

SECTION 678-3

SOLID STATE SIGNAL LOAD SWITCH (MODEL 200)

678-3.1 General Requirements:

Signal Load Switches shall be provided with all Model 170 E controller assemblies for controlling power to the signal indications. The Signal Load Switch, hereinafter referred to as a Switch Pack, shall be a modular plug-in device containing three (3) solid state switches to be used for opening and closing connections between the applied power and an external load.

Switch Pack control circuitry and switches shall be readily accessible by the use of a screwdriver or wrench. Only one (1) type of screw head end (slotted or phillips) shall be used throughout.

Each Switch Pack shall be so constructed that persons inserting or removing the module will not be exposed to any parts having live voltage. A handle shall be attached to the front of each Switch Pack to facilitate the module insertion or removal from its mating connector.

678-3.2 Design Requirements:

678-3.2.1 Physical Characteristics:

Figure 678-7 illustrates the physical attributes of the Model 200 Switch Pack.

- (a) Dimension of the Switch Pack shall not exceed 8.25 inches from the panel surface holding the mating connector, including the handle or gripping device. The Switch Pack shall be no more than 1.75 inches in width and no more than 4.2 inches high.
- (b) The Plug Connector shall be a BEAU P-5412-1AB or approved equivalent.
- (c) The connector plug contact tails shall be solder hook or eye styles only. PCB (soldered to the PCB) and quick connections styles are not allowed.
- (d) The Switch Pack shall intermate with BEAU S-5412 socket or approved equivalent.
- (e) The lower surface of the switch pack shall not extend greater than 2.1 inches below the centerline of the connector configuration.
- (f) The Switch Pack shall be constructed so no part of it will extend more than 0.9 inches to the left and 1.1 inches to the right of the centerline of the connect pin configuration as viewed from the front.

- (g) Continuous edge guides shall be provided on the Switch Pack.
- (h) The front panel of the Switch Pack shall be provided with one (1) indicator per switch. The indicators shall be vertically centered on the front panel with top and bottom indicators no more than one inch from the panel vertical center.

678-3.2.2 Electrical Characteristics:

- (a) The three (3) independent switching circuits shall be defined as circuits A, B and C. The "A" indicator shall be at the top, "B" in the middle, and "C" at the bottom when the Switch Pack is installed.
- (b) Each switching circuit shall have a minimum current rating of 10 amperes for a tungsten lamp or gas tubing transformer load over a voltage range of 95 to 135 Volts AC RMS at 60 Hertz. No more than one (1) circuit shall be energized at any one (1) time unless the combined load on the energized circuits does not exceed a 10 ampere load. This power handling capability shall not be de-rated for operation over the temperature range specified in Section 672.
- (c) Each switch shall turn ON within +/- 5 degrees of the zero voltage point of the AC sinusoidal line, and shall turn OFF within +/- 5 degrees of the zero current point of the alternating current sinusoidal line. After power restoration, the zero voltage turn ON may be within +/- 10 degrees of the zero voltage point only during the first half cycle of line voltage during which an input signal is applied. Turn ON and OFF shall be within 8.33 ms following application or removal of the logic signal respectively.
- (d) Inputs of the A, B and C circuits and the Volt DC input of the switch shall be isolated from the line power so that line transients or failure of the switch will not adversely affect the controller unit. Reed relays, light coupling devices or other approved devices may be used to isolate the input and output of each switching circuit of the Switch Pack.
- (e) Each switch shall be designed for a minimum of three hundred million (300,000,000) operations while switching a tungsten filament load of 1,000 watts at 158°F (70°C).
- (f) Input voltage to the switching circuits of the switch shall be negative true logic which is referred to the common of the +24 Volt DC supply and is characterized by the following:
 - 1) The transition zone of the input circuitry from conducting state to the non-conducting state (and vice versa) shall occur between 6 and 16 Volts DC.
 - 2) A voltage between 0 and 6 Volts DC shall cause the output device to conduct.
 - 3) A voltage greater than 16 Volts DC shall cause the output device not to conduct.

- (g) Input circuits of the Switch Pack shall be returned to the +24 Volt DC supply in such a manner that removal of any connections to the input circuits shall allow the input voltage to rise to the +24 Volt DC supply.
- (h) The input driver to any of the switch's input circuits shall not be required to sink more than 10 milliamperes.
- (i) DC voltage supply to the switch shall be 24 ± 2 Volts. The switch shall not draw more than 10 milliamperes times the number of circuits energized, plus 10 milliamperes (i.e., if one (1) circuit is energized, no more than 20 milliamperes will be required by the Switch Pack). The current return to the 24 Volt DC supply is out of the switch input to logic ground via the Switch Pack driver.
- (j) Each switch shall have a one (1) cycle surge rating of 175 amperes RMS and a one (1) second surge rating of 40 amperes RMS.
- (k) Each switch shall be capable of withstanding a peak inverse voltage of 600 volts at 158°F (70°C) and no more than 20 ma leakage.
 - (l) Each switch shall have a OFF state dv/dt rating of 100 volts per microsecond (us) or greater.
- (m) The input circuit of each switch shall have reverse polarity protection.
- (n) The resistance between the AC+ input terminal and the AC+ output terminal of each switch shall be 15,000 ohms, minimum, when the switch is in the open position. The output current from the Switch Pack through the load when the load switch is in the OFF state shall not exceed 20 ma peak.
- (o) Each switch shall be isolated so that line transients or switch failure will not adversely affect the controller unit.

678-3.3 Pin Assignment:

Pin assignments of the Switch Packs shall be as illustrated in Figure 678-8.

678-3.4 Load Resistors:

Load resistors shall be provided on the Field Service Panel (Refer to Section 676-5.3).

PIN NUMBER

FUNCTION

1	120 VAC Line Side
2	Chassis Ground
3	"A" Output
4	No Connection
5	"B" Output
6	"A" Input
7	"C" Output
8	"B" Input
9	+24 Volts DC
10	"C" Input
11	AC Common
12	No Connection

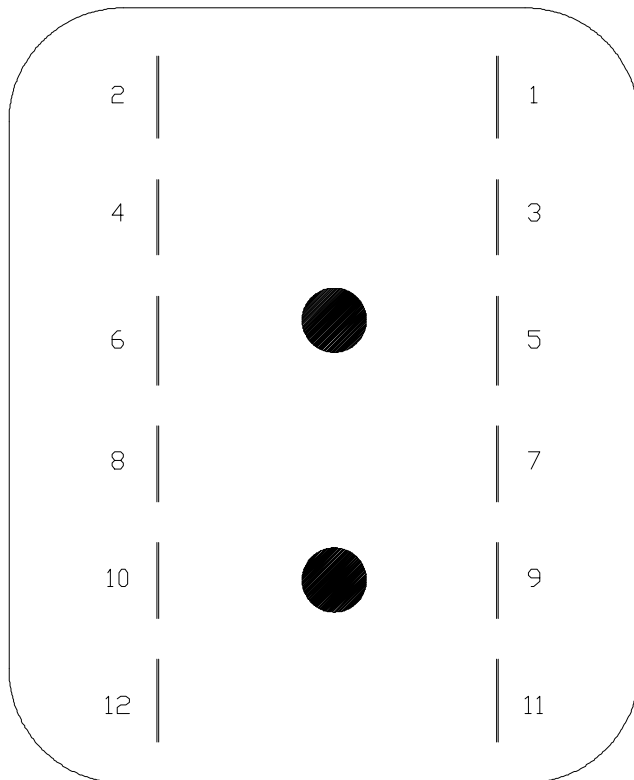


Figure 678-8: SWITCH PACK PIN ASSIGNMENTS