

BULLARD

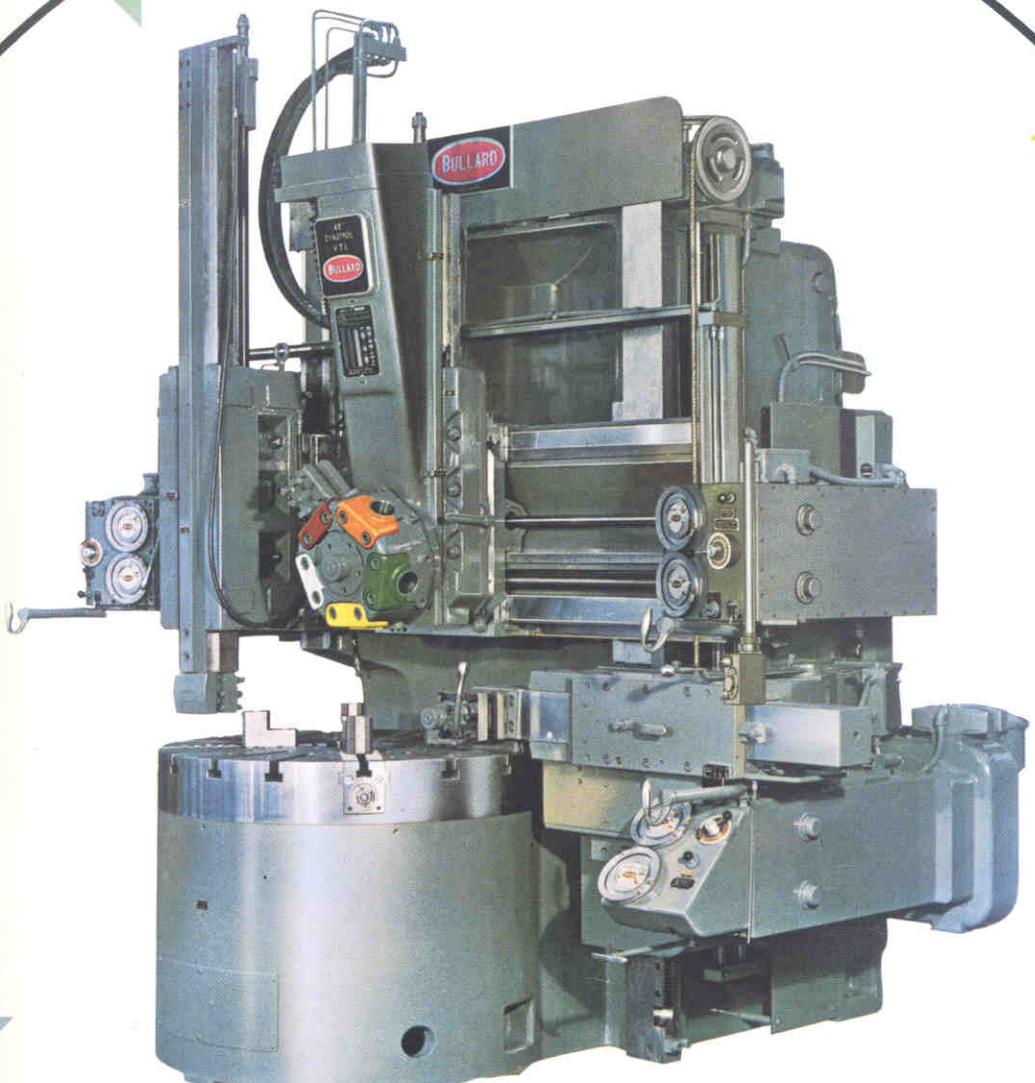
# DYNATROL

vertical turret lathes and vertical boring mills

dynamic

precision

control



The Bullard DYNATROL Vertical Turret Lathes and Vertical Boring Mills incorporate several unique and exclusive developments in machine tool control.

This extensive line of DYNATROL Vertical Turret Lathes and Vertical Boring Mills is fully power-controlled which keeps the tool in the cut more of the time — reducing time between cuts — and, therefore, increases the output of the machine.

The Bullard DYNATROL line has been designed for versatility, covering a broad range from manual operation to completely automatic control. A review of the following pages will convince you that the Bullard DYNATROL Vertical Turret Lathes and Vertical Boring Mills are the most modern and most productive machines of their type available to industry today.

You can't beat a BULLARD.

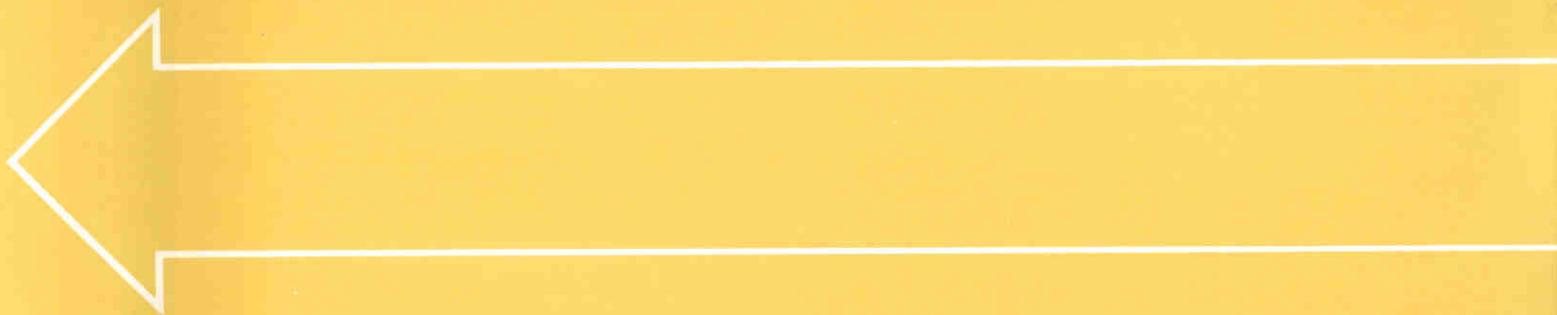
## index

|   |       |
|---|-------|
| Automatic Lubrication                   | 18    |
| Bed                                     | 11    |
| Capacity Charts, Machine: 26" - 36"     | 20-21 |
| 46" - 56" - 66" - 76" - 86"             | 22-23 |
| 108" - 124"                             | 24-25 |
| Capacity Charts, Head                   | 26-29 |
| Chucks                                  | 18    |
| Cross Rail                              | 11    |
| Cut Grinder                             | 18    |
| Cutting Coolant System                  | 16    |
| Feed Works and Control                  | 2     |
| Headstock                               | 12    |
| Machine Weights                         | 19    |
| Man-Au-Trol                             | 6-7   |
| Mechanical Readout                      | 15    |
| Power Indexing Turrets                  | 15    |
| Ram Heads                               | 14    |
| Ram Heads, Heavy Duty, Power Turret     | 15    |
| Recommended Horsepower                  | 19    |
| Side Head                               | 14    |
| Size-Au-Trol                            | 4-5   |
| Table Bearings                          | 12    |
| Table Drive and Control                 | 3     |
| Table Speeds                            | 19    |
| T.D.A. Attachment                       | 17    |
| Temperature Control                     | 17    |
| Tracer and Numerical Controls           | 15    |
| Turret Heads, Manual                    | 13    |
| Turret Heads, Index Registry            | 13    |
| 26" - 36" Illustrated                   | 8     |
| 46" - 56" - 66" - 76" - 86" Illustrated | 9     |
| 108" - 124" Illustrated                 | 10    |

**BULLARD**

# DYNATROL®

**vertical turret lathes and vertical boring mills**

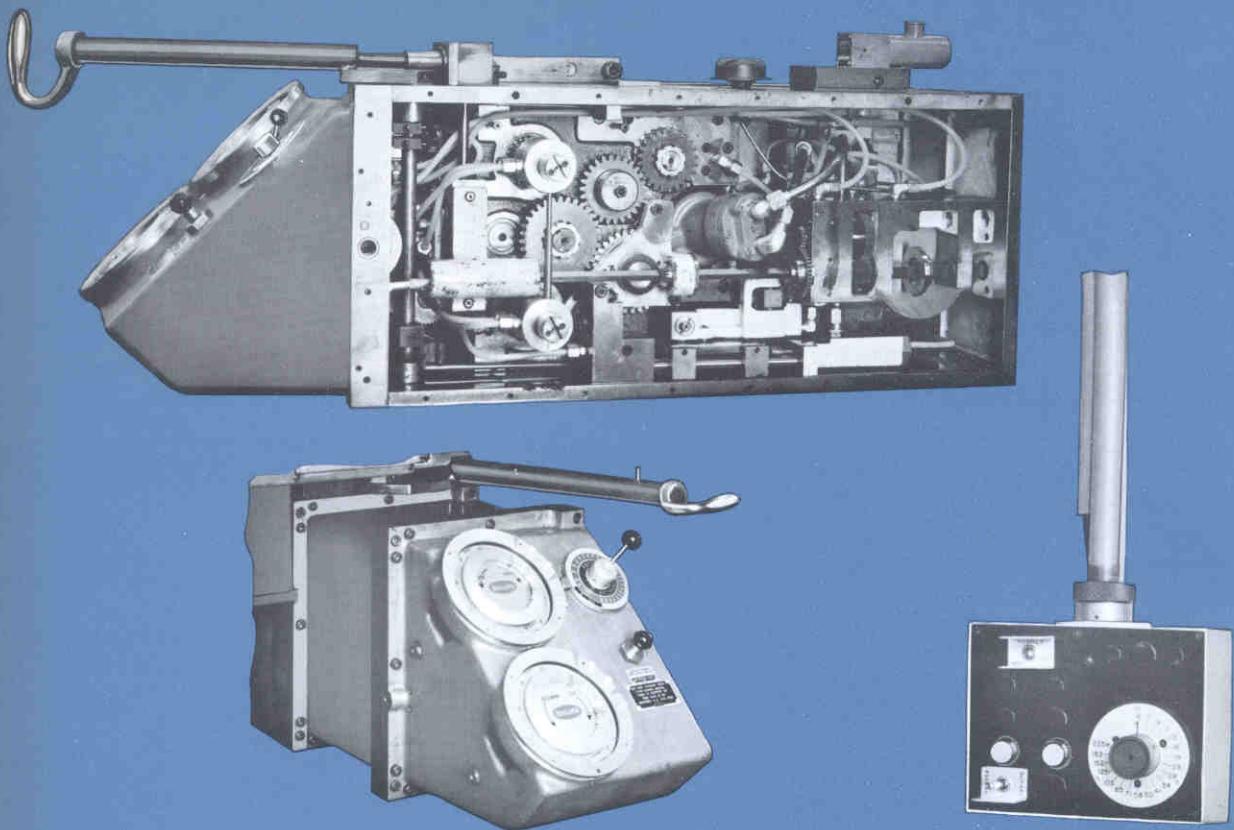


*with dynamic precision control*

The Bullard Company reserves the right to make changes and improvements  
in detail to the machines, products and specifications illustrated  
and described in this catalog at any time and without prior notice.

# DYNAMIC PRECISION CONTROL

and what it can do for you...



*Manual Control with Electric Speed Selector or...*

## Feed Works and Control

The standard feed bracket for each head provides infinitely variable traverse and feed rates over the entire range, from .001 to a maximum traverse rate of nine feet per minute.

For optimum tool performance and productivity, the feed rate can be varied while the tool continues cutting. Valuable production time is gained because it is no longer necessary to stop the table to change the feed rate.

Large, easily read clock-type dials with dual pointers are provided. The rotating pointers register individually in tenths and thousandths of an inch graduations on a fixed dial. This accurate visual measuring system permits exact head positioning in either feed or traverse without the need of hand wheels.

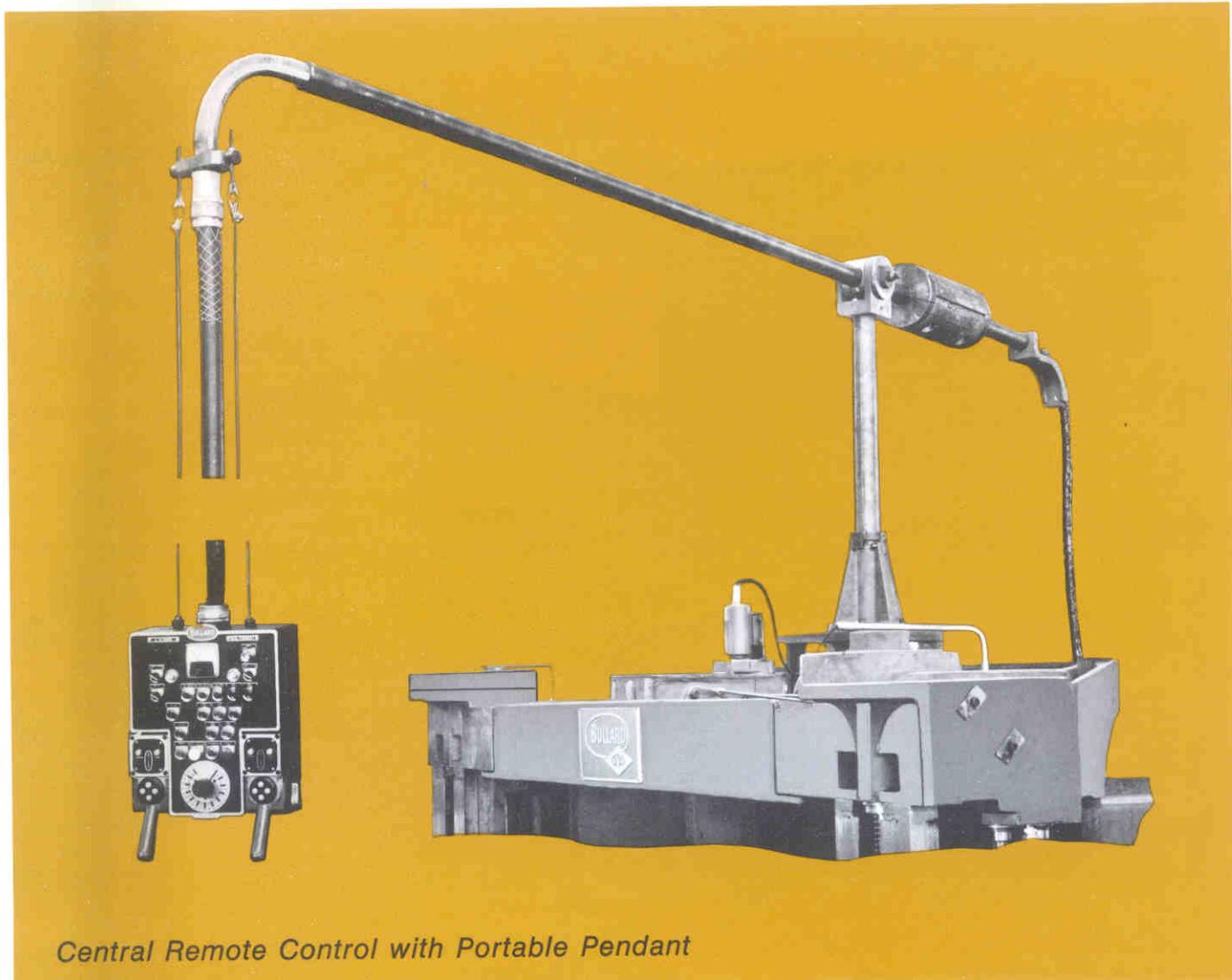
With manual control, all traverse and feed motions are selected by a lever arm, which also has a rotatable hand grip for directional selection. Mov-

ing the arm from neutral to the left, a short distance to a mark indicated on a fixed scale establishes a slow, constant creep rate for fine positioning. Pushing the arm beyond this point results in increasingly faster traverse rates.

Moving the control arm from neutral to the right results in increasing rates of feed.

Releasing the hand grip when in traverse results in the control arm returning to neutral, automatically stopping all head motion.

For remote control machines, an individual, compact portable control with pistol grip is provided for each head.



*Central Remote Control with Portable Pendant*

## Table Drive and Control

Any one of four types of table drives (*see page 12*) are available:

20 Speed w/AC Motor (single speed)

20 Speed w/AC Motor (two speed)

20 Speed w/DC Motor

2 Range - 4:1 w/DC Motor

In the twenty speed headstock, speed change clutches are hydraulically engaged by pistons actuated through solenoid actuated hydraulic valves. The speed gears always remain in constant mesh.

For machines equipped with a manual lever feed and traverse control, an electric speed selector is mounted on a short moveable arm extending from the top of the feed bracket on the right hand end of the cross rail.

For remote control power operated machines, a portable pendant is suspended from a swinging boom centrally mounted on the top of the machine. This travels with the operator around the entire front of the machine, giving him constant and in-

stantaneous control of directions and rates of motion of all heads individually, as well as start-stop, table RPM, coolant on-off.

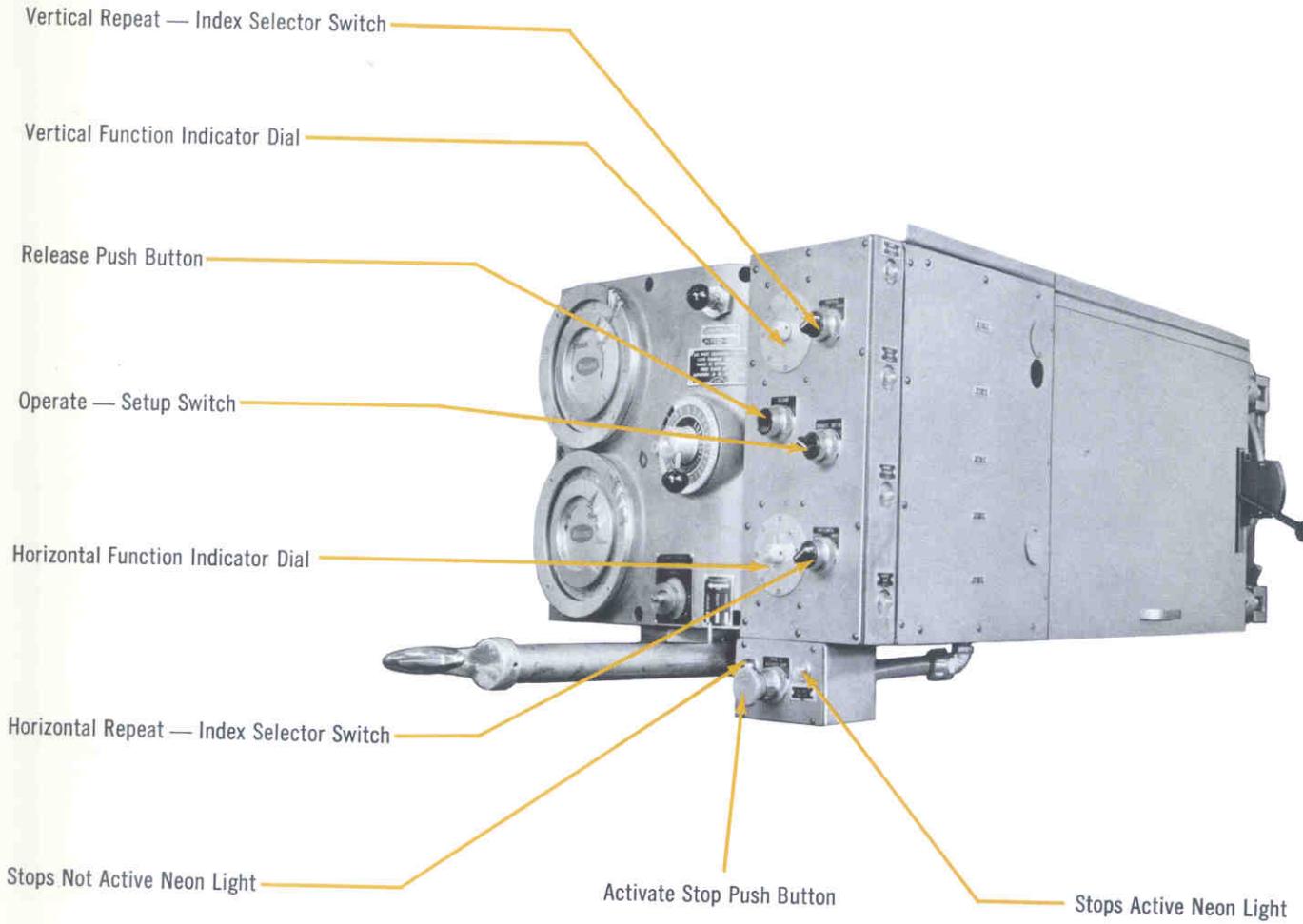
## Control Combinations

Various combinations of manual and remote controls are available to suit different requirements such as the following:

1. Manual feed works control with directional lever for each head, with electric table speed selector mounted on the right-hand feed bracket.

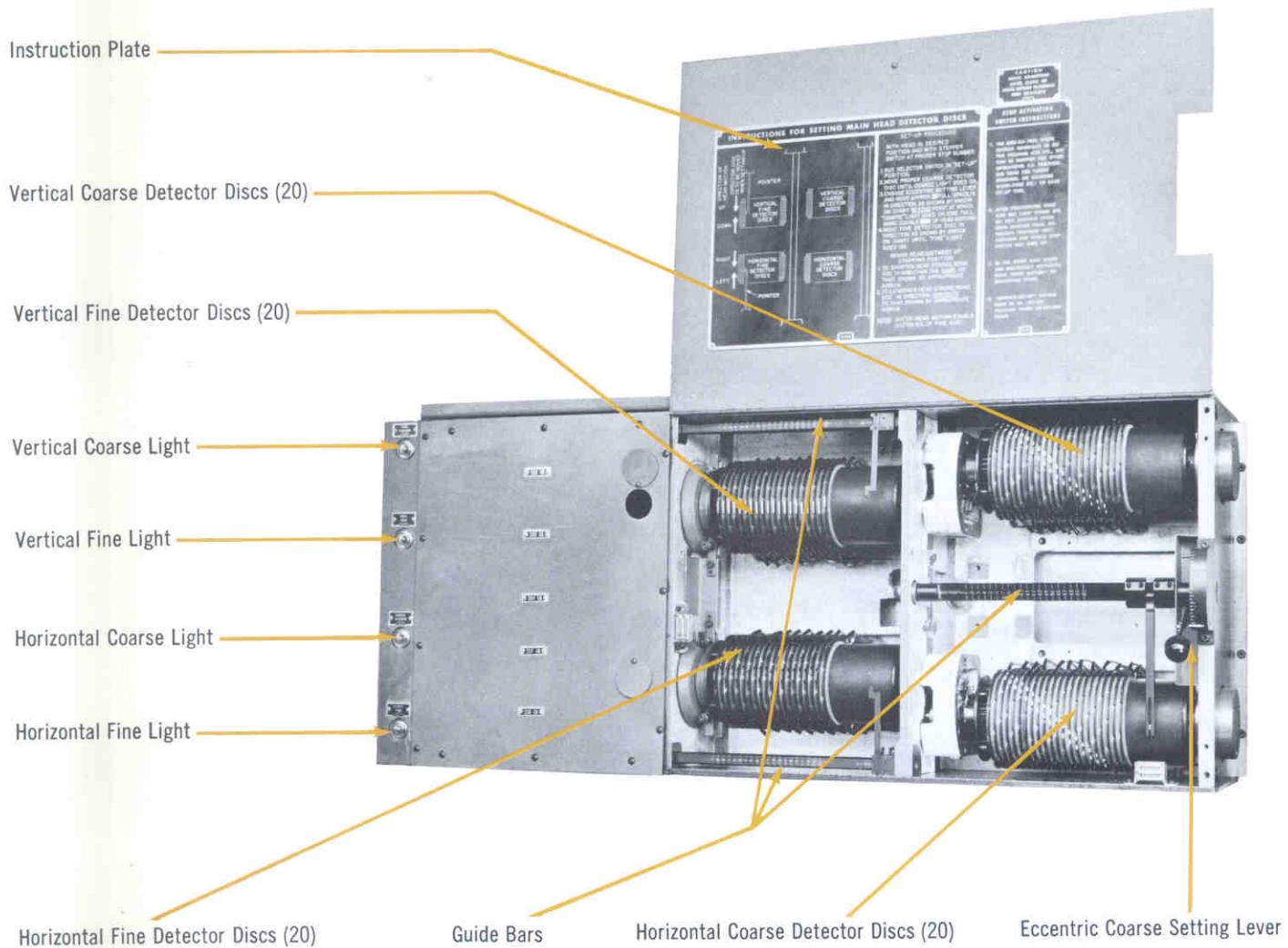
2. Individual, portable remote control with pistol grip for each power operated head, with electric speed selector for table RPM mounted on the right-hand feed bracket.

3. A compact, unified remote control pendant on a centrally mounted, swinging boom incorporating remote controls for all machine functions.



## **SIZE-AU-TROL**

**is a revolutionary new concept  
in machine tool positioning control**



This feature insures consistent and automatic control of size of the part to be machined. Repetitive accuracy, after initial setup, minimizes the responsibility of the operator for sizing the work and reduces time consuming manual gaging operations. Repetitive accuracy to limits of .0003 inches in either axis is possible through the unique arrangement of relating head position to rapid traverse and feed drive. Twenty detector discs per axis are furnished as standard.

## Function

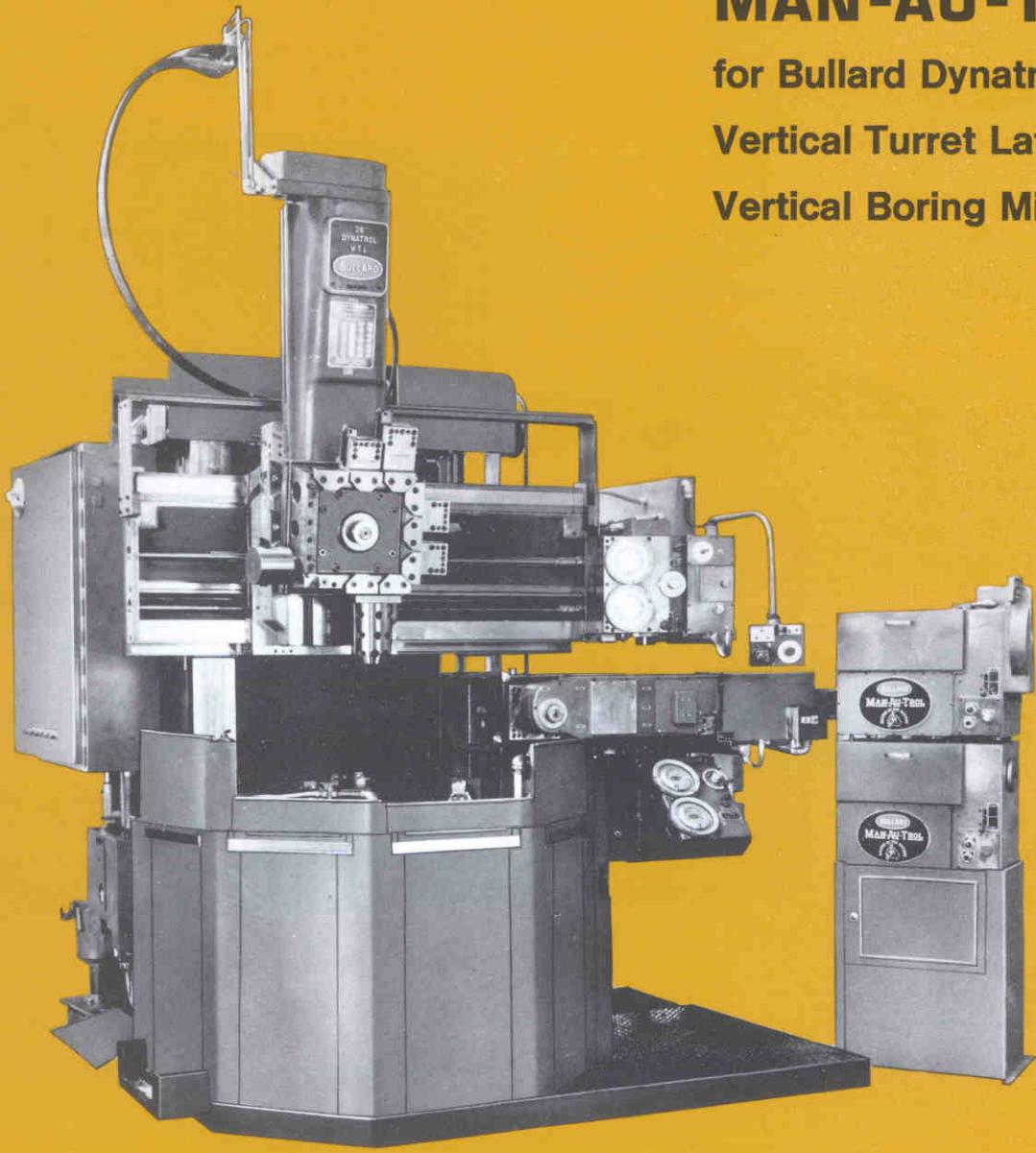
The movements of the heads are engaged manually in the proper direction by means of the single-lever control. When the head (i.e., the cutting tool) reaches the pre-set position, Size-Au-Trol stops its movement automatically. A stepping relay indexes the drum to the next function and the operator then manually engages the proper traverse or feed for the next movement of the head; Size-Au-Trol again takes over. To compensate for tool wear, the operator at any time can over-ride Size-Au-Trol and make manual adjustments in the size of the work before engaging the next function.

# **MAN-AU-TROL**

**for Bullard Dynatrol**

**Vertical Turret Lathes and**

**Vertical Boring Mills**



Man-Au-Trol can be applied to any or all heads of Bullard Vertical Turret Lathes and Boring Mills.

With Man-Au-Trol the machine is equipped to be operated either automatically or manually from the pendant control, using a transfer switch.

Because Man-Au-Trol automatically selects, activates, times and stops each and every machining function in its proper sequence, a consistently accurate, high rate of production can be maintained. Man-Au-Trol may be ordered with a machine or applied at a later date in the customer's plant. Power indexing turrets are required for Man-Au-Trol operation.

Man-Au-Trol can be programmed for any sequence of operating functions within the machine's capacity and is not limited to any one specific job. Any head equipped with Man-Au-Trol can perform 49 distinct functions or any number thereof during the machining cycle.

Explicitly, Man-Au-Trol controls the following functions — 1. Direction of feed and traverse horizontally, vertically or on a 45 degree angle. 2. Feed rates — any one of six feeds may be selected in an infinite range of from .001-.250 per revolution. 3. Table speeds — the full range of table speeds can be selected and automatically changed during the

operating cycle. 4. Turret index — power operated turrets are automatically indexed when necessary to bring different tools into the machining operation. 5. Length of feed and traverse strokes — maximum strokes up to the capacity of the machine are obtainable. The length of stroke, however, can be varied by as little as .002". Varying the length of stroke for one function in no way alters the length of stroke of another. 6. In addition to the above functions, the operation of Bullard standard attachments such as: Thread Cutting and Drum Scoring, Angular Turning, Contouring, and Infinitely Variable Gear Drive can be controlled by Man-Au-Trol.

## Function Control Unit

The Function Control is housed in a portable free-standing console which can be readily placed in any convenient location adjacent to the machine. It contains a separate function drum for each head, which controls all machine functions including feed and traverse rates, dwell, feed and traverse direction, speed changes, start-stop and turret index. The drum is usually set up from a pre-determined job operation chart on which all operating functions are listed in their proper sequence. The function drum can be set up while in place in the unit or removed and pre-set wherever convenient.

The drum has 49 rows of holes around its periphery representing 49 possible sequential changes of pre-selected functions in a machining cycle. To facilitate drum setup, a function chart gage is provided. To set up the drum, it is simply a matter of securing a function pin in the proper hole as indicated on the function chart gage. These pins can readily be rearranged for any number of different machine operations.

In operation, the function drum is automatically indexed at the completion of the preceding function.

The Man-Au-Trol Function Control Drum has been designed so that, once set up for a specific job, it can be removed and stored for future use whenever the same job is re-run without disturbing the prepared sequence of functions, thereby reducing setup time to a minimum and increasing valuable productive time.

## Detector Control Unit

This portion of the Man-Au-Trol system, which automatically controls all head motions in any pre-selected sequence and the rough and finished dimensions of the workpiece being machined, is mounted on the outer side of the feed works for each head under Man-Au-Trol control.

In construction and function this unit is similar to Size-Au-Trol as described and illustrated on

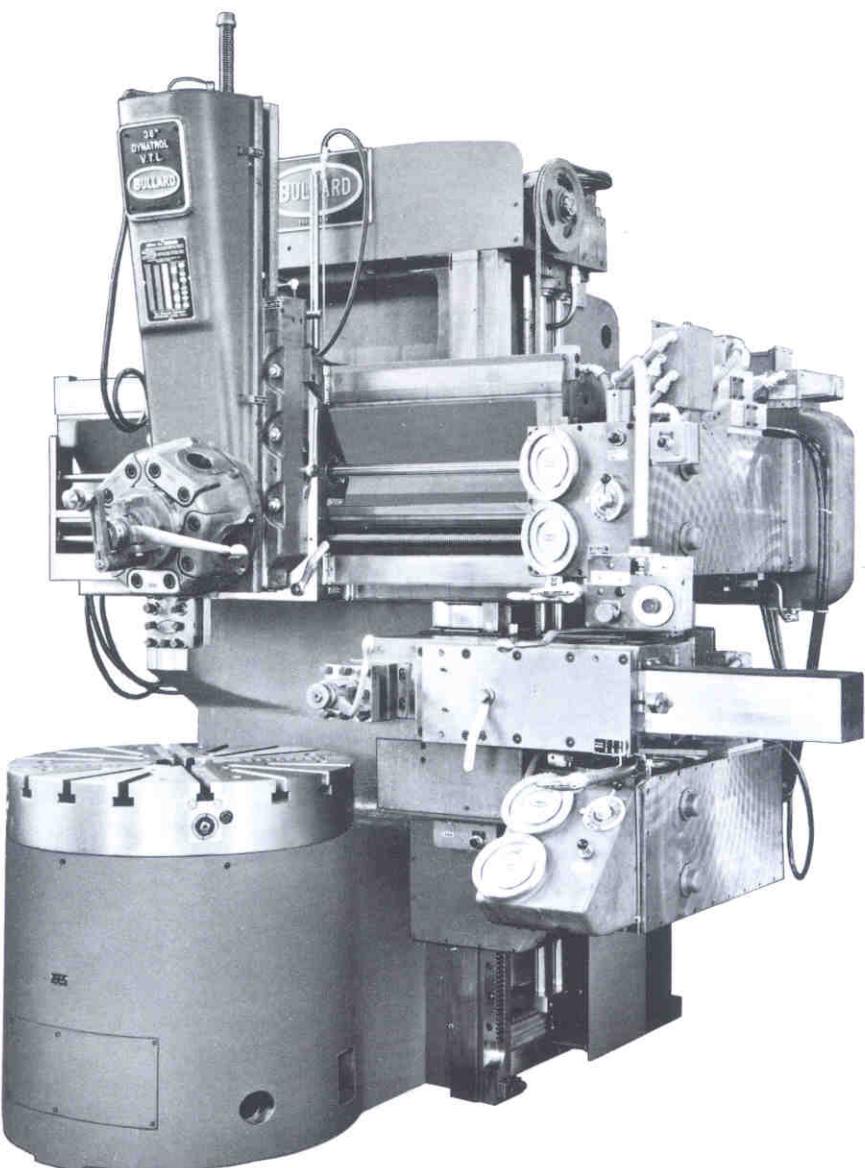
Function Control Unit



pages 4 and 5, except that the detector control unit is supplied with 30 detector discs for each standard drum instead of 20. Setup is accomplished in much the same manner. The proper procedure, which is quite simple, is fully detailed in the Dynatrol Operator's Instruction Book. Essentially, the operator machines the first piece manually, setting the proper stops and controls for each operation as he proceeds through the setup.

The dimensions of the part being machined can be quickly altered at any time if required, with a micrometer adjustment provided for this purpose. This permits accurate and immediate compensation for tool wear without removing any tool from the machine or in any way disturbing it.

At any time during automatic cycle the machine can be instantly changed to manual control by simply moving one lever. When this is done, the heads are controlled manually and may be moved to any position desired by the operator. The machine may then be returned to automatic control by again moving the same lever and restarted at any desired position.

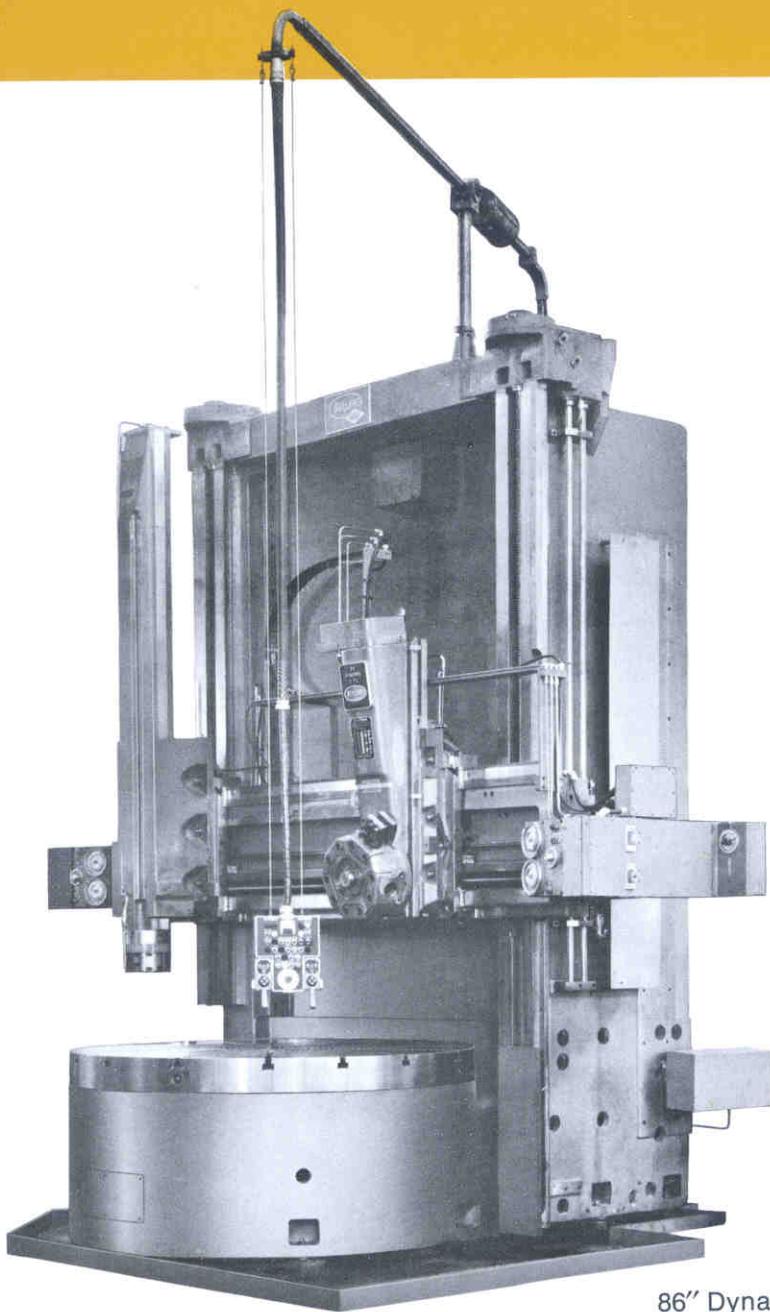


36" Dynatrol Vertical Turret Lathe

**26"-36"**  
**DYNATROL**  
vertical turret lathes

The Dynatrol Vertical Turret Lathe was designed to deliver maximum productivity with precision and reliability. Simple controls, located in the most convenient positions, provide the operator with a fully power-controlled machine, allowing him to use modern cutting tools at maximum rates to produce more work — better and faster.

These two smaller sizes of Bullard Dynatrol Vertical Turret Lathes are compact in design and rigid in construction. They are lower in height and require less floor space than previous models. Yet with this compactness, all the ruggedness inherent in Bullard vertical turret lathes has been retained. Many new features have been added and previous ones improved.



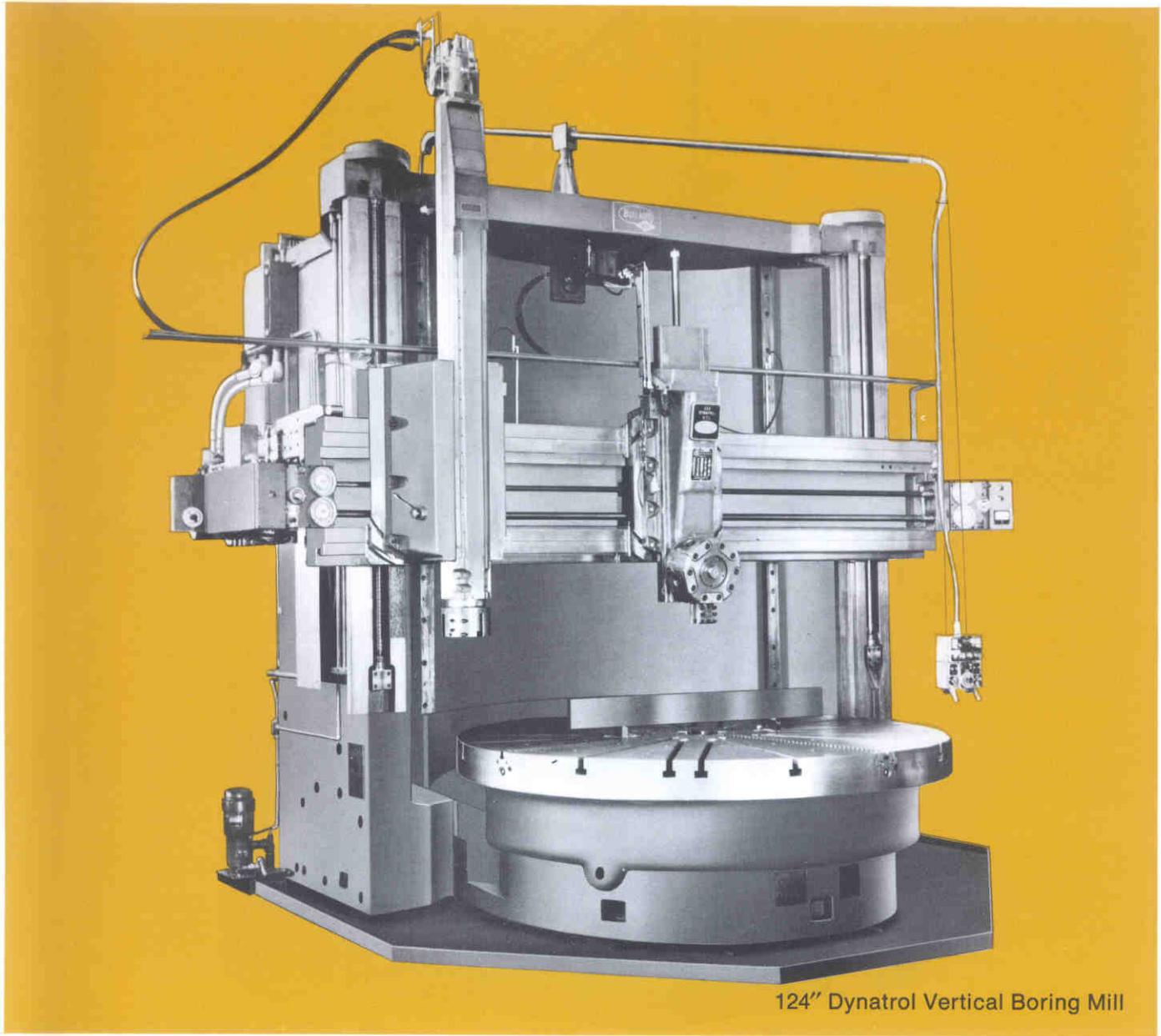
86" Dynatrol Vertical Turret Lathe

**46"-56"-66"-76"-86"**  
**DYNATROL**  
**vertical turret lathes**

The Dynatrol line of vertical turret lathes from 46" to 86" table diameter provide complete versatility of controls and head combinations to best suit various machining requirements. Manual controls or portable remote controls for all head movements can be specified. The cross rail can be equipped with one or two heads, either turret or ram type, or any combination of each. Usually a side head is also used.

Size for size, they offer more work handling capacity and greater productivity than any previous models.

The Bullard Dynatrol Vertical Turret Lathes are the most versatile and productive available to the metalworking industry.



124" Dynatrol Vertical Boring Mill

**108"-124"**  
**DYNATROL**  
**vertical boring mill**

The Bullard Dynatrol Vertical Boring Mill line, offered with 108" and 124" diameter tables, is the most advanced design available today for this class of boring mill. For maximum strength, the base and upright columns are tied together by front and rear cast tie plates, resulting in a single rigid box type construction.

A central, remote control, portable pendant is provided. This is suspended from a swinging overhead boom, and gives the operator complete freedom to command every machine function from any convenient position around the front sector of the machine. Ruggedness, durability and precision are built into the design of these giant Dynatrol Vertical Boring Mills and they are available in sizes to handle a wide range of requirements.



## Bed

The bed casting features rugged, ribbed construction with maximum rigidity for the heaviest cutting loads and maximum stability for operating accuracy. The bottom of the base is sloped inside to accelerate the return of the oil to the filtration system. Regardless of size, all machine bases are designed so that installation requires no service pits or floor openings. Replaceable hardened and ground wear strips for bed bearing ways can be furnished. When required, extra high beds are available.

## Cross Rail

The cast iron way bearings of the cross rail, with replaceable hardened and ground wear strips, feature large bearing areas and wide spacing. This provides maximum support for the head saddles to insure maximum rigidity and support of tools under severest cutting conditions. Bearing ways and all moving parts are automatically lubricated.



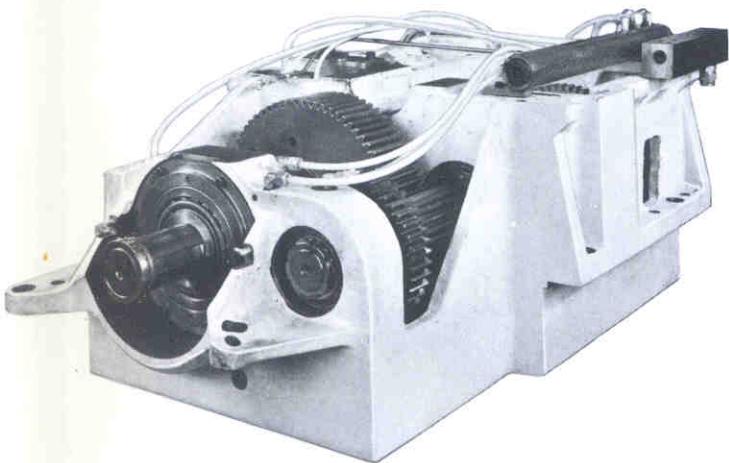
## Table Bearings

A pilot is incorporated in the bed casting and machined to accurately locate the large radial tapered roller bearing for the table carrier. In addition, an anti-friction thrust bearing is mounted adjacent to the ring gear. A simple pre-load cap, accessible by removal of the table, simultaneously preloads the bearings. The 86" thru 124" size machines have an additional anti-friction thrust bearing provided adjacent to the radial bearing to assure maximum support for heavy thrust loads.

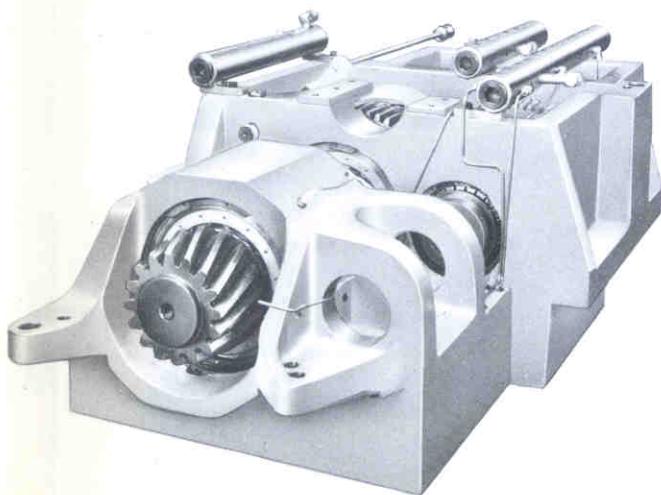
The load bearing capacity of this construction is vastly greater than the weight of any workpiece that can be placed upon it. A table giving load bearing capacity for each machine size is available on request.



Spindle Bearing — 36" Dynatrol V.T.L.



20 Speed Headstock



Two Range 4:1 Headstock (Used W/DC Drive)

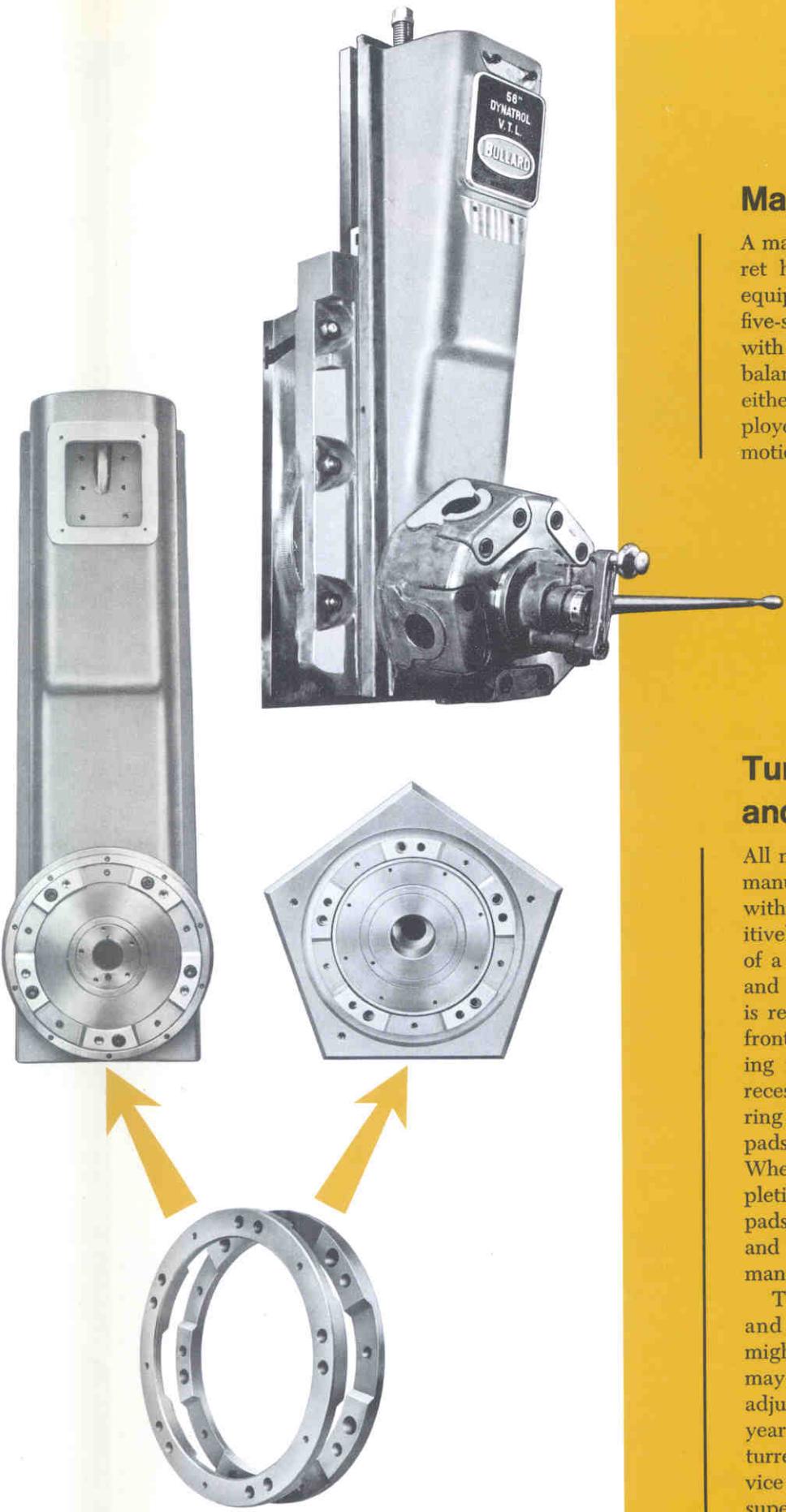
## Headstock — 20 Speed

The entire headstock assembly unit is mounted on parallel machined ways in the bed. All gears are in constant mesh. Speed selection is obtained by means of toothed clutches. A simplified electric speed change and table start-stop control is actuated from the pendant. A rotary selector drum activates hydraulic pistons to engage the clutches. Clutch and brake are safety interlocked and are hydraulically engaged to provide smooth action and require no adjustments. All shift controls are conveniently located and are readily accessible.

The V-Belt drive input to the main shaft, as well as hydraulic and lubricating pumps, are mounted on the clutch case for easy accessibility. Safety interlocks are provided throughout.

## Headstock — Two Range

This headstock has a high and low speed range with a 4:1 ratio. Speeds are infinitely variable throughout each range using an AC - DC motor generator set or an SCR-drive to vary the speed of the main drive motor, up to 125 H.P. max. The range of table speeds available depends on the size of the machine. Constant H.P. is provided from base speed up to four times the base speed. Constant torque is provided below base speed, in each range. Over-speed and field loss protection are standard.



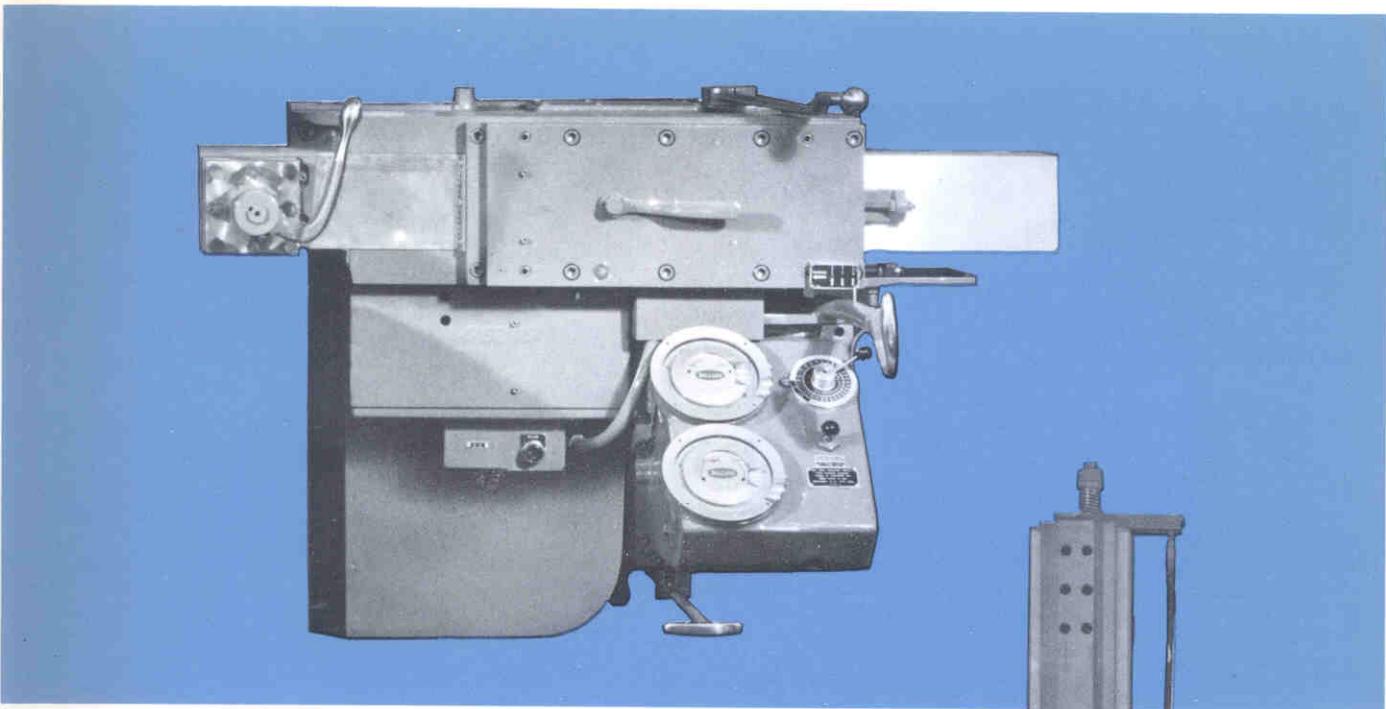
## Main Turret Head

A manually indexing five-sided main turret head on the cross rail is standard equipment. Also available are four or five-sided power indexing turret heads with ample power for indexing out-of-balance tool loads. Heads swivel 30° either side of center. Screw feed is employed for both vertical and horizontal motions.

## Turret Index Registry and Locking Rings

All main turret heads, four or five-sided manual or power indexing, are registered with repetitive accuracy and locked positively in each working position by means of a pair of mating, precision, hardened and ground steel locking rings. One ring is recessed, bolted and dowelled to the front of the down-slide; the other mating ring is secured in a corresponding recess to the back of the turret. Each ring has a series of offset, equally spaced pads with precision-ground tapered sides. When the turret is pulled in at the completion of each index, the taper-sided pads mesh together and assure positive and precise turret location under a permanent locking force.

This construction is positive, simple and reliable. Any slight wear which might develop after prolonged usage may be compensated for by a simple adjustment. It has been proven over the years in thousands of Bullard vertical turret lathes under the most severe service conditions — we know of no device superior to this original concept.

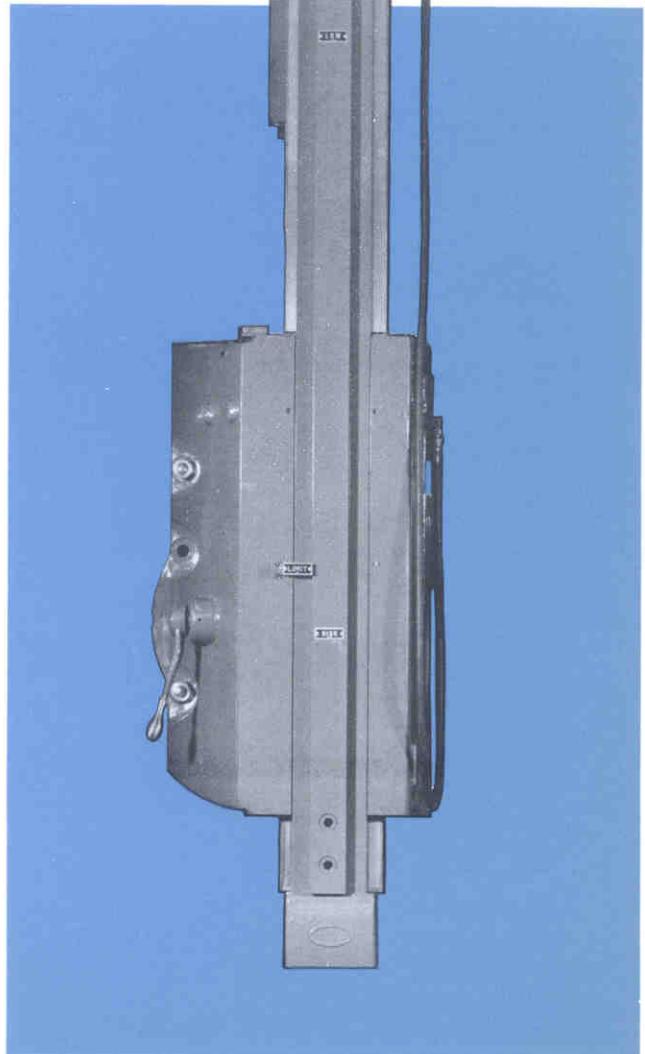


## Side Head

A manually indexing four-position side head turret is standard. Power indexing is offered as optional equipment. Employing a wrap-around design permits placing the way bearings at the front and side of the machine bed, resulting in greater bearing area and superior mechanical advantage. The square forged steel side head horizontal ram provides ample rigidity when fully extended. This proven design assures the utmost in precision, reliability and low maintenance.

## Ram Heads

Cruciform section rams with hardened and ground ways are available, which swivel 30° either side of center on machines up to 86" size and 45° either side of center on 108" and 124". Rams of various lengths can be provided to satisfy job requirements. Screw feed is employed for both horizontal and vertical motion. Ram and swivel bearings are in full contact even when the ram is fully extended. All standard rams are 9" in section. Extra heavy duty rams — 11" in section — are available for special application or where extra long stroke is required.



## OPTIONAL FEATURES

### Power Indexing Turrets

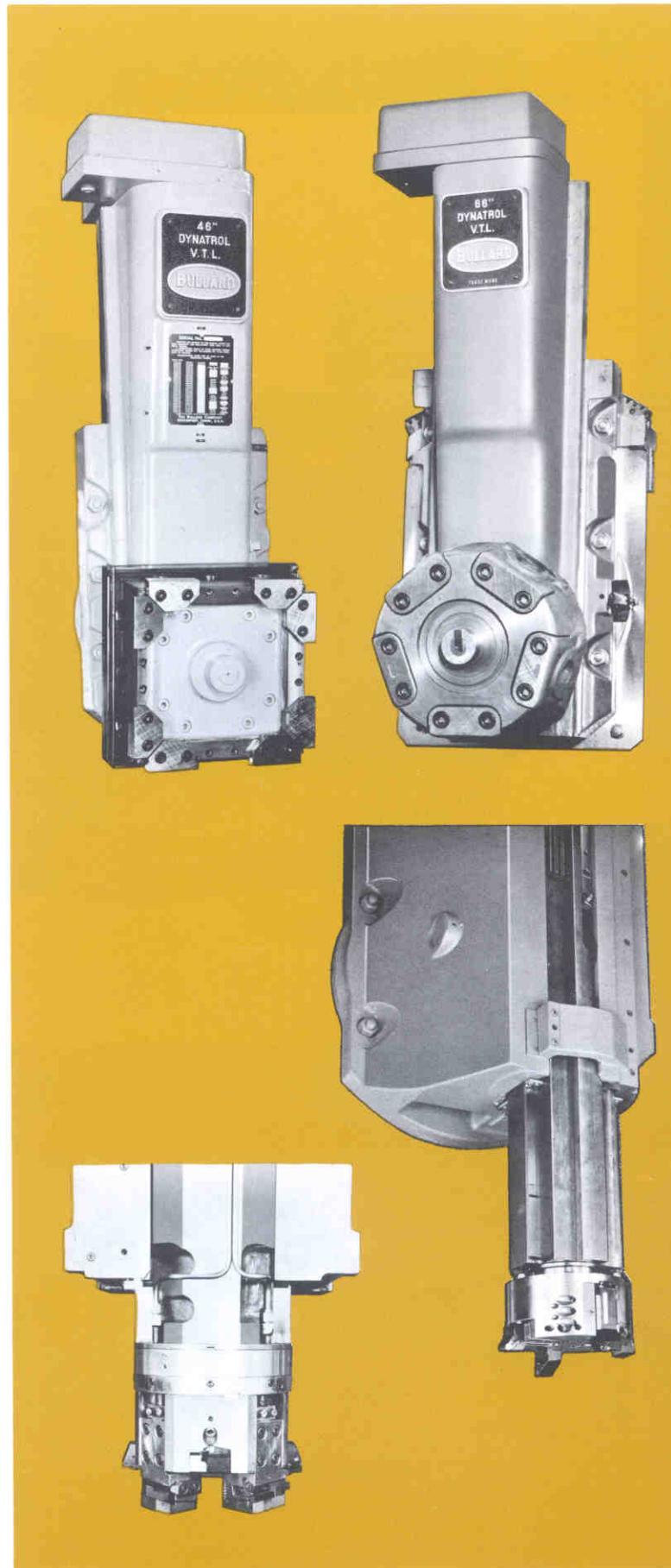
Any or all rail and side heads can be equipped with power indexing turrets, and a four-sided or a five-sided power indexing turret is available for the main turret head. The side head can be equipped with a rugged four-sided power indexing turret.

### Heavy Duty Ram Heads

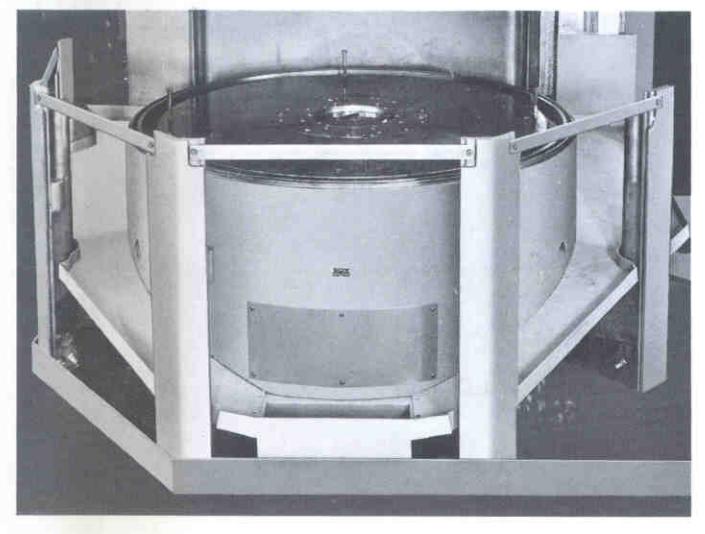
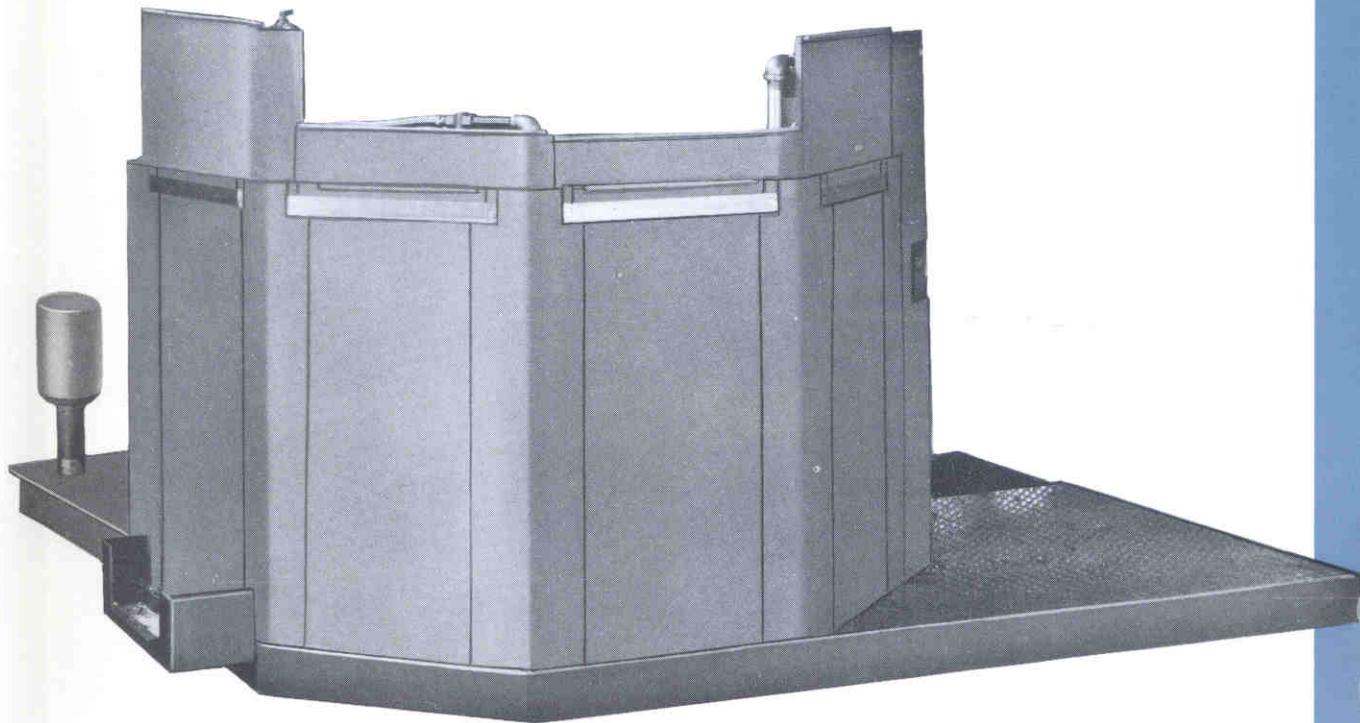
The heavy duty 11" ram head can be supplied with a four or eight-sided power indexing turret.

**Tracer Controls** — Any one of several different types of Tracer Control Systems can be applied to any Bullard Dynatrol Vertical Turret Lathe or Vertical Boring Mill. The various tracer systems can provide contouring capabilities up to 360 degrees depending upon machining requirements and may be electric or hydraulic controlled.

**Electronic Readout Systems** — All Dynatrol heads may be equipped with a variety of different electronic head position readout systems. The systems provide continuous digital display of the head's position as it moves along its horizontal and vertical axes. Head positions may be monitored up to tenths of an inch as required.

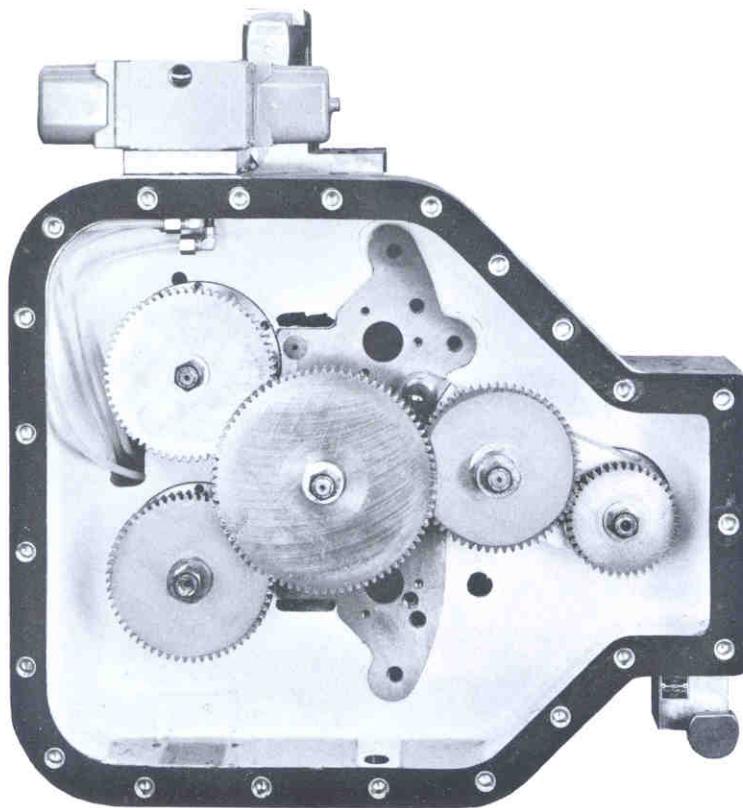


# ACCESSORIES



## Cutting Coolant System

The Cutting Coolant System includes heavy gauge steel guards around the barrel of the machine to retain chips. The guards may be raised or lowered, according to the height of work on the table, protecting the operator from flying chips and coolant spray. The coolant conductors are also adjustable to work height. They are equipped with flexible hoses for channeling the coolant directly to the cutting tools. Coolant flow is regulated by means of individual flow valves. A centrifugal pump and motor unit is mounted on the coolant reservoir. Large doors facilitate easy chip removal manually, or if desired, they can be removed by means of automatic chip conveyors. At additional cost, sloping chip troughs to assist with chip removal, either manually or automatically, can be furnished.



## Temperature Control

Refrigeration systems for both lubrication and cutting coolant can be supplied if required. Adjustable thermostatically controlled heaters are also available for precision temperature control of the lubricating oil only.

These features are particularly useful in machining large parts with critical dimensional tolerances, such as jet engine and aerospace components.

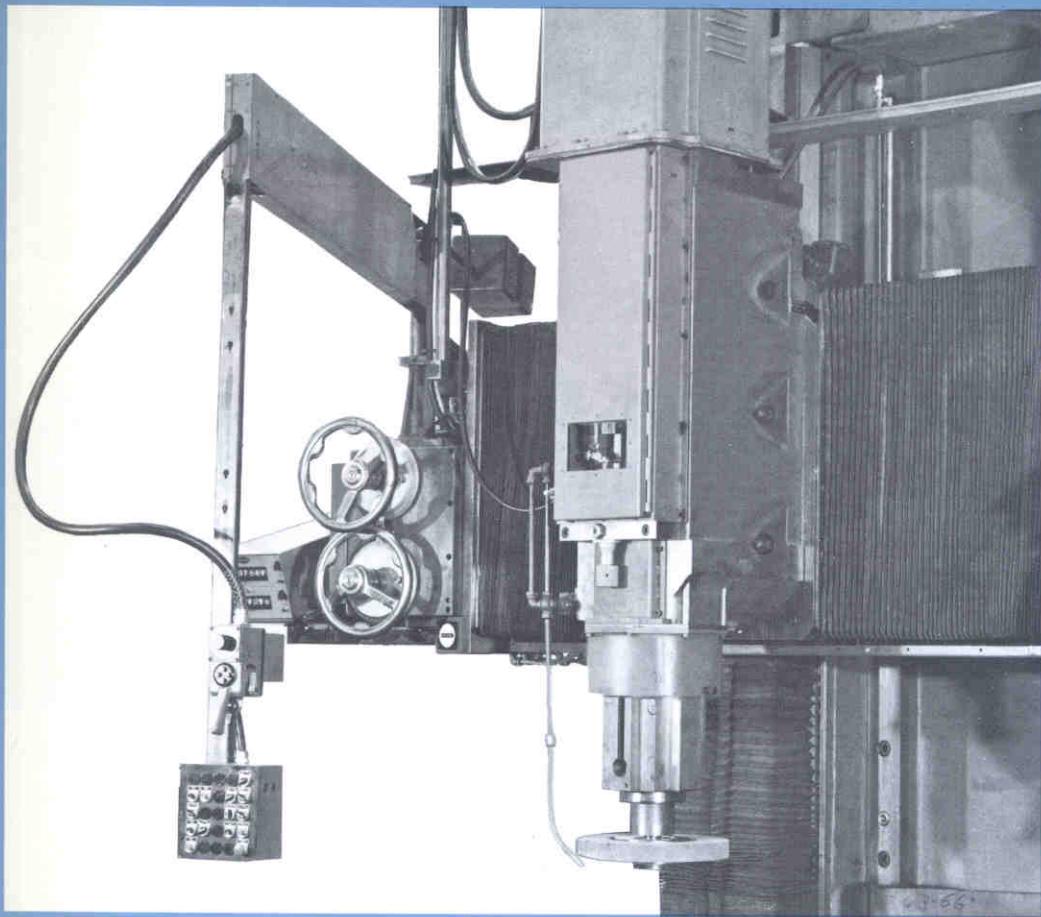
## TDA Attachment

The thread cutting, drum scoring and angle turning attachment which can be secured to any feed works will, with the proper gearing, provide the following:

**Thread Cutting** — 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 11½, 12, 14, 16 and 18 English threads per inch or 1, 1.25, 1.5, 1.75, 2, 2.5, 3, 3.5, 5, 6 or 7 m/m pitch.

**Drum Scoring** — English or Metric — Apply to The Bullard Company, Bridgeport, Connecticut for specific application information.

**Angle Turning** — All angles from 0°-55' of the vertical to 0°-55' of the horizontal are obtainable.

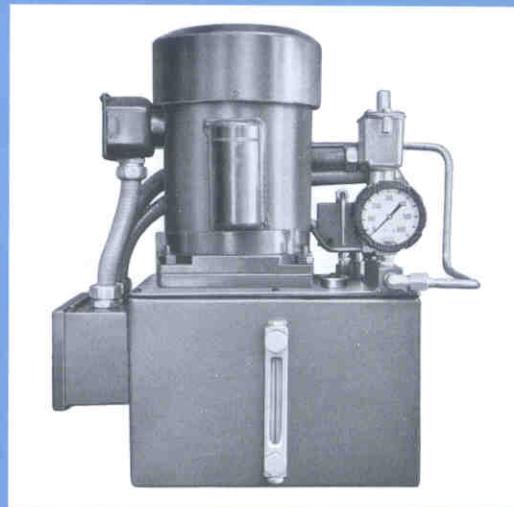


## Cut Grinder

We have furnished a number of machines with this unique and valuable feature. Usually one rail head and the side head are used for rough and finish turning, facing, boring or contouring, while the second rail head carries an individually motorized precision grinding spindle.

## Chucks

A wide variety of standard chucks is available: 1.) Plain tables for use with face plate jaws or fixtures. 2.) 3, 4 and 5 jaw independent or combination chucks can be supplied for either manual or power operation. 3.) Magnetic chucks. 4.) Vacuum connections may be supplied for special fixturing. Dynatrol Vertical Turret Lathes and Vertical Boring Mills have a simplified hydraulic chuck operation mechanism. Pressure range is adjustable.



## Automatic Lubrication

The Bullard Dynatrol has full automatic lubrication to all bearing ways of rail, saddles, slides, feed screws, nuts and other external moving parts from a single oil reservoir. This reservoir is conveniently located at floor level. The oil pulsations may be regulated to conform with operating conditions.

**Table Speeds and Machine Weights**

| 20 SPEED HEADSTOCK |       |       |                  |   |        |      |        |                            |                                 | 2 RANGE 4:1 RATIO HEADSTOCK w/3:1 CONSTANT H.P. RANGE DC MOTOR |                                  |            |                  |                 |        |        |       |  |   | APPROXIMATE MACHINE NET WEIGHTS<br>(LESS MOTORS, OIL and COOLANT) |                                      |                   |  |
|--------------------|-------|-------|------------------|---|--------|------|--------|----------------------------|---------------------------------|--|----------------------------------|------------|------------------|-----------------|--------|--------|-------|--|---|---|--------------------------------------|-------------------|--|
| MACHINE<br>SIZE    | TABLE | SPEED | PULLEY<br>R.P.M. | RECOMMENDED<br>MOTOR<br>HORSE-<br>POWER | PINION | GEAR | RATIO  | CONSTANT<br>TORQUE<br>H.P. | LOW RANGE<br>CONSTANT<br>TORQUE |  | HIGH RANGE<br>CONSTANT<br>TORQUE |            | CONSTANT<br>H.P. | CHANGE<br>GEARS | PINION | GEAR   | RATIO | BASE<br>MACHINE<br>with<br>CROSS<br>RAIL | TURRET<br>HEAD<br>with<br>FEED<br>WORKS | SIDER<br>HEAD<br>with<br>FEED<br>WORKS                            | RAM<br>HEAD<br>with<br>FEED<br>WORKS | COOLANT<br>SYSTEM |  |
|                    |       |       |                  |   |        |      |        |                            | 3:1                             | 5.5 - 55.4   | 55.4 - 166.3                     | 22.2 - 222 | 222 - 666        | 45-45           | 19     | 57     | 3:1   | 23,000                                   | 3,700                                   | 6,600   | —                                    | 2,280             |  |
| 26"                | 10.3  | 375   | 1167             | 30-50                                   | 19     | 57   | 3:1    | 5.5 - 55.4                 | 55.4 - 166.3                    | 22.2 - 222   | 222 - 666                        | 45-45      | 19               | 57              | 3:1    | 23,000 | 3,700 | 6,600                                    | —                                       | 2,280   |                                      |                   |  |
|                    | 13.7  | 500   | 1556             | 30-60                                   | 19     | 57   | 3:1    | 4.4 - 44.4                 | 44.4 - 133.2                    | 17.7 - 177.6   | 177.6 - 533                      | 40-50      | 19               | 57              | 3:1    | 23,000 | 3,700 | 6,600                                    | —                                       | 2,280   |                                      |                   |  |
|                    | 17.0  | 625   | 1944             | 30-75                                   | 19     | 57   | 3:1    | 1.2 - 12.3                 | 12.3 - 37                       | 14.8 - 148   | 148 - 444                        | 36-54      | 19               | 57              | 3:1    | 23,000 | 3,700 | 6,600                                    | —                                       | 2,280   |                                      |                   |  |
| 36"                | 6.15  | 225   | 1167             | 30-50                                   | 16     | 80   | 5:1    | 4.2 - 41.7                 | 41.7 - 125                      | 16.6 - 166.6   | 166.6 - 500                      | 40-50      | * *25            | 80              | 3:2:1  | 23,750 | 3,700 | 6,600                                    | —                                       | 2,310   |                                      |                   |  |
|                    | 8.15  | 300   | 1556             | 30-60                                   | 16     | 80   | 5:1    | 3.3 - 33.3                 | 33.3 - 100                      | 13.3 - 133.3   | 133.3 - 400                      | 45-45      | 16               | 80              | 5:1    | 23,750 | 3,700 | 6,600                                    | —                                       | 2,310   |                                      |                   |  |
|                    | 12.7  | 468   | 1556             | 40-75                                   | 25     | 80   | 3:2:1  | 2.6 - 25.7                 | 25.7 - 77                       | 10.2 - 102   | 102 - 306                        | 39-51      | 16               | 80              | 5:2:1  | 23,750 | 3,700 | 6,600                                    | —                                       | 2,310   |                                      |                   |  |
| *                  | 16.0  | 585   | 1944             | 50-75                                   | 25     | 80   | 3:2:1  | 2.2 - 25.7                 | 25.7 - 77                       | 10.2 - 102   | 102 - 306                        | 39-51      | **25             | 96              | 3:8:1  | 23,750 | 3,700 | 6,600                                    | —                                       | 2,310   |                                      |                   |  |
| *                  | 5.12  | 187   | 1167             | 30-50                                   | 16     | 96   | 6:1    | 3.3 - 33.2                 | 33.2 - 99.5                     | 13.3 - 132.7   | 132.7 - 398                      | 39-51      | **25             | 96              | 3:8:1  | 23,750 | 3,700 | 6,600                                    | —                                       | 2,350   |                                      |                   |  |
| *                  | 6.83  | 250   | 1556             | 40-75                                   | 16     | 96   | 6:1    | 2.8 - 27.7                 | 27.7 - 83.2                     | 11.1 - 111   | 111 - 333                        | 45-45      | 16               | 96              | 6:1    | 23,600 | 3,700 | 6,600                                    | —                                       | 2,350   |                                      |                   |  |
| *                  | 8.50  | 312   | 1944             | 50-100                                  | 16     | 96   | 6:1    | 2.2 - 22.3                 | 22.3 - 66.8                     | 8.9 - 89   | 89 - 267                         | 40-50      | 16               | 96              | 6:1    | 23,600 | 3,700 | 6,600                                    | —                                       | 2,350   |                                      |                   |  |
| *                  | 10.7  | 393   | 1556             | 40-75                                   | 25     | 96   | 3:8:1  | 2.2 - 22.3                 | 22.3 - 66.8                     | 8.9 - 89   | 89 - 267                         | 40-50      | **24             | 120             | 5:1    | 23,600 | 3,700 | 6,600                                    | —                                       | 2,350   |                                      |                   |  |
| *                  | 4.10  | 150   | 1167             | 30-50                                   | 16     | 120  | 7:5:1  | 2.7 - 27                   | 27 - 80                         | 10.7 - 107   | 107 - 320                        | 40-50      | 16               | 96              | 6:1    | 23,600 | 3,700 | 6,600                                    | —                                       | 2,350   |                                      |                   |  |
| *                  | 5.47  | 200   | 1556             | 50-100                                  | 16     | 120  | 7:5:1  | 2.2 - 22.3                 | 22.3 - 66.8                     | 8.9 - 89   | 89 - 267                         | 45-45      | 16               | 120             | 7:5:1  | 23,600 | 3,700 | 6,600                                    | —                                       | 2,350   |                                      |                   |  |
| *                  | 6.80  | 250   | 1944             | 60-100                                  | 16     | 120  | 7:5:1  | 2.2 - 22.3                 | 22.3 - 66.8                     | 8.9 - 89   | 89 - 267                         | 45-45      | 16               | 120             | 7:5:1  | 23,600 | 3,700 | 6,600                                    | —                                       | 2,350   |                                      |                   |  |
| *                  | 8.20  | 300   | 1556             | 60-100                                  | 24     | 120  | 5:1    | 1.6 - 16.1                 | 16.1 - 54.3                     | 7.1 - 71   | 71 - 213                         | 40-50      | 16               | 120             | 7:5:1  | 23,600 | 3,700 | 6,600                                    | —                                       | 2,350   |                                      |                   |  |
| *                  | 2.28  | 83.3  | 776              | 40-50                                   | 16     | 144  | 9:1    | 3.3 - 33.2                 | 33.2 - 69.5                     | 9.3 - 93   | 93 - 278                         | 45-45      | * *20            | 144             | 7:2:1  | 23,600 | 3,700 | 6,600                                    | —                                       | 2,350   |                                      |                   |  |
| *                  | 3.41  | 125   | 1167             | 60-75                                   | 16     | 144  | 9:1    | 1.9 - 18.5                 | 18.5 - 55.5                     | 7.4 - 74   | 74 - 222                         | 45-45      | 16               | 144             | 9:1    | 24,000 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 4.55  | 166   | 1556             | 75-100                                  | 16     | 144  | 9:1    | 1.5 - 15.3                 | 15.3 - 46                       | 6.2 - 62   | 62 - 185                         | 36-54      | * *20            | 144             | 7:2:1  | 24,000 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 5.60  | 207   | 1944             | 75-100                                  | 16     | 144  | 9:1    | 1.1 - 11.1                 | 11.1 - 33.2                     | 4.9 - 49   | 49 - 148                         | 36-54      | 16               | 144             | 9:1    | 24,000 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 7.0   | 260   | 1944             | 75-100                                  | 20     | 144  | 7:2:1  | 1.2 - 12.3                 | 12.3 - 37                       | 4.9 - 49   | 49 - 148                         | 36-54      | 16               | 144             | 9:1    | 24,000 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 2.05  | 75    | 776              | 40-50                                   | 17     | 170  | 10:1   | 1.7 - 16.6                 | 16.6 - 50                       | 6.7 - 66.6   | 66.6 - 200                       | 45-45      | 17               | 170             | 10:1   | 25,500 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 3.07  | 112   | 1167             | 60-75                                   | 17     | 170  | 10:1   | 1.3 - 13.3                 | 13.3 - 40                       | 5.3 - 53.3   | 53.3 - 160                       | 40-50      | 17               | 170             | 10:1   | 25,500 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 4.09  | 150   | 1556             | 75-100                                  | 17     | 170  | 10:1   | 1.1 - 11.1                 | 11.1 - 33.2                     | 4.4 - 44.3   | 44.3 - 133                       | 36-54      | 17               | 170             | 10:1   | 25,500 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 1.62  | 60    | 776              | 40-50                                   | 16     | 200  | 12.5:1 | 1.3 - 13.3                 | 13.3 - 40                       | 5.3 - 53.3   | 53.3 - 160                       | 45-45      | 16               | 200             | 12.5:1 | 26,600 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 2.38  | 90    | 1167             | 60-75                                   | 16     | 200  | 12.5:1 | 1.1 - 11                   | 11 - 32                         | 4.3 - 43   | 43 - 128                         | 40-50      | 16               | 200             | 12.5:1 | 26,600 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 3.20  | 120   | 1556             | 75-100                                  | 16     | 200  | 12.5:1 | .9 - 9                     | 9 - 27                          | 3.5 - 35.3   | 35.3 - 107                       | 36-54      | 16               | 200             | 12.5:1 | 26,600 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 2.1   | 75    | 1167             | 60-75                                   | 17     | 255  | 15:1   | .85 - 8.5                  | 8.5 - 25.5                      | 3.4 - 34   | 34 - 102                         | 39-51      | 17               | 255             | 15:1   | 27,500 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 2.8   | 100   | 1556             | 75-100                                  | 17     | 255  | 15:1   | .73 - 7.3                  | 7.3 - 22                        | 3.0 - 29.7   | 29.7 - 89                        | 36-54      | 17               | 255             | 15:1   | 27,500 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| *                  | 1.38  | 50.6  | 1556             | 75-100                                  | 17     | 255  | 15:1   | .55 - 5.5                  | 5.5 - 16.5                      | 2.2 - 22   | 22 - 66                          | 45-45      | 17               | 255             | 15:1   | 28,000 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |
| 124"†              | 1.65  | 62.2  | 1944             | 75-100                                  | †17    | 255  | 15:1   | .37 - 3.7                  | 3.7 - 11                        | 1.5 - 14.7   | 14.7 - 44                        | 36-54      | 17               | 255             | 15:1   | 28,000 | 4,300 | 10,400                                   | —                                       | 2,400   |                                      |                   |  |

NOTE: On 20 Speed Headstock when pulley R.P.M. is 776 a 1200 R.P.M. drive motor is required.

All other speeds are based on 1800 R.P.M. drive motor.

Also, in certain extra high speed ranges, #3 Certified Iron Tables are required at extra charge.

For information on both these conditions, refer to The Bullard Company, Bridgeport, Connecticut.

† 124" Machine has 2:1 Reduction

Between Headstock and Table Pinions.

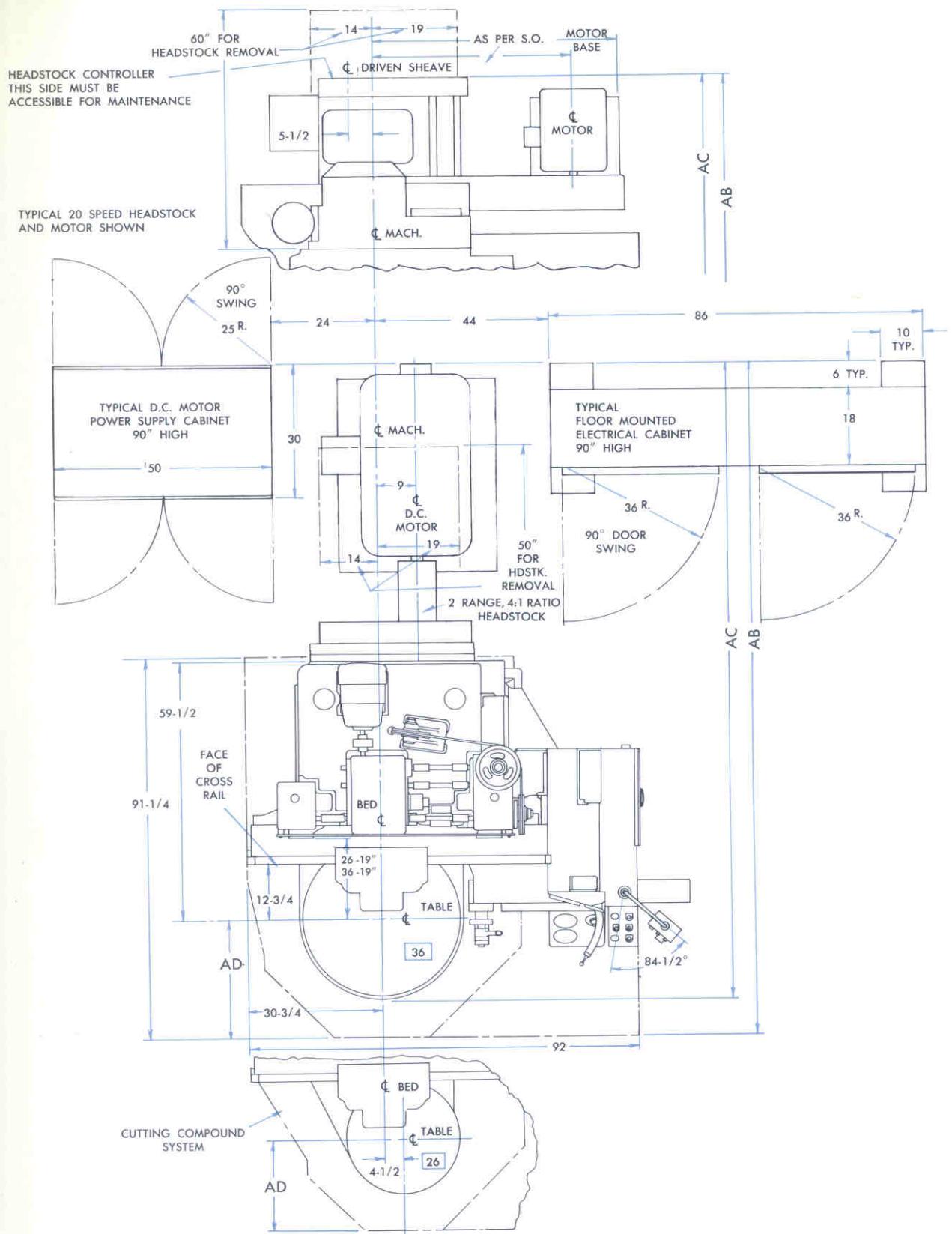
\* Special Gear required at extra charge.

\*\* Special Pinion required at extra charge.

NOTE – Add 450 lbs. for Size-Au-Trol per head.

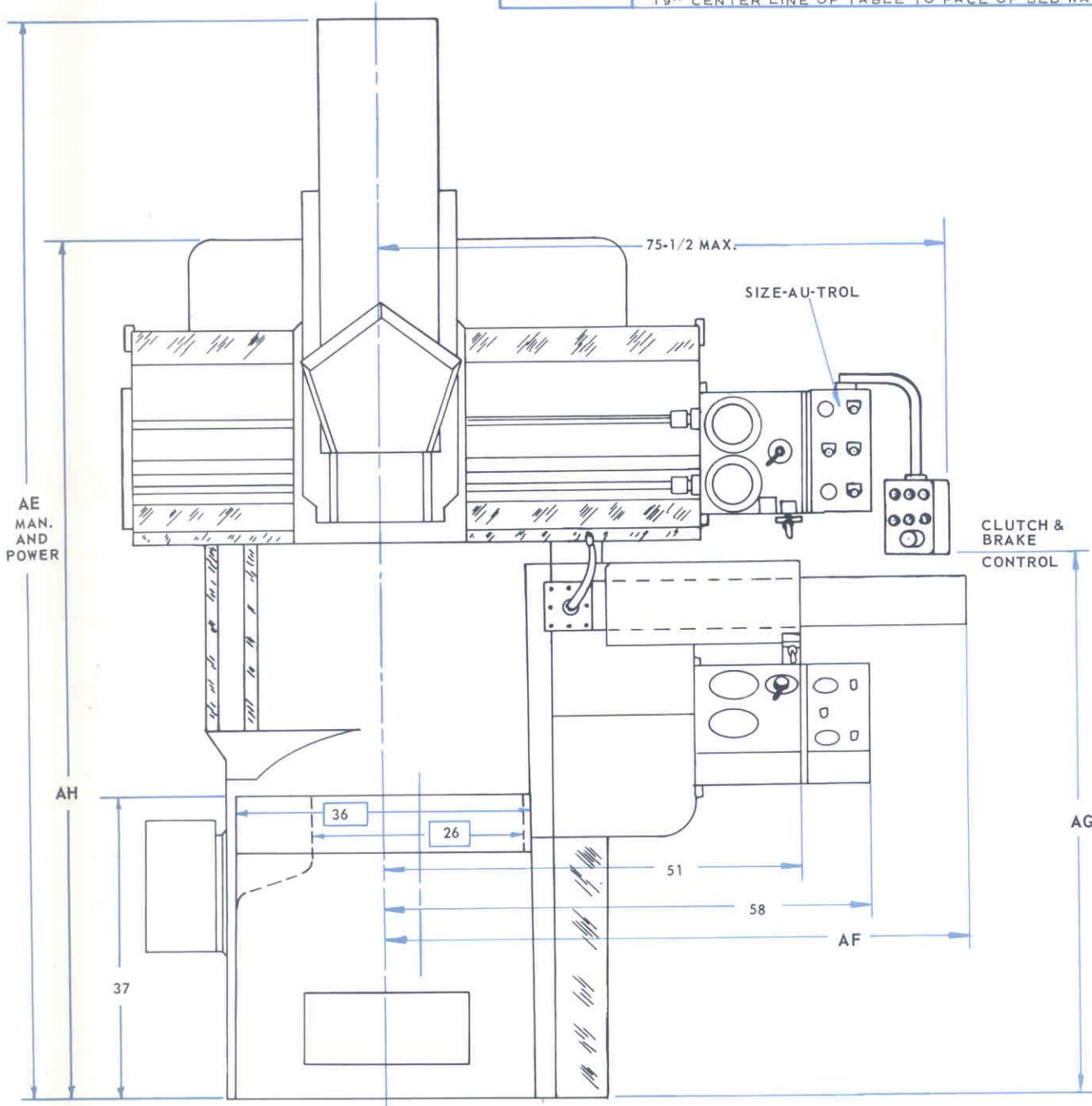
Add 440 lbs. for Man-Au-Trol Console only.

19



| MACH.<br>SIZE | AB             |                   | AC      |                   | AD     | BED<br>HEIGHT | AE   |      | AF     |      | AG   |      | AH  |  |  |
|---------------|----------------|-------------------|---------|-------------------|--------|---------------|------|------|--------|------|------|------|-----|--|--|
|               | HEADSTOCK TYPE |                   |         |                   |        |               | MAN. | POW. | MAN.   | POW. | MAX. | MIN. |     |  |  |
|               | 20 SPD.        | 2 RANGE INF. VAR. | 20 SPD. | 2 RANGE INF. VAR. |        |               |      |      |        |      |      |      |     |  |  |
| 26            | 122-1/2        | 154-1/8           | 113     | 144-5/8           | 23-1/2 | STD.          | 137  | 160  | 72-1/2 | 81   | 65   | 45   | 100 |  |  |
|               |                |                   |         |                   |        | +12           | 149  | 172  | 72-1/2 | 81   | 77   | 45   | 117 |  |  |
|               |                |                   |         |                   |        | +24           | 161  | 184  | 72-1/2 | 81   | 89   | 45   | 129 |  |  |
|               |                |                   |         |                   |        | +36           | 173  | 196  | 72-1/2 | 81   | 101  | 45   | 141 |  |  |
|               |                |                   |         |                   |        | +48           | 185  | 208  | 72-1/2 | 81   | 113  | 45   | 153 |  |  |

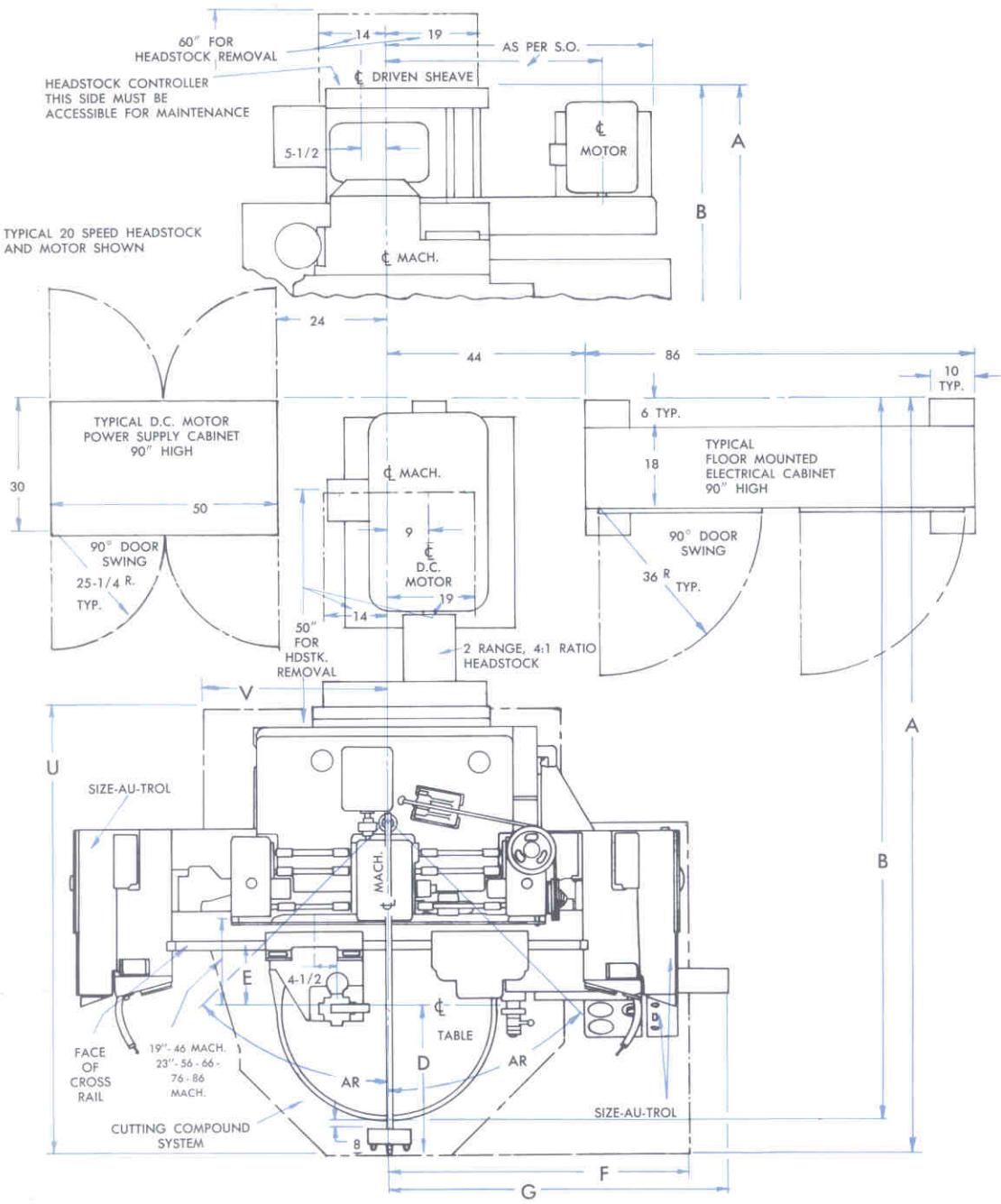
| MACHINE |   |
|---------|---|
| 26      | 30" DIA. MAX. SWING SIDE HEAD IN WORK. POSITION   |
| 36      | 39" DIA. MAX. SWING SIDE HEAD IN WORK. POSITION   |
| 26      | 46" DIA. MAX. SWING SIDE HEAD BELOW TABLE TOP   |
| 36      | 48" DIA. MAX. SWING SIDE HEAD BELOW TABLE TOP   |
| 26-36   | 7 3/4" DIA. SMALLEST HOLE TOOL POST BORES<br>19" CENTER LINE OF TABLE TO FACE OF BED WAYS |



REF. CROSS RAIL TRAVEL - Page 26  
 SIDE HEAD TRAVEL - Page 26  
 TURRET HEAD TRAVEL - Page 27  
 RAM HEAD TRAVEL - Page 27

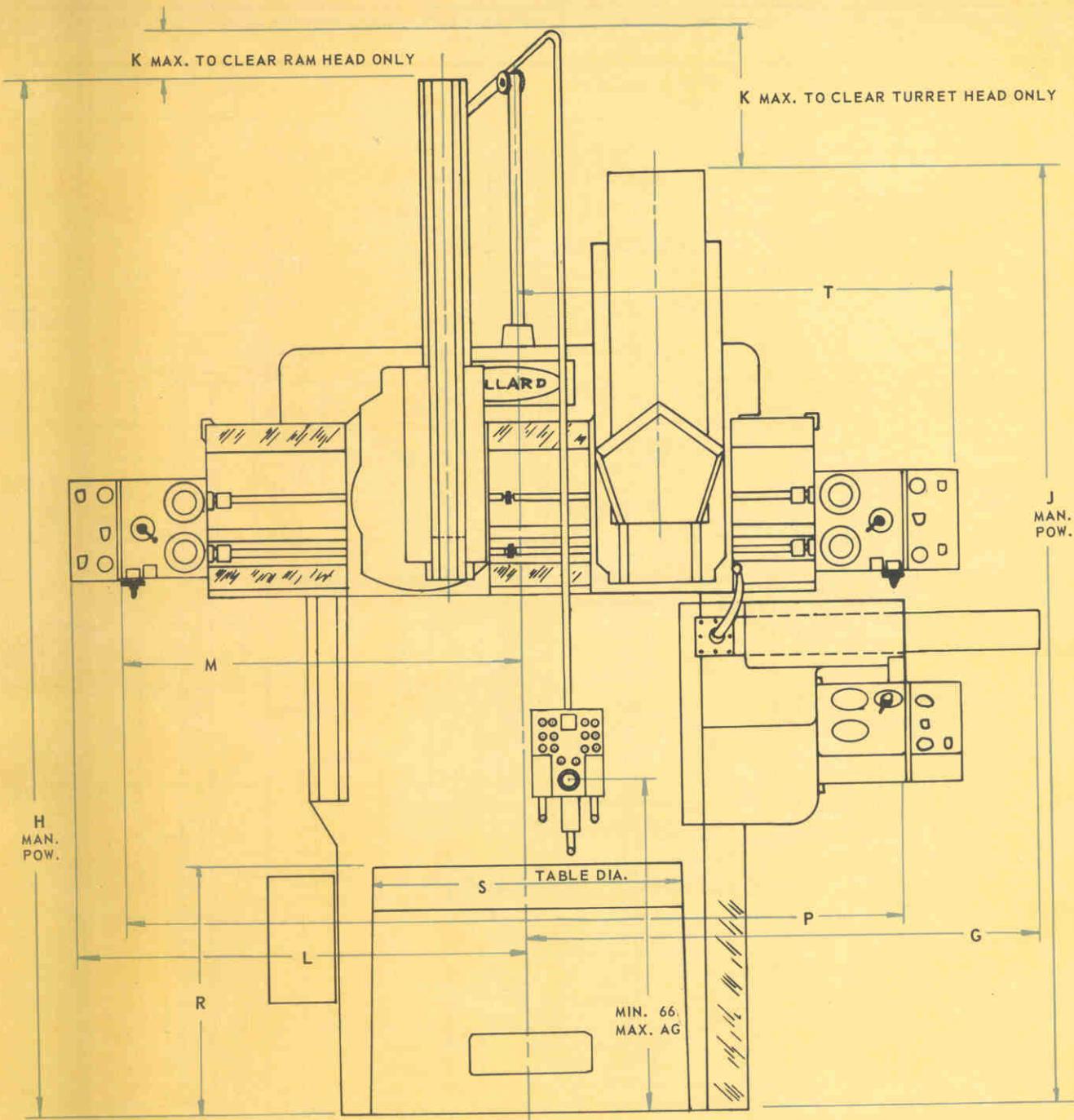
**CAPACITY CHART**  
**FLOOR PLAN & FRONT ELEVATION**  
**26"-36" DYNATROL V. T. L.**

| MACHINE  |                |     |
|--|----------------|-----|
| DIA. MAX. SWING S.H. BELOW TABLE TOP                       | 58"            | 46  |
|  | 68"            | 56  |
|  | 78"            | 66  |
|  | 88"            | 76  |
|  | 98"            | 86  |
| 9-1/2 MIN. HOLE RAM WILL ENTER - 9" STD. RAM<br>W/O TURRET | 46-56-66-76-86 | 49" |
|  | 46             | 62" |
|  | 56-66-76-86    | 72" |
|  |                | 82" |
|  |                | 92" |
| DIA. MAX. SWING S.H. IN WORK POSITION                      |                |     |
| 7-3/4 DIA. SMALLEST HOLE TOOL POST BORES                   |                |     |
| CENTER LINE OF TABLE TO FACE OF BED WAYS                   |                |     |



| MACH.<br>SIZE | A              |                      | B           |                      | D       | E  | F      | G       | U       | V      | H 9" RAM - 51" * STROKE |        |     |     |     |       |     |     |     |     |     |  |  |  |  |
|---------------|----------------|----------------------|-------------|----------------------|---------|----|--------|---------|---------|--------|-------------------------|--------|-----|-----|-----|-------|-----|-----|-----|-----|-----|--|--|--|--|
|               | HEADSTOCK TYPE |                      |             |                      |         |    |        |         |         |        |                         | MANUAL |     |     |     | POWER |     |     |     |     |     |  |  |  |  |
|               | 20<br>SPEED    | 2 RANGE<br>INF. VAR. | 20<br>SPEED | 2 RANGE<br>INF. VAR. |         |    |        |         |         |        | STD.                    | +12    | +24 | +36 | +48 | STD.  | +12 | +24 | +36 | +48 |     |  |  |  |  |
|               | 46             | 134-1/2              | 166-1/8     | 125                  | 156-5/8 | 33 | 12-3/4 | 66      | 77-1/2  | 99     | 40-1/4                  | 180    | 192 | 204 | 216 | 228   | 205 | 217 | 229 | 241 | 257 |  |  |  |  |
| 56            | 144-1/2        | 176-1/8              | 135         | 166-5/8              | 38      | 15 | 69     | 98-3/4  | 116-3/4 | 49-1/4 | 192                     | 204    | 216 | 228 | 240 | 217   | 229 | 241 | 253 | 269 |     |  |  |  |  |
| 66            | 154-1/4        | 185-7/8              | 144-3/4     | 176-3/8              | 43      | 15 | 74     | 103-3/4 | 122-1/2 | 54-1/4 | 204                     | 216    | 228 | 240 | 252 | 229   | 241 | 253 | 265 | 277 |     |  |  |  |  |
| 76            | 164-1/2        | 196-1/8              | 155         | 186-5/8              | 48      | 15 | 79     | 108-3/4 | 128-3/4 | 59-1/4 | 216                     | 228    | 240 | 252 | 264 | 241   | 253 | 265 | 277 | 289 |     |  |  |  |  |
| 86            | 176            | 207-5/8              | 166-1/2     | 198-1/8              | 53      | 15 | 86     | 115-3/4 | 140-1/4 | 66-3/4 | 231                     | 243    | 255 | 267 | 279 | 256   | 268 | 280 | 292 | 304 |     |  |  |  |  |

\*FOR ANY OTHER STROKE RAM ADD OR SUBTRACT THE DIFFERENCE

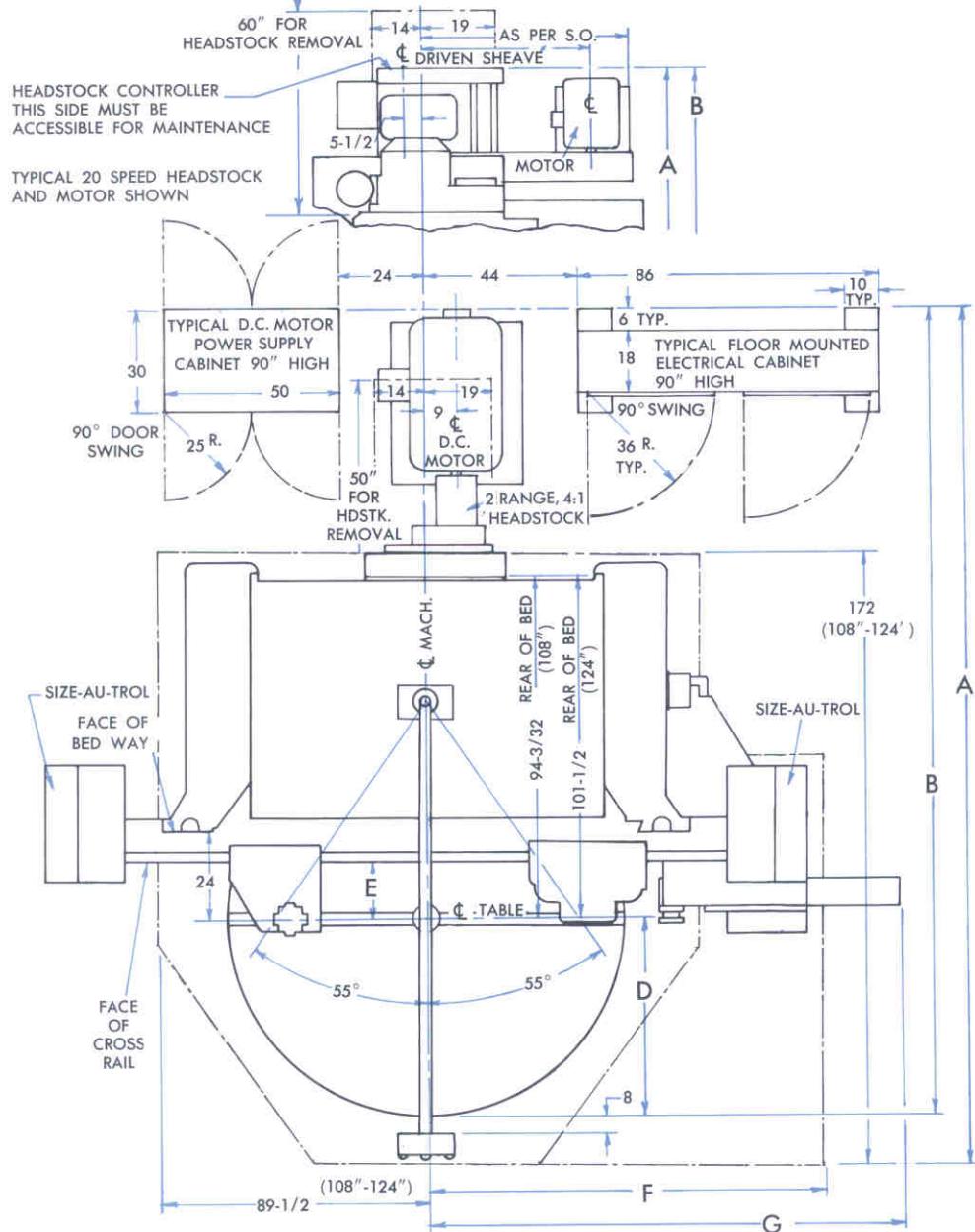


REF. CROSS RAIL & SIDE HEAD TRAVEL - Page 26  
 TURRET HEAD TRAVEL - Page 27  
 R. H. RAM HEAD TRAVEL - Page 27  
 L. H. RAM & TURRET HEAD TRAVEL - Page 28  
 L. H. RAM & R. H. RAM HEAD TRAVEL - Page 29  
 L. H. & R. H. TURRET HEAD TRAVEL - Page 29

CAPACITY CHART  
 FLOOR PLAN & FRONT ELEVATION  
 46" - 56" - 66" - 76" - 86" DYNATROL V. T. L.

| SIZE | J      |     |     |     |     | POWER |     |     |     |     | MAX. | K      | L      | M       | P   | R   | S    | AG  | AR     | T |
|------|--------|-----|-----|-----|-----|-------|-----|-----|-----|-----|------|--------|--------|---------|-----|-----|------|-----|--------|---|
|      | MANUAL |     |     |     |     | STD.  | +12 | +24 | +36 | +48 |      | STD.   | +12    | +24     | +36 | +48 |      |     |        |   |
|      | STD.   | +12 | +24 | +36 | +48 | STD.  | +12 | +24 | +36 | +48 |      | STD.   | +12    | +24     | +36 | +48 | MAX. |     |        |   |
| 46"  | 143    | 155 | 167 | 179 | 191 | 163   | 175 | 187 | 199 | 211 | 24   | 67-1/2 | 59-5/8 | 115-1/2 | 37  | 46  | 108  | 45° | 63-3/4 |   |
| 56"  | 158    | 170 | 182 | 194 | 206 | 178   | 190 | 202 | 214 | 226 | 24   | 77-1/4 | 69-3/8 | 135     | 37  | 56  | 108  | 45° | 73-1/2 |   |
| 66"  | 170    | 182 | 194 | 206 | 218 | 190   | 202 | 214 | 226 | 238 | 24   | 82-1/4 | 74-3/8 | 145     | 37  | 66  | 126  | 55° | 78-1/2 |   |
| 76"  | 182    | 194 | 206 | 218 | 230 | 202   | 214 | 226 | 238 | 250 | 24   | 87-1/4 | 79-3/8 | 155     | 37  | 76  | 126  | 55° | 83-1/2 |   |
| 86"  | 197    | 209 | 221 | 233 | 245 | 217   | 229 | 241 | 253 | 265 | 24   | 94-1/4 | 86-3/8 | 169     | 40  | 86  | 126  | 55° | 90-1/2 |   |

| MACHINE   |         |  |
|---|---------|--|
| 120" MAX. SWING S.H. BELOW TABLE TOP                    | 108     | 116" DIA. MAX. SWING SIDE HEAD IN WORK. POSITION |
| 140" " " " "  | 124     | 136" " " " " " "                                 |
| 12" MIN. HOLE RAM WILL ENTER-11" STD. RAM<br>W/O TURRET | 108-124 |  |



REF. CROSS RAIL & SIDE HEAD TRAVEL - Page 26

TURRET HEAD TRAVEL - Page 27

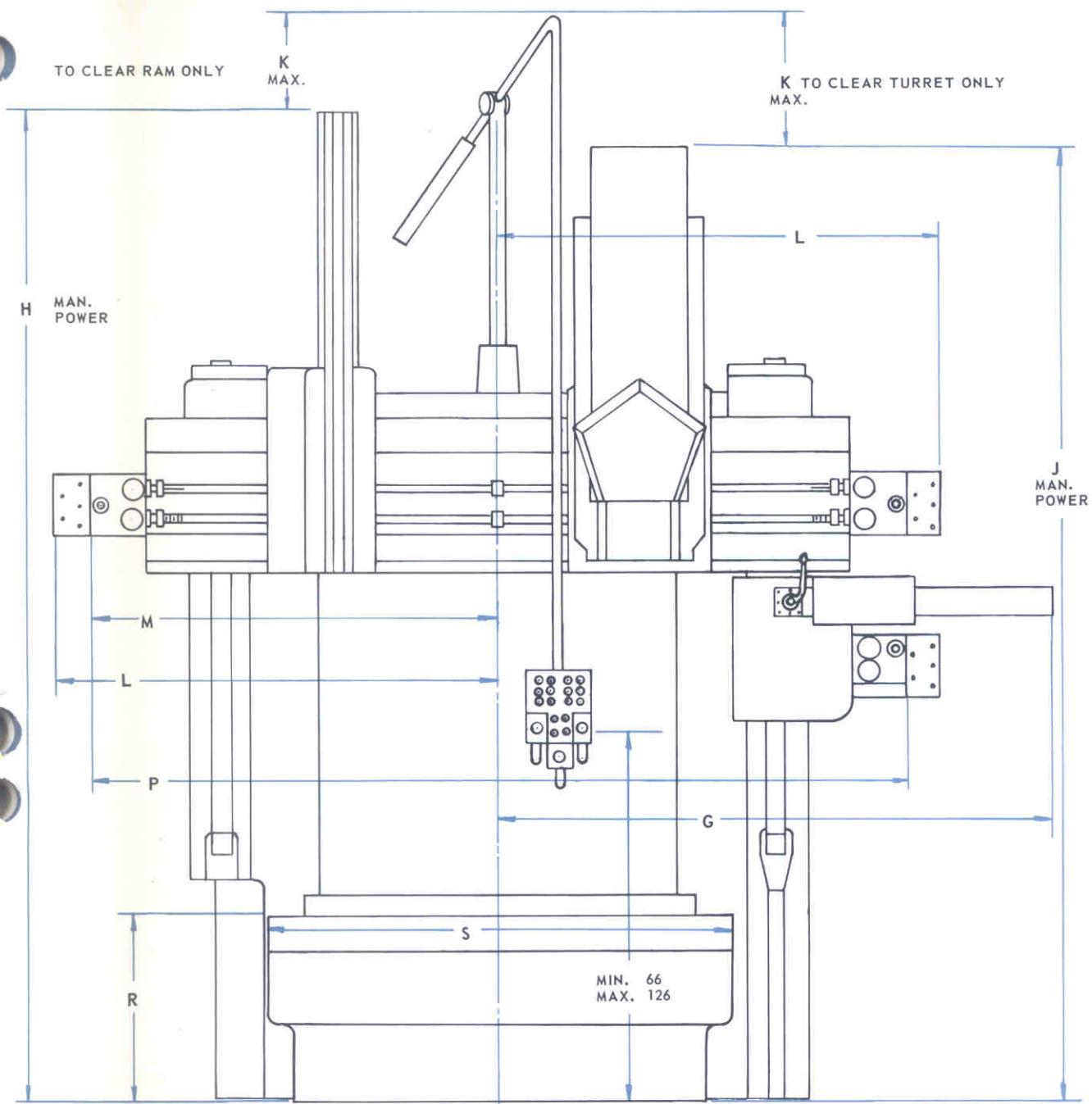
R. H. RAM HEAD TRAVEL - Page 27

L. H. RAM & TURRET HEAD TRAVEL - Page 28

L. H. RAM & R. H. RAM HEAD TRAVEL - Page 29

L. H. & R. H. TURRET HEAD TRAVEL - Page 29

| MACH.<br>SIZE | A              |                      | B           |                      | D  | E  | F      | G   |  |  |  |  |
|---------------|----------------|----------------------|-------------|----------------------|----|----|--------|-----|--|--|--|--|
|               | HEADSTOCK TYPE |                      |             |                      |    |    |        |     |  |  |  |  |
|               | 20<br>SPEED    | 2 RANGE<br>INF. VAR. | 20<br>SPEED | 2 RANGE<br>INF. VAR. |    |    |        |     |  |  |  |  |
| 108           | 204-5/8        | 236-1/4              | 187-5/8     | 219-1/4              | 71 | 16 | 89-1/2 | 134 |  |  |  |  |
| 124           | 212            | 243-5/8              | 203         | 234-5/8              | 71 | 16 | 91     | 148 |  |  |  |  |



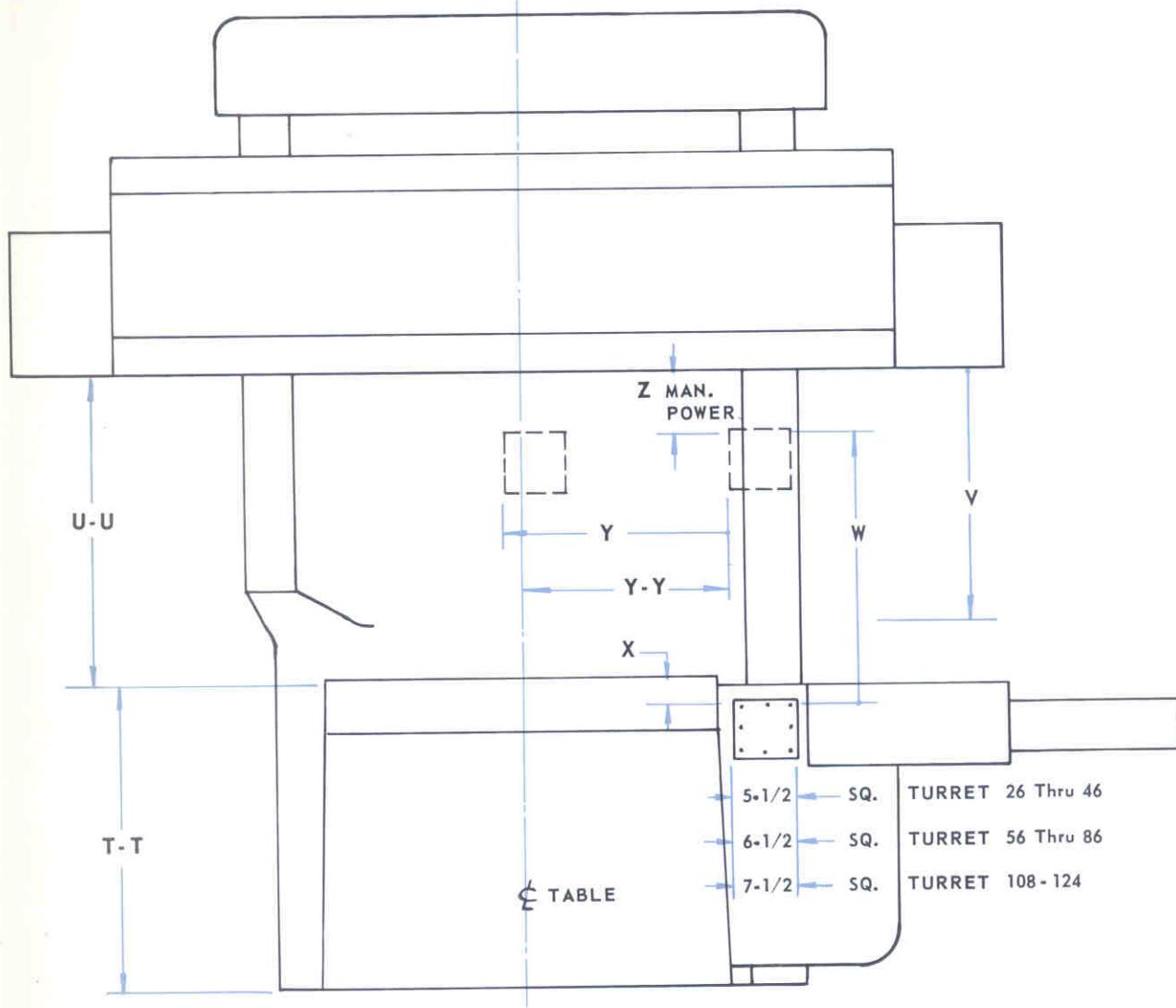
**CAPACITY CHART  
FLOOR PLAN & FRONT ELEVATION  
108" - 124" DYNATROL V. T. L.**

| SIZE | H * 11" RAM - 50" STROKE |     |     |     |       |     |     |     | J      |     |     |     |       |     |     |     | K  | L       | M       | P   | R  | S   |  |  |  |  |  |  |  |
|------|--------------------------|-----|-----|-----|-------|-----|-----|-----|--------|-----|-----|-----|-------|-----|-----|-----|----|---------|---------|-----|----|-----|--|--|--|--|--|--|--|
|      | MANUAL                   |     |     |     | POWER |     |     |     | MANUAL |     |     |     | POWER |     |     |     |    |         |         |     |    |     |  |  |  |  |  |  |  |
|      | STD.                     | +24 | +36 | +48 | STD.  | +24 | +36 | +48 | STD.   | +24 | +36 | +48 | STD.  | +24 | +36 | +48 |    |         |         |     |    |     |  |  |  |  |  |  |  |
| 108" | 236                      | 260 | 272 | 284 | 261   | 285 | 297 | 309 | 216    | 240 | 252 | 264 | 236   | 260 | 272 | 284 | 24 | 102-3/4 | 95      | 190 | 44 | 108 |  |  |  |  |  |  |  |
| 124" | 236                      | 260 | 272 | 284 | 261   | 285 | 297 | 309 | 216    | 240 | 252 | 264 | 236   | 260 | 272 | 284 | 24 | 116-1/4 | 108-1/2 | 217 | 44 | 124 |  |  |  |  |  |  |  |

\* FOR ANY OTHER STROKE RAM ADD OR SUBTRACT THE DIFFERENCE

**ALL STROKE CAPACITY DIMENSIONS ARE TO ELECTRICAL LIMIT STOPS.**

**ALL HEAD TRAVELS TO POSITIVE MECHANICAL STOPS ARE 1/4" BEYOND ELECTRICAL STOPS IN EACH DIRECTION.**  
 (Applies to all charts.)



**FOR POWER INDEX SIDE HEAD CONSIDER THE FOLLOWING FOR 8" SQUARE TURRET**

|                   |          |       |      |       |
|-------------------|----------|-------|------|-------|
| 26 - 36 - 46      | Subtract | 0     | From | Y - Y |
| " " "             |          | 1-1/4 | "    | X     |
| 56 - 66 - 76 - 86 | "        | 0     | "    | Y - Y |
| " " "             |          | 3/4   | "    | X     |
| 108 - 124         | "        | 1/4   | "    | X     |

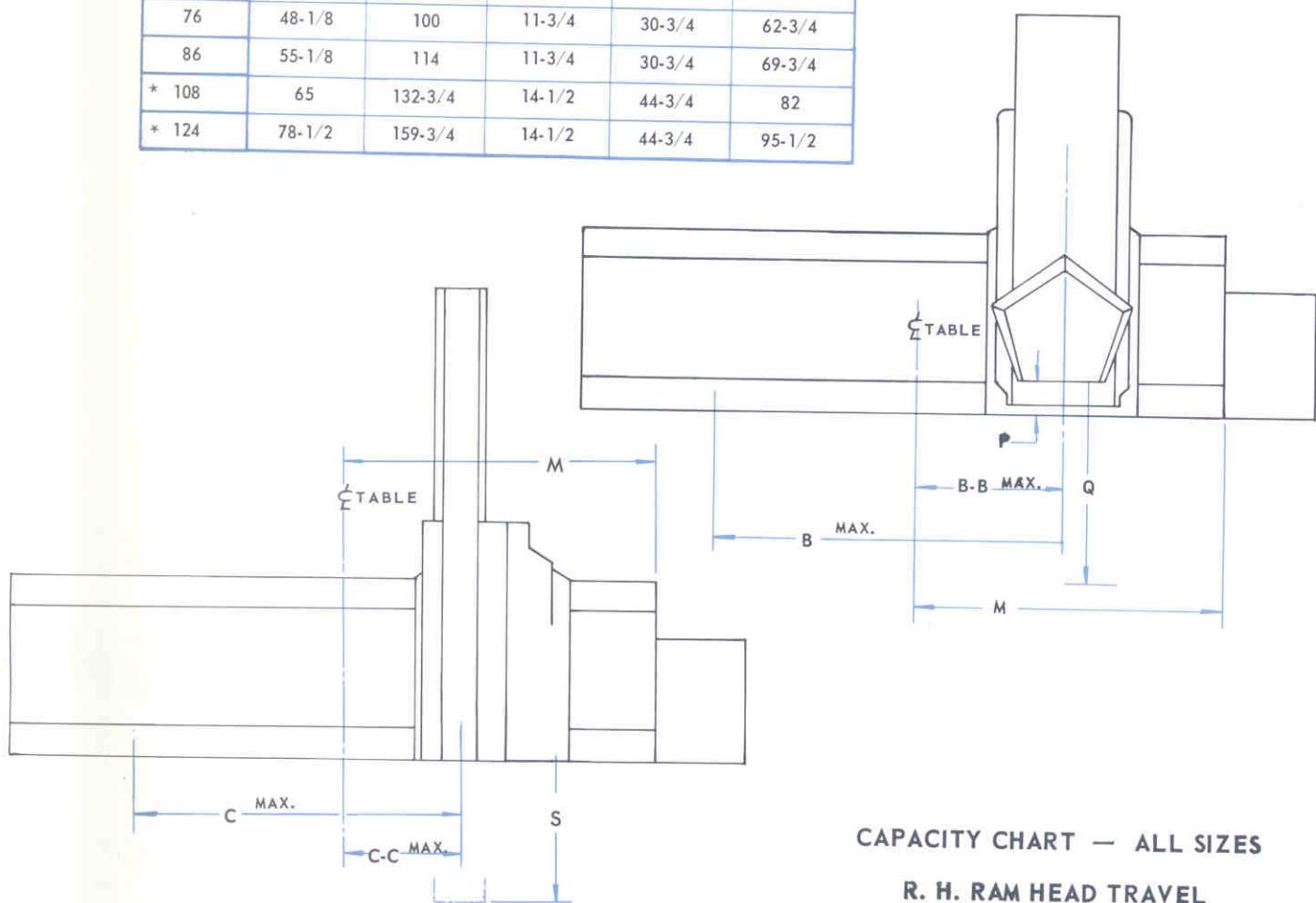
| SIZE | TT | UU<br>Std. | UU    | UU    | UU    | UU    | V    | V     | V     | V     | W<br>Std. | W<br>12 Hi | W<br>24 Hi | W<br>36 Hi | W<br>48 Hi | X $\Delta$ | Y     | Y-Y $\Delta$ | Z MIN. ELECT. |       |       |
|------|----|------------|-------|-------|-------|-------|------|-------|-------|-------|-----------|------------|------------|------------|------------|------------|-------|--------------|---------------|-------|-------|
|      |    |            | 12 Hi | 24 Hi | 36 Hi | 48 Hi | Std. | 12 Hi | 24 Hi | 36 Hi |           |            |            |            |            |            |       |              |               |       |       |
| 26   | 37 | 30         | 42    | 54    | 66    | 78    | 20   | 32    | 44    | 56    | 68        | 28-3/4     | 40-3/4     | 52-3/4     | 64-3/4     | 76-3/4     | 2-5/8 | 23-3/4       | 15-1/4        | 3-3/4 | 2-1/2 |
| 36   | 37 | 30         | 42    | 54    | 66    | 78    | 20   | 32    | 44    | 56    | 68        | 28-3/4     | 40-3/4     | 52-3/4     | 64-3/4     | 76-3/4     | 2-5/8 | 23-3/4       | 19-3/4        | 3-3/4 | 2-1/2 |
| 46   | 37 | 40         | 52    | 64    | 76    | 88    | 30   | 42    | 54    | 66    | 78        | 38-3/4     | 50-3/4     | 62-3/4     | 74-3/4     | 86-3/4     | 2-5/8 | 23-3/4       | 24-3/4        | 3-3/4 | 2-1/2 |
| 56   | 37 | 48         | 60    | 72    | 84    | 96    | 38   | 50    | 62    | 74    | 86        | 46-3/4     | 58-3/4     | 70-3/4     | 82-3/4     | 94-3/4     | 2-7/8 | 31-3/4       | 32-3/4        | 4     | 3-1/4 |
| 66   | 37 | 60         | 72    | 84    | 96    | 108   | 50   | 62    | 74    | 86    | 98        | 58-3/4     | 70-3/4     | 82-3/4     | 94-3/4     | 106-3/4    | 2-7/8 | 31-3/4       | 37-3/4        | 4     | 3-1/4 |
| 76   | 37 | 72         | 84    | 96    | 108   | 120   | 62   | 74    | 86    | 98    | 110       | 70-3/4     | 82-3/4     | 94-3/4     | 106-3/4    | 118-3/4    | 2-7/8 | 31-3/4       | 42-3/4        | 4     | 3-1/4 |
| 86   | 40 | 84         | 96    | 108   | 120   | 132   | 74   | 86    | 98    | 110   | 122       | 82-3/4     | 94-3/4     | 106-3/4    | 118-3/4    | 130-3/4    | 2-7/8 | 31-3/4       | 49-3/4        | 4     | 3-1/4 |
| 108  | 44 | 80         | 92    | 104   | 116   | 128   | 70   | 82    | 94    | 106   | 118       | 79         | 91         | 103        | 115        | 127        | 3     | 37-3/4       | 58            | 4     | 3-3/4 |
| 124  | 44 | 80         | 92    | 104   | 116   | 128   | 70   | 82    | 94    | 106   | 118       | 79         | 91         | 103        | 115        | 127        | 3     | 37-3/4       | 71-1/2        | 4     | 3-3/4 |

\* Wide Saddle

| SIZE  | B-B    | B       | P      | Q      | M      |
|-------|--------|---------|--------|--------|--------|
| 26    | 21-1/2 | 43-3/4  | 10-3/8 | 26     | 33-1/2 |
| 36    | 26     | 43-3/4  | 10-3/8 | 26     | 38     |
| 46    | 31     | 65-1/2  | 10-3/8 | 26     | 43     |
| 56    | 38-1/8 | 80      | 11-3/4 | 30-3/4 | 52-3/4 |
| 66    | 43-1/8 | 90      | 11-3/4 | 30-3/4 | 57-3/4 |
| 76    | 48-1/8 | 100     | 11-3/4 | 30-3/4 | 62-3/4 |
| 86    | 55-1/8 | 114     | 11-3/4 | 30-3/4 | 69-3/4 |
| * 108 | 65     | 132-3/4 | 14-1/2 | 44-3/4 | 82     |
| * 124 | 78-1/2 | 159-3/4 | 14-1/2 | 44-3/4 | 95-1/2 |

### CAPACITY CHART — ALL SIZES

#### TURRET HEAD TRAVEL

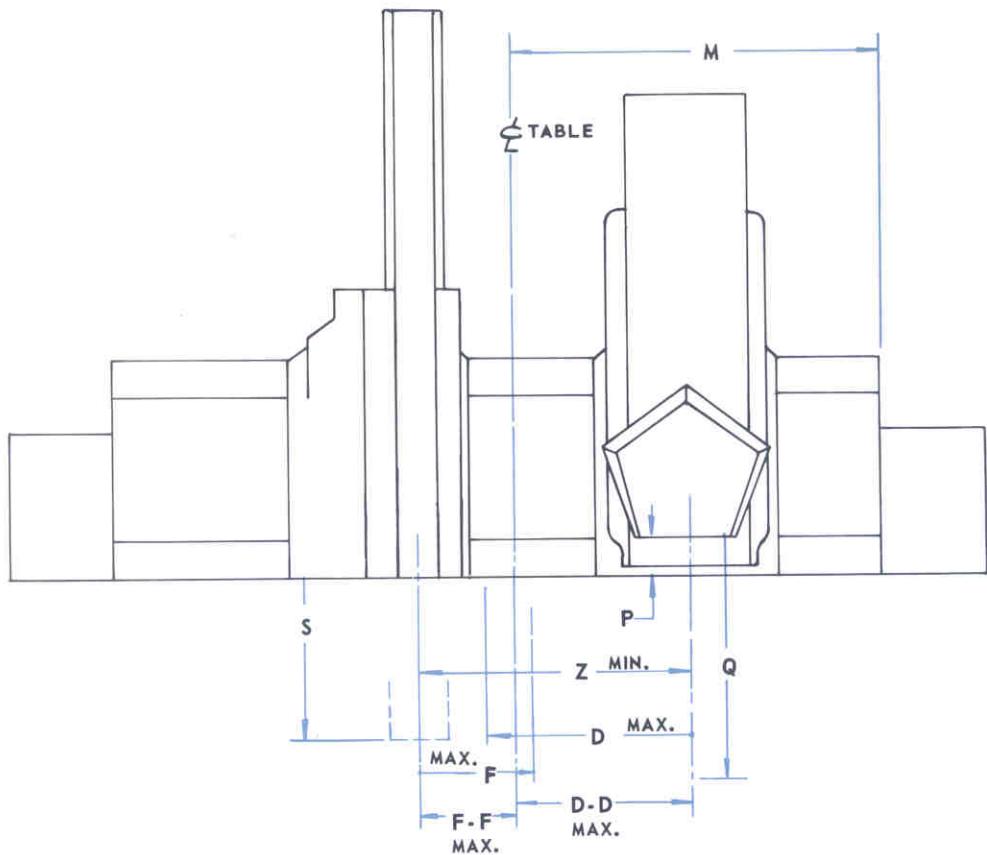


### CAPACITY CHART — ALL SIZES

#### R. H. RAM HEAD TRAVEL

\* Wide Saddle

| SIZE  | STD. ON 26 - 36 - 46<br>STANDARD 9" RAM<br>OPTIONAL ON 56 THRU 86 |        | RANGE |    | STD. ON 56 THRU 124<br>HEAVY DUTY RAM |         | RANGE |    |    |     | M      |
|-------|---|--------|-------|----|---------------------------------------|---------|-------|----|----|-----|--------|
|       | C-C   | C      | S     | S  | C-C                                   | C       | S     | S  | S  | S   |        |
| 26    | 17  | 43-3/4 | 33    | 51 | 18-1/4                                | 43-3/4  | 50    | 70 |    |     | 33-1/2 |
| 36    | 21-1/2  | 43-3/4 | 33    | 51 | 22-3/4                                | 43-3/4  | 50    | 70 |    |     | 38     |
| 46    | 26-1/2  | 65-1/2 | 33    | 51 | 27-3/4                                | 65-1/2  | 50    | 70 |    |     | 43     |
| 56    | 33-5/8  | 80     | 33    | 51 | 34-7/8                                | 80      | 50    | 70 | 90 | 110 | 52-3/4 |
| 66    | 38-5/8  | 90     | 33    | 51 | 39-7/8                                | 90      | 50    | 70 | 90 | 110 | 57-3/4 |
| 76    | 43-5/8  | 100    | 33    | 51 | 44-7/8                                | 100     | 50    | 70 | 90 | 110 | 62-3/4 |
| 86    | 50-5/8  | 114    | 33    | 51 | 51-7/8                                | 114     | 50    | 70 | 90 | 110 | 69-3/4 |
| * 108 |   |        |       |    | 61-3/4                                | 132-3/4 | 50    | 70 | 90 | 110 | 82     |
| * 124 |   |        |       |    | 75-1/4                                | 159-3/4 | 50    | 70 | 90 | 110 | 95-1/2 |



\* Wide Saddle

NOTE - Not Available on 26-36 Combination.

| SIZE  | D-D    | P      | Q      | D<br>W/STD.<br>RAM | D<br>W/HEAVY<br>DUTY RAM | Z<br>W/STD.<br>RAM | Z<br>W/HEAVY<br>DUTY RAM |
|-------|--------|--------|--------|--------------------|--------------------------|--------------------|--------------------------|
| 46    | 31     | 10-3/8 | 26     | 34-1/4             |                          | 18                 |                          |
| 56    | 38-1/8 | 11-3/4 | 30-3/4 | 41-3/8             | 40-1/8                   | 22-1/2             | 23-3/4                   |
| 66    | 43-1/8 | 11-3/4 | 30-3/4 | 46-3/8             | 45-1/8                   | 22-1/2             | 23-3/4                   |
| 76    | 48-1/8 | 11-3/4 | 30-3/4 | 51-3/8             | 50-1/8                   | 22-1/2             | 23-3/4                   |
| 86    | 55-1/8 | 11-3/4 | 30-3/4 | 58-3/8             | 57-1/8                   | 22-1/2             | 23-3/4                   |
| * 108 | 65     | 14-1/2 | 44-3/4 |                    | 66-7/8                   |                    | 23                       |
| * 124 | 78-1/2 | 14-1/2 | 44-3/4 |                    | 80-3/8                   |                    | 23                       |

| SIZE  | STD. ON 46"<br>STANDARD 9" RAM<br>OPTIONAL ON 56 THRU 86 |        | RANGE |    | STD. ON 56 THRU 124<br>HEAVY DUTY RAM |        | RANGE |    |    |     | M      |
|-------|--|--------|-------|----|---------------------------------------|--------|-------|----|----|-----|--------|
|       | F-F  | F      | S     | S  | F-F                                   | F      | S     | S  | S  | S   |        |
| 46    | 30   | 30-1/4 | 33    | 51 |                                       |        | 50    | 70 |    |     | 43     |
| 56    | 37-3/8   | 37-5/8 | 33    | 51 | 38-5/8                                | 38-7/8 | 50    | 70 | 90 | 110 | 52-3/4 |
| 66    | 42-3/8   | 42-5/8 | 33    | 51 | 43-5/8                                | 43-7/8 | 50    | 70 | 90 | 110 | 57-3/4 |
| 76    | 47-3/8   | 47-5/8 | 33    | 51 | 48-5/8                                | 48-7/8 | 50    | 70 | 90 | 110 | 62-3/4 |
| 86    | 54-3/8   | 54-5/8 | 33    | 51 | 55-5/8                                | 55-7/8 | 50    | 70 | 90 | 110 | 69-3/4 |
| * 108 |  |        |       |    | 61-3/4                                | 66-7/8 | 50    | 70 | 90 | 110 | 82     |
| * 124 |  |        |       |    | 75-1/4                                | 80-3/8 | 50    | 70 | 90 | 110 | 95-1/2 |

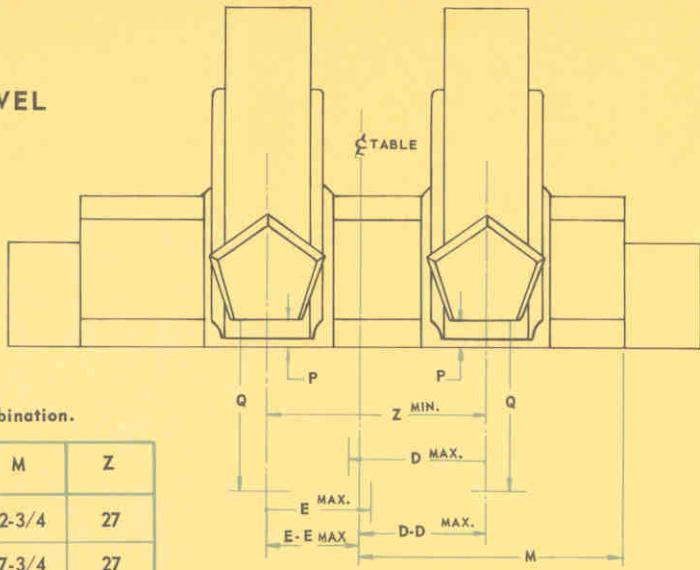
**- CAPACITY CHART -**  
**46" THRU 124" - L. H. RAM and R. H. TURRET HEAD TRAVEL**

**-CAPACITY CHART-**  
**56" THRU 124" - L. H. and R. H. TURRET HEAD TRAVEL**

\* Wide Saddle

NOTE - Not Available on 26-36-46 Combination.

| SIZE  | D-D    | D      | E-E    | E      | P      | Q      | M      | Z      |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|
| 56    | 38-1/8 | 40-1/8 | 41-7/8 | 42-1/8 | 11-3/4 | 30-3/4 | 52-3/4 | 27     |
| 66    | 43-1/8 | 45-1/8 | 46-7/8 | 47-1/8 | 11-3/4 | 30-3/4 | 57-3/4 | 27     |
| 76    | 48-1/8 | 50-1/8 | 51-7/8 | 52-1/8 | 11-3/4 | 30-3/4 | 62-3/4 | 27     |
| 86    | 55-1/8 | 57-1/8 | 58-7/8 | 59-1/8 | 11-3/4 | 30-3/4 | 69-3/4 | 27     |
| * 108 | 65     | 66-7/8 | 65     | 66-7/8 | 14-1/2 | 44-3/4 | 82     | 26-1/4 |
| * 124 | 78-1/2 | 80-3/8 | 78-1/2 | 80-3/8 | 14-1/2 | 44-3/4 | 95-1/2 | 26-1/4 |

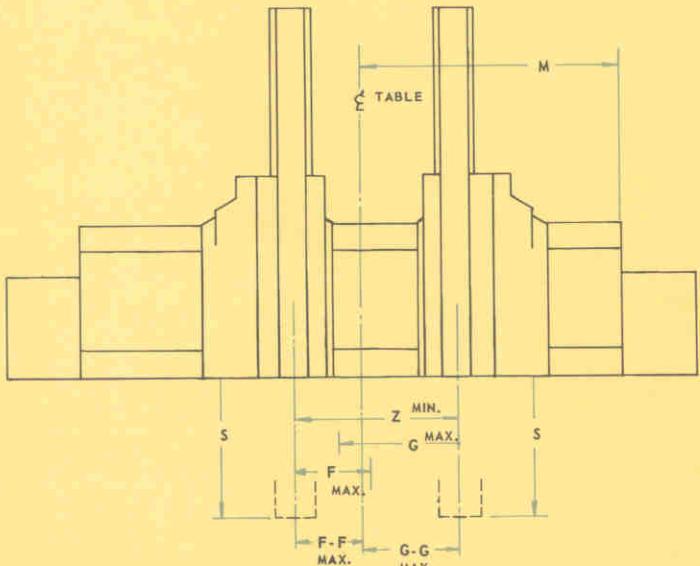


**-CAPACITY CHART-**  
**46" THRU 124" - L. H. and R. H. RAM HEAD TRAVEL**

\* Wide Saddle

NOTE - Not Available On 26-36 Combination.

| SIZE  | STANDARD 9" RAM |        |        | HEAVY DUTY RAM |        |        |
|-------|-----------------|--------|--------|----------------|--------|--------|
|       | G-G             | G      | Z Min. | G-G            | G      | Z Min. |
| 46    | 26-1/2          | 34-1/4 | 14-3/4 |                |        |        |
| 56    | 33-5/8          | 41-3/8 | 18     | 34-7/8         | 40-1/8 | 20-1/2 |
| 66    | 38-5/8          | 46-3/8 | 18     | 39-7/8         | 45-1/8 | 20-1/2 |
| 76    | 43-5/8          | 51-3/8 | 18     | 44-7/8         | 50-1/8 | 20-1/2 |
| 86    | 50-5/8          | 58-3/8 | 18     | 51-7/8         | 57-1/8 | 20-1/2 |
| * 108 |                 |        |        | 61-3/4         | 66-7/8 | 19-3/4 |
| * 124 |                 |        |        | 75-1/4         | 80-3/8 | 19-3/4 |



| SIZE  | STD. ON 46"<br>STANDARD 9" RAM<br>OPTIONAL ON 56 THRU 86 |        | RANGE |    | STD. ON 56 THRU 124"<br>HEAVY DUTY RAM |        | RANGE |    |    |     | M      |
|-------|--|--------|-------|----|--|--------|-------|----|----|-----|--------|
|       | F-F  | F      | S     | S  | F-F                                    | F      | S     | S  | S  | S   |        |
| 46    | 30   | 30-1/4 | 33    | 51 |  |        | 50    | 70 |    |     | 43     |
| 56    | 37-3/8   | 37-5/8 | 33    | 51 | 38-5/8                                 | 38-7/8 | 50    | 70 | 90 | 110 | 52-3/4 |
| 66    | 42-3/8   | 42-5/8 | 33    | 51 | 43-5/8                                 | 43-7/8 | 50    | 70 | 90 | 110 | 57-3/4 |
| 76    | 47-3/8   | 47-5/8 | 33    | 51 | 48-5/8                                 | 48-7/8 | 50    | 70 | 90 | 110 | 62-3/4 |
| 86    | 54-3/8   | 54-5/8 | 33    | 51 | 55-5/8                                 | 55-7/8 | 50    | 70 | 90 | 110 | 69-3/4 |
| * 108 |  |        |       |    | 61-3/4                                 | 66-7/8 | 50    | 70 | 90 | 110 | 82     |
| * 124 |  |        |       |    | 75-1/4                                 | 80-3/8 | 50    | 70 | 90 | 110 | 95-1/2 |

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