Intellisys™ Serviceman's Guide

SSR® 10 - 40 Horsepower Models
SSR 50 - 450 Horsepower Models

INGERSOLL-RAND®
AIR COMPRESSORS

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INTRODUCTION

The I-R Intellisys controller is a fully integrated microprocessor based control unit which replaces all electromechanical components previously used to control compressor operation. The Intellisys is applied to the SSR 10-40 horsepower range and is the first in a series of new controllers. This commonality of systems will allow more flexibility in operation than has been presently possible.

This presentation will go through the Intellisys Controller in detail. We will cover the main components that make up the controller, the sensors used by the system and operation of the systems default messages and troubleshooting.

COMPONENTS

The SSR 10-40 horsepower Intellisys system is made up of the following components, the Intellisys box, temperature sensor, pressure sensor, and starter interface board.

The Intellisys box contains the following major pieces, the membrane switch, CPU board and plastic enclosure.

The membrane switch is layers of polycarbonate adhered together. The top layer is the layer that is visible to the operator. Silkscreening is used on the backside of the top layer to give the maximum durability. This top layer is embossed by a heat process to help delineate the switch pads. The second layer of the switch has holes which contain stainless steel domes to provide tactile feedback to the operator. The third layer has been printed with a conductive ink. When the metal dome contacts the ink circuit, it completes the circuit and makes a momentary contact switch. These circuits are arranged in a matrix grid that terminates in a plug. The fourth layer is the back of the membrane and it is also printed to provide a static shield.

The layers of the membrane switch are adhered by a 3M adhesive that has been tested to withstand the effects of a compressor environment including exposure to Ultra Coolant. The reliability of a membrane is much higher than that of a mechanical switch.

The enclosure is a injection molded component. Polyester was selected due to its resistivity to pollutants found in normal environments and its superior strength. Injection molding was selected as the manufacturing process due to its high precision.

The CPU Assembly is an Ingersoll-Rand design.

This board is not intended for general service and never requires field troubleshooting.

The Starter Interface Board is the transition between the electrical wiring and the Intellisys. The large terminal strips are for field accessibility. The Starter Interface Board is divided into a high level 115 volt AC and a 5 volt DC section.

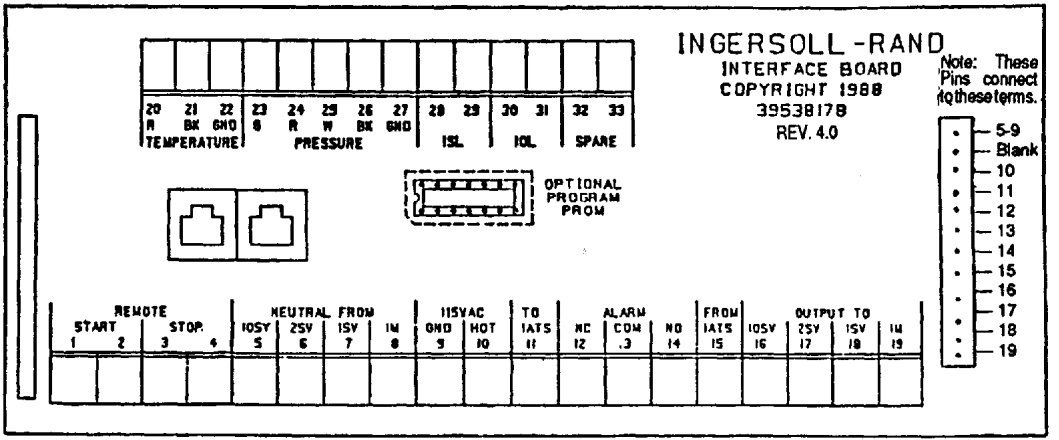
Each terminal has been clearly identified as to its purpose.

The ribbon cables connecting the starter boards with the Intellisys controller have been separated the same way. The larger cable is for 115 volt AC signals

and the smaller cable is for 5 volt DC signals.

This is the socket for the option prom and the communications port. Options are activated by inserting the option prom in the socket. The prom contains permanent memory which supplies the Intellisys controller with some additional information required for the respective option and triggers a code in the microprocessor.

The communications port is for communication with other Ingersoll-Rand Products.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INTERFACE BOARD
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Note: These Pins connect to these terms.
20 R TEMPERATURE
21 BK TEMPERATURE
22 GND TEMPERATURE
23 G PRESSURE
24 R PRESSURE
25 W PRESSURE
26 BK PRESSURE
27 GND PRESSURE
28 29 ISL
30 31 IOL
32 33 SPARE
OPTIONAL PROGRAM PROM
REMOTE START 1 2
REMOTE STOP 3 4
NEUTRAL FROM IOSV 5
NEUTRAL FROM 2SV 6
NEUTRAL FROM 1SV 7
NEUTRAL FROM 1M 8
115VAC GND 9
115VAC HOT 10
TO IATS 11
ALARM NC 12
ALARM COM 13
ALARM NO 14
FROM IATS 15
OUTPUT TO IOSV 16
OUTPUT TO 2SV 17
OUTPUT TO 1SV 18
OUTPUT TO 1M 19
5-9
Blank
10
11
12
13
14
15
16
17
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19

SENSORS

There are 2 sensors utilized on the SSR 10-40 HP range.

One is a pressure sensor.

The other is a temperature sensor.

The temperature sensor is a thermistor located in the discharge air circuit. It comes complete with a 6 foot lead that directly connects it to the Starter Interface Board. It connects to terminal 20 (a red wire), terminal 21 (a black wire) and terminal 22 has an insulated ground wire.

The temperature sensor reports its values by a change in resistance. As the resistance decreases it relates to an increase in the temperature.

The pressure sensor is a strain gauge device that terminates in a female plug. A male plug is connected and terminates in the Starter Interface Board. The top part of the pressure sensor is a stainless steel diaphragm that will move as pressure increases. This movement results in a positive voltage change. The Intellisys directly interprets this voltage to a pressure.

The cable connects to the interface board as follows:

1	green	23
2	red	24
3	white wire connects to terminal	25
4	black wire connects to terminal	26
5	ground wire	27

OPERATION

The SSR 10-40 horsepower Intellisys is delivered completely operational. All that is required is to hook up main power to the starter and operate the compressor. There are no adjustments required. The initial settings will vary according to the stated operating pressure of the compressor. Please refer to the instruction book for these values. Compressors equipped with the Intellisys are truly plug in and run units.

Upon initial power up, all the lights on the Intellisys will light. The numeric display will show four 8's. This feature accomplishes 2 things. First it gives a lamp test to insure that all the lights and all the segments in the display are functional, and secondly, it allows the microprocessor to perform a self-check. Since the only way all the lights can light and the display can show all 8's is on command from the microprocessor. If this occurs, we know that the processor is good.

When the Intellisys display shows 8888's, pressing the SET button will clear it. When cleared, the display will show 0 signifying that the compressor is ready to start.

To start the compressor be sure that the display is showing 0. Pushing the start button, the compressor will start. It will remain unloaded until the load switch has been pressed.

Press the load switch and the compressor will load and operate in the on-line off-line mode. It will continue to operate in this mode which is the most efficient mode of operation until the load button is depressed again.

To run the compressor in modulate mode merely press the load switch again. This will put the compressor in modulate/ACS and it will operate automatically from this point.

Each time the load button is depressed the compressor will switch to another mode of operation.

All Intellisys have ACS as a standard feature. On the original Intellisys however, it was not printed on the face of the controller. The most recent controller has Modulate/ACS printed on the face.

On the original Controller ACS operates as follows: While running in the ON/OFF LINE MODE and the machine cycles three times in three minutes, the controller will automatically shift to modulation. While running in the modulate mode and the machine runs unloaded for three minutes, the controller will shift back to ON/OFF LINE. The green LED lights will follow these shifts.

On newer Intellisys with ACS printed on the face, the controller activates the ACS mode differently. If this controller is manually placed in the ON/OFF LINE mode, it will stay in this mode and not shift automatically to modulate. The controller must be placed in the Modulate/ACS Mode position in order for the unit to modulate and shift into ON/OFF LINE if demand indicates. Unlike the original controller, the green LED lights will not shift position.

In any mode of operation pressing the display-select button will change the value that is being read. The legend next to the display-select is to show what is being displayed. Each successive depression of the display-select moves the selection down one.

After 10 minutes of no activity on the display-select, the display will automatically revert to the default setting which is discharge air pressure.

To stop the compressor, merely press the unloaded stop button. The compressor will initially unload and operate unloaded for approximately 7 seconds at which point it will stop. This unloaded stop has been installed to insure the most optimal operation of the compressor.

The emergency stop button is provided for emergency operation. This device immediately breaks the 115 volt AC supply voltage to the compressor. This switch should be used with care since it may cause damage to the compressor. It is truly provided for emergency purposes only.

The set button in conjunction with the up and down arrows is used to make adjustments to the machine. In order to utilize this feature, the machine must be stopped.

The first press of the set button will put the controller into the set mode and light the first setable parameter, Set Off Line Air Pressure.

By pressing the up or down step arrows the value shown in the window will change. When the desired value is selected, press the set button to fix it into memory.

The display will shift down to the next setable parameter. The unit will loop around when it gets to the bottom. When an option is not installed, dashes will appear in the display.

If the Intellisys is allowed to remain in the SET POINT mode with no change for more than fifteen seconds the system will return to READY mode as announced by the 0 in the display.

The set button also serves the functions of clearing an alarm. Pressing the set button twice will clear the alarm.

The 2 step arrows also perform another function of calibrating the pressure sensor. Any time the pressure sensor or controller are changed, the unit should be re-calibrated. To re-calibrate, have the compressor off with zero pressure on the pressure sensor and press both step arrows simultaneously once.

INDICATOR LIGHTS

The Intellisys controller features two indicator lights. One being the power-on light and the other being the automatic re-start indicator light.

The power-on light indicates that there is 115 volt control voltage to the Intellisys. In the event that the power light is lit and the display is blank, that indicates that there is a fault in the Intellisys and that it has to be changed out. In the event that the power light is not lit, but the display is lit, it means that the power-on light is burned out. This is not a field replaceable item and the Intellisys should be replaced.

The other indicator light is the automatic restart indicator light. This light indicates that the compressor has shut down automatically due to the fact that the line pressure exceeds the off-line limit that has been programmed into the unit. With this light lit the compressor is able and probable to start at any time.

MESSAGES

The Intellisys Controller display 12 numeric fault codes in the display window, except that some early units do not have a -12- code.

Displays 1 through 12 indicate fault annunciation with the unit. All fault annunciation is identifiable by the preceeding and trailing dash. In other words, the display would show a -01-.

The fault codes will only appear when an actual fault is detected. This will be demonstrated.

MESSAGE -01- STARTER FAILURE

The way the Intellisys controller has determined whether it is a starter failure or not is by checking the condition of the starter interlock switch. Remember to remove all electrical power from the compressor. Lock and tag the disconnect switch.

Upon this fault, the first thing you should do is to check the functioning of the starter interlock switch. This can be done by removing the control wiring to the switch and attaching a continuity checker.

If this is functioning properly, then check the functioning of the main starter coils. This can be done by disconnecting the wires to the coil and applying 115 volts to the coil from a near by wall outlet.

Before proceeding be sure to remove the 115 volts applied to the starter coil for safety.

If these 2 prove to be OK, check for continuity between terminal #19 on the starter interface board and the starter coil connection. Also check for continuity between the opposite coil connection and terminal #8 on the starter interface board. If these check out OK, check for continuity between #8 on the interface board and pin 1 on the 115 volt connector. This is the white connector on the right side of the board and pin 1 is the top most pin. Also, check for continuity between terminal #19 on the interface board and the bottom most pin on the white connector.

If there is no continuity between the terminals and the pins, change the starter interface board. If there is continuity here, change the Intellisys controller.

MESSAGE -02- MOTOR OVERLOAD

If the display shows an -02- check the motor over-load for proper operation. Remember to remove all electrical power from the compressor, lock and tag the disconnect switch.

The overload contact circuit can be checked by removing the wiring each side of the contact. Attach a continuity meter across the contact. Remove a heater element and mechanically trip the internal mechanism to open the overload contact.

If the contact is functioning properly check for continuity between terminals 30 and 31 on the starter interface board and the connections on the motor overload.

If we have continuity, proceed to the next test. Check for continuity of terminal 31 to any of the ground connections or the same terminal strip like 20 or 27. If this proves OK, remove the 5 volt cable which is the cable on the left, the black plug, and check for continuity between 31 and either of the bottom 2 most pins on the connector.

Also check for continuity between terminal 30 and pin #7 on the right side of the black connector.

If all continuity checks prove OK, and the overload checks OK, then change the Intellisys controller.

MESSAGE -03- HIGH DISCHARGE AIR TEMPERATURE

If the display shows an-03-fault, this occurs when the temperature sensed by the thermistor in the discharge air exceeds the value programmed into the Intellisys controller.

First, check the value of the shutdown by pressing the display-select for discharge air temperature. Insure this limit is in the correct range by pressing the set button twice to clear the-03-fault, then continue pressing set until the discharge air temperature is displayed.

The range adjustment is between 200°F and 228°F. At 97% of the shutdown value the red alarm light will start flashing.

This is a warning indication of rising temperature.

A compressor that is experiencing a higher air temperature condition may have the following symptoms.

1. It is experiencing poor to inadequate room ventilation.
2. The compressor room ambient may exceed 100°F.
3. The coolers may be fouled with dirt.
4. Inadequate lubrication within the airend may be causing high discharge temperature.

However, if the temperature range proves to be acceptable, check the resistance of the temperature sensor. Do this by disconnecting the cable wire from terminals 20 and 21. Attach an OHM meter to the leads of the thermister.

Remember, the temperature must be held constant on the sensor in order to measure a constant OHM value. The use of a thermometer may be an advantage. Use the following table as a guide and match the OHM value to a sensor temperature. This will verify if the temperature is good or bad.

Degree F°	OHMS
50	20244
60	15475
70	11934
80	9282
90	7277
100	5748
110	4573
120	3663
130	2955
140	2400
150	1962
160	1614
170	1335
180	1110
190	928
200	780
210	658
220	558
230	476
240	407

MESSAGE -04- HIGH DISCHARGE AIR PRESSURE

When the-04-fault exists, the controller reacts to this problem by sensing the pressure via the pressure sensor. Should this value exceed what is set into the controller, it will shut down. Upon shutdown, the first thing to do is check the value in the display window.

Press display select to obtain a discharge air pressure reading in the display window. This is the shutdown pressure.

The controller can be set for 100-125-150 or 175 psig. The controller will shut down if the discharge pressure exceeds 15 psig over any of the preset discharge pressures programmed into the controller by the factory.

SYMPTOMS

1. The Intellisys controller does not power up, even though power is present at the primary and secondary contacts of the transformer and interface board or intermittent contact will give various error codes.

The cause of this is the electrical signal in the pressure transducer and can ground itself fully or intermittently when the 4 prong adapter is installed in the cable housing.

The spade connection at the end of the wire may contact the inner metal wire sheath of the cable connector.

There are four wires inside the cable (red, green, black and white). Therefore, several combinations of ground contact are possible.

TO CORRECT THE PROBLEM:

1. Loosen the nut, pull slightly on cable.

If you have a unit that is showing symptoms as described, it may be necessary to repair or replace the existing cable.

This problem has been corrected on new units with the addition of a heat shrink shield at the end of the transducer cable to prevent contact.

Re-assemble the connector and plug it back in.

The pressure transducer should be calibrated at start up and anytime a component associated with the transducer or Intellisys system is replaced. Calibration of the transducer is accomplished as follows:

1. All pressure must be removed from the pressure transducer. Be sure to remove the tubing attached to the line sump solenoid valve.
2. The controller must be in the ready to start mode. (“O” in the display window).
3. Press the step up/down arrows at the same time, (ONCE). When the arrows are pressed, the green LED light on the display-select will shift to SUMP and then return to discharge air pressure.
4. This procedure can be done anytime you suspect an error in the pressure transducer circuit.

IT IS VERY IMPORTANT TO HAVE THE AIR PRESSURE REMOVED FROM THE TRANSDUCER PRIOR TO CALIBRATION.

MESSAGE -05- TEMPERATURE SENSOR FAILURE

If this fault shows-05-temperature sensor failure, the Intellisys looks at the value from the temperature sensor and checks to see if it is within a proper range. If

it is completely out of range it shuts the unit down on temperature failure. While investigating, remember to open the electrical disconnect and lock and tag.

The next step is to press the display-select button twice and check the value of the shutdown temperature.

If the temperature range is acceptable, check the resistance of the temperature sensor. Do this by disconnecting the cable wires from terminals 20 and 21. Attach an OHM meter to the leads of the thermister.

Remember the temperature must be held constant on the sensor in order to measure a constant OHM value. The use of a therometer may be an advantage.

Use the following chart as a guide and match the OHM value to a sensor temperature. This will verify if the temperature sensor is good or bad.

The next step is to check the continuity of the interface boards. Remember to remove all electrical power, lock and tag. Remove the 5 volt DC ribbon cable and check for continuity between terminal 20 and the top left most pin, and continuity between 21 and the top right most pin. Check continuity of pin 22 to ground, terminal 27. Also, check continuity of 22 to either of the bottom most pins which are ground connections. If all continuity checks are good, replace the Intellisys controller.

Remember, intermittent contact associated with the interface board may be detected with slight flexing or elevated room ambient conditions.

Degree F°	OHMS
50	20244
60	15475
70	11934
80	9282
90	7277
100	5748
110	4573
120	3663
130	2955
140	2400
150	1962
160	1614
170	1335
180	1110
190	928
200	780
210	658
220	558
230	476
240	407

MESSAGE -06- PRESSURE SENSOR FAILURE

When the-06-fault exists the Intellisys determines pressure sensor failure by taking the reading of the sensor and checking it against some logical range. If it is out of range, it considers the sensor to be failed.

In this case, check the male-female connection on the end of the sensor. Also disassemble the male cable and insure that all wires are intact as was done for fault number -04-.

Check for continuity on each wire of the cable after disconnecting it from the interface board.

Just follow the color codes of the wires.

The most common-06-failure is a result of not having 15 pounds of sump pressure in 10 seconds after start-up. This can be caused by a small air leak in the tubing attached to the line sump solenoid valve or failure of the valve to toggle. First check for leaks and check the solenoid for proper operation including the presence of moisture or dirt in the solenoid orifice.

After checking the pressure transducer calibration and its cable for shorts, the following procedure will tell you if the circuit through the interface board is defective.

1. Disconnect the five leads from the pressure transducer cable at the interface board (terminals 23 through 27).

2. Install a jumper between terminals 23 and 25.

3. With the controller in the ready to start mode (0 in the display window), press the Step Up and Down arrows at the same time (once).

4. If an O shows in the display window the circuit through the Interface Board is OK. If a -06-shows in the window, the board is defective and should be replaced.

MESSAGE -07- EMERGENCY STOP

The emergency stop switch contains 2 sets of contacts. One set of contacts completely breaks the 115 control voltage. The other set of contacts supplies a signal to the Intellisys controller that the switch has been pressed. This display is telling you that the switch has been pressed. To clear the emergency stop switch, rotate the switch, clockwise, hit set twice, which resets zero in the display. The compressor will be ready to start again.

If “set” does not clear, change the Intellisys controller.

MESSAGE -08- EMERGENCY STOP BUTTON ENGAGE

The emergency stop switch supplied with the Intellisys controller is a twist to unlock unit. This fault appears when the-07-message appears and the operator has pressed the set switch to clear it without disengaging the stop switch. When still engaged, the Intellisys controller will scan the contacts and realize that it is still depressed and will not allow starting.

To correct this, the emergency stop switch must be disengaged.

MESSAGE -09- MICROPROCESSOR FAILURE

The CPU Printed Circuit Board Assembly contains a circuit called the watchdog. The way the watchdog functions is that on each cycle of the program, it signals the watchdog that it is functioning OK. The watchdog starts a timer. If before the timer times out, the program has not come back and signaled the watchdog, the watchdog shuts the unit down as a microprocessor failure. It may or may not be a true indication of a failure. In the event of an -09- signal, please follow the following steps.

First disconnect power to the unit by opening the disconnect switch.

Re-energize the unit and look at the display. The display should come up all 8's with all the lights lit. As we stated earlier in this training, that means that the microprocessor is OK.

Press set to clear the unit and press start to start the compressor. If on power-up, any of the lights do not come up or any of the 8's do not come up, it indicates that there is a potential microprocessor failure.

To confirm a -09- message disconnect the wires from terminals 9 and 10 on the starter interface board. Connect a 115 volt extension cord and plug it into a nearby wall outlet. Reset the Intellisys as stated earlier. If Intellisys functions okay the problem is in the incoming power. If the Intellisys shuts down with -09- , change the Intellisys.

MESSAGE -10- REMOTE STOP ENGAGE

The above feature tells the operator that the unit has a remote start and stop feature installed. The fault occurs when the remote stop button is open or a remote wire is loose, open or broken.

MESSAGE -11- LOW VOLTAGE

The Intellisys System provides a more accurate method of monitoring input electrical voltage to the controller than any hand held meter. Conditions that allow the incoming electrical power to the controller to drop to 85% of 115 volts or less will shut the compressor down within one electrical cycle. Should this fault occur, check the line voltage for a value.

Conditions that may contribute to low voltage would include undersize wiring, incorrect or undersize step down transformer or undersize step up/step down transformer.

Open the compressor disconnect switch, and lock and tag the panel prior to changing any wiring. One test that can be performed is to remove the 115 volt power from the transformer, at terminal 9 and 10 on the interface board. Tape the wire for safety. Be sure to supply the positive lead to terminal 10 on the interface board. Failure to do this will damage the board. Re-apply power, set 0 in the display and try to restart the compressor. If the Intellisys unit powers up and the compressor can be operated in a normal manner this indicates that the primary and secondary voltages were too low and must be corrected.

Below 80 volts the display will show blinking 8888's and the green LED light will also blink.

MESSAGE -12- INCORRECT COMPRESSOR ROTATION

Generally this fault will only occur during initial start up where the operator has connected the cables wrong so that the compressor is being driven backwards. Check the main incoming and power leads to insure that they are correct.

In earlier versions the controller will try to read a positive 10 psig sump pressure in the first 3 seconds of operation. If it does not see this pressure it will assume the unit is rotating backwards and can not develop pressure.

This condition can also exist when the flexible tubing attached to the line sump solenoid is not inserted into the fittings completely and a small air leak exists.

Foreign material inside the solenoid valve orifices can also prevent a pressure build up and the fault will occur.

Refer to the Intellisys Field Service Sheet No. 9.

Certain SSR 10-40 units may not develop adequate sump pressure of 10 psi (or more) within 3 seconds of a manual start up. When this happens the unit shuts down and indicates -12- (reverse rotation) on the display even though rotation is correct.

To help alleviate this potential situation, we are revising the logic within the Intellisys to look for a positive pressure within 3 seconds of start up. This will eliminate the nuisance shutdown on -12- in these instances.

To secure this new revision level Intellisys Controller, order Kit No. 39679097. This is for a factory re-manufactured controller and should be used when making warranty repairs. We also have the capability of programming into the controller appropriate load and unload hours to match units operating in the field. Specify this requirement with your order if it is an important consideration.

Keep in mind that the parts manual also lists a new controller, P/N 39786470 order Kit No. 39668793. It will also have the new software feature described above, but with zero hours running time. When making field repairs, it is necessary to order gasket P/N 39786413. (Included in 39679097 and 39668793 Kits)

An order must be placed on Davidson for these parts, and the controller will be shipped out of Davidson.

Units shipped after January 2, 1990 will have the reverse rotation revision described above. Units manufactured prior to this date will not have the feature described.

LOSS OF ELECTRICAL POWER 8888's

If this happens all 8888's will appear in the display. This occurs when the electrical power is interrupted for 250 milliseconds, which is equivalent to 15 cycles of electrical power. A conventional volt meter can not respond quickly enough to detect this. However, the Intellisys can.

"Intellisys made after August 31, 1990 (Rev 9.0) go to 'ø' ready to start."

If you experience intermittent shut downs on the Intellisys equipped units, indicated by the appearance of all 8888's or-01-in the display window, check the female connector on the gray ribbon.

We have learned that this connector may not be making a good contact with the male pins on the interface boards.

To correct the problem, remove the female connector from the interface board, look into the connector holes, if any of the contactors are depressed or appear not to be making a good contact follow this procedure to effect the repair.

1. Remove the gray ribbon cable connector from the interface board.

2. Identify the connector that is not making good contact with the interface connector pin.

3. Remove the connector socket by pressing on the latch while pulling on the wire.

4. The socket will slide out of the plastic housing.

5. Make sure the latch is bent back to the original position.

6. Bend an arc back into the socket connector to insure good contact with the mating pin.

7. Slide the socket connector back into the plastic housing. You can hear the latch click when it is all the way in.

8. Make sure that the beveled latch on the connector latches with the mating half on the interface board.

Another symptom causing all 8888's is that even though power is present at the primary and secondary contacts of the transformer, intermittent contact can cause shutdown within the control circuit.

The electrical signal in the pressure transducer can ground itself fully or intermittently when the compressor is operating.

The spade connection at the end of the wire may contact the inner metal wire sheath of the cable connector.

There are four wires inside the cable. Therefore several combinations of ground contact is possible.

To check for a grounded cable condition, remove the ground wire on Terminal 27. Before performing this function, disconnect all electrical power, lock and tag. Run the compressor and if it continues to run, then this is an indication that the transducer cable is defective and should be repaired or replaced. Remember, to reconnect the ground connection on Terminal 27 after the test and repair is complete.

INTELLISYS HOUR TIMER

During the first hour of compressor operation, the Intellisys is counting in minutes only. If a decimal is showing the unit is timing in minutes.

There are three 20 minute increments in the first hour.

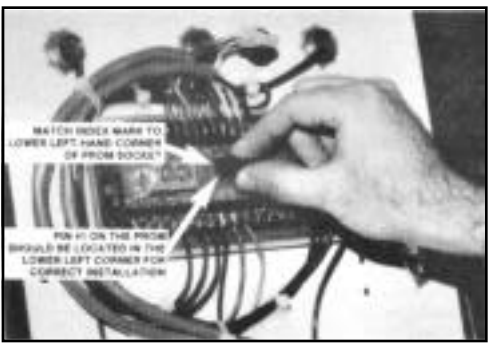
20-40-60

If the power is interrupted in any of the 20 minute increments, the time goes back to the last elapsed time 20 minute period.

Example: The unit has 21 minutes and the power is removed from the unit. The timer will go back to the 20 minutes.

Notice the Intellisys panel showing 59 minutes of accumulated time. The display will change over to 1 hour and continue recording in 1 hour increments.

OPTION INSTALLATION AUTO STOP/START



For those plants which have a widely varying plant air demand, larger air storage capacity and/or want automatically available standby air capacity, Automatic Stop/Start Control Option is available.

During periods of low demand, if the line pressure rises to the off line set point of Intellisys controller, a timer is energized and begins to time out. The automatic stop time is adjustable in a 10-30 minute range. The timer will continue to

operate as long as the plant line-pressure remains above the on line set point of the Intellisys controller.

If the timer continues to operate for as long as its adjusted time setting, a relay contact in the Intellisys opens to de-energize the compressor motor starter coil. At the same time, an amber light on the Intellisys panel is lit to indicate the compressor has shut down automatically and will restart automatically.

The automatic restart will take place when the line pressure drops to the on line set point of the Intellisys controller.

INSTALLATION INSTRUCTIONS:

Remove the option prom (39666672) from its package, **using care not to damage the pins on the prom.**

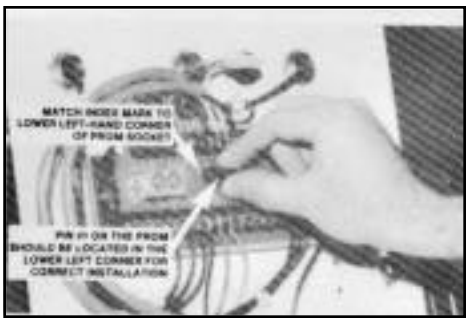
Insert the prom into the optional program prom socket located in the center of the interface board as shown in Figure 1. (Pin #1 on the prom should be located in the lower left corner for correct installation).

Set the automatic stop time on the Intellisys panel. Press the set button to initialize the prom function.

Start the compressor and adjust the isolation valve to allow the unit to slowly reach the off line pressure and unload. The compressor should run for the pre-set time and then shut down.

The compressor should restart automatically when system air pressure drops below the on line air pressure setting.

OPTION INSTALLATION REMOTE STOP/START



The remote stop/start option allows the operator to control the compressor from a remote mounted stop/start station. Two different terminal points are provided on the interface board, one a connection for a normally closed stop switch (terminals 3 and 4) and one for a normally open, momentary contact start switch (terminals 1 and 2).

For safety, a selection is available in the Intellisys setpoints to disable the remote stop and start switches. This allows the compressor to be fully controlled by the Intellisys controller and not from the remote stop/start station.

If the remote start switch is momentarily closed, the Intellisys controller starts the compressor. The remote stop switch is normally closed. If the remote stop switch opens, the compressor will do an unloaded stop. The compressor cannot restart until the remote stop switch has been reset to a closed position.

The compressor must be loaded initially at the Intellisys in order for it to be loaded remotely.

Also on a power outage the compressor panel must be reset locally in order for the remote stop/start to control the compressor.

INSTALLATION INSTRUCTIONS:

Remove the option prom* from its package, **using care not to damage the pins on the prom.**

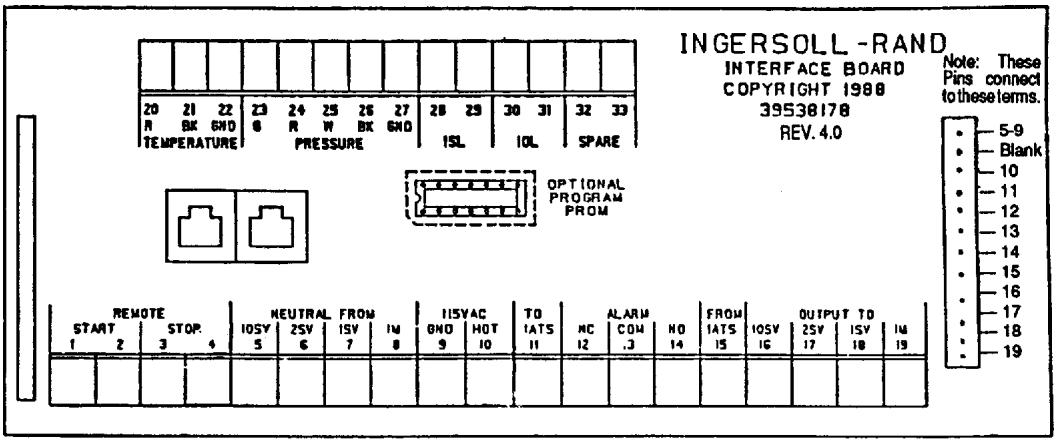
Insert the prom into the optional program prom socket located in the center of the interface board as shown in Figure 1. (Pin #1 on the prom should be located in the lower left corner for correct installation).

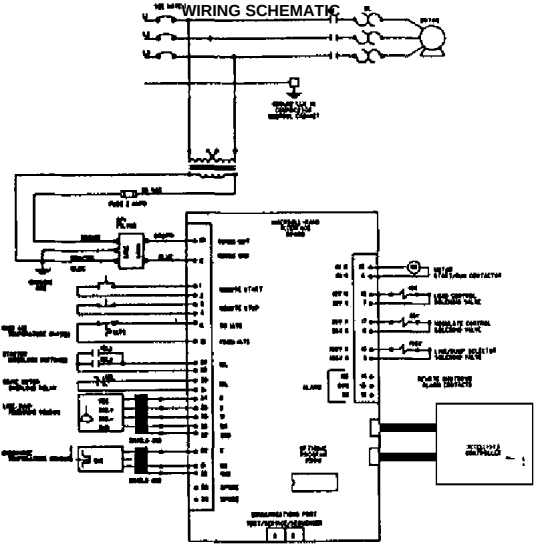
Connect the remote stop and start switch wiring to terminals 1-4 on the interface board. Terminals 1 and 2 are labeled “start”, 3 and 4 are labeled “stop”.

Select remote stop/start function on the Intellisys controller. “0000” in the display, indicates remote stop/start is disabled “1111” in the display indicates remote stop/start is activated.

Remember to push the set button once to initialize the prom function.

*ITEMS NOT SOLD SEPARATELY, FOR REPLACEMENT PARTS ORDER KIT NO. 39666680.


INGERSOLL-RAND
INTERFACE BOARD
COPYRIGHT 1988
39538178
REV. 4.0
Note: These Pins connect to these terms.
20 R
21 BK
22 GND
TEMPERATURE
23 G
24 R
25 W
26 BK
27 GND
PRESSURE
28 29
ISL
30 31
IOL
32 33
SPARE
OPTIONAL PROGRAM PROM
5-9
Blank
10
11
12
13
14
15
16
17
18
19
REMOTE
START 1 2
STOP 3 4
NEUTRAL FROM
IOSV 5
2SV 6
ISV 7
IM 8
115VAC
GND 9
HOT 10
TO TATS 11
ALARM
NC 12
COM 13
NO 14
FROM TATS 15
OUTPUT TO
IOSV 16
2SV 17
ISV 18
IM 19



Refer to Page 30 for Schematic

INTELLYSIS CONTROLLER INACTIVATED

The photo on page 21 illustrates a condition that can render the Intellysis controller inoperative; display error codes 01 through 06 or 8's appearing on the display.

SYMPTOMS:

1. The Intellysis controller does not power up, even though power is present at the primary and secondary contacts of the transformer and interface board or intermittent contact will give various error codes.

CAUSE:

The electrical signal in the pressure transducer can ground itself fully or intermittently when the 4 prong adopter is installed in the cable housing.

The spade connection at the end of the wire may contact the inner metal wire sheath of the cable connector. Note photo A on page 21.

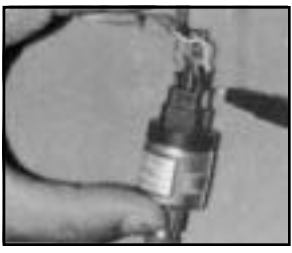
There are four wires inside the cable (red, green, black, white). Therefore several combinations of ground contact is possible. Note photo B on page 21.

TO CORRECT THE PROBLEM:

1. Loosen nut A. Pull slightly on cable B. See photo C below.

   If you have a unit that is showing symptons as described, contact the customer service department in Davidson. It may be necessary to repair or replace the exisiting cable.

   This problem has been corrected on new units with the addition of a heat shrink shield at the end of the transducer cable to prevent contact.



A

B

C

IMPORTANT NOTICE

AUTO CONTROL SELECTOR

10 - 40 Horsepower

ACS and how it is activated on the Intellisys controller.

The original Intellisys has ACS (Automatic Control Selector), however, **it was not printed on the face/membrane of the controller. The most recent controller has modulate/ACS printed on the face.**

The operation of ACS is as follows: Original Controller. While running in the **ON/ OFF LINE MODE**, and the machine cycles three times in three minutes, the controller will automatically shift to modulation. While running in the modulate mode and the machine runs unloaded for three minutes the controller will shift back to ON/OFF LINE. The green LED lights, will follow these shifts.

The most recent controller activates the ACS mode differently. If this controller is manually placed in the ON/OFF Line Mode, it will stay in this mode and not shift automatically to modulate.

The controller must be placed in the modulate / ACS Mode position in order for the unit to modulate and shift into ON/OFF line if demand dictates. Unlike the original controller, the green LED lights will not shift position.

INTELLISYS CODE-12-SHUTDOWNS
SSR 10-40 Horsepower

Code 12 is activated by the pressure transducer which must sense 10 psig sump pressure within three seconds after depressing the start button.

If 10 psig sump pressure is not developed within the three second interval, the controller thinks the compressor is running in reverse rotation and will shut the unit down and display CODE 12.

If any positive pressure is displayed on the controller, the rotation is correct.

Any leakage in the tubing, fittings or line/sump solenoid valve could prevent the true sump pressure from reaching the transducer within the 3 second time period and should be checked prior to changing any components.

If "0" psig sump pressure is displayed **during startup**, check terminals 5 and 16 on the Interface Board to confirm that 115 volts is being supplied to the (10SV) line/sump solenoid. A defective (10SV) would not shift to sump during startup, which would also show "0" psig pressure.

TRANSDUCER CALIBRATION

SSR (10-40 Horsepower With Intellisys Controller)

The Pressure Transducer should be calibrated at Start-Up, and anytime a component associated with the transducer or Intellisys system is replaced. Calibration of the transducer is accomplished as follows:

1. All pressure must be removed from the pressure transducer.

2. The Controller must be in the ready to start mode. ("0" in the Display Window).

3. Press the Step Up and Down Arrows at the same time, (ONCE). When the arrows are pressed, the Green LED light on the Display Select will shift to Sump and then return to Discharge Air Pressure.

4. This procedure can be done anytime you suspect an error in the pressure Transducer circuit.

NOTE: IT IS **VERY IMPORTANT** TO HAVE THE AIR PRESSURE REMOVED FROM THE TRANSDUCER PRIOR TO CALIBRATION.

INTELLISYS INTERFACE BOARD

(SSR 10-40 Horsepower)

Some of the Rev. 3.0 Interface Boards give symptoms of intermittent contact and open circuits. This can result in various error codes displayed on the Intellisys. We have learned that the Rev. 3.0 Board has had broken and cold solder joints. The new Rev. 4.0 should correct this problem.

The Rev. 3.0 and 4.0 have the same I-R part number 39538178. The Rev. 3.0 should no longer be in stock in Davidson Parts Center.

Do not replace the Rev. 3.0 Interface Board unless you have experienced problems with it.

Contact Customer Service Department in Davidson for techniques in troubleshooting defective Interface Boards.

INTERFACE BOARD TEST PROCEDURE

Procedure for testing the 115V circuits in the Interface Board

We have experienced problems with different components not operating electrically. These components could be the 1M contactor, 1SV Load Solenoid, 2SV Modulate Solenoid, and 10SV Line/Sump Solenoid. The problem could be in an open circuit, or cold solder joint in the Interface Board. The following test should help in troubleshooting these problems:

1. Remove the power from the machine.

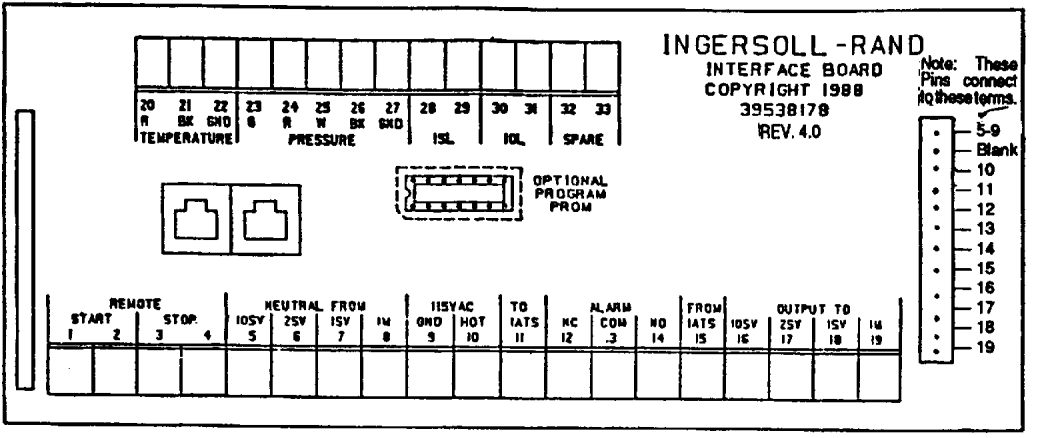
2. Disconnect the two ribbon cables from the Interface Board.

3. As an example, assume you are having a problem with the 1M Contactor not pulling in. Take an extension cord and connect the two leads to terminals 8 and 19. Plug in the cord. The contactor should pull in. If it does, unplug your cord and reconnect the leads in the pins on the white connector that connect to terminals 8 and 19, (see diagram 1).

4. Plug in your extension cord if the 1M contactor does not pull in. The Interface Board is open on this particular circuit and should be replaced.

5. This test can be done on all of the 115V components that connect to the Interface Board. Use diagram 1 to determine connection points.

DIAGRAM 1


INGERSOLL-RAND
INTERFACE BOARD
COPYRIGHT 1988
39538178
REV. 4.0
20 21 22
R BK GND
TEMPERATURE
23 24 25 26 27
G R W BK GND
PRESSURE
28 29
ISL
30 31
IOL
32 33
SPARE
OPTIONAL PROGRAM PROM
Note: These Pins connect to these terms.
5-9
Blank
10
11
12
13
14
15
16
17
18
19
REMOTE
START 1 2
STOP 3 4
NEUTRAL FROM
IOSV 5
2SV 6
ISV 7
IM 8
115VAC
GND 9
HOT 10
TO IATS 11
ALARM
NC 12
COM 13
NO 14
FROM IATS 15
OUTPUT TO
IOSV 16
2SV 17
ISV 18
IM 19

INTERFACE BOARD TEST FOR PRESSURE SENSOR FAILURE

Shut downs may occur that display an error code of -06- and -12-. After checking the pressure transducer calibration, and its cable for shorts, the following procedure will tell you if the circuit through the interface board is defective.

1. Disconnect the five leads from the pressure transducer cable at the interface board (terminals 23 through 27).

2. Install a jumper between terminals 23 and 25.

3. With the controller in the ready to start mode (0 in the display window). Press the Step Up and Down arrows at the same time (once).

4. If an 0 shows in the display window the circuit through the Interface Board is OK. If a -06- shows in the window, the board is defective and should be replaced.

NUISANCE SHUTDOWNS ON 12

Certain SSR 10-40 units may not develop adequate sump pressure of 10 psi (or more) within 3 seconds of a manual start up. When this happens the unit shuts down and indicates -12- (reverse rotation) on the display even though rotation is correct.

To help alleviate this potential situation, we are revising the logic within the Intellisys to look for a positive pressure within 3 seconds of start up. This will eliminate the nuisance shutdown on -12- in these instances.

To secure this new revision level Intellisys Controller, order kit 39679097. This is for a factory re-manufactured controller and should be used when making warranty repairs. We also have the capability of programming into the controller appropriate load and unload hours to match units operating in the field. Specify this requirement with your order if it is an important consideration.

Keep in mind that the parts manual also lists a new controller, order kit 39668793. It will also have the new software feature described above, but with zero hours running time. When making field repairs, it is necessary to order gasket P/N 39786413. (Included in kits)

An order must be placed on Davidson for these parts, and the controller will be shipped out of Davidson.

Units shipped after January 2, 1990 will have the reverse rotation revision described above. Units manufactured prior to this date will not have the feature described.

SSR 10 - 40 LOW VOLTAGE CONDITIONS

The Intellisys System provides a more accurate method of monitoring input electrical voltage to the controller than any hand held voltmeter. Conditions that allow the incoming electrical power to the controller to drop to 97 volts or less will shut the compressor unit down within 1 electrical cycle.

Conditions that may contribute to low voltage would be undersize wiring, incorrect or undersize step down transformer or undersize buck boost transformers.

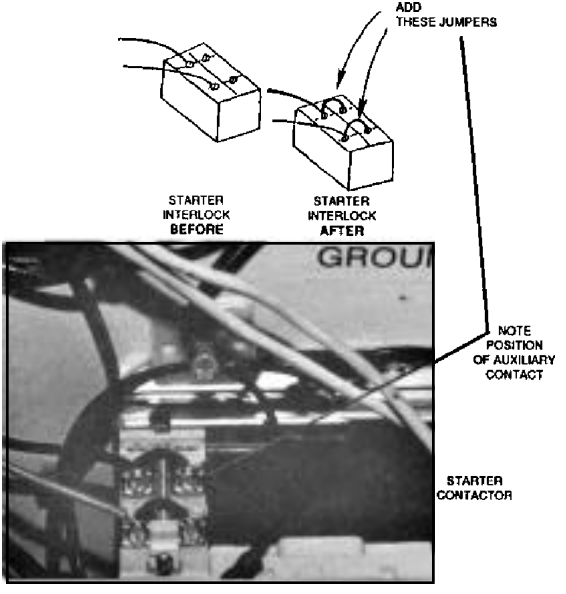
SSR 10-40 HORSEPOWER
NUISANCE -01- SHUTDOWN PROBLEM

Presently, the starter auxiliary contact is used by the controller to determine starter operation.

It has been determined that the auxiliary contact may be one of the causes of Nuisance -01- Shutdowns.

Due to vibration and/or corrosion, these contacts can momentarily open causing the -01- shutdown.

The solution to this problem is to use both sets of normally open contacts. This can be accomplished by adding two jumpers to the auxiliary contact. (See Picture)



LOOSE CABLE IN TEMPERATURE SENSOR

Please be advised that we have determined a potential field failure may exist in the temperature sensor.

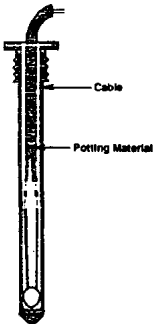
Units affected are:

SSR 10 - 40 Horsepower
SSR 50 - 200 Horsepower

Visual inspection of the thermistor (sensor) cable will reveal that the shielded cable is loose within the body of the thermistor caused by the potting material (epoxy) that does not bond to the cable.

Moving the cable may also reveal excessive play between the cable and the potting material at the end of the thermistor body.

This allows the wires to break or short out within the thermistor body.



On units built after July 13, 1990, the problem has been corrected. Some temperature sensors supplied before this date may be suspect.

Replacement cables are available from Davidson.

Following normal procedures for returned materials, please return the defective cables to Davidson Reliability Engineering, to the attention of Jeff Meadows.

Order replacement cables as required using the same part number supplied in the manuals.

Part number 10-40U Intellisys temperature sensor 39538079.
50-200 Intellisys temperature sensor 39541677.

BEFORE STARTING PROCEDURE CHANGE

Since September 1, 1990 on all SSR 10-40 horsepower units, the BEFORE STARTING procedure changed. These units are equipped with the latest E Prom Revision 9.0.

The revised sequence is as follows:

Close the main disconnect.

The display window will show 0. Power and unload indicator lights will be on.

Push “Unloaded Stop” for lamp check. All lights will be on and “8888” will be displayed in the window until the “Unloaded Stop” button is released.

After the lamp test has been completed, the unit will display 0. Ready to Start.

Units equipped with the Revision 9.0 E Prom will not show 8888 in the display window when the main power disconnect is closed.

Should your customer order a replacement Intellisys controller, he will receive a similar instruction sheet and a “Notice” Instruction decal, part number 39808316 that is to be placed over the existing decal already on the unit. This existing part number is 39788518.

Over a period of time, it may be possible that an 0 Ready to Start controller will require a replacement and the unit will not require a decal replacement.

10-40 HORSEPOWER
INTELLISYS EQUIPPED COMPRESSORS

EMERGENCY STOP BUTTON

It has been learned that the emergency stop button contacts are susceptible to low vibration or shock and can cause nuisance shutdowns on some units.

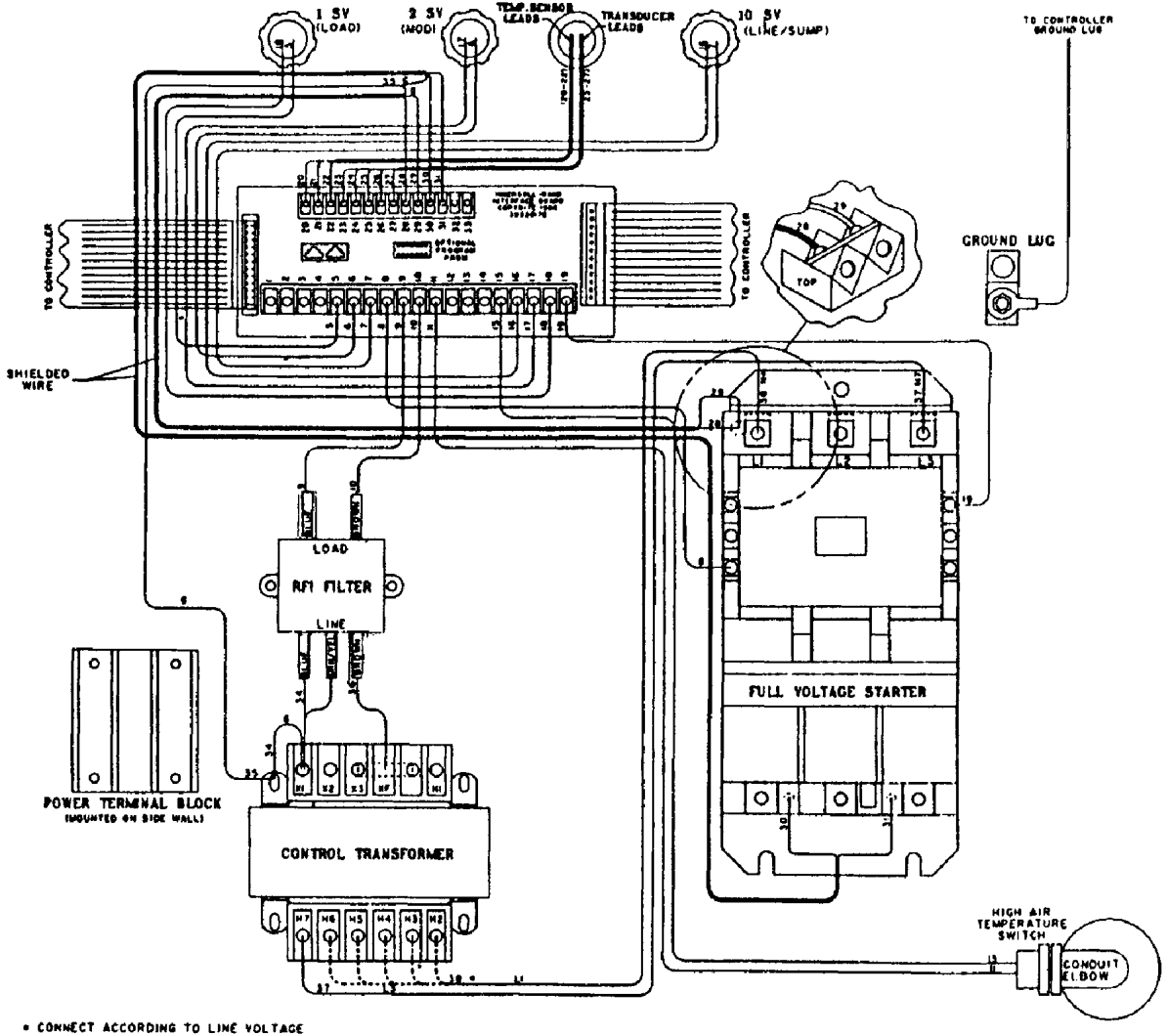
Two contact blocks are mounted on the back of the button. One set of contacts carries 110 volts AC. If this contact should vibrate open, the compressor will shutdown on all 8888’s. The other set of contacts carries 5 volts DC and if opened will shut the units down on 01 starter fault.

To correct this problem a new improved emergency stop button has been developed and is available from I-R stock, P/N 39549159. The button can be replaced on any controller which has a removable back cover. These controllers were available on units shipped after November 30, 1989.

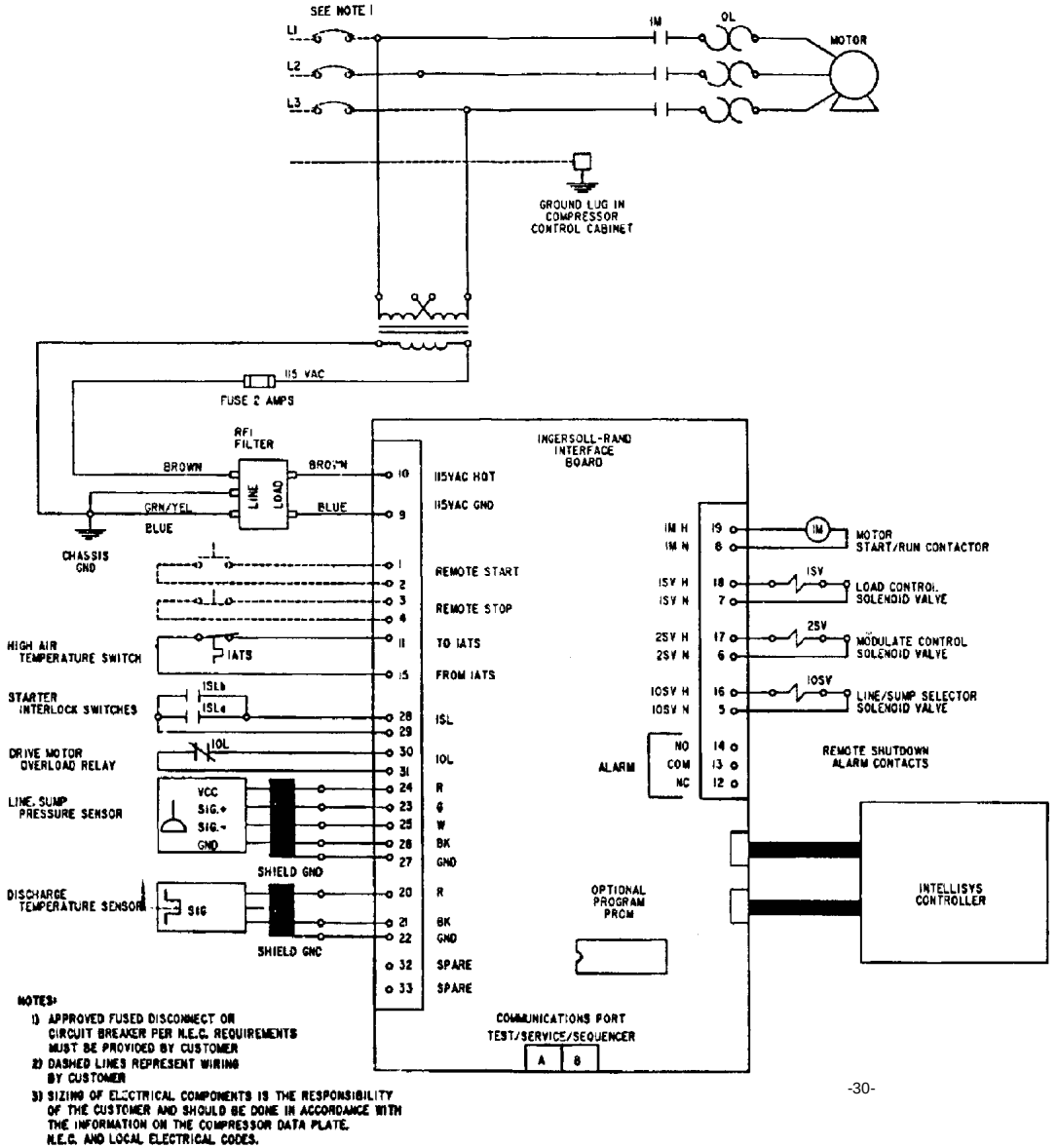
Any unit manufactured prior to November 30, 1989 that may require a new E-stop button will require a new or remanufactured controller.

The new E-stop button will be provided on both of the controllers.

Remanufactured Controller P/N 39801204
New Controller P/N 39786470



* CONNECT ACCORDING TO LINE VOLTAGE



NOTES:

1) APPROVED FUSED DISCONNECT OR CIRCUIT BREAKER PER N.E.C. REQUIREMENTS MUST BE PROVIDED BY CUSTOMER
2) DASHED LINES REPRESENT WIRING BY CUSTOMER
3) SIZING OF ELECTRICAL COMPONENTS IS THE RESPONSIBILITY OF THE CUSTOMER AND SHOULD BE DONE IN ACCORDANCE WITH THE INFORMATION ON THE COMPRESSOR DATA PLATE, N.E.C. AND LOCAL ELECTRICAL CODES.

FIELD INSTALLATION OF SEQUENCER INTERFACE I SSR® 10-40 HORSEPOWER UNITS WITH INTELLISYS™ (FOR CONNECTION OF COMPRESSORS WITH INTELLISYS™ TO STANDARD INGERSOLL-RAND SEQUENCER)

THE PURPOSE OF THESE INSTRUCTIONS IS TO IDENTIFY THE CORRECT PARTS REQUIRED WHEN INSTALLING A STANDARD INGERSOLL-RAND SEQUENCER AND WIRING IT TO AN INTELLISYS COMPRESSOR. A DEVICE CALLED A **SEQUENCER INTERFACE I** IS USED ALONG WITH OTHER COMPONENTS BETWEEN THE COMPRESSOR AND SEQUENCER TO MAKE THE COMPRESSOR WORK PROPERLY.

SAFETY

Lock and tag the main power disconnect in the open position. Isolate the compressor from the compressed air system by closing isolation valve and vent pressure from the unit.

APDD 403A -91

INSTALLATION INSTRUCTIONS:

1. Remove the Intellisys Controller from the starter box or starter box mount. Refer to the Compressor Operators Manual for procedure.

2. If the controller bottom cover is attached using tamper-proof screws a new controller is required (reference note 1). Refer to controller replacement instructions in the compressor operators manual.

3. If the controller bottom cover is attached with phillips head screws the EPROM is replaceable (reference note 2). Refer to EPROM replacement instructions below.

4. Locate the area inside the starter box where the **Sequencer Interface I** (P/N39813274) is to be mounted (see figure 1). Mark the mounting holes. Drill #25 diameter pilot holes for the #10-32 self-tapping screws (enclosed units), or 1/4" dia. clearance holes for the #10-24 screws (open units). Mount **Sequencer Interface I** to the starter box using screws provided in the kit.

5. Connect the modular cable (P/N39547880) between the communication port jack on the **Squencer Interface I** and the communication port jack on the compressor starter interface board (see figure 2). Route cable and secure away from primary voltage wiring/components.

6. Connect 115 V. A. C. wiring between the **Sequencer Interface I** and the starter interface board as shown in the wiring diagram (figure 2).

7. Connect wiring from terminals #1-#5 on the Sequencer Interface to corresponding terminals #TB-1 through #TB-5 on the sequencer block. It is recommended that conduit be used to connect the sequencer to the compressor starter box/**Sequencer Interface I** to assure continuous grounding between components.

8. The 115 V.A.C. wiring and the 5 wires connecting the **Sequencer Interface I** to the sequencer should be separated from 5 V.D.C and other low voltage wiring, as much as possible.

9. Install the automatic start/stop prom in the starter interface board.

INTELLISYS CONTROLLER EPROM REPLACEMENT (SEE NOTE 2)

1. Remove the Intellisys Controller from the starter box or starter box mount. Refer to the Compressor Operators Manual for procedure.

2. Remove the aluminum bottom cover.

3. Remove the existing programmed EPROM (located on printed circuit board in socket labeled U2).

4. Remove the new programmed EPROM (P/N39179585) from its packaging, **using care not to damage the pins on the** EPROM.

5. Insert the EPROM into the socket labeled U2. Pin #1 on EPROM should be located in the upper left corner for correct installation.

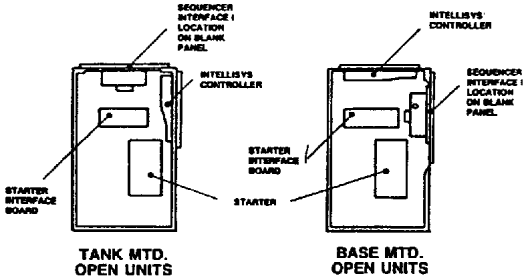
6. Replace the bottom cover.

7. Re-install the Intellisys Controller in the starter box or starter box mount.

OPERATION

1. Refer to Sequence Controller Instructions (APDD 405A-91) for sequencer operation.

FIGURE 1
INTERFACE MOUNTING LOCATION



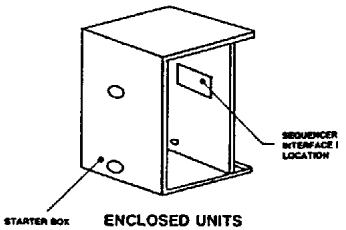
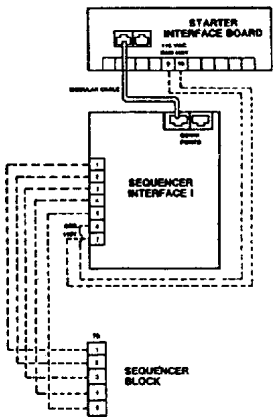


FIGURE 2 - WIRING DIAGRAM



SEQUENCE CONTROLLER INSTRUCTIONS

FOR MODELS:
SSR 10-450 HORSEPOWER

TWO, THREE, FOUR OR FIVE UNIT COMPRESSOR INSTALLATIONS

When two or more compressors, each designed for automatic start-up control, operate together one should always be the "lead" unit. If this "lead" compressor can maintain the required plant air pressure, all other compressors should be set to shut down. This can be done by setting all compressor off line values at different settings. The obvious result of doing this is that the compressors do not log equal operating hours-the compressor with the pressure switch set at the highest pressure level will log far more hours than the other compressors.

To make any compressor a lead machine and, on a rotative basis, equalize the operating hours for each of the compressors, a sequence controller is used. By interconnecting a rotary drum switch and a group of auxiliary pressure switches(one for each compressor), it is possible to revise the order of automatic operation of the compressors without making individual adjustments to the compressors. Each pressure switch in the sequence controller senses line pressure, (introduced via a manifolded tubing assembly), and controls the compressor to which it has been connected electrically.

A three compressor installation in a plant which has a minimum pressure requirement of 90 psig could have its sequence controller pressure switches set as follows-using varying pressure differential settings.

After time delay, each compressor will shut down at or above its "switch opening pressure" and will automatically re-start at the "reset pressure". From the setting shown, step rotation of the sequence selector switch connects the pressure switch 1 to the control leads of compressor No. 2, making it the lead machine- and pressure switch II to compressor No. 3 making it the No. 1 lag compressor. Compressor No. 1 which was the lead machine would become the No. 2 lag unit.

One more step of switch rotation continues the progression, so that each compressor, in turn, becomes the lead unit.

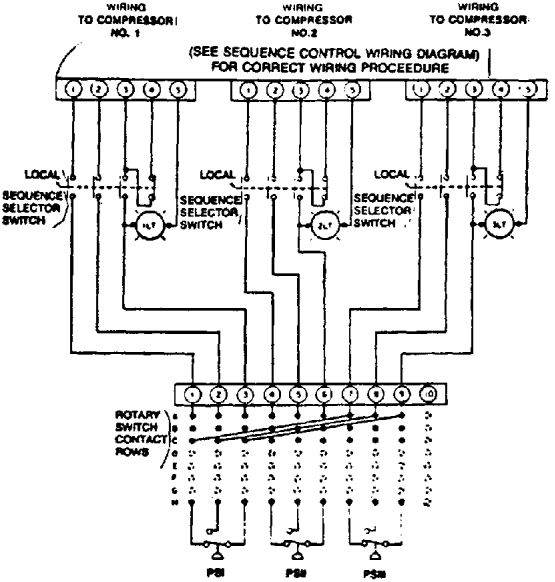
A pointer, on the sequence panel face, indicates which unit is in the lead position.

Local-sequence selector switches, one for each compressor are mounted on the sequence controller. These switches enable an operator to put any compressor in sequence control or local control.

An indicating light, mounted above each selector switch, is lit when its corresponding compressor is placed in sequence control.

When a compressor is in local control, it will operate in the automatic start-stop mode but under the control of its own pressure switch (1PS).

COMPRESSOR	PRESSURE	POSITION	SWITCH OPENING PRESSURE (PSIG)	RESET PRESSURE (PSIG)
1	I	LEAD	100	94
2	II	1 LAG	98	92
3	III	2 LAG	95	90



NOTE: REFER TO OPERATORS MANUAL OR APPLICABLE WIRING SCHEMATIC FOR COMPLETE COMPRESSOR ELECTRICAL SYSTEM

NOTE: THE JUMPER WIRE BETWEEN ITB-7 AND ITB-10 (ON COMPRESSOR CONTROL PANEL) MUST BE REMOVED WHEN SEQUENCE CONTROLLER IS INSTALLED

NOTE: WHEN TWO UNIT CONTROLLER IS FURNISHED, INTER-CONNECTING WIRING WILL BE:

A1-B4	A4-B1
A2-B5	A5-B2
A3-B6	A6-B3

AND PS III IS NOT SUPPLIED

WHEN FOUR OR FIVE UNIT CONTROLLER IS FURNISHED, INTER-CONNECTING WIRING WILL FOLLOW PATTERN SIMULAR TO THAT OF THREE UNIT CONTROLLER ADDITIONAL PRESSURE SWITCHES AND ROTARY SWITCH CONTACTS ARE SUPPLIED.

THREE UNIT CONTROLLER SHOWN

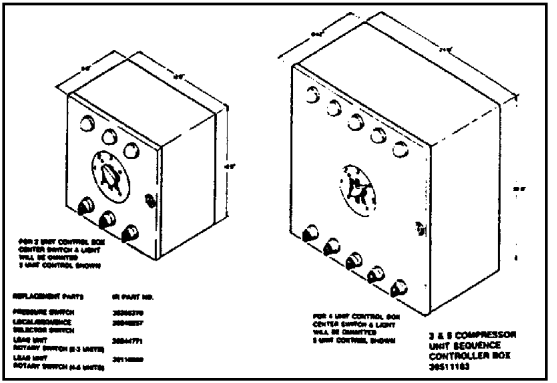
THREE SETS OF CORRESPONDING CONTACTS IN ROWS A, B, AND C HAVE BEEN INTERCONNECTED IN THE ROTARY SWITCH. THESE CONNECTIONS ARE:

A1-C4-B7	A4-B1-C7	*A7-B4-C1
A2-C5-B8	A5-B2-C8	*A8-B5-C2
A3-C6-B9	A6-B3-C9	*A9-B6-C3

*SHOWN ON WIRING SCHEMATIC

THE POINTER ON THE ROTARY SWITCH HANDLE SHOWS WHICH ROW OF CONTACTS IS CONNECTED TO THE PRESSURE SWITCH CONTACTS OF ROW H AS SHOWN. IF THE POINTER IS ON "C", PRESSURE SWITCH PSI IS CONNECTED TO COMPRESSOR NO. 3

39510730



For proper operation when using the Sequencer Interface I with an Intellisys Unit, the following hardware is required.

PART NUMBER	QTY	DESCRIPTION
39786470 (1)	1	Intellisys Controller (Rev. 8.9 or current software)
39179585 (2)	1	EPROM, Programmed (Software Rev. 8.9 Onward)
39666672	1	Automatic Start/Stop Option Field Kit (Units Not Already Equipped With Auto Start/Stop)

NOTES:

(1) Units having Intellisys Controllers with software Revisions 8.6 or 8.7 EPROMS are non-replaceable and controller bottom covers are attached with tamper-proof screws.

(2) Units having Intellisys Controller with software Revision 8.8 EPROM is replaceable and controller bottom cover is attached with phillips head screws.

IF CONTROLLER HAS	THEN
A. Software Revisions 8.6 Or 8.7 (EPROM Soldered In & Tamper-Proof Screws In Bottom Cover)	Install New Controller 39786470
B. Software Revision 8.8 (EPROM Plug-In & Phillips Head Screws In Bottom Cover)	Install New EPROM 39179585 In Existing Controller
C. Software Revision 8.9 Onward (EPROM Plug-In & Phillips Head Screws In Bottom Cover)	No Changes Required

IF COMPRESSOR	THEN
A. Has Auto Start/Stop Prom	No Changes Required
B. Does Not Have Auto Start/ Stop Prom	Install Auto Start/Stop Field Kit 39666672

TOOLS REQUIRED:
ONLY WHAT WOULD BE FOUND IN ANY REASONABLY EQUIPPED SERVICEMAN'S TOOL BOX.

PARTS LIST (KIT P/N 39674387)

ITEM	PART NUMBER	QTY	DESCRIPTION
1	39813274	1	INTERFACE I, SEQUENCER
2	39547880	1	CABLE, MODULAR, 44" LG.
3	39177357	4	SCREW, #10-32 SELF TAPPING
4	39178611	4	SCREW, #10-24
5	39128533	4	NUT, #10-24
6	APDD 403A-91	1	INSTRUCTIONS, INTERFACE I INSTALLATION
7	APDD 405A-91	1	INSTRUCTIONS, SEQUENCE CONTROLLER, SSR 10-450 HP
8	39181284	1	FUSE, 1A (SPARE)

SUBJECT: TESTING SOFTWARE WITH A SEQUENCER

Connect a sequencer to a compressor. Follow the following steps for testing software with a sequencer.

1) Start the compressor.
2) Put the compressor into the ON/OFF LINE mode.
3) Set the sequencer to load and unload at pressures lower than the current settings of the controller.
4) Start the sequencer. The unit should begin to load and unload at the sequencer's pressure settings.
5) Stop the sequencer. The unit should load and unload at the controller's pressure settings.
6) Start the sequencer. The unit should begin to load and unload at the sequencer's pressure settings.
7) Disconnect the sequencer. The unit should load and unload at the controller's pressure settings.
8) Connect the sequencer. The unit should load and unload at the sequencer's pressure settings.

If the unit has AUTO START/STOP, do steps 9 and 10.

9) Close discharge valve so the unit will unload. Wait for the amount of time that the auto restart timer is set for. When this time has expired, the unit should shut off.
10) Open the discharge valve. The line pressure should drop and the unit should restart. The unit should load and unload at the sequencer's pressure settings.
11) Stop the sequencer and the compressor.

TEMPERATURE/RESISTANCE CHART

DEGREE F. TEMP.	RES.	DEGREE F. TEMP.	RES.	DEGREE F. TEMP.	RES.
0	89768	52	19171	104	5241
1	86914	53	18658	105	5123
2	84161	54	18161	106	5007
3	81503	55	17679	107	4894
4	78938	56	17211	108	4784
5	76463	57	16757	109	4677
6	74072	58	16317	110	4573
7	71765	59	15889	111	4472
8	69536	60	15475	112	4372
9	67384	61	15072	113	4276
10	65306	62	14681	114	4182
11	63298	63	14301	115	4090
12	61359	64	13933	116	4000
13	59485	65	13575	117	3913
14	57674	66	13227	118	3828
15	55924	67	12890	119	3745
16	54233	68	12562	120	3663
17	52598	69	12244	121	3584
18	51017	70	11934	122	3507
19	49490	71	11634	123	3432
20	48012	72	11342	124	3359
21	46584	73	11058	125	3287
22	45202	74	10782	126	3218
23	43865	75	10514	127	3150
24	42573	76	10254	128	3083
25	41322	77	10000	129	3019
26	40112	78	9754	130	2955
27	38941	79	9515	131	2894
28	37808	80	9282	132	2833
29	36712	81	9055	133	2775
30	35650	82	8835	134	2717
31	34623	83	8621	135	2661
32	33631	84	8413	136	2607
33	32668	85	8210	137	2553
34	31736	86	8013	138	2501
35	30834	87	7821	139	2450
36	29960	88	7635	140	2400
37	29114	89	7453	141	2352
38	28295	90	7277	142	2304
39	27501	91	7105	143	2258
40	26733	92	6937	144	2213
41	25988	93	6774	145	2169
42	25267	94	6616	146	2125
43	24568	95	6461	147	2083
44	23891	96	6311	148	2042
45	23235	97	6165	149	2001
46	22599	98	6022	150	1962
47	21983	99	5883	151	1924
48	21385	100	5748	152	1888
49	20806	101	5616	153	1849
50	20244	102	5488	154	1813
51	19699	103	5363	155	1778

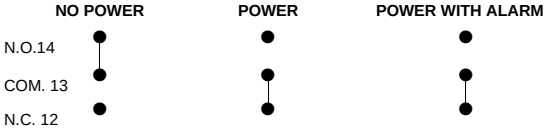
DEGREE F. TEMP.	RES.	DEGREE F. TEMP.	RES.	DEGREE F. TEMP.	RES.
156	1744	184	1033	212	636.9
157	1710	185	1014	213	626.5
158	1677	186	996.4	214	616.2
159	1645	187	978.8	215	606.1
160	1614	188	961.5	216	596.3
161	1583	189	944.6	217	586.6
162	1553	190	928.1	218	577.1
163	1523	191	911.9	219	567.8
164	1495	192	896.0	220	558.6
165	1466	193	880.5	221	549.7
166	1439	194	865.2	222	540.9
167	1412	195	850.3	223	532.2
168	1386	196	835.6	224	523.8
169	1360	197	821.3	225	515.4
170	1335	198	807.2	226	507.3
171	1310	199	793.4	227	499.3
172	1286	200	779.9	228	491.4
173	1262	201	766.7	229	483.7
174	1239	202	753.7	230	476.1
175	1216	203	741.0	231	468.7
176	1194	204	728.5	232	461.4
177	1172	205	716.3	233	454.2
178	1151	206	704.3	234	447.2
179	1130	207	692.5	235	440.3
180	1110	208	681.0	236	433.5
181	1090	209	669.7	237	426.9
182	1071	210	658.6	238	420.3
183	1051	211	647.7	239	413.9

E-PROMS AND KIT NUMBERS

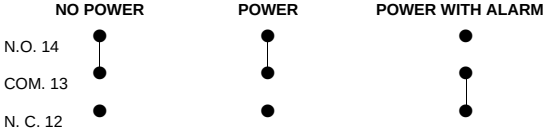
10-40 INTELLISYS	**P/N**
Current main program E-prom	39179585
Auto Start and Stop Prom Kit	39666672
Remote Start and Stop Kit	39666680
Instructions APDD305-89	
Combination Start and Stop Kit	39666698
Sequencer Interface Kit	39674387
Instructions APDD405-90	
Instructions Installation APDD403-90	

ALARM CONTACT POSITIONS
SSR 10 THROUGH 40 HORSEPOWER

BEFORE E-PROM REVISION LEVEL 9.0



REVISION LEVEL 9.0 AND HIGHER



SSR 10-40 HP
INTERFACE BOARD TROUBLESHOOTING CHART

U-Series Voltage Chart
Interface board

TERMINAL #'S	VOLTAGE	CONDITION
5,16	115 VAC 0 VAC	ENERGIZED DE-ENERGIZED
6,17	115 VAC 0 VAC	ENERGIZED DE-ENERGIZED
7,18	115 VAC 0 VAC	ENERGIZED DE-ENERGIZED
8,19	115 VAC 0 VAC	ENERGIZED/UNIT RUNNING DE-ENERGIZED/UNIT STOPPED
9,10	115 VAC 0 VAC	POWER ON POWER OFF
9,15	115 VAC 0 VAC	ITAS CLOSED ITAS OPEN
1,2	0 VDC 5 VDC	REMOTE START PB CLOSED REMOTE START PB OPEN
3,4	0 VDC 5 VDC	REMOTE STOP PB CLOSED REMOTE STOP PB OPEN
28,29	0 VDC 5 VDC	EITHER STARTER AUX CONTACT CLOSED BOTH STARTER AUX CONTACTS OPEN
30,31	0 VDC 5 VDC	STARTER OVERLOAD CONTACT CLOSED STARTER OVERLOAD CONTACT OPEN
24,26	5 VDC 0 VDC	POWER ON POWER OFF
23,25	VARIABLE WITH PRESSURE 0-50mVDC 0 VDC	POWER ON POWER OFF
20,21	10K OHM	@ 25 DEG. C POWER OFF *

* TAKE MEASUREMENT WITH POWER OFF

INGERSOLL-RAND
50-450 HORSEPOWER
INTELLISYS
SERVICEMAN'S GUIDE

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COMPRESSOR ALARMS

When an alarm occurs, the display will alternately show the following messages: the actual alarm message, PRESS TEST-FOR VALUES, and PRESS RESET 2X-CLEAR. If multiple alarms have occurred the display will show SCROLL FOR ALARMS instead of the alarm messages. In this situation the up and down arrows will be used to view the alarm messages. All alarms (with the exception of the emergency stop) will be reset by twice pressing the RESET button. Any exceptions to the above discretion will be explained in the alarm description.

The following is a list of the alarm messages.

1) HIGH INLET VACUUM
   This will occur if the unit is running unloaded and 1AVPT is greater than 13.8 psi (vacuum) activated after *Δ transition plus 2 seconds.

2) CK INLET CONTROL
   If the unit is running unloaded and 1AVPT is less than-3 psi (vacuum), this will occur.

3) LOW UNLOAD SUMP PRESS
   This will occur if the unit is running unloaded and 3APT is less than 15 psig.

4) HIGH SUMP AIR PRESS
   This will occur if the unit is running and 3APT is greater than the rated pressure plus 23.

5) HIGH A/E DISCH TEMP
   This will occur if 2ATT is greater than 228 degrees.

6) STARTER FAULT
   This alarm will occur if the starter contacts open while the unit is running. This alarm is not checked during the first 2 seconds of operation. This alarm will also occur if the unit is given the stop command and the starter contacts do not open or the unit has the no starter option and 1S contact does not open within 30 seconds after starting.

7) MAIN MOTOR OVERLOAD
   This will occur if a motor overload is sensed. This is a 5V DC input.

8) FAN MOTOR OVERLOAD
   This will occur if a fan motor overload is sensed. This is a 5V DC input.

9) CK MOTOR ROTATION
   This alarm will occur if a unit is started and 1AVPT is less than 1 psi (vacuum). This alarm is not checked during the first 2 seconds of operation.

10) CK INLET CONTROL SYS
    If the inlet valve is to move to the fully open or fully closed position and the limit switch for that position is never made, this alarm will occur.

11) INLET VALVE ROTATED
    This alarm will occur if unit is given the start command and the inlet valve is not in the fully closed position.

12) STEPPER LIMIT SWITCH
This alarm will occur if the open and close limit switches of the stepper limit switch board are made at the same time.

13) STARTER DOOR OPEN
This alarm will occur if the start door is opened.

14) REMOTE STOP FAILURE
If the REMOTE START/STOP option is enabled and the remote stop button is not wired in, this alarm will occur.

15) REMOTE START FAILURE
This alarm will occur if the unit is started by the remote start button and the button stays closed for 7 seconds after the unit starts.

16) SENSOR FAILURE
Whenever a sensor is recognized as missing or broken, a sensor failure alarm will occur. The sensors affected by this alarm are 1AVPT, 3APT, 4APT, 10PT, 2ATT, and 2CTT. The failure sensor will be displayed along with the sensor failure message.

INITIAL CHECK ALARM
This alarm will only occur when the machine is not running. When it occurs, the message WAIT FOR COOL DOWN is added to the alternating group of alarm messages.

17) HIGH A/E DISCH TEMP
This will occur if 2ATT is greater than 95% of the high air end discharge temperature limit.

EMERGENCY STOP
This will occur when the EMERGENCY STOP button is engaged. The display will alternate between:
EMERGENCY STOP
DISENGAGE BFR START.
When the EMERGENCY STOP button is disengaged the display will change to:
RESET BEFORE START.
Press the RESET button once to reset this alarm.

WARNINGS

When a warning occurs, the display will alternate between the current message and the warning message. If multiple warnings exist, the message
SCROLL FOR WARNINGS
will be substituted for the warning messages. The up and down arrows can be used to obtain the warnings.

A warning needs to be reset by an operator. The warning will clear when the RESET button is pressed once. The following is a list of the warning messages.

1) CHANGE INLET FILTER
This will occur if 1AVPT is greater than .7 psi (vacuum) and the unit is fully loaded (inlet valve is completely open).

2) CHG COOLANT FILTER
This warning will occur if the oil filter delta p switch closes, 2CTT is greater than 120 degrees, and the unit is loading.

3) CHANGE SEPR ELEMENT
This warning will occur if [(3APT - (4APT + CONSTANT)) >= 12], the unit is loading, 2CTT is greater than 120 degrees, and 4APT is greater than 90 psig.

4) AIR END DISCH TEMP
CHECK AIR/OIL SYSTEM
This will occur if 2ATT is within 97% of the alarm limit.

5) SENSOR FAILURE 4ATT
This will occur if 4ATT is determined to be missing or broken.

SSR 50 HORSEPOWER AND HIGHER
INTELLISYS COMPONENTS

The Intellisys system has seven (7) external control components; 3 pressure transducers; 3 temperature thermistors; and the inlet butterfly stepper motor. The pressure transducers convert a pressure/vacuum signal to a variable millivolt output to the Intellisys.

Pressure Transducer

0-200 psi
0-50 M. V.

(M. V. output is linear and can be read on green and white wires) for example:

0 psi	= 0	M. V.
4 psi	= 1	M. V.
100 psi	= 25	M. V.
200 psi	= 50	M. V.

The transducers are supplied with a 5 VDC signal. The three pressure transducers are located on the side of the starter box with tubes connecting them to the airend inlet below the butterfly valve (0-15 psi) to the separator tank sump and to the moisture separator trap (0-200 psi).

The three temperature thermistors function by changing a resistance value to the Intellisys as the temperature changes. These thermistors are located in the airend discharge, injected coolant manifold and in the moisture separator/trap. These three elements are interchangeable.

The stepper motor controls the position of the inlet butterfly valve electrically. The Intellisys controller monitors the system pressure and compares it to the programmed set points and commands the stepper motor open and close the inlet butterfly valve to maintain system demand under all control modes.

The stepper motor and stepper limit board are connected to the Intellisys system at the starter interface board terminal BTS-2.

The pressure transducers and temperature thermistors are connected to the Intellisys system at the analog barrier terminal board. Both of the above

mentioned connection boards connect to the Intellisys controller through a ribbon cable.

Other starter interface connections:

	Terminal	
	1-2	24 volt supply
	3-36	15 volt supply
BTS1	31-32	Manual Hats
	29-30	Jumper (OPT phase monitor)
	33-34	Emergency Stop Button
	14-15	1M Interlock
	12-13	1S and 2M Interlock
BTS2	10-11	Main OVL
	8-9	Fan OVL
	4 through 7	OPT Remote Stop/Start
	J-1	5 Volt Supply Plug
	4-35	Power on light 1LT
	27-28	1M Coil
BTS1	25-26	2M Coil
	23-24	1S Coil
	19-20	Blowdown Solenoid Watershut off/Coolant
	17-18	Stop Solenoid
BTS1	15-16	OPT Remote Cooler Pressure Relief
	4-35	Power on Light 2LT
		Option Program Proms Sockets (4 each)
	J-2	Communication Port Test/Service/Sequencer

Other Analog Barrier Terminal Board Connections

	3-4	Coolant Filter Delta P Switch
BTS3	5-6	Logic E Stop
	7-8	Door Interlock

SSR 50-450 HP

SHUTDOWNS ON HIGH INLET VACUUM

All machines with Intellisys software 1.4 and lower will shutdown on high inlet vacuum if the inlet valve closes and remains closed after Star Delta transition causing the inlet vacuum to reach 13.8 psi vacuum.

If this situation occurs, there are several reasons that would cause the inlet valve

to remain closed.

1. Sticking or binding inlet valve
2. Starter Interface Board drive chips and circuit
3. Stepper motor and cable
4. Slipping or broken coupling

On machines with Intellisys software of 1.5 and higher, the high inlet vacuum shutdown has been eliminated and the above situations would give a low sump pressure shutdown.

If any of these problems exist, changing a 1.4 to a 1.5 Eprom will not correct the problem, but it will give you a low sump pressure shutdown instead of a high inlet vacuum shutdown. Check all mechanical areas of the butterfly valve. Loose rivets, broken, misaligned, or loose coupling, stepper motor failure, or sticking valve are all likely causing factors. Refer to the Confidential Field Service Manual for troubleshooting procedures under LOW UNLOADED SUMP PRESSURE.

The 1.5 EPROM was developed with a number of changes. The changes that concern the people in the field are as follows:

1. Removed the need for a unit to have to get smart after 500 loaded hours.

2. After the unit is started and through transition, the Intellisys will monitor the sump pressure. If the sump pressure rises to within 20 psi of the rated pressure, the inlet valve will close to the smart position. This is to prevent blowing of the safety valve if the isolation valve is closed on initial start up.

3. Remove the HIGH INLET VACUUM alarm.

4. Make the machine compatible for use with a sequencer system.

“CHECK INLET CONTROL” - ALARM

This alarm is the result of the inlet valve not being closed far enough.

The alarm can happen when:

1. The inlet vacuum is less than 3 psi.

   (Note: Items 2-5 are the possible causes of Item 1. Normally, the inlet vacuum is much higher when the unit is running unloaded.)

2. When the unit is **unloaded** and the lower limit switch is made.

3. The coupling reaches the limit switch but the valve plate does not because the coupling position is off.

*4. If the unit was modulating and the lower limit switch gave a false indication of being closed, possibly due to a faulty connection.

*5. False reading on the inlet vacuum transducer due to mis-calibration or disconnected tubing.

*Most likely causes of alarm

Use the following procedure to investigate and correct if the alarm occurs.

1. Check the connections on the starter interface board for the stepper limit switch. Look for frayed connections.

   Check calibration of vacuum transducer. Activate inlet vacuum with unit off and read value; it should be 0. If any other value is shown, recalibrate the transducer.

   Check the tubing connections to the transducer.

2. Remove the inlet filter, but leave the bracket in place. Observe the inlet vacuum in the display.

3. Load the unit - valve should be fully open.

4. Unload unit and read the vacuum.
   Vacuum should be in the high range of 10-13 psi.

5. If inlet vacuum is 3 psi or less and alarm occurs with power on the unit, go to the analog board and measure DC voltage as follows:

Terminal	4 wire Blk 3 wire Red	+5 Volt DC	This is power to the transducer.
Terminal	1 wire Gr. 2 wire Wh.	+ or - 2.5	millivolt (Typically this will be one millivolt or less)

These measurements determine if the transducer is normal.

6. The analog board would be suspect only if all sensors were showing alarms because the signal is interpreted on one circuit into the controller.

LOW UNLOADED SUMP PRESSURE - ALARM

The display will read “Low Unloaded Sump Pressure” when the sump pressure of the compressor is below 15 PSI.

NOTE: This signal (alarm) is ignored after the start button is engaged.

(The period the signal is ignored is actually 10 seconds after Star-Delta transition to "run", or 10 seconds after full voltage starter contactor engagement. After these 10 seconds pass, the alarm becomes active.)

The alarm shutdown point is 15 PSI. Sump pressure must be 15 PSI or greater to allow the compressor to run. If sump pressure has been greater than 15 PSI and is decreasing, the alarm will occur should sump pressure fall below 15 PSI for 15 seconds. Normal range of sump pressure is 24 to 33 PSI.

NORMAL OPERATION

When the compressor is started normally, sump pressure must make 15 PSI within 10 seconds after Star-Delta transition to "run", or 10 seconds after full voltage starter contactor engagement. If 15 PSI is not seen, compressor will shutdown, displaying "LOW UNLOADED SUMP PRESSURE".

When the compressor is operating normally on a system, loading and unloading routinely, if sump pressure drops to 15 PSI or lower for more than 15 seconds for any reason, the compressor will shutdown displaying "LOW UNLOADED SUMP PRESSURE".

TROUBLESHOOTING SEQUENCE

The most likely cause of LOW UNLOADED SUMP PRESSURE is mispositioning of the inlet butterfly valve.

1. Check all mechanical areas of the butterfly valve. Loose rivets, broken, misaligned, or loose coupling, stepper motor failure or sticking valve, are likely causing factors.

2. Check sump pressure transducer 3 APT for leaks or leaks associated within the tubing carrying the pressure signal.

3. Check that minimum pressure valve is stuck completely open if the unit is discharging into an open system.

4. If mechanical areas of the valve seem normal, refer to "HIGH INLET VACUUM - ALARM", TROUBLESHOOTING SEQUENCE. Follow through this sequence, and resume normal operation.

STARTER FAULT - ALARM

Reasons for the Alarm:

Star Delta Starters

1. Incorrect Starter Function.
   a. Loose wiring.
   b. Bad starter coil.
   c. Foreign material.
   d. Damaged or welded contacts.
   e. No output 110 Voltage to starter coils from BTS - 1 terminals 27-28 M1 coil. Terminal 24-23 IS coil when the start button is pushed. (Starter coil wiring must be connected.)
   f. Faulty auxiliary contact.

2. Mechanical High Air Temperature switch opens.

3. Faulty Emergency Stop Button contact opens the 115 Volt AC circuit and 5 Volt DC circuit stays engaged.

4. Optional Phase monitor alarm condition. (Reverse phase for correct rotation.)

5. Jumper loose or missing on BTS-1 Terminal strip at terminal 29 or 30.

6. Loose wiring.

7. Bad Output on interface board. (Reference 1e. above.)

8. Damaged cable from controller and starter interface board affecting the output voltage at BTS-1 or reading of the auxiliary contact position.

NORMAL OPERATION

When the start button is pushed 1 M and 1 S contactor engage. After 2 seconds the controller logic looks to see if the auxiliary contacts on 1M and 1S are closed. If they are open the unit will shutdown. After the 10 second minimum transition time 1S drops out and 1S auxiliary contacts are monitored for the open position or the unit will shutdown. One second is allowed for 1S auxiliary contact to open or shutdown will occur. 2M contactor is energized. 2 seconds is allowed before 2M auxiliary contacts are expected to be closed.

Once the compressor is running any item under “REASON FOR ALARM” will shut the unit down.

TROUBLESHOOTING

BTS 1 Terminal Strip

1. If 1M or 1S pull in, the following components can be assumed good.
   a. E - Stop
   b. High Air Temperature Switch

c. Jumper 29 and 30 on BTS - 1.

2. Check wiring at terminals 29 and 30 BTS - 1.

3. Between terminal 29 and ground should have 110 Volts.

4. Check BTS - 1 Terminals 23 - 28 Trace wiring to main coils.

5. If partial transition, troubleshoot auxiliary contacts.

6. If contactors chatter, suspect low secondary voltage.

7. Check high air temperature switch. (1 TAS).

ALARM

CHECK INLET CONTROL SYSTEM

This alarm is activated when the small tab on the drive coupling for the inlet air valve has not properly engaged the "open" and "closed" limit switches located on the Stepper Limit board. These two inlet valve positions are used as reference points by the Intellisys Controller logic and the alarm can occur both **before** and **after** starting the compressor.

Before Starting Activation

Activation of the Check Inlet Control System alarm can happen or the moment the incoming power is applied to the unit **or** after any alarm condition has been reset.

This alarm activation results as the Intellisys Controller makes a physical check of the two Stepper Limit switches prior to starting the compressor and one of the switches was not properly engaged.

After Starting Activation

Activation of the Check Inlet Control System alarm can happen only **after** the Star-Delta transition has been completed and either of the following conditions is experienced.

A) When the unit is first loaded in either On/Off line or Mod/ACS mode and the "open" limit switch for the Stepper Motor was not properly engaged when the unit air valve went fully open.

B) If the compressor has been running loaded and the Unload **or** Unloaded Stop button is pressed and the inlet valve coupling does not properly engage the "closed" limit switch as the inlet air valve closes.

There are several checks with the power OFF and the power ON that can be made to locate problem components that activate the Check Inlet Control System alarm.

WARNING!

Several of the following checks must be made with the starter door open which exposes HIGH and DANGEROUS VOLTAGE conditions. Use great care during the checking procedures to prevent serious injuries or death.

Power OFF Checks

1. Remove the inlet air filter and the mounting bracket. Manually move the inlet air valve with your fingers. It should move with a "grainy" feel. Move it to full open and then to full closed. If it seems loose, moves erratically or jams in one position, suspect a coupling that is slipping on the motor shaft.

2. Confirm the two cables from the black Stepper Motor housing are connected to BTS-3 terminal strip of the Starter Interface Board as follows:

Small Cable (Stepper Limit Printed Circuit Board)

Terminal	Wire Color
1	Ground/Shield
2	Black
3	White
4	Green
5	Red

Large Cable (Stepper Motor)

Terminal	Wire Color
6	Brown
7	Blue
8	Green with Yellow
9	Black

3. Carefully inspect the wires described above for excess insulation at the terminal strip end which could prevent good contact between the wire and its terminal connection.

4. Check for loose terminals or wires at the transformers and terminal strip connections of the Starter Interface Board. Also, inspect the plug-in connector for the Stepper Motor located within the black housing on the Stepper Motor for full engagement.

5. Check fuse 3FU (39118484) which is rated at 5 AMPs and replace if required. Do not install a fuse rated greater than 5 AMPS.

   If 3FU was found blown, remove wires 1 and 2 from BTS-1 of the Starter Interface Board and verify an open circuit between terminals 1 and 2 of the board.

   If a short circuit exists between terminals 1 and 2 of the Starter Interface Board, consider the board to be defective.

   When replacing wires 1 and 2 back into the terminal strip, use caution to prevent any of the wire strands from touching between the two terminals.

6. Check the OHM value of the Stepper Motor windings by removing the four motor wires from BTS-3 terminals 6, 7, 8 and 9 of the Starter Interface Board.

   There are two sets of Stepper Motor windings.

   Wires 6 and 7 are a pair and 5-6 OHMs should be measured between these two wires on 50-200 horsepower units.

   Wires 8 and 9 are the second pair and 5-6 OHMs should also be measured between these two wires on 50-200 horsepower units.

   In addition, measure the OHM value from ea**ch** of the four wires to the motor case. "O" OHMs will indicate a ground condition and a defective Stepper Motor.

7. With the Stepper Motor wires still disconnected from TBS-3 of the Starter Interface Board, confirm an open circuit between terminals 6 and 7. Also, confirm an open circuit between terminals 8 and 9.

   If a "O" OHMs reading is measured at either of these two locations, a defective Starter Interface Board is indicated.

Power "ON" Checks

Remove the inlet air filter assembly from the inlet valve prior to closing the main disconnect switch that supplies power to the compressor.

Observe the inlet air valve while an assistant closes the main disconnect switch.

At the moment the main disconnect switch is closed, the inlet valve moves to the full open position and then immediately goes to the closed position. This is followed by Checking Machine and Ready To Start in the display.

This is the normal pattern of inlet valve operation.

Normal valve operation can also be observed by leaving the main disconnect switch closed and then depressing the Emergency Stop Button.

Then disengage the Emergency Stop Button by rotating slightly clockwise followed by pressing Reset twice to clear the alarm.

Observe if the valve again moves to the full open position and then to the closed position in the normal manner.

If the inlet air valve does not move or simply "shakes", a faulty Stepper Motor, blown fuses, faulty cable connection at the plug located in the black Stepper Motor housing, faulty Starter Interface Board and transformers are likely problem areas.

Various checkpoints are listed below in order of being performed.

1. Using a quality meter, check for 24 volts AC between terminals 1 and 2 on BTS-1 terminal strip of the Starter Interface Board.

   If voltage is not available at this point, check wire connections, fuses and transformer performance.

2. Check for 5 Volts DC between terminals 2 and 5 on BTS-3 terminal strip of the Starter Interface Board.

   If voltage is not available at this point, a faulty Starter Interface Board is indicated and must be replaced.

3. Check for 5 Volts DC between terminals 2 and 3 on BTS-3 terminal strip of the Starter Interface Board when the inlet valve is **closed**.

   If 5 Volts DC is not present, check to determine if the tab on the coupling is actually engaging the **closed** limit switch on the Stepper Limit board. If the switch is engaged, check for a loose wire or faulty Stepper Limit board.

4. Check for 5 Volts DC between terminals 2 and 4 on BTS-3 terminal strip of the Starter Interface Board when the inlet valve is fully **open**.

   If 5 Volts DC is not present, inspect areas listed in previous checkpoint 3.

PROCEDURE FOR SETTING THE PROPER BLOWDOWN SEQUENCE ON SSR INTELLISYS MACHINES

The proper blowdown sequence depends upon the correct unloaded position of the inlet valve. Loss of unloaded inlet valve position will only result in a longer blowdown sequence than expected. The following are conditions that will cause the Intellisys to lose control of the correct unloaded inlet valve position. (2) alarms will make it dumb high vacuum, los amps or calibration of a transducer.

A. Calibration, (recalibration) of any pressure transducer.

B. High inlet vacuum shutdown.

C. Low sump pressure.

D. Temporary, programmed loss of unloaded inlet valve position occurs every 500 hours of loaded operation. Recovery from this condition is automatic and will occur without operator attention.

To establish the correct inlet valve position, perform the following steps:

1. Calibrate 1 AVPT transducer as follows:

   a. Power to unit must be shut off.

   b. Vent all pressure from the unit.

   c. Turn on incoming power to the unit ... you will see the "Power On" light, the small lightning shaped "Power" light, the small, "Unload" light and the words, "Checking Machine" which will change automatically to "Ready to Start".

   d. Press "Set" once ... then you will see the words "Ready To Start" change to "Press Set Chg Values" and/or "Press Test - Light Ck". These two sets of words will flash back and forth about every 3 seconds.

Also, a small white light over the “Set” button and a red “Test” light will appear.

e. Press the “Down” arrow of the “Display Select” and the Mod/ACS button at the same time once.

f. You should see the words “Scroll for Sensor” and 2 red arrows appear.

g. Press the “Down” red arrow and you will see two sets of words ... “Sensor 1 AVPT” and “Inlet Vacuum” flash back and forth on the display about every three seconds.

h. Press “Set” ... and “Sensor 1AVPT” will blink twice and lock in the transducer calibration. No further transducer calibration is necessary to finish this procedure.

i. Now wait thirty seconds and the panel will automatically default back to “Checking Machine” and then to “Ready To Start”.

2. Start the machine and allow it to warm the injected coolant temperature to at least 120 Deg. F.

3. Load the machine in either mode - on/off line or Mod/ACS.

4. Manually unload and observe the sump pressure, allowing sufficient time, (approx. 5 min.) for the sump pressure to drop into the range of 23 - 34 PSI.

5. When the sump pressure falls into the range of 24 - 33 PSI, and stabilizes for 7 to 10 seconds, load the machine.

6. Unload again and observe the sump pressure. It should fall to 24 - 33 PSI range, in less time than observed in step 4. (Approximately 3 minutes.)

7. If the sump pressure does not fall quickly into the 24 - 33 PSI range, stop the unit and repeat steps 1-6.

NOTE: The sump pressure will stay between 45 - 50 PSI when the injected oil temperature is below 120 Deg. F. when the unit is unloaded. (Unit must be above 120 Deg. F. coolant temperature to perform the above procedure.)

INTELLISYS

50-200 HORSEPOWER

Procedure To Calibrate Transducers

1) Vent all pressure from the unit.

2) Turn on incoming power to unit...you should see...the big “Power-ON” light, the small lightning shaped “Power” light, the small “Unload” light and the words “Checking Machine” which then turns to “Ready-To-Start.”

3) Press “Set” **once**...then you should see the words "Ready-To-Start" change to “Press Set Chg Values” and/or “Press Test - Light Ck”. These two sets of words will flash back and forth about every 3 seconds.

   Also, a small white light over the “Set” button **and** a red “Test” light will appear.

4) Press the “Down” arrow of the “Display Select” **and** the Mod/ACS button at the same time **once**.

5) You should see the words “Scroll for Sensor” and 2 red arrows appear.

6) Press the “Down” red arrow and you will see two sets of words...”Sensor 1AVPT" and “Inlet Vacuum” flash back and forth on the display about every three seconds.

7) Press “Set”...and “Sensor 1AVPT” will blink twice and lock in the transducer calibration and then automatically scroll to a different set of words...they will be “Sensor 3APT” and “Sump Pressure”. They also flash back and forth about every three seconds.

8) Press “Set”...and “Sensor 3APT” will blink twice and lock in the transducer calibration and then automatically scroll to a different set of words...they will be “Sensor 4APT” and “Package Discharge Pressure.” They also flash back and forth about every three seconds.

9) Press “Set” and 4APT will blink twice and lock in the transducer calibration and then automatically scroll back to the beginning set of words.

10) All three transducers are now calibrated...To exit this function...press the “Down” arrow of the “Display Select”...or...simply wait for thirty seconds and the panel will automatically default back to “Checking Machine” and then to “Ready-To-Start”.

11) The unit can now be started normally.

PROGRAM CONTROLLER TO READ INLET FILTER CONDITION

1. Ready to Start (in display window)

2. Press set

3. Press UNLOAD and MOD/ACS at the same time “checking machine” will display for 2 seconds.

4. Scroll down to inlet filter condition and see -0- zero.

5. Run the machine and read inlet filter condition under various load conditions. Maximum 13.8 shutdown on high inlet vacuum.

NOTE: All Display readings are frozen into memory after any shutdown until reset is pressed.

PROCEDURE FOR CHANGING THE INTELLISYS CONTROLLER

SSR 50-450 Horsepower

1. Remove the power from the machine.
2. Remove the back cover from the defective controller. (Be careful not to break the ground strip that is connected to the back cover.)
3. Disconnect the two ribbon cables inside the controller.
4. Remove the controller mounting screws and remove the controller out the front of the starter door.
5. Remove the gasket from the defective controller and use it on the new one. If the old gasket is damaged, replace it.
6. Install the new controller in the starter door using the mounting screws.
7. Reconnect the ribbon cables to the new controller by removing the back cover. Note: The new controller comes with two new ribbon cables, but the installed ribbon cables can be used if they are in good condition.
8. Replace the back cover on the controller.

PROCEDURE FOR CHANGING THE STARTER INTERFACE BOARD

SSR 50-450 Horsepower Intellisys

1. Remove power from the machine.
2. Disconnect the ribbon connector in the upper right hand corner of the interface board.
3. Remove the connector from the transformer in the top center of the board.
4. Disconnect the wires from the stepper motor and stepper limit board from terminal strip BTS-3 (left side of the interface board).
5. Remove the six (6) mounting screws and allow the board to lay down.
6. Completely back out all of the terminal screw before mounting the board in the starter box.
7. Mount the replacement starter interface board using the six mounting screws.
8. Remove and reconnect one wire at a time from the old board to the new one. Be careful to remember which terminal number each wire is moved from.
9. Reconnect the stepper motor and stepper limit board using the color codes on the wires and terminals.
10. Reconnect the controller ribbon connector and the transformer connector.

SSR 50-450 CHANGE RATED PRESSURE

(Setting the Controller Pressure Range)

1. "Ready to start" in display window.
2. Press Set.
3. Press Unload and ON/OFF Line buttons twice at the same time.
4. The controller pressure will display in the window, plus a red up and down arrow will appear under the set button.
5. Use the red arrows to change the pressure range.
6. Press Set to enter the new pressure range. The window display will blink three times.
7. Press one of the display select arrows to return to "Ready to Start".

INLET VALVE KITS 125-200 HORSEPOWER

All compressors built after July 16, 1990 have the new resilient mounted inlet valve assembly. We have listed below a description of the proper inlet valve kit to purchase depending on the date of manufacture and what the customer is wanting to replace.

1. If the compressor was built prior to July 16, 1990 and the customer is needing to replace the inlet valve he should order 39679261. This kit includes the new style inlet valve and all required parts to modify the compressor to a resilient mounted inlet valve. If the customer orders part number 39675863 which is the kit number in the parts book he will receive the above kit.
2. If the compressor was built after July 16, 1990 the customer should order 39679253 which includes only the new style inlet valve, coupling and a replacement bottom gasket for the inlet valve.
3. If the customer has a machine built prior to July 16, 1990 and he wants to convert to resilient mounting using the old style valve he should order field kit number 39677547.

The parts book will eventually be updated to reflect the inlet valve assembly number 39679253. If you need any additional information please let us know.

INLET VALVE ISOLATION FIELD RETROFIT KIT

SAFETY

Insure that compressor is isolated from compressed air system by closing isolation valve and bleeding pressure from drip leg.

Insure that main power disconnect switch is locked open and tagged.

INSTRUCTIONS:

1. Remove inlet air filter assembly located on top of the inlet valve.

2. Remove and discard blowdown tube between separator tank and fitting "A". Sever any tie wraps that may be attached to tube.

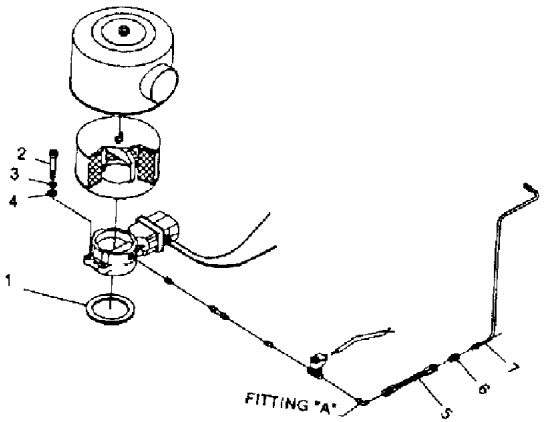
3. Remove and discard the four metric socket head bolts that mount inlet valve. Use a 17mm hex socket wrench. Lift inlet valve and discard gasket beneath. Replace with new isolation gasket (Item 1).

4. Replace inlet valve using new retrofit parts: Bolts (Item 2), flat washers (Item 3) and bolt isolator gaskets (Item 4). Use 17mm hex socket wrench.

5. Replace blowdown tube with new retrofit parts: Hose (Item 5), tube union (Item 6) and tube (Item 7).

6. Re-install old air filter assembly.

ITEM NO	I-R PART NO	QTY	DESCRIPTION
1	39483144	1	Gasket, Isolation
2	39181607	4	Bolt, special metric
3	95081618	4	Washer, Flat
4	39483169	4	Gasket, Bolt Isolation
5	39120944	1	Hose, .75 x 12" Lg



TEMPERATURE/RESISTANCE CHART

°F TEMP.	RES.	°F TEMP.	RES.	°F TEMP.	RES.
0	89768	52	19171	104	5241
1	86914	53	18658	105	5123
2	84161	54	18161	106	5007
3	81503	55	17679	107	4894
4	78938	56	17211	108	4784
5	76463	57	16757	109	4677
6	74072	58	16317	110	4573
7	71765	59	15889	111	4472
8	69536	60	15475	112	4372
9	67384	61	15072	113	4276
10	65306	62	14681	114	4182
11	63298	63	14301	115	4090
12	61359	64	13933	116	4000
13	59485	65	13575	117	3913
14	57674	66	13227	118	3828
15	55924	67	12890	119	3745
16	54233	68	12562	120	3663
17	52598	69	12244	121	3584
18	51017	70	11934	122	3507
19	49490	71	11634	123	3432
20	48012	72	11342	124	3359
21	46584	73	11058	125	3287
22	45202	74	10782	126	3218
23	43865	75	10514	127	3150
24	42573	76	10254	128	3083
25	41322	77	10000	129	3019
26	40112	78	9754	130	2955
27	38941	79	9515	131	2894
28	37808	80	9282	132	2833
29	36712	81	9055	133	2775
30	35650	82	8835	134	2717
31	34623	83	8621	135	2661
32	33631	84	8413	136	2607
33	32668	85	8210	137	2553
34	31736	86	8013	138	2501
35	30834	87	7821	139	2450
36	29960	88	7635	140	2400
37	29114	89	7453	141	2352
38	28295	90	7277	142	2304
39	27501	91	7105	143	2258
40	26733	92	6937	144	2213
41	25988	93	6774	145	2169
42	25267	94	6616	146	2125
43	24568	95	6461	147	2083
44	23891	96	6311	148	2042
45	23235	97	6165	149	2001
46	22599	98	6022	150	1962
47	21983	99	5883	151	1924
48	21385	100	5748	152	1886
49	20806	101	5616	153	1849
50	20244	102	5488	154	1813
51	19699	103	5363	155	1778

°F TEMP.	RES.	°F TEMP.	RES.	°F TEMP.	RES.
156	1744	184	1033	212	636.9
157	1710	185	1014	213	626.5
158	1677	186	996.4	214	616.2
159	1645	187	978.8	215	606.1
160	1614	188	961.5	216	596.3
161	1583	189	944.6	217	586.6
162	1553	190	928.1	218	577.1
163	1523	191	911.9	219	567.8
164	1495	192	896.0	220	558.6
165	1466	193	880.5	221	549.7
166	1439	194	865.2	222	540.9
167	1412	195	850.3	223	532.2
168	1386	196	835.6	224	523.8
169	1360	197	821.3	225	515.4
170	1335	198	807.2	226	507.3
171	1310	199	793.4	227	499.3
172	1286	200	779.9	228	491.4
173	1262	201	766.7	229	483.7
174	1239	202	753.7	230	476.1
175	1216	203	741.0	231	468.7
175	1194	204	728.5	232	461.4
177	1172	205	716.3	233	454.2
178	1151	206	704.3	234	447.2
179	1130	207	692.5	235	440.3
180	1110	208	681.0	236	433.5
181	1090	209	669.7	237	426.9
182	1071	210	658.6	238	420.3
183	1051	211	647.7	239	413.9

VACUUM CONVERSIONS

PSIA	PSI VACUUM	INCHES MERCURY	MM MERCURY	INCHES WATER
14.7	0	0.00	0.00	0.00
14.6	0.1	0.20	5.17	2.77
14.5	0.2	0.41	10.34	5.55
14.4	0.3	0.61	15.51	8.32
14.3	0.4	0.81	20.69	11.09
14.2	0.5	1.02	25.86	13.86
14.1	0.6	1.22	31.03	16.64
14	0.7	1.43	36.20	19.41
13.9	0.8	1.63	41.37	22.18
13.8	0.9	1.83	46.54	24.96
13.7	1	2.04	51.71	27.73
13.6	1.1	2.24	56.89	30.50
13.5	1.2	2.44	62.06	33.28
13.4	1.3	2.65	67.23	36.05
13.3	1.4	2.85	72.40	38.82
13.2	1.5	3.05	77.57	41.59
13.1	1.6	3.26	82.74	44.37
13	1.7	3.46	87.91	47.14
12.9	1.8	3.66	93.09	49.91
12.8	1.9	3.87	98.26	52.69
12.7	2	4.07	103.43	55.46
12.6	2.1	4.28	108.60	58.23
12.5	2.2	4.48	113.77	61.01
12.4	2.3	4.68	118.94	63.78
12.3	2.4	4.89	124.11	66.55
12.2	2.5	5.09	129.29	69.32
12.1	2.6	5.29	134.46	72.10
12	2.7	5.50	139.63	74.87
11.9	2.8	5.70	144.80	77.64
11.8	2.9	5.90	149.97	80.42
11.7	3	6.11	155.14	83.19
11.6	3.1	6.31	160.31	85.96
11.5	3.2	6.52	165.49	88.74
11.4	3.3	6.72	170.66	91.51
11.3	3.4	6.92	175.83	94.28
11.2	3.5	7.13	181.00	97.05
11.1	3.6	7.33	186.17	99.83
11	3.7	7.53	191.34	102.60
10.9	3.8	7.74	196.51	105.37
10.8	3.9	7.94	201.69	108.15
10.7	4	8.14	206.86	110.92
10.6	4.1	8.35	212.03	113.69
10.5	4.2	8.55	217.20	116.47
10.4	4.3	8.75	222.37	119.24
10.3	4.4	8.96	227.54	122.01
10.2	4.5	9.16	232.71	124.78
10.1	4.6	9.37	237.89	127.56
10	4.7	9.57	243.06	130.33
9.9	4.8	9.77	248.23	133.10
9.8	4.9	9.98	253.40	135.88

PSIA	PSI VACUUM	INCHES MERCURY	MM MERCURY	INCHES WATER
9.7	5	10.18	258.57	138.65
9.6	5.1	10.38	263.74	141.42
9.5	5.2	10.59	268.91	144.20
9.4	5.3	10.79	274.09	146.97
9.3	5.4	10.99	279.26	149.74
9.2	5.5	11.20	284.43	152.51
9.1	5.6	11.40	289.60	155.29
9	5.7	11.61	294.77	158.06
8.9	5.8	11.81	299.94	160.83
8.8	5.9	12.01	305.11	163.61
8.7	6	12.22	310.29	166.38
8.6	6.1	12.42	315.46	169.15
8.5	6.2	12.62	320.63	171.93
8.4	6.3	12.83	325.80	174.70
8.3	6.4	13.03	330.97	177.47
8.2	6.5	13.23	336.14	180.24
8.1	6.6	13.44	341.32	183.02
8	6.7	13.64	346.49	185.79
7.9	6.8	13.84	351.66	188.56
7.8	6.9	14.05	356.83	191.34
7.7	7	14.25	362.00	194.11
7.6	7.1	14.46	367.17	196.88
7.5	7.2	14.66	372.34	199.66
7.4	7.3	14.86	377.52	202.43
7.3	7.4	15.07	382.69	205.20
7.2	7.5	15.27	387.86	207.97
7.1	7.6	15.47	393.03	210.75
7	7.7	15.68	398.20	213.52
6.9	7.8	15.88	403.37	216.29
6.8	7.9	16.08	408.54	219.07
6.7	8	16.29	413.72	221.84
6.6	8.1	16.49	418.89	224.61
6.5	8.2	16.70	424.06	227.39
6.4	8.3	16.90	429.23	230.16
6.3	8.4	17.10	434.40	232.93
6.2	8.5	17.31	439.57	235.70
6.1	8.6	17.51	444.74	238.48
6	8.7	17.71	449.92	241.25
5.9	8.8	17.92	455.09	244.02
5.8	8.9	18.12	460.26	246.80
5.7	9	18.32	465.43	249.57
5.6	9.1	18.53	470.60	252.34
5.5	9.2	18.73	475.77	255.12
5.4	9.3	18.93	480.94	257.89
5.3	9.4	19.14	486.12	260.66
5.2	9.5	19.34	491.29	263.43
5.1	9.6	19.55	496.46	266.21
5	9.7	19.75	501.63	268.98
4.9	9.8	19.95	506.80	271.75
4.8	9.9	20.16	511.97	274.53
4.7	10	20.36	517.14	277.30
4.6	10.1	20.56	522.32	280.07

PSIA	PSI VACUUM	INCHES MERCURY	MM MERCURY	INCHES WATER
4.5	10.2	20.77	527.49	282.85
4.4	10.3	20.97	532.66	285.62
4.3	10.4	21.17	537.83	288.39
4.2	10.5	21.38	543.00	291.16
4.1	10.6	21.58	548.17	293.94
4	10.7	21.79	553.34	296.71
3.9	10.8	21.99	558.52	299.48
3.8	10.9	22.19	563.69	302.26
3.7	11	22.40	568.86	305.03
3.6	11.1	22.60	574.03	307.80
3.5	11.2	22.80	579.20	310.58
3.4	11.3	23.01	584.37	313.35
3.3	11.4	23.21	589.45	316.10
3.2	11.5	23.41	594.72	318.89
3.1	11.6	23.62	599.89	321.67
3	11.7	23.82	605.06	324.44
2.9	11.8	24.02	610.23	327.21
2.8	11.9	24.23	615.40	329.99
2.7	12	24.43	620.57	332.76
2.6	12.1	24.64	625.74	335.53
2.5	12.2	24.84	630.92	338.31
2.4	12.3	25.04	636.09	341.08
2.3	12.4	25.25	641.26	343.85
2.2	12.5	25.45	646.43	346.62
2.1	12.6	25.65	651.60	349.40
2	12.7	25.86	656.77	352.17
1.9	12.8	26.06	661.94	354.94
1.8	12.9	26.26	667.12	357.72
1.7	13	26.47	672.29	360.49
1.6	13.1	26.67	677.46	363.26
1.5	13.2	26.88	682.63	366.04
1.4	13.3	27.08	687.80	368.81
1.3	13.4	27.28	692.97	371.58
1.2	13.5	27.49	698.14	374.35
1.1	13.6	27.69	703.32	377.13
1	13.7	27.89	708.49	379.90
0.9	13.8	28.10	713.66	382.67
0.8	13.9	28.30	718.83	385.45
0.7	14	28.50	724.00	388.22
0.6	14.1	28.71	729.17	390.99
0.5	14.2	28.91	734.34	393.77
0.4	14.3	29.11	739.52	396.54
0.3	14.4	29.32	744.69	399.31
0.2	14.5	29.52	749.86	402.08
0.1	14.6	29.73	755.03	404.86
0	14.7	29.93	760.20	407.63

THE INTELLISYS CONTROLLER DISPLAYS INLET VACUUM IN PSI VACUUM. FOR INSTANCE, IF THE INLET VACUUM DISPLAY READS 128, THIS IS 12.8 PSI VACUUM. FOR THOSE OF YOU WHO ARE USED TO OTHER SCALES SUCH AS "H_2O" OR "HG" WE HAVE INCLUDED THE ABOVE CONVERSION CHART.

50-200 HORSEPOWER ROTARY INTELLISYS EQUIPPED

INTELLISYS UNITS WITH AN E-PROM LABELED "SHOW"

The purpose of the "Show" software is to demonstrate the display functions of the Intellisys controller.

Attached are the instructions which outline the procedure for using the "show" prom. Only the Display Select Up and Down buttons work when the E-Prom is in a controller. The instructions 1-7 also apply to any E-Prom installation.

The "Show" prom should not be in any compressor delivered to a customer.

It has been determined that after the "show" prom is used some problems may occur with the set point values:

a) The set point values **may** change and have to be reset.
b) The set point routine may not function correctly. This means that the correct values may not be obtainable.

To correct the problem, do one of the following:

a) Remove the RAM chip, then put it back into the board. **CAUTION**: Doing this will cause the run and loaded hours to be lost.

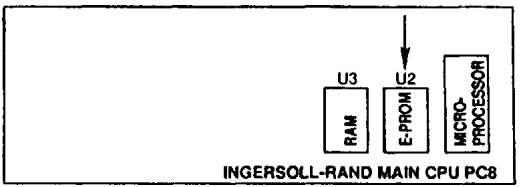
Preferred Correction:

b) Replace your current E-Prom with an E-Prom of the next higher Rev. level. (Contact Customer Service for current revision level E-Prom.)

SSR 50-200 "SHOW PROM"

INSTALLATION INSTRUCTIONS

1. Disconnect all power, lock and tag out the main disconnect.
2. Open Starter Box Door.
3. Remove the back cover of the Intellisys panel mounted in the starter door (top section).
4. Locate the production prom installed in the U2 socket.



5. Using your fingers (do not use tools) and/or the prom ejector, carefully pull out the production prom. Be careful not to bend the contacts. This prom will be reinstalled after the show.

6. Carefully install the “Show Prom” in socket location U2.

7. Replace the cover on the Intellisys panel.

8. Locate the starter interface PCB in the lower compartment of the starter box.

9. Get a two wire, heavy duty power cord approximately 10' in length. Have a plug (115v) on one end and trim back and expose the two wires on the other end.

10. Connect one wire from your power cord to blank terminal #21 on the Starter Interface PCB.

11. Remove the brown wire from terminal #36 on the Starter Interface PCB and connect the remaining wire from your power cord to terminal #36.

12. Plug your power cord in and ready to start should appear on the Intellisys Panel. Remember the only functional membrane switch is the selection scroll arrows.

13. When the show is over reverse the procedure and reinstall the production prom.

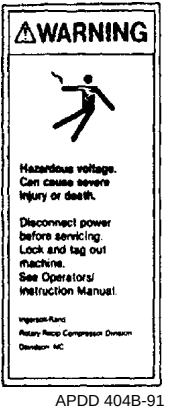
NOTE: If troubles at start-up occur contact Customer Service immediately!

FIELD INSTALLATION OF SEQUENCER INTERFACE I SSR 50-450 HORSEPOWER UNITS WITH INTELLISYS™ (FOR CONNECTION OF COMPRESSORS WITH INTELLISYS™ TO STANDARD INGERSOLL-RAND SEQUENCER).

THE PURPOSE OF THESE INSTRUCTIONS IS TO IDENTIFY THE CORRECT PARTS REQUIRED WHEN INSTALLING A STANDARD INGERSOLL-RAND SEQUENCER AND WIRING IT TO AN INTELLISYS COMPRESSOR. A DEVICE CALLED A **SEQUENCER INTERFACE I** IS USED ALONG WITH OTHER COMPONENTS BETWEEN THE COMPRESSOR AND SEQUENCER TO MAKE THE COMPRESSOR WORK PROPERLY.

SAFETY

Lock and tag the main power disconnect in the open position. Isolate the compressor from the compressed air system by closing isolation valve and vent pressure from the unit.



APDD 404B-91

For proper operation when using the sequencer Interface I with an Intellisys unit, the following hardware is required.

PART NUMBER	QTY	DESCRIPTION
39671193	1	Automatic Start/Stop Option Field Kit (Units Not Already Equipped With Auto Start/Stop)
39179593	1	E-PROM, Programmed (Software Rev. 1.5 Onward)

IF CONTROLLER HAS	THEN
A. Software Revisions 1.11, 1.20, 1.3 or 1.4	Install new E-PROM 39179593 Revision 1.5 onward In Existing Controller
B. Software Rev. 1.5 Onward	No Changes Required

IF COMPRESSOR	THEN
A. Has Auto Start/Stop Prom	No Changes Required
B. Does Not Have Auto Start/Stop Prom	Install Auto Start/Stop Field Kit 39671193

TOOLS REQUIRED:
ONLY WHAT WOULD BE FOUND IN ANY REASONABLY EQUIPPED SERVICEMAN'S TOOL BOX.

PARTS LIST FOR SEQUENCER INTERFACE I (KIT P/N 39674395)

ITEM	PART NUMBER	QTY	DESCRIPTION
1	39813274	1	Interface I, Sequencer
2	39547880	1	Cable, Modular, 44" Lg.
3	39177357	4	Screw, #10-32 Self Tapping
4	APDD 404B-91	1	Instructions, Interface I Installation
5	APDD 405A-91	1	Instruction, Sequence Controller, SSR10-450 HP
6	39181284	1	Fuse, 1A (Spare)
7	39179593	1	EPROM, Programmed (Software Revision 1.5 Onward)

INSTALLATION INSTRUCTIONS:

1. Locate the area inside the starter box where the **Sequencer Interface I** (P/N39813274) is to be mounted (see figure 1). Align the left hand side of the **Sequencer Interface I** approximately 3 inches from the left side of the starter box and center front to back on the starter box shelf. Mark the mounting holes. Drill #25 diameter pilot holes for the #10-32 self-tapping screws. Attach the **Sequencer Interface I** with the screws provided in the kit.

2. Connect the Modular Cable (P/N39547880) between Communication Port Jack on the **Sequencer Interface I** and the Communication Port Jack on the Compressor Starter interface Board (see figure 3). Route cable along with existing ribbon cables and secure away from primary voltage wiring/components.

3. Connect 115 V. A. C. wiring between the **Sequencer Interface I** and the Starter Interface board as shown in the wiring diagram (figure 3).

4. Connect wiring from terminals #1-#5 on the **Sequencer Interface I** to corresponding terminals #TB-1 through #TB-5 on the Sequencer Block. It is recommended that conduit be used to connect the Sequencer to the Compressor Starter Box/ **Sequencer Interface I** to assure continuous grounding between components.

5. The 115 V.A.C. wiring and the 5 wires connecting the **Sequencer Interface I** to the sequencer should be separated from existing ribbon cables and 5 V.D.C. wiring, as much as possible.

INTELLISYS CONTROLLER E-PROM VERIFICATION/REPLACEMENT

1. Remove the aluminum back cover from the Intellisys Controller. (See Figure 2).

2. Locate the existing programmed E-PROM (located on printed circuit board in socket labeled U2). See figure A. If the E-PROM label indicates software revision levels 1.11, 1.2, 1.3 or 1.4 replace the E-PROM with E-PROM 39179593 having software revision 1.5 onward. (Steps 3-6). If the E-PROM label indicates software revision 1.5 onward, no changes are required, replace the back cover.

3. Remove the existing programmed E-PROM (located on printed circuit board in socket labeled U2). See figure A.

4. Remove the new programmed E-PROM (P/N39179593) from its packaging, **using care not to damage the pins on the E-PROM.**

5. Insert the E-PROM into the socket labeled U2 (see figure A). Pin #1 on the E-PROM should be located in the upper left corner for correct installation.

6. Replace the back cover.

OPERATION

1. Refer to Operators/Instruction Manual (APDD 321C-90) to activate auto start/stop and sequencer functions in the Intellisys Controller.

2. Refer to Sequence Controller Instructions (APDD 405A-91) for Sequencer Operation.

FIGURE A

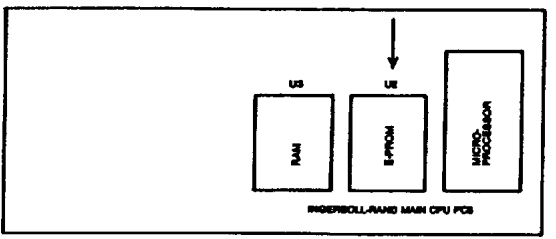


FIGURE 1
INTERFACE MOUNTING LOCATION

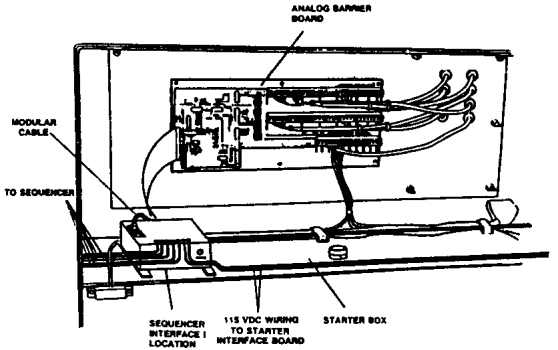


FIGURE 2
INTELLISYS CONTROLLER

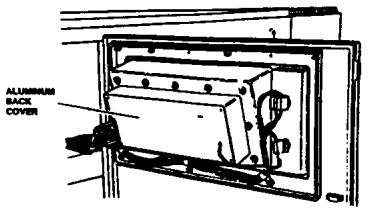
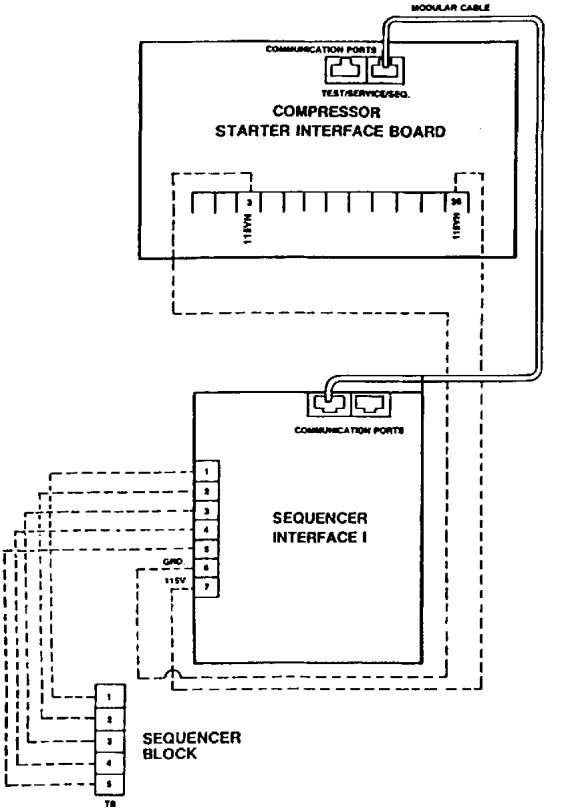
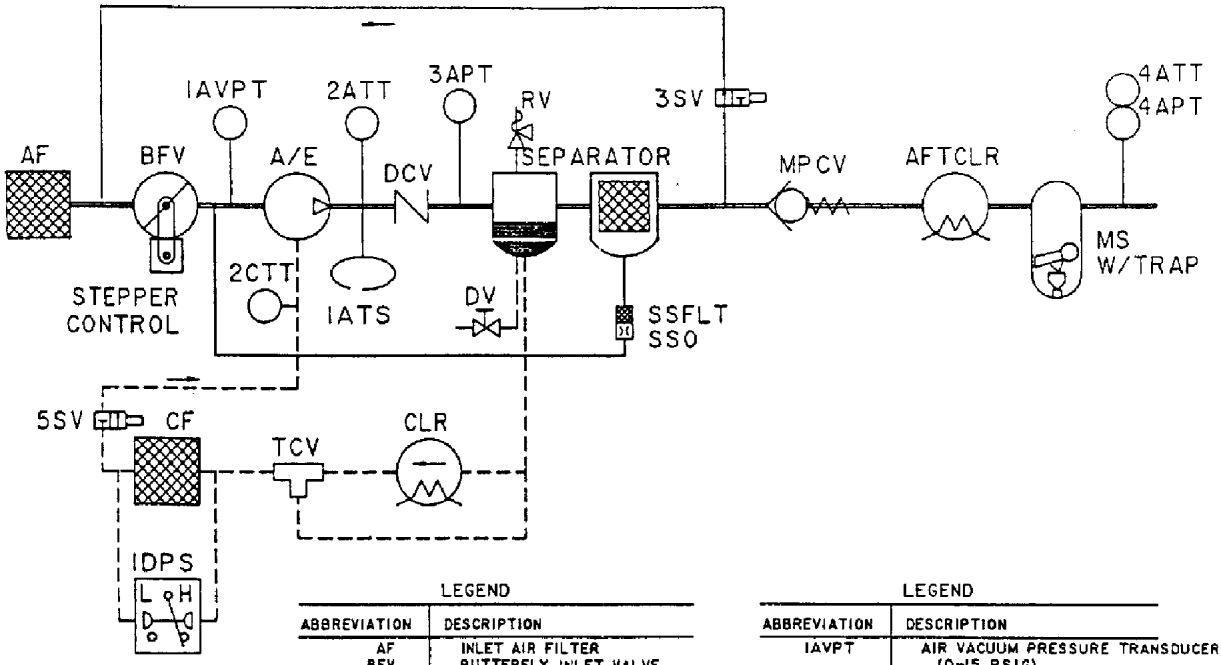


FIGURE 3
WIRING DIAGRAM



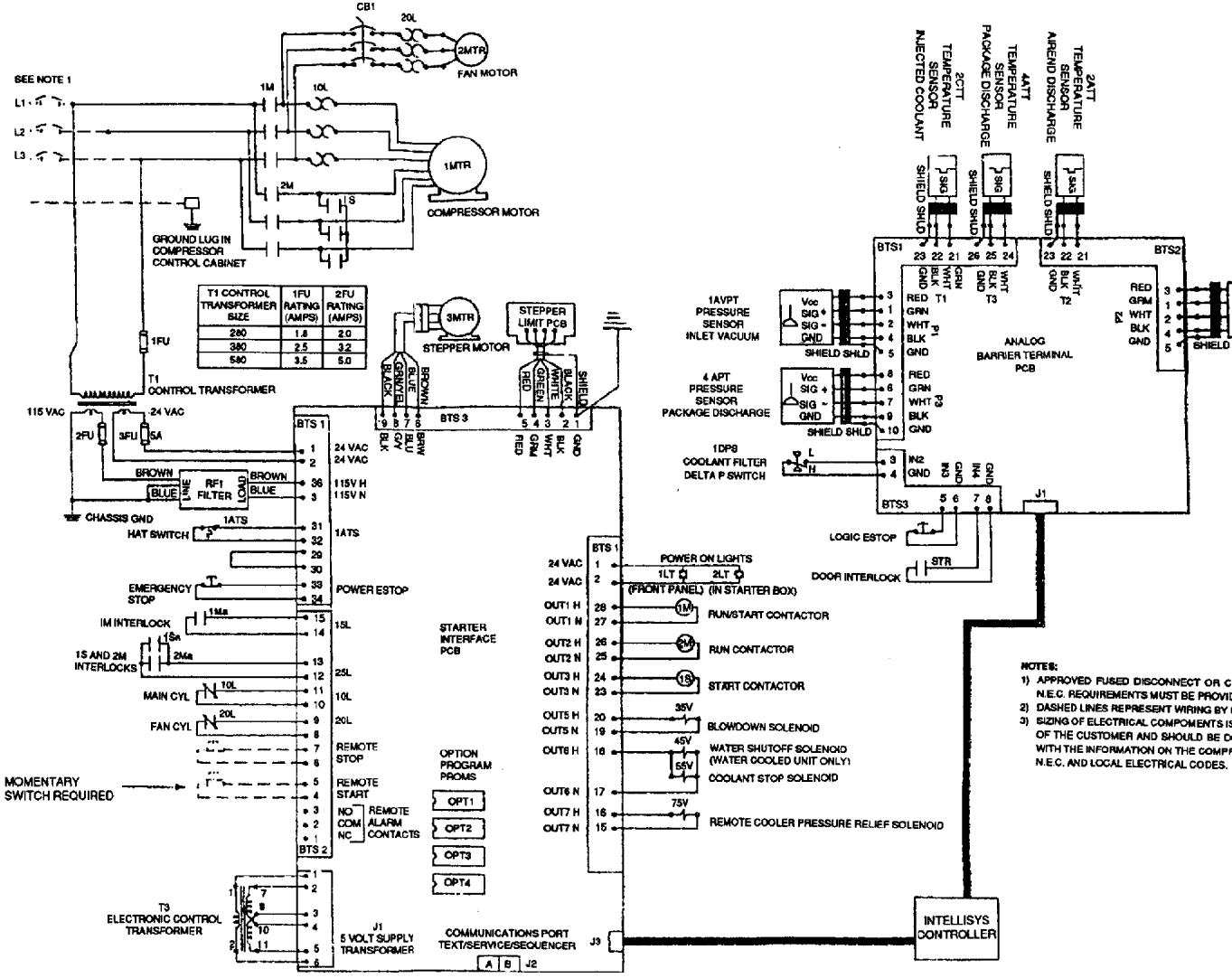


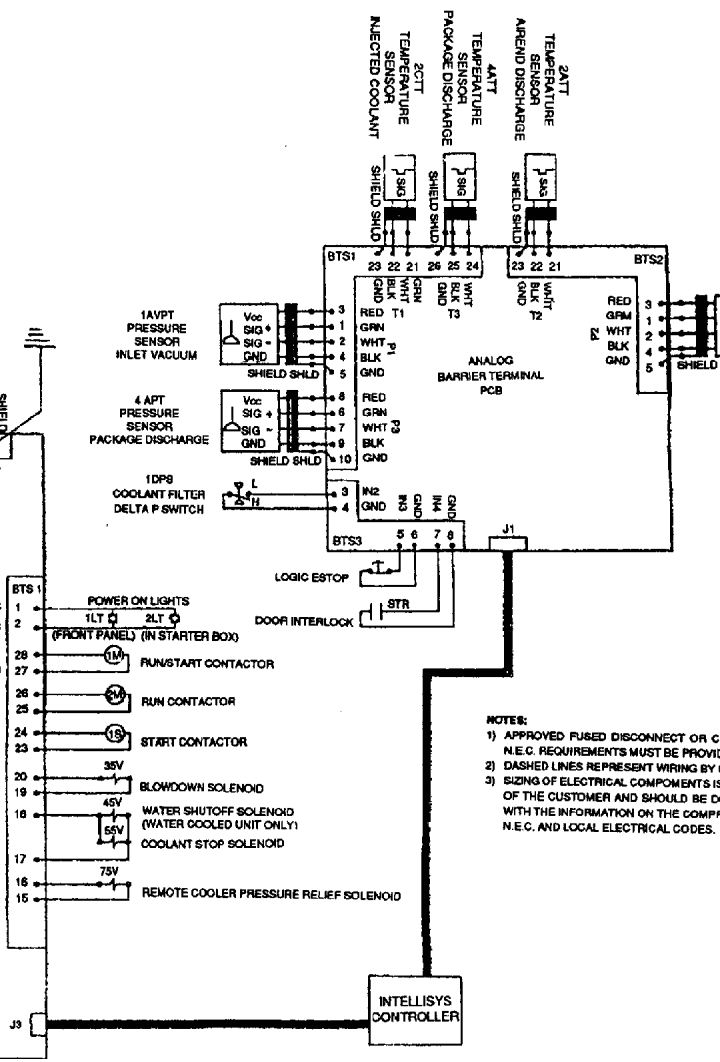
LEGEND

ABBREVIATION	DESCRIPTION
AF	INLET AIR FILTER
BFV	BUTTERFLY INLET VALVE
A/E	COMPRESSOR
DCV	DISCHARGE CHECK VALVE
MPCV	MINIMUM PRESSURE CONTROL VALVE
AFTCLR	AFTERCOOLER
CF	COOLANT FILTER
TCV	THERMOSTATIC CONTROL VALVE
CLR	COOLANT COOLER
MS	MOISTURE SEPARATOR
SSFLT	SEPARATOR SCAVENGE FILTER
SSO	SEPARATOR SCAVENGE ORIFICE
RV	SEPARATOR TANK RELIEF VALVE
DV	COOLANT DRAIN VALVE

LEGEND

ABBREVIATION	DESCRIPTION
1AVPT	AIR VACUUM PRESSURE TRANSDUCER (0-15 PSIG)
3APT	AIR PRESSURE TRANSDUCER (0-200 PSIG)
4APT	AIR PRESSURE TRANSDUCER (0-200 PSIG)
2CTT	COOLANT TEMPERATURE SENSOR
2ATT	AIR TEMPERATURE SENSOR
4ATT	AIR TEMPERATURE SENSOR
1ATS	HIGH AIR TEMPERATURE SWITCH
3SV	BLOWDOWN SOLENOID VALVE
5SV	COOLANT STOP SOLENOID VALVE
IDPS	COOLANT FILTER DELTA-P SWITCH


CB1
20L
2MTR
FAN MOTOR
SEE NOTE 1
1M
10L
1MTR
COMPRESSOR MOTOR
2M
S
GROUND LUG IN COMPRESSOR CONTROL CABINET
T1 CONTROL TRANSFORMER SIZE
1FU RATING (AMPS)
2FU RATING (AMPS)
280 1.8 2.0
380 2.5 3.2
580 3.5 5.0
1FU
T1
CONTROL TRANSFORMER
115 VAC
24 VAC
2FU
3FU
5A
BROWN
BLUE
LINE
LOAD
RF1 FILTER
CHASSIS GND
1ATS
HAT SWITCH
EMERGENCY STOP
IM INTERLOCK
1Ma
1Sa
1S AND 2M INTERLOCKS
2Ma
MAIN CYL
10L
FAN CYL
20L
MOMENTARY SWITCH REQUIRED
BTS 1
24 VAC
24 VAC
115V H
115V N
1ATS
POWER ESTOP
15L
25L
10L
20L
REMOTE STOP
REMOTE START
NO
COM
NC
REMOTE ALARM CONTACTS
BTS 2
3MTR
STEPPER MOTOR
STEPPER LIMIT PCB
BTS 3
BLACK
GRN/YEL
BLUE
GRAY
BLU
BRWN
RED
GRN
WHT
BLK
GND
STARTER INTERFACE PCB
OPTION PROGRAM PROMS
OPT1
OPT2
OPT3
OPT4
T3
ELECTRONIC CONTROL TRANSFORMER
J1
5 VOLT SUPPLY TRANSFORMER
COMMUNICATIONS PORT TEXT/SERVICE/SEQUENCER
J3
A
B
J2
BTS 1
24 VAC
24 VAC
POWER ON LIGHTS
1LT
2LT
(FRONT PANEL)
(IN STARTER BOX)
OUT1 H
OUT1 N
1M
RUN/START CONTACTOR
OUT2 H
OUT2 N
2M
RUN CONTACTOR
OUT3 H
OUT3 N
1S
START CONTACTOR
OUT5 H
OUT5 N
35V
BLOWDOWN SOLENOID
OUT6 H
45V
WATER SHUTOFF SOLENOID (WATER COOLED UNIT ONLY)
55V
COOLANT STOP SOLENOID
OUT6 N
OUT7 H
75V
OUT7 N
REMOTE COOLER PRESSURE RELIEF SOLENOID
2CTT TEMPERATURE SENSOR INJECTED COOLANT
4ATT TEMPERATURE SENSOR PACKAGE DISCHARGE
2ATT TEMPERATURE SENSOR AIREND DISCHARGE
SHIELD SHLD
BTS1
BTS2
BTS3
T1
T2
T3
ANALOG BARRIER TERMINAL PCB
1AVPT PRESSURE SENSOR INLET VACUUM
4 APT PRESSURE SENSOR PACKAGE DISCHARGE
1DPS COOLANT FILTER DELTA P SWITCH
LOGIC ESTOP
DOOR INTERLOCK
STR
J1
INTELLISYS CONTROLLER
NOTES:
1) APPROVED FUSED DISCONNECT OR C
N.E.C. REQUIREMENTS MUST BE PROVI
2) DASHED LINES REPRESENT WIRING BY
3) SIZING OF ELECTRICAL COMPONENTS IS
OF THE CUSTOMER AND SHOULD BE D
WITH THE INFORMATION ON THE COMP
N.E.C. AND LOCAL ELECTRICAL CODES.


2CTT TEMPERATURE SENSOR INJECTED COOLANT
4ATT TEMPERATURE SENSOR PACKAGE DISCHARGE
2ATT TEMPERATURE SENSOR AIREND DISCHARGE
SHIELD SHLD
SIG
BTS1
BTS2
BTS3
ANALOG BARRIER TERMINAL PCB
1AVPT PRESSURE SENSOR INLET VACUUM
4 APT PRESSURE SENSOR PACKAGE DISCHARGE
1DPS COOLANT FILTER DELTA P SWITCH
LOGIC ESTOP
DOOR INTERLOCK
STR
POWER ON LIGHTS
1LT
2LT
(FRONT PANEL)
(IN STARTER BOX)
RUN/START CONTACTOR
RUN CONTACTOR
START CONTACTOR
BLOWDOWN SOLENOID
WATER SHUTOFF SOLENOID (WATER COOLED UNIT ONLY)
COOLANT STOP SOLENOID
REMOTE COOLER PRESSURE RELIEF SOLENOID
INTELLISYS CONTROLLER
J1
J3
NOTES:
1) APPROVED FUSED DISCONNECT OR C
N.E.C. REQUIREMENTS MUST BE PROVID
2) DASHED LINES REPRESENT WIRING BY
3) SIZING OF ELECTRICAL COMPONENTS IS
OF THE CUSTOMER AND SHOULD BE D
WITH THE INFORMATION ON THE COMP
N.E.C. AND LOCAL ELECTRICAL CODES.

E-PROMS AND KIT NUMBERS

50-450 Horsepower	P/N
Current main program E-prom	39179593
Auto Start and Stop Prom only	39479399
Remote Start and Stop Prom only	39479423
% Modulation Prom only	39479407
Sequence Control Prom only	39479415
Sequencer Interface I	39805312
Show Prom	39183702
APDD404-90 Instruction Installation	
APDD405-90 Instruction Sequencer Controller	

TEMPERATURE SENSOR OVERVIEW
Issued 1 February '91

There are three thermistor type temperature sensors used on SSR 50 through 450 horsepower units.

The word "Thermistor" means "thermally sensitive resistor" and is a device that will change its resistance value as it changes in temperature. The thermistor is made from a mixture of sintered metal oxides such as manganese, cobalt or nickel that is sealed within a glass bead. Two wires are attached to the thermistor device...a Black wire "in" and a White wire "out".

The resistance characteristics of the thermistor will quickly change as the temperature of its stainless steel housing changes. The thermistor is very sensitive, very accurate and the resistance value of the device will DECREASE as the temperature INCREASES.

As an example...there will be approximately 10,000 ohms resistance between the Black and White wire at 77 degrees F. but only 1,014 ohms resistance at 185 degrees F.

Accordingly, at approximately 77 degrees F. and with 5 volts DC applied to the Black wire of the thermistor, the voltage allowed through the thermistor will be reduced to approximately 61 millivolts DC.

This varying DC voltage from the thermistor is processed by an Analog-To-Digital converter device and then forwarded to the Intellisys Controller. Depen ding on the voltage level, decisions will be made by the Intellisys that may only change a temperature number on the panel display **or** could possibly shut the compressor down if conditions dictate.

Each of the three temperature sensing thermistors is connected to a specific point on the Analog Board located in the upper portion of the main starter box.

Sensor 2CTT connects to an area marked "T1", 2ATT connects to an area marked "T2" and 4ATT connects to an area marked "T3". See page 72 for outline. (Analog Barrier Board)

These three connection areas (T1,T2 and T3) each have three terminal screws having both a terminal number identification and a wire color identification. As an example...connection area T1 has 21/WHT, 22/BLK and 23/GND. Accordingly, sensor 2CTT will connect to area T1 with the White wire connected to

terminal 21, the Black wire connected to terminal 22 and the Ground wire connected to terminal 23. All three sensors connect to their respective areas of the Analog Board in a similar manner.

The 5 volt DC source for the sensors is supplied by a small but extremely accurate voltage regulator mounted on the upper left side of the Analog Board. The input voltage to this small regulator is approximately 9 volts DC but this 9 volts input may vary up or down in significant amounts as the customer's line voltage varies. However, the voltage regulator output of 5 volts DC will remain exactly at 5 volts DC. This 5 volts DC output must remain stable and **constant** for the Intellisys Controller logic to function properly.

This constant 5 volt DC signal entering the thermistor will be greatly reduced in voltage due to the resistance effect of the variable resistor sealed within the sensor body as the voltage tries to get back to the Analog Board through the White wire.

The three temperature thermistors used are identical and carry CCN 39541677. The thermistor housing is made of stainless steel and requires an O-Ring (39404157) to seal the SAE fitting area of the housing to its installed location.

These thermistors are neither adjustable nor repairable and must be replaced should one fail.

Because the thermistor is actually part of an assembly, further explanation will use the word "Sensor" to describe this device.

Operation of the temperature sensors is as follows:

2CTT - Injected Coolant Temperature Sensor

Monitors the temperature of Coolant being injected into the airend that absorbs heat of compression, lubricates moving components and seals rotor clearances. The sensor is located in the Coolant piping just prior to the Coolant being injected into the airend.

Sensor (2CTT) sends a variable DC voltage signal to the Intellisys Controller to provide temperature information for "Injected Coolant Temperature" if that display has been selected on the Controller panel **and** instructs the Intellisys to slightly open the unloaded position of the air inlet valve when the injected Coolant temperature is lower than 120 degrees F. This slight opening of the inlet air valve when the unit is cold increases the unloaded sump pressure approximately 20 PSIG to promote flow of the cold Coolant.

After the temperature of the injected Coolant rises above 120 degrees F., the signal from 2CTT is interpreted by the Intellisys which then recloses the inlet air valve the slight amount mentioned in the previous paragraph. The unloaded sump pressure then drops to the normal level of 24 to 33 PSIG and the compressor runs unloaded.

One additional feature of 2CTT is that the signal from this thermistor is also used by the Intellisys to display "Wait-Coolant Too Cold" should the operator select "Coolant Filter Condition" when the injected Coolant temperature is lower than 120 degree F.

This sensor serves no other function and does not provide a Warn or Alarm feature that will shut the compressor down.

4ATT - Package Discharge Temperature Sensor

Monitors the temperature of the compressed air downstream of the unit's aftercooler prior to the air exiting the package. Typically, this sensor is located in the top of the combination moisture separator/trap assembly.

This sensor (4ATT) also sends a variable DC voltage signal to the Intellisys to provide temperature information for "Package Discharge Temperature" if that display has been selected on the Controller panel.

This sensor has no other "Warn" feature or "Alarm" that will shut the unit down.

2ATT - Airend Discharge Temperature Sensor

Monitors the temperature of the air/oil mixture as the flow exits the airend discharge port area. Typically, this sensor is located adjacent to the flange area of the discharge housing and just prior to the air/oil flow entering the airend discharge check valve.

This sensor (2ATT) sends a variable DC voltage signal to the Intellisys Controller that is used to make a series of decisions.

First, the Intellisys uses the variable voltage signal to provide temperature information for "Airend Discharge Temperature" if that display has been selected on the Controller panel.

Secondly, the Intellisys has the logic to evaluate the sensor's voltage signal and **automatically** display a "Warn" light on the Controller Panel should the airend discharge temperature rise to 97% of the 228 degrees F. Alarm/Shutdown setting. As an example...should the airend discharge temperature rise to 221 degrees F. (228 x .97 = 221), a red "Warn" light and a lighted "Reset" light appear along the bottom of the panel. At this same time, the main display will begin to show "Airend Disch Temp" alternately with "Check Air/Oil System" **and** whatever message was on the display at the moment the "Warn" started.

As an example...if the unit was operating with "Package Discharge Pressure" on the display when the "Warn" began, the display will begin to alternate "Airend Disch Temp" with "Check Air/Oil System" and "Package Discharge Pressure". This series of messages will continue to be displayed until such time as an operator "Resets" the panel even if the compressor has cooled down. This feature continues to "Warn" and serves as an indicator that the unit is (or had been) overheating and checks should be made. Examples might be high room temperature (especially late in a summer afternoon) or possibly a dirty oil cooler surface.

If the compressor should cool down while continuing to run and "Reset" is pressed, the display will go back to whatever was on the display at the moment the "Warn" started. The "Reset" light also goes out at this time.

However, if the airend discharge temperature continues to rise to approximately 229 degrees F., the compressor will automatically shut down and the "Alarm" light plus "Reset" and "Test" will appear along the bottom of the panel. The "Warn" light goes out at this time.

The main display of the panel will begin to show "High A/E Disch Temp 229 Deg" alternately with "Press Test - For Values" followed by "Press Reset 2X - Clear".

The first response to any "Alarm" shutdown should be to push "Test" which automatically activates the Up/Down Display Select arrows of the panel, turns on the small green indicator light next to the fourteen (14) possible displays on the right side of the panel and causes the "Reset" light to disappear.

Use the "Down" Display Select arrow to scroll through the fourteen (14) possible displays on the right side of the panel and record each reading to assist in trouble investigation for cause of the shutdown.

After recording all values, press "Test" again and the panel display will return to the original "Alarm" condition plus the "Reset" light comes back onto the display.

Press "Reset" twice and the panel display will read "High A/E Disch Temp" and the present temperature of the airend discharge which, in all likelihood, is beginning to cool down a few degrees.

If the unit has not cooled to the lower reset point of the Intellisys (approximately 215 degrees F.) the display adds "Wait for Cool Down" into the alternating messages **and** the panel will not clear.

However, if the unit has cooled below 215 degrees F. and "Reset" is pushed, the display goes to "Checking Machine" and then to "Ready to Start".

Sensor Checking and Replacement

On occasion, an operator could make an easy comparison check of the three temperature sensors by merely scrolling through "Package Discharge Temperature", "Airend Discharge Temperature" and "Injected Coolant Temperature" **after** the compressor has been shut down for several hours. As an example, make the comparison check on Monday morning after a weekend shutdown.

If any reading seems abnormal from the others, further checks can be made as follows.

To remove any of the three sensors, disconnect the incoming power from the unit and vent all pressure from the system. In the case of the injected Coolant Temperature Sensor (2CTT) or Airend Discharge Temperature Sensor (2ATT), small amounts of Coolant could drain from the unit when the sensor is removed from its location. A small drain pan might be handy here.

Disconnect the snap-type connector on the sensor wire being careful not to damage the small gasket between the two halves. Use a 9/16 inch open-end wrench to loosen the sensor and then remove.

Locate a high quality thermometer, a suitable container of liquid (Coolant or oil will do nicely), a high quality ohmmeter that has a digital read-out and a heating device such as an electric hot plate.

Place the sensor and the thermometer into the liquid filled container.

Heat the liquid to a temperature somewhere between 180 degrees F. and 225 degrees F. to bring the sensor into its normal operating range. Stir the liquid to ensure even heating allowing ample time for the sensor and the thermometer to stabilize with each other in the liquid.

Connect a good quality digital read-out ohmmeter to the Black and White wires.

Carefully record the thermometer and ohmmeter readings and compare them with the charts (pages 81, 82) in the following sequence.

First...locate the temperature on the chart that corresponds with the temperature measured with the test thermometer in the heated liquid.

Second...observe the resistance value shown on the chart next to the correct temperature. This resistance value must be within a tolerance of plus/minus 2 percent of your test ohmmeter reading.

The sensor will be either good or bad. Replace if required.

To replace, install a new O-Ring over the sensor body using care to prevent damage from the threads of the fitting. It would also be advisable to make an inspection of the wire connections within each half of the snap-type connector at this time.

To make the check, loosen the small plastic nut (use a 1/2 inch open-end wrench) where the wire enters the connector half. Next, remove the small screw in the side of the connector half and gently slide the inner portion of the connector out of its housing. Use a screwdriver to check the integrity of the three small terminals that hold the wire ends. If the wires are tight, re-assemble the connector half and install the small screw in the side of the housing that holds the assembly together. Gently tighten the small nut only enough to compress the rubber grommet around the wire that prevents dirt or liquid from entering the connector.

Put a drop or two of Coolant on the sensor threads and O-Ring prior to installing the sensor back into position. Gently tighten the sensor and install the self indexing wire connector. Confirm the small gasket is between the two halves of the connector.

Carefully inspect your work at this point to determine no damage to the wiring has occurred during installation of the sensor.

Troubleshooting

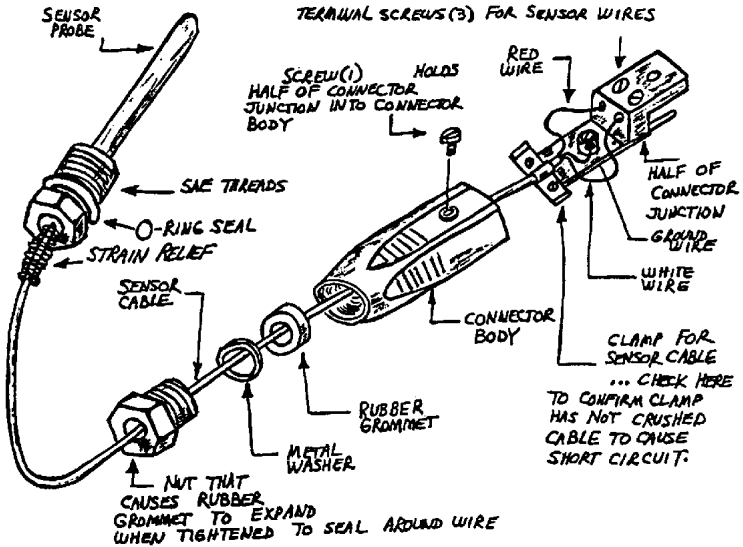
The Intellisys panel has the logic to determine that a "Sensor Failure" has occurred and will indicate the probable area to check with a message on the display.

As an example, if the compressor has shut down on an Alarm condition and Sensor Failure 4APT is on the display, the problem can be located within the circuitry for that particular sensor.

There can be various types of "Failures" associated with the temperature sensors and are easier to understand if the failures are placed in different categories.

A) **Open circuit** such as a broken wire, disconnected cable junction halves, loose wire, etc. on either the Black or White wire.

This type of problem causes the compressor to shutdown with an Alarm Condition displayed on the panel if the open wire is on either the Airend Discharge Temperature Sensor (2ATT) or Injected Coolant Temperature Sensor (2CTT). The open circuit reacts the same regardless of which wire (Black or White) is cut.


SENSOR PROBE
TERMINAL SCREWS (3) FOR SENSOR WIRES
RED WIRE
SCREW (1) HOLDS HALF OF CONNECTOR JUNCTION INTO CONNECTOR BODY
HALF OF CONNECTOR JUNCTION
SAE THREADS
O-RING SEAL
STRAIN RELIEF
GROUND WIRE
WHITE WIRE
SENSOR CABLE
CONNECTOR BODY
CLAMP FOR SENSOR CABLE ... CHECK HERE TO CONFIRM CLAMP HAS NOT CRUSHED CABLE TO CAUSE SHORT CIRCUIT.
RUBBER GROMMET
METAL WASHER
NUT THAT CAUSES RUBBER GROMMET TO EXPAND WHEN TIGHTENED TO SEAL AROUND WIRE

The compressor will shut down and the display will indicate the specific sensor in an alternating message with whatever message was on the display at the moment the Alarm condition began. These messages will continue to alternate until the problem is corrected and "Reset" is pushed.

If an open circuit condition is experienced on the Package Discharge Temperature Sensor (4ATT), the compressor will not shut down but "Warn" and "Reset" will appear at the lower edge of the panel and the message display will show Sensor Failure 4ATT alternately with whatever message was on the display at the moment the "Warn" condition began.

The panel will not Reset until such time as the problem is corrected.

B) **An Open Circuit** with the Ground wire on any of the three temperature sensors will not create a problem to cause either a "Warn" or "Alarm" condition. In reality, this ground wire is one end of a shield for the Black and White wires to reduce electrical interference (noise) that could cause incorrect readings. One end of the shield goes to ground while the other end located within the temperature sensor housing is an open circuit in relation to the sensor housing.

C) **Black Wire to Ground** conditions cause a direct short of the 5 volt DC Barrier Board power supply. This direct short circuit rarely damages the Analog Board or other components and merely pulls the output signal of the voltage regulator down to a point at which the components are unable to function. Correcting the short circuit condition will in almost every instance, correct the problem.

Prior to making a series of checks for a black wire to ground condition, verify that the Analog Board has 9 volts DC supplied to it using the following procedure.

1) Observe the small voltage regulator "VR1" on the upper left corner of the Analog Board. This voltage regulator is held in position by a small hexagon shaped nut.

On the lower edge of this voltage regulator can be found three connection points.

2) Use a voltmeter between the **LEFT** - bottom connection point of the voltage regulator and any of the "GND" (ground) terminals of the top-most terminal strip BTS1. The voltage measured between these two points should be approximately 9 volts DC.

3) If voltage is measured as outlined in Step 2, proceed to check the voltage regulator output by measuring between the **RIGHT** - bottom connection point and any of the "GND" (ground) terminals of the top-most terminal strip BTS1. The voltage measured between these two points should be approximately 5 volt DC.

If the 5 volts DC supply for the Analog Board is interrupted for any reason to include a direct short circuit condition, the compressor will shut down in an "Alarm" condition.

If this ground condition exists on the Black wire going to any of the three temperature sensors, the panel display will show "Scroll for Alarm" then "Press Test for Values" then "Press Reset 2 x - Clear" in an alternating message list.

Also, Reset, Test, red UP arrow, red DOWN arrow and "Alarm" are on the lower edge of the panel.

After correcting the ground condition, press "Reset" to clear the panel.

D) **Black Short Circuited to White** causes the particular temperature sensor to display "246 DEG" on the Intellisys panel if that display has been selected.

This problem will cause an Alarm shutdown on the Airend Discharge Temperature sensor 2ATT **only**. When scrolling for the cause of Alarm, "246 DEG" will show on the display for "Airend Discharge Temperature".

Temperature sensors 2CTT and 4ATT do not cause an Alarm or Warn condition and therefore only show 246 DEG on the display if the Black and White wires become short circuited.

As an example, if the Black and White wires for Package Discharge Temperature sensor 4ATT become short circuited, the compressor will continue to run and "246 DEG" will come up on the display for Package Discharge Temperature when selected.

The short circuit condition is individual to the affected sensor and will not cause multiple displays on the panel.

E) **White Wire to Ground** will cause a "Warn" condition for "Package Discharge Air Temperature" sensor 4ATT while the compressor continues to operate. The Intellisys display will alternate "Sensor Failure 4ATT" with whatever was on the display at the moment the warn condition began. Remember, the compressor continues to run with only a "Warn" indication and "Reset" along the lower edge of the panel.

If a short circuit develops between the White wire and Ground on "Injected Coolant Temperature" sensor 2CTT, the compressor will shut down with an "Alarm" condition.

The display will show "Sensor Failure 2CTT" followed by "Coolant Temp", "Press Test For Values" followed by "Press Reset 2 - Clear".

If a short circuit between the White wire and Ground develops on "Airend Discharge Temperature" 2ATT, an "Alarm" will occur and the compressor will shut down.

The Intellisys display will show "Airend Disch Temp" followed by "Press Test for Values", and "Press Reset 2 x - Clear" and "Sensor Failure 2ATT".

An investigation of the wires is now indicated.

After the short circuit condition is corrected, the Intellisys can be cleared in the normal manner.

In summation, wire damage is the most likely cause of temperature sensor failures. These failures are usually "cut wires" or "short circuits" either to ground or between wires. A careful investigation will quickly identify your problem area.

TEMPERATURE/RESISTANCE CHART

DEGREE F. TEMP.	RES.	DEGREE F. TEMP.	RES.	DEGREE F. TEMP.	RES.
0	89768	52	19171	104	5241
1	86914	53	18658	105	5123
2	84161	54	18161	106	5007
3	81503	55	17679	107	4894
4	78938	56	17211	108	4784
5	76463	57	16757	109	4677
6	74072	58	16317	110	4573
7	71765	59	15889	111	4472
8	69536	60	15475	112	4372
9	67384	61	15072	113	4276
10	65306	62	14681	114	4182
11	63298	63	14301	115	4090
12	61359	64	13933	116	4000
13	59485	65	13575	117	3913
14	57674	66	13227	118	3828
15	55924	67	12890	119	3745
16	54233	68	12562	120	3663
17	52598	69	12244	121	3584
18	51017	70	11934	122	3507
19	49490	71	11634	123	3432
20	48012	72	11342	124	3359
21	46584	73	11058	125	3287
22	45202	74	10782	126	3218
23	43865	75	10514	127	3150
24	42573	76	10254	128	3083
25	41322	77	10000	129	3019
26	40112	78	9754	130	2955
27	38941	79	9515	131	2894
28	37808	80	9282	132	2833
29	36712	81	9055	133	2775
30	35650	82	8835	134	2717
31	34623	83	8621	135	2661
32	33631	84	8413	136	2607
33	32668	85	8210	137	2553
34	31736	86	8013	138	2501
35	30834	87	7821	139	2450
36	29960	88	7635	140	2400
37	29114	89	7453	141	2352
38	28295	90	7277	142	2304
39	27501	91	7105	143	2258
40	26733	92	6937	144	2213
41	25988	93	6774	145	2169
42	25267	94	6616	146	2125
43	24568	95	6461	147	2083
44	23891	96	6311	148	2042
45	23235	97	6165	149	2001
46	22599	98	6022	150	1962
47	21983	99	5883	151	1924
48	21385	100	5748	152	1888
49	20806	101	5616	153	1849
50	20244	102	5488	154	1813
51	19699	103	5363	155	1778

DEGREE F. TEMP.	RES.	DEGREE F. TEMP.	RES.	DEGREE F. TEMP.	RES.
156	1744	184	1033	212	636.9
157	1710	185	1014	213	626.5
158	1677	186	996.4	214	616.2
159	1645	187	978.8	215	606.1
160	1614	188	961.5	216	596.3
161	1583	189	944.6	217	586.6
162	1553	190	928.1	218	577.1
163	1523	191	911.9	219	567.8
164	1495	192	896.0	220	558.6
165	1466	193	880.5	221	549.7
166	1439	194	865.2	222	540.9
167	1412	195	850.3	223	532.2
168	1386	196	835.6	224	523.8
169	1360	197	821.3	225	515.4
170	1335	198	807.2	226	507.3
171	1310	199	793.4	227	499.3
172	1286	200	779.9	228	491.4
173	1262	201	766.7	229	483.7
174	1239	202	753.7	230	476.1
175	1216	203	741.0	231	468.7
176	1194	204	728.5	232	461.4
177	1172	205	716.3	233	454.2
178	1151	206	704.3	234	447.2
179	1130	207	692.5	235	440.3
180	1110	208	681.0	236	433.5
181	1090	209	669.7	237	426.9
182	1071	210	658.6	238	420.3
183	1051	211	647.7	239	413.9

50-450 HORSEPOWER ROTARY
INTERFACE GROUND

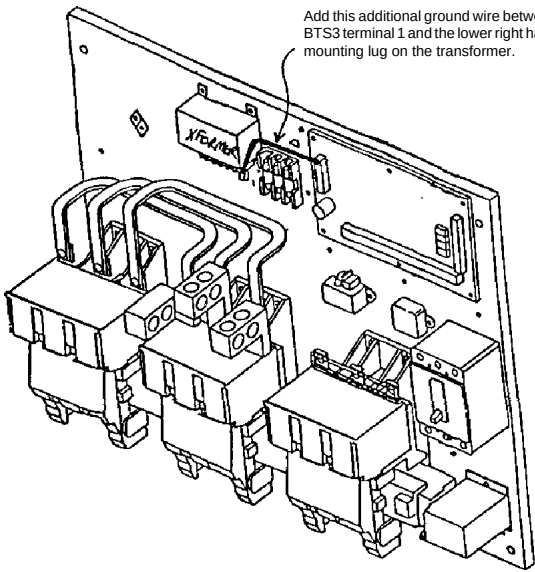
Electro-Magnetic Interference generated by radio frequencies, DC generators, arc welding, etc. has the potential to cause intermittent shutdowns on SSR 50 through 450 horsepower Intellisys units.

This interference usually shows up as random pressure reading fluctuations, erroneous pressure sensor indication, erratic LED displays or unit shutdown with "Ready to Start" showing on the display.

To correct for this potential problem area, a ground wire should be installed between the Starter Interface Board BTS-3 terminal 1 and chassis ground.

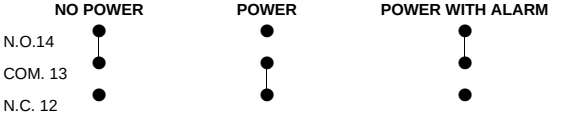
To connect this control ground to chassis ground, attach a 16AWG green wire between BTS3 terminal 1 and the lower right mounting lug of the control voltage transformer. Keep this ground wire as short as possible (approximately 8 inches).

The wire being added will be placed under the same screw that holds the existing green wire for the control voltage transformer.

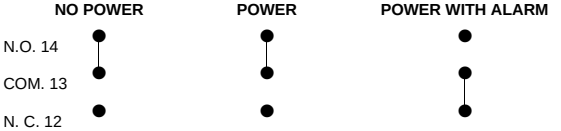


ALARM CONTACT POSITIONS
SSR 10 THROUGH 40 HORSEPOWER

BEFORE E-PROM REVISION LEVEL 9.0

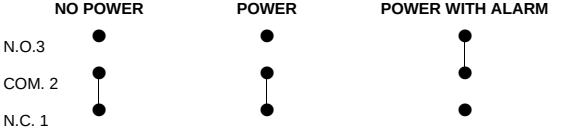


REVISION LEVEL 9.0 AND HIGHER

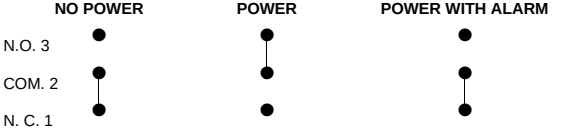


ALARM CONTACT POSITIONS
SSR 50 THROUGH 200 HORSEPOWER

BEFORE E-PROM REVISION LEVEL 1.4

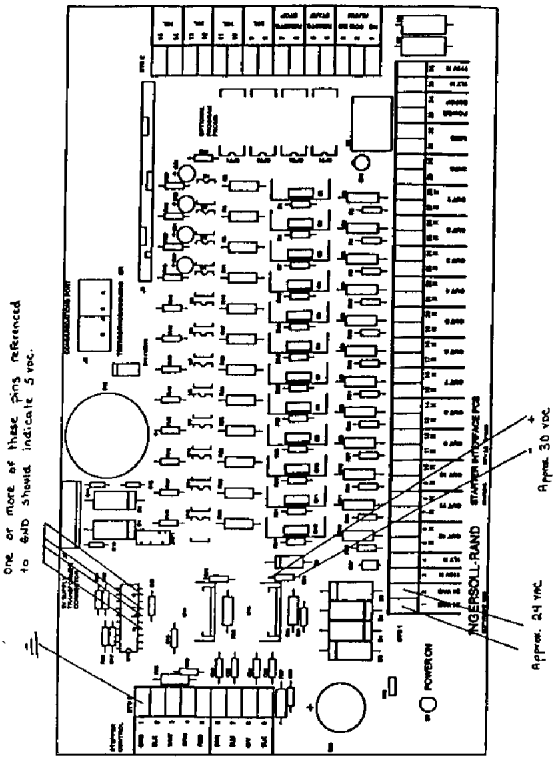


REVISION LEVEL 1.4 AND HIGHER



POWER TEST INTERFACE BOARD
(50-450 ROTARY)

Measure voltages on interface boards at locations shown to determine normal operation.



STEPPER MOTOR DRIVER CHIPS
50-450 Horsepower

The Electronics group has identified some susceptible driver chip components.

Most of the units were either replaced or retested by the vendor. There is a chance that some units with this date code will exhibit problems. These chips have identifiable data codes printed on them.

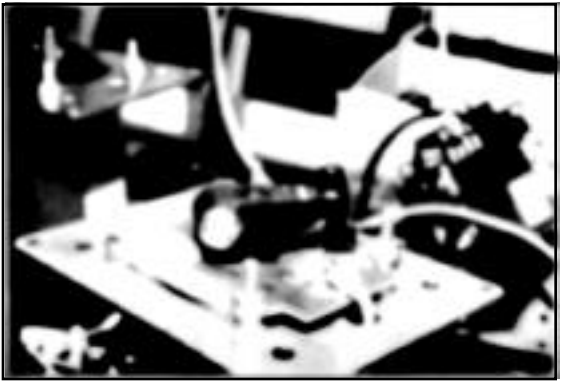
The two date codes to look for are 89015 and 89018. These codes will appear on "U14" or "U15" on the starter interface P/N 39182175.

REPLACEMENT OF STEPPER ASSEMBLY COMPONENTS

Replacing the stepper couplings:

Begin by removing the air filter element(s).
Remove the stepper motor assembly from the inlet valve body. The stepper limit switch and male half of the coupling will come off along with the stepper motor, and motor mounting plate. Remove both halves of the coupling from their respective shafts.

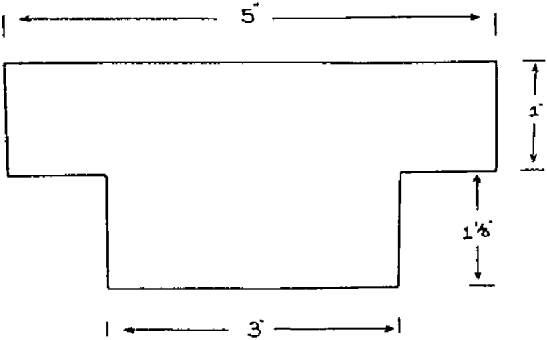
When installing the male half of the coupling onto the stepper shaft, first open it with a small screwdriver and then slide it onto the shaft. Leave the shaft end recessed from the surface of the coupling approximately 1/8" as shown. NOTE!! Use only the nut and bolt provided by I-R for clamping the coupling. Regular hardware will cause concentrated stresses within the coupling resulting in rapid failure. This bolt should be torqued to 150 inch-lbs. Mark a line on the end of the stepper shaft and the coupling with a permanent marker so that if any rotation occurs later on, it can be easily detected.



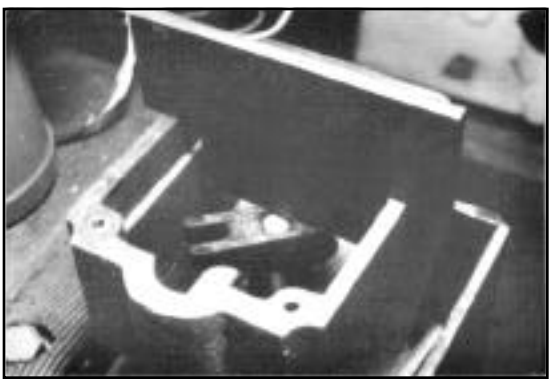
Replace the female half of the coupling on the valve shaft, using the nut and bolt originally provided. The coupling should be positioned on the shaft so that the upper surface of the coupling is 1-1/8" from the surface where the stepper mounting plate mounts on the valve body. This dimension is important as deviation will cause the coupling to become misaligned. The bolt requires 120 inch-lbs of torque.

Since the female coupling is always 1-1/8" from the stepper motor mounting plate, a simple tool can be made to allow for easy positioning of this coupling half on all sizes of Intellisys machines (see drawing).

FEMALE COUPLING PLACEMENT TOOL



Can be made of wood or metal
in any convenient thickness.



Replacing the stepper motor or limit board:

When replacing the stepper motor or limit switch board, remove the stepper motor assembly from the valve body. Remove the male coupling from the stepper motor shaft. Disconnect the leads going to the board or motor. Replace the old component for the new one on the stepper mounting plate. Be sure to replace the stand-off nuts between the limit board and stepper mounting plate. Leaving the extra nuts out will usually cause a short circuit. Take care to use only minimal torque when attaching a new limit board. Too much torque may crack the board and cause it to malfunction.

Reassembly:

Prior to reassembly, inspect the limit switch board for any signs of physical damage, contact at the limit switches or "burned" looking areas. Replace with a new limit board if any physical damage is seen. Always replace both halves of the coupling if either side shows appreciable wear. Check that the inlet valve rotates freely. The female coupling should not touch the stop when the valve is fully closed, although it will touch the opposing stop if you open the valve far enough. On the stepper motor, check that the male coupling is square on the shaft and rotates freely through both limit switches without any contact. The bottom of the spine should move through the limit switches at or below the base of the grooves that face each other inside the limit switches. Make note of how the motor resists with small "detentes" as you rotate it. Verify that all electrical connections are secure. Also check the gasket for damage and replace if necessary.

Rotate the male coupling so that its spine is in the center of the closed limit switch. Close the inlet valve. Replace the stepper motor assembly back onto the inlet valve housing.

After tightening the bolts that secure the stepper motor assembly to the inlet valve housing, rotate the inlet valve. You should feel the same type of slight resistance "detentes" in both directions as when rotating the stepper itself. If it seems loose, moves sloppily or jams in any one position then the assembly is in need of further repair. Try reassembling unit.

Once the assembly is complete, observe the inlet valve while an assistant turns the power on to the machine. The valve should go full open, then nearly full closed (leaving a slight crack) and stop. Now ask the assistant to press the Start Button on the Intellisys panel. Watch the butterfly valve closely. In Star-Delta starting units the valve should move quickly from near closed position to full closed position at the moment the start button is pressed. You will hear the machine accelerate to speed. The valve should not move during this acceleration. Once starter transition takes place the valve should open just a crack once again. Units which employ full voltage starters simply stay slightly open throughout start-up.

After it is clear that the inlet assembly is operating properly, replace the inlet filter element(s).

SSR 50-450 HP

CHECK MOTOR ROTATION SHUTDOWN

This alarm will occur if the unit is started and 1AVPT transducer sees less than 1 psi vacuum. The alarm is not checked during the first two seconds of operation. If the alarm occurs, make repairs by using the following procedure:

1. Make sure that the rotation is correct (clockwise looking over the non-drive end of the motor).

2. Make sure that both ends of the flex tube are cut off squarely and dip the ends of the tube in Ultra Coolant to insure that there is a good seal in the fittings on the airend and on the transducer.

3. Make sure that a vacuum is felt at the transducer end of the flex tube during a start attempt. If vacuum is present, this assures the airend is turning in the correct direction.

4. Check for 5VDC on the transducer cable red and black wires at the analog board.

5. With the inlet vacuum transducer fully connected, check for a millivolt reading on the green and white wires on the transducer cable at the analog board. The range is 0 millivolts at 0 pressure, and 50 millivolts at 15 psi vacuum.

6. Make sure that the inlet valve closes fully during the first ten seconds after the start button is depressed. The closed inlet valve causes a high vacuum under the inlet valve, which confirms correct rotation.

7. If 5 VDC is not found on the red and black wires at terminals 3 and 4 on the analog board terminal strip BTS-1, check the other transducers 3APT and 4APT red and black leads for 5 VDC. If the other red and black transducer leads read 5 VDC and the inlet vacuum transducer does not, replace the analog board.

8. If 5 VDC is available at the analog board terminals at the red and black lead, but no millivolts are read on the green and white leads while a vacuum is applied to transducer, replace the transducer or cable.

VOLTAGE CHANGE FOR AMBER "POWER ON" LIGHTS (50 THROUGH 450 HORSEPOWER)

To improve bulb life for the two amber "Power On" lights on 50-450 horsepower units, a change from 110V to 24V has been made.

Original units had 110V "Power On" lights connected to the Starter Interface Board terminal strip BTS1 between terminals 4 and 35. The part number for a complete 110V "Power On" light is 39478961 and the part number for a replacement 110V bulb is 39132667.

Newer units have 24V amber "Power On" lights connected to the Starter Interface Board terminal strip BTS1 between terminals 1 and 2. The part number for a complete "Power On" light is 39485032 and the part number for a replacement 24V bulb is 39485024.

The basic difference between either a 110 light and a 24V light is the bulb rating and the connection points on BTS1.

WARNING

Prior to replacing any bulbs or making wiring changes, disconnect incoming power and lock and tag the disconnect switch.

Should you desire to convert an older unit from 110V "Power On" lights to 24V, install 24V bulbs and reconnect the light socket wires to BTS1 terminals 1 and 2 on the Starter Interface Board.

Whenever installing replacement bulbs on any unit, confirm the light voltage supply matches the voltage rating of the bulb being installed.

This CFSM sheet is issued for information purposes only and field conversions are not warrantable.

CONTROL VOLTAGE TRANSFORMER CONNECTIONS (ALL UNITS)

When changing a unit from a lower operating voltage to a higher operating voltage (Example: 230V to 460V) the control voltage transformer must be properly reconnected or Intellisys damage will occur.

The damage results from higher than normal control voltage from an improperly connected transformer.

The damage is easily identifiable and will be non-warrantable.

Refer to the connection diagram on the front of the control voltage transformer and confirm the required reconnections have been made **before** applying incoming power to the unit.

SHUTDOWNS RELATED TO INLET VALVE FAILURE

Follow this procedure if a 50 to 450 HP Intellisys machine shutsdown because the inlet valve failed to open after Star Delta transition.

1. Program the controller to look at inlet filter condition (i.e., psi vacuum) during operation. Serviceman's Guide, Page 55.

   (Normal operation)
2. At start-up, the inlet will close completely causing a high inlet vacuum (14 psi vacuum) or higher. At Star-Delta transition, the inlet valve should open slightly causing the vacuum to decrease and allowing the sump pressure to rise.

3. If the inlet valve does not open after Star-Delta transition, the machine will shut-down on:

   a. High Inlet Vacuum - Eprom 1.4 and lower (see trouble shooting procedure)
   b. Low Unloaded Sump Pressure - Eprom 1.5 and higher (see trouble shooting procedure)
   c. Check Inlet Control System - If a load mode is selected at transition, and the open stepper limit switch is not activated. (See trouble shooting procedure)

   Note:
   a, b, & c are normally caused by electrical circuit problems. Verify that all electrical circuits and components are operating properly.

4. If the valve does not open at Star-Delta transition, the problem is normally cause by the inability of the stepper motor to overcome resistance in the inlet valve. High inlet vacuum or a worn inlet valve shaft and plate assembly can mechanically bind and prevent the valve from opening against initial vacuum. Also, the valve shafts and plate assembly could be corroded or rusted in some manner.

5. The 6" Inlet Valve can be modified to reduce the torque required to open the valve. This is accomplished by drilling a 7/16" hole through the open side of the valve plate. See figure A for the location of the hole.

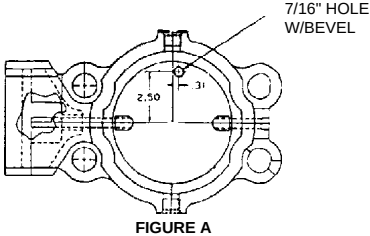


FIGURE A

All future production SSR compressors that use the 6" butterfly valve will use the valve with the 7/16" hole in the plate (P/N 39816798).

For field service needs, ordering the valve without the hole (P/N 39805577) will cross reference to the valve with the hole (P/N 39816798). Ordering the inlet valve kit including the valve wihtout the hole (P/N 39679253) will cross reference to the kit including the valve with the hole (P/N 39685656). Therefore, any replacement valves ordered will have the hole.

SSR 50-450 HP
STARTER INTERFACE BOARD VOLTAGE CHART

SSR Voltage Chart
Starter Interface Printed Circuit Board

BTS-1

TERMINAL #'S	VOLTAGE	CONDITION
1,2	24 VAC	POWER ON
1,2	0 VAC	POWER OFF
36,3	115 VAC	POWER ON
36,3	0 VAC	POWER OFF
32,3	115 VAC	HATS CLOSED
32,3	0 VAC	HATS OPEN
30,3	115 VAC	CLOSE D
30,3	0 VAC	OPEN
34,3	115 VAC	ESTOP CLOSED
34,3	0 VAC	ESTOP OPEN
28,27	115 VAC	DURING START UP AND RUNNING
28,27	0 VAC	UNIT STOPPED
26,25	115 VAC	AFTER STARTER TRANSITION
26,25	0 VAC	UNIT STOPPED AND PRIOR TO STARTER TRANS
24,23	115 VAC	UNIT STARTED AND BEFORE TRANSITION
24,23	0 VAC	UNIT STOPPED AND AFTER STARTER TRANSITION
20,19	115 VAC	UNIT RUNNING LOADED
20,19	0 VAC	UNIT STOPPED AND UNIT RUNNING UNLOADED
18,17	115 VAC	UNIT RUNNING
18,17	0 VAC	UNIT STOPPED
16,15	115 VAC	UNIT RUNNING *REMOTE COOLER SOLENOID MUST
16,15	0 VAC	UNIT STOPPED BE INSTALLED TO MEASURE INDICATED VOLATE

BTS-2

TERMINAL #'S	VOLTAGE	CONDITION
15,14	+5VDC	CONTACT OPEN
15,14	0VDC	CONTACT CLOSED
13,12	+5VDC	BOTH CONTACT OPEN
13,12	0VDC	EITHER CONTACT CLOSED
11,10	+5VDC	CONTACT OPEN
11,10	0VDC	CONTACT CLOSED
9,8	+5VDC	CONTACT OPEN
9,8	0VDC	CONTACT CLOSED
7,6	+5VDC	CONTACT OPEN
7,6	0VDC	CONTACT CLOSED
5,4	+5VDC	CONTACT OPEN
5,4	0VDC	CONTACT CLOSED
3,2,1	DRY CONTACTS RATED TO 240 VAC	

T3 ELECTRONIC CONTROL TRANSFORMER TERMINAL J1

TERMINAL #'S	VOLTAGE	CONDITION
1,6	115VAC	POWER ON
1,6	0 VAC	POWER OFF
2,4	7.1VAC	POWER ON
2,4	0 VAC	POWER OFF
3,5	7.1VAC	POWER ON
3,5	0 VAC	POWER OFF

BTS-3

TERMINAL #'S	VOLTAGE	CONDITION
1	GROUND	
5,2	+5VDC	POWER ON
5,2	0VDC	POWER OFF
3,2	+5VDC	INLET VALVE CLOSED AND COUPLING ENGAGED IN LOWER LIMIT SWITCH
3,2	0VDC	INLET VALVE NOT CLOSED
4,2	+5VDC	INLET VALVE OPEN AND COUPLING ENGAGED IN UPPER LIMIT SWITCH
4,2	0VDC	INLET VALVE NOT OPEN
6,7	5-12 OHMS POWER OFF *	
6,7	10-20 VDC POWER ON PHASE ON	
	0 VDC POWER ON PHASE OFF	
8,9	5-12 OHMS POWER OFF *	
8,9	10-20 VDC POWER ON PHASE ON	
	0 VDC POWER ON PHASE OFF	

TERMINAL #	VOLTAGE	CONDITION
J2 COM PORT	0-5VDC	
J3	LOW VOLTAGE DC (0,5,10VDC)	

* DO NOT ATTEMPT RESISTANCE MEASUREMENT WITH POWER ON.

50-100 HP APPROXIMATELY 6 OHMS
125-300 HP APPROXIMATELY 8 OHMS
300-450 HP APPROXIMATELY 12 OHMS

SSR 50-450 HP
ANALOG BARRIER BOARD VOLTAGE CHART

Analog Barrier Terminal Printed Circuit Board

BTS-1

TERMINAL #'S	VOLTAGE	CONDITION	
3,4	+5VDC	POWER ON	# 3 RED 5 VDC SUPPLY
3,4	0VDC	POWER OFF	# 4 BLACK GND
1,2	VARIABLE WITH PRESSURE		
	0-50mVDC	POWER ON	LINEAR
	0 VDC	POWER OFF	
5	GROUND		
8,9	+5 VDC	POWER ON	# 8 RED 5VDC SUPPLY
8,9	0VDC	POWER OFF	# 9 BLACK GND
6,7	VARIABLE WITH PRESSURE		
	0-50mVDC	POWER ON	LINEAR
	0 VDC	POWER OFF	
10	GROUND		
23,22	+5VDC	POWER ON	# 22 BLK 5 VDC SUPPLY
23,22	0VDC	POWER OFF	# 23 SHLD GND
21,22	VARIABLE DUE TO TEMPERATURE #21 WHT SIGNAL 10K OHM WITH TEMPERATURE @ 25 DEG. C. WITH POWER OFF *		
25,26	+5VDC	POWER ON	# 25 BLK 5 VDC SUPPLY
25,26	0VDC	POWER OFF	# 26 SHLD GND
24,25	VARIABLE DUE TO TEMPERATURE #24 SHT SIGNAL 10K OHM WITH TEMPERATURE @ 25 DEG. C. WITH POWER OFF *		

* TAKE MEASUREMENT WITH POWER OFF

BTS-2

TERMINAL #'S	VOLTAGE	CONDITION	
3,4	+5VDC	POWER ON	# 3 RED 5 VDC SUPPLY
3,4	0VDC	POWER OFF	# 4 BLACK GND
1,2	VARIABLE WITH PRESSURE		
	0-50mVDC	POWER ON	LINEAR
	0 VDC	POWER OFF	
5	GROUND		
22,23	+5VDC	POWER ON	# 22 BLK 5 VDC SUPPLY
22,23	0VDC	POWER OFF	# 23 SHLD GND
21,22	VARIABLE DUE TO TEMPERATURE # 21 SHT SIGNAL 10K OHM WITH TEMPERATURE @ 25 DEG. C. WITH POWER OFF. *		

* TAKE MEASUREMENT WITH POWER OFF AND THERMISTOR DISCONNECTED

BTS-3

TERMINAL #'S	VOLTAGE	CONDITION
3,4	+5VDC	CONTACT OPEN
3,4	0VDC	CONTACT CLOSED
5,6	+5VDC	CONTACT OPEN
5,6	0VDC	CONTACT CLOSED
7,8	+5VDC	CONTACT OPEN
7,8	0VDC	CONTACT CLOSED
J1	LOW VOLTAGE DC (0,5,10 VDC)	POWER ON
	0 VDC	POWER OFF

ELECTRO-STATIC DISCHARGE
FIELD SERVICE KIT
CCN 39198619

Static electricity built up by our ordinary everyday movement can be dissipated to any object we touch or handle during the day. Electronic devices, such as those found on Ingersoll-Rand compressors, can be damaged by this electricity. Even though the part will function properly for a while, the component life can be dramatically shortened.

An Electro-Static Discharge (ESD) kit has been developed to eliminate the risk of transmitting electricity to electronic components. Ingersoll-Rand recommends using the kit everytime Intellisys components (EPROMS, option proms, interface boards, etc.) are handled.

The ESD kit is now available through Ingersoll-Rand Air Compressor Parts.

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