

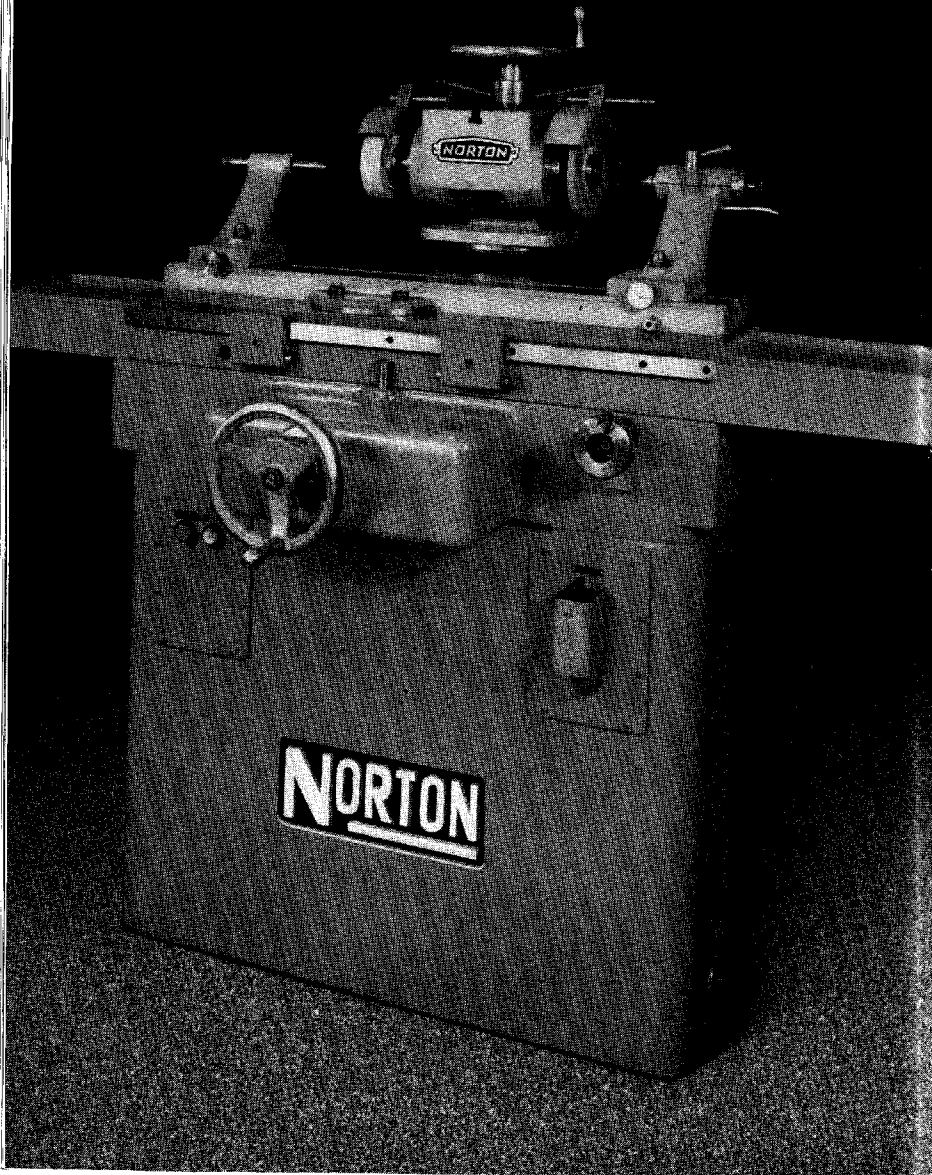
**CHAPTER XII****Norton Grinding Machines for the Tool Room***Universal Tool and Cutter Grinders*

Three machines of this type are available, each representing in its particular range, the highest development in equipment for sharpening a wide variety of cutters and reamers, and for light cylindrical, surface and internal grinding operations, as well. All have motor driven wheel heads. All may be had with the bare essentials for cutter grinding, or may be fully equipped to perform the many and diversified jobs found in the modern tool room.

Dual or interchangeable controls permit machine operation from either side. Handwheels for the table movement, transverse movement of the saddle or vertical movement of the wheel head, are all graduated in thousandths of an inch. Table traverse is by hand-operated mechanisms on the No. 1 Tool and Cutter and on the No. 20 Cutter and Tool Grinder, and by hand or automatic hydraulic power on the No. 2 Tool and Cutter machine.

A universal workhead that takes cutters with either National Standard or B & S tapers is available for all three machines. It can be swiveled and set at any desired angle in both horizontal and vertical planes, and by application of the motor drive arrangement that can be supplied, becomes a power driven headstock for cylindrical grinding.

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*20 Cutter and  
Grinder*

### *10", 12", 14" and 18" Universal Grinders*

No large tool room is complete without a high grade universal grinder. There are always jobs beyond the capacities of tool and cutter grinders; large internal grinding jobs, face grinding on work that must be held on a revolving chuck and countless other grinding operations where a universal grinder answers the purposes of separate machines for external and internal grinding.

Norton Universals are hydraulic types and are highly versatile. On all series sliding table ways are automatically pressure lubricated and the grinding wheel feed is either by hand or automatic at table reversal. A mechanism for rapid power positioning of the grinding wheel is available, and 12", 14" and 18" machines may be equipped with a semiautomatic grinding cycle for plunge-grind jobs where quantity runs are made. The grinding wheel head may be swiveled and the wheel set at any angle and fed at any angle. The wheel feed is operated from a convenient fixed position regardless of the angular setting of the wheel head.

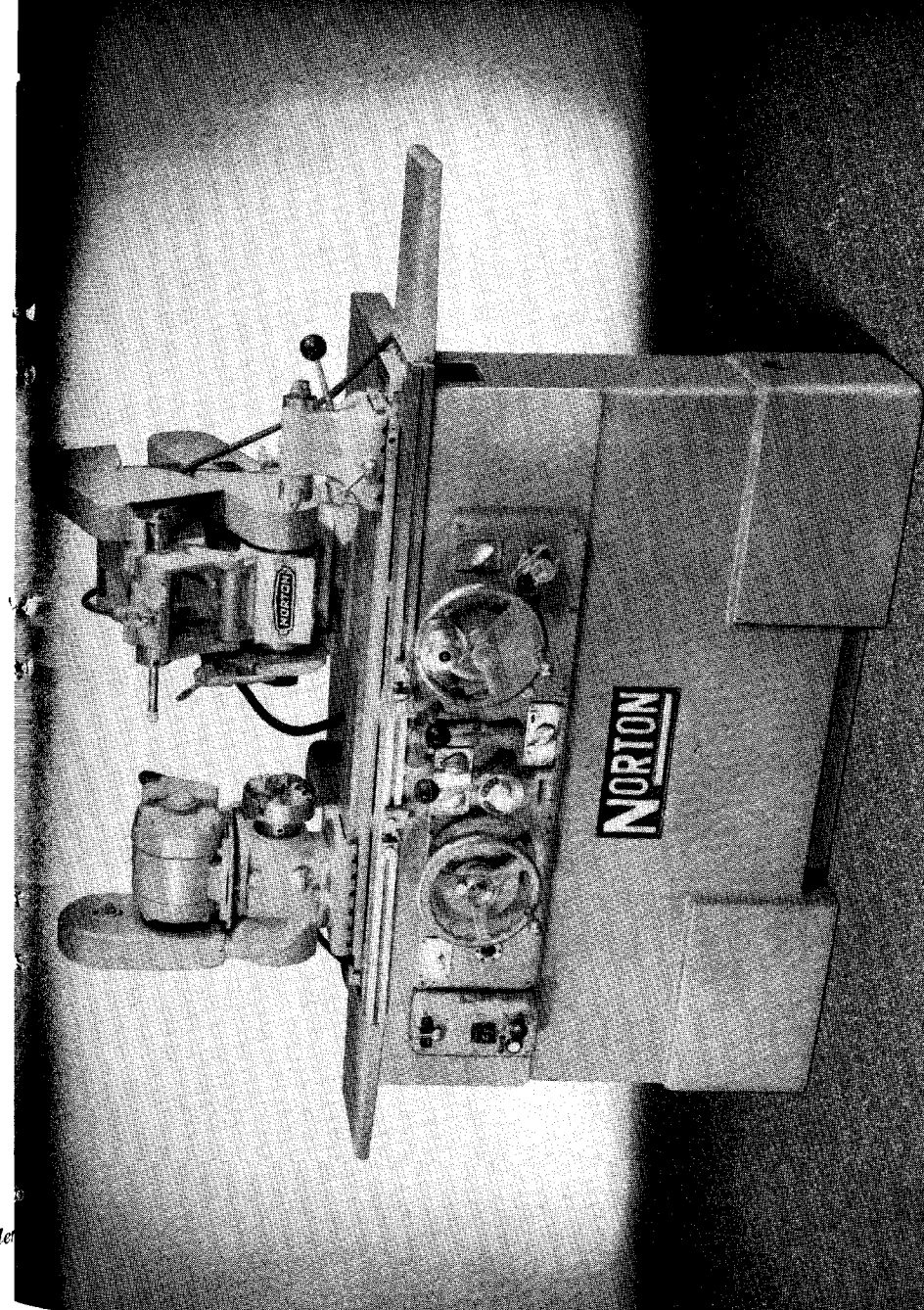
The headstock permits permanent mounting of a chuck. This feature shortens substantially the time factor in setting up for chucked jobs. The headstock also can be swiveled to any desired angle and operated with a dead center or live spindle. A clear hole in the headstock spindle permits work up to a certain diameter to pass through, thus adding to the work length capacity of the machine.

Provision is made for internal grinding, using standard internal spindles. The machines permit quick changeover from one type of grinding to another and the operating controls are simple and convenient.

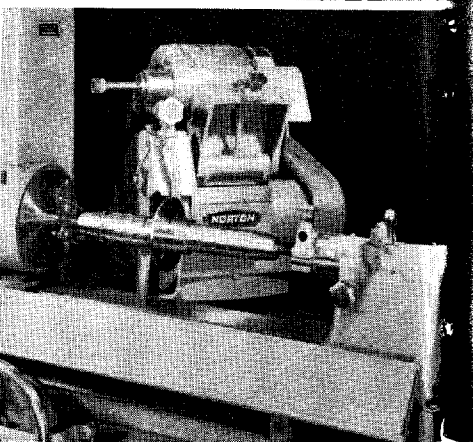
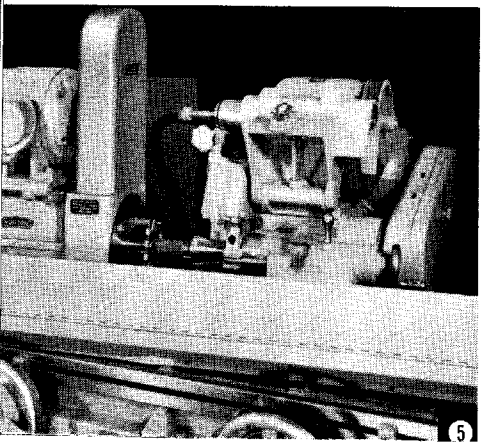
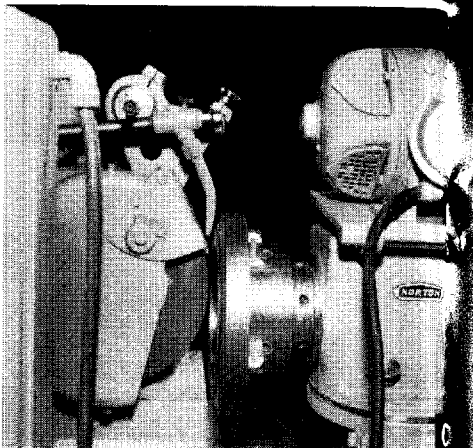
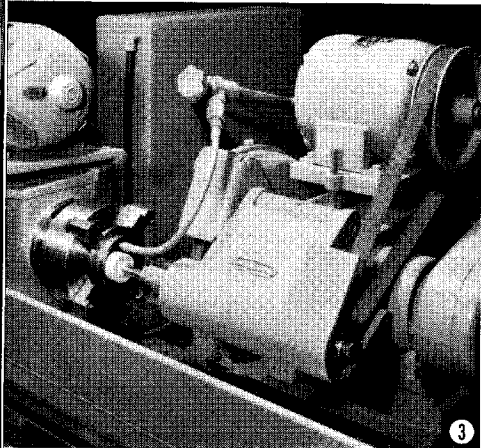
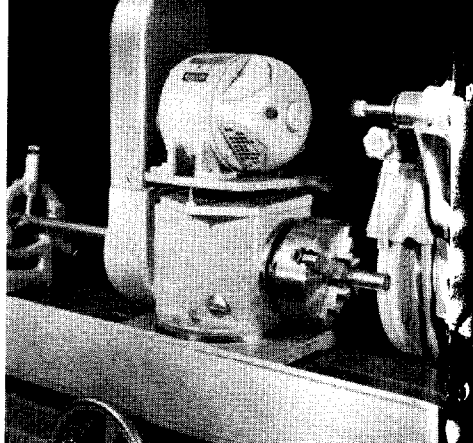
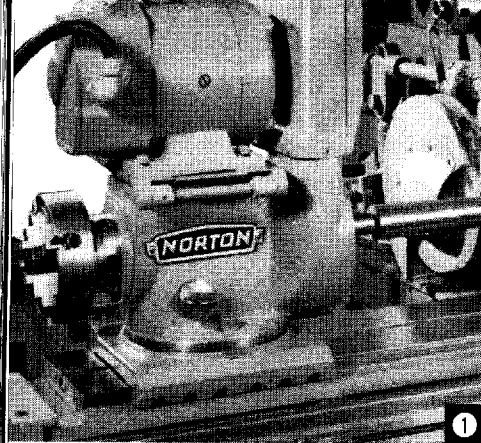
Norton Universal machines also give exceptional service for general production—as well as for tool room work where the diversity of grinding requires a universal type. Norton Universals quickly return their investment.

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*Norton 10" x 24" Universal Grinder*



### *Norton Universal Grinder Set-Ups*



- ① *Minimum effort to change from dead center to chucking work. Chuck may remain mounted at back end of headstock while dead-center grinding*
- ② *Hollow headstock spindle gives additional capacity for grinding long bars by passing them clear through and supporting them in grinding position*
- ③ *Hinged-bracket type internal grinding spindle swings up and out of the way when not in use. This means quicker setups for I.D. or O.D. grinding*
- ④ *Performing a face grinding operation with work head set at 90° from regular position permitting grinding with periphery of straight faced wheel*
- ⑤ *Grinding a taper plug gage. The table is easily swiveled for taper grinding. Tapers beyond the swivel capacity of the table may be ground because of the wheel head compound swivel feature. For these jobs settings are established whereby the wheel is traversed along the work by the wheel feed hand wheel*
- ⑥ *Grinding a spindle thrust flange with grinding wheel set in angular position. In this job, the footstock spindle is quickly locked by the binder knob on the footstock body to take the thrust*

### *6" x 18" and 8" x 24" Type S-3 Hydraulic Surface Grinders*

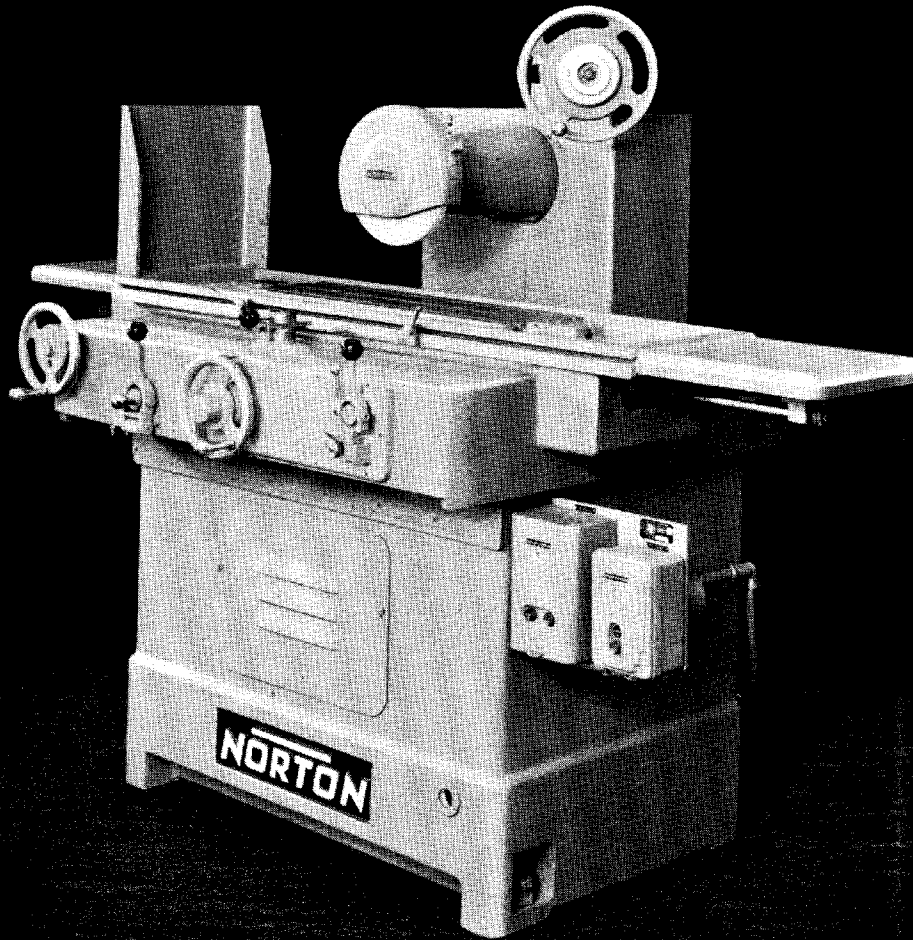
By grinding at a table speed of 125 feet per minute, these high speed surface grinders produce plane surfaces of excellent quality. Scientific study shows that finishing flat fast, especially where sensitive steels are concerned, produces a better surface on work. This is because thicker chips result which carry off heat, preventing its penetration deeply into the work.

Operation-easing features of the machines tend to preserve operator efficiency by reducing fatigue. Long guide ways provide a wheel head support which promotes accuracy in heavy cutting, plus a lasting capacity to grind square shoulders rapidly. Wheel head gib construction also contributes to the capacity for fast grinding by eliminating grinding wheel "hang up" resulting from uneven pressure on the gibs.

Hydraulic power and hand table traverse, automatic hydraulic and hand-operated cross feed arrangements are furnished as standard. These machines are normally arranged for dry grinding, either with or without an individual dust exhaust system, but may be had, if desired, with wet grinding attachment.

Magnetic chucks can be furnished which make the machines very useful for quickly holding and grinding flat work, small dies, jig and fixture parts, parallels, and other tools. Extreme accuracy in parallelism, flatness and size may be produced with them and an excellent quality of finish is quickly obtained.

These machines are very sturdy and dependable and they are found to be extremely useful and productive machines in the many tool rooms.



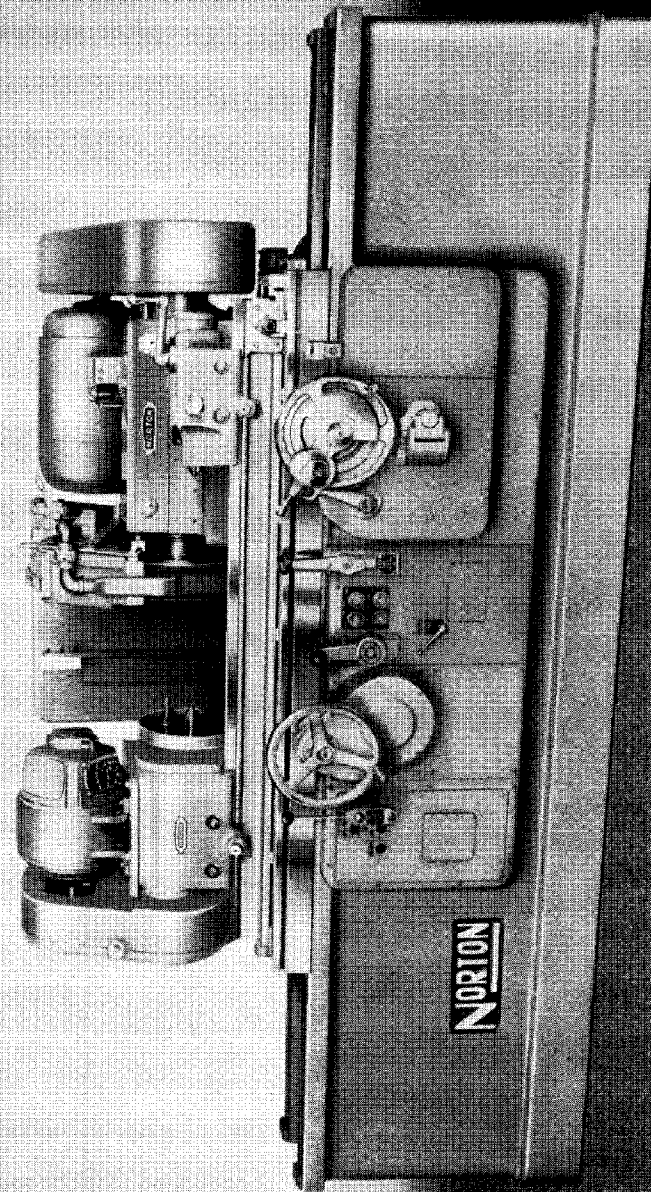
*Norton 8" x 24" Type S-3 Hydraulic Surface Grinder*

### *4", 6" and 10" Type CTU Cylindrical Grinders*

These machines speedily produce the finest precision work. They are of special value to tool rooms where a considerable amount of cylindrical grinding such as boring bars, large arbors or long shafts is required. Not only are they rapid producers and fine finishers, but they are easily operated as well. Various attachments and accessories are available which adapt them for a wide variety of cylindrical grinding jobs including taper grinding, form grinding, shoulder grinding, cam grinding, etc.

The 4" machine is built in 18" length, the 6" in 18" and 30" length, and the 10" machine in length capacities from 18" to 120". Table traverse is automatic, by hydraulic means with an auxiliary manual means provided. The wheel feed is either by hand or automatic at each table reversal in traverse grinding. Special features are automatic lubrication of table ways, wheel slide ways and wheel spindle and the powerful self-contained motor driven grinding wheel unit.

For complete information on any of the Norton grinding machines described in these pages, write to Norton Company, Worcester 6, Massachusetts, Machine Tool Division.



*Norton 10" Type CTU  
Cylindrical Grinder*