



ACCESSORY

EQUIPMENT

**for Monarch Series 80, 90, and 91,
HEAVY DUTY DYNA-SHIFT LATHES**

Table of Contents

RESTS	<i>Page</i>
Steady Rests	3
Follow Rests	4
PLATES	
Dog Plate	4
Face Plate	4
Face Plate Jaws	4
CHUCKS	
Air Operated Chuck	5
Collet Chuck	5
Mechanical Chucks	5
TOOL HOLDERS	
Connected Compound and Plain Block Rear Tool Support ..	6
Heavy Duty Tool Block	6
Round Tool Post	6
TURRETS	
Monarch Inbuilt Turret	6
Attachable Turrets	7
STOPS	
Multiple Automatic Length Stops	7
Dial Indicator Carriage Stop	8
Micrometer Carriage Stop	8
TAPER ATTACHMENTS	
Taper Attachment	8
Taper Attachment Variator—Rack Type	9
TAILSTOCKS	
Air Operated Tailstock	9
Two-Speed Range Tailstock	10
Anti-Friction Tailstock Spindle	10
Heavy Duty Drill Adapter	11
COOLANT SYSTEMS	
Coolant Pan	11
Single Pump Coolant System	11
Dual Pump Coolant System	12
MISCELLANEOUS	
Sub-Headstock	12
Metric Transposing Gears	12
Centers and Center Sleeve	13
Pipe Centers	13
J.I.C. Electricals	13
TRACERS	
Monarch "Air-Gage Tracer" Duplicating System	14
90° "Air-Gage Tracer"	14
Monarch Electro-Gage Tracer	15

accessory

for **Monarch**

series **80, 90 and 91**

Heavy Duty

Dyna-Shift Lathes

equipment

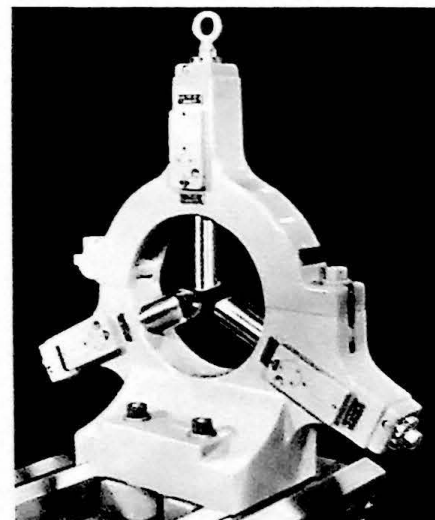
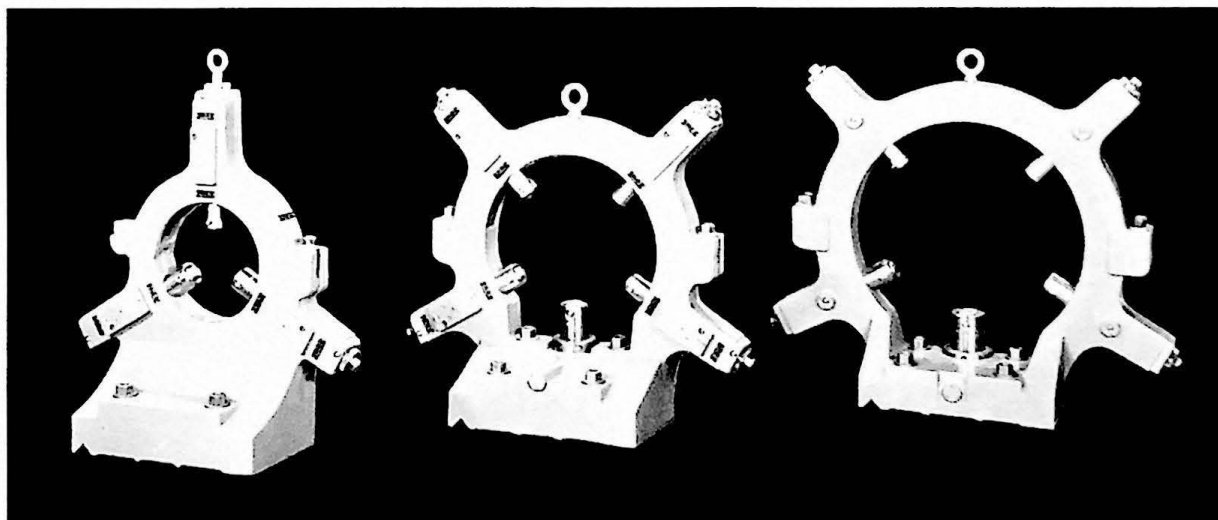
Steady Rests

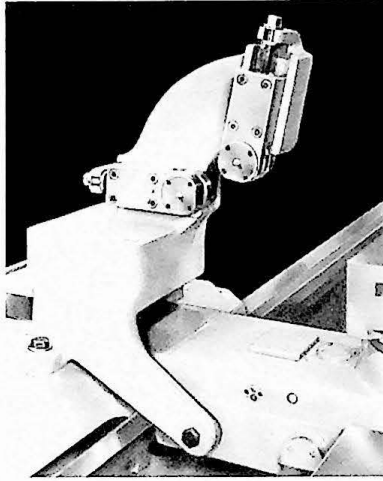
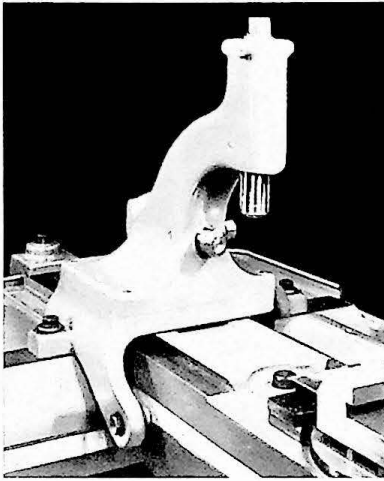
A particularly rugged design offered in a series of sizes which covers the full swing capacity of each model. All sizes are furnished with roller bearing tipped jaws. Interchangeable jaws with replaceable, brass tips are also available. Grease fittings are provided for jaw, roller bearing and jaw adjusting screw lubrication.

Reversible plates on the 1"-12", 6"-16" and 10"-

20" size ranges permit the required amount of jaw movement without exposing the keyways to chips, dust and coolant. The upper half of the 1"-12" and 6"-16" size ranges is hinged. Solid support by the lower half is assured by an adjusting screw which prevents the hinge pin from taking the load. All sizes except the 1"-12" and 6"-16" have five jaws and are not hinged. Standard sizes are listed in the accompanying table.

Model	Sizes							
2516	1"-12"	6"-16"						
2516-20	1"-12"	6"-16"	10"-20"					
3220	1"-12"		10"-20"					
3220-24	1"-12"		10"-20"	16"-24"				
3220-28	1"-12"		10"-20"			20"-28"		
4025	1"-12"		10"-20"		18"-26"			
4025-31	1"-12"		10"-20"			20"-28"	24"-32"	
4025-36	1"-12"		10"-20"			20"-28"		28"-36"

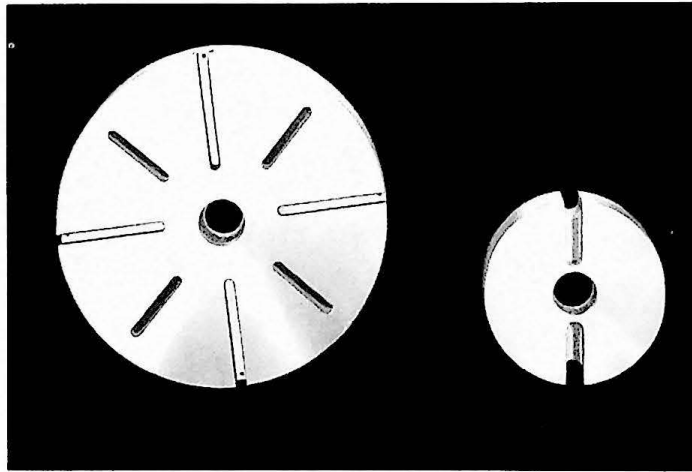
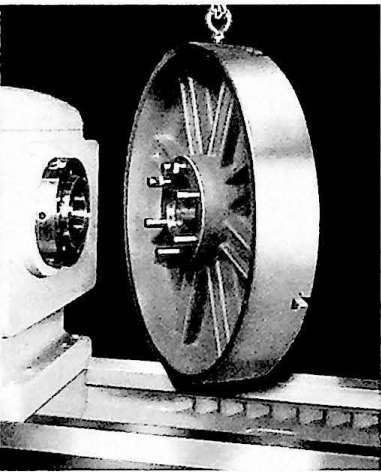




Follow Rests

Available with plain, renewable tip jaws or with roller bearing jaws. Sizes are as follows.

Model	Dia. Range Plain Jaws	Dia. Range Roller Jaws
2516	1"-6"	1"-6"
2516-20	1"-6"	1"-6"
3220	2¾"-10¼"	1"-6"
3220-24	2¾"-10¼"	1"-6"
3220-28	2¾"-10¼"	1"-6"
4025	4"-11"	1"-7"
4025-31	4"-11"	1"-7"
4025-36	4"-11"	1"-7"



Dog Plate

Attaches quickly and rigidly to Camlock spindle nose. 14" diameter furnished for Models 2516 and 2516-20; 15" diameter for other Series 80 Models and all Series 90 and 91 Models.

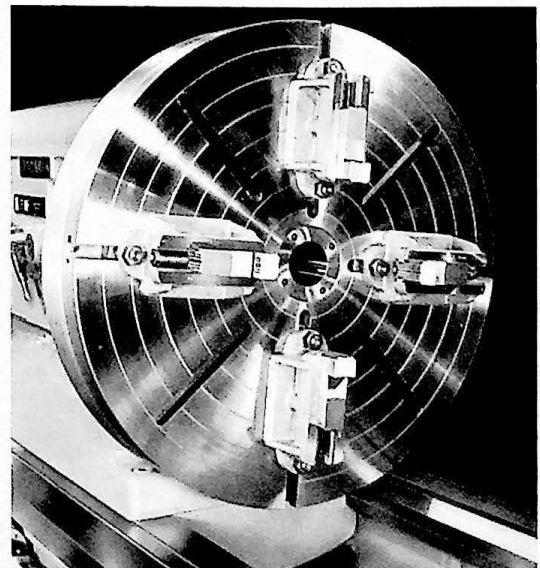
Face Plate

Mounts accurately, quickly and rigidly to Camlock spindle nose. Has four machined T-slots and also four cored slots to facilitate attachment of fixtures. The following sizes are considered standard.

Model	Dia.	Model	Dia.
2516	24"	3220-28	36"
2516-20	28"	4025	36"
3220	28"	4025-31	42"
3220-24	32"	4025-36	46"

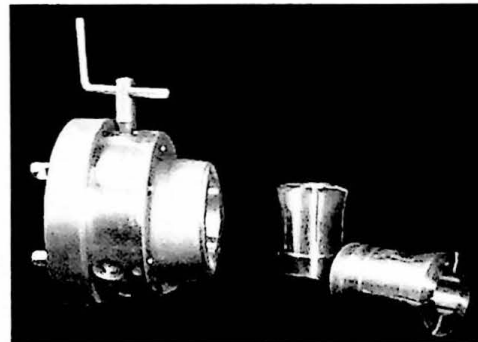
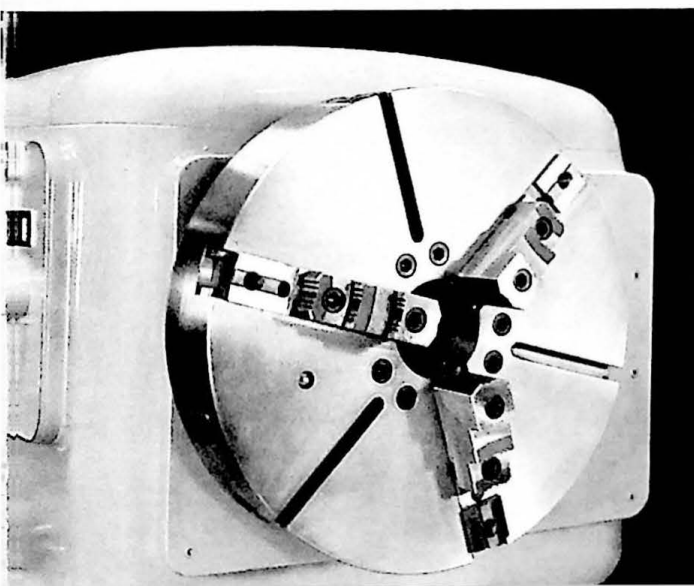
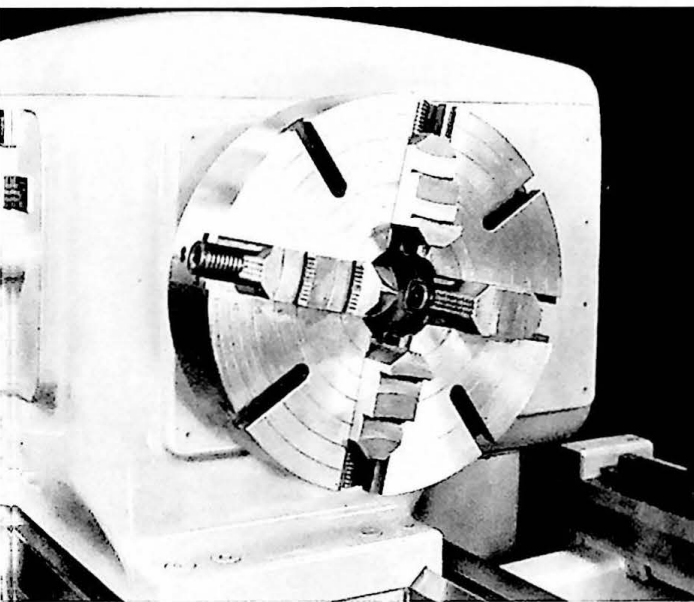
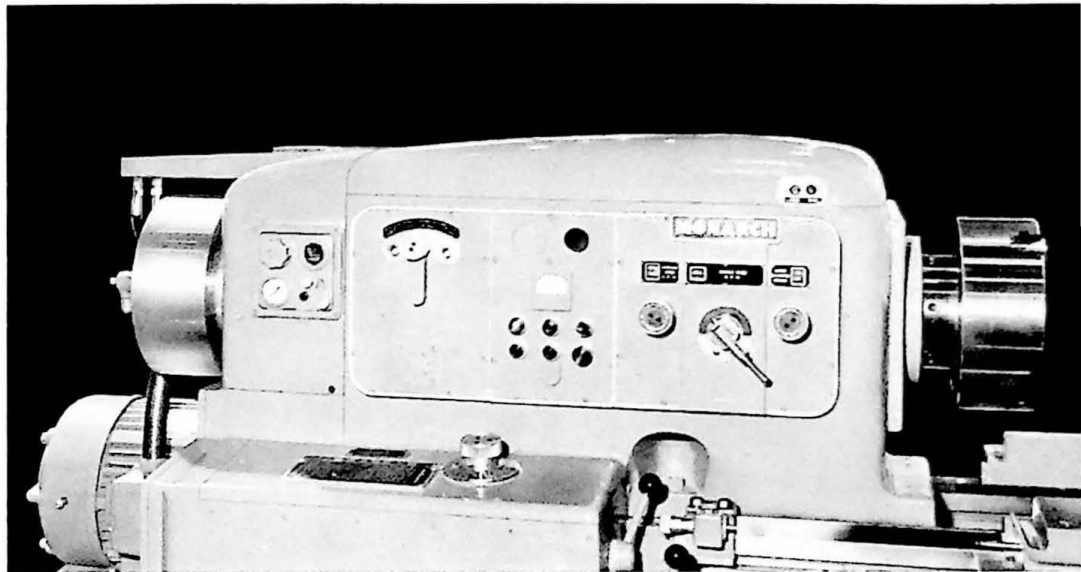
Face Plate Jaws

Single key type, as illustrated, may be attached to any standard T-slotted face plate. Either 8" or 10" size generally used. Double key type can be furnished along with face plates specially slotted to receive them.



Air Operated Chucks

May be factory applied to all models of Series 80, 90 and 91 machines. Precision centering and powerful, controlled gripping assure safe operation under heavy cuts and at high speed. Control, as illustrated, is at front of headstock cover. May also be arranged for foot control.



Collet Chuck

Attached to an intermediate plate with cam studs for mounting on Camlock spindle nose. This is a No. 315 Cushman with 1" to 3/4" collet capacity.

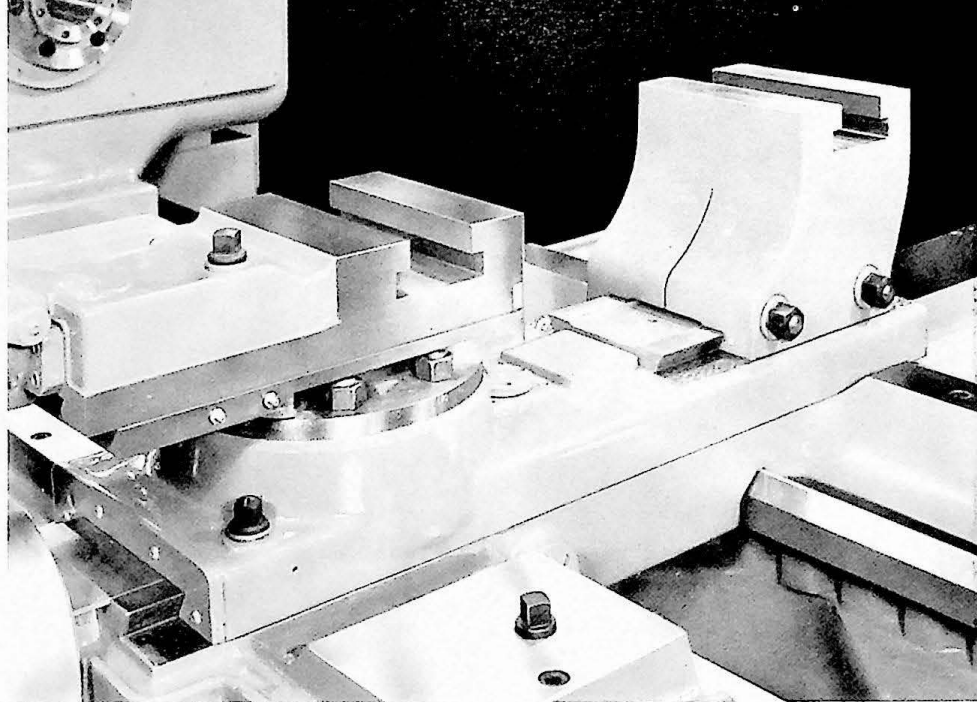
Mechanical Chucks

All sizes have a steel body and are furnished with cam studs for mounting on Camlock spindle nose. Independent chucks are the four jaw type with solid reversible jaws. Universal chucks are the three jaw type with two piece reversible jaws. Available as listed.

Lathe	Independent Chuck Size	Universal Chuck Size
SERIES 80 Models 2516 and 2516-20	12", 15", 18", 21", 24", 28"	12", 15", 18", 21", 24"
SERIES 80 Models 3220, 3220-24 and 3220-28 SERIES 90 and 91 Models 4025, 4025-31 and 4025-36	18", 21", 24", 28", 32", 36"	18", 21", 24"

Connected Compound and Plain Block Rear Tool Support

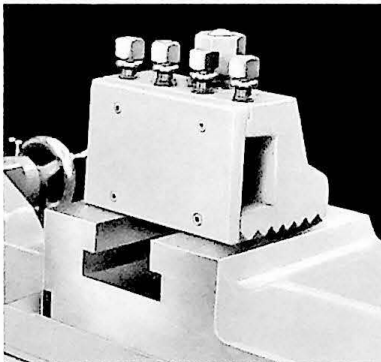
A desirable accessory which permits turning to be performed by the front tool and supplementary necking, facing or forming operations by a rear tool. Both the compound and the rear tool support are mounted on the same bottom slide. The rear tool block is adjustable in or out. Available only on Series 80—Model 2516 and 2516-20 machines. On the Model 2516, swing over the cross slide is $15\frac{3}{8}$ " either with or without the rear block mounted. On the Model 2516-20, swing over the cross slide is 16" with the rear block mounted, $19\frac{3}{8}$ " without the rear block.



Heavy Duty Tool Block

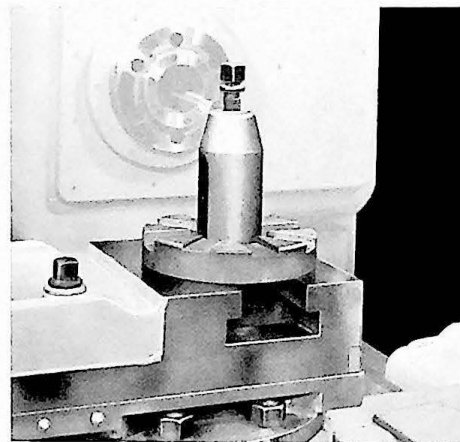
Mounts on compound for heavy duty turning. Radially located serrations on base of block mate with like serrations on top of T-block to prevent slippage under cut. Maximum tool sizes:

- Series 80, Model 2516 — $1\frac{1}{2}$ " x $1\frac{1}{2}$ "
- Series 80, Model 3220 — $1\frac{1}{2}$ " x 2"
- Series 90 and 91, Model 4025 — 2" x 2"



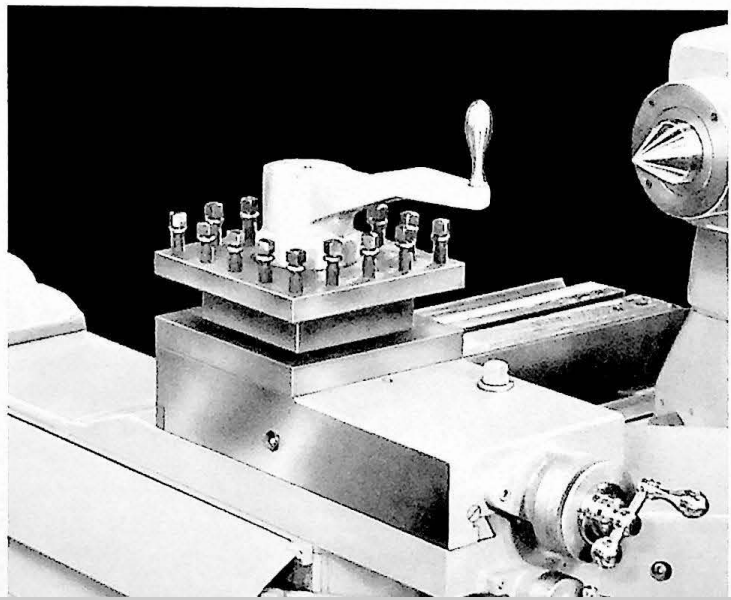
Round Tool Post

Compound mounted for operations not requiring heavy stock removal. Maximum tool size—1" x 2".



Monarch Inbuilt Turret

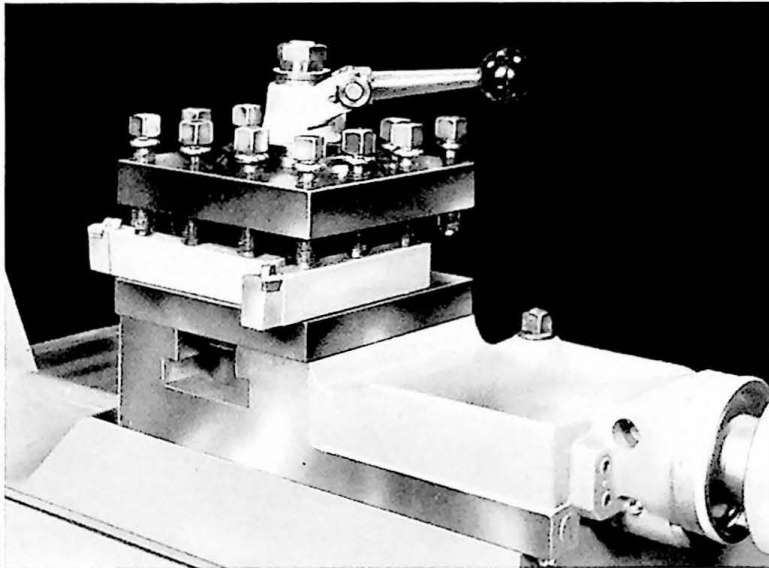
Four-way type, precision for extreme accuracy in indexing. It is mounted as an integral part of the compound slide for maximum rigidity and accuracy. Indexing is within .0005" Two sizes are available, each of which will take a maximum tool height of $1\frac{1}{2}$ ". Most common use is on machines equipped with the "Air-Gage Tracer."



Attachable Turrets

Models E, HD-3 and HD-4 turrets are for intermittent use. They index accurately in twelve positions and fit directly to the compound. The Model EL turret is in-

tended for continuous use. It fits directly to the bolt circle of the regular bottom slide and also indexes accurately in twelve positions. Essential specifications are in the accompanying table.



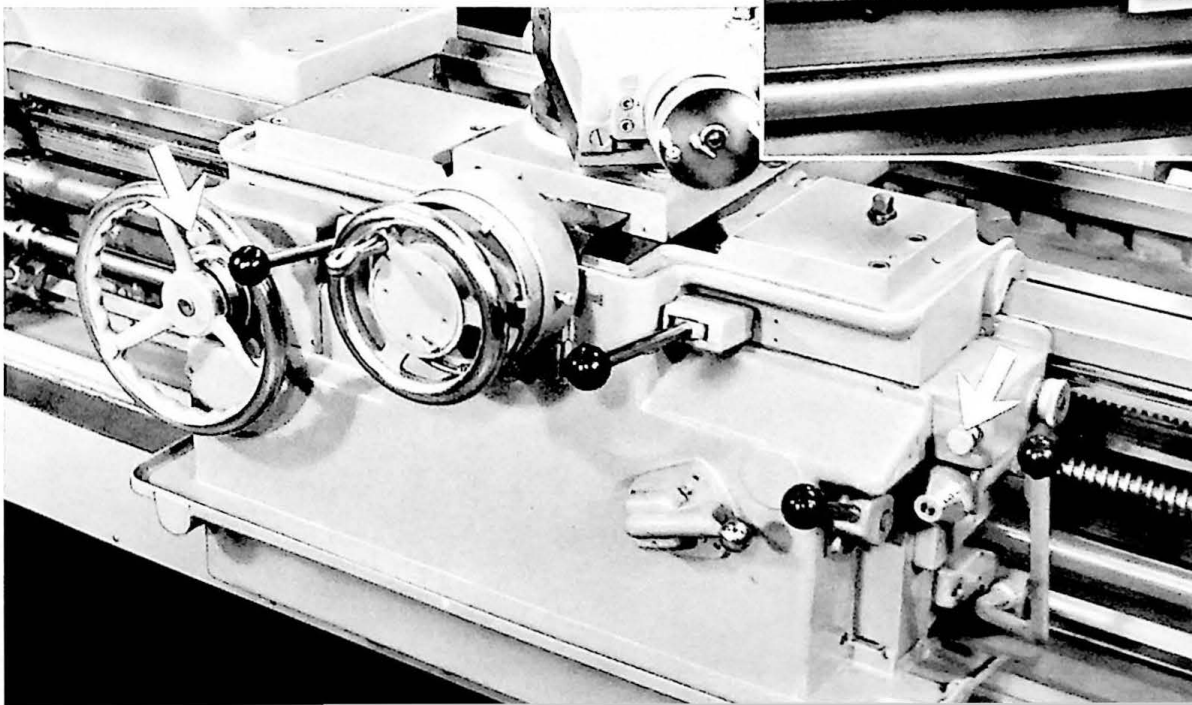
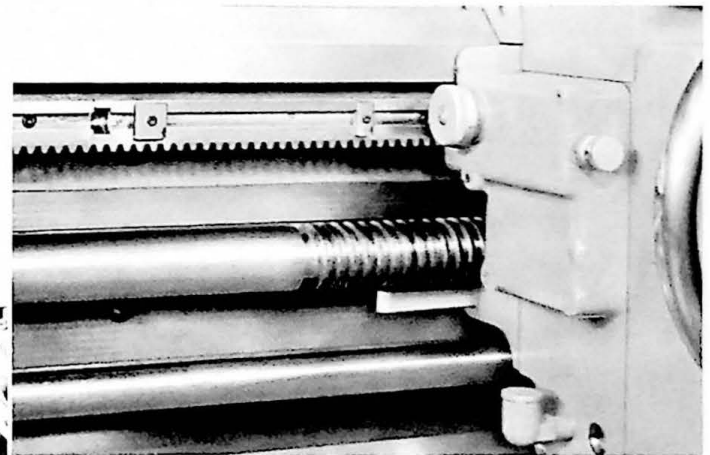
Model	Machines	Square	Tool Height
E	Series 80—Models 2516 and 2516-20. All models of Series 80, 90 and 91 with "Air-Gage Tracer."	8½"	1¼"
E	Series 80—Models 3220, 3220-24 and 3220-28. All models of Series 90 and 91.	8½"	1½"
EL	All models of Series 80, 90 and 91. Not applicable to "Air-Gage Tracer" lathes.	8½"	2"
HD-3	Series 80—Models 2516 and 2516-20. All models of Series 80, 90 and 91 with "Air-Gage Tracer."	7"	1¼"
HD-3	Series 80—Models 3220, 3220-24 and 3220-28.	7"	1½"
HD-4	All models of Series 90 and 91.	7½"	1½"

Multiple Automatic Length Stops

Stop mechanisms built into each end of apron from which point they are operative either for feed traverse, left or right. Stop dogs are mounted in T-slot on face of bed rack. They are adjustable to the desired position and may be used in any number required. Minimum length between stops is ½".

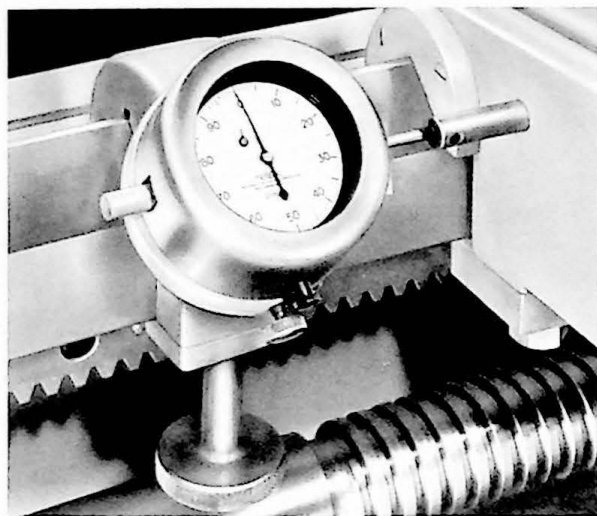
Adjusting knob at end of each stop mechanism is for quick, critical repositioning of all stop positions—either left or right. Front knob is for engagement and disengagement of stop mechanism. When stop plunger contacts stop dog during feed, the feed lever is automatically disengaged.

Traverse stops immediately upon the stop plunger contacting a stop dog during traverse movement. Chief use of this is to terminate traverse return after the end of a cut.



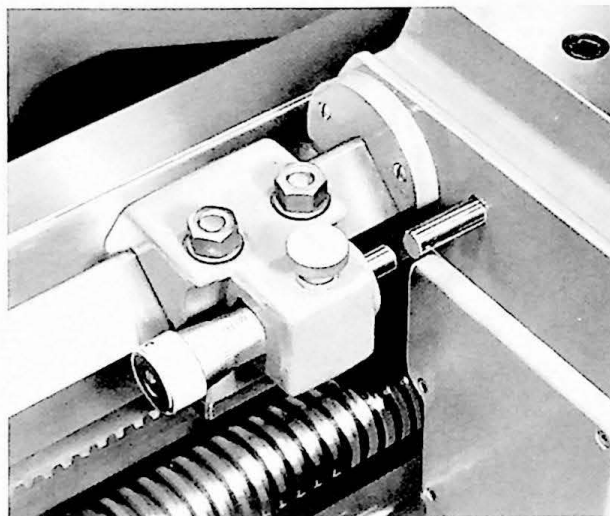
Dial Indicator Carriage Stop

Precision dial indicator graduated in thousandths and encased for protection. Indicator stem has up to 1" travel. The stop bracket may be clamped at any desired position along the front bed "V."



Micrometer Carriage Stop

Micrometer screw made of induction hardened alloy steel with precision ground threads. Indications are in thousandths. Stop bracket may be positioned at any point on the front bed "V."

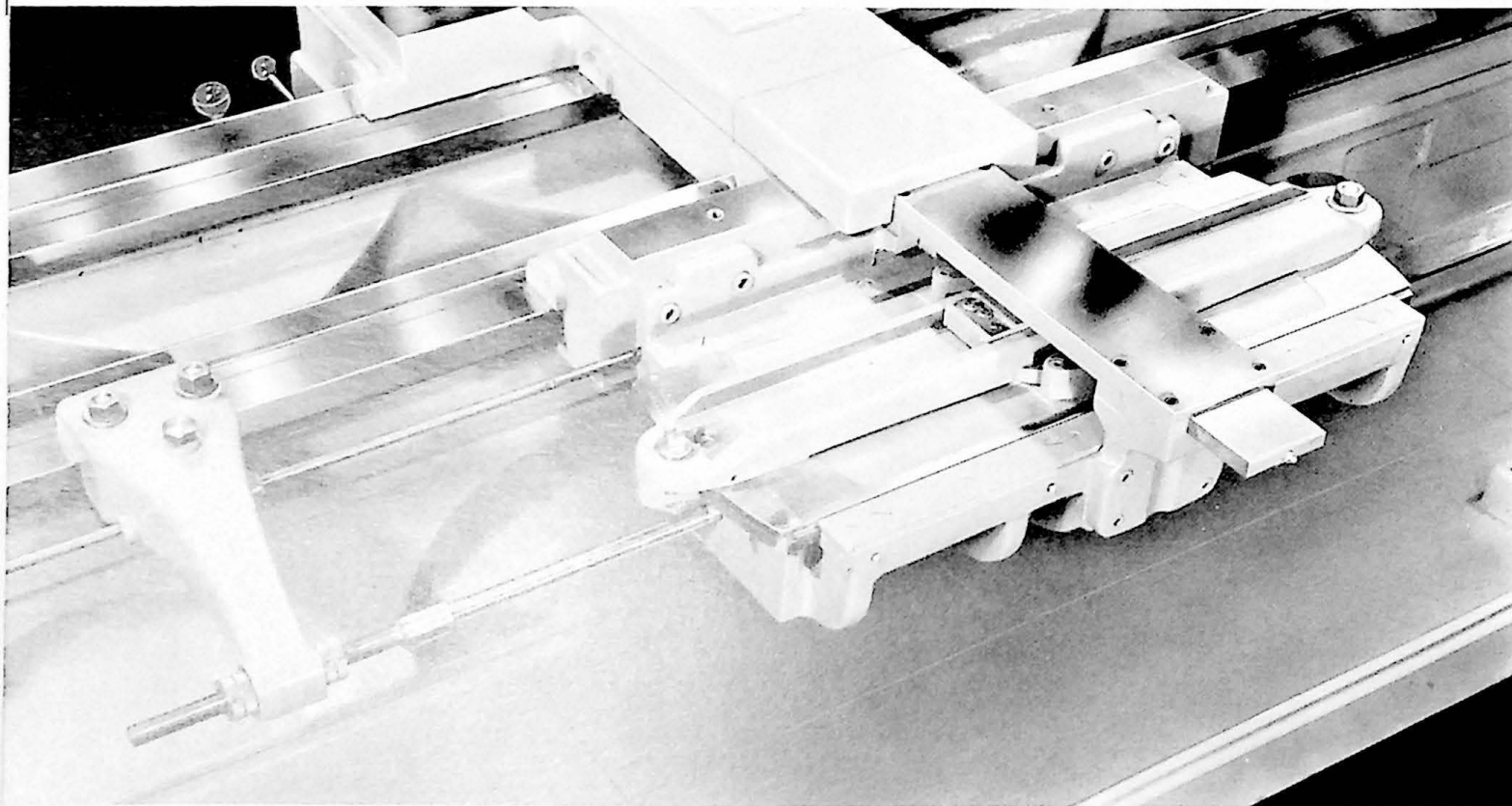


Taper Attachment

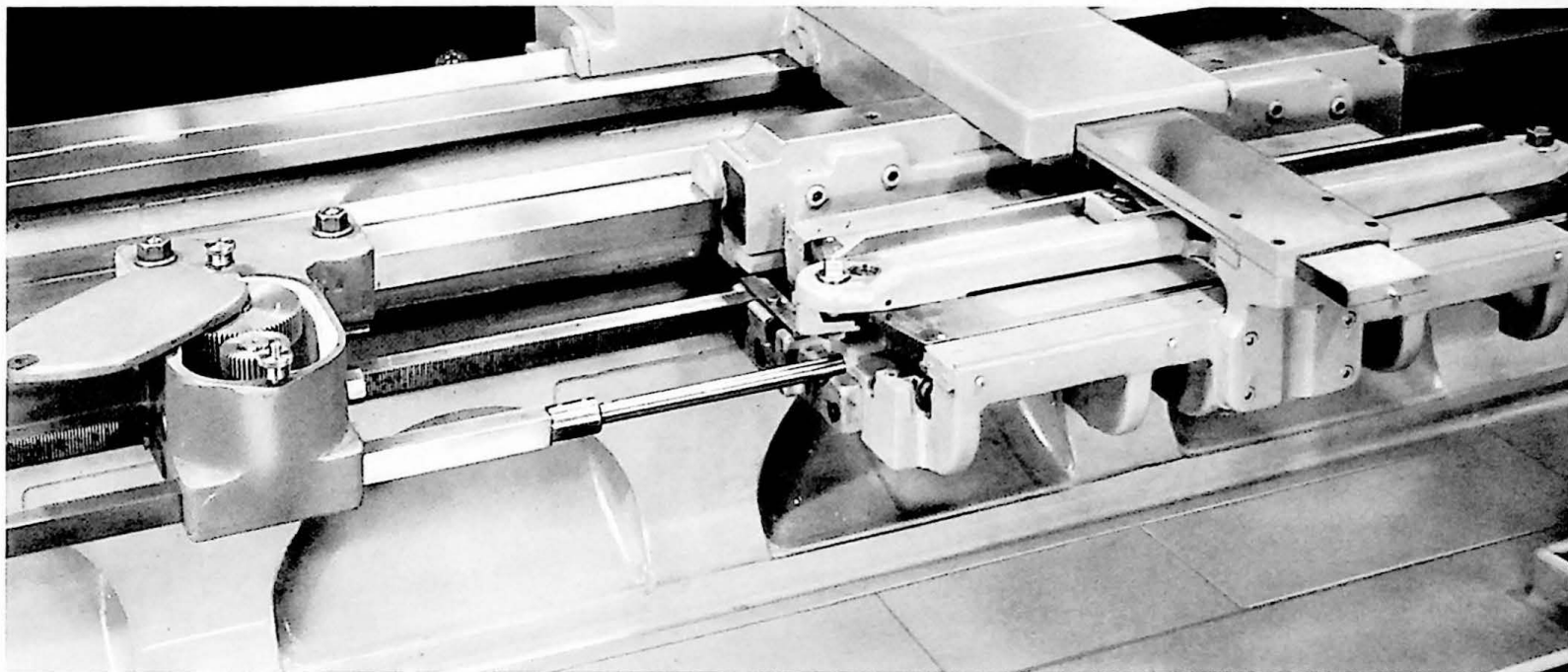
Anti-friction type which operates on ball bearings with permanent sealed-in lubrication. Lost motion, backlash and friction are practically eliminated. Bearings are mounted on eccentric studs to provide adjustment should it ever be needed. All bearing surfaces are flame

hardened and ground for long service life.

Slides and scales accurately graduated both in degrees and inches taper per foot. Swivel is equipped with magnifying glass for critical setting. Turning capacity—Series 80, 90 and 91, all models—6½" maximum taper per foot, 24" maximum length at one setting, 30° maximum included angle.



Taper Attachment Variator—Rack Type



Versatility of taper attachment extended by variator which consists of a gear box with pick-off gears and a rack to control motion of taper attachment slide. Three sets of pick-off gears are furnished, providing a 1 to 1,

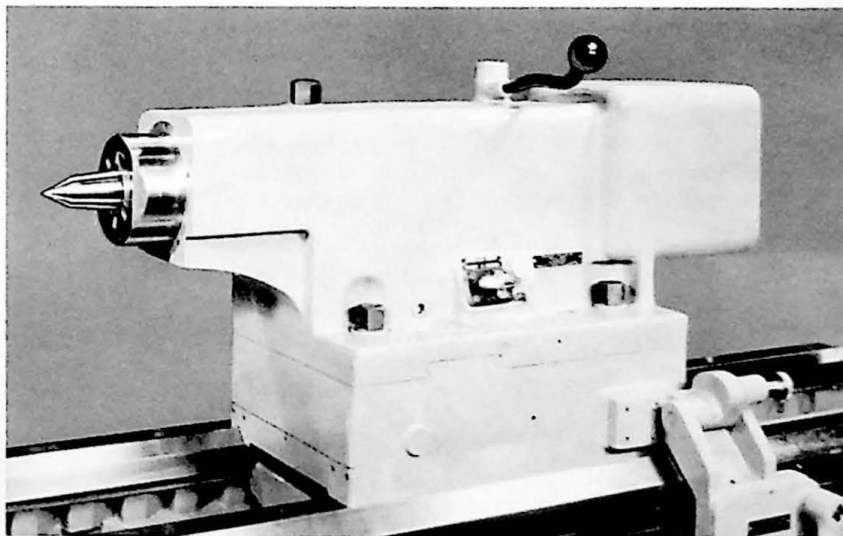
a 2 to 1 or a 3 to 1 gear ratio. Variator increases degree of taper which can be turned or bored and increases length taper turning capacity at one setting as per accompanying listing.

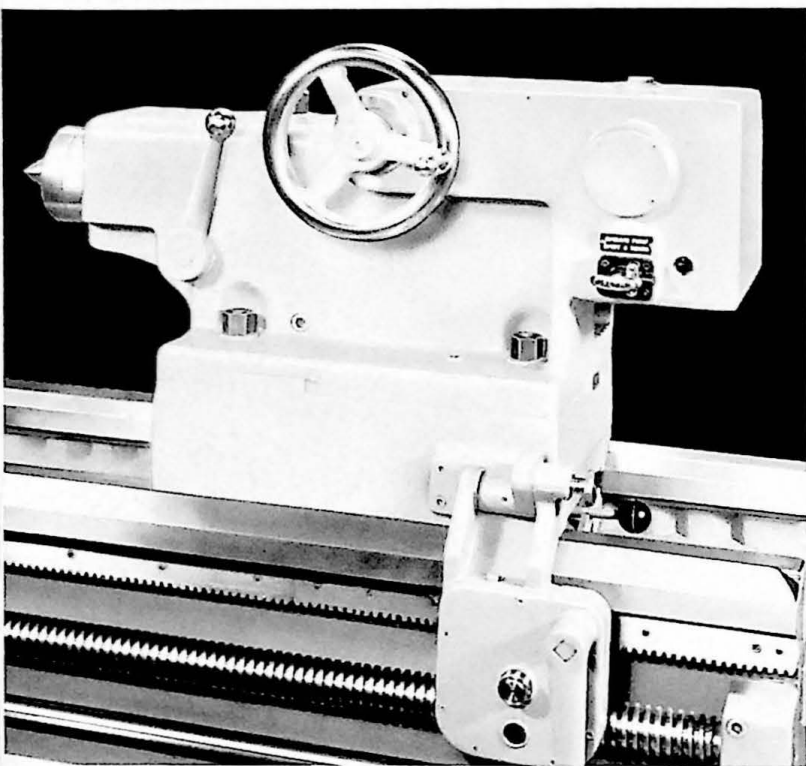
		Max. Taper Per Foot	Max. Work Length
Steep Angle	(1:1 Ratio)	13" — 56° Included angle	12"
Turning	(2:1 Ratio)	19½" — 78° Included angle	8"
	(3:1 Ratio)	26" — 94° Included angle	6"
Long Taper	(2:1 Ratio)	3¼" — 15° Included angle	48"
Turning			

NOTE: Normally this variator is furnished with gearing either for (1) both steep angle and long taper turning or for (2) long taper turning only. Specify which of these two is required.

Air Operated Tailstock

For quickly advancing and retracting tailstock spindle. Multi-position control lever clamps spindle rigidly in operative position. Total spindle stroke—8". Air pressure may be regulated to vary pressure of center against work as required. Provided with an anti-friction center and a one-shot pump pressure lubrication system. The tailstock described and illustrated is furnished on Series 80 Models only.



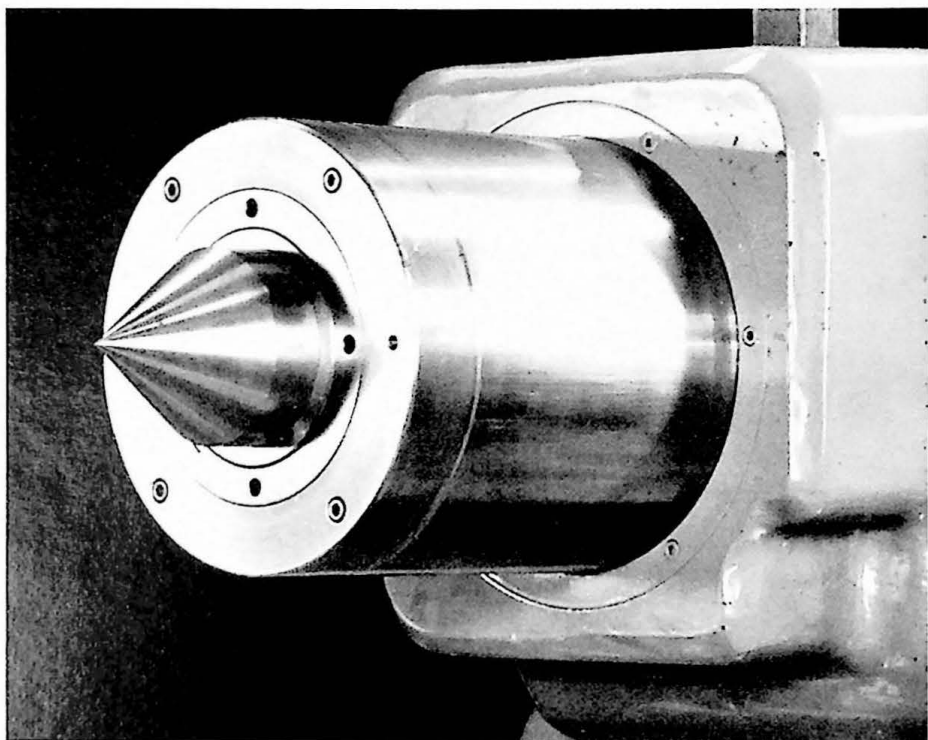


Two-Speed Range Tailstock

Spindle provided with two ranges of travel through a gear box. A 6 to 1 reduction gives a fast range for quick positioning and a slow one principally for drilling operations. Either an anti-friction or dead center spindle may be supplied. Except for the two-speed range feature, this tailstock is similar in all ways to the regular screw operated type.

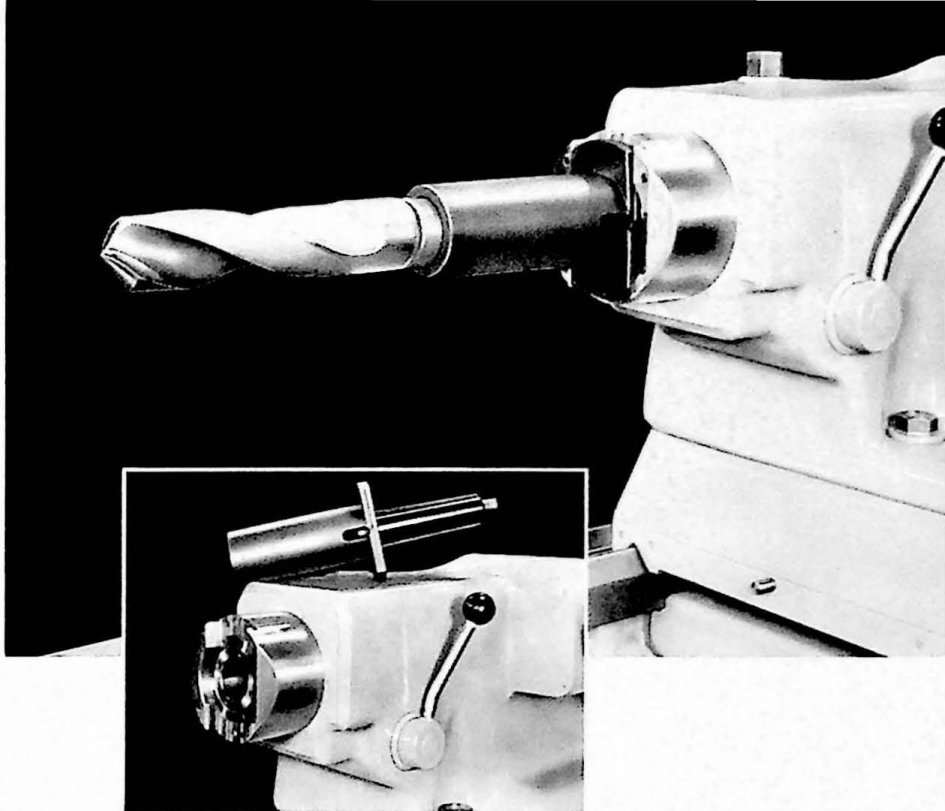
Anti-Friction Tailstock Spindle

Recommended for high speed turning operations either on the regular screw operated type or optional two-speed range type tailstock. To the rear of the anti-friction mounted taper sleeve is an adapter which engages the tang of standard drills to permit drilling. That makes it possible to perform such operations without removing the anti-friction tailstock spindle and replacing it with a dead center spindle. Work piece expansion, due to heat often generated during high speed operations, is absorbed by heavy duty springs in the spindle assembly.



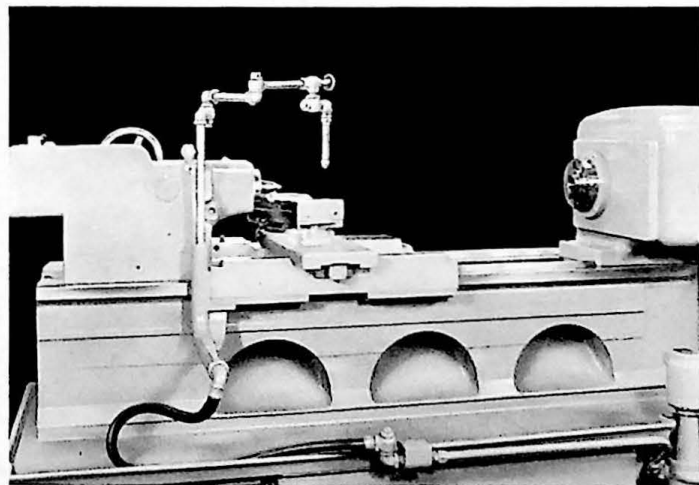
Heavy Duty Drill Adapter

For heavy duty drilling an adapter is available for application to tailstocks with an anti-friction spindle. It mounts in the taper bore of the anti-friction sleeve and has arms which engage and lock with a special spindle cap. Extending from the front of the adapter is a tang slot tapered receiver for drills. A knock-out pin is furnished for drill ejection. After the drill is removed, retraction of the spindle causes ejection of the adapter.



Coolant Pan

Even though a coolant system is not required, the pan is always recommended for use as a chip pan. It is especially proficient in the screening and settling out of coolant sediment to prevent recirculation. The illustration of the end pan with the covers removed clearly depicts the baffle and screen system employed. On machines requiring more than one pan, all coolant is led to this end reservoir pan for the removal of sediment.

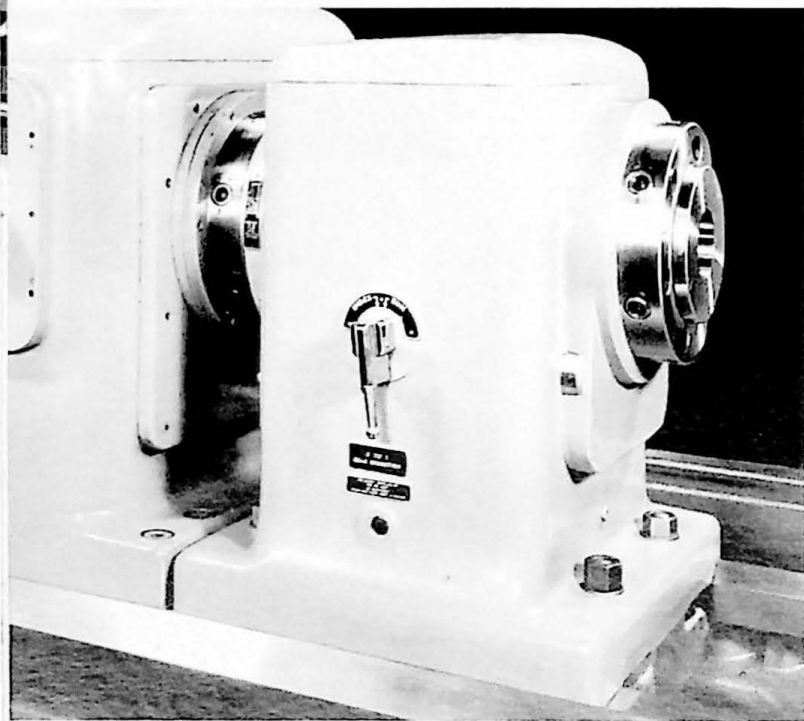
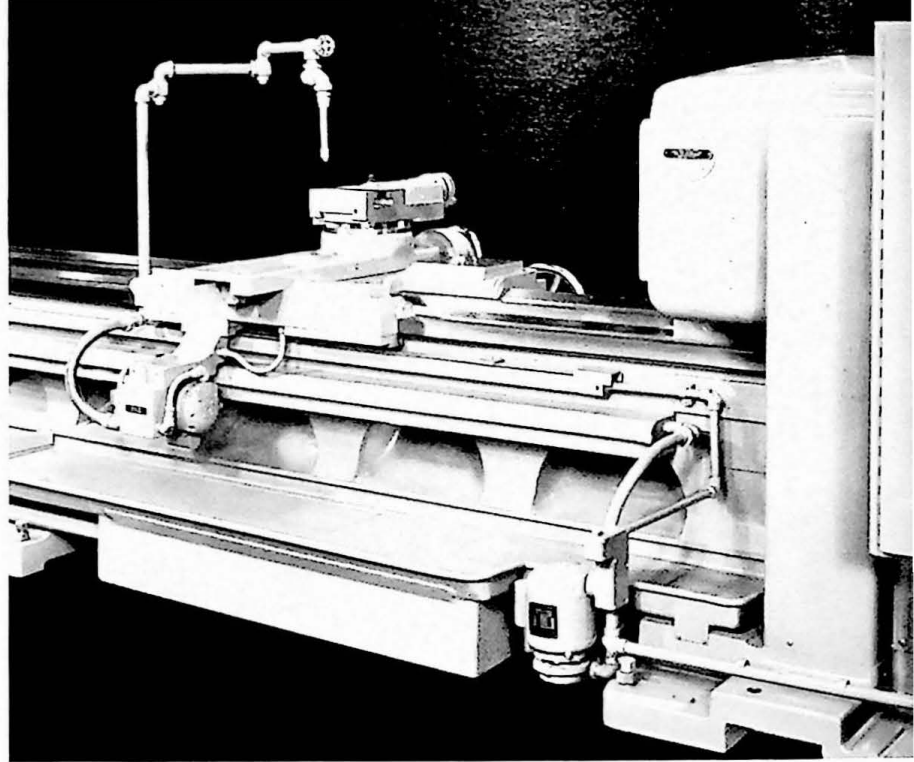


Single Pump Coolant System

A conventional, individually motor driven coolant pump and necessary piping which may be field applied to machines not originally so equipped. This system is the one regularly supplied on the shorter Series 80's, 90's and 91's and optionally furnished on lathes 96" between centers and longer.

Dual Pump Coolant System

On all machines 96" between centers and longer a dual coolant pump arrangement may be furnished. It gives more precise coolant control at the working area and eliminates the conventional long hose from pump to final piping. The primary pump keeps a covered trough, extending the length of the bed, continuously filled with coolant. From its location on the carriage a secondary pump picks up the coolant from the trough at any carriage position. Push button control of the secondary pump is at the apron.



Sub-Headstock

This completely self-contained and automatically lubricated unit is a requirement for extremely coarse leads and multiple threads. It is available in reductions of 6 to 1, 8 to 1 or 10 to 1. Teeth of the index gear may be engaged for 1, 2, 3, 4, 5 and 6 multiple start threads. A graduated dial is provided for quick and easy selection of the desired start. One revolution of this dial is equal to one revolution of the spindle.

Both the spindle and intermediate shaft are precision roller bearing mounted. For interchangeability of chucks, face plates and fixtures, the sub-headstock spindle has the same size Camlock nose as the headstock spindle.

Metric Transposing Gears

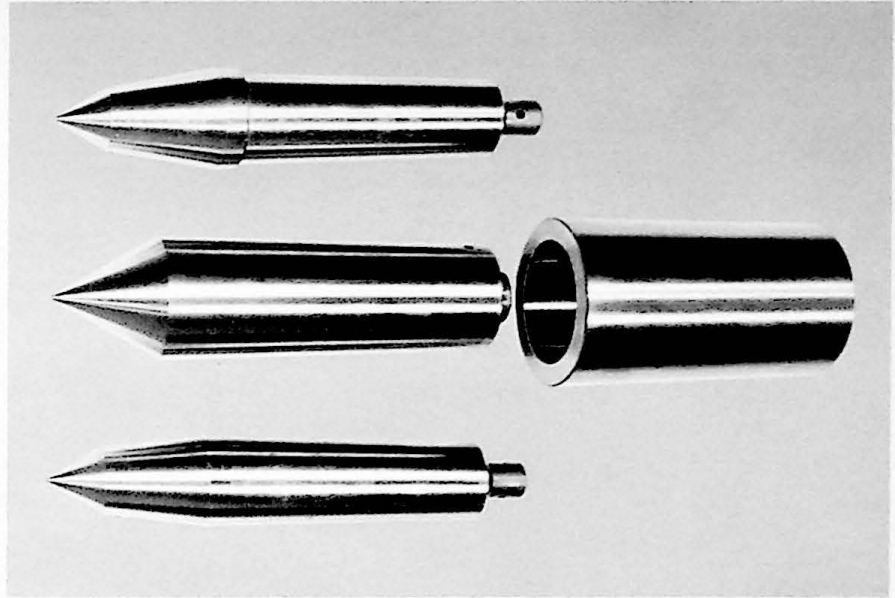
Metric transposing end gearing can be furnished on all models of Series 80, 90 and 91 lathes. On the Series 80 there are 72 feeds ranging from .0421 to 2.524 millimeters per revolution. There are also 72 different thread settings with the following pitch in millimeters: .5000, .5500, .5625, .6000, .6250, .6500, .6875, .7000, .7500, .8125, .8750, .9375, 1.000, 1.100, 1.125, 1.200, 1.250, 1.300, 1.375, 1.400, 1.500, 1.625, 1.750, 1.875, 2.000, 2.200, 2.250, 2.400, 2.500, 2.600, 2.750, 2.800, 3.000, 3.250, 3.500, 3.750, 4.000, 4.400, 4.500, 4.800, 5.000, 5.200, 5.500, 5.600, 6.000, 6.500, 7.000, 7.500, 8.000,

8.800, 9.000, 9.600, 10.00, 10.40, 11.00, 11.20, 12.00, 13.00, 14.00, 15.00, 16.00, 17.60, 18.00, 19.20, 20.00, 20.80, 22.00, 22.40, 24.00, 26.00, 28.00 and 30.00.

Using this end gearing, Series 90 and 91 lathes have 42 feed and thread changes. Feed range is .074 to 4.127 millimeters per revolution. Thread settings with the pitch in millimeters are as follows: .750, .875, .9375, 1.000, 1.125, 1.250, 1.3125, 1.500, 1.750, 1.875, 2.000, 2.250, 2.500, 2.625, 3.000, 3.500, 3.750, 4.000, 4.500, 5.000, 5.250, 6.000, 7.000, 7.500, 8.000, 9.000, 10.000, 10.500, 12.000, 14.000, 15.000, 16.000, 18.000, 20.000, 21.000, 24.000, 28.000, 30.000, 32.000, 36.000, 40.000 and 42.000.

Centers and Center Sleeve

All work centers and the headstock center sleeve used on these machines are Monarch produced to the close standards demanded by precision lathes. They are sturdily proportioned for heavy duty service.



Headstock and Tailstock Tapers			
	SERIES 80 Models 2516 and 2516-20	SERIES 80 Models 3220, 3220-24 and 3220-28	SERIES 90 & 91 All Models
Headstock Spindle	No. 350 American Standard	No. 400 American Standard	No. 450 American Standard
Headstock Center	No. 6 Morse Taper	No. 6 Morse Taper	No. 7 Morse Taper
Tailstock Center (Dead spindle)	No. 6 Morse Taper	No. 6 Morse Taper	No. 6 Morse Taper
Tailstock Center (Anti-friction spindle)	No. 5 Morse Taper	No. 5 Morse Taper	No. 6 Morse Taper

Pipe Centers

Furnished in solid type for use with anti-friction tail-

stock spindle and anti-friction type for dead center spindles. Commonly used sizes are 1" to 6" and 6" to 12". Other sizes also available.

J.I.C. Electricals

All models of Series 80, 90 and 91 lathes may be supplied with electrical equipment according to J.I.C. standards. In such a case the following is furnished: totally enclosed, fan cooled, ball bearing type motor; A.C. combination magnetic starter, line voltage type,

with or without coolant pump control, with air circuit breaker disconnect switch, thermal overload relays, dual voltage primary and fused secondary circuit protection; transformer for 110 volt control circuit and 100 watt machine light; N.E.M.A. Type XII enclosure and oil-tight push button station for separate mounting.

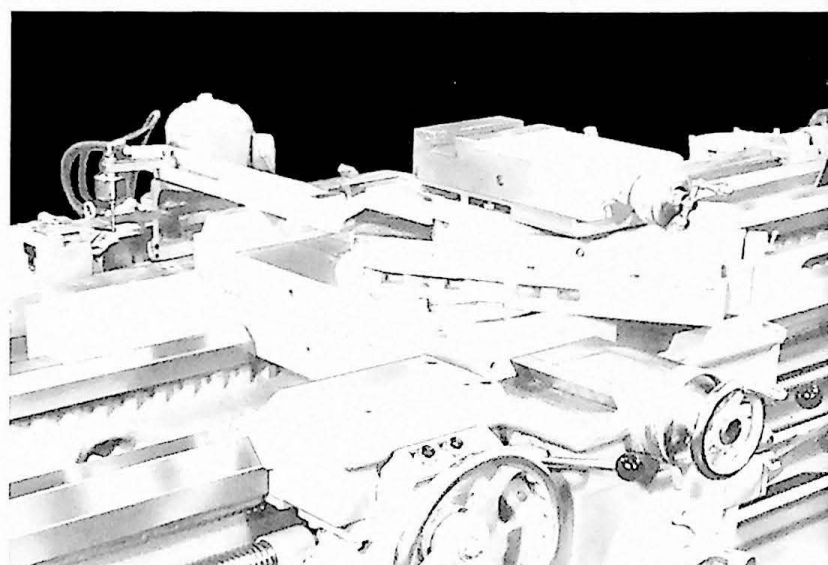
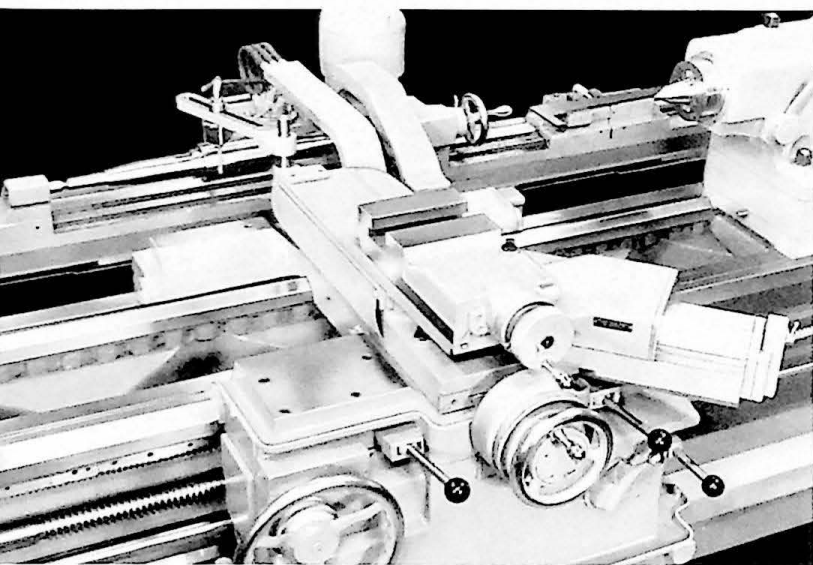
Monarch "Air-Gage Tracer" Duplicating System

A versatile means for making a Monarch lathe quickly convertible to a production machine for straight or contour turning, boring or facing. On most work this template controlled method reproduces the accuracy of the template to within $\pm .001$ " when roughing; $\pm .0005$ " when finishing. Consequently the amount of stock which must be left for grinding is often halved. Grinding and polishing operations are frequently eliminated.

The "Air-Gage Tracer" also obviates the need for expensive form tools and the cost of multiple tool setups. Complete setup change is accomplished in as little

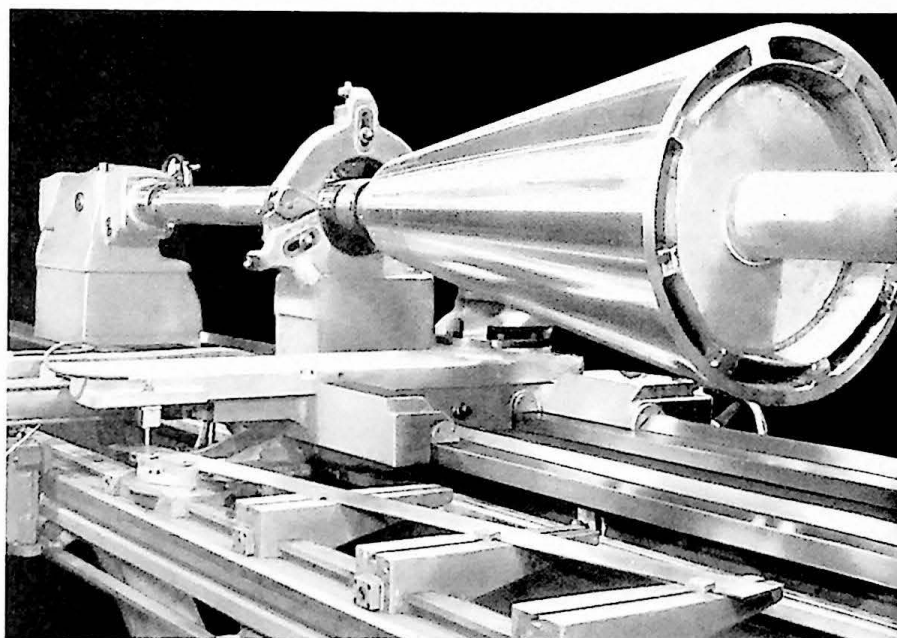
as 15 to 20 minutes; tool change in 1 minute. Practically any combination of cuts may be taken in a single, continuous operation which imparts a smooth, stepless finish. Repetitive measurements are unnecessary, thereby reducing the chance for human error. Work spoilage is practically eliminated.

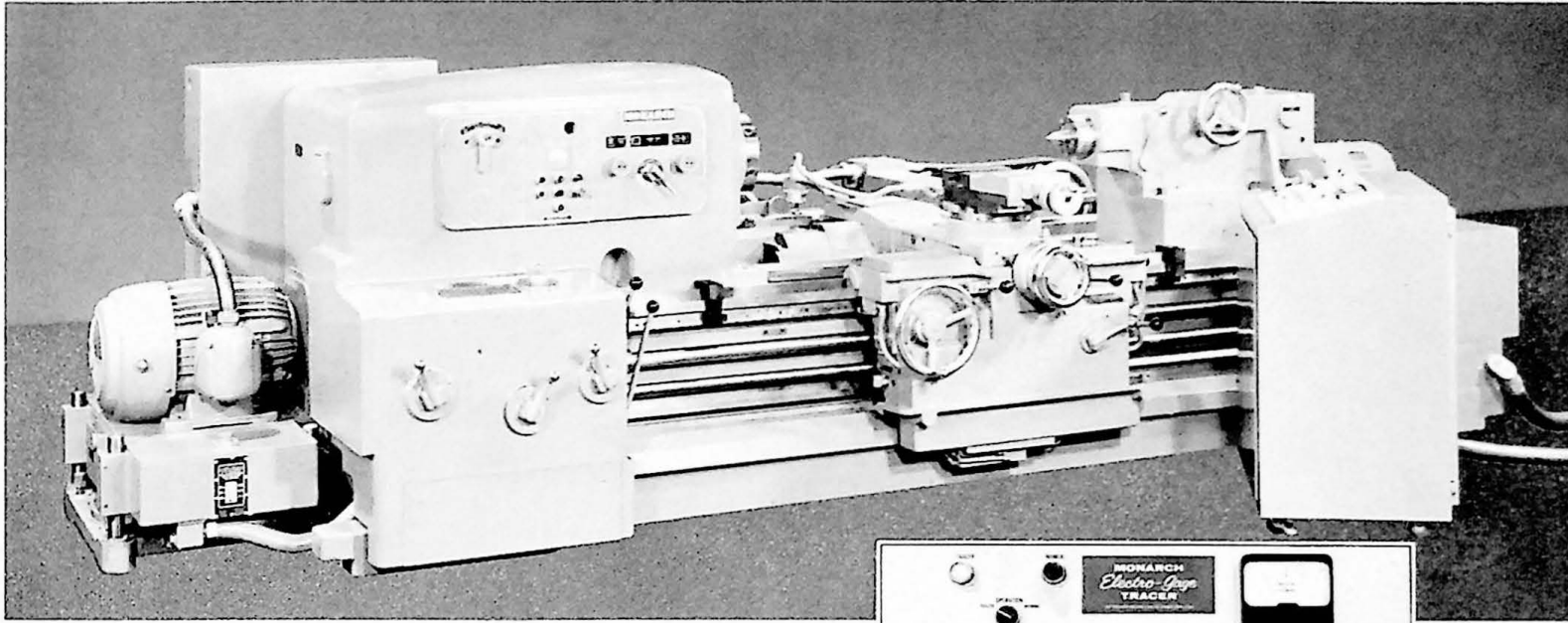
Either a rigid or a swiveling type is available. The latter permits boring to be done at the front of the hole while the spindle is rotating in the same direction as during turning operations. In addition, the swiveling slide is required for some undercuts as well as many facing operations having an extreme contour range. Generally the "Air-Gage Tracer" is factory applied to new machines but lathes may be ordered arranged for later application in the field.



90° "Air-Gage Tracer"

Essentially a hydraulic taper attachment, it is capable of handling any taper up to 36" maximum diameter on Monarch Series 90 and 91 lathes. A hydraulic cylinder mounted at the rear of the carriage moves the bottom slide and compound in and out at a 90° angle to the work axis. By setting a straight template at an angle (as illustrated) the machine turns much steeper tapers than can be handled by a taper attachment. Stroke is 18" which provides a 36" diameter change at one setting. Other shapes can also be turned and, with the hydraulic cylinder locked, the lathe can be used in conventional manner.





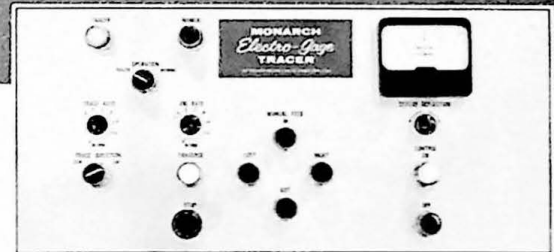
Monarch Electro-Gage Tracer

Designed for both accuracy and reliability, the Monarch Electro-Gage Tracer follows contours in either direction, with an infinitely adjustable feed rate that is electronically compensated to remain constant regardless of load.

Both 180° and 360° systems are available. The 360° system will automatically trace any contour . . . the tooling being the only limitation.

For high reliability and long life, the system electronics are entirely transistorized. High performance servo valves and hydraulic motors supply power to each slide.

Only 12-ounces stylus deflection is required. When the tool has reached full depth, the stylus may, at push button command, leave the template to rough out areas of excess stock.



Closeup of Electro-Gage Tracer control panel.

Manual jog controls and traverse are provided for set-up and tool approach. An emergency button stops all feed and automatically clears the tool perpendicularly from the work.

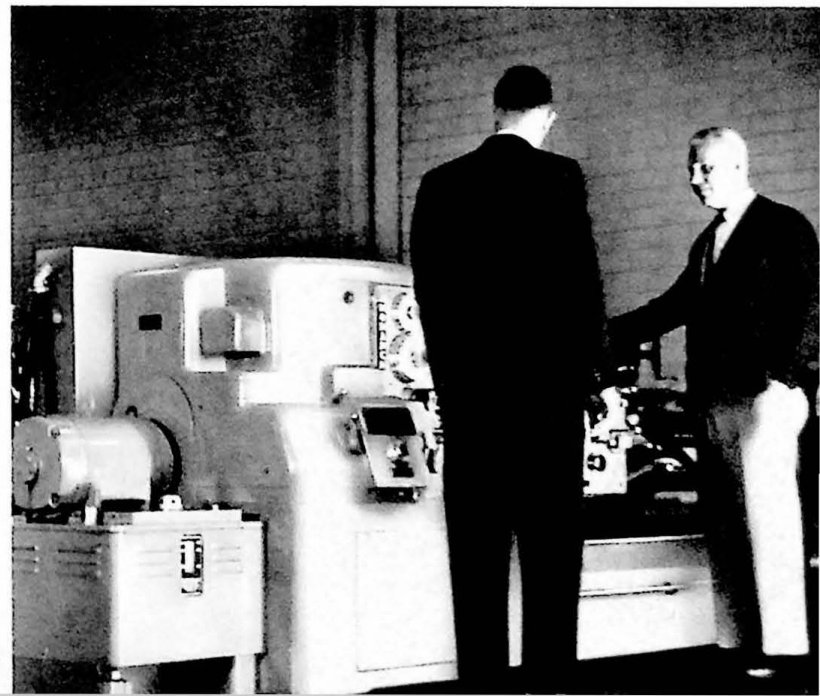
Constant feed rate along the template provides exceptionally fine finishes. Constant chip thickness control is available for use on constant surface cutting speed applications.

TURNING PROBLEM?

Turn it into a profit!

Perhaps your problem can be answered by the accessories shown on the preceding pages. If you need more information concerning any of them, just let us know.

Or, perhaps your problem can best be answered by sending parts, people or prints to the Monarch Demonstration Room in Sidney, Ohio. Here we can prove to you, by turning *your parts* on Monarch equipment, how we can give you greater accuracy, increased output, fewer rejects . . . paying you dividends in lower costs and higher profits.



AGGESSORY EQUIPMENT



THE MONARCH MACHINE TOOL COMPANY

Sidney, Ohio • Area Code 513 492-4111