

G & L No. 3 JIG BORER

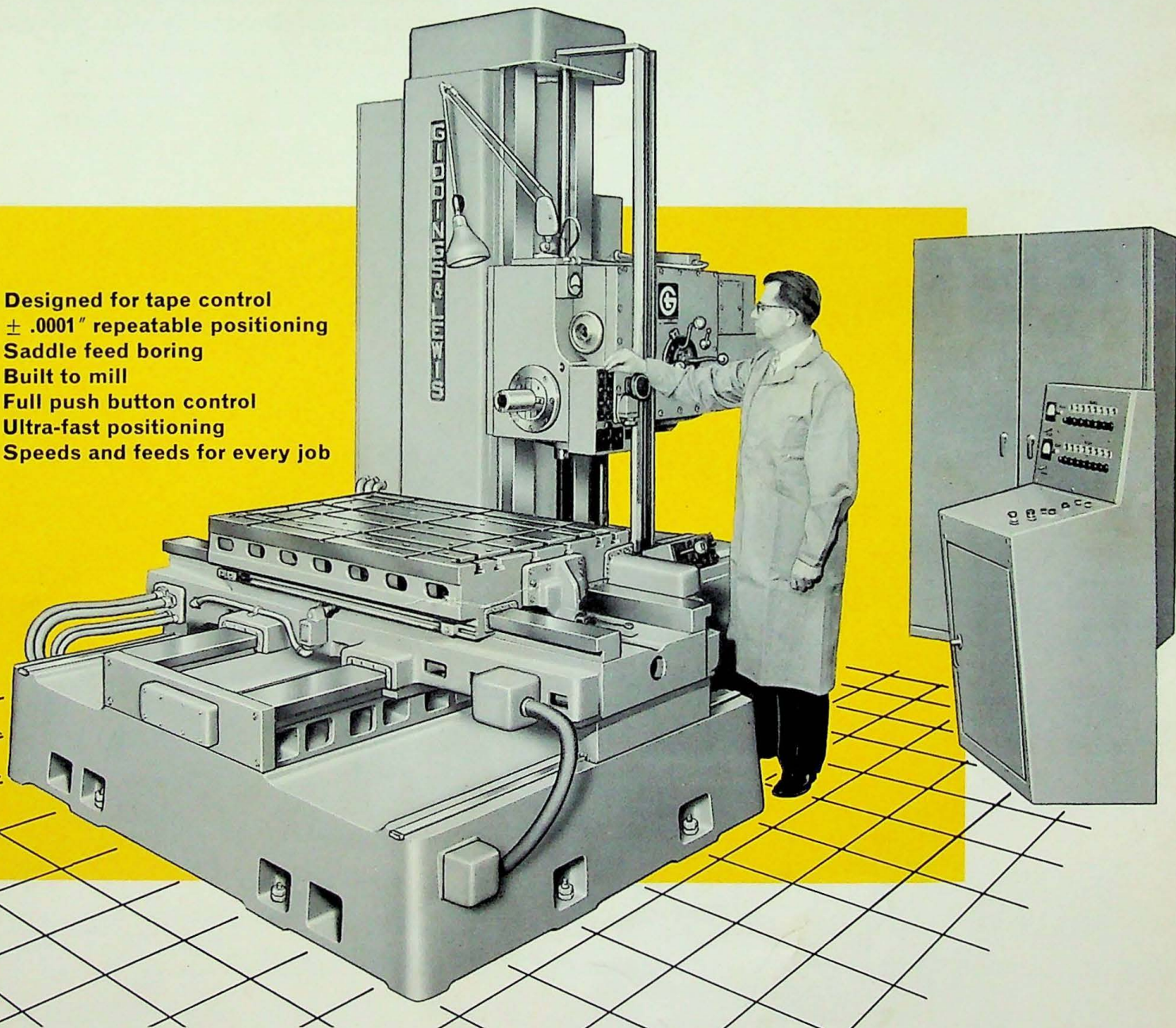
AND MILLING MACHINE



GIDDINGS & LEWIS

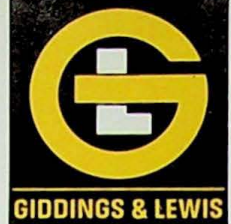
Catalog No. 3-JB

- Designed for tape control
- $\pm .0001$ " repeatable positioning
- Saddle feed boring
- Built to mill
- Full push button control
- Ultra-fast positioning
- Speeds and feeds for every job

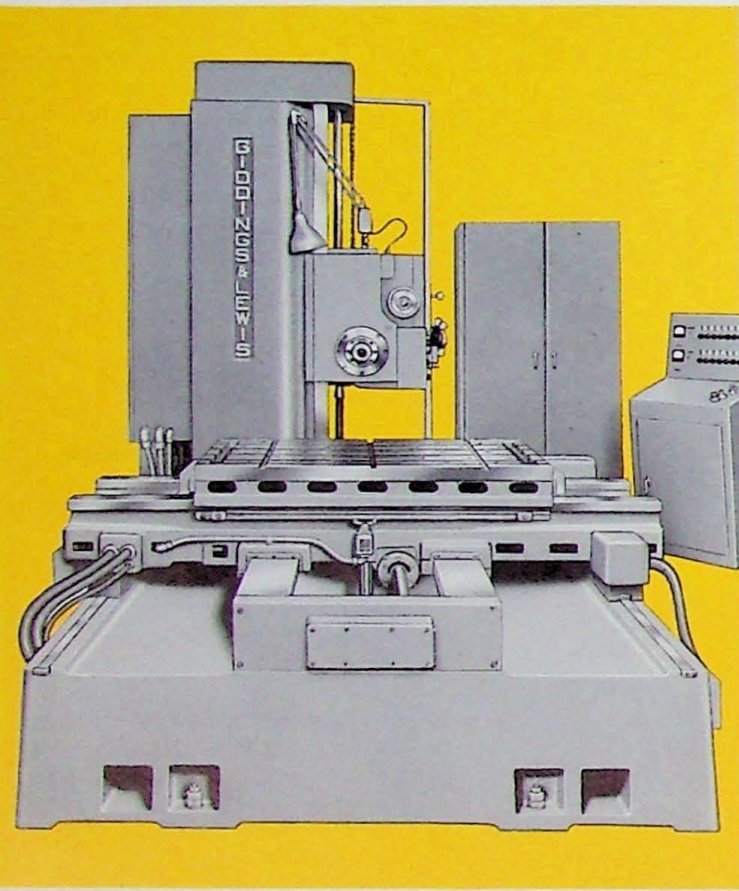


GIDDINGS & LEWIS MACHINE TOOL COMPANY
FOND DU LAC, WISCONSIN • ESTABLISHED 1859

G & L No. 3 JIG BORER AND MILLING MACHINE



**A TOTALLY NEW CONCEPT IN PRECISION . . .
VERSATILITY . . . PRODUCTIVITY . . . CONTROL**



Massive four-way bed with replaceable flame hardened ways and anti-friction track type saddle supports.

Here's a machine with exclusive features that jumps you ten years ahead of the times! It is designed and built to be operated by advanced control systems, including punched tape. It positions to $\pm .0001$ " with consistent repeatability. It takes heavy milling cuts with ease. It minimizes nonproductive time by ultra-fast positioning. It machines long bores to precision accuracy because it is equipped with saddle feed. It enables the operator to do more per day because advanced remote control of every function is standard. And, it provides optimum output with high-speed steel, carbide, or ceramic tools because it has the widest range of feeds and speeds available.

Never before has a new machine been based on greater experience and know-how or more thorough operational testing . . .

. . . back of it are more than 6200 G&L horizontal spindle machines in the field—machines with a world-wide reputation for excellence—machines with an unequalled resale value.

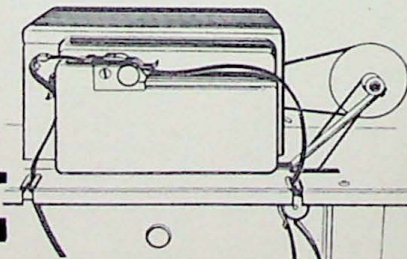
. . . back of it is leadership in tape control. Giddings & Lewis developed the first commercially available tape-controlled machine tool—and has produced more major tape-controlled machines than any other builder.

. . . back of it is proof of performance on the job—more than a year under tape control on G&L's own production before being released to the field.

Here is the most productive, versatile, and profitable machine in its class, and yet it is competitively priced. You will want to see a demonstration.

The machine and products illustrated in this catalog are fully protected by United States and foreign patents, patents pending and applied for. Illustrations and specifications published in this catalog are not binding in detail as we reserve the right to make further improvements and incorporate them in our designs.

DESIGNED FOR NUMERICAL CONTROL



From the bed up, the all-new G&L No. 3 jig borer has been designed to operate under Giddings & Lewis Numeripoint* control or other commercially available numerical control systems. Numerical control greatly adds to the productivity of the machine. It relieves the operator of responsibility for positioning accuracy, reduces nonmachining time, assures optimum feeds

and speeds. Wherever G&L tape-controlled machine tools are in use, remarkably high savings are being reported.

Data input for the headstock and table positioning is introduced to the control by means of 1" punched paper tape or by manually set ten-position switches. (If only the dial-in control is wanted, it can be pur-

chased without the punched tape reader, which can be added at any time later.)

The smallest increment of positioning information is .0001". Repeatable positioning accuracies of $\pm .0001"$ are normally obtained barring outside influence such as temperature change.

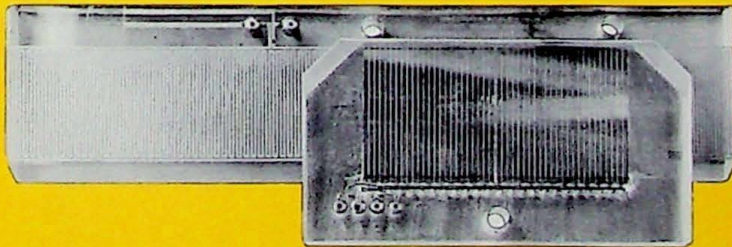
Once the zero reference point has been established under tape, the operator can take over the dial-in or push button control and then switch back to tape without re-establishing zero.

MACHINE WEAR CANNOT INTRODUCE ERROR

The highly accurate Inductosyn scale feed-back measuring for the control system is completely independent of the mechanical functions of the machine. The glass Inductosyn scale, which operates on the principle of a rolled-out resolver, is mounted on one machine member and the slider is mounted on the other member. An air gap separates the scale and slider. Error due to mechanical wear cannot be introduced into the system. In operation, the control compares the output of the command data read from the decade switches with the output of the scale slider combination feedback, and any deviation between command and feedback causes the machine to move in the direction which will reduce the error to zero.

FAST SIMULTANEOUS POSITIONING OF HEADSTOCK AND TABLE

Additional timesaving and operator convenience features include: pre-selection of positioning for both motions, reference offset over the full range of both motions, a maximum positioning speed of 120"/minute



"Inductosyn"® Scale. The fine positioning of the machine system consists of precisely spaced metallic conductors on glass plates. Unexcelled accuracy is obtained from this system because the system is completely divorced from any mechanical functions of the machine. Plus or minus programming to .0001" is practical with this arrangement.

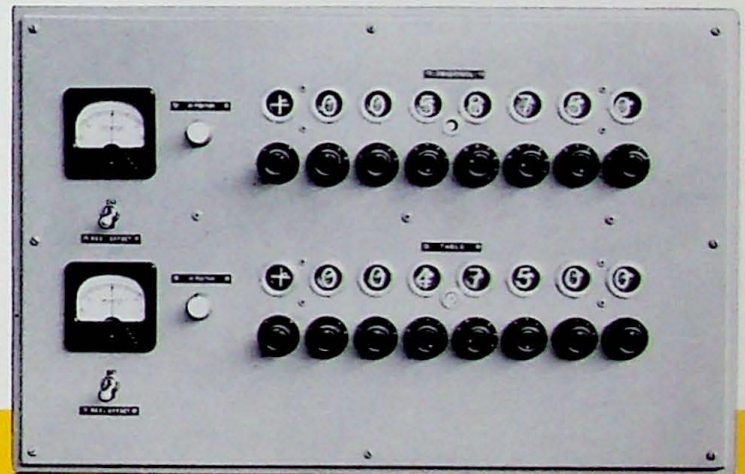
* ® Trademark of Inductosyn Corporation for "Electrical Measurement Apparatus."

with positioning of both units simultaneously, and programming or positioning in both directions on either motion. This is the fastest positioning jig borer built.

The tape is prepared on a standard record reproduce electric typewriter. The information is in block form and one block contains all of the information necessary to complete one cycle of machine operation. The information is transferred to the control at the discretion of the operator by pressing a read-in button. Positioning is initiated by depressing a cycle-start button and, when both motions are in position, position lights will be illuminated.

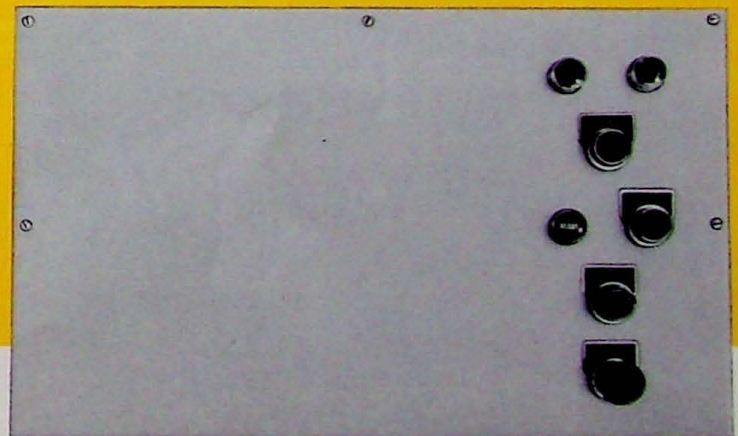
AUXILIARY FUNCTION CONTROL

Further operator conveniences are available by incorporating the auxiliary function control with the tape control feature. This includes spindle speed and feed selection, milling feed selection, three-positioning modes (precision positioning, standard positioning, and rough positioning), four milling modes (precision milling, standard milling, picture-frame milling, and rough milling), tool number display, coolant control, and dial-in milling.



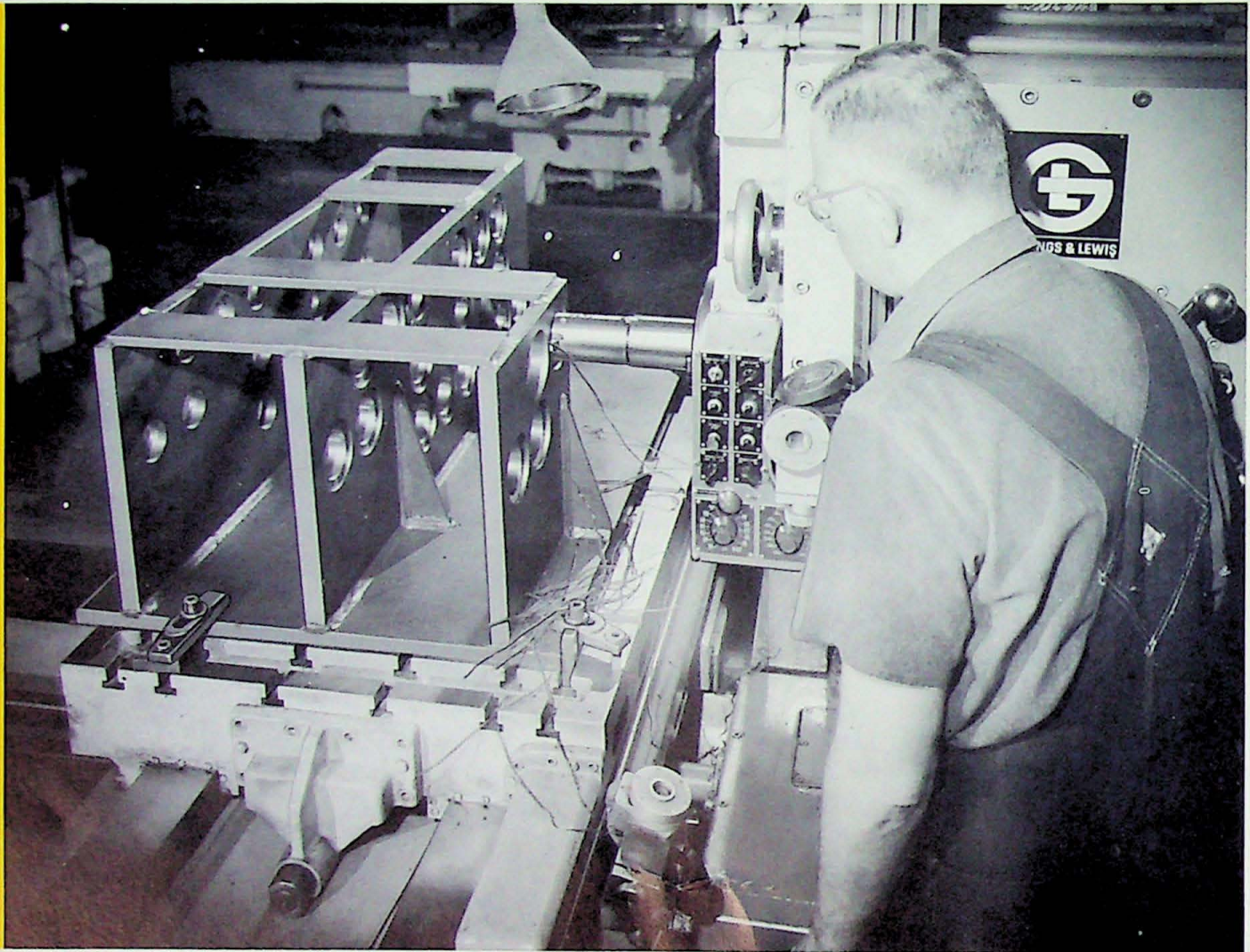
Dial Control Panel. This panel contains the readout measuring indicators as well as the digital dials for preselect positioning operation, reference offset adjustment, and the optional deviation meters.

Tape Control Panel. A very simplified pushbutton station is mounted on the sloping top of the control console. Work space has also been provided on the sloping top for convenient storage of program manuscripts, drawings, and other operator's reference material.



SADDLE FEED BORING IS STANDARD

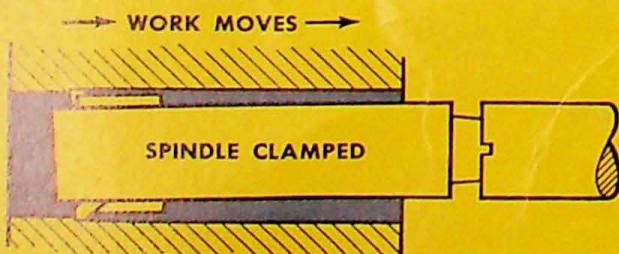
ERROR PRODUCED BY BAR SAG IS ELIMINATED



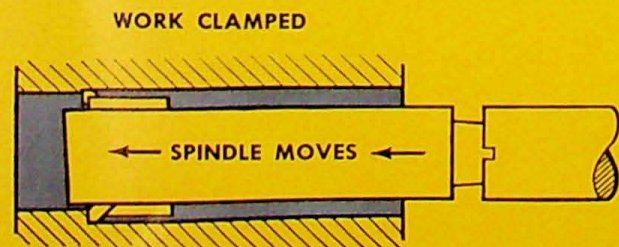
Recognizing that saddle feed boring is the only method of obtaining accurate long bores with stub bars, the G&L No. 3 jig borer has been arranged with boring feeds to the saddle of .012" to 120"/min. By referring to the sketches below, the compensating effect of saddle feed to correct bar deflection may be seen. Since this deflection remains substantially constant while machining, with no change in bar extension

from the headstock, the bore alignment will not be affected. It will be parallel to the horizontal motion of the table as it feeds the work into the cutters.

On the contrary, when spindle feed is used, the progressive increase of deflection of stub bars on long bores is substantial. This is completely avoided by using the saddle feed.



RIGHT

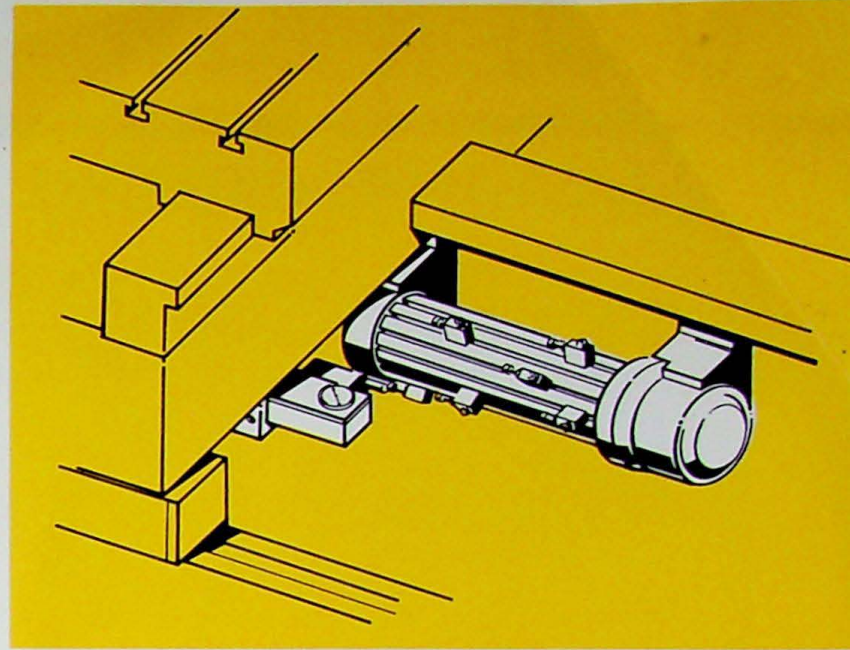


WRONG

AUTOMATIC SADDLE DEPTH POSITIONING

Automatic electric saddle depth positioning is standard equipment for use with the saddle boring feeds. Predetermined settings are established by use of job rods or end measures and repeatable accuracies can be obtained within $\pm .0001"$. The saddle moves into position through a three-step slow down from the feed rate selected for the boring operation by the operator.

Additional flexibility is available with the saddle depth positioning control by installing the optional depth positioning drum with 12 individually adjustable depth stops. When the drum is purchased with the 2-axis tape control feature, it is possible to index the drum from the tape control system.



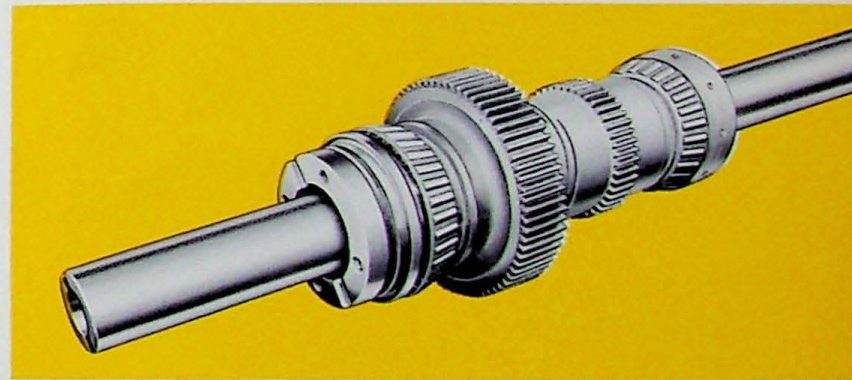
SUPERIOR HEADSTOCK CONSTRUCTION

COMBINES JIG BORING PRECISION WITH HEAVY MILLING CAPACITY

Precision spindle. Accurate boring, as well as work-horse milling, is possible because of exclusive G&L spindle construction. The 3" diameter hardened nitralloy spindle is carried in a hardened sleeve rotating on the finest available ultra-precision preloaded Timken tapered roller bearings. Surface finish on the spindle averages between two and three microinches, and spindle runout normally measures .0001" to .0002" TIR.

Drive gear close to front. The driving bullgear is shifted close to the front spindle sleeve bearing for slow-speed operation and heavy boring and milling work. This minimizes torsional deflection on the spindle and sleeve. When the high-speed gear is engaged, the heavy bullgear is disengaged and provides a flywheel effect essential for use with carbide or ceramic tooling.

A power-operated drawbolt is standard, eliminating the antiquated method of using drawkeys, drifts, and hammers for securing tools. Tools and arbors are drawn up snugly and evenly and ejected smoothly by this precision device. Faster tool changes will also result because the spindle need not be extended to change the tools. The power drawbolt is powered by a small torque motor located at the rear of the ram guide and is controlled from the remote control station.

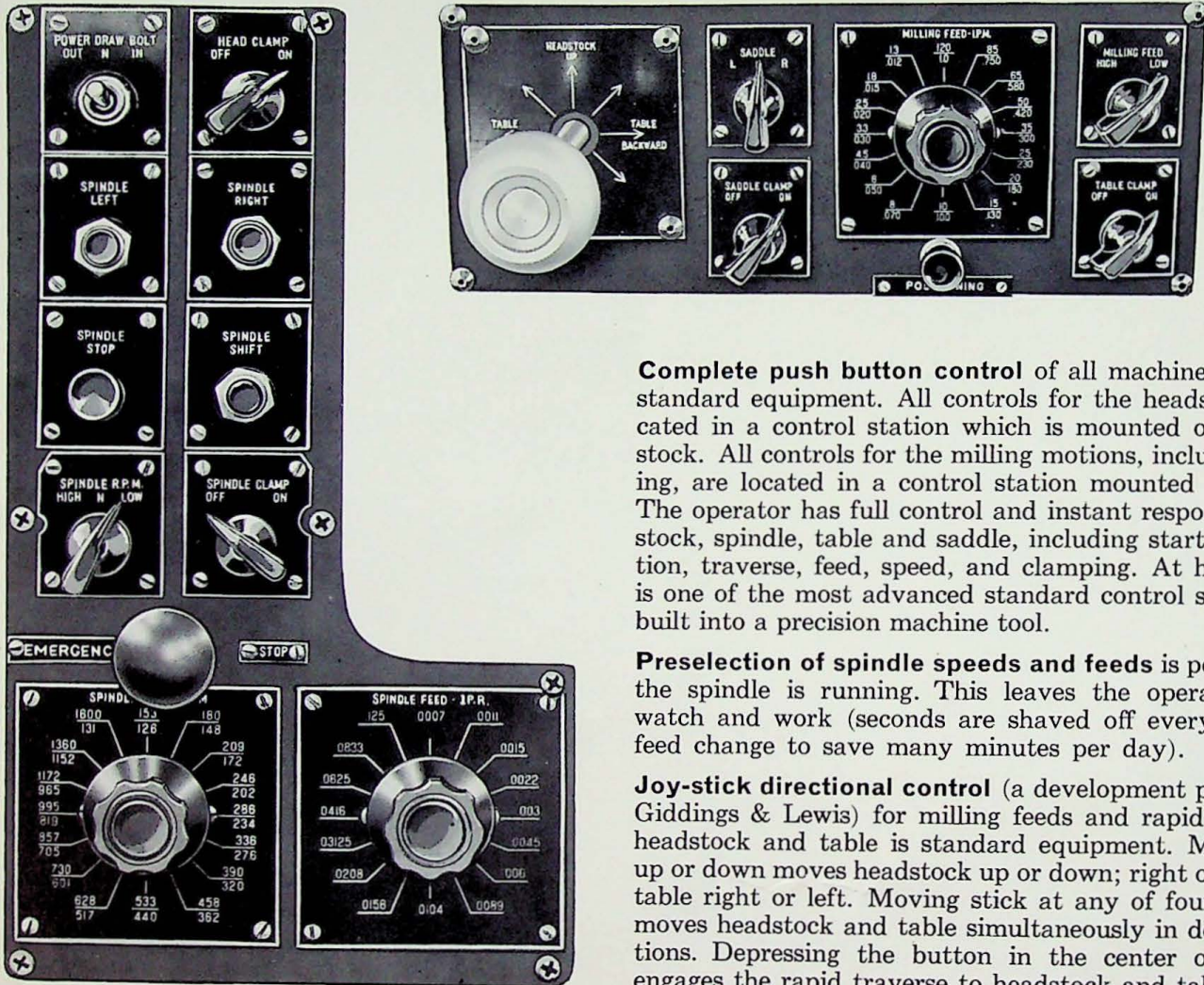


Independent 10-horsepower spindle drive motor with hardened alloy steel gears provides a smooth, even flow of power from the motor to the cutter. All gears are carried in antifriction bearings and lubrication to the gears and bearings is completely automatic from an independent lubrication system. Shifting of the gears and clutches in the headstock is accomplished by electrohydraulic means and is controlled from a panel at the front of the headstock which is easily accessible for the operator.

An independent spindle feedbox is standard equipment, making it possible for the operator to bore with either the spindle or the saddle. The spindle feeds are interlocked with the spindle speeds for tapping operations, and a full range of thread leads is available by changing pickoff gears.

COMPLETE PUSH BUTTON CONTROL

MOST ADVANCED SYSTEM AVAILABLE ANYWHERE



Complete push button control of all machine functions is standard equipment. All controls for the headstock are located in a control station which is mounted on the headstock. All controls for the milling motions, including clamping, are located in a control station mounted on the bed. The operator has full control and instant response of headstock, spindle, table and saddle, including start, stop direction, traverse, feed, speed, and clamping. At his fingertips is one of the most advanced standard control systems ever built into a precision machine tool.

Preselection of spindle speeds and feeds is possible while the spindle is running. This leaves the operator free to watch and work (seconds are shaved off every speed and feed change to save many minutes per day).

Joy-stick directional control (a development pioneered by Giddings & Lewis) for milling feeds and rapid traverse to headstock and table is standard equipment. Moving stick up or down moves headstock up or down; right or left moves table right or left. Moving stick at any of four 45° angles moves headstock and table simultaneously in desired directions. Depressing the button in the center of the knob engages the rapid traverse to headstock and table. A separate button actuates the saddle rapid traverse.

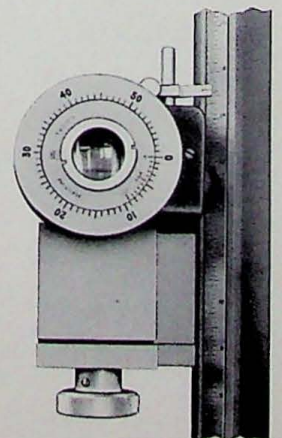
PRODUCTION-BOOSTING OPTIONALS

COOLANT SYSTEM

For maximum cutter efficiency, either flood coolant or mist coolant systems are available. Either can be easily installed. Machine components have been designed so that they will catch the draining fluids.

OPTICAL MEASURING

For easy, more accurate reading of scales, an optical measuring system is available for the headstock, table, and saddle motions. With this system, measurements can be read to .0001".



UNYIELDING RIGIDITY . . . ACCURACY

TRUE G & L COLUMN, BED, TABLE, AND SADDLE CONSTRUCTION

Massive ribbed castings. To capably support maximum table loads and resist maximum horsepower cuts, the column, bed, saddle, and table castings are heavily ribbed and full depth for rigidity and stiffness. All castings are poured in G&L foundries where the highest degree of quality is maintained. They are machine tool grade and designed to provide maximum rigidity during precision machining operations.

Flame-hardened ways. Freedom from galling, replaceability, higher machining accuracies, and longer life are provided by heavy-duty, flame-hardened ways on the saddle and two center ways of the bed. These semi-steel cast ways have a surface hardness of Rockwell C-50 to 55 to a depth of approximately $\frac{1}{8}$ ".

Antifriction saddle supports. For assurance that precision alignments will be maintained when the table is in its extreme position, antifriction, track-type saddle supports are provided. These roller bearings, riding on hardened steel strips, provide 24 lines of contact and the best possible support for heavy, offset table loads.

Precision lead screws. High accuracy is maintained longer by the precision construction of the alloy steel Acme lead screws which are stress-relieved and ground. Bearing on these lead screws are special wear-resistant brass antibacklash nuts. The screws are driven from a transmission and feedbox combination which is powered by an independent $7\frac{1}{2}$ -horsepower feed motor. The gears and the feedbox are shifted by electrohydraulic means and are controlled remotely from a control station on the bed.

For positive locking of the table, headstock, and saddle, antifriction wedge blocks are forced into place by hydraulic cylinders controlled from the remote control station. The clamping force is sufficient to

resist any motion which might be induced by a maximum horsepower cut.

Automatic lubrication. The feedbox, transmission, lead screws, and all way surfaces are lubricated automatically. The lubrication system, main drive motor, and milling feed motor are interlocked or arranged with fail safe solenoid valves to prevent operation of the machine unless proper lubrication is provided.

As a safety feature to prevent damage due to over-travel of any of the machine elements, a complete set of end limit switches protects all machine units.

Scales and verniers standard. For accurate measurements to .001" scales and adjustable verniers are supplied for table and headstock motions. Calibration of these verniers is over a length of .050". This, coupled with the convenient location, provides unequalled ease of measurement reading. In addition to scales and adjustable verniers, fine feed microdials are furnished for the headstock, table, and saddle motion. These microdials are calibrated in .001", making rapid final settings of machine elements possible.

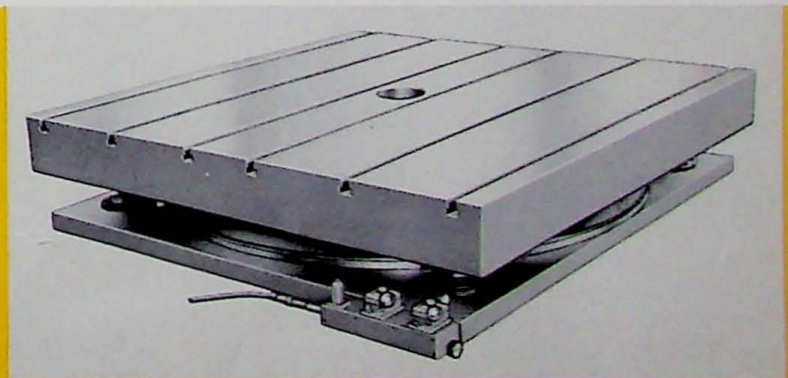
Square-lock gibbing is the assurance of maximum rigidity and a logical absorption of forces set up under heavy boring or milling operations. This method of gibbing provides positive alignment of all machine elements at all times. This is particularly valuable when using the spindle in an extended position.

Firm anchorage. For accurate machine leveling and hold-down to the foundation, tubular screws with a spherical nose are supported by a spherical seated plate on the foundation. This arrangement compensates for any misalignment. The anchor bolt, which is imbedded in the foundation, extends through the tubular screw and secures the tubular screw firmly to the foundation.

LUBRI-COOL* SYSTEM

Machine accuracy can be maintained simply and easily with a G&L Lubri-Cool system which dissipates heat generated in the machine and maintains a uniform operating temperature. This system maintains a constant flow of cool oil circulating through the headstock and bed units. The spindle sleeve bearings in the headstock are surrounded by oil manifolds which permit direct cooling of the outer races. The other bearings and gears in the headstock and bed are cooled by a cascade of refrigerated oil. The lubricant is maintained at a temperature relative to the room temperature, so a very gradual increase throughout the day is encountered. This increase keeps pace with the normal temperature rise of the machine and workpiece.

*Registered trademark



ROTARY TABLE

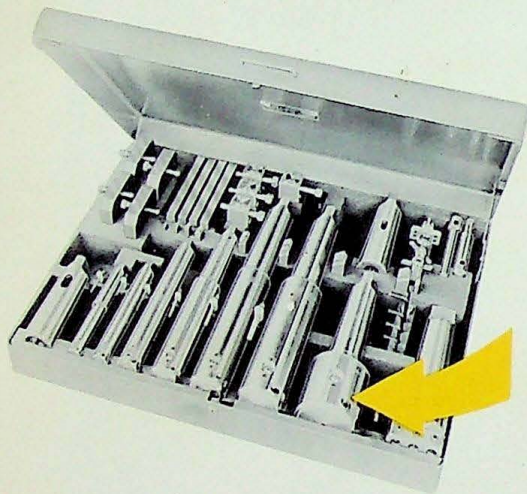
Designed for unusually quick and easy turning, with an air actuated tapered locating pin, this new air lift rotary table permits machining to close tolerances on multiple surfaces of the workpiece.

GENERAL SPECIFICATIONS

G&L NO. 3 JIG BORER AND MILLING MACHINE

Spindle Diameter	3"	Number of Spindle Feeds	16
Spindle Taper	#40 MM	Spindle Feed Range0007 to .125"/Rev.
Spindle Feed	24"	Number of Milling Feeds	32
Headstock Travel	40"	Milling Feed Range012 to 120"/Min.
Table Size*	30" x 48"	Rapid Traverse (Headstock, Table, Saddle)	120"/Min.
Cross Travel	36"	Width Across Saddle Supports	72"
Saddle Travel	16"	Standard Thread Leads	2, 3, 4, 6, 8, 12, 16, 24, 32, 48, 64, 96
Number of Spindle Speeds	32		
Spindle Speed Range	12.6 to 1600		

* Optional - 30" x 60" table with 48" cross travel



DAVIS JIG BORER TOOL SET

"SUPER-MIKE" BARS — 1-1/4" to 8" bore range • Radial adjustment in .0001" increments by direct reading dial • Adjusting mechanism has zero backlash for maximum adjustment accuracy • Cutters adjusted without releasing clamp screw pressure • Interchangeable SHSS, TCT or throwaway insert cutters.

CF-4 HEAD — 7/16" to 10" range • Bore, face, turn, thread, recess, backface, counterbore • Continuous radial feed to slide • Rapid traverse manual slide retraction • Adjustable feed stops • Rigid slide clamp for boring and turning • Complete with bars, extensions, pencil boring tool and handwheel.

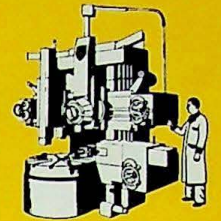
ACCESSORIES — MT sleeve adapter for drilling, tapping, etc. • Set-up items.

The Davis #3 Jig Borer Tool Set includes a combination of the most accurate and versatile tooling for jig boring work. It features the exclusive Davis "Super-Mike" Micrometer Adjustable Flycutters in a complete range of bars and the Davis CF-4 Head for a broad variety of machining operations; plus precision set-up accessories to complement the #3 Giddings & Lewis Jig Borer & Milling Machine.

Also available is a Davis #3 Jig Borer Milling Arbor Set which includes Davis #1, #2-A, #3 and #9 Milling Arbors for shell mills from 1-3/4" to 5" in diameter. It also includes three (3) end mill holders for end mills ranging from 1/2" to 1" in shank diameters.

No. 3 JIG BORER TOOL SET INCLUDES					
Tool No.	Shank No.	Bar Dia.	Effective Bar Length	Cutter Size	Bore Range
123	4 Morse Taper	1	4	1/4	1 1/4-1 3/4
121	4 Morse Taper	1 1/4	5	3/8	1 1/2-2
118	40 MM	1 3/4	7	1/2	2-3
116	40 MM	2 1/4	8	1/2	2 1/2-3 1/2
114	40 MM	2 3/4	5	3/4	3 1/2-4 1/2
111	40 MM	3 1/2	5	3/4	4-6
107	40 MM	4 1/2	5	1	5-8
CF-4 Head Tool Set (Range 7/16"-10")					
CF-4 Boring Hd.	Tool	Tool No.	Sq. Slot Size	Effective Bar	
				Dia.	Length
W/40 MM Shank	Boring Bar	52-31	3/16	3/8	3
	Boring Bar	52-32	1/4	7/8	2 1/2
	Boring Bar	52-33	1/4	7/8	4 1/2
	90° Holder	52-35			1 1/2
	Facing Bar	52-34	3/8	1 1/4	1 1/4
	Pencil Boring	52-30	3/16 Dia.	1 1/4	2
Feed Actuation Handwheel					
7	Sleeve — 4 M.T. Socket w/40 MM Shank (Hdn. and Grd.)				
F-46	(4) T-slot Stop Jack 4" Sq. x 1 1/4" Thick				
F-53	(4) Table Stop Jack 3/4" Dia. Pilot				
No. 6	(4) Parallel Blocks 3/4 x 1 1/4 x 8				

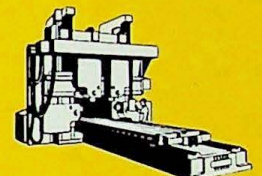
GIDDINGS & LEWIS THE HEAVY DUTY LINE



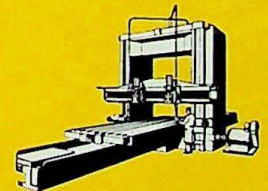
VERTICAL TURRET LATHES



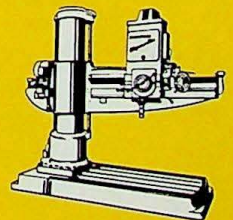
VERTICAL BORING MILLS



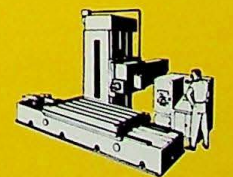
PLANER MILLS



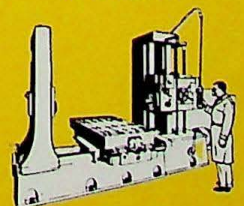
PLANERS



RADIAL AND UPRIGHT DRILLING MACHINES



CONTOUR MILLING MACHINES



HORIZONTALS — TABLE, FLOOR AND PLANER TYPE



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