Performer™

Single / Multi-stage
Rack Controller

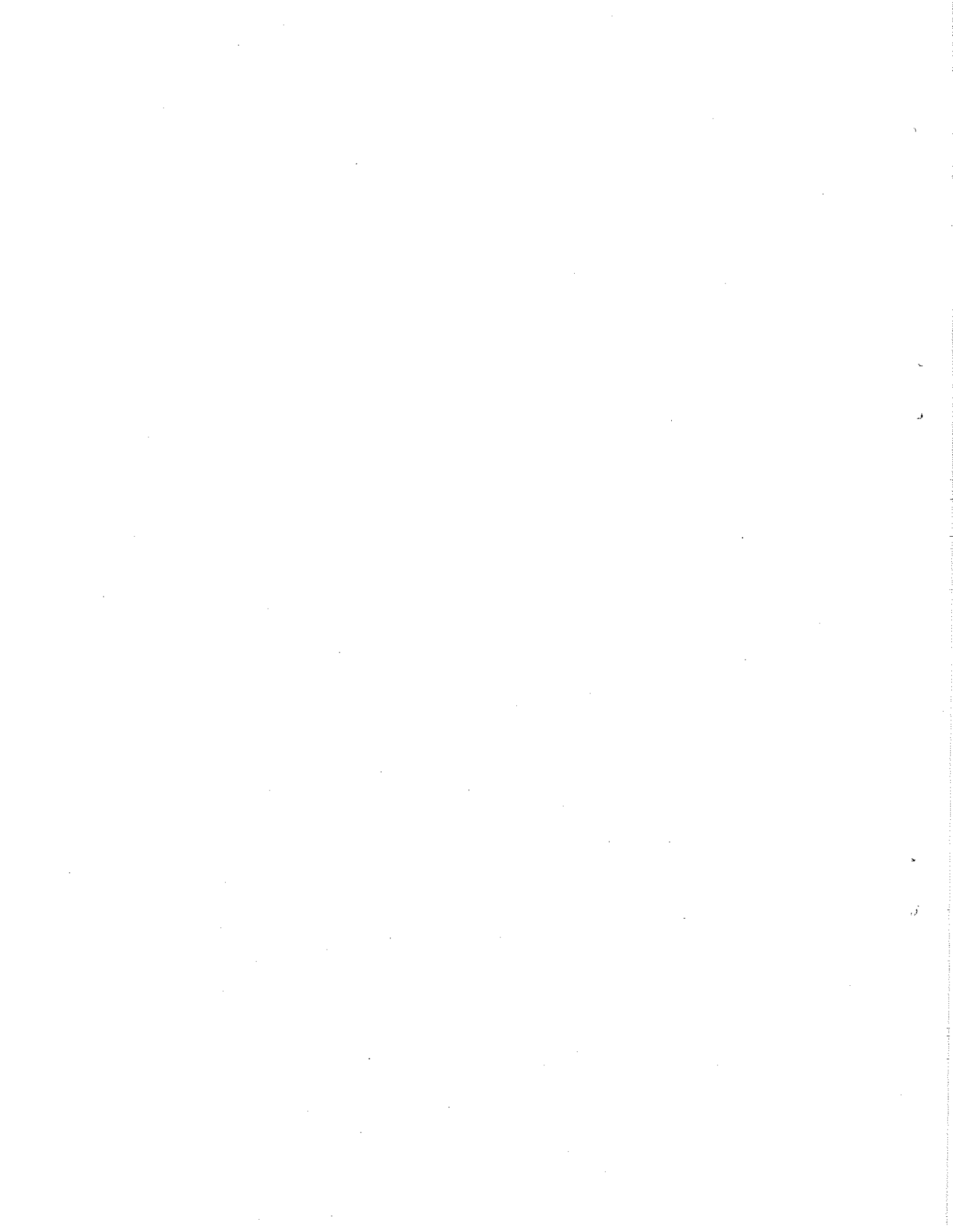# Installation and Operation Manual

Johnson Controls, Inc. - Encore Products
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Product covered by
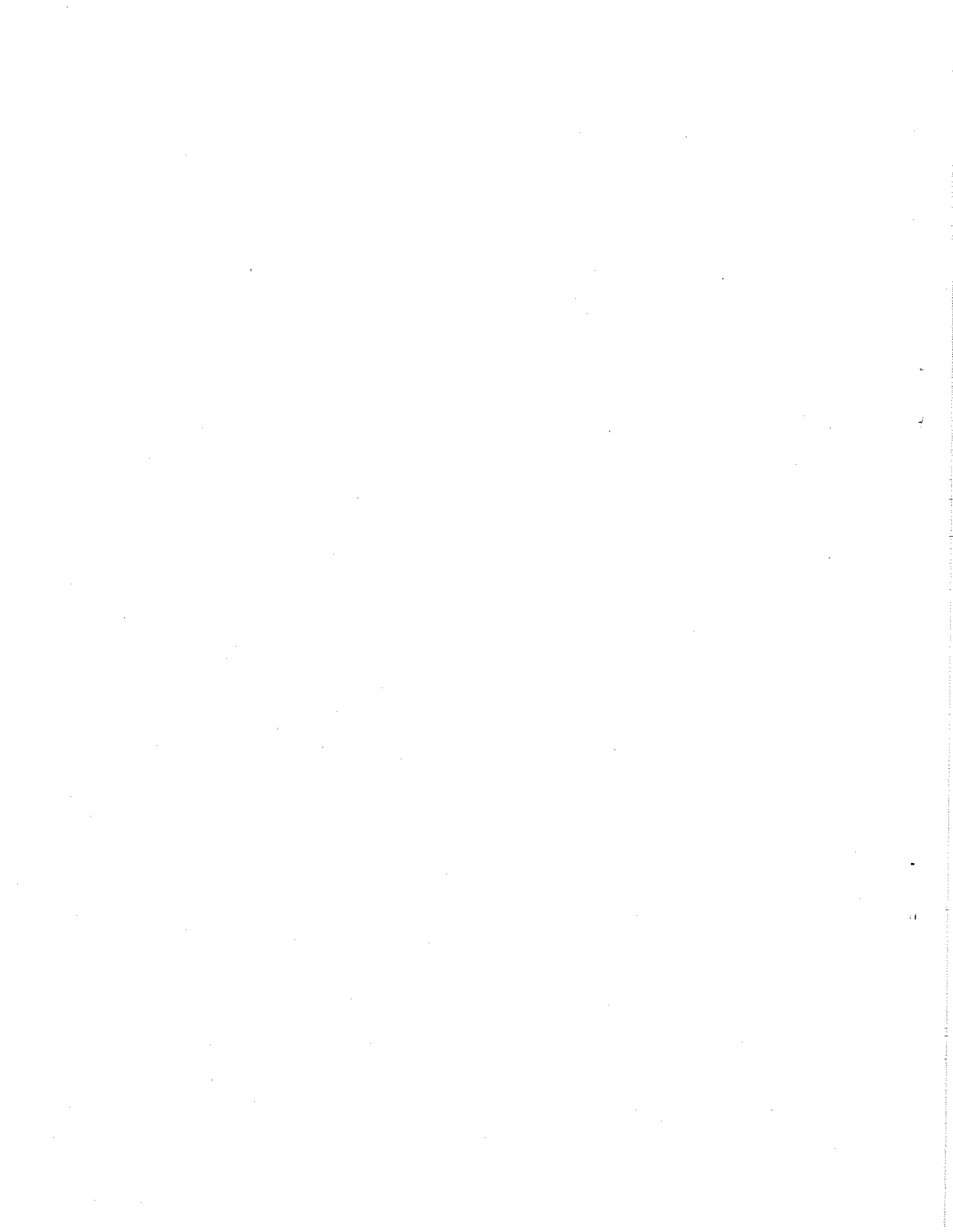U.S. Patent 5,440,891
Revision C (11/30/99)

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For questions relating to this product call Encore Products at (770) 427-9808.
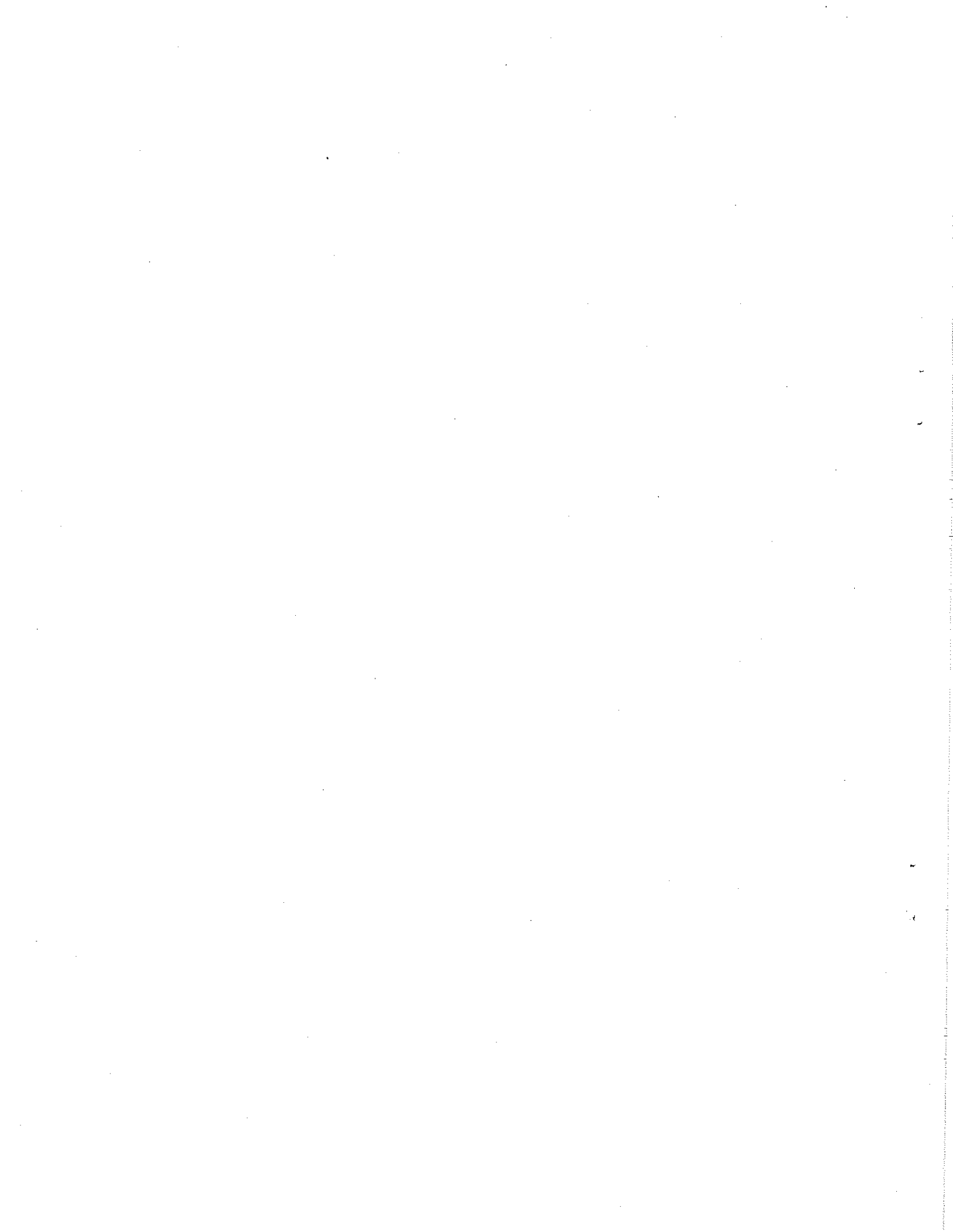
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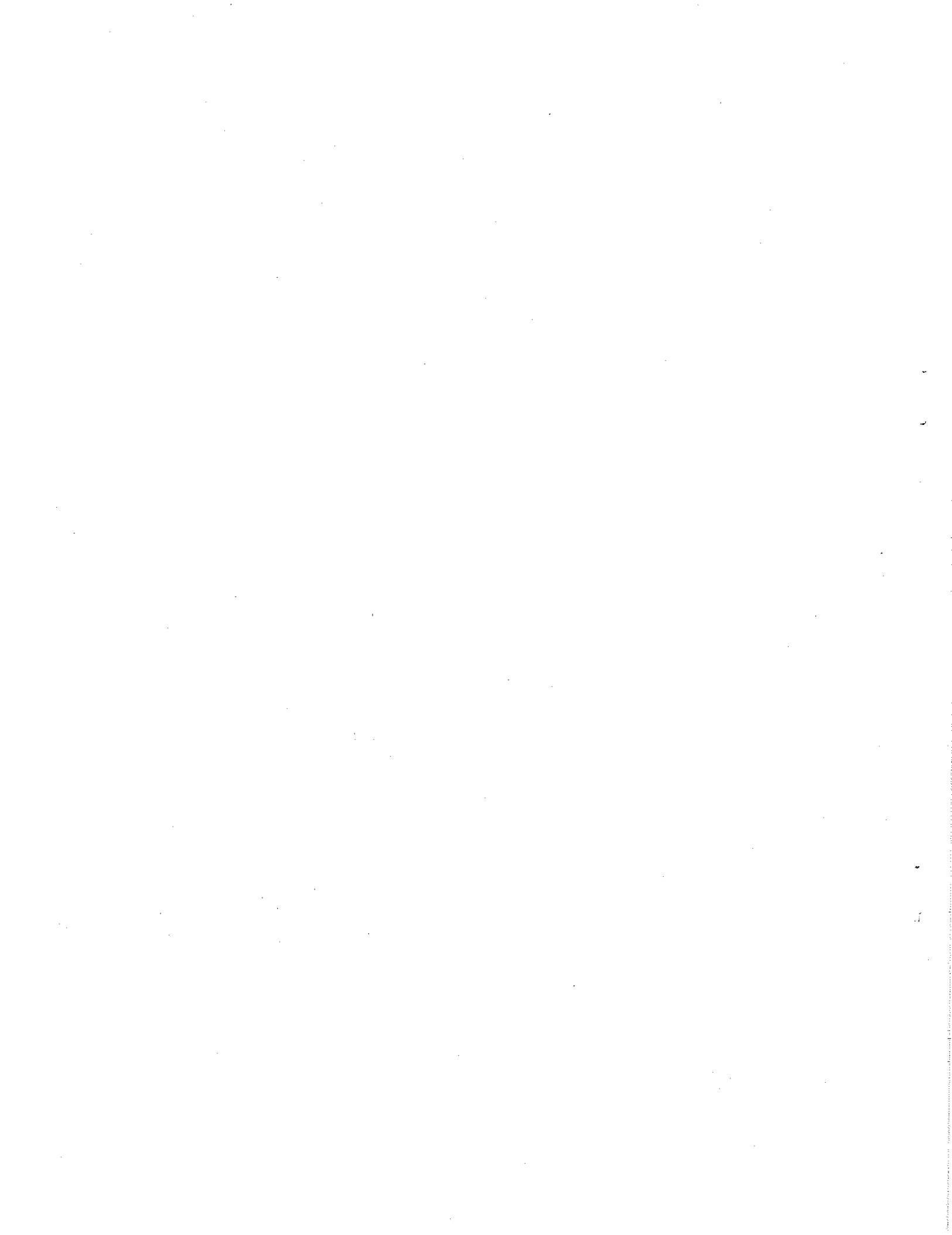
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Performer™

Single / Multi-stage Rack Controller
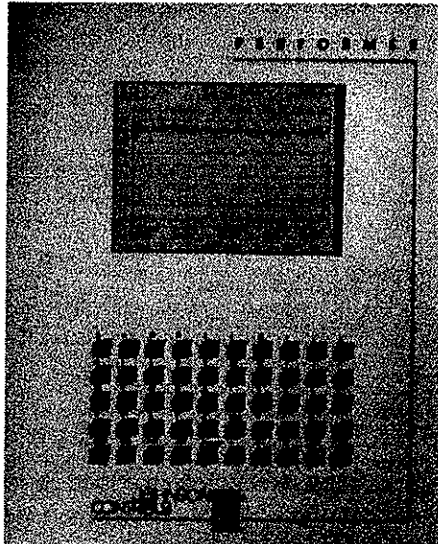
INTRODUCTION

The PERFORMER™ is a pressure controller for single or multistage refrigeration racks. Using a new concept in control logic, the PERFORMER™ offers superior control of refrigeration racks. The PERFORMER™ uses a single target which greatly improves the stability of the rack.

THEORY OF OPERATION

Controls using separate cut-in and cut-out setpoints have an inherent deadband problem. They are not controlling the rack when the suction pressure is between those two setpoints. In fact, by having a time delay, they only control when the suction pressure has moved outside the deadband for some period of time. This allows much wider swings in suction pressure than desired (see FIG. 1). Until the PERFORMER™, the cut-in / cut-out method of the control was the best available. Now, with the PERFORMER™, deadband is not a problem and suction pressures are controlled much tighter.
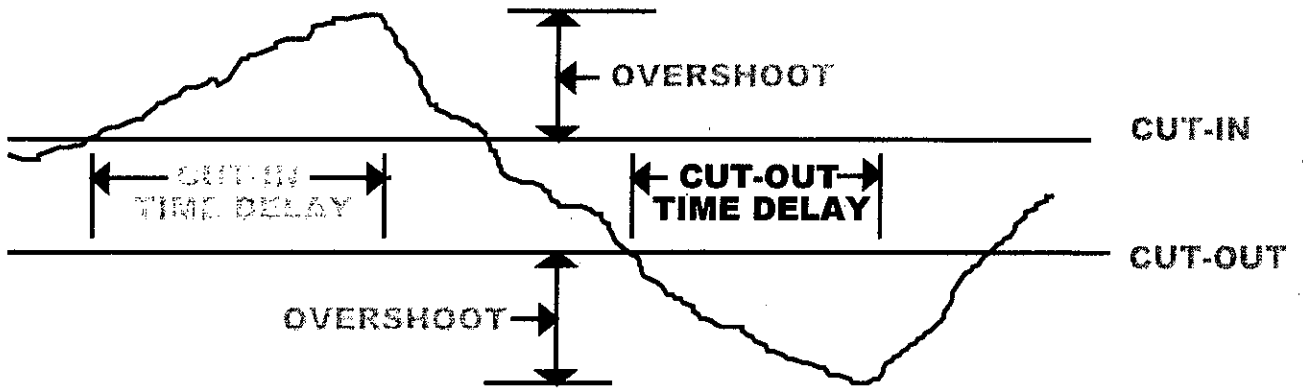
FIG. 1 - SUCTION PRESSURE OF CUT-IN / CUT-OUT CONTROLLERS

By using patented FUZZY LOGIC control, the PERFORMER™ does not have the deadband problem, it is controlling constantly. This means that your racks will run more consistently, suction pressure swings will not be as great. Consequently, shelf life of products will be longer. In addition, the FUZZY LOGIC allows the PERFORMER™ to reduce the number of cycles on compressors, lengthening their life. If unloaders are available, they will be used much more efficiently than currently available with other controllers.

PERFORMER responds quickly to large load changes

When using unloaders, the PERFORMER will control suction pressure very tightly
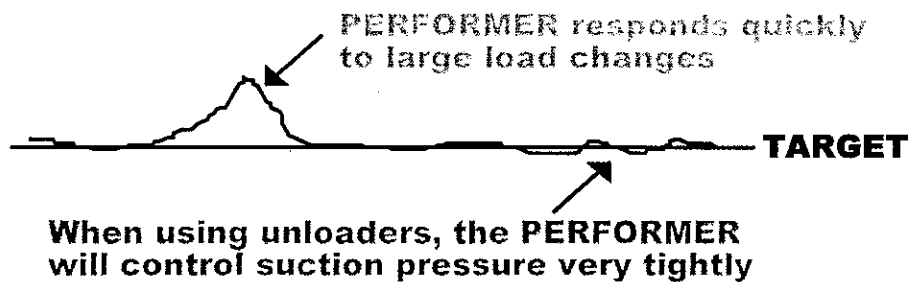
FIG. 2 - SUCTION PRESSURE OF PERFORMER

Previous rack controllers were limited to changing only one step at a time. This was due to limiting "state changes" to no more than two at a time. The PERFORMER™ does not need to limit the changes. It will add the number of compressors or unloaders needed. Wear on compressors will be reduced by not turning them on and off as often. In addition, the PERFORMER™ responds much quicker to large changes in suction pressure such as a case going into or coming out of defrost (see FIG. 2).

Often in a refrigeration system, suction pressure setpoints do not maintain the coldest or lead case at the desired temperature. A way around this was to "float" the suction pressure setpoints. For instance, if the lead case was too warm, the suction pressure setpoints were decreased a step at a time until the suction pressure was low enough to keep the case at the desired temperature. Likewise, if the case was too cold, the setpoints were adjusted up. By using FUZZY LOGIC, the PERFORMER™ does not need to adjust the suction pressure setpoints. Instead, it monitors the case temperature and if not close to the desired case temperature, will adjust the rack capacity using the suction pressure target to compensate for the difference. As the case temperature approaches the desired target, the PERFORMER™ will use the case temperature to adjust the capacity. With the PERFORMER™ there is no longer any confusion about why the setpoints are different from where they were set. The PERFORMER™ target stays where you set it and the case runs at the proper temperature.

PERFORMER™ FEATURES:

Very simple to use

- Single target

Three Suction Groups with 12 Outputs on each group to control either

- Compressors
- Unloaders
- Variable speed compressors

Sub-Cooling

- Built-in sub-cooling control

Control racks with:

- Single header - one suction header.
- Split-header - two suction headers using common discharge header.
- 2-stage - discharge of low stage feeding high stage.

Controls 2-stage correctly

- No external interlocking required to prevent low stage running without high stage
- Operates to improve compression ratio

Utilizes Unloaders efficiently

- Operates unloaders whenever possible to change capacity
- Reduces compressor cycling

Optimizes capacity for coldest case

- Maintains suction target and case temperature
- Gives much better temperature control than older controls using "floating"

Logging

- Keeps 500 logs and graphs of many system inputs
- Last 100 alarms

Generic Inputs and Outputs

- 64 generic analog / digital inputs
- 32 generic outputs
- Schedules
- Log and graph inputs individually

Quickly responds during abrupt suction pressure changes

- Not limited to next step of capacity
- Excellent response after defrost
- Reduces number of compressor start/stops
- Uses actual runtimes to equalize runtimes on compressors with same horsepower, no first-on, first-off.

Solenoid and Defrost Control

- 40 Circuits
- Hot Gas, Electric and Off Cycle
- Sensor control and termination can use multiple sensors
- Simple and quick manual overrides

Condenser Control

- 12 fans with variable speed fan
- Split condenser

Built-in alarms

- Suction pressure
- Discharge pressure
- Case temperature
- Local alarm output
- Liquid level

Remote communications

- Encore 2100 System
- "Maestro" Windows™ Remote Package

INSTALLATION

SHIPPING DAMAGE

The PERFORMER™ has been inspected, packed and delivered to the carrier in good condition. If the carton appears to have been damaged in transit, notify the carrier at once. Inspect the unit carefully upon arrival, check contents against packing slip. Notify our office or your local dealer if a discrepancy should exist. No returns are accepted without prior approval.

PRE-INSTALLATION CHECK

Before installing the PERFORMER™ be sure that the supply voltage is supplied by an Encore transformer, part number 700-1005 (5 board transformer) or 700-1010 (10 board transformer).

WARNING - MAKE SURE THAT THE SUPPLY VOLTAGE IS CORRECT. DO NOT USE 120 OR 208 VAC.

In addition, make sure that the network wiring to the input and output boards is correct and polarity has been maintained. Each input board has to have its unique address set into the switches on the board (see pages 78 & 79). Like wise each output board must have its unique address set into its switches (see pages 78 & 79).

UNIT LOCATION

The PERFORMER™ should be located on the control cabinet of the rack. Mount the unit protected from the elements - indoors and away from any possible water contact. Eye level is recommended for ease of operation.

UNIT MOUNTING

The PERFORMER™ is designed to mount in the door of the rack's control cabinet. Using the appropriate anchors, place fasteners in the six mounting holes provided (see page 83). Do NOT use a drill inside the PERFORMER™ enclosure. Drill filings will cause the unit to malfunction and this damage is not covered under warranty. Do NOT drill any new holes in the enclosure.

WIRING

All wiring must meet NEC and local codes.

Note: Wire any sensor and low voltage wires separately from any high voltage.

WIRING SIZES:

Pressure Transducers - Use 18AWG stranded three conductor shielded cable, Belden 9365 or equivalent.

Temperature Sensors and Defrost Sensors - Use 22AWG stranded two conductor shielded cable, Belden 9451 or equivalent

All wiring and connections are field supplied and installed.

RELAY CONTACTS

The PERFORMER™ uses Encore output boards for control connections. The output boards use relay contacts and are rated at 208VAC, 3A Max. These "Form C" contacts may be wired N.C. (normally closed) or N.O. (normally open). The red LED light above the individual relay will be on when the relay is energized (opened). For instance, if a condenser fan is wired N.C. (fail closed) the fan itself will be powered when the relay is NOT energized. This example will also have the red LED above this relay off while the condenser fan is on.

POWER INPUT

Power Supply - **Insure that the supply voltage is 24 volts AC.** Follow NEC and local codes, and connect PERFORMER™ to a transformer supplied by Encore (part number 700-1005). Do not use a transformer other than the Encore 700-1005 as damage may occur to unit.

REMOTE ALARM

PERFORMER™ offers NO-COM-NC (Form C) terminals for remote alarm use. This output is used for the remote alarm output. The alarm output should be wired to a local alarm to notify store personnel of a problem on the rack. The local alarm should be wired to the Normally Closed (NC) contact. This will allow an alarm should power be lost to the PERFORMER™.

STARTUP

After all connections have been made, apply power to the PERFORMER™. The display will show the Main screen. Make sure that all sensors are reading properly. If the readings are not correct, check the wiring.

From the main screen press the "S" key to start setting up the PERFORMER™. (see Setup section under Screens for help with questions). Call our office at (770) 427-9808 for help with any questions on the PERFORMER™ .

REFRIGERATION SYSTEM SETUP

If you plan to use temperature to control the rack, you must do things a little differently at startup than with other controllers you may be used to. You must set the temperature target to "N/A" in the PERFORMER™ and force the rack to run off suction pressure only. When all EPR valves and superheat has been set then you can enter a target into the PERFORMER™. If you do not do this and the temperature cannot be pulled down to your target, the PERFORMER™ may cycle suction pressure widely in an effort to satisfy both temperature and pressure.

OPERATION

PUSH-BUTTON OPERATION

Push-buttons are used to set the PERFORMER™ initially and change setpoints. The PERFORMER™ has a full keyboard available instead of requiring you to press several keys to get one letter or number. The keys labeled with yellow are those keys you will use most. Entries are made by pressing the keys you want. When you press a letter key, you will get a small case letter. If you want a upper case letter, hold the "shift" key while pressing the key you want.

In many fields you will have several options to choose from. To see your options and scroll through them, press the "spc" key.

When you are in a data entry field, you can use the right and left arrows to move around in the field. To delete a character, move the cursor to the letter you wish to delete by using the arrow keys then press the "del" key.

Anytime you are making changes you can get back to the menu by pressing the "menu" key.

ENTERING A PASSWORD

All of the settings in the PERFORMER™ may be viewed but may not be changed without first entering a password. If a password has not already been entered when the down-arrow key is pressed, the password entry screen will pop up and request a user ID. When the user ID is entered, another screen will request the user's password. Once the user ID and password have been entered, the PERFORMER™ will search through the list of authorized users and, if found, will log you on. Setpoint changes may now be entered. You can log off by going to the Main Screen and pressing the "G" (LoGoff) key. However, you do not have to log off. The PERFORMER™ will automatically log off when no keys are pressed within 5 minutes. But, it is best if you log off when finished making any changes. This prevents someone from coming up after you leave within the five minute time period and making unauthorized changes.

How To...

...check status of the suction groups?

On the main screen of the Performer™, most of the information for the first suction group is available. To see the other suction groups (if used), press the "Hot Keys" 2 or 3 for the second and third suction groups.

To get to the Main Screen from any other screen, press the "M" key (Main) from any other screen while in the menu items.

MAIN SCREEN - Status of Suction Group Number One

Menu Items:
The backlit letters or numbers are the "Hot Keys". Press the "Hot Key" on the keypad below to move to the desired menu item on any screen.

Suction Pressure and its target.

Displayed if the Master Liquid Line Solenoid is on.

If the stage letter is Backlit, the stage is being called for to be on.

If the stage letter is blinking, the stage has been overriden on or off (depending on whether it is backlit or not).

Displayed if this Performer™ has an alarm.

How this suction group is controlled.

Lead Case Temperature (if used, its target and if DEF is shown - it is in Defrost.

Discharge Pressure and its cutout value.

Up to 12 stages of control:
C - Compressor
U - Unloader
V - Variable Speed
_ - None

Liquid Level (if used)

Variable Speed (if used)

```
STATUS      11/15/95   12:50 PM      REV B 2.09
Group2 Group3 Target History Override
Setup  Circuits ConDenser  I/O Logoff

GROUP 1      ALARM      Controlled by
                         Pressure

  Suction        Case         Discharge
     8           -15            182
   psig         deg F           psig
                 DEF
  Target 8     Target N/A     Cutout 350

              MLLS
  STATUS

   1 2 3 4 5 6 7 8 9 10 11 12
   V C U C U C C U _  _  _  _

   Liquid Level      60 %
   Speed           1200 RPM
```

...check status of the condenser?

From the main screen of the Performer™, press the "D" key (conDenser) to move to the status of the condenser.

CONDENSER SCREEN - Status of Condenser

Discharge Pressure (in psig).

If used, target will be displayed.

The condenser can be controlled by:

Discharge Pressure, Drop-leg Temperature, or Drop-leg / Outdoor Air Temp. Differential

Status of up to 12 condenser fans.

F – Fan

– None

If On, the split condenser valve is being called for to be on.

```
STATUS - CONDENSER
Main Group2  Group3 Targets Overrides
Runtime

 ┌──────────────┬──────────────┬──────────────┐
 │  Discharge   │  Drop Leg    │  Outdoor     │
 │              │              │              │
 │    182       │     85       │     73       │
 │              │              │              │
 │   psig       │   deg F      │   deg F      │
 │              │              │              │
 │ Target 180   │              │              │
 └──────────────┴──────────────┴──────────────┘

    Controlled by Discharge Pressure

        Fan Status              Subcooler
 ┌───────────────────────────┐  ┌─────────┐
 │ 1 2 3 4 5 6 7 8 9 10 11 12│  │  1 2 3  │
 │ F F F F - - - - - - - -  │  │  S S S  │
 └───────────────────────────┘  └─────────┘

                   Subcooler Outlet    80
 Split Valve:  On
```

Outdoor Air Temperature (in °F).

[if used or monitored]

Drop-leg Temperature (in °F).

[if used, target will be displayed]

Status of up to 3 stages of subcooler control.

S – Subcooler stage

If the stage letter is Backlit, the stage is being called for to be on.

If the stage letter is blinking, the stage has been overriden on or off (depending on whether it is backlit or not).

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...check a graph of a rack input, refrigeration circuit temperature or generic input?

The Quick Graph feature on the Performer™ will allow up to 3 graphs to be overlaid on a single screen. You will be able to zoom in and out up to 5 times and see the actual readings, time and date of each graphed item.

To Quick Graph feature from any other screen, press the "M" key (Main) from any other screen while in the menu items and then press the "H" key (History), then the "D" key (Data) and then the "G" key (Graphing).

The Quick Graph feature is also accessible in the Circuits menu under the Logs of the case temperatures and is accessible in the Logs of the Generic I/O's (generic inputs and outputs). These different paths to the Quick Graph feature are placed in to make it easier to get to the graphing from many different locations in the Performer™ Rack Controller.

QUICK GRAPH

View rack inputs, circuit temperatures and generic inputs

Zoom in and out by pressing the "I" to Zoom In and the "O" to Zoom Out.
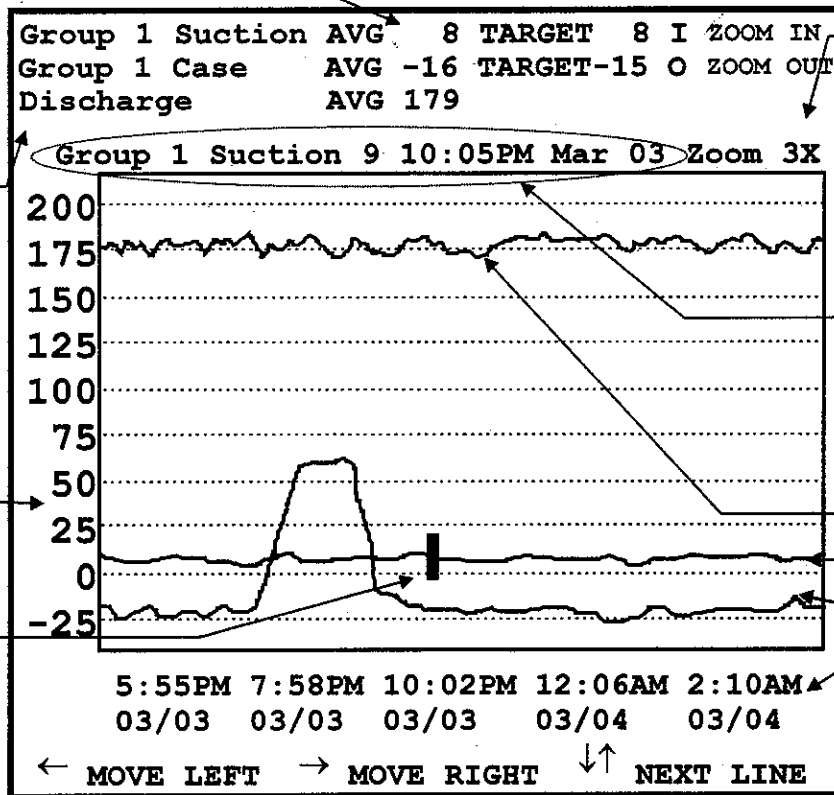
Quick Graph automatically displays the average of the logged inputs and the targets (if assigned a target).

Zoom in up to 5 times magnification.

```
Group 1 Suction  AVG    8 TARGET   8 I ZOOM IN
Group 1 Case     AVG  -16 TARGET-15 O ZOOM OUT
Discharge        AVG 179
```

Overlay up to 3 inputs for graphing from rack inputs, case temperatures or generic inputs.

Quick Graph will display any logged reading, time and date from any of the up to 3 inputs overlaid on this graph. The cursor position on the graph will determine the which reading is displayed here.

```
 Group 1 Suction 9 10:05PM Mar 03 Zoom 3X
 200
 175
 150
 125
 100
  75
  50
  25
   0
 -25
```

Quick Graph automatically sets up the display with the correct intervals for the graph to display all information.

Overlay up to three graphs on a single screen.

Quick Graph Cursor - move around the graph with the arrow keys to find a specific logged reading from one of the 3 graphs on screen.

```
  5:55PM  7:58PM  10:02PM  12:06AM  2:10AM
  03/03   03/03   03/03    03/04    03/04

← MOVE LEFT   → MOVE RIGHT   ↓↑ NEXT LINE
```

Date and Times of the graph above.

Use the yellow arrow keys to move the cursor from one graph to another or across readings on one graph.

Hold down the "ALT" key and then press the "←" or "→" arrow keys to jump across pages of this graph. Hold down the "SHIFT" key and press the "←" or "→" arrow keys to jump over a few logged readings

...edit setpoints in the Performer™?

On any screen which may be edited, press the "↓" down-arrow key to move from the Menu Items at the top of the screen to the editable information below. Keep pressing the "↓" down-arrow key until the field in which you wish to edit is backlit. Once backlit, you may type in the value (if the field accepts values), press the "del" if you wish to delete one character at a time, or press the "spc" key (space key) to toggle through the available choices (if the field has predetermined values). You may use the "↓" down-arrow key and "↑" up-arrow key to move through all the fields on the screen.

When editing a screen, you will not be able to move from one screen to another. When you have finished editing all the fields on this screen, press the "menu" key (at the bottom of the keypad) to move back up to the Menu Items at the top of this screen.

...check status of the alarm logs or data logs?

From the main screen of the Performer™, press the "H" key (History) to move to the alarm and system logs. The **LOGS - ALARMS** screen will display all the alarms (with the most current alarm at the top of the list) for this Performer™. To see who acknowledged the alarm and what suction group the alarm was from, press the "↓" down-arrow key to move to the desired alarm and then press the "→" right-arrow key to see the additional information.

To view the data logs on this Performer™, move from the main screen by pressing the "H" key (History) to move to the alarm and system logs. Then press the "D" key (Data) to move to the **LOGS - DATA** screen to see the last 500 logs (with the most current log at the top of the list) for this Performer™. To view all the data - logging information, press the "↓" down-arrow key to move to the desired data - log and then press the "→" right-arrow key to see the additional information.

...log into and out of the Performer™?

Signing into the system (Logging On) is extremely simple. No matter what screen you are on, when you try to place something into override or edit any information, the Performer™ will prompt you immediately to enter your user name and your password. Simply use the keypad to enter your name and then press the "enter" key. Then enter your password and press the "enter" key.

Encore sends out the Performer™ with "ABC" as the user name and "ABC" as the password. To access a new Performer™ at your facility, when the user name prompt is on the screen, type in ABC and press the "enter" key. Then, when prompted for the password, type in ABC and press the "enter" key again and you are then signed onto the system.

Signing out of the system (Logging Off) is just as easy. From the main screen, press the "G" key (loGoff) or wait five minutes and the Performer™ will automatically sign you off.

You can view all statuses, setpoints and logs without being logged on. To modify or override anything, you must be logged on.

...manual defrost?

From the main screen, press the "C" key (Circuits), then press the "↓" down-arrow key to move to the desired circuit to override and then press the "M" key (Manual). Then press the "D" key (start Defrost) to start the defrost for this circuit. The defrost will proceed through it's normal termination (time or temperature) cycle.

...manual runoff for defrost?

From the main screen, press the "C" key (Circuits), then press the "↓" down-arrow key to move to the desired circuit to override and then press the "M" key (Manual). Then press the "R" key (start Run off) to start the Run off for this circuit. The runoff will proceed through it's normal time termination.

...stop a defrost?

From the main screen, press the "C" key (Circuits), then press the "↓" down-arrow key to move to the desired circuit to override and then press the "M" key (Manual). Then press the "T" key (Terminate defrost) to stop the defrost for this circuit. This termination stops a normal or manual defrost.

...override a refrigeration solenoid ON?

From the main screen, press the "C" key (Circuits), then press the "↓" down-arrow key to move to the desired circuit to override and then press the "M" key (Manual). Then press the "O" key (override On) to override ON the refrigeration solenoid for this circuit. This is a FIXED override and will stay overriden until it is manually taken out of override.

...override a refrigeration solenoid OFF?

From the main screen, press the "C" key (Circuits), then press the "↓" down-arrow key to move to the desired circuit to override and then press the "M" key (Manual). Then press the "F" key (override oFf) to override OFF the refrigeration solenoid for this circuit. This is a FIXED override and will stay overriden until it is manually taken out of override.

...take a refrigeration solenoid out of override?

From the main screen, press the "C" key (Circuits), then press the "↓" down-arrow key to move to the desired circuit to override and then press the "M" key (Manual). Then press the "C" key (Cancel override) to cancel the manual override for the refrigeration solenoid for this circuit.

...override a compressor?

From the main screen, press the "O" key (Overrides), then press the "↓" down-arrow key to move to the desired compressor to override and then press the "spc" key (space key) until the desired override is selected ON, OFF, or Norm (normal operation). These overrides are FIXED and will stay overriden until taken out of override.

...override a condenser, split condenser valve or subcooler stage?

From the main screen, press the "O" key (Overrides), then press the "C" key (Condener), and then "↓" down-arrow key to move to the desired output to override and then press the "spc" key (space key) until the desired override is selected at ON, OFF, or Norm (normal operation). These overrides are FIXED and will stay overriden until taken out of override.

...override a generic output?

From the main screen, press the "O" key (Overrides), then press the "O" key (Outputs), and then "↓" down-arrow key to move to the desired output to override and then press the "spc" key (space key) until the desired override is selected at ON, OFF, or Norm (normal operation). These overrides are FIXED and will stay overriden until taken out of override.

SCREENS - (GENERAL INFORMATION)

NOTES:

- All setpoints and information in the PERFORMER™ can be viewed by pressing the keys. You must enter a password when changing any setpoints. If you press the down arrow key while the menu selections are highlighted and have not entered a password, you will then be prompted to input your password.

- The PERFORMER™ operates by using a menu system. The first line always shows the name of the screen you are currently on. The second and third lines of the display always show selections available. To get to the screen you want, press the key that is highlighted.

- Once on the desired screen to view or edit, press the "↓" key (down arrow key) to select or edit the information on that screen.

- Some selections are shown in brackets[ ]. To save you time, the "spc" key can be used to scroll through all available selections for those fields enclosed by brackets.

- When you have made changes to a screen, press the "menu" key and the menu will be highlighted again allowing a new selection to be displayed.

- On most screens, the first selection on the menu will be "Main". Pressing the "M" key will return you to the main screen, the central point for all other menu selections.

COMPRESSORS

COMPRESSOR STATUS - "MAIN SCREEN"

```
STATUS     11/15/95  12:50 PM    REV B 2.09
Group2 Group3 Target History Override
Setup Circuits ConDenser I/O LoGoff
```

GROUP 1   [ALARM]   Controlled by
Pressure

Suction	Case	Discharge
8	**-15**	**182**
psig	deg F	psig
	[DEF]	
Target 8	Target N/A	Cutout 350

[MLLS]

STATUS

```
1  2  3  4  5  6  7  8  9 10 11 12
V  C  U  C  U  C  C  U  _  _  _  _
```

Liquid Level   60 %
Speed   1200 RPM

To get here:
This is the screen that shows up when power is applied to the PERFORMER™. Also, you can get here from any other screen by pressing the "M" key when in the MENU.

Purpose:
The main screen shows the current status of the rack.

Menu Selections:

Group2	- shows status of suction group 2 (if used)
Group3	- shows status of suction group 3 (if used)
Target	- allows targets or alarm setpoints for the group or condenser to be set or changed
History	- allows viewing of data logs or alarm log
Setup	- used to initially setup the PERFORMER™
Overrides	- used to manually turn an output on or off (all manual overrides except defrost and refrigeration solenoids)
Circuits	- setup, make changes and manual overrides for defrost and refrigeration solenoids (this includes defrost and solenoid manual overrides)
Condenser	- shows status of condensers and targets

I/O — view status, setup, edit and overrides of generic inputs and outputs

Logoff — used to log off the PERFORMER™. If there is no activity on the PERFORMER™ keypad in 5 minutes, the system will log off automatically.

Function:

This screen shows the status of suction group number 1. If more than one suction group is being controlled, the information for group 2 can be shown by pressing the "2" key. Likewise, if a third group is being controlled, that information can be accessed by pressing the "3" key. The current group number is shown.

If there is any type unacknowledged alarms, "ALARM" will be displayed in reverse lettering on this screen as shown.

Since the PERFORMER™ controls the rack by temperature or pressure, this screen tells you which is currently being used for control.

Three blocks are shown on the Main screen. The leftmost block shows the current suction pressure in large numbers and the target value just below it. The center block shows the current lead case temperature in large numbers and the lead case temperature target just below. The rightmost block shows the current discharge pressure in large numbers and the cut-out discharge pressure below it.

In the status block, the current status of each compressor or unloader is shown. If the output is a compressor, a "C" will be displayed under the output number (numbers on top going from 1 to 12). If the first output is a variable speed, a "V" will be shown instead of a "C". If the output is an unloader, a "U" will be displayed. If the output is off, the letter will be blue with a white background. If the output is on, it will be a white letter with a blue background. If the output is currently overridden, it will flash.

Finally, if the first output is a variable speed compressor, the current speed in RPM will be shown directly below the status box.

If DEF shows on the screen in the Lead Case Temperature display box (as shown here), that indicates that the lead case is in defrost.

If MLLS shows on the screen (as shown here), then the Master Liquid Line Solenoid is energized (a hot gas circuit is in defrost).

COMPRESSOR TARGETS AND ALARM SETPOINTS
(for suction group1, group2 and group3)

```
┌─────────────────────────────────────────────────────┐
│ TARGETS - GROUP 1                                   │
├─────────────────────────────────────────────────────┤
│ Main   Group 2 Group 3  Disch Condenser             │
│ Split   Setup-Group1                                │
├─────────────────────────────────────────────────────┤
│                                                     │
│             Target  HiAlm  LoAlm  Delay             │
│                                                     │
│ Suction        8      25      3   30 min.           │
│ Case         -15       0    -25   90 min.           │
│ Compressor ON Delay               90 sec.           │
│ Compressor OFF Delay              30 sec.           │
│ Unloader ON/OFF Delay              5 sec.           │
│                                                     │
│   [Yes] Run one compressor during defrost           │
│   [No ] Run in vacuum                               │
│   [Yes] Vacuum causes alarm                         │
│                                                     │
│                                                     │
│                                                     │
│                                                     │
│                                                     │
│                    ↓                                │
│   Press        to edit or select for list           │
│                                                     │
└─────────────────────────────────────────────────────┘
```

Get here from the Main screen:
Press the "T" key.

Menu selections:

Main	- show the group 1 status screen
Group2	- targets for group 2 (if used)
Group3	- targets for group 3 (if used)
Disch	- discharge setpoints
Condenser	- condenser setpoints
Split	- setpoints for split condenser (if used)
Setup_Group1	- set compressor information, etc. for group 1

Purpose:

Allows targets and alarms to be set for suction group 1. (Group2 and Group3 targets screens show this same information except for group 2 and group 3 respectively).

Function:

This screen allows the operating targets, alarm setpoints and timing to be set for the suction group. Note that there is only one target suction pressure and lead case temperature used by the PERFORMER™ . The suction target is the suction pressure from a pressure-temperature chart which should maintain the desired temperature in the lead (coldest) case. If the suction pressure

goes above or remains at the value set into the Suction HiAlm field for the Delay period, a high suction alarm will be put into the alarm log and the alarm output will be energized (if an output board and point number has been assigned). Likewise, if the suction pressure goes lower than the Suction LoAlm field value and remains for the Delay period, an alarm will occur. The same will occur for the lead case temperature. If no alarm is desired for either of these fields, press the "N" key and an "N/A" will be shown to indicate that this feature will not be used.

The PERFORMER™ normally operates by using temperature to control the rack if a lead case target is entered. If you do not wish to use temperature control, enter a "N/A" into the Case Target field. This will cause the PERFORMER™ to use only suction pressure in controlling the rack.

The PERFORMER™ makes the selection of which compressors or unloaders are to be turned on or off by its patented fuzzy logic algorithm. In addition, it determines the amount of time delay between changing the outputs. Therefore, you may see a very short period of time when the PERFORMER™ is actively changing the outputs. This normally occurs when power is restored, at the beginning of a defrost or at the end of a defrost. However if this is unsatisfactory, you may limit the number of times the outputs are cycled by changing the Compressor ON Delay and OFF Delay values and the Unloader Delay values (if used). The ON delay is the time in seconds after a output has turned on until another output can come on. Similarly, the OFF delay is the time in seconds that must elapse after one output has turned off before another output can turn off.

On this screen you also have three other options regarding suction pressure. First, you can have the PERFORMER™ force at least one compressor to run during defrost. In hot gas systems this should insure that heat is available. Next, if "NO" is entered in the "run in vacuum" field, the PERFORMER™ will turn off all outputs should the suction pressure go below 0 PSIG. The final option allows you to get an alarm if the suction pressure goes into a vacuum.

COMPRESSORS OVERRIDES

```
┌─────────────────────────────────────────────────────┐
│ OVERRIDES - COMPRESSORS                               │
│ ▌M▐ain   ▌C▐ ondenser  ▌O▐ utputs                     │
├─────────────────────────────────────────────────────┤
│ Group 1                                               │
│   Comp  Stat   Comp  Stat   Comp  Stat                │
│    1    Norm    5    Norm    9    Norm                 │
│    2    On      6    Norm   10    Norm                 │
│    3    Off     7    Norm   11    Norm                 │
│    4    Norm    8    Norm   12    Norm                 │
│ Group 2                                               │
│   Comp  Stat   Comp  Stat   Comp  Stat                │
│    1    Norm    5    Norm    9    Norm                 │
│    2    Norm    6    Norm   10    Norm                 │
│    3    Off     7    Norm   11    Norm                 │
│    4    Norm    8    Norm   12    Norm                 │
│ Group 3                                               │
│   Comp  Stat   Comp  Stat   Comp  Stat                │
│    1    Norm    5    Norm    9    Norm                 │
│    2    On      6    Norm   10    Norm                 │
│    3    Off     7    Norm   11    Norm                 │
│    4    Norm    8    Norm   12    Norm                 │
│   Press  ↓  to edit or select for list                │
└─────────────────────────────────────────────────────┘
```

To get here from the Main screen:
Press the "O" key.

Menu selections:

Main	- show the group 1 status screen
Condenser	- allows overriding of condenser fans
Outputs	- allows overriding of generic outputs (up to 32 generic outputs)

NOTE: Defrost and Solenoid overrides are not in this menu item. Those overrides are in the Circuits menu item on the main screen.

Purpose:
Allows you to manually turn on a suction group output. This can be used during setup of the system to insure proper wiring.

Function:
To override a compressor, you must press the down-arrow. The "Stat" or status field of the output will be highlighted. Note that all three suction groups are shown on this one screen, so make sure that you are in the correct suction group. Press the down-arrow or up-arrow until you get to the desired output. You have a couple of options to set the output to the desired state. You can press the "spc" key and the status will cycle from "Norm" (normal operation), to Off, then to On, and finally back to Norm. When the status is what you want it to be, press the down-arrow or up-arrow to move to the next output. When you are finished, press the "menu" key.

NOTE: **These overrides are fixed, once they are turned on or off, they will stay that way until someone manually takes it out of override into normal operation.**

COMPRESSORS RUNTIMES

```
┌──────────────────────────────────────────────────┐
│COMPRESSOR RUNTIMES - GROUP 1                       │
│█Main   Group █  Group █   █ondenser C █ear          │
│                                                    │
│                                                    │
│Group 1                                             │
│ Cmp  Hours  Cmp  Hours  Cmp  Hours  Cmp  Hours     │
│   1     3    4     2     7     1    10     0        │
│   2     1    5    10     8     6    11     0        │
│   3     9    6     4     9     0    12     0        │
│                                                    │
│                                                    │
│                                                    │
│                                                    │
│                                                    │
│                                                    │
│                                                    │
│                                                    │
│                                                    │
│ Press   ↓   to edit or select for list             │
└──────────────────────────────────────────────────┘
```

To get here from the Main screen:
Press "H" (history), press "G" (Group1_Runtime).

Menu selections:

Main	- show the group 1 status screen
Group2	- shows group 2 runtimes (if used)
Group3	- shows group 3 runtimes (if used)
Condenser	- shows condenser runtimes
Clear	- clears runtimes of one or all stages of compressors in a group or fans in the condenser

Purpose:
Displays the runtime in hours of all 12 outputs of a suction group.

Function:
The output number is shown under the header "Cmp" and its runtime is shown to the right under the "Hours" header.

To clear runtimes, press the "L" key. A window will appear asking if you wish to clear all the runtimes or a single output. If you wish to clear all runtimes for this suction group, press the "1" key. All runtimes will be immediately cleared to zero hours.

If you only want to clear a particular output to zero, for instance, where a single compressor body has been replaced, press the "2" (single) key. A new window will appear asking which individual runtime you would like to clear. Enter the appropriate number between 1 and 12.

In either case you can cancel the clearing of runtimes by pressing the "C" key and then the "enter" key.

Runtimes for suction groups 2 and 3 of the condenser operate in the same manner as the above description for group 1.

COMPRESSOR SETUP

```
COMPRESSOR SETUP - GROUP 1
Main Group2  Group3  Condenser  Runtimes
Targets

SUCTION GROUP 1
 # Type       HP B/Pt   # Type      HP B/Pt
 1 Fix      20.0 1/01   7 Fix     15.0 1/07
 2 Fix      10.0 1/02   8 Unl     15.0 1/08
 3 Unl       5.0 1/03   9 None      .0 0/00
 4 Fix      15.0 1/04  10 None      .0 0/00
 5 Unl      10.0 1/05  11 None      .0 0/00
 6 Fix      15.0 1/06  12 None      .0 0/00

Group 1 Inputs    B/Pt
 Suct 100 psig    1/02 Suct Offset       0
 Defrost status   0/00 Case Temp      1/05
                       Temp Offest       0
Inverter Inputs/Outputs
                  B/Pt                   B/Pt
 Speed Output     2/09 Alarm Input    2/04
 Speed Input      0/00 Bypass Output  2/02
 Reset Output     2/01

 Press   ↓   to edit or select for list
```

To get here from the Main screen:
Press the "S" key, then press the "O" key.

Menu selections:

Main	- show the group 1 status screen
Group2	- setup suction group 2
Group3	- setup suction group 3
Condenser	- setup or make changes to condenser control
Runtimes	- display the runtimes for suction group 1
Target	- allows targets or alarm setpoints for the group to be set or changed

Purpose:
This screen allows you to setup the outputs and inputs for this suction group.

Function:

For the PERFORMER™ to operate, you must tell it what is connected and where. On this screen, you will see all twelve outputs. These outputs can be connected to compressors or unloaders. In addition, output 1 can be set up as a variable speed compressor. You must set the type, horsepower and board and point number for each output that is connected. If no output is connected, set the type to "None". To set the output type, press the down-arrow. The "Type" field for output number one will be highlighted. Press the "spc" key until the correct type of output is shown in the field. The Types are:

Fix   - fixed speed compressor   Unl   - unloader
Var.   - variable speed   None   - nothing connected

Next you must enter the horsepower of the output. The horsepower is entered in tenths of a horsepower. For instance, to enter a compressor with 15 HP, enter "150" then press the down-arrow key. To enter the horsepower for a compressor which has an unloader, you must use the unloaded horsepower for the compressor portion and use the amount of horsepower that is added when the compressor is loaded for the unloader horsepower. For instance, if a 15.0 HP compressor with 50% unloading is being used, you would enter "75" (7.5HP) for the compressor and "75" (7.5 HP) for the unloader.

Finally, for each output that has a compressor or unloader connected, you must enter the output board and point number which it is connected to.

For the remaining fields on this screen you must enter the input or output board and point number if used.

Field Information:

Suct 100 psig   Input for the suction transducer for this group. This must have a board/point number. Normally, a 100 psig transducer is used. However a 200 psig transducer may be used, if so this field can be changed by highlighting the field and pressing the "spc" key.

Suction Offset   Error adjustment for the suction transducer. This value must be entered to insure a correct reading of the suction pressure. If a transducer is replaced the new value, written on the side of the transducer, must be entered.

Defrost Status   If defrost is not being done by the PERFORMER™ there must be a dry contact input indicating when the lead case is in defrost. This insures that the PERFORMER™ does not used temperature for control when the lead case in defrost.

Case Temp   Input for the lead case temperature sensor, if temperature control is being used.

Temp Offset   Error adjustment for the lead case temperature (if needed).

The fields under Inverter Inputs/Outputs are used only if variable speed is being used on this suction group. The fields represent:

Speed Output   Output signal to the inverter telling it what speed to run. The point number can only be 9 or 10.

Alarm Input	If the inverter has a problem, this contact should close causing the PERFORMER™ to reset the invert in an attempt to correct the problem.
Speed Input	This is a signal from the inverter indicating what speed it is currently running the compressor. If this speed differs from what the PERFORMER™ is telling it by more than 10%, the PERFORMER™ will go into the bypass mode.
Bypass Output	If the PERFORMER™ goes into the bypass mode, this output will close and should be wired so that the inverter is bypassed. The PERFORMER™ will operate the compressor in a fixed speed mode if this happens.
Reset Output	This output is used to reset the inverter.

CONDENSERS

CONDENSER STATUS

```
STATUS - CONDENSER
Main Group2  Group3 Targets Overrides
Runtime

 ┌──────────────┬──────────────┬──────────────┐
 │  Discharge   │   Drop Leg   │   Outdoor    │
 │              │              │              │
 │     182      │     OPEN     │     OPEN     │
 │              │              │              │
 │    psig      │    deg F     │    deg F     │
 │              │              │              │
 │  Target 180  │              │              │
 └──────────────┴──────────────┴──────────────┘

     Controlled by Discharge Pressure

               Fan Status
      ┌────────────────────────────────┐
      │ 1 2 3 4 5 6 7 8 9 10 11 12      │
      │ F F F F - - - - - -  -  -       │
      └────────────────────────────────┘

  Split Valve:   On
```

To get here from the Main screen:
Press the "D"key (conDenser).

Menu selections:

Main   - show the group 1 status screen

Group2	- shows status of suction group 2 (if used)
Group3	- shows status of suction group 3 (if used)
Target	- allows targets or alarm setpoints for the group to be set or changed
Overrides	- used to manually turn an output on or off
Runtime	- display the runtimes for suction group 1

Purpose:

This screen shows the current status of the condenser.

Function:

Three blocks are shown on the Condenser Status screen. The leftmost block shows the current discharge pressure in large numbers and if the condenser is being controlled by discharge pressure the target value for condenser control will be shown just below it. The center block shows the drop-leg temperature in large numbers and if the condenser is being controlled by drop-leg temperature, (or the Drop-leg/Outdoor air Differential) the target temperature will be shown below the drop-leg temperature. The rightmost block shows the current outdoor temperature in large numbers.

In the status block the current status of each fan is shown. If the output is defined as a fixed speed fan, a "F" will be displayed under the output number (numbers on top going from 1 to 12). If the output is off, the letter will be blue with a white background. If the output is on, it will be a white letter with a blue background. If the output is currently overridden, it will flash.

The split valve status will also be shown at the bottom of the screen if used.

If Subcooling is being used, see the section **SUBCOOLING.**

CONDENSER TARGETS

```
TARGETS - CONDENSER
Main Group1 Group2 Group3 Disch Split
Setup-Condenser

Control by
    Discharge Pressure

  Target          180
  Deadband         10
  Increase Delay  30 sec.
  Decrease Delay  10 sec.


Condenser Recovery Speedup
  If Discharge Pressure  > 200
    Make Increase Delay      15 sec.
  If Discharge Pressure  < 160
    Make Decrease Delay       5 sec.




Press  ↓  to edit or select for list
```

To get here from the Main screen:
Press the "D" key (conDenser), and then the "T" key (Targets).

Menu selections:

Main	- show the group 1 status screen
Group1	- targets for group 1
Group2	- targets for group 2 (if used)
Group3	- targets for group 3 (if used)
Disch	- discharge setpoints
Split	- setpoints for split condenser (if used)
Setup_Condenser	- set condenser information

Purpose:
Used to set the operation of the condenser.

Function:
The PERFORMER™ controls the condenser in a first-on, last-off sequence. It will control the condenser either by discharge pressure, drop-leg temperature or drop-leg / outdoor temperature differential. There is a single target with a deadband. Fans are cut on or off based on time. If the discharge pressure (or drop-leg temperature or differential) is above the Target plus one-half of the Deadband value for the Increase Delay time the next sequential fan will be turned on. When the discharge pressure (or drop-leg temperature or differential) goes below the Target minus one-half of the Deadband value for the Decrease Delay time, the next sequential fan will be turned off.

A Fast Recovery option is available. This allows the fans to be turned on faster if the pressure, temperature or differential gets too high. If the pressure, temperature or differential reachs the high Condenser Recovery Target, the increase delay time will be reduced to the time set in the Condenser Recovery Speedup field for increase delay. If the pressure, temperature or differential decreases to the low Condenser Recovery Target, the decrease delay time will be reduced to the time set in the Condenser Recovery Speedup field for decrease delay.

Field information:

Control by

Either control by Discharge Pressure, Drop-leg Temperature or Drop-leg Temperature / Outdoor Air Temperature Differential can be used to control the condenser. Use the "spc" key to make your selection.

Target, DeadBand, Increase Delay, Decrease Delay - see discussion above.

Condenser Recovery Speedup

Fast recovery is started when the pressure, temperature or differential reaches either the high or low target for the Condenser Recovery Speedup.

Condenser Recovery Delays

The Increase or Decrease Delay will be changed to this value when the PERFORMER™ condenser control is in the Condenser Recovery Speedup.

CONDENSER SETUP

```
CONDENSER - SETUP
Main  Runtimes   Targets

Fan Type   STG.  B/Pt   Fan Type   STG.  B/Pt
  1 Fix    1     3/01     7 Fix    1     3/07
  2 Fix    2     3/02     8 Fix    2     3/08
  3 Fix    1     3/03     9 None   1     0/00
  4 Fix    2     3/04    10 None   1     0/00
  5 Fix    1     3/05    11 None   1     0/00
  6 Fix    2     3/06    12 None   1     0/00

Fans are Energized Off   Disch Offset 000

Controlling Sensors        B/Pt
 Discharge Pressure        1/03
 Drop-Leg Temperature      0/00




Press  ↓  to edit or select for list
```

To get here from the Main screen:

Press the "S" key (setup), then press the "C" key (condenser), then press "C" (Setup_Condenser).

Menu selections:

Main	- show the group 1 status screen
Runtimes	- display the runtimes for suction group 1
Target	- allows targets or alarm setpoints for the group to be set or changed

Purpose:

This screen is used to define the inputs and outputs for condenser control.

Function:

The PERFORMER™ is capable of controlling up to 12 condenser fans. More fans can be controlled by connecting the fans in banks. The condenser fans are controlled in a first on, last off manner. In other words, output number one is the first output to be turned on and will be the last output to be turned off. This is especially important in most condenser applications.

Field Information:

Fan	The fan order. This will be the order in which the fans are turned on and off.
Type	This is the type of fan connected. If no output is connected, set the type to "None". To set the output type, press the "↓" key (down arrow key).

Then the "Type" field for output number one will be highlighted. Press the "spc" key until the correct type of output is shown in the field. The Types are:

Fix. - fixed speed fan
None - nothing connected to this output

STG. This is the split condenser stage. This allows you to determine which of the fans will be cut off during split condenser operation. Those fans with STG. set to "2" will be split off. If split operation is not being used, STG. should be set to "1".

B/Pt The board and point number to which each fan is connected.

Fans are Energized

The relay on the Encore Output (relay) can be energized when the Performer™ calls for the fan to be off or when the fan is called to be on. Normally, this is set to energize the fan Off which will allow all the fans to come on if there was a problem with the PERFORMER™ (the fans would "fail on" if wired Normally Closed).

Disch Offset Value used to correct any errors that exists in the discharge transducer. This is common to most transducers. The value (if needed) to be entered is written on the discharge transducer itself.

Condensers can be controlled by using discharge pressure, drop-leg temperature or a drop-leg temp./outdoor temp. differential. The board and point number must be entered for the appropriate sensor under the Controlling Sensors section. The outdoor air temperature board and point setup is under "Inputs" in the "Setup" menu item off the "Main" Screen.

Discharge Pressure

The board and point location for the discharge pressure must be entered here.

Drop-Leg Temperature

The board and point location must be entered here for the dropleg temperature (if used).

DISCHARGE TARGETS

```
┌─────────────────────────────────────────────────┐
│ TARGETS - DISCHARGE                              │
│ Main Group 1 Group 2 Group 3 Condenser          │
│ Split                                            │
│─────────────────────────────────────────────────│
│                                                  │
│   High Discharge CutOut:  350 psig               │
│                                                  │
│   Low Discharge Alarm:    120 psig               │
│                                                  │
│   Alarm Delay:             15 sec.               │
│                                                  │
│                                                  │
│   [Yes]  Turn off all Compressors if  High       │
│   [Yes]  Auto Reset at 50 psig below High         │
│   [Yes]  Alarm if High Discharge                  │
│                                                  │
│                                                  │
│                                                  │
│                                                  │
│                                                  │
│                                                  │
│   Press   ↓   to edit or select for list         │
└─────────────────────────────────────────────────┘
```

To get here from Main screen:
Press the "T" (targets) key, then press the "D"(Disch) key on the targets screen.

Menu selections:

Main	- show the group 1 status screen
Group1	- targets for group 1
Group2	- targets for group 2 (if used)
Group3	- targets for group 3 (if used)
Condenser	- condenser setpoints
Split	- setpoints for split condenser (if used)

Purpose:
This screen allows setting of the discharge pressure alarm setpoints and whether or not to cutout all compressors if the discharge pressure goes above the high alarm setpoint.

Function:
If the discharge pressure reaches the high discharge cutout setpoint the PERFORMER™ will put a notice into the alarm log. On this screen you can select whether all outputs will be turned off when the high discharge pressure is reached. Also, you can select whether an alarm will occur. A final option allows the outputs to turn back on when the discharge pressure drops 50 PSIG below the high discharge cutout setpoint. A low discharge alarm setpoint may be entered which will allow an alarm to occur if the discharge pressure reaches or goes below this value for the Alarm Delay time. This is useful to determine if the discharge pressure is too low to generate

reclaim heat or hot gas for defrost. To disable either of these setpoints, enter "N/A" into the field by pressing the "N" key while in the field.

SPLIT CONDENSER TARGETS

```
┌─────────────────────────────────────────────────┐
│ TARGETS - SPLIT                                  │
│ ▋ain   Group▋  Group▋  Group▋   ▋isch           │
│ ▋ondenser   Setup-▋ondenser                     │
├─────────────────────────────────────────────────┤
│  Split Method:   < 50% Fans Running             │
│                                                  │
│   Split                                          │
│     Delay        2 min.                          │
│                                                  │
│     Target    85                                 │
│     DeadBand  10                                 │
│                          Bd/Pt                   │
│     Split Valve          00/00                   │
│     Fan Split Relay      00/00                   │
│                                                  │
│   Overrides:                                     │
│     Undo Split When:                             │
│       Disch. Press > 250 psig for  20 sec.      │
│                                                  │
│                                                  │
│                                                  │
│                                                  │
│   Press   ↓   to edit or select for list        │
└─────────────────────────────────────────────────┘
```

To get here from the Main screen:
Press the "D" key (conDenser), press the "T" key (Targets), then press the "S" key (Split).

Menu selections:

Main	- show the group 1 status screen
Group1	- targets for group 1
Group2	- targets for group 2 (if used)
Group3	- targets for group 3 (if used)
Disch	- discharge setpoints
Condenser	- setup or make changes to condenser control
Setup-Condenser	- setup condenser information

Purpose:
Allows setting the PERFORMER™ to use split condenser operation.

Function:
The PERFORMER™ can split the condenser during times when the full capacity of the condenser is not needed. When the outside air temperature reaches the Target temperature minus one-half of the deadband and remains at that temperature for the Delay time, the condenser will

split. It will return to full condenser operation when the outside air temperature rises above the Target plus one-half of the deadband.

Other options for controlling splitting the condenser are by discharge pressure, and when less than 50% of the fans are running. With less than 50% of the fans running, the condenser can split automatically. When the Condenser Setpoint calls for more fans with this split engaged, the condenser will un-split and return to normal operation automatically.

An override can be set to undo the split and return the condenser to full capacity if the discharge pressure rises above a set value and remains there for a time period.

CONDENSER, SPLIT CONDENSER AND SUBCOOLER OVERRIDES

```
 OVERRIDES - CONDENSERS
 Main    Compressor  Outputs


 Fans
  Fan   Stat    Fan   Stat    Fan   Stat
   1   Norm      5   Norm      9   Norm
   2   Norm      6   Norm     10   Norm
   3   Norm      7   Norm     11   Norm
   4   Norm      8   Norm     12   Norm

 Split Valve    Norm



 Subcooler
   Stage 1 Norm
   Stage 2 Norm
   Stage 3 Norm




 Press    ↓   to edit or select for list
```

To get here from the Main screen:
Press the "O" key (Overrides), then press the "C" key (Condenser).

Menu selections:

Main	- show the group 1 status screen
Compressor	- allows overriding of suction group outputs
Outputs	- allows overriding of generic outputs (up to 32 generic outputs)

NOTE: Defrost and Solenoid overrides are not in this menu item. Those overrides are in the Circuits menu item on the main screen.

Purpose:
Allows you to manually turn on a condenser fan, condenser split valve and subcooling stage outputs. This can be used during setup of the system to insure proper wiring.

Function:

To override a fan, you must press the down-arrow. The "Stat" or status field of the output will be highlighted. Press the down-arrow or up-arrow until you get to the desired fan. You have a couple of options to set the output to the desired state. You can press the "spc" key and the status will cycle from "Norm" (normal operation), to Off, then to On, and finally back to Norm. When the status is at the desired setting, press the "↓" key (down arrow key) or "↑" key (up arrow key) to move to the next output. When finished, press the "menu" key.

In addition to the fan outputs, you can override the split valve outputs to check for proper wiring.

In addition to the fan and split valve outputs, you can override the subcooling stage outputs to check for proper wiring.

NOTE: **These overrides are fixed, once they are turned on or off, they will stay that way until someone manually takes it out of override into normal operation.**

CONDENSER RUNTIMES

```
CONDENSER FAN RUNTIMES
Main Condenser Setup-Condenser Clear

Condenser Fan Runtimes
  Fan   Hours          Fan   Hours
   1      9              7      0
   2      8              8      0
   3      3              9      0
   4      3             10      0
   5      0             11      0
   6      0             12      0
```

To get here from the Main screen:
Press "D" key (conDenser), then press "R" key (Runtimes).

Menu selections:
>   Main   - show the group 1 status screen
>   Condenser   - setup or make changes to condenser control
>   Setup-Condenser - setup condenser information
>   Clear   - clears runtimes (all or a single runtime)

Purpose:
Displays the runtime in hours of all 12 condenser fans (or banks of fans).

Function:

The output number is shown under the header "Fan" and its runtime is shown to the right under the "Hours" header.

To clear runtimes, press the "L" key. A window will appear asking if you wish to clear all the runtimes or a single output. If you wish to clear all runtimes for the condenser, press the "1" key. All runtimes will be immediately cleared to zero hours.

If you only want to clear a particular output to zero, for instance, where a single fan has been replaced, press the "2" (single) key. A new window will appear asking which individual runtime you would like to clear. Enter the appropriate number between 1 and 12.

SUBCOOLER

SUBCOOLER STATUS

If subcooling is being used, the **CONDENSER STATUS** screen will read as follows:

```
STATUS - CONDENSER
Main Group2  Group3 Targets Overrides
Runtime

   ┌──────────────┬──────────────┬──────────────┐
   │  Discharge   │   Drop Leg   │   Outdoor    │
   │              │              │              │
   │    182       │    OPEN      │    OPEN      │
   │              │              │              │
   │    psig      │    deg F     │    deg F     │
   │              │              │              │
   │  Target 180  │              │              │
   └──────────────┴──────────────┴──────────────┘

        Controlled by Discharge Pressure

            Fan Status              Subcooler
   ┌──────────────────────────────┐  ┌─────────┐
   │ 1 2 3 4 5 6 7 8 9 10 11 12    │  │ 1 2 3   │
   │ F F F F - - - - - - - -       │  │ S S S   │
   └──────────────────────────────┘  └─────────┘

                          Subcooler Outlet    80
   Split Valve:   On
```

To get here from the Main screen:
Press the "D"key (conDenser).

Menu selections:

Main	- show the group 1 status screen
Group2	- shows status of suction group 2 (if used)
Group3	- shows status of suction group 3 (if used)

Target	- allows targets or alarm setpoints for the group to be set or changed
Overrides	- used to manually turn an output on or off
Runtime	- display the runtimes for suction group 1

Purpose:
This screen shows the current status of the condenser and the subcooler.

Function:
This screen provides the same information that is detailed in **CONDENSER STATUS** on page 27. This screen also includes the subcooler status and the subcooler outlet temperature. The drop-leg temperature is the inlet temperature for the subcooler. The subcooler can be controlled by either the subcooler outlet temperature or the subcooler inlet temperature (drop-leg temperature).

SUBCOOLER SETUP

```
 SUB-COOLER SETUP
[M]ain   [S]ystem-Setup

Subcooler                    Bd/Pt
 Inlet Temperature           00/00
 Outlet Temperature          00/00
 Lock-out Subcooler if Inlet < 55 deg.
 Stage 1
   Controlling Sensor    Outlet Temp.
   Output (Bd/Pt) 00/00 Energize when off
   Target     55        Deadband   5
   On Delay   0 sec.    Off Delay  0 sec.
 Stage 2
   Controlling Sensor    Outlet Temp.
   Output (Bd/Pt) 00/00 Energize when off
   Target     0         Deadband   0
   On Delay   0 sec.    Off Delay  0 sec.
 Stage 3
   Controlling Sensor    Outlet Temp.
   Output (Bd/Pt) 00/00 Energize when off
   Target     0         Deadband   0
   On Delay   0 sec.    Off Delay  0 sec.
                ↓
   Press       to edit or select for list
```

To get here from the Main screen:
Press the "S" key (Setup), then a "S" key.

Menu selections:
- Main - show the group 1 status screen
- System_Setup - show the setup screen

Purpose:
To enter subcooling stages (up to 3) temperature sensors and setpoints.

Function:
This screen allows the setup of the three available subcooling stages. The inlet and outlet temperature sensor board and point locations and the subcooler lock-out setpoint are available at the top of this screen.

Then, for each stage of subcooling, the controlling sensors, the output relay location, target, deadband and on/off delays will be set on this screen. Each stage can be controlled with different settings and sensors.

SUBCOOLER OVERRIDES

See **CONDENSER OVERRIDES** section.

CIRCUITS / DEFROST

CIRCUIT / DEFROST STATUS

```
┌─────────────────────────────────────────────────────┐
│CIRCUIT STATUS        .              12:50 PM         │
│Main  Add                                             │
│                                                      │
│                                 Control       T      │
│ #   Circuit Name        Status   Value        R      │
│                                                      │
│ 1 12x20 ICE CREAM        Off       -5                │
│ 2 FROZEN FOOD TUB 3      On         2                │
│ 2 8x16 FROZEN FOOD       On        -8                │
│                                            /         │
│                                                      │
│                                                      │
│                                                      │
│                                                      │
│                                                      │
│                                                      │
│                                                      │
│                                                      │
│ Delete Edit Log Search Next Manual                   │
└─────────────────────────────────────────────────────┘
```

To get here from the Main screen:
Press the "C" key (Circuit).

Menu selections:

Main	- show the group 1 status screen
Add	- add a defrost circuit (only valid on screen if logged on)

Purpose:
This screen is used to view defrost and refrigeration solenoid control. This screen also allows for Manual overrides of the defrost circuits and refrigeration solenoids.

Function:
The PERFORMER™ will control up to 40 circuits of defrost and refrigeration solenoids. This

screen shows the status of the defrost and refrigeration circuits. It shows the circuit number, circuit name, status (Normal - not defrosting, In-Defrost - currently defrosting, or Runoff - currently in the runoff period), length of defrost, time remaining if in defrost and others mentioned below . The type of defrost is shown on the right side of the screen. To add circuits or make changes you must be logged on. When this screen is displayed, the "Add" menu selection will not function if you are not logged on. You can log on at this screen when you try to edit or manually override any circuit. Once you have signed on, you will be able to edit or override any circuit.

If you then press the down-arrow key the first circuit information will be highlighted. In addition, a new line will appear at the bottom of the screen. (The CIRCUIT STATUS screen displayed previously has both the menu item across the top and the bottom. The actual screen will have one or the other.) Once a circuit is highlighted, you may view the additional status information for this circuit by pressing the right arrow key until the desired information is on the screen.

Once a circuit is highlighted, you will have the following options for that circuit:

Delete	Used to delete all information for a circuit. By using the arrow keys move to the circuit that you wish to delete. Double check to insure that you are on the circuit you wish to delete. Then press the "D" or delete key and then press the "Y" key if you are sure this is the correct circuit to delete. Once you type "Y", the circuit will been deleted.
Edit	Allows you to change the settings of a circuit. See **Circuit Setup.**
Log	Allows you to view the log of the temperature for the selected circuit. Within the Log feature, there is a menu item for access to the **Quick Graph** feature.
Search	Since there are up to 40 circuits controlled by the PERFORMER™, this feature allows you to enter a circuit name or part of a circuit name and the PERFORMER™ will search for it and if found will display it on the screen. When you press the "S" key a window will appear prompting you to enter the circuit name. Enter all or part of the circuit name and press "enter". If found, the circuit will be displayed.
Next	Used in conjunction with the "Search" selection, "Next" searches for the next occurrence of a search string. If a match was found on a previous search, pressing the "N" key will find the next match of the circuit name if possible.
Manual	Allows you to place defrost circuits and refrigeration solenoids into manual override.

Circuit Status headers:

#	circuit number (1 through 40 available)
Circuit Name	specific circuit name (up to 20 characters)
Status	current status of this circuit

                                          On = Refrigeration Solenoid is on

                                          Off = Refrigeration Solenoid is off

                                          Defrost = Circuit is in Defrost

Runoff = Circuit is in Runoff

ON = Refrigeration Solenoid has been overridden ON

OFF = Refrigeration Solenoid has been overridden OFF

Control Value the operating temperature for this refrigeration circuit. Up to four sensors may be used to control a refrigeration solenoid. This will be detailed in **Circuit Setup.**

Time Rem time remaining for this defrost cycle (defrost or runoff)

Defrost Type type of defrost (Hot Gas, Electric or Off Cycle) used by this circuit.

Input Math math associated with the 4 sensors available to control the refrigeration circuits. This will be detailed in **Circuit Setup.**

Controlling Inputs shows the status of the 4 sensors available to control the refrigeration solenoid for this circuit.

Control Setpoints setpoints for the controlling value to control the refrigeration solenoid

Dual Temp status of the dual temp shift digital input. This will be detailed in **Circuit Setup.**

Defrost Termination status of up to 4 defrost termination sensors (An1...An4) or the status of the digital terminator (Dig). This will be detailed in **Defrost Setup.**

Alm Dis Input status of the Alarm Disable Input. This will be detailed in **Circuit Setup.**

CIRCUIT SETUP

```
┌──────────────────────────────────────────────────┐
│ CIRCUIT - SETUP                                    │
│ ▓ain  Circuit-▓tatus  ▓efrost-Setup                │
├──────────────────────────────────────────────────┤
│                                                    │
│ Name 12X20 ICE CREAM                               │
│ Output (Bd/Pt) 09/01                               │
│ Error Adjustment:  000                             │
│ Setpoints                                          │
│     On  at  -4  after    0 sec.                    │
│     Off at  -6  after    0 sec.                    │
│ Alarm Setpoints                                    │
│   High at   2  after  10 min.                      │
│   Low  at -12  after  10 min.                      │
│   Alarm Disable Input  (Bd/Pt)   00/00             │
│ Controlling Inputs (Bd/Pt)                         │
│   1:03/04   2:03/05   3:03/06   4:00/00             │
│   Use the AVERAGE of these Inputs.                 │
│ Dual Temp                                          │
│   Setpoints shift value   0                        │
│   Shift Input (Bd/Pt) 00/00                         │
│                     ↓                              │
│   Press    ↓   to edit or select for list          │
└──────────────────────────────────────────────────┘
```

To get here from the Main screen:
When adding a circuit:
> Press the "C" key (Circuit), then press the "A" key (Add) to add a circuit.

When editing an existing circuit:
> Press the "C" key (Circuit), then press the "↓" key (down arrow key) to move to the desired circuit, then press the "E" key (Edit).

Menu selections:
> Main   - show the group 1 status screen
> Circuit-Status   - shows status of the circuits
> Defrost-Setup   - allows the setup of the defrost control for this circuit

Purpose:
This screen is used to either add a refrigeration circuit or change an existing one.

Function:
The refrigeration solenoid setpoints and other pertinent circuit information (except defrost) is set using this screen. When all information has been entered or changed, press the "S" key (Circuit-Status) to return to the circuit status display or press the "D" key (Defrost-Setup) to edit the defrost setpoints.

Field Information:

Circuit   This is the name of the circuit. It can be up to 20 characters.

Output   This is the board and point location of the refrigeration solenoid output.

Error Adjustment   Offset for the sensor used to control the refrigeration solenoid.

Setpoints   These are the On and Off settings for controlling the refrigeration solenoid with time delays in seconds. These settings use the control value for control.

Alarm Setpoints   These are the high and low alarm settings for the control value with time delays in minutes.

Alarm Disable Input This board and point location allows a digital signal to automatically disable any alarm.

Controlling Inputs   Up to 4 sensors can be used to control the refrigeration solenoid. The 4 sensor board / point locations are placed on this screen.

Input Math   This option can be set to take either the MAXIMUM, MINIMUM or AVERAGE value of up to 4 Controlling Input sensors to produce a single Control Value.

Control Value   This is the result of the Input Math on the Controlling Input sensors. The Control Value will then be used to control the refrigeration solenoid by the On and Off setpoints as described above.

Dual Temp   This feature allows for a dual temperature shift for this circuit. One week the circuit may have pizzas in the cases and the next week it may have meat. When desired, a switch can be thrown (Shift Input) and the Dual Temperature Shift will adjust the Setpoints on this circuit higher or lower (depending on what the value is in Setpoint shift value). This will allow a setpoint shift without the need of store personnel manually changing the setpoints in the PERFORMER™.

DEFROST SETUP

```
┌─────────────────────────────────────────────────┐
│ CIRCUIT - DEFROST                               │
│ ▉ain   Circuit-▉tatus  ▉ircuit-Setup            │
├─────────────────────────────────────────────────┤
│                                                 │
│ Name:12X20 ICE CREAM          Type:Hot Gas      │
│   Duration: 24 min.         Run Off: 3 min.     │
│   Defrost Start Times                           │
│     1:  01:00AM  2:  09:00AM    3:  05:00PM      │
│     4:  N/A  AM  5:  N/A  AM    6:  N/A  AM      │
│ Ref. Solenoid  09/01   MLLS Output   00/00      │
│ Heat Output    09/02   MLLS Energize: Off       │
│   Terminate Defrost When                        │
│      Coldest Analog is above:    000            │
│                   Or                            │
│      Digital input is:  Open                    │
│                                                 │
│   Termination Inputs                            │
│      Analog 1:   00/00     Digital  00/00       │
│             2:   00/00                          │
│             3:   00/00                          │
│             4:   00/00                          │
│   Press   ↓   to edit or select for list        │
└─────────────────────────────────────────────────┘
```

To get here from the Main screen:
When adding a circuit:
> Press the "C" key (Circuit), then press the "A" key (Add) to add a circuit and then press "D" (Defrost-Setup).

When editing an existing circuit:
> Press the "C" key (Circuit), then press the "↓" key (down arrow key) to move to the desired circuit, then press the "E" key (Edit) and then press "D" (Defrost-Setup).

Menu selections:

Main	- show the group 1 status screen
Circuit-Status	- shows status of the circuits
Circuit-Setup	- allows the setup of the refrigeration solenoid control

Purpose:
This screen is used to either add a defrost circuit or change an existing one. Defrost times and other defrost setpoints may be changed here.

Function:
The defrost times and other pertinent defrost information is set using this screen. When all information has been entered or changed, press the "S" key (Circuit-Status) to return to the circuit status display or press the "C" key (Circuit-Setup) to edit the refrigeration solenoid setpoints.

Field Information:

Name   This is the name of the circuit. It can be up to 20 characters.

Type   Type of defrost. Three types are available; off cycle, electric, or hot gas. These can be selected by pressing the "spc" key while on that field.

Duration   Maximum length of each defrost. Actual time may be shorter if temperature termination is used.

Run Off   This is the time after the defrost has terminated before the refrigeration solenoid will be opened again. This allows most water to drip from the coil so that it will not re-freeze.

Defrost Start Times   Six times are available per day for defrost. Type in the times as desired. As an example, 6:00AM would be entered by entering "600", press the down-arrow key, press "A" then the down-arrow key again. PM can be entered by pressing the "P" key instead of the "A" key.

Terminate Defrost When Coldest sensor is above

This allows the PERFORMER™ to use analog sensors to terminate the defrost. When the temperature reaches the value entered, the defrost will terminate.

Or All Digital inputs are

Here you can select either Open or Closed, depending on the type of digital input device used. This option would be used with the Klixon type of termination.

Termination inputs   Enter the board and point number for either the analog or digital inputs being used, not both. If analog inputs are used, all of the analog sensors must be above the termination temperature before defrost will be temperature terminated (the defrost will terminate if it goes for the Duration). If digital termination is used, all of the sensors must be open or closed for termination to occur.

Ref. Solenoid   Enter the board and point number to which the refrigeration solenoid for this circuit is connected.

Heat Output   Enter the board and point number to which the heat output for this circuit is connected. This option will not be seen unless hot gas or electric heat types are used for this circuit.

MLLS Output   Enter the board and point number to which the Master Liquid Line Solenoid for this rack is connected. This option will not be seen unless hot gas is used for this circuit.

MLLS Energize   This indicates whether the relay point has been wired for the MLLS to "fail closed" (Normally Closed) or "fail open" (Normally Open). If the relay point has been wired to "fail closed", this field should be 'Off'. If the relay point has been wired to "fail open", this field should be 'On'. This option will not be seen unless hot gas is used for this circuit.

CIRCUITS / DEFROST OVERRIDES

```
CIRCUIT STATUS                        12:50 PM
Main  Add


                                Control    T
#   Circuit Name        Status   Value     R

    24x20 ICE CREAM      On        5
2   FROZEN FOOD TUB 3    On        2
2   8x16 FROZEN FOOD     On       -8




                Start Defrost
                Start Run On
            T   Terminate Defrost
                Override On
                Override OFf
            C   Cancel Override
                E scape


Delete Edit Log Search Next Manual
```

To get here from the Main screen:
Press the "C" key (Circuits), then press the "↓" key (down arrow key) to move to the desired circuit to override. Once the desired circuit is highlighted, then press the "M" key (Manual).

Menu selections:

Main	- show the group 1 status screen
Add	- add a defrost circuit (only valid on screen if logged on)

Purpose:
This manual override screen is used to override defrost and refrigeration solenoid control.

Function:
This will allow manual overrides of the defrost and refrigeration solenoids. Once the desired circuit to override has been selected and the Manual selection at the bottom of the screen has been selected, the screen will display the following choices for manual overrides of the circuits:

Start Defrost — Allows you to start the defrost cycle for this circuit. After placing this circuit in defrost, it will then terminate under normal operation standards by time and/or termination. This defrost override will turn off the refrigeration solenoid, turn on the Master Liquid Line Solenoid (if a hot gas circuit) and turn on the defrost solenoid or electric heater (if used).

Start Runoff	Allows you to start the runoff cycle for this circuit. After placing this circuit in runoff, it will terminate after the set runoff duration has elapsed.
Terminate Defrost	Allows you to stop the current defrost cycle of this circuit.
Override On	This will override the refrigeration solenoid ON for this circuit. **NOTE : This is a fixed override. This will stay in override until it is manually taken out of override.**
Override Off	This will override the refrigeration solenoid OFF for this circuit. **NOTE : This is a fixed override. This will stay in override until it is manually taken out of override.**
Cancel Override	Allows you to cancel the refrigeration solenoid overrides, NOT the defrost or runoff overrides.
Escape	Allows you to exit this override menu without placing a circuit into override.

GENERIC INPUTS AND OUTPUTS

GENERIC INPUT/OUTPUT STATUS

```
I/O STATUS                           12:50 PM
Main   AddInput AddOutput Linear Setup
Schedule Status
                                          -Set
#   I/O Name                   Status     On

1 AI   Motor Room Temp.          83
1 DO   Motor Rm. Exhaust Fan     On         7
2 DI   Oil Fail Comp 1 Alarm     Open
3 DI   Oil Fail Comp 2 Alarm     Open
4 DI   Oil Fail Comp 3 Alarm     Open







     Delete      Edit    Log     OVerride
```

To get here from the Main screen:
Press the "I" key (I/0...generic Inputs and Outputs).

Menu selections:

Main	- show the group 1 status screen
Add Input	- add a digital or analog input (only valid on screen if logged on)
Add Output	- add a digital output (only valid on screen if logged on)
Linear Setup	- edit the two linear tables available for analog inputs (only valid on screen if logged on)
Schedule Status	- edit or add a schedule for a digital output (only valid on screen if logged on)

Purpose:
This screen is used to view the status of the generic inputs and outputs. This screen also allows for manual overrides of the generic outputs.

Function:
The PERFORMER™ will monitor and control up to 64 generic inputs and 32 generic outputs. This screen shows the status of the inputs and outputs.

If you then press the "↓" key (down arrow key) the first circuit information will be highlighted. In addition, a new line will appear at the bottom of the screen. (The I/O STATUS screen displayed previously has both the menu item across the top and the bottom. The actual screen will have one or the other.)

Field Information:

Delete	Used to delete all information for an input or output. By using the arrow keys, move to the generic device that you wish to delete. Once this device is highlighted, double check to insure that you are on the generic device you wish to delete. Then press the "D" or delete key and then press the "Y" key if you are sure this is the correct generic device to delete. Once you type "Y", the device will been deleted.
Edit	Allows you to change the settings of a generic input or output that is highlighted. This will be detailed in **Input - Setup or Output - Setup.**
Log	Allows you to view the log of the generic input or output highlighted. Within the Log feature, there is a menu item for access to the **Quick Graph** feature.
Manual	Allows you to place generic outputs into manual override.
	These overrides are fixed, once they are turned on or off, they will stay that way until someone puts them back to normal.

Generic Input and Output Status headers:

#	Generic inputs will be numbered 1 through 64. The generic inputs will be labeled AI or DI for Analog Input or Digital Input, respectively. Generic outputs will be numbered 1 through 32. The generic outputs will be labeled DO for Digital Output.

Name	Specific device (up to 20 characters)
Status	Current status of this circuit
	On = Digital Output is on
	Off = Digital Output is off
	OPEN = Digital Input is OPEN
	CLOSED = Digital Input is CLOSED
	-ON- = Digital Output has been overridden ON
	-OFF- = Digital Output has been overridden OFF
Setpoints	Generic outputs on and off settings
Sched Status	Status of the schedule assigned to this generic output (if used)
Input Math	Math associated with the 4 sensors available to control the generic outputs. This will be detailed in **Output - Setup**.
Sensor Input Values-	Shows the status of the 4 sensors available to control a generic output.
Alm Dis Input	Status of the Alarm Disable Input. This will be detailed in **Input - Setup**.

GENERIC INPUT SETUP

```
┌─────────────────────────────────────────────┐
│ INPUT - SETUP                                │
│ Main Status                                  │
│                                              │
│ Name: Motor Room Temp.         Bd/Pt 03/07   │
│ Input Type: Temp (-50 to 125 F)              │
│ Error Adjustment:   0                        │
│ Logging Interval:   5 min.                   │
│                                              │
│ Alarm Setpoints                              │
│   High at  80   after    5 min.              │
│   Low  at  70   after    5 min.              │
│   [No ] Automatic Reset?                     │
│   Alarm Disable Input  (Bd/Pt)   00/00       │
│                                              │
│ Related Inputs  (Bd/Pt)                      │
│     2 03/08        3 03/09        4 00/00     │
│   Use the AVERAGE of this and related        │
│   inputs as the Control Value                │
│                                              │
│                                              │
│                    ↓                         │
│   Press      to edit or select for list      │
└─────────────────────────────────────────────┘
```

To get here from the Main screen:
When adding a generic input:
> Press the "I" key (I/O), then press the "I" key (add Input) to add a generic input.

When editing an generic input:
> Press the "I" key (I/O), then press the "↓" key (down arrow key) to move to the desired generic input. Once the desired input is highlighted, then press the "E" key (Edit).

Menu selections:

Main	- show the group 1 status screen
Status	- shows status of the generic inputs and outputs

Purpose:
This screen is used to either add a generic input or edit an existing one.

Function:
The generic input setpoints and other pertinent generic input information is set using this screen. When all information has been entered or changed, (after pressing the "menu" key) press the "S" key (Status) to return to the generic input and output status display.

Field Information:

Name	This is the name of the generic input. It can be up to 20 characters.
Bd/Pt	This is the board and point location of the generic input sensor.
Input Type	This is the type of sensor used to provide the reading for the generic inputs. Following is a list of available sensors:

Temp (-50 to 125 F)	= Encore Low temperature sensor in degrees Fahrenheit
Temp (0 to 350 F)	= Encore High temperature sensor in degrees Fahrenheit
Eclipse 100 lb.	= 100 lb. Eclipse style transducer
Eclipse 200 lb.	= 200 lb. Eclipse style transducer
Eclipse 500 lb.	= 500 lb. Eclipse style transducer
SA-Type 100 lb.	= 100 lb. SA-Type style transducer
SA-Type 200 lb.	= 100 lb. SA-Type style transducer
SA-Type 500 lb.	= 100 lb. SA-Type style transducer
0-5V Linear	= Linear sensor which reads from 0 to 5 volts
0-10V Linear	= Linear sensor which reads from 0 to 10 volts
1-6V Linear	= Linear sensor which reads from 1 to 6 volts
Unused	= This input type is unused at this time
Linear Type 1	= This input type can be customized in **Linear Setup**
Linear Type 2	= This input type can be customized in **Linear Setup**
OZZIE 1-6V	= Encore Leak Detector sensor (1 to 6 volts)
Humidity 1-5V	= Encore Humidity sensor (1 to 5 volts)
Liquid Level	= Encore Liquid Level sensor
Digital Input	= Digital input (reads open or closed). If this sensor is selected, the entire screen changes. See **Input - Setup (Digital Inputs).**

Error Adjustment	Offset for the control value being monitored and/or used for controlling any generic output. Control Value is defined below in **Input Math**.
Alarm Setpoints	These are the high and low alarm settings for the control value with time delays in minutes.
Logging Interval	Each generic input can be logged at it's own logging interval.
Automatic Reset	This feature (if selected with "Yes") will automatically reset the alarm when the control value returns within the appropriate alarm setpoints.
Alarm Disable Input	This board and point location allows a digital signal to automatically disable this alarm.
Related Inputs	Up to 3 additional sensors can be used to monitor and/or control any generic output. The 3 additional sensor board / point locations are placed on this screen.
Input Math	This option can be set to take either the MAXIMUM, MINIMUM, AVERAGE or 1 MINUS 2 (only uses 2 sensors) value of up to 4 input sensors to produce a single Control Value.
Control Value	This is the result of the Input Math on the main input with the related input sensors. The Control Value will then be monitored and/or used to control any generic output.