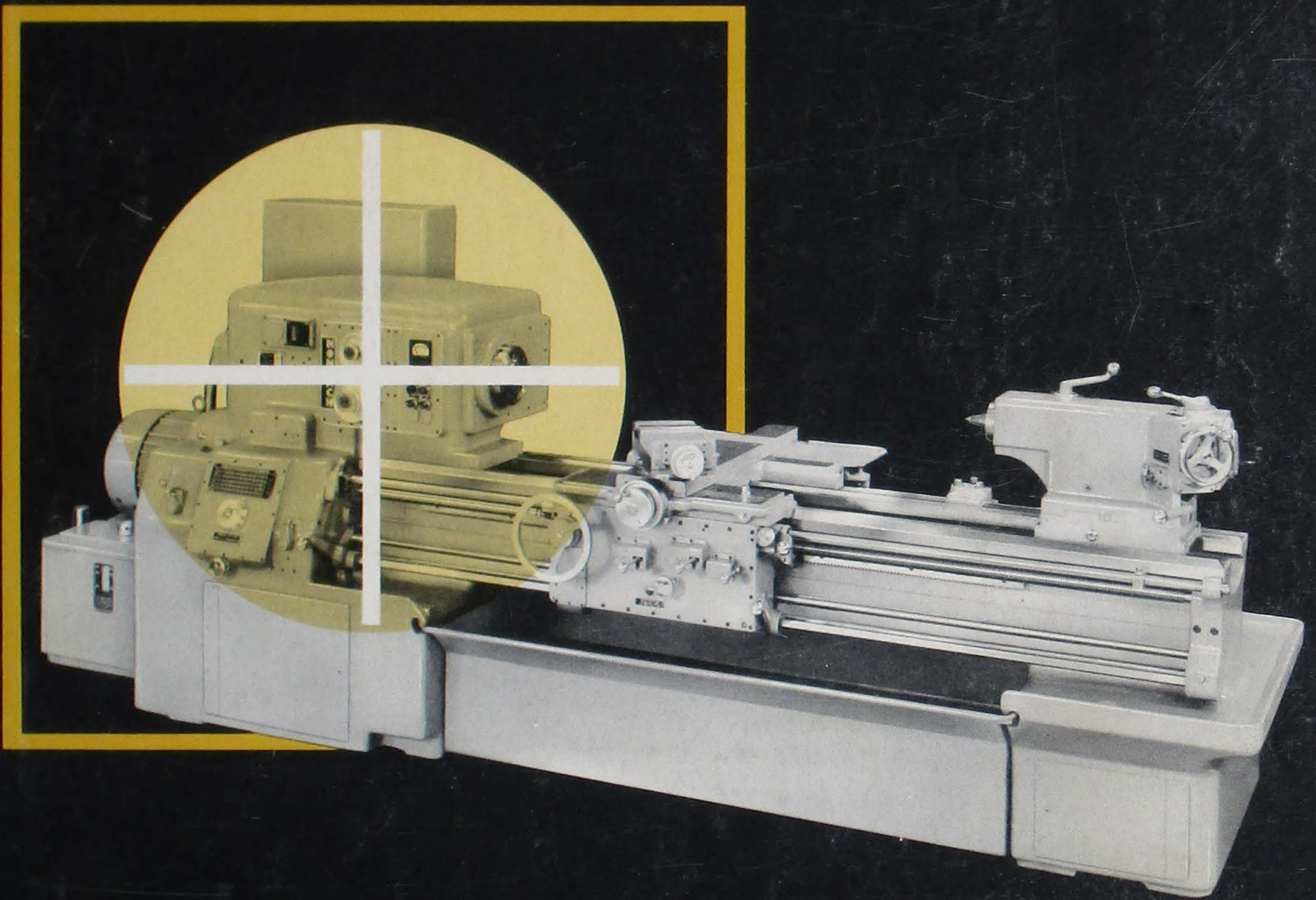


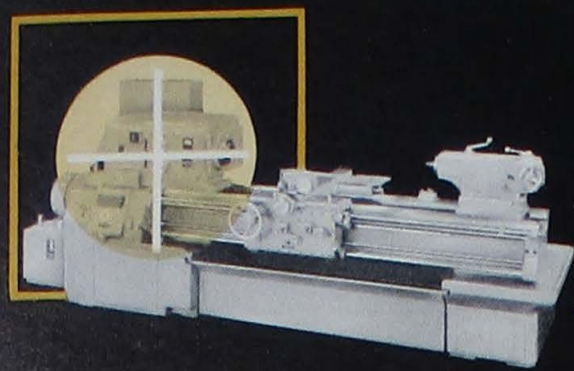
Monarch



TURNING MACHINES



THE MONARCH MACHINE TOOL COMPANY • SIDNEY, OHIO



THIS IS Monarch...

The name Monarch represents over 50 years of continuous and concentrated experience in the design and manufacture of but one product—lathes—until today a Monarch Lathe is widely accepted as the best possible turning machine obtainable anywhere. Some of the reasons for success like this are:

A STABLE, EXPERIENCED MANAGEMENT

A management team whose sum total of experience is many times the age of the company—many, many years devoted to keeping Monarch design ahead of the field. The fact that Monarch shares are listed on the New York Stock Exchange, and have paid dividends regularly since 1913 is but one example of their success.

ACTIVE ENGINEERING RESEARCH . . .

Is another factor in the success of Monarch. Trained mechanical, electrical and hydraulic engineers conduct new product development as a separate, continuous program in their own building where their one and only goal is to develop new turning concepts for the lathes you will be buying tomorrow.

METAL TURNING RECOMMENDATIONS

Monarch metallurgical engineers can supply complete and reliable turning data in order that the highest removal rates and shortest cycle times can be utilized for maximum efficiency. Proper cutting speeds and feeds have been studied for years, with results recorded using the finest of instrumentation.

THE MONARCH TURNING CLINIC

In a comfortable, air-conditioned 4000 square feet of floor area provided especially for the purpose, Monarch can demonstrate some of the most modern lathes in the world. This area is called a Turning Clinic, because it is here that some of the most difficult turning problems are solved using Monarch Lathes.

SUPER-ACCURATE LATHES

Ultra-precision tolerances are the order of the day. In such fields as missiles, atomic energy, electronics and instrumentation the limits now demanded far surpass anything thought possible only a few years ago. Monarch precision has kept pace. An outstanding example is the Series 180 Ultra-Precision Contouring Lathe which contours the O.D. and I.D. of thin-wall spherical work within a guaranteed total accumulated error of ± 75 millionths. Field performance even exceeds this.

BUILT BY CRAFTSMEN

Monarch Lathes are built by craftsmen who stay with Monarch—many of them alongside others of their family. Long periods of service are commonplace—indicative, perhaps, of the satisfaction obtained in contributing to products of the highest degree of quality and dependability. These craftsmen are aided in their efforts . . .

WITH MODERN MACHINERY AND METHODS

A quality lathe can not be produced economically with obsolete and worn-out equipment. No one knows that better than Monarch, with the result that the most modern production equipment and methods are used.

A tour of the Monarch plant can easily be arranged to see the investment that has been made in the production of Monarch Lathes . . .

INCORPORATING THE LATEST TURNING TECHNIQUES

Monarch pioneered the first Tracer Controlled Lathe in 1929, and subsequently the "Air-Gage Tracer" and the Electro-Hydraulic Tracer. These are concrete and easily understood examples of cost reduction turning techniques developed by Monarch. As new turning techniques are developed, checked and approved, they are built into Monarch Lathes to keep them the best possible turning machines obtainable anywhere.

SMALL AND MEDIUM SWING LATHES

Precision Toolmaker's Lathe—10" Model EE	4-5
Precision Manufacturing Lathe—10" Model EE	6
Precision Lathe—Series EE, Model 1000	7
612 Lathes	8-9
Dyna-Shift Lathes--Series 62	10-11

HEAVY DUTY LATHES

Dyna-Shift Lathes—Series 80	12-13
Dyna-Shift Lathes—Series 90	14-15
Missile Master Lathes—Series 170	16-17

PRODUCTION LATHES

Mona-Matic—Model 20-H	18-19
Mona-Matic—Model 21	20-21
Mona-Matic—Model 21-H	22
Hydra-Slide	23
Numerical Control	24-25

TRACER CONTROLS

"Air-Gage Tracer"	26-27
Air-Tracer Pak	28
Rotary Profile Tracer Lathe	29
Monarch-Keller Contour Turning Lathes	30

SPECIAL PURPOSE LATHES

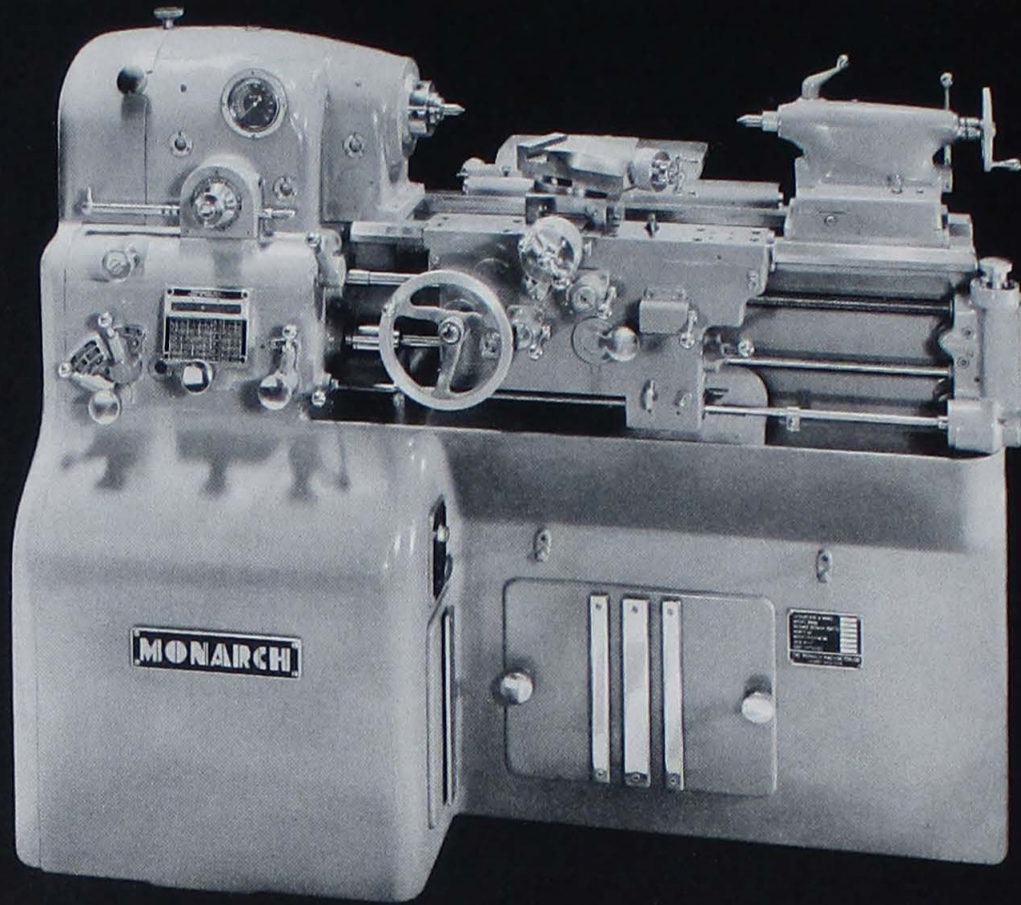
Speedi-Matic—Model B	31
Heavy Duty Roll Turner	32
Ultra-Precision Contouring Lathe—Series 180	33
60" Right Angle Lathes—Models O and F	34
Machinability Test Lathes	35

MONARCH REPRESENTATIVES

**Back
Cover**

PRECISION TOOLMAKER'S LATHES

10" MODEL EE



For precision turning, boring, facing and threading in the toolroom the Model EE has no equal. It's fully as proficient for such super-accurate manufacturing operations as required for small jet, missile, instrument, electronic and camera components.

The Model EE is supplied with an electronic drive as standard equipment. The main drive motor secures its power through an electronic unit which utilizes almost any source of A.C. current.

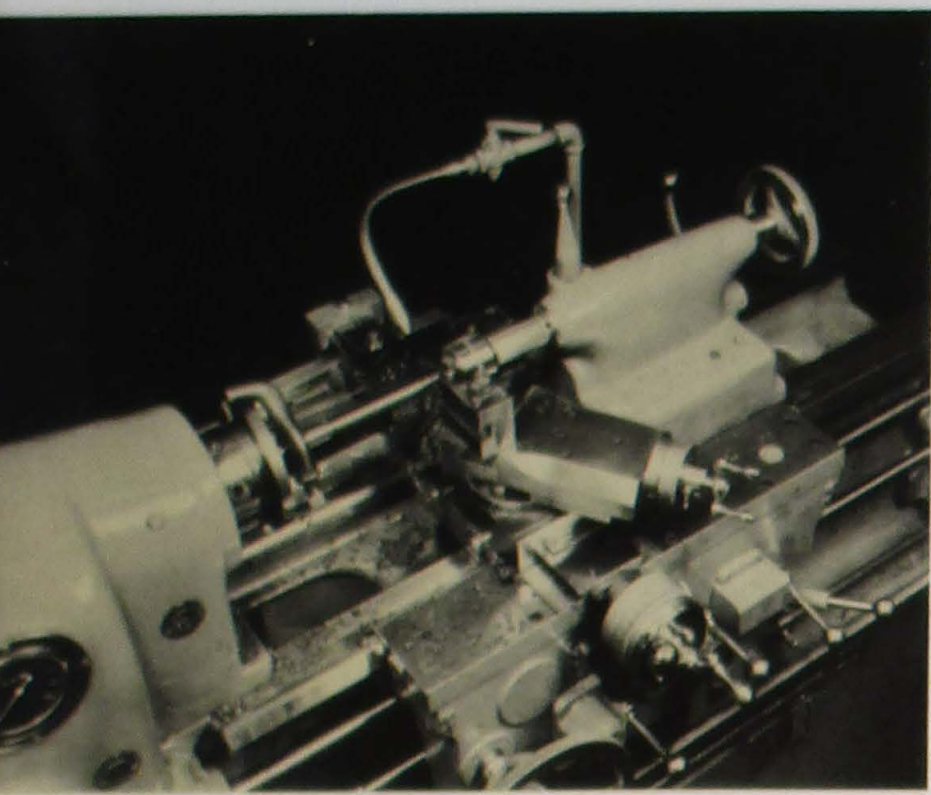
Numerous benefits are inherent in this type of drive. Vibration at all speeds is minimized by the absence of revolving equipment in the power supply to the driving motor. Noise is practically eliminated.

The machine illustrated above is equipped with electric leadscrew reverse which is not standard equipment but is a great saver of time when chasing threads. Variable reverse speed control should always be specified for use with electric leadscrew reverse. The combination of these two features has increased production as much as 100% on many threading jobs.

The 10" Model EE can be made still more versatile by the use of many other available attachments. The ones most commonly employed are: taper turning attachment, follow rest, multiple index face plate, multiple positive length stop, micro-gaging dial, collet attachment and various types of collets, chucks and the cost reducing Monarch "Air-Gage Tracer".

Principal Features

- 5 H.P. drive direct to spindle through multiple "V" belts, providing an infinitely variable speed range. No gears in the headstock.
- Standard speed range, 5 to 3000 R.P.M.; optional range 6.5 to 4000 R.P.M.
- D.C. variable speed motor secures its power through an electronic unit which utilizes almost any source of A.C. This type of power supply minimizes vibration at all speeds, practically eliminates noise, improves speed regulation regardless of load and maintains better torque at the lower speeds.
- Spindle comes to dead stop in less than 2 seconds, attains full speed in less than 3 seconds.
- Automatic lubrication throughout.
- American standard Camlock spindle nose—for quick, rigid and accurate chuck and fixture mounting.
- Wide range of threads and feeds through totally enclosed gear box and end gearing.
- Cross feed and leadscrews induction hardened and ground.
- Flame hardened and precision ground bed ways for both carriage and tailstock. Bed all in one piece—no inserts.
- Easy, fatigue-free operation. Base design permits operator to work close comfortably, from standing or sitting positions.
- The only small lathe available with anti-friction bearing taper attachment.
- For thread chasing up to 100% faster, is available with exclusive combination of electric leadscrew reverse and variable reverse speed control.



A typical thread chasing operation being performed on a 10" Model EE Toolmaker's Lathe.

A battery of Model EE lathes, carefully chosen for their speed and precision, working on complex electronic equipment parts.



SPECIFICATIONS

General

Swing over bed	12¼"
Swing over cross slide	7¼"
Distance between centers	20"
Distance, spindle center to floor	43½"
Floor space	29" W x 64" L

Headstock

Hole through spindle	1-13/32"
Center, Morse taper	No. 2
American standard Camlock spindle nose	3" D-1
Optional spindle speeds (range No. 1 furnished)	
A.C. Supply	Open Belt Speed Reducer
Range No. 1	30 to 3000 rpm 5 to 500 rpm
Range No. 2	40 to 4000 rpm 6.5 to 650 rpm

Gear Box

Leadscrew diameter and threads per inch	1"—8 thd.
Range of threads	3 to 184
Range of feeds through endless belt0005" to .016"
Number of thread changes	60
Number of feed changes	50

Tailstock

Tailstock spindle diameter	1¼"
Tailstock spindle traverse	3½"

Steady Rest

Steady rest opening	3"
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Carriage and Compound

Carriage length	20½"
Carriage bridge width	5"
Compound rest top slide travel	2"
Size of lathe tool	⅜" x ⅞"

Motor Data

Motor size	5 H.P.
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Shipping Data

Net weight with regular equipment only, but including electrical equipment	2900 lbs.
Domestic shipping weight, as above	3250 lbs.

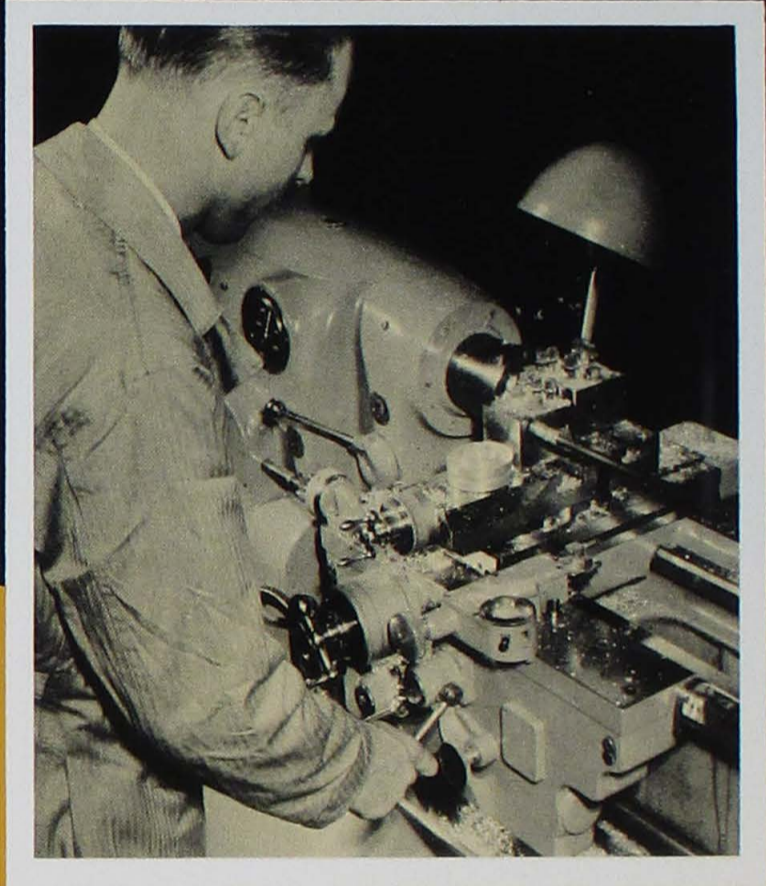
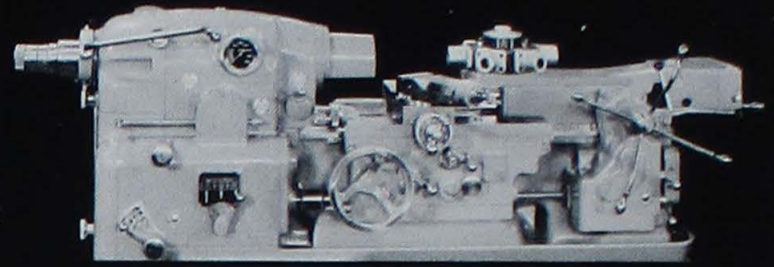
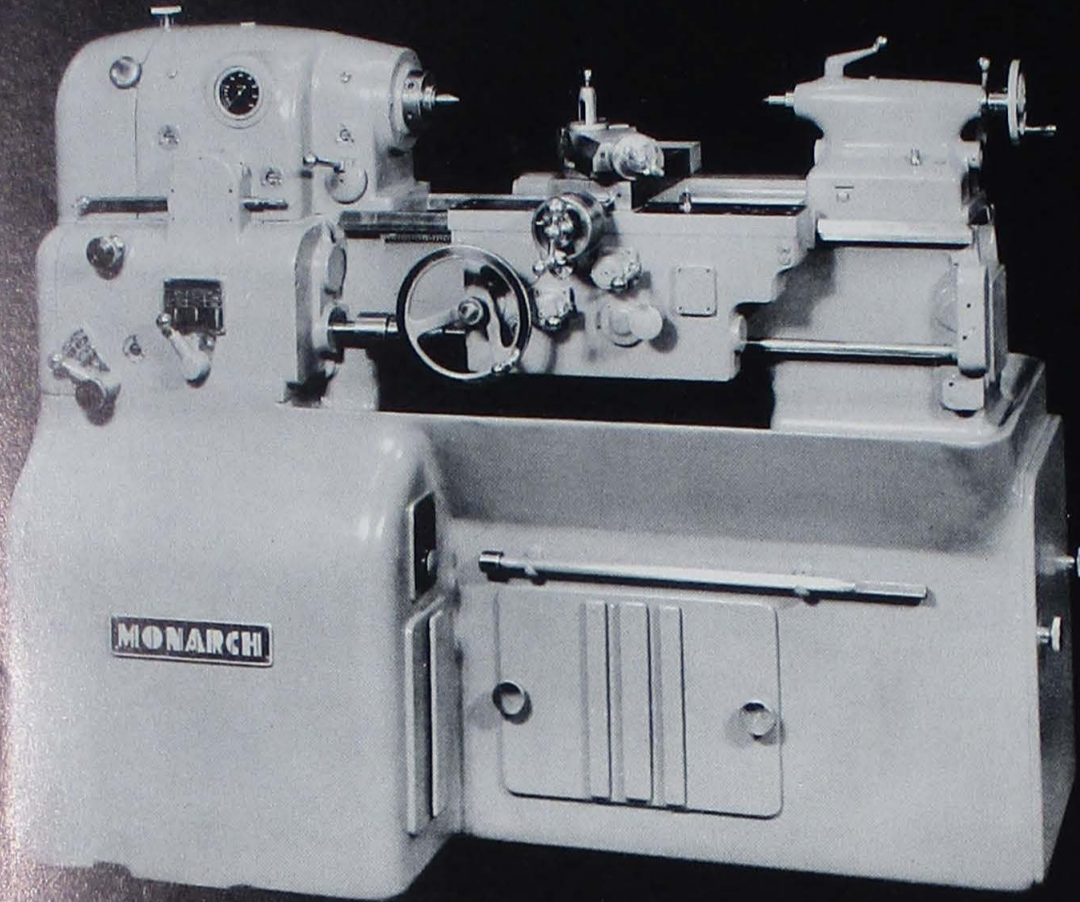
Rear view of the Model EE showing the clean, uncluttered design, characteristic of this lathe.





PRECISION MANUFACTURING LATHE

10" MODEL EE



The 10" Precision Manufacturing Lathe Model EE is a production shop version of the Toolmakers Model EE described on the preceding pages.

In its basic form it consists of a bed mounted on a cabinet base, built-in oil pan of the reservoir type, headstock, 5 H.P. 100 to 1 variable speed electric drive with magnetic switch and start and stop push button station, six feed gear box and feed rod. The machine is not intended for thread chasing operations and, as a consequence, no provision is made for the use of a lead-screw or other screw cutting parts.

An extraordinarily large choice of equipment and accessories is available. This makes it possible for the user to select the combination which will enable him to secure the utmost in productivity on his class of work. This equipment includes turrets, dog plate and face plate, jaw chucks, steady rest, follow rest, taper turning attachment, motor driven coolant pump, collet attachments, collet chucks and collets, step chucks, stops, micro-gaging diameter dial, bar feed attachment, hexagon power feed bed turret, hexagon hand feed bed turret, hand operated cut-off slide and tool cabinet.

The small illustration to the right above indicates the versatility of the Precision Manufacturing Lathe Model EE and its adaptability to individually different production jobs. Here the machine has been equipped with a collet attachment, a Monarch powered ram type hexagon turret and hydraulic powered feed box for rapid production of parts requiring a multiple tool setup.

SPECIFICATIONS

General

Swing over bed	12½"
Swing over cross slide	7¼"
Distance, between centers	20"
Distance, spindle center to floor	43½"
Floor space, basic machine	29" W x 64" L

Headstock

Hole through spindle	1-13/32"	
Center, Morse taper	No. 2	
American standard Camlock spindle nose	3" D-1	
Optional spindle speeds (range No. 1 furnished)		
A.C. Supply	Open Belt	Speed Reducer
Range No. 1	30 to 3000 rpm	5 to 500 rpm
Range No. 2	40 to 4000 rpm	6.5 to 650 rpm

Gear Box

Number of feed changes	6
Range of feeds per revolution002", .003", .004", .006", .009" and .012"

Carriage and Compound

Carriage length	20½"
Carriage bridge width	5"
Compound rest top slide travel	2"
Size of lathe tool, round tool post	¾" x ⅞"

Tailstock

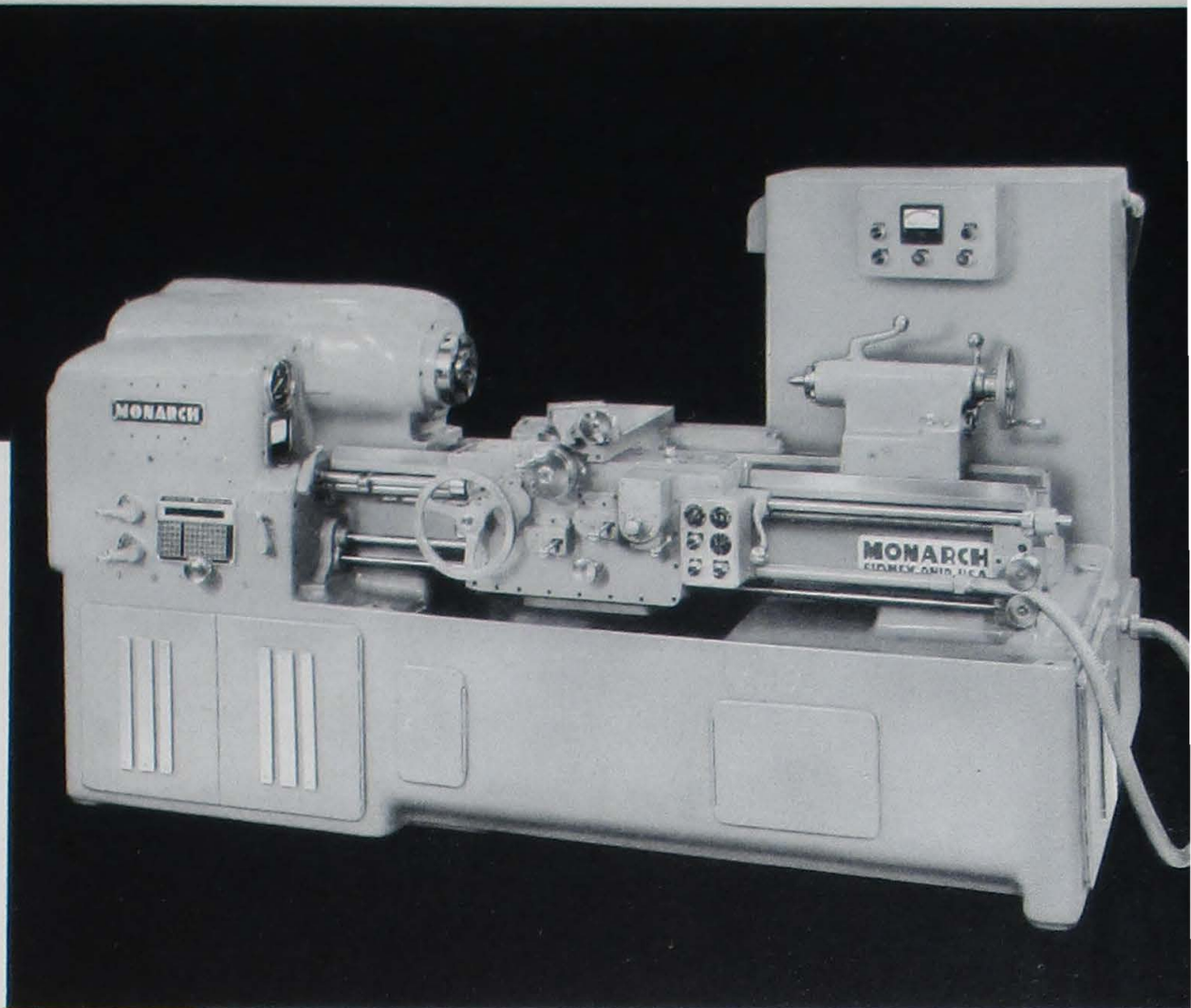
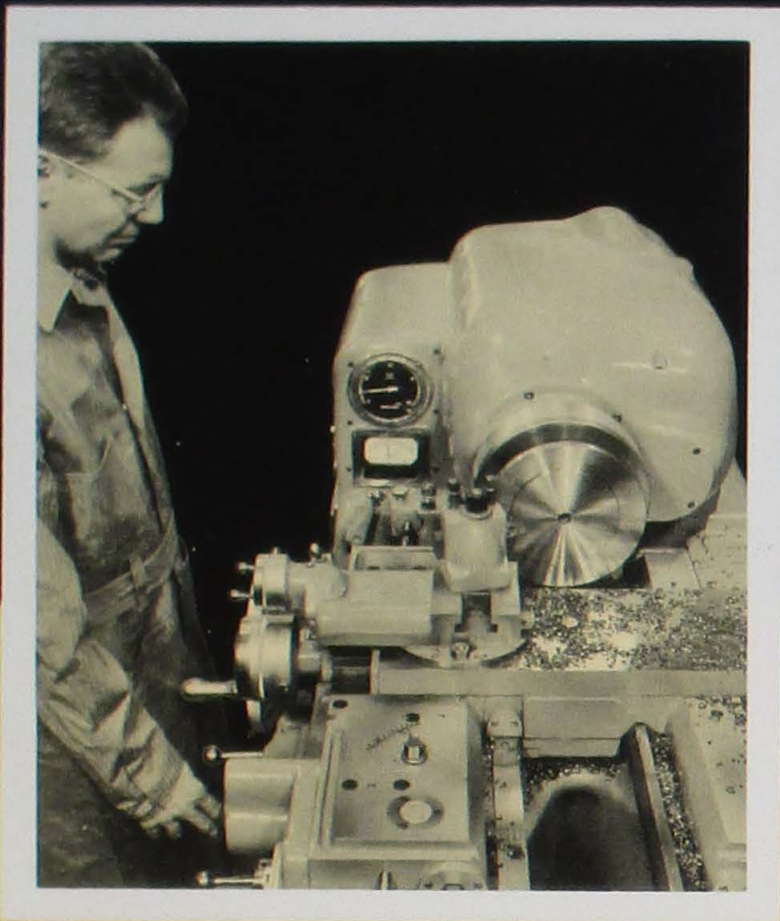
Tailstock spindle diameter	1¼"
Tailstock spindle traverse	3½"

Motor Data

Motor size	6 H.P.
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Shipping Data

Net weight, basic machine only	2515 lbs.
Domestic shipping weight, as above	2875 lbs.



SPECIFICATIONS

General

Swing over bed	15½"
Swing over cross slide	8¾"
Takes between centers, tailstock flush	30" and 54"
Distance, spindle center to floor	42½"
Floor space, base length	61¼" W x 101" L

Headstock

Hole through spindle	1-13/16"
Center, Morse taper	No. 4
American standard Camlock spindle nose	6" D-1
Spindle speed range:	
Low gear	25 to 215 R.P.M.
Intermediate gear	55 to 440 R.P.M.
High gear	120 to 945 R.P.M.
Direct belt drive	250 to 2000 R.P.M.
Constant surface speed range	30 to 650 F.P.M. (variable)

Gear Box

Leadscrew diameter and threads per inch ..	1¼"—4 thd.
Range of threads per inch, quick change ...	2 to 120
Range of feeds per revolution, quick change	.001" to .066"
Thread and feed changes, reg. quick change	66
Metric transposing feed range0006" to .042"

Tailstock

Spindle diameter	2⅞"
Spindle travel and set-over	5⅝"—½"

Carriage and Compound

Carriage length	27½"
Carriage bridge width	8"
Size of lathe tool	¾" x 1½"

Motor Data

Motor size, D.C. variable speed	20 H.P.
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Shipping Data

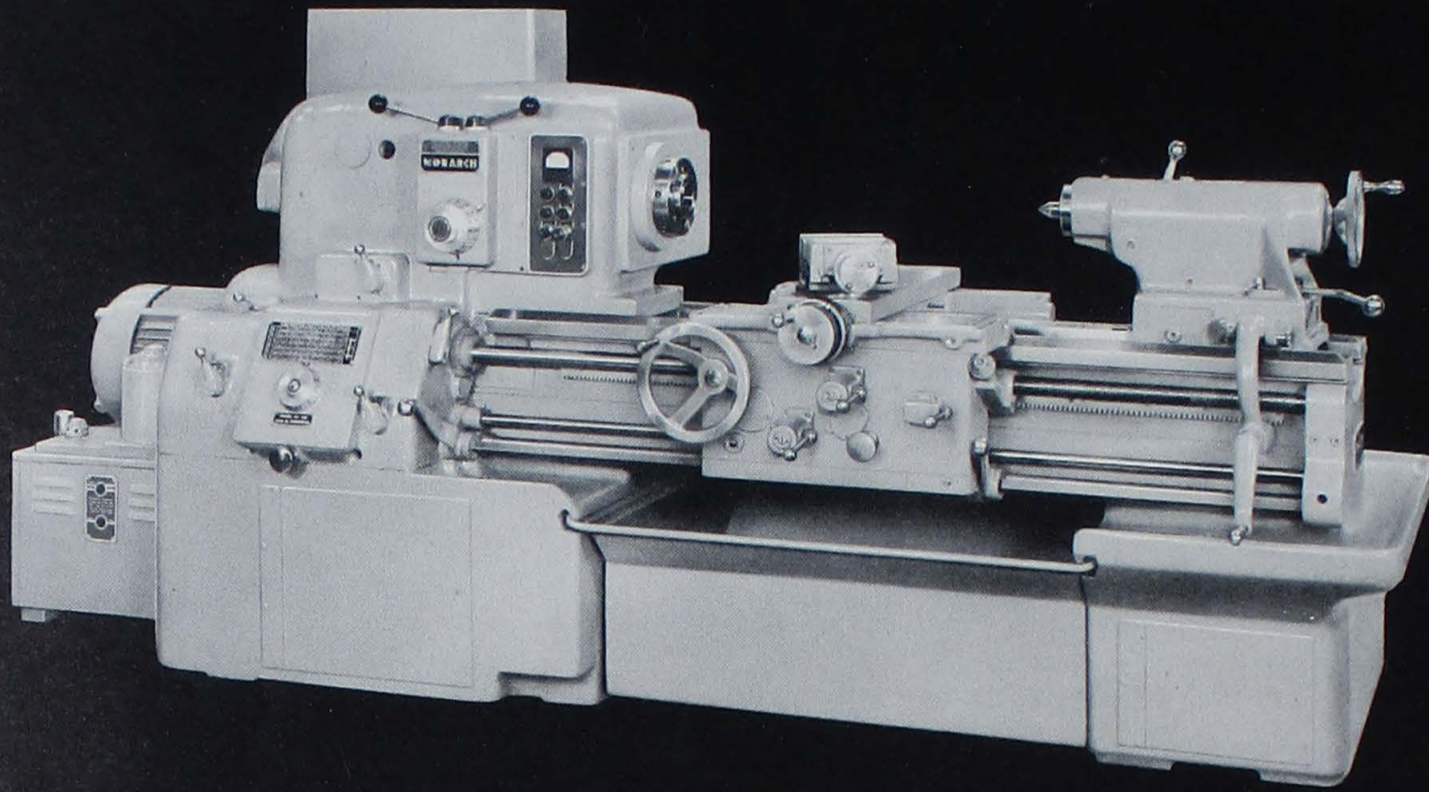
Net weight, with regular equipment only, base length	10,250 lbs.
Domestic shipping weight, as above	11,500 lbs.

A big brother of the 10" Model EE which is equally suitable either in the toolroom or on manufacturing operations. Outstanding features are:

- **Built-In Constant Surface Cutting Speed.** This feature becomes operative at the flick of a switch. With it, the operator is always using the most efficient surface cutting speed. Both finish and accuracy are improved. Constant surface cutting speed is recommended particularly on facing operations. It can also be used advantageously on multiple diameter shaft work for the automatic maintenance of the correct surface cutting speed from the smallest to the largest diameter being turned.
- **Infinitely Variable Speeds Up To 2000 R.P.M.** Any speed between 25 R.P.M. and 2000 R.P.M. may be secured on the Series EE Lathe. There are four overlapping ranges with the highest speed range secured by the multiple "V" belt drive direct to the spindle.
- **Electrical Speed Change.** Speed change is accomplished in a few seconds. The turn of a knob gives every speed within a given range; change-over from one speed range to another is automatic upon resetting of the selector knob. There is no calculating of lever settings by reference to an index plate.
- **Electronic Main Drive Motor Control.** The 20 H.P., D.C. main drive motor of the Monarch Series EE is provided with electronic control. Almost any source of A.C. may be utilized. Vibration at all speeds is minimized by the absence of revolving equipment in the power supply to the driving motor. Noise is practically eliminated.
- **Four-Way Power Rapid Traverse.** Power rapid traverse keeps the placement of all tool movements under power at the apron which is where the operator spends 90 to 95% of his time.



612 LATHES



A Dial-Select 36 speed machine for sound investment in cost reduction . . . that, in essence is the story of the Monarch 612 Lathe. By any standard you may wish to apply it equals or exceeds other turning machines of like swing capacity. And it is provided with many exclusive features. Practical shop men will quickly recognize the value of such advantages as:

- Weight, power and proportions for metal removal limited only by tool and work piece characteristics.
- Design refinements, manufacturing and inspection standards to meet today's demands for precision output.
- Automatic lubrication throughout.
- Flame hardened and ground bed ways integral with bed section.
- Electricals mounted externally.
- 36 speeds, from 12 to 1500 R.P.M.—dial selected. Optional higher range of 14 to 1750 R.P.M. available.
- Final work drive through powerful helical gears.
- Safety interlock which prevents movement of shifting lever while spindle is rotating.
- Speed shift and free spindle accomplished quickly.
- Completely enclosed gear box and end gearing.
- Apron controls convenient, fast and efficient.
- Ruggedly proportioned tool slides.
- Massive tailstock for solid work support.
- A complete line of tracer equipment and accessories.

The Monarch 612 line consists of three entirely separate machines, each with its own properly proportioned bed. For example, the Model 2013 is not a raised Model 1610 but a heavier, more rugged machine overall for the ultimate in productiveness on work within its range. The Model 2516 is not merely the raise of another machine designed for smaller work but is a separate lathe with the dimensions, weight and power necessary to do the job every user has the right to expect.

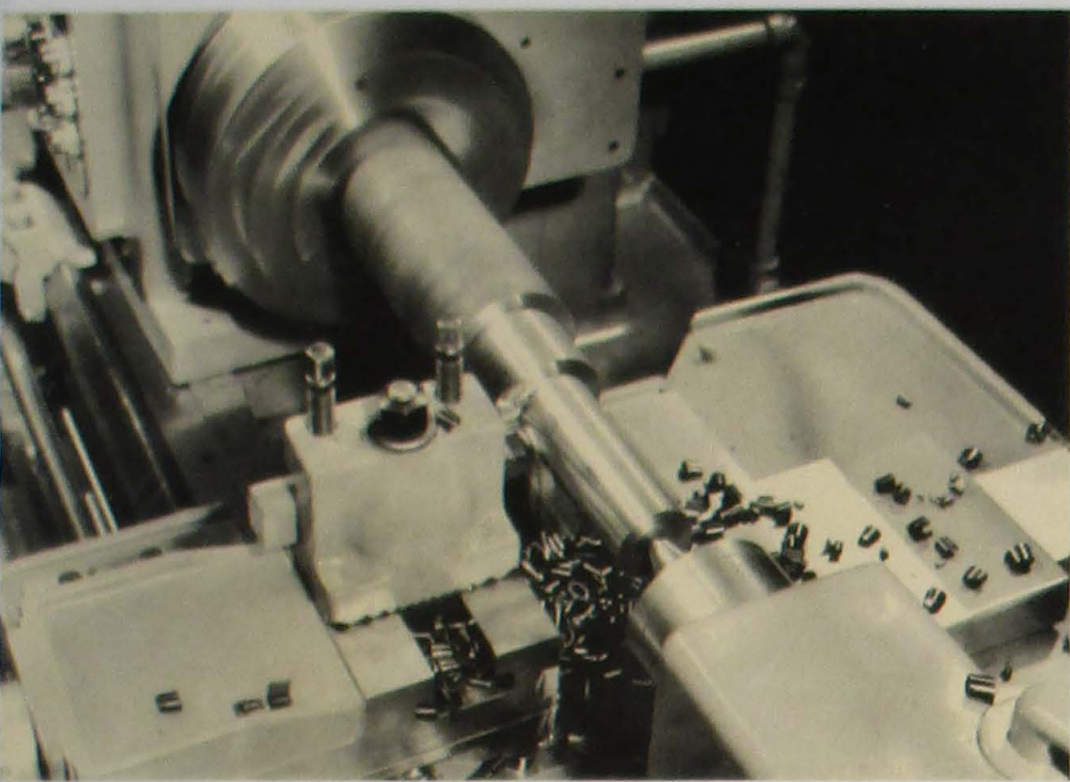
Nor is the machine offered with such confusing designations as "Standard" and "Heavy Duty." You know what you're getting when you purchase a Monarch. Check the specifications opposite for verification of the foregoing.

Models 1610T, 2013T and 2516T

When lathes are used in the toolroom, they are ordinarily preferred with a larger complement of regular equipment so as to increase their versatility on single piece or very small lot production. In recognition of this, the models with the suffix "T" are furnished with additional equipment.

Models 1610-13, 2013-16 and 2516-19

Many lathe users occasionally require more swing than is provided by basic models yet find it impractical to purchase larger basic models because of the increased investment in capacity not ordinarily required. To meet this problem Monarch offers engineered raises, the two digits following the hyphen in the model designation being the raised swing over the cross slide. Raise is in the sand. No blocks are used.



The amount of metal which can be removed with a Monarch 612 is limited only by tool and work piece characteristics.

Note the speed selector dial. Low range of speeds on outer circle of figures, high range on inner circle.



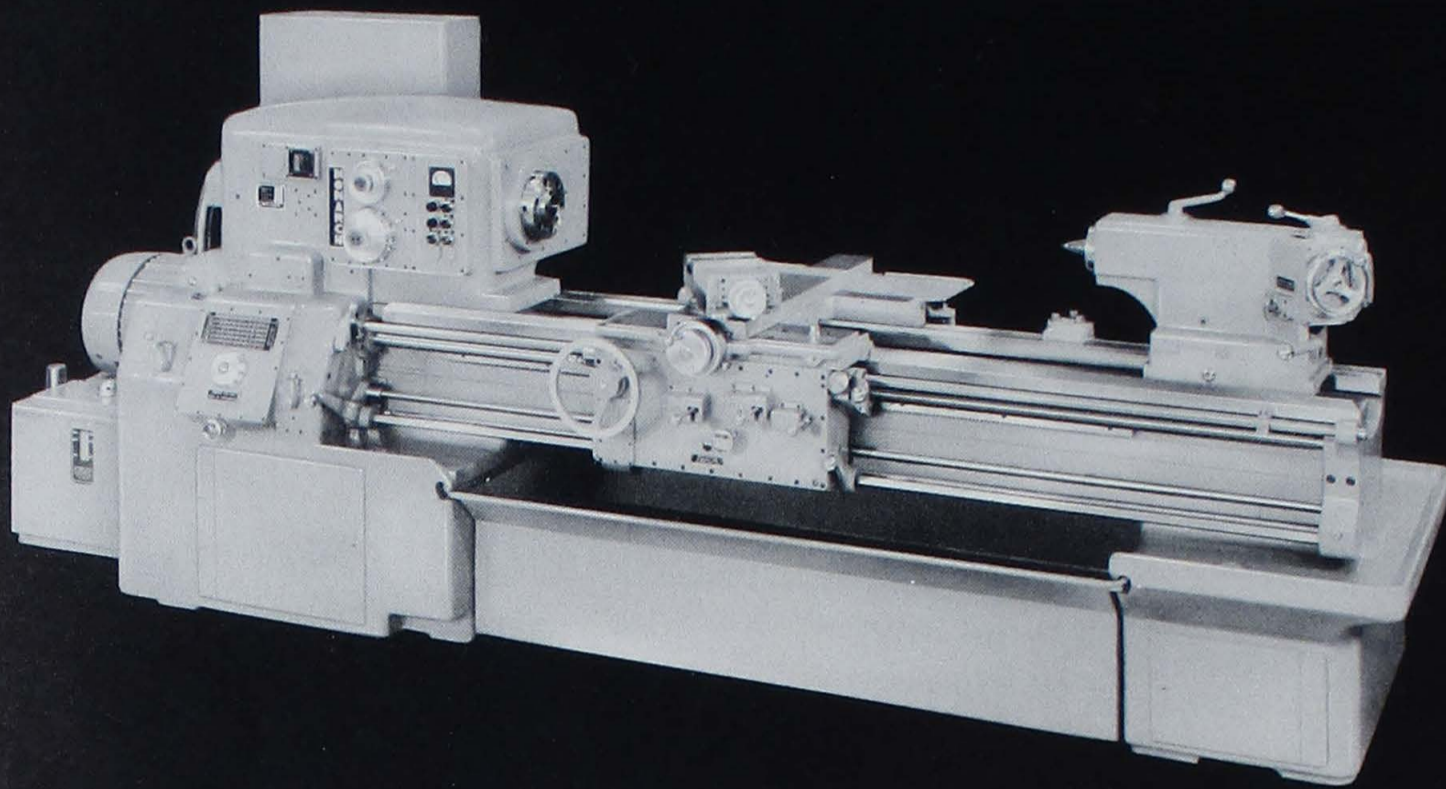
Rear view of a 612 showing commodious chip pan and clean modern appearance.

SPECIFICATIONS

General	Model 1610	Model 2013	Model 2516
Swing over bed and carriage wings.....	16"	20"	25"
Swing over cross slide.....	10"	13"	16"
Takes between centers, base length.....	30"	30"	48"
Center distance increases in increments of	24"	24"	24"
Headstock			
Hole through spindle.....	2-1/16"	2-1/16"	2-1/16"
Spindle, Jarno taper.....	No. 18	No. 18	No. 18
Center, Morse taper.....	No. 4	No. 4	No. 4
American standard Camlock spindle nose..	6" D-1	6" D-1	6" D-1
Number of speeds.....	36	36	36
Spindle speed range, R.P.M.....	12 to 1500	12 to 1500	12 to 1500
Gear Box			
Leadscrew diameter and threads per inch..	1 1/4"—4 thd.	1 1/2"—4 thd.	1 1/2"—4 thd.
Range of threads per inch.....	2 to 120	2 to 120	2 to 120
Range of feeds per revolution.....	.0013" to .082"	.001" to .068"	.001" to .068"
Thread and feed changes.....	66	66	66
Tailstock			
Spindle diameter.....	4"	4 1/4"	4 1/2"
Spindle travel.....	6"	7"	9"
Spindle taper.....	Morse No. 4	Morse No. 4	Morse No. 5
Carriage and Compound			
Carriage bearing on bed.....	21 1/4"	25"	25"
Carriage bridge width.....	7"	8"	9"
Compound rest top slide travel.....	3 1/4"	5"	5 1/4"
Lathe tool-shank size for round tool post..	5/8" x 1 1/2"	3/4" x 1 1/2"	7/8" x 1 1/4"
Bed			
Width of bed.....	13 1/2"	17"	19 1/2"
Motor Data			
Main drive motor.....	10 H.P.	20 H.P.	20 H.P.
Note—Other motors applicable for special requirements.			
Shipping Data			
Net weight including all electrical equipment, base length.....	6,815 lbs.	9,640 lbs.	10,690 lbs.
Domestic shipping weight, as above.....	7,215 lbs.	10,140 lbs.	11,230 lbs.



DYNA-SHIFT LATHES SERIES 62



The Series 62 Dyna-Shift is a highly refined power shift lathe which reflects superior engineering know-how.

Basic in the design is the Dyna-Shift headstock. With the settings in terms of surface speed, this feature makes it unnecessary for the operator ever to figure the R.P.M. he needs for the desired surface speed. All he does at the start of a job is set one large dial for the surface speed needed. Thereafter he does nothing but set a second dial as the cut progresses from one diameter to another.

The machine calculates each speed, sets up the change and makes the change when ordered to do so by movement of the main control lever. Speed change requires but a few seconds. That in conjunction with the wide choice of available speeds means it is to the operator's advantage to shift as necessary for top cutting efficiency. Speed range is high enough to utilize the advantages of the very latest carbide and oxide tooling.

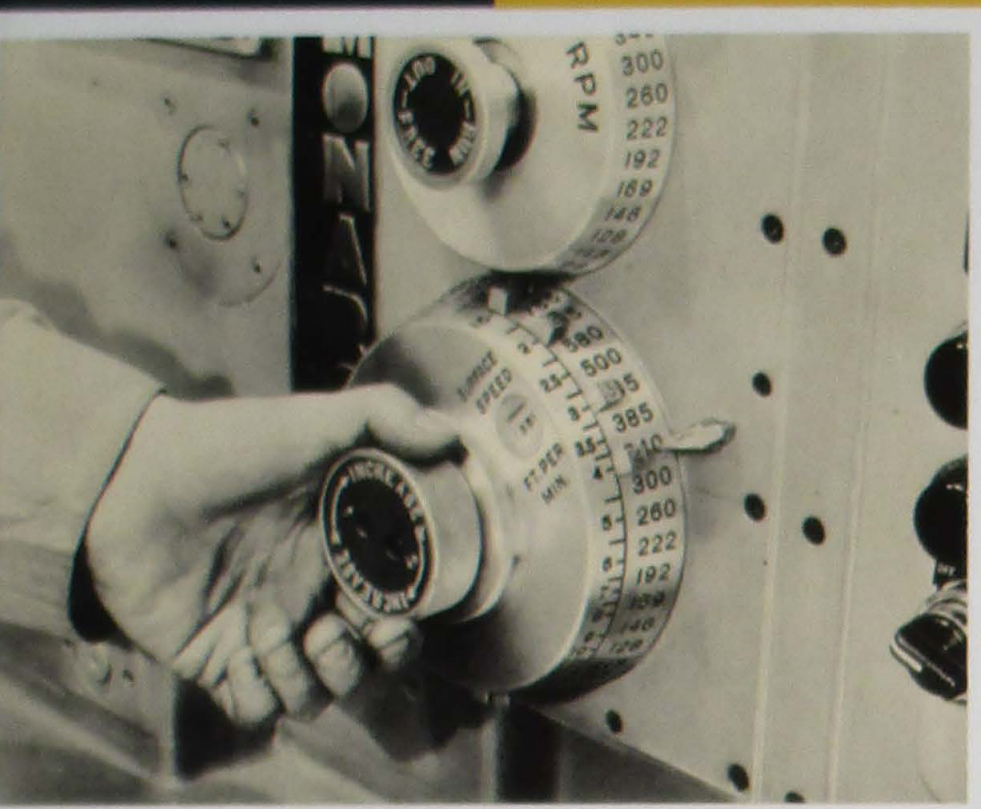
Still another advantage of this headstock is speed preselection. It enables the operator to preselect speed changes for succeeding diameters while the machine is taking a cut. Once the diameter preselectors have been set, as many pieces as desired can be turned without re-setting of the preselector tabs.

There are many other cost reducing features such as the four-way power rapid traverse and two-speed range tailstock. The Series 62 is also available with a larger complement of regular equipment so as to increase its versatility on single piece and very small lot production

in the toolroom. Engineered raises are offered for those users who occasionally require more swing than is provided by basic models yet find it impractical to purchase larger basic models because of the increased investment in capacity not ordinarily required.

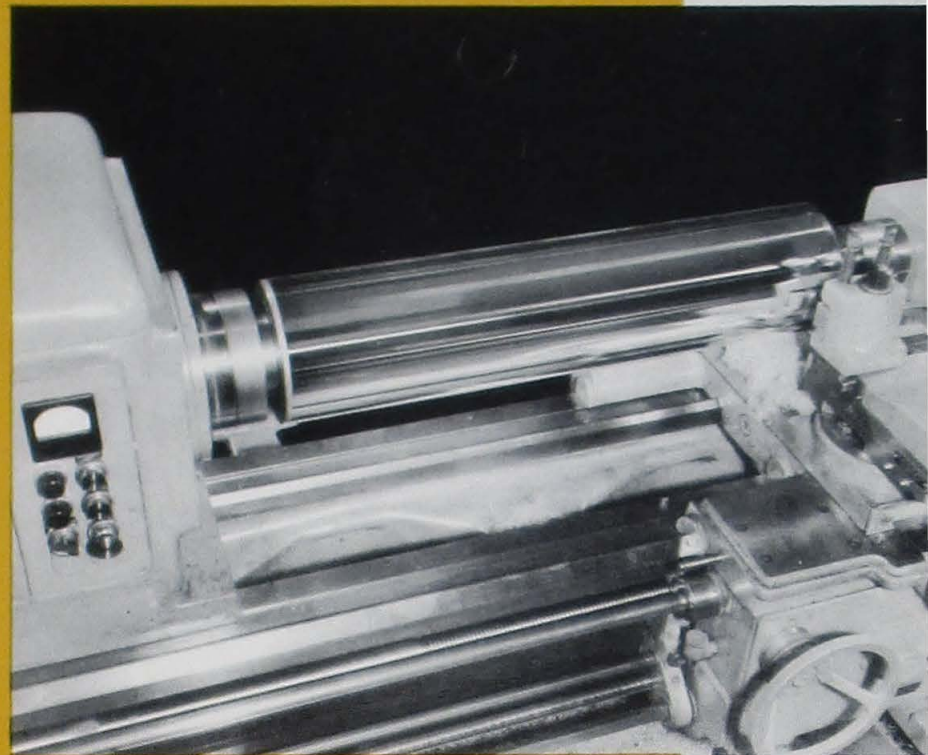
Principal Features

- Weight, power and proportions for metal removal limited only by tool and work piece characteristics.
- Design refinements, manufacturing and inspection standards to meet today's demands for precision output.
- Automatic lubrication throughout.
- Flame hardened and ground bed ways integral with bed section.
- Electricals mounted externally.
- 36 speeds, from 14 to 1750 R.P.M. Optional higher range of 20 to 2500 R.P.M. available.
- Automatic spindle speed calculation and power shift.
- Speed preselection while machine is in operation and in any sequence desired.
- Final work drive through powerful helical gears.
- Safety interlocks which protect both machine and operator.
- Completely enclosed gear box and end gearing.
- Four-way power rapid traverse which saves as much as 50% in tool adjust time.
- Ruggedly proportioned tool slides.
- Massive two-speed range tailstock for solid work support.
- A complete line of tracer equipment and accessories.



While the machine is in operation and taking a cut, the next speed can be selected by turning the diameter dial to the preselector tab position for the next cut.

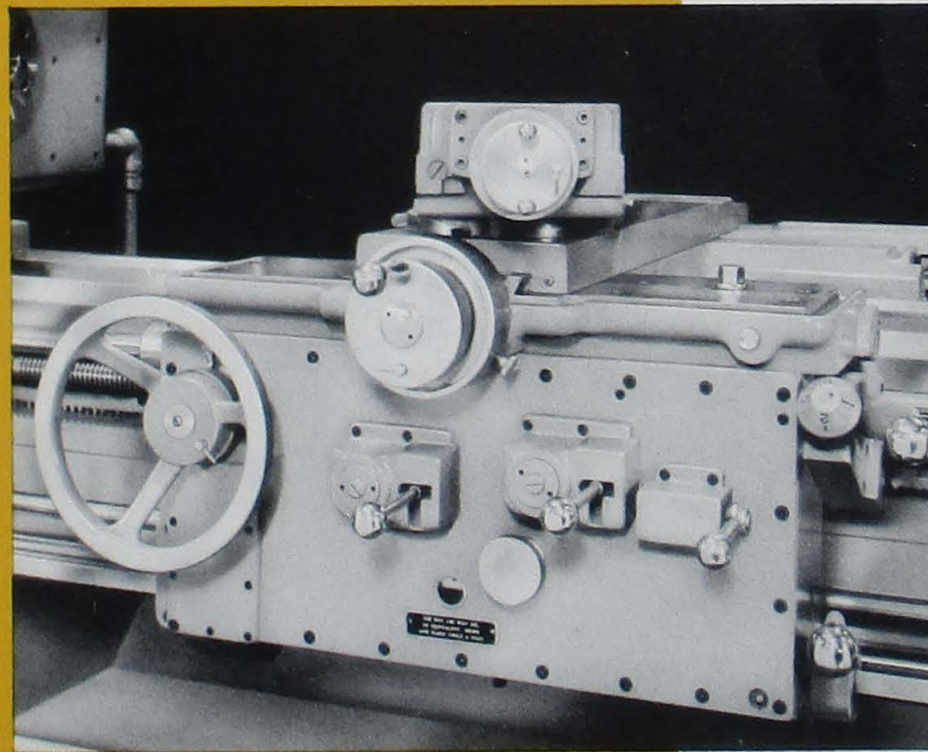
A 6 micro-inch finish obtained with a diamond tool and surface cutting speeds above 2000 f.p.m., on the Series 62 Hy-Fin Lathe.



SPECIFICATIONS

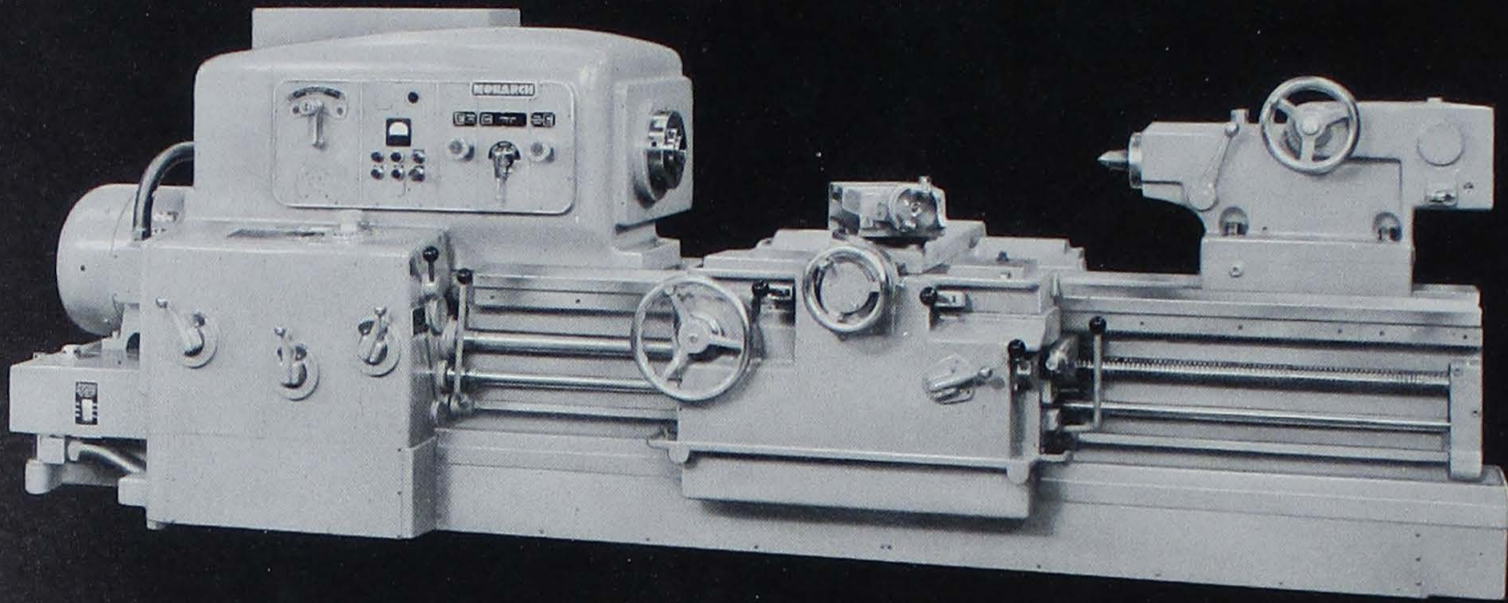
	Model 1610	Model 2013	Model 2516
General			
Swing over bed and carriage wings.....	16"	20"	25"
Swing over cross slide.....	10"	13"	16"
Takes between centers, base length.....	30"	30"	48"
Center distance increases in increments of ...	24"	24"	24"
Headstock			
Hole through spindle.....	2-1/16"	2-1/16"	2-1/16"
Spindle, Jarno taper.....	No. 18	No. 18	No. 18
Center, Morse taper.....	No. 4	No. 4	No. 5
American standard Camlock spindle nose.....	6" D-1	6" D-1	6" D-1
Number of speeds.....	36	36	36
Spindle speed range, R.P.M.....	14 to 1750	14 to 1750	14 to 1750
Gear Box			
Leadscrew diameter and threads per inch....	1 1/4" - 4 thd.	1 1/2" - 4 thd.	1 1/2" - 4 thd.
Range of threads per inch.....	2 to 120	2 to 120	2 to 120
Range of feeds per revolution.....	.0013" - .082"	.001" - .068"	.001" - .068"
Thread and feed changes.....	66	66	66
Tailstock			
Spindle diameter.....	4"	4 1/4"	4 1/2"
Spindle travel.....	6"	7"	9"
Spindle taper.....	Morse No. 4	Morse No. 4	Morse No. 5
Carriage and Compound			
Carriage bearing on bed.....	21 1/4"	25"	25"
Carriage bridge width.....	7"	8"	9"
Compound rest top slide travel.....	3 1/4"	5"	5 1/4"
Lathe tool—shank size for round tool post....	5/8" x 1 1/2"	3/4" x 1 1/2"	7/8" x 1 1/4"
Bed			
Width of bed.....	13 1/2"	17"	19 1/2"
Motor Data			
Main drive motor.....	10 H.P.	20 H.P.	20 H.P.
Note—Other motors applicable for special requirements.			
Shipping Data			
Net weight, with average accessory equipment, including all electrical equipment—base length.....	7,065 lbs.	9,890 lbs.	10,940 lbs.
Domestic shipping weight as above.....	7,465 lbs.	10,390 lbs.	11,480 lbs.
Net weight, each additional two feet.....	390 lbs.	430 lbs.	550 lbs.

The Series 62 Apron—a "control center" unique for its time-saving convenience.





DYNA-SHIFT LATHES SERIES 80



Heavy duty lathes are intended primarily for heavy stock removal from large work having considerable weight. But more than massive machine components and swing capacity are required. The basic consideration is almost always greater production, therefore lowered costs. This is obtainable in the Monarch Series 80 Heavy Duty Dyna-Shift—an ultra-modern machine which will remove more metal at any speed than is possible on any other heavy duty lathes. Maximum production results because the machine can be kept under full load during the entire cutting cycle. Major contributing factors are more machine output per unit of power input, less operator effort, reduced maintenance and ease of supervision.

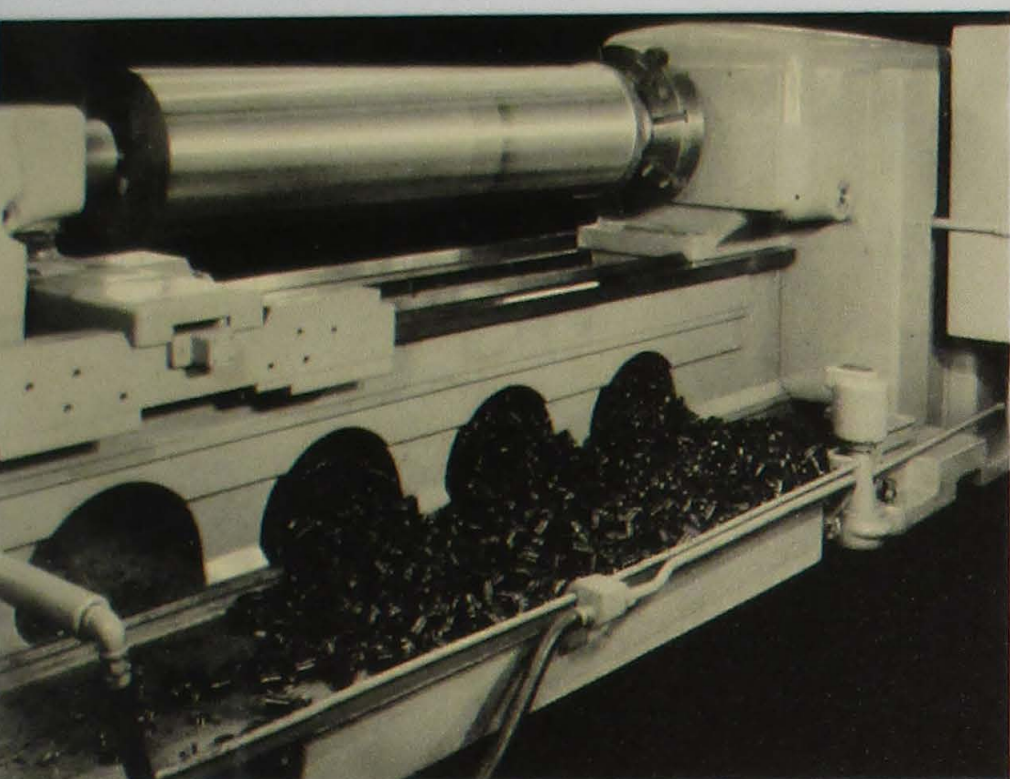
There are two separate Series 80 machines, each with its own properly proportioned bed. The Model 3220 is not a raised Model 2516 but an even heavier, more rugged design overall for optimum productiveness on work within its range.

Both machines use the Monarch Dyna-Shift Headstock, the “Headstock that Thinks”. The operator works only in terms of surface cutting speed, the machine automatically figures the correct R.P.M. and sets up the shift. The operator sets two dials—one for work diameter, the other for desired surface speed. The machine does the rest.

Here is a multi-feature machine that provides its user with a degree of cost reduction and operator convenience not found in any other lathe.

Principal Features

- Weight, power and proportions for metal removal limited only by the nature of the tool and the work piece.
- Design refinements, manufacturing and inspection standards to meet today's demands for precision output on large work.
- Automatic lubrication throughout.
- Four flame hardened and precision ground bed ways integral with the bed section.
- Electricals mounted externally.
- 36 speeds. From 10 to 1250 R.P.M. on the Model 2516, from 8 to 1000 R.P.M. on the Model 3220.
- Final work drive through powerful helical gears.
- Desired surface cutting speed automatically calculated; power shift from one speed to another.
- Free spindle and spindle jog accomplished quickly.
- Safety interlocks completely protect both machine and operator at all times.
- Fully enclosed gear box and end gearing.
- Four-way variable speed power rapid traverse to carriage and cross slide.
- Automatic disengagement of apron handwheel and cross feed dial during traverse; pick-up at same spot after traverse.
- Ruggedly proportioned tool slides.
- Massive tailstock provided with power positioning, and designed to permit setting compound parallel to bed ways.
- Chip flow to rear for easy removal, eliminating chip pan obstruction at front of machine.
- A complete line of tracer equipment and accessories.



Chip flow is to the rear for easy removal. No chip pan obstruction at front of machine.

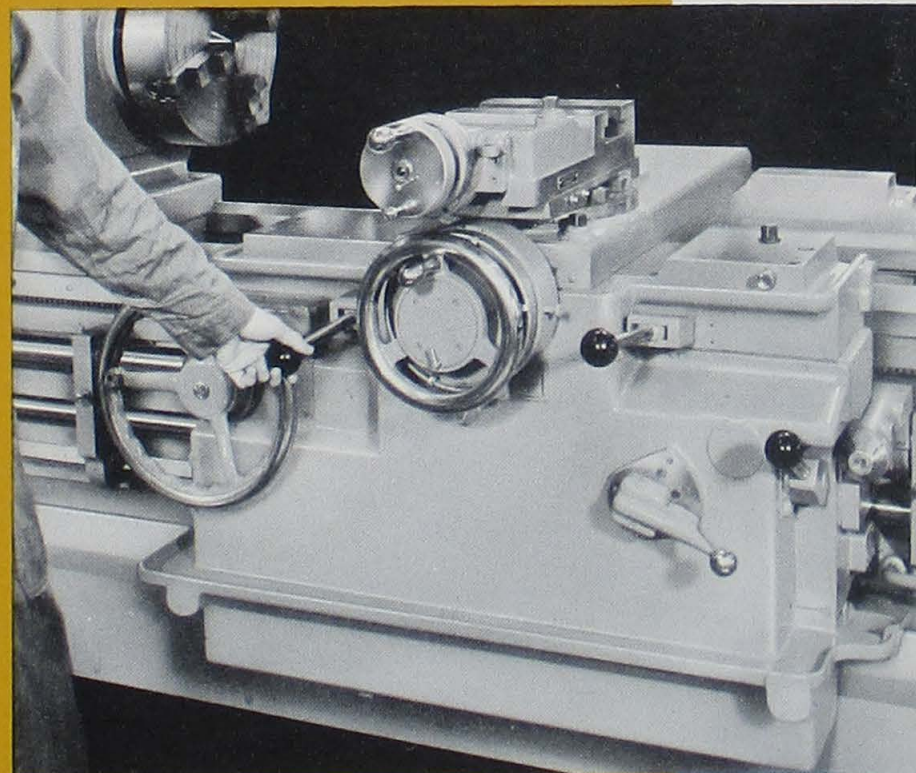
Speed changes can be made in seconds with no calculation necessary to obtain the correct spindle speed.



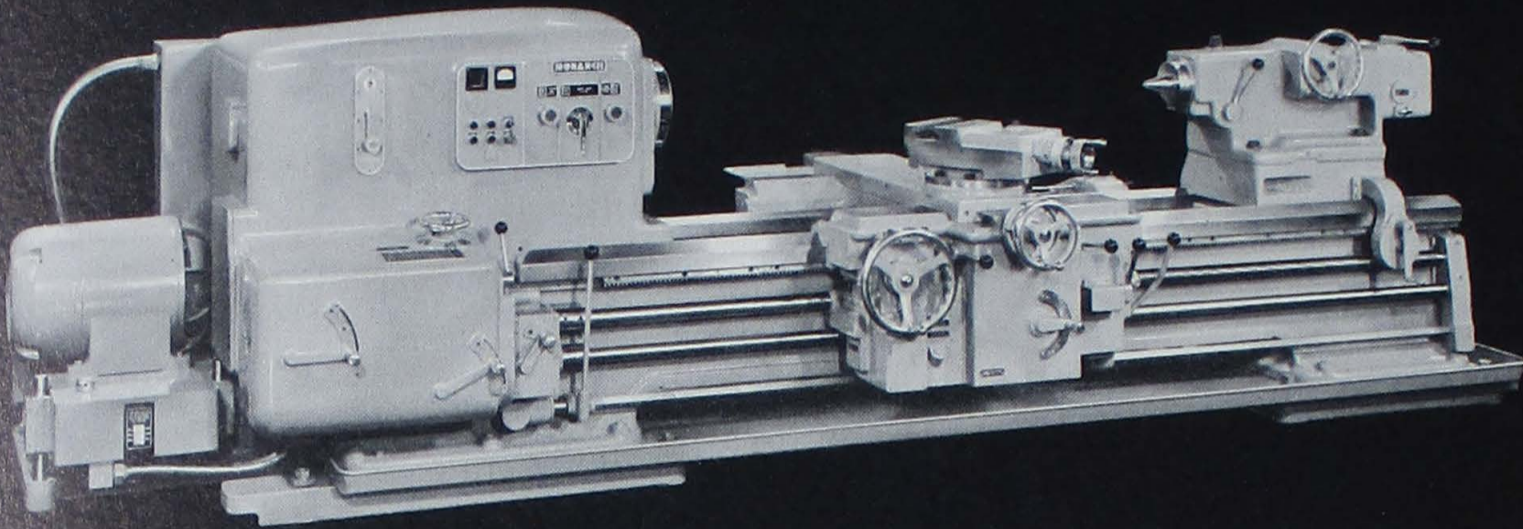
SPECIFICATIONS

	Model 2516	Model 3220
General		
Swing over bed and carriage wings.....	25"	32"
Swing over cross slide.....	16"	20"
Takes between centers, tailstock flush, base length.....	51"	55"
Length between centers in increments of 24".....	48" to 240"	48" to 240"
Distance, spindle center to floor with sum pan.....	43 3/4"	45 3/4"
Floor space, base length.....	72" W x 179" L	80" W x 190" L
Headstock		
Hole through spindle.....	3-1/16"	3-9/16"
Center, Morse taper.....	No. 6	No. 7
Spindle, American Standard taper.....	No. 350	No. 400
American standard Camlock spindle nose.....	8" D-1	11" D-1
Number of speeds.....	36	36
Spindle speed range.....	10 to 1250	8 to 1000
Gear Box		
Leadscrew diameter and threads per inch.....	2 1/4" — 2 thd.	2 1/4" — 2 thd.
Range of threads per inch, quick change.....	1/2 to 28	1/2 to 28
Range of feeds per revolution, quick change.....	.003 to .1683"	.003 to .1683"
Thread and feed changes, regular quick change.....	48	48
Tailstock		
Spindle diameter.....	5 1/4"	6 1/2"
Spindle travel.....	10"	11"
Spindle set-over.....	1/2" each direction	1/2" each direction
Carriage and Compound		
Carriage length.....	37-3/16"	42-11/16"
Carriage bridge width.....	11 1/4"	12 1/2"
Compound rest top slide travel.....	8"	7"
Size of lathe tool.....	1 1/2" x 1 1/2"	1 1/2" x 2"
Carriage power rapid traverse.....	0 to 200" per min.	0 to 200" per min.
Bottom slide power rapid traverse.....	0 to 100" per min.	0 to 100" per min.
Bed		
Width of bed.....	22"	26 1/2"
Depth of bed.....	22 3/4"	22 3/4"
Motor Data		
Main drive motor.....	30-40 H.P.	30-40 H.P.
Shipping Data		
Net weight with average accessory equipment including all elect. equipment—base length ..	17,250 lbs.	19,660 lbs.
Domestic shipping weight, as above.....	19,020 lbs.	21,460 lbs.

The only machine available with variable four-way hydraulic power rapid traverse.



DYNA-SHIFT LATHES SERIES 90



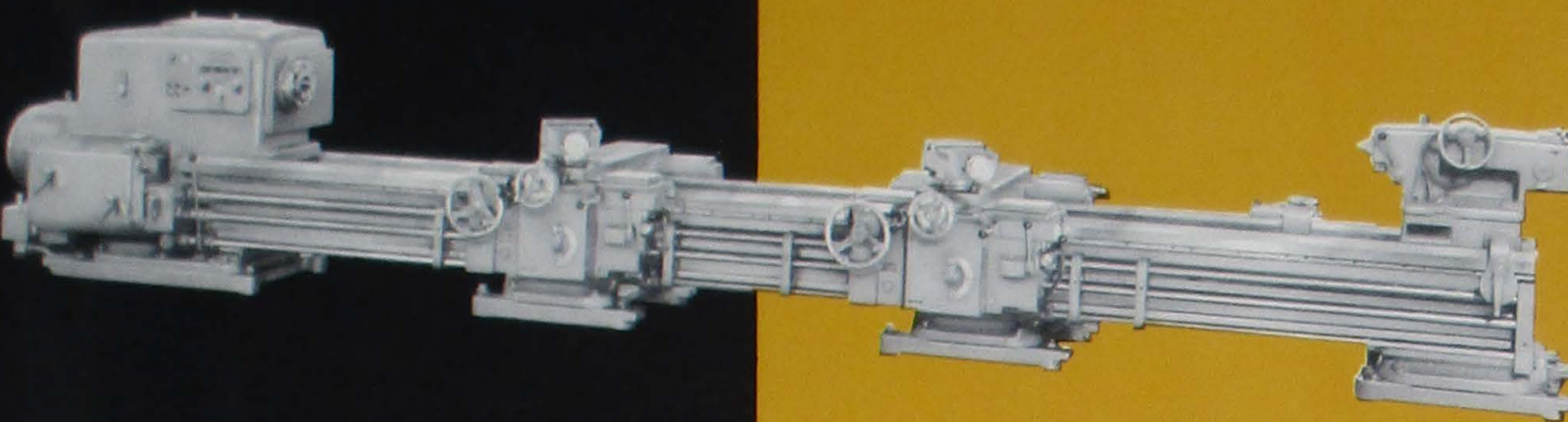
The new Monarch Series 90 Dyna-Shift Lathe is a distinctly different kind of metal turning machine. Old concepts of design have been cast aside. And with them have gone old concepts of performance. The result is a lathe offering a new approach to heavy duty turning, one that more than ever before allows carbide tooling to be used to its fullest advantage on work of considerable size.

Heart and soul of this machine is the exclusive Monarch Dyna-Shift drive headstock. With it any speed change may be made in seconds with it never being necessary for the operator to calculate the spindle speed (R.P.M.) from the work diameter and the desired surface speed (S.F.P.M.). All he needs to do is set the surface speed and set the work diameter indicator to the diameter to be turned. Quickly he gets the correct speed automatically, accurately, positively, and this speed is indicated for reference.

The Series 90 Dyna-Shift is offered in three models—all with either a 40 or a 50 H.P. main drive motor. Model 4025 swings 25" over the cross slide, 40" over the bed. Model 4025-31 swings 31" over the cross slide, 44" over the bed while Model 4025-36 swings 36" over the cross slide and 48" over the bed.

Principal Features

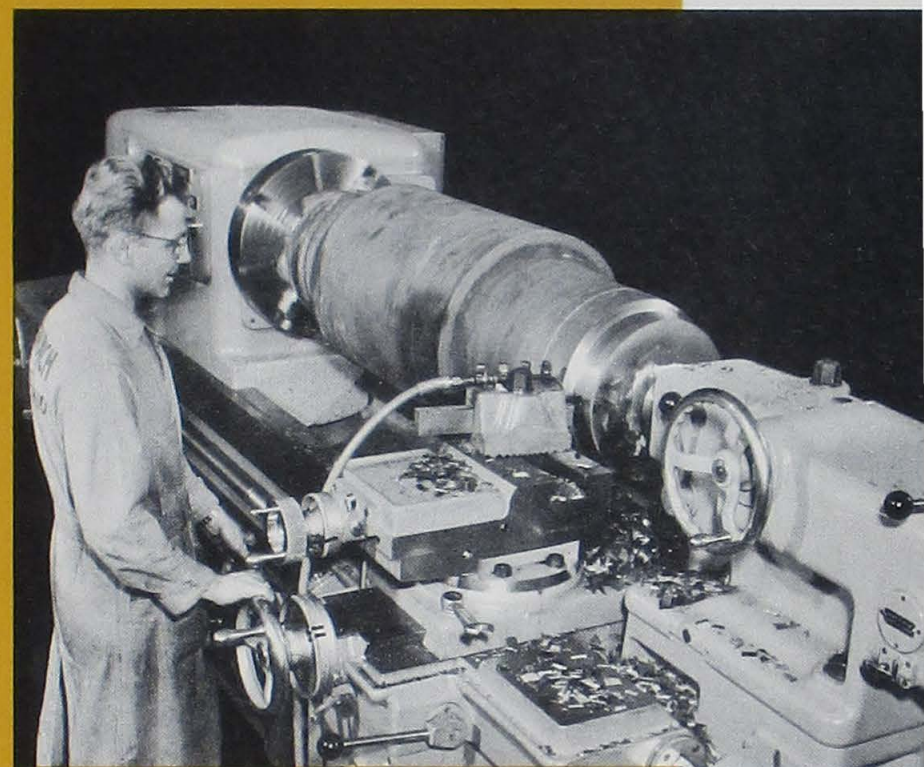
- Weight, power and proportions for metal removal limited only by the nature of the tool and the work piece.
- Design refinements, manufacturing and inspection standards to meet today's demands for precision output on large work.
- Automatic lubrication throughout.
- Four flame hardened and precision ground bed ways integral with the bed section.
- Electricals mounted externally.
- 36 speeds. From 6 to 750 R.P.M., a ratio of 1 to 125 on all three models. The Series 90 covers practically every heavy duty speed requirement.
- Final work drive through powerful helical gears.
- Desired surface cutting speed automatically calculated; power shift from one speed to another.
- Free spindle and spindle jog accomplished quickly.
- At no time is there a speed step-up in a gear pair which keeps gear speed down and minimizes both wear and efficiency loss.
- Safety interlocks completely protect both machine and operator at all times.
- Fully enclosed gear box and end gearing.
- Two-way power rapid traverse to carriage.
- Ruggedly proportioned tool slides.
- Massive tailstock designed to permit setting compound parallel to bed ways.
- A complete line of tracer equipment and accessories.



Extra long bed lengths are available for the Series 90—long enough to accommodate two carriages.

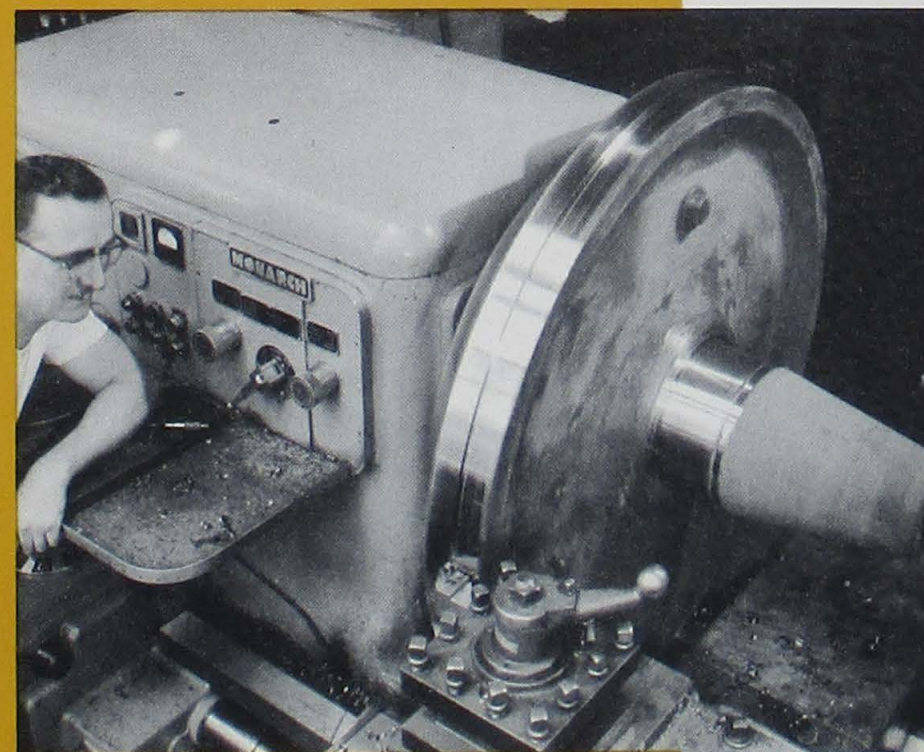
SPECIFICATIONS

	Model 4025	Model 4025-31	Model 4025-36
General			
Swing over bed and carriage wings	40"	44"	48"
Swing over cross slide	25"	31"	36"
Takes between centers, tailstock flush, base length	60"	60"	60"
Length between centers in increments of 24"	60" to 324"	60" to 324"	60" to 324"
Distance, spindle center to floor, with sump pan	50"	53"	55"
Floor space, base length	88" W x 202" L	88" W x 202" L	88" W x 202" L
Headstock			
Hole through spindle	4-1/16"	4-1/16"	4-1/16"
Center, Morse taper	No. 7	No. 7	No. 7
American standard Camlock spindle nose	11" D-1	11" D-1	11" D-1
Number of speeds	36	36	36
Spindle speed range R.P.M.	6 to 750	6 to 750	6 to 750
Gear Box			
Leadscrew diam. and threads per in.	2 1/2" — 2 thd.	2 1/2" — 2 thd.	2 1/2" — 2 thd.
Range of thds. per in., quick change	1/2 to 28	1/2 to 28	1/2 to 28
Range of feeds per rev., quick change	.0035" to .196"	.0035" to .196"	.0035" to .196"
Thread and feed changes, regular quick change	48	48	48
Tailstock			
Spindle diameter	7"	7"	7"
Spindle travel	12"	12"	12"
Spindle set-over	1/2" each direc.	1/2" each direc.	1/2" each direc.
Carriage and Compound			
Carriage length	47"	47"	47"
Carriage bridge width	14 1/2"	14 1/2"	14 1/2"
Compound rest top slide travel	7"	7"	7"
Size of lathe tool	1 1/2" x 2"	1 1/2" x 2"	1 1/2" x 2"
Carriage power rapid traverse	185" per min.	185" per min.	185" per min.
Bed			
Width of bed	31 1/2"	31 1/2"	31 1/2"
Depth of bed	26 1/2"	26 1/2"	26 1/2"
Taper Attachment			
Maximum taper per foot	6 1/2"	6 1/2"	6 1/2"
Maximum length at one setting	24"	24"	24"
Motor Data			
Main drive motor	40-50 H.P.	40-50 H.P.	40-50 H.P.
Shipping Data			
Net weight with average accessory equipment including all electrical equipment, base length	26,100 lbs.	26,900 lbs.	27,500 lbs.
Domestic shipping weight, as above	28,225 lbs.	29,025 lbs.	29,625 lbs.

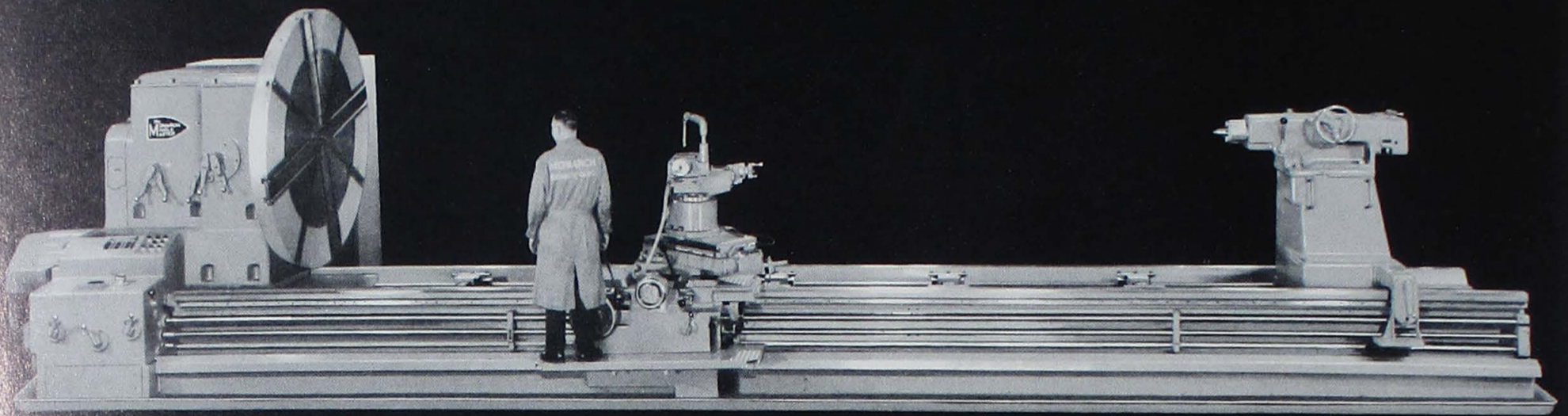


Above—note the depth of cut possible with a Series 90.

Below—large swings are no problem either.



MISSILE MASTER LATHES SERIES 170



The new Monarch Missile Masters are space age lathes. They are designed for the contour turning, boring and facing of missile components or other large thin-walled and fabricated parts. Typical missile work includes nose sections, nozzles, motor cases, bulkheads, air frame sections and hemispherical and elliptical domes. Other parts include large, thin-walled and fabricated parts as rolls, cylinders, spiders, jet engine components, valve gates and electrodes.

Certain basic characteristics are common to most of these. Contours are complex and must be machined to ultra-close tolerances and critical surface finishes. High strength alloys are usually employed and it is necessary always to cope with the problem of thin-wall sections. And finally, many of the components are so large that presently available tracer lathes lack the needed capacity.

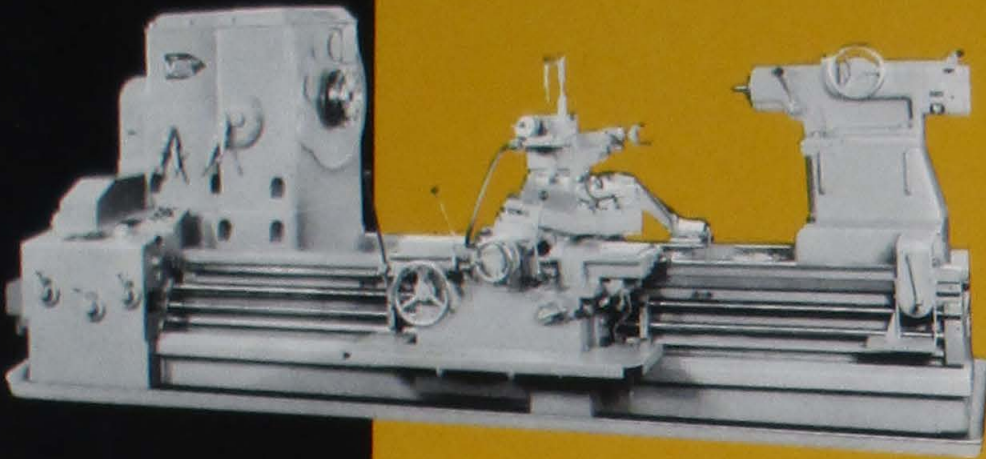
Design of the Missile Master is based on a meeting of these requirements plus a background of accumulated experience in the turning of many smaller missile parts. The machines are offered in 4 ft. increments up to 300" between centers. Although swing and between center capacity are considerable, it must be remembered that parts such as missile components, being thin-walled, are relatively light in weight. Heavy stock removal is not required. The 25 H.P. motor furnished, therefore, is more than adequate for all work for which the Missile Master is recommended.

Large diameter work pieces require low spindle speeds. This is achieved by the use of the time-proved Monarch face plate drive headstock, the importance of which cannot be overstressed where large diameter work must be handled. While it is true that the same low spindle speeds are secured both through the spindle drive and the face plate drive, long experience has shown that full delivery of power on large diameter work is secured only when the driving power is applied to the face plate far out from the work axis.

Speed range through the face plate drive is sufficiently wide to handle quite a diameter range. For example, assuming 150 surface feet per minute is the ideal for a given work piece, the surface speed may be maintained constant over a 19" to 71" diameter range, using only the highest spindle speed lever setting. Using any one of the other 7 lever settings gives an equally wide ratio over lower diameter ranges.

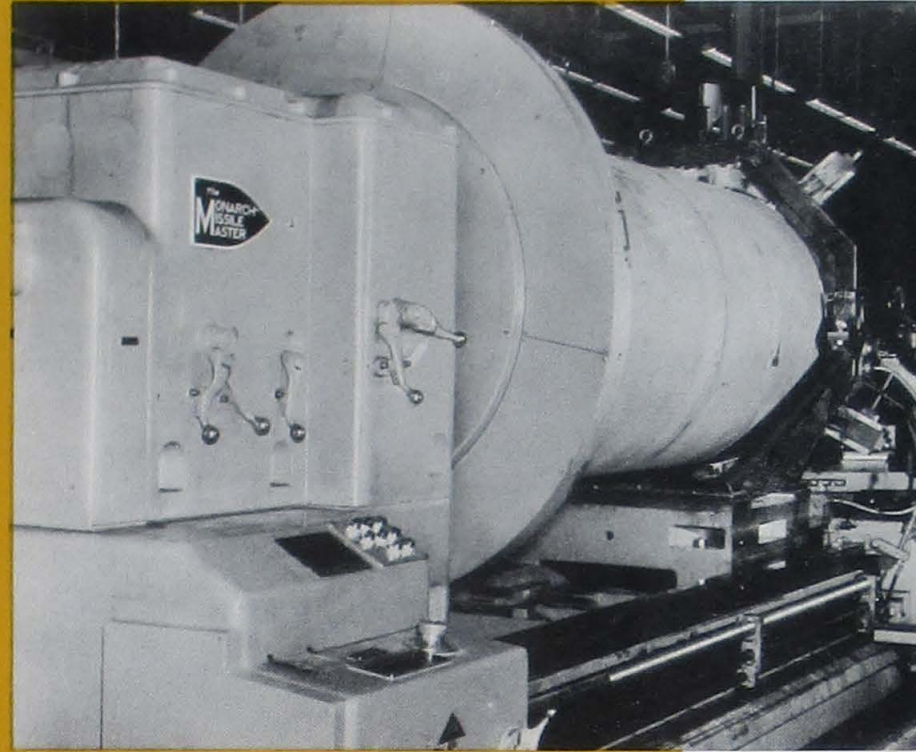
A swiveling type "Air-Gage Tracer" is used. In no other way can the complex shapes and the extreme contour range be handled efficiently. This method of tool control has been proved over the years by successful application to a wide variety of sizes and types of Monarch lathes. Always, it has provided the most accurate known method of reproducing the template form on the work piece.

The two Missile Master models are identical except that the Model 6750 has a smaller swing than does the Model 8567.



View of the Model 6750 Missile Master, recommended for work not requiring the swing of the Model 8567.

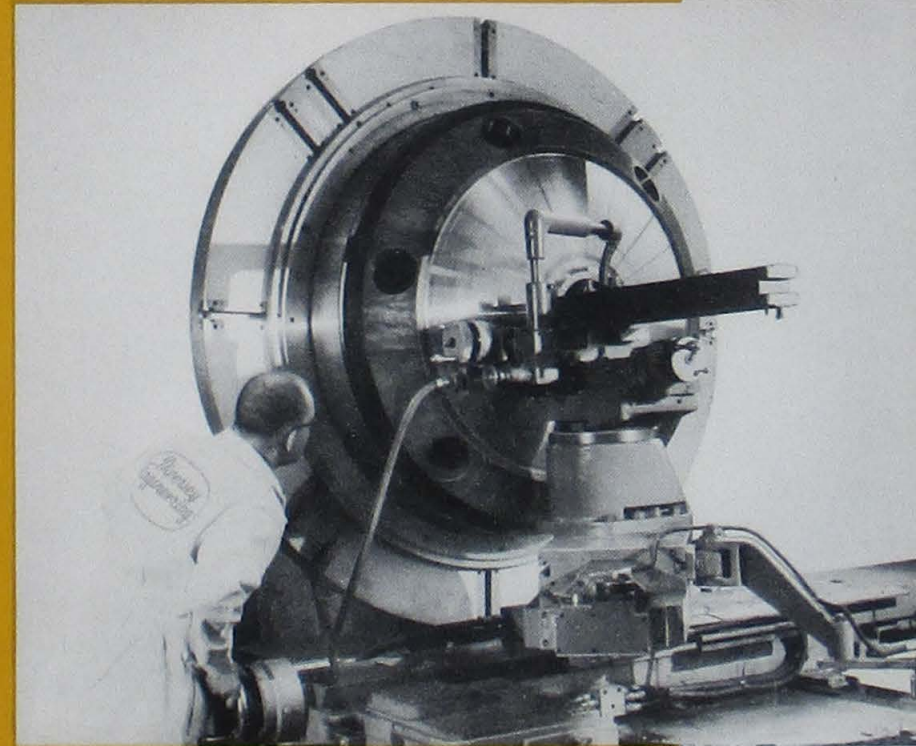
Machining a typical missile assembly on a Monarch Missile Master.



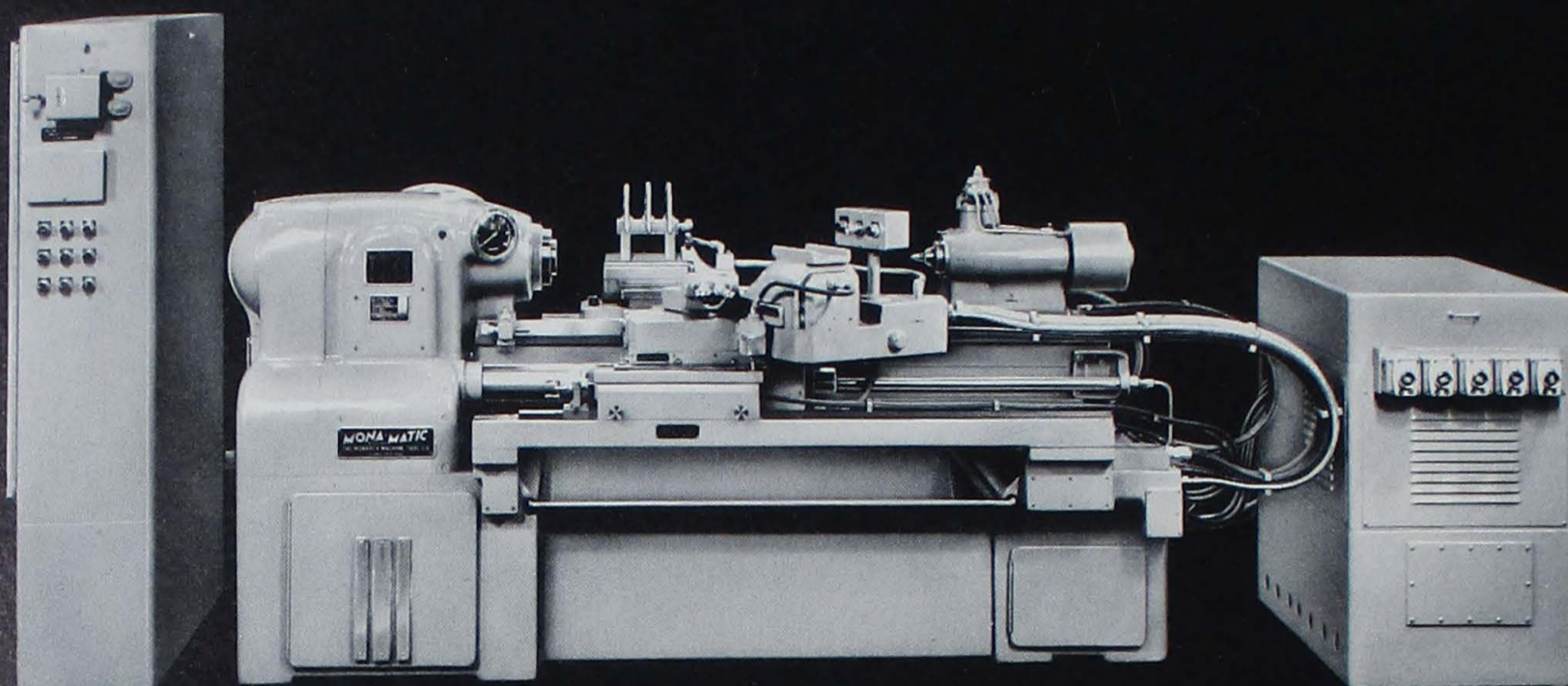
SPECIFICATIONS

	Model 6750	Model 8567
General		
Swing over bed	67"	85"
Swing over cross slide	50"	67"
Length between centers in increments of 48"	Up to 300"	Up to 300"
Headstock		
Hole through spindle	2-3/16"	2-3/16"
Center, Morse taper	No. 6	No. 6
Spindle nose, flanged type	15" A-1	15" A-1
Face plate diameter, standard	50"	50"
Number of spindle speeds, standard	24	24
Spindle speed ranges through spindle, standard D.C. drive	16	16
Spindle speed ranges through face plate drive, standard D.C. drive	8	8
Range of spindle speeds through spindle, standard D.C. drive	1/4 to 250 R.P.M.	1/4 to 250 R.P.M.
Range of spindle speeds through face plate drive, standard D.C. drive	1/4 to 30 R.P.M.	1/4 to 30 R.P.M.
Gear Box		
Leadscrew diameter and threads per inch	2 1/4" - 2 thd.	2 1/4" - 2 thd.
Thread and feed changes, regular quick change	48	48
Range of threads per inch, quick change	2 to 112	2 to 112
Range of feeds per revolution, quick change	.0007" to .0421"	.0007" to .0421"
Tailstock		
Spindle diameter	7 1/4"	7 1/4"
Spindle travel	12"	12"
Carriage		
Carriage length	54"	54"
Carriage bridge width	16"	16"
"Air-Gage Tracer"		
Stroke of "Air-Gage Tracer" slide	10"	10"
Maximum template width	35"	35"
Bed		
Width of bed	54"	54"
Motor Data		
Motor size	25 H.P.	25 H.P.

Air-Gage Tracing a missile dome which is another typical application of the Missile Master.



MONA-MATIC
MODEL 20-H



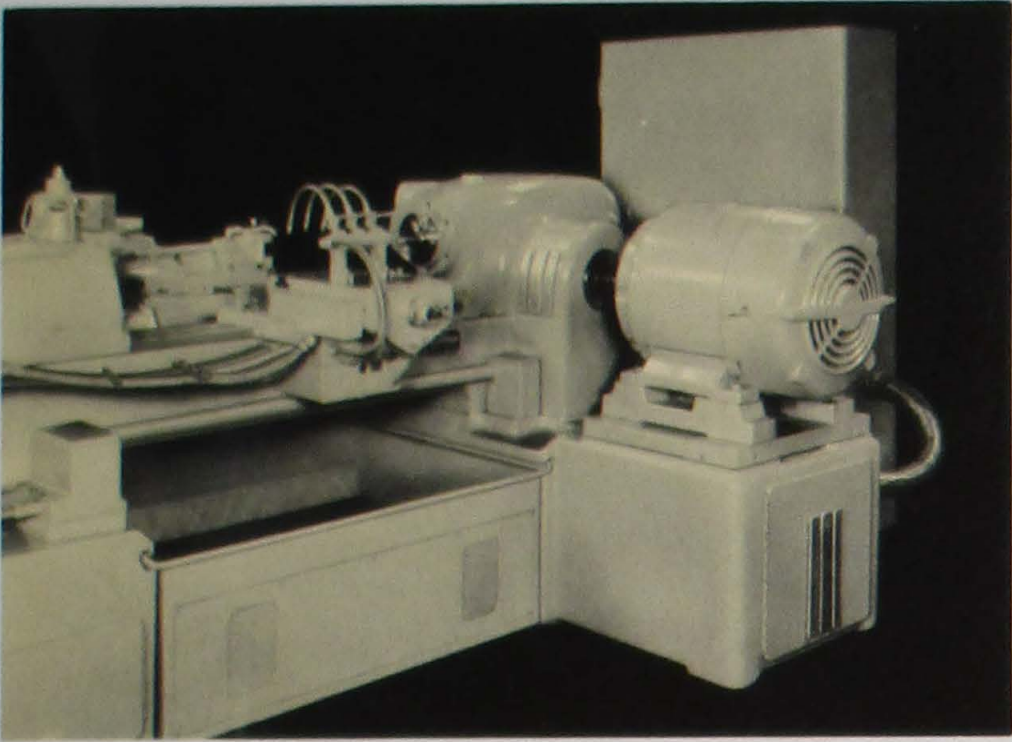
Automatic cycle metal turning has reached its highest development in the Monarch line of Mona-Matics. The Model 20-H is a low cost, high quality machine designed and constructed to provide only those features needed to reduce production costs.

Principal user advantages are (A) increased output, (B) lowered tooling costs, (C) less setup time, (D) greater accuracy, (E) time saved on succeeding operations, (F) greater versatility and (G) equal proficiency for large or small lots. Major design features include:

- "Air-Gage Tracer" system, which operates on the precision air-gaging principle, controls the hydraulically powered tool slide from a master template. Stylus pressure against the template is only 5 to 6 ounces, practically eliminating template wear. Accuracy of template shape is reproduced easily within $\pm .001"$. Flat templates are usually desirable but the machine can be arranged for round templates.
- Dual template control, furnished on most machines, employs two templates. A lathe so equipped performs both a roughing and a finishing operation on the work piece, automatically, in one continuous cycle.
- The "Air-Gage Tracer" slide is set at a 60° angle to the work axis, permitting rapid entry of the turning tool for undercut sections of the work piece and for grinding reliefs.
- Tool slide adjustment for diameter change is positive by means of a dial graduated to read directly in diameter. Regardless of extent or direction of change, length dimensions are not altered.
- Ample power and speed are available to utilize the full produc-

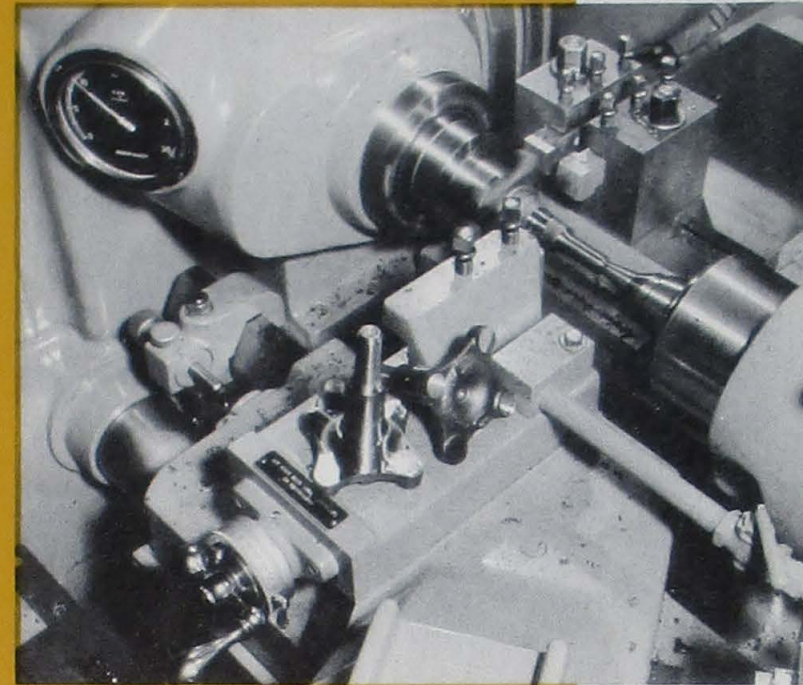
tiveness of carbide tooling as well as the new ceramics and titanium carbides.

- Turning cycle is completely automatic including the rear mounted facing and forming slide. The latter may be brought into the cycle any time during front carriage operation or at the conclusion of the cut. An optional boring cycle is also available.
- Hydraulic feed range of both slides is wide and infinitely variable . . . no need to use a feed that is a compromise. Extra-fast slide return helps reduce cycle time.
- Built-in automatic feed change provides up to four different front slide feeds, each of which may be made operative at any time during the cycle. They may be set at any point within their range to create the proper cutting condition demanded by change in depth of cut or finish requirement.
- Three spindle speed ranges are offered, the highest of these providing a speed up to 2760 R.P.M. A two-speed motor drive may be used advantageously where there is extreme diameter variation or when some portion of the cut requires an exceptionally low speed. Either motor speed may be made operative automatically at the proper point in the cycle.
- Rugged, rear mounted facing and forming slide, furnished for auxiliary machining operations, may be timed to take its cut as demanded by the nature of the work piece.
- Single lever on tailstock speeds work piece change. This is a multiple position lever which in proper sequence controls spindle travel and actuates the air operated chuck.
- Automatic lubrication; everywhere, all the time.
- All bed ways are flame hardened and precision ground for retention of built-in accuracy. Front tracer slide and rear slide way surfaces are also hardened.
- Chips and scale fall free of the slides, a real contribution to the maintenance of original accuracy.



View at rear of machine showing manner in which massive cabinet base at headstock end extends to rear for main drive motor mounting.

Turning a front wheel spindle. Tools on the facing and forming slide face both sides of flange.



SPECIFICATIONS

General

Swing over bed	15"
Swing over front slide	8"
Swing over rear slide	8"
Length between centers	18", 30", 42"
Distance, spindle center to floor	44"
Floor space, 18" length	72" W x 171" L
Floor space, 30" length	72" W x 183" L
Floor space, 42" length	72" W x 195" L

Headstock

Hole through spindle	2-3/16"
Center, Morse taper	No. 3
Spindle nose, flange type	6" A-1
Spindle speed ranges	155 to 900 R.P.M. 320 to 1850 R.P.M. 470 to 2700 R.P.M.

Tailstock

Spindle diameter	3 3/4"
Center, Morse taper	No. 3
Spindle travel	3 1/2"

Front Carriage and Slide

Infinitely variable feed range	1" to 40" per minute
Traverse rate	200" per minute

Air-Gage Tracer

Maximum diameter change at one setting	5 1/4"
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Rear Carriage and Slide

Infinitely variable feed range	1/2" to 40" per min.
Traverse rate	90" per minute
Maximum tool slide travel, in or out	5 1/2"
Width of tool slide	10 1/2"

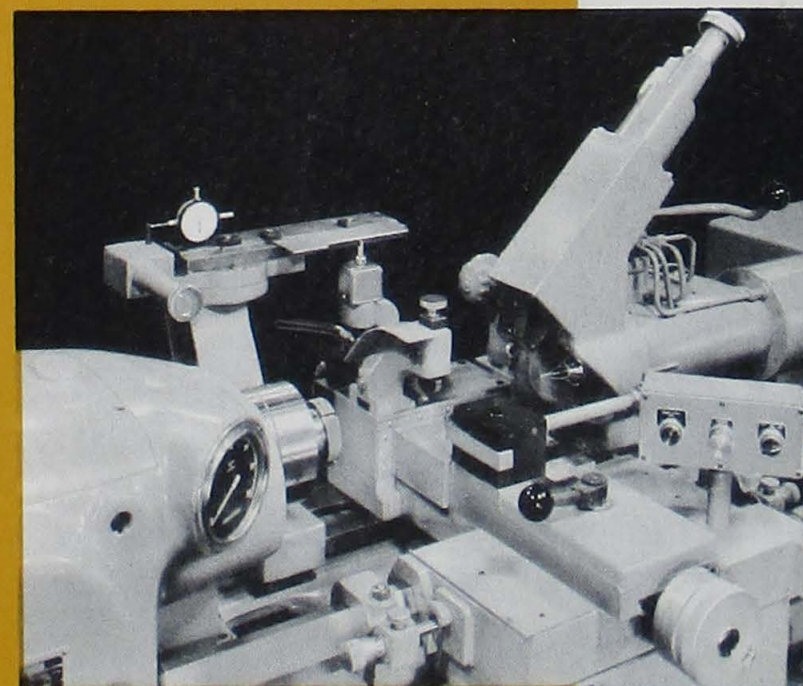
Motor Data

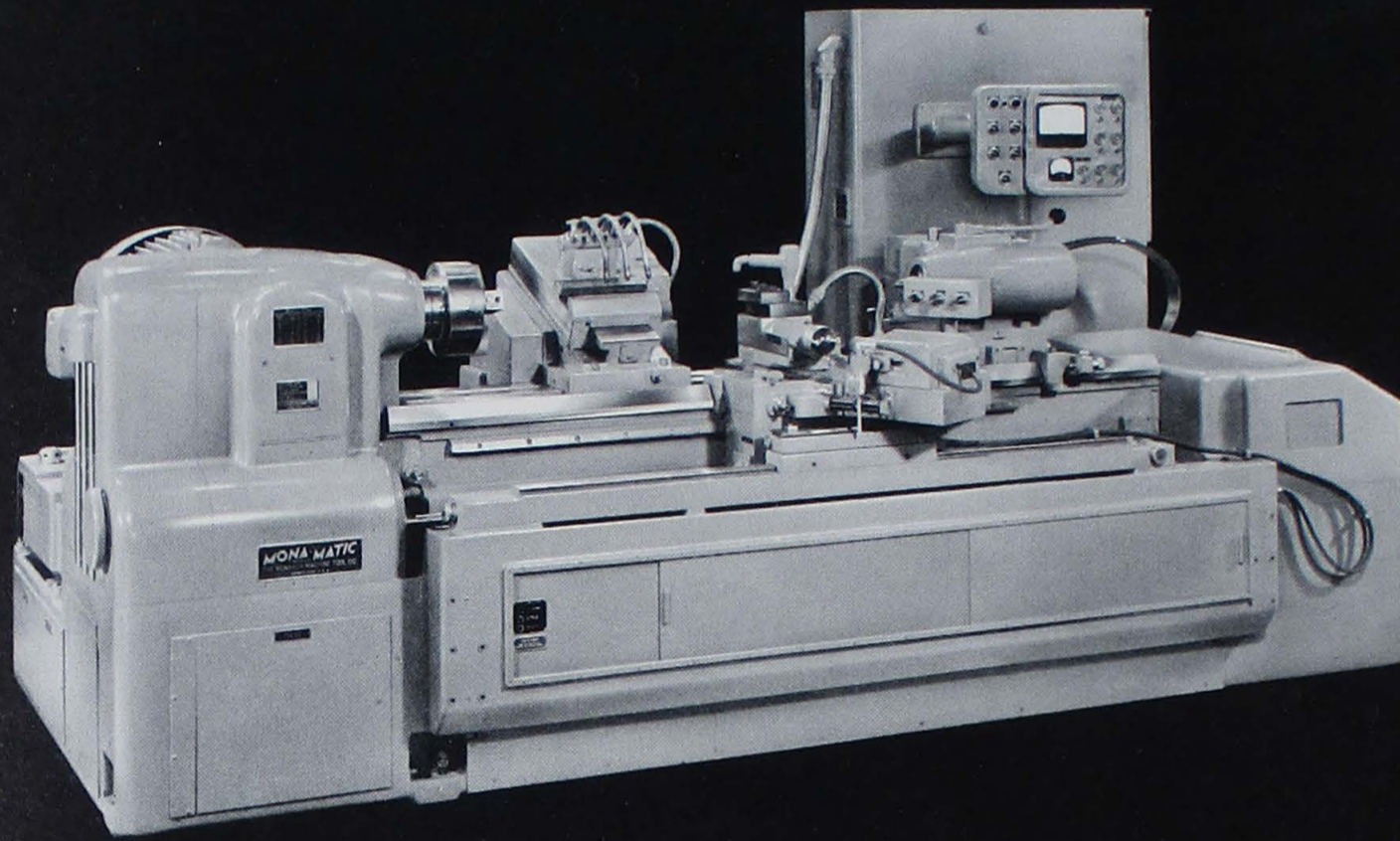
Work drive motor	20 H.P.
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Shipping Data

Net weight with average accessory equipment and including electrical equipment—base length	10,200 lbs.
Domestic shipping weight, as above	11,000 lbs.

Special adaptation of the Model 20-H for the high production turning of twist drill blanks.





The most effective production metal turning machine on the market today . . . the Monarch Model 21 Mona-Matic incorporates features not found heretofore on any lathe.

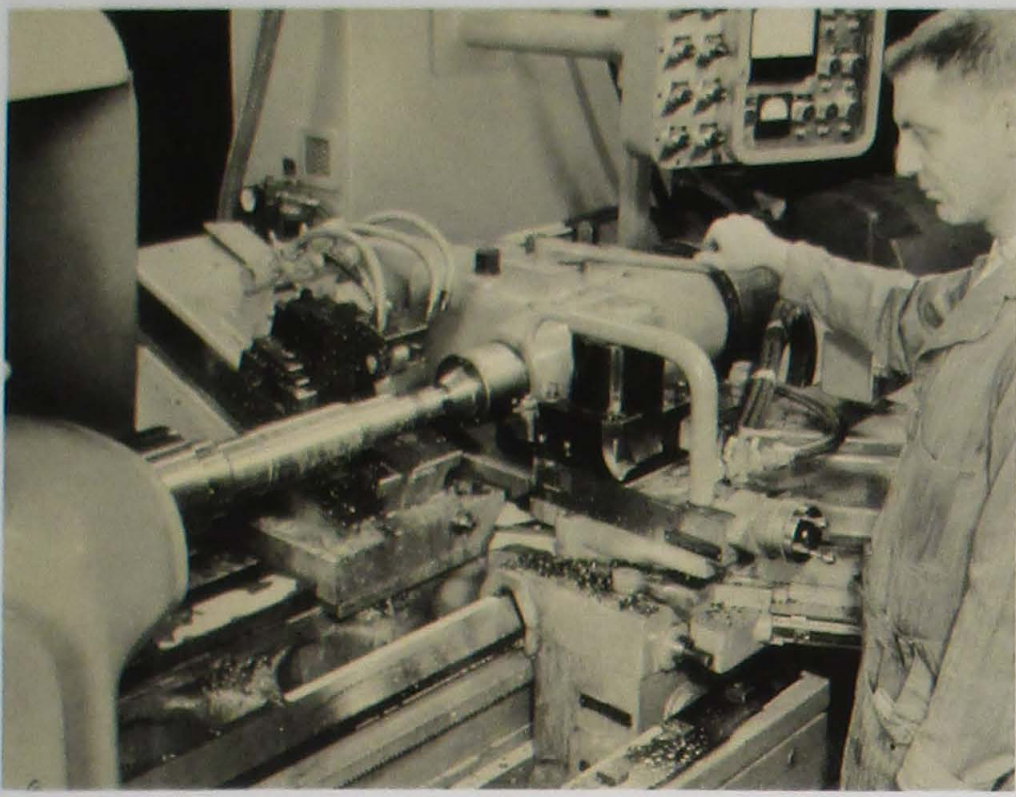
Yet, many of its basic principles of operation have been tried and proved on numerous production lines. The records established by previous models have brought widespread acceptance of cost reducing mass production turning based on the use of a tracer controlled, single point, front running tool. Add to this the accuracy of performance inherent in the Monarch "Air-Gage Tracer", plus a rear carriage with tools for facing and forming cuts and you have an unbeatable combination for both large and small lot output. These time-proved features have been carried over into the Model 21.

Many additional advantages, however, await the user of this lathe. As with all other Mona-Matics, it's an automatic cycle machine but the addition of the multi-cycle programmer gives it a cycle versatility never approached before. Cycle variation, generally required when changing from one job to another is accomplished in a matter of minutes.

Still another feature is the possibility of securing multiple cuts over a work piece, all as a part of the automatic cycle. This adds tremendously to the productiveness of the Model 21 as there is no reasonable limitation on the amount of stock the machine is capable of removing.

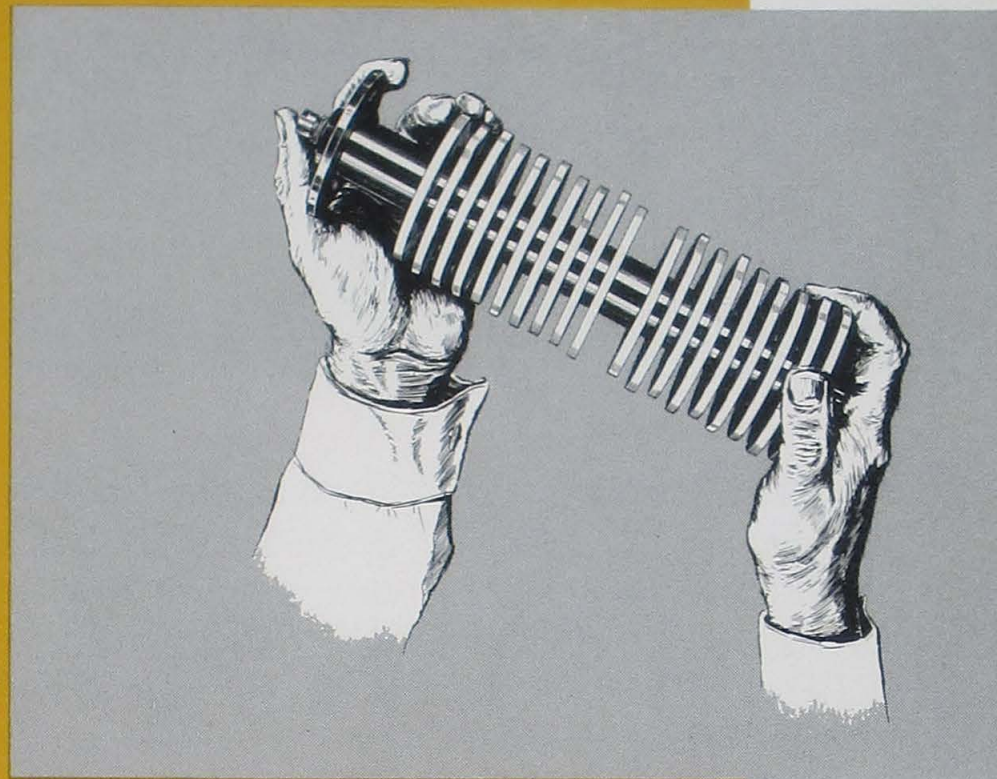
Principal Features

- All users of lathes such as the Mona-Matic would not have the same turning requirements. For that reason the machine is offered in four basic cycles, a four cut, a three cut, a two cut, and a one cut cycle, as required by the work to be done. All cycles are fully automatic.
- Many Model 21 Mona-Matics are supplied with a two speed main drive motor, which is optional and recommended. This is desirable for the purpose of introducing speed variation automatically in order to secure better cutting tool efficiency over the entire machining cycle.
- Chiefly responsible for the unusual versatility of the Model 21 Mona-Matic is the multi-cycle programmer. Within the limitation of the number of cuts provided by the cycling of the basic machine, the multi-cycle programmer makes it possible to secure cycle variations with unbelievable speed. No changes have to be made in any of the circuitry; merely by changing the programmer.
- Accuracy of template reproduction is one of the outstanding virtues of the Air-Gage Tracing method. Stylus pressure against the template is only five or six ounces. This, plus the very fast feed movement, causes reaction in the power cylinder within a few thousandths of a second after the stylus changes position.
- As all feeds are infinitely variable within a wide range, the exact feed needed for top efficiency on every cut can be secured. Never need a compromise feed be used. Power for front carriage feed and rapid traverse in either direction is supplied by a single, electronically controlled, fan cooled motor housed in the front gear box compartment.
- On the Model 21 equipped with optional constant surface cutting speed, the speed is automatically controlled by the movement of the tracer slide through gearing and a cam. Use of the constant surface cutting speed feature in no way interferes with the normal functioning of the multi-cycle programmer. Regardless of the number of cuts in the cycle or the nature of the cycle, speed is varied automatically as there is variation in the distance between the point of the cutting tool and the work axis.

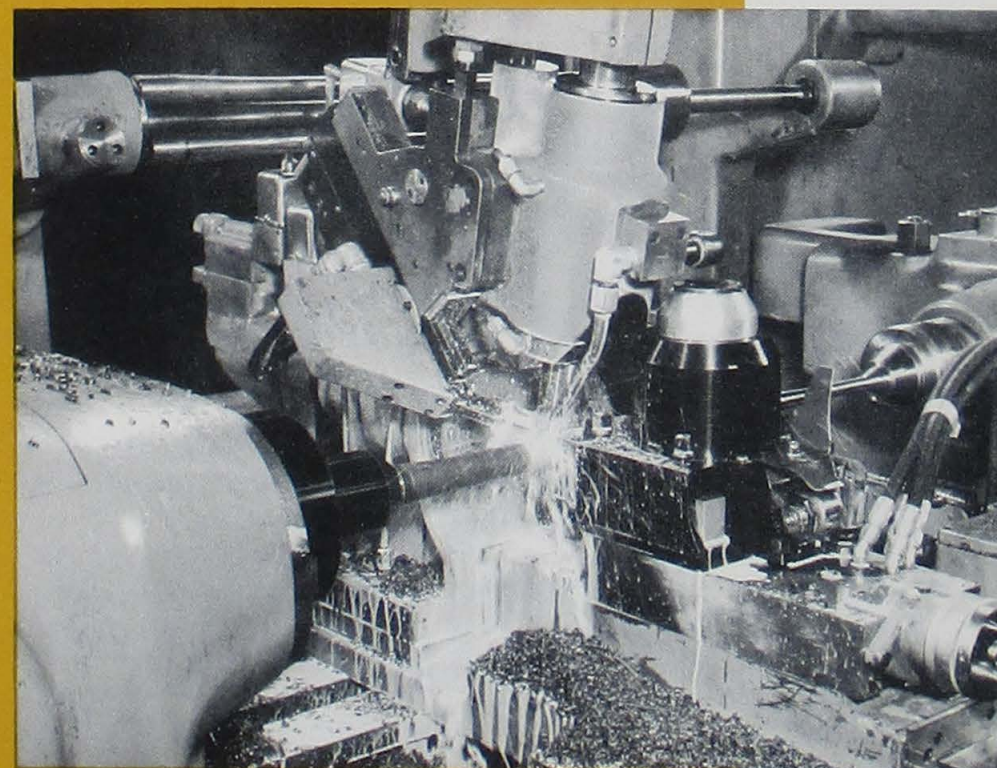


View showing another Mona-Matic plus value. Thread rollers mounted on the facing and forming slide perform a precision thread rolling operation after turning and during traverse return of carriage.

The Multi-Cycle Programmer. When a cycle change is necessitated by a new job, the proper programmer can be interchanged quickly with one previously used.



Turning a rifle barrel with ultra-precision and speed.



SPECIFICATIONS

General

Swing over bed	20"
Swing over front slide	9"
Swing over rear slide	4½"
Swing in front of rear slide	9"
Length between centers	18", 30", 42", 54"
Distance spindle center to floor	45½"
Floor space, 18" length	78" W x 116" L
Floor space, 30" length	78" W x 128" L
Floor space, 42" length	78" W x 140" L
Floor space, 54" length	78" W x 152" L

Headstock

Hole through spindle	2-3/16"
Spindle bore, Morse taper	No. 6
Center, Morse taper	No. 3
Spindle nose, flange type	6" A-1
Spindle speed ranges	160 to 920 R.P.M. 328 to 1880 R.P.M. 480 to 2760 R.P.M.

Tailstock

Spindle diameter	4½"
Center, Morse taper	No. 4
Spindle travel (air operated type)	3½"

Front Gear Box

Infinitely variable feed range	2½" to 30" per minute
Traverse rate	175" per minute

"Air-Gage Tracer"

Maximum diameter change at one setting	6"
Size of lathe tool	1½"

Rear Carriage and Slide

Infinitely variable feed range	½" to 15" per minute
Traverse rate	110"
Maximum tool slide travel, in or out	4"
Width of tool slide	10½"

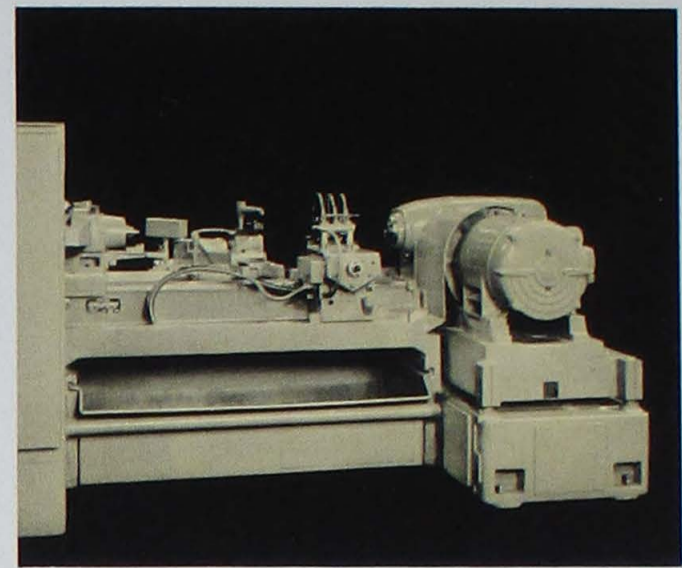
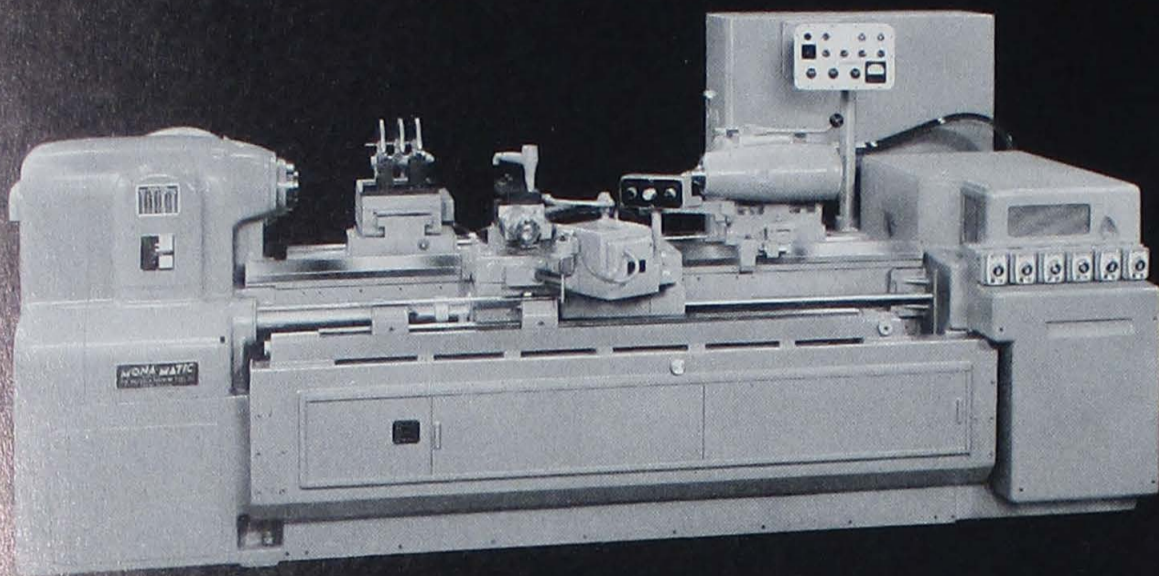
Motor Data

Work drive motor	30 H.P.
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Shipping Data

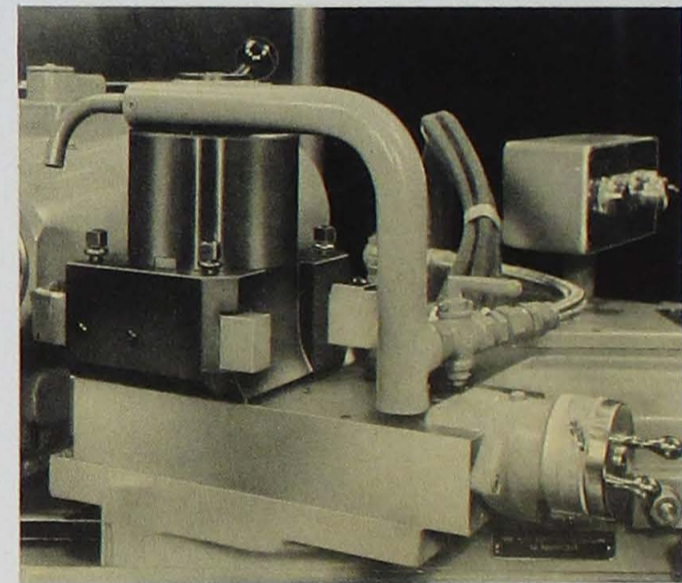
Net weight with average accessory equipment and including electrical equipment—base length	12,400 lbs.
Domestic shipping weight, as above	13,085 lbs.

MONA-MATIC
MODEL 21-H



Above—Rear view of the 21-H Mona-Matic.

Below—Productiveness of the Model 21-H is often improved by the application of such optional accessory equipment as this automatic, two-position indexing turret.



The Monarch Model 21-H is a low cost, high production machine basically the same as the Model 21 described on the previous two pages. The same choice of four automatic cycles is available, and the "Air-Gage Tracer" is also included. However, feeds are hydraulically controlled on the 21-H rather than under electronic control as on the Model 21. Other important features of the 21-H are:

- Turning cycle is completely automatic including the rear mounted facing and forming slide. The latter may be brought into the cycle any time during front carriage operation or at the conclusion of the cut.
- Built-in automatic feed change provides four different front slide feeds. They may be set at any point within their range to create the proper cutting condition demanded by change in depth of cut or finish requirement.
- Three spindle speed ranges are offered, the highest of these providing a speed up to 2760 R.P.M. A two-speed motor drive may be used advantageously where there is extreme diameter variation or when some portion of the cut requires an exceptionally low speed.
- Rugged, rear mounted facing and forming slide, furnished for auxiliary machining operations, may be timed to take its cut as demanded by the nature of the work piece.
- Single lever on tailstock speeds work piece change. This is a multiple position lever which in proper sequence controls spindle travel and actuates the air operated chuck.
- All bed ways are flame hardened and precision ground for retention of built-in accuracy. Front tracer slide and rear slide way surfaces are also hardened.
- Chips and scale fall free of the slides, a real contribution to the maintenance of original accuracy.

SPECIFICATIONS

General

Swing over bed	20"
Swing over front slide	9"
Swing in front of rear slide	9½"
Length between centers	18", 30", 42", 54"
Floor space, base length	78" W x 116" L

Headstock

Hole through spindle	2-3/16"
Spindle bore, Morse taper	No. 6
Center, Morse taper	No. 3
Spindle nose, flange type	6" A-1
Spindle speed ranges	160 to 920 R.P.M. 328 to 1880 R.P.M. 480 to 2760 R.P.M.

Tailstock

Spindle diameter	4½"
Center, Morse taper	No. 4
Spindle travel (air operated type)	3½"

Front Carriage and Slide

Infinitely variable feed range	1" to 40" per minute
Traverse rate	200" per minute

Rear Carriage and Slide

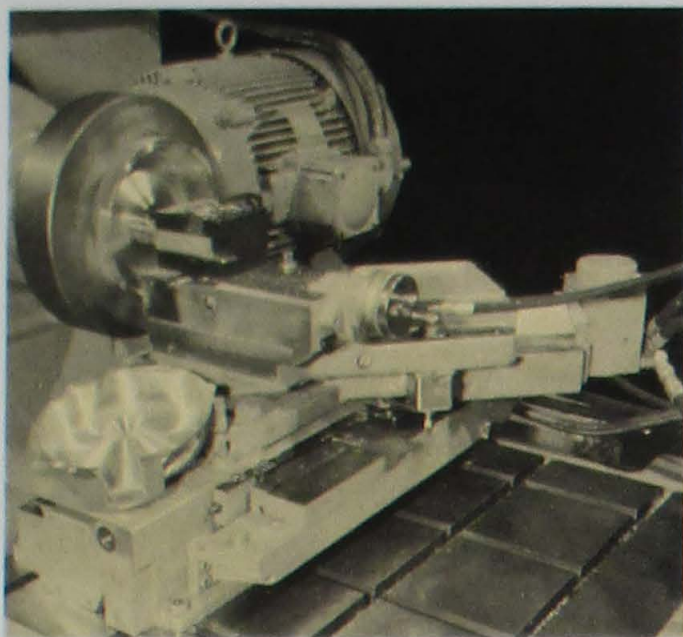
Infinitely variable feed range	½" to 20" per minute
Traverse rate	90" per minute

Motor Data

Work drive motor	30 H.P.
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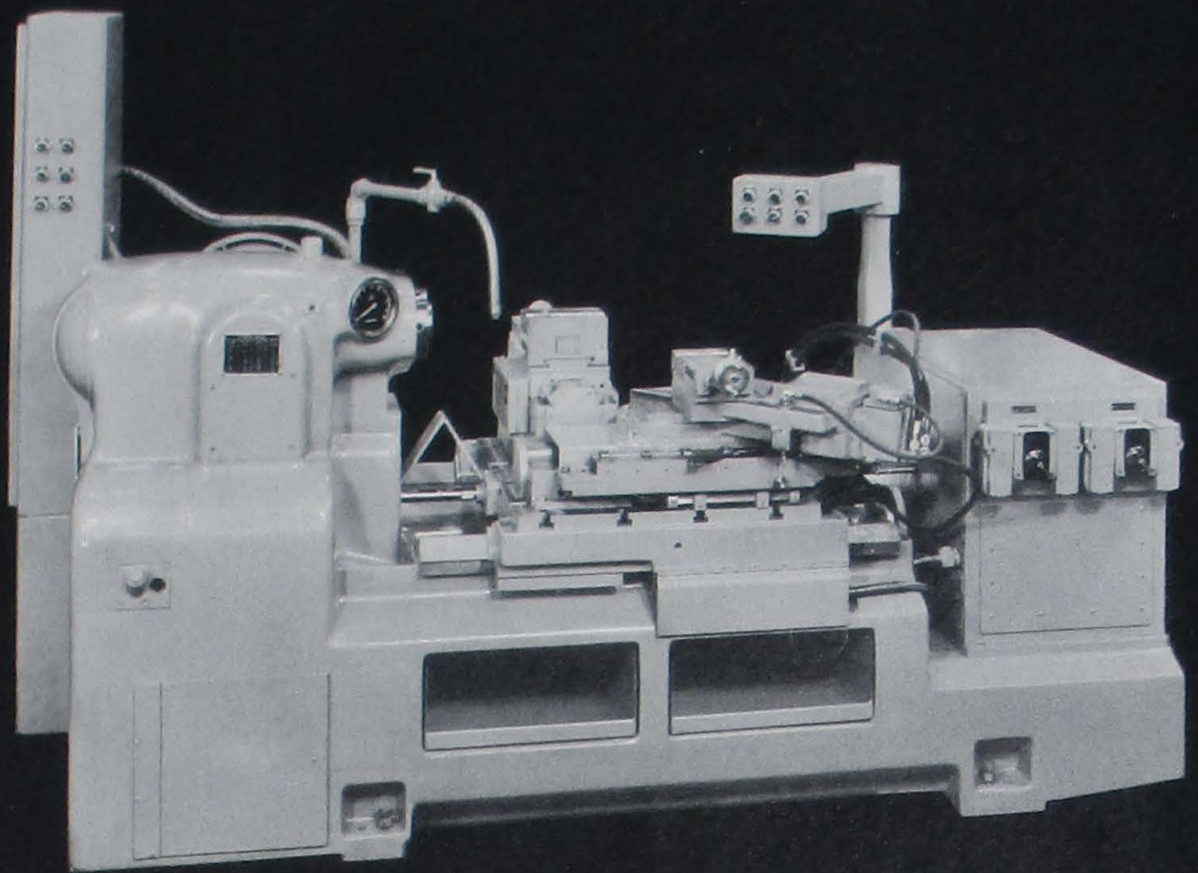
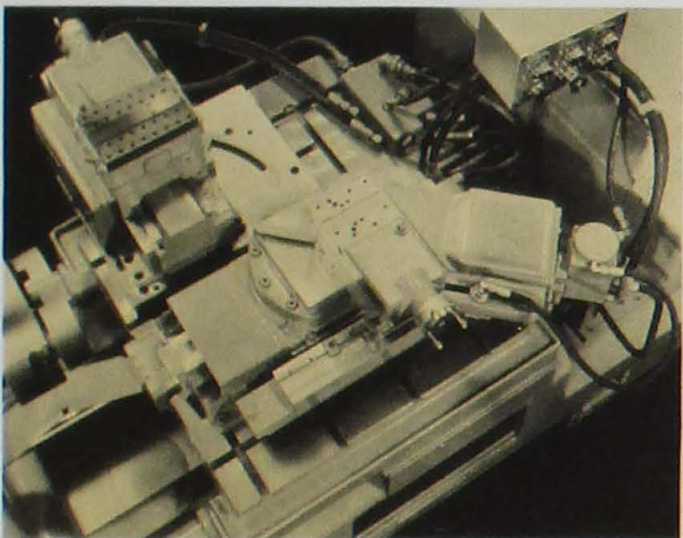
Shipping Data

Net weight with average accessory equipment and including electrical equipment—base length	16,695 lbs.
Domestic shipping weight, as above	17,420 lbs.



Above—turning a meter housing with front slide unit crosswise on platen.

Below—top close-up view showing multiple slide arrangement.



The Hydra-Slide is an exceptionally versatile, high production chucking lathe for both first and second operation work. Chief characteristic is a fully automatic cycle which controls practically any desired combination of four different hydraulic slide movements. Once the Hydra-Slide is set up with the most efficient feeds established, automatic cycling assures continuous, maximum output.

Principal Features

- Basic unit on most of these lathes is a hydraulically operated front slide on which is mounted the well-known Monarch "Air-Gage Tracer." A hydraulically operated rear slide is provided with automatic, hydraulic tool relief. Both the front and rear slides are mounted on a platen with fast hydraulic movement to expedite work piece change.
- The "Air-Gage Tracer" slide may be set at a 30°, 45° or 60° angle. Upon removal of the rear slide from the platen, the entire front slide unit may be positioned crosswise on the platen, a particularly advantageous set-up when contour facing a large diameter. Rear slide may be swiveled on its ground base between a 90° and a 45° angle to the work center line.
- All-electric controls are provided for effortless operation and set-up. Versatility of the machine is such that the automatic cycle may be set up quickly using both the front and rear slides, the front slide only or the rear slide only. The front slide may be made to complete its cut prior to the start of the rear slide cut or vice versa.
- The "Air-Gage Tracer" slide, front slide and rear slide ways are flame hardened and precision ground. When the feed is against a stop, as in the case of the platen and rear slide, a positive type stop is used for the ultimate in accuracy of operation.
- Two large chip pans in the base may be pulled out at the rear of the machine for ease of chip removal. Design is arranged in such a manner that a chip conveying system may be applied optionally.

SPECIFICATIONS

General

Swing over front slide unit with "Air-Gage Tracer".....	15"
Swing over rear slide unit with slide set at 90° to spindle.....	13"
Floor space.....	72" W x 117" L

Headstock

Hole through spindle.....	2-3/16"
Spindle bore, Morse taper.....	No. 6
Spindle nose, flange type.....	6" A-1
Spindle speed ranges.....	155 to 900 R.P.M. 320 to 1850 R.P.M. 470 to 2700 R.P.M.

Platen

Length of stroke.....	12"
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Front Slide

Length of stroke.....	9"
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"Air-Gage Tracer" Slide

Length of stroke.....	5"
Slide settings.....	30°, 45° or 60°

Rear Slide

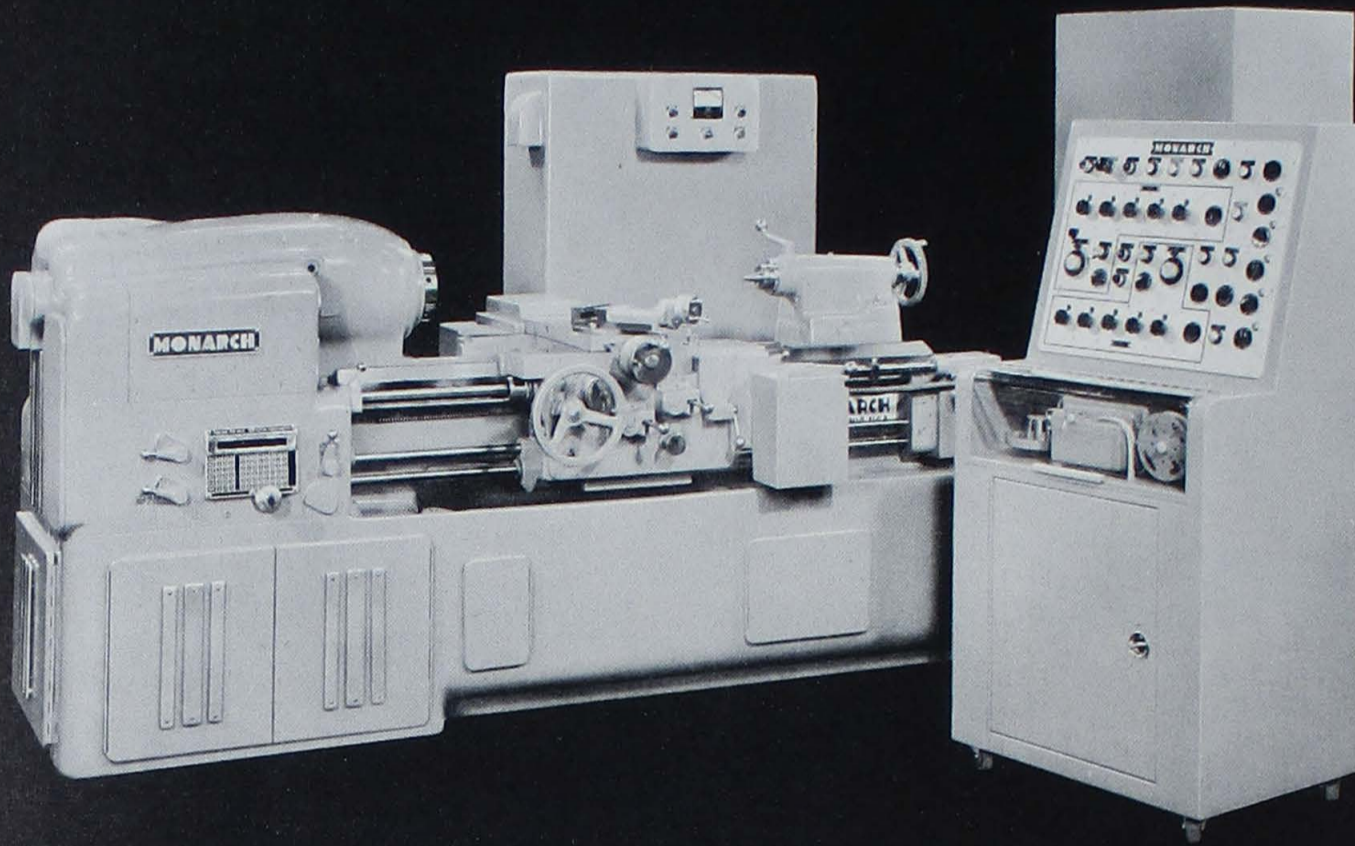
Length of stroke.....	4"
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Motor Data

Work drive motor.....	15-20 H.P.
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Shipping Data

Net weight with average accessory equipment and including all electrical equipment.....	9,850 lbs.
Domestic shipping weight, as above.....	10,635 lbs.



Where lathes are concerned, the economical application of Numerical Control depends on two factors:

1. *The number of individual jobs to be run.*
2. *The allowable time lag between completion of drawings and completion of machining.*

Are your problems a multiplicity of turning jobs and lightning-fast conversion of drawings into finished work pieces? If the answer is "yes", let's explore the possibilities. Here is one application:

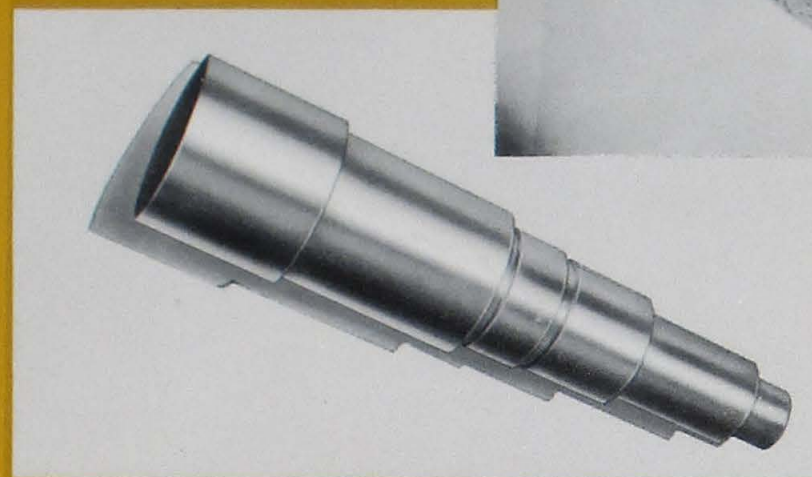
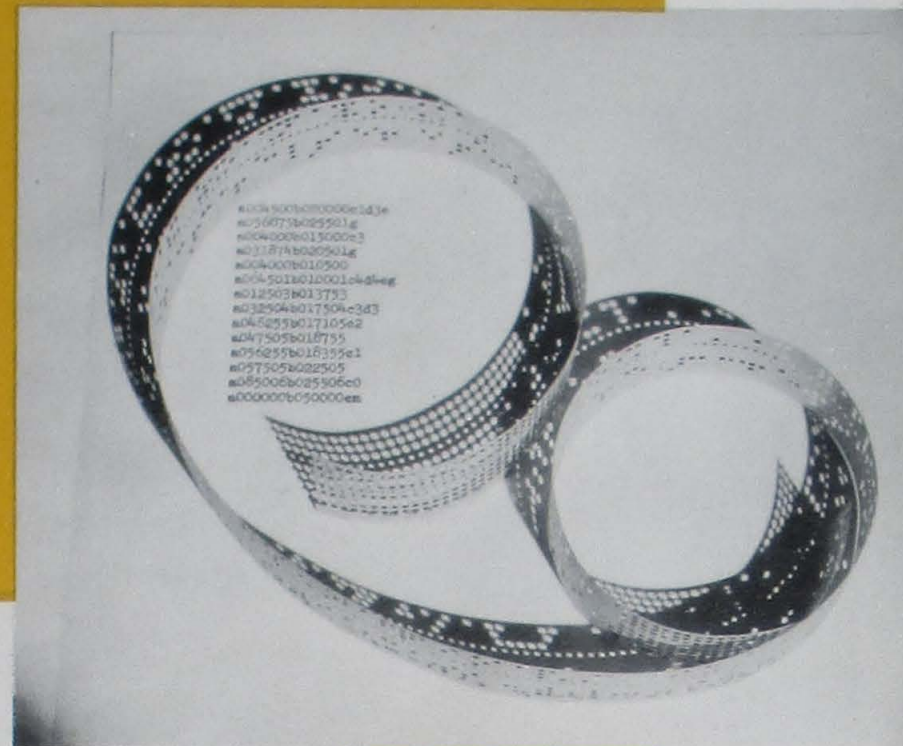
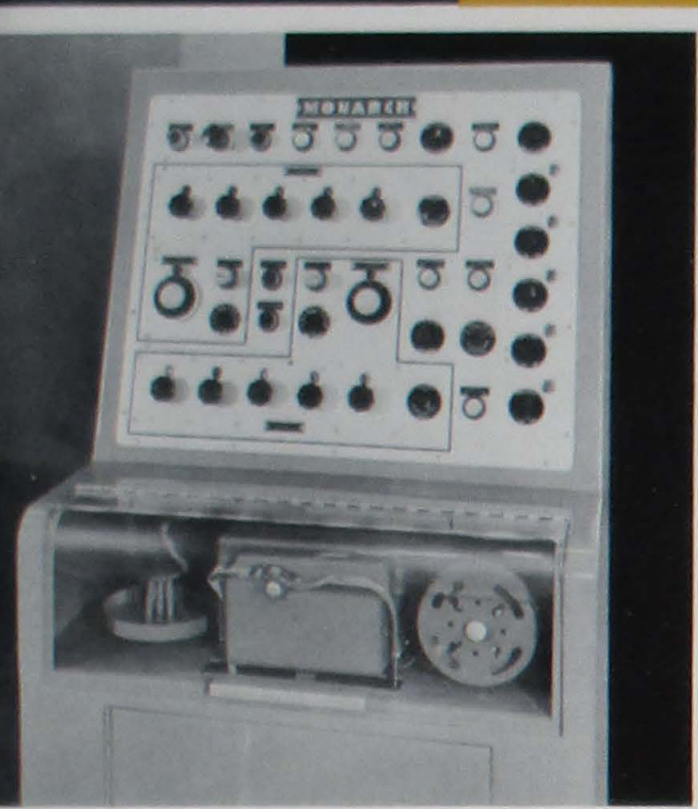
The Series EE, Model 1000

Positioning controls for turning, facing and boring are available on the versatile Monarch Series EE, Model 1000 Lathe. A console, located convenient to the operator, provides numerical control through a modified General Electric Mark II unit. All of the lathe's regular control features have been retained, making the machine adaptable to conventional manual operations in a few seconds time.

Data input is from standard 8 channel, 1" wide punched paper tape, prepared on a Flexowriter. A programmer sets up information which is punched on the tape in block form. Each block directs the dimension the carriage must move from the zero point, as well as the diameter information for movement of the cross slide. Feed rates are set up as well as spindle speeds and other auxiliary functions.

When the tape is read on the tape reader in the control console, the information is interpreted in the director cabinet and remains in memory until the proper carriage and cross slide positions are obtained. Feedback units on the carriage and cross slide signal the director when the commanded position has been reached.

The versatility of the Series EE Model 1000 is particularly adapted for numerical control as this lathe has four infinitely variable speed ranges which are power selected. Tape commands can select any of these ranges and, through five manually set potentiometers controlling the drive motor speed, can select any one of five speeds for a given cycle. The infinitely variable 15 H.P., D.C. main drive motor gives speeds from 20 to 2000 R.P.M.



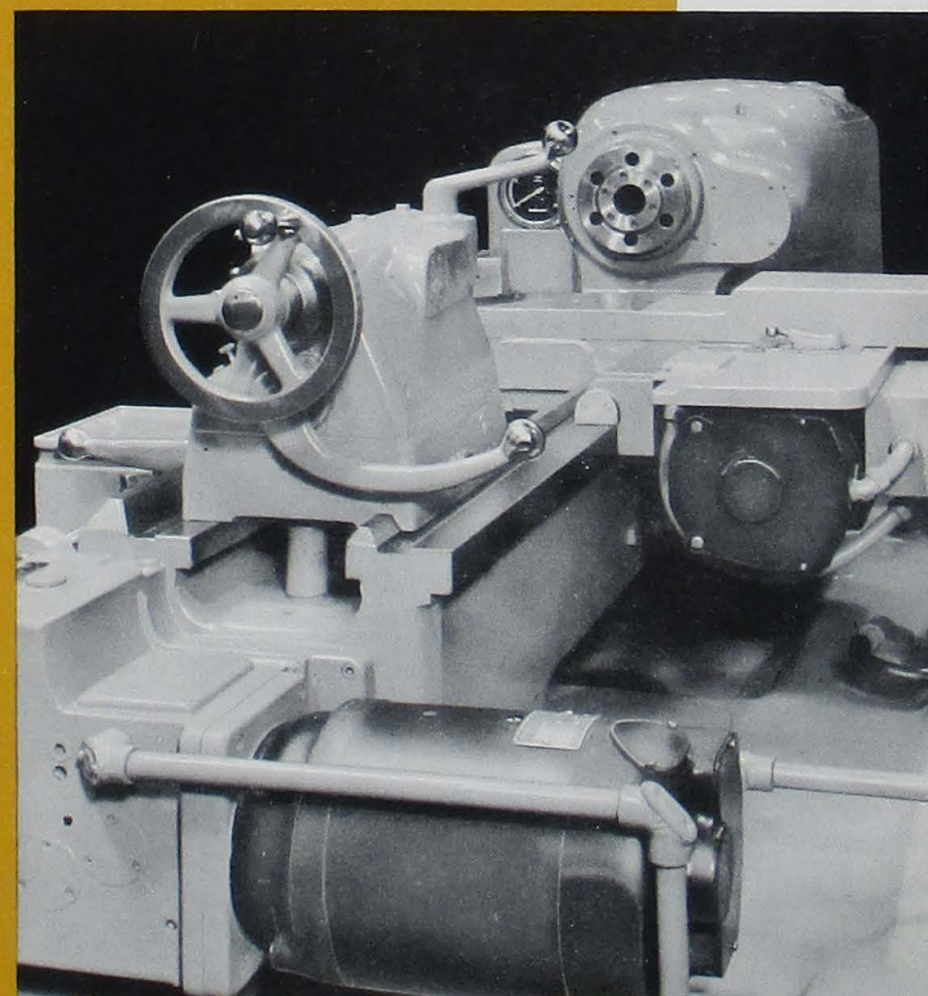
Electronically powered feed motors drive the carriage and cross slide through gear boxes. Each gear box has a low and high feed range as well as a traverse range, all of which can be tape selected. Within each one of the high or low feed ranges there are 9 pre-selectable feed rates ranging from .55" to 6.25" per minute in low; from 2" to 25" per minute in high. Any of these 18 feeds may be programmed.

Longitudinal and cross feed rates may be separately selected. Longitudinal traverse rate is 150" per minute; cross traverse rate, 75" per minute. Both gear boxes can be manually disengaged for manual operation of the lathe.

The prepared tape is turned over to the operator along with a companion data sheet. Setup is simple and quick. The data sheet gives the starting point for the cut so that the operator may position the tool in correct relation to the zero reference. Longitudinal and cross zero positions may be shifted by appropriate knobs on the console to bring the zero reference position on the tape to the zero position on the work piece.

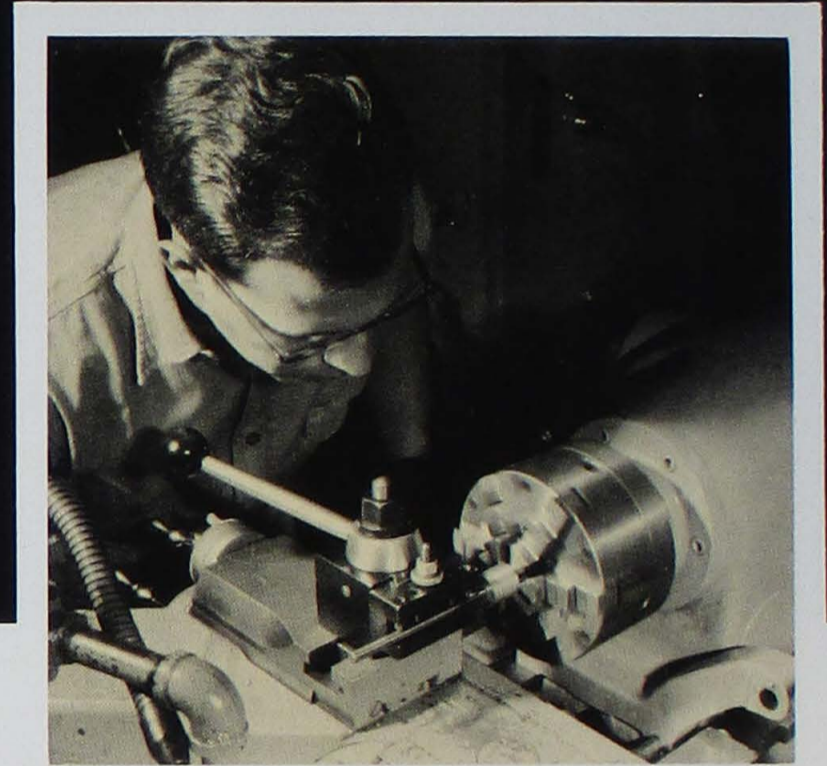
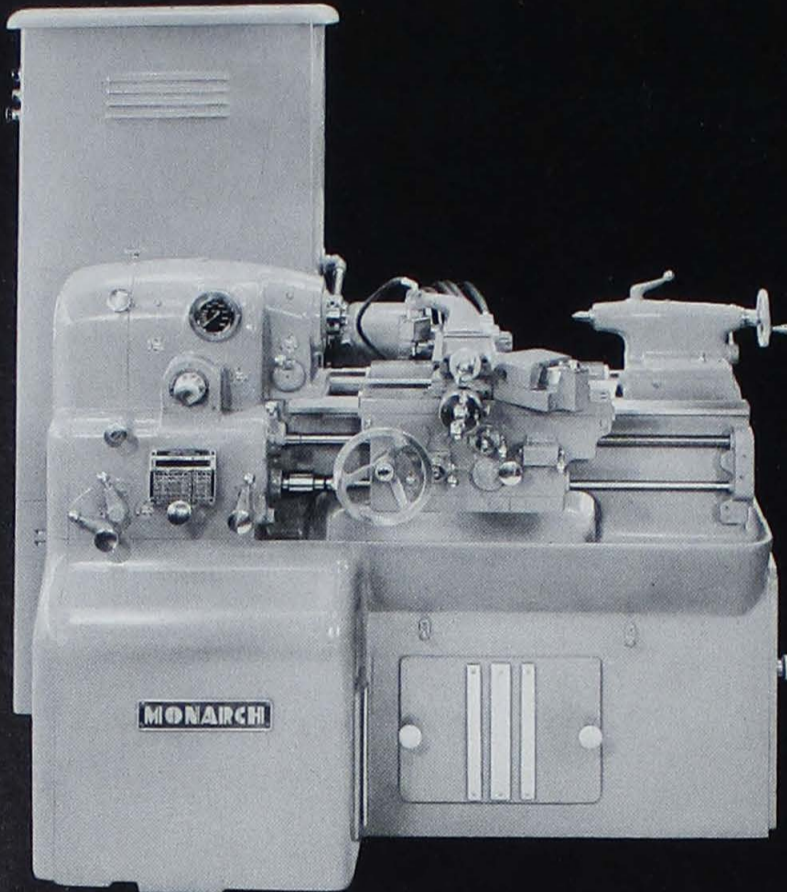
Spindle motor speed settings for each of the potentiometers are included on the data sheet. Accuracies of $\pm .001$ " on both diameter and length are achieved by this control system.

Right hand end view showing electronically powered motors for carriage and cross slide.





"AIR-GAGE TRACER"



Since 1929 when Monarch developed the first practical tracer controlled lathe, over 4000 such machines have been supplied. The "Air-Gage Tracer" is the latest application of this principle.

No lathe development in recent years has equalled template controlled turning for substantial cost reduction and its advantages performed with the Monarch "Air-Gage Tracer" are of still greater importance. This duplicating method:

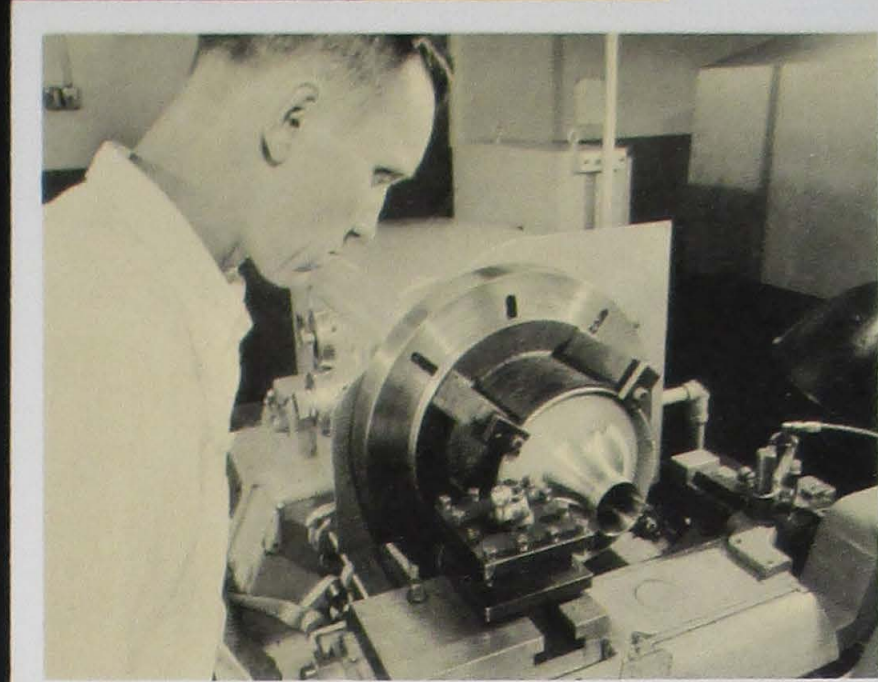
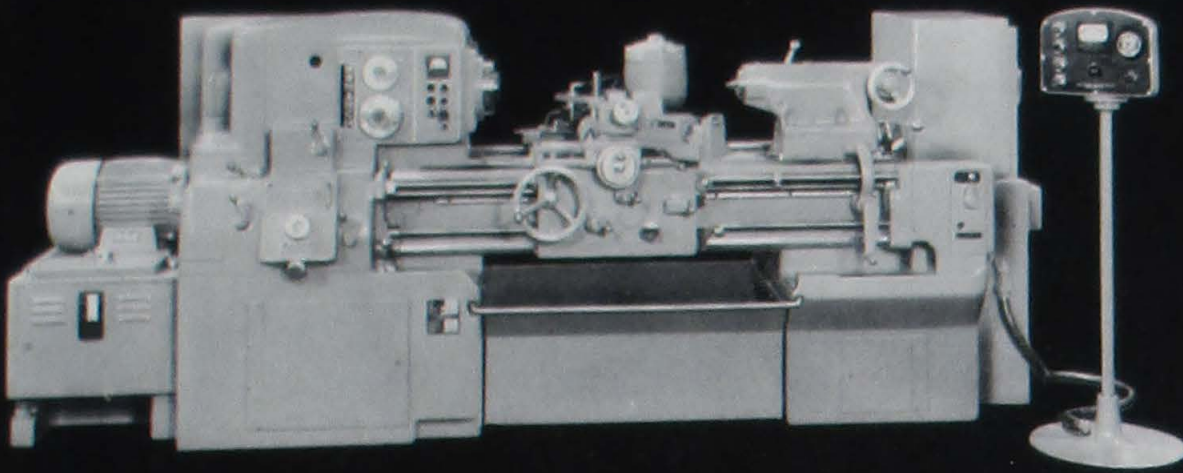
- Always outproduces a manually operated machine; in some instances as much as 8 to 10 times.
- On most work reproduces accuracy of template to within $\pm .001$ " or less, and consequently often halves amount of stock left for grinding; sometimes eliminates grinding and polishing operations.
- Eliminates the need for expensive form tools and the cost of multiple tool setups and allows a complete setup change in as little as 15 to 20 minutes; tool change in 1 minute.
- Permits machining practically any combination of diameters, tapers, forms, grooves, undercuts, shoulders, necks, radii and chamfers in a single continuous cut which imparts a smooth, stepless finish.
- Eliminates the need for repetitive measurements and reduces the chance for human error, thereby keeping the amount of spoiled work to an absolute minimum.

All "Air-Gage Tracer" equipped lathes may be used as manually operated machines for the usual turning, boring, facing and threading operations. Switchover to manual operation is made by a small lever at the front of the hydraulic slide.

Principal Features

The exclusive features that follow put the Monarch "Air-Gage Tracer" in a class by itself in the field of lathe duplicating devices.

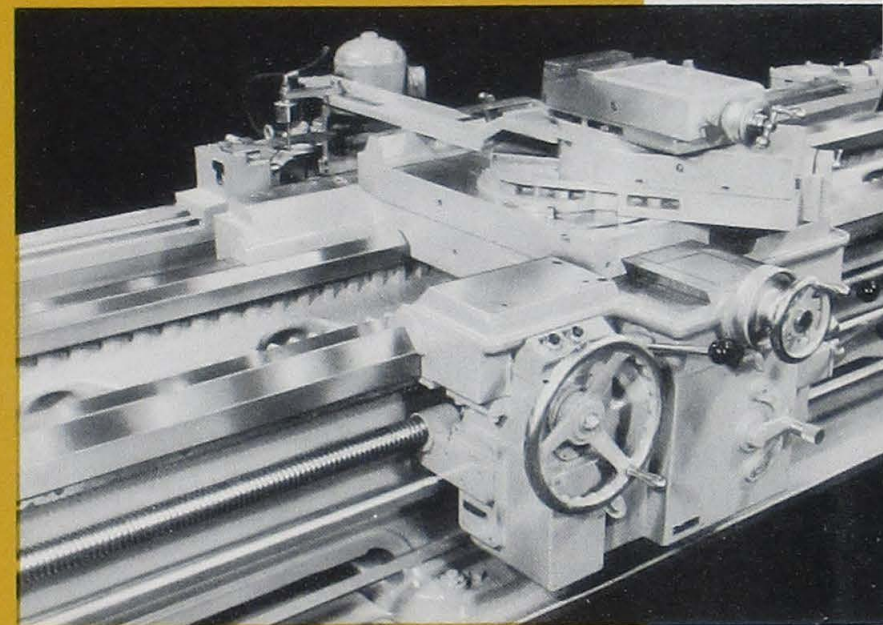
- The only lathe duplicator which utilizes the combination of air-hydraulic control. That's the secret of its super-accuracy.
- As the design deals with both oil and air in constant motion, reaction in the power cylinder is within a few thousandths of a second after the tracer changes position.
- The air circuit is an open loop servo system which provides air-gaging and multiplies both force and motion.
- It's the simplest and most trouble-free of all lathe duplicating methods. Tracer head maintenance is never a costly problem.
- Stylus pressure against template is only 5 to 6 ounces, practically eliminating template wear.
- Either a flat or a round template may be used. Excepting on very small lot, non-repetitive runs, the flat template has many advantages. Never is it necessary to use a large, bulky round template so that it can be indexed periodically due to excessive wear from high stylus pressure.
- Available both in a rigid and swiveling type, the latter of which may be used at any setting between 45° and 90° . Universal nature of swiveling type a "must" for top production on many complex facing and boring operations.
- The only lathe duplicator offered optionally with full automatic cycling and potentiometer feed control.
- Backed by over 30 years' experience in the field of tracer controlled turning. Thousands of "Air-Gage Tracer" lathes attest to its acceptance by industry everywhere.



SPECIFICATIONS

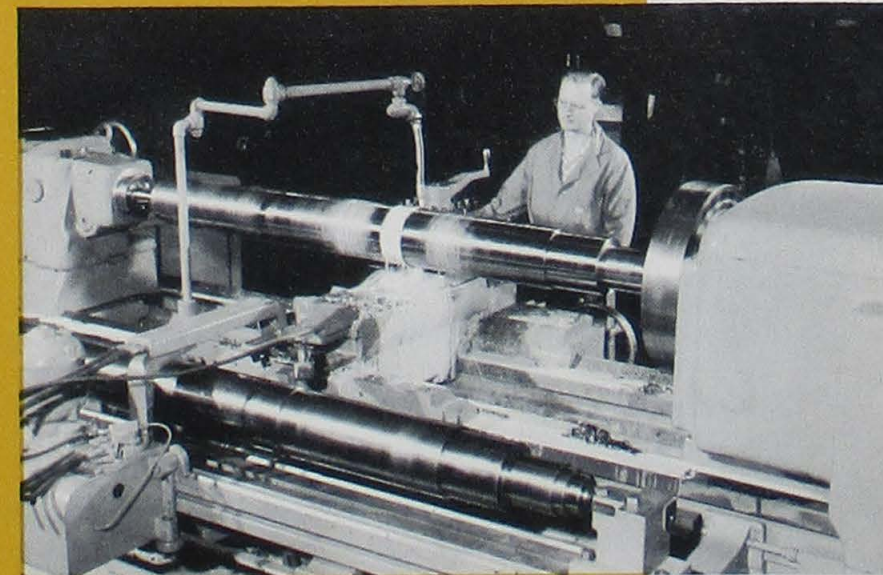
lathe application	type tracer	swing over bed	turning capacity over cross slide	length of stroke	*max. diameter change
10" EE Toolmaker's	C-Rigid	12½"	5½"	2 ⁵ / ₁₆ "	3¼"
10" EE Manufacturing	C-Rigid	12½"	5½"	2 ⁵ / ₁₆ "	3¼"
Model 1610-13 612 and Series 62	C-Rigid	20"	9¼"	3 ¹⁷ / ₃₂ "	5"
Model 2013-16 612 and Series 62	C-Rigid	24"	11"	5 ²¹ / ₃₂ "	8"
Model 2516 612 and Series 62	C-Rigid	25"	11"	5 ²¹ / ₃₂ "	8"
Model 2516-19 612 and Series 62	C-Swiveling Underarm	28"	12"	5¾"	8 ⁷ / ₈ " at 45°
Model 2516-20 Series 80	C-Rigid	30"	15"	6 ²³ / ₃₂ "	9½"
Model 3220 Series 80	C-Rigid	32"	15"	6 ²³ / ₃₂ "	9½"
Model 3220-28 Series 80	C-Swiveling Underarm	40"	21"	6 ²³ / ₃₂ "	9½" at 45°
Model 4025 Series 90	C-Rigid	40"	16"	6 ²³ / ₃₂ "	9½"
Model 4025-31 Series 90	C-Swiveling Underarm	44"	21½"	6 ²³ / ₃₂ "	9½" at 45°

*Refers to maximum diameter change at one setting of cross slide.



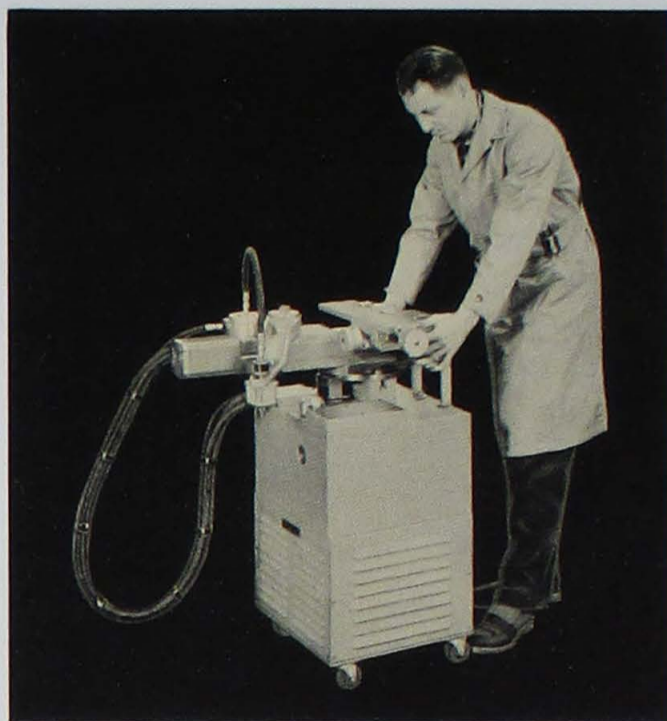
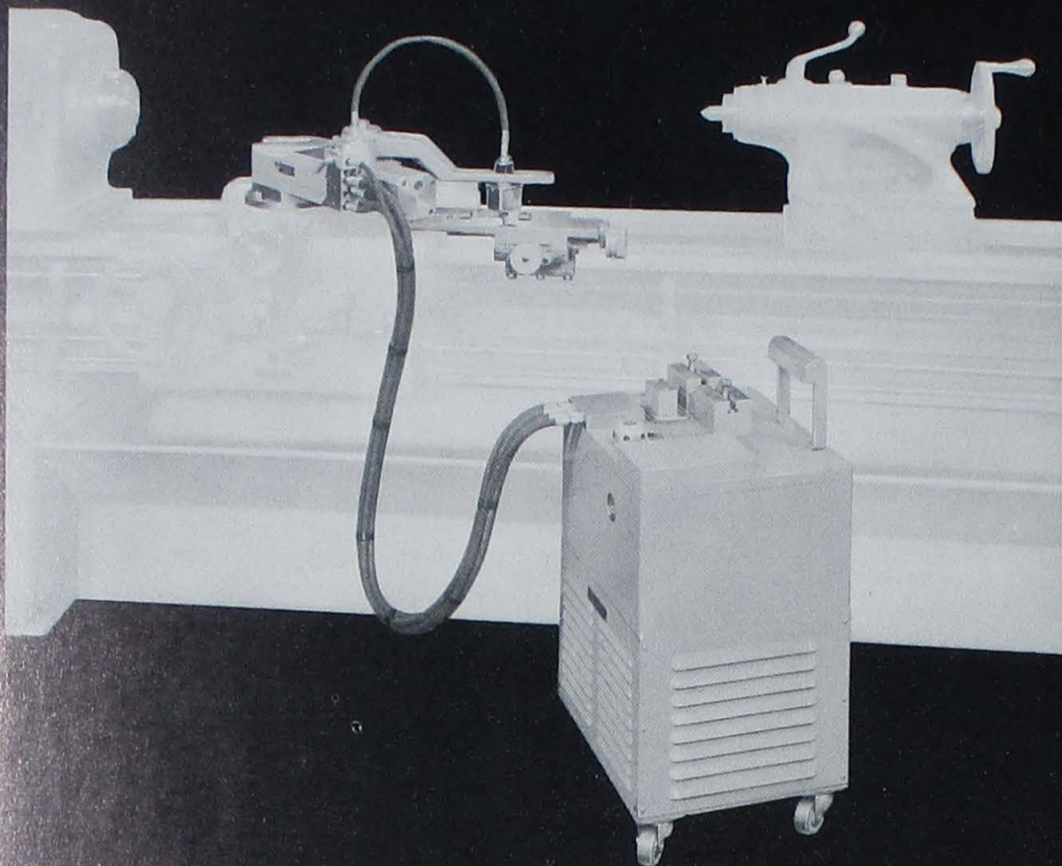
A Type C Swiveling "Air-Gage Tracer" applied to a Monarch Series 90 Dyna-Shift Lathe.

Grinding was eliminated entirely, and turning time reduced 75% using an "Air-Gage Tracer" in machining this drum shaft.



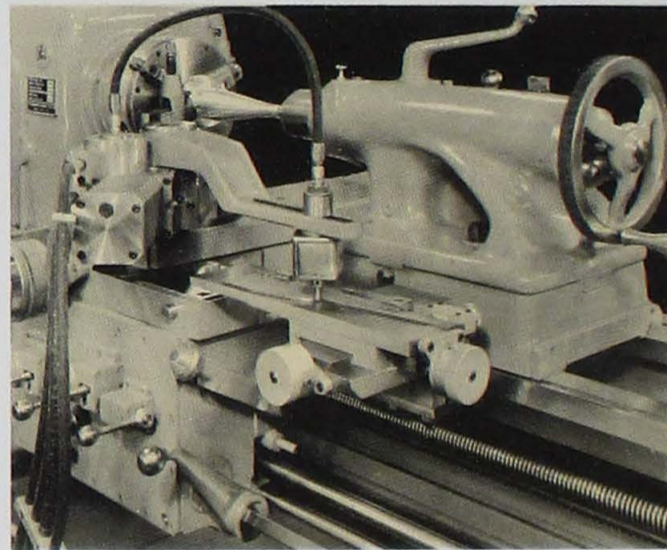


AIR-TRACER PAK



Above—The portability of the Air-Tracer Pak is clearly illustrated by this view.

Below—A typical turning operation with the slide at a 45° setting.



The Monarch Air-Tracer Pak is a completely self-contained "Air-Gage Tracer" unit available for application to Monarch lathes in the field. Designated as the Air-Tracer Pak, it may be used on Series 60, 61 and 62 machines and the Monarch 612 without any reduction of swing capacity.

Removal of the regular compound rest permits quick attachment of the tracer slide assembly to the cross slide. This assembly consists of a hydraulically powered tool slide, a swiveling tracer arm and a swivel base having the proper height and bolt circle size for application to the lathe with which it is to be used. The combination of swiveling design and slide speeds up to 50" per minute gives the Air-Tracer Pak the versatility to handle many complex operations with an efficiency not possible on other tracer systems.

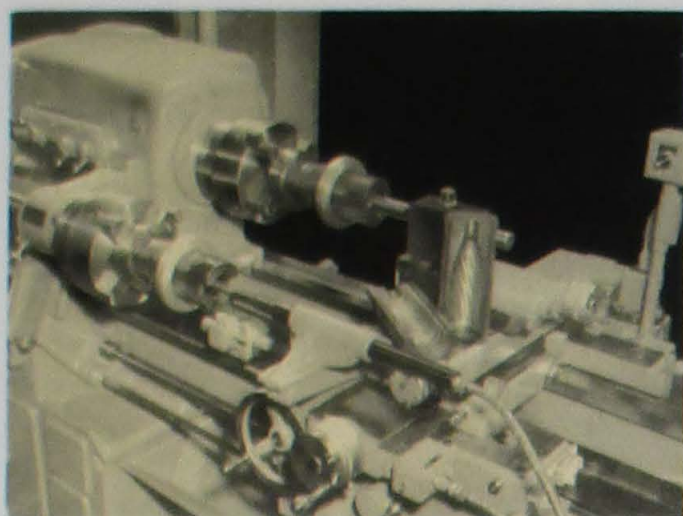
Mounted on the slide is the air-hydraulic servo valve which is controlled by the tracer head. A convenient two-position handle on this valve provides manual control of the slide which may be made to retract or move in until the stylus balances against the template. Constant pressure air and hydraulic oil are supplied to the valve by flexible hoses from the portable power unit.

The template support is clamped to the front bed "V". Micrometer dials are provided for longitudinal and cross adjustment of the template position. The former is graduated in half-thousandths and is direct reading. The latter is graduated in thousandths and reads in work diameter change. For quick and accurate template alignment a swivel pin on the support is used in conjunction with a micrometer adjusting bracket. Appropriate mounting holes allow the bracket to be positioned properly for both short and long turning templates and for facing templates.

A portable and completely self-contained power unit stands at the front of the machine. Included in this unit are the hydraulic tank, motor-driven hydraulic pump, air filter and air regulator. The hydraulic pump motor operates on 110 volt, single phase, A.C., a receptacle in the power unit base providing easy power plug-in. There is also a connection in the base for the air supply line. On the top of the unit are storage brackets to which the tracer slide assembly and tracer support are attached when not in use. Casters on the unit make it portable for storage and for movement to the machine.

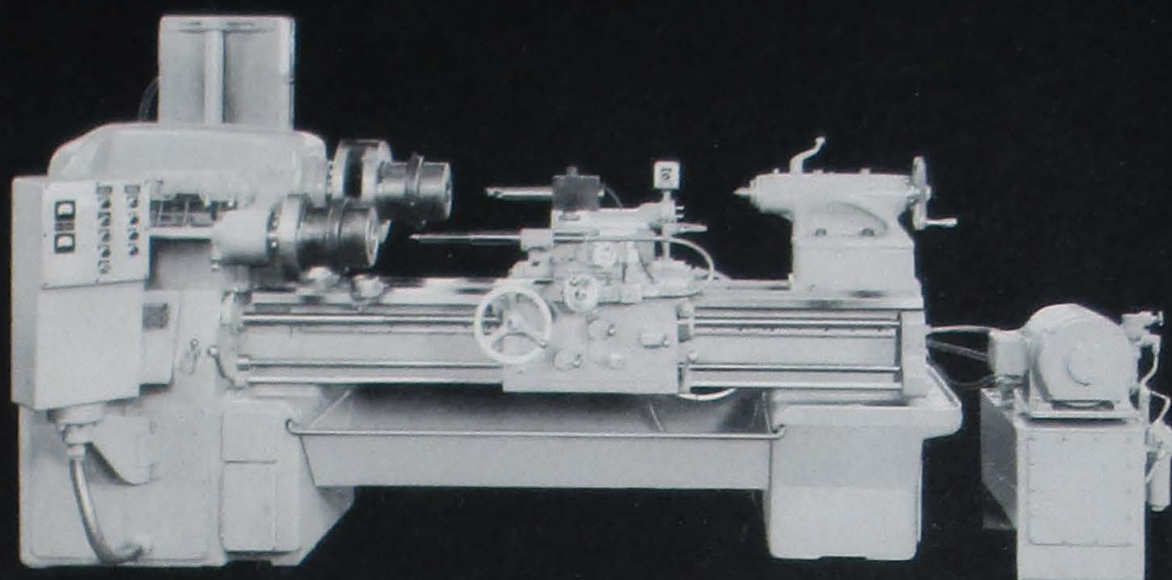
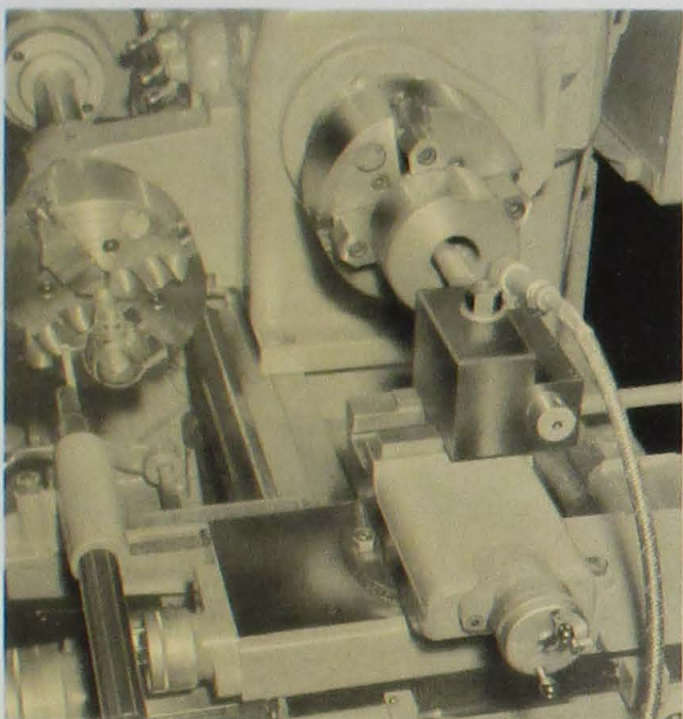
SPECIFICATIONS

Hydraulic tool slide stroke.....	4"
Maximum diameter change with tool slide set at 45°.....	5½"
Tool slide speed, up to.....	50" per minute
Hydraulic tool slide swivels.....	90° between parallel to and perpendicular to work axis
Maximum template length.....	18"
Template adjustment, in and out.....	3"
Template adjustment, longitudinal.....	1"
Hydraulic pump motor.....	110 V, 60 cycle, single phase
Air supply, to be furnished by customer....	2.5 cu. ft. at 60 psi



Above—reproducing a mold using a mold as the master. Note the opened mold halves in front of the tool block.

Below—machining a mold using a glass bottle as the master.



While this machine is basically an engine lathe, and can be used for conventional turning, boring and threading operations, it was developed especially for non-circular cross section work as the boring of non-circular glass bottle molds, plastic molds, aircraft parts, cams and rotors, etc. Its major feature is the new Monarch super-sensitive electro-hydraulic tracer with a stylus deflection pressure of only 1½ ounces and accuracy of duplication as close as ± .001".

Electrical amplification of stylus movement instantly translates the slightest work contour change into hydraulic tool slide movement. As a result of extreme stylus sensitivity and fast slide response, tracer slide speeds up to six times as fast as those used previously are possible, reducing machine time and subsequent hand finishing to a fraction of that previously required.

The master spindle is mounted at the front of the machine for ease of set up and operation. There is a positive gear drive from the headstock spindle through a quadrant mounted idler which can be adjusted to eliminate any backlash between the lathe spindle and the master spindle. A female or a male master can be used or, with the master spindle locked stationary, a half-mold or a conventional flat template may be used to guide the tool for parts of circular cross section. Because of the light stylus pressure, non-metallic materials can be used as masters.

The hydraulic power unit which stands on the floor at the tailstock end of the machine is equipped with a water-cooled heat exchanger to maintain constant hydraulic oil temperature.

SPECIFICATIONS

General

Swing over bed and carriage wings.....	28"
Swing over cross slide.....	14"
Swing over bed—rotating master.....	18"
Swing over carriage wing—rotating master.....	11"
Center distance between headstock spindle and master spindle.....	15"
Minimum diameter bore which can be traced.....	1"
Takes between centers, tailstock flush.....	48"
Floor space.....	67" W x 158" L

Headstock

Hole through spindle.....	1-9/16"
American standard Camlock spindle nose.....	6" D-1
Spindle speed range, low side motor with 6 to 1 reduction.....	1.5 to 66 R.P.M.
Spindle speed range, high side motor with 6 to 1 reduction.....	3 to 133 R.P.M.
Spindle speed range, low side motor only.....	9 to 400 R.P.M.
Spindle speed range, high side motor only.....	19 to 800 R.P.M.
Number of speeds in each range.....	16

Slides

Upper tool slide adjustment.....	5"
Lower tool slide adjustment.....	3"
Maximum tracer slide stroke at one setting.....	4"

Motor Data

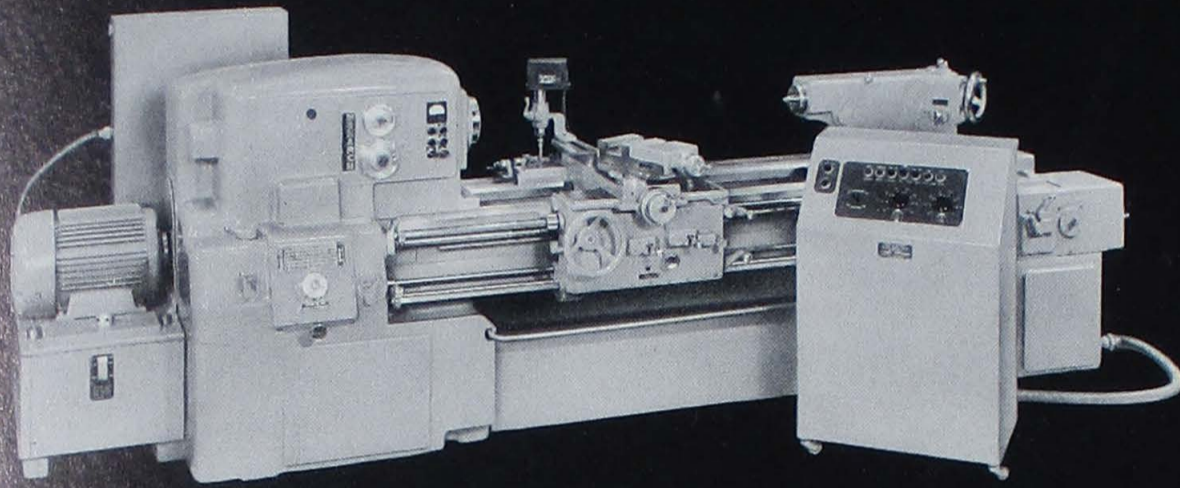
Motor size (2 speed).....	7½—3¼ H.P.
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Shipping Data

Net weight with average accessory equipment and including electrical equipment.....	9,160 lbs.
Domestic shipping weight, as above.....	9,660 lbs.



MONARCH-KELLER CONTOUR TURNING LATHES

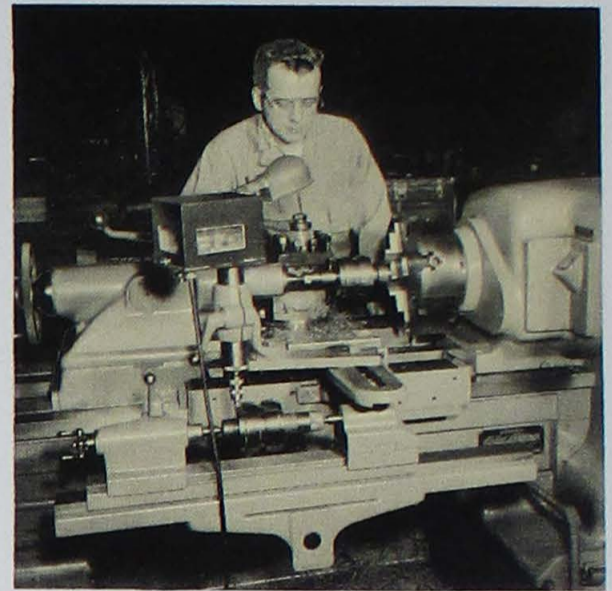


The Monarch-Keller was the original automatic tracer-controlled lathe. Over 1500 are now in use. Monarch-Keller can be applied to any size Monarch lathe above Model 1610.

These lathes are recommended for fast, accurate, economical turning, facing and boring of irregular contours of circular cross-sections from a thin metal template. When not in use the controls can be quickly disengaged to permit regular turning.

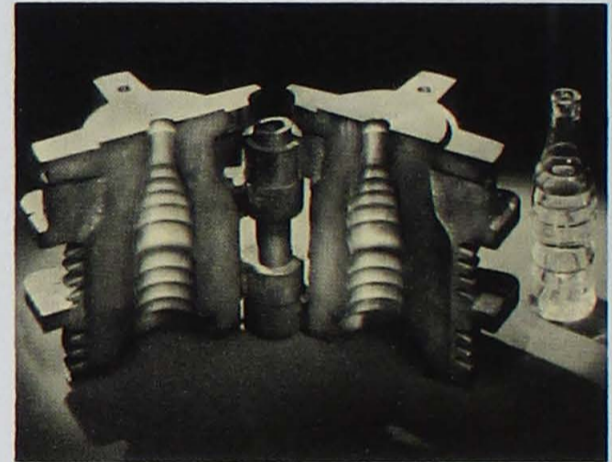
what it does

- Provides a means of accurately tracing unusual contours using thin metal templates.
- Provides accuracy of sizing that can cut grinding time and grinding wheel cost appreciably, or in some cases eliminate grinding completely.
- Eliminates the need for repetitive measurements.
- Eliminates the necessity for form tooling and special form turning attachments and has more contour turning versatility than either of the latter arrangements because it reproduces work more accurately and is in cycle for the entire length of the work.
- Eliminates the possibility of scrap because once the machine is set up properly the Monarch-Keller controls make it impossible for the operator to spoil a piece of work.
- Simple to operate. Anyone who can operate a lathe can learn to operate a Keller quickly and efficiently.
- Sets up in a comparatively short time. The average job can be set up in one-half to three-quarters of an hour.
- Permits the machining of practically any combination of diameters, tapers, bevels, forms, grooves, undercuts, shoulders, necks, radii and chamfers in a single continuous cut.
- Uses the same template for both rough and finish passes, so that finishing can follow roughing immediately without set-up changes other than tool change.
- Range and metal-removing capacities of the machine are not in any way limited by the Monarch-Keller controls. Therefore the lathe will take any work within its normal capacity.



Above—Machining a circular forming tool, using another tool as a master.

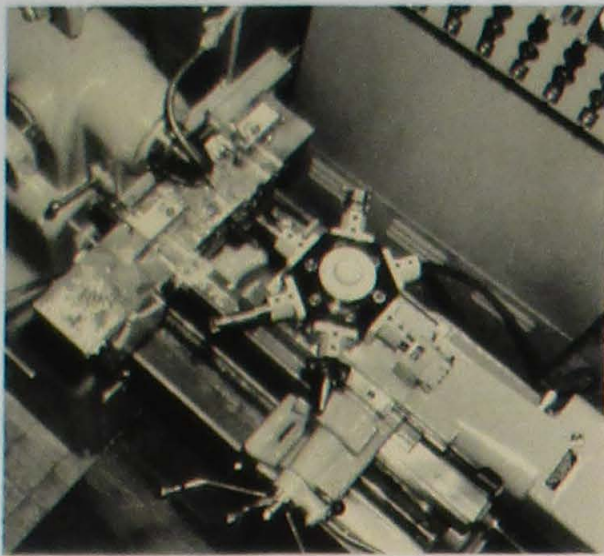
Below—a circular cross-section bottle mold machined on a Monarch-Keller.



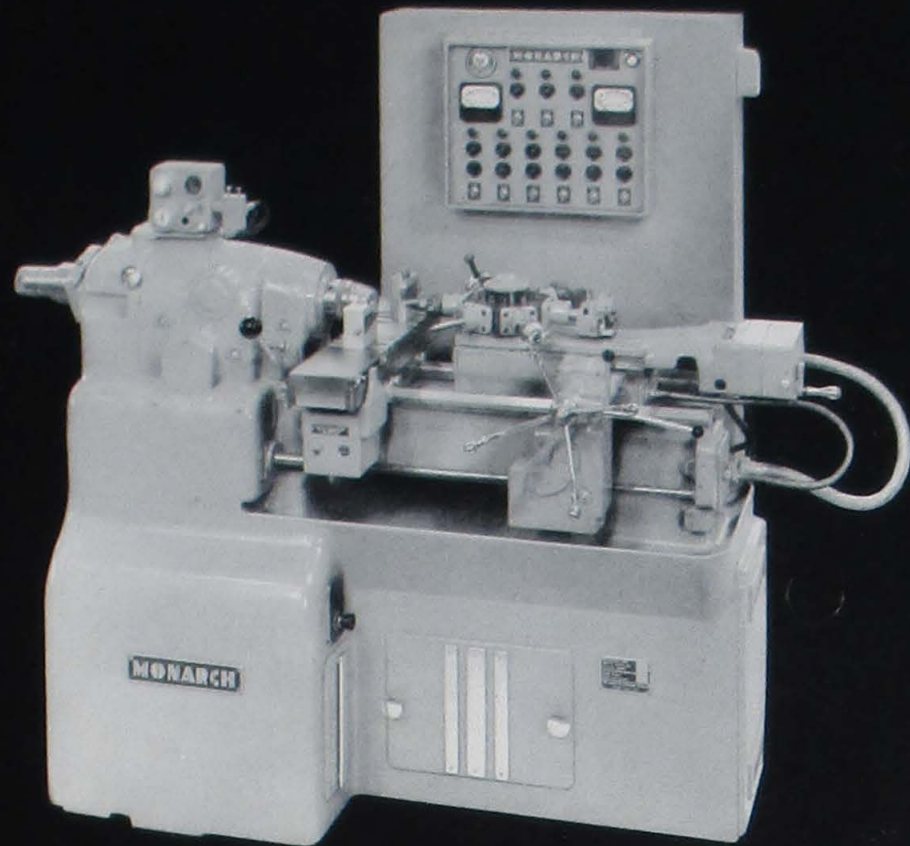
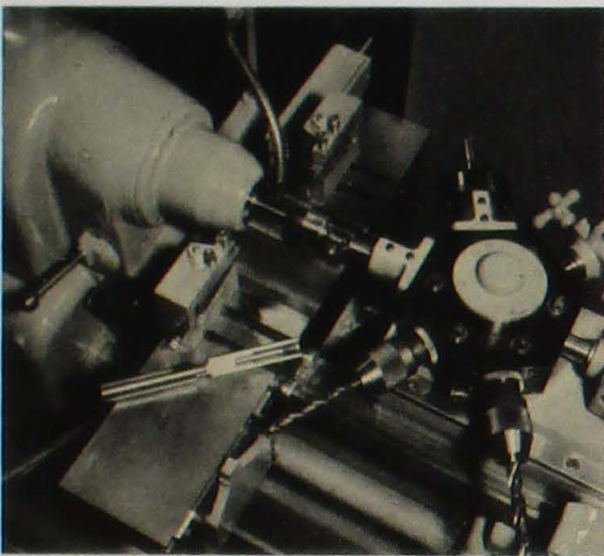
The Keller electrical controls provide feed for the carriage and tool slide and are built into the machine. The Monarch-Keller unit consists of the standard Keller tracer, the magnet clutch box and the control cabinet. The magnet clutch box has four magnetic clutches which are driven by an integrally mounted D.C. variable speed motor.

A quick-change gear box is used to provide a wide range of feeds. Two of the four magnetic clutches drive the leadscrew, which provides longitudinal feed to the carriage in both directions. The other two magnetic clutches drive the feed rod which provides "in" and "out" motion to the tool slide. The small amount of D.C. electric current required by the Keller controls is supplied by an electronic converter located in the base of the control cabinet which may be positioned for the convenience of the operator.

The illustration above shows a Monarch Dyna-Shift Series 62 Lathe equipped with Keller controls. Other Monarch machines can be ordered with controls installed, or arranged for later installation by a Monarch serviceman.



Above and Below—typical setup views showing detail of power feed turret and the self-centering, ball bearing type cut-off slide.



The Speedi-Matic is a hand operated screw machine for lots ranging from less than 25 to more than 2500 pieces. It is recommended particularly for the low cost production of close limit work.

Chief performance characteristics are high output, better-than-ever accuracy, reduced operator effort and quick and easy setup without cams.

Principal Features

- A control center that provides preselected, automatic speed and feed change for each tool position. Speed range is infinitely variable from 40 to 4000 R.P.M.; feed range, infinitely variable from $\frac{1}{8}$ " to 16" per minute. The most efficient speed and feed is provided for each operation, assuring maximum production.
- A power feed, ram type turret, the turret head of which is hydraulically indexed, hydraulically located in the new position to an accuracy of less than .0002" and hydraulically clamped in position. It is also automatically lubricated.
- A feed box, powered by an electronically controlled feed motor.
- A powerful, lever operated, self-centering cut-off and forming slide that moves on preloaded ball bearings and carries its own forced feed lubrication system.
- Electrical controls to J.I.C. standards. The spindle and feed control elements are in the form of plug-in modules for ease of maintenance.
- Simplicity of setup to the degree that the time is regained during production of the first few pieces.

SPECIFICATIONS

General

Swing over bed	12½"
Floor space, including control cabinet	74" L x 48" W

Headstock

American standard Camlock spindle nose	3" D-1
Hole through spindle	1-13/32"
Center, Morse taper	No. 2
Number of preselected spindle speeds	9
Spindle speed range, infinitely variable	40 to 4000 R.P.M.

Collet Capacity

Pusher type, lever operated	$\frac{7}{8}$ "
Bar feed type, air operated	$\frac{7}{8}$ "

Cut-off Slide

Movement to front from neutral	15¾"
Movement to rear from neutral	10¾"
Size of tool (front and rear blocks)	$\frac{1}{2}$ " x $\frac{1}{2}$ " x 3½"

Ram Type Turret

Work travel of ram	5"
Number of preselected feeds	8
Feed range, infinitely variable	$\frac{1}{8}$ " to 16" per min.
Maximum distance face of turret to spindle (turret ram retracted)	20"
Turret holes	1"
Distance across flats	7"

Motor Data

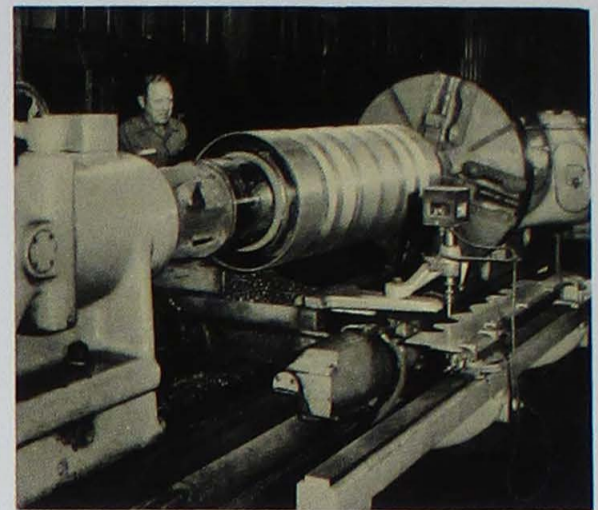
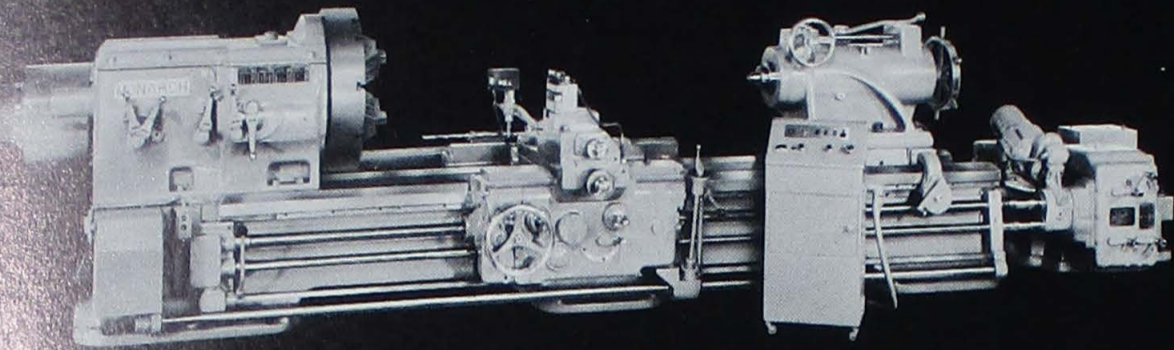
Main drive motor	5 H.P.
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Shipping Data

Net weight with average accessory equipment and including electrical equipment	4,200 lbs.
Domestic shipping weight, as above	4,800 lbs.

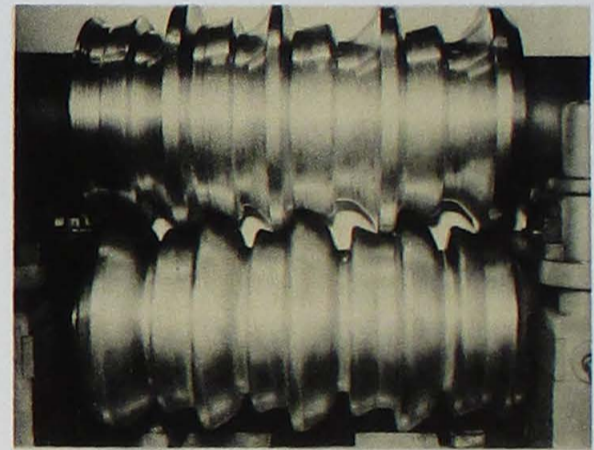


HEAVY DUTY ROLL TURNER



Above—a machine setup showing the tracer unit and template mounting.

Below—a set of rail mill rolls from a Monarch Roll Turning Lathe.



Contour turning of steel mill rolls with a template controlled Monarch Roll Turning Lathe not only reduces drastically the turning time formerly required, but permits the use of standard cutting tools rather than the hundreds of expensive forming tools once required.

Following are important reasons for the outstanding performance of Monarch Roll Turning Lathes.

- There is no need to match rolls in pairs, since forming of the contour is template controlled. Each roll turned from any given template is identical. One of a pair can be redressed or a new one turned with assurance it will match the other. The same template is used for both rough and finish passes.
- Rolls are turned on centers which permit the handling of necks during the same setup.
- Face Plate Drive is used on the Heavy Duty Roll Turner, applying driving power far out from the work axis to permit heavy cuts on large diameter rolls.
- The massive rotating spindle type tailstock of the Heavy Duty Roll Turner has anti-friction bearings equal in size to those in the headstock. Contrary to ordinary practice it makes no difference whether heavy cuts are taken toward the headstock or toward the tailstock.
- Bed ways are flame hardened and ground. Feed screws, gears and all other parts subject to wear are hardened. Exclusive on the Monarch is a leadscrew with a thread section hardened to Rockwell C-45.
- An individually motor driven, push-button controlled longitudinal rapid traverse enables the operator quickly to move the cutting tool from one end of the roll to the other. He may also inch the tool into position longitudinally.
- An electrical control stand, located at any point convenient to the operator, places complete electrical control at his fingertips.

SPECIFICATIONS

General

Maximum roll diameter body.....	25"
Length between centers.....	102" and 126"

Headstock

Hole through spindle.....	2-3/16"
Center, Morse taper.....	No. 6
Flange type spindle nose.....	15"
Number of mechanical speed changes.....	24
Speeds obtained through the spindle drive..	10 thru 505 R.P.M.
Speeds obtained through the face plate drive	2½ thru 15 R.P.M.

Keller Controls

Keller control feeds—longitudinal.....	.046" to 3.000" per min.
Keller control feeds—cross.....	.046" to 3.000" per min.
Power rapid traverse.....	90" per min.

Tailstock

Quill diameter.....	6"
Spindle diameter.....	4¾"
Center, Morse taper.....	No. 6
Spindle travel.....	6"

Carriage and Compound

Carriage length.....	47"
Carriage bridge width.....	14½"
Tool slide travel.....	5"
Size of lathe tool.....	1½" x 1½"

Bed

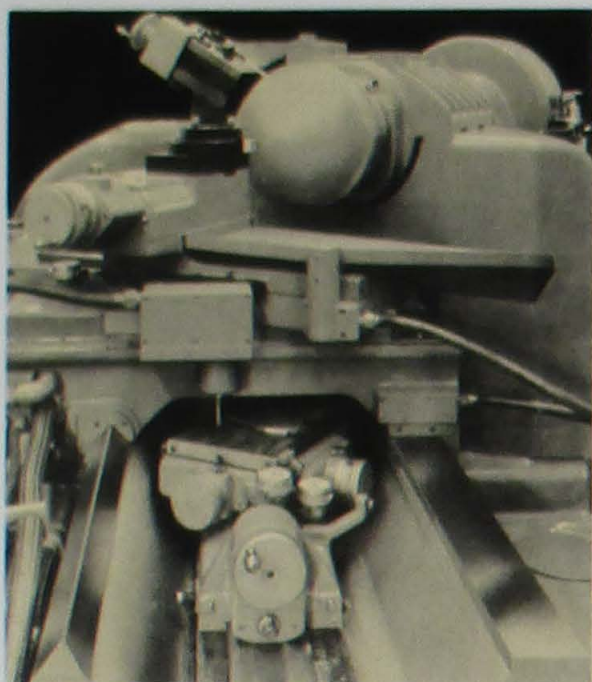
Width of bed.....	31½"
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Motor Data

850/1700 R.P.M. D.C. motor recommended...	30 H.P.
Alternate constant speed— 1800 R.P.M. motor recommended.....	30 H.P.

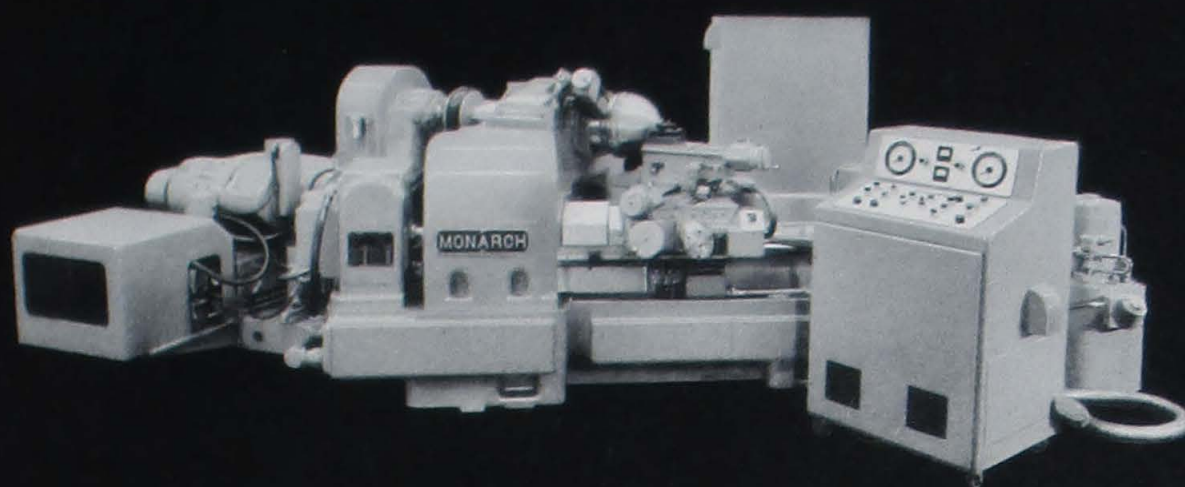
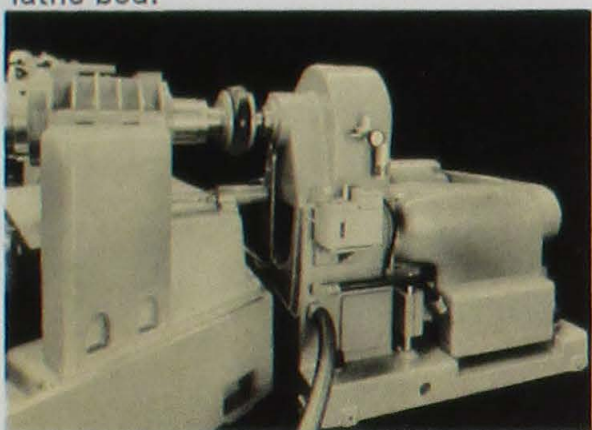
Shipping Data

Net weight, including all electrical equipment—base length.....	31,750 lbs.
Domestic shipping weight, as above.....	34,900 lbs.



Above—typical setup view which shows template mounting between bed ways.

Below—machine drive is isolated from lathe bed.



Performance of the Monarch Series 180 cannot be equalled by any other lathe. It was developed specifically for ultra-precision machining of thin-wall spherical and related shape work pieces, contouring O.D. and I.D. with a total accumulated error of ± 75 millionths of an inch, or less. Entirely new design concepts are used in this chucking type lathe in order to attain such precision.

SPECIFICATIONS

Diameter range.....	5" to 15"
Spindle nose runout, less than.....	.000025"
Constant surface cutting speed ratio.....	6 to 1
Speed Range, R.P.M.....	8½ to 1000
Total accumulated error from stylus point to tool.....	.000020"
Feed Range, inches per minute.....	.008 to 7.500

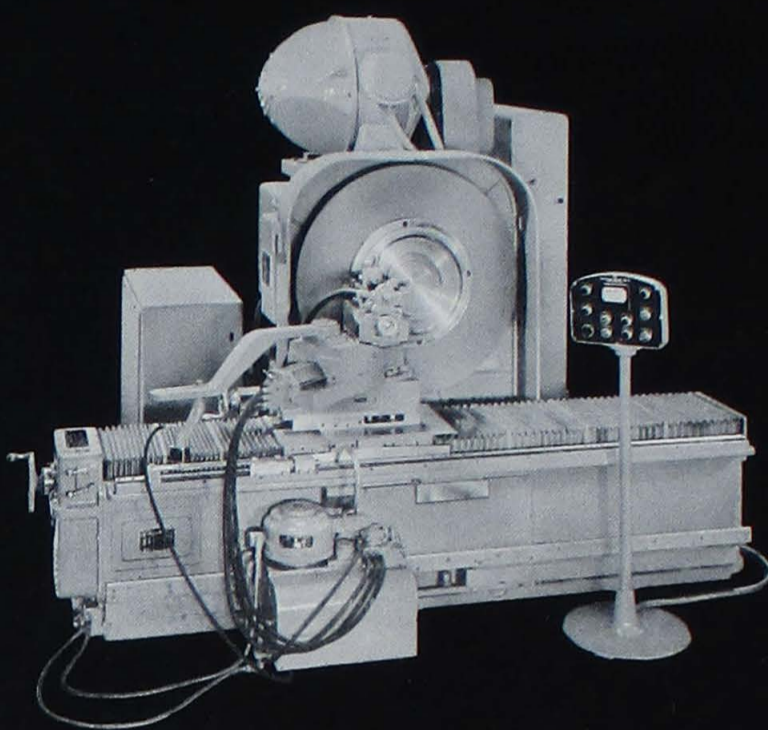
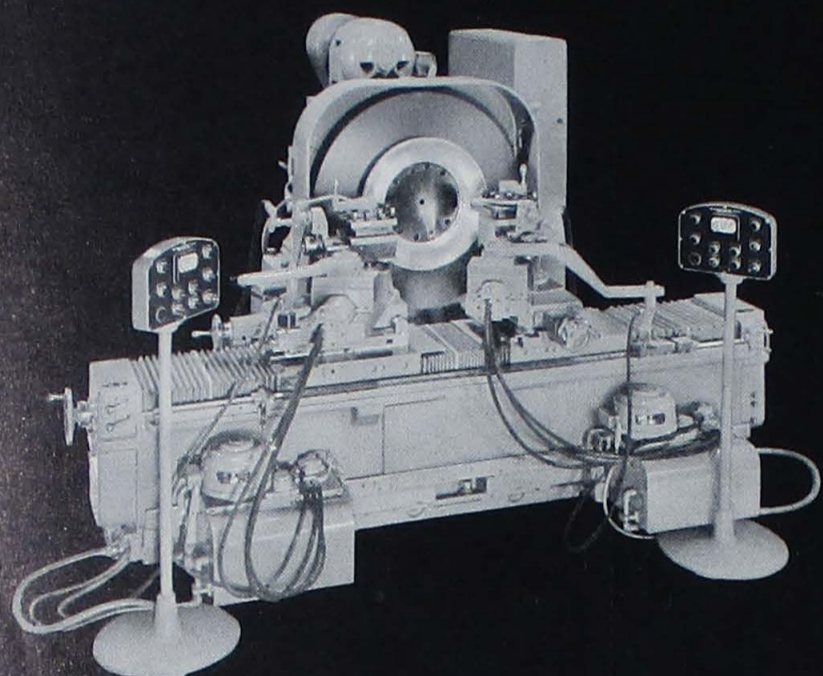
NOTE

Due to the highly specialized nature of the Series 180 machine, many design details will depend upon the nature of the work which is to be done. Numerical control can be furnished. For additional information with respect to your project, kindly address The Monarch Machine Tool Company at Sidney, Ohio, on your business letterhead, with full details on the work to be done.

Principal Features

- The Monarch electro-hydraulic tracer has a stylus deflection pressure of only 1½ ounces. This, plus electrical amplification of stylus movement, instantly translates template contour change into hydraulic slide movement.
- The constant surface cutting speed drive is separately mounted to eliminate vibration transmittal to the bed.
- Drive is flexibly coupled to the spindle which is set at a 30° angle to the bed axis.
- Spindle bearing lubricant is refrigerated; the floor mounted tracer hydraulic tank is separately cooled and coolant temperature is controlled within $\pm .5^\circ$.
- Bed ways are flame hardened and precision ground. The cross slide moves on large preloaded steel balls to minimize friction.
- Two tool adjusting slides permit tool adjustment both parallel to and at right angles to the spindle axis.
- The machine is built and tested in a temperature-controlled area and must be so operated.

60" RIGHT ANGLE LATHES MODELS O AND F



Chuck type machines for the turning, boring and facing of thin-walled work pieces having large diameter and short length.

The Model O has two slides, one or both of which may be controlled by the "Air-Gage Tracer", and is especially suitable for turning and boring applications.

The Model F with one slide and built-in surface cutting speed control is best suited for precise facing over a large diameter, although turning and boring can also be done.

Principal Features

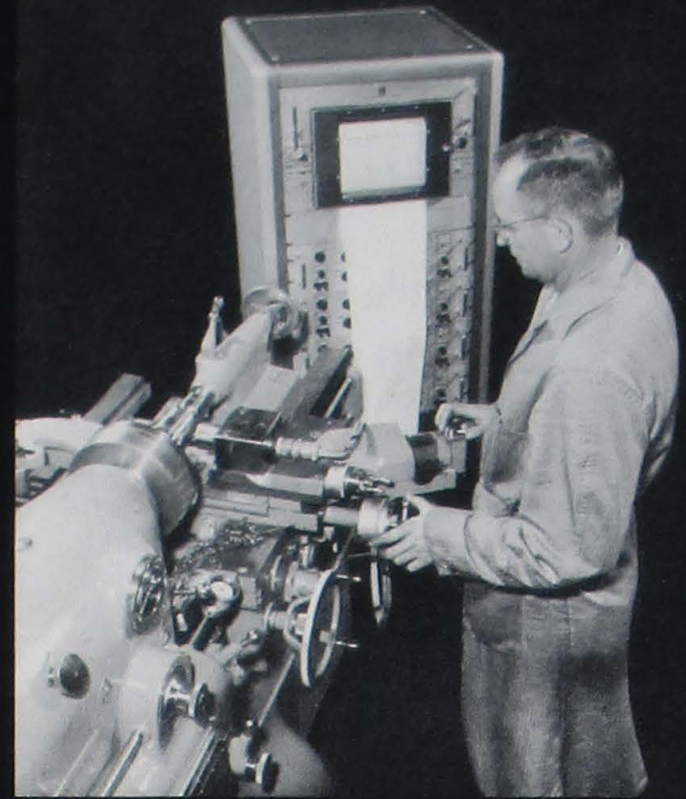
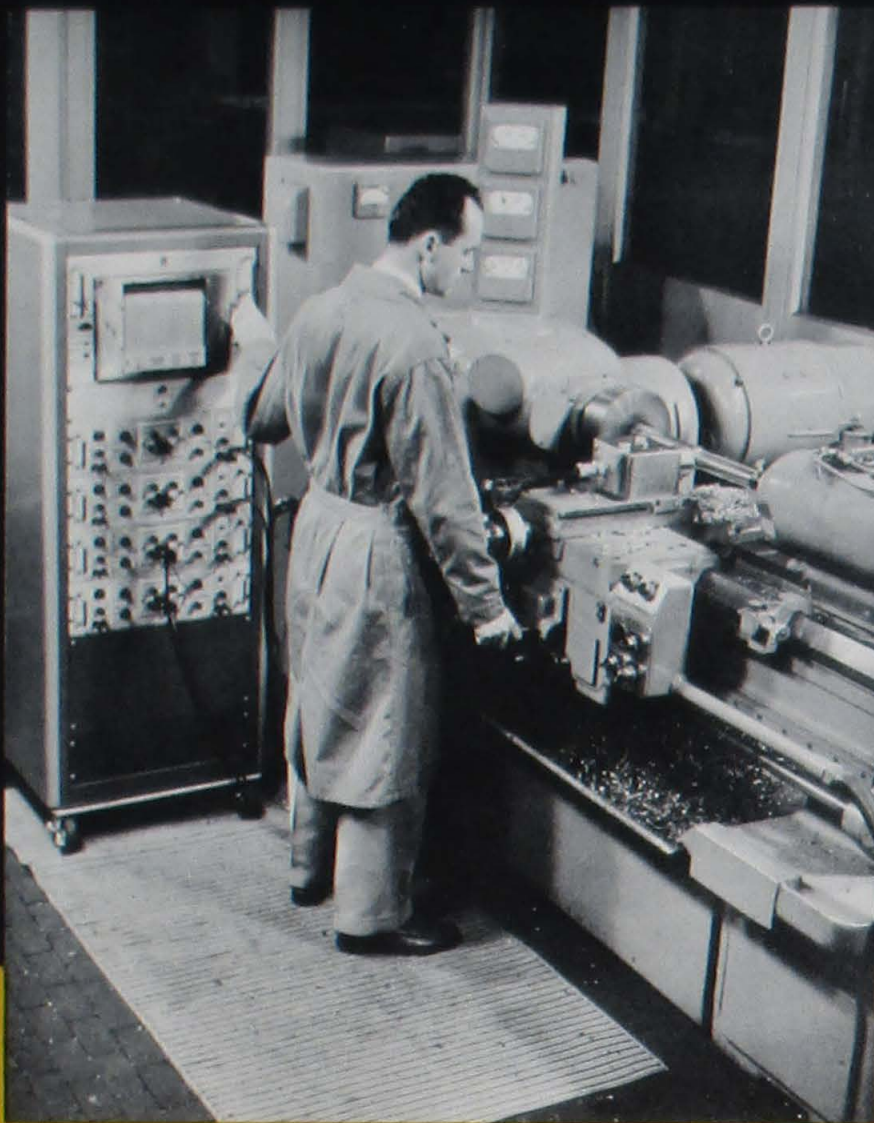
- Complete push-button control. Turning cycle completely automatic.
- Both longitudinal and angular cross feed infinitely variable. On Model O machines, use of separate feed and traverse motor drives provides any desired feed at either slide.
- All slides provided with power angular feed. On the Model O machine, many work pieces may be produced complete at one chucking, in some cases with the two slides operating simultaneously.
- Headstock position adjustable over a total travel of 12". This exclusive Monarch feature brings most work closer to the operator, thereby making loading and unloading easier.
- Constant surface cutting speed feature for facing operations on Model F machine permits maintenance of satisfactory finish over entire face regardless of extreme diameter variation.
- Either a 40" or a 52" face plate may be supplied. Work up to 60" in diameter may be swung in gap as long as its thickness (or combined thickness of work and holding fixture) does not exceed 14". All machines have power longitudinal feed for up to 48" turn diameter.
- Sizable saving in floor space. The Right Angle Lathe, because of its unique design, ordinarily requires only about half of the floor space needed by a conventional engine lathe having like swing capacity.



Typical parts machined on Monarch Right Angle Lathes.

SPECIFICATIONS

	Model F	Model O
General		
Floor space.....	121" W x 130" L	132" W x 130" L
Headstock		
Swing in gap.....	60"	60"
Swing over way guards.....	40"	40"
Maximum turn diameter.....	48"	48"
Maximum turn diameter, right-hand slide only.....	14"	14"
Face plate diameter.....	40" or 52"	40" or 52"
Speeds available through complete set of change gears R.P.M.....	15 to 760	
Number of speeds.....		18
Speed range, regular R.P.M.....		6-303
Speed range, optional R.P.M.....		3-455
Maximum distance from face plate to face of tool slide.....	17"	17"
Minimum distance from face plate to face of tool slide.....	5"	5"
Hole through spindle.....	4 1/4"	2 1/2"
Spindle nose.....	15" A-1	15" A-1
Carriage and Slide Assembly		
Carriage feed and power angular slide feed, per minute.....	.050" to 10"	.050" to 10"
Carriage traverse and power angular slide traverse.....	50" per min.	50" per min.
Minimum power angular slide travel.....	12"	12"
Power angular slide swivel, either side of center.....	90°	90°
Compound rest swivel, either side of center.....	180°	180°
Maximum travel of compound rest, without "Air-Gage Tracer" control.....		5"
"Air-Gage Tracer" Slide		
Maximum travel.....	6 3/8"	6 3/8"
Maximum diameter change with slide setting at 45°.....	9 3/8"	9 3/8"
Motor Data		
Motor size.....	15 H.P.	20 H.P.
Shipping Data		
Net weight including electrical equipment.....	20,230 lbs.	18,900 lbs.
Domestic shipping weight, as above.....	22,230 lbs.	20,900 lbs.



SPECIFICATIONS

Drive	20 h.p. variable speed, four to one ratio, constant horsepower electronic controlled D.C. drive.
Headstock	Infinitely variable speed range of 425 to 3400 r.p.m. Additional gearing can be obtained to extend this speed range. Headstock is mist lubricated. Electrically operated brake will bring spindle to a complete stop within a few seconds.
Chucking	Semi-forged steel safety chuck.
Tailstock	Heavy duty mist lubricated tailstock with anti-friction center; air operated with 5 $\frac{3}{4}$ " spindle diameter.
Controls	All controls located at right of apron. Electrical tachometers to indicate spindle speed in three ranges. Load meter for indication of overload. Cycle control with tool relief and limit switch for traverse return available as optional equipment.
Coolant Pump	Special heavy duty coolant pump with piping to top slide.
Apron	Variable feed, 2 to 30 inches per minute with feedback control to maintain constant feed in inches per revolution. Manually operated clutch with cross feed. Carriage supported on back ways and reinforced.
Tool Block	Standard heavy duty tool block for 1 $\frac{1}{2}$ " x 1" tool. Dynamometer available as optional equipment for loads of 10 to 1200 lbs.

There is no substitute for a rapid and reliable machining test to reveal proper cutting conditions for a specific job and material. A machine tool designed specifically for cutting research should be made available for all metal cutting programs, with an infinite range of speeds and feeds, plus sufficient horsepower and rigidity to carry out any type of cutting test required.

Such a machine is the Monarch Machinability Test Lathe. It is actually similar to our standard production Mona-Matic lathes. This allows for cutting tests to be run under conditions similar to those obtained on modern production machines.

The extent and amount of instrumentation used with the lathe varies with individual requirements. Often the basic machine is all that is required for cutting tests. Sufficient control has been built into the lathe so that special recording devices are not necessary.

In the case of fundamental research, where cutting tool forces are important, instrumentation can be applied to the lathe. The machine is designed to take a tool force dynamometer and has external plugs for connecting recording instruments into the wattmeter and speedmeter, which are on the machine. A recording type of oscillograph is normally used with the dynamometer in order to record cutting forces, spindle speeds, horsepower and time.

Pick-up units can be attached to the tool post for obtaining vibrations and displacements at the cutting edge of the tool.

The illustration, upper left, shows the Monarch Machinability Test Lathe in use. It is possible also to make machinability tests on certain other properly equipped Monarch lathes. A tool force dynamometer and a recorder may be utilized for this purpose in connection with the 10" Model EE Toolmaker's Lathe as shown above, right. Such supplementary equipment may also be applied to the Monarch 612 and the Series 62 Lathes as long as these machines are provided with D.C. drive.

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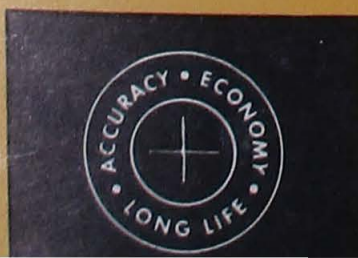
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