PRODUCT DRAWING YORK INTERNATIONAL CORPORATION P.O. Box 1592, York, PA 17405	Supersedes: Nothing Form 160.55-PW7 (899) **WIRING DIAGRAM** **FIELD CONTROL MODIFICATIONS** ***MILLENNIUM*™ MODEL YT CHILLERS (STYLE J)**
CONTRACTOR _____ ORDER NO. _____ YORK CONTRACT NO. _____ YORK ORDER NO. _____	PURCHASER _____ JOB NAME _____ LOCATION _____ ENGINEER _____
☐ REFERENCE DATE _____	☐ APPROVAL DATE _____ ☐ CONSTRUCTION DATE _____

JOB DATA:

CHILLER MODEL NO. YT _____ CHILLER MODEL NO. YT _____

NO. OF UNITS _____ NO. OF UNITS _____

TYPE OF STARTING _____ TYPE OF STARTING _____

Included by YORK for Field Installation (by others) are:

	YES	NO	PER UNIT
One – Two Unit Sequence Control Kit, Part No. 466-61597T	☐	☐	_____
Condenser Water Flow Switch	☐	☐	_____
_____	☐	☐	_____
_____	☐	☐	_____

ENERGY MANAGEMENT SYSTEMS

Millennium chiller design allows for ease of interfacing with Energy Management Systems (EMS). The Graphic Control Center includes unit status contacts, provisions for remote control inputs and provisions for remote setpoint reset of leaving chilled liquid temperature and current limit for EMS interfacing. See Note 7.

Five sets of unit status contacts are factory furnished through a field wiring terminal board in the Graphic Control Center. Each set of contacts are single pole, normally open, rated at 5 amperes resistive at 240VAC. Chiller status contacts are provided for unit:

- Remote Mode Ready to Start – See Fig. 1.
- Cycling Shutdown – See Fig. 2.
- Safety Shutdown – See Fig. 3.
- Run (System Operating) – See Fig. 4.
- Anticipatory/Alarm – See Fig. 5.

Four sets of inputs are available to the EMS, allowing for remote control of unit operation. Input device contact rating shall be 5 milliamperes at 115VAC. Field wiring terminal board (TB4) in the Graphic Control Center permits connection for the following operation:

- Remote Stop Contacts – See Fig. 6.
- Remote Start Contacts – See Fig. 6.
- Remote/Local Cycling Devices – See Fig. 7.
- Multi-unit sequence – See Fig. 8.

The chiller should not be cycled by the Energy Management System because the large motor used to drive the centrifugal compressor is limited to one start per 30 minutes. Instead, it is possible to limit the compressor motor amp draw indirectly or directly by the following methods:

1. Application of Sequence Control Kit, so only one unit is running, when a single unit can carry the cooling load – See Fig. 10.
2. When multiple unit installations are controlled by an EMS, remote start and stop contacts are available to start and stop each chiller per Fig. 6. Contact rating shall be 5 milliamperes at 115 volts A.C.

ENERGY MANAGEMENTS SYSTEMS (CONT'D)

3. The Graphic Control Center has a programmable time clock function as a standard feature with holiday capability. This offers one preset automatic Start-Stop per day on a seven day calendar basis with the ability to program a single additional holiday start and stop time up to a week in advance. Chilled water pump control contacts (see Note 13) are also provided, allowing for efficient automatic operation of the chilled water pump to reduce energy. Two chilled water pump operating modes are available via the CHW PUMP programming dip switch (position 8 of SW1) on the Micro Board. With the switch in the OFF position, the chilled water pump operates for 30 seconds prior to chiller start, during chiller operation, coastdown, and LWT cycling shutdowns. With the switch in the ON position, the chilled water pump operates as above plus it operates during MULTI-UNIT and REMOTE/LOCAL cycling shutdowns.
4. Reduce the compressor-motor kW input (and thus amps), by raising the leaving chilled liquid temperature through remote temperature control setpoint in the "remote" operating mode. When remote temperature reset is accomplished by supplying a 1 to 11 second pulse-width modulated signal, refer to Fig. 20. Through use of the remote temperature control analog input on the Micro Board, the leaving chilled liquid temperature may be reset via a 0 to 20 or 4 to 20mA D.C. current signal, a 0 to 10 or 2 to 10 volt D.C. signal.
5. Current limiting of demand during pulldown may be accomplished by using the standard PULLDOWN DEMAND LIMIT function provided in the Graphic Control Center. The "Pulldown Demand Limit" key can be programmed to limit compressor motor current from 30 to 100 percent of full load amperes, for 1 to 255 minutes following each compressor start. For more details refer to Graphic Control Center Instructions, Form 160.55-O1.
6. Controlling the maximum allowable compressor motor amps from 30 to 100% through remote current limit setpoint. Refer to Fig. 17 when the remote current limit is accomplished by supplying a 1 to 11 second pulse-width modulated signal in the "remote" operating mode. A jumper configurable analog input is available for remote current limit setpoint via a 0 to 20 or 4 to 20mA D.C. current signal, a 0 to 10 or 2 to 10 volt D.C. signal.
7. The YORK ISN System may be interfaced with the chiller Graphic Control Center to provide unified chiller plant system control. The ISN System directly communicates with the Graphic Control Center via the ISN GPIC card which may be installed in the Control Center. All temperatures, pressures, safety alarms and cycling information known to the Graphic Control Center are then available to the ISN System for integrated chiller plant control, data logging, and local and remote operator displays. The ISN GPIC card also allows the ISN to start, stop, and reset the chiller's leaving chilled water and current limit setpoints.

External wiring, unless specified as an optional connection in the manufacturer's product literature, is not to be connected inside this cabinet. Furthermore, auxiliary devices such as relays, switches, transducers and controls may not be installed inside this enclosure. All wiring must be in accordance with YORK's published specifications and must be performed only by qualified personnel. YORK will not be responsible for damages resulting from improper connection to these controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and may cause serious damage to property or injury to persons.

LIST OF FIGURES

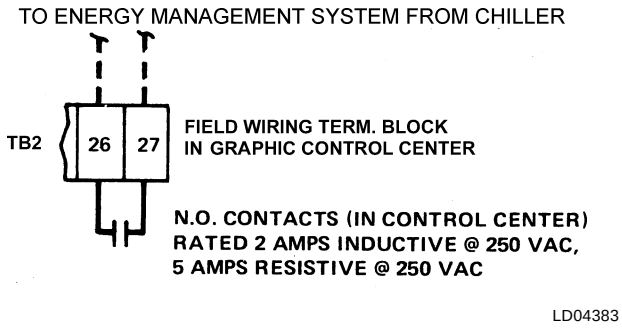

FIG. 1 – REMOTE MODE READY TO START CONTACTS

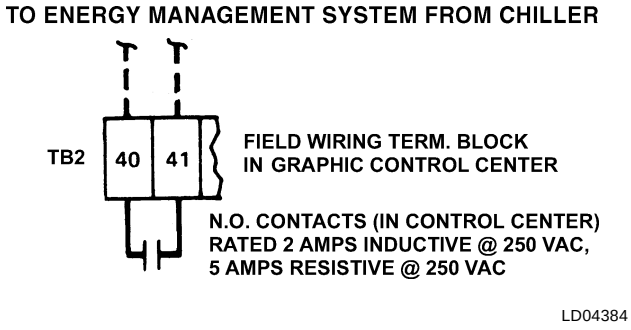

FIG. 2 – CYCLING SHUTDOWN CONTACTS

FIG. 1 – REMOTE MODE READY TO START CONTACTS

When closed, these contacts signify the following:

1. The Graphic Control Center is in “digital”, “analog” or “ISN” remote operating mode, allowing for energy management system or remote start/stop control (Fig. 6);
2. All chiller safety cutout controls are in the normal position, so they will allow the unit to start;
3. All chiller cycling cutout controls are in the normal position, so they will allow the unit to start;
4. The Graphic Control Center COMPRESSOR switch is in the “RUN” (**I**) position;
5. The 30 minute anti-recycle timer has timed out. A closure of the Remote Mode Ready to Start Contacts then signifies that the unit shall start when the Energy Management System maintains the Remote Stop contact (Fig. 6) open and momentarily closes the Remote Start Contact (Fig. 6). When the Remote Mode Ready to Start Contacts close, the Graphic Control Center will display the following message: “SYSTEM READY TO START”.

FIG. 2 – CYCLING SHUTDOWN CONTACTS

When closed, these contacts signify the unit is not permitted to start due to a CYCLING shutdown condition. The unit will automatically restart after the cycling condition is no longer present. YORK Operating and Maintenance Manual 160.55-O1 provides a list and explanation of all Cycling shutdowns. While these contacts are closed, the Graphic Control Center will display “Cycling Shutdwon – Auto Restart” on the System Status Bar and the cause of the shutdown on the System Details bar of the display. Cycling Shutdwon contacts function in all operating modes.

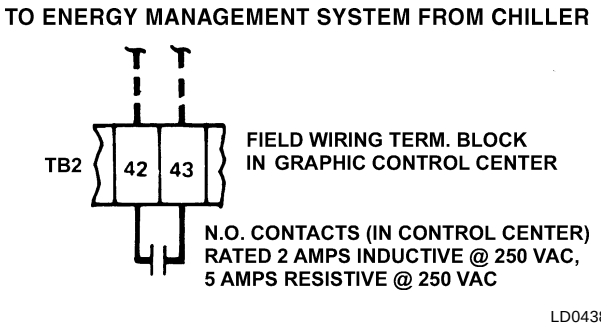

FIG. 3 – SAFETY SHUTDOWN CONTACTS

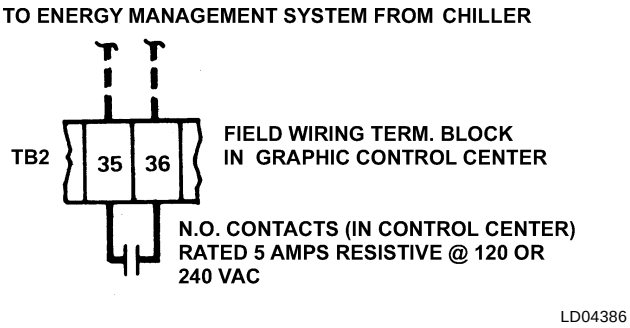

FIG. 4 – RUN CONTACTS

FIG. 3 – SAFETY SHUTDOWN CONTACTS

When closed, these contacts signify the unit is not permitted to start due to a SAFETY shutdown condition. Safety shutdowns require a manual reset procedure be performed before the unit can be restarted. YORK Operating and Maintenance Manual 160.55-O1 provides a list and explanation of all Safety shutdowns. While these contacts are closed, the Graphic Control Center will display "Safety Shutdown – Manual Restart" on the System Status Bar and the cause of the shutdown on the System Details Bar of the display. These contacts will remain closed until the safety condition no longer exists and a manual reset is performed by placing the Graphic Control Center COMPRESSOR Switch in the Stop-Reset position (O). The unit can then be restarted. Safety Shutdown contacts function in all operating modes.

FIG. 4 – RUN CONTACTS

When closed, these contacts signify that the unit is operating. The Graphic Control Center will display a System Run Message.

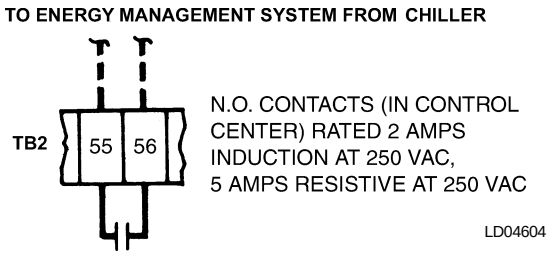

FIG. 5 – ANTICIPATORY/ALARM CONTACTS

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These contacts will close whenever one or more of the following WARNING conditions occurs. They will remain closed as long as the condition is in effect. On most Warnings, the contacts automatically open when the condition is no longer present. On those warnings marked with an asterisk, the contacts will open only after the condition is no longer present and the WARNING RESET key is pressed in Operator (or higher) access level.

Real time Clock failure, Condenser or Evaporator Transducer Error*, Purge – High Pressure*, Purge – Float Switch Error*, Excess Purge*, Vanes Uncalibrated, External I/O – Serial Communications, Setpoint Override*, Condenser-High Pressure Limit, Evaporator-Low Pressure Limit, Vanes Uncalibrated – Fixed speed, Harmonic filter – Operation Inhibited, Harmonic Filter – Data Loss, Harmonic Filter – Input Frequency Out of Range.

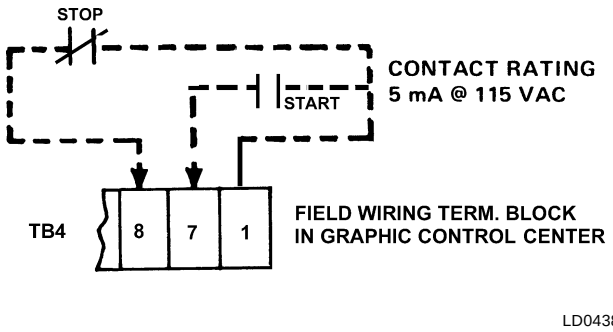

FIG. 6 – REMOTE START-STOP CONTACTS FROM ENERGY MANAGEMENT SYSTEM

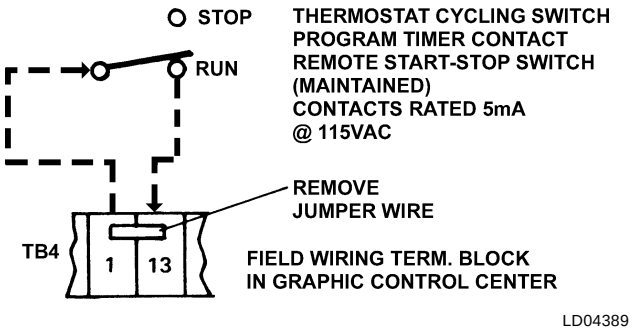

FIG. 7 – REMOTE/LOCAL CYCLING DEVICES

FIG. 6 – REMOTE START AND STOP CONTACTS FROM ENERGY MANAGEMENT SYSTEM

When the Graphic Control Center is in the "Digital", "Analog" or "ISN" remote operating mode and the COMPRESSOR switch is in the "RUN" (**I**) position, with the Remote Stop Contacts open, and the Remote Mode Ready to Start Contacts closed (Fig. 1), the unit will start via a closure of the Remote Start Contacts. A subsequent closure of the Energy Management System Remote Stop Contacts causes the chiller to shut down. The Graphic Control Center will display "REMOTE STOP" because the Energy Management System Remote Stop Contact has commanded the unit to shut down.

It is recommended that maintained contacts be used for both START and STOP.

NOTE

Even when the chiller is applied with Remote Start-Stop (when the Control Center is in the "remote operating mode), an EMERGENCY STOP by an operator or others can STOP the compressor from the Graphic Control Center and prevent the chiller from restarting. However, the operator cannot locally start the compressor using "compressor" start switch, when the control center is in the "remote" operating mode.

FIG. 7 – REMOTE/LOCAL CYCLING DEVICES

The closure of an automatic reset device across this input will permit the unit to operate in all operating modes. Conversely, an opening of the device contacts will inhibit the unit from operating; the Graphic Control Center will then display the following messages: "CYCLING SHUTDOWN – AUTO RESTART" and "SYSTEM CYCLING – CONTACTS OPEN".

NOTE

The Graphic Control Center contains a seven day time clock to select daily schedule Start/Stop times (Sunday through Saturday including one or more holidays in week) up to one full week at a time. So automatic start and stop of the unit on a daily basis, at predetermined times, can be programmed as a standard feature; an additional program timer is not required for this function.

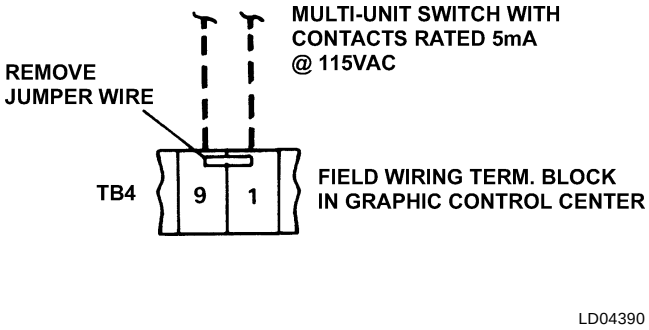

FIG. 8 – MULTI-UNIT SEQUENCE

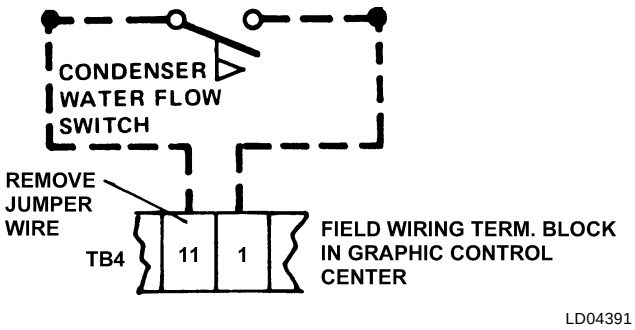

FIG. 9 – CONDENSER WATER FLOW INTERLOCK

FIG. 8 – MULTI-UNIT SEQUENCE

For multiple chiller installation application, Multi-Unit Sequence contacts are available to start and stop each unit. The maintained closure of a device contacts across terminals [1] and [9] will permit the unit to operate in all the operating modes with the "compressor" switch in the "RUN" (**I**) position. Conversely, an opening of the device contacts will inhibit the unit from operating; the Graphic Control Center will then display the following message: "CYCLING SHUTDOWN – AUTO RESTART" and "MULTIUNIT CYCLING – CONTACTS OPEN". An accessory sequence control kit for two, three or four units is available from YORK – See Fig. 10 for Two Unit Sequence Control kit.

FIG. 9 – CONDENSER WATER FLOW INTERLOCK

If desired, a condenser water flow interlock can be applied. Flow switch – McDonnel type FS8W, max. 150 psi (YORK Part No. 024-15793) available at additional cost. If condenser water flow switch is not used, a jumper must be installed between terminals [1] and [11].

When condenser water is flowing, the flow switch contact will close. Opening of the condenser water flow switch contacts for 2 continuous seconds will cause unit shutdown. The Flow Switch Status is checked 30 seconds into "System Run" and continuously thereafter. The Graphic Control Center will display the following message: "CYCLING SHUTDOWN – AUTO RESTART" and "CONDENSER FLOW SWITCH OPEN".

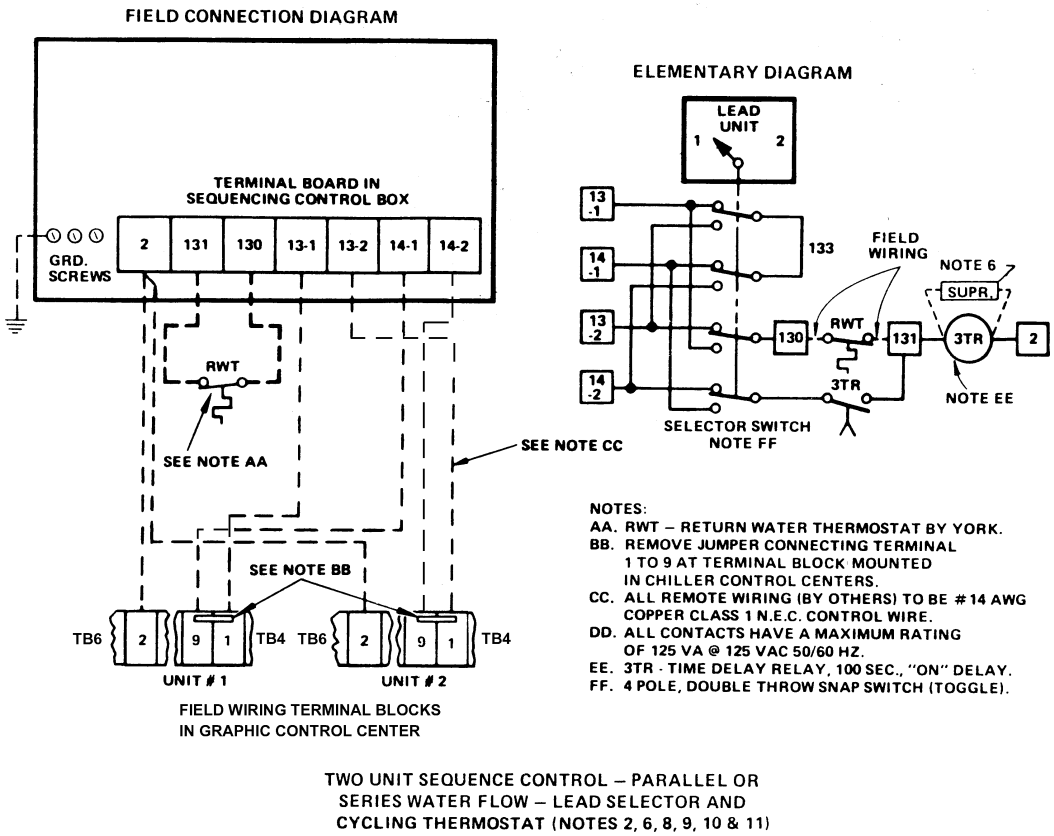

FIG. 10 – TWO UNIT SEQUENCE CONTROL

FIG. 10 – TWO UNIT SEQUENCE CONTROL

Provides that cycling thermostat RWT will automatically cycle either #1 or #2 unit. Timer 3TR is an additional feature which prevents simultaneous starting of lead and lag unit following a power failure and eliminates nuisance starting of lag unit due to periodic fluctuations in temperature. For two unit sequence control kit, order YORK Accessory Kit No. 466-61597T for controls as specified with NEMA 1 enclosure.

RWT has 20°F to 80°F range with adjustable differential of 3-1/2 to 14°F; 6 ft. of capillary with 3/8" x 5" bulb and 1/2" NPT brass well (maximum liquid DWP 300 PSIG). The thermostat is drawn to indicate its operation closes on rise. A 1/2" pipe coupling in the return chilled water line from the building must be furnished (by others) for RWT control well.

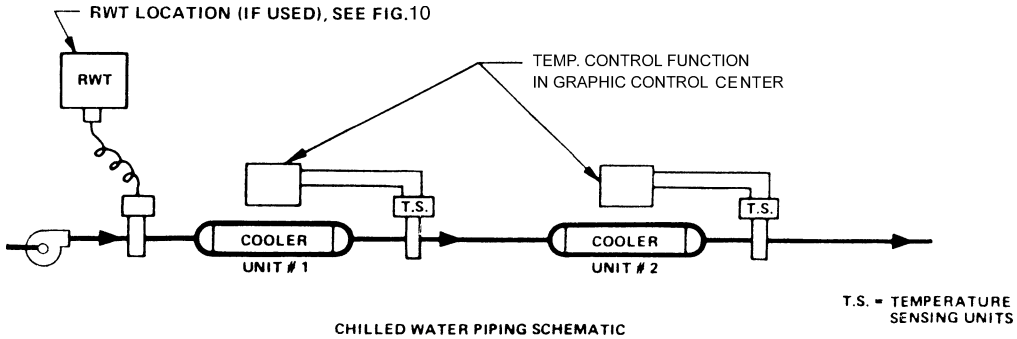

FIG. 11 – MULTIPLE UNITS (TWO) – SERIES OPERATION (NOTES 8 & 11)

FIG. 11 – MULTIPLE UNITS (TWO) – SERIES OPERATION

The supply chilled water temperature to the building is normally determined by the "chilled liquid temp." setpoint for Unit #2. When lead selector position of sequence control kit (Fig. 10) is Unit #1, the supply chilled water temperature to the building will be the temperature control setpoint on Unit #1 Graphic Control Center. If lower temperature is desired, reprogram the "chilled liquid temp." setpoint for Unit #1.

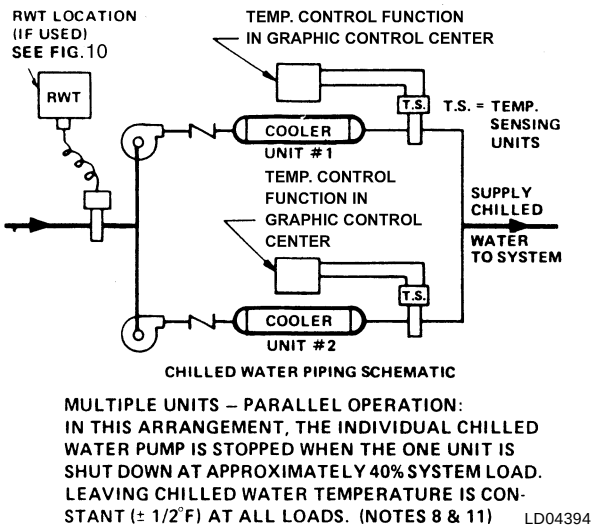

FIG. 12 – MULTIPLE UNITS (TWO) – PARALLEL OPERATION – INDIVIDUAL UNIT PUMPS

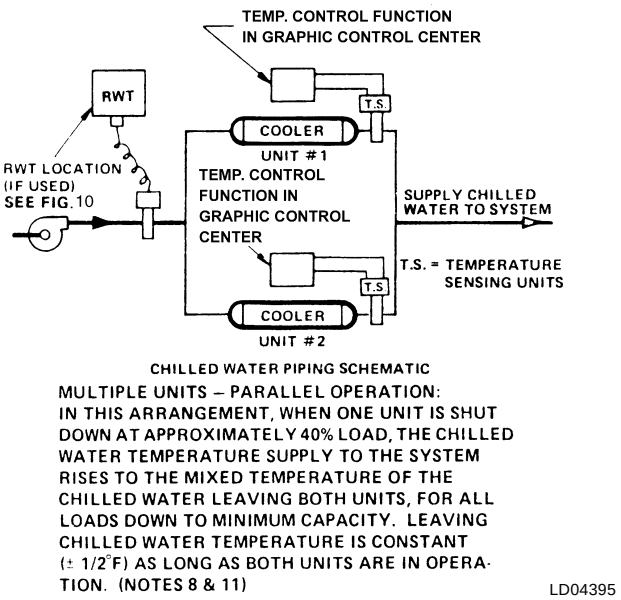

FIG. 13 – MULTIPLE UNITS (TWO) – PARALLEL OPERATION – SINGLE CHILLED WATER PUMP

FIG. 12 – MULTIPLE UNITS (TWO) – PARALLEL OPERATION – INDIVIDUAL UNIT PUMPS

This piping arrangement is the same as Fig. 13, except that the chilled water pumps associated with each cooler (evaporator) are cycled on and off with the unit. This results in reduced chilled water flow rates whenever a single unit can handle the cooling load. Because no chilled water flows through the inoperative unit, the mixed water temperature peculiar to using a single pump is avoided. When one unit is cut-out by the sequence control (Fig. 10) the temperature of the supply chilled water does not change.

FIG. 13 – MULTIPLE UNITS (TWO) – PARALLEL OPERATION – SINGLE CHILLED WATER PUMP

For this piping arrangement, each chiller's water sensor is located in its own leaving water nozzle. This produces a constant "mixed" chilled water temperature when both units are operating. When either unit is cycled off by the sequence control (Fig. 10), mixed chilled water temperature will rise as a result of uncooled return water flowing through the inoperative unit. For individual unit chilled water pump piping, refer to Fig. 12.

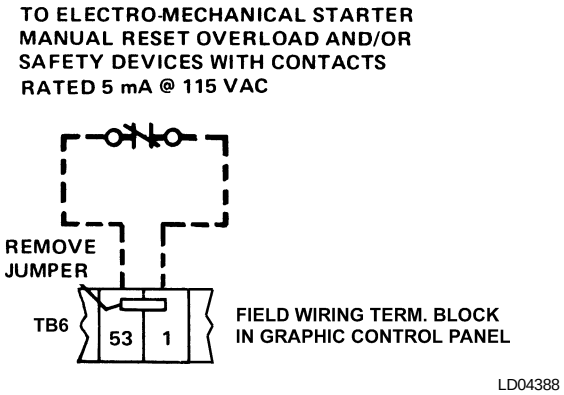

FIG. 14 – ELECTRO-MECHANICAL STARTER MANUAL RESET OVERLOADS (2300 to 4160 Volts U.L. or C.S.A. approved units only)

FIG. 14 – ELECTRO-MECHANICAL STARTER MANUAL RESET OVERLOADS

Terminals are available for connection of the manual reset overloads and/or safety devices in the high voltage electro-mechanical starter for U.L. or C.S.A. approved units having 2300 to 4160 volt motors. See Remote Motor Starter (E-M) specifications, Product Drawing Form 160.45-PA5.1. An opening of the contacts causes the Graphic Control Center to display: "CYCLING SHUTDOWN – AUTO RESTART" and "MOTOR CONTROLLER – CONTACTS OPEN". To restart the chiller, reset the external device in the electro-mechanical starter that caused the shutdown. Then the unit will automatically restart.

REMOTE CURRENT LIMIT SETPOINT with 0-10VDC, 2-10 VDC, 0-20mA, 4-20mA or Pulse Width Modulation Signal.

The Remote Current Limit setpoint can be reset over the range of 100% to 30% Full Load Amps (FLA) by supplying (by others) a 0-10VDC, 2-10VDC, 0-20mA, 4-20mA or 1 to 11 second Pulse Width Modulated (PWM) signal to the Graphic Control Center. The Graphic Control Center must be configured appropriately to accept the desired signal type as follows:

- The appropriate Remote Mode must be selected: **Analog** Remote Mode must be selected when using a voltage or current signal input. **Digital** Remote Mode must be selected when using a PWM input.
- If **Analog** Remote Mode is selected, the **Remote Analog Input Range** setpoint must be set to "0-10VDC" or "2-10VDC" as detailed below, regardless of whether the signal is a voltage or current input signal type.
- Micro Board Program Jumper P23 must be positioned appropriately per the input signal type as detailed below. It is recommended that a qualified Service Technician position this jumper.

NOTE

Important! The signal type used for Remote Current Limit Setpoint reset and the signal type used for Remote Leaving Chilled Liquid Temperature setpoint reset must be the same. For example, if a 0-10VDC signal is being used for Remote Leaving Chilled Liquid Temperature Reset , then a 0-10VDC signal must be used for Remote Current Limit Reset.

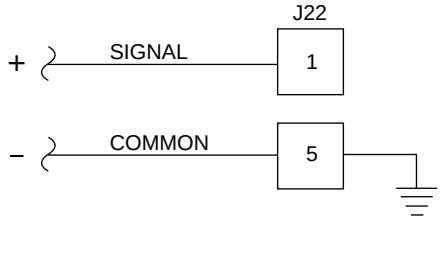

FIG. 15 – REMOTE CURRENT LIMIT SETPOINT WITH 0-10VDC OR 2-10VDC SIGNAL

0-10VDC - As shown in Fig. 15, connect input to Micro Board J22-1 (signal) and J22-5 (Gnd). The setpoint varies linearly from 100% to 30% FLA as the input varies from 0-10VDC. This input will only be accepted when **Analog** Remote Mode is selected, the **"Remote Analog Input Range"** setpoint is set for 0-10 Volts, and Micro Board Program Jumper JP23 has been removed. Calculate the setpoint for various inputs as follows:

$$\text{SETPOINT (\%)} = 100 - (\text{VDC} \times 7)$$

For example, if the input is 5VDC, the setpoint would be set to 65% as follows:

$$\text{SETPOINT (\%)} = 100 - (5 \times 7) = 100 - 35 = 65\%$$

2-10VDC - As shown in Fig. 15, connect input to Micro Board J22-1 (signal) and J22-5 (Gnd). The setpoint varies linearly from 100% to 30% FLA as the input varies from 2 to 10VDC. This input will only be accepted when **"Analog"** Remote Mode is selected, the **"Remote Analog Input Range"** setpoint is set for "2-10 Volts" and Micro Board Program Jumper JP23 has been removed. Calculate the setpoint for various inputs as follows:

$$\text{SETPOINT (\%)} = 100 - [(\text{VDC} - 2) \times 8.75]$$

For example, if the input is 5VDC, the setpoint would be set to 74% as follows:

$$\text{SETPOINT (\%)} = 100 - [(5-2) \times 8.75]$$

$$= 100 - [3 \times 8.75]$$

$$= 100 - 26.25 = 74\%$$

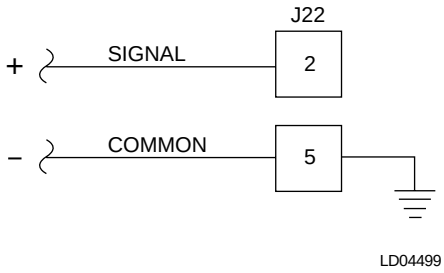

FIG. 16 – REMOTE CURRENT LIMIT SETPOINT WITH 0-20mA OR 4-20mA SIGNAL

0-20 mA - As shown in Fig. 16, connect input to Micro Board J22-2 (signal) and J2-5 (Gnd). The setpoint varies linearly from 100% to 30% FLA as the input varies from 0mA to 20mA. This input will only be accepted when **"Analog"** Remote Mode is selected, the **"Re-**

mote Analog Input Range" setpoint is set for 0-10 Volts, and Micro Board Program Jumper JP23 has been placed on pins 1 and 2. Calculate the setpoint for various inputs as follows:

SETPOINT (%) = 100 – (mA X 3.5)

For example, if the input is 8mA, the setpoint would be set to 72% as follows:

SETPOINT (%) = 100 – (8 X 3.5)
= 100 – 28 = 72%

4-20mA - As shown in Figure 16, connect input to Micro Board J22-2 (signal) and J2-5 (Gnd). The setpoint varies linearly from 100% to 30% FLA as the input varies from 4mA to 20mA. This input will only be accepted when **"Analog"** Remote Mode is selected, the **"Remote Analog Input Range"** setpoint is set for "2-10 Volts" and Micro Board Program Jumper JP23 has been placed on pins 1 and 2. Calculate the setpoint for various inputs as follows:

SETPOINT (%) = 100 – [(mA – 4) X 4.375]

For example, if the input is 8mA, the setpoint would be set to 83% as follows:

SETPOINT (%) = 100 – [(8 – 4) X 4.375]
= 100 – (4 X 4.375)
= 100 – 17.5
= 82.5
= 83%

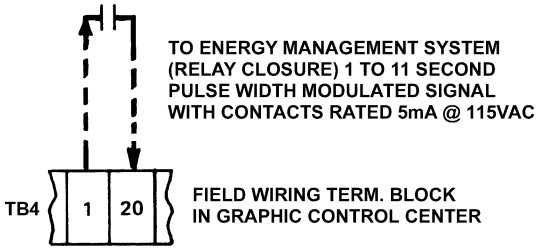

FIG. 17 – REMOTE CURRENT LIMIT SETPOINT WITH PWM SIGNAL

PWM - The Pulse Width Modulation input is in the form of a 1 to 11 second relay contact closure that applies 115VAC to the I/O Board TB4-20 for 1 to 11 seconds. As shown in Fig. 17, connect dry closure relay contacts between I/O Board TB4-20 (signal) and TB4-1 (115VAC). The setpoint varies linearly from 100% to 30% as the relay contact closure time changes from 1 to 11 seconds. The relay contacts should close for 1 to 11 seconds at least once every 30 minutes to maintain the setpoint to the desired value. If a 1 to 11 second closure is not received within 30 minutes of the last closure, the setpoint is defaulted to 100%. A closure is only accepted at rates not to exceed once every 70 seconds. This input will only be accepted in **"Digital"** Remote Mode. Calculate the setpoint for various pulse widths as follows:

SETPOINT (%) = 100 – [(PULSE WIDTH IN SECONDS – 1) X 7]

For example, if the relay contacts close for 3 seconds, the setpoint would be set to 86% as follows:

SETPOINT (%) = 100 – [(3 – 1) X 7]
= 100 – (2 X 7)
= 100 – 14
= 86%

REMOTE LEAVING CHILLED LIQUID SETPOINT with 0-10VDC, 2-10VDC, 0-20mA, 4-20mA or Pulse Width Modulation Signal

Remote Leaving Chilled Liquid Temperature Setpoint Reset can be accomplished by supplying (by others) a 0-10VDC, 2-10VDC, 0-20mA, 4-20mA or 1 to 11 second Pulse Width Modulated (PWM) signal to the Control Center. The **Leaving Chilled Liquid Temperature Setpoint** is programmable over the range of 38°F to 70°F (water applications), 36°F to 70°F (water applications with Smart Freeze Protection enabled) or 10°F to 70°F (brine applications). The Remote Input Signal changes the setpoint by creating an offset above the locally programmed Leaving Chilled Liquid Temperature Base Setpoint value. The setpoint can be remotely changed over the range of 10° or 20º F (as per the locally programmed **Remote Reset Temperature Range** setpoint) above the Local Leaving Chilled Liquid Temperature Setpoint. For example, if the Local Setpoint is 40°F and the **Remote Reset Temperature Range** setpoint is programmed for 10°F, the Leaving Chilled Liquid Temperature setpoint can be remotely reset over the range of 40°F to 50°F. The Control Center must be configured appropriately to accept the desired signal type as follows:

- The appropriate Remote Mode must be selected: **Analog Remote Mode** must be selected when using a voltage or current signal input. **Digital Remote Mode** must be selected when using a PWM input.
- If **Analog Remote Mode** is selected, the **Remote Analog Input Range** setpoint must be set to "0-10VDC" or "2-10VDC" as detailed below, regardless of whether the signal is a voltage or current signal type.

- Micro Board Program Jumper JP24 must be positioned appropriately per the input signal type as detailed below. It is recommended a qualified Service Technician position this jumper.

NOTE

Important! The signal type used for Remote Leaving Chilled Liquid Temperature setpoint reset and the signal type used for Remote Current Limit setpoint reset must be the same. For example, if a 0-10VDC signal is being used for Remote Current Limit Setpoint, then a 0-10VDC signal must be used for Leaving Chilled Liquid Temperature reset.

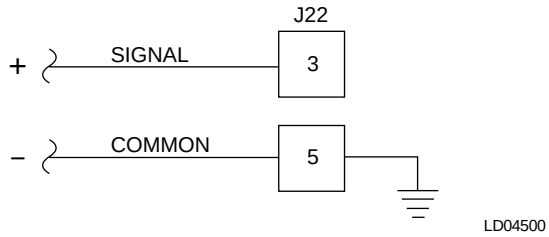

FIG. 18 – REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT WITH 0-10VDC OR 2-10 VDC SIGNAL

0-10VDC - As shown in Fig. 18, connect input to Micro Board J22-3 (signal) and J22-5 (Gnd). A 0VDC signal produces a 0°F offset. A 10VDC signal produces the maximum offset (10 or 20°F above the Local Setpoint value). The setpoint is changed linearly between these extremes as the input varies linearly over the range of 0VDC to 10VDC. This input will only be accepted when **"Analog" Remote Mode** is selected., the **"Remote Analog Input Range"** setpoint is set for "0-10VDC" and Micro Board Program Jumper JP24 has been removed. Calculate the setpoint for various inputs as follows:

$$\text{OFFSET(°F)} = \frac{\text{(VDC)(REMOTE RESET TEMP. RANGE)}}{10}$$

$$\text{SETPOINT(°F)} = \text{LOCAL SETPOINT} + \text{OFFSET}$$

For example, if the input is 5VDC and the Remote Reset Temp Range setpoint is programmed for 10°F and the Local Leaving Chilled Liquid Temperature setpoint is programmed for 40°F, the setpoint would be set to 45°F as follows:

$$\text{OFFSET (°F)} = \frac{5 \times 10}{10}$$

$$= \frac{50}{10}$$

$$= 5°\text{F}$$

$$\text{SETPOINT (°F)} = 40 + 5$$

$$= 45°\text{F}$$

2-10VDC - As shown in Fig. 18, connect input to Micro Board J22-3 (signal) and J2-5 (Gnd). A 2VDC signal produces a 0°F offset. A 10VDC signal produces the maximum allowed offset (10°F or 20°F above the Local Setpoint Value). The setpoint is changed linearly between these extremes as the input varies over the range of 2VDC to 10VDC. This input will only be accepted when **"Analog" Remote Mode** is selected, the **"Remote Analog Input Range"** setpoint is set for "2-10VDC" and the Micro Board Program Jumper JP24 has been removed. Calculate the setpoint for various inputs as follows:

$$\text{OFFSET (°F)} = \frac{\text{(VDC} - 2)\text{(REMOTE RESET TEMP. RANGE)}}{8}$$

$$\text{SETPOINT (°F)} = \text{LOCAL SETPOINT} + \text{OFFSET}$$

For example, if the input is 5VDC and the Remote Reset Temp. Range setpoint is programmed for 40°F, the setpoint would be set to 43.8°F.

$$\text{OFFSET (°F)} = \frac{(5 - 2)(10)}{8}$$

$$= \frac{(3)(10)}{8}$$

$$= \frac{30}{8}$$

$$\text{SETPOINT (°F)} = 40 + 3.8$$

$$= 43.8°\text{F}$$

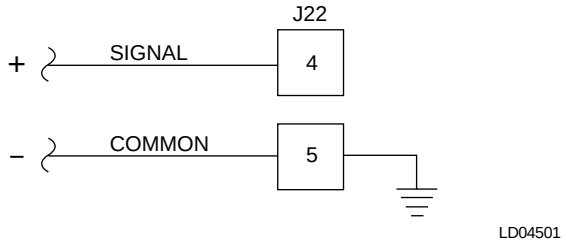

FIG. 19 – REMOTE LEAVING CHILLED LIQUID TEMP. SETPOINT WITH 0-20MA OR 4-20MA SIGNAL

0-20mA - As shown in Fig. 19, connect input to Micro Board J22-4 (signal) and J22-5 (Gnd). A 0mA signal produces a 0°F offset. A 20mA signal produces the maximum allowed offset (10 or 20°F above the local setpoint value). The setpoint is changed linearly between these extremes as the input varies over the range of 0-20mA. This input will only be accepted when **"Analog" Remote Mode** is selected, the **"Remote Analog Input Range"** setpoint is set for "0-10VDC" and Micro Board Program Jumper J24 has been placed on pins 1 and 2. Calculate the setpoint for various inputs as follows:

$$\text{OFFSET (°F)} = \frac{(\text{MA})(\text{REMOTE RESET TEMP RANGE})}{20}$$

$$\text{SETPOINT(°F)} = \text{LOCAL SETPOINT} + \text{OFFSET}$$

For example, if the input is 8mA, the Remote Reset Temp Range Setpoint is programmed for 10°F and the Local Leaving Chilled Liquid Temperature setpoint is programmed for 40°F, the setpoint would be set to 44°F as follows:

$$\text{OFFSET(°F)} = \frac{(8)(10)}{20}$$

$$= \frac{80}{20}$$

$$= 4°\text{F}$$

$$\text{SETPOINT (°F)} = 40 + 4$$

$$= 44°\text{F}$$

4-20mA - As shown in Fig. 19, connect input to Micro Board J22-4 (signal) and J22-5 (Gnd). A 4mA signal produces a 0°F offset. A 20mA signal produces the maximum allowed offset (10 or 20°F above the Local setpoint Value). The setpoint is changed linearly between these extremes as the input varies over the range of 0-20mA. This input will only be accepted when **"Analog" Remote Mode** is selected, the **"Remote Analog Input Range"** setpoint is set for "2-10VDC" and Micro Board Program Jumper JP24 has been placed on pins 1 and 2. Calculate the setpoint for various inputs as follows:

$$\text{OFFSET(°F)} = \frac{(\text{MA} - 4)(\text{REMOTE TEMP. RESET RANGE})}{16}$$

$$\text{SETPOINT(°F)} = \text{LOCAL SETPOINT} + \text{OFFSET}$$

For example, if input is 8mA, and the Remote Reset Temp Range setpoint is programmed for 10°F and the Local Leaving Chilled Liquid Temperature setpoint is programmed for 40°F, the setpoint would be set to 42.5°F as follows:

$$\text{OFFSET(°F)} = \frac{(8 - 4)(10)}{16}$$

$$= \frac{(4)(10)}{16}$$

$$= \frac{40}{16}$$

$$= 2.5°\text{F}$$

$$\text{SETPOINT(°F)} = 40 + 2.5$$

$$= 42.5°\text{F}$$

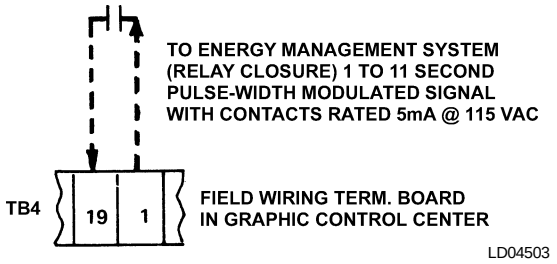

FIG. 20 – REMOTE LEAVING CHILLED LIQUID TEMPERATURE SETPOINT WITH PWM SIGNAL

PWM – The Pulse Width Modulation input is in the form of a 1 to 11 second relay contact closure that applies 115VAC to the I/O Board TB4-19 for 1-11 seconds. As shown in Fig. 20, connect dry closure relay contacts between I/O Board TB4-19 (input) and TB4-1 (115VAC). A contact closure time (pulse width) of 1 second produces a 0°F offset. An 11 second closure produces the maximum allowed offset (10 or 20°F above the local setpoint value). The relay contacts should close for 1 to 11 seconds at least once every 30 minutes to maintain the setpoint to the desired value. If a 1 to 11 second closure is not received within 30 minutes of the last closure, the setpoint is defaulted to the Local setpoint value. A closure is only accepted at rates not to exceed once every 70 seconds. This input will only be accepted in **"Digital" Remote Mode**. Calculate the setpoint for various pulse widths as follows:

$$\text{OFFSET(°F)} = \frac{(\text{PULSE WIDTH IN SECONDS})(\text{REMOTE RESET TEMP. RANGE})}{10}$$

$$\text{SETPOINT(°F)} = \text{LOCAL SETPOINT} + \text{OFFSET}$$

For example, if the relay contacts close for 5 seconds and the Remote Reset Temp Range setpoint is programmed for 10°F, and the Local Leaving Chilled Liquid Temperature setpoint is programmed for 40°F, the setpoint would be set to 44°F as follows:

$$\text{OFFSET (°F)} = \frac{(5-1)(10)}{10}$$

$$= \frac{(4)(10)}{10}$$

$$= \frac{40}{10}$$

$$= 4°F$$

$$\text{SETPOINT (°F)} = 40 + 4$$

$$= 44°F$$

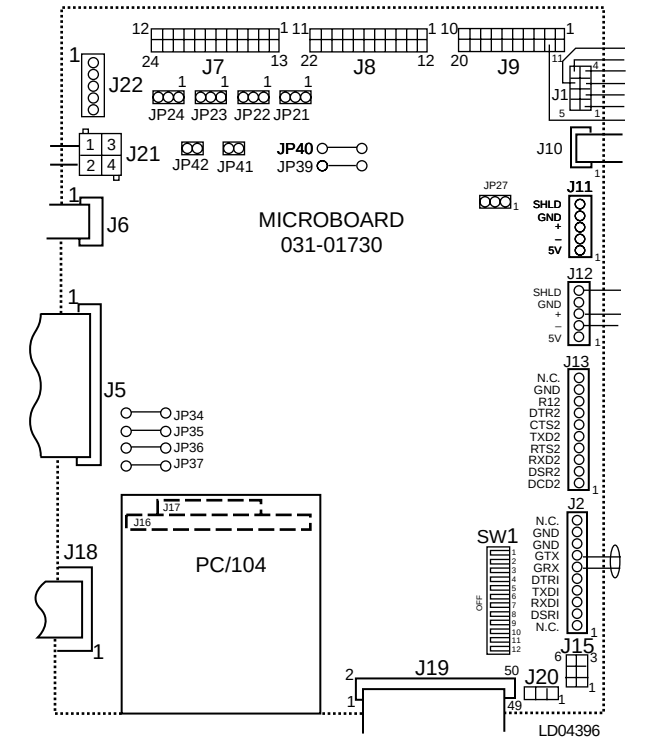

FIG. 21 – MICRO BOARD DIP SWITCH FOR AUTO/ MANUAL RESTART AFTER POWER FAILURE

FIG. 21 – MICRO BOARD DIP SWITCH FOR POWER FAILURE RESTART

This figure shows the location of the **Power Failure Restart Dip Switch** on the Micro Board. The Micro Board is mounted on the rear panel located directly behind the Graphic Control Center door. Refer to the Connection Diagram page of Wiring Diagram, Form 160.55-PW4 (with Electro-Mechanical Starter), Form 160.55-PW5 (with Solid State Starter), or Form 160.55-PW6 (with Variable Speed Drive). For orientation purposes with the Connection Diagram, see Fig. 21.

1. Power Failure Restart Dip Switch - The Control Panel is furnished for Manual Restart After Power Failure as a standard function. The Control Panel can be field-changed to **Automatic** Restart after a power failure if the **Manual** Restart feature is not desired. Simply place position 5 of the 12-position Dip Switch (SW1) on ON and the **Automatic** Restart feature will be enabled. Place to the OFF position to return to **Manual** Restart.

2. English/Metric Display Units Configuration – The Control Panel can present data on the Graphic Display in English or Metric Units. In Operator Access Level, from the HOME screen, press the **"Setpoints"** key to go to the SETPOINTS screen. Next, press the **"Setup"** key to go to the SETUP screen. Press the **"User"** key to go the USER SETUP screen. Press the **"English/Metric Units"** key to select the desired units. The data field will toggle between English and Metric with each press of the **" ◄ or ► "** key. For English Units, the temperature display is in degree Fahrenheit (°F), and absolute pressure is in pounds per square inch (psia). For Metric Units, temperature is in degrees Celsius (°C), and pressure in KiloPascals (kPa).

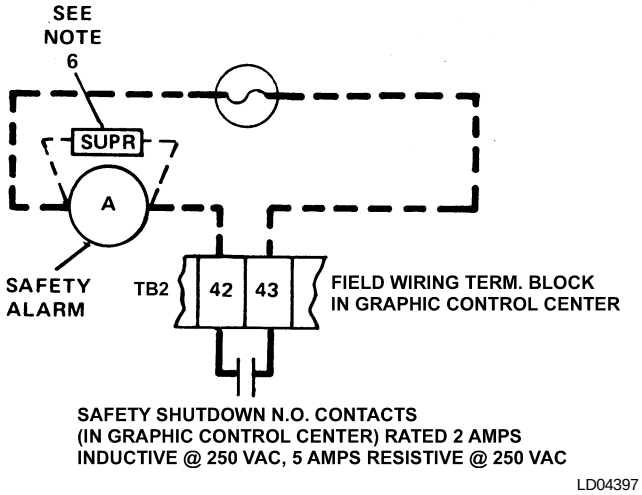

FIG. 22 – EXTERNAL SIGNAL FOR REFRIGERATION UNIT FAILURE (NOTE 6)

FIG. 22 – EXTERNAL SIGNAL FOR REFRIGERATION UNIT FAILURE

When the Safety Shutdown Contacts (see Fig. 3) are not connected to an Energy Management System they may be employed to energize a local or remote safety alarm (by others). When the normally open Safety Shutdown Contacts close, the alarm will indicate shutdown of the unit. The cause of shutdown will be one or more of the following safety controls: low oil pressure; high oil pressure; high condenser pressure; low evaporator pressure; high oil temperature; high discharge temperature; auxiliary safety; power failure when the **"Auto Restart After Power Failure"** Dip Switch on the Micro Board (Fig. 21) is in the OFF position (SW1, position 5 = OFF), which implies that the chiller requires **"Manual Restart After Failure"**.

On solid state starter units only, when the **Current Imbalance** option is selected via the Solid State Starter screen, three phase current imbalance protection is provided. A safety shutdown occurs (following a 45 second by-pass at startup) whenever the % FLA readout exceeds 80% for 45 seconds continuously and the % imbalance is ≥ 30%. When all safety controls are satisfied, and the Graphic Control Center COMPRESSOR switch has been manually **"Reset"** (de-energizing alarm) and returned to the RUN position (**"1"**), the unit may be restarted, if panel is in **"Remote"** mode, via the Remote Start contacts (Fig. 6); or, if panel is in "local" mode by momentarily pressing the keypad compressor switch to the START (" ◀") position.

NOTE

If the unit was shut down because of Cycling Shutdown Contacts (see Fig. 2) the alarm will not be energized, but the unit will have been shut down. A closure of the safety alarm contacts means that an operator must manually reset and restart the unit.

When the Safety Shutdown contacts close, the Graphic Control Center will display the following message: "SAFETY SHUTDOWN – MANUAL RESTART", and cause of shutdown.

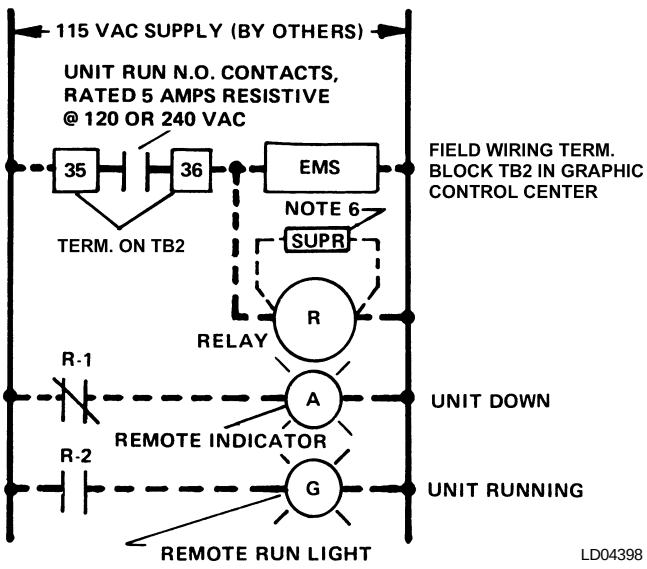

FIG. 23 – RUN CONTACTS / REMOTE RUN LIGHT AND SHUTDOWN INDICATOR PLUS EMS

FIG. 23 – RUN CONTACTS/REMOTE RUN LIGHT AND SHUTDOWN INDICATOR PLUS EMS

When run contacts are required for a Remote Run Light and/or Shutdown Indicator AND Energy Management System (EMS), connect (by others) as shown in the diagram. The EMS, control relay, shutdown and run lights are furnished by others. When the N.O. contacts close, between terminals 35 and 36 on field wiring terminal block TB2 in the Graphic Control Center, this indicates that the unit is operating; the remote Run Light will be energized. The unit run contacts open when the unit is shutdown (safety or cycling) and the remote indicator will then be energized. For run contacts to EMS only refer to Fig. 4. When terminals 35 and 36 are not used for an EMS, they may be connected to a remote Run Light. The control relay scheme shown in Fig. 23 can also be applied for a remote Run Light AND a Remote Shutdown Indicator, when an EMS is not used.

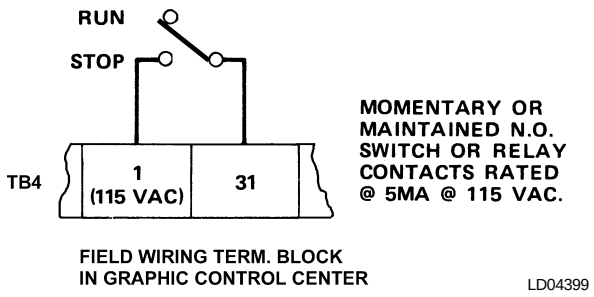

FIG. 24 – AUXILIARY SAFETY SHUTDOWN INPUT

The closure of a Momentary or Maintained N.O. Switch or Relay Contacts will cause the unit to shut down and display: "SAFETY SHUTDOWN – MANUAL RESTART" and "AUXILIARY SAFETY – CONTACTS CLOSED". The unit will not restart until the contacts open and the keypad COMPRESSOR switch is moved to the "STOP-RESET" position (**"O"**) and then to the "START" (" ◀ ")position.

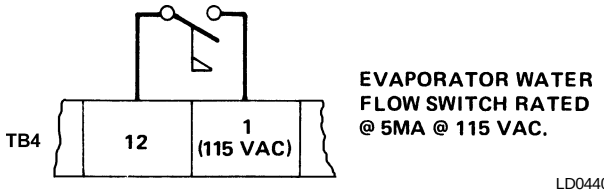

FIG. 25 – EVAPORATOR WATER PUMP INTERLOCK OR FLOW SWITCH

When Evaporator Water is flowing, the flow switch contact will close. If the flow switch opens for 2 seconds, the unit shuts down and displays "CYCLING SHUTDOWN – AUTO RESTART" and "LEAVING CHILLED LIQUID – FLOW SWITCH OPEN". The chiller will automatically restart when the switch again closes. The flow switch status is checked 25 seconds into "START SEQUENCE INITIATED" and continuously thereafter.

NOTES

1. This drawing shows recommended field control wiring modifications (by others) to the standard Graphic Control Center Wiring Diagram. Refer to Graphic Control Center Wiring Diagram: Product Drawing Form 160.55-PW1, units having an Electro-mechanical Starter; Product Drawing Form 160.55-PW2, units furnished with a YORK Solid State Starter; or 160.55-PW3, units with a Variable Speed Drive.
2. If more than one of these modifications is to be utilized with a particular unit, additional consideration must be given to the application to insure proper functioning of the control system. Consult your YORK representative.
3. The additional controls and wiring for these modifications are to be furnished and installed in the field (by others). (See Warning on page 2.)
4. The controls specified are recommended for use, but other controls of equal specifications are acceptable.
5. All wiring shall be in accordance with the National Electrical Code, and applicable State and Local Codes.
6. Each 115VAC field connected inductive load, i.e. relay coil, motor starter coil, etc., shall have a transient suppressor wired (by others) in parallel with its coil, physically located at the coil. Spare transient suppressors are furnished in a bag in the Graphic Control Center.
7. The Graphic Control Center is factory furnished for Manual Restart After Power Failure as a standard function. The control center can be field changed from Manual restart to Auto Restart after a power failure by setting position 5 of Dip Switch SW1 to the ON position - See Fig. 21.
8. Two (2) unit controls schemes are suitable for 8° – 12°F water range. Constant chilled water flow is assumed at all loads. For other requirements contact your YORK representative.
9. _____
10. Lead selector and cycling control to provide similar lead selection and cycling of lag units for three (3) units is available: Kit No. 366-44684D (see Product Drawing Form 160.00-PA1.1) in NEMA I enclosure. Consult your YORK representative.
11. Sequence control kits (see Fig.9 and Note 10) assume a constant chilled water flow and a constant leaving chilled water temperature to sense the cooling load. Sequence control kits are not designed for variable chilled water flow or with reset of the leaving chilled water temperature – see Figs. 18 to 20 and Note 2.
12. Maximum allowable current draw between circuits [24] and [2] for field installed devices is 2 amp holding and 10 amps inrush – see Graphic Control Center Wiring Diagram Form No. in Note 1.
13. For required field wiring connections of the chilled water pump contacts (terminals [44] and [45] on Graphic Control Center field wiring terminal block TB2) and chilled water flow switch (terminals [1] and [12] on Graphic Control Center field wiring terminal board TB2), see Wiring Diagram – Field Connections: Form 160.55-PW4, units having an Electro-mechanical Starter; Product Drawing Form 160.55-PW5, units furnished with a YORK Solid State Starter; or 160.55-PW6, units with a Variable Speed Drive.

    The chilled water flow switch is a safety control. It must be connected to prevent operation of the chiller whenever chilled water flow is stopped. The use of the chilled water flow switch for purposes other than protection of the chiller may be accomplished in several ways. Two flow switches, a flow switch and a relay or separate contacts on the same flow switch.
14. _____
15. Do not apply voltage on field wiring terminal blocks TB4 and TB6 in YORK Graphic Control Center, as 115VAC source is fed from terminals [1] and [2] .

P.O. Box 1592, York, Pennsylvania USA 17405-1592

Form 160.55-PW7 (899)
Supersedes: Nothing