

Job Name	<u>Dupont Experimental Station</u>
York S.O.#	<u>90-813,634</u>
Compressor Model	<u>M255B7</u>

The recommended spare parts for the Multi-Stage Centrifugal Compressor may be found on the compressor sectional: York Drawing No. 381-05179d, Sheet 2 of 2. Recommended spares are indicated with a triangle next to the B/M item number.

In addition to the parts on the sectional drawing, the following items are recommended as compressor spares:

<u>Quantity</u>	<u>Description</u>	<u>York Part No.</u>
8	Cartridge, Oil Filter	026-13833
1	Kit, Seal Replacement for (Tuthill-3C) Auxiliary Oil Pump	026-20340
1	Heater, Oil (1000 Watt)	025-09445
1	Pump, Auxiliary Oil (460-3-60)	026-20909A
1	Thermometer	026-04414
1	Thermometer	026-10887
1	Gauge, Pressure	026-31722
1	Bearing Temp. Sensor	025-28317
1	Switch, Hi Oil Discharge Temperature	025-28317
1	Switch, Hi Thrust Bearing Oil Temp.	025-28317

Spare Parts for the Refrigerant Condenser

<u>Quantity</u>	<u>Description</u>	<u>York Part No.</u>
150	Condenser Tubes (MTI# 202)	007-07906
38 Ft.	Extrusion Gasket (Waterbox Covers)	028-08353A
12 Ft.	Channel Gasket	028-08373A

Spare Parts for the Cooler

<u>Quantity</u>	<u>Description</u>	<u>York Part No.</u>
100	Cooler Tubes (MTI# 178)	007-07754
4	Gasket, Sight Port	028-10962
45 Ft.	Extrusion Gasket (Waterbox Covers)	028-08353A
8 Ft.	Channel Gasket	028-08373A

Miscellaneous Spare Parts

<u>Quantity</u>	<u>Description</u>	<u>York Part No.</u>
1	2" Bursting Disk @ 185# (System Relief)	026-31751A
2	2" Bursting Disk @ 200# (Pumpout Relief)	026-31728A
2	Intercooler Gaskets (Covers)	076-65535
2	Intercooler Gaskets (Float Adjuster)	028-01054
2	Packing, Intercooler Float Adjuster	028-01100K
2	Oil Return Cartridge Filter	026-20990
1	Heater, E. Immersion (2000W)	025-29260
1	Temperature Switch (Oil Return)	025-26786
1	Valve, Sol. 3/4" (Oil Return)	025-18811
1	Valve, Sol. 2" (Liq. Injection)	025-21030

UNIT NOT OPERATING

1. Control power is available to the control panel.
2. Compressor sump oil heaters are energized.
3. The capacity controls are disabled; compressor pre-rotation vanes and the interstage control valve are closed. The hot gas valve is open.

SYSTEM STARTUP

1. All chiller safeties must be satisfied prior to starting, with the exception of the compressor and gear low oil pressure switches. The oil pressures are bypassed initially, until the auxiliary oil pumps can establish pressures. The "RESET" button must be pushed to clear any previous power failures (if any).
2. Select the "Main" screen and enable the chiller start by pressing the "Enable Start" button.

NOTE: In order to start the chiller, cooler and condenser water flows must be established. The actual flows (in GPM) are displayed on the "Main" screen. The cooler and condenser on the CRT lube system screen change from white to blue when sufficient flows are established to satisfy the alarm switches FSL-601 and FSL-604.

The cooler water flow must be established remotely or locally (using the "Main" screen keypad button F5) by manually opening the cooler water outlet valve (PCV-706).

3. With the above Enable Start signal, the chiller controls start the compressor and gear auxiliary oil pumps. The "Pre-Lube" text in the lower left corner of the screen changes to yellow indicating that pre-lube timer is timing and the seconds display is incremented. The respective pump symbols on the CRT "Lube System" screen change from green to red. The condenser water outlet valve (PCV-102) control signal is slowly increased to open the valve and establish water flow.
4. Twenty-five seconds after the "Enable Start," the compressor and gear low oil pressures are checked.

SYSTEM STARTUP (Continued)

If the minimum oil pressures are not established, startup will be prevented and an alarm signal will be transmitted to the CRT for indication and recording. The chilled and condenser water flow alarms are also enabled at this time.

5. At 30 seconds after the "Enable Start," with the oil pressures and water flows established:
 - a) A signal is provided to energize the compressor drive motor starter interposing relays R4 and R5 and the message "Compr Stopped" (green) text changes to "Compr Ready" (yellow) on the CRT "Lube System" and "Main" screens.
 - b) The compressor pre-rotation vanes are opened to their minimum position necessary to prevent "surging."
 - c) At this time the chiller must be manually started using the "Compressor Start" pushbutton on the front of the panel.

6. When the feeder breaker is closed an auxiliary contact closes to signal the chiller microprocessor to operate the following:
 - a) Enable the capacity control circuit. Compressor pre-rotation vanes, hot gas bypass valve and interstage valve will now begin to ramp open/closed at a predetermined rate. See Panelview Operator Terminal Description (Screen #12: PID Tune) for further details on ramp tuning.
 - b) De-energize the compressor oil heaters.
 - c) When the shaft pumps maintain the gear and compressor oil pressure for a 100 second time period (through the respective auxiliary pump pressure control software switch), the auxiliary motor driven oil pumps will be stopped.

NOTE: Whenever either the gear or compressor oil pressure falls below the auxiliary oil pump control software switch setting, the auxiliary pump motors will be restarted.

SYSTEM STARTUP (Continued)

- d) When the compressor auxiliary oil pump stops, solenoid valve SV-401 is energized allowing the sump vent FCV-401 to slowly open at a rate determined by the needle valve FCV-001 in the supply air line. The sump vent valve will be closed any time the compressor auxiliary oil pump is re-started.
7. 100 Seconds after the motor feeder breaker auxiliary contact closes the oil separator heaters are energized. When the oil temperature level in the separator reaches approximately 110°F, the temperature control switch (TS-140) closes to actuate the solenoid valve in the high pressure gas supply line to the eductor. The eductor will then pull a fresh oil and refrigerant mixture from the bottom of the evaporator, into the separator. The Refrigerant is boiled off and returned to the evaporator. The oil level increases and flows out of the separator, to return to the compressor. Refer to the Flow Diagram drawing 076-73763E (Sht.2) for further details
8. After ramp-up is completed the capacity controls operate to control chiller capacity in response to chilled water outlet temperature. See Panelview Operator Terminal Description (Screen #5: Capacity Controls) for further details on ramp-up features.

SYSTEM SHUTDOWN

1. The chiller may be shutdown normally by depressing the CRT keypad STOP pushbutton or the hardwired "Compressor Stop" pushbutton on the front of the panel. Also, the chiller may be stopped via a safety control, in which event the CRT displays and records the cause of shutdown. On any shutdown, the sequence is as follows.
2. The chiller motor starter interposing relays R4 and R5 are de-energized to stop the motor if the CRT stop pushbutton is used. If the hardwired pushbutton is used, these relays remain energized.
3. The compressor pre-rotation vanes and the interstage gas valve are closed to minimize back flow of gas through the compressor. The hot gas valve is opened to equalize the condenser pressure with the evaporator. These actions are taken to reduce backspin of the compressor on shutdown.

SYSTEM SHUTDOWN (Continued)

4. The oil separator heaters are de-energized, and the oil return ejector gas supply solenoid valve is de-energized.
5. The compressor and gear auxiliary oil pump motors are started when the shaft pump pressures fall below the setting of the software control switches PDS-401 and PCS-502.
6. The solenoid (SV-401) is de-energized to close the compressor sump vent valve (FCV-401).
7. The low water flow and low oil pressure alarm circuits to the CRT are inactivated to prevent nuisance alarms when these switches later open as a normal occurrence.
8. The chilled water flow may be shutoff at this time.

The condenser water outlet valve PCV-102 is automatically closed.

9. The anti-recycle timer is activated at this time. The anti-recycle (cool down) time depends on the down time of the motor prior to starting and the number of previous starts attempted as described below.

During this time, further restarts of the motor are prevented. The "Anti-recycle" text on the screen is yellow and the time to next allowable start is displayed.

10. Five seconds after the shutdown, the compressor oil sump heaters are energized.
11. 120 Seconds after the shutdown, the drive components will have coasted to a stop and the auxiliary oil pumps will be turned off.

If the hardwired stop pushbutton was used to stop the unit, the pumps will continue to run the operator presses the CRT stop pushbutton, and then continue to run for 120 seconds.

ANTI-RECYCLE OPERATION

Cold Starts

If the chiller has been shutdown for 2 hours prior to the first start, the cool down (anti-recycle) time will be 3 minutes for the first and second cold start.

To start a third time, the chiller must be off for 22 minutes.

Any additional starts would be considered hot starts.

Hot Starts

If the chiller has been running for 30 minutes at 50-100% FLA or has been restarted 3 times per the cold start procedure, the cool down time will be 30 minutes.

Excessive Starts Lockout

If an attempt is made to start the chiller more than 10 times in a 24 hour period, further starts will be prevented until after 24 hours time has elapsed from the time of the first start, or until after a minimum 2 hour cool down period.

An alarm message will also be displayed on the CRT if the chiller start is inhibited due to excessive starts.

Capacity Controls Operation

MAJOR CAPACITY CONTROL DEVICES

1. Compressor Pre-rotation Vanes:

The compressor pre-rotation vanes (PRV's) are internal guide vanes in the suction flow path to the first stage impeller wheel. The PRV's are used to throttle the Refrigerant flow through the system as a means of controlling capacity. The PRV's control capacity in response to the leaving chilled water temperature. If the leaving chilled water setpoint falls below the setpoint, the PRV's are partially closed until the net cooling is reduced and the leaving chilled water returns to setpoint.

In the event of high motor current, the capacity control signal is over-ridden and the compressor PRV's are closed to keep the motor current down. On start-up, the PRV's are closed to reduce the starting load torque of the compressor.

The compressor pre-rotation vanes are closed on shutdown to reduce backflow of high pressure gas from the condenser which might otherwise cause the compressor to spin backwards at a high rate of speed.

The mechanical pre-rotation vane linkage at the compressor is operated by a Conoflow piston operator, which has a pneumatic 3-15 psig direct acting positioner (increasing air signal opens the PRV's). The capacity control signal from the Allen Bradley PLC-5 microprocessor is converted from 4-20 maDC to a 3-15 psi pneumatic signal by an I/P transducer TY-601A.

2. Hot Gas Bypass Valve:

The hot gas bypass valve is used primarily at low loads to maintain a minimum suction gas flow required by the compressor for stability. When the compressor has reduced capacity to its minimum flow (via pre-rotation vane throttling), further capacity reductions are accomplished by opening the hot gas bypass valve. This maintains the flow to the compressor by bypassing the discharge gas back to the compressor suction. However, the hot gas flow replaces the useful evaporation in the cooler since the compressor flow is at minimum. Thus, the net chilling capacity is reduced (albeit not efficiently).

Capacity Controls Operation

Hot Gas Bypass Valve: (Continued)

The minimum suction flow or minimum compressor PRV position will vary. As the differential "head" pressure is lowered (due to colder condenser water) the compressor is capable of stable operation at lower loads. The programming in the chiller panel thus uses the differential "head" pressure to establish when the hot gas may be needed.

The hot gas valve is a Posi-Seal butterfly valve with Fisher actuator and 3620J electro-pneumatic positioner. This positioner has a direct input of 4-20 maDC, which is converted to pneumatic within the positioner (TY-601C).

3. Interstage Gas Valve:

The interstage valve controls Refrigerant flash gas, from the intermediate chamber of the intercooler to the second stage compressor impeller wheel when capacity must be reduced below 50% vane position. At normal high "head" conditions, the interstage valve operates from the same signal as the compressor pre-rotation vanes (multiplied by 2): Throttling to control capacity; closing on startup for reduced load torque; and closing on shutdown to reduce compressor backspin.

When the Differential "HEAD" pressure (R-134a Compr. discharge minus evaporator pressure) falls below 23 PSID (due to cold condenser water temperatures) the interstage valve is driven closed by the "Low Head" pressure controller in software. This maintains a minimum pressure in the intercooler and ensures that the intercooler lowest stage R-134a float valve will have sufficient pressure drop to accommodate the design flow of liquid being expanded to the evaporator.

4. Manual Override (M/A) Stations:

The CRT Screen No. 4 provides for manual/auto control of: pre-rotation vane, interstage valve, and hot gas bypass valve. Normally these should be left in the "Auto" mode.

If during manual operation, the unit is started or stopped, the M/A stations are returned to "Auto" mode so that the PRV and valves return to their safe positions.

Capacity Controls Operation

5. Temperature (Capacity) Control (TC-601):

The temperature control is a programmed control function. Using the input signal from a temperature sensor in the leaving chilled water line, the control provides a proportional plus reset output signal which decreases as water temperature drops below set point to reduce the capacity of the chiller.

This control is forced to "manual" operation with its setpoint tracking the chilled water temperature when the chiller shutdown, during ramp-up, and whenever the vanes are manually controlled. See Panelview Operator Terminal Description (Screen #5: Capacity Controls) for further details.

6. Current Override (IC-551):

The current override control function uses the motor current input signal to limit capacity. When the motor current exceeds normal, the controller puts out a decreasing signal. The LSR-2 will then pass this lower signal on to close the PRV's and interstage valve whenever the motor current is high.

Since the vanes are fully closed at a 25% control signal, the minimum output signal for this controller is set at 35%. This will prevent the vane signal (after CR-2) from going below 13% on a high motor amps condition. This is to prevent a potential low oil pressure trip problem on start-up.

7. Initial Pulldown (Low Evap. Pressure Override) (PC-101):

During startup, the condensing pressure may initially be low. This can cause the refrigerant to back up ahead of the intercooler expansion float valves. If this occurs, the low level of evaporator liquid uncovers a portion of the tube bundle, thereby reducing the heat exchanger performance, and lowering the evaporator pressure.

The Initial Pulldown Evaporator Pressure Controller provides a proportional output signal which decreases as the evaporator falls below a set point which is slightly below design. When a low evaporator pressure is sensed, the lower output signal overrides the capacity signal and is passed on by LSR-1 to keep the PRV's and Interstage valve closed.

The minimum output signal for this controller is set at 35% to prevent a low oil pressure trip problem on a low pressure override condition.

Capacity Controls Operation

When the pressure returns to a safe operating condition, the controllers increasing signal is passed through a ramp (CR-5 and SS-5) to slowly bring the signal to LSR-1 up to 100% (the signal will increase at a rate of 1% per second) and prevent cycling of the controls.

8. Low Head Override Controller (PDC-102):

This programmed control function senses when the differential "Head" pressure is low, and through the low select relay LSR-3 acts to close the interstage valve at "Head" pressures below 23 psid. This raises the interstage pressure, and ensures that any refrigerant collects in the condenser upstream of the first intercooler float valve. Otherwise, if the refrigerant were to back up in the intercooler ahead of the lower stage float valve, large amounts of liquid could enter the compressor interstage connection causing potential damage.

9. Anti-surge Controller (Min. Vane Position) (PDC-102A):

As the differential "Head" pressure falls, the compressor is capable of stable operation at lower minimum PRV settings. From an energy standpoint, it is wise to use the PRV's for capacity control rather than hot gas bypass whenever possible. The Anti-surge controller output signal to HSR provides a minimum closure of PRV's and interstage valve to suit the measured "Head" pressure input. This output also provides the setpoint for the hot gas controller.

See Panelview Operator Terminal Description (Screen #12: PID Tune) for procedure to determine tuning values for most efficient operation.

10. Hot Gas Controller (TC-601C):

This controller modulates the hot gas valve when the capacity control signal reaches the minimum signal established by PDC-102A. As long as the control signal from the temperature controller TC-601 (PV) is above the anti-surge controller output signal (SP) the hot gas valve remains closed.

When the capacity signal PV falls below the SP setpoint, the output of TC-601C is increased above minimum, which starts to open the hot gas bypass valve. Thus at low loads, the capacity is controlled by modulating the hot gas bypass valve.

Capacity Controls Operation

11. Minimum Condensing Pressure Controller (PC-102)

The minimum entering condenser water temperature at design flow (9000 GPM) is 55°F. At temperatures below this the flow must be reduced to maintain the condenser pressure above the minimum (approximately 57 PSIG).

The controller (PC-102) provides a proportional output signal which decreases as the condensing pressure falls below a set point which is slightly above the minimum condensing pressure.

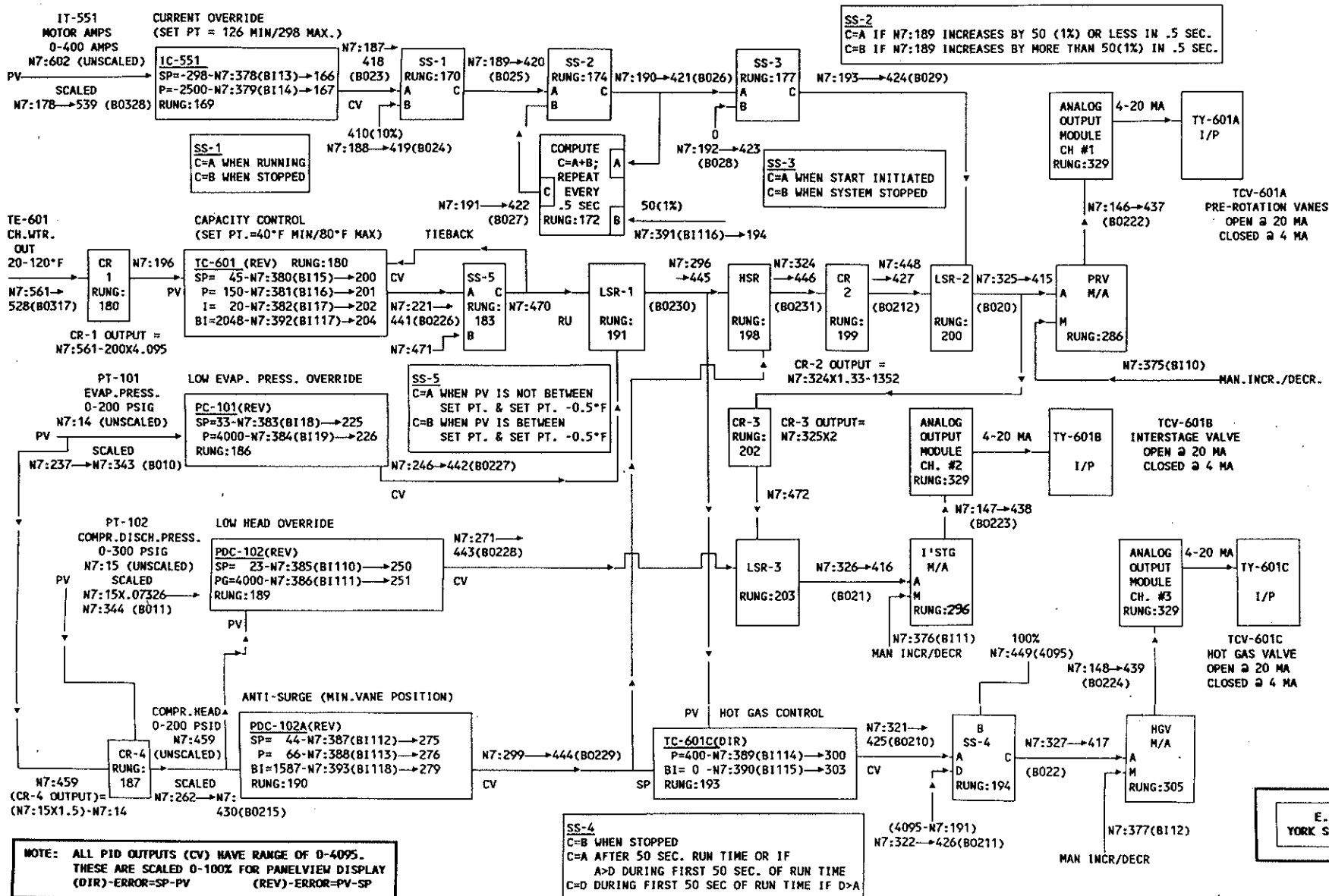
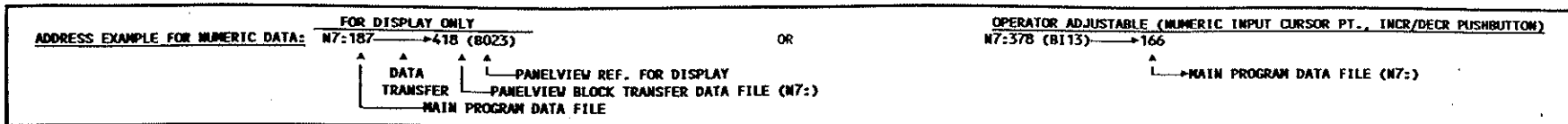
This causes the condenser water outlet valve (PCV-102) to close, reducing flow through the condenser and prevents the condensing pressure from falling below the minimum allowed.

12. Condenser Water Flow Controller (FC-604)

The flow control is a programmed control function. Using the input signal from a flow sensor in the entering condenser water line, the control provides a proportional plus reset output signal which decreases as flow increases above set point to close the water outlet valve PCV-102.

The control is forced to "manual" operation with its setpoint tracking the condenser water flow when the chiller is shutdown, during start-up, whenever PC-102 is controlling the valve, and whenever the valve is manually controlled. See Panelview Operator Terminal Description (Screen #13: Condenser Controls) for further details.

CAPACITY CONTROL DIAGRAM



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 YORK S.O. 90-813634

Refer to the User's Manual for complete instructions. The following describes various features of the terminal and screens as configured by the York factory.

ACCESS CODE

Screen #4-MAN/AUTO Control, Screen #12 PID Tune, and Screen #13-Condenser Controls are programmed for limited access to prevent unauthorized manual operation and changes to PID tuning parameters.

The access codes must be entered and the security enabled by the user while the terminal is in the configuration mode.

To add or delete operators having access to these screens, the program must be revised and downloaded to the terminal.

SCREEN #1 : MISC. OPERATING STATUS

This screen provides the capacity control signals, chiller load, motor current, and running time meter with total running time, running time since last start, and time to next start (time remaining on anti-recycle timer).

The total running time can be reset by temporarily setting B3/20 in the PLC bit file using a programming terminal. The running time since last start time is automatically reset whenever the chiller starts.

CAUTION: Whenever a new program is downloaded into the PLC, the total running time will be replaced by whatever values reside in the PLC counters accumulated value words.

Prior to downloading, the accumulated values of the following counters must be changed to the present values appearing on the screen.

C5:0.ACC	=	Minutes
C5:1.ACC	=	Hours
C5:2.ACC	=	Days

SCREEN #2 : LUBE SYSTEM

This screen will appear on initial power-up and on re-start after a power failure.

This screen would normally be used when enabling the chiller for manual start-up to view the condition of the lube oil system. The double yellow lines represent main lube oil piping. The objects on the screen change states as follows (next page).

SCREEN #2 : LUBE SYSTEM (Continued)

<u>OBJECT</u>	<u>STATE 0</u>	<u>STATE 1</u>
Motors/Gear/ Compr/Pumps	Green (not rotating)	Red (rotating)
Evap, Cond,	White (no water flow)	Blue (water flowing)
Oil Coolers	Yellow (no water flow)	Blue (water flowing)
Pre-alarm Indicator (Tag # Pre-fix PI-/PDI-/TI-)	Cyan (normal)	*Yellow Blinking (abnormal)
Shutdown Indicator (Tag #401, 501 etc.)	Cyan (normal)	*Red Blinking (shutdown)
Enable Start Pushbutton	White (Enable start)	Yellow (Start enabled)
Stop Pushbutton	White	Red
Start/Stop GAOP	Green (start GAOP)	Red (stop GAOP)
Start/Stop CAOP	Green (start CAOP)	Red (stop CAOP)
Pre-Lube Timer Indicator Text	White (not timing)	Yellow (timing - start initiated)
Post-Lube Timer Indicator Text	White (not timing)	Yellow (timing)
Anti-Recycle Timer Indicator Text	White (not timing, restart allowed)	Yellow (timing, restart inhibited)
Heaters	Green (off)	Red (on)

* Pre-alarm and shutdown indicators will remain in alarm state until reset pushbutton (F20) is pressed after the conditions have returned to normal.

SCREEN #2 : LUBE SYSTEM (Continued)

The text to the left of the compressor will read "Compr. Stopped" (green) when the run interlock is open (relay R9 is de-energized), "Compr. Ready" (yellow) when the compressor motor starter interposing relays R4 and R5 are energized, and "Compr. Running" (red) when the starter auxiliary contact closes energizing relay R9.

SCREEN #3 : MAIN

This screen would normally be used during start-up to manually open the chilled water valve (PCV-706) and during normal and free cooling operation.

The lines are color coded to represent the following:

- Single Cyan** - Oil and refrigerant from bottom of evaporator to jet pump oil eductor.
- Double Cyan** - Main low pressure refrigerant gas.
- Single Red** - High pressure refrigerant liquid for interstage liquid injection.
- Double Red** - Main high pressure refrigerant gas, liquid, and hot gas bypass.
- Single Magenta** - Oil, refrigerant liquid and gas from jet pump oil eductor to oil separator.
- Double Magenta** - Main interstage refrigerant gas.
- Double Blue** - Main chilled and cooling water piping.

The object states are the same as the lube system with the following additions:

<u>OBJECT</u>	<u>STATE 0</u>	<u>STATE 1</u>
Oil Sep (Text)	White (not operating)	White/Red Background (operating)
Condenser Text Evaporator Text	White (no water flowing)	White/Blue Background (water flowing)
Solenoid Valve	Green (de-energized)	Red (energized)

SCREEN #3 : MAIN (Continued)

Major capacity control output signals to the compressor PRV (TCV-601A), interstage valve (TCV-601B) and hot gas valve (TCV-601C) are displayed in bar graph form with ranges of 0 to 100 percent (0=closed, 100=open).

Free Cooling

Free cooling operation is selected using the F7 CRT keypad button which is configured as a momentary pushbutton. When pressed and released, the Green "START FREE CLG" changes to Red "STOP FREE CLG" and the PRV and valves are opened. When pressed again and released, the indicator changes back to Green "START FREE CLG" and the PRV and valves return to their normal shutdown positions.

Chilled Water Flow Control

The chilled water outlet valve (PCV-706) and water flow (FI-601) may be manually controlled from this screen using function buttons F5 and F6 while observing the % displayed beneath the valve symbol and the GPM displayed to the right of the valve.

SCREEN #4 : MAN/AUTO

This screen would normally only be used on initial start-up of chiller to test valve operation and to determine min. and max. vane positions at low and high head conditions as described under Screen #12.

The INCR & DECR pushbuttons are activated by pressing the MAN pushbutton. Pressing the INCR/DECR button and releasing within 1 second will cause a 1% man output change. Pressing the INCR/DECR button and holding for more than 1 second will cause a 5% per second manual output change. To insure bumpless transfer from manual to automatic, the manual signal must be equal to the automatic signal (CV). Transfer is inhibited if signals are not equal ($\pm 5\%$).

The MAN and AUTO pushbuttons indicate the mode selected as follows:

	<u>COLOR IN</u> <u>AUTO MODE</u>	<u>COLOR IN</u> <u>MAN. MODE</u>
MAN Pushbutton	White	Yellow
AUTO Pushbutton	Cyan	White

SCREEN #4 : MAN/AUTO (Continued)

The red warning "MAN/AUTO TRANSFER INHIBITED" appears if a transfer is attempted with CV & Man. Output not equal. The red warning "HI MTR AMPS DECR PRV MAN OUTPUT" appears if the operator opens vanes too far causing excessive load on the motor. Operator should immediately decrease PRV signal until this message disappears.

If during manual operation, the unit is started or stopped the controls are returned to automatic so that the PRV and valves return to their safe positions.

SCREEN #5 : CAPACITY CONTROLS

The Capacity Control screen #5 is an abbreviated representation of the capacity control diagram (See Capacity Controls Operation - Figure 1). This screen shows how the outputs of the various controller blocks react to their respective input signals. It also shows how the various controller outputs are selected via low selector or high selector relays at intermediate stages, and shows which signals become the dominant control signal to the controlled analog output devices (compressor Pre-rotation vanes; hot gas bypass valve and interstage valve).

This screen would also be used along with screen #12 (PID TUNE), on initial start-up of the chiller to establish optimum tuning parameters for the controllers, to provide the most efficient chiller operation.

The temp controller (TC-601) block has a "manual" indicator which blinks yellow whenever this control is in the manual mode.

This occurs when the unit is shutdown, during ramp-up and whenever the PRV Man/Auto station is in manual.

With unit stopped, TC-601 is in manual, its set point is equal to the chilled water out temperature and its output is equal to the PRV signal before CR-2. (When in manual TC-601 drives its output to same as tieback input).

PDC-102A output is at 24% (with initial tuning values) since there is no differential pressure.

When start is initiated, the PRV signal goes to 30% and TC-601 output is driven to 30%.

SCREEN #5 : CAPACITY CONTROLS (Continued)

When the starter interlock closes, the PRV signal slowly increases (LSR-2 selects the lower ramp signal), and the hot gas valve signal slowly decreases.

During the ramp-up, TC-601 set point will track the chilled water temperature and its output will be driven to equal the PRV output signal before CR-2.

If the ramp signal (SS-3 output) rises above the minimum vane signal (HSR output) the PRV will open only at the rate the head increases to cause PDC-102A output to increase, and will only open as far as this signal allows since LSR-2 will select the lower signal.

If during ramp-up the capacity increases sufficiently to lower the chilled water outlet temperature to less than 0.5°F above the desired setpoint, TC-601 is changed to the automatic mode and its output now changes in response to load changes.

If the chilled water temperature continues to fall, TC-601 output will decrease causing the hot gas valve and PRV to move to whatever positions are required to maintain the chilled water at set point.

If the unit is started with a high load, the chilled water temperature will not be reduced substantially during ramp-up because the vanes will only open to the minimum vane position as described above.

When the ramp-up is completed and TC-601 is changed to automatic, its setpoint will return to whatever the setpoint is stored in panelview memory at that time.

TC-601 output will then increase to open the vanes and bring the water temperature to set point.

If the PRV is put in manual mode at any time, TC-601 is put in manual mode and the tieback input is used to drive the TC-601 output to the same value as the manual control output.

The above tracking and tieback controls provide a bumpless transfer from manual to automatic control after the ramp-up period and also after manually controlling the PRV.

SCREEN #6 : LUBE OIL STATUS

This screen provides a list of all measured lube oil pressures and temperatures, compressor sump and balance piston pressures, present status, and the safety alarm and shutdown setting (if applicable) for each.

If the present status value exceeds the safety setpoints, the alarm value changes to yellow (blinking) and the shutdown value changes to red (blinking) and remains in this state until the reset button (F20) is pressed after the condition returns to normal.

SCREEN #7 : REFRIG AND WATER STATUS

This screen provides a list of all measured refrig-134a and water pressures and temperatures, present status, and the safety alarm and shutdown settings (if applicable) for each.

It functions the same as Screen #6.

SCREEN #8: BEARING & CASING STATUS

This screen provides a list of all measured bearing temperatures, and casing vibration, present status, and the safety alarm and shutdown setting for each.

It functions the same as Screen #6.

SCREEN #9 : SCREEN LIST

This screen allows the user to select any other operating screen and also the alarm history screen which shows the last 21 alarms that occurred, the date and time of occurrence, and the date and time the alarm was acknowledge.

SCREEN #11: BEARING/CASING VIBRATION

This screen provides a graphical representation of the motor, gear and compressor. It shows all the measured bearing temperatures and casing vibration. The tag numbers provide pre-alarm and shutdown indication, which operate the same as those on screen# 2.

SCREEN #12: PID TUNE

This screen would normally only be used on initial start-up, or whenever it becomes necessary to fine tune the capacity controls due to changing operating conditions. The effects of changes to the PID tuning changes are observed by changing back to the Capacity Controls screen #5 (A programmed button is provided to allow for direct changing between these two screens).

The adjustable tuning parameters are shown with a white and a cyan number, separated with a "/". The white numbers are the values stored in Panelview memory, and the cyan numbers are the value currently used by the PID controller. The controllers are configured using ISA equations, with the following values:

SP = Set point
P = Controller Gain x 0.01
I = Reset Time x 0.01 Minutes/Repeat
BIAS = Feed-forward or Constant Bias

Refer to the Allen-Bradley processor manual (chapter 15) for additional information on the PID instruction.

Changing Tuning Parameters

To change tuning parameters, press "Select" on the keypad to activate the numeric input cursor point, then use the arrow keys to move the Red cursor to the desired position.

NOTE: When changing the set point of TC-601, three digits must be entered, i.e. a new set point of 45.5 would be entered 455.

The setpoints for IC-551 and TC-601 must be within the following ranges:

IC-551 set point = 157 min. to 298 max.
TC-601 set point = 40.0 (400) min to 80.0 (800) max.

After entering the new value in the scratchpad area at the top of the screen, press "Enter" to replace the existing value at the cursor. Change as many values as required and then press "Cancel" to remove the scratchpad. To enter the new values into the PID instructions in the processor, press the "Load" pushbutton.

SCREEN #12: PID TUNE (Continued)

CAUTION: Before pressing "LOAD" button, be sure all tuning parameters are at the proper values. To insure that the new values are retained after a power failure, set the power-up values to "LAST STATES." To do this, place the Panelview in the configuration mode and select "PRESET OPERATIONS" from the menu.

This button should blink red one time indicating that the new values have been entered, and the cyan numbers should change to the new values.

The tuning values shown are estimated only and may require adjustment depending on actual chiller operating conditions.

Anti-Surge Controller (PDC-102A) Tuning

The Anti-surge controller (PDC-102A) tuning values are based on estimated conditions as follows:

	<u>Compressor</u> <u>Diff. Press.</u>	<u>Min.Vane</u> <u>Signal (before</u> <u>CR-2) @ Surge</u>
High Head	70 PSID	37%
Low Head	18 PSID	27%

It is very important that this control be adjusted to suit actual chiller operating conditions to achieve maximum efficiency of operation.

You must first establish the actual high and low head minimum vane signals as accurately as possible by manually holding the hot gas valve closed and closing the vanes (to maintain leaving chilled water temperature) until the compressor begins to surge. Note and record the "MAN PRV signal" at high and low head surge.

If actual operating conditions are different: e.g. 40% high head and 30% low head min. vane signals, you must determine the required tuning values for PDC-102A to produce a 40 to 30% signal as follows:

High Head Signal = 40 %
Low Head Signal = 30 %

Assuming the high and low head differential pressures are 70 and 18 PSID, the setpoint (SP) must be at mid point or 44 PSID, with an output of 35% (i.e. $[40\%+30\%]\div 2$). The Bias (BI) must be set to equal the output at set point:

SCREEN #12: PID TUNE (Continued)

$$\text{Bias} = .35 \times 4095 = 1433$$

To determine the Proportional Gain (P) setting:

$$\begin{aligned} P &= \frac{\text{Output Chg \%}}{\text{Input Chg \%}} = \frac{(\text{Hi head output\%}) - (\text{Low head output\%})}{[(\text{Hi Head } \Delta P) - (\text{Low Head } \Delta P)] + \text{Span}} \times 100 \\ &= \frac{(40\% - 30\%)}{[(70 - 18) \div 200] \times 100} = \frac{10}{26} = 0.38 \end{aligned}$$

Since the value entered is actually a multiple of .01, the actual P value entered must be 38 (38 ÷ .01).

Hot Gas Control (TC-601C) Tuning

To determine the new P (Gain) setting for TC-601C to achieve full hot gas (100% output) as a decreasing load causes TC-601 output to drop below the minimum vane set point (30%) to 0%:

$$P = \frac{\text{Output Chg \%}}{\text{Input Chg \%}} = \frac{100}{30} = 3.33 \div .01 = 333$$

The Bias setting on the hot gas control (TC-601C) is used to provide a safety zone between actual surge and the minimum vane position (SP). Since this value is added to the result of the PID calculation [P (SP-PV)] to produce the actual signal, a value greater than 0 will cause the hot gas valve to open sooner. For example, if SP = PV, CV = P (SP-PV) + BIAS = 3.33(0) + 5% = 5%. This will allow the hot gas valve to begin opening before the vanes reach their minimum position, providing a smooth transition from PRV to hot gas control of the chiller capacity.

Ramp Tuning

The ramp rate determines how fast the vanes are allowed to open and the hot gas valve is allowed to close on start-up after the motor starter run interlock closes. Increasing the rate will decrease the total ramp-up time displayed in seconds beneath the rate.

SCREEN #12: PID TUNE (Continued)

The total ramp-up time displayed will not change until the new rate has been loaded. For example, if the current rate setting of 16 were increased to 20, the ramp-up time would decrease from 128 seconds to 102 seconds after the "load" pushbutton is pressed. If the rate setting were decreased to 12, the ramp-up time would increase to 171 seconds.

SCREEN #13: CONDENSER CONTROLS

This screen would normally be used only when it is necessary to manually control the condenser water flow or change the minimum condensing pressure control (PC-102) or condenser water flow control (FC-604) tuning values.

The manual/auto control and tuning operations are the same as described for screen #4 Man/Auto and screen #12 PID Tune.

Note: When entering the setpoint for FC-604, a 3 digit number must be entered since the controller is scaled 0-140 (actual setpoint in GPM = Entered value x 100).

The controller is scaled 0-140 so that its output does not change with flow transmitter signal fluctuations of ± 49 GPM or less, thus providing more stable operation of the condenser water regulating valve PCV-102.

The flow controller (FC-604) block has a "manual" indicator which blinks yellow whenever this control is in the manual mode.

This occurs when the unit is shutdown, during start-up, whenever PC-102 is controlling the valve due to low condenser pressure, and whenever the valve Man/Auto station is in manual.

With unit stopped, FC-604 is in manual, its set point is equal to the condenser water flow and its output is equal to the signal after the free cooling selector. (When in manual FC-604 drives its output to equal the tieback input).

The free cooling selector output is 0 when not in free cooling and 100% when in free cooling mode.

When start is initiated, the CR-7 output signal slowly increases, and the water valve slowly opens.

SCREEN #13: CONDENSER CONTROLS (Continued)

During the start-up, FC-604 set point will track the condenser water flow and its output will be driven to equal the CR-7 output signal.

If the PC-102 output falls below the CR-7 output signal due to cold condenser water, the water valve will only open as far as the PC-102 output signal allows since LSR-4 will select the lower signal.

When the water flow increases to 6000 GPM, FC-604 is switched to the automatic mode (unless the PC-102 output signal is lower than the CR-7 output), the setpoint is returned to whatever is stored in the Panelview memory at that time, and its output now changes to maintain the desired flow rate.

SCREEN #14: CHILLER STATUS (PG.1)

This screen provides a list of all the measured pressures, temperatures and flows and shows the present status of each.

The pushbutton indicator for function button F8 shows if automatic printing of the screen (as well as Screen #15 and #16) has been selected.

The time interval between prints is changed using the same procedure as described for changing tuning parameters on Screen #12: PID Tune.

The function button F5 is used to print only this screen and may be used to test the printer.

Note: The Panelview terminal will support any serial IBM (or compatible) text printer. Before printing, ensure that the printer and the terminal have the same serial parameters including baud rate, parity, data bits and stop bits.

This must be done with the terminal in the configuration mode. See the Panelview User's Manual for more information.

With the printer connected and working properly, and "auto Print" enabled, the PLC will automatically change the terminal screen first to #14, then to #15 and #16, and print them every time the time interval between prints has elapsed.

SCREEN #14: CHILLER STATUS (PG.1) (Continued)

These screens are also printed any time there is an abnormal operating condition. The prints would be run during a pre-shutdown condition and also 2 seconds prior to shutdown if the condition degrades to that point, thus providing a record of all system parameters for use in diagnosing the cause of the malfunction.

The PLC then changes the screen to #3: Main and the operator may then change to other screens if desired.

SCREEN #15: CHILLER STATUS (PG.2)

This screen provides a list of other measured parameters (not shown on Screen #14) and control output signals, and shows the present status of each.

It functions the same as Screen #14.

SCREEN #16: ALARM STATUS

This screen displays active and inactive alarms, the number of times a point has gone into alarm (the alarm count) and the total amount of time a point has been in alarm.

Refer to Panelview User's Manual for more information on this screens features.

When the automatic print mode is selected on Screen #14, the "Active Alarms Mode" screen will be printed.

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 1

M.I.S.C. · O.P.E.R.A.T.I.N.G. · S.T.A.T.U.S.

NEXT
STATUS

C.A.P.A.C.I.T.Y. · C.O.N.T.R.O.L.S.
 CONTROL

L.O.A.D.
 NNNN TONS
 NNNN %

RETURN

SYMBOL	CONTROL SIGNAL(%)	DESCRIPTION
TCV-601A	[NN]	COMPR PRE-ROTATION VANES
TCV-601B	[NN]	INTERSTAGE VALVE
TCV-601C	[NN]	HOT GAS VALVE
MOV-603	[NN]	CONDENSER WTR OUTLET VALVE

COMPR
STOP

R.U.N.N.I.N.G. · T.I.M.E. · M.E.T.E.R.
 TOTAL SINCE LAST START

M.O.T.O.R.
 C.U.R.R.E.N.T.
 NN AMPS
 NN % FLA

SCREEN
LIST

NNN]	DAYS	NNN]	DAYS
[N]	HOURS	[N]	HOURS
[N]	MINUTES	[N]	MINUTES

MAIN
SCREEN

P.R.E.S.E.N.T.	L.A.S.T. · S.T.A.R.T.
DATE MM/DD/YY	N/ N/ NNN
TIME HH:MM:SS PM	N: N:ON

T.I.M.E. · T.O.	N.E.X.T. · S.T.A.R.T.
NNN SECONDS	

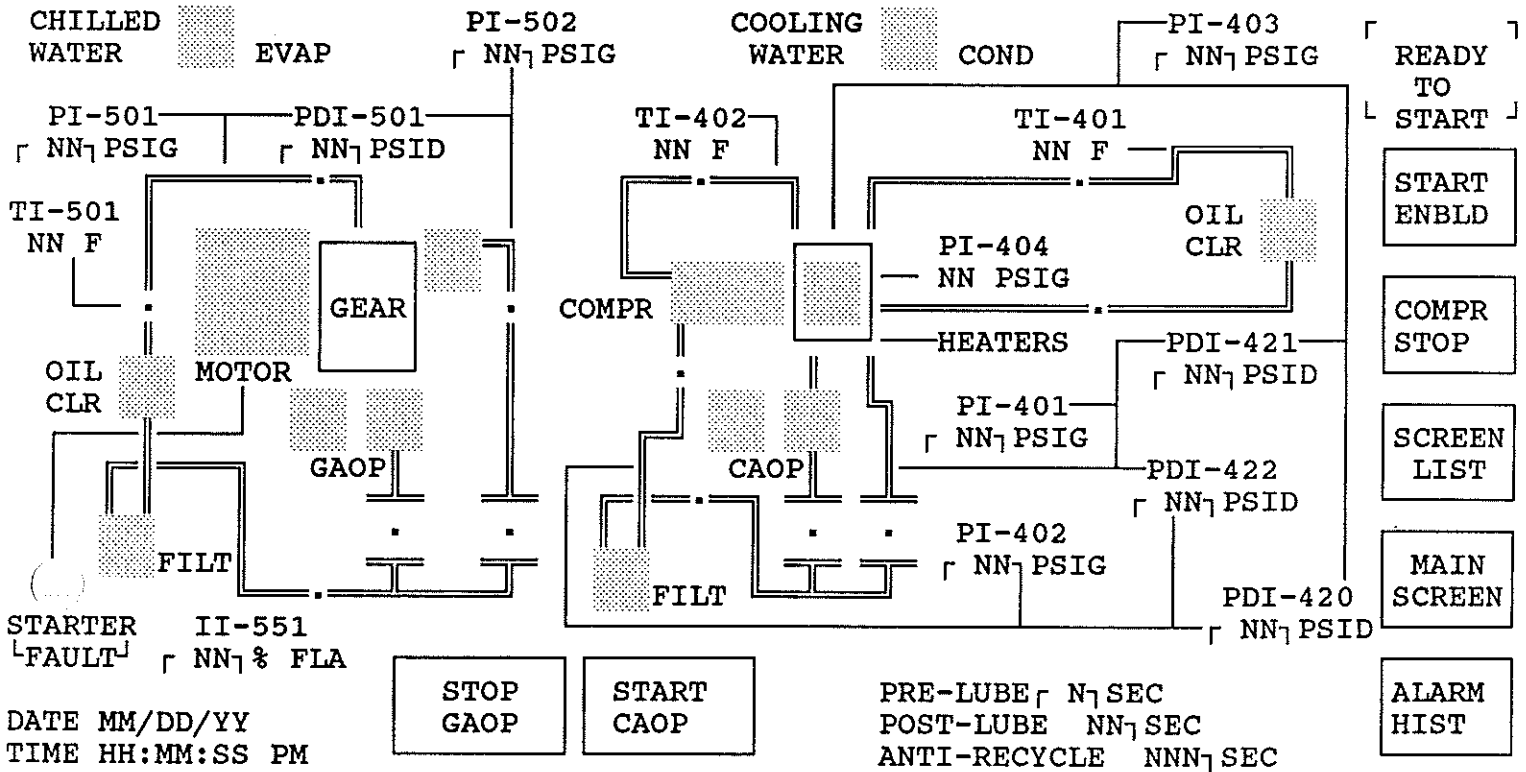
ALARM
HIST

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 2

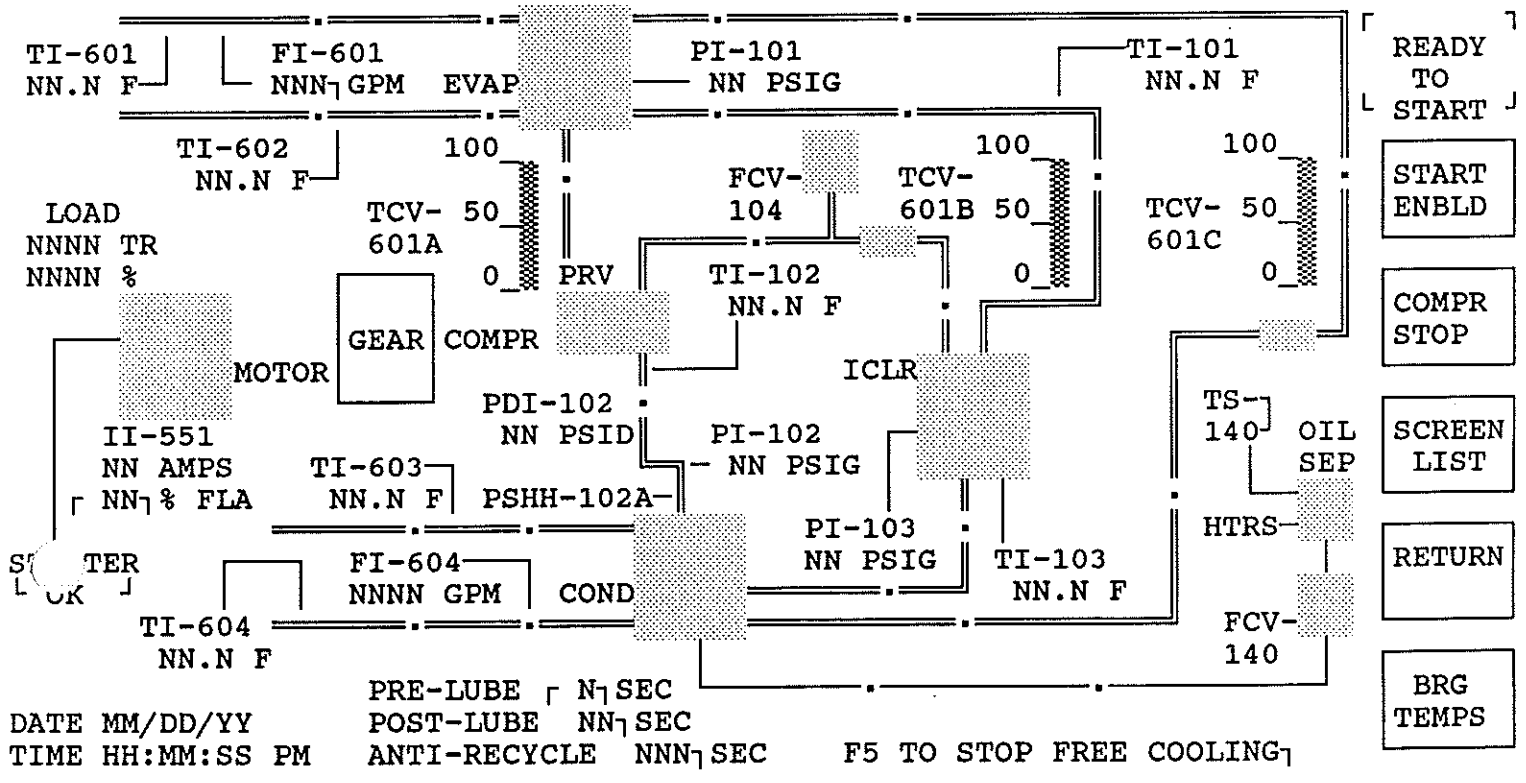


PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 3



DATE MM/DD/YY
 TIME HH:MM:SS PM

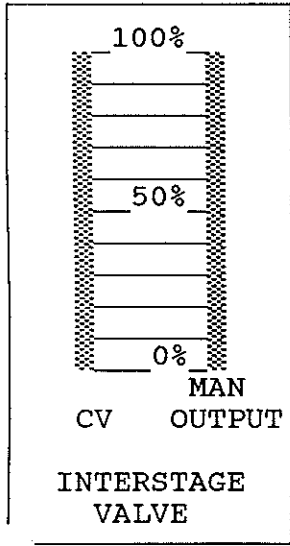
PRE-LUBE N SEC
 POST-LUBE NN SEC
 ANTI-RECYCLE NNN SEC
 F5 TO STOP FREE COOLING

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

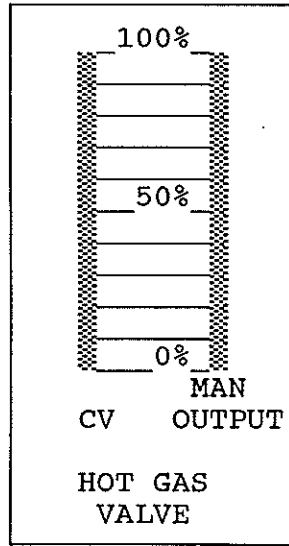
May 17 1991 08:42:53

Screen Report for Screen 4



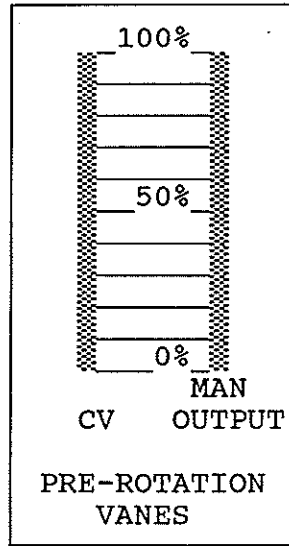
MAN INCR

AUTO DECR



MAN INCR

AUTO DECR



MAN INCR

AUTO DECR

LVG CHILLED
WATER TEMP NN.N F
COMPR HEAD r NN r PSID
ANTI-SURGE CV r NN r %
AUTO PRV SIGNAL r NN r %
MAN PRV SIGNAL r NN r %

COMPR MOTOR
CURRENT
r NN r %FLA

PID
TUNE

HI MTR AMPS
DECR PRV
MAN OUTPUT r

MAIN
SCREEN

MAN/AUTO r
TRANSFER
INHIBITED

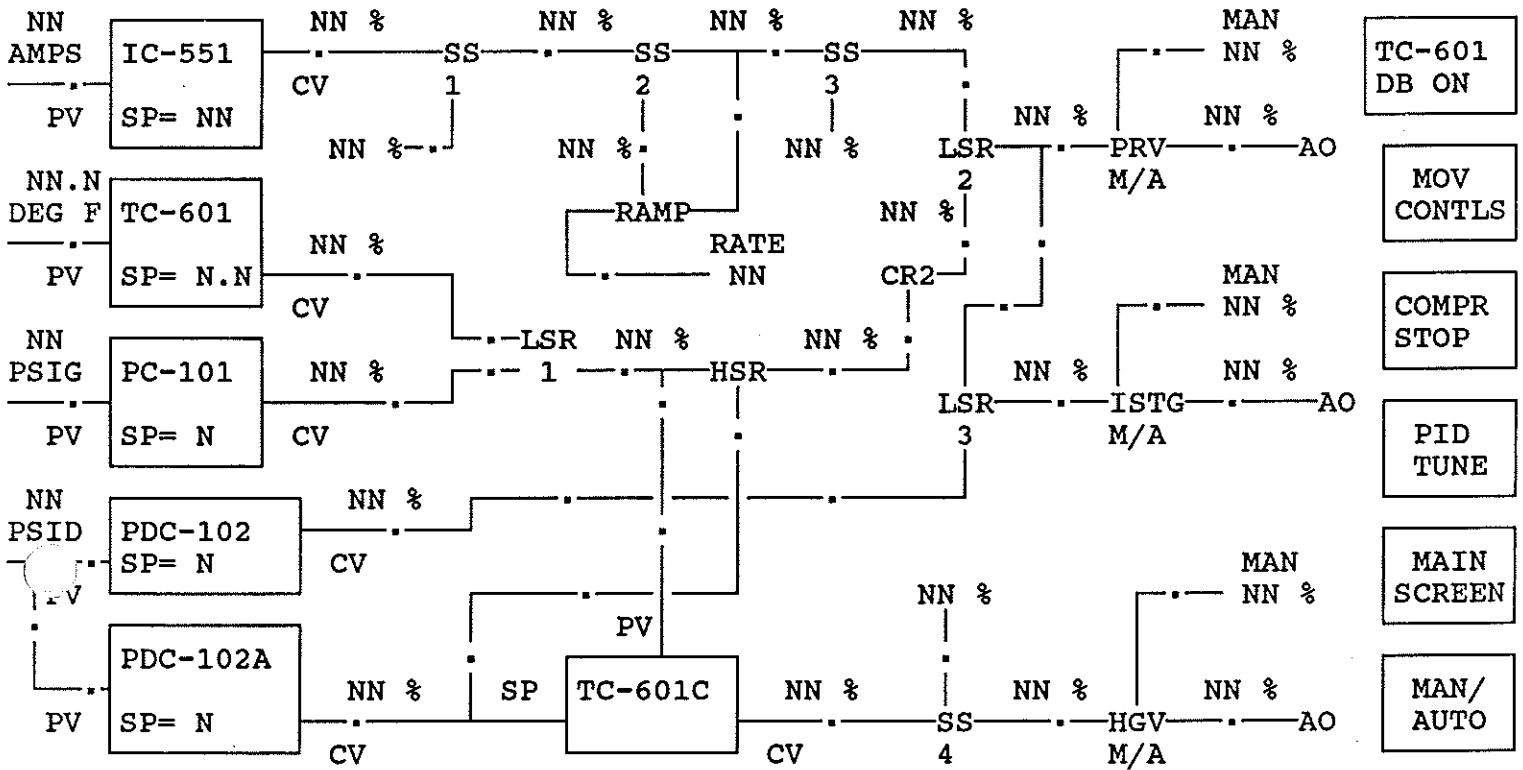
CAP
CONTLS

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 5



PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 6

L·U·B·E· O·I·L· S·T·A·T·U·S·

NEXT
STATUS

P·R·E·S·S·U·R·E· P·S·I·G·/·P·S·I·D·

SYMBOL	PRESENT STATUS	SAFETY SETPOINT		DESCRIPTION
		ALARM	SHUTDOWN	
PI-401	┌ NN┐	-	-	COMPR SHAFT PUMP
PI-402	┌ NN┐	-	-	COMPR BRG SUPPLY
PI-403	┌ NN┐	-	-	COMPR SUMP
PI-404	┌ NN┐	-	-	COMPR BALANCE PISTON
PDI-420	┌ NN┐	45	38	COMPR SUPPLY DIFF
PDI-421	┌ NN┐	50 (START AOP)	-	COMPR SHAFT PUMP DIFF
PDI-422	┌ NN┐	20	-	COMPR FILTER DIFF
PI-501	┌ NN┐	15	10	GEAR SUPPLY
PI-502	┌ NN┐	37 (START AOP)	-	GEAR SHAFT PUMP
PDI-501	┌ NN┐	15	-	GEAR FILTER DIFF

RETURN

COMPR
STOP

SCREEN
LIST

T·E·M·P·E·R·A·T·U·R·E· D·E·G· F·

TI-401	NN	175	185	COMPR THRUST BRG
TI-402	NN	175	185	COMPR FRONT BRG RETURN
TI-501	NN	130	140	GEAR SUPPLY

MAIN
SCREEN

ALARM
HIST

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

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Screen Report for Screen 7

R·E·F·R·I·G· ·1·3·4·a· ·A·N·D· ·W·A·T·E·R· ·S·T·A·T·U·S·

NEXT
STATUS

P·R·E·S·S·U·R·E· P·S·I·G·/·P·S·I·D·
 PRESENT SAFETY SETPOINT

RETURN

SYMBOL	PRESENT STATUS	ALARM	SHUTDOWN	DESCRIPTION
PI-101	┌ NN┐	31	28	EVAP REFRIG
PI-102	┌ NN┐	175	185	COMPR REFRIG DISCH
PDI-102	┌ NN┐	--	--	COMPR REFRIG DIFF(HEAD)
PI-103	┌ NN┐	--	--	INTERCOOLER REFRIG
T·E·M·P·E·R·A·T·U·R·E· D·E·G· F·				
TI-101	NN.N	34	32	EVAP REFRIG LIQUID
TI-102	NN.N	210	226	COMPR REFRIG DISCH
TI-103	NN.N	--	--	CONDENSER REFRIG LIQUID
TI-601	NN.N	39	38	LEAVING CHILLED WATER
TI-602	NN.N	--	--	ENTERING CHILLED WATER
TI-603	NN.N	--	--	LEAVING CONDENSER WATER
I-604	NN.N	--	--	ENTERING CONDENSER WATER
W·A·T·E·R· ·F·L·O·W· ·G·P·M·				
FI-601	NNN┐	3000	2400	CHILLED WATER
FI-604	NNNN	1800	900	CONDENSER WATER

COMPR
STOP

SCREEN
LIST

MAIN
SCREEN

ALARM
HIST

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

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Screen Report for Screen 8

B.E.A.R.I.N.G. & C.A.S.I.N.G. S.T.A.T.U.S.

NEXT
STATUS

B.E.A.R.I.N.G. T.E.M.P.E.R.A.T.U.R.E.S. D.E.G. F.

SYMBOL	PRESENT	SAFETY SETPOINT		DESCRIPTION
	STATUS	ALARM	SHUTDOWN	
TI-502	[NN]	180	190	GEAR HI SPEED SHAFT END
TI-503	[NN]	180	190	GEAR HI SPEED OPP SHAFT END
TI-504	[NN]	180	190	GEAR LOW SPEED SHAFT END
TI-505	[NN]	180	190	GEAR LOW SPEED OPP SHAFT END

RETURN

COMPR
STOP

C.A.S.I.N.G. V.I.B.R.A.T.I.O.N. I.N./S.E.C.

XI-401	N.NNN	0.150	0.188	COMPRESSOR FRONT
XI-402	N.NNN	0.150	0.188	COMPRESSOR REAR
XI-501	N.NNN	0.200	0.350	GEAR HI SPEED SHAFT END
XI-502	N.NNN	0.140	0.190	GEAR LOW SPEED SHAFT END
XI-551	N.NNN	0.240	0.310	MOTOR SHAFT END
XI-552	N.NNN	0.240	0.310	MOTOR INBOARD END

SCREEN
LIST

MAIN
SCREEN

ALARM
HIST

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 9

S·C·R·E·E·N· ·L·I·S·T·
.....

- SCREEN 1 MISC OP STATUS
- SCREEN 2 LUBE SYSTEM
- SCREEN 3 MAIN
- SCREEN 4 MAN/AUTO
- SCREEN 5 CAPACITY CONTROLS
- SCREEN 6 LUBE OIL STATUS
- SCREEN 7 R-134a/WTR STATUS
- SCREEN 8 BRG/CSG STATUS
- SCREEN 11 BRG TEMP/CSG VIBR
- SCREEN 12 PID TUNE
- SCREEN 13 MOV-603 CONTROLS
- ALARM HISTORY

CURSOR
UP

CURSOR
DOWN

ENTER

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 10

C·O·N·T·R·O·L· ·P·O·W·E·R· ·O·N·
.....

P·R·E·S·S· ·P·O·W·E·R· ·F·A·I·L·U·R·E· ·R·E·S·E·T· ·B·U·T·T·O·N·
.....

A·N·D· ·S·E·L·E·C·T· ·S·C·R·E·E·N·
.....

SCREEN
LIST

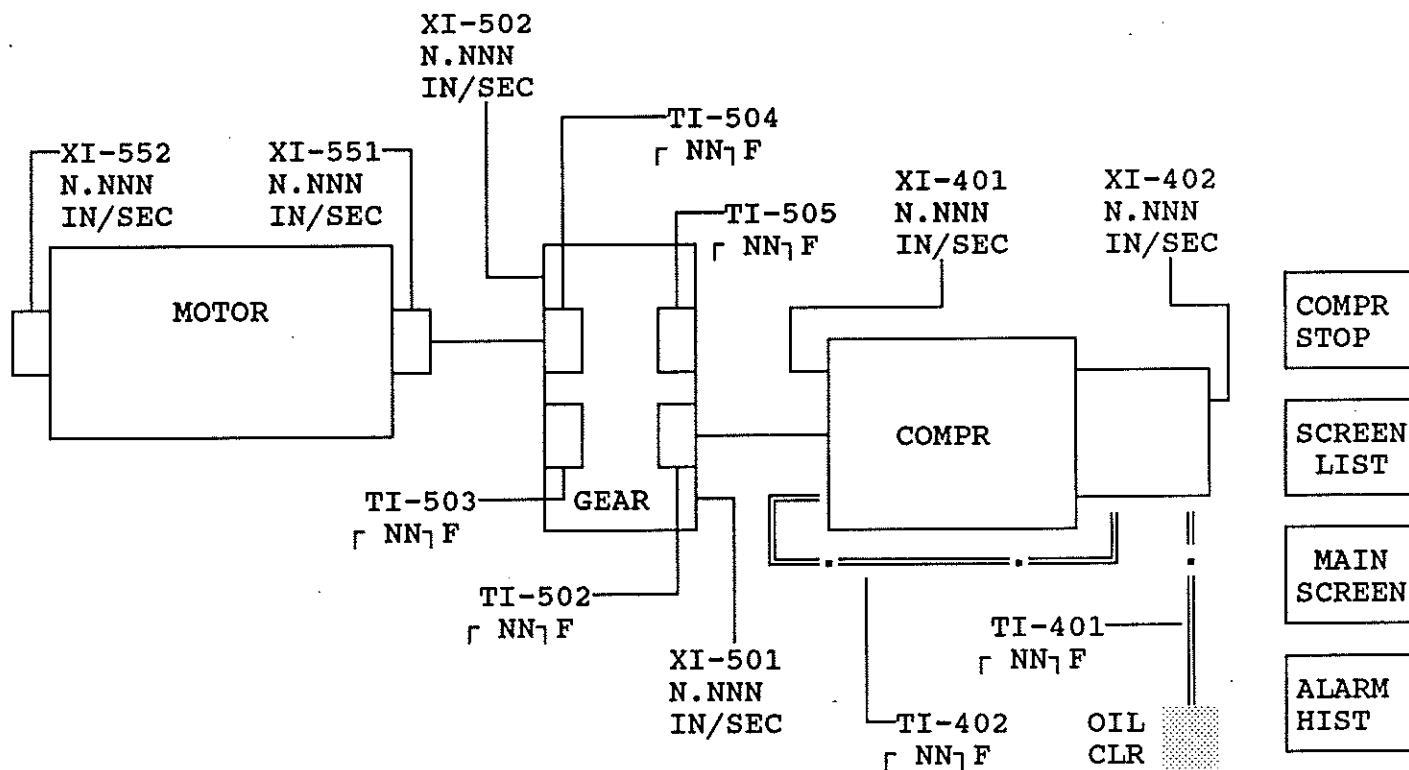
LUBE
SYSTEM

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 11



PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 12

I·C·--·5·5·1·
SP=· NN/ NN
P=· NNN/ NNN

P·C·--·1·0·1·
SP=· N/ N
P=· NNN/ NNN

P·D·C·--·1·0·2·
SP=· N/ N
P=· NNN/ NNN

MOV
CONTLS

T·C·--·6·0·1·
SP=· NN/ N.N
P=· NNN/ NNN
I=· NNN/ NNN
BI=· NNN/ NNN

T·C·--·6·0·1·C·
P=· NNN/ NNN
BI=· NN/ NN

P·D·C·--·1·0·2·A·
SP=· N/ N
P=· NN/ NN
BI=· NNN/ NNN

LOAD

CAP
CONTLS

R·A·M·P·
RATE=· NN/ NN

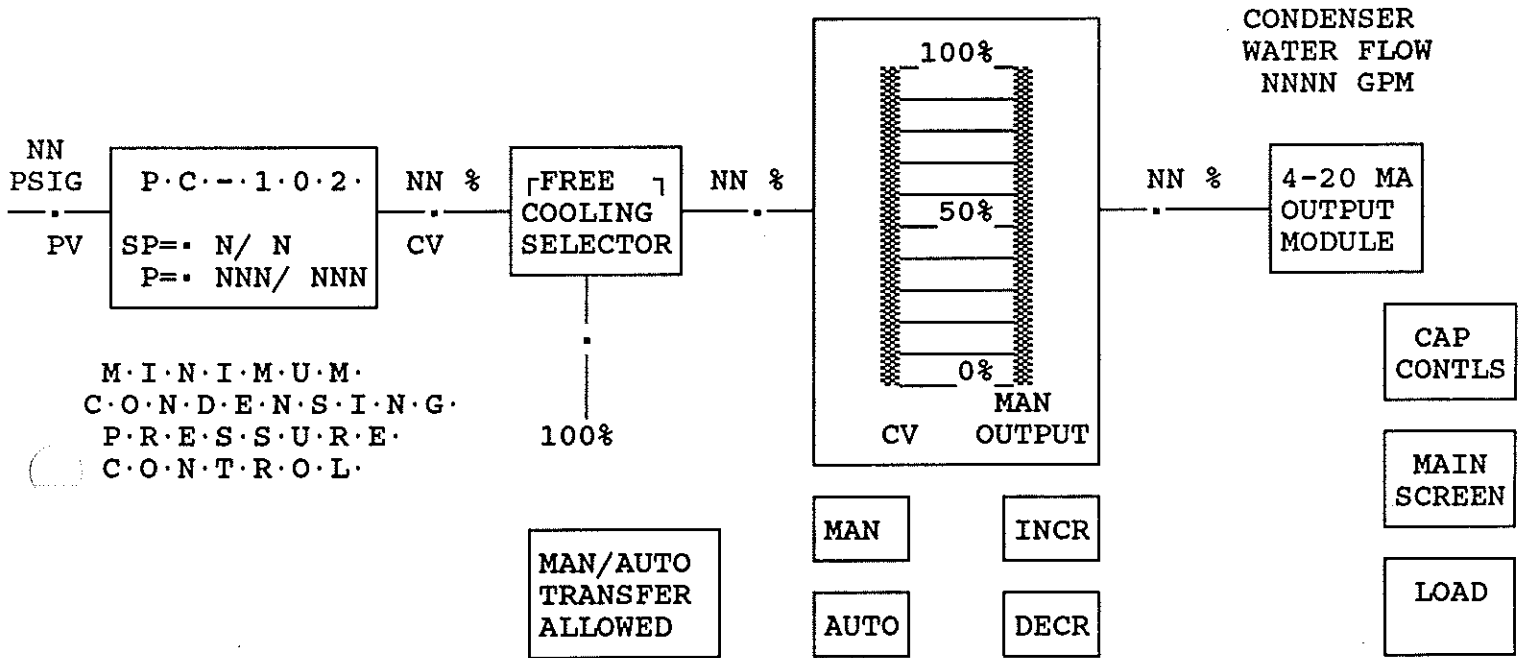
MAIN
SCREEN

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Screen Report for Screen 13



PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 15:35:10

Information Window Operation

Operation:	Enable
Foreground Color:	Black
Background Color:	Red
Blink:	No
Underline:	No
Character Height:	Single
Character Width:	Single
Window Address:	D O 2 2/13 thru 2/15

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 15:35:10

Information Window Messages

Number	Message
--------	---------

1	IC-551 SET POINT OUT OF RANGE(126-298)
2	TC-601 SET POINT OUT OF RANGE(40-80)
3	PRESS POWER FAILURE RESET PUSHBUTTON

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 15:35:10

Alarm Window Operation

Operation:	Enable
Foreground Color:	Black
Background Color:	Red
Blink:	No
Underline:	No
Character Height:	Single
Number of Visible Messages:	3
Window Address:	D O 2 3/0 thru 7/11

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

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Alarm Window Messages

Number	Alarms	Message
-----	-----	-----
1	[A R]	EVAP REFRIG LO PRESS AL
2	[A R]	EVAP REFRIG LO PRESS SD
3	[A R]	COMPR DISCH HI PRESS AL
4	[A R]	COMPR DISCH HI PRESS SD
5	[A R]	COMPR OIL LO DIFF PRESS AL
6	[A R]	COMPR OIL LO DIFF PRESS SD
7	[A R]	COMPR DISCH HPCO (HARDWIRED)
8	[A R]	COMPR DISCH HI TEMP AL
9	[A R]	COMPR DISCH HI TEMP SD
10	[A R]	COMPR THRUST OIL HI TEMP AL
11	[A R]	COMPR THRUST OIL HI TEMP SD
12	[A R]	COMPR FR BRG OIL HI TEMP AL
13	[A R]	COMPR FR BRG OIL HI TEMP SD
14	[A R]	GEAR HS SE BRG HI TEMP AL
15	[A R]	GEAR HS SE BRG HI TEMP SD
16	[A R]	GEAR OIL LO PRESS AL
17	[A R]	GEAR OIL LO PRESS SD
18	[A R]	GEAR HS OSE BRG HI TEMP AL
19	[A R]	GEAR HS OSE BRG HI TEMP SD
20	[A R]	GEAR SUPPLY OIL HI TEMP AL
21	[A R]	GEAR SUPPLY OIL HI TEMP SD
22	[A R]	GEAR LS SE BRG HI TEMP AL
23	[A R]	GEAR LS SE BRG HI TEMP SD
24	[A R]	GEAR LS OSE BRG HI TEMP AL
25	[A R]	GEAR LS OSE BRG HI TEMP SD
26	[A R]	LVG CHILLED WTR LO TEMP AL
27	[A R]	LVG CHILLED WTR LO TEMP SD
28	[A R]	CHILLED WATER LO FLOW AL
29	[A R]	CHILLED WATER LO FLOW SD
30	[A R]	EMERGENCY STOP ALARM
31	[A R]	COND WATER LO FLOW SD
32	[A R]	TRANSMITTER/RTD FAILURE
33	[A R]	RACK "1" FAULT
34	[A R]	POWER FAILURE ALARM
35	[A R]	COMPR OIL FILT HI DP AL
36	[A R]	GEAR OIL FILT HI DP AL
37	[A R]	COND WATER LO FLOW AL
39	[A R]	COMPR MTR STARTER FAULT
40	[A R]	PROCESSOR MAJOR FAULT
41	[A R]	EVAP REFRIG LO TEMP AL
42	[A R]	EVAP REFRIG LO TEMP SD
43	[A R]	RACK "0" FAULT
44	[A R]	COMPR FRONT HI VIBR AL
45	[A R]	COMPR FRONT HI VIBR SD
46	[A R]	COMPR REAR HI VIBR AL
47	[A R]	COMPR REAR HI VIBR SD
48	[A R]	GEAR HI SPEED HI VIBR AL

PanelBuilder Development Software Report

DUPONT: Color with Function Keys

Mar 20 1991 16:48:57

Alarm Window Messages

Number	Alarms	Message
-----	-----	-----
49	[A R]	GEAR HI SPEED HI VIBR SD
50	[A R]	GEAR LO SPEED HI VIBR AL
51	[A R]	GEAR LO SPEED HI VIBR SD
52	[A R]	MOTOR SHAFT END HI VIBR AL
53	[A R]	MOTOR SHAFT END HI VIBR SD
54	[A R]	MOTOR INBRD END HI VIBR AL
55	[A R]	MOTOR INBRD END HI VIBR SD
60	[A R]	COMPR AUX OIL PUMP RUNNING
61	[A R]	GEAR AUX OIL PUMP RUNNING
62	[A R]	COMPR MOTOR HI CURRENT AL
63	[A R]	INTERCOOLER PT FAILURE
65	[A R]	ANALOG I/O MODULE FAILURE
66	[A R]	COMPR BAL PISTON PT FAILURE
67	[A R]	PLC BATTERY LOW