OPERATING INSTRUCTIONS & PARTS LIST

TYPE '300' COPYING UNIT

COLCHESTER

4½ CRN HEIGHT

HEPWORTH TYPE 300 HYDRAULIC COPYING EQUIPMENT

OPERATING INSTRUCTIONS AND PARTS CATALOGUE

Issued by:
THE HEPWORTH IRON COMPANY (ENGINEERING) LTD.
Industrial Hydraulic Mechanisms
BRIDGE MILLS, HOLMFIRTH
048489. HUDDERSFIELD, YORKSHIRE
Telephone: Holmfirth 2244
Telegrams: Bridgemills, Holmfirth

GENERAL DESCRIPTION

Hepworth type 300 copying equipment consists of the following six assemblies:—

1. Profile slide.
2. Swivel-mounted toolbox.
3. Rear beam and tailstock.
4. Pump set and flexible pipes.
5. Turret stop (optional extra).
6. Facing beam (optional extra).

Profile Slide Assembly

This assembly slides on a base which can be attached to the lathe in one of four alternative positions viz., parallel to, or at an angle of 30, 60 or 90 degrees to the lathe centre line.

The profile slide incorporates a hydraulic actuating cylinder, with a fixed ramshaft attached to the base slide, and a hydraulic control valve cartridge with all necessary internal porting. It also carries the stylus lever bearing assembly and the retraction assembly.

Precision ground V-slides are used and rigid strips are fitted for wear adjustment. An adjustable retraction stop is provided.

A flat port plate bolted to the underside of the profile slide provides the necessary oil ports between the valve and the cylinder. This plate is extended beyond the profile slide to provide a grouped entry boss for the three nylon pipes (two $\frac{1}{4}$ in. bore, one $\frac{1}{8}$ in. bore) from the pump set. Two adaptors, one on the pump set and one at the entry point, secure the flexible metallic armouring which protects these pipes. Fig. 2 identifies the three pipes for installation purposes.

Control Valve

Carried in a flanged housing and secured in the profile slide, with suitable seals, the control valve is a self-contained assembly. Every valve is calibrated at the works and performance details are individually recorded. A complete replacement can be obtained but component spares are not supplied.

Stylus Lever

The stylus lever is rigidly attached to a vertical pivot shaft mounted on pre-set angular contact bearings within the profile slide casting. The outer end of the stylus lever embodies a mounting hole for the vertical stylus rod, which is adjustable in height. The rod in turn carries the stylus itself.

An operating tappet for the control valve is carried on the pivot shaft together with an adjustable nut which provides a setting face for the speed control unit.

Retraction Handle

This assembly consists of a manually operated eccentric acting on the valve tappet. It is controlled through a hand-lever conveniently situated on top of the unit. An eccentric shaft carried in the lever boss is adjustable to give control of forward velocity. The retraction handle is positively detented in both the ON and OFF positions.

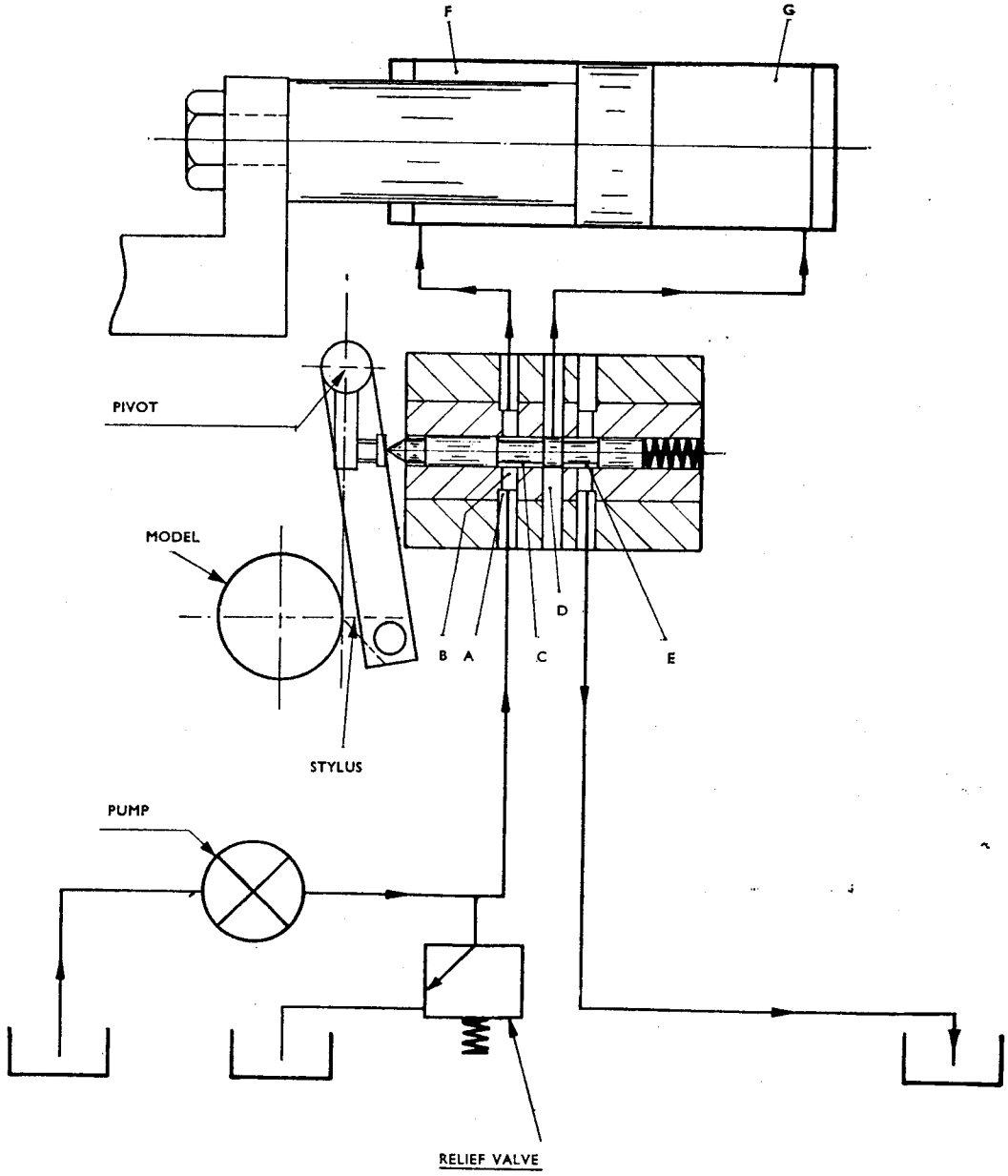
Toolbox

Built on to a base slide which spigots into the front of the profile slide, this assembly is capable of being mounted in four alternative positions corresponding to those obtainable on the profile slide mounting.

The toolbox is arranged for interchangeable tool-holders and is provided with micrometer adjustment over a distance of $\frac{1}{2}$ in. A heavy-duty slide lock fixes the toolbox during cutting. Whilst all the tool assemblies are capable of accepting the standard interchangeable tool-holders for boring and turning, the base slides are supplied in three alternative thicknesses, to suit 5 in., 6 in. and 7 in. lathes.

Rear Beam

The steel beam, which is surface-mounted to the rear of the lathe bed, is angled on its edges to suit the two beam-carrying brackets. These brackets, which are secured by heavy locking clamps, can be freed to slide along the beam to the required position.



HYDRAULIC CIRCUIT

Fig. 1

The left-hand bracket, i.e. that nearest the headstock as viewed from the front of the machine, carries a spring-loaded tailstock housing which is free to slide on the bracket in a plane normal to the lathe centre line. Approximately $2\frac{1}{2}$ in. adjustment is provided. The right-hand bracket carries an adjustable tailstock assembly mounted on a base which is also free to slide in the same plane.

Both tailstocks are capable of being adjusted relative to the lathe centre line in order to accommodate the stylus position at various angular settings of the profile slide. A locking handle is provided on each tailstock assembly.

Alternative beams, in all specified bed lengths, are available for each size of lathe.

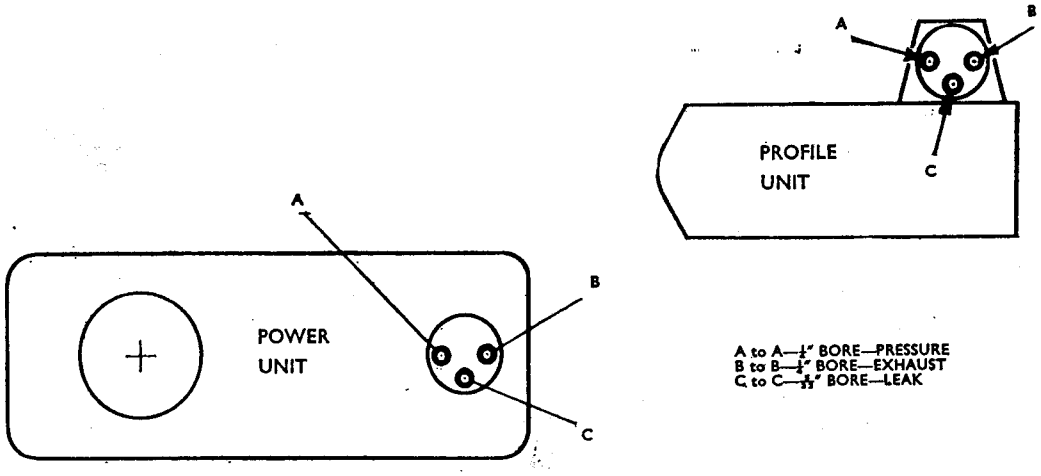
Each tailstock housing carries a flat machined platform to accommodate templates. Short templates can be mounted on the right-hand tailstock body only, in which case the normal length adjustment provided for the model is also suitable for the template. With longer templates it is necessary to use the left-hand mounting face for additional support. In this case the template bolting hole must be slotted to enable a longitudinal setting of the template to be achieved.

Pump Set

The self-contained tank assembly incorporates a motorised rotary pump of 0·6 g.p.m. capacity, which has an in-built relief valve set at the factory to 300 p.s.i. A wire mesh suction filter and a micronic pressure line filter are incorporated in the piping which is taken through the lid of the tank and grouped within a circular boss. Three screws secure the tank lid and the complete assembly of motor, filters, pump and piping can be withdrawn from the tank body in one piece. An oil level indicator gives a clearly visible oil reading at the required oil volume of five imperial gallons.

A pressure gauge is provided as standard equipment.

Mounted on the top of the motor is a direct on-line push-button starter. As with the motor itself, alternative types are available to suit the specified electrical supply. All motors and starters comply with C.S.A. requirements as specified.



PIPE CONNECTIONS

Fig. 2

Hydraulic Circuit

As illustrated in Fig. 1, pressure oil from the pump passes through the relief valve enters the control valve at annulus A, and flows directly to the ramshaft end of the cylinder F. In addition, pressure oil from annulus A passes through two drilled ports (B) to the valve spool chamber C and thence into annulus D through the first restriction, which is formed by the valve spool and the liner end. A second restriction is interposed before the pressure oil reaches the valve spool chamber E, which is connected to tank. Annulus D is connected to the cylinder at G.

The supply pressure thus passes to sump through two variable orifices. Longitudinal deflection of the valve spool in the direction of the spring increases the pressure drop from chamber C to annulus D. Conversely, deflection against the spring decreases the pressure drop. Since the supply pressure is ultimately dropped to sump, a longitudinal position of the valve spool can be achieved at which the pressure drop is equal across each orifice: in this position, pressure in annulus D is half the supply pressure.

The cylinder is so arranged that the area of the end of the ramshaft F is half the area of the end of the piston G. Since supply pressure operates on half the area of F while only half supply pressure operates on the full area of G, the forces on the piston are equal and opposite: consequently, the cylinder is at rest in a pressure-balanced condition.

The contact of the lever-mounted stylus on the model maintains the unit in this balanced condition until a deflection of the valve results from an increase or decrease in model diameter being encountered during a longitudinal feed. Deflection caused by an increase in model diameter will produce a cylinder movement to the right, taking with it the pivot of the stylus lever and thus enabling the valve spring to restore the balanced condition at a new diameter. In a similar manner, a decrease of model diameter will result in deflection of the valve away from the spring and the movement produced will restore balance at the reduced diameter.

External over-riding deflection of the valve spool produced by the mechanical retraction system against the spring moves the cylinder away from the model to the limit of cylinder stroke.

Turret Stop

Available as an optional extra is a turret stop conversion kit consisting of four separate assemblies, namely:—

1. A turret stop, together with operating handle, carrying six different length stations.
2. An adjustable stop bracket.
3. An extended valve lever complete with tappet screw and locknut.
4. A speed control housing assembly.

A square cover plate fitted at the right-hand side of the profile slide is removed and is replaced by the turret stop assembly, using the same screws.

This turret stop is designed to operate through a limited angular displacement. When the handle is moved away from the unit, the slide is retracted.

Movement of the lever towards the profile slide advances the unit and indexes the turret drum by one station. As the unit advances, the selected stop contact the fixed stop on the base slide and the profile slide is balanced at the set diameter of workpiece. Progressive settings of the stop pegs enable roughing cuts of uniform depth to be taken. The final cut follows the full template at an inoperative station of the turret stop.

When this unit is fitted to the machine, the operating handle is used for normal advance and retraction of the profile slide regardless of whether or not the turret stops are in use. The normal retraction handle assembly is therefore removed from the machine this being achieved by withdrawing the pin which secures the graduated dial, thereby enabling the handle boss to be lifted off. This in turn gives access to two cap screws securing the cam plate. The plate and eccentric shaft should then be removed. The replacement assembly can then be bolted into position, using the same fixing holes.