

## TYPE V-5 MACHINE TOOL CONTROLLER INSTRUCTIONS

### Application

The type V-5 machine tool drum controller is used in connection with shunt and compound wound motors in machine tool operation, where either reversing or non-reversing control and speed adjustments by field control is required. It is rated at 1 to 10 hp. at 230 volts. Three starting points and 17 running points in each direction provide a maximum speed range of 1 to 4. Dynamic braking may be obtained by the addition of a separate resistor. A protective panel is required if overload and under voltage protection is desired. The controller can be made remote control, if the handle must be located near the work. A controller with extended shaft is necessary for this purpose.

### Construction

The drum switch is mounted on a cast steel frame with all live parts enclosed by an asbestos-lined sheet steel cover. The cover is fastened by ring latches making it easy to remove without tools. With the cover removed, all parts are readily accessible for inspection and repair. The starting and speed regulating resistors are mounted on the back of the controller and are totally enclosed. This enclosure is arranged for wall mounting and the controller is hinged to it, so that it may be swung forward for the inspection or repair of the resistors without interfering with the mounting. If a dynamic braking resistance is used, it must be mounted separately. Conduit connections are provided in the bottom of the controller.

The main drum segments and contacts are separated by barriers to prevent short circuiting of heavy arcs. The segments are heavy copper strap attached to the drum castings by screws and are easily renewed when they become worn. Field control is obtained by means of a drum with fingers for cutting in the field resistor. A spring return mechanism in the handle makes it impossible to leave the motor running on an armature resistance point.

### Installation

Inspect the controller thoroughly before installing to make sure that nothing has become loose or broken in shipment. A rigid mounting should be pro-

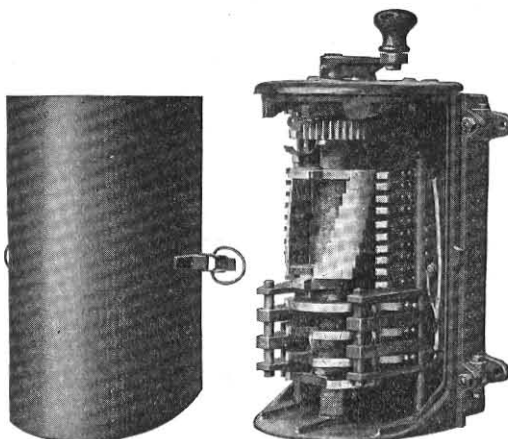


Fig. 1—Type V-5 Machine Tool Controller

vided for the controller which may be mounted in a vertical, horizontal or inverted position. If it is to be mounted for remote control, the controller may be operated through a splined shaft connected to the drum shaft extension through the bottom of the controller. There should be very little spring or lost motion in the remote control mechanism. For reversing service, remove the set screw in the top plate.

When making connections follow closely the diagram furnished with the controller. A protective panel and dynamic braking resistor cannot be used in connection with the controller at the same time, unless a separate reset button is provided for the protective panel. If the dynamic braking resistor is not used, the protective panel reset connection can be made across + and B on the controller, but special precaution should be taken to see that the protective panel connections are made to the same side of the line, as those on the controller. It may be necessary to reverse the polarity of the protective panel diagrams. The wiring should also be made, so that the direction of rotation of the motor will agree with the marking on the top of the controller.

### Operation

The top plate is marked "forward" and "reverse" and if connections to the motor are properly made will indicate the direction of operation. The first two points are armature resistance points used for starting, and the controller must not be held on these points longer than 15 seconds. The remaining points are speed regulating and are used

to cut in field resistance. The motor speed is consequently increased as the handle is moved away from the "off" position. The controller may be left on any of the speed regulating points continuously.

A quicker stop will result after operating with a weakened field, if the handle of the controller is held momentarily on the first running point before bringing it to the "off" position. Do not stop the motor by reversing unless absolutely necessary for an emergency stop, as this practice causes severe mechanical and electrical stresses in the motor. If a dynamic braking resistor is used, bringing the handle to the "off" position will cause a quick stop.

A protective panel prevents unexpected starting of the motor after a stop caused by overload or voltage failure. A reset contact on the controller if used in connection with the protective panel, is closed in the "off" position only and makes it impossible to close the line contactor on the protective panel, unless the drum is in the "off" position. If a push button is used for resetting, the operator must bring the controller to the "off" position before depressing the reset button.

### Maintenance

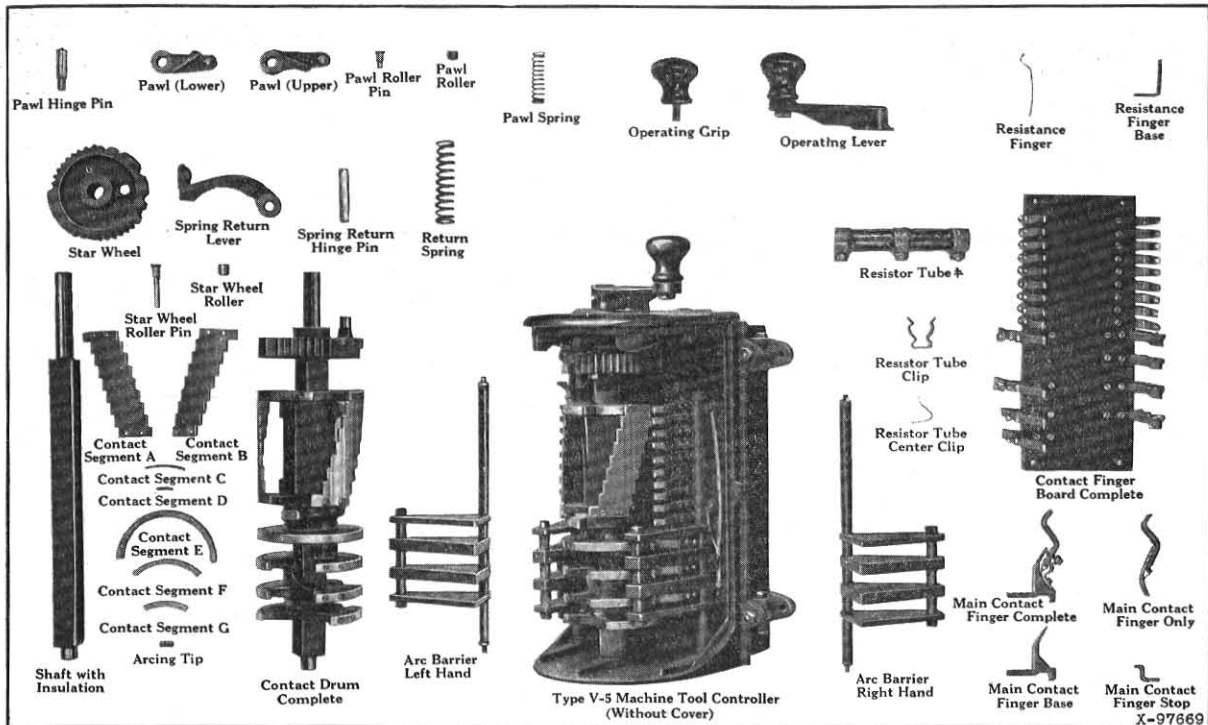
With ordinary service the controller will require very little attention. A periodic inspection will often result in detecting small troubles before they become large ones. Keep the fingers and segments clean. A small amount of dirt increases the resistance of the contacts causing excessive temperature and oxidation which aggravates the condition. Sand paper may be used for cleaning the contacts, but do not use emery cloth. Look for wear on fingers and segments, as light contact also increases the resistance and temperature. Keep a supply of contact parts on hand, so that they may be renewed when necessary.

If the motor stops or fails to start although there is full voltage at the controller, make sure that all connections are tight and look for an open circuit in the resistors, or in the controller, due to worn or loose fingers. If the motor starts too suddenly, look for short circuits between the resistor tubes.

\*To be filed as an Instruction Leaflet and as Renewal Parts Data; for Renewal Parts see reverse side of this sheet.

## TYPE V-5 MACHINE TOOL CONTROLLER

### RENEWAL PARTS DATA



#### RECOMMENDED STOCK OF RENEWAL PARTS

|                                                                        |                      |                       |       |                      |
|------------------------------------------------------------------------|----------------------|-----------------------|-------|----------------------|
| Style Number of Controllers.....                                       |                      |                       |       | 231166               |
|                                                                        |                      |                       |       | 541066               |
| For Controllers in use up to and Including.....                        |                      | 1                     | 5     |                      |
| Name of Part                                                           | No. Per Con- troller | Recommended For Stock |       | Style Number of Part |
| Contact Drum Complete.....                                             | 1                    | 0                     | 0     | 204929               |
| Contact Segment—A.....                                                 | 1                    | 0                     | 0     | 231903               |
| Contact Segment—B.....                                                 | 1                    | 0                     | 0     | 231902               |
| Contact Segment—C.....                                                 | 1                    | 1                     | 1     | 231905               |
| Contact Segment—D.....                                                 | 2                    | 1                     | 2     | 231904               |
| Contact Segment—E.....                                                 | 2                    | 1                     | 2     | 231901               |
| Contact Segment—F.....                                                 | 2                    | 1                     | 2     | 231900               |
| Contact Segment—G.....                                                 | 4                    | 2                     | 4     | 231899               |
| Arcing Tip.....                                                        | 12                   | 6                     | 12    | 231898               |
| † Contact Segment Screw #6-32 x 1/2" Flat Hd. Brass Machine Screw..... | 42                   | 6                     | 12    | Std. Hdw.            |
| Shaft with Insulation.....                                             | 1                    | 0                     | 0     | 204930               |
| † Star Wheel with Roller.....                                          | 1                    | 0                     | 0     | 204934               |
| Star Wheel without Roller.....                                         | 1                    | 0                     | 0     | 231906               |
| Star Wheel Roller.....                                                 | 1                    | 0                     | 1     | 204900               |
| Star Wheel Roller Pin.....                                             | 1                    | 0                     | 1     | 204935               |
| Contact Finger Board Complete.....                                     | 1                    | 0                     | 0     | 514508               |
| Main Contact Finger Only.....                                          | 8                    | 4                     | 8     | 44696                |
| Main Contact Finger Base.....                                          | 8                    | 0                     | 2     | 212729               |
| Main Contact Finger Stop.....                                          | 8                    | 0                     | 0     | 231890               |
| Resistance Finger.....                                                 | 18                   | 9                     | 18    | 231891               |
| Resistance Finger Base.....                                            | 18                   | 0                     | 3     | 231892               |
| Pawl (Upper) with Roller and Pin.....                                  | 1                    | 0                     | 0     | 231908               |
| Pawl Roller.....                                                       | 1                    | 0                     | 1     | 204937               |
| Pawl Roller Pin.....                                                   | 1                    | 0                     | 1     | 231907               |
| Pawl (Lower) with Roller and Pin.....                                  | 1                    | 0                     | 0     | 231909               |
| Pawl Roller.....                                                       | 1                    | 0                     | 1     | 204937               |
| Pawl Roller Pin.....                                                   | 1                    | 0                     | 1     | 231907               |
| Pawl Spring.....                                                       | 2                    | 0                     | 1     | 581194               |
| Pawl Hinge Pin.....                                                    | 1                    | 0                     | 0     | 231896               |
| Spring Return Lever.....                                               | 2                    | 0                     | 0     | 231910               |
| Spring Return Hinge Pin.....                                           | 1                    | 0                     | 0     | 231897               |
| Return Spring.....                                                     | 2                    | 0                     | 1     | 204936               |
| Arc Barrier—Right Hand.....                                            | 1                    | 0                     | 1     | 204922               |
| Arc Barrier—Left Hand.....                                             | 1                    | 0                     | 1     | 204923               |
| Operating Lever.....                                                   | 1                    | 0                     | 0     | 204918               |
| Operating Grip.....                                                    | 1                    | 0                     | 0     | 191932               |
| Resistor Tube Clip.....                                                | 16                   | 0                     | 0     | 42342                |
| Resistor Tube Center Clip.....                                         | 8                    | 0                     | 0     | 261813               |
| † Resistor Tube.....                                                   | 1 Set                | 0                     | 1 Set | †                    |

† Not listed on illustration.

Parts indented are included in the part under which they are indented.

‡ If possible specify identification number of resistor tube. If no identification number appears on tube, give length, resistance in ohms and number of contact clips engaging with tube.

This is a list of the Renewal Parts and the quantities of each that we recommend should be stocked by the user of this apparatus to minimize interrupted operation caused by breakdowns. The parts recommended are those most subject to wear in normal operation or those subject to damage or breakage due to possible abnormal conditions.

This list of Renewal Parts is given only as a guide. When continuous operation is a primary consideration, additional insurance against shutdowns is desirable. Under such conditions more renewal parts should be carried, the amount depending upon the severity of the service and the time required to secure renewals.

#### ORDERING INSTRUCTIONS

Name the part and give its style number. Give the complete name plate reading. State whether shipment is desired by express, freight or by parcel post. Send all correspondence and orders to nearest sales office of the company. Small orders should be combined so as to amount to a value of at least \$1.00 net. Where the total of the sale is less than this, the material will be invoiced at \$1.00.

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