3200 MP MICROPROCESSOR SIMULATOR

OPERATING MANUAL

Control and Indicator Description:

INDICATORS:

This upper section of the 3200 MP simulator consists of 12 lights that indicate various operating conditions within the chiller.

OIL PUMP -	Indicates that the oil pump motor has been energized.
MOTOR START -	Indicates that the compressor motor has been energized in it's "start" configuration.
MOTOR RUN -	Indicates that the compressor motor has completed transition and has entered it's "run" configuration.
ALARM LIGHT -	Indicates that the microprocessor has received input from a sensor that indicates a potentially serious condition within the chiller.
COOLING TOWER FAN -	Indicates that the cooling tower fans have been energized.
CHILLED WATER PUMP -	Indicates that the evaporator water pump has been energized.
CONDENSER WATER PUMP -	Indicates that the condenser water pump has been energized.
PURGE -	Indicates that the purge pump has been energized.
DIFFUSER WALL: INC. -	Indicates that the diffuser wall is closing. (DM - SERIES ONLY)
DEC. -	Indicates that the diffuser wall is closing. (DM - SERIES ONLY)
GUIDE VANES: INC. -	Indicates that the guide vanes are opening.
DEC. -	Indicates that the guide vanes are closing.

SWITCHES:

This middle section of the simulator contains 16 switches that are used to represent the numerous DISCRETE inputs that are monitored by the microprocessor. (digital inputs) ON/OFF DEVICES

REMOTE START -	This switch represents a remote set of contacts that are used to initiate a remote start. (if activated by an ESP panel)
MOTOR TEMPERATURE -	Represents the discrete input signal regarding motor temperature. (if enabled using DIP switches)

CONDENSER PRESSURE - Represents the discrete input indicating excessive condenser pressure.

DEMAND LIMIT: "A" - Discrete input representing remote demand limit set-point "A" (if activated by an ESP panel)

"B" Discrete input representing remote demand limit set-point "B" (if activated by an ESP panel)

"C" - Discrete input representing remote demand limit set-point "C" (if activated by an ESP panel)

RUN SIGNAL - Discrete signal that informs the microprocessor that the compressor motor has completed transition.

EVAPORATOR FLOW - Discrete input representing evaporator flow.

BEARING TEMPERATURE - Discrete input that signifies excessive bearing temperature (if enabled by DIP switches).

SPARE LIMIT - (Used for safety device if system is brine) Provision made for extra discrete limit input.

MOTOR OVERLOADS - Discrete input that controls motor overload trip-outs.

CONDENSER FLOW - Digital input that signifies condenser flow.

IMPELLER DISPLACEMENT - (On neutral side of system.) Digital input that indicates excessive impeller displacement. (19E -SERIES ONLY)

PURGE PRESSURE - Discrete input that indicates the status of the purge pressure switch contacts.

OIL PRESSURE - Digital input that indicates low oil pressure.

POWER - Main power switch that controls power to the simulator and the microprocessor.

POTENTIOMETERS:

This lower section of the simulator contains 12 potentiometers that are used to represent the thermistors and the feedback pot. (analog inputs) These are 10 turn potentiometers.

*DEMAND LIMIT (ESP) - This control represents a 4-20 mA signal from the building automation system that allows remote demand limiting. (if activated by an ESP panel)

*CHILLED WATER RESET (ESP -	Control representing a 4-20 mA signal from the building automation system that allows remote chilled water reset. (if activated by an ESP panel)
MOTOR TEMPERATURE - 220°	Potentiometer that simulates the motor winding temperature thermistor. (if enabled using the DIP switches)
CONDENSER REFRIG. TEMPERATURE -	Potentiometer that represents the condenser refrigerant thermistor.
EVAPORATOR REFRIG. TEMPERATURE -	Potentiometer that represents the leaving chilled water temperature.
CHILLED WATER TEMPERATURE -	Potentiometer that represents the leaving chilled water temperature.
SPARE 1 & 2 (Read only device)	Spare analog inputs monitored by the microprocessor.
BEARING 220° F TEMPERATURE	Analog input that represents the compressor thrust bearing thermistor. (if enabled using the DIP switches)
DIFFUSER WALL -	Feedback pot that indicates the relative position of the diffuser wall. (DM - SERIES ONLY)
DISCHARGE GAS TEMPERATURE 220° F -	Analog input indicating the compressor discharge temperature.
MOTOR CURRENT -	Variable control that simulates motor current.
WATER/BRINE	Switch input that alters that calibration of the simulator to allow operation of a microprocessor that is set-up for either water or brine operation.

SIMULATOR OPERATION:

The 3200 MP simulator is a unique instrument designed to "dry-run" the popular 3200 MP microprocessor chiller control. It is connected directly to the 3200 MP that is on an existing chiller. This simulator replaces the existing field wiring and simulates the input and output conditions that the chiller would normally handle. The following are the steps that **MUST** be taken for the proper and safe use of this simulator.

CONNECTION:

1. Shut the power off and remove the field source of 120 volts from the microprocessor power connections. (L1 and L2). Isolate these wires from the processor and make safe.
2. Remove the field wiring connectors from the processor board and input./output board. These connectors are identified on the microprocessor boards as 1J1, 1J2, 2J1, 2J2, 2J4, 2J5 and 2J6.

Note: It is necessary to label each connector with it's identification code (1J1, 2J4, etc.) to avoid confusion when re-installing the connector.

Note: When removing the connectors from the boards, DO NOT pull on the wires leading from the connector. If excessive force is used the wires will be pulled out of the connector and are very difficult to re-install without the proper tools.

3. Install the connectors from the simulator in place of the field wiring connectors that you just removed. You will notice that each connector on the simulator is labeled. These labels correspond to the identification codes that are printed on the microprocessor boards beside the pin terminal strip that these connectors fit onto.

   Note: Don't put on upside down. Be sure that you place the correct connectors on the correct pin terminal strip or damage <u>WILL RESULT</u> to the microprocessor.

4. Connect the braided wire cable from the simulator to the microprocessor power connections as follows:

   WHITE wire with spade lug = neutral (L2) - Daisy chain L2 together
   BLACK wire with spade lug = hot (L1)
   BLUE wire with insulated alligator clip = earth ground

SET-UP:

1. The switches are installed so that when the toggle is in the "up" position the contacts are closed. Set the switches in the positions as indicated below:

REMOTE START -	DOWN (no remote start)
MOTOR TEMPERATURE -	UP (safe motor temperature)
CONDENSER PRESSURE -	UP (normal condenser pressure)
DEMAND LIMIT "A", "B", "C" -	DOWN (no remote demand limit)
RUN SIGNAL -	DOWN (transition not complete)
EVAPORATOR FLOW -	DOWN (no chilled water flow)
BEARING TEMPERATURE -	UP (safe bearing temperature)
SPARE LIMIT -	UP (safe operating range)
MOTOR OVERLOAD -	UP (no overload)
CONDENSER FLOW -	DOWN (no condenser water flow)
IMPELLER DISPLACEMENT -	UP (normal impeller position)

PURGE PRESSURE -	DOWN (low purge pressure)
OIL PRESSURE -	DOWN (open contacts)
POWER -	DOWN (simulator and microprocessor power is off)

2. The potentiometers must be adjusted so that they are within a reasonable range of realistic operating settings or the microprocessor will detect the erroneous input and cause an alarm condition.

Note: The potentiometers that are used in the simulator are multi-turn (10 turn) and therefore it is first necessary to turn ALL the knobs FULLY COUNTER-CLOCKWISE until the end-stop is reached before proceeding.

Listed below are typical settings used to place the controls within the reasonable range:

DEMAND LIMIT -	rotate clockwise to desired remote demand limit. (AFTER START-UP)
CHILLED WATER RESET -	rotate clockwise to desired remote chilled water. (AFTER START-UP)
MOTOR TEMPERATURE -	rotate clockwise 1.5 TURNS.
CONDENSER REFRIGERANT TEMPERATURE -	rotate clockwise 8.5 TURNS.
EVAPORATOR REFRIGERANT TEMPERATURE -	rotate clockwise 3 TURNS.
CHILLED WATER TEMPERATURE -	rotate clockwise 5.5 TURNS.
SPARE TEMPERATURE #1 -	rotate clockwise until the desired spare temperature #1 reading is reached. (AFTER START-UP) READ ONLY SENSOR.
SPARE TEMPERATURE #2 -	rotate clockwise until the desired spare temperature #2 reading is reached. (AFTER START-UP) READ ONLY SENSOR.
BEARING TEMPERATURE -	rotate clockwise 1.5 TURNS.
DIFFUSER WALL -	rotate clockwise 2 TURNS.
DISCHARGE TEMPERATURE -	rotate clockwise 1.5 TURNS.
MOTOR CURRENT -	leave set to the EXTREME COUNTER-CLOCKWISE rotation.

WATER/BRINE SWITCH - set depending upon which type of solution has been selected by the DIP switches on the processor board. (WATER --- DOWN IS NORMAL)

OPERATION:

Now that the simulator wiring harness has replaced the field wiring, the microprocessor is totally isolated from the chiller. The controls of the simulator have been set to their proper initial positions, and when power is applied to the microprocessor it will "see" the simulator as the chiller in it's entirety. Now follow the instructions outlined below for simulator operation:

1. Plug the power cord from the simulator into a grounded receptacle. (120 bolts AC) Always use a polarity plug.
2. Switch the simulator power switch to the ON position (up). This will power the simulator and the microprocessor.
3. The microprocessor will now enter a count-down timer sequence before it will enter a valid operational mode. Therefore, we MUST wait for this timer to expire. (usually three minutes)

   Note: While the count-down timer is operating the guide vanes decrease light will be illuminated.

4. When the timer has expired, the set-point display board (and ESP panel will display the start-up code (20, 21, 22). Start the microprocessor from the point indicated by this display code on ESPII ... ESPI panel goes blank.
5. The microprocessor will now enter it's start-up sequence and a code 26 will be displayed. (Reference Example 19DM-3SSM)
6. The chilled water pump light will illuminate, therefore; switch the evaporator flow switch to the closed (up) position to indicate that flow has been achieved.
7. The condenser water pump light will illuminate, therefore; switch the condenser flow switch to the closed (up) position to indicate that flow has been achieved.
8. The tower fans, oil pump and the diffuser wall decrease light will all illuminate at the same instant. We do not have to concern ourselves with the tower fans or diffuser wall indicators.

   Note: At this time we must prove oil pressure, this is done by placing the oil pressure switch in the UP position.

9. Once the diffuser wall (if applicable) has been calibrated, the microprocessor will attempt to start the compressor motor, (motor start light illuminated) we must now apply a motor current signal to the microprocessor. This is accomplished by rotating the motor current potentiometer clockwise approximnately 5 TURNS (this produces a motor current signal equal to 85% RLA). Once this motor current signal has been applied we should now acknowledge that the motor has completed transition by placing the run signal switch in the closed (up) position.
10. The motor run light will now illuminate and the chiller is in the run mode and will ramp load while a code 29 is displayed.

Note: The guide vanes and diffuser wall indicators will flash in what will seem to be an erratic sequence, this is normal due to the pulse nature of the signal sent to these output devices.

11. When the microprocessor has completed ramp loading it will enter the normal run mode and display a code 28.

THE SIMULATOR HAS NOW PLACED THE EXISTING 3200MP INTO NORMAL OPERATION AS IF THE CHILLER WAS ACTUALLY IN OPERATION.