

Cold Forming of Metals

Air friction clutch presses

On a press with air friction clutch/brake, the control performs the following functions

- 1 Provides that the press operator must hold both run buttons during the down stroke until the slide has descended to a point where there is no longer a hazard. Release of any button during "holding time" should stop the slide
- 2 Allows the operator to release buttons after completion of "holding time" and press will complete stroke
- 3 On "single cycle" operation, it stops the slide at end of a stroke even though operator holds control buttons depressed
- 4 Actuates clutch/brake air valve(s) so that friction brake will stop machine at top of stroke
- 5 Provides anti-repeat protection and prevents repeat operation with any buttons tied down

Starters for main drive motor should be the magnetic, reversing type. This feature permits backing up of the press in the event of a jam without the need for an electrician to change wiring. Selector switches should require keys so that backing up can be done by authorized personnel only.

The clutch control should be provided with a main drive motor "forward interlock" so that the press can be run only when the motor is turning in the forward direction. "Backward" operation of the press is unsafe because there is no run button "holding time". This interlock also prevents "run" actuation of the clutch air valve before the motor is started or when the flywheel is coasting. Starting the motor with the clutch engaged is unsafe since it may result in unexpected downward movement of the slide. Inch or jog operation should normally bypass the interlock to allow power-off "inching".

Pressure switches should be provided on the compressed air system downstream from pressure regulators and shut-off valves to assure that air is present for proper actuation of clutch-brake mechanisms and counterbalance cylinders. These switches should be normally open and wired in series into the control circuit ahead of the main-drive-motor starter and clutch/brake control.

- 1 The clutch pressure switch assures that the correct air pressure is available before the machine is started. This assures proper movement of the slide and protects clutch plates from excessive wear resulting from slippage.
- 2 The counterbalance pressure switch prevents a sudden drop of the slide during the instant between release of the brake and engagement of the clutch. Proper counterbalance pressure is also required for quick stopping of the slide during the down-stroke, or prevention of drop back if the slide is stopped during the up stroke.

Jogging or inching of the slide is often required when setting up or trying out dies. The use of two-hand inch buttons is preferred for these operations so that both hands must be out of the danger area. Where a single button is used, it should be guarded so that it cannot be operated unintentionally.

The clutch/brake solenoid valve(s) should not be energized directly across the line through the contacts of a single relay, in such a way that faulty operation of this single relay will result in unintended energization of the valve(s). Protection can be accomplished through the use of multiple relays and/or energization of the valve(s) through push button switches and rotary limit switches.

The previous paragraph makes stopping a machine independent of operation of the valve or run relay. Normally closed contacts of this relay should be incorporated into the circuit to check actual dropout of the relay.

The use of a multiple clutch control valve is recommended. This is a relatively inexpensive means for reducing the possibility of press repeats due to malfunctioning of a single valve.

Press clutch control circuits can be either of two types

- 1 GROUNDING, with all coils connected to one side of the isolated secondary of a control transformer, and this side grounded to the machine frame, or
- 2 UNGROUNDING (double ended) with ground detector lights connected to each side of the line and a double break arrangement.

On multiple operator presses, complete operating stations not required should be