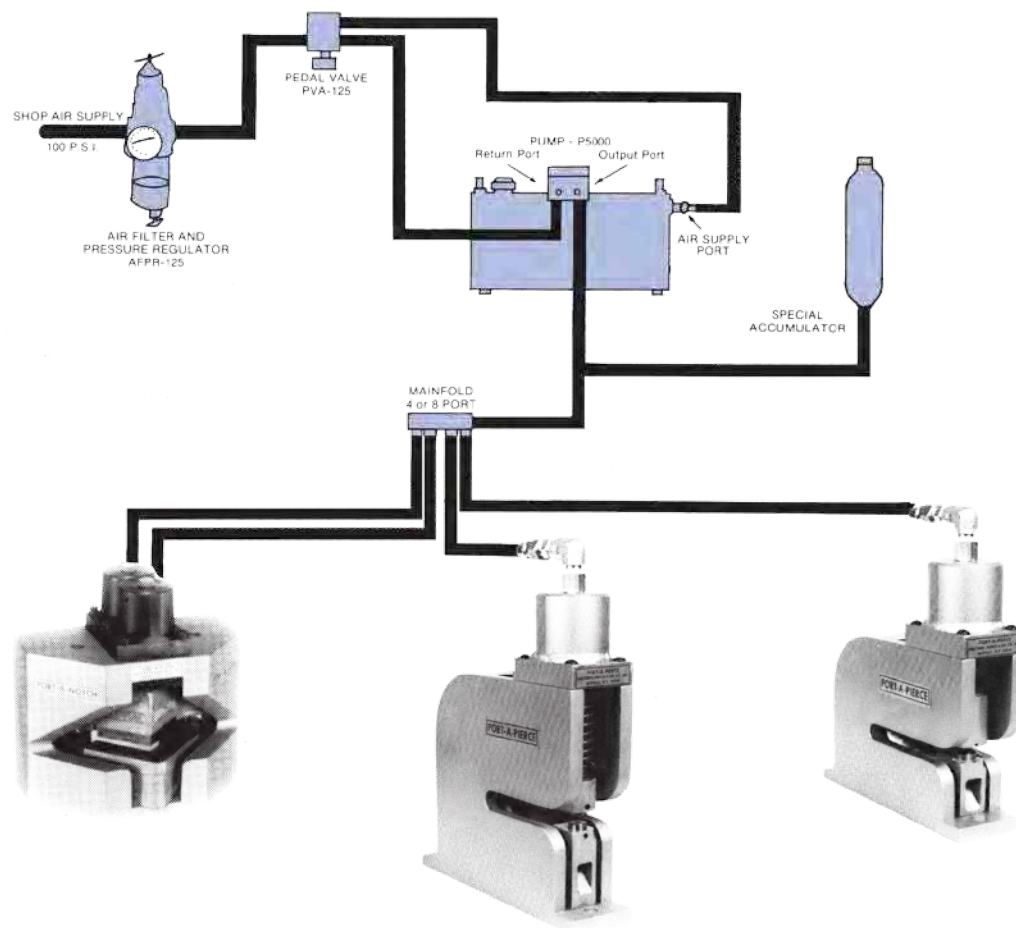
The two stage action advances the tool under low pressure until the tool meets the steel, then changes over to high pressure just when extra force is required. This is how MULTICYL saves energy.

Another way MULTICYL saves energy is by operating only when needed, while the punch press or hydraulic power pack run continuously, even during load/unload time.

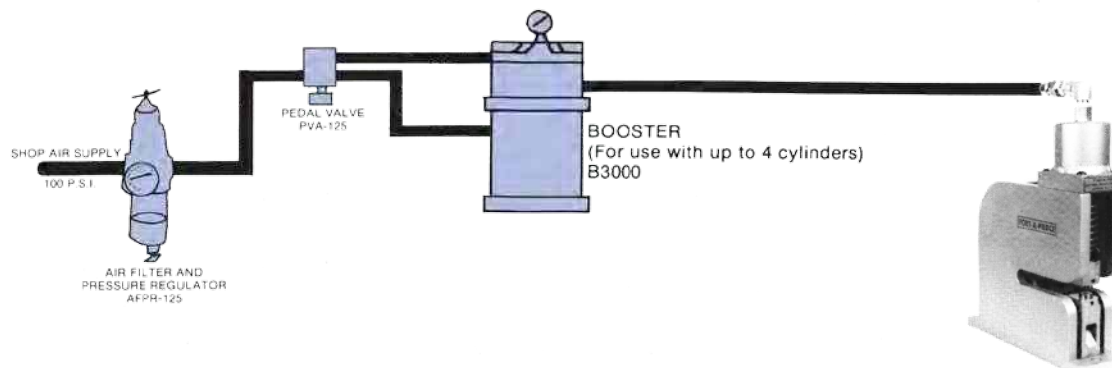
THE SYSTEM & HOW IT OPERATES...

The graphic diagrams shown here simplify the concept of obtaining hydraulic power from shop air to pierce and notch your material. The standard components illustrated and their flow make up the entire Port-A-Pierce/Port-A-Notch System.

PUMP SYSTEM



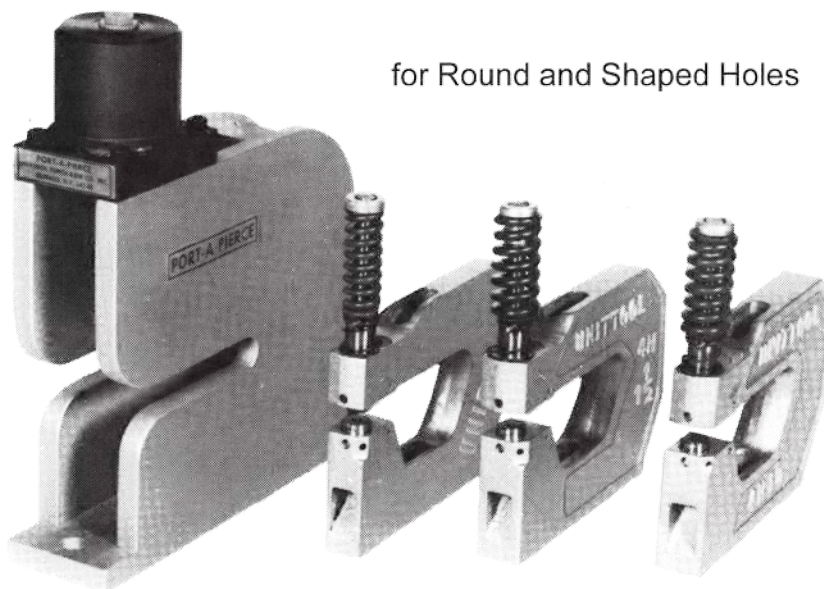
BOOSTER SYSTEM



Heavy Duty Cage & Cylinder (5HC-3)

Unittool's Heavy-Duty Cage, model no. 5-HC3, is designed to encase the heavy-duty $8\frac{3}{8}$ " shut height units. The following units will fit this cage: Model 4H-1, 4H-1 $\frac{1}{4}$ & 4H1 $\frac{1}{2}$. Cages of greater throat depth are available upon request. For 'C' Frame unit specifications, refer to catalog H-83. In all applications, the capability of this system depends upon what you can do with 6 tons of force. For larger hole diameters, shear on the punches will help to reduce the punching pressure required. Refer to page 16 as your guide.

for Round and Shaped Holes



4-H1

4H1 $\frac{1}{4}$

4H1 $\frac{1}{2}$

SPECIFICATIONS CAGE

Cat. No.	5-HC3
Throat Depth	5 $\frac{1}{4}$ "
Range	5/8" Dia. in 3/16" Mat'l. 1/2" Dia. in 1/4" Mat'l.

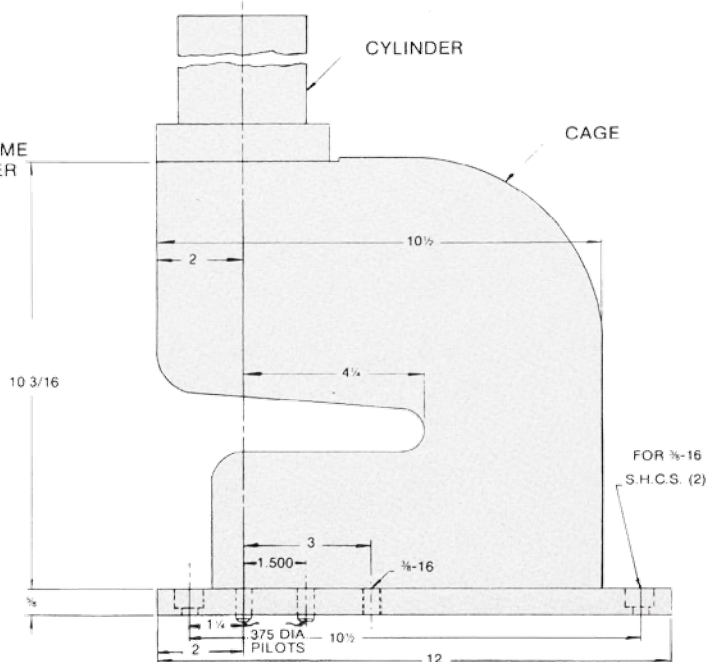
CYLINDER

Cat. No.	HC10T
Max. Tonnage	10 Ton
Stroke	1 in
Tonnage Developed	10 Ton @ 5000 PSI with pump
	6 Ton @ 3000 PSI with booster

FOR OPTIMUM PERFORMANCE, SHARPEN PUNCH AND DIE FREQUENTLY



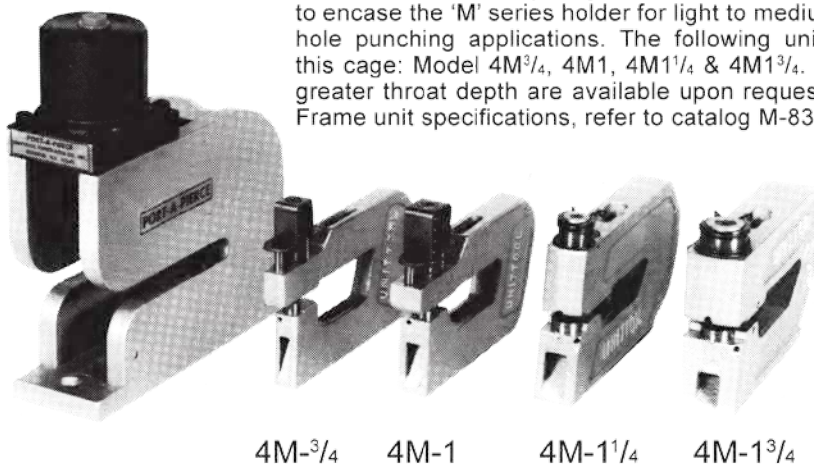
"C" FRAME
HOLDER



Medium Duty Cage & Cylinder (5MC-3)

for Round and Shaped Holes

The Medium Duty Cage, Model 5MC3, is designed to encase the 'M' series holder for light to medium gauge hole punching applications. The following units will fit this cage: Model 4M^{3/4}, 4M1, 4M1^{1/4} & 4M1^{3/4}. Cages of greater throat depth are available upon request. For 'C' Frame unit specifications, refer to catalog M-83.



SPECIFICATIONS

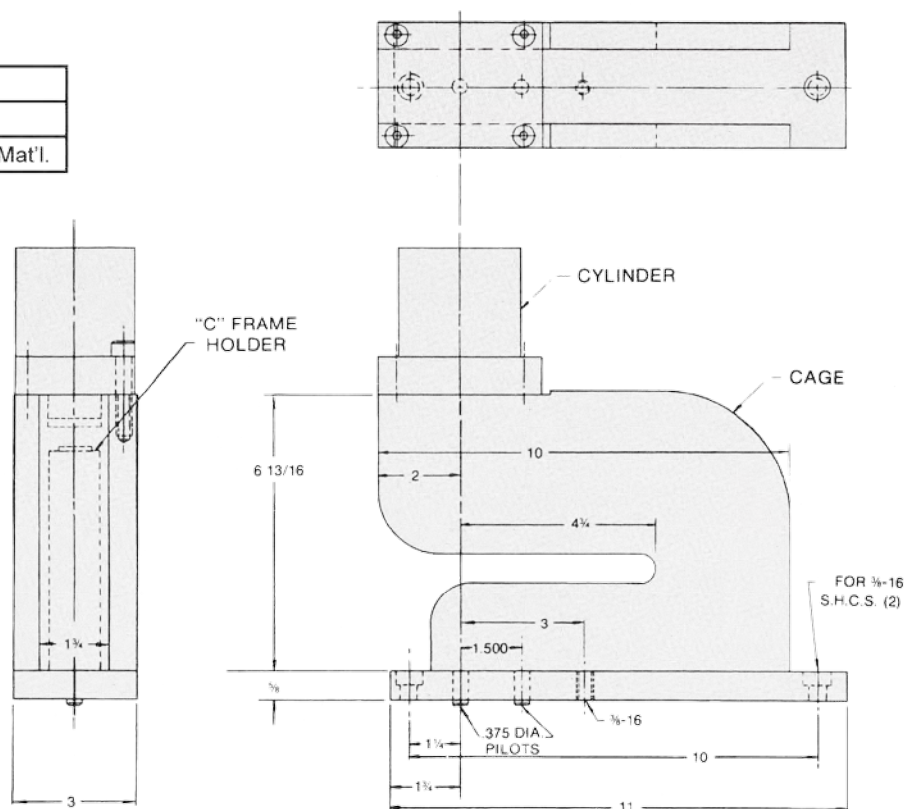
CAGE

Cat. No.	5 MC 3
Throat Depth	5 ¹ / ₂ "
Range	.093-.500 in 10GA Mat'l.

CYLINDER

Cat. No.	MC10T
Max. Tonnage	10 Ton
Stroke	1/2"
Tonnage Developed	10 Ton @ 5000 PSI with pump
	6 Ton @ 3000 PSI with booster

FOR OPTIMUM PERFORMANCE, SHARPEN PUNCH AND DIE FREQUENTLY



Medium Duty Cage & Cylinder (5MC-4 $\frac{1}{2}$)

for Round and Shaped Holes

This Medium Duty Cage, Model 5MC-4 $\frac{1}{2}$, is designed to accommodate units 4M2 $\frac{1}{4}$ & 4M3. With this cage & 'C' Frame units stated, you have increased hole capacity for light & medium cage material. For 'C' Frame unit specifications, refer to catalog M-83.



4M-2 $\frac{1}{4}$

4M-3

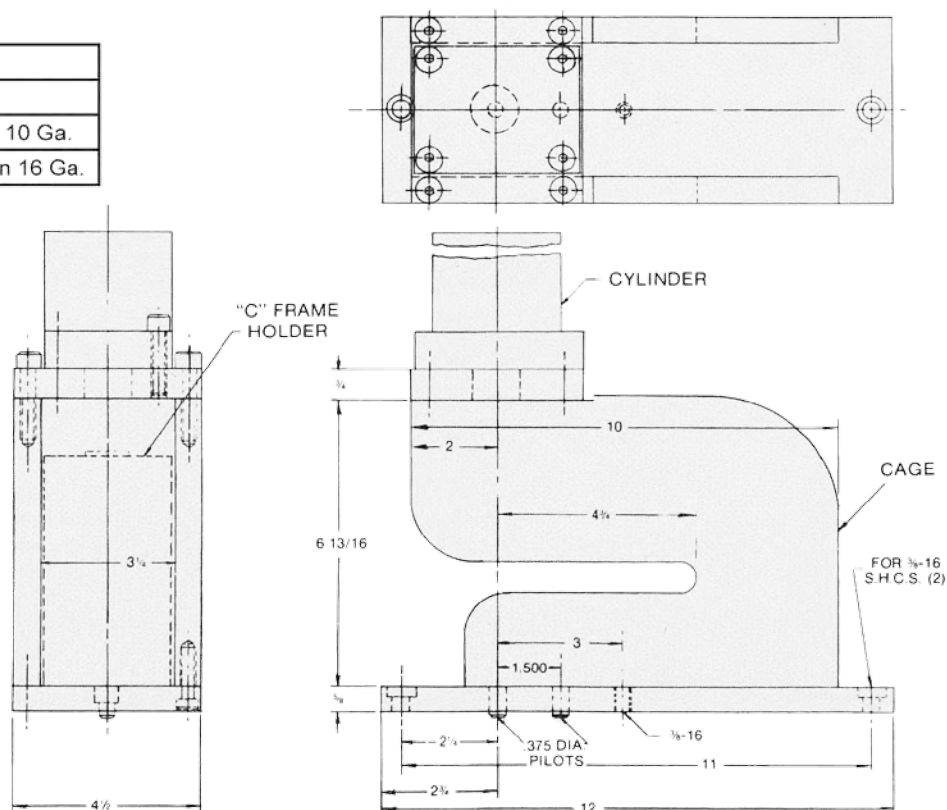
SPECIFICATIONS CAGE

Cat. No.	5MC-4 $\frac{1}{2}$
Throat Depth	5 $\frac{1}{2}$ "
Range	.250-1.000 Dia. in 10 Ga. 1.000-2.000 Dia. in 16 Ga.

CYLINDER

Cat. No.	HC10T
Max. Tonnage	10 Ton
Stroke	1"
Tonnage Developed	10 Ton @ 5000 PSI with pump 6 Tons @ 3000 PSI w/booster

FOR OPTIMUM PERFORMANCE, SHARPEN PUNCH AND DIE FREQUENTLY



For Material Thickness Up To 1/8" Mild Steel

Unittool's Port-A-Notch System incorporates a cage & cylinder with a standardized medium duty notching unit. Shown below are corner, edge & vee notching operations with a specially designed cage for each application. Due to increased tonnage requirements for notching, heavy-duty units are not available in the Port-A-Notch System. For notching units specifications, refer to catalog N-82.

NOTE: To assist you in the most efficient use and application of this system, send your blueprint or piece part to Unittool's Engineering Department.

MODEL
MCCN-33

CORNER NOTCH

Perform left hand and right hand
90° corner notches or vee notch
— with one tool...



MODEL
MCEN-33

EDGE NOTCH

also used for corner notching,
nibbling, coping and strip stock
cut-off.

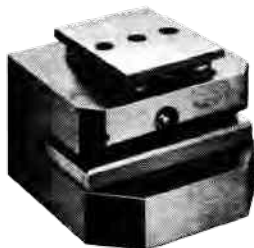
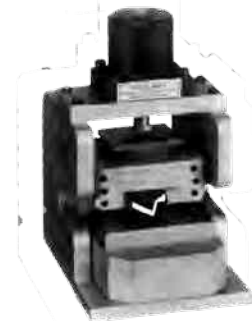


MODEL
MCVN-1
and
MCVN-1 1/2

90° VEE NOTCH

Units for 60°, 45°, 30°, and other
sizes are available.

ASK FOR QUOTATION

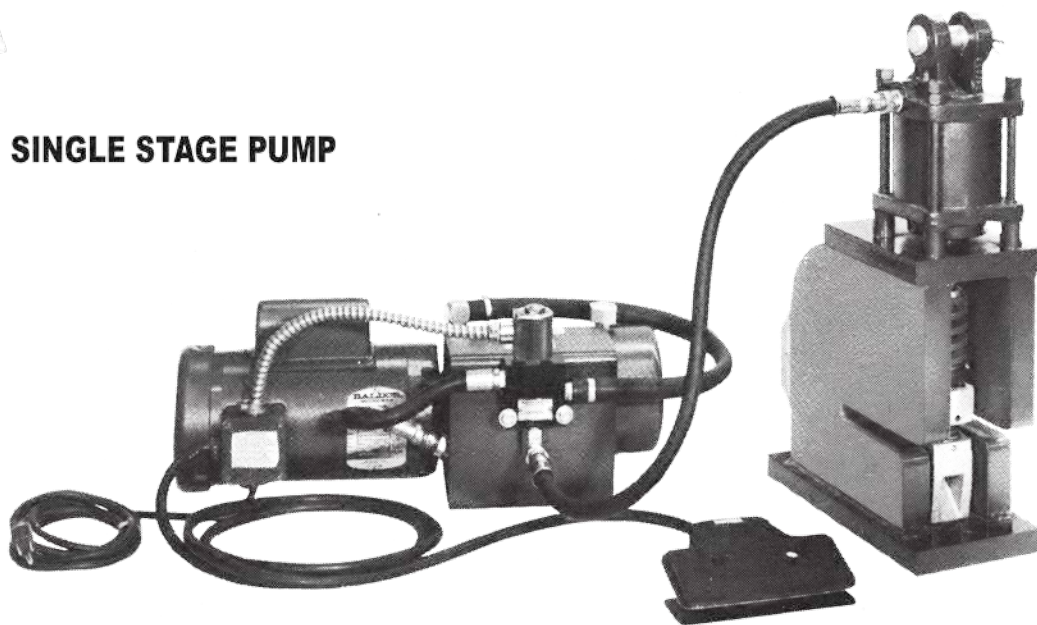


CUSTOM DESIGN

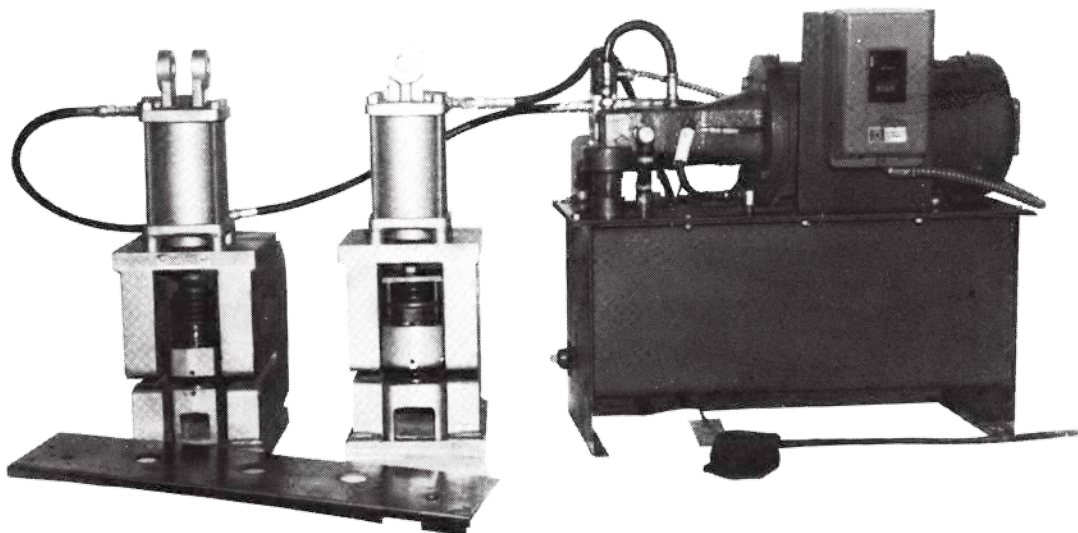
Special notching units can be provided for combination
notch and pierce operations as well as special edge or
corner notching applications.



PRICE ON APPLICATION. PLEASE SEND SKETCH FOR QUOTATION.

New!**SINGLE STAGE PUMP**

Unittool has now made available the EXTRA HEAVY-DUTY PORT-A-PIERCE/PORT-A-NOTCH line. With a capacity range from 10 to 25 tons, this pure hydraulic system should be utilized where the standard Port-A-Pierce system leaves off. The cylinders used here are the Single-Acting/Spring Return type in 10, 15 and 25 ton sizes. Cages and power units are designed to meet individual applications. Contact our engineering department for complete detailed data on this Extra Heavy-Duty Port-A-Pierce Hydraulic System.

**DOUBLE STAGE PUMP**

Hydraulic Cylinders

M-SERIES UNITS



H-SERIES UNITS



SPECIFICATIONS

Part No.	MC 10T	Part No.	HC 10T
Piston Area	3.976 Sq. In.	Piston Area	3.976 Sq. In.
Volume	1.988 Cu. In.	Volume	3.976 Cu. In.
Max. Input	5000 P.S.I. – 10 Tons	Max. Input	5000 P.S.I. – 10 Tons

NOTE: The 'H' Series Cylinder is used with all Medium Duty Cages over 3" wide and with all notching units

EXTRA HEAVY-DUTY-H SERIES



SPECIFICATIONS

Part No.	HH 10T	HH 15T	HH 25T
BORE DIA.	4"	4"	5"
STROKE ADJUSTMENT	1 ¹ / ₁₆	1 ¹ / ₁₆	1 ¹ / ₁₆

Port-A-Pierce/Port-A-Notch

FLEXIBLE HOSE

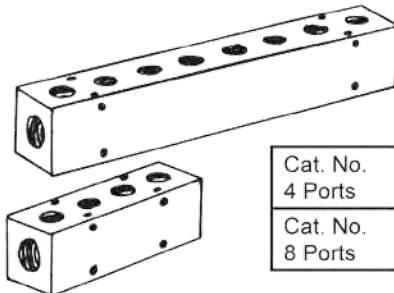
³/₈" I.D. Hydraulic Hose, available in 4000 psi or 7000 psi ratings are supplied in lengths listed below.



Cat. No.	Length Overall
HPH-12	12" Long
HPH-18	18" Long
HPH-24	24" Long
HPH-36	36" Long
HPH-72	72" Long

MANIFOLD

For Multiple Cage/Cylinder applications operating pressure - hydraulic - 4000 P.S.I.



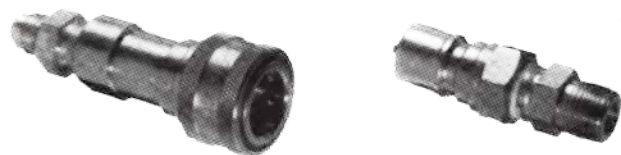
Cat. No.	MNF-4000-4
4 Ports	
Cat. No.	MNF-4000-8
8 Ports	

ACCESSORIES

QUICK DISCONNECT COUPLES

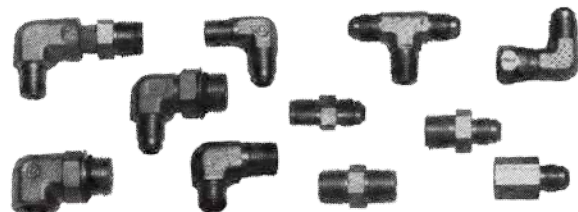
Including sleeve & nipple ³/₈" NPT

Cat. No.	DCH-375
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FITTINGS

Unittool stocks a complete inventory of ³/₈" NPT fittings (elbows, tees, nipples, etc.) For the assembly of the Port-A-Pierce/Port-A-Notch System



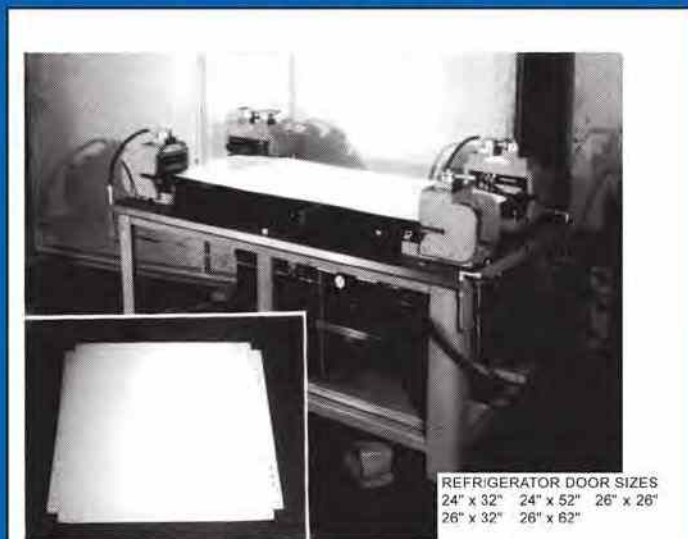


A special application of the Port-A-Pierce System to punch a rectangular hole in the side of a preformed refrigerator door. The punching unit has 1 1/2" feed clearance to clear a 1 1/4" return bend. The no tie down hand control was incorporated for maximum safety.



Part of a special machine using the Port-A-Pierce/Notch System to emboss & cutoff precious metals to exact tolerances.

Shown Are a Few Examples of How the Port-A-Pierce System Can Improve Your Productivity and Get the Job Done.



REFRIGERATOR DOOR SIZES
24" x 32" 24" x 52" 26" x 26"
26" x 32" 26" x 62"

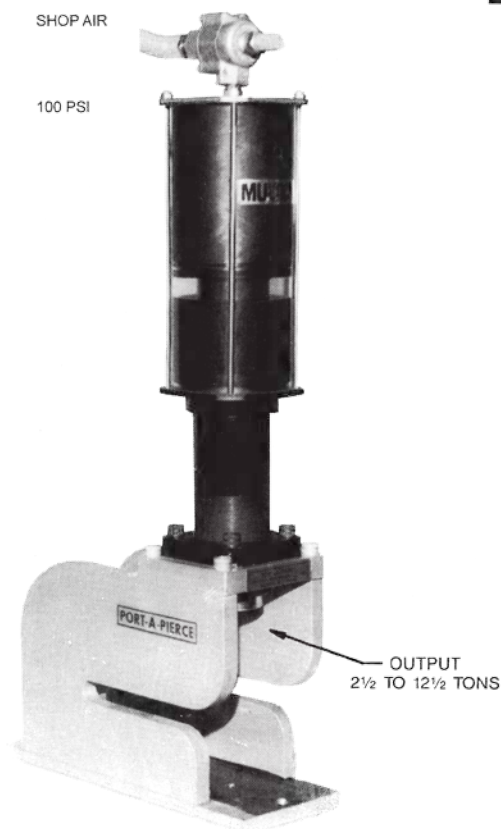
Setup time has been reduced to minutes in changing over from one size part to another. This is a self-contained work center.



Shear tab for sheet metal screw assembly.



25 Ton Hydraulic Notching System



THE MULTICYL® SYSTEM

THE ***SPEED*** OF AIR

THE **POWER** OF HYDRAULICS

The Multicyl pressure intensifier combines both cylinder and booster into one energy saving component. With 100 P.S.I. shop air input and up to 15,000 pounds output, this versatile system will deliver up to 60 strokes per minute. As shown in the photo (left), the Multicyl can be mounted to a standard Port-A-Pierce cage by means of a universal plate. Special cages for mounting 2 or more Multicyls are also available. Add a Unittool "C" frame unit and you are ready for production.

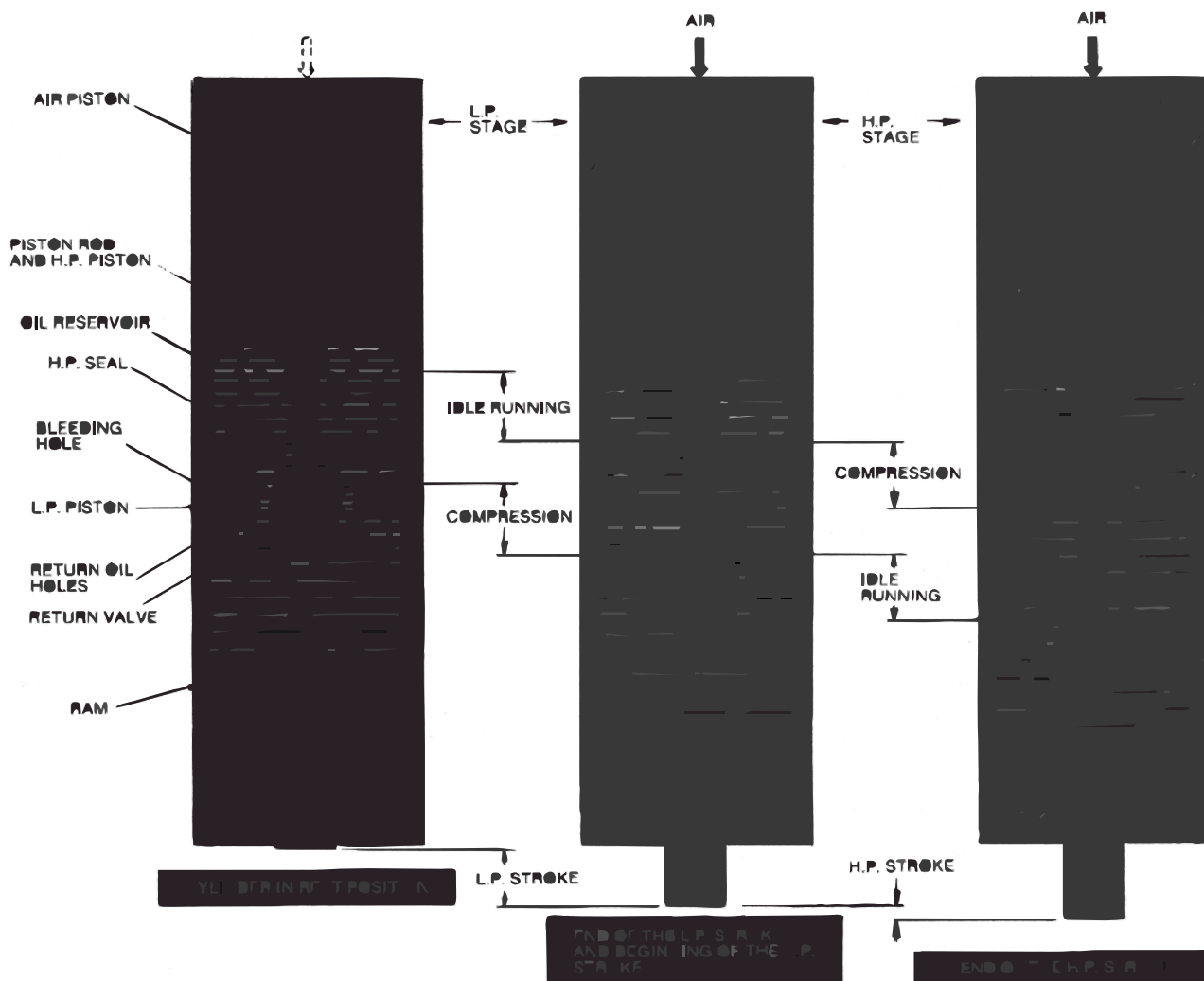


MULTICYL SELECTOR CHART

MULTICYL	"MC" SERIES				"XL" SERIES
MODEL NO.	MC12-5-4	MC15-5-9	MC-12-16-7	MC5-16-20	XL25-5-9
OVERALL LENGTH, inch	16-1/4	22-3/4	25-1/2	25-1/2	23
THREAD LENGTH AND DIAMETER	6-1/4x2-1/2-16tpi	6-1/4x2-1/2-16tpi	6-1/4x2-1/2-16tpi	6-1/4x2-1/2-16tpi	127mm (5") x 75mm - 1.5 pitch
H.P. CYLINDER LENGTH, inch	7-13/16	10-1/2	13-7/8	13-7/8	12
OVERALL CYLINDER DIAMETER, inch	3-3/4	3-3/4	3-3/4	3-3/4	4-3/4
WEIGHT, Lbs (Kg)	17 (7.7)	21 (9.5)	24 (10.8)	24 (10.8)	37 (17)
STROKES PER MINUTE	60	45	30	30	30
OVERALL STROKE, inch (mm)	5/8 (15.9)	5/8 (15.9)	2 (50.8)	2 (50.8)	5/8 (15.9)
WORKING STROKE, inch (mm)	1/8 (3.2)	9/32 (7.1)	7/32 (5.5)	5/8 (15.9)	9/32 (7.1)
FORCE OUTPUT AT:					
80 psi	8320 (37)	10400 (46)	8320 (37)	3400 (13)	17200 (78)
100 psi	10400 (46)	13000 (58)	10400 (46)	4400 (20)	21500 (98)
Lbs. (kn)	12480 (56)	15600 (70)	12480 (56)	5400 (24)	26000 (118)
MAXIMUM AIR	80 psi	.150 (.0042)	.150 (.0042)	.150 (.0042)	.247 (.007)
CONSUMPTION PER	100 psi	.085 (.0024)	.188 (.0052)	.188 (.0052)	.310 (.008)
STROKE AT:	120 psi	.102 (.0029)	.226 (.0065)	.226 (.0065)	.373 (.010)
TONNAGE	6	7-1/2	6	2-1/2	12-1/2
RECOMMENDED AIR LINE HOSE DIAMETER inch	3/8	3/8	3/8	3/8	1/2

The Multicyl output will be selected according to stroke and tonnage requirements. The patented two-stage action will conserve energy by advancing the tool to the workpiece under minimum force, then automatically producing a short working stroke whenever the advance force is exceeded. As the Multicyl output is proportionate to the input, select tonnage according to available air pressure.

THE MULTICYL® INTENSIFIER & HOW IT OPERATES



NOTE:

1. The high pressure is obtained by the ratio between the area of the cylinder piston and the area of the larger piston rod. The high pressure times the area of the ram piston gives the H.P. force.
2. In order for the Multicyl to work properly, the oil should be kept on the right level. The air valve has to function immediately.
3. For best results, place the air filter regulator 8 to 10 feet from the cylinder.

L.P. STAGE

Air pressure is applied. As soon as the L.P. Piston starts to move, the return valve is closed immediately. When the resistance of the ram becomes too great, the L.P. Piston only creeps due to oil escaping through the bleeding hole.

H.P. STAGE

L.P. Piston is ineffective due to the larger bore (position of return valve is immaterial).

®MULTICYL REGISTERED-PIERCE ALL DIV.

OPERATING INSTRUCTIONS FOR MULTICYL®

INSTALLATION

A. VERTICAL CONFIGURATION

1. Screw MULTICYL into mounting threads of cage on fixture.
2. Position ram of MULTICYL just above punch or tool, providing sufficient, minimal, feed clearance.
3. Attach rapid exhaust valve to the air inlet of the MULTICYL.
4. Connect air control (e.g. foot pedal) to rapid exhaust valve.
5. Attach exhaust silencer to rapid exhaust valve.
6. Cycle MULTICYL a few times to bleed air from system, then test with piece part.

NOTE: MULTICYLs are self-bleeding.

7. Adjust shut height as necessary by rotating MULTICYL up or down in mounting threads.

NOTE: The spring return of the MULTICYL is designed to return the MULTICYL ram. It is NOT designed to strip and return tooling. This must be accomplished by separate springs incorporated into the tool.

B. HORIZONTAL CONFIGURATION

The procedure for mounting the MULTICYL in the horizontal configuration is the same as that for vertical, with the following exceptions:

- a) When positioning the MULTICYL over the tool, the two drain holes at the bottom of the oil reservoir must be fully submerged in oil. To assist in this task, a mark is stamped on the wrench flat which is opposite the holes. Therefore, when mounting, the mark should be UP.
- b) If shut height adjustment is required, complete revolutions must be used in order to maintain correct orientation of the oil drain holes.
- c) To prevent rotation of the MULTICYL, the use of a jam nut is recommended.

NOTE: The MULTICYL will not operate in the UPSIDE-DOWN configuration.

NOTE: Operating setup should be guarded to comply with applicable standards for operator safety.

MULTICYL® APPLICATIONS



MULTICYL

FAST...

EASY...

EFFICIENT!!!



TONNAGE CHART

APPROXIMATE PRESSURES REQUIRED FOR PUNCHING ROUND HOLES IN MILD STEEL

HOLE DIAMETER		1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"	13/16"	7/8"	15/16"	1"
		.125	.1875	.250	.3125	.375	.4375	.500	.5625	.625	.6875	.750	.8125	.875	.9375	1.000
Metal Gauge	Thickness Inches	PRESSURE IN TONNES														
28	.015	.2	.2	.3	.4	.4	.5	.6	.7	.7	.8	.9	1.0	1.1	1.2	1.3
26	.018	.2	.3	.4	.4	.5	.6	.7	.8	.9	1.0	1.1	1.1	1.2	1.3	1.4
24	.024	.2	.4	.5	.6	.7	.8	.9	1.1	1.2	1.3	1.4	1.5	1.6	1.8	1.9
22	.030	.3	.4	.6	.7	.9	1.0	1.2	1.3	1.5	1.6	1.8	1.9	2.1	2.2	2.4
20	.036	.4	.5	.7	.9	1.1	1.2	1.4	1.6	1.8	1.9	2.1	2.3	2.5	2.6	2.8
18	.048	.5	.7	.9	1.2	1.4	1.6	1.9	2.1	2.4	2.6	2.8	3.1	3.3	3.5	3.8
16	.060	.6	.9	1.2	1.5	1.8	2.1	2.3	2.6	2.9	3.2	3.5	3.8	4.1	4.4	4.7
14	.075	.7	1.1	1.5	1.8	2.2	2.6	2.9	3.3	3.7	4.0	4.4	4.8	5.1	5.5	5.9
12	.105	1.0	1.5	2.1	2.6	3.1	3.6	4.1	4.6	5.1	5.7	6.2	6.7	7.2	7.7	8.2
11	.120	1.2	1.8	2.4	2.9	3.5	4.1	4.7	5.1	5.9	6.2	7.1	7.6	8.3	8.8	9.4
10	.135	1.3	2.0	2.6	3.3	4.0	4.6	5.3	5.9	6.6	7.3	7.9	8.6	9.2	9.9	10.6
5/32"	.157	—	2.3	3.1	3.8	4.6	5.4	6.1	6.9	7.7	8.4	9.2	10.0	10.7	11.5	12.3
3/16"	.188	—	2.8	3.7	4.6	5.5	6.4	7.4	8.3	9.2	10.1	11.0	12.0	12.9	13.8	14.8
1/4"	.250	—	—	4.9	6.1	7.4	8.6	9.8	11.1	12.3	13.5	14.7	16.0	17.2	18.4	19.7
3/8"	.375	—	—	—	—	11.1	12.8	14.8	16.5	18.5	20.2	22.1	23.8	25.8	27.5	29.5
1/2"	.500	—	—	—	—	—	—	19.7	22.0	24.6	26.9	29.5	31.8	34.4	36.8	39.4
5/8"	.625	—	—	—	—	—	—	—	—	30.8	33.7	36.9	39.9	43.0	46.0	49.2
3/4"	.750	—	—	—	—	—	—	—	—	—	—	44.3	47.7	51.7	55.2	59.0
1"	1.000	—	—	—	—	—	—	—	—	—	—	—	—	—	—	80.0

To obtain tonnage required for punching round holes in mild steel — — — — multiply as follows: —
 3.1416 X DIAMETER OF HOLE X MATERIAL THICKNESS X 25 —
 PUNCHING PRESSURE REQUIRED FOR ONE HOLE

— TONNAGE CHART — APPROXIMATE PRESSURES REQUIRED FOR NOTCHING MILD STEEL

METAL THICKNESS	Gauge	20	18	16	14	12	11	10	3/16"	1/4"	3/8"	1/2"	5/8"	3/4"	1"
	Decimal	.036	.048	.060	.075	.105	.120	.135	.187	.250	.375	.500	.625	.750	1.000
TONS REQUIRED TO NOTCH 1" LENGTH		.90	1.20	1.50	1.87	2.63	3.00	3.38	4.68	6.25	9.38	12.5	15.75	18.75	25.00

Formula for notching mild steel based on 25 tons per square inch:
 TOTAL SHEAR LENGTH X MATERIAL THICKNESS X 25 = TONNAGE

— MULTIPLIER CHART —

<p>THE MULTIPLES SHOWN OPPOSITE MAY BE USED TO CONVERT THE ABOVE CHART AND FORMULA TO FIND TONNAGE REQUIRED TO NOTCH OTHER MATERIAL.</p> <p>FOR EXAMPLE: — IT REQUIRES 1.5 TONS TO NOTCH 1" OF 16-GAUGE MILD STEEL — STAINLESS STEEL (18-8), WOULD REQUIRE 1.5 X 1.4 (MULTIPLIER) OR 2.1 TONS.</p>	MATERIAL DESCRIPTION	TONS PER SQ. IN.	SHEAR STRENGTH PER SQ. IN.	MULTIPLIER
	Aluminium - Soft Sheet	7½	15,000 P.S.I.	.30
	Aluminium - Half Hard	9½	19,000 P.S.I.	.38
	Aluminium - Hard	12	25,000 P.S.I.	.50
	Brass - Soft Sheet	15	30,000 P.S.I.	.60
	Brass - Half Hard	17½	35,000 P.S.I.	.70
	Copper - Rolled	14	28,000 P.S.I.	.57
	Steel - Mild	25	50,000 P.S.I.	1.00
	Steel - ASTM-A36	30	60,000 P.S.I.	1.20
	Steel - 50 Carbon	35	70,000 P.S.I.	1.40
	Steel - Cold Drawn	30	60,000 P.S.I.	1.20
	Steel - Stainless (18-8)	35	70,000 P.S.I.	1.40

