

---

# **SINGER SURGE ANTICIPATOR PANEL**

## **Used in Conjunction with**

### **SINGER MODEL 106/206-RPS-L&H-ET or 106/206-ARPS**

#### **Schematic A-9007B**

#### **DESCRIPTION:**

The Singer Surge Anticipator Panel is an electronically timed surge anticipating controller that works in conjunction with Singer Model 106/206-RPS-L&H-ET or 106/206-ARPS. The valve and panel system anticipates and dissipates surges caused by power failure to pumps.

The standard Singer Surge Anticipator Panel features:

- \*NEMA 4 rated enclosure
- \*LOGO! Logic module with built-in adjustable digital timers
  - \*Start-up timer SUT (adjustable from 0 seconds to 100 minutes with 1-second increment)
  - \*Surge anticipator timer SAT (adjustable from 0 seconds to 100 minutes with 1-second increment)
  - \*Shutdown timer SDT (adjustable from 0 seconds to 100 minutes with 1-second increment)
  - \*Push buttons for time adjustments without disarming the panel
- \*Uninterrupted battery back-up system with
  - \*12VDC Float charge with 120VAC main power input
  - \*12VDC 4Ah, Long-life sealed (maintenance-free) Lead-Acid battery
  - \*Door-mounted test-button for battery status
  - \*Door-mounted voltmeter
- \*System Test feature
- \*Door-mounted, push-to-test indicator lights for panel status
- \*Laminated plastic labels
- \*Wiring to a fully labeled terminal strip

#### **SEQUENCE OF OPERATION:**

The Singer Surge Anticipator Panel is a logic module based controller that operates a 12VDC solenoid pilot to open the main valve by energizing the solenoid on low line pressure associated with sudden stopping by pumps. This assures that the valve is open when the returning high pressure surge arrives. It features built-in adjustable digital timers that permits coordination of valve operation with pump start-ups, normal shutdowns, power failures, and downsurges.

A Main power switch is located inside the control panel. This makes or breaks the 120VAC power connection from the supply, and the 12VDC battery from the charger. The main power switch allows the panel to be disarmed completely and prevents the battery from discharging when the panel is in storage.

When the power switch is turned on and the panel is configured to work with a pump motor starter, a flashing door-mounted amber light indicates that the panel is on stand-by mode and is waiting for the pump to be started. During stand-by mode, the panel will not be armed.

When a pump start command begins, the panel will initiate the start-up sequence. This is indicated by a steady-ON door-mounted amber light "START-UP TIMER". During the start-up mode, the SUT (Start-Up Timer) keeps the panel disarmed for a pre-set time delay (adjustable from 0 seconds to 100 minutes). This allows the system to be filled without responding to any pressure transients that may occur during this period.

After the SUT expires, and the normal operating pressure has been established, the panel will now be armed and ready to respond to power failures and/or downsurges. This is indicated by a steady-ON door-mounted green light "ARMED".

The Singer Surge Anticipator Panel incorporates two modes that can be selected using the MODE selector switch mounted internally:

\*When the switch is on MODE A, the control panel will only respond to downsurge in anticipation of the returning surge wave. In an event of a power failure, the panel will not respond and will remain armed unless accompanied by a downsurge.

\*When the switch is on MODE B, the control panel will respond to both power failure or downsurge.

During MODE A or MODE B operation, when the system pressure is lowered below the setting of the pressure switch (mounted on the main line header), valve opening cycle is initiated and the solenoid will be energized to open main valve. The control panel will keep the solenoid energized for a pre-set SAT (Surge Anticipator Timer) time delay (adjustable from 1 second to 100 minutes with 1-second increment) in anticipation of the returning surge wave.

After the SAT expires and valve opening cycle has been completed, the panel will re-arm automatically as soon as the system pressure comes back to its normal operating range (pressure is above pressure switch setting).

During MODE B operation, in the event of a power failure/power interruption, even momentarily, the valve opening cycle is initiated and the solenoid will be energized to open the main valve and keep it open for a pre-set time delay. The control panel incorporates a battery back-up system (12VDC) to ensure continuous protection.

After the SAT expires and valve opening cycle is completed, the panel will re-arm automatically as soon as the system pressure comes back to its normal operating range (pressure is above pressure switch setting). A slow-flashing green light indicates the panel is armed but running under the back-up battery power. The panel will still respond to a low line pressure in anticipation of the next surge wave.

*NOTE: Although the panel is re-armed after the first surge wave, a second surge wave should not occur if the valve and panel are configured correctly. A properly timed system will dissipate the pressure surge in a single valve opening (SAT) cycle.*

When a normal pump shutdown command is given, the pre-set SDT (ShutDown Timer) time delay is initiated (adjustable from 0 seconds to 100 minutes). During this period, the panel will still be armed and will respond to any downsurges that may occur on pump shutdown. This is indicated by a fast-flashing green light.

After the SDT expires, the panel will go back to stand-by mode indicated by the flashing amber light.

System Test button will simulate a power failure and pressure downsurge thus initiating the valve opening cycle.

**TECHNICAL SPECIFICATIONS:**

<i>SINGER MODEL</i>	<b>SURGE ANTICIPATOR PANEL</b>	
<i>SUPPLY VOLTAGE</i>	<b>120 VAC, 60Hz</b>	
<i>AC FUSE RATING</i>	<b>3 A @ 125 VAC</b>	
<i>DC FUSE RATING</i>	<b>3 A @ 12 VDC</b>	
<i>AC POWER CONSUMPTION</i>	<b>20VA max.</b>	
<i>DC POWER CONSUMPTION</i>	<b>20W max. (With 11.6 Watts Solenoid Load)</b>	
<i>PROCESS CONTROLLER</i>	<b>LOGO! Logic Module</b>	
<i>CONTROL OUTPUTS</i>	<b>12 VDC 10 A OMRON Relay SPDT</b>	
<i>CONTROL INPUTS</i>	<b>Isolated Pressure Switch Contact / Isolated Motor Starter Contact</b>	
<i>DOOR PANEL READOUT</i>	<b>0 to 15VDC Analog Voltmeter</b>	
<i>INTERNAL DC CHARGER</i>	<b>Float Charger</b>	
<i>BATTERY TYPE</i>	<b>4 Ah 12 VDC Maintenance-Free sealed Lead-Acid</b>	
<i>CONTROL MODES</i>	MODE A	<b>Responds only to Pressure Switch</b>
	MODE B	<b>Responds both to Pressure Switch and Power Failure</b>
<i>BUILT-IN ADJUSTABLE TIMERS</i>	START-UP TIMER (SUT) <b>B5</b>	<b>Range 0 sec. to 100 min. (+/- 0.6 second max. deviation)</b>
	SURGE ANTICIPATOR TIMER (SAT) <b>B24</b>	<b>Range 1 sec. to 100 min. (+/- 0.6 second max. deviation)</b>
	SHUTDOWN TIMER (SDT) <b>B10</b>	<b>Range 0 sec. to 100 min. (+/- 0.6 second max. deviation)</b>
<i>REPLACEMENT INDICATOR LAMP</i>	POWER ON INDICATOR	<b>Bayonet Type, 120 VAC 2 W</b>
	START-UP TIMER INDICATOR	<b>Bayonet Type, 14 VDC 3 W</b>
	PANEL ARMED INDICATOR	<b>Bayonet Type, 14 VDC 3 W</b>
	SOLENOID ENERGIZED INDICATOR	<b>Bayonet Type, 14 VDC 3 W</b>

## **INSTALLATION:**

1. Mount the panel in a suitable location according to all local and federal regulations.
2. Check the valve mounted pilot solenoid for operation and correct voltage.
3. Wire the solenoid to the panel as required. Refer to wiring diagram.
4. Wire the isolated pressure switch contact to the panel. Refer to the wiring diagram.
5. Wire the auxiliary motor starter contact (isolated) to the panel. Refer to the wiring diagram.

*NOTE: If the panel will not be configured to operate with a pump, connect a jumper across the pump motor starter inputs in the panel. Refer to the wiring diagram.*

6. Verify that correct terminal wiring connections have been made.
7. Following all local and federal codes, connect the 120 VAC power to the panel. Refer to wiring diagram.

## **CONFIGURATION:**

### **A) General Setup:**

1. Make sure that the main POWER switch inside the panel is in the OFF position.
2. Verify that the battery terminals are connected properly. Red battery wire must be connected to the red (+) battery terminal. Black (-) battery wire must be connected to the black battery terminal.
3. Turn the POWER switch ON.
4. When the power is initially turned ON and the panel is configured to operate with the pump motor starter, the panel will be in stand-by mode, indicated by a flashing amber light.
5. If the panel is not configured to work with a pump and a jumper is installed across the inputs, the panel will immediately operate in Start-Up mode, indicated by the steady-lit amber light.
6. Verify that the charger is operating properly, and the door-mounted panel voltmeter is reading 12 to 14 VDC.
7. Press the door-mounted battery test push-button and verify that the battery voltage is 12 to 14 VDC.
8. If the battery voltage is less than 12 VDC, verify that the battery is being charged properly. The yellow light "BATTERY CHARGING" at the bottom side of the internal battery charger indicates that the battery is being charged.
9. If the charger's red indicator light "SHORTED / REVERSED LEADS" is ON, this means that the battery is completely discharged. If the charger's red light is ON for more than 2 minutes, turn the POWER switch off and check that the battery terminals are wired correctly.
10. The battery has an average life of 3 to 6 years under normal operating conditions. Under certain circumstances when the charger's red light is ON for more than an hour, this indicates that the battery is dead and needs to be replaced. Replace the battery with the same rating.
11. Verify that the panel is set-up for the required mode, MODE A or MODE B. MODE A configures the panel to respond only to downsurges, MODE B configures the panel to respond to both pressure downsurges and power failures.
12. Verify that the LOGO! logic module is ON. To set the clock to the current time and date, press **ESC**.

13. The LOGO! screen switches to parameterization mode and displays the parameterization menu. Move the cursor to **Set Clock** and press **OK**.
14. Use the left or right arrow keys on the LOGO! to move the cursor across the screen.
15. Use the up or down arrow keys on the LOGO! to change the value on the current cursor position. The UP arrow key increases the value, the DOWN arrow key decreases the value.
16. Once all desired values are set, press **OK** to accept.
17. Press **ESC** to return to main screen.

#### **B) Timer Adjustments:**

1. The built-in timers can be adjusted at anytime the power switch is ON.
2. To access the timer parameters, press **ESC**.
3. The LOGO! screen switches to parameterization mode and displays the parameterization menu. Move the cursor to **Set Param** and press **OK**.

#### START-UP TIMER

1. The SUT (Start-Up Timer) has a factory default setting of 30 seconds (**00:30m**). During the SUT time delay sequence, the panel will not be armed.
2. Use the up or down arrow keys on the LOGO! to display the timer parameter **B5**, which is the SUT parameter. Press **OK**.
3. Use the left or right arrow keys to move the cursor across the time range **T**.
4. Use the up or down arrow keys on the LOGO! to change the value on the current cursor position. The UP arrow key increases the value, the DOWN arrow key decreases the value.
5. Once all desired values are set, press **OK** to accept.

#### SURGE ANTICIPATOR TIMER

6. The SAT (Surge Anticipator Timer) has a factory default setting of 10 seconds (**00:10m**). During the SAT time delay sequence, the panel will command the valve to open in anticipation of the returning surge wave.
7. Use the up or down arrow keys on the LOGO! to display the timer parameter **B24**, which is the SAT parameter. Press **OK**.
8. Use the left or right arrow keys to move the cursor across the time range **T**.
9. Use the up or down arrow keys on the LOGO! to change the value on the current cursor position. The UP arrow key increases the value, the DOWN arrow key decreases the value.
10. Once all desired values are set, press **OK** to accept.

### SHUTDOWN TIMER

11. The SDT (ShutDown Timer) has a factory default setting of 30 seconds (**00:30m**). During the SDT time delay sequence, the panel will still be armed after the pump has been shutdown.
12. Use the up or down arrow keys on the LOGO! to display the timer parameter **B10**, which is the SDT parameter. Press **OK**.
13. Use the left or right arrow keys to move the cursor across the time range **T**.
14. Use the up or down arrow keys on the LOGO! to change the value on the current cursor position. The UP arrow key increases the value, the DOWN arrow key decreases the value.
15. Once all desired values are set, press **OK** to accept.
16. To return to LOGO! main screen, press **ESC** twice.

***CAUTION: Never press any two or more arrow keys on the LOGO! simultaneously, internal program error may occur.***

### **C) Using the System Test:**

The Singer Surge Anticipator control panel is equipped with a System Test push button switch. Pressing **System Test** simulates power failures or pressure downsurges, initiating the SAT and the valve opening cycle.

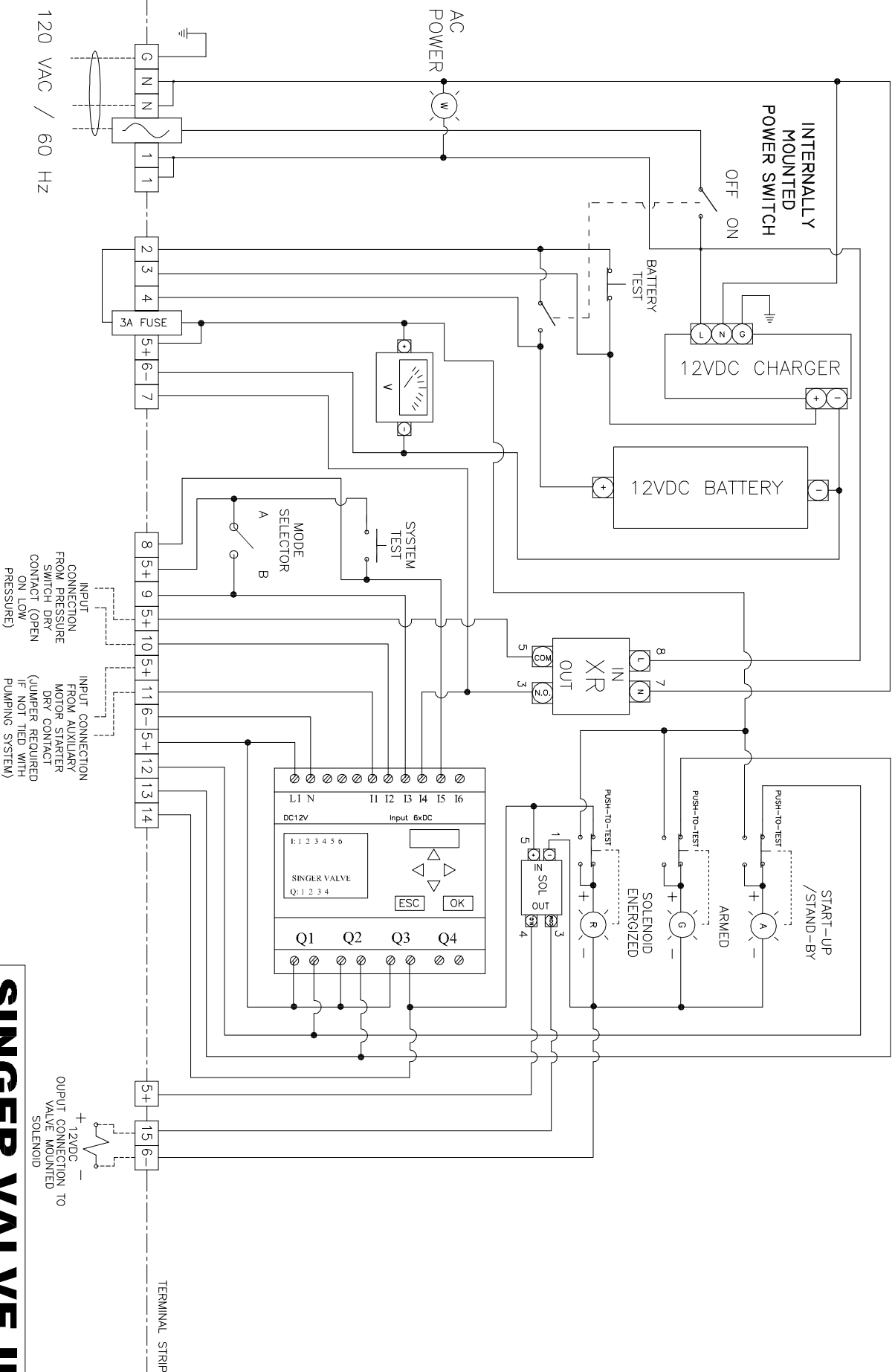
The system test function only works when the panel is armed (green indicator light "ARMED" is ON or flashing).

If the panel is configured to work with a pump motor starter that is currently OFF (panel on stand-by) and a system test is required:

1. Disconnect pump motor starter input wires and replace the connection between the terminals with a jumper.
2. The panel will go to its normal start-up sequence before arming, wait until the panel is armed.
3. When the system static pressure is above the setting of the pressure switch and the panel is armed, you may now press the **System Test** push button. The panel will start its valve opening cycle and the valve should start opening.

***NOTE: Pressing the System Test will keep the valve open for the pre-set SAT time, to interrupt and stop the valve opening cycle, turn the power switch OFF.***

# SINGER SURGE ANTICIPATOR PANEL



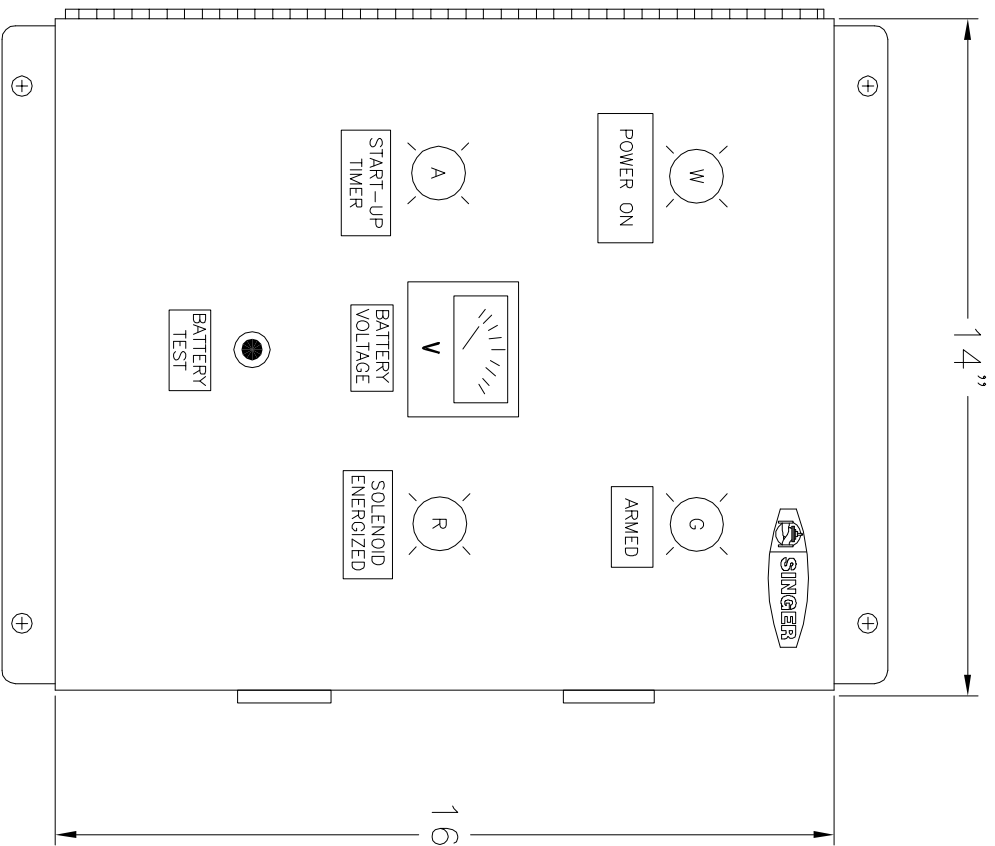
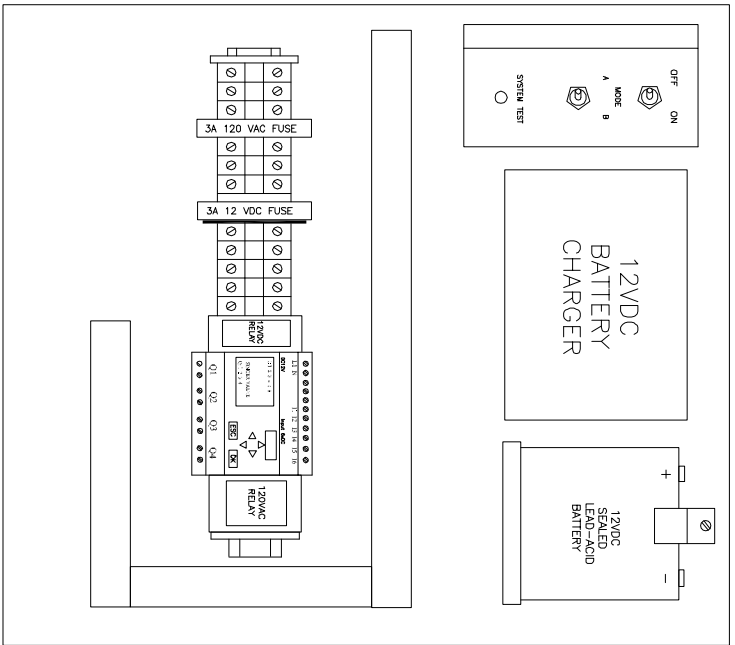
12850-87th Avenue  
Surrey, BC  
Canada, V3W-3H9

**SINGER VALVE INC**

Date: FEBRUARY 2004 Appd. By: **EB**

Drawn By: EUGENE BAHIA **A-9007B**

**SURGE ANTICIPATOR PANEL**



**SINGER VALVE INC**  
 12850-87th Avenue  
 Surrey, BC  
 Canada. V3W-3H9



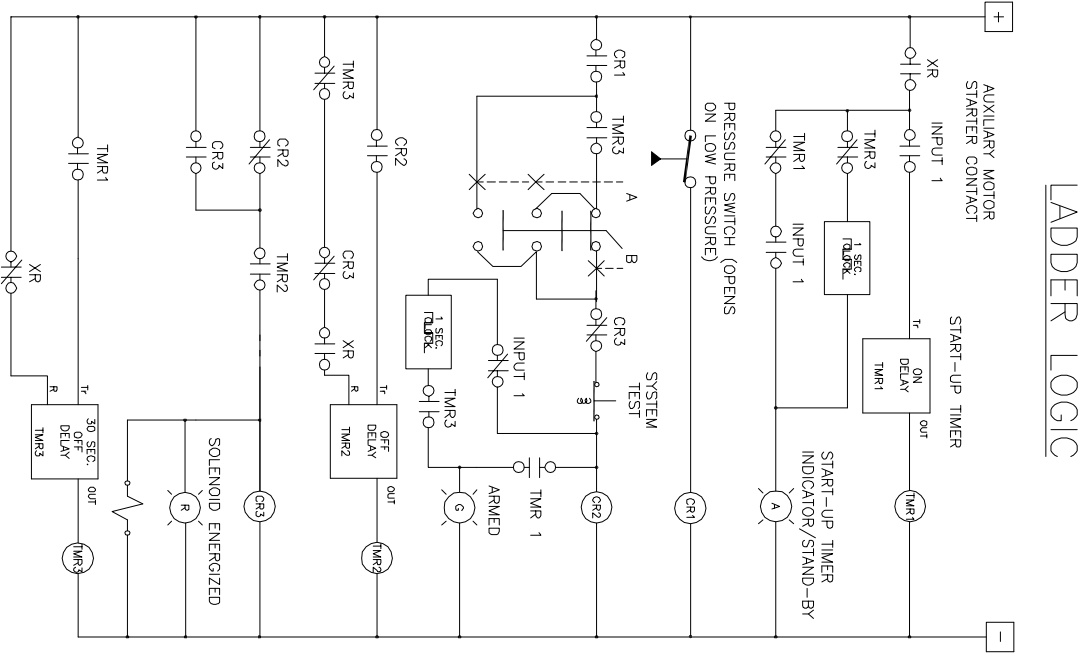
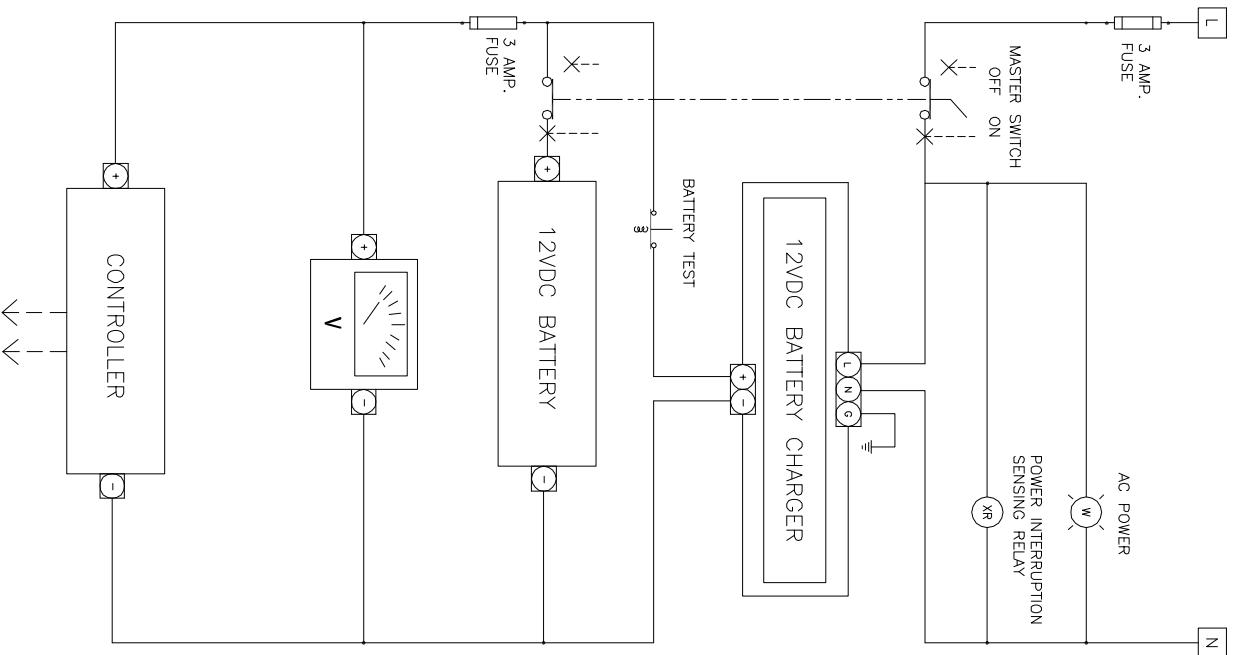
Date: FEBRUARY 2004 Appd. By:

Drawn By: EUGENE BAHIA A-9007B

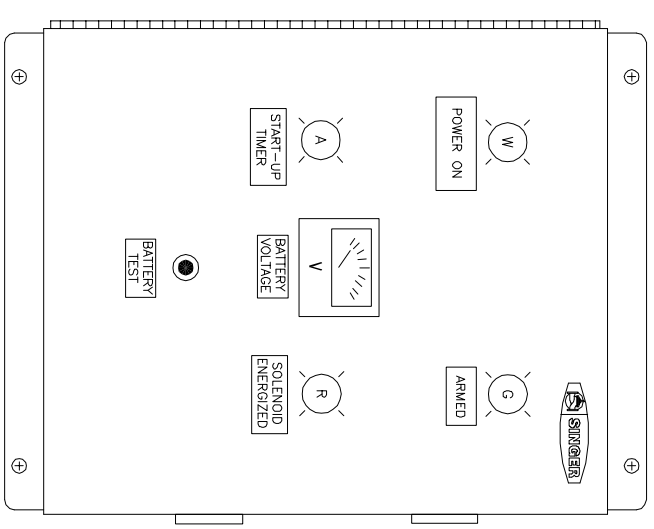
**SURGE ANTICIPATOR PANEL**

SINGER SURGE ANTICIPATOR PANEL





# SINGER SURGE ANTICIPATOR PANEL



**SINGER VALVE INC**  
 12850-87th Avenue  
 Surrey, BC  
 Canada. V3W-3H9

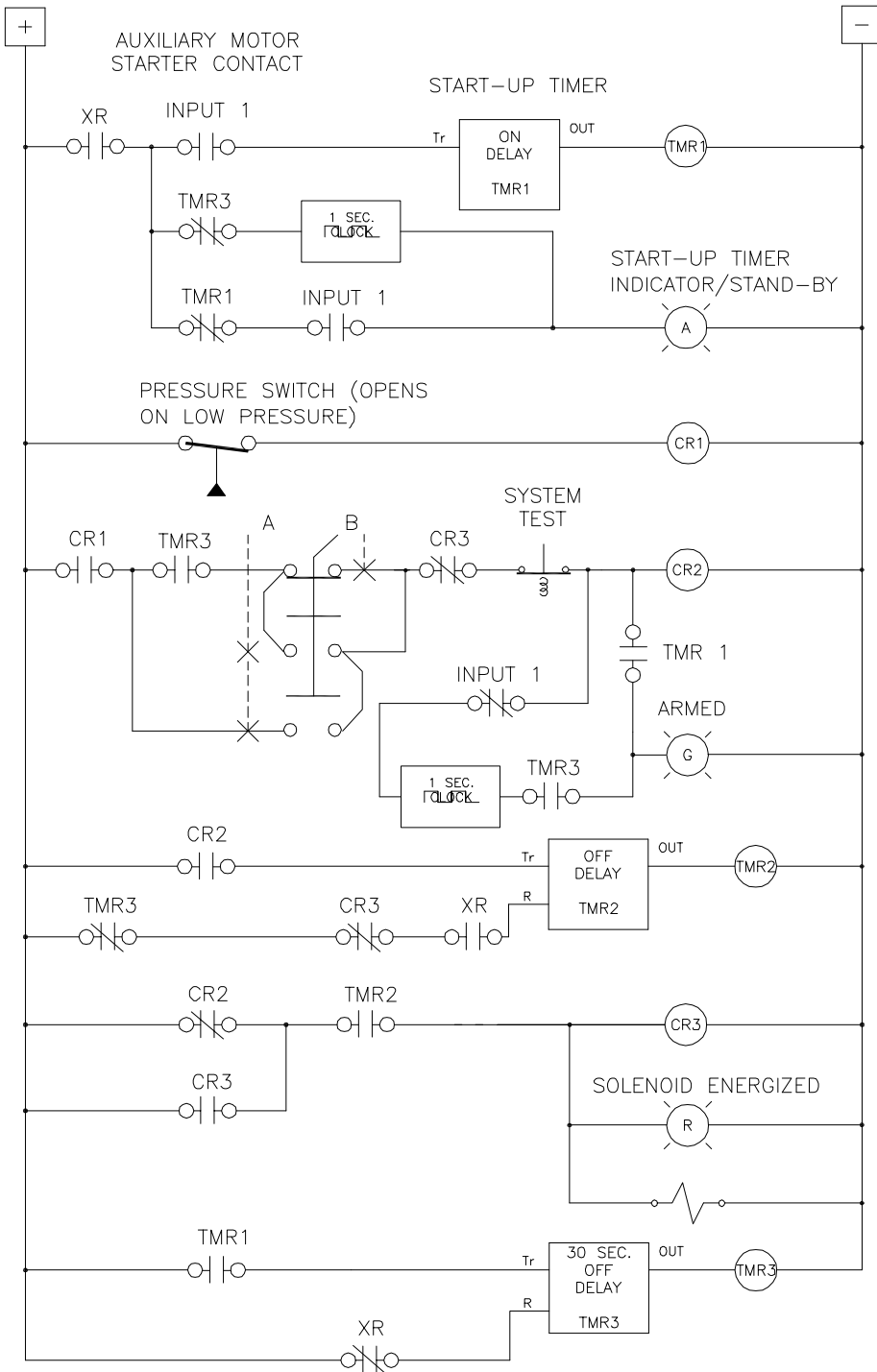


Date: FEBRUARY 2004 Appd. By:

Drawn By: EUGENE BAHIA A-9007B

**SURGE ANTICIPATOR PANEL**

# LADDER LOGIC



START-UP TIMER IS INITIATED WHEN INPUT 1 IS CLOSED (AUXILIARY MOTOR STARTER CONTACT IS CLOSED) AND POWER IS AVAILABLE (XR IS CLOSED).

PULSE GENERATOR (CLOCK) WILL BE ENABLED WHEN TMR3 (NORMAL SHUTDOWN TIMER) HAS EXPIRED AND A.C. POWER IS STILL AVAILABLE. THIS WILL FLASH THE "STAND-BY" INDICATOR LIGHT.

WHEN INPUT 1 IS CLOSED AND ON DELAY TIMER HAS NOT EXPIRED, AMBER LIGHT WILL LIGHT UP.

PRESSURE SWITCH IS NORMALLY CLOSED ON HIGH PRESSURE AND WILL OPEN ON LOW PRESSURE.

CR2 IS THE "COMMANDING" RELAY THAT DECIDES WHEN THE VALVE SHOULD OPEN. IT IS NORMALLY CLOSED (ENERGIZED) WHEN PRESSURE IS HIGH (MODE A) OR PRESSURE IS HIGH AND POWER IS AVAILABLE (MODE B).

"ARMED" INDICATOR LIGHT IS ON WHEN START-UP TIMER HAS EXPIRED AND CR2 IS CLOSED. IT WILL FLASH WHEN A NORMAL SHUTDOWN MODE HAS BEEN INITIATED (INPUT 1 OPENED) AND TIMER 3 HAS NOT YET EXPIRED. DURING THIS TIME THE PANEL WILL STILL RESPOND TO DOWNSURGE.

TMR2 IS AN OFF DELAY TIMER THAT DECIDES HOW LONG THE SOLENOID WILL BE ENERGIZED. IT IS TRIGGERED (Tr) BY OPENING OF CR2. TMR2 IS FORCED TO TURN OFF WHEN RESET (R) IS ON.

CR3 IS A "LATCHING" RELAY THAT WILL LATCH TMR2 TRIGGER TO OPEN POSITION EVEN IF THE PRESSURE GOES BACK UP AGAIN OR THE POWER IS RESTORED DURING THE TMR2 PERIOD.

TMR3 IS A THE NORMAL SHUTDOWN OFF DELAY TIMER. IT IS INITIATED WHEN INPUT 1 IS OPENED, PRESSURE IS OK, AND POWER IS STILL AVAILABLE.

## SINGER VALVE INC



12850-87th Avenue  
Surrey, BC  
Canada. V3W-3H9

Date: JANUARY 11, 2000

Appd. By:

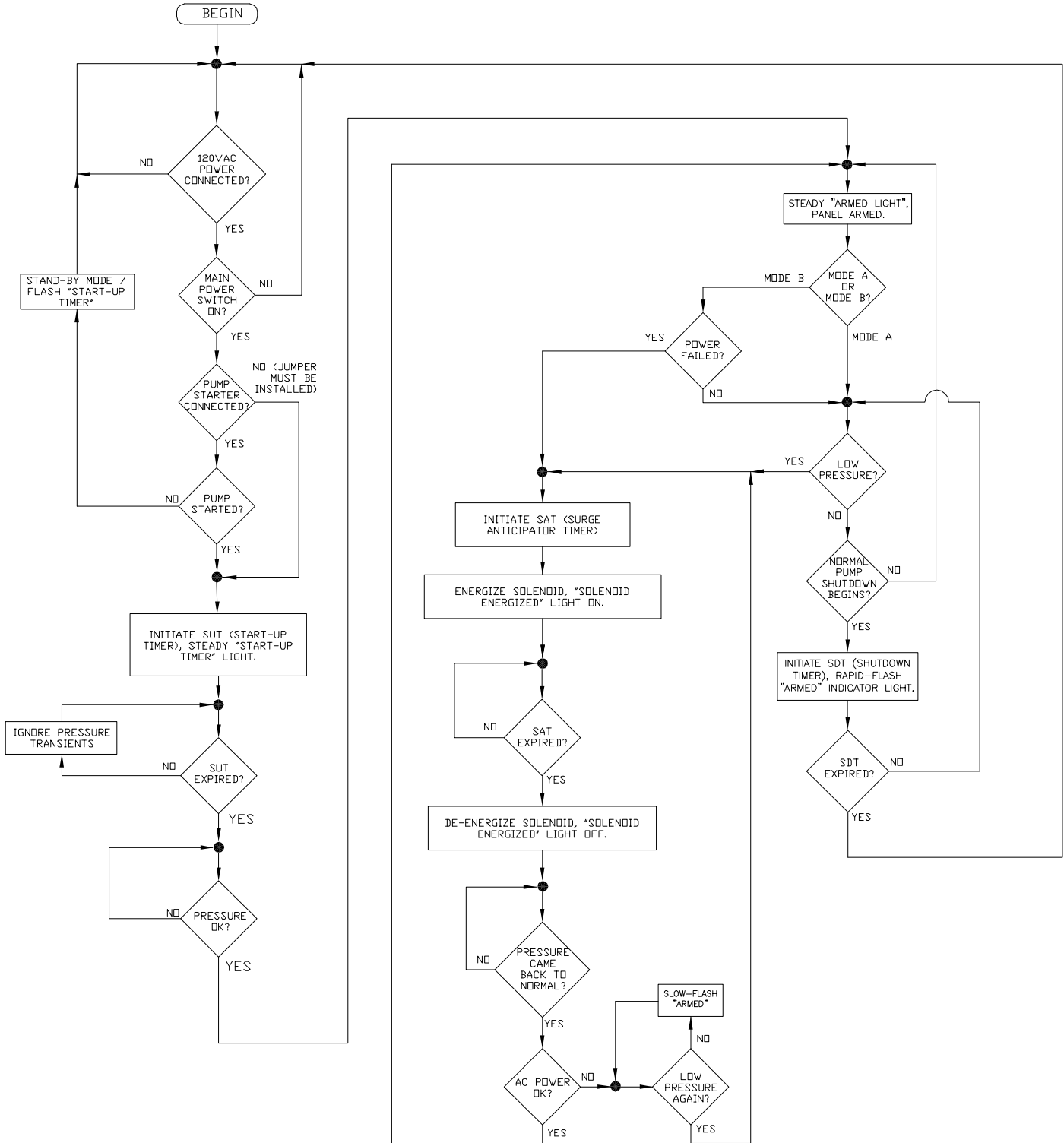
Drawn By: EUGENE BAHIA

Drawing

A-9007A

### SINGER SURGE ANTICIPATOR PANEL

# SINGER SURGE ANTICIPATOR PANEL



**SINGER VALVE INC**



12850-87th Avenue  
Surrey, BC  
Canada. V3W-3H9

Date: FEBRUARY 2004

Appd. By:

Drawn By: Eugene Bahia

Drawing

**Flow Chart**

**SINGER SURGE ANTICIPATOR PANEL**