

INSTALLATION AND SERVICE MANUAL
FOR THE
SSPC1-LV
SINGLE COMPRESSOR
SOLID STATE PRESSURE CONTROLLER

**ALTECH
CONTROLS**

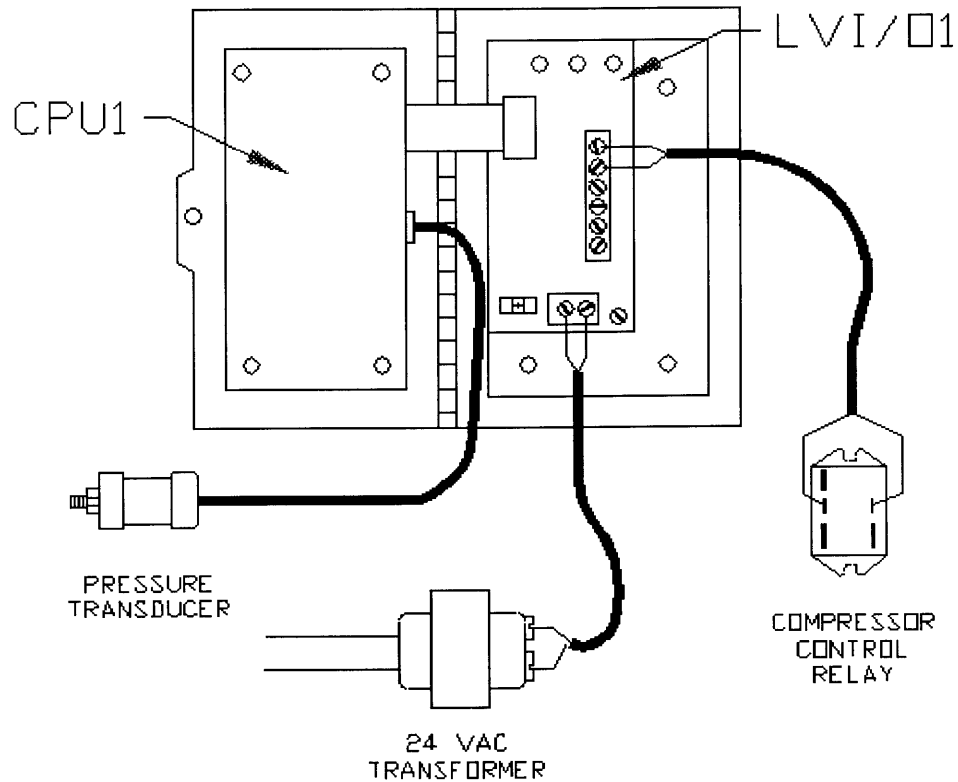
1545 Industrial Drive
Missouri City, Texas 77489
(281) 499-5697
Fax (281) 499-5504

Rev. B

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GENERAL INFORMATION



The SSPC1-LV is a single compressor suction pressure controller that has the following features:

- * Digital readout of the suction pressure Cut In and Cut Out settings.
- * LED indicators of the compressor, pressure levels and Override switch status.
- * 24 VAC supply voltage.
- * Manual override switch.
- * Remote mounting of the mechanical compressor control relay.

The SSPC1-LV will perform the following:

- * Control a single compressor using the “Fixed Time Cycle” logic and a single set of Cut In and Cut Out settings.
- * Control the cycling rate of the compressor.
- * Prevent compressor from operating in a vacuum.
- * Power failure logic.

HARDWARE:

The SSPC1-LV Controller consists of the following major components (See Figure 1):

- Enclosure
- CPU1 Board (Located on the Enclosed Door)
- LVI/01 Board (Located in bottom of Enclosure)
- Pressure Transducer (SSPX)
- Control Transformer
- Compressor Control Relay

ORDERING PART NUMBERS:

<u>Part Number</u>	<u>Description</u>
40304	SSPC1-LV Controller, 0 - 85 psi, calibrated to match the included SSPX Pressure Transducer (Does not include a 24 VAC transformer or compressor control relay.)

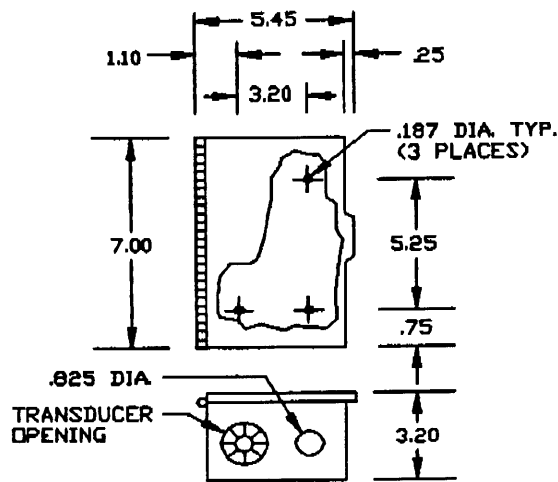
Options and Accessories

<u>Parts Number</u>	<u>Description</u>
40058	24 VAC Class 2 Transformer, 40VA (115/208/220 VAC)
40093	Compressor Control Relay (Aromat)
40211	Cable, 1 pair 24 AWG shielded
40301	SSPC1-LV Controller Manual

SPECIFICATIONS

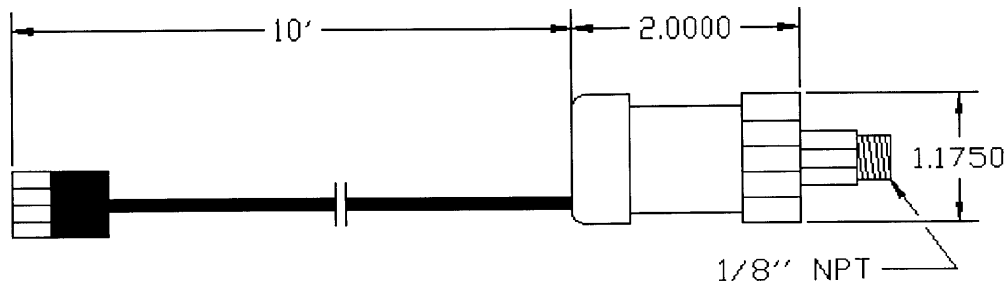
SSPC1-LV CONTROLLER SPECIFICATIONS:

Ambient Temperature: 35 to 125 °F
 Ambient Humidity: ... 0 to 95 %RH (Non-condensing)
 Controller Input Voltage: 20-28 VAC
 Controller Power: 10 VA
 Weight: 1.3 lb.



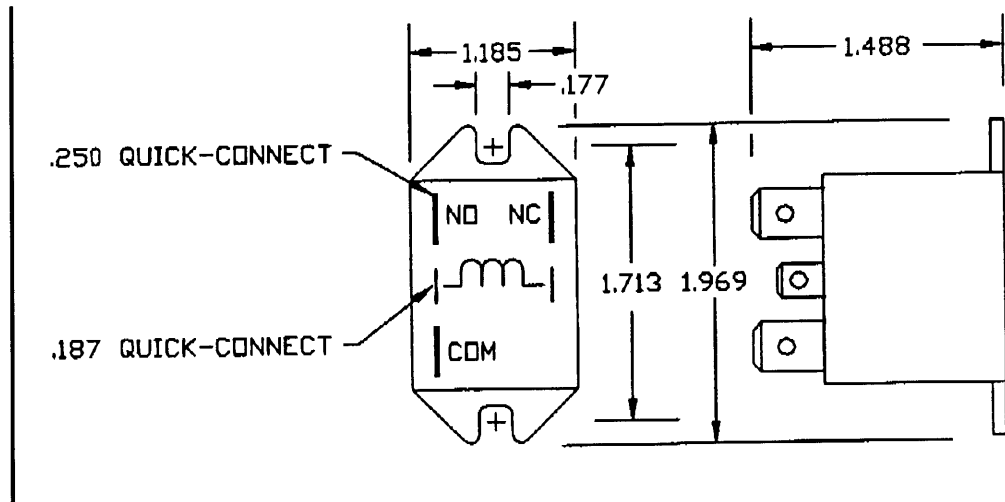
PRESSURE TRANSDUCER SPECIFICATIONS:

Ambient Temperature: -20 to 125 °F
 Maximum Pressure Reading: 85 PSIG
 Maximum Pressure Rating: 350 PSIG
 Fitting Material: Stainless Steel
 Refrigerants: CFC, HCFC, & HFC
 Weight: 0.3 lb.
 Cable Voltage Rating: 300 VAC



COMPRESSOR CONTROL RELAY SPECIFICATIONS:

- Ambient Temperature: 35 to 125 °F
- Ambient Humidity: ... 0 to 90 %RH (Non-condensing)
- Power Requirements: 2 VA @ 24 VDC (From SSPC1-LV)
- Weight: 2 lb.
- Contact Arrangement: 1 Form C per relay
- Contact Rating: Pilot Duty @ 125 or 250 VAC



OPERATION

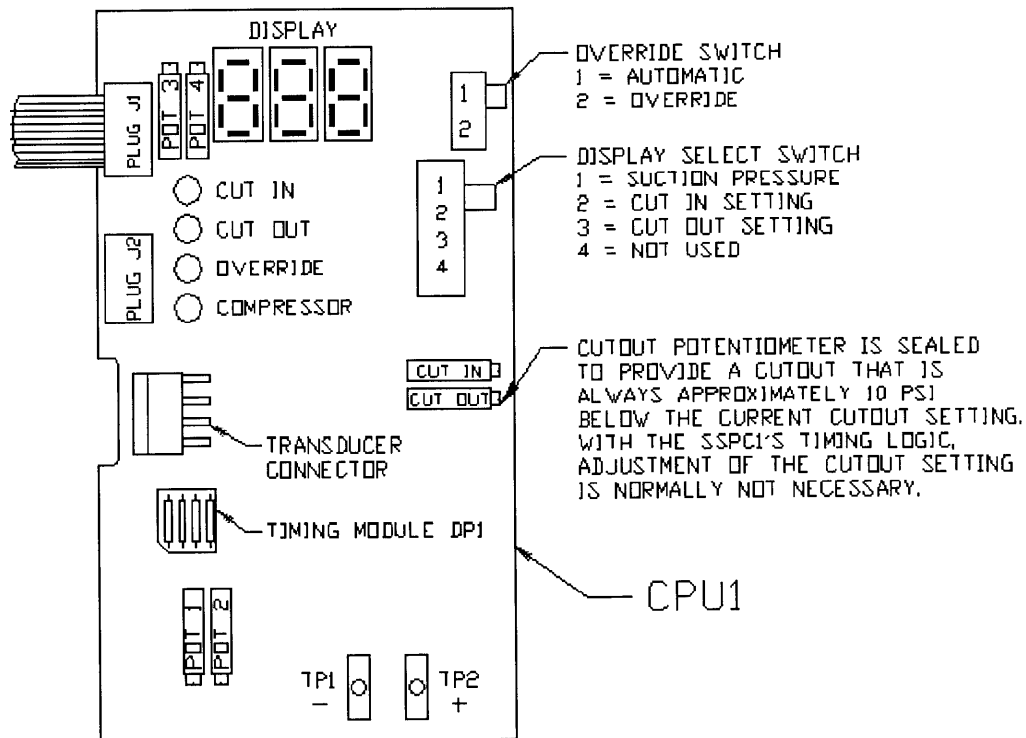
DIGITAL DISPLAY:

The SSPC1-LV is equipped with a three digit LED display for reading the suction pressure and the Cut In and Cut Out settings. The Display Control switch (See Figure 5) is used to select which parameter is displayed. The Display slide switch is accessed by "popping" open the SSPC1's hinged front cover.

Note: The SSPC1's cover can be opened by pulling on the tab provided on the right side. The screw located on the middle right side of the cover does not need to be removed to open the cover.

If the slide switch is in the top position (#1), then the display is the measured suction pressure. If moved down to the second position, the SSPC1's Cut In setting is displayed. The third position from the top (#3) displays the Cut Out setting. The bottom position (#4) is reserved for use with expansion boards. It should read approximately "00.00".

FIGURE 5



CPU1 LED STATUS INDICATORS:

The SSPC1 has four status LED's on the CPU1 that can be seen through the acrylic cover. The top one is labeled "CUT IN" and is turned on only when the suction pressure is above the Cut In setting. The second one from the top is labeled "CUT OUT" and is turned on when the suction pressure is below the Cut Out setting.

The third LED from the top is labeled "OVERRIDE" and is turned on only when the Override switch (See Figure 5) is thrown into the Override position (#2 or down position). When the override switch is thrown the SSPC1-LV's control relay will be de-energized regardless of what CPU1's circuitry and "COMPRESSOR" LED are indicating.

The fourth LED, labeled "COMPRESSOR", is "ON" when the CPU1 board's logic says that the compressor should be on. The LED's status and the compressor's status should always be the same unless the "OVERRIDE" switch is thrown or there is a malfunction.

CUT IN AND CUT OUT SETTINGS:

The Cut In and Out Setting adjustments are made on two 18 turn potentiometers (with internal slip clutches at both ends of travel) located on the right side of the CPU1 board (See Fig. 5).

The Cut In setting should be made first. It is adjustable from 0 to 85 psi and its value can be displayed by placing the Display Select switch in the second position (#2). The Cut In setting can be increased by turning the potentiometer clockwise.

The Cut Out setting should be set after the Cut In setting has been adjusted. It can be adjusted by turning the potentiometer on the CPU1 board labeled "CUT OUT". The Cut Out setting is displayed by positioning the Display Select switch in the third position (#3). It should be noted that the display will reflect the actual Cut Out setting. The Cut Out setting made to the Cut Out potentiometer is actually a differential setting from the Cut In setting. The Cut Out differential from the Cut In setting can be set between 0 and 30 psi. To increase the Cut Out setting, turn the Cut Out potentiometer clockwise.

SELECTABLE TIMING PLUG:

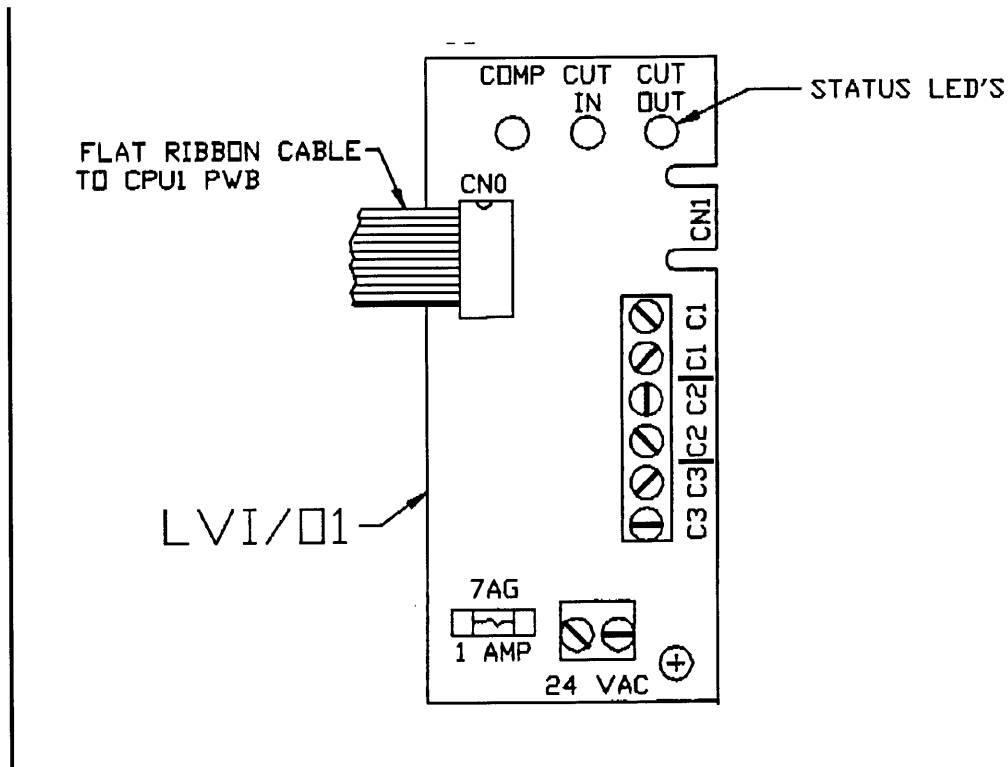
The standard SSPC1-LV comes with a timing plug in location DP1 that provides a "Turn ON" time delay of 30 seconds and a maximum compressor cycling rate of 10 per hour. This plug is mounted in an 8 position socket and is field replaceable. Timing plugs with alternate timing characteristics can be special ordered.

LVI/01 STATUS LED INDICATORS:

The LVI/01 board also has some status LED's (See Figure 6). The one labeled "COMP" should match the status of the compressor. It will normally be the same as the CPU1's "COMPRESSOR" LED unless the Override switch is thrown or a malfunction has occurred. If the Override switch is thrown, the LED will be turned on regardless of the status of the CPU1's "COMPRESSOR" LED.

The other two LED's labeled, "CUT IN" and "CUT OUT" are not functional when connected to a CPU1 board. They are only functional when connected to another CPU board.

FIGURE 6



COMPRESSOR CONTROL LOGIC:

- Compressor Turn On: The SSPC1 will turn the compressor on if the suction pressure exceeds the Cut In setting and the compressor has been off for at least 30 seconds (DP1-5M timing module).
- Compressor Turn Off: The SSPC1 will turn the compressor off if the suction pressure is below the Cut Out setting and the SSPC1's timing logic says that the compressor has run a sufficient amount of time. The time the SSPC1 forces the compressor to run is not constant but will vary between 0 and 6 minutes (DP1-5M) depending on the refrigeration system's requirements. If the suction pressure does not reach the Cut Out setting, then the SSPC1 will allow the compressor to continue to operate until it does reach the Cut Out setting.
- Vacuum Protection:
status If the suction pressure falls below 0 psi, the SSPC1 will immediately turn the compressor off regardless of the of the SSPC1's timing logic. This feature can be eliminated if desired by changing the timing plug DP1.
- Short Cycle Protect:
Alternate
DP1 The SSPC1 has timing logic that will restrict the maximum frequency of compressor cycles to 10 (DP1-5M). maximum frequency rates can be selected on the timing plug.
- Power-Up Logic: If a power interruption is detected the SSPC1 will turn the compressor off and start the turn on time delay (30 sec. for DP1-5M).
- Override Switch: If the Override Switch on the CPU1 board is thrown, then the control relay is de-energized regardless of what the CPU1's logic is saying. When the control relay is de-energized, the NC contacts will be closed and the compressor will run. When the SSPC1 is overridden provisions should be taken to properly control the temperature in the refrigerated fixture.
- Control Relay: The SSPC-LV utilizes a mechanical relay mounted remote from the SSPC's enclosure. This relay's NC contacts are used to control the compressor. Consequently, if the relay is energized, then the compressor is off.

INSTALLATION

CAUTION

- * Installer must be a trained and experienced serviceman.
- * Do not perform any installation or service work on the line voltage components without first removing power.
- * Do not perform any installation or service work on the SSPC1-LV without first disconnecting the 24 VAC power to the SSPC1-LV.
- * Always perform a complete check-out when the installation is complete.

PART NEEDED:

SSPC1-LV Control	See Installation specs Includes pressure transducer
24 VAC Transformer (20 VA min.)	1 per SSPC1-LV Controller
Control Relay	1 per SSPC1-LV Controller
Relay and power cable	Check installation specs

CONTROLLER MOUNTING:

- * The SSPC1-LV is designed to be mounted directly to the outside of the refrigeration control panel using the 3 provided mounting holes. The mounting must provide adequate support for the SSPC1 enclosure against vibration.

**THE MOUNTING LOCATION MUST NOT BE IN A
LOCATION WHERE CONDENSATION FROM
REFRIGERATION PIPES MIGHT DRIP INTO THE SSPC1!**

DO NOT ALLOW DRILL SHAVING TO GET INSIDE ENCLOSURE

- * Install the 24 VAC transformer and control relay in the refrigeration control panel. It is not recommended that either the transformer or the control relay be mounted inside the SSPC1-LV's enclosure.

WIRING:

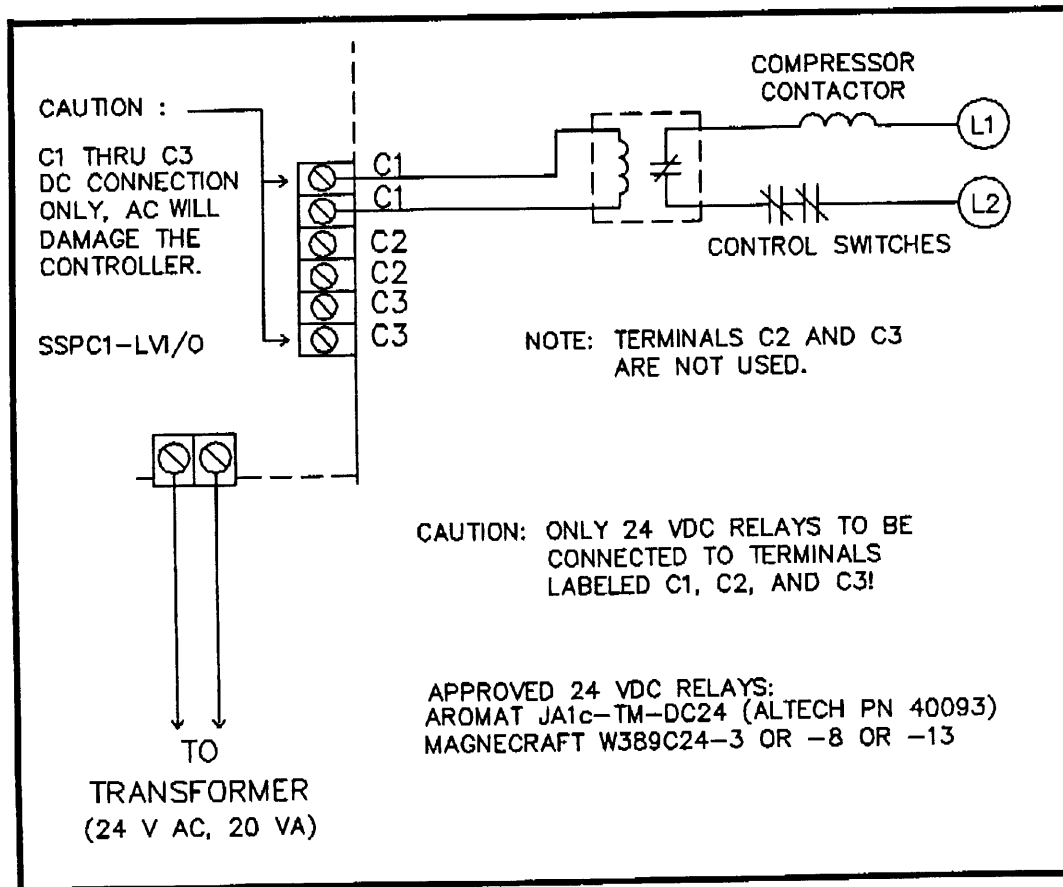
- * Mount and wire the 24 VAC transformer to the LVI/01 board as shown in Figure 7. Wire in accordance with all applicable codes.
- * Mount the control relay in the refrigeration control panel and wire as shown in Figure 7. Mounting the control relay inside the SSPC1-LV enclosure is NOT recommended! Wire in accordance with all applicable codes.

Notes: The compressor control relay (24 VDC) is connected to the terminals marked "C1" (No polarity needs to be observed!).

The terminals marked "C2" and "C3" are not used in the single compressor control application and are not connected.

DO NOT CONNECT LINE VOLTAGE DIRECTLY TO THE LVI/01 BOARD!

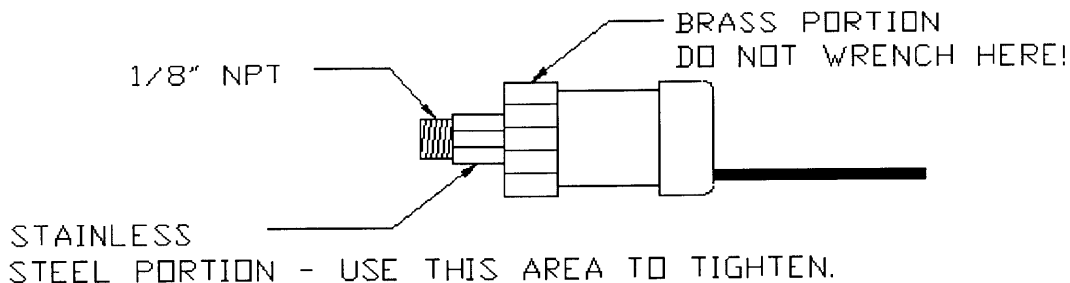
FIGURE 7



TRANSDUCER INSTALLATION:

- (1) The SSPC1-LV is supplied with a remote mounting suction pressure transducer. To mount the transducer, unplug the transducer from the CPU board.
- (2) Thread the section pressure transducer fitting into the 1/8" female pipe thread fitting in the suction line. **USE ONLY THE STAINLESS STEEL PORTION OF THE FITTING FOR TIGHTENING THE TRANSDUCER.** Using the brass portion of the transducer can cause permanent damage. (See Figure 8)
- (3) Route the transducer cable back to SSPC1 enclosure and route the plug through the plastic bushing located on the bottom left of the SSPC1 enclosure. Dress and secure the wire.
- (4) Plug the SSPX pressure transducer back into the CPU1 board.

FIGURE 8



START-UP PROCEDURE

Before applying power to the SSPC1-LV controller check the following:

- (1) Is the pressure transducer plugged into the CPU1 board correctly? The transducer cable should be directed away from the front cover.
- (2) The override switch should be in the "1" position (up) for normal operation.
- (3) The display select switch should be in the "2" position (cut in).
- (4) Now apply power only to the pilot circuit (Leave compressor circuit breaker off!). The Cut In setting should displayed.
- (5) Consult the application literature for the system and determine the proper Cut In setting for the refrigeration system. As a rule of thumb, set the Cut In pressure setting equal to the equivalent desired discharge air temperature for the fixture. Use the 18 turn "CUT IN" potentiometer to set the Cut In setting.

- (6) Switch the Display Select switch to the Cut Out setting (3). Set the proper Cut Out setting using 18 turn Cut Out potentiometer on the CPU1 board. The Cut Out setting is typically set at 10 psi differential from the Cut In setting and the potentiometer may be factory sealed. The Cut Out setting is of minor importance on the SSPC1 during normal operation since the SSPC1's timing logic controls when the compressor is turned off. The most important thing to remember is not to set the Cut Out setting too low.
- (7) Switch the display select switch to the top position (1) to display the suction pressure.
- (8) Check the compressor status LED's on both the CPU1 and LVI/01 board. If the suction pressure is above the Cut In setting, the compressor LED's should have come on by now. If they have, then the compressor's contactor should have pulled in. If so, turn on the compressor circuit breaker and allow the compressor to operate.
- (9) Check the setting of any mechanical suction pressure controls in the control circuit. The Cut Out setting for the mechanical low pressure control should be set at approximately 6" of mercury (vacuum). The Cut In setting for a mechanical pressure control should be set at least 5 psi below the SSPC1's Cut In setting.
- (10) After 1 to 2 hours of operation without a defrost, the temperature of the fixture should be monitored. If the temperature is too warm, lower the Cut In setting approximately 1 psi for each 1 °F the temperature is too warm.

NOTE: It should never be necessary to set the Cut In lower than 5 psi below the fixture manufacturer's recommendations.

SERVICING

GENERAL SYSTEM CHECKOUT

- (1) Before working on the SSPC1-LV control, familiarize yourself with the “OPERATION” section of the manual.
- (2) Verify that the digital display will light up in both position 2 and 3 of the display select switch. If not, go to the Pressure Transducer Checkout and Calibration Procedure in this manual. If the SSPC1 appears to be completely dead, check the incoming 24 VAC power and the fuse on the LVI/01 board.
- (3) Confirm that the actual suction pressure corresponds to the pressure indicated by the SSPC1’s display. If not, go to the Pressure Transducer Checkout and Calibration Procedure in this manual.
- (4) Confirm that the compressor will run when the override switch is placed in the override position (2). If it does not, then remove power to the control relay and determine if the compressor runs. If not, check the line voltage portion of the compressor control circuit to determine the problem. If the compressor runs with the control relay de-energized the problem is in the LVI/01 or control relay.
- (5) Confirm that the actual compressor operation corresponds to the logic detailed on page 8. The override switch can be used in this checkout since it does not alter the operation of the CPU1 board’s COMPRESSOR LED. The status LED’s on the CPU1 board help determine the operation. If the Cut In LED is on but the Compressor LED is not on, then it is being held off by a time delay. If the Cut Out Led is on and the compressor LED is not off, then the compressor is being forced to run by the CPU1’s timing logic.

BOARD LEVEL SERVICING OF SSPC1:

The best means of diagnosing problems to the board level is to use “Board Swapping” techniques. This technique is especially applicable to the SSPC1 since most installations will have more than one control. The board or transducer of a SSPC1 that appears to be defective can be temporarily exchanged with a board from a control that is functioning correctly. This will determine if the problem follows the board or stays with the control.

NOTE: It is not recommended that any calibration pots or settings be changed during the temporary exchanges.

PRESSURE TRANSDUCER CHECKOUT AND CALIBRATION:

- (1) Move S2 (Position Switch) to position 4 and adjust P4 for -0.1.
- (2) Move S2 to position 2 and adjust the Cut In potentiometer clockwise to its maximum position.
- (3) Adjust potentiometer 3 to read 85 psi.
- (4) Readjust the Cut In to the desired setting and then move S2 to position 3 and adjust the Cut Out to its desired setting.
- (5) Move S2 to position 1 and with 0 psi applied, adjust potentiometer 1 until the display reads -0.1.
- (6) Adjust potentiometer 2 until the display reads the same as an accurate gauge.
- (7) Calibration is now complete.

NOTE: The voltage that will appear across TP1 - and TP2 + will not convert 0.1 VDC to 1 psi.

REPLACEMENT PART NUMBERS

<u>Part Number</u>	<u>Description</u>
R40019	CPU1 Circuit Board, 0 - 85 psi (will require pressure transducer calibration)
R40302	LVI/01 Circuit Board
R40024	Pressure Transducer (SSPX) (will require pressure transducer calibration)
40203	24 VAC Class 2 Transformer 40 VA (115/208 VAC)
40093	Compressor Control Relay
40211	Cable, 24 AWG Stranded Shielded Cable (sold by ft.)

NOTE 1: Supplied parts may be re-manufactured parts.

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USA - 4537038

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SSPC 1

GENERAL INFORMATION

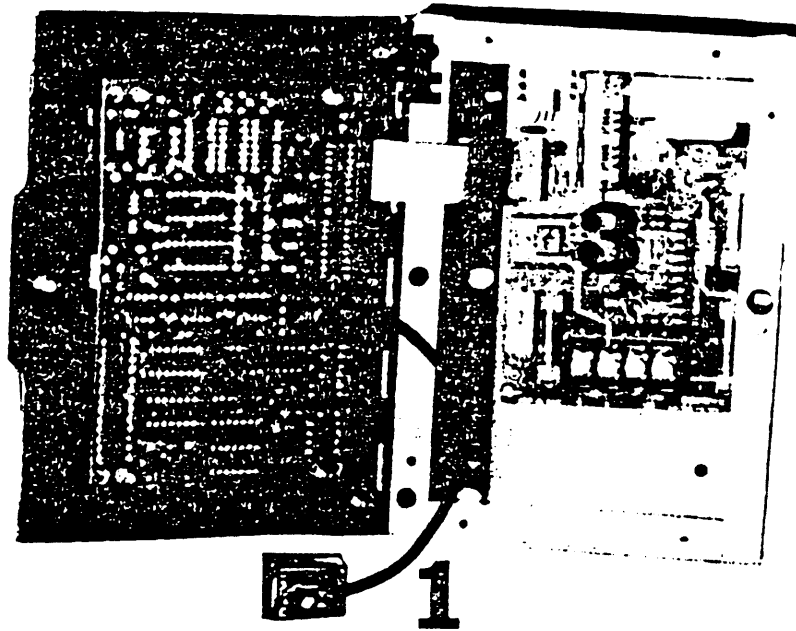


FIGURE 1

The SSPC 1 controls refrigeration compressor with one cut in and cut out suction pressure setting and time delays.

A typical SSPC is shown in Figure 1. It consists of: 1-A remote pressure transducer, 2-A CPU board, 3-An I/O board, and 4-An enclosure with a pop open hinged door.

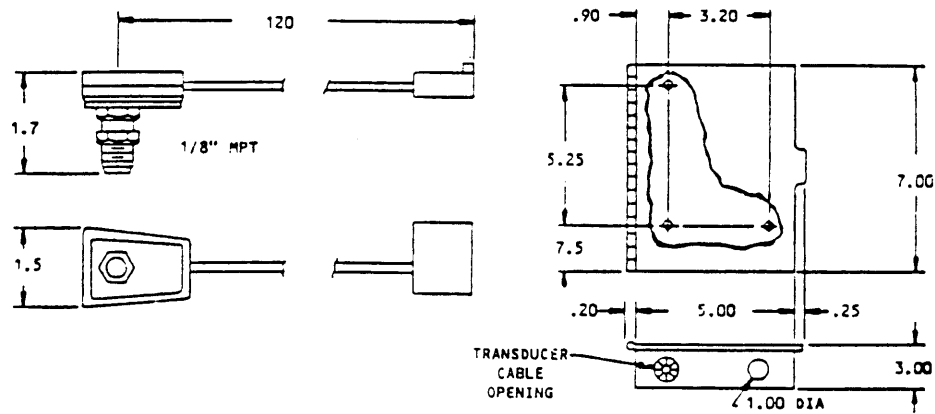


FIGURE 2

GENERAL OPERATION

*LOGIC

Compressor Turn On: The SSPCI will turn the compressor on when the suction pressure exceeds the adjustable cut in setting if the turn on time delay (standard delay: 1/2 min.) has expired since the compressor was turned off.

Compressor Turn Off: The SSPCI will turn off the compressor only if the suction pressure is below the adjustable cut out setting and the SSPCI's timing logic says that the compressor has run a sufficient amount of time. The time the SSPCI forces the compressor to run below the cut out setting is not constant but will vary (between 0 min. and 6 min. with the standard timing logic) depending on the refrigeration system's needs.

Vacuum Protection: If the suction pressure does reach 0 psi or below the SSPCI will immediately turn the compressor off regardless of the timing logic. This logic can be eliminated, if desired, by changing field replacable timing plug DP1.

Short Cycle Protect: The SSPCI has a timing logic that will restrict the maximum frequency of compressor cycles. (standard: 10 per hr.)

Power Up Logic: The SSPCI will turn the compressor off and engage the turn on time delay (standard: 1/2 minute) whenever power is applied to the SSPCI's power supply terminals or if a power interruption of 5 seconds or longer occurs.

Override Switch: This switch on the SSPCI's CPU1 board (see Figure 3) allows the SSPCI to be easily overridden such that the SSPCI logic can not turn the compressor off.

*CUT IN AND CUT OUT SETTINGS:

The cut in and cut out setting adjustments are made on two 18 turn potentiometers (with internal slip clutches at both ends of travel) located on the right side of the CPU1 board (see Figure 3).

The Cut In setting adjustment should be made first. It is adjustable from 0 psi to 65 psi and the setting can be read by switching the Display Select Switch to Position 2. Turning the screw clockwise will increase the setting.

The Cut Out setting should be made next. It is a differential adjustment which can set the Cut Out setting anywhere between 0 psi and 30 psi below the Cut In setting. The actual Cut Out setting (not the differential) can be read by switching the Display Select Switch into Position 3. Turning the potentiometer's screw clockwise will increase the Cut Out setting.

*SELECTABLE TIMING PLUG DP1:

The standard SSPCI comes with a DP1-5M timing plug. This provides a turn on time delay of 30 seconds and a maximum compressor cycling rate of 10 per hr. The background color behind the programming components on the DP1-5M plug is blue and yellow. Timing plugs with alternate timing characteristics can be special ordered.

***SWITCHES AND VISUAL INDICATORS**

The standard SSPCI has a 3 digit LED display which can display the following with the different positions of the Display Select Switch on on the CPU1 board (see Figure 3).

- Position 1: Suction Pressure
- Position 2: Cut In Pressure Setting
- Position 3: Cut Out Pressure Setting
- Position 4: Optional Board Display

The CPU1 board is also equipped with 4 LED status lights. These lights are arranged in a vertical row and are labled on the front cover. The lights indicate (from the top):

- L1 Cut In Indicates that the suction pressure is above the Cut In setting. If this LED is on and the compressor is not, then the turn on time delay or an optional board is holding the compressor off.
- L2 Cut Out Indicates that the suction pressure is below the Cut Out setting. If this LED is on and the copressor continues to run, then the SSPCI timing logic is forcing the compressor to run.
- L3 Compressor Indicates that the SSPCI logic has the output switch on the I/O1 board (see Figure 4) is closed. Consequently the compressor should be running.
- L4 Override Indicates that the Override Switch on the CPU1 board is in the "override" position (Position 2).

The CPU1 board is equipped with an Override Switch (see Figure 3). This switch allows a serviceman to override the SSPCI's control and turn the compressor on. Position 1 (up) is for normal SSPCI operation whereas Position 2 is for overriding SSPCI control.

FIGURE 3

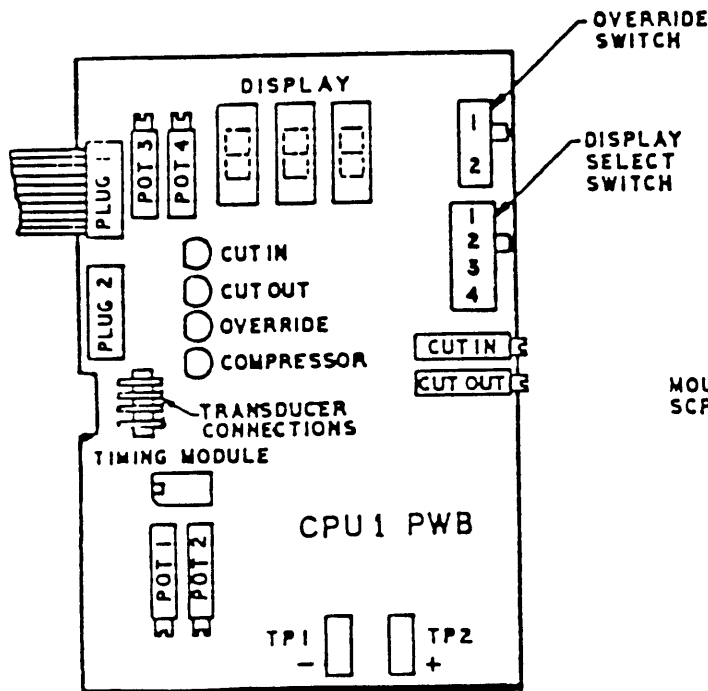
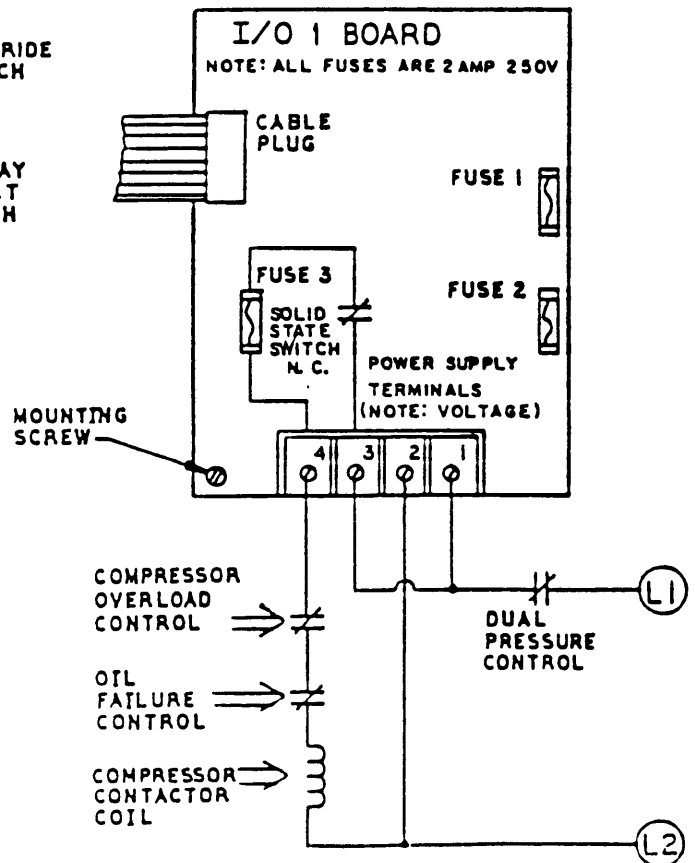


FIGURE 4



SPECIFICATIONS

POWER CONSUMPTION:

- . 6 VA Max
- .115 VAC 50/60 HZ
- .208/240 VAC 50/60 HZ

CUT IN SETPOINT: 0-65 psi
DIFFERENTIAL (CUT OUT): 0-30 psi

SWITCH RATINGS

1 Amp @ 115/208/230 VAC

AMBIENT:

45°F to 105°F
0% to 90% RH

WEIGHT: 2.5 lbs

DIMENSIONS: See Figure 2

PRESSURE TRANSDUCER

Maximum Pressure Reading: 65 PSI
Maximum Pressure Rating: 150 PSI
Refrigerants: R12, 22, 502
Fitting: Brass 1/8" MPT
Cable Length: 10 Feet

Note: Continual engineering research results in steady improvements; therefore, design and specifications are subject to change without notice.

INSTALLATION

CAUTION

1. Installer must be a trained and experienced serviceman.
2. Disconnect power supply before beginning installation.
3. Always conduct a complete check-out when installation is completed.

The SSPC 1 is designed to be mounted directly to the outside of the refrigeration control panel using the 3 provided mounting holes. Any other mounting method must provide adequate support for the SSPC 1 enclosure against vibration.

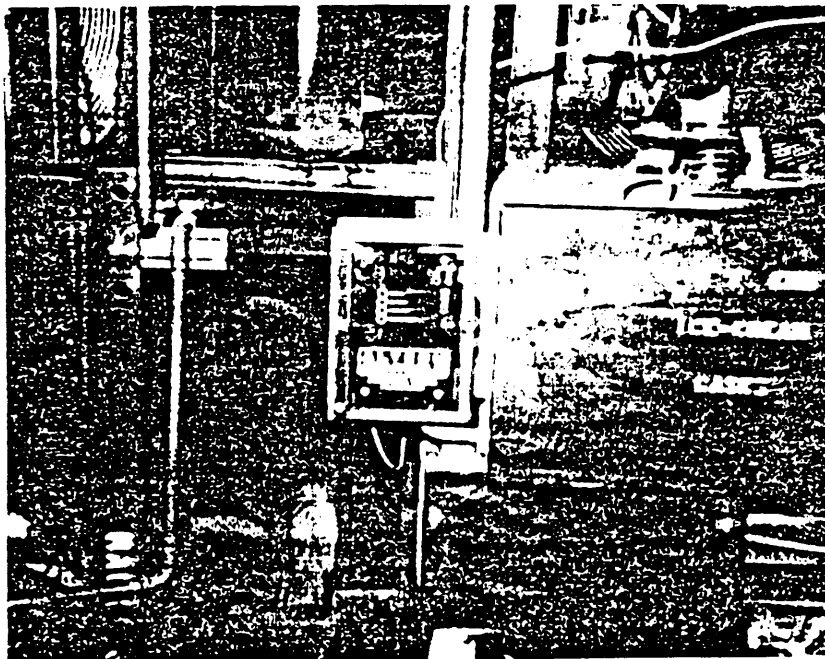
Also the mounting location must not be in an area where water could get on the SSPC 1.

MOUNTING

The SSPC 1 is designed to be mounted directly to the outside of the refrigeration control panel using the 3 provided mounting holes. Any other mounting method must provide adequate support for the SSPC enclosure against vibration. Also the mounting location must not be in an area where water could get on the SSPC 1.

An optional mounting bracket is also available that will allow the SSPC1 to the either the left or the right side of an refrigeration control panel. The electrical connections are then routed through some 3/8 Greenfield flexible conduit. Refer to Figure 5 for an example how the SSPC1 can be mounted.

FIGURE 5



The high voltage field installed connections shall be made to terminal labeled 1 thru 4 on the I/O 1 board shown in Figure 4. Note that the terminals are labeled right to left. It is recommended that only stranded wire be connected to the SSPC 1 due to the vibration associated with the application.

Terminal labels are:

- Terminals 1 and 2: Power Supply either 115V, 208/240 V
- Terminals 3 and 4: Compressor Switch (NC)

The high voltage field installed wires should be directed through the 3/4 conduit hole provided in the bottom right hand side of the SSPC enclosure. After the wires are connected, the wires should be neatly dressed.

The SSPC 1 is supplied with a remote pressure transducer (or sensor) that is to be mounted to the suction manifold. To mount the transducer, first unplug the transducer cable from the CPU 1 board by simply pulling on the plug, shown as Item 5 in Figure 1. Second push the plug thru the plastic bushing (Item 6 in Figure 1) located in the bottom left hand side of the enclosure.

The transducer is now separate from the enclosure and can be threaded into any 1/8" female pipe thread fitting along with adequate pipe thread compound. Use only the lower half of the transducer fittings (See Figure 6) to tighten the transducer. Tightening on the top half of the transducer fitting can cause permanent damage to the transducer.

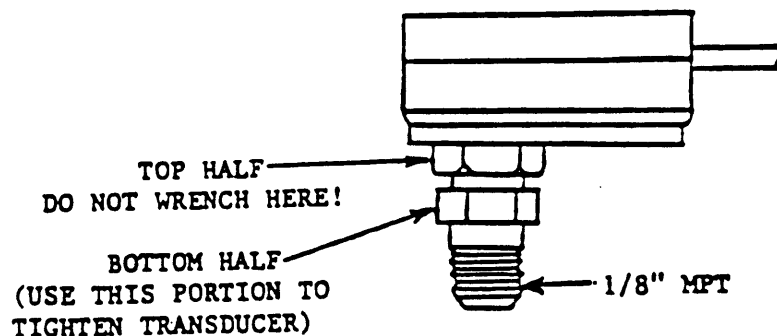


FIGURE 6

The transducer cable can now be reconnected to the SSPC 1's CPU 1 board. Be sure not to interchange transducers between SSPC 1's. Each transducer is calibrated to a particular control board before it leaves the factory. If transducers are interchanged then the transducer will have to be recalibrated to the control board using the "Pressure Transducer Checkout and Calibration Procedure" described in a later section.

Re-route the transducer cable thru the plastic bushing (Item 6 of Figure 1) and plug into the CPU board as shown in Figure 1. Note that the transducer wire will come out away from the front cover when installed correctly. The plug's receptacle has a catch to hold the plug from vibrating loose once plugged in. Do not plug the transducer cable in backwards, it can cause permanent damage to the transducer. It should also be noted that the CPU board's wiring is entirely current limited low voltage and does not pose an electrical shock hazard.

SETTINGS AND ADJUSTMENTS

START UP

Before applying power to the SSPC 1 check the following:

- (1.) Is the pressure transducer plugged in properly (wires directed away from the front cover).
- (2.) The override switch on the CPU board should be in the "1" position (up) for normal operation.
- (3.) The display select switch on the CPU board should be in the "2" position.

CAUTION

Be sure to double check wiring before applying power.

- (4.) Now apply power only to the pilot circuit. The cut in pressure should be displayed.

- (5.) To set the SSPC 1's Cut In pressure, determine the necessary coil pressure on the unit by consulting the manufacturer's specifications.

Now locate the Cut In pressure potentiometer (it is an 18 turn device labeled Cut In on Figure 3). Using a small flat screw driver adjust the potentiometer until the display pressure corresponds to the desired cut in pressure setting. Turn clockwise to increase setting.

Note 1: The Cut In pressure cannot be set below 0 PSIG.

Note 2: Be sure to not try adjusting the potentiometers labeled Pot 1, Pot 2, Pot 3, Pot 4. These are factory calibrated and should not be moved.

- (6.) The Cut Out pressure setting is selected via a 0 to 30 PSI differential lower than the Cut In pressure setting. Consult manufacturer's specifications for the proper Cut Out pressure for the loads being controlled.

The Cut Out point can be set by first observing the displayed Cut In pressure setting ("2" position) then switching the display switch to "3" position. The Cut Out setting is now displayed. Subtract the Cut In from the Cut Out to determine the differential. The differential can be changed by adjusting the 18 turn potentiometer on the CPU board labeled Cut Out (See Figure 4) until properly set. Turn clockwise to increase the Cut Out setting (decrease the differential).

- (7.) Now switch the display switch to the "1" position to display the suction pressure. Once the pressure drops below 65 PSI the suction pressure display will be accurate.
- (8.) Now energize the compressor circuit breakers and let the unit pull down to the operating pressure. Check the settings of any mechanical low pressure control in the system. The override switch may be useful in this step. The mechanical pressure control's Cut In should be set at as low as possible without allowing operation in a vacuum.

(9.) After 1 to 2 hours operation without a defrost, the temperature of the fixture with the coldest coil temperature should be monitored. Should the temperature of the fixture be too high, lowering of the cut in by 1 psi for each 1°F should be tried.

Note: It should not be necessary to operate a system at more than 5 psi lower than the manufacturers recommended coil pressure.

TROUBLE SHOOTING A REFRIGERATION SYSTEM UNDER SSPC CONTROL

- A. Before working on a SSPC 1 control, familiarize yourself with the "GENERAL OPERATION" section of this manual.
- B. Verify the digital display will light up in both Positions 2 and 3 of the display select switch.
 - 1. If so, go on to next step.
 - 2. If not, go to "Display Checkout and Calibration Procedure" in this manual.
- C. Confirm the actual suction pressure corresponds to the SSPC 1's indicated pressure by comparing it to the reading of a calibrated set of gauges.
 - 1. If they agree, go on to the next step.
 - 2. If not, recalibrate the transducer per the "Pressure Transducer Checkout and Calibration Procedure".
- D. Locate the Override Switch on the CPU 1 board (See Figure 3). Place in the overridden position (Position 2).
 - 1. If all compressors operate regardless of status lights, return override to position 1 and go on to the next step.
 - 2. If not, check for blown fuses on the I/O board. (Note: NEMA contacts can blow a 1 amp fuse if they hang up.) Also confirm that other pressure controls, relays, or other safety controls are not holding the compressors off.
 - 3. If not, proceed to Step "F".
- E. Confirm the actual compressor operation corresponds to the logic detailed in "General Operation" of this manual. Also the override switch can be used in this checkout; it does not alter the logic of the CPU 1 board.
 - 1. If the operation of the SSPC is as described in the manual, go on to Step "G".
 - 2. If not, proceed to Step "F".
- F. The problem cannot be repaired in the field. Contact your Altech Distributor or Altech for Warranty Repair information.
- G. SSPC 1 is operating correctly. Verify that all switches on the SSPC are in the normal position. Verify that all circuit breakers are made and that all safety and limit controls are made.

PRESSURE TRANSDUCER CHECKOUT AND CALIBRATION PROCEDURE

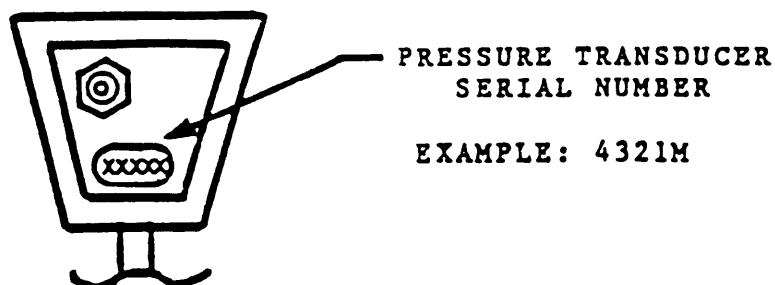
1. Be sure the display is reading actual pressure — not Cut In or Cut Out. The display switch should be in Position 1 (See Figure 3).
2. With the pressure transducer not connected to any pressure, adjust Pot #1 (See Figure 3) until the pressure reads "00.0". Note that Pot #1 is an 18 turn potentiometer with a slip clutch arrangement at either end of its travel. Turning Pot 1 (As viewed from the top) clockwise will increase the pressure reading. If the display cannot be zeroed (Be sure to try the full range of Pot 1) then snap open the transducer plug connector and check for a loose connection. If the wire connections look good, then replace the transducer.
3. Reconnect the transducer to the suction line.
4. By some means, raise the pressure in the suction line to a range of 25 to 40 PSI as indicated by a set of accurate pressure gauges.
5. Adjust Pot #2 until the indicated pressure corresponds to the actual pressure. Be sure no valves are closed preventing pressure from being sensed by the transducer.
6. Allow the pressure to change. Confirm that the indicated pressure changes accordingly.
7. If the indicated pressure goes off calibration shortly after being calibrated, then replace the pressure transducer.
8. Note: Each pressure transducer has its own unique electrical characteristics. Consequently, each transducer must be calibrated to the SSPC control on which it is to be used.
9. If calling in for a replacement pressure transducer, be sure to note the serial number inscribed in the transducer housing and have it available when ordering the transducer.

DISPLAY CHECKOUT AND CALIBRATION PROCEDURE

1. If there is no display, check if any other indicator LEDs are properly lighted (See L1 - L4 In Figure 3).
 - a. If so, go on to Step 2.
 - b. If not:
 - Check to see if you have the correct voltage between Terminals 1 and 2 on the I/O 1 terminal strip.
 - Check power supply fuses F1 and F2 for discontinuity. Replace only once before contacting your Altech Distributor or Altech.
 - Unplug the pressure transducer cable and measure the voltage between the two outside terminals. It should be between 10 - 13 VDC. If it is, go on to Step 2. If it is not, then the I/O Board is suspect. Contact Your Altech Distributor.

2. Display Calibration
 - a. Locate a digital voltmeter with an input impedance of at least 10 meg. ohms.
 - b. Set scale on 10 VDC.
 - c. Insert probe into test points TP1 (+) and TP2 (-) located on the lower righthand corner of the CPU 1 Board (See Figure 3). Note: The probes can be plugged in without removing the CPU 1 Board from the door. Simply open the door and insert the probes from the bottom.
 - d. The volt meter is now seeing the same signal as the display 1 PSI = .1 VDC or 29.1 PSI = 2.91 VDC. Move the Display Select Switch to Position 2 to read the Cut In pressure setting. Compare the display reading to the volt meter's reading (using the conversion). If they match, then the display is calibrated. If they do not match or the display is blank then go on to step "e".
 - e. Move the display select to position 4 (See Figure 3) and disconnect the cable to Plug #2. If an optional board is attached to the CPU 1 board, check display to see if it is reading 00.0±.1. If not, adjust Pot 4 located in the upper left hand corner of the CPU 1 board until the display is reading 00.0±.1. Note turning Pot 4 clockwise will increase the display reading.
 - f. Return the display switch to position 2 (and reconnect optional board cable if applicable). Compare the display reading with the reading of the digital voltmeter as done in Step D. If the two readings do not match, then adjust Pot 3 until they do. The display is now calibrated.
 - g. Note: Both Pot 3 and Pot 4 are 18 turn potentiometers with internal slip clutches at both ends of travel.

SERVICE MEMORANDUM: FIELD REPLACEMENT OF PRESSURE TRANSDUCERS



EXAMPLE: 4321M

One part of the pressure transducers supplied with the SSPC pressure controllers is manufactured by two different suppliers. These parts are not directly interchangeable. The letter suffix on the end of the pressure transducers serial number provides the key to determining which type you have. It is recommended that pressure transducers be replaced with a pressure transducer made by the same manufacturer. If the two are mixed, the transducer may not zero correctly and could have a tendency to drift.

Manufacturer Codes:

- "N" Manufacturer Letter Suffix "none", "L", or "N"
- "M" Manufacturer Letter Suffix "M"

For SSPC-2,3 and4:

If a situation occurs where it is not known in advance which brand of transducer will be needed to be replaced, it is possible to replace a "M" type transducer with an "N" type as long as a 1/4 watt calibration resistor in location R15 on the CPU Board (SSPC 2, 3, 4) is changed from 10,000,000 ohms to 1,000,000 ohms. R15 is located to the left of the override switch and whenever "M" transducers were used, the resistor was plugged into lead sockets rather than soldered directly in the board. The best way to make this change out is to use a needle nose pliers. A 10,000,000 ohm resistor has the following color code "brown, black, blue, gold" whereas the 1,000,000 ohm resistor has the following color code "brown, black, green, gold".

For SSPC-1:

The change out is slightly different on a SSPC-1. If a "M" type transducer is to be replaced with a "N" type transducer then the timing module DP1 must also be changed. The timing module contains the calibration resistor in it's left most position. The following standard timing plugs can be ordered from Altech:

<u>TRANSDUCER TYPE</u>	<u>DIP PLUG NUMBER</u>	<u>TIMING CHARACTERISTICS</u>
"M"	DP1-5M (BLUE/YELLOW)	TURN ON TIME DELAY: 30 SECONDS MAXIMUM CYCLE RATE: 10 PER HOUR
"N"	DP1-5N (BLUE/ORANGE)	TURN ON TIME DELAY: 30 SECONDS MAXIMUM CYCLE RATE: 10 PER HOUR

LIMITED WARRANTY

ALTECH CONTROLS CORPORATION warrants to the original purchaser or distributor our products to be free from defects in material and workmanship under normal use and service for a period of twelve months from date of shipment from the factory. Our obligation shall be limited to repairing or replacing at our discretion, F.O.B. factory, any part or portion of any product of our manufacture which upon examination we judge to be defective. The warranty stated does not include the cost of labor incurred in the handling, removing or installing of any equipment or component thereof, or loss of refrigerant. Furthermore, the warranty does not apply to any material that has been subjected to improper installation, application, misuse, neglect, alteration or accident. Removal of original serial number or date code shall release ALTECH from all obligations. ALTECH assumes no liability for product failure beyond repairing or replacing our product. If the product was damaged in transit, the purchaser must file a claim with the carrier.

The warranties are expressly in lieu of all other warranties, express or implied, and all other obligations or liabilities on our part. The obligation to repair or replace parts judged to be defective in material or workmanship states our entire liability whether based on tort, contract or warranty. We neither assume nor authorize any person to assume for us any other liability in connection with our products.

THE WARRANTIES AND REMEDIES SET FORTH HEREIN ABOVE ARE EXCLUSIVE AND NO OTHER WARRANTY TO REMEDY OF ANY KIND, WHETHER STATUTORY, WRITTEN, ORAL, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, SHALL APPLY.

ALTECH will make good faith effort for prompt correction or other adjustment with respect to any product deemed defective within warranty. For service, write or call ALTECH at address below and describe the nature of the defect.

Altech Controls
1545 Industrial Drive
Missouri City, Texas 77489
Attn: Customer Service Co-ordinator

Phone: (713) 499-5697
Fax: (713) 499-5504

Product design and specifications are subject to change without notification.