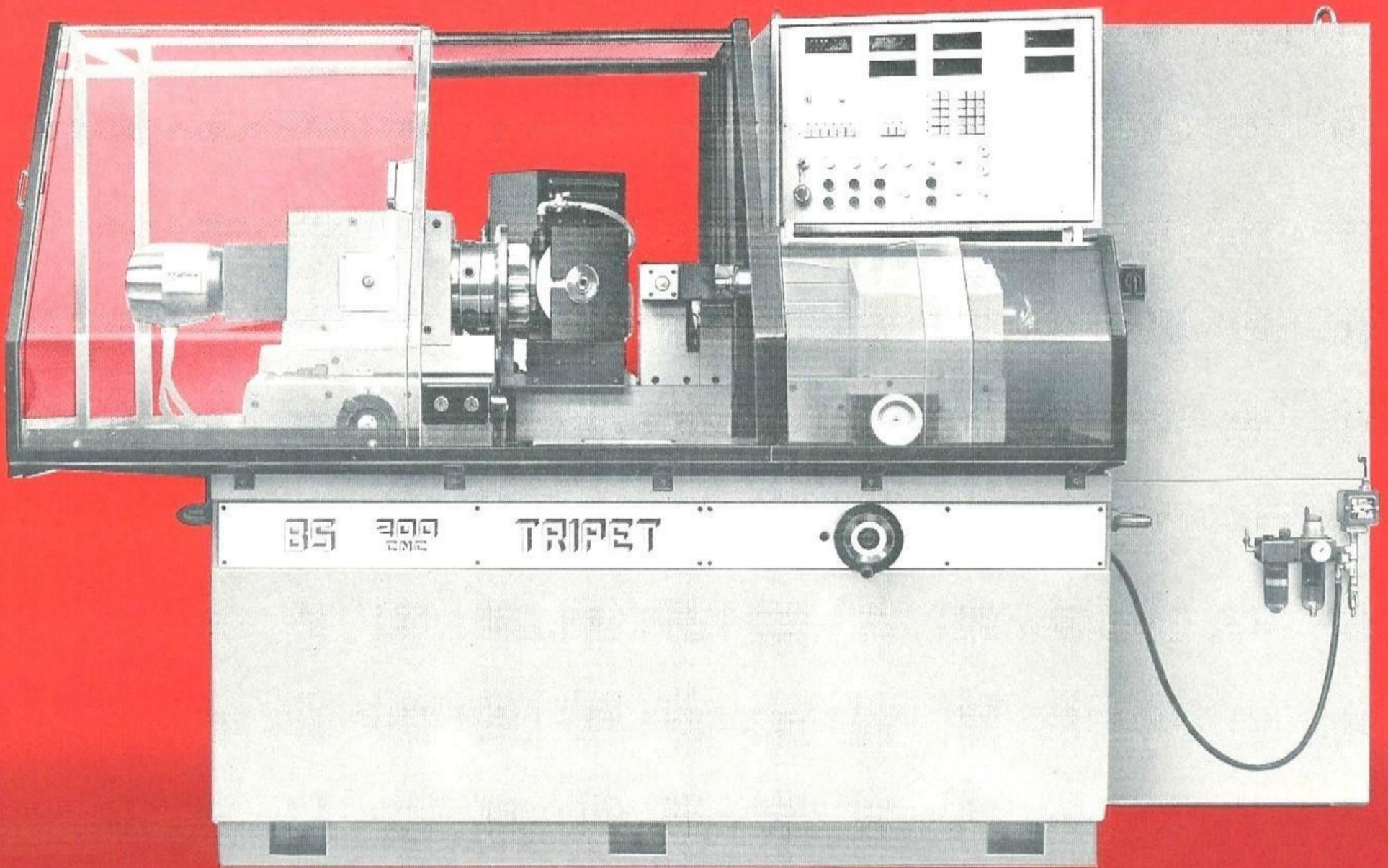


TRIPET BS200CNC

ULTRA-PRECISE
INTERNAL PRODUCTION
GRINDING MACHINE

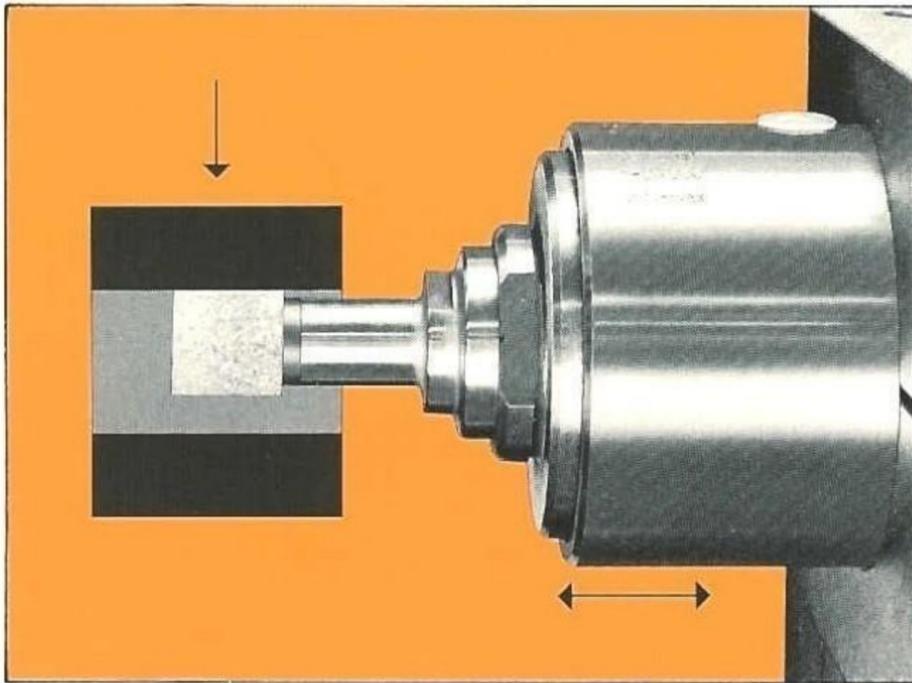


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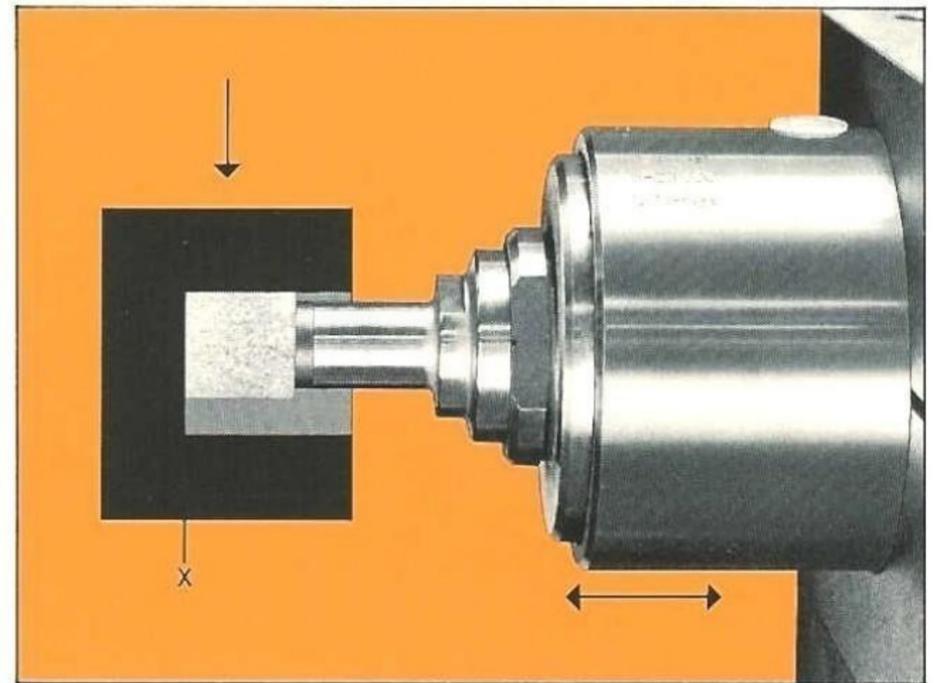
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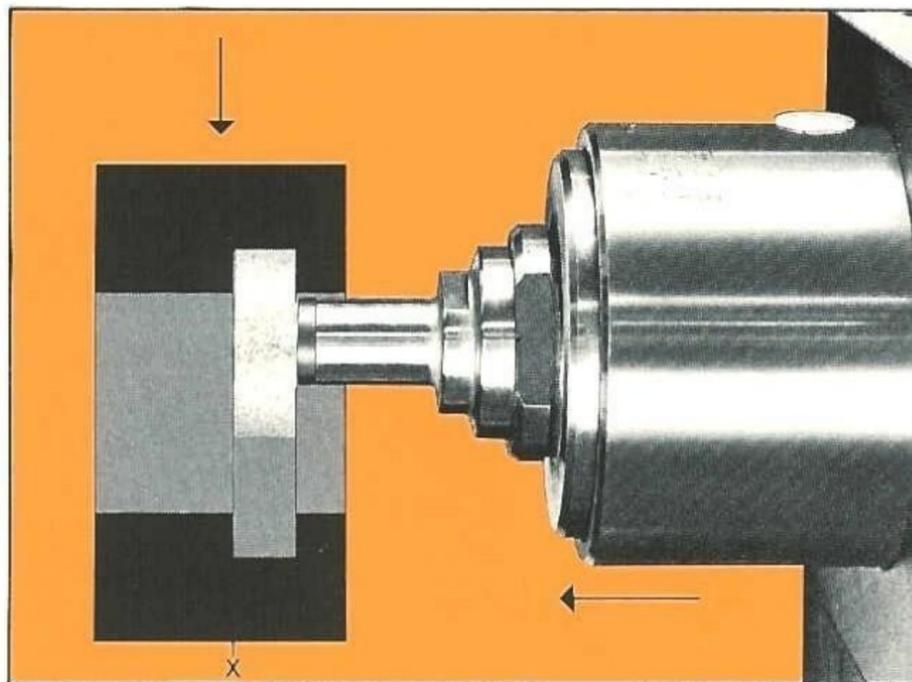
A wide range of possibilities, i. e.



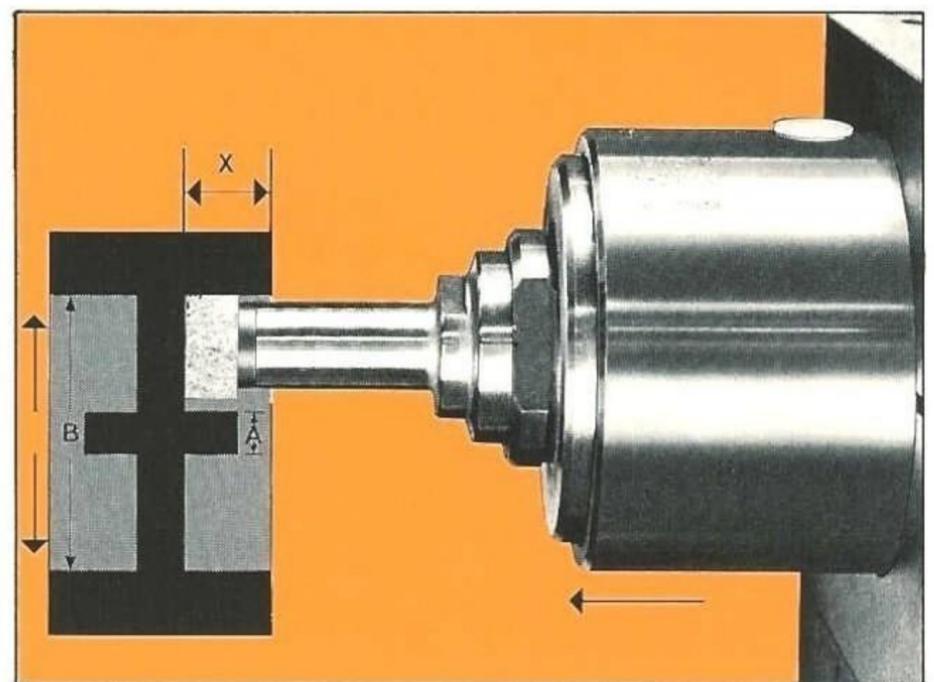
Normal grinding. Infeed at single or double table reversal.



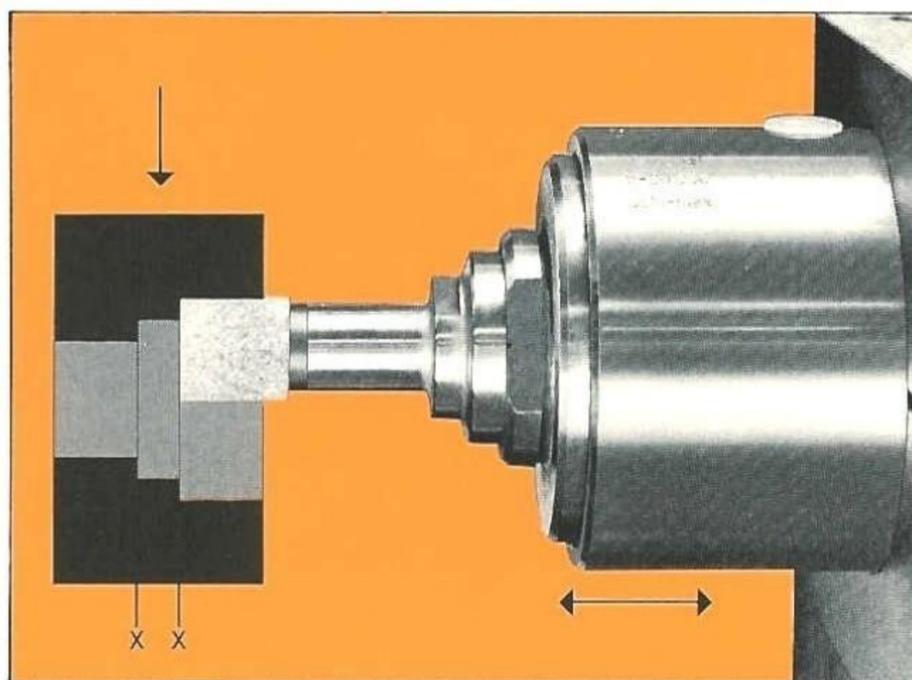
Creep grinding of blind bores. "X" position given by rotating end-coder.



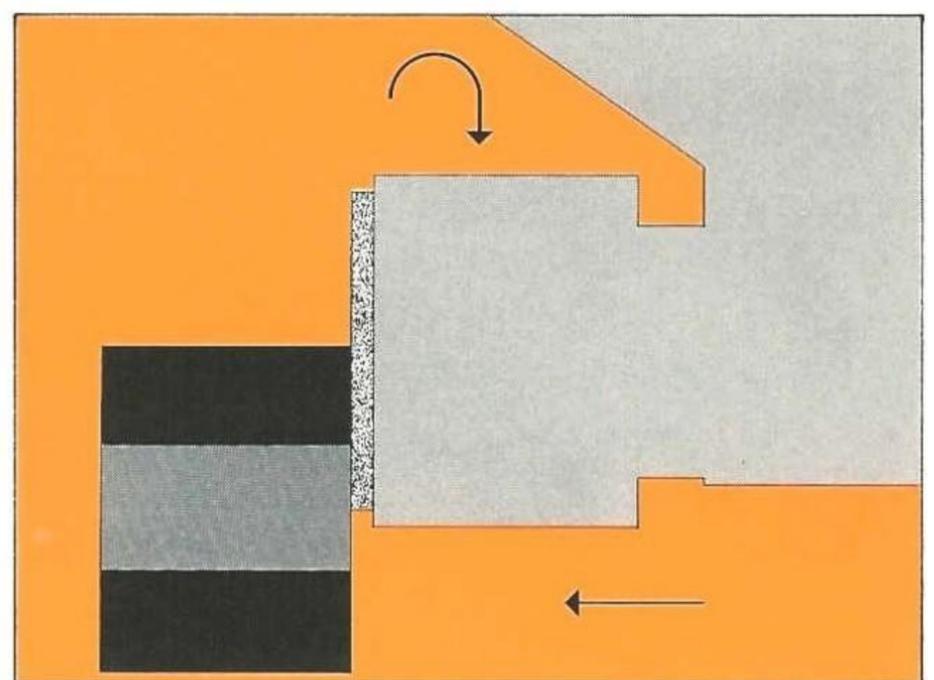
Plunge grinding. Infeed by stepping motor with steplessly adjustable speed. "X" position given by rotating end-coder.



Plunge grinding cycle: dia. A, distance "X" and dia. B. "X" position given by rotating end-coder. Visual indication of diameters by digital readout.



Automatic grinding of stepped diameters and various lengths in one chucking. "X" positions given by rotating end-coder.



Automatic face grinding. Hydraulic wheel positioning. Infeed by stepping motor.

B5200CNC

A big step forward in precision internal grinding

This new ultra-precise internal production grinding machine offers greater productivity thanks to its modern conception.

Advanced techniques

Machine conception is a result of more than 3 years market survey.

The CNC control system using LSI and modular units has been specially developed in conjunction with a leading Swiss electronic and electrical control company. Longitudinal slide is of cast iron, hydraulically traversed and controlled by means of an electro-hydraulic linear amplifier (optimum servo-properties, low friction, high stiffness, high dynamics) and a rotating encoder for very accurate positioning.

Workhead spindle is mounted on preloaded special needle bearings with oil-mist lubrication to guarantee roundness tolerance less than one micron/mm (.000040").

Stepping motors and ballscrews are used to power the infeed of workhead and wheel spindle towards dressing diamond.

Easy to use

Grinding, dressing and reversal positions are controlled by the rotating end-coder. The control panel with keyboard for data input is conveniently placed in front of the operator.

Its design ensures maximum efficiency for set-up and operation. Infeed progression, grinding programme and table position will be permanently indicated on Digital Readout.

Workspindle fixed speed for setting 30 r.p.m.

Wheel slide can be manually traversed for setting.

Special push-button control provides automatic workpiece back-off and rapid slide withdrawal, useful for manual gauging.

Quick interchangeable spindle brackets.

Up to 5 dressings per work cycle, automatically.

Control variations for specific problems

A more advanced control system enables the automatic grinding of stepped diameters and various length in one chucking.

The control panel can be fitted with additional modules for:

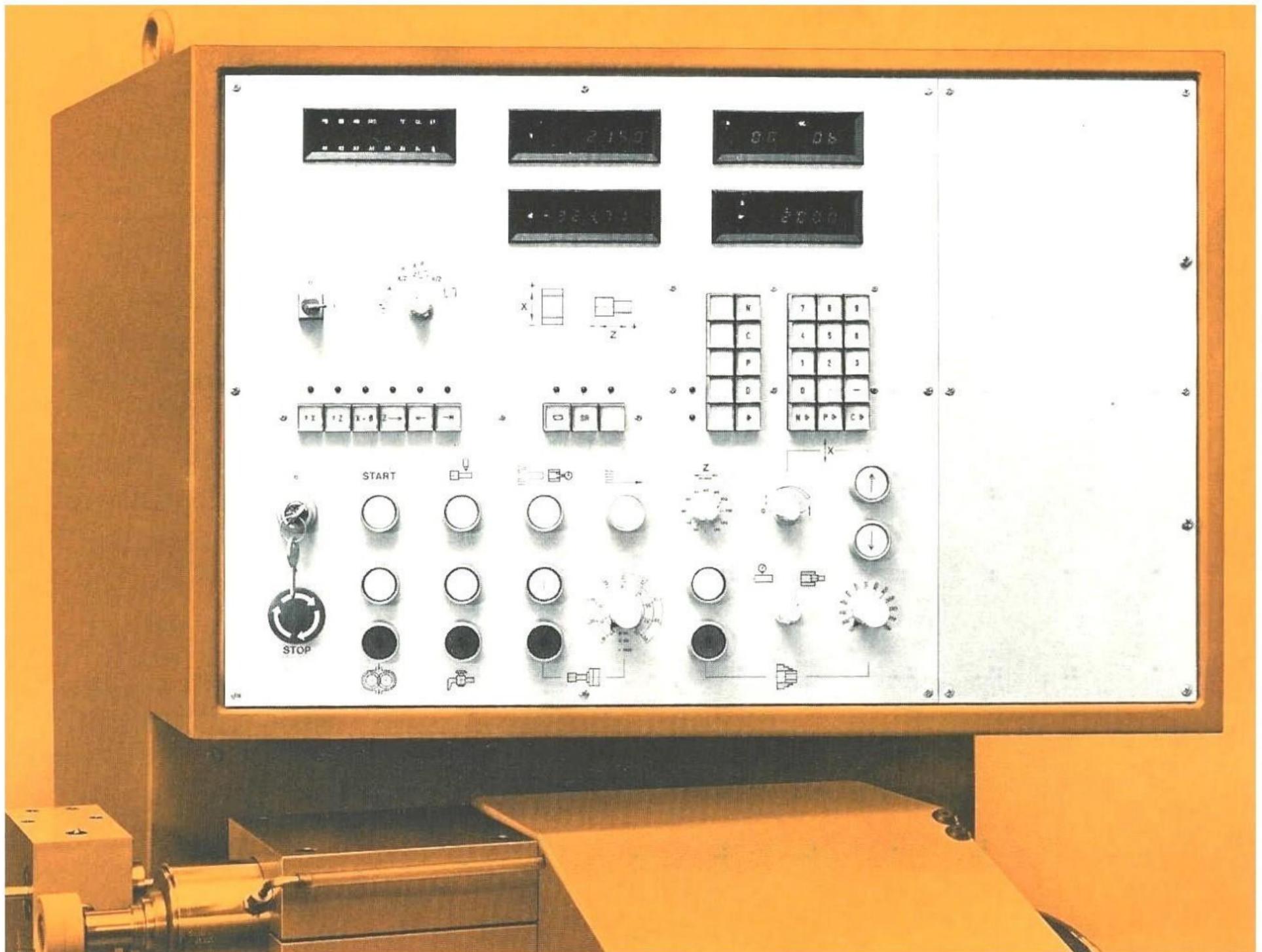
- In-process gauging.
- Automatic face grinding attachment.
- Automatic peripheral face grinding attachment.
- Hydraulic clamping unit.
- Automatic loading and unloading systems.

This new production grinder can solve most of your problems in the range of bore sizes 3 to 120 mm (.12" to 4.7").

Main features:

- Ribbed cast-iron heavy base provides extremely good rigidity.
- The table runs on roller ways, oscillation speeds are infinitely variable controlled by hydraulic linear amplifier (up to 9 m/min. - 30 ft/min.).
- Very fine infeed by stepping motor and ballscrew, adjustable (single or double table reversal) from 0,001 to 0,099 mm (.000039" to .0039").
- Full automatic working cycle.
- Phases for roughing, finishing, sparkout and back-off, all adjustable for optimum results.
- Control system provides automatic workpiece back-off after sparking out (.03 mm - .0012").
- Digital size correction by inching button in increments of 0,001 mm (.000039").
- Basic execution includes 5 programmes:
 - Internal bore grinding with infeed at single table reversal.
 - Internal bore grinding with infeed at double table reversal.
 - Blind bore grinding.
 - Plunge grinding without oscillations.
 - Plunge grinding with oscillations.
- Grinding wheelspindle speeds from 8000 to 150 000 r.p.m. (motor-high frequency and air turbine spindles).
- Standard wheelspindle is driven by A.C. variable speed motor (4 kW) with solid state frequency convertor.
- Max. weight carried on workspindle 50 kg (110 lbs).

CNC Microprocessor Control



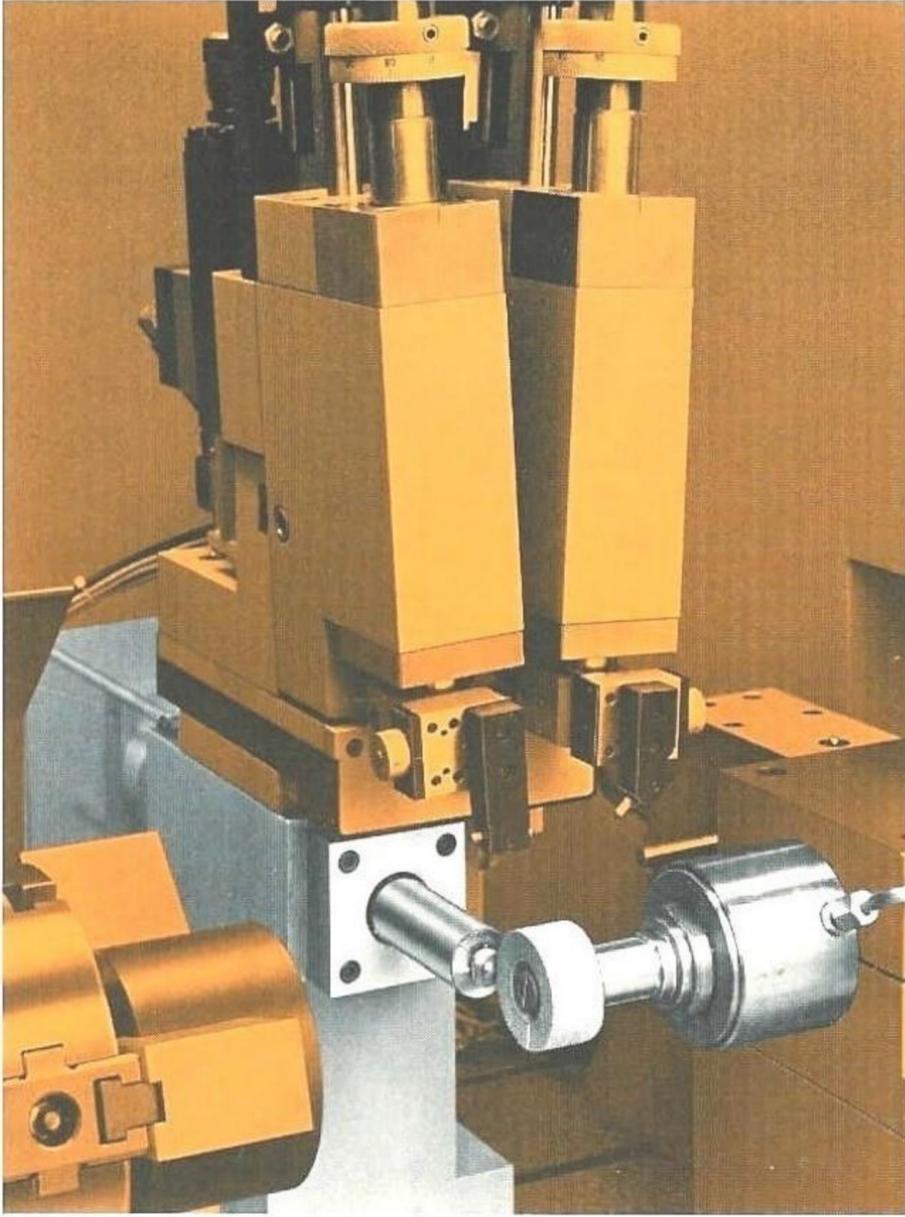
This microprocessor control system has been designed to use the latest developments in electronics. It is a modular system capable of development in many ways. Programming is straightforward, data are fed directly into the machine, separate tape input station is not needed as data input is done on a simple alpha-numeric keyboard. A wide range of workpieces can be ground manually or under full automatic cycle control.

Programming is based on a canned cycle system. As the control system contains some basic canned programmes the input data is reduced to specific data for each workpiece as the basic machine cycle is included in each canned cycle.

With the basic CNC control each of the 5 canned programmes can be used independently, with the extended CNC control each canned cycle can be selected as many times as necessary for each workpiece. Thus with the extended CNC control more complicated parts can be ground automatically with various bores, faces and recesses in a single complete machine cycle.

The control system checks that the entry data is being inserted in logical sequence, it also monitors the power supply and functioning of the microprocessor. The inserted data is locked in the memory store and checked before use. Additionally the elements of the memory itself are checked in cycle.

Dressing devices for 2 or 3 wheel faces Ref. 1700



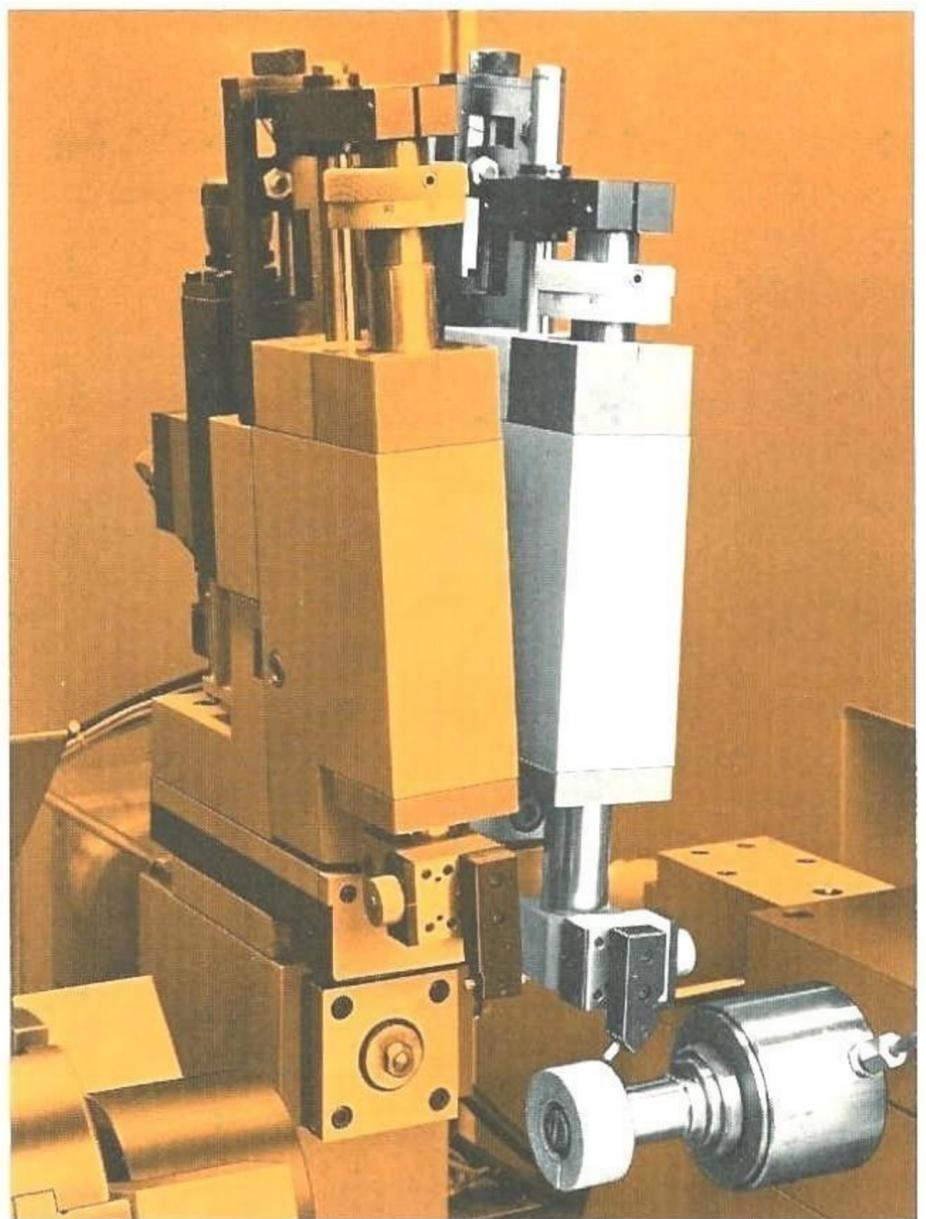
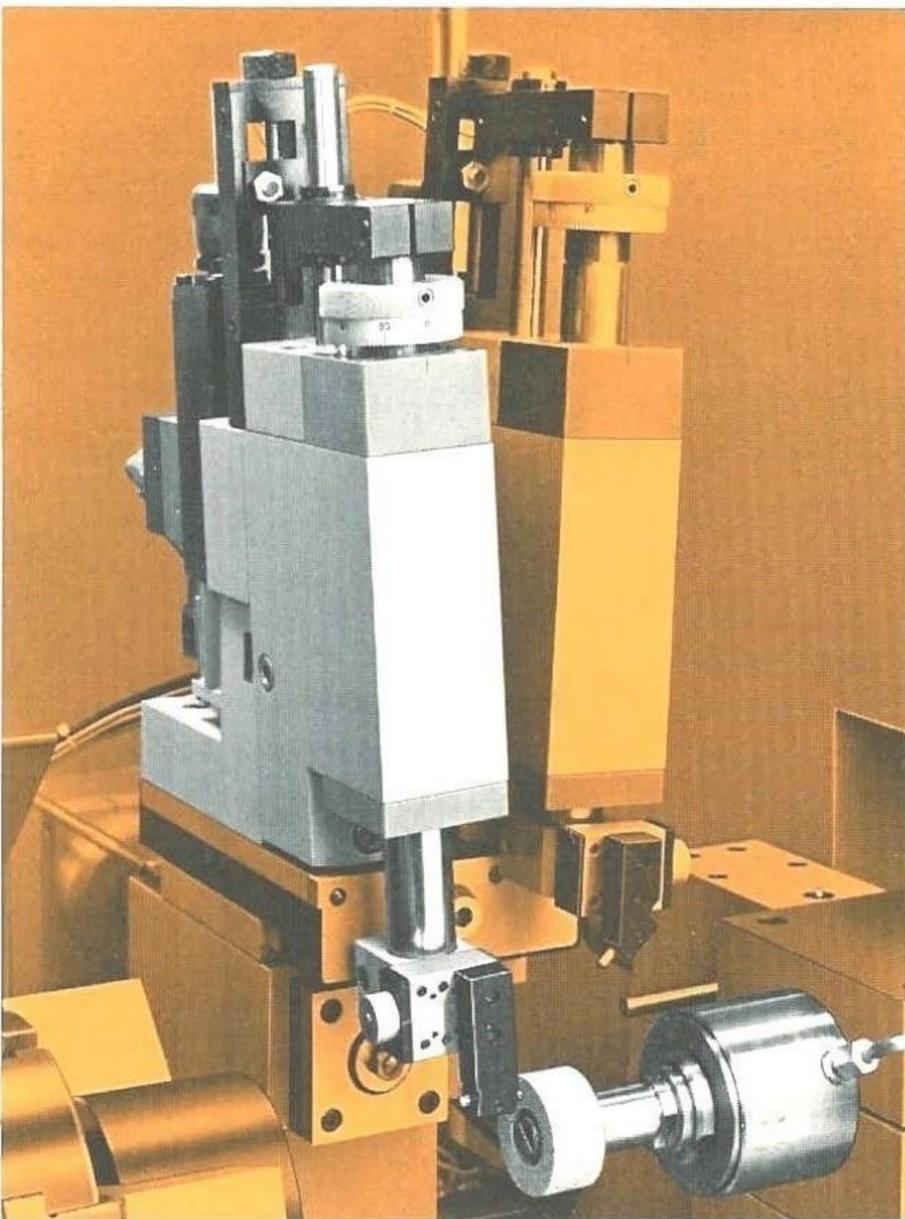
Range of Use:

- Diamonds mounted in line with wheel axis (relative to max. wheel dia.) adjustable on cross slide.
- Upper units can be tilted up to 10° for relief dressing of both wheel faces
- Predetermined amounts can be dressed of both faces
- Micrometer settings for diamond travel
- Flow valve for variable dressing speeds
- Distance between face diamonds variable to suit wheel width and according to type of spindle and wheel arbor.

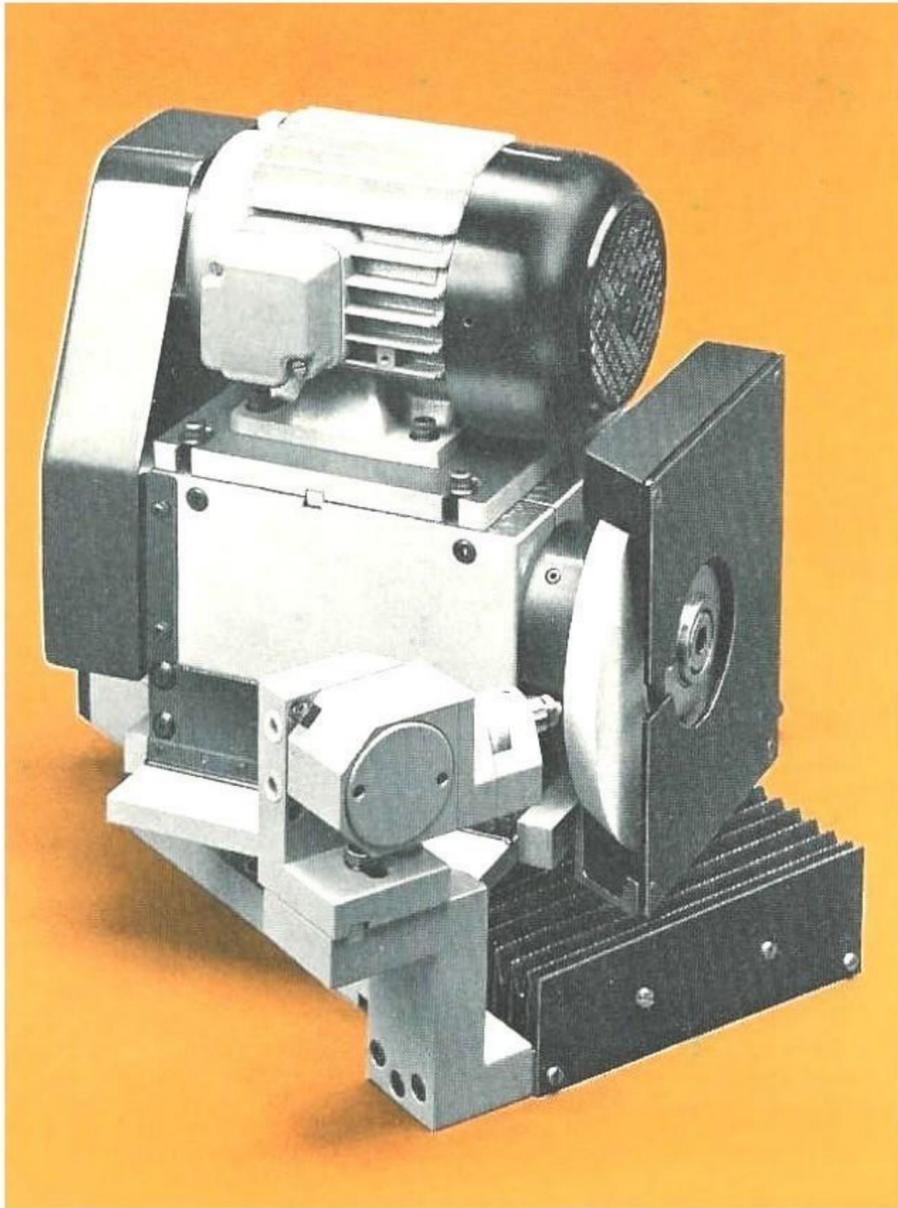
Rapid traverse for quick approach to dressing position and rapid withdrawal to rest position. Stroke controlled by proximity switches.

Note

Thanks to the CNC control system linked to the linear hydraulic amplifier and its rotary encoder wear on wheel dia. and width is automatically compensated.



Automatic Peripheral Face Grinding Attachment Ref. 1500/00



Additional equipment

With additional longitudinal slide, for dressing 2 sides of the wheel, the unit will perform external and face grinding operations. Proximity switches control the 90° rotation of the diamond and position of the longitudinal slide.

This attachment is used mainly for external face grinding up to 160 mm dia.

If the internal bore is less than 20 mm dia. this attachment grinds the face after the bore grinding operation.

If the internal bore exceeds 20 mm the face grinding operation can be done at the same time the bore is ground.

Working, dressing and reversal positions are controlled by proximity switches with security dead stops.

Main features:

Longitudinal slide on roller ways with hydraulic traverse.

Rapid approach stroke 0–15 mm.

Max. slide movement 145 mm.

Cross slide on roller ways with ballscrews and stepping motor feed.

Infeed: 0.0025 mm per motor step, infeed rate adjustable by potentiometer.

Max. grinding wheel wear: 35 mm on radius.

Spark-out time: infinitely variable on potentiometer.

Back-off: 0.03 mm Automatic back-off at end of cycle.

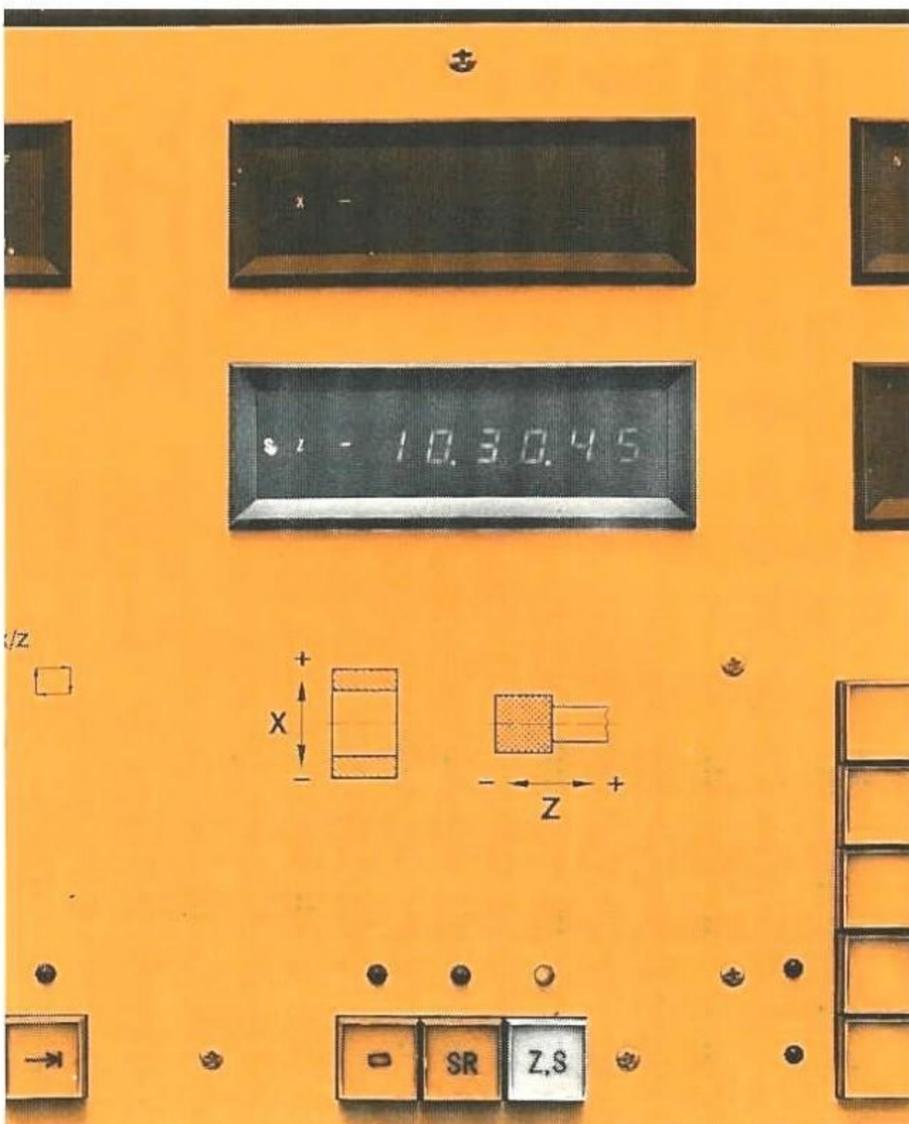
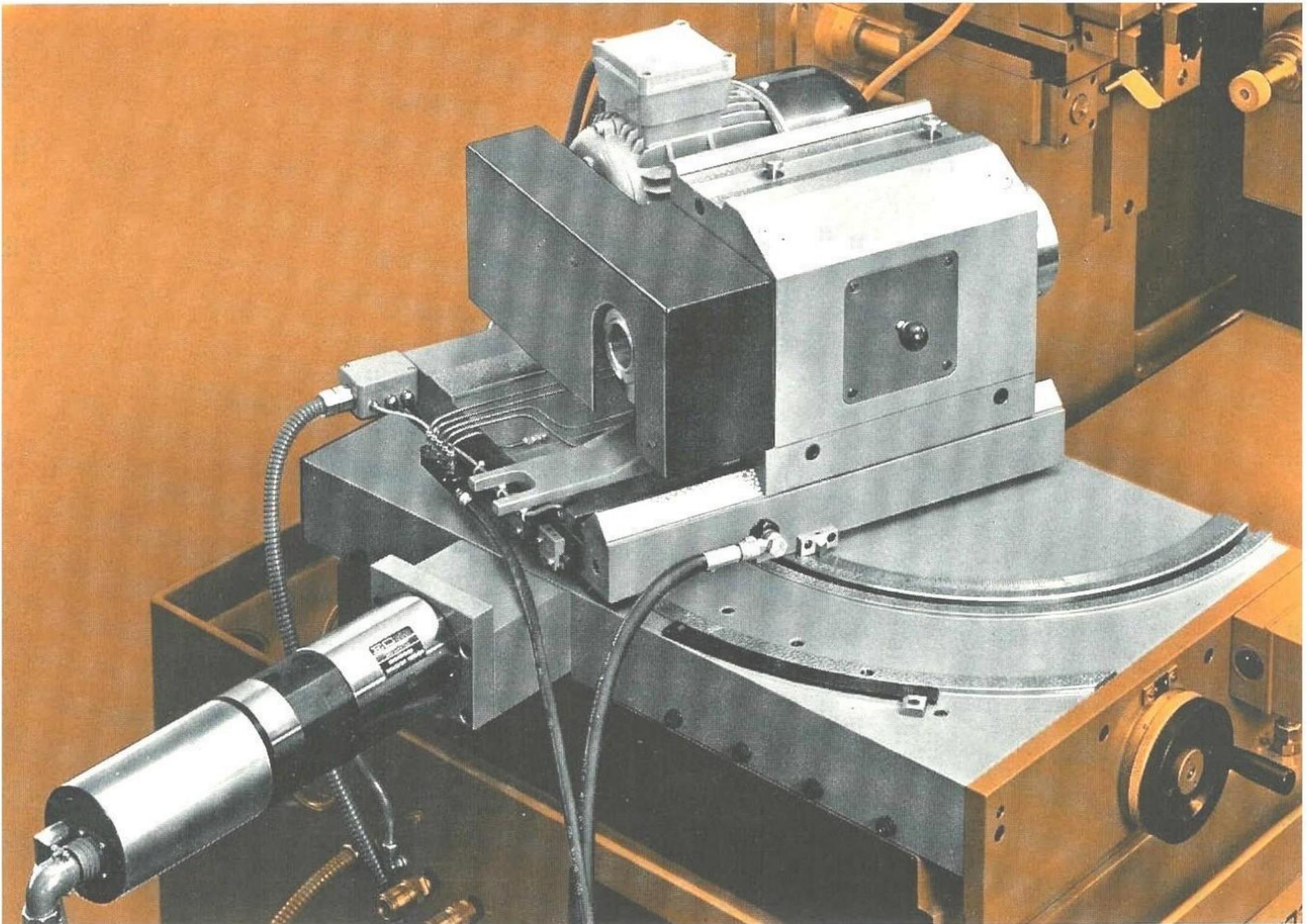
Grinding Wheel dia.: 225 × 50 × 50.8 mm.

Drive motor 1.1 kW (1.5 h.p.) 2800 r.p.m.

Mechanical dead stops.

Automatic compensation for wheel wear.

Automatic Angular Positioning of Workhead ref. 300/500



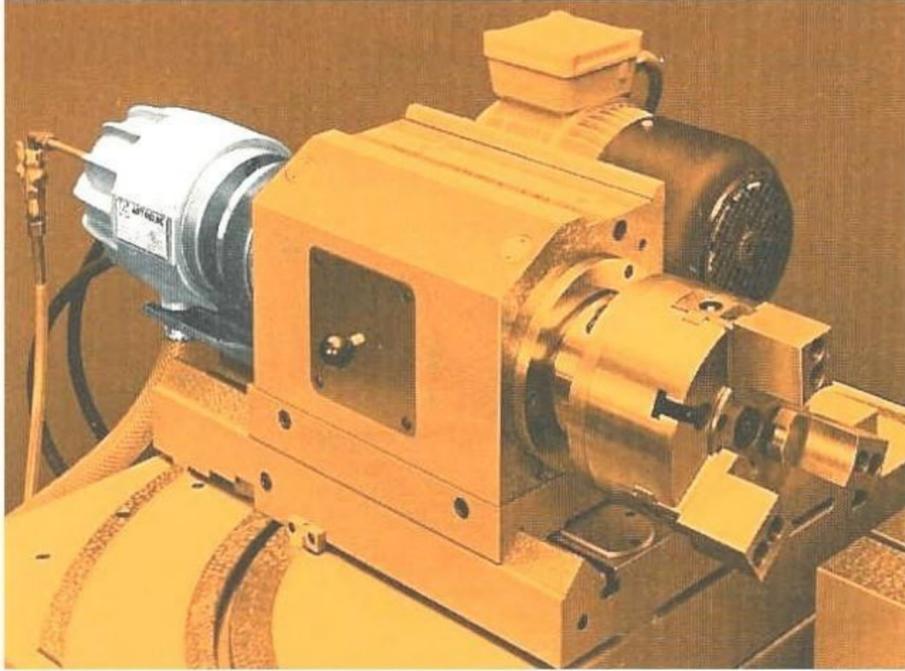
This new option provides an additional controlled axis on the BS 200 CNC grinder and enables bores and tapers to be ground in one chucking. Workhead is rotated by D.C. servomotor with rotary encoder on reaching the selected position the head is automatically clamped.

Angular position can be programmed on the M.D.I. keyboard in degrees, minutes and seconds. Angular movements can be done as many times as desired in the automatic grinding cycle. Automatic setting covers the full range of $-30, +45$ degrees.

Underside of the workhead mounting face is automatically lubricated for ease of movement.

Angular position of workhead is permanently displayed on digital readout panel.

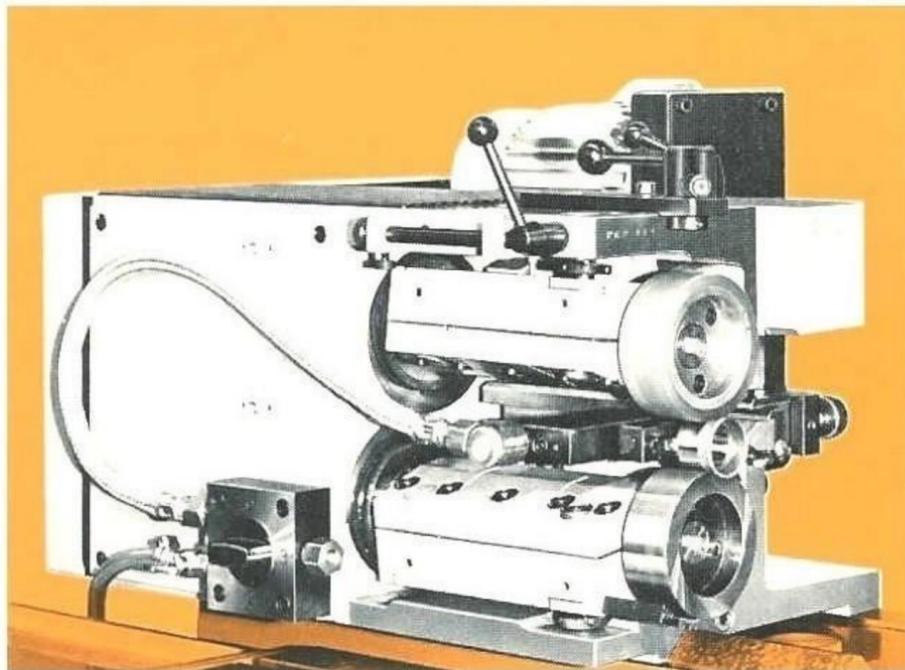
Hydraulic Clamping Unit Ref. S.P.



With this unit the workpieces can be clamped internally or externally in 3 jaw chucks. Clamping force can be pre-set by means of a reducing valve and pressure gauge. Max. force 1400 daN at 20 bar (max.) pressure. Max. rotation speed 4000 r.p.m. piston stroke 25 mm, cylinder bore 32 mm. Rotating coupling enables coolant to be fed from rear of the workhead. The cylinder can also be fitted with an accurate dead stop.

Centreless Workhead, type PE-2

Designed to grind bores concentric to the O.D.



Principle

The PE-2 Workhead is designed on the centreless principle, will grind bores concentric to within 2—3 microns. Workpiece is supported on a tungsten carbide workrest and driven by 2 rollers, one of steel, the other of a resilient material running slightly faster. This supports and drives on the reference O.D. and will maintain concentricity independent of workhead bearings or chucks.

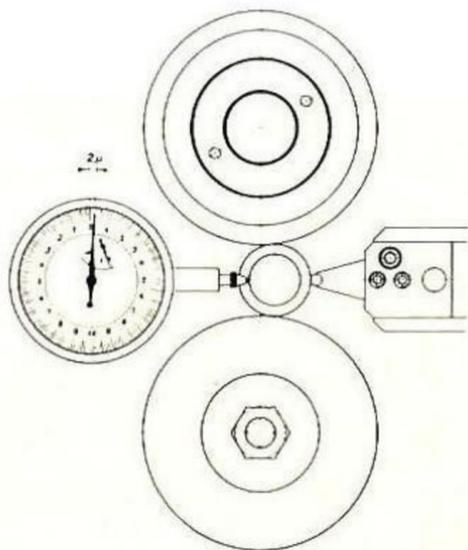
Technical Data

Workpiece O.D. range 0—32 mm (0—1.26")

Max. length 150 mm (5.9") but controlled by factors such as dia. and length of workpiece, length of driving (support) area, distance between support and grinding areas, wheel pressure against work.

Width of interchangeable drive rollers 8-14-20-30 mm

Motor for variable speed drive 0.12 kW - 2800 r.p.m.

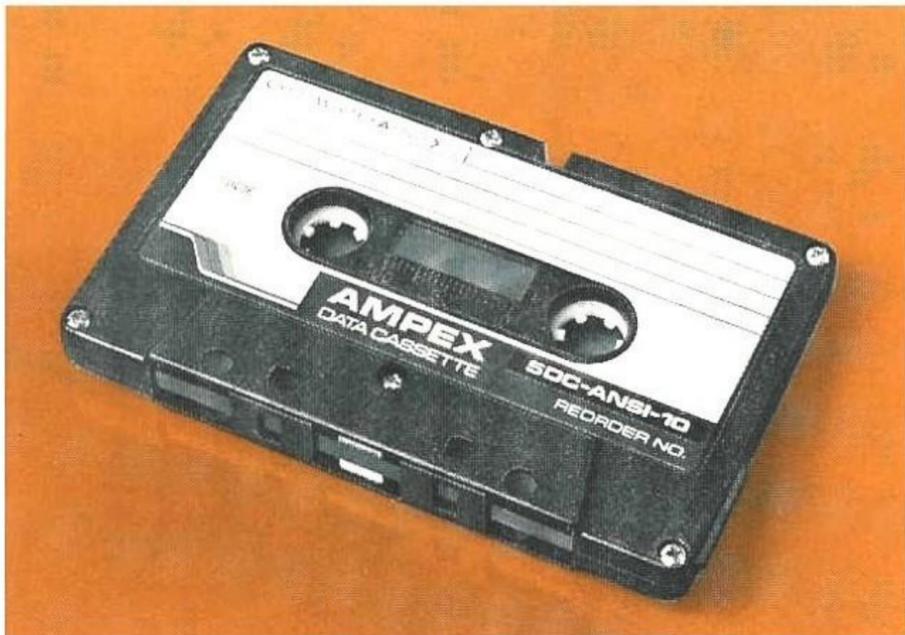


Cassette magnetic tape recorder ref. BR/FAMA



The unit is completely enclosed with mechanical drive system plus electronic elements. It is mounted on the right hand side of the main CNC control panel. Cassettes are loaded and unloaded from the front. Standard "computer tape" cassettes are used. Recording can be done on both sides of tape, recording is digital with density of 32 bits/mm. Data input corresponds to standards ISO-3047, ECMA-34, JIS-6281.

Each programme is identified by a four digit number and recorded as a block, the block length is constant and independent of length of programme. The block number enables a tape to be searched for the corresponding programme, this can then be read and checked on the digital display.



Cassettes must conform to following standards:
ISO. ANSI. ECMA or JIS.

Tape Punch ref. BR/FALO



for storing complete cycle programmes.

This unit with reader and punch is mounted on movable stand next to the machine. One tape is produced for each workpiece.

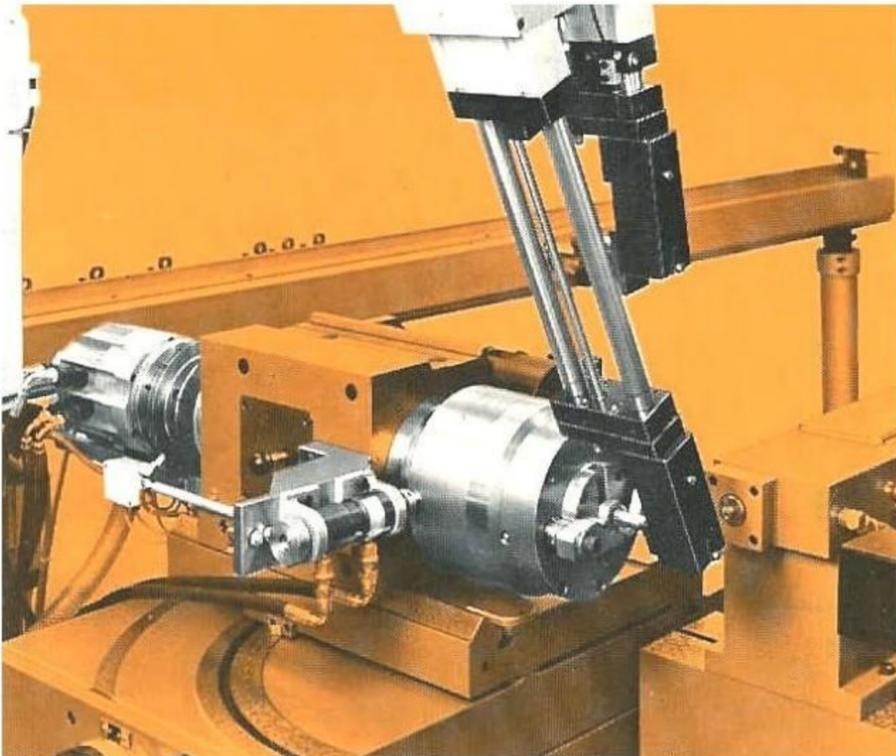
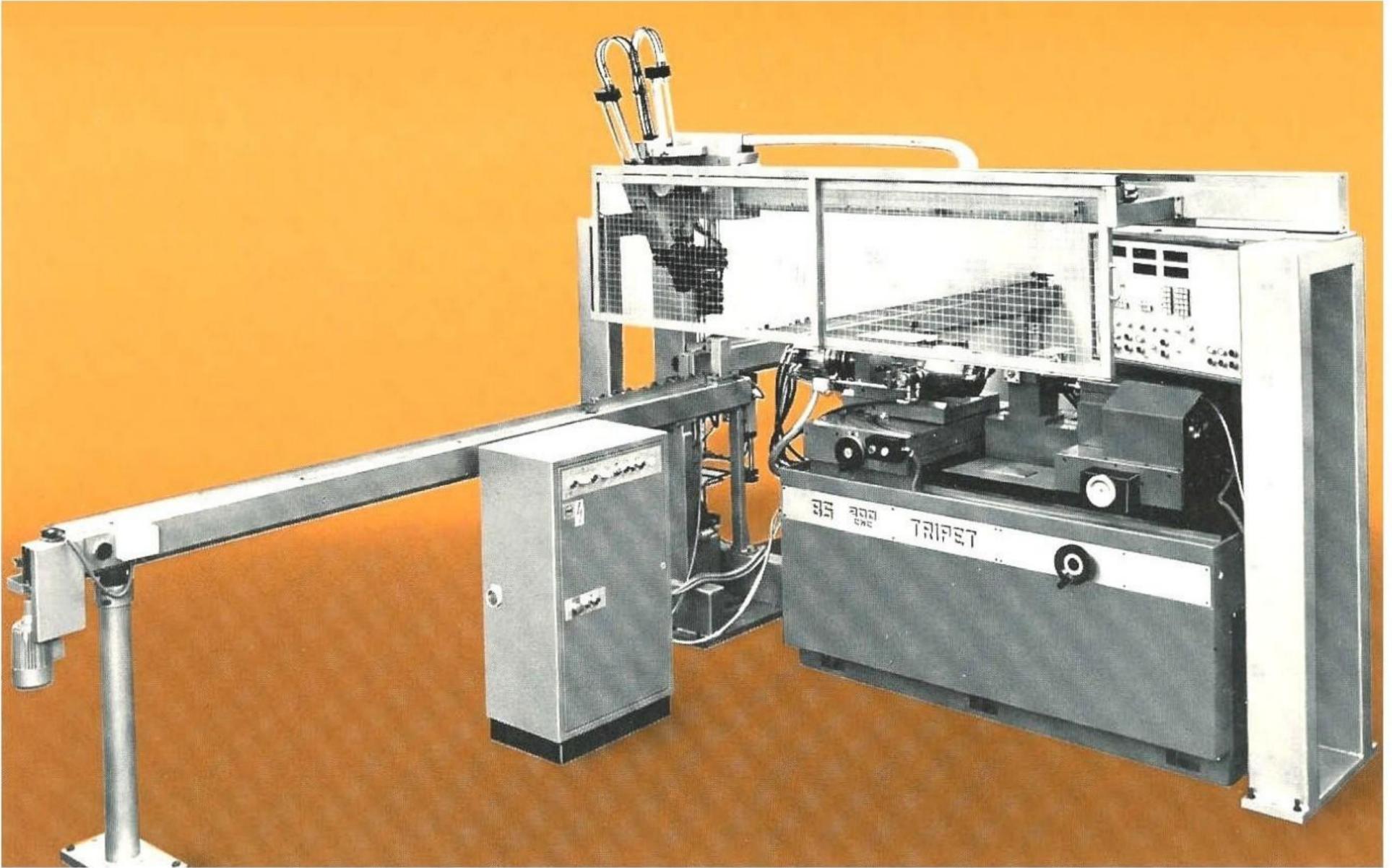
Keys for transmission of data to the tape punch are integrated in the machines CNC control panel. Start and stop buttons are on the punch unit. Tape is read at 0—120 ch/sec using an optical reader. Standard tapes and tape material are utilised, can be read in both directions and stopped at any point.

If customer has compatible tape preparation equipment, it may be possible to provide an interface on the CNC panel to enable the machine to be linked to their own tape preparation dept. This enables control tapes to be produced away from the machine.

Gap Elimination ref. 500/30

This option provides rapid infeed until the grinding wheel contacts the workpiece. The rapid infeed operates in timed steps with a minimum of 30 m/sec. and programmed from 0.1 to 9.9 secs. The rapid infeed per step is programmable from 0 to 99 microns. As soon as the wheel senses the cutting load, the normal automatic infeed commences.

Automatic loading devices



In this case the ground bore is not concentric with the O.D. so a special clamping device had to be developed, this has two hydraulically actuated jaws provided axial clamping.

Various types of automatic loading and unloading devices can be furnished on the BS 200 CNC.

Proposals can be made after studying the customers requirements.

Below we show a typical solution using a portal type loader.

This is part of a fully automatic grinding line.

The workpieces are first externally ground on a cylindrical grinder (equipped with portal loader) then automatically delivered to the conveyor chain on the internal grinder.

The unit comprised the basic portal or bridge (completely independent of the machine), 2 conveyor chains, 2 load/unload arms with grippers and horizontal feed slide with stepping motor drive.

During the grinding cycle the 2 arms will place a ground part on one conveyor chain and take an unground part from the other chain. The stepping motor then drives the slide with arms to the next position over the workhead. As soon as the grinding cycle is completed, the arms and grippers will unload and reload the chuck.

An advanced conception

Here are the facts

Main features:

CNC control system using LSI techniques

- Fully automatic cycle with push button including: wheel approach, roughing, finishing and spark out. Automatic workpiece back-off before dressing.
- Digital size correction.
- Digital control of minimum wheel diameter and wheel length.
- Infinitely variable:
 - a) table speeds
 - b) dressing speeds
 - c) creep feed for blind holes
 - d) plunge grinding
 - e) workspindle speeds
 - f) wheel speeds
- Table positioning control with rotating end-coder.
- Headstock feed by stepping motor and ballscrew.

- Wheelspindle feed towards dressing diamond by stepping motor and ballscrew.
- Automatic compensation of wheel wear when dressing (diameter and length).
- All slides are on roller ways, grease packed for life.
- Workheadstock guarantees a geometrical form less than 1 micron/mm (.000039").
- Spindle nose: Camlock 4" (will also accept Morse taper sleeves and collet adaptors).
- Easy and accurate angular setting of workhead through worm gears (on request can be done automatically).
- Free standing cabinet for electrical, electronic and hydraulic equipment.
- Steady rest for long workpieces.
- Face grinding attachment, also automatic.
- Automatic peripheral face grinding attachment.
- Dressing devices for two or three sides of the wheel.
- Hydraulic clamping.
- Adjustable surface speed of workheadstock.
- Infeed of the workpiece according to motor loading.
- Workpiece headstock PE-2 on centerless principle.
- Cassette tape for long time storing of the programmes.
- Automatic loading and unloading systems.

Technical data

Grinding dia. range	3—120 mm (.12"—4.7")
Grinding length	200 mm (7.9")
Centre height over slide	132 mm (5.2")
Max. longitudinal stroke	500 mm (20")
Workhead swivel	+45° to —30°
Workhead spindle bore	40 mm (1.57")
Max. weight on spindle nose	50 kg (110 lbs)

Workspindle speeds steplessly adjustable	75—1300 r.p.m.
Workspindle fixed speed for setting	30 r.p.m.
Wheelspindle speeds available	8000—150 000 r.p.m.
Dimensions	1700 x 1000 x 1800 mm (68" x 40" x 72")
Net weight	2400 kg (5280 lbs)
Required power	8—15 kW

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