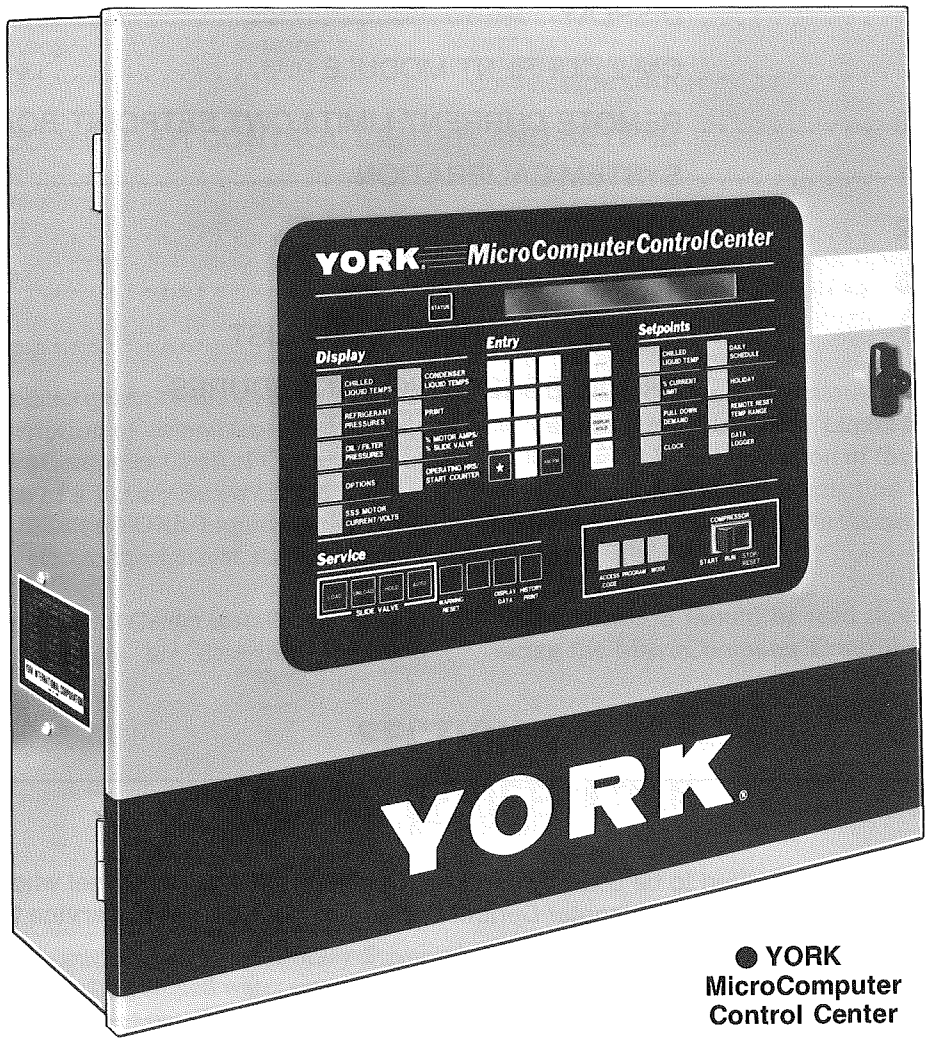
MICROCOMPUTER CONTROL CENTER

Part No. 371-01112-001 or 371-01200-003

for

MODEL YS BA BA S0 THRU YS FC FB S5 (STYLE A)

125 THRU 675 TONS



● YORK
MicroComputer
Control Center

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IMPORTANT

This instruction is intended to be used by certified (Qualified) Service personnel who have been instructed to service the MicroComputer Control Center. **Do not attempt to service this control center if you are not qualified.**

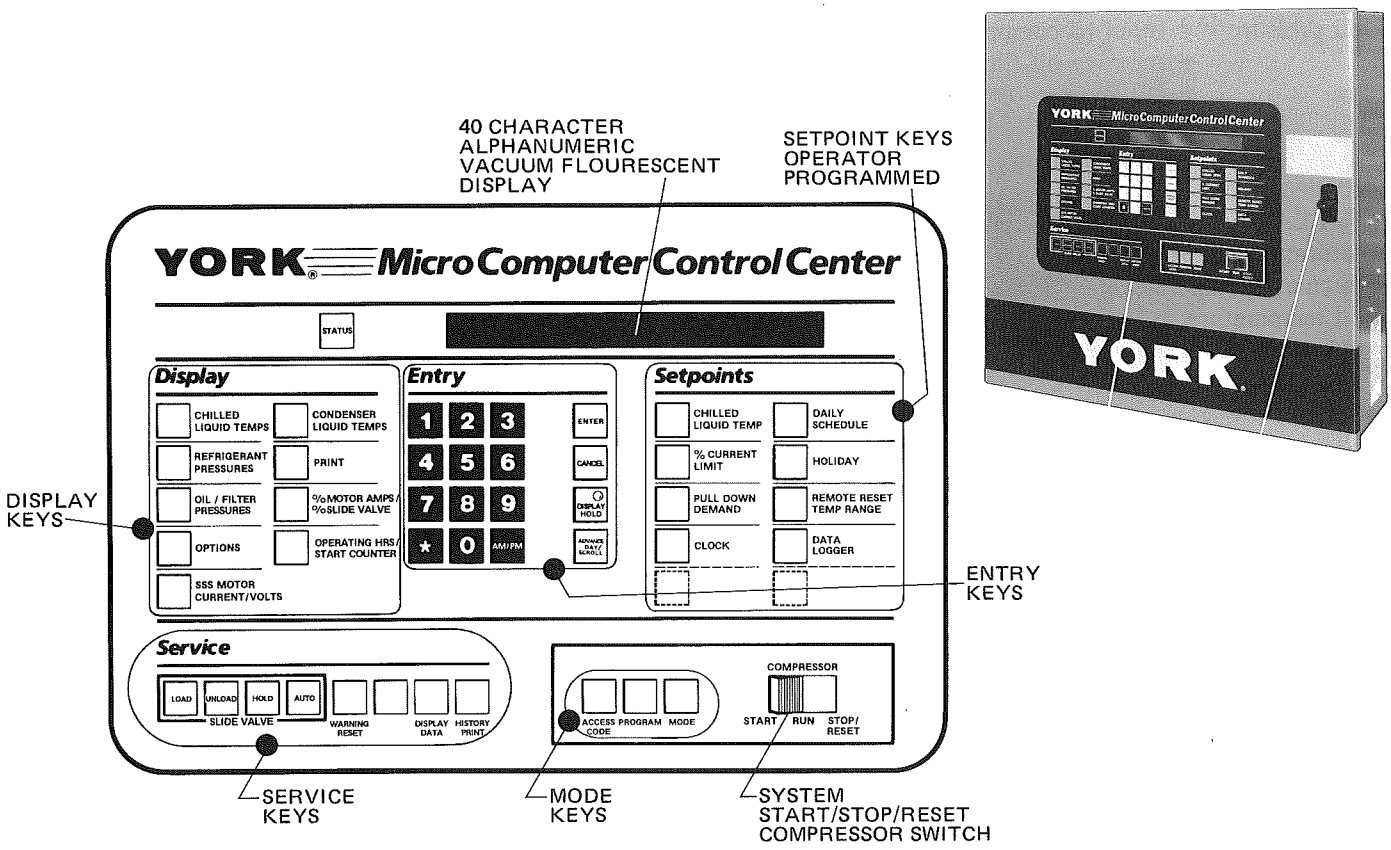


FIG. 1 — MICROCOMPUTER CONTROL CENTER AND KEYPAD

SECTION 1
INTRODUCTION

This instruction is a description of the electronic operation, functional description of components and trouble shooting of the MicroComputer Control Center used to control the operation of a Rotary Screw Liquid Chiller. This control center utilizes a YORK Liquid Cooled Solid State Starter, or an electro-mechanical starter.

The MicroComputer Control Center installation, operation, and display messages are described in Form 160.47-O1.1. Those instructions are basically for the operator of the Rotary Screw Liquid Chiller and does not include the technical operation of the control center, but should be used with this instruction by the field service technician qualified to perform the necessary service when needed.

This instruction should be read thoroughly before servicing the MicroComputer Control Center.

SECTION 2
THEORY OF OPERATION

OVERVIEW

The YORK MicroComputer Control Center is a microprocessor based control system for Rotary Screw chillers. It controls the leaving chilled water temperature via slide valve control and has the ability to limit motor current via control of the slide valve. Further, it is compatible with the Liquid Cooled Solid State Starter and electro-mechanical starter applications.

A front panel mounted keypad allows the operator to display system operating parameters on a 40 character alphanumeric display that is an inherent part of the keypad. These parameters are:

- chilled liquid temperatures
- refrigerant pressures
- oil pressure –
  - Input to compressor
  - Input to oil filter
  - Oil filter differential
  - Differential oil (oil pressure – evaporator pressure).
- condenser liquid temperatures (optional)
- % FLA, motor current; slide valve position
- saturation temperatures
- discharge temperature
- oil temperature
- operating hours; compressor starts
- 3Ø motor current (Liquid Cooled Solid State Starter applications only)
- 3Ø line voltage (Liquid Cooled Solid State Starter applications only)

The system setpoints are operator entered on the front panel keypad. These setpoints can also be displayed on the 40 character alphanumeric display. The system setpoints are:

- leaving chilled liquid temperature
- % current limit
- pulldown demand limit
- clock (time-of-day, day of week, calendar date)
- daily schedule (7 day time-clock programming)
- holiday schedule
- remote reset temperature range
- chiller full load amps (Liquid Cooled Solid State Starter applications only.) Preset at factory, may be changed **only** by the qualified York Service Technician.
- undervoltage threshold (Liquid Cooled Solid State Starter applications only.)
- data logger—start time and print interval (optional—printer required) Ref. 160.47-NO1.2

An optional printer can be used as a data logger to record all system parameters at an operator specified interval. Also, an operator can initiate this same print-out at any time by pressing a keypad key. Further, anytime the chiller shuts down on a safety or cycling shutdown, all system parameters valid at the time of shutdown and it's cause and time are printed. A history of the last four shutdowns is saved in memory and can be retrieved at any time by pressing the keypad **HISTORY PRINT** key. Refer to York Form 160.47-NO1.2 for details of printer option.

If the MicroComputer Control Center is equipped with Micro Board P/N 031-00940-001, it can be interfaced to the FAX-4000 EMS (Ref. YORK Form 450.00-NM1). If equipped with Micro Board P/N 031-01065-000, it can be interfaced to the FAX-4500 EMS (Ref. YORK Form 450.00-NM2). Refer to Section 7 for details of Micro Boards and required EPROMS.

The cause of any system shutdowns (safety or cycling) is preserved in the Micro Board's memory for subsequent viewing on the keypad display. Moreover, the operator is continually advised of system operating conditions by various background and warning messages. Finally, the keypad contains special service keys for use by the service technician when performing system troubleshooting.

The MicroComputer Control Panel is compatible with most energy management systems (EMS) in use today. The standard design allows for the following EMS interface:

- remote start
- remote stop
- remote LCWT setpoint (PWM signal)
- remote current limit setpoint (PWM signal)
- "remote mode ready to start" status contacts
- safety shutdown status contacts
- cycling shutdown status contacts

As an enhancement to the above standard EMS features, the customer may purchase optional plug-in PC boards that allow for remote LCWT setpoint and remote current limit setpoint interface in the following format:

- 4-20 MA
- 0-10 VDC
- contact closures

SYSTEM ARCHITECTURE

The microprocessor and supporting digital logic and analog circuits are contained on a single PC board known as the **Micro Board**. All system operating decisions are made on this board; such as when to open or close the slide valve, when to operate the oil line solenoid, when to shutdown on safety shutdowns, etc. Therefore, all system inputs and outputs must pass through this board. However, since the Micro Board's digital logic is +5 VDC, the 115 VAC inputs must be signal conditioned prior to application to the Micro Board. Similarly, the outputs must be relay isolated in order to drive the system 115 VAC relays and solenoids. These functions are performed by the digital input board and relay output-board respectively.

The **Digital Input Board** accepts 115 VAC inputs from system relays and external devices such as chilled water pump interlocks, local/remote cycling devices, EMS, separator oil level switch, etc. These 0 VAC/115 VAC input signals are converted to 0 VDC/+ 5 VDC logic level signals for use by the Micro Board. The output of the Digital Input Board is interfaced directly to the Micro Board.

The Micro Board output interfaces directly to the **Relay Output Board**. The logic level outputs of the Micro Board energize or de-energize DC relays on the relay output board. The contacts of these relays energize or de-energize the system 115 VAC solenoids and relays. Also, the EMS remote status contacts are located on this board.

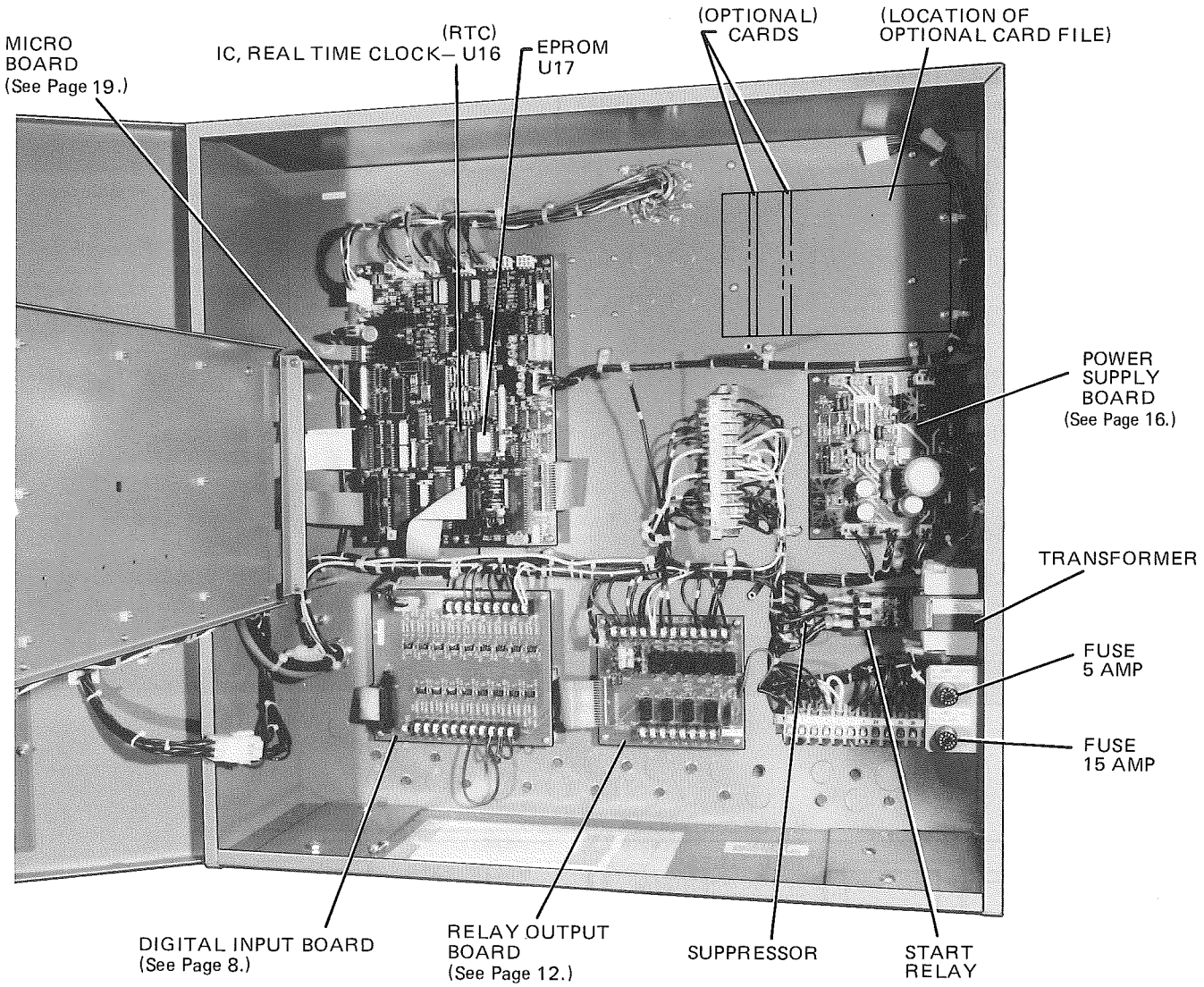


FIG. 2 — MICROCOMPUTER CONTROL CENTER — DOOR AND HINGED PANEL OPEN

System pressures are sensed by **transducers**. System temperatures are sensed by **thermistors**. The transducers and thermistors are input to the Micro Board where multiplexing allows sharing of a single analog to digital converter. The digital words are compared to stored safety threshold values and, if exceeded, the Micro Board initiates a chiller shutdown.

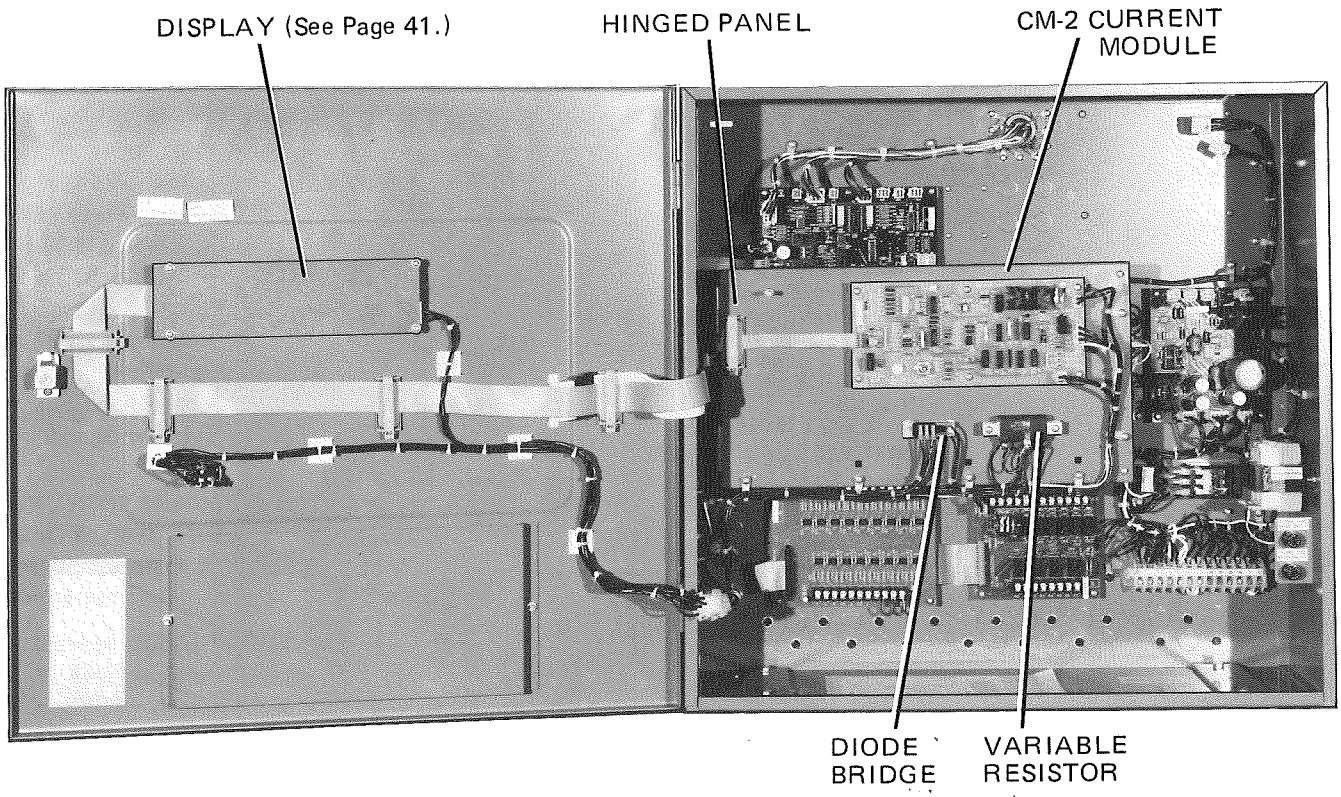
DC power is supplied to all circuit boards by a **Power Supply Board**. AC power is supplied to the power supply board via a 115VAC to 24VAC stepdown transformer.

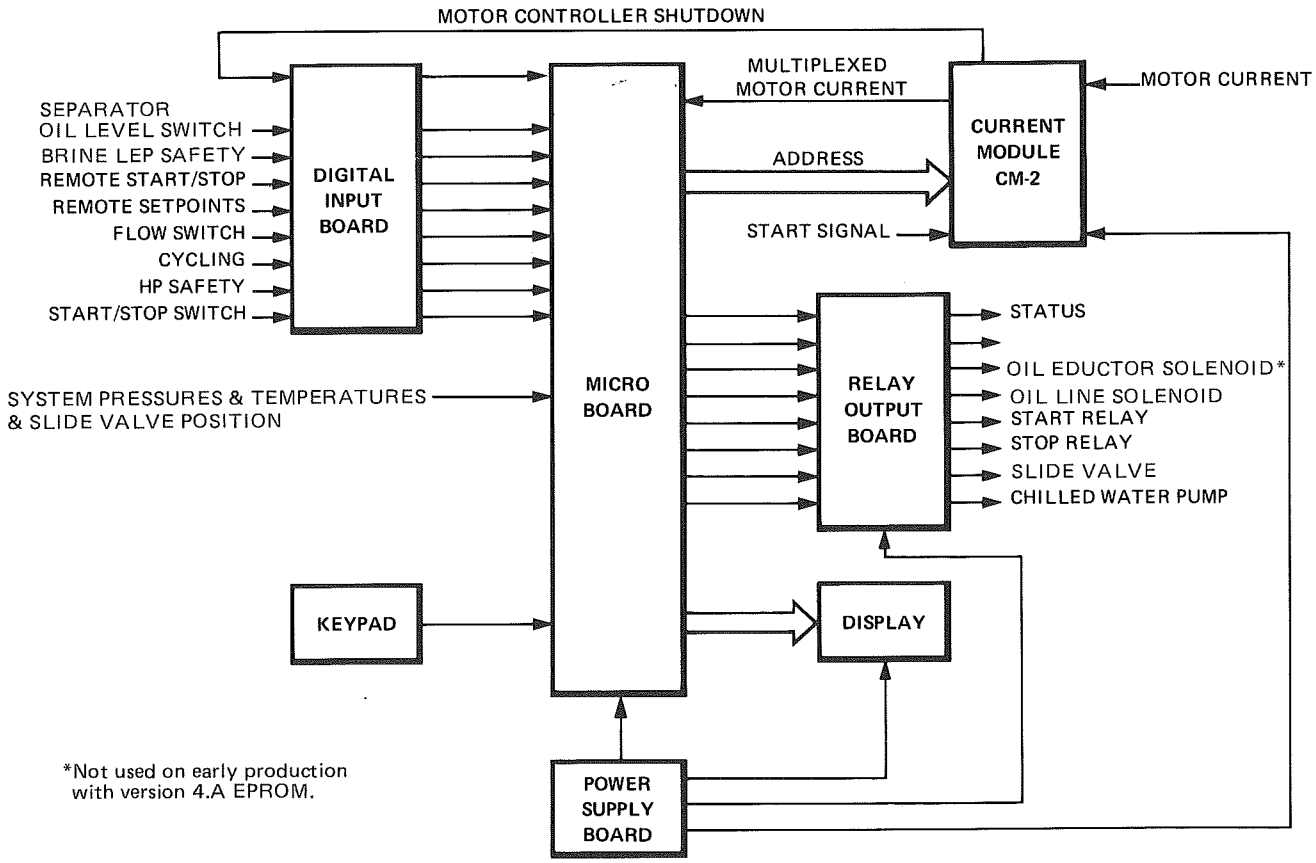
Applications

The MicroComputer Control Center is used on electro-mechanical or YORK Solid State Starter applications.

When the control center is used on **Electro-Mechanical Starter** applications, it performs both LCWT and current limit control. A CM-2 module (located inside the micro panel) is provided to perform compressor motor overload and power fault protection. Also, the CM-2 module provides motor current values to the Micro Board that is displayed as % of FLA.

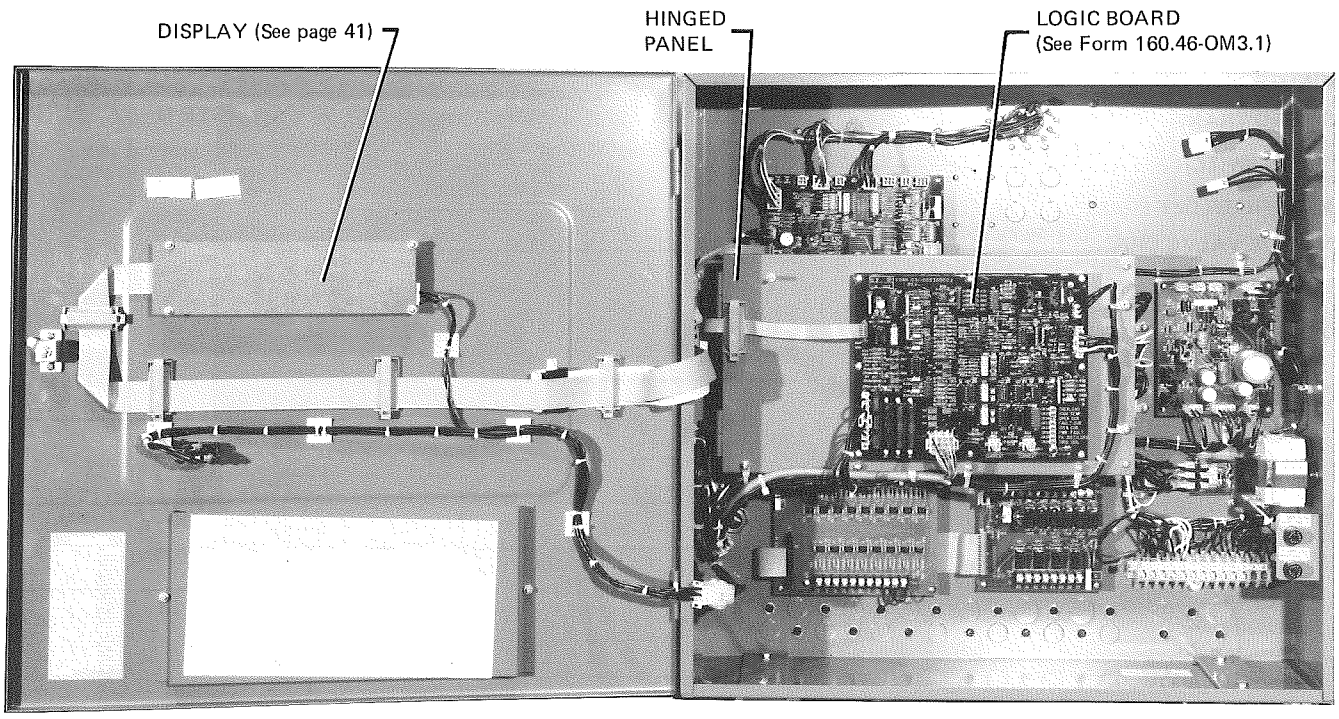
When the control panel is used on **Liquid Cooled Solid State Starter** applications, it performs both LCWT and current limit control. The solid state starter logic board is provided inside the MicroComputer Control Center. It performs compressor motor overload and power fault protection in addition to solid state starter control functions. Also, it provides 3 phase power line voltage and compressor motor current values to the Micro Board for low line voltage and current unbalance protection and front panel display.

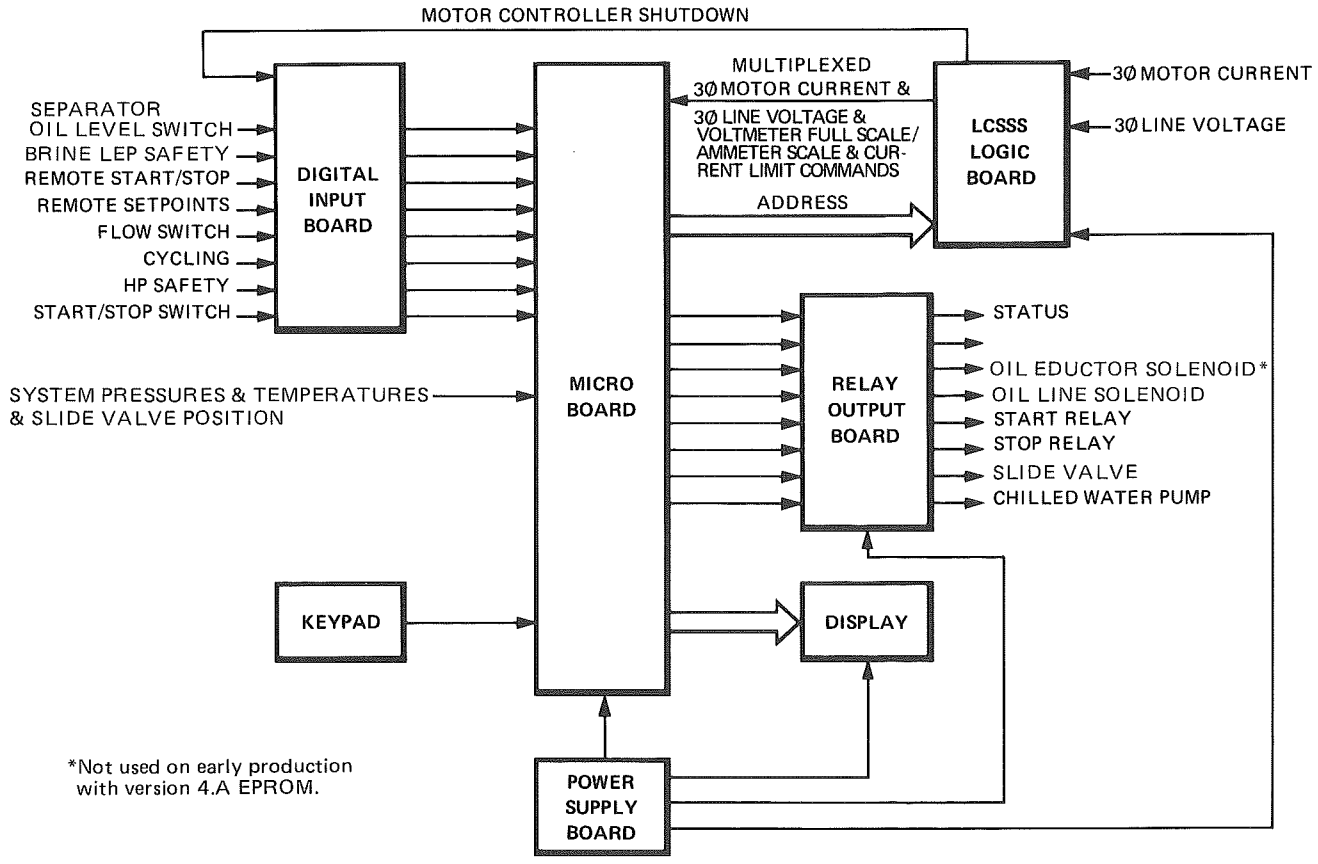




BLOCK DIAGRAM

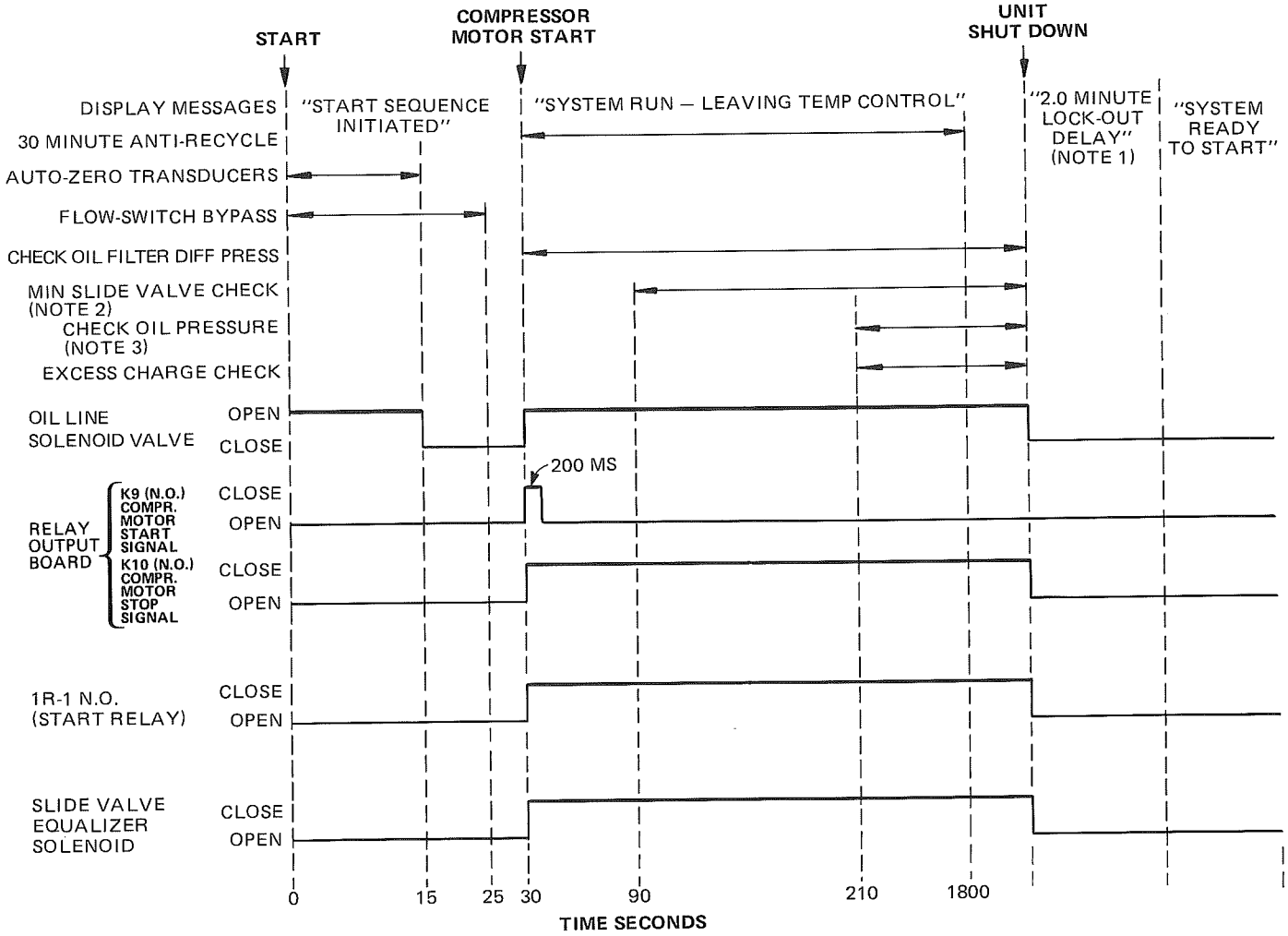
FIG. 3 — MICROCOMPUTER CONTROL CENTER — DOOR OPEN — ELECTRO-MECHANICAL STARTER APPLICATIONS





BLOCK DIAGRAM

FIG. 4 — MICROCOMPUTER CONTROL CENTER — DOOR OPEN — SOLID STATE STARTER APPLICATIONS



NOTE:
1. REF. PROGRAM JUMPER JP4 ON MICRO BOARD.
2. ONLY USED ON EARLY PRODUCTION WITH VERSION 4.A EPROM.
3. VERSION 4.A EPROM – 120 SECONDS

FIG. 5 — CODEPAK CHILLER STARTING SEQUENCE & SHUTDOWN SEQUENCE

SECTION 3
COMPONENT DESCRIPTIONS
SECTION 4
DIGITAL INPUT BOARD

DIGITAL INPUT BOARD (Ref. Fig. 6, 7, 8 and 9)

The Digital Input Board converts 115VAC signals to +5VDC logic level signals for use by the Micro Board.

When the digital input device in question closes, the 115VAC input is applied to a full wave rectifier. This unfiltered DC is then applied to an opto-coupler that turns on and allows the full +5VDC to be dropped across the output resistor. In summary, the input switch closure supplies a 115 VAC input which produces a +5VDC output; an open input produces a 0VDC output.

Terminal Strip TB2 is provided on the Digital Input Board for interfacing external customer signals (flow switch, multi-unit sequence, etc.). The signal input terminals are grouped together (according to function) with a 115 VAC power source terminal (1). The power source terminal (1) supplies source voltage for externally located relay contacts—such as: the chilled water pump interlock/flow switch terminal (12) located adjacent to a terminal (1). Since terminal (1) is internally connected to 115VAC on the **Digital Input Board,** the flow switch contacts would be connected between (12) and (1). When the flow switch contacts close, 115 VAC is applied to in-

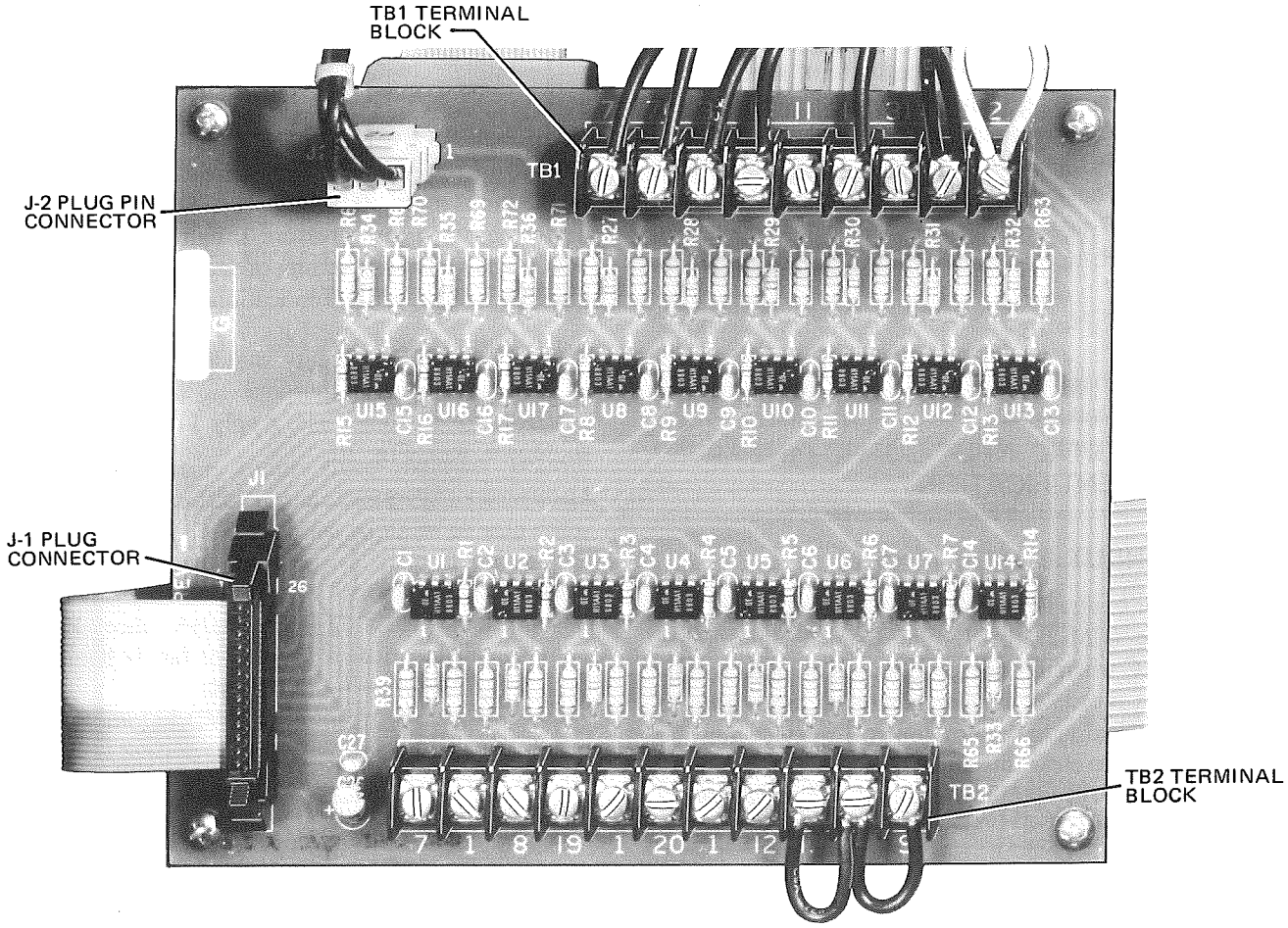


FIG. 6 — DIGITAL INPUT BOARD

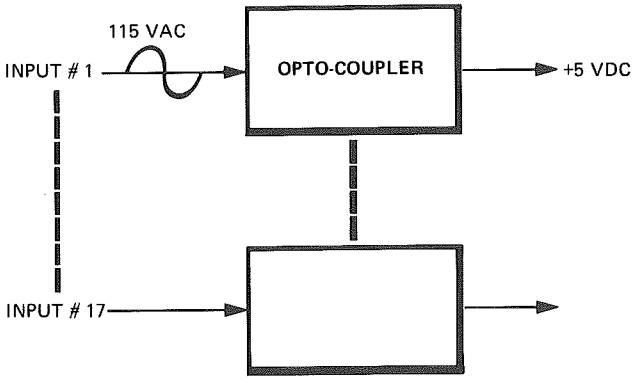


FIG. 7 — DIGITAL INPUT BOARD SIMPLIFIED BLOCK DIAGRAM

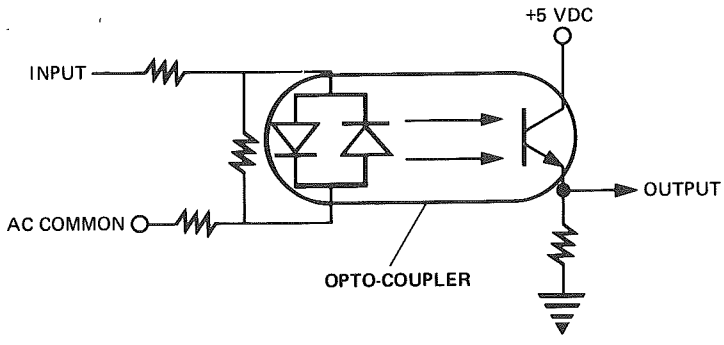


FIG. 8 — DETAILED SCHEMATIC REPRESENTATION DIGITAL INPUT-BOARD

put terminal (12) causing the **Digital Input Board** output J1-19 to transition from 0VDC to +5VDC. The output will remain at +5VDC as long as the flow switch is closed.

Terminal strip TB1 is provided for interfacing YORK supplied components that are located on the chiller. (Separator oil level switch, high pressure safety switch, low evaporator pressure switch, - brine units only).

Connector J2 is provided to interface the motor controller contacts and keypad COMPRESSOR switch to the Digital Input Board.

Connector J1 is provided to connect the logic level outputs of the Digital Input Board to the Micro Board via ribbon cable.

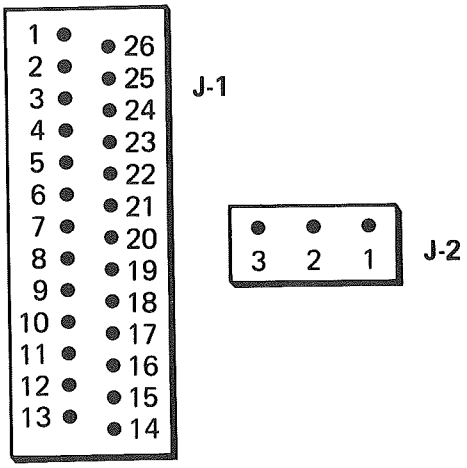


FIG. 9 — DIGITAL INPUT BOARD-PIN IDENTIFICATION

DIGITAL INPUT BOARD—Inputs

J2-1 - Motor controller contacts (CM) input. From current module (CM-2), or Liquid Cooled Solid State Starter. 0VAC when motor controller has initiated a shutdown. When motor controller has reset, input goes to 115VAC. Typically, the motor controller device must be manually reset to clear this signal. However, the following motor controller shutdowns do not require an external reset:

Liquid Cooled Solid State Starter - High temp (> 110°F), trigger OOL, phase rot/loss, power fault and fault current.
Electro-Mechanical Starter - (Current Module-CM2) - power fault.

When the motor controller device has detected a "Power Fault", the motor controller contacts will open and reclose in less than 3 seconds. Any reclosure in less than 3 seconds will be interpreted by the control center as a power fault. Power fault shutdowns do not require an external reset before restarting chiller; the chiller automatically restarts.

J2-2 - Compressor switch **"STOP"** position input. 115VAC when switch is in **"STOP"** position, otherwise 0VAC.

J2-3 - Compressor switch **"START"** position input. 115VAC when switch is in **"START"** position, otherwise 0VAC.

TB1—TERMINAL BLOCK

TB1-71—Not Used.

TB1-70—Not Used.

TB1-32—High pressure safety input. This function is provided by a pressure control mounted on the condenser shell. 115 VAC when condenser pressure rises to 270 PSIG. High pressure safety device resets when condenser pressure falls to 210 PSIG.

TB1-18—Separator oil level switch input. 115VAC when level is sufficient. 0VAC otherwise.

TB1-11—Not Used.

TB1-10—Low evaporator pressure safety input on brine applications only. 0 VAC when external LEP safety device senses a low pressure situation, otherwise, 115 VAC. The actual trip setting of the safety device is determined by the specific application.

TB1-31—Auxilliary safety shutdown input. This input is used as a general purpose safety shutdown input available for customer use. Apply 115VAC to initiate a shutdown. Ref. Fig. 10.

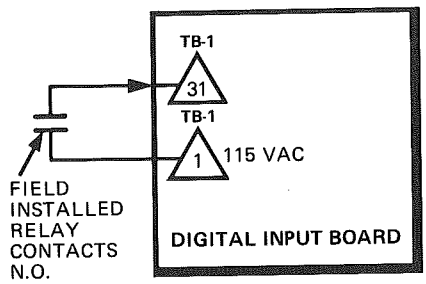


FIG. 10 — AUXILIARY SAFETY SHUTDOWN INPUT – TYPICAL APPLICATION CONTROL CENTER 371-01112-001

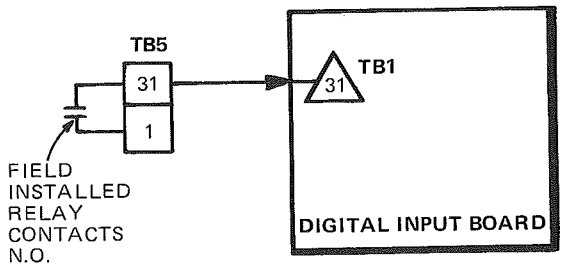


FIG. 10A — AUXILIARY SAFETY SHUTDOWN INPUT – TYPICAL APPLICATION CONTROL CENTER 371-01200-003

TB1-1—115 VAC input from Control Center AC power.

TB1-2—115 VAC neutral input from Control Center AC power.

TB2—Terminal Block

TB2-7—Remote start input from external Energy Management System (EMS). Input designed to accept 115 VAC from external field supplied contacts to start compressor. Input will only be accepted if Control Center is in **REMOTE** mode and panel **"COMPRESSOR"** switch is in **RUN** mode. Refer to Fig. 11. This signal need only be a momentary signal to initiate a start, but a maintained closure is recommended.

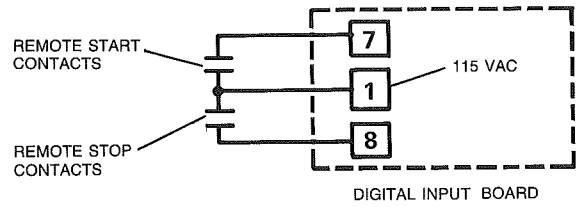


FIG. 11 — REMOTE START AND STOP UNITS

TB2-1—Connected to 115 VAC on Digital Input Board. Source voltage for remote start and remote stop inputs. Refer to Fig. 11 above.

TB2-8—Remote stop input from external Energy Management System (EMS). Input designed to accept 115 VAC from external field supplied contacts to stop compressor. Input will only be accepted if Control Center is in **REMOTE** mode and panel **"COMPRESSOR"** switch is in **RUN** mode. Refer to Fig. 11. This signal must be a maintained signal to provide a stop function.

TB2-19—Remote LCWT setpoint from external Energy Management System (EMS). Signal is a 1-11 SEC. Pulse Width Modulated (PWM) signal as follows: A 1 second application of 115 VAC corresponds to the Control Center operator programmed **CHILLED LIQUID TEMP** setpoint . . . An 11 second application of 115 VAC corresponds to the maximum allowable remote reset value, 10°F or 20°F (Refer to description of **REMOTE RESET TEMP RANGE**). All settings between 1 sec. and 11 sec. are linearly scaled. Refer to Fig. 12 below. Input will only be accepted if Control Center is in **REMOTE** mode. Calculate the setpoint as follows:

$$\text{°F Offset} = \frac{(\text{Pulse Width} - 1)\ (\text{Remote Reset Temp Range})}{10}$$

Setpoint = Keypad Entered Setpoint + °F Offset

TB2-1—Connected to 115 VAC on Digital Input Board. Source voltage for remote LCWT setpoint (PWM signal) and remote current limit setpoint (PWM signal). Refer to Fig. 12 below.

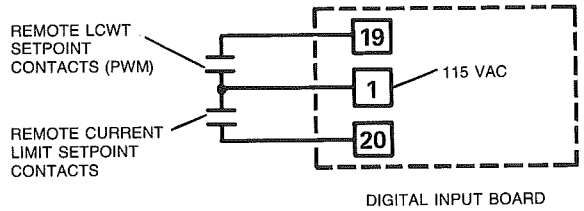


FIG. 12 — REMOTE LCWT & CURRENT LIMIT SETPOINT INPUTS (PWM)

TB2-20—Remote current limit setpoint from external Energy Management System (EMS). Signal is a 1-11 sec. Pulse Width Modulated (PWM) signal as follows: A 1 second application of 115 VAC corresponds to a setting of 100% FLA . . . an 11 second application of 115 VAC corresponds to a setting of 40% FLA. All settings between 1 sec. and 11 sec. are linearly scaled. Input will only be accepted when Control Center is in **REMOTE** mode. Refer to Fig. 12. Calculate the setpoint as follows:

Setpoint = 100% [(Pulsewidth - 1) 6%]

TB2-1—Connected to 115 VAC on Digital Input Board. Source voltage for chilled water pump interlock/flow switch inputs. Refer to Fig. 13 below.

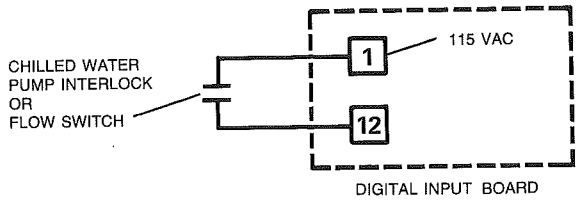
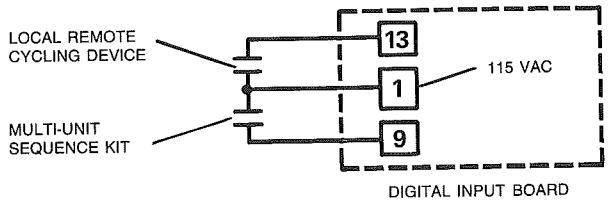


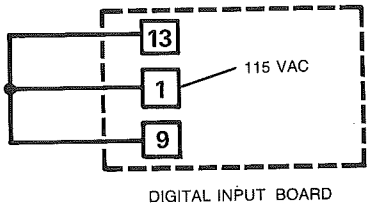
FIG. 13 — CHILLED WATER PUMP INTERLOCK OR FLOW SWITCH CONTACTS

TB2-12—Chilled water pump interlock or flow switch contacts input. 115 VAC when interlock or water flow is established. This condition is a prerequisite to running the compressor. Refer to Fig. 13 above.

TB2-1—Connected to 115 VAC on digital input board. Source voltage for Local/Remote Cycling Device Input



DETAIL A



NO LOCAL OR REMOTE CYCLING OR MULTI UNIT SEQUENCE

DETAIL B

FIG. 14 — LOCAL REMOTE CYCLE DEVICE & MULTI-UNIT SEQUENCE KIT INPUTS

and multi-unit sequence input. Refer to Fig. 14 (Details A & B)

TB2-9—Multi-unit sequence kit input. 115 VAC when sequence kit enables the compressor to run. If no multi-unit sequence kit is provided, this input must be jumpered as shown in Fig. 14. Detail B. "**COMPRESSOR**" switch must be in RUN position to enable input. Refer to Fig. 14 (Details A & B)

TB2-13—Remote/local cycling device input. 115 VAC when remote device enables the compressor to run. If no cycling device is provided, this input must be jumpered as shown. Compressor switch must be in "Run" position to enable input. Refer to Fig. 14 (Detail A & B)

DIGITAL INPUT BOARD—OUTPUTS

All outputs are +5VDC in the active state. In other words, a 115 VDC input signal causes a +5VDC output level on the corresponding board output. A 0VAC input causes a 0VDC output. All outputs interface to the micro board via ribbon cable.

J1-1-Separator Oil Level Switch
2-HP Safety
3-Not Used
4-Not Used
5-Not Used
6-Not Used
7-Motor Controller
8-Stop (Local)
9-Start (Local)
10-Not Used
11-Not Used
12-Not Used
13-5V Return
14-+5V Regulated
15-Remote Start
16-Remote Stop
17-Remote LCWT Setpoint
18-Remote Current Limit Setpoint
19-Flow Switch
20-Local/Remote Cycling Device
21-Multi-Unit Sequence
22-Not Used
23-Not Used
24-Aux. Safety Shutdown
25-LEP (Brine Units Only)
26-Not Used

SECTION 5
RELAY OUTPUT BOARD

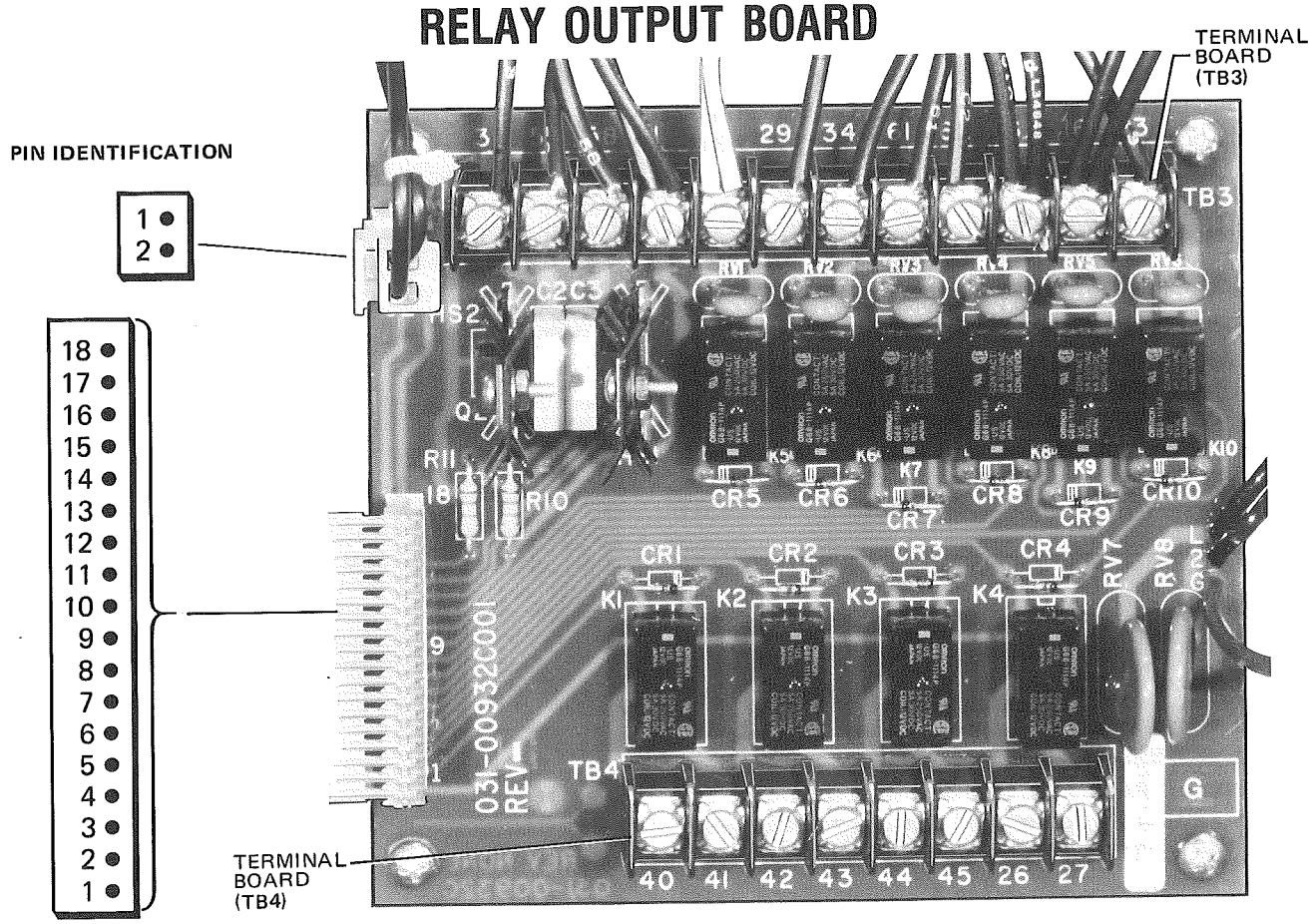
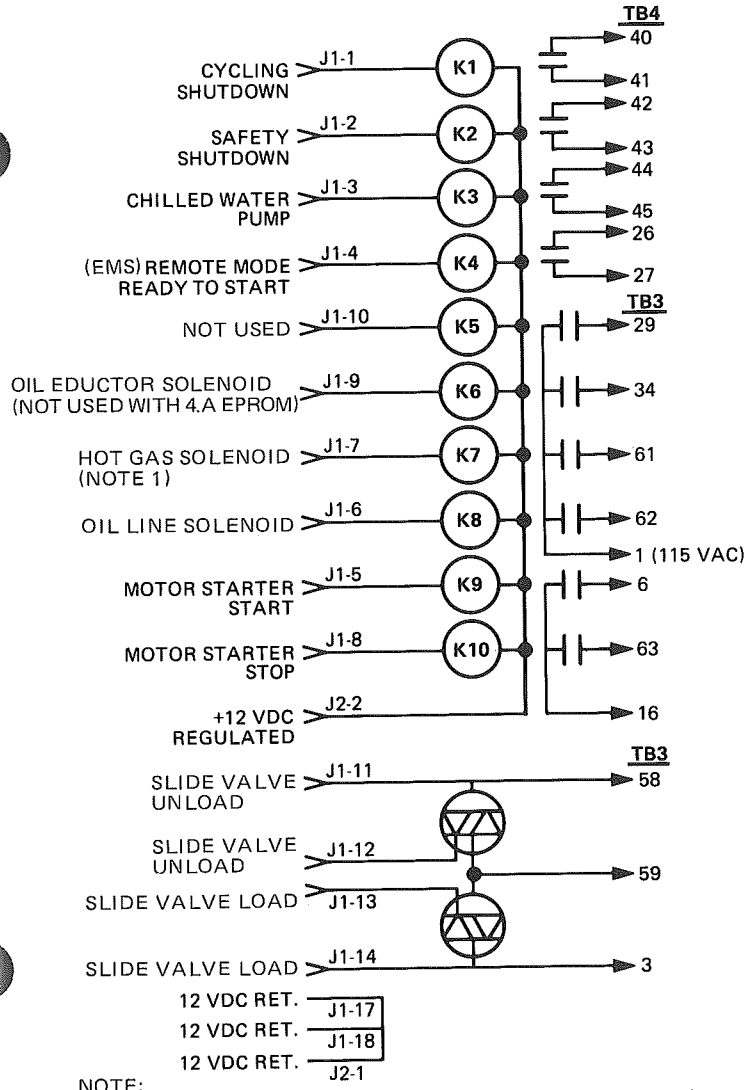


FIG. 15 — RELAY OUTPUT BOARD



NOTE:
1. If Control Center is equipped with Micro Board 031-00940-001 and Hot Gas Bypass is applied, EPROM Version 4.DH (031-01051-003) must be used to enable Hot Gas Solenoid operation. If equipped with Micro Board 031-01065-000, program Jumper JP4 must be removed to enable Hot Gas Solenoid operation. Refer to TB3-61, page 14 for Operation.

FIG. 16 — RELAY OUTPUT BOARD SIMPLIFIED SCHEMATIC DIAGRAM

RELAY OUTPUT BOARD (Ref. Fig. 15 & 16)

The Relay Output Board allows the Micro Board to be interfaced to 115 VAC output signals. Ten board-mounted relays are driven by the micro board. One side of each relay coil is connected to +12VDC regulated power. The other side of the coil is connected to the input connector J1. The Micro Board is connected to this connector and it drives the appropriate pin to ground potential when it wants to energize a selected relay. The contacts (N.O.) of each relay are interfaced, via Terminal blocks TB3 and TB4, to various external relays and solenoids.

Terminal block TB3 is provided for interfacing the system start relay, the system stop relay, selected system safeties, system solenoids and the slide valve. The water temperature control circuits that control the slide valve are located on the micro board. These circuits control two triacs located on the relay output board; one to load the slide valve and one to unload the slide valve. The triacs are then interfaced to the load and unload slide valve solenoids.

Terminal block TB4 is provided for field interface of system status contact closures, and chilled water pump contacts.

RELAY OUTPUT BOARD—INPUTS

All inputs are logic low in the active state. A logic low input to this board causes the output relay to energize. A +12VDC level causes the output relay to de-energize. All inputs interface from the micro board.

J1-1 - Cycling Shutdown
J1-2 - Safety Shutdown
J1-3 - Chilled Water Pump
J1-4 - Remote Mode Ready to Start
J1-5 - Motor Starter—Start
J1-6 - Oil Line Solenoid
J1-7 - Hot Gas Solenoid****
J1-8 - Motor Starter—Stop
J1-9 - Oil Eductor Solenoid***
J1-10 - Not Used
J1-11 - Slide Valve Unload*
J1-12 - Slide Vavle Unload*
J1-13 - Slide Valve Load**
J1-14 - Slide Valve Load**
J1-15 - Not Used
J1-16 - Not Used
J1-17 - +12VDC Return
J1-18 - +12VDC Return

J2-1 - +12VDC Return
J2-2 - +12VDC

TB3-1 - 115VAC
TB3-2 - 115VAC Neutral

*Slide Valve Unload - 0VAC as measured from J1-11 to J1-12 when Micro Board is commanding the slide valve to unload. Approx. 115VAC when slide valve is holding or loading.

**Slide Valve Load - 0VAC as measured from J1-13 to J1-14 when Micro Board is commanding the slide valve to load. Approx. 115VAC when slide valve is holding or unloading.

***Not used on early production with version 4.A EPROM.

****Refer to Fig. 16, Note 1.

RELAY OUTPUT BOARD—OUTPUTS

TB3-59 - 115VAC

TB3-3 - Slide Valve Load Solenoid. 0VAC measured to TB3-59 when slide valve is loading. Approx. 115VAC when slide valve is holding or unloading.

TB3-58 - Slide Valve Unload Solenoid.0VAC measured to TB3-59 when slide valve is unloading. Approx. 115VAC shen slide valve is holding or loading.

SECTION 5

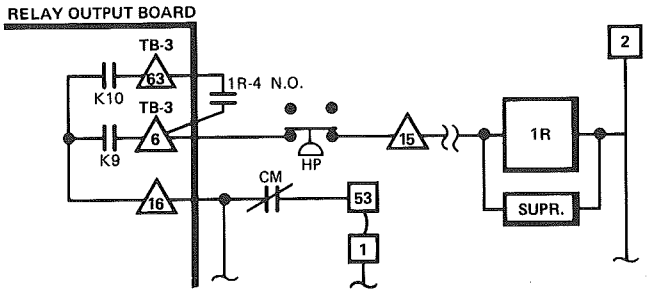


FIG. 17 — RELAY OUTPUT BOARD

TB3-29 - Not Used

TB3-34 - Oil Eductor Solenoid. 115VAC when Micro Board is commanding the solenoid valve to energize (open). This occurs when the slide valve position is equal-to or less-than 17%. 0VAC to de-energzie (close) the solenoid when the slide valve position is greater-than 19%. The slide valve position check is bypassed for 255 seconds at compressor start. During the first 255 seconds of chiller run time and anytime the chiller is shutdown the solenoid will be de-energized (closed). The oil eductor solenoid is not used on early production with version 4.A EPROM.

TB3-6 - Motor starter contacts (Ref. Fig. 17). Part of 1R (start relay) anti-chatter circuit. After the 30 second pre-lube (START SEQUENCE INITIATED) the Micro Board energizes K9 and K10 coincident with the Micro Board going into "RUN" mode (SYSTEM RUN-LEAVING TEMP CONTROL). 1R is energized thru K9 contacts causing 1R-4 contacts to close creating a holding circuit thru 1R-4 and K10 contacts. After 200 milliseconds, the Micro Board de-energizes K9. 1R remains energized thru 1R-4 and K10 contacts. If 1R fails to energize or if it de-energizes at any time while the Micro Board is in SYSTEM RUN-LEAVING TEMP CONTROL , 1R cannot again energize until K9 is again energized at completion of START SEQUENCE INITIATED (the next chiller start). When 1R de-energizes while SYSTEM RUN-LEAVING TEMP CONTROL is displayed the Micro Board senses a loss of motor current (for 25 continuous seconds) and shuts down the chiller and displays AC UNDER-VOLTAGE-AUTOSTART . Refer to explanation of this message in MicroComputer Control Center operating manual Form 160.47-O1.1

TB3-16 - Motor controller input. 115VAC when motor controller device is satisfied. Otherwise, 0VAC.

TB3-61 - Hot gas solenoid. 115VAC when Micro Board is commanding the hot gas solenoid to energize (open). 0VAC when the Micro Board is commanding the hot gas solenoid to de-energize (close). After a 4 minute bypass at start, anytime the slide valve position decreases to 5%, the hot gas solenoid is energized (opened). It is then de-energized (closed) when the slide valve position reaches 10% (Micro Board 031-00940-001 w/ version 4.DH EPROM) 15% (Micro Board 031-01065-000 w/program jumper JP4 cut).

TB3-62 - Oil line solenoid valve contacts. 115VAC when Micro Board is commanding the oil line solenoid valve to energize (open). 0VAC otherwise. Refer to Fig. 5 Timing Diagram.

TB3-63 - Motor starter stop contacts (Ref. Fig. 17). Part of 1R (start relay) anti-chatter circuit. 115VAC when Micro Board is commanding the compressor motor to run and the motor controller contacts (CM) are closed. Refer to explanation of TB3-6.

TB4-40/41 - Cycling shutdown contacts. Dry closure N.O. contacts (rated for 115VAC; 2 AMPS) available for remote status indications. Contacts will close whenever chiller is shutdown on a "Cycling" shutdown. A "Cycling" shutdown is that which does not require a local manual reset at the Control Center to restart the compressor; such as local/remote cycling device, low water temp, motor controller or multi-unit sequence kit. When shutdown control is satisfied, the system will restart automatically. The contacts open upon

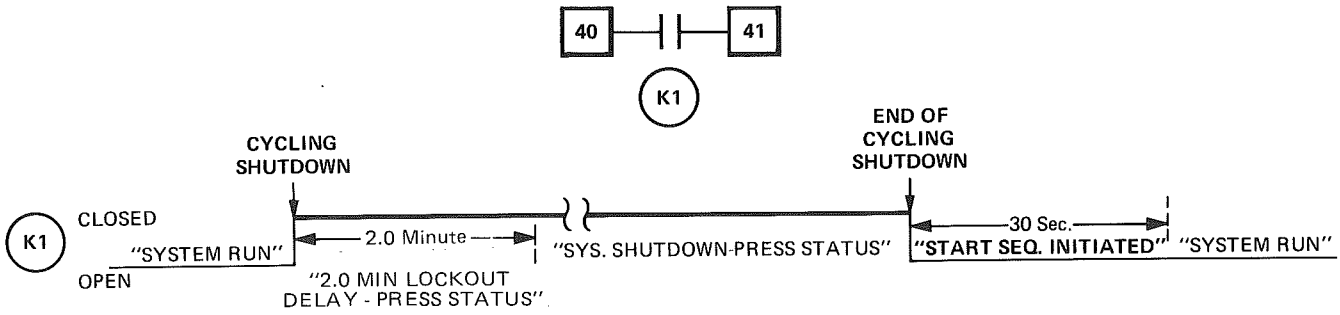


FIG. 18 — STATUS CONTACTS — CYCLING SHUTDOWN

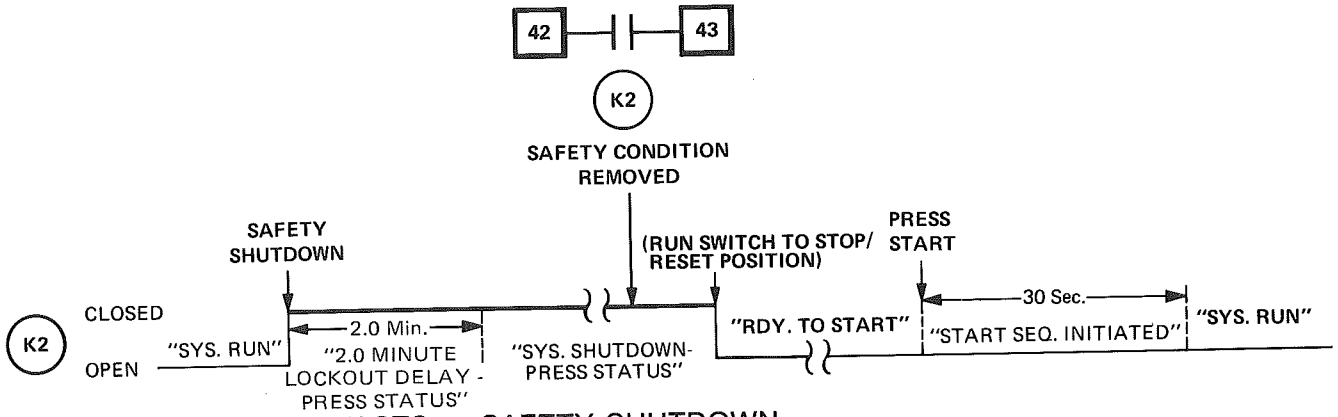


FIG. 19 — STATUS CONTACTS — SAFETY SHUTDOWN

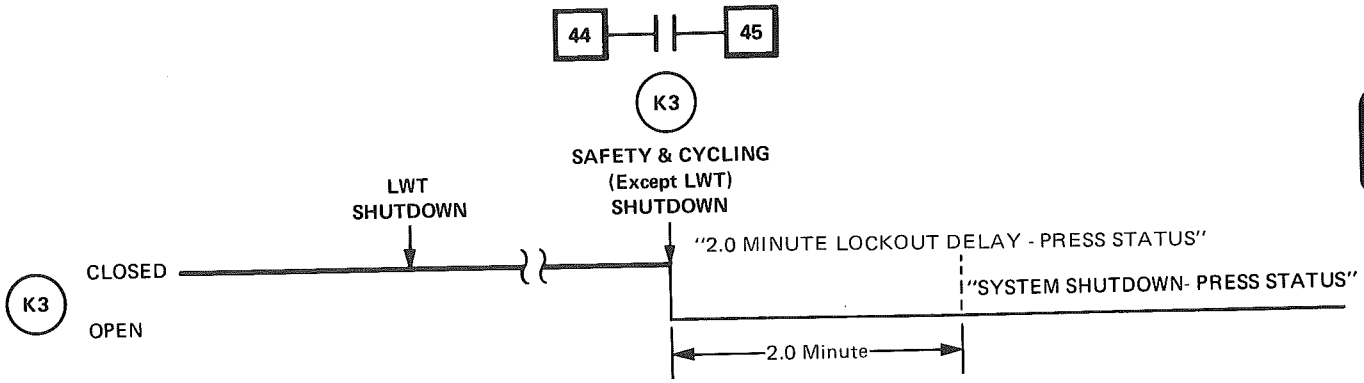


FIG. 20 — CHILLED WATER PUMP CONTACTS — CYCLING AND SAFETY SHUTDOWNS PROGRAM JUMPER (J54) INSTALLED ON MICRO BOARD

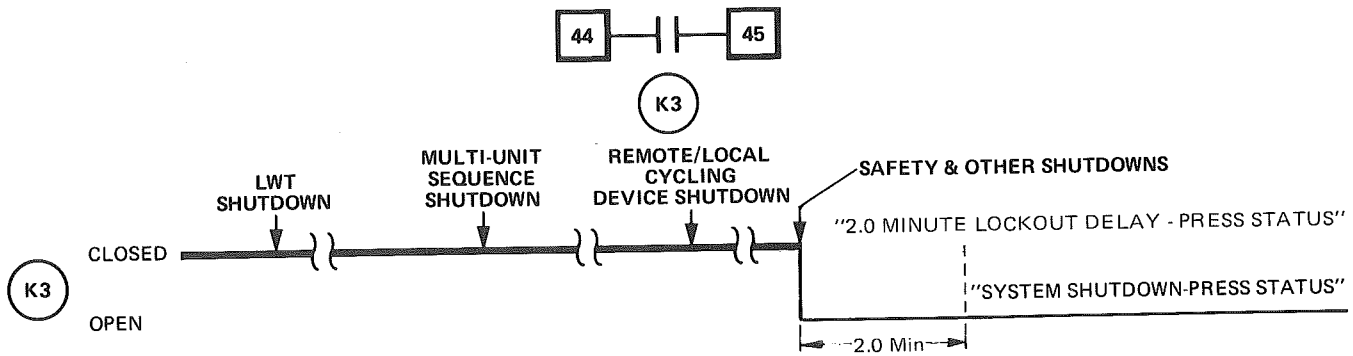


FIG. 21 — CHILLED WATER PUMP CONTACTS — CYCLING AND SAFETY SHUTDOWN PROGRAM JUMPER (J54) REMOVED ON MICRO BOARD

"Start Sequence Initiated" or when the "**COMPRESSOR**" switch is placed in "**STOP/RESET**" position. Refer to Fig. 18.

TB4-42/43 – Safety shutdown contacts. Dry closure N.O. contacts (rated for 115VAC; 2 AMPS) available for remote status indications. Contacts will close whenever chiller is shutdown on a "safety" shutdown. A "safety" shutdown is that which requires a local manual reset at Control Center to restart system; such as power failure (manual restart option), Motor phase current unbalance (Solid State Starter only), starter malfunction detection, LEP, HOT, HDT, LOP, HOP, or HP. The contacts will open when the "**COMPRESSOR**" switch is placed in "**STOP/RESET**" position and the condition that caused the safety no longer exists. The system must be manually restarted. Refer to Fig. 19.

TB4-44/45 – Chilled water pump contacts. Dry closure N.O. contacts (rated for 115VAC, 2 AMPS) that can be used to automatically start and stop the chilled water pump under microprocessor control. An anti-chatter circuit on the Micro Board prevents this output from energizing the chilled water pump at a rate greater than once every 10 seconds. A program jumper

("LWT PMP"-J54) located on the Micro Board determines the operation of these contacts as follows:

JUMPER INSTALLED (as shipped from factory) (Fig. 20).

The contacts will close (starting the chilled water pump) when a chiller start sequence is initiated. Any shutdown command, except **LWT** (Low Water Temp), will cause the contacts to open (stopping the chilled water pump) at the completion of "System Coastdown". When the chiller shuts down on **LWT** the contacts remain closed, causing the chilled water pump to continue to run.

JUMPER REMOVED (Fig. 21)

The contacts operate the same as with the jumper installed except that in addition to **LWT** shutdowns keeping the pump running, **Multi-Unit Sequence** (Digital Input Board TB2-1,9) and **Remote/Local Cycling** (Digital Input Board TB2-1,13) shutdowns also allow the pump to continue to run after SYSTEM COASTDOWN .

TB4-26/27 - Remote mode ready to start contacts. Dry closure N.O. contact (115VAC, 2A).

Available for remote status indication to an Energy Management System (EMS). The contacts will be closed if the Control Center is in **REMOTE** mode and the **COMPRESSOR** switch is in the **RUN** position and all safeties, cycling devices and 30 min. anti-recycle timer are satisfied. The contacts will open coincident with any safety or cycling device becoming unsatisfied or if the Control Center is put in **LOCAL** mode, or if the **"COMPRESSOR"** switch is moved to the **STOP** position. Refer to Fig. 22.

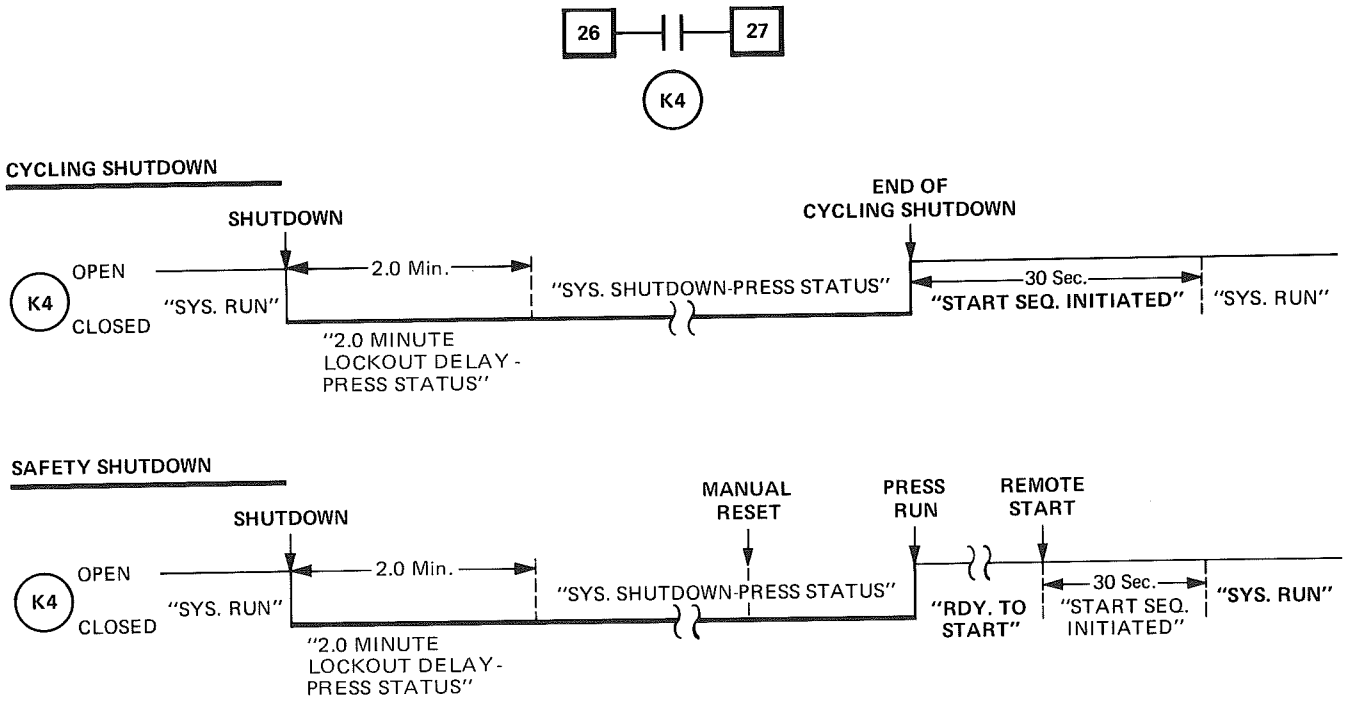


FIG. 22 — REMOTE MODE READY TO START CONTACTS

SECTION 6
POWER SUPPLY BOARD

CONTROL CENTER 371-01112-001

Power Supply Board 031-00938-000 (Ref. Fig. 23 & 24)

This board provides the necessary operating voltages for all the PC boards in the MicroComputer Control Center. A step-down transformer (1T) (external to the power supply board) provides 24VAC to a bridge rectifier. The unregulated output (30 VDC) is applied to the a.) Liquid Cooled Solid State Starter Logic Board if is applied, or b.) CM-2 current module if Electro-Mechanical Starter is applied. The Solid State Starter logic board and CM-2 module have their own on-board power supplies that supply the required voltages for these boards.

Two switching regulators supply + 12VDC and + 10VDC to the Relay Output Board and Micro Board respectively. The 10VDC output is further regulated to + 5VDC for use by the vacuum fluorescent display. Finally, a voltage regulator supplies + 24VDC to the optional card file for use by the remote LCWT setpoint card and remote current limit setpoint card.

Power Supply Board 031-01080-000 (Ref. Fig. 23A & 24A)

This Power Supply Board can be used as a replacement part in Control Center 371-01112-001. It contains the same circuits as Power Supply 031-00938-000. In addition, it contains a display reset circuit that is not used in Control Center 371-01112-001.

CONTROL CENTER 371-01200-003

Power Supply Board 031-01080-000 is used in Control Center 371-01200-003. It has the same circuits as Power Supply Board 031-00938-000. In addition, it contains a **Display Reset Circuit** that outputs a reset signal to the Vacuum Fluorescent Display 031-00775-001 (Babcock VF-140-02 or IEE 33383-01) during low voltage conditions. This prevents display "Latch-up" conditions. Whenever the +5VDC regulated power supply output (J2-4) to the display decreases to +4.7VDC, the $\overline{\text{RESET}}$ output (J6-2) transitions from +5VDC to logic low condition (less than 1VDC). This causes the display to blank for the duration of this condition. Refer to "Display" Section 8.

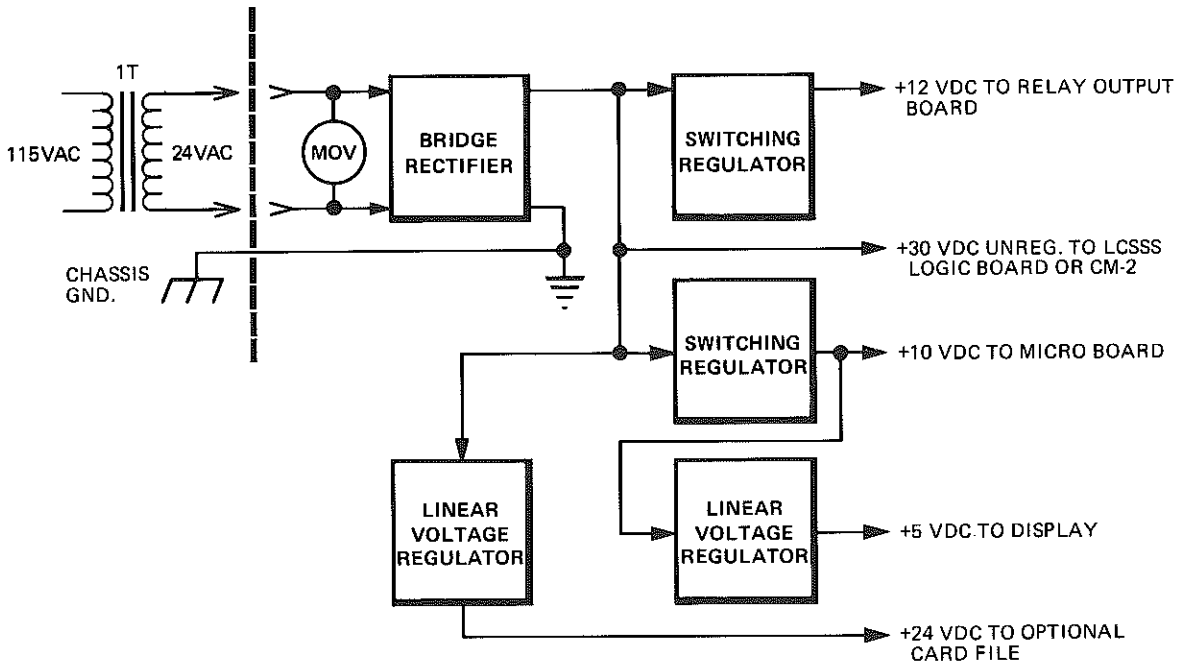


FIG. 23 — POWER SUPPLY BOARD BLOCK DIAGRAM (031-00938-000)
CONTROL CENTER 371-01112-001 ONLY

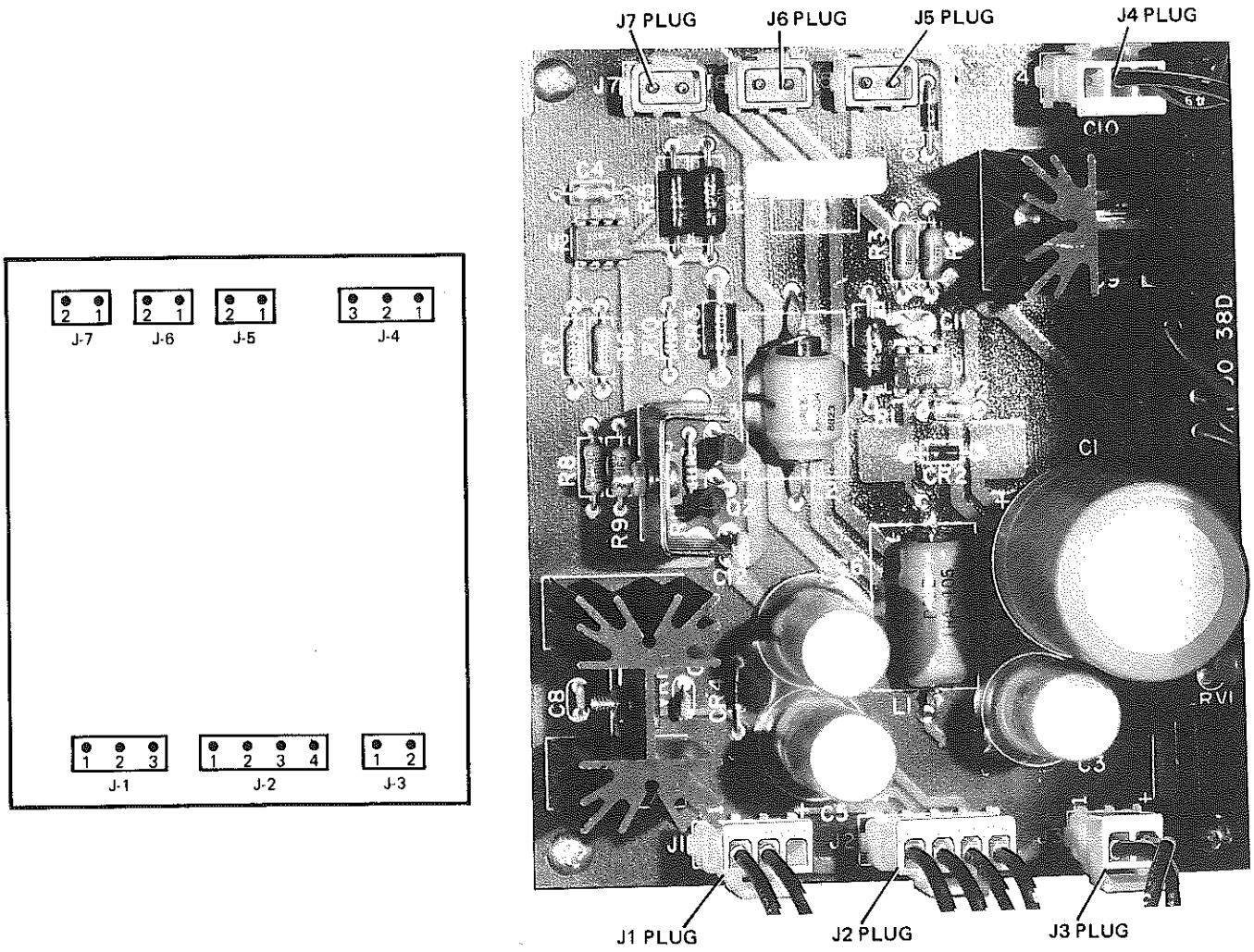


FIG. 24 — POWER SUPPLY BOARD (031-00938-000)
CONTROL CENTER 371-01112-001 ONLY

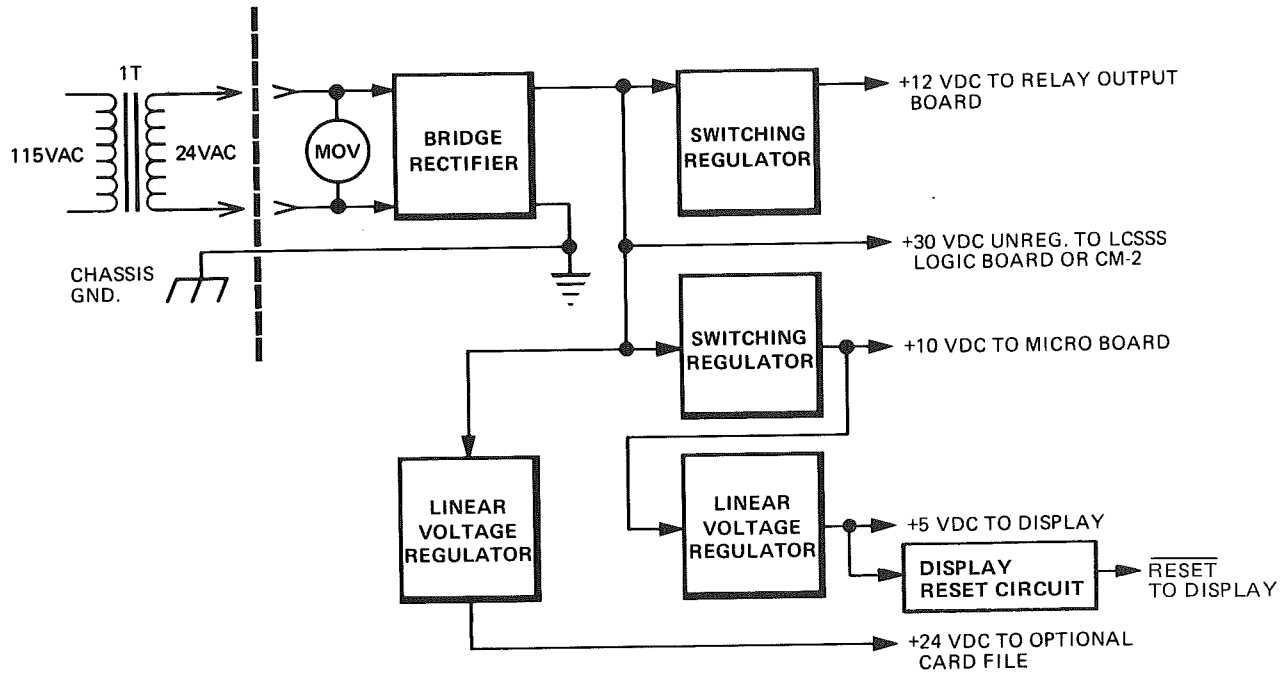
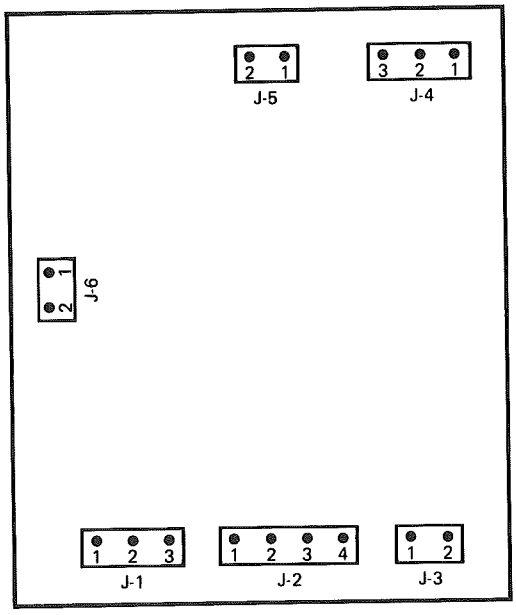


FIG. 23A — POWER SUPPLY BOARD BLOCK DIAGRAM (031-01080-000)



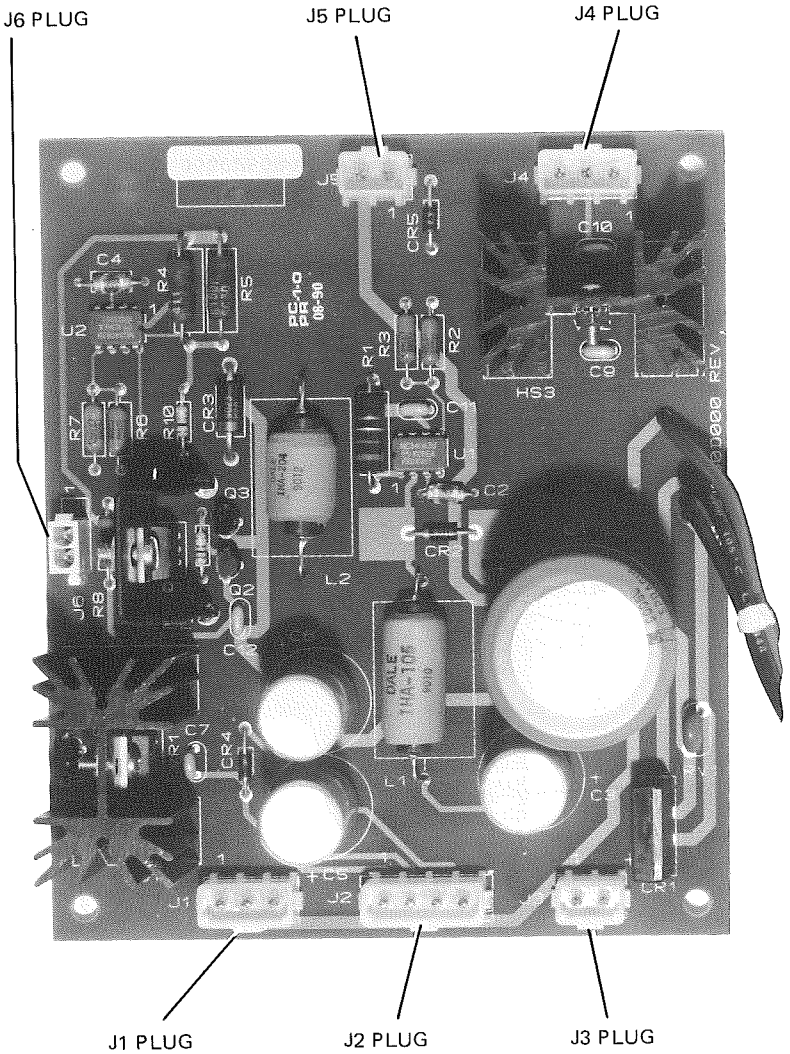


FIG. 24A — POWER SUPPLY BOARD (031-01080-000)

SECTION 7
MICRO BOARD

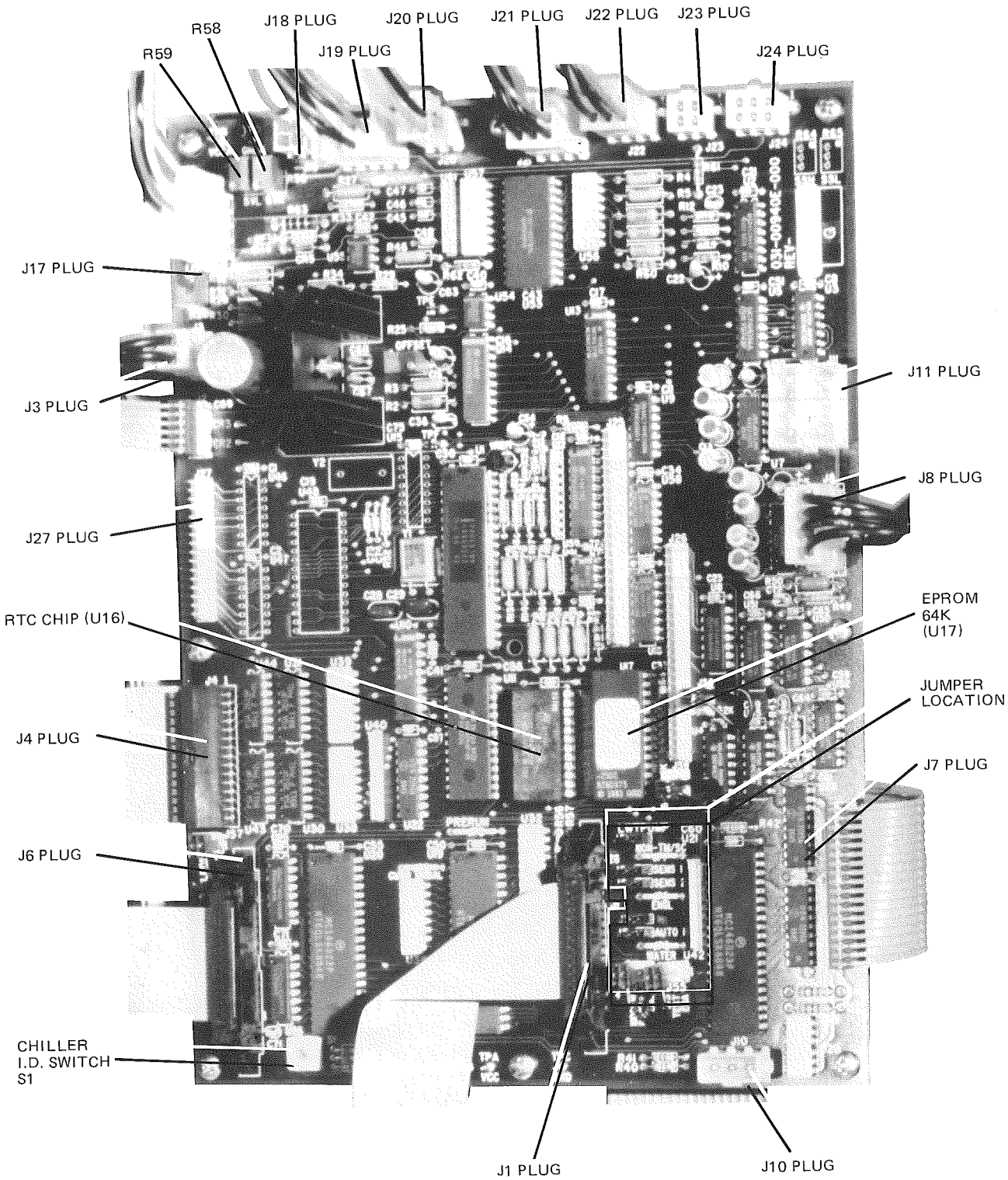
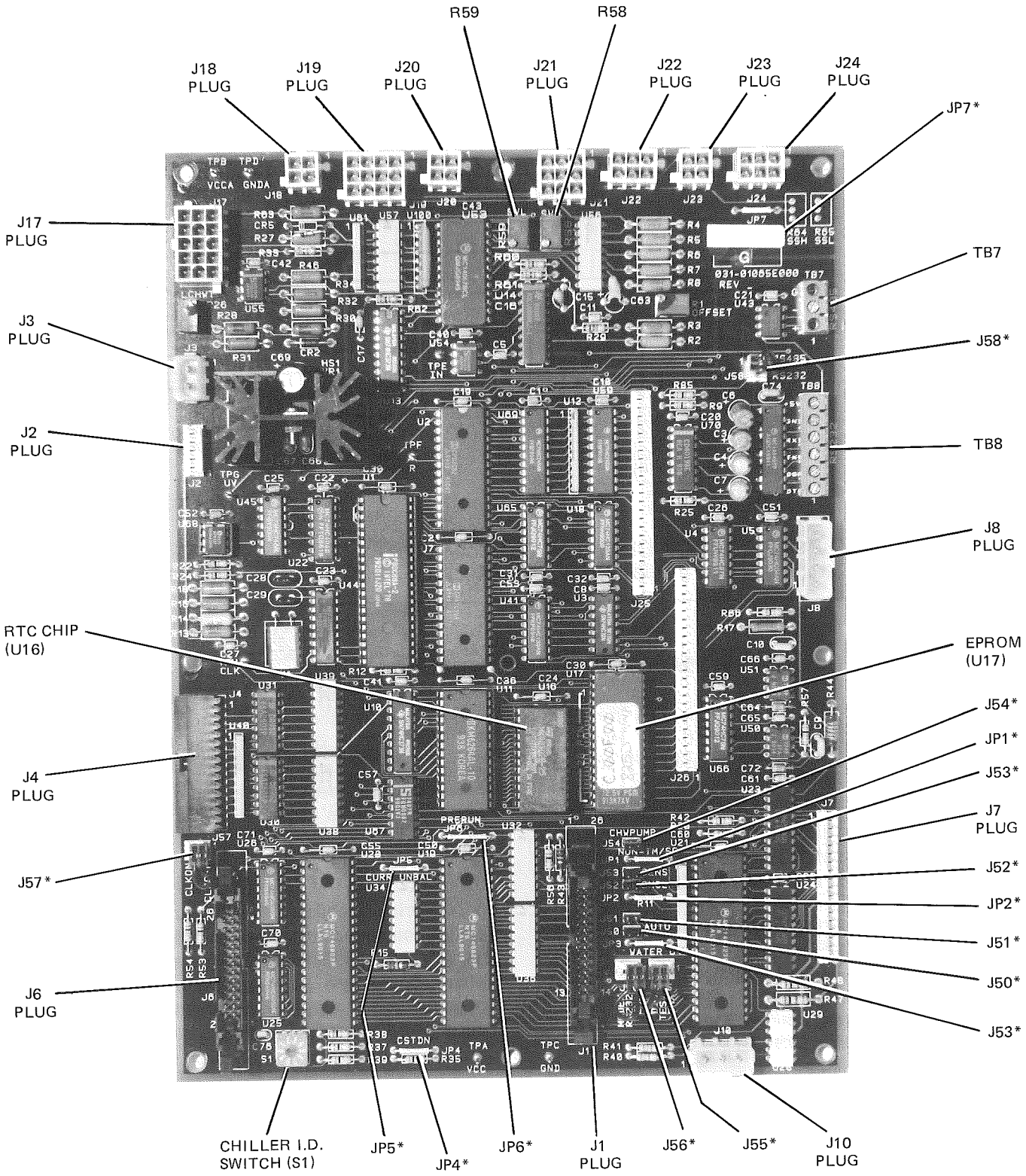


FIG. 25 — MICRO BOARD AND PLUG IDENTIFICATION (031-00940-001)
CONTROL CENTER 371-01112-001 ONLY



*PROGRAM JUMPER

FIG. 25A — MICRO BOARD AND PLUG IDENTIFICATION (031-01065-000)

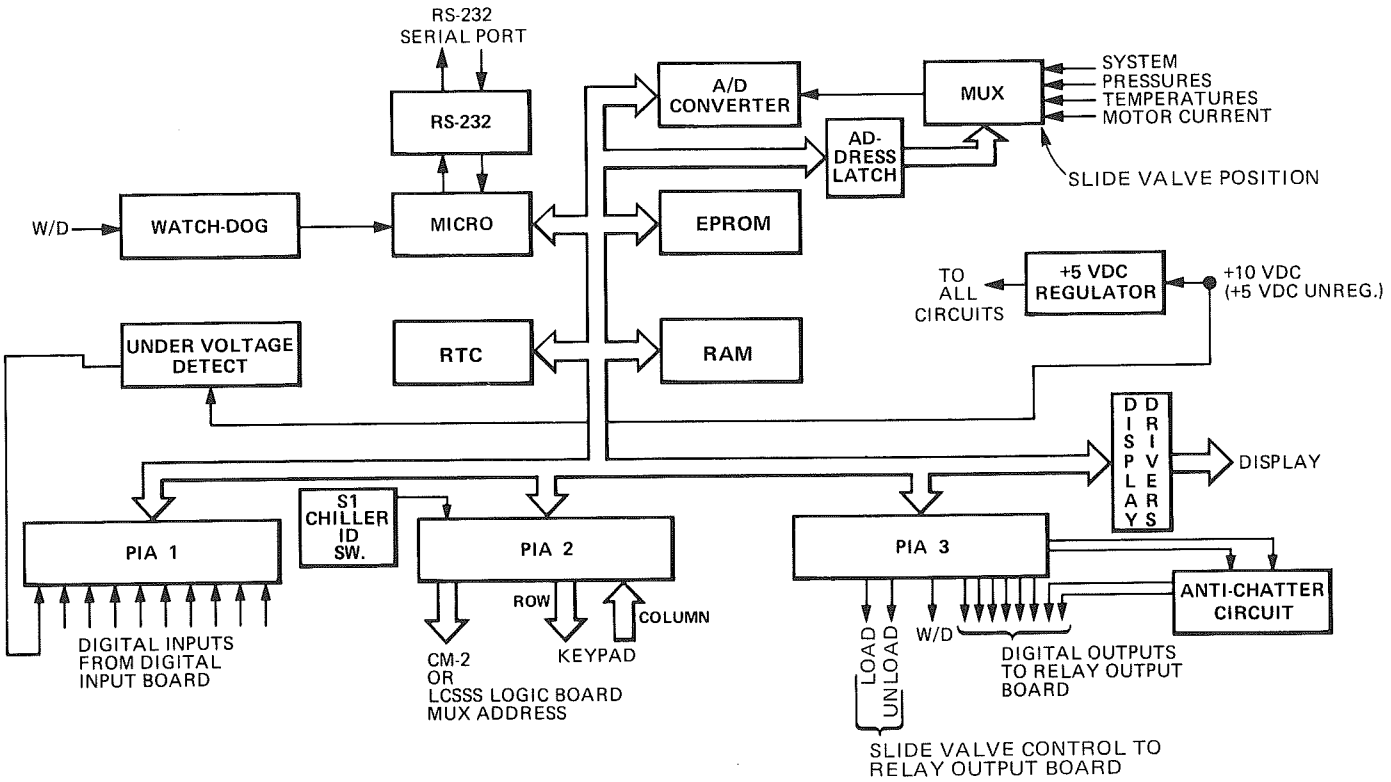


FIG. 26 — MICRO BOARD BLOCK DIAGRAM (031-00940-001)
CONTROL CENTER 371-01112-001 ONLY

MICRO BOARD (Ref. Fig. 25, 25A, 26, & 26A)

Control Center 371-01112-001 is supplied from the factory with Micro Board 031-00940-001. However, Micro Board 031-01065-000 can be used as a replacement part.

Control Center 371-01200-003 is supplied from the factory with Micro Board 031-01065-000. Micro Board 031-01065-000 is used as the replacement part.

Micro Board 031-01065-000 provides same operation as 031-00940-001 but includes program jumper and serial interface port enhancements. Each of the Micro Boards require different software (EPROM). Refer to Renewal Parts List 160.47-RP3.

The Micro Board contains a microprocessor. An external **RAM** is provided for scratchpad memory and the operating program is stored in an external **EPROM**. Operator entered system setpoints are stored in battery-backed RAM available in the real-time clock (RTC). The RTC also stores and updates the time-of-day, day-of-week, and calendar date.

System analog parameters (Pressures, Temperatures, Motor Current) are input to the multiplexer (MUX). Under program control these parameters are transmitted serially to the analog to digital converter where they are converted to digital words. The Micro Board compares these values to stored safety thresholds (EPROM) and initiates a chiller shutdown if thresholds are exceeded. These parameters are stored for: a.) subsequent viewing on the display if requested by the operator thru keypad operation; b.) data transmission thru RS-232 serial port to printer, or YORK FAX-4000 EMS (031-00940-001 Micro Boards). If equipped with Micro Board 031-01065-000, data transmission can be thru RS-232 serial port to printer, modem (YORK guardian service/remote chiller communications) or thru RS-485 serial port to YORK FAX-4500 energy management system. The Micro Board also uses these parameters for system control. Specifically, leaving chilled water temp control via slide valve movement, current limit control, high and low pressure limit control.

An undervoltage detection circuit monitors the +5VDC unregulated (approx. 10VDC) input from the power supply board. This voltage is compared to a reference voltage. When the input voltage decreases to the reference voltage threshold, the undervoltage detector output transition is read by the Micro Board via the PIA No. 1 and the Micro Board initiates a chiller shutdown. If the **AUTO-R** (J50) program jumper on the Micro Board is installed (Auto-Restart After Power Failure) and the keypad **COMPRESSOR** switch is in the **RUN** position,

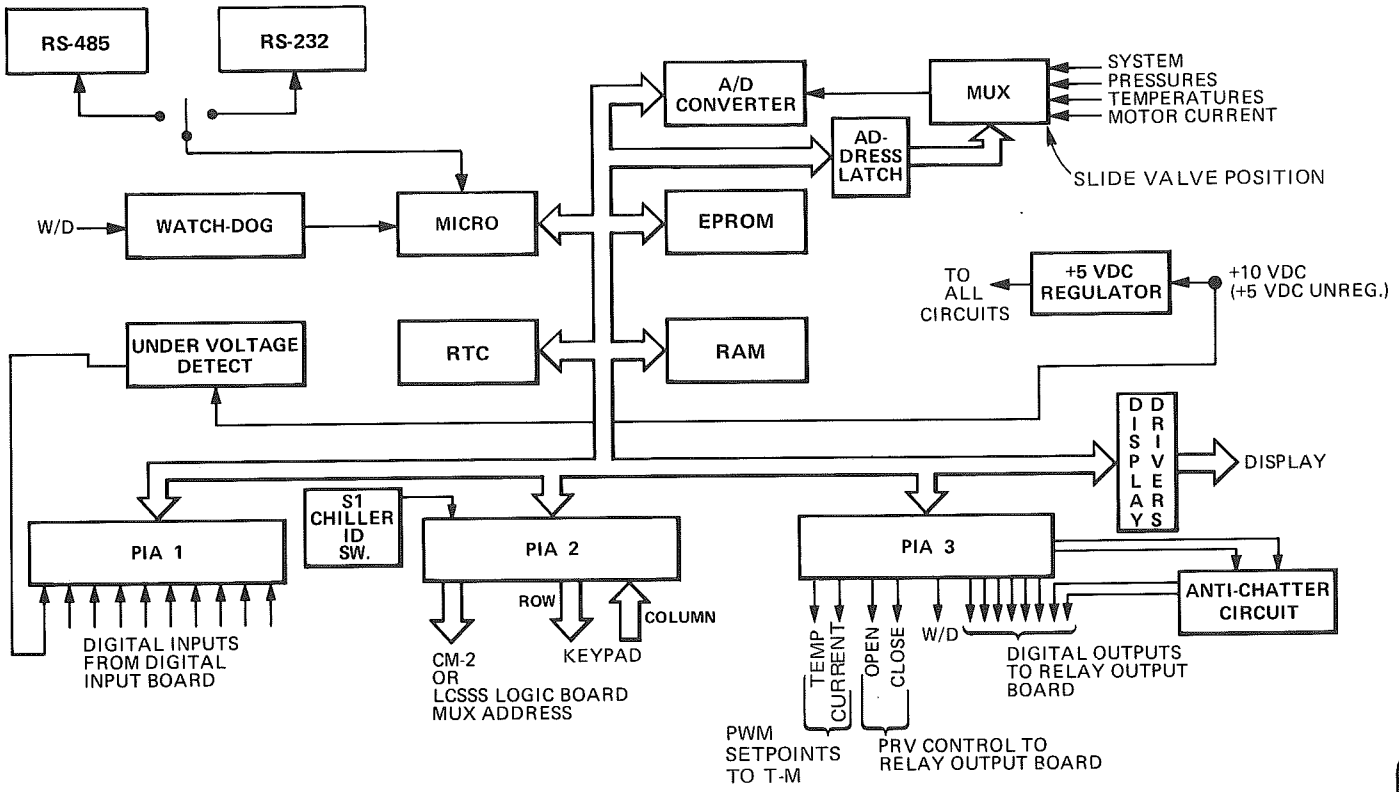


FIG. 26A — MICRO BOARD BLOCK DIAGRAM (031-01065-000)

the Micro Board will initiate a chiller start ("START SEQUENCE INITIATED" is displayed) when power is restored. If the **AUTO-R** (J50) program jumper is removed (Manual Restart After Power Failure), "SYSTEM SHUTDOWN-PRESS STATUS" is displayed when power is restored. " Mon 10:00 AM - POWER FAILURE " is displayed when the operator presses the keypad **STATUS** key. The Micro Board will prevent a chiller restart until the operator moves the **COMPRESSOR** switch to the **STOP-RESET** position and then to the **START** position.

A watchdog circuit ensures that the complete program is executed every program cycle. This prevents the program from looping endlessly in a subroutine with the result that critical chiller parameters could be overlooked. Each program cycle (≈100MS) the Micro Board outputs a pulse to the watchdog circuit via the parallel interface adapter (PIA). This pulse starts a 2 second timer in the watchdog circuit. If another pulse is not received by the watchdog circuit before 2 seconds have elapsed, the watchdog circuit will output a reset pulse to the Micro Board. The Micro Board shuts down the chiller, reinitializes the program and displays "MON 10:00 AM - PROGRAM INITIATED RESET". The Micro Board will automatically restart the chiller.

If equipped with Micro Board 031-00940-001, an RS-232 port (J11) provides serial data interfacing to:

1. Local printer (Ref. 160.47-NO1.2)

2. YORK FAX-4000 EMS (Ref. 450.00-NM1)

When used with applications a.) Micro Board program jumper J56 must be in **MODEM** position. Application b.) requires it to be in **EMS** position.

If equipped with Micro Board 031-01065-000 serial data interfacing to external equipment is provided thru an RS-232 port (TB8) or RS-485 port (TB7). Both ports cannot be connected to external devices at the same time. The position of program jumper J58 determines which port is enabled. The ports are used as follows:

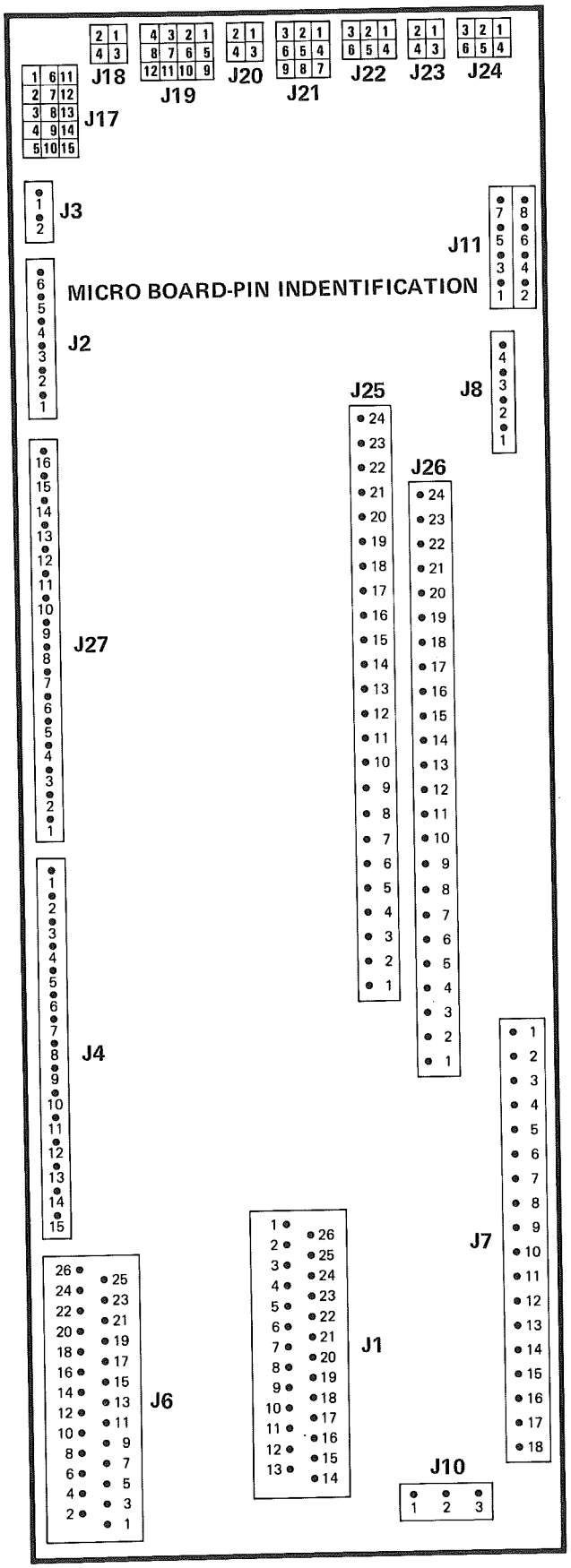
- TB8 (RS-232) – Program jumper J56 must be in **MODEM** position when this port is used.

  a.) Local printer (Ref. 160.47-NO1.2)
  b.) Modem (YORK guardian service/remote chiller applications; future application)
  c.) Modem and local printer (see b.) above)

- TB7 (RS-485) – Program jumper J56 must be in **EMS** position when this port is used.

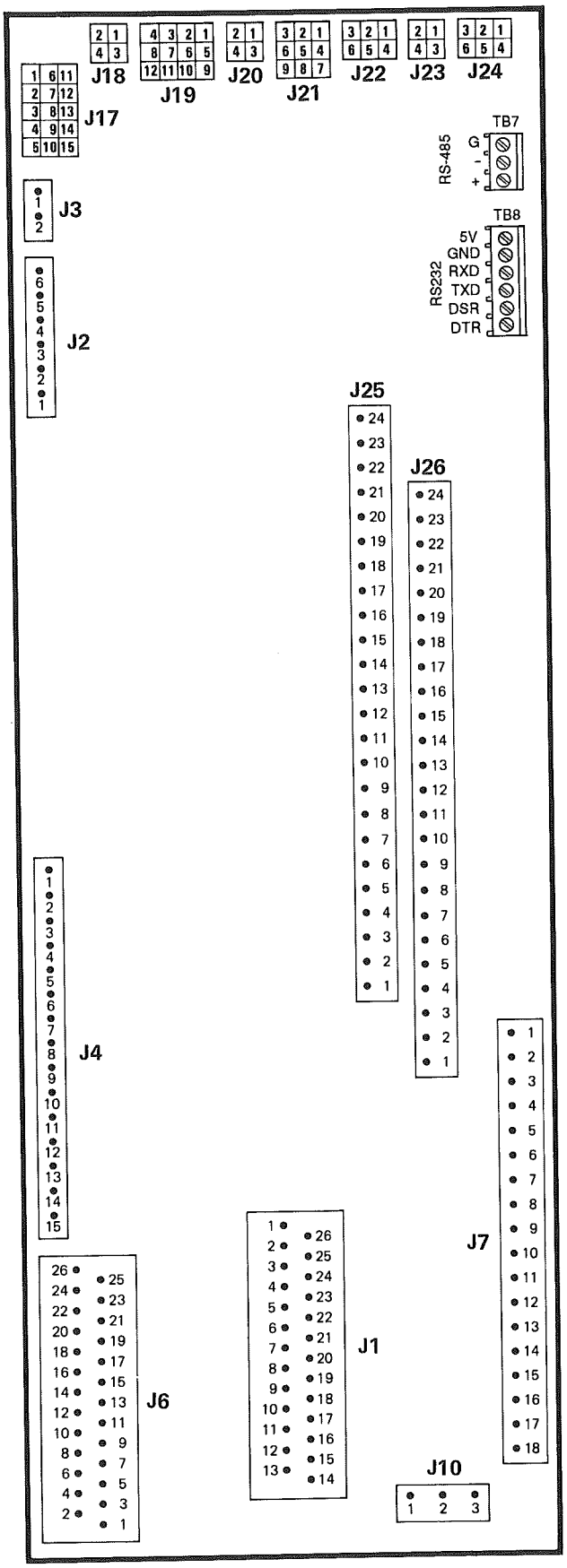
  a.) YORK FAX-4500 EMS (450.00-NM2)

SECTION 7



NOTE: USE AMP REMOVAL TOOL 724668-2 WHEN REMOVING PINS FROM J17-J24

FIG. 27 — MICRO BOARD PLUG PIN IDENTIFICATION (031-00940-001)



NOTE: USE AMP REMOVAL TOOL 724668-2 WHEN REMOVING PINS FROM J17-J24

FIG. 27A — MICRO BOARD PLUG PIN IDENTIFICATION (031-01065-000)

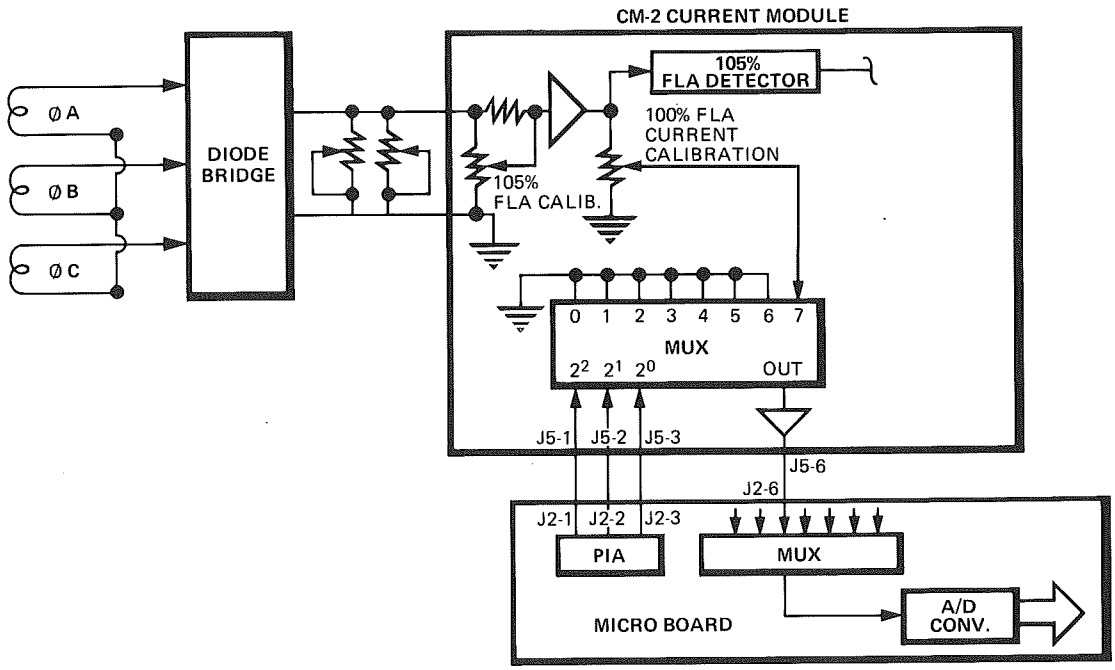


FIG. 28 — CM-2 CURRENT MODULE INTERFACE TO MICRO BOARD (USE WITH ELECTRO-MECHANICAL STARTING)

SECTION 7

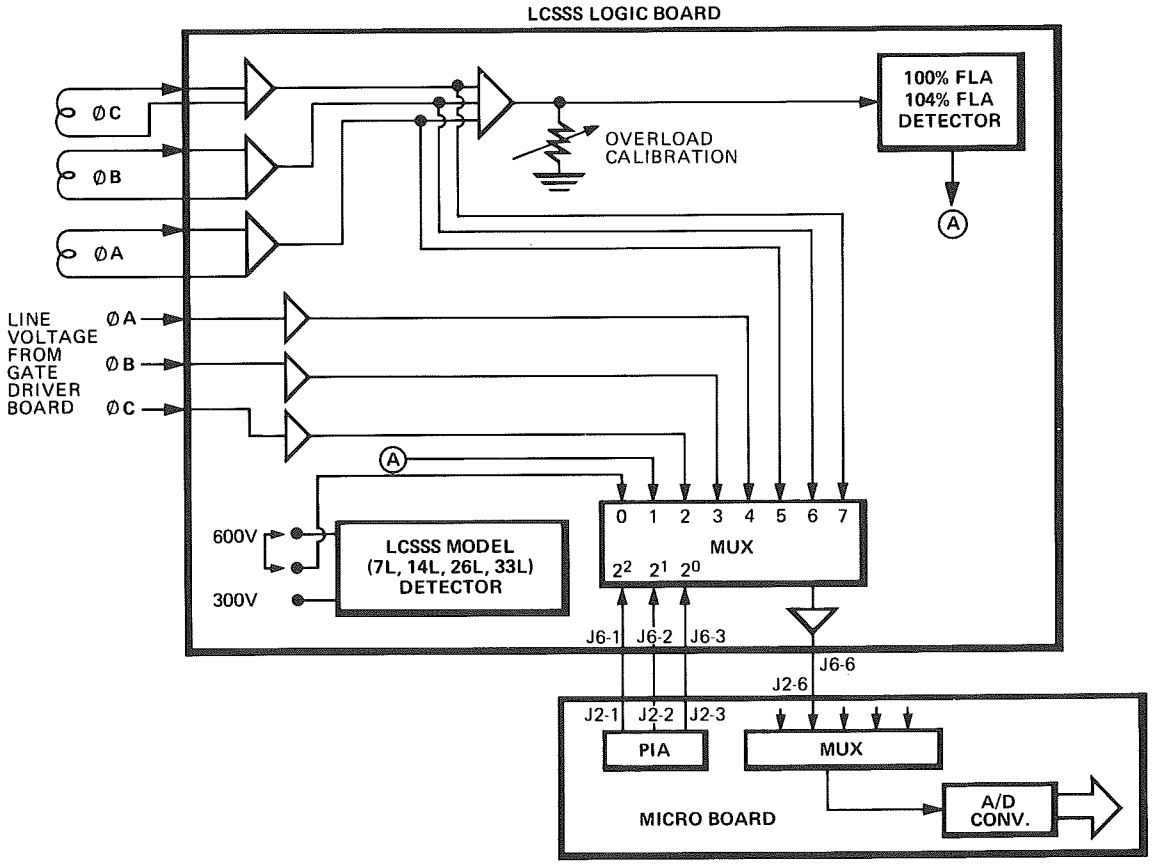


FIG. 29 — LCSSS LOGIC BOARD INTERFACE TO MICRO BOARD

The Real-Time Clock (RTC) circuit stores and updates the time-of-day, day-of-week and calendar date. Anytime the chiller shuts down on a safety or cycling shutdown, the "Day" and "Time" of shutdown is displayed along with the cause of shutdown. This "Time" information is also used to determine correct chiller start and stop times when the programmable internal time clock is used to automatically start and stop the chiller. The RTC chip

contains a non-replacable battery. This battery powers the RTC RAM in the event of an AC power failure. All of the keypad programmable setpoints are stored in the RTC RAM. Therefore, the setpoints will be saved during a power failure. The life of this battery is 5-10 yrs. During each program cycle, the Micro Board monitors the condition of the battery. If a low battery condition is detected, "REPLACE RTC, U16-REPROGRAM SETPOINTS" is displayed on the keypad display. If this message appears the RTC Chip (U16) must be replaced. Refer to instructions in operating manual Form 160.47-O1.1. This RTC chip (York Part Number 031-00955-000) is available from the York Parts Distribution Centers. To conserve battery life over winter shutdowns, J57 Program Jumper must be positioned to the **CLOCK OFF** position. Refer to Fig. 31 for procedure. Also, the service technician must turn-on the clock during chiller commissioning.

The Parallel Interface Adapters (PIA) allow the Micro Board to interface to digital inputs and outputs. Each PIA formats the digital inputs, or outputs into 8 bit words. PIA No. 1 receives the digital (On/Off) inputs from the digital input board. These are 115VAC system inputs that have been converted to +5VDC/0VDC digital inputs by the digital input board. In each program cycle, the digital inputs are read by the Micro Board. The Micro Board, under program control, acts accordingly on the digital inputs. For example, if the High Pressure (HP) input transitions from 0VDC to +5VDC, the Micro Board initiates a chiller shutdown and displays the appropriate message.

PIA No.2 sends a 3-bit address to the CM-2 Current Module (Electro-Mechanical Starter Application) (Ref. Fig. 28) or LCSSS Logic Board (Ref. Fig. 29) (Solid State Starter Applications). This address is applied to a multiplexer. The multiplexer outputs analog data that is applied to the Micro Board multiplexer. The addresses and data are as follows:

CM-2 CURRENT MODULE

ADDRESS	DATA
000	Ground (EM Starter Identification)
001	None (GND.)
010	None (GND.)
011	None (GND.)
100	None (GND.)
101	None (GND.)
110	None (GND.)
111	Motor Current-Highest Phase

LCSSS LOGIC BOARD

ADDRESS	DATA
000	Starter Model-7L, 14L, 26L, 33L (Ammeter Scale) and Voltmeter full scale
001	Current limit commands (<1.2VDC = ≥ 104% FLA, 1.21-3.45 VDC = ≥ 100% FLA, ≥ 3.46 VDC = < 98%)
010	ØC AC Line Voltage
011	ØB AC Line Voltage
100	ØA AC Line Voltage
101	ØA Motor Current
110	ØB Motor Current
111	ØC Motor Current

On Electro-Mechanical Starter Applications (CM-2) (Ref. Fig. 28) the Micro Board uses the motor current (highest phase) value to perform "Current Limit" function. When the motor current is equal to 100% FLA the Micro Board will not allow the slide valve to load any further until current decreases to 98%. When the motor current is equal to 104% FLA the Micro Board will begin unloading the slide valve until the current decreases to 102% FLA.

This motor current value is also displayed, by pressing the "% Current Limit Key" on the keypad. If the operator has programmed a "Pulldown Demand Limit" or "% Current Limit" function on the keypad, the Micro Board will control the slide valve to limit the motor current to the specified value. The Micro Board also checks to assure that motor current is present when the Control Center is in **RUN** mode ("System Run—leaving Temp Control" displayed). If no motor current is present the Micro Board initiates a chiller shutdown. (Refer to "AC Undervoltage" shutdown description in operating instruction Form 160.47-O1.1.

On Liquid Cooled Solid State Starter (LCSSS) applications (Ref. Fig. 29), the first data the Micro Board reads from the LCSSS logic board is the starter model (size) and line voltage application. The LCSSS can be ordered in four sizes . . . . 7L, 14L, 26L, 33L. Each size has a different maximum starting current and full load amp capability. Also, within these different models there are different line voltage models. Since the Micro Board displays 3Ø motor current and 3Ø line voltage, the starter size and voltmeter full scale value must be available to the Micro Board in order to calculate the correct motor current and line voltage display. This data is supplied as an analog voltage. The value is determined by the LCSSS logic board model detector curcuit and the position of the 300V/600V jumper. The position of this jumper determines the "Voltmeter" full scale display capability.

The next data the Micro Board reads is the current limit commands from the LCSSS logic board. This is an analog voltage that tells the Micro Board when to initiate **CURRENT LIMIT** control. If the operator has entered a current limit setpoint at the keypad of less than 100% FLA, **CURRENT LIMIT** control is totally under Micro Board (Software) control. Specifically, the slide valve is

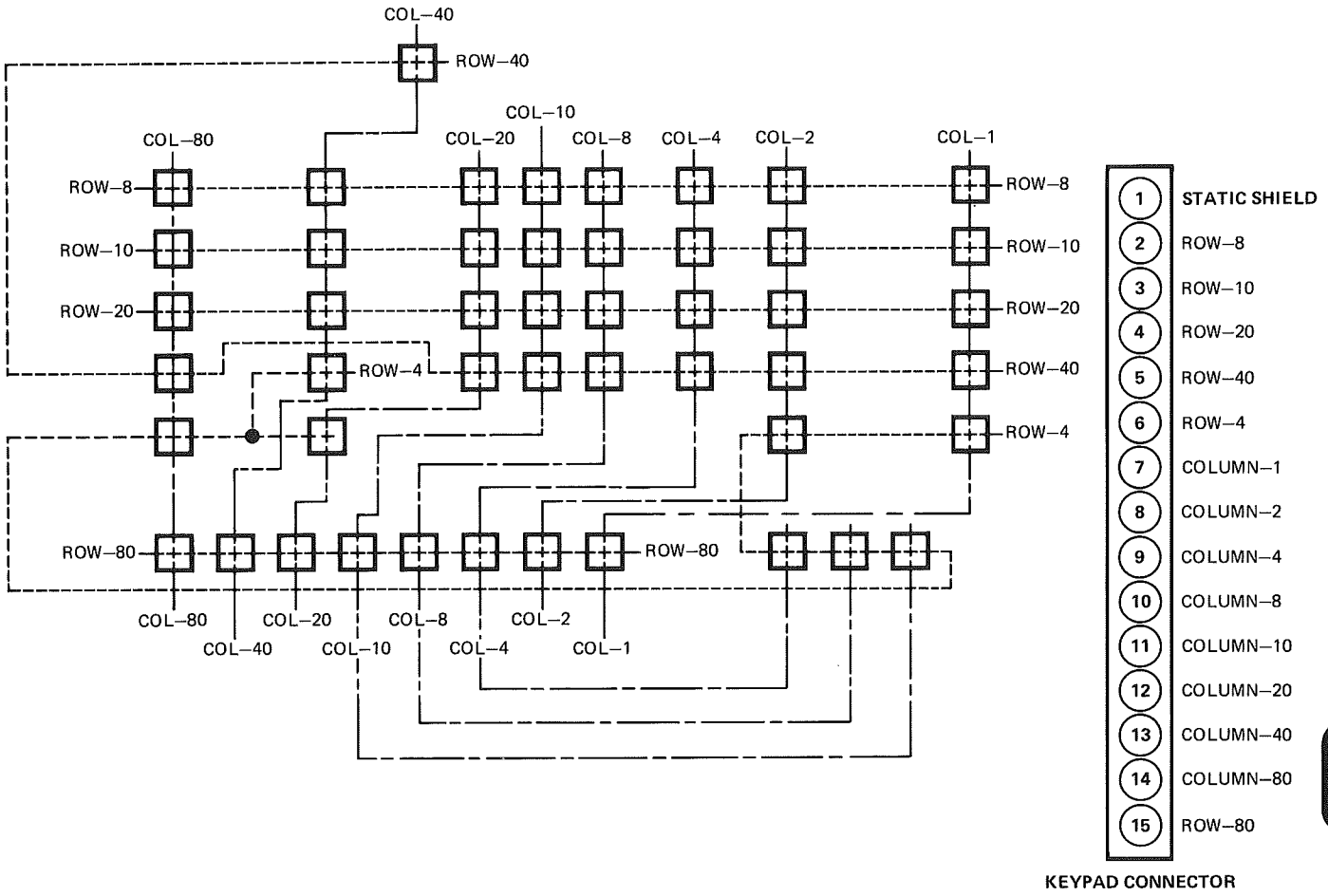


FIG. 30 — KEYPAD CONNECTION MATRIX

prevented from loading any further at 100% FLA (it will be allowed to load when current falls to 98% FLA.); at 104% FLA the slide valve is driven closed until the motor current decreases to 102% FLA. However, if the operator entered setpoint is 100% FLA, the LCSSS Logic Board tells the Micro Board when to initiate current limit control. To illustrate, when the motor current rises to 100%, as determined by the calibration of the LCSSS Logic Board **OVERLOAD** pot, the LCSSS Logic Board sends a command (1.21-3.45VDC) to the Micro Board. The Micro Board then prevents the slide valve from further loading until the Logic Board detects motor current has decreased to 98% FLA, at which time another command (>3.46VDC) is sent to the Micro Board and the Micro Board allows the slide valve to load. If the motor current had increased to 104% FLA, the Logic Board would send another command (<1.20VDC) which would cause the Micro Board to drive the slide valve closed until the logic board detects the motor current has decreased to 102% FLA. The current limit command would then transition to 1.21-3.45VDC. This causes the Micro Board to stop unloading the slide valve.

The next data read from the LCSSS Logic Board is the 3Ø AC Power Line Voltage. This is 3 individual analog voltages. The Micro Board converts those analog voltages to AC line voltage values and displays them upon operator request. Also, they are checked to assure each phase meets the minimum and maximum required compressor motor starting and running voltage. If the requirements are not met, the Micro Board initiates a chiller shutdown and displays "MON XX:XX AM LOW LINE VOLTAGE". or "MON XXX:XX AM HIGH LINE VOLTAGE". (Refer to explanation of this message in operating instruction, Form 160.47-O1.1). The service technician can disable this line voltage check through setpoint programming at the keypad. (Refer to "System Setpoints" in operating instruction Form 160.47-O1.1).

The next data read is the 3Ø motor current. This is 3 individual analog voltages. The Micro Board converts these analog voltages to motor current values and displays them upon operator request. IF the **CURR UNBAL** program jumper is installed on the Micro Board, the motor current is checked to assure balanced motor current in the 3 phases. If the balance requirement is not satisfied, the Micro Board initiates a chiller shutdown and displays "MON XX:XX AM — PHASE CURRENT UNBALANCE". (Refer to explanation of this message in Operating Instruction Form 160.47-O1.1). If the **CURR UNBAL** program jumper is removed, the balance of the 3Ø motor current is not checked and no shutdown is initiated. At

current limit setpoints of less than 100%, the Micro Board executes current limit when the highest phase current equals the current limit setpoint. For example, if the FLA of a chiller is 200 AMPS and the operator has programmed a current limit setpoint of 50%, the Micro Board will inhibit the slide valve from further loading when the current in the highest phase equals 100 AMPS (100%). When the current in the highest phase equals 104 A (104%) the Micro Board unloads the slide valve until the current in the highest phase decreases to 102%.

PIA No. 2 interfaces to the front panel keypad to determine which key the operator is pressing (Ref. Fig. 30). The keypad is a two-layer matrix of conductors arranged in a configuration of rows and columns. When a key is pressed, the conductor in that column makes contact with the conductor in that row. There are 6 PIA outputs to the keypad rows. The rows are designated 4, 8, 10, 20, 40, 80. There are 8 PIA inputs from the keypad columns. The columns are designated 1, 2, 4, 8, 10, 20, 40, 80. At regular intervals the Micro Board reads the keypad keys by sequentially driving the PIA outputs to the rows to logic low and reading the resultant voltage at the column input to the PIA. For example, when row 8 is driven to logic low, if no keys are accessed in that row, all column inputs to the PIA will be +5VDC. However, if any key is pressed in row 8, the appropriate column input to the PIA would be at logic low potential.

On Electro-Mechanical Starter and Liquid Cooled Solid State Starter (LCSSS) applications PIA No. 3 drives the slide valve via triacs located on the relay output board. The Micro Board compares the leaving chilled water temperature (as determined by the LCWT thermistor) to the programmed **"CHILLED LIQUID TEMP"** setpoint and modulates the slide valve to achieve the desired leaving chilled water temperature. Similarly, the Micro Board modulates the slide valve to prevent the compressor motor current from exceeding the programmed **"% CURRENT LIMIT"** setpoint. There are two PIA outputs; one feeds the "Load" triac and one feeds the "Unload" triac on the relay output board. When the Micro Board com-slide valve to unload, the PIA output turns on the "Unload" triac. In each case, the turn-on of the triac causes the load or unload solenoid to energize.

The PIA No. 3 interfaces to the Relay Output Board (J1) to control DC relays located on that board. There are three system status relays that provide status to external devices such as energy management systems. Another relay can control the chilled water pump automatically under program control. Two other relays control the start and stop signal to the compressor motor starter. Another relay controls the oil line solenoid valve. (Refer to explanation of the relay functions under "Relay Output Board" section of this instruction page 12.). Under program control, the Micro Board energizes the relays by driving the PIA output to ground (logic low) potential. To prevent damage to the compressor motor and chilled water pump motor, anti-chatter circuits are used to control the chilled water pump relay (J7-3)(K3) and the motor starter relay (J7-5)(K9). The anti-chatter circuits prevent K3 from energizing at a rate greater than once every 15 seconds and K9 every 30 seconds.

Early production versions equipped with version 4.A EPROM used a "Minimum Slide Valve Override" technique to aid compressor oil return at light loads. Refer to York Form 160.47-O1.1 for explanation. Later production with version 4.B EPROM used a gas powered eductor to return oil directly to the compressor. To prevent performance penalties at all but minimum capacity conditions, a solenoid valve is used to block the gas flow as follows:

> If the chiller has been operating for at least 255 seconds, when the slide valve position decreases to 8% or less, the micro energizes relay K6 on relay output board. This applies 115VAC to the oil eductor solenoid and causes it to energize (open). When the slide valve position increases to greater than 10%, Relay K6 is de-energized, causing the oil eductor solenoid to de-energize (close). During the first 255 seconds of chiller run time and anytime the chiller is shutdown Relay K6 will be de-energized causing the oil eductor solenoid valve to de-energize (close).

A chiller identification switch (S1) is provided for use when YORK energy management system or a local system status printer is connected to the Micro Board Serial Port. For information on the use of the ID switch with YORK energy management systems, refer to: 450-00-NM1 (FAX-4000); 450.00-NM2 (FAX-4500). The chiller ID switch can be used to assign an identification number(0 thru 7) to each chiller. If a local system status printer is applied, this number is printed at the top of each printout. Refer to York Form 160.47-NO1.2 for details of printer applications. This ID is useful in multiple chiller installations to identify individual printouts from different chillers.

Since the Micro Boards are universal in application, program jumpers are provided to configure for different applications. Refer to Fig. 31 for explanation of each program jumper.

J54 LWT PMP –

IN= Causes chilled water pump contacts (Relay Output Board TB4-44/45) to open after all chiller shutdowns except low water temp (LWT) shutdowns. On LWT shutdowns the contacts remain closed, causing the pump to continue to run.

OUT= Causes above contacts to open after all chiller shutdowns except LWT, multi-unit sequence, and remote/local cycling shutdowns. On these shutdowns the contacts remain closed, causing the pump to continue to run.

NOTE: Refer to Relay Output Board "OUTPUTS" section of this instruction.

JP1 NON T-M / SC

IN= Screw Chiller Application

OUT= Position not used in Screw Chiller Application.

J53 SENS 1 – Leaving chilled water temp sensitivity control. Configuration of jumpers affects slide valve deadband as follows:

J52 SENS 2 –

SENS 1	SENS 2	DEADBAND
IN	IN	± .35° F
IN	OUT	± .42° F
OUT	IN	± .45° F
OUT	OUT	± .55° F

JP2 ENGL –

IN= System pressures and temperatures displayed in PSIA and °F respectively.

OUT= System pressures and temperatures displayed in KPa (Kilo Pascals) and °C respectively.

J51

IN= Cancels 30 minute anti-recycle time.

OUT= Enables 30 minute anti-recycle time.

NOTE: Shipped with jumper removed. Never install this jumper unless absolutely necessary during troubleshooting.

J50 AUTO R –

IN= Enables Auto Restart after power failure feature.

OUT= Enables Manual Restart after power failure feature.

NOTE: Shipped with jumper removed.

JP3 WATER –

IN= Water cooling applications (LCWT setpoint 38°F–70° F).

OUT= Brine cooling applications (LCWT setpoint 10°F–45° F).

J55 TEST – In the DISABLE position the software diagnostic is disabled. Shipped with jumper in this position. This is the normal position for operating the chiller.

DIS ENA

In the ENABLE position the software diagnostic is enabled. Refer to "TESTING" section of this instruction before putting the jumper in this position.

DIS ENA

J56 RS 232 – In the MODEM position, a local printer (Refer to Form 160.47-NO1.2) can be connected to the RS 232 serial port (Micro Board J11).

MODEM EMS

In the EMS position, the YORK EMS FAX-4000 (Ref. 450.00-NM1) can be connected to the RS-232 serial port (Micro Board J11). A special optional Eprom is required when this interface is used. The remote PWM temp and current setpoint and start/stop inputs to the digital input board cannot be used with the jumper in this position.

MODEM EMS

JP4 CSTDN –

IN= Provides a 2 minute lockout delay after chiller shutdown.

OUT= Provides 6 minute lockout delay after chiller shutdown. The jumper should be out for steam turbine applications only.

JP5 CURR UNBAL –

IN= Enables 3Ø motor current unbalance detection on Liquid Cooled Solid State Starter applications.

OUT= Disables 3Ø motor current unbalance detection on Liquid Cooled Solid State Starter applications.

NOTE: Refer to MicroComputer Control Center Operating Instruction (Form 160.47-O1.1) "MTR Phase Current Unbalance" shutdown display message.

JP6 PRERUN – Not used in Screw Chiller Application.

J57 CLOCK –

CLKON CLKOFF

In the CLKON position the RTC CLOCK (Day/TIME/Date) is permitted to run. This is the normal operating position. To turn on clock move jumper to this position while AC power is applied to MicroComputer Control Center, then proceed to program clock setpoint per Operating Instruction (Form 160.47-O1.1). Clock will start when keypad ENTER key is pressed after clock setpoint is programmed.

CLKON CLKOFF

In the CLKOFF position the RTC CLOCK does not run. Shipped with jumper in this position. This position is used for long-term storage, shipping and winter shutdowns when AC power is removed from MicroComputer Control Center. This extends the life of the RTC Battery. To turn off clock, move jumper to this position while AC power is applied to MicroComputer Control Center.

NOTE: System setpoints are retained in this position as long as the battery is OK.

J58 EPROM – The correct position for this jumper is determined by the Eprom size (32K memory locations, 64K memory locations). The normal operating program that is shipped with the unit is 64K. Therefore, this jumper should be in the 64K position as shown.

64K

32K

J59 – Refer to J58.

32K

64K

SECTION 7

FIG. 31 — MICRO BOARD PROGRAM JUMPERS (031-00940-001)

J54 CHW PMP—

IN= Causes chilled water pump contacts (Relay Output Board TB4-44/45) to open after all chiller shutdowns except low water temp (LWT) shutdowns. On LWT shutdowns the contacts remain closed, causing the pump to continue to run.

OUT= Causes above contacts to open after all chiller shutdowns except LWT, multi-unit sequence, and remote/local cycling shutdowns. On these shutdowns the contacts remain closed, causing the pump to continue to run.

NOTE: Refer to Relay Output Board "OUTPUTS" section of this instruction.

JP1 NON T-M / SC

IN= Screw Chiller Application

OUT= Position not used in Screw Chiller Application.

J53 SENS – Not used on Screw Chiller Application.

J52 ENGL –

IN= System pressures and temperatures displayed in PSIA and °F.

OUT= System pressures and temperatures displayed in KPW (Kilo Pascals) and °C respectively.

JP2 R11 – Not used in Screw Chiller Applications.

J51

IN= Cancels 30 minute anti-recycle time.

OUT= Enables 30 minute anti-recycle time.

NOTE: Shipped with jumper removed. Never install this jumper unless absolutely necessary during troubleshooting.

J50 AUTO R –

IN= Enables Auto Restart after power failure feature.

OUT= Enables Manual Restart after power failure feature.

NOTE: Shipped with jumper removed.

JP3 WATER –

IN= Water cooling applications (LCWT setpoint range 38°F – 70°F). Evaporator Transducer 025-28678-002 must be used when this jumper is in.

OUT= Brine cooling applications (LCWT setpoint range 10°F – 45°F). Evaporator Transducer 025-28678-003 must be used when this jumper is out.

J55 DIS ENA **TEST** – In the DISABLE position the software diagnostic is disabled. Shipped with jumper in this position. This is the normal position for operating the chiller.

DIS ENA In the ENABLE position the software diagnostic is enabled. Refer to "TESTING" section of this instruction before putting the jumper in this position.

J56 MODEM EMS **RS 232** – In the MODEM position, a modem (Future Remote Chiller Communications or YORK GUARDIAN SERVICE Application) and/or local printer can be connected to the RS-232 serial port (TB8)

MODEM EMS In the EMS position, the YORK EMS (FAX-4500) can be connected to the RS-485 serial port (Micro Board TB7). A special optional Eprom is required when this interface is used. The remote PWM temp and current setpoint and start/stop inputs to the digital input board cannot be used with the jumper in this position.

JP4 CSTDN –

IN= S1 thru S5 compressors without hot gas bypass.

OUT= All S0 compressors or S1 thru S5 compressors with hot gas bypass. Operation is as follows: During compressor operation, after a 4 minute bypass at start:

- If the slide valve position decreases to 5%, the slide valve is inhibited from unloading.
- If the slide valve position is greater than or equal to 6% the slide valve is permitted to unload.
- If the slide valve position decreases to 5%, the hot gas bypass solenoid (if installed) is energized (Relay Output Board TB3-61).
- If the slide valve position is greater than or equal to 15%, the hot gas bypass solenoid (if installed) is de-energized (Relay Output Board TB3-61).

JP5 CURR UNBAL –

IN= Enables 3Ø motor current unbalance detection on Liquid Cooled Solid State Starter applications.

OUT= Disables 3Ø motor current unbalance detection on Liquid Cooled Solid State Starter applications.

NOTE: Refer to MicroComputer Control Center Operating Instruction (Form 160.47-O1.1) "MTR Phase Current Unbalance" shutdown display message.

JP6 PRERUN – Not used in Screw Chiller Application.

JP7 Not used in Screw Chiller Application.

J57 CLOCK –

CLKON CLKOFF In the CLKON position the RTC CLOCK (Day/TIME/Date) is permitted to run. This is the normal operating position. To turn on clock move jumper to this position while AC power is applied to MicroComputer Control Center, then proceed to program clock setpoint per Operating Instruction (Form 160.47-O1.1). Clock will start when keypad ENTER key is pressed after clock setpoint is programmed.

CLKON CLKOFF In the CLKOFF position the RTC CLOCK does not run. Shipped with jumper in this position. This position is used for long-term storage, shipping and winter shutdowns when AC power is removed from MicroComputer Control Center. This extends the life of the RTC Battery. To turn off clock, move jumper to this position while AC power is applied to MicroComputer Control Center.

NOTE: System setpoints are retained in this position as long as the battery is OK.

J58 SERIAL PORT SELECT – The position is of this jumper determines which serial port (RS-232 or RS-485) can be used.

RS-485 / RS-232 In this position the RS-232 port (TB8) is enabled. Place in this position when a "YORK Guardian Service" modem, "Remote Chiller Communications" modem (future) or local printer is connected to TB8. If this position is selected, program jumper J56 must be in **MODEM** position.

RS-485 / RS-232 In this position the RS-485 port (TB7) is enabled. Place in this position when the "YORK FAX-4500" Energy Management System is connected to TB7. If this position is selected, program jumper J56 must be in **EMS** position.

FIG. 31A — MICRO BOARD PROGRAM JUMPERS (031-01065-000)

MICRO BOARD – INPUTS AND OUTPUTS (PLUG PIN NO'S.)

(Refer to Fig. 27 & 27A for pin identification.)

J1-26—Not Used

J1-25—Low evaporator pressure safety (Brine applications only). 0 VDC when external LEP safety indicated a low pressure condition.

J1-24—Auxilliary safety shutdown. +5VDC when optional external device has initiated a shutdown.

J1-23—Spare

J1-22—Not Used

J1-21—Multi-unit sequence. +5VDC when sequence kit enables compressor to run; or when jumper is installed at input to digital input board.

J1-20—Local/remote cycling device. +5VDC when remote cycling device enables the compressor to run; or when jumper is installed at input to digital input board.

J1-19—Chilled water pump interlock or flowswitch. +5VDC when interlock or flowswitch enables compressor to run.

***J1-18**—Remote current limit setpoint (EMS). A 1-11 sec pulse width modulated (PWM) signal that is +5VDC in the active state. Signal is only accepted every 60 seconds—any signal received at a rate greater than 1 signal/60 seconds will be ignored.

***J1-17**—Remote LCWT setpoint (EMS). A 1-11 sec Pulse Width Modulated (PWM) signal that is +5VDC in the active state. Signal is only accepted every 60 seconds. Any signal received at a rate greater than 1 signal/60 seconds will be ignored.

J1-16—Remote stop (EMS). +5VDC when remote EMS has commanded the compressor to stop. This must be a maintained signal to provide a stop function.

J1-15—Remote start (EMS) +5VDC when remote EMS has commanded the compressor to start. This signal need only be a momentary signal to initiate start but a maintained signal is recommended.

J1-14—+5VDC unreg. power supply (+10VDC)

J1-13—5V ret.

J1-12—Not used.

*This signal is normally sent from EMS once every 60-90 seconds. However, if a signal is not received within 30 minutes of the last signal received, the setpoint reverts to the control panel programmed setpoint.

J1-11—Not used.

J1-10—Not used.

J1-9—Start. +5VDC when compressor switch is in **START** position.

J1-8—Stop. +5VDC when compressor switch is in stop position.

J1-7—Motor controller. 0 VDC when motor controller contacts are open indicating a motor controller shutdown.

J1-6—Not used.

J1-5—Not used.

J1-4—Not Used.

J1-3—Not Used.

J1-2—High pressure. +5VDC when condenser pressure rises to 270 PSIG as indicated by external HP safety. Returns to 0 VDC when pressure falls to 210 PSIG.

J1-1—Separator oil level switch – +5VDC when separator oil level switch is closed (sufficient level). 0VDC when switch opens (insufficient level).

SECTION 7

J2

J2-1—2^2 address bit to multiplexer on CM-2 module (Electro-Mechanical Starter Applications), LCSSS Logic Board (LCSSS Applications). +12DC in active state. Otherwise 0VDC. (+15VDC—EM Starter).

J2-2—2^1 address bit to CM-2 module (Electro-Mechanical Starter Applications), LCSSS Logic Board (LCSSS Applications). +12VDC in active state. Otherwise 0VDC. (+15VDC- EM starter)

J2-3—2^0 address bit to CM-2 module (Electro-Mechanical Starter Applications), LCSSS Logic Board (LCSSS Applications), +12VDC in active state. Otherwise 0VDC. (+15VDC-EM starter)

J2-4—+5VDC

J2-5—GND

J2-6—Multiplexed 0-5VDC output of CM-2 module (Electro-Mechanical Starter Application) or LCSSS Logic Board (LCSSS Application).

CM-2—MUX Channel 0 = GND.
MUX Channel 7 = Calibrated Motor Current Analog Signal +4.0VDC = 100% FLA

LCSSS Logic Board—MUX Channel 0 = Ammeter Scaling (LCSSS Model Detector) and voltmeter range analog signal as follows:

7L/300VAC = .294VDC Nominal
14L/300VAC = 1.00VDC Nominal
26L/300VAC = 2.09VDC Nominal
33L/300VAC = 3.48VDC Nominal
7L/600VAC = .594VDC Nominal
14L/600VAC = 1.50VDC Nominal
26L/600VAC = 2.75VDC Nominal
33L/600VAC = $\geq$ 3.88VDC Nominal

MUX Channel 1 = Current Limit command as follows:
$<$ 98% = $\geq$3.46VDC
$\geq$ 100% = 1.21-3.45VDC
$\geq$ 104% = $<$1.20VDC

MUX Channel 2, 3, 4 = ØC, ØB, ØA AC line voltage analog signal. Calculate value as follows:

300VAC full scale = $V_{OUT} = \frac{V_{AC}}{67.906}$

600VAC full scale = $V_{OUT} = \frac{V_{AC}}{135.791}$

MUX Channel 5, 6, 7 = ØA, ØB, ØC motor current analog 0-4.7VDC signal. LCSSS Logic Board is factory calibrated to provide the following output at full scale amps. It is linear between 0-4.7VDC.

MODEL	FULL SCALE AMPS	OUTPUT
7L	750A	4.7VDC
14L	1500A	4.7VDC
26L	2800A	4.7VDC
33L	3500A	4.7VDC

J3

J3-1—GND

J3-2—+5VDC unreg. (+10VDC)

J4

J4-1—+5VDC return

J4-2—Keypad output, row-8. This line is driven to GND when Micro Board is scanning row-8. Otherwise +5VDC.

J4-3—Keypad output, row-10. This line is driven to GND when Micro Board is scanning row-10. Otherwise +5VDC.

J4-4—Keypad output, row-20. This line is driven to GND when Micro Board is scanning row-20. Otherwise +5VDC.

J4-5—Keypad output, row-40. This line is driven to GND when Micro Board is scanning row-40. Otherwise +5VDC.

J4-6—Keypad output, row-4. This line is driven to GND when Micro Board is scanning row-4. Otherwise +5VDC.

J4-7—Keypad input, column-1, 0VDC when a key in column 01 is pressed. Otherwise, +5VDC.

J4-8—Keypad input, column-2, 0VDC when a key in column 2 is pressed. Otherwise, +5VDC.

J4-9—Keypad input, column-4, 0VDC when a key in column 4 is pressed. Otherwise, +5VDC.

J4-10—Keypad input, column-8, 0VDC when a key in column 8 is pressed. Otherwise, +5VDC.

J4-11—Keypad input, column-10, 0VDC when a key in column 10 is pressed. Otherwise, +5VDC.

J4-12—Keypad input, column-20, 0VDC when a key in column 20 is pressed. Otherwise, +5VDC.

J4-13—Keypad input, column-40, 0VDC when a key in column 40 is pressed. Otherwise, +5VDC.

J4-14—Keypad input, column-80, 0VDC when a key in column 8 is pressed. Otherwise, +5VDC.

J4-15—Keypad output, row-80. This line is driven to GND when Micro Board is scanning row-80. Otherwise +5VDC.

J6

J6-1—"To" output. Control bit that is used to initiate the display self-test. Bit is GND for greater than 3 sec to initiate test. Otherwise +5VDC.

J6-3—$\overline{CS}$ (Chip Select) output. Control bit that is 0 VDC to enable vacuum fluorescent display module to accept a character. Otherwise, +5VDC.

J6-5—+5VDC.

J6-7—"A" output. Not used.

J6-9—$\overline{WR}$ (Write) output. Control bit that is 0 VDC to write a character into the vacuum fluorescent display module. Otherwise, +5VDC.

J6-11—2^0 bit output. ASCII that is +5VDC in the active state. Otherwise, 0 VDC.

J6-13—2^1 bit output. ASCII that is +5VDC in the active state. Otherwise 0 VDC.

J6-15—2^2 bit output. ASCII that is +5VDC in the active state. Otherwise, 0 VDC.

J6-17—2^3 bit output. ASCII that is +5VDC in the active state. Otherwise, 0 VDC.

J6-19—2^4 bit output. ASCII that is +5VDC in the active state. Otherwise, 0 VDC.

J6-21—2^5 bit output. ASCII that is +5VDC in the active state. Otherwise, 0 VDC.

J6-23—2^6 bit output. ASCII that is +5VDC in the active state. Otherwise, 0 VDC.

J6-25—2^7 bit output. ASCII that is +5VDC in the active state. Otherwise, 0 VDC.

J7

J7-1—Cycling shutdown. 0 VDC when Control Center is shutdown on a "Cycling" shutdown. Otherwise, +12 VDC. Refer to **RELAY OUTPUT BOARD-OUTPUTS** section (TB4-40/41) for details of "Cycling" shutdown.

J7-2—Safety shutdown. 0 VDC when panel is shutdown on a "Safety" shutdown. Otherwise, +12 VDC. Refer to **RELAY OUTPUT BOARD-OUTPUTS SECTION** (TB4-42/43) for details of "Safety" shutdown.

J7-3—Chilled water pump. 0 VDC when panel is commanding the chilled water pump to run. Otherwise, +12 VDC. Refer to **RELAY OUTPUT BOARD-OUTPUTS SECTION** (TB4-44/45) for details of "Chilled Water Pump" contacts. An anti-chatter circuit on the Micro Board prevents this output from energizing the chilled water pump at a rate greater than once every 10 seconds.

J7-4—Remote mode ready to start. 0 VDC when all safeties and cycling devices are satisfied and the keyswitch is in the **REMOTE** mode. Otherwise, +12 VDC.

J7-5—Motor Starter "Start". 0 VDC for 200 milliseconds to start compressor motor. Then transitions to +12 VDC.

J7-6—Oil line solenoid valve, 0 VDC when Micro Board is commanding solenoid to energize (Open). Otherwise, +12 VDC. Refer to timing diagram Fig. 5.

J7-7—Hot gas solenoid. 0 VDC when Micro Board is commanding solenoid to energize (open). Otherwise, +12 VDC. After a 4 minute bypass after chiller start, anytime the slide valve position decreases to 5% the Micro Board commands the solenoid to energize (open). When the slide valve position increases to 10% (Micro Board 031-00940-001 w/version 4.DH EPROM), 15% (Micro Board 031-01065-000 w/program jumper JP4 cut) the Micro Board commands the solenoid to de-energize (close).

J7-8—Motor starter "Stop". 0 VDC to start and run compressor motor. +12 VDC to stop compressor motor.

J7-9—Oil eductor solenoid valve. 0VDC when Micro Board is commanding the solenoid valve to energize (open). This occurs when the slide valve position is equal-to or less than 17%. +12VDC to de-energize (close) the solenoid when the slide valve position is greater than 19%. The slide valve position check is bypassed for 255 seconds at compressor start. During the first 255 seconds of chiller run time and anytime the chiller is shutdown, the solenoid will be de-energized (closed). The oil eductor solenoid is not used on early production with version 4.A EPROM.

J7-10—Not Used.

J7-11—Slide valve unload. 0 VAC as measured to J7-12 when Micro Board is commanding the slide valve to unload. Approximately 115VAC when slide valve is holding or loading.

J7-13—Slide valve load. 0 VAC as measured to J7-14 when Micro Board is commanding slide valve to load. Approximately 115 VAC when slide valve is holding or unloading.

J7-15—Not used.

J7-16—Not used.

J7-17—12V return (GND).

J7-18—12V return (GND).

J8

J8-1—Cardfile interface current loop serial port connector. Receiver for future use.

J8-2—GND.

J8-3—Not used.

J8-4—Cardfile current loop serial port interface connector transmitter. For future use.

J10—Not used.

J10-1—Not Used.

J10-2—Not Used.

J10-3—Not Used.

J11—RS-232 Serial Port. (Micro Board 031-00940-001)

J11-1—TXD (Transmit Data). Serial data to remote device. Logic 1 = −5VDC to −25VDC. Logic 0 = +5VDC to +25VDC. Baud rate determined by application.

J11-2—DTR (Data Terminal Ready). Control signal to remote device. Logic high (+5 to +25VDC) when Micro Board is ready to transmit or receive data from remote device. Logic low (−5 to −25VDC) when Micro Board is not ready.

J11-3—RCD (Receive Data) - Serial data from remote device. Logic 1 = −5VDC to −25VDC. Logic 0 = +5VDC to +25VDC.

J11-4—DSR (Data Set Ready) - Control signal from remote device. Logic high (+5 to +25VDC) when remote device is ready to receive or transmit data to Micro Board.

J11-5—5VDC return (GND).

J11-6—+5VDC regulated.

J11-7—Not used.

J11-8—$\overline{\text{DTR}}$ - Same as J11-2 but inverted.

Micro Board 031-01065-000 only: (TB7 & 8)

TB7-3—RS-485 Serial Port Ground.

TB7-1—RS-485 serial port balanced (+) I/O line. Greater than +.2 VDC with respect to (-) line (TB1-3) is a logic 1 (mark). Greater than -.2 VDC is a logic 0 (space). Baud rate is determined by the application.

TB7-2—RS-485 Serial Port balanced (-) I/O line. See TB1-2.

TB8-1—DTR (Data Terminal Ready) – Control signal to remote device. Logic high (+5 to +25 VDC) when Micro Board is ready to transmit or receive data from remote device.

TB8-2—DSR (Data Set Ready) – Control signal from remote device. Logic high (+5 to +25 VDC) when remote device is ready to receive or transmit data to Micro Board.

TB8-3—TXD (Transmit Data) – Serial data to remote device. Logic 1 = -5 to -25 VDC. Logic 0 = +5 to +25 VDC. Baud rate determined by application.

TB8-4—RXD (Receive Data) – Serial data from remote device. Logic 1 = -5 to -25 VDC. Logic 0 = +5 to +25 VDC.

TB8-5—Micro Board ground.

TB8-6—Micro Board +5 VDC.

J17

J17-1—5V RET

J17-2—Not used.

J17-6—+5VDC

J17-11—Oil pressure transducer input (input to compressor) 1.28VDC to 4.7 VDC transducer output [as measured to ground (J17-1)] corresponds to 59-315 PSIG transducer input. To calculate the transducer output voltage vs. a given input pressure, use the following formula:
(Ref. Fig. 32).

To Solve For V:

$$V = \frac{P + 37.5}{75}$$

Where: P = Pressure in PSIG
V = Volts DC

To Solve For P:

$$P = 75 \times V - 37.5$$

J17-4—Not used.

J17-3—5V RET

J17-8—+5VDC

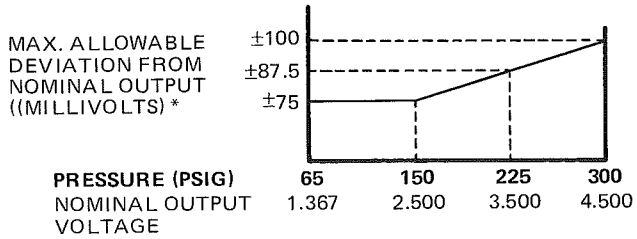


FIG. 32 — OIL PRESSURE & FILTER OIL PRESSURE & CONDENSER PRESSURE TRANSDUCERS. YORK P/N 025-28678-001

J17-13—Filter Oil pressure transducer input (Input to Oil Filter). 1.28—4.7VDC transducer output [as measured to ground (J17-3)] corresponds to 59-315 PSIG transducer input.

To calculate the transducer output voltage vs. a given input pressure; use the following formula: (Refer to Fig. 32)

To Solve For V:

$$V = \frac{P + 37.5}{75}$$

Where: P = Pressure in PSIG
V = Volts DC

To Solve For P:
$P = 75 \times V - 37.5$

J17-5—Not used.

J17-10—5V RET

J17-9—+5VDC

J17-15—Not Used.

J19

J19-2—Not Used.

J19-1—5V Ret.

J19-5—+5VDC

J19-9—Evaporator transducer input. Transducer 025-28678-002* is used for water cooling applications (Fig. 33). Transducer 025-28678-003* is used for brine cooling applications (Fig. 33A). Transducer output as measured to ground (J19-1). Calculate transducer output voltage vs. a given input pressure as follows:

Transducer 025-28678-002 (Water; Fig. 33)

$$V = \frac{P \times 4 - 162.5}{75}$$

$$P = \frac{75 \times V + 162.5}{4}$$

Where: P = Pressure in PSIG
V = Volts DC

* NOTE: Transducer 025-28678-002 is used for both water and brine cooling applications when control center is equipped with Micro Board 031-00940-001. When equipped with Micro Board 031-01065-000, Transducer 025-28678-002 is used for water applications and Transducer 025-28678-003 is used for brine applications.

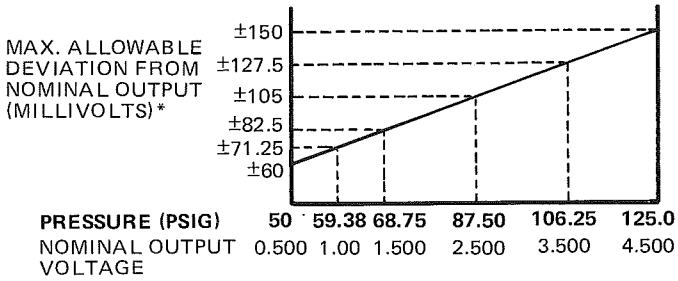


FIG. 33 — EVAPORATOR TRANSDUCER YORK P/N 025-28678-002

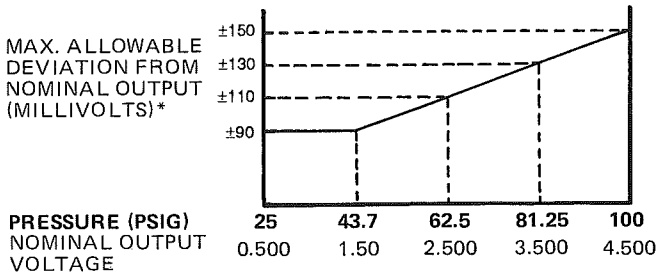


FIG. 33A — EVAPORATOR TRANSDUCER (BRINE APPLICATIONS) YORK P/N 025-28678-003

SECTION 7

Transducer 025-28678-003 (Brine; Fig. 33A)

$$V = \frac{P - 15.6}{18.75}$$

$P = 18.75 \times V + 15.6$

Where: P = Pressure in PSIG
V = Volts DC

J19-4—Not Used.

J19-8—5V Ret.

J19-7—+5VDC

J19-12—Condenser pressure transducer input. 1.28—4.7 VDC transducer output [as measured to ground (J19-8)] corresponds to 59-315 PSIG transducer input. To calculate the transducer output voltage vs. a given input pressure, use the following formula: (Fig. 32)

To Solve For V:

$$V = \frac{P + 37.5}{75}$$

Where: P = Pressure in PSIG
V = Volts DC

To Solve For P:

$P = 75 \times V - 37.5$

J19-6—+5VDC to leaving chilled water temp thermistor.

J19-10—Leaving chilled water temp thermistor input to Micro Board. 0-5VDC. Refer to Table 1 for Temperature/Voltage Chart.

J19-3—Not Used.

J21-4—+5VDC to entering chilled water temp thermistor.

J21-7—Entering chilled water temp thermistor input to Micro Board. 0-5VDC. Refer to Table 2 for Temperature/Voltage Chart.

J21-1—Not Used.

J21-5—+5VDC to oil temp thermistor.

J21-8—Oil temp thermistor input to Micro Board 0-5VDC. Refer to Table 3 for Temperature/Voltage Chart.

J21-2—Not Used.

J21-6—+5VDC to discharge temp thermistor.

J21-9—Discharge temp thermistor input to Micro Board. 0-5VDC. Refer to Table 3 for Temperature/Voltage Chart.

J21-3—Not Used.

J22-4—+5VDC to entering condenser water temp thermistor.

J22-5—Entering condenser water temp thermistor input to Micro Board Customer Option. 0-5VDC. Refer to Table 4 for Temperature/Voltage Chart.

J22-1—Not Used.

J22-2—+5VDC to leaving condenser water temp thermistor.

J22-6—Leaving condenser water temp thermistor input to Micro Board Customer Option. 0-5VDC. Refer to Table 4 for Temperature/Voltage Chart.

J22-3—Not Used.

J20-1—Slide Valve Pot Return.

J20-2—Not Used.

J20-3—+5VDC supply to slide valve pot.

J20-4—Refer to Fig. 34. Slide valve pot input as measured to ground (J20-2). Voltage level reflects slide valve position as calibrated (Refer to Calibration procedure in Section 11 Page 49). 100% = 3.573VDC; 0% = .836VDC. Calculate other positions as follows:

$$\% \text{ Slide Valve} = \frac{(100 \times V - 83.6)}{2.737}$$

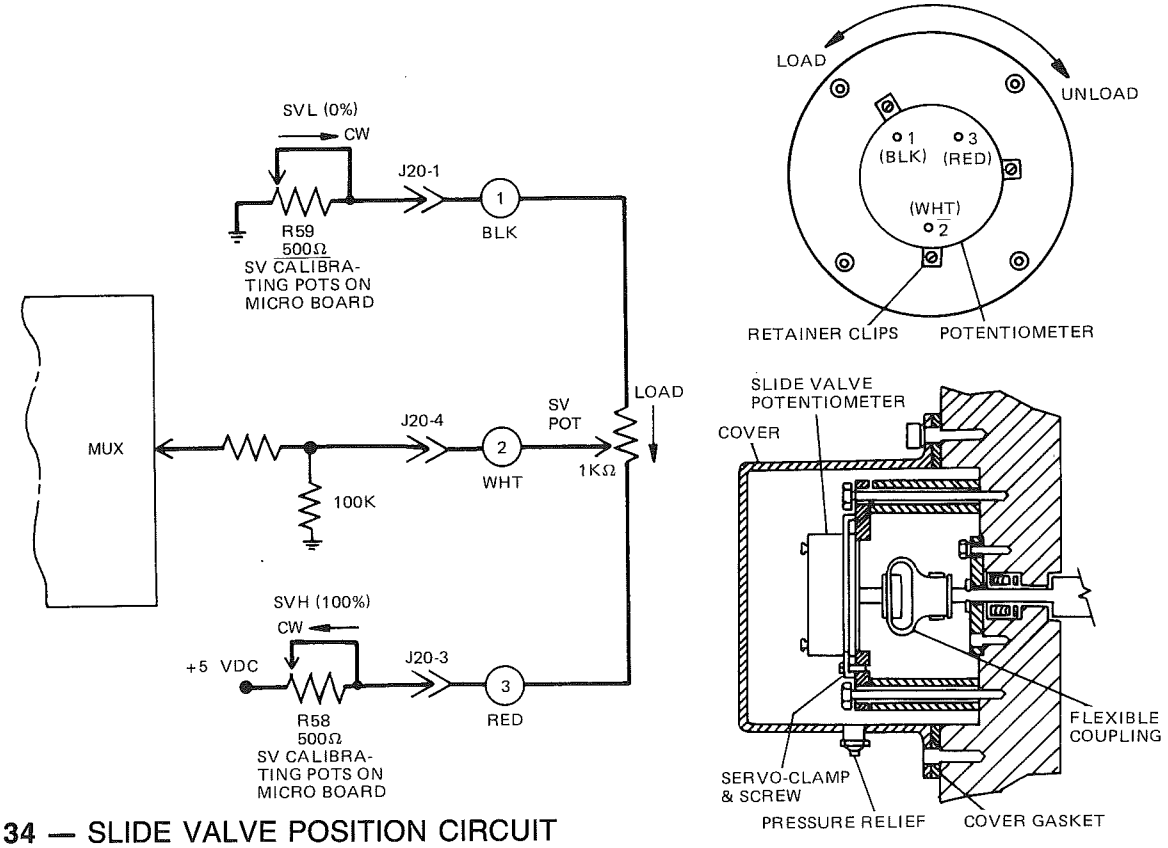


FIG. 34 — SLIDE VALVE POSITION CIRCUIT

TABLE 1 — LEAVING CHILLED WATER TEMP.

temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin
9.90	1.4280	15.13	1.5957	20.17	1.7634	25.08	1.9311
10.00	1.4310	15.22	1.5987	20.26	1.7664	25.17	1.9341
10.09	1.4341	15.32	1.6018	20.35	1.7695	25.26	1.9372
10.19	1.4371	15.41	1.6048	20.44	1.7725	25.35	1.9402
10.29	1.4402	15.50	1.6079	20.53	1.7756	25.43	1.9433
10.39	1.4432	15.60	1.6109	20.62	1.7786	25.52	1.9463
10.48	1.4463	15.69	1.6140	20.71	1.7817	25.61	1.9494
10.58	1.4493	15.78	1.6170	20.80	1.7847	25.70	1.9524
10.68	1.4523	15.87	1.6201	20.89	1.7878	25.79	1.9555
10.77	1.4554	15.97	1.6231	20.98	1.7908	25.87	1.9585
10.87	1.4584	16.06	1.6262	21.07	1.7939	25.96	1.9616
10.97	1.4615	16.15	1.6292	21.16	1.7969	26.05	1.9646
11.06	1.4645	16.24	1.6322	21.25	1.8000	26.14	1.9677
11.16	1.4676	16.34	1.6353	21.34	1.8030	26.23	1.9707
11.25	1.4706	16.43	1.6383	21.43	1.8060	26.31	1.9738
11.35	1.4737	16.52	1.6414	21.52	1.8091	26.40	1.9768
11.45	1.4767	16.61	1.6444	21.61	1.8121	26.49	1.9798
11.54	1.4798	16.70	1.6475	21.70	1.8152	26.58	1.9829
11.64	1.4828	16.80	1.6505	21.79	1.8182	26.67	1.9859
11.73	1.4859	16.89	1.6536	21.88	1.8213	26.76	1.9890
11.83	1.4889	16.98	1.6566	21.97	1.8243	26.84	1.9920
11.93	1.4920	17.07	1.6597	22.06	1.8274	26.93	1.9951
12.02	1.4950	17.16	1.6627	22.15	1.8304	27.02	1.9981
12.12	1.4981	17.26	1.6658	22.24	1.8335	27.11	2.0012
12.21	1.5011	17.35	1.6688	22.33	1.8365	27.20	2.0042
12.31	1.5042	17.44	1.6719	22.42	1.8396	27.28	2.0073
12.40	1.5072	17.53	1.6749	22.51	1.8426	27.37	2.0103
12.50	1.5103	17.63	1.6780	22.60	1.8457	27.46	2.0134
12.59	1.5133	17.72	1.6810	22.69	1.8487	27.55	2.0164
12.69	1.5164	17.81	1.6841	22.78	1.8518	27.64	2.0195
12.78	1.5194	17.90	1.6871	22.87	1.8548	27.73	2.0225
12.88	1.5225	17.99	1.6902	22.96	1.8579	27.81	2.0256
12.97	1.5255	18.08	1.6932	23.04	1.8609	27.90	2.0286
13.07	1.5286	18.17	1.6963	23.13	1.8640	27.99	2.0317
13.16	1.5316	18.26	1.6993	23.22	1.8670	28.08	2.0347
13.26	1.5347	18.35	1.7024	23.31	1.8701	28.17	2.0378
13.35	1.5377	18.44	1.7054	23.40	1.8731	28.25	2.0408
13.45	1.5408	18.54	1.7085	23.49	1.8762	28.34	2.0439
13.54	1.5438	18.63	1.7115	23.58	1.8792	28.43	2.0469
13.64	1.5469	18.72	1.7146	23.67	1.8823	28.52	2.0500
13.73	1.5499	18.81	1.7176	23.75	1.8853	28.61	2.0530
13.83	1.5530	18.90	1.7207	23.84	1.8884	28.69	2.0561
13.92	1.5560	18.99	1.7237	23.93	1.8914	28.78	2.0591
14.01	1.5591	19.08	1.7268	24.02	1.8945	28.87	2.0622
14.11	1.5621	19.17	1.7298	24.11	1.8975	28.96	2.0652
14.20	1.5652	19.26	1.7329	24.20	1.9006	29.04	2.0683
14.29	1.5682	19.36	1.7359	24.29	1.9036	29.13	2.0713
14.39	1.5713	19.45	1.7390	24.37	1.9067	29.22	2.0744
14.48	1.5743	19.54	1.7420	24.46	1.9097	29.31	2.0774
14.57	1.5774	19.63	1.7451	24.55	1.9128	29.39	2.0805
14.67	1.5804	19.72	1.7481	24.64	1.9158	29.48	2.0835
14.76	1.5835	19.81	1.7512	24.73	1.9189	29.57	2.0866
14.85	1.5865	19.90	1.7542	24.82	1.9219	29.66	2.0896
14.95	1.5896	19.99	1.7573	24.91	1.9250	29.75	2.0927
15.04	1.5926	20.08	1.7603	24.99	1.9280	29.83	2.0957

TABLE 1 — LEAVING CHILLED WATER TEMP. (Continued)

temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin
29.92	2.0988	34.73	2.2665	39.57	2.4342	44.46	2.6019	49.48	2.7696
30.01	2.1018	34.82	2.2695	39.66	2.4372	44.55	2.6049	49.57	2.7726
30.10	2.1049	34.91	2.2726	39.74	2.4403	44.64	2.6080	49.66	2.7757
30.18	2.1079	34.99	2.2756	39.83	2.4433	44.73	2.6110	49.75	2.7787
30.27	2.1110	35.08	2.2787	39.92	2.4464	44.82	2.6141	49.84	2.7818
30.36	2.1140	35.17	2.2817	40.01	2.4494	44.91	2.6171	49.94	2.7848
30.45	2.1171	35.26	2.2848	40.10	2.4525	45.00	2.6202	50.03	2.7879
30.53	2.1201	35.34	2.2878	40.19	2.4555	45.09	2.6232	50.12	2.7909
30.62	2.1232	35.43	2.2909	40.27	2.4586	45.18	2.6263	50.22	2.7940
30.71	2.1262	35.52	2.2939	40.36	2.4616	45.27	2.6293	50.31	2.7970
30.79	2.1293	35.61	2.2970	40.45	2.4647	45.36	2.6324	50.40	2.8001
30.88	2.1323	35.70	2.3000	40.54	2.4677	45.46	2.6354	50.50	2.8031
30.97	2.1354	35.78	2.3031	40.63	2.4708	45.55	2.6385	50.59	2.8062
31.06	2.1384	35.87	2.3061	40.71	2.4738	45.64	2.6415	50.68	2.8092
31.14	2.1415	35.96	2.3092	40.80	2.4769	45.73	2.6446	50.78	2.8123
31.23	2.1445	36.05	2.3122	40.89	2.4799	45.82	2.6476	50.87	2.8153
31.32	2.1476	36.13	2.3153	40.98	2.4830	45.91	2.6507	50.96	2.8184
31.41	2.1506	36.22	2.3183	41.07	2.4860	46.00	2.6537	51.06	2.8214
31.49	2.1536	36.31	2.3214	41.16	2.4891	46.09	2.6568	51.15	2.8245
31.58	2.1567	36.40	2.3244	41.24	2.4921	46.18	2.6598	51.24	2.8275
31.67	2.1597	36.48	2.3274	41.33	2.4952	46.27	2.6629	51.34	2.8306
31.76	2.1628	36.57	2.3305	41.42	2.4982	46.36	2.6659	51.43	2.8336
31.84	2.1658	36.66	2.3335	41.51	2.5012	46.45	2.6690	51.52	2.8367
31.93	2.1689	36.75	2.3366	41.60	2.5043	46.55	2.6720	51.62	2.8397
32.02	2.1719	36.83	2.3396	41.69	2.5073	46.64	2.6751	51.71	2.8428
32.10	2.1750	36.92	2.3427	41.78	2.5104	46.73	2.6781	51.80	2.8458
32.19	2.1780	37.01	2.3457	41.87	2.5134	46.82	2.6811	51.90	2.8489
32.28	2.1811	37.10	2.3488	41.96	2.5165	46.91	2.6842	51.99	2.8519
32.37	2.1841	37.18	2.3518	42.05	2.5195	47.00	2.6872	52.09	2.8549
32.45	2.1872	37.27	2.3549	42.14	2.5226	47.09	2.6903	52.18	2.8580
32.54	2.1902	37.36	2.3579	42.23	2.5256	47.18	2.6933	52.28	2.8610
32.63	2.1933	37.45	2.3610	42.31	2.5287	47.27	2.6964	52.37	2.8641
32.72	2.1963	37.54	2.3640	42.40	2.5317	47.36	2.6994	52.46	2.8671
32.81	2.1994	37.62	2.3671	42.49	2.5348	47.45	2.7025	52.56	2.8702
32.89	2.2024	37.71	2.3701	42.58	2.5378	47.55	2.7055	52.65	2.8732
32.98	2.2055	37.80	2.3732	42.67	2.5409	47.64	2.7086	52.75	2.8763
33.07	2.2085	37.89	2.3762	42.76	2.5439	47.73	2.7116	52.84	2.8793
33.16	2.2116	37.98	2.3793	42.85	2.5470	47.82	2.7147	52.94	2.8824
33.24	2.2146	38.07	2.3823	42.94	2.5500	47.91	2.7177	53.03	2.8854
33.33	2.2177	38.15	2.3854	43.03	2.5531	48.00	2.7208	53.13	2.8885
33.42	2.2207	38.24	2.3884	43.12	2.5561	48.09	2.7238	53.22	2.8915
33.51	2.2238	38.33	2.3915	43.21	2.5592	48.18	2.7269	53.32	2.8946
33.59	2.2268	38.42	2.3945	43.30	2.5622	48.27	2.7299	53.41	2.8976
33.68	2.2299	38.51	2.3976	43.39	2.5653	48.37	2.7330	53.51	2.9007
33.77	2.2329	38.60	2.4006	43.48	2.5683	48.46	2.7360	53.60	2.9037
33.86	2.2360	38.69	2.4037	43.57	2.5714	48.55	2.7391	53.70	2.9068
33.94	2.2390	38.77	2.4067	43.65	2.5744	48.64	2.7421	53.79	2.9098
34.03	2.2421	38.86	2.4098	43.74	2.5775	48.74	2.7452	53.89	2.9129
34.12	2.2451	38.95	2.4128	43.83	2.5805	48.83	2.7482	53.98	2.9159
34.21	2.2482	39.04	2.4159	43.92	2.5836	48.92	2.7513	54.08	2.9190
34.29	2.2512	39.13	2.4189	44.01	2.5866	49.01	2.7543	54.17	2.9220
34.38	2.2543	39.22	2.4220	44.10	2.5897	49.11	2.7574	54.27	2.9251
34.47	2.2573	39.30	2.4250	44.19	2.5927	49.20	2.7604	54.36	2.9281
34.56	2.2604	39.39	2.4281	44.28	2.5958	49.29	2.7635	54.46	2.9312
34.64	2.2634	39.48	2.4311	44.37	2.5988	49.38	2.7665	54.55	2.9342

TABLE 1 — LEAVING CHILLED WATER TEMP. (Continued)

temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin
54.65	2.9373	60.05	3.1050	65.75	3.2727	71.83	3.4404	78.42	3.6081
54.74	2.9403	60.15	3.1080	65.85	3.2757	71.95	3.4434	78.55	3.6111
54.84	2.9434	60.25	3.1111	65.96	3.2788	72.06	3.4465	78.67	3.6142
54.93	2.9464	60.36	3.1141	66.06	3.2818	72.18	3.4495	78.80	3.6172
55.03	2.9495	60.46	3.1172	66.17	3.2849	72.29	3.4526	78.93	3.6203
55.12	2.9525	60.56	3.1202	66.28	3.2879	72.41	3.4556	79.05	3.6233
55.22	2.9556	60.66	3.1233	66.39	3.2910	72.52	3.4587	79.18	3.6264
55.32	2.9586	60.76	3.1263	66.49	3.2940	72.64	3.4617	79.31	3.6294
55.41	2.9617	60.86	3.1294	66.60	3.2971	72.75	3.4648	79.44	3.6325
55.51	2.9647	60.96	3.1324	66.71	3.3001	72.87	3.4678	79.57	3.6355
55.61	2.9678	61.06	3.1355	66.82	3.3032	72.98	3.4709	79.69	3.6386
55.70	2.9708	61.17	3.1385	66.93	3.3062	73.10	3.4739	79.82	3.6416
55.80	2.9739	61.27	3.1416	67.03	3.3093	73.21	3.4770	79.95	3.6447
55.90	2.9769	61.37	3.1446	67.14	3.3123	73.33	3.4800	80.08	3.6477
56.00	2.9800	61.47	3.1477	67.25	3.3154	73.44	3.4831	80.20	3.6508
56.09	2.9830	61.57	3.1507	67.36	3.3184	73.56	3.4861	80.33	3.6538
56.19	2.9861	61.67	3.1538	67.47	3.3215	73.68	3.4892	80.46	3.6569
56.29	2.9891	61.78	3.1568	67.58	3.3245	73.80	3.4922	80.59	3.6599
56.39	2.9922	61.88	3.1599	67.68	3.3276	73.92	3.4953	80.72	3.6630
56.48	2.9952	61.98	3.1629	67.79	3.3306	74.04	3.4983	80.85	3.6660
56.58	2.9983	62.08	3.1660	67.90	3.3337	74.16	3.5014	80.98	3.6691
56.68	3.0013	62.18	3.1690	68.01	3.3367	74.28	3.5044	81.11	3.6721
56.78	3.0044	62.28	3.1721	68.12	3.3398	74.40	3.5075	81.24	3.6752
56.87	3.0074	62.39	3.1751	68.23	3.3428	74.52	3.5105	81.37	3.6782
56.97	3.0105	62.49	3.1782	68.34	3.3459	74.64	3.5136	81.50	3.6813
57.07	3.0135	62.59	3.1812	68.45	3.3489	74.75	3.5166	81.63	3.6843
57.17	3.0166	62.69	3.1843	68.56	3.3520	74.87	3.5197	81.76	3.6874
57.26	3.0196	62.80	3.1873	68.67	3.3550	74.99	3.5227	81.89	3.6904
57.36	3.0227	62.90	3.1904	68.78	3.3581	75.11	3.5258	82.02	3.6935
57.46	3.0257	63.01	3.1934	68.90	3.3611	75.23	3.5288	82.15	3.6965
57.56	3.0287	63.11	3.1965	69.01	3.3642	75.35	3.5319	82.28	3.6996
57.66	3.0318	63.22	3.1995	69.12	3.3672	75.47	3.5349	82.41	3.7026
57.76	3.0348	63.32	3.2025	69.23	3.3703	75.60	3.5380		
57.86	3.0379	63.43	3.2056	69.34	3.3733	75.72	3.5410		
57.96	3.0409	63.53	3.2086	69.45	3.3763	75.84	3.5441		
58.06	3.0440	63.63	3.2117	69.56	3.3794	75.96	3.5471		
58.15	3.0470	63.74	3.2147	69.67	3.3824	76.08	3.5501		
58.25	3.0501	63.84	3.2178	69.78	3.3855	76.20	3.5532		
58.35	3.0531	63.95	3.2208	69.89	3.3885	76.32	3.5562		
58.45	3.0562	64.05	3.2239	70.01	3.3916	76.44	3.5593		
58.55	3.0592	64.16	3.2269	70.12	3.3946	76.57	3.5623		
58.65	3.0623	64.26	3.2300	70.24	3.3977	76.69	3.5654		
58.75	3.0653	64.37	3.2330	70.35	3.4007	76.81	3.5684		
58.85	3.0684	64.47	3.2361	70.46	3.4038	76.93	3.5715		
58.95	3.0714	64.58	3.2391	70.58	3.4068	77.05	3.5745		
59.05	3.0745	64.68	3.2422	70.69	3.4099	77.18	3.5776		
59.15	3.0775	64.79	3.2452	70.80	3.4129	77.30	3.5806		
59.25	3.0806	64.90	3.2483	70.92	3.4160	77.43	3.5837		
59.35	3.0836	65.00	3.2513	71.03	3.4190	77.55	3.5867		
59.45	3.0867	65.11	3.2544	71.15	3.4221	77.68	3.5898		
59.55	3.0897	65.21	3.2574	71.26	3.4251	77.80	3.5928		
59.65	3.0928	65.32	3.2605	71.37	3.4282	77.93	3.5959		
59.75	3.0958	65.43	3.2635	71.49	3.4312	78.05	3.5989		
59.85	3.0989	65.53	3.2666	71.60	3.4343	78.17	3.6020		
59.95	3.1019	65.64	3.2696	71.72	3.4373	78.30	3.6050		

TABLE 2 — ENTERING CHILLED WATER TEMP.

temp(F)	Vin
15.01	1.5918
15.16	1.5967
15.31	1.6016
15.46	1.6064
15.61	1.6113
15.76	1.6162
15.91	1.6211
16.05	1.6260
16.20	1.6309
16.35	1.6357
16.50	1.6406
16.64	1.6455
16.79	1.6504
16.94	1.6553
17.09	1.6602
17.23	1.6650
17.38	1.6699
17.53	1.6748
17.68	1.6797
17.82	1.6846
17.97	1.6895
18.11	1.6943
18.26	1.6992
18.41	1.7041
18.55	1.7090
18.70	1.7139
18.84	1.7188
18.99	1.7236
19.13	1.7285
19.28	1.7334
19.43	1.7383
19.57	1.7432
19.71	1.7480
19.86	1.7529
20.00	1.7578
20.15	1.7627
20.29	1.7676
20.44	1.7725
20.58	1.7773
20.73	1.7822
20.87	1.7871
21.01	1.7920
21.16	1.7969
21.30	1.8018
21.45	1.8066
21.59	1.8115
21.73	1.8164
21.88	1.8213
22.02	1.8262
22.17	1.8311
22.31	1.8359
22.45	1.8408
22.60	1.8457
22.74	1.8506
22.88	1.8555

temp(F)	Vin
23.03	1.8604
23.17	1.8652
23.31	1.8701
23.45	1.8750
23.60	1.8799
23.74	1.8848
23.88	1.8896
24.02	1.8945
24.16	1.8994
24.31	1.9043
24.45	1.9092
24.59	1.9141
24.73	1.9189
24.87	1.9238
25.01	1.9287
25.16	1.9336
25.30	1.9385
25.44	1.9434
25.58	1.9482
25.72	1.9531
25.86	1.9580
26.00	1.9629
26.14	1.9678
26.28	1.9727
26.42	1.9775
26.56	1.9824
26.71	1.9873
26.85	1.9922
26.99	1.9971
27.13	2.0020
27.27	2.0068
27.41	2.0117
27.55	2.0166
27.70	2.0215
27.84	2.0264
27.98	2.0313
28.12	2.0361
28.26	2.0410
28.40	2.0459
28.54	2.0508
28.68	2.0557
28.82	2.0605
28.96	2.0654
29.10	2.0703
29.24	2.0752
29.38	2.0801
29.52	2.0850
29.66	2.0898
29.80	2.0947
29.94	2.0996
30.08	2.1045
30.22	2.1094
30.36	2.1143
30.50	2.1191
30.64	2.1240

temp(F)	Vin
30.78	2.1289
30.92	2.1338
31.06	2.1387
31.20	2.1436
31.34	2.1484
31.48	2.1533
31.62	2.1582
31.76	2.1631
31.90	2.1680
32.04	2.1729
32.18	2.1777
32.32	2.1826
32.46	2.1875
32.60	2.1924
32.74	2.1973
32.88	2.2021
33.02	2.2070
33.16	2.2119
33.30	2.2168
33.44	2.2217
33.59	2.2266
33.73	2.2314
33.87	2.2363
34.01	2.2412
34.15	2.2461
34.29	2.2510
34.43	2.2559
34.57	2.2607
34.71	2.2656
34.85	2.2705
34.99	2.2754
35.13	2.2803
35.27	2.2852
35.41	2.2900
35.55	2.2949
35.69	2.2998
35.83	2.3047
35.97	2.3096
36.11	2.3145
36.25	2.3193
36.39	2.3242
36.53	2.3291
36.67	2.3340
36.81	2.3389
36.95	2.3438
37.09	2.3486
37.23	2.3535
37.37	2.3584
37.51	2.3633
37.66	2.3682
37.80	2.3730
37.94	2.3779
38.08	2.3828
38.22	2.3877
38.36	2.3926

temp(F)	Vin
38.51	2.3975
38.65	2.4023
38.79	2.4072
38.93	2.4121
39.07	2.4170
39.21	2.4219
39.35	2.4268
39.50	2.4316
39.64	2.4365
39.78	2.4414
39.92	2.4463
40.06	2.4512
40.20	2.4561
40.34	2.4609
40.48	2.4658
40.62	2.4707
40.76	2.4756
40.91	2.4805
41.05	2.4854
41.19	2.4902
41.33	2.4951
41.48	2.5000
41.62	2.5049
41.76	2.5098
41.90	2.5146
42.05	2.5195
42.19	2.5244
42.33	2.5293
42.48	2.5342
42.62	2.5391
42.76	2.5439
42.90	2.5488
43.05	2.5537
43.19	2.5586
43.33	2.5635
43.48	2.5684
43.62	2.5732
43.76	2.5781
43.91	2.5830
44.05	2.5879
44.19	2.5928
44.34	2.5977
44.48	2.6025
44.62	2.6074
44.77	2.6123
44.91	2.6172
45.06	2.6221
45.20	2.6270
45.35	2.6318
45.49	2.6367
45.64	2.6416
45.79	2.6465
45.93	2.6514
46.08	2.6563
46.22	2.6611

TABLE 2 — ENTERING CHILLED WATER TEMP. (Continued)

temp(F)	Vin
46.37	2.6660
46.51	2.6709
46.66	2.6758
46.80	2.6807
46.95	2.6855
47.09	2.6904
47.24	2.6953
47.39	2.7002
47.53	2.7051
47.68	2.7100
47.82	2.7148
47.97	2.7197
48.11	2.7246
48.26	2.7295
48.41	2.7344
48.56	2.7393
48.70	2.7441
48.85	2.7490
49.00	2.7539
49.15	2.7588
49.30	2.7637
49.44	2.7686
49.59	2.7734
49.74	2.7783
49.89	2.7832
50.04	2.7881
50.19	2.7930
50.34	2.7979
50.48	2.8027
50.63	2.8076
50.78	2.8125
50.93	2.8174
51.08	2.8223
51.23	2.8271
51.38	2.8320
51.53	2.8369
51.68	2.8418
51.83	2.8467
51.98	2.8516
52.13	2.8564
52.28	2.8613
52.44	2.8662
52.59	2.8711
52.74	2.8760
52.89	2.8809
53.04	2.8857
53.19	2.8906
53.34	2.8955
53.50	2.9004
53.65	2.9053
53.80	2.9102
53.95	2.9150
54.11	2.9199
54.26	2.9248
54.41	2.9297

temp(F)	Vin
54.56	2.9346
54.72	2.9395
54.87	2.9443
55.02	2.9492
55.17	2.9541
55.33	2.9590
55.48	2.9639
55.64	2.9688
55.79	2.9736
55.95	2.9785
56.11	2.9834
56.26	2.9883
56.42	2.9932
56.57	2.9980
56.73	3.0029
56.89	3.0078
57.04	3.0127
57.20	3.0176
57.36	3.0225
57.51	3.0273
57.67	3.0322
57.83	3.0371
57.99	3.0420
58.15	3.0469
58.31	3.0518
58.47	3.0566
58.62	3.0615
58.78	3.0664
58.94	3.0713
59.10	3.0762
59.26	3.0811
59.42	3.0859
59.59	3.0908
59.75	3.0957
59.91	3.1006
60.07	3.1055
60.23	3.1104
60.39	3.1152
60.55	3.1201
60.72	3.1250
60.88	3.1299
61.04	3.1348
61.20	3.1396
61.37	3.1445
61.53	3.1494
61.69	3.1543
61.85	3.1592
62.02	3.1641
62.18	3.1689
62.34	3.1738
62.51	3.1787
62.67	3.1836
62.84	3.1885
63.01	3.1934
63.17	3.1982

temp(F)	Vin
63.34	3.2031
63.51	3.2080
63.68	3.2129
36.84	3.2178
64.01	3.2227
64.18	3.2275
64.34	3.2324
64.51	3.2373
64.68	3.2422
64.85	3.2471
65.02	3.2520
65.19	3.2568
65.36	3.2617
65.53	3.2666
65.70	3.2715
65.87	3.2764
66.04	3.2813
66.21	3.2861
66.39	3.2910
66.56	3.2959
66.73	3.3008
66.91	3.3057
67.08	3.3105
67.25	3.3154
67.43	3.3203
67.60	3.3252
67.77	3.3301
67.95	3.3350
68.12	3.3398
68.30	3.3447
68.48	3.3496
68.66	3.3545
68.83	3.3594
69.01	3.3643
69.19	3.3691
69.36	3.3740
69.54	3.3789
69.72	3.3838
69.90	3.3887
70.08	3.3936
70.26	3.3984
70.45	3.4033
70.63	3.4082
70.81	3.4131
70.99	3.4180
71.17	3.4229
71.36	3.4277
71.54	3.4326
71.72	3.4375
71.91	3.4424
72.09	3.4473
72.28	3.4521
72.46	3.4570
72.64	3.4619
72.83	3.4668

temp(F)	Vin
73.01	3.4717
73.20	3.4766
73.38	3.4814
73.57	3.4863
73.76	3.4912
73.95	3.4961
74.14	3.5010
74.33	3.5059
74.53	3.5107
74.72	3.5156
74.91	3.5205
75.10	3.5254
75.29	3.5303
75.48	3.5352
75.68	3.5400
75.87	3.5449
76.07	3.5498
76.26	3.5547
76.46	3.5596
76.65	3.5645
76.84	3.5693
77.04	3.5742
77.24	3.5791
77.44	3.5840
77.64	3.5889
77.84	3.5938
78.04	3.5986
78.24	3.6035
78.44	3.6084
78.64	3.6133
78.84	3.6182
79.04	3.6230
79.25	3.6279
79.45	3.6328
79.66	3.6377
79.86	3.6426
80.07	3.6475
80.27	3.6523
80.48	3.6572
80.68	3.6621
80.89	3.6670
81.10	3.6719
81.31	3.6768
81.52	3.6816
81.72	3.6865
81.93	3.6914
82.14	3.6963
82.35	3.7012
82.56	3.7061

SECTION 7

TABLE 3 — OIL AND DISCHARGE TEMP.

temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin
31.99	0.2637	58.43	0.5322	75.98	0.8008	89.90	1.0693
32.63	0.2686	58.81	0.5371	76.25	0.8057	90.13	1.0742
33.27	0.2734	59.18	0.5420	76.53	0.8105	90.36	1.0791
33.90	0.2783	59.54	0.5469	76.81	0.8154	90.59	1.0840
34.51	0.2832	59.90	0.5518	77.09	0.8203	90.82	1.0889
35.12	0.2881	60.26	0.5566	77.36	0.8252	91.05	1.0938
35.73	0.2930	60.63	0.5615	77.63	0.8301	91.28	1.0986
36.32	0.2979	60.98	0.5664	77.90	0.8350	91.51	1.1035
36.91	0.3027	61.33	0.5713	78.17	0.8398	91.74	1.1084
37.49	0.3076	61.69	0.5762	78.44	0.8447	91.96	1.1133
38.05	0.3125	62.04	0.5811	78.71	0.8496	92.19	1.1182
38.61	0.3174	62.39	0.5859	78.98	0.8545	92.42	1.1230
39.18	0.3223	62.73	0.5908	79.24	0.8594	92.64	1.1279
39.72	0.3271	63.07	0.5957	79.50	0.8643	92.87	1.1328
40.26	0.3320	63.41	0.6006	79.77	0.8691	93.10	1.1377
40.80	0.3369	63.75	0.6055	80.03	0.8740	93.32	1.1426
41.33	0.3418	64.09	0.6104	80.30	0.8789	93.54	1.1475
41.85	0.3467	64.43	0.6152	80.56	0.8838	93.77	1.1523
42.37	0.3516	64.76	0.6201	80.82	0.8887	93.99	1.1572
42.89	0.3564	65.09	0.6250	81.08	0.8936	94.21	1.1621
43.39	0.3613	65.42	0.6299	81.33	0.8984	94.43	1.1670
43.89	0.3662	65.75	0.6348	81.59	0.9033	94.65	1.1719
44.39	0.3711	66.08	0.6396	81.85	0.9082	94.88	1.1768
44.88	0.3760	66.40	0.6445	82.11	0.9131	95.10	1.1816
45.36	0.3809	66.72	0.6494	82.37	0.9180	95.32	1.1865
45.84	0.3857	67.04	0.6543	82.62	0.9229	95.53	1.1914
46.32	0.3906	67.36	0.6592	82.87	0.9277	95.75	1.1963
46.79	0.3955	67.68	0.6641	83.12	0.9326	95.97	1.2012
47.25	0.4004	68.00	0.6689	83.37	0.9375	96.19	1.2061
47.72	0.4053	68.31	0.6738	83.62	0.9424	96.41	1.2109
48.18	0.4102	68.62	0.6787	83.88	0.9473	96.63	1.2158
48.63	0.4150	68.93	0.6836	84.13	0.9521	96.84	1.2207
49.07	0.4199	69.24	0.6885	84.38	0.9570	97.06	1.2256
49.52	0.4248	69.55	0.6934	84.62	0.9619	97.27	1.2305
49.97	0.4297	69.86	0.6982	84.87	0.9668	97.49	1.2354
50.40	0.4346	70.17	0.7031	85.11	0.9717	97.70	1.2402
50.83	0.4395	70.47	0.7080	85.36	0.9766	97.92	1.2451
51.26	0.4443	70.77	0.7129	85.61	0.9814	98.13	1.2500
51.69	0.4492	71.07	0.7178	85.85	0.9863	98.35	1.2549
52.11	0.4541	71.37	0.7227	86.10	0.9912	98.56	1.2598
52.53	0.4590	71.67	0.7275	86.34	0.9961	98.77	1.2646
52.94	0.4639	71.96	0.7324	86.58	1.0010	98.98	1.2695
53.36	0.4688	72.26	0.7373	86.82	1.0059	99.20	1.2744
53.77	0.4736	72.55	0.7422	87.06	1.0107	99.41	1.2793
54.17	0.4785	72.84	0.7471	87.30	1.0156	99.62	1.2842
54.57	0.4834	73.14	0.7520	87.54	1.0205	99.83	1.2891
54.97	0.4883	73.43	0.7568	87.78	1.0254	100.04	1.2939
55.37	0.4932	73.72	0.7617	88.02	1.0303	100.25	1.2988
55.76	0.4980	74.00	0.7666	88.25	1.0352	100.46	1.3037
56.15	0.5029	74.29	0.7715	88.49	1.0400	100.67	1.3086
56.54	0.5078	74.57	0.7764	88.72	1.0449	100.88	1.3135
56.92	0.5127	74.86	0.7813	88.96	1.0498	101.09	1.3184
57.31	0.5176	75.14	0.7861	89.20	1.0547	101.29	1.3232
57.68	0.5225	75.42	0.7910	89.43	1.0596	101.50	1.3281
58.06	0.5273	75.70	0.7959	89.67	1.0645	101.71	1.3330

TABLE 3 — OIL AND DISCHARGE TEMP. (Continued)

temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin
101.92	1.3379	112.86	1.6064	123.21	1.8750	133.27	2.1436	143.32	2.4121
102.13	1.3428	113.06	1.6113	123.39	1.8799	133.46	2.1484	143.51	2.4170
102.33	1.3477	113.25	1.6162	123.58	1.8848	133.64	2.1533	143.69	2.4219
102.54	1.3525	113.44	1.6211	123.76	1.8896	133.82	2.1582	143.87	2.4268
102.74	1.3574	113.63	1.6260	123.94	1.8945	134.00	2.1631	144.06	2.4316
102.95	1.3623	113.82	1.6309	124.13	1.8994	134.18	2.1680	144.24	2.4365
103.15	1.3672	114.01	1.6357	124.31	1.9043	134.37	2.1729	144.43	2.4414
103.36	1.3721	114.20	1.6406	124.50	1.9092	134.55	2.1777	144.61	2.4463
103.56	1.3770	114.40	1.6455	124.68	1.9141	134.73	2.1826	144.80	2.4512
103.77	1.3818	114.59	1.6504	124.86	1.9189	134.91	2.1875	144.98	2.4561
103.97	1.3867	114.78	1.6553	125.05	1.9238	135.09	2.1924	145.17	2.4609
104.18	1.3916	114.97	1.6602	125.23	1.9287	135.28	2.1973	145.35	2.4658
104.38	1.3965	115.16	1.6650	125.42	1.9336	135.46	2.2021	145.54	2.4707
104.58	1.4014	115.35	1.6699	125.60	1.9385	135.64	2.2070	145.72	2.4756
104.78	1.4063	115.54	1.6748	125.78	1.9434	135.82	2.2119	145.91	2.4805
104.99	1.4111	115.73	1.6797	125.97	1.9482	136.01	2.2168	146.09	2.4854
105.19	1.4160	115.92	1.6846	126.15	1.9531	136.19	2.2217	146.28	2.4902
105.39	1.4209	116.11	1.6895	126.33	1.9580	136.37	2.2266	146.46	2.4951
105.59	1.4258	116.30	1.6943	126.52	1.9629	136.55	2.2314	146.65	2.5000
105.80	1.4307	116.49	1.6992	126.70	1.9678	136.73	2.2363	146.84	2.5049
105.99	1.4355	116.67	1.7041	126.88	1.9727	136.92	2.2412	147.02	2.5098
106.19	1.4404	116.86	1.7090	127.07	1.9775	137.10	2.2461	147.21	2.5146
106.39	1.4453	117.05	1.7139	127.25	1.9824	137.28	2.2510	147.39	2.5195
106.59	1.4502	117.24	1.7188	127.43	1.9873	137.46	2.2559	147.58	2.5244
106.79	1.4551	117.43	1.7236	127.62	1.9922	137.65	2.2607	147.77	2.5293
106.99	1.4600	117.62	1.7285	127.80	1.9971	137.83	2.2656	147.95	2.5342
107.19	1.4648	117.80	1.7334	127.98	2.0020	138.01	2.2705	148.14	2.5391
107.39	1.4697	117.99	1.7383	128.17	2.0068	138.19	2.2754	148.32	2.5439
107.59	1.4746	118.18	1.7432	128.35	2.0117	138.37	2.2803	148.51	2.5488
107.79	1.4795	118.37	1.7480	128.53	2.0166	138.56	2.2852	148.70	2.5537
107.99	1.4844	118.56	1.7529	128.71	2.0215	138.74	2.2900	148.88	2.5586
108.18	1.4893	118.74	1.7578	128.90	2.0264	138.92	2.2949	149.07	2.5635
108.38	1.4941	118.93	1.7627	129.08	2.0313	139.11	2.2998	149.26	2.5684
108.58	1.4990	119.12	1.7676	129.26	2.0361	139.29	2.3047	149.45	2.5732
108.78	1.5039	119.31	1.7725	129.44	2.0410	139.47	2.3096	149.63	2.5781
108.97	1.5088	119.49	1.7773	129.63	2.0459	139.65	2.3145	149.82	2.5830
109.17	1.5137	119.68	1.7822	129.81	2.0508	139.84	2.3193	150.01	2.5879
109.37	1.5186	119.87	1.7871	129.99	2.0557	140.02	2.3242	150.20	2.5928
109.56	1.5234	120.05	1.7920	130.17	2.0605	140.20	2.3291	150.38	2.5977
109.76	1.5283	120.24	1.7969	130.36	2.0654	140.39	2.3340	150.57	2.6025
109.95	1.5332	120.43	1.8018	130.54	2.0703	140.57	2.3389	150.76	2.6074
110.15	1.5381	120.61	1.8066	130.72	2.0752	140.75	2.3438	150.95	2.6123
110.34	1.5430	120.80	1.8115	130.90	2.0801	140.94	2.3486	151.14	2.6172
110.54	1.5479	120.98	1.8164	131.09	2.0850	141.12	2.3535	151.33	2.6221
110.73	1.5527	121.17	1.8213	131.27	2.0898	141.30	2.3584	151.51	2.6270
110.93	1.5576	121.35	1.8262	131.45	2.0947	141.49	2.3633	151.70	2.6318
111.12	1.5625	121.54	1.8311	131.63	2.0996	141.67	2.3682	151.89	2.6367
111.32	1.5674	121.72	1.8359	131.82	2.1045	141.85	2.3730	152.08	2.6416
111.51	1.5723	121.91	1.8408	132.00	2.1094	142.04	2.3779	152.27	2.6465
111.70	1.5771	122.10	1.8457	132.18	2.1143	142.22	2.3828	152.46	2.6514
111.90	1.5820	122.28	1.8506	132.36	2.1191	142.40	2.3877	152.65	2.6563
112.09	1.5869	122.47	1.8555	132.54	2.1240	142.59	2.3926	152.84	2.6611
112.28	1.5918	122.65	1.8604	132.73	2.1289	142.77	2.3975	153.03	2.6660
112.48	1.5967	122.84	1.8652	132.91	2.1338	142.95	2.4023	153.22	2.6709
112.67	1.6016	123.02	1.8701	133.09	2.1387	143.14	2.4072	153.41	2.6758

SECTION 7

TABLE 3 — OIL AND DISCHARGE TEMP. (Continued)

temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin	temp(F)	Vin
153.60	2.6807	164.36	2.9492	175.92	3.2178	188.71	3.4863	203.40	3.7549
153.79	2.6855	164.56	2.9541	176.14	3.2227	188.96	3.4912	203.69	3.7598
153.98	2.6904	164.76	2.9590	176.36	3.2275	189.21	3.4961	203.99	3.7646
154.17	2.6953	164.96	2.9639	176.58	3.2324	189.46	3.5010	204.28	3.7695
154.36	2.7002	165.17	2.9688	176.80	3.2373	189.71	3.5059	204.57	3.7744
154.55	2.7051	165.37	2.9736	177.02	3.2422	189.96	3.5107	204.86	3.7793
154.74	2.7100	165.57	2.9785	177.25	3.2471	190.21	3.5156	205.16	3.7842
154.94	2.7148	165.78	2.9834	177.47	3.2520	190.46	3.5205	205.46	3.7891
155.13	2.7197	165.98	2.9883	177.69	3.2568	190.71	3.5254	205.76	3.7939
155.32	2.7246	166.19	2.9932	177.91	3.2617	190.96	3.5303	206.05	3.7988
155.51	2.7295	166.39	2.9980	178.14	3.2666	191.22	3.5352	206.35	3.8037
155.70	2.7344	166.60	3.0029	178.36	3.2715	191.47	3.5400	206.65	3.8086
155.90	2.7393	166.80	3.0078	178.59	3.2764	191.73	3.5449	206.96	3.8135
156.09	2.7441	167.00	3.0127	178.81	3.2813	191.98	3.5498	207.26	3.8184
156.28	2.7490	167.21	3.0176	179.04	3.2861	192.23	3.5547	207.57	3.8232
156.47	2.7539	167.42	3.0225	179.26	3.2910	192.49	3.5596	207.87	3.8281
156.67	2.7588	167.62	3.0273	179.49	3.2959	192.75	3.5645	208.17	3.8330
156.86	2.7637	167.83	3.0322	179.72	3.3008	193.01	3.5693	208.48	3.8379
157.05	2.7686	168.04	3.0371	179.94	3.3057	193.27	3.5742	208.79	3.8428
157.25	2.7734	168.24	3.0420	180.17	3.3105	193.53	3.5791	209.10	3.8477
157.44	2.7783	168.45	3.0469	180.40	3.3154	193.79	3.5840	209.42	3.8525
157.64	2.7832	168.66	3.0518	180.63	3.3203	194.05	3.5889	209.73	3.8574
157.83	2.7881	168.87	3.0566	180.86	3.3252	194.31	3.5938	210.04	3.8623
158.02	2.7930	169.07	3.0615	181.09	3.3301	194.57	3.5986	210.35	3.8672
158.22	2.7979	169.28	3.0664	181.32	3.3350	194.84	3.6035	210.67	3.8721
158.41	2.8027	169.49	3.0713	181.55	3.3398	195.10	3.6084	210.99	3.8770
158.61	2.8076	169.70	3.0762	181.78	3.3447	195.37	3.6133	211.31	3.8818
158.80	2.8125	169.91	3.0811	182.01	3.3496	195.63	3.6182	211.62	3.8867
159.00	2.8174	170.12	3.0859	182.24	3.3545	195.90	3.6230	211.94	3.8916
159.19	2.8223	170.33	3.0908	182.48	3.3594	196.16	3.6279	212.27	3.8965
159.39	2.8271	170.54	3.0957	182.71	3.3643	196.43	3.6328	212.59	3.9014
159.59	2.8320	170.75	3.1006	182.94	3.3691	196.70	3.6377	212.92	3.9063
159.78	2.8369	170.96	3.1055	183.17	3.3740	196.97	3.6426	213.24	3.9111
159.98	2.8418	171.18	3.1104	183.41	3.3789	197.24	3.6475	213.57	3.9160
160.18	2.8467	171.39	3.1152	183.65	3.3838	197.51	3.6523	213.90	3.9209
160.37	2.8516	171.60	3.1201	183.88	3.3887	197.78	3.6572	214.23	3.9258
160.57	2.8564	171.81	3.1250	184.12	3.3936	198.06	3.6621	214.56	3.9307
160.77	2.8613	172.02	3.1299	184.36	3.3984	198.33	3.6670	214.89	3.9355
160.97	2.8662	172.24	3.1348	184.59	3.4033	198.61	3.6719	215.23	3.9404
161.16	2.8711	172.45	3.1396	184.83	3.4082	198.88	3.6768	215.56	3.9453
161.36	2.8760	172.66	3.1445	185.07	3.4131	199.15	3.6816	215.90	3.9502
161.56	2.8809	172.88	3.1494	185.31	3.4180	199.43	3.6865	216.24	3.9551
161.76	2.8857	173.10	3.1543	185.55	3.4229	199.71	3.6914	216.58	3.9600
161.96	2.8906	173.31	3.1592	185.79	3.4277	199.99	3.6963	216.92	3.9648
162.15	2.8955	173.53	3.1641	186.03	3.4326	200.27	3.7012	217.26	3.9697
162.35	2.9004	173.74	3.1689	186.27	3.4375	200.55	3.7061	217.60	3.9746
162.55	2.9053	173.96	3.1738	186.51	3.4424	200.83	3.7109	217.95	3.9795
162.75	2.9102	174.17	3.1787	186.75	3.4473	201.11	3.7158	218.30	3.9844
162.95	2.9150	174.39	3.1836	186.99	3.4521	201.39	3.7207	218.65	3.9893
163.15	2.9199	174.61	3.1885	187.24	3.4570	201.68	3.7256	219.00	3.9941
163.35	2.9248	174.83	3.1934	187.48	3.4619	201.97	3.7305	219.35	3.9990
163.55	2.9297	175.04	3.1982	187.73	3.4668	202.25	3.7354	219.70	4.0039
163.75	2.9346	175.26	3.2031	187.97	3.4717	202.54	3.7402	220.06	4.0088
163.96	2.9395	175.48	3.2080	188.22	3.4766	202.82	3.7451		
164.16	2.9443	175.70	3.2129	188.46	3.4814	203.11	3.7500		

TABLE 4 — ENTERING AND LEAVING CONDENSER WATER

temp(F)	Vin
40.12	1.8408
40.27	1.8457
40.42	1.8506
40.58	1.8555
40.73	1.8604
40.88	1.8652
41.03	1.8701
41.18	1.8750
41.33	1.8799
41.48	1.8848
41.64	1.8896
41.79	1.8945
41.94	1.8994
42.09	1.9043
42.24	1.9092
42.39	1.9141
42.54	1.9189
42.70	1.9238
42.85	1.9287
43.00	1.9336
43.15	1.9385
43.30	1.9434
43.45	1.9482
43.60	1.9531
43.75	1.9580
43.90	1.9629
44.05	1.9678
44.20	1.9727
44.35	1.9775
44.50	1.9824
44.65	1.9873
44.80	1.9922
44.95	1.9971
45.10	2.0020
45.25	2.0068
45.40	2.0117
45.55	2.0166
45.70	2.0215
45.85	2.0264
46.00	2.0313
46.15	2.0361
46.30	2.0410
46.45	2.0459
46.60	2.0508
46.75	2.0557
46.90	2.0605
47.05	2.0654
47.20	2.0703
47.35	2.0752
47.50	2.0801
47.65	2.0850
47.79	2.0898
47.94	2.0947
48.09	2.0996
48.24	2.1045

temp(F)	Vin
48.39	2.1094
48.54	2.1143
48.69	2.1191
48.84	2.1240
48.99	2.1289
49.14	2.1338
49.29	2.1387
49.44	2.1436
49.59	2.1484
49.74	2.1533
49.89	2.1582
50.03	2.1631
50.18	2.1680
50.33	2.1729
50.48	2.1777
50.63	2.1826
50.78	2.1875
50.93	2.1924
51.08	2.1973
51.23	2.2021
51.38	2.2070
51.53	2.2119
51.68	2.2168
51.83	2.2217
51.97	2.2266
52.12	2.2314
52.27	2.2363
52.42	2.2412
52.57	2.2461
52.72	2.2510
52.87	2.2559
53.02	2.2607
53.17	2.2656
53.32	2.2705
53.47	2.2754
53.62	2.2803
53.77	2.2852
53.92	2.2900
54.07	2.2949
54.21	2.2998
54.36	2.3047
54.51	2.3096
54.66	2.3145
54.81	2.3193
54.96	2.3242
55.11	2.3291
55.26	2.3340
55.41	2.3389
55.56	2.3438
55.71	2.3486
55.86	2.3535
56.01	2.3584
56.16	2.3633
56.31	2.3682
56.46	2.3730

temp(F)	Vin
56.61	2.3779
56.76	2.3828
56.91	2.3877
57.06	2.3926
57.21	2.3975
57.36	2.4023
57.51	2.4072
57.66	2.4121
57.81	2.4170
57.97	2.4219
58.12	2.4268
58.27	2.4316
58.42	2.4365
58.57	2.4414
58.72	2.4463
58.87	2.4512
59.02	2.4561
59.17	2.4609
59.33	2.4658
59.48	2.4707
59.63	2.4756
59.78	2.4805
59.93	2.4854
60.09	2.4902
60.24	2.4951
60.39	2.5000
60.54	2.5049
60.69	2.5098
60.85	2.5146
61.00	2.5195
61.15	2.5244
61.30	2.5293
61.45	2.5342
61.61	2.5391
61.76	2.5439
61.91	2.5488
62.06	2.5537
62.21	2.5586
62.36	2.5635
62.52	2.5684
62.67	2.5732
62.82	2.5781
62.98	2.5830
63.13	2.5879
63.29	2.5928
63.44	2.5977
63.59	2.6025
63.75	2.6074
63.90	2.6123
64.06	2.6172
64.21	2.6221
64.36	2.6270
64.52	2.6318
64.67	2.6367
64.83	2.6416

temp(F)	Vin
64.98	2.6465
65.14	2.6514
65.29	2.6563
65.45	2.6611
65.60	2.6660
65.76	2.6709
65.91	2.6758
66.07	2.6807
66.22	2.6855
66.38	2.6904
66.54	2.6953
66.69	2.7002
66.85	2.7051
67.00	2.7100
67.16	2.7148
67.32	2.7197
67.47	2.7246
67.63	2.7295
67.78	2.7344
67.94	2.7393
68.10	2.7441
68.26	2.7490
68.41	2.7539
68.57	2.7588
68.73	2.7637
68.89	2.7686
69.05	2.7734
69.21	2.7783
69.36	2.7832
69.52	2.7881
69.68	2.7930
69.84	2.7979
70.00	2.8027
70.16	2.8076
70.32	2.8125
70.48	2.8174
70.64	2.8223
70.80	2.8271
70.96	2.8320
71.12	2.8369
71.28	2.8418
71.44	2.8467
71.61	2.8516
71.77	2.8564
71.93	2.8613
72.09	2.8662
72.25	2.8711
72.41	2.8760
72.57	2.8809
72.73	2.8857
72.89	2.8906
73.05	2.8955
73.22	2.9004
73.38	2.9053
73.54	2.9102

TABLE 4 — ENTERING AND LEAVING CONDENSER WATER (Continued)

temp(F)	Vin
73.71	2.9150
73.87	2.9199
74.04	2.9248
74.20	2.9297
74.37	2.9346
74.53	2.9395
74.70	2.9443
74.86	2.9492
75.03	2.9541
75.19	2.9590
75.36	2.9639
75.52	2.9688
75.69	2.9736
75.85	2.9785
76.02	2.9834
76.19	2.9883
76.35	2.9932
76.52	2.9980
76.69	3.0029
76.85	3.0078
77.02	3.0127
77.19	3.0176
77.36	3.0225
77.53	3.0273
77.70	3.0322
77.86	3.0371
78.03	3.0420
78.20	3.0469
78.37	3.0518
78.54	3.0566
78.71	3.0615
78.88	3.0664
79.05	3.0713
79.22	3.0762
79.40	3.0811
79.57	3.0859
79.74	3.0908
79.91	3.0957
80.08	3.1006
80.26	3.1055
80.43	3.1104
80.60	3.1152
80.77	3.1201
80.95	3.1250
81.12	3.1299
81.29	3.1348
81.47	3.1396
81.64	3.1445
81.81	3.1494
81.99	3.1543
82.16	3.1592
82.33	3.1641
82.51	3.1689
82.69	3.1738
82.86	3.1787

temp(F)	Vin
83.04	3.1836
83.22	3.1885
83.39	3.1934
83.57	3.1982
83.75	3.2031
83.93	3.2080
84.10	3.2129
84.28	3.2178
84.46	3.2227
84.65	3.2275
84.83	3.2324
85.01	3.2373
85.19	3.2422
85.37	3.2471
85.55	3.2520
85.73	3.2568
85.92	3.2617
86.10	3.2666
86.28	3.2715
86.47	3.2764
86.65	3.2813
86.84	3.2861
87.02	3.2910
87.21	3.2959
87.39	3.3008
87.58	3.3057
87.76	3.3105
87.95	3.3154
88.13	3.3203
88.32	3.3252
88.51	3.3301
88.70	3.3350
88.88	3.3398
89.07	3.3447
89.26	3.3496
89.44	3.3545
89.63	3.3594
89.82	3.3643
90.01	3.3691
90.20	3.3740
90.39	3.3789
90.59	3.3838
90.78	3.3887
90.97	3.3936
91.16	3.3984
91.35	3.4033
91.54	3.4082
91.74	3.4131
91.93	3.4180
92.13	3.4229
92.32	3.4277
92.52	3.4326
92.72	3.4375
92.91	3.4424
93.11	3.4473

temp(F)	Vin
93.31	3.4521
93.51	3.4570
93.70	3.4619
93.90	3.4668
94.10	3.4717
94.30	3.4766
94.50	3.4814
94.70	3.4863
94.90	3.4912
95.11	3.4961
95.31	3.5010
95.52	3.5059
95.72	3.5107
95.93	3.5156
96.13	3.5205
96.34	3.5254
96.54	3.5303
96.75	3.5352
96.96	3.5400
97.17	3.5449
97.38	3.5498
97.59	3.5547
97.80	3.5596
98.01	3.5645
98.22	3.5693
98.43	3.5742
98.64	3.5791
98.86	3.5840
99.07	3.5889
99.29	3.5938
99.50	3.5986
99.71	3.6035
99.93	3.6084
100.14	3.6133
100.36	3.6182
100.58	3.6230
100.79	3.6279
101.01	3.6328
101.23	3.6377
101.45	3.6426
101.67	3.6475
101.89	3.6523
102.11	3.6572
102.33	3.6621
102.55	3.6670
102.78	3.6719
103.00	3.6768
103.22	3.6816
103.45	3.6865
103.67	3.6914
103.89	3.6963
104.12	3.7012
104.35	3.7061
104.58	3.7109
104.81	3.7158

temp(F)	Vin
105.04	3.7207
105.27	3.7256
105.50	3.7305
105.73	3.7354
105.96	3.7402
106.20	3.7451
106.44	3.7500
106.67	3.7549
106.91	3.7598
107.14	3.7646
107.38	3.7695
107.62	3.7744
107.86	3.7793
108.11	3.7842
108.35	3.7891
108.59	3.7939
108.84	3.7988
109.08	3.8037
109.32	3.8086
109.57	3.8135
109.82	3.8184
110.06	3.8232
110.31	3.8281
110.56	3.8330
110.81	3.8379
111.05	3.8428
111.31	3.8477
111.56	3.8525
111.82	3.8574
112.08	3.8623
112.34	3.8672
112.59	3.8721
112.85	3.8770
113.11	3.8818
113.37	3.8867
113.63	3.8916
113.88	3.8965
114.14	3.9014

SECTION 8
DISPLAY

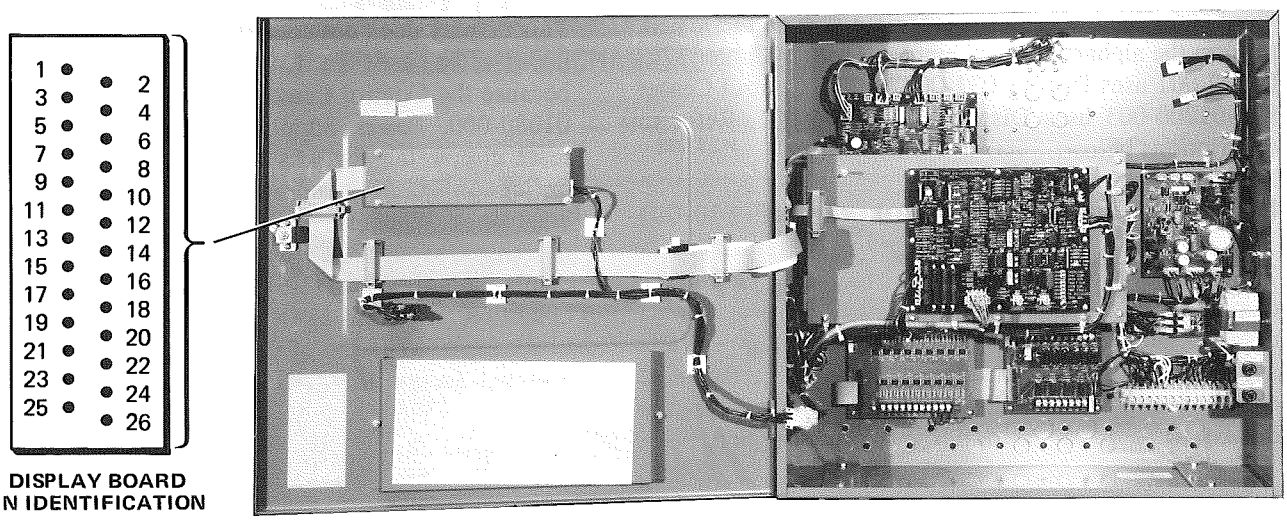


FIG. 35 — CONTROL CENTER DISPLAY BOARD

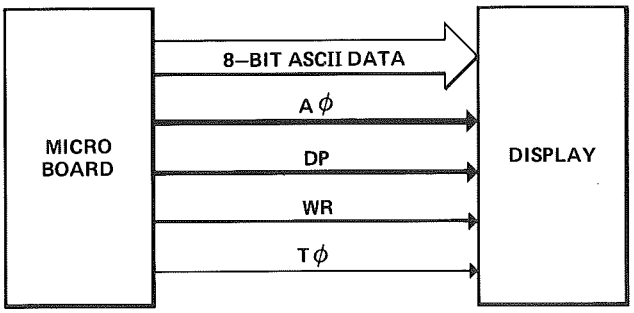


FIG. 36 — VACUUM FLUORESCENT DISPLAY BLOCK DIAGRAM

DISPLAY (Ref. Fig. 35, 36 & 37)

The Control Center Display is a 40 character vacuum fluorescent dox matrix display. It receives a parallel 8-bit ASCII alphanumeric word from the Micro Board. Each 8-bit word represents a character. These words are stored, as a string, in the **RAM & EPROM** on the Micro Board.

When the Micro Board writes to the display, it provides the 8-bit ASCII word along with a **WR** pulse and the **DP** (chip select pulse). The least significant bit (LSB) of the address bus, AØ, must also be driven low to allow the display to accept data from the Micro Board.

In addition to the alphanumeric data that is written to the display, command codes are also written to the display. These codes control the position of the cursor. When the Micro Board writes a command code to the display it provides the code along with a **WR** and **DP** pulse. Also, the LSB of the address bus must be driven high to allow the display to accept a command code.

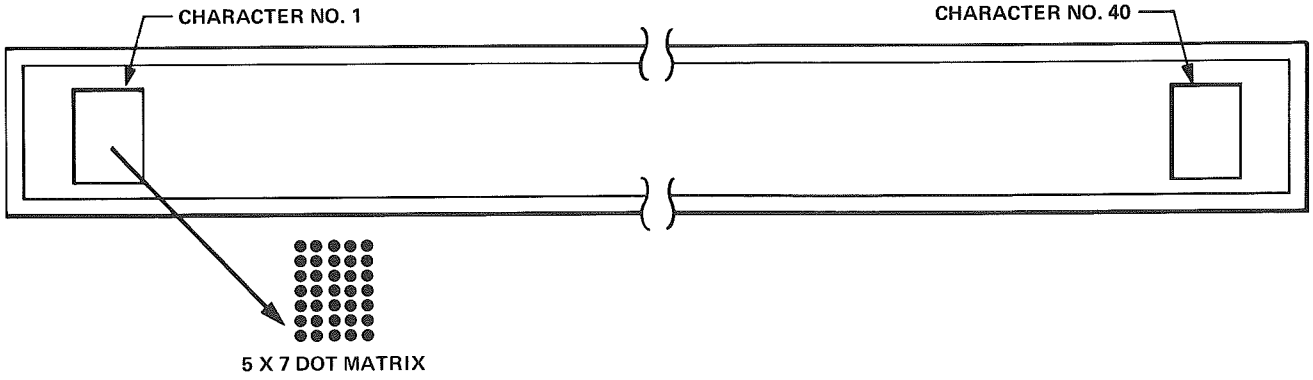


FIG. 37 — VACUUM FLUORESCENT DISPLAY

Forty characters can be simultaneously displayed. Each character is displayed on a 5 x 7 phosphor dot matrix (Fig. 37). A character generator interprets the ASCII word and illuminates the appropriate dots in the matrix to form the alphanumeric character. Control Center 371-01112-001 uses Display 031-00775-000. Control Center 371-01200-003 uses Display 031-00775-001. Refer to descriptions below:

DISPLAY 031-00775-000 (Babcock VF-140-04)

This display contains a reset circuit that resets the display during low-voltage conditions. This prevents display latch-up conditions. Whenever the +5VDC supply to the display decreases to 4.7VDC, the reset circuit causes the display to reset. This causes the display to blank for the duration of the condition.

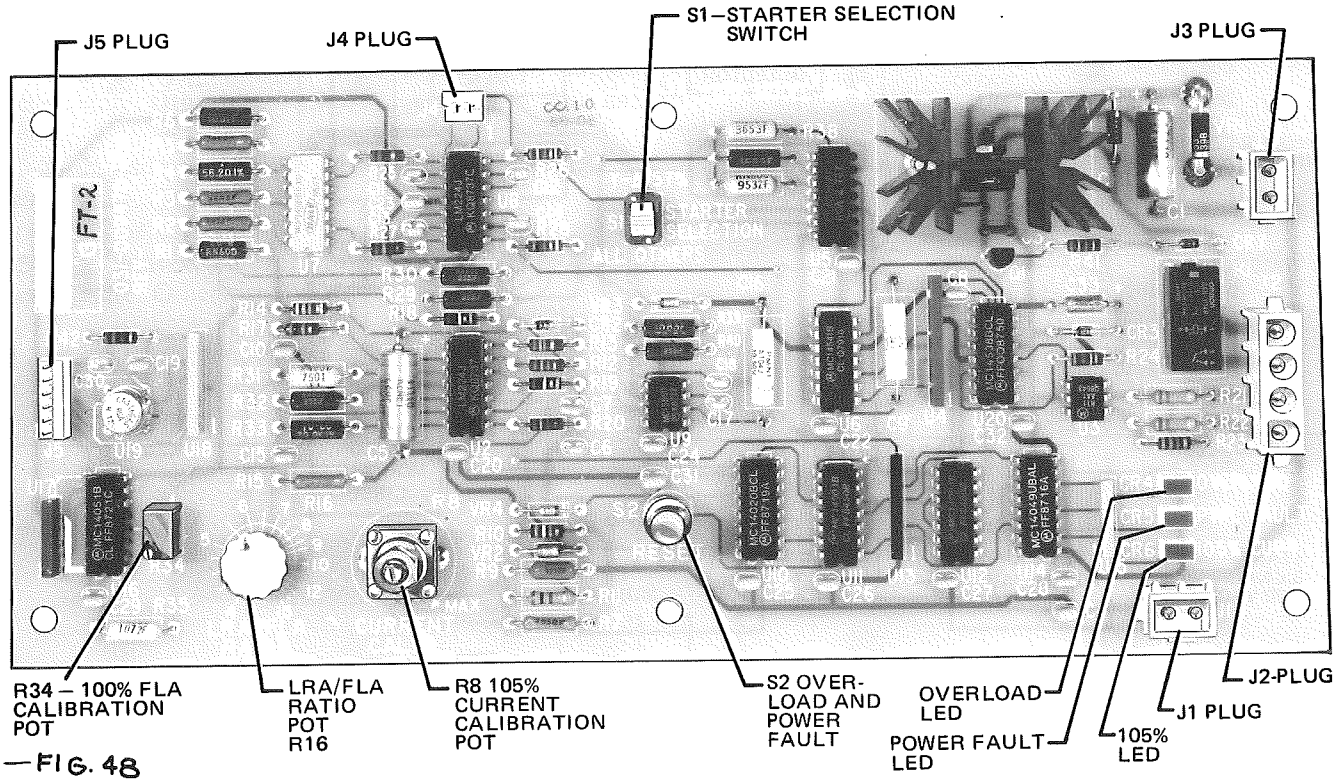
DISPLAY 031-00775-001 (Babcock VF-140-02 or IEE 33383-01)

This display does not contain a reset circuit. Therefore, it must be used in Control Center 371-01200-003 because the Control Center contains power supply 031-01080-000. Power Supply 031-01080-000 contains a reset circuit that outputs a reset pulse to the display during low-voltage conditions to prevent display latch-up conditions. Whenever the +5VDC supply to the display decreases to 4.7VDC, the Power Supply drives the display $\overline{\text{RESET}}$ input (J1-6) from +5VDC to a logic low condition (less than 1VDC). This causes the display to blank for the duration of the condition. Refer to "Power Supply" Section 6.

SECTION 9

CM-2 CURRENT MODULE

FOR ELECTRO-MECHANICAL STARTERS



—FIG. 48

FIG. 38 — CM-2 CURRENT MODULE

SECTION 9

CM-2 CURRENT MODULE (Electro-Mechanical Starter Applications Only) (Ref. Fig. 38 and 39)

If the MicroComputer Control Center is used with an electro-mechanical starter, a CM-2 module is required. It is mounted on the hinged door inside the Control Center. This module provides compressor motor current **OVERLOAD** and **POWER FAULT** protection. Also, the 100% FLA motor current signal is calibrated on this board and multiplexed to the Micro Board for use in current limit control and display purposes.

External to the CM-2, three CT's provide 3Ø motor current signal to a diode bridge. The bridge rectifies the signal and applies it to two parallel variable resistors. The resistors are adjusted to provide a 1VDC (.90-1.05VDC) signal to the CM-2 (J1-1/2) when the compressor motor is conducting 100% FLA. On the CM-2 module, this signal is applied to a power fault detector circuit. When the motor current decreases to 15% FLA the power fault detector initiates a 1 second pulse from the monopulse circuit and simultaneously illuminates the "Power Fault" LED. The LED remains illuminated until manually reset. The 1 second pulse de-energizes K1 relay for 1 second. After 1 second, K1 relay again energizes. This causes a momentary interruption of the "Motor Controller Circuit" located between TB5-53, TB3-16 and Digital Input Board J2-1 and initiates a chiller shutdown. "MON XX:XX AM POWER FAULT-AUTOSTART" is displayed on the keypad display. At the completion of "System Coastdown" the chiller will automatically restart. The power fault detector is inhibited for 75 seconds after the 120VAC start signal 24 is received.

The motor current signal input at J1-2 and J1-1 is also buffered and applied to the 100% FLA calibration potentiometer (R34). The wiper of the POT provides an analog voltage to the multiplexer (MUX). This voltage represents the compressor motor current. The POT is calibrated to provide 4VDC @ 100% FLA. When the Micro Board addresses MUX Channel No. 0, 0VDC is output from the MUX to the Micro Board. This tells the Micro Board that this is an electro-mechanical starter application and the Micro Board skips over MUX Channel 1 thru 6 and addresses MUX Channel No. 7. The motor current analog signal is then output to the micro board where this value is used to determine when "Current Limit" control is to be initiated. Also this value can be displayed as "% FLA" upon operator request.

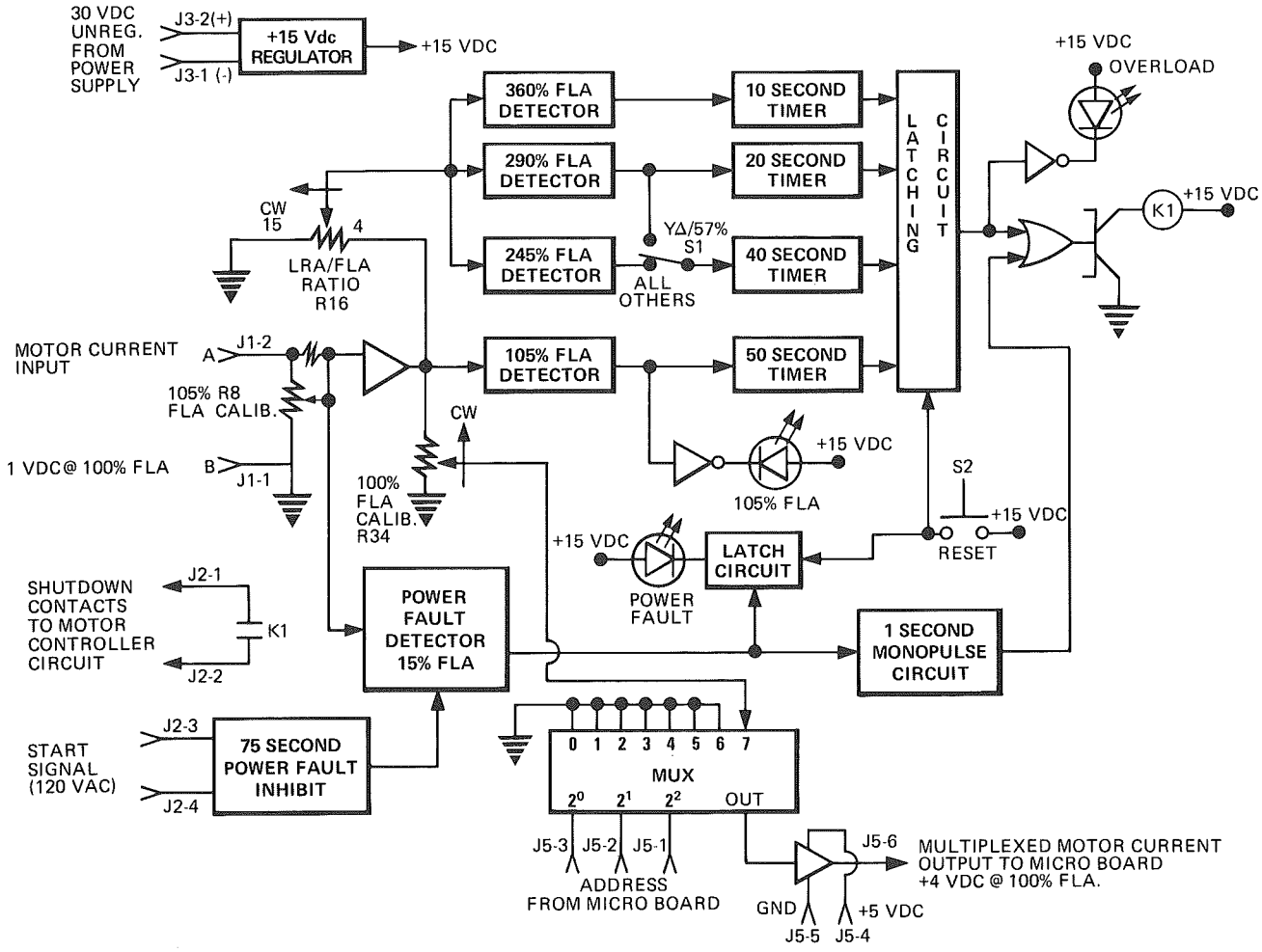


FIG. 39 — CM-2 MODULE BLOCK DIAGRAM

The buffered motor current signal is also applied to the motor current "Overload" circuits. When the motor current reaches 105% FLA the 105% FLA LED illuminates and the 50 second timer is started. When 50 seconds have elapsed, if the current is still at 105% FLA, the timer output causes the latching circuit to latch and illuminate the "OVERLOAD" LED. Simultaneously, K1 relay is de-energized. This opens the "Motor Controller" circuit between Micro Control Center TB5-53, TB3-16 and Digital Input Board J2-1 which initiates a chiller shutdown. "MON XX:XX AM MOTOR CONTROLLER—EXT RESET" is displayed on the keypad display. The "OVERLOAD" LED remains illuminated and K1 relay remains de-energized until the **RESET** pushbutton is pressed.

The remaining overload circuits (245% FLA, 290% FLA, 360% FLA) receive the buffered motor current signal from the **LRA/FLA RATIO** potentiometer. The setting of this POT is determined by $\frac{\text{LRA}}{\text{FLA}}$ = SETTING. If switch S1 is in **ALL OTHERS** (across the line starter) position, when the motor current remains at 245% FLA, 290% FLA, or 360% FLA for 40 seconds, 20 seconds or 10 seconds respectively, the chiller shuts down on "OVERLOAD" as described above. If switch S1 is in the YΔ/57% (YΔ = open/close transition starter; 57% = auto-transformer starter) the 245% FLA detection circuit is disabled.

CM-2 MODULE – INPUTS AND OUTPUTS

J1-1/2—3Ø motor current input. Calibrated by external variable resistors to be 1VDC @ 100% FLA (.90—1.05VDC).

J2-1/2—Dry closure relay (K1) contacts interfaced to the "Motor Controller" circuit TB5-53 to Relay Output Board TB3-16 and digital input board TB3-16. Relay K1 is normally energized causing contacts to be closed. When CM-2 module initiates a **POWER FAULT** shutdown, contacts open for 1 second and then close. When CM-2 module initiates an **OVERLOAD** shutdown, contacts open and remain open until manually reset with S2 **RESET** pushbutton.

J2-3/4—120VAC start signal input from TB5-24. Signal is used to inhibit power fault detection circuit for the first 75 seconds of chiller run time.

J3-1—30VDC Return (GND.)

J3-2—+30VDC unregulated from power supply board.

J5-1—2^2 address bit from Micro Board. +15VDC in active state. Otherwise 0VDC.

J5-2—2^1 address bit from Micro Board. +15VDC in active state. Otherwise 0VDC.

J5-3—2^0 address bit from Micro Board. +15VDC in active state. Otherwise 0VDC.

J5-4—+5VDC from Micro Board.

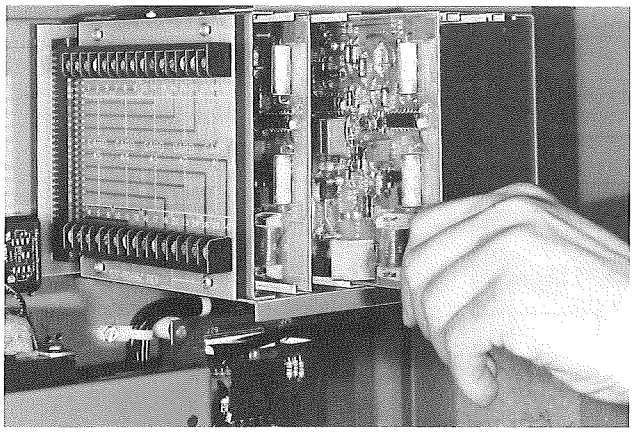
J5-5—+5VDC Return (GND.) from Micro Board.

J5-6—Multiplexed 0-5VDC output of MUX to Micro Board.

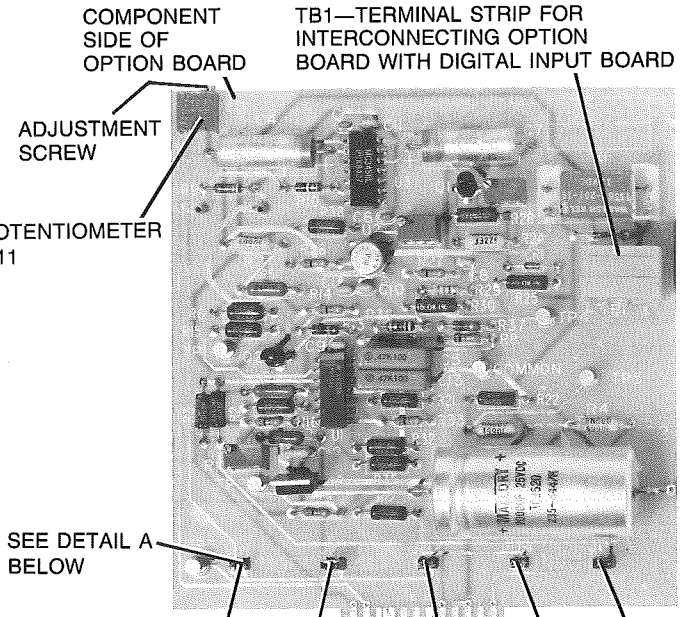
ADDRESS	OUTPUT
000	0VDC (GND)
001	Not Used
010	Not Used
011	Not Used
100	Not Used
101	Not Used
110	Not Used
111	0-5VDC motor current analog signal calibrated on CM-2 module to be +4VDC @ 100% FLA

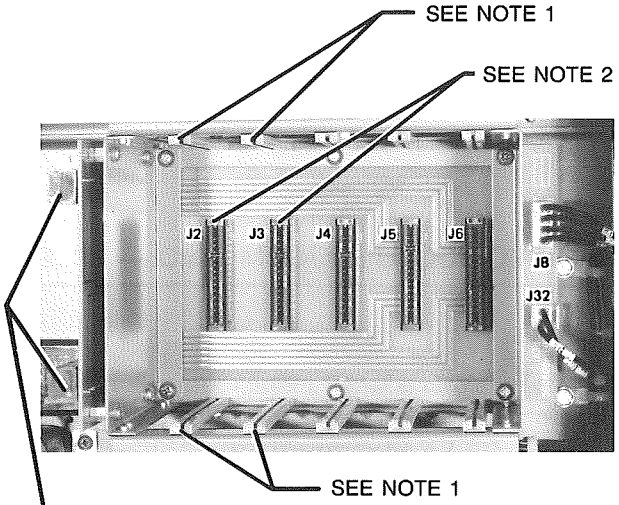
SECTION 9

SECTION 10
REMOTE CURRENT LIMIT/LCWT SETPOINT BOARD



BOARD CARD FILE





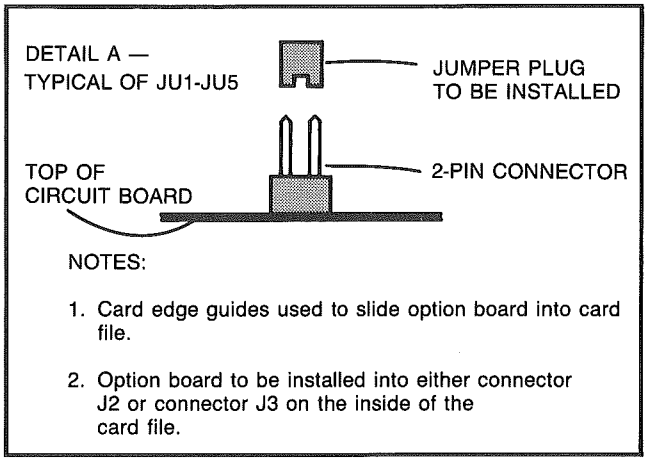


FIG. 40 — CARD FILE AND BOARDS

REMOTE CURRENT LIMIT/LCWT SETPOINT BOARD (Ref. Fig. 40 thru 42)

The Remote Current Limit/LCWT Setpoint Board(s) (031-00814-000) allows the MicroComputer Control Center to accept a 4-20MA, 0-10VDC or a contact closure remote setpoint from an Energy Management System (EMS). This board(s) slides into a card file (031-00827-000) that is field mounted in the upper right corner of the MicroComputer Control Center enclosure. Both the card file and the PC board(s) are Customer options. (For connection to energy management systems).

This board can accept either remote current limit setpoints or remote LCWT setpoints from an EMS. Therefore, if both of these remote setpoint capabilities are desired, two boards (031-00814-000) are required. They are installed in J2 and J3 of the card file. (If only one function is required, the board is installed in J2 or J3).

The EMS (supplied by others) applies a 4-20MA or 0-10VDC or contact closure to the remote current limit/LCWT setpoint board. This board converts the remote signal to Pulse Width Modulation (PWM). The PWM pulse is applied to the appropriate input (TB2-19

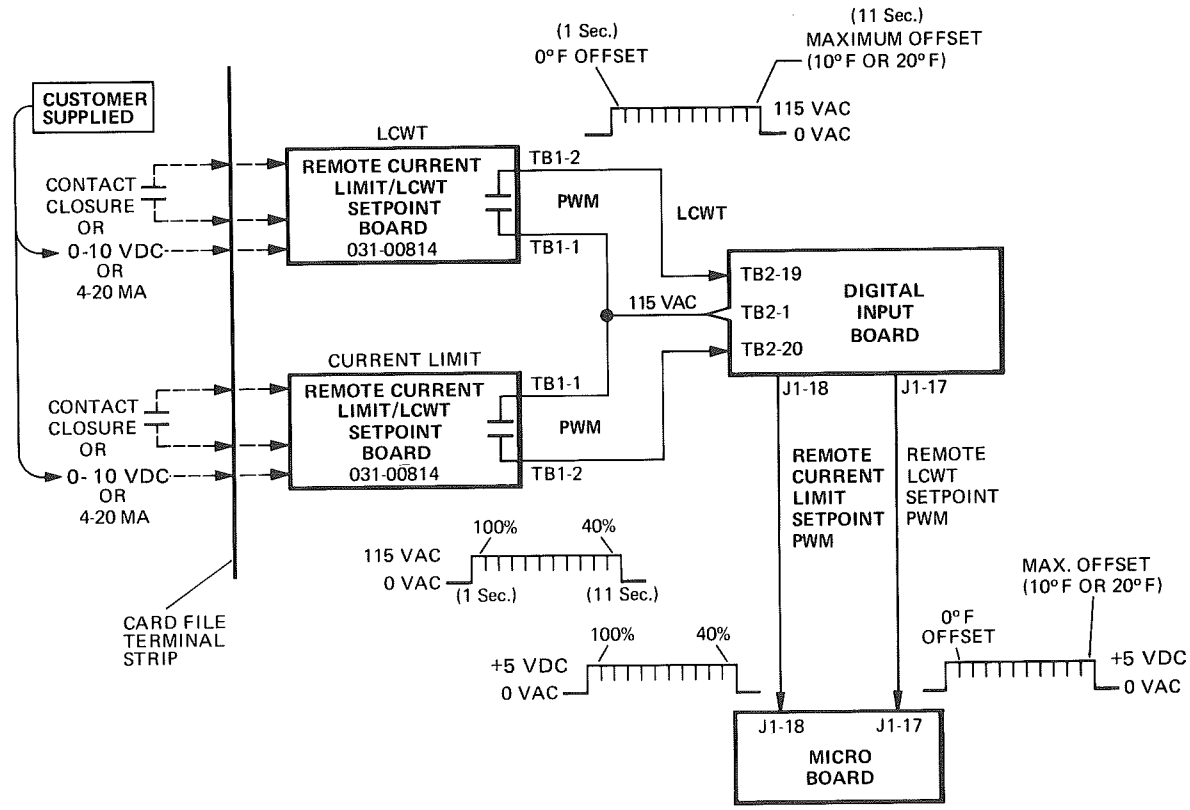


FIG. 41 — REMOTE CURRENT LIMIT/REMOTE LCWT SETPOINT CONFIGURATION

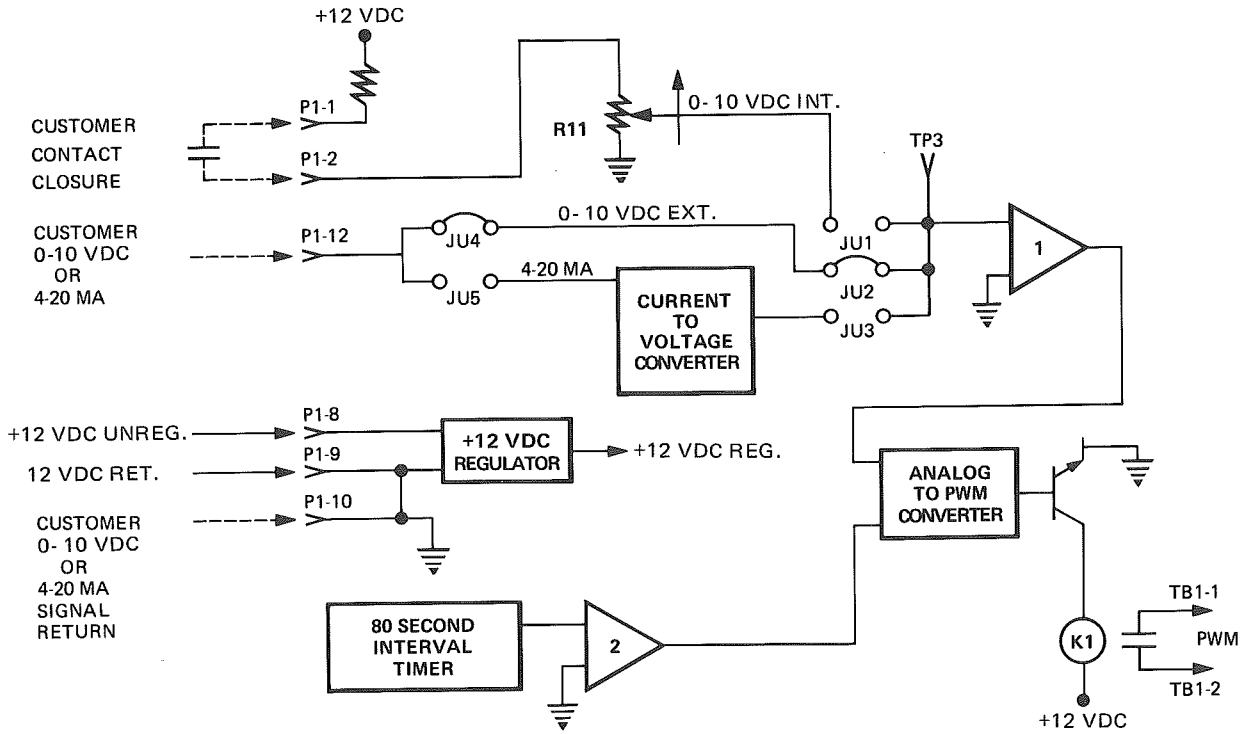


FIG. 42 — REMOTE CURRENT LIMIT/REMOTE LCWT SETPOINT BOARD SIMPLIFIED BLOCK DIAGRAM PART NO. 031-00814-000

for LCWT or TB2-20 for current limit) of the digital input board where the 115VAC PWM pulse is converted to +15VDC PWM pulse for use by the Micro Board. The length of the PWM pulse is 1-11 seconds. Refer to "Inputs & Outputs" section in this book for details of these signals. The board contains five 2-Pin connectors (JU1 thru JU5) that are used to configure the board for the desired input signal type. Two 2-pin jumper plugs are provided with each board. These jumper plugs are installed on the 2-pin connectors as follows:

DESIRED INPUT	INSTALL JUMPERS ON:
4-20 MA	JU5 & JU3
0-10VDC	JU4 & JU2
Contact Closure	JU1 & JU4

The **0-10VDC Customer Input** is applied to the board @ J1-12 and passes thru JU4 and JU2 to amplifier no. 1 where it is conditioned for input to the analog to PWM converter. The 80 second interval timer assures a PWM pulse is only output at a rate of 1 pulse every 80 seconds. The Micro Board ignores pulses received at less than 60 second intervals. The PWM output drives relay K1 which is normally de-energized. When the PWM pulse is output, relay K1 is energized for a period of 1-11 seconds. This applies 115VAC to the digital input board for a period of 1-11 seconds. When the contacts open, 0VAC is applied to the digital input board.

The **4-20MA Customer Input** is applied at J1-12 and passes thru JU5 to the "Current To Voltage Converter" where the 4-20MA signal is converted to a 0-10VDC signal. This signal passes thru JU3 and then continues on the same path as discussed above.

The **"Contact Closure Customer Input"** is applied at J1-1 & J1-2. When the contacts are open, 0VDC is applied to JU1. When the contacts are closed, a voltage (0-10VDC) corresponding to the setting of POT R11 is applied to JU1. This signal passes thru JU1 and continues on the same path as discussed above.

REMOTE CURRENT LIMIT/LCWT SETPOINT BOARD (031-00814-000) – INPUTS

Since this board is installed in the card file, the field supplied 4-20MA, 0-10VDC or contact closure inputs to this board connect to the card file. The field connection terminal strips are located on the left side of the card file. When the board is installed in the card file, all inputs are automatically connected to the board from the card file.

When a board is installed in J2 of the card file, the input connections are:

INPUT		CARD FILE TERMINAL
4-2MA	(+)	28
4-20MA	(−)	30
0-10VDC	(+)	28
0-10VDC	(−)	30
Contact Closure		25 & 26

When a board is installed in J3 of the card file, the input connections are:

INPUT		CARD FILE TERMINAL
4-20MA	(+)	22
4-20MA	(−)	24
0-10VDC	(+)	22
0-10VDC	(−)	24
Contact Closure		19 & 20

When this board is used for remote current limit setpoint, the following is an analysis of the input signals:

4-20MA - 4-20MA input corresponding to a 100% - 40% current limit setpoint (i.e., 4MA = 100% setpoint, 20MA = 40%). To calculate the setpoint for values between 4MA and 20MA use the following formula:

SETPOINT = 100% - [(MA SIGNAL - 4) 3.75%]

For example, an 8MA input would be calculated as follows:

SETPOINT = 100 − [(8 − 4) 3.75]
SETPOINT = 100 − [4 × 3.75]
SETPOINT = 100 − [15]
SETPOINT = 85%

0-10VDC - 0-10VDC input corresponding to a 100%-40% current limit setpoint (i.e., 0VDC = 100% setpoint, 10VDC = 40% setpoint). To calculate the setpoint for values between 0VDC and 10VDC use the following formula:

SETPOINT = 100% − [(DC VOLTAGE SIGNAL) 6%]

For example, a 4VDC input would be calculated as follows:

SETPOINT = 100 − (4 × 6)
SETPOINT = 100 − 24
SETPOINT = 76%

CONTACT CLOSURE - When the customer supplied contacts are open, the input is 0VDC which corresponds to a 100% setpoint. When the contacts are closed, the input is 0-10VDC (100% - 40%) as determined by the setting of POT R11 (located on the front edge of the PC Board). To calculate the setpoint for values between 0VDC and 10VDC (as measured @ TP-3) use the above formula.

When this board is used for remote LCWT setpoint, the following is an analysis of the input signals:

4-20MA - A 4MA input corresponds to the control panel operator programmed "Chilled Liquid Temp" setpoint

(0 °F offset). A 20MA input corresponds to the maximum allowable "Chilled Liquid Temp" setpoint offset (10 °F or 20 °F as programmed). To calculate the setpoint for values between 4MA and 20MA use the following formula:

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

$$\text{SETPOINT} = \text{KEYPAD ENTERED SETPOINT} + \text{°F OFFSET}$$

For example, if the programmed "Remote Reset Temp" range is 10 °F and the programmed "Chilled Liquid Temp" is 45 °F, a 12MA input would be calculated as follows:

$$\text{°F OFFSET} = \frac{(12 - 4)(10)}{16} = 5\,\text{°F}$$

$$\text{SETPOINT} = 45 + 5 = 50\,\text{°F}$$

0-10VDC - A 0VDC input corresponds to the control panel operator programmed "Chilled Liquid Temp" setpoint (0 °F offset). A 10VDC input corresponds to the maximum allowable "Chilled Liquid Temp" setpoint offset (10 °F or 20 °F as programmed). To calculate the setpoint for values between 0VDC and 10VDC use the following formula:

$$\text{°F OFFSET} = \frac{\text{(DC VOLTAGE SIGNAL) (REMOTE RESET TEMP RANGE)}}{10}$$

$$\text{SETPOINT} = \text{KEYPAD ENTERED SETPOINT} + \text{°F OFFSET}$$

For example, if the programmed "Remote Reset Temp" range is 10 °F and the programmed "Chilled Liquid Temp" is 45 °F, a 5VDC input would be calculated as follows:

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

$$\text{SETPOINT} = 45 + 5 = 50\,\text{°F}$$

CONTACT CLOSURE = When the customer supplied contacts are open, the input is 0VDC which corresponds to the control panel operator programmed "Chilled Liquid Temp" setpoint (0 °F offset). When the contacts are closed the input is 0-10VDC as determined by the setting of POT R11 (located on the front edge of the PC board). A 10VDC input corresponds to the maximum allowable "Chilled Liquid Temp" setpoint offset (10 °F or 20 °F as programmed). To calculate the setpoint for values between 0VDC and 10VDC (as measured @ TP-3) use the above formula.

REMOTE CURRENT LIMIT/LCWT SETPOINT BOARD (031-00814-000) – OUTPUTS

When this board is used for remote current limit setpoint, the output is as follows:

TB1-1/2 - A relay contact closure Pulse Width Modulated (PWM) signal that is 1-11 seconds in length. A 1 second closure corresponds to a setting of 100% FLA. An 11 second closure corresponds to a setting of 40% FLA. All settings between 1 second and 11 seconds are linearly scaled. To calculate the setpoint for values between 1 second and 11 seconds use the following formula:

$$\text{SETPOINT} = 100\%\ [(\text{PULSEWIDTH} - 1)\ 6\%]$$

For example, a 4 second closure would be calculated as follows:

$$\text{SETPOINT} = 100 - [(4\text{-}1)\ 6]$$

$$\text{SETPOINT} = 100\text{-}18$$

$$\text{SETPOINT} = 82\%$$

When this board is used for remote LCWT setpoint, the output is as follows:

TB1-1/2 - A relay contact closure Pulse Width Modulation (PWM) signal that is 1-11 seconds in length. A 1 second closure corresponds to the control panel operator programmed "Chilled Liquid Temp" setpoint (0 °F offset). An 11 second closure corresponds to the maximum allowable "Remote Reset Temp Range" value (10 °F or 20 °F). Refer to description of "Remote Reset Temp Range". All setting between 1 second and 11 seconds are linearly scaled. To calculate the setpoint for values between 1 second and 11 seconds use the following formulas:

$$\text{°F OFFSET} = \frac{\text{(PULSEWIDTH - 1) (REMOTE RESET TEMP RANGE)}}{10}$$

$$\text{SETPOINT} = \text{KEYPAD ENTERED SETPOINT} + \text{°F OFFSET}$$

For example, if the programmed "Remote Reset Temp Range" is 10 °F and the programmed "Chilled Liquid Temp" is 45 °F, a 5 second closure would be calculated as follows:

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

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

$$\text{°F OFFSET} = \frac{40}{10}$$

$$\text{°F OFFSET} = 4\,\text{°F}$$

$$\text{SETPOINT} = 45\,\text{°F} + 4\,\text{°F}$$

$$\text{SETPOINT} = 49\,\text{°F}$$

SECTION 10

SECTION 11
SYSTEM CALIBRATION PROCEDURES

SYSTEM CALIBRATION PROCEDURES

In the following calibration checks and procedures, it will be necessary to manually operate the slide valve to achieve the desired motor current. When the slide valve **LOAD** key is first pressed in **SERVICE** operating mode, a 10 minute window is opened in which the Micro Board software will allow the motor current to be increased to a maximum of 107% FLA. When 10 minutes have elapsed, the software will automatically impose current limit at 100% FLA thereafter. Upon completion, always return to **LOCAL** or **REMOTE** mode.

ELECTRO-MECHANICAL STARTER APPLICATIONS:

The MicroComputer Control Center is delivered from the factory fully calibrated. However, the calibration must be checked at start-up. If the CM-2 module is replaced, the calibration of the CM-2 module must be checked.

Check calibration as follows:

1. Run chiller. Read compressor motor current in ØA or ØB or ØC with clamp-on ammeter. Apply ammeter to highest phase.
2. Manually operate slide valve if necessary and run compressor motor to 100% FLA as indicated by the clamp-on ammeter.
3. With the motor running at 100% FLA, press % **MOTOR AMPS/% SLIDE VALVE** display key on keypad. "Motor Current = 100% FLA" should be displayed.
4. Run compressor motor to 105% FLA as indicated by the clamp-on ammeter. The 105% FLA LED on the CM-2 module should illuminate.
5. If system doesn't operate as above, calibration is necessary.

To calibrate, proceed as follows:

1. Calculate $\frac{LRA}{FLA}$ ratio. LRA = Compressor Motor Locked Rotor Amps. FLA = Job Full Load Amps. On CM-2 Module, set switch **R16** (LRA/FLA Ratio) to this value.
2. On CM-2 Module, set switch 1 (Starter Selection) to correct position. UP = YΔ/57% (Wye-Delta or Auto-Transformer) starter. Down = All other (Across-The-Line) starters.
3. Program % **CURRENT LIMIT** to "100% FLA." Program **PULL DOWN DEMAND** setpoint to "000 minutes @ 100% FLA."
4. Apply clamp-on ammeter to highest phase of compressor motor current wires (ØA, ØB, or ØC).
5. If necessary, manually operate the slide valve and run compressor motor to 100% FLA as indicated by the clamp-on ammeter.
6. Connect digital voltmeter to CM-2 module J1-2 (+) to J1-1 (−).
7. With the compressor motor running @ 100% FLA, the Digital Voltmeter should read 1 VDC (.90 VDC − 1.05 VDC). This is the voltage drop across the "RES" variable resistors.
8. If the voltage drop across the "RES" variable resistors is not correct, they must be adjusted. Use the formulas below to calculate the correct resistance. Then adjust both resistors equally such that the combined resistance equals the calculated value.

Motor Voltage	FLA	CT Ratio	Resistance
208-600	65-111 112-224 225-829 830-1790	200:1 350:1 700:1 1400:1	$R = \frac{1.282 \text{ (CT Ratio)}}{FLA}$
2300-4160	11-18	200:1	$R = \frac{0.247 \text{ (CT Ratio)}}{FLA}$
	19-37	200:1	$R = \frac{0.370 \text{ (CT Ratio)}}{FLA}$
	38-123	200:1	$R = \frac{0.740 \text{ (CT Ratio)}}{FLA}$
	124-264	350:1	

NOTE: This completes the recommended field calibration. Field calibration of the CM-2 module is not practical and not recommended. Although the following procedure can be used for field calibrations of the CM-2. Nuisance "Overload" or "Power Fault" shutdowns can occur during the procedure.

1. Manually operate the slide valve to run the compressor motor @ 105% FLA. (As indicated by clamp-on ammeter on highest phase).
2. Adjust POT **R8** on CM-2 module until "105%" LED just illuminates.
3. Manually operate the slide valve to run the compressor motor @ 100% FLA (as indicated by clamp-on ammeter on highest phase).
4. Monitor Keypad "% MOTOR CURRENT" key and adjust CM-2 module POT **R34** until Keypad Display reads MOTOR CURRENT = 100% FLA.

LIQUID COOLED SOLID STATE STARTER APPLICATIONS:

The AC power line **supply voltage range** and chiller **full**

load amps value must be checked at the control center keypad at system start-up. If the proper supply voltage range is not programmed, the control center will shut-down on "Low Line Voltage" or "High Line Voltage". If the proper full load amps are not programmed, current limit control will not occur at the proper current levels. For security reasons, a special access code is required to program these setpoints. To prevent unauthorized personnel from changing these setpoints, this access code does not appear in any other published document. Refer to the programming procedure below.

The LCSSS Logic Board **start current** and **overload** POTS are calibrated as delivered from the factory. However, they must be checked at system start-up. If the LCSSS Logic Board is field replaced, field calibration is necessary. Refer to procedure below.

Programming the Undervoltage and Chiller Full Load Amps (FLA) Setpoints (Solid State Starter Applications Only):

1. Press **ACCESS CODE** key.
2. ENTER VALID ACCESS CODE _ _ _ _ is displayed.
3. Using entry keys enter **1 3 8 0**.
4. As each digit is entered, the characters **Y O R K** are displayed. NOTE: If digits other than **1 3 8 0** are entered, **Y O R K** is still displayed.
5. Press **ENTER** key.
   NOTE: If digits other than **1 3 8 0** were entered in Step No. 4, INVALID ACCESS CODE is displayed when the **ENTER** key is pressed. If this occurs, enter the correct access code (1380) and proceed.
6. ACCESS TO PROGRAM KEY AUTHORIZED is displayed. NOTE: Unless terminated by pressing the **ACCESS CODE** key again, the operator will have access to the **PROGRAM** key for 10 minutes. When 10 minutes have elapsed, access to program key will be automatically disabled and the operator must return to Step No. 1 to gain access.
7. Press **PROGRAM** key.
8. PROGRAM MODE, SELECT SETPOINT is displayed.
9. When the voltage range and chiller full load amps have been entered, per instructions below, press the **ACCESS CODE** key to exit program mode and terminate access to program mode. ACCESS TO PROGRAM MODE DISABLED is displayed. The control center will automatically return to LOCAL, REMOTE or SERVICE mode . . . . whichever was last selected.

To enter **UNDERVOLTAGE** setpoints = (SOLID STATE STARTER APPLICATIONS ONLY)

1. Press and release **SSS MOTOR CURRENT/VOLTS** key. The previously selected voltage range is displayed as follows:

   SUPPLY VOLTAGE RANGE 200-208
   or
   SUPPLY VOLTAGE RANGE 220-240
   or
   SUPPLY VOLTAGE RANGE 380
   or
   SUPPLY VOLTAGE RANGE 400
   or
   SUPPLY VOLTAGE RANGE 415
   or
   SUPPLY VOLTAGE RANGE 440-480
   or
   SUPPLY VOLTAGE RANGE 550-600
   or
   SUPPLY VOLTAGE RANGE DISABLED

2. Press and release the **ADVANCE DAY/SCROLL** key to scroll to the desired voltage range. Each time the **ADVANCE DAY/SCROLL** key is pressed, a different voltage range is displayed.
   NOTE: The undervoltage cutout function can be disabled by scrolling to SUPPLY VOLTAGE RANGE DISABLED. This safety should not be arbitrarily disabled.
3. Press ENTER key.

To Enter Chiller Full Load Amps - (Solid State Starter Applications Only):

1. Press and release **% CURRENT LIMIT** setpoint key. The following program prompt message is displayed:
   CURRENT LIMIT = XXX% FLA: MTR CUR = _ _ _ _ FLA
2. Use entry keys to enter the desired current limit value and a proper chiller (job) full load amps. The chiller (job) full load amp value is found on the motor data plate or sales order.
3. Press and release **ENTER** key.
   PROGRAM MODE, SELECT SETPOINT is displayed.

Check calibration as follows:
START CURRENT - Proper starting current is 45% × Delta LRA. For example, if the motor nameplate Delta LRA (Locked Rotor Amps) is 2500A, the proper starting current is .45 × 2500 = 1125A. To check, start chiller and monitor motor current with clamp-on ammeter or monitor current with **SSS MOTOR CURRENT/VOLTS** keypad key (use in conjunction with display hold key).

OVERLOAD -

1. Ascertain correct **FLA** value is programmed @ keypad.
2. Run chiller.
3. Monitor highest phase (ØA, ØB, or ØC) of compressor motor current with clamp-on ammeter.
4. Monitor highest phase of compressor motor current using keypad **SSS MOTOR CURRENT/VOLTS** key in conjunction with **DISPLAY HOLD** key.
5. Display should read the same as clamp-on ammeter ± 5%. If it doesn't, refer to Solid State Starter troubleshooting Form 160.46-OM3.1.
6. Monitor highest phase of compressor motor current on keypad display using **SOLID STATE STARTER MOTOR CURRENT/VOLTS** key with **DISPLAY HOLD** key.
7. Manually operate slide valve to run compressor motor to 105% FLA as indicated by the highest phase on the display.
8. Solid State Starter Logic Board 105% LED should just illuminate.
9. If system doesn't operate per above, calibration is necessary.

To calibrate, proceed as follows:

START CURRENT -

1. Monitor Motor Current using a.) a clamp-on ammeter, or b.) **SOLID STATE STARTER MOTOR CURRENT/VOLTS** keypad key with **DISPLAY HOLD** key.
2. Start chiller.
3. When motor first begins to turn, adjust LCSSS Logic Board **START CURRENT** POT (R38) to achieve proper starting current **Clockwise** increases current, **Counter-clockwise** decreases current. Proper start current is 45% × Delta LRA. (NOTE: If monitoring the motor current on the display, there is a 2 second delay on display update.) Tighten R38 locking nut.
4. Restart chiller and check starting current.

OVERLOAD -

1. Ascertain correct **FLA** value is programmed at keypad.
2. Run chiller.
3. Monitor highest phase of compressor motor current on keypad display using **SSS MOTOR CURRENT/VOLTS** key with **DISPLAY HOLD** key.
4. Monitor highest phase of compressor motor current with clamp-on ammeter.
5. Display should read the same as clamp-on ammeter ± 5%. If it doesn't, refer to Solid State Starter troubleshooting Form 160.46-OM3.1.
6. Monitor highest phase of compressor motor current on keypad display using **SSS MOTOR CURRENT/VOLTS** key with **DISPLAY HOLD** key.
7. Manually operate slide valve to run compressor motor to 105% FLA as indicated by the highest phase on the display.
8. Adjust LCSSS Logic Board **OVERLOAD** POT (R44) until LCSSS Logic Board 105% LED just illuminates.

Tighten R44 locking nut.

9. Re-check calibration.

ALL APPLICATIONS:

The **SLIDE VALVE POSITION CIRCUIT** (Ref. Fig. 34) is fully calibrated as delivered from the factory. However, it must be checked at start-up. If the slide valve pot or micro board is replaced, field calibration is necessary. The slide valve position circuit consists of the slide valve pot and two calibration pots (R58 & R59) located on the micro board.

Check calibration as follows: (Ref. Fig. 34)

1. Remove slide valve potentiometer cover plate.
2. Run chiller.
3. Monitor slide valve position on keypad display using **% MOTOR AMPS/% SLIDE VALVE** display key and **DISPLAY HOLD** key.
4. In "Service" operating mode, press slide valve **LOAD** key on keypad.
5. While slide valve is loading, monitor slide valve position on keypad display and shaft of slide valve potentiometer.
6. Allow slide valve to fully load. The slide valve will be fully loaded when the slide valve potentiometer shaft no longer turns.

NOTE: Under certain operating conditions, the software could impose a high or low pressure slide valve load limit when the condenser pressure reaches 251.3 PSIG or evaporator pressure reaches 56.2 PSIG. If either of these conditions develop, modify local operating conditions to allow the slide valve to fully load.

7. When the slide valve reaches the fully loaded position, the keypad display should indicate a position of 100%.

8. Press slide valve **UNLOAD** key on keypad.

9. The slide valve should fully unload.

NOTE: Early production units equipped with version 4.A EPROM prevent the slide valve from fully unloading under certain operating conditions (Refer to 160.47-O1.1). If this occurs, it will be necessary to place the slide valve in **AUTO** mode and shutdown the chiller to cause slide valve to fully unload.

10. As the slide valve unloads, monitor the slide valve potentiometer shaft and the slide valve position on the keypad display.

11. The slide valve will be fully unloaded when the slide valve potentiometer shaft no longer turns.

12. The display should indicate 0% slide valve position when the slide valve is fully unloaded.

If the operation does not conform to above, calibration is necessary.

To calibrate, proceed as follows: (Ref. Fig. 34)

NOTE: If the slide valve pot is field replaced, perform the entire calibration procedure (coarse and fine). However, if only the Micro Board is field replaced, it is not necessary to perform the coarse adjustment, proceed with the fine adjustment. The instructions include procedures to load and unload the slide valve while the chiller is running. An alternate method of loading and unloading the slide valve is provided at the end of the adjustment procedure. This alternate method allows the slide valve to be loaded and unloaded while the chiller is shut down.

COARSE ADJUSTMENT (WITH CHILLER RUNNING)

1. Fully unload the slide valve.

   In "SERVICE" operating mode, press the slide valve **UNLOAD** key. Monitor the slide valve potentiometer shaft. The slide valve is fully unloaded when the shaft no longer rotates.

2. Shut down chiller.

3. Disconnect J20 plug (slide valve pot interface cable) from the Micro Board.

4. Using digital ohmmeter, measure resistance of slide valve pot by connecting ohmmeter in PINS 3 and 4 of plug removed in Step 2. With the slide valve fully unloaded the resistance should be 965 OHMS (± 10 OHMS).

   If not, loosen retainer clips that secure the slide valve pot. Rotate the pot clockwise or counterclockwise to achieve correct resistance value. Tighten each slide valve retainer clip screw a little at a time in a sequential fashion so that pot is tight against frame with equal pressure.

5. Reconnect plug removed in Step 2 to Micro Board J20.

FINE ADJUSTMENT (WITH CHILLER RUNNING)

1. Fully unload the slide valve.

   In "SERVICE" operating mode, press the slide valve **UNLOAD** key. Monitor the slide valve potentiometer shaft. The slide valve is fully unloaded when the shaft no longer rotates.

2. While monitoring the slide valve position with the **% MOTOR AMPS/% SLIDE VALVE** keypad key, adjust micro board pot R59 (SVL 0%) until displayed slide valve position just equals "0%".

   If the displayed slide valve position already equals "0%", back off pot R59 to "1%" and then adjust to "0%".

SECTION 11

3. Fully load slide valve.

   In "SERVICE" operating mode, press the slide valve **LOAD** key to cause the slide valve to fully load. Monitor the slide valve potentiometer shaft. The slide valve is fully loaded when the shaft no longer rotates.

4. While monitoring the slide valve position with the **% MOTOR AMPS/% SLIDE VALVE** keypad key, adjust micro board pot R58 (SVH, 100%) until displayed slide valve position just equals "100%".

   If the displayed slide valve position already equals "100%", back off pot R58 to "99%" and then adjust to "100%".

5. Repeat "Calibration Check" per above. Because of the interaction of micro board pots R58 and R59, it might be necessary to perform "Fine Adjustment" several times until desired results are achieved. At that time seal pots R58 and R59 adjusting screws with "GLYPTAL" or equivalent sealer.

The following procedure allows the serviceman to manually operate the slide valve from fully open to fully closed while the chiller is shut down.

1. Remove 115VAC Control Power from MicroComputer Control Center.

2. Remove Wire #23 from left-hand side to TB6-23 in MicroComputer Control Center. Wrap electrical tape around the terminal of the removed wire and secure temporarily to prevent contact with cabinet or electrical terminals. This allows the slide valve equalizer solenoid valve (2SOL) to remain de-energized (closed) during the procedure.

3. Apply 115VAC Control Power to the MicroComputer Control Center.

4. Place MicroComputer Control Center in **SERVICE** Mode and place slide valve in **HOLD**.

5. Refer to following figure:

   TO LOAD SLIDE VALVE:

   a.) Connect a hose from Schrader Valve 1 to 3.

   b.) Using a hand oil pump, pump oil in Schrader Valve 2.

   TO UNLOAD SLIDE VALVE:

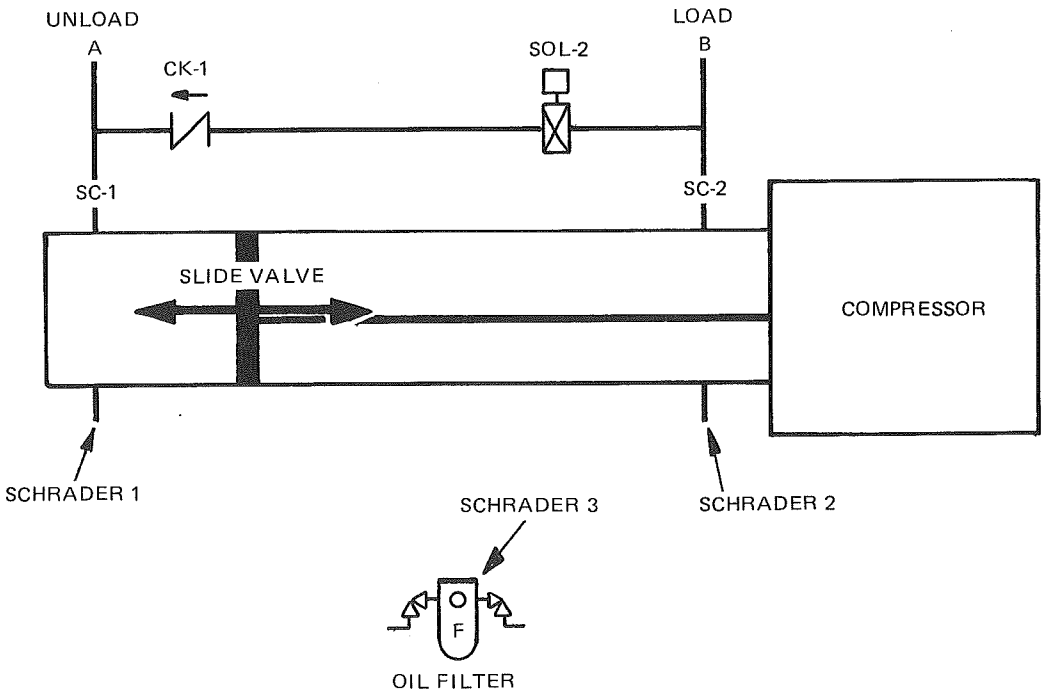
   a.) Connect a hose from Schrader Valve 2 to 3.

   b.) Using a hand oil pump, pump oil in Schrader Valve 1.

6. Remove 115VAC power from MicroComputer Control Center.

7. Connect wire #23 (Removed in Step 2) to TB6-23.

8. Apply 115VAC Control Power to MicroComputer Control Center.



SECTION 12
TESTING

DIAGNOSTIC SOFTWARE – YORK MICRO-COMPUTER CONTROL CENTER

The diagnostic software consists of six tests. These tests are Ram test, A/D test, display test, keyboard test, digital input test, and digital output test. The diagnostic software is stored in the same memory as the operating program. To enable the diagnostic, enter **SERVICE** mode and place the enable/disable jumper plug (on Micro Board) in the **ENABLE** position. To disable the diagnostic, leave **SERVICE** mode and place the enable/disable jumper plug in the **DISABLE** position. After the diagnostic is enabled, all further service technician interaction is done on the front panel keypad. When the diagnostic is enabled, the service technician is presented with a menu from which he can choose the test to be performed. The menu and six tests are described as follows:

CAUTION: Before performing this test, remove the jumper between terminals 24 and 25 on TB5. This disables the compressor motor. Upon completion of the test, replace the jumper between terms 24 and 25 on TB5.

MENU

Upon entering the diagnostic software the technician will observe a menu from which one of the six tests may be chosen. Press **9** key to view all five tests. The tests may be chosen by selecting the numeric key listed with the test. The keys and tests are as follows:

0—Ram test
1—A/D test
2—Display test
3—Keyboard test
4—Digital input test
5—Digital output test

The numeric keys are located under "Entry" on the front of the control center.

RAM TEST

This test will check all ram locations in the system. The ram consists of three areas:

EXT—external ram
RTC—ram internal to the clock
INT—ram internal to the MicroComputer

After the test is completed the display will show the three areas with either a pass or fail. A failed condition would indicate that the Micro Board should be replaced. Press any key after the test is over to return to the main menu.

A/D TEST

This test will allow the technician to select any of the analog input channels and display the voltage on that channel on the display. The display will show the voltage found on that channel in volts (0-5.000V). Upon entering this test the technician will be asked to push one of the display function keys to select a group of analog channels; from here an individual channel may be selected. The analog channels associated with the display keys are as follows:

CHILLED LIQUID TEMPS
ECWT—entering chilled water pressure
*LCWT—leaving chilled water temp

*The voltage displayed is that which is measured at MUX IC U53 PIN #7; not input connector J19-10.

REFRIGERANT PRESSURES
COND—condenser pressure
EVAP—evaporator pressure

OIL/FILTER PRESSURE
FOP—filter oil pressure (pressure @ input to oil filter)
LOP—low oil pressure (pressure @ input to compressor)

OPTIONS
Not Used

SSS MOTOR CURRENT/VOLTS
0 = line voltage range and starter size (ammeter scale) analog voltage
1 = 100% and 104% current limit command analog voltage
2 = ØC line voltage (C-A) analog voltage
3 = ØB line voltage (B-C) analog voltage
4 = ØA line voltage (A-B) analog voltage
5 = ØA motor current analog voltage
6 = ØB motor current analog voltage
7 = ØC motor current analog voltage

CONDENSER LIQUID TEMPS
ECNWT—Entering condenser water temp
LCNWT—Leaving condenser water temp

PRINT
DISCGT—Discharge Temp
OT—Oil Temp

% MOTOR AMPS/% SLIDE VALVE

- SV—Slide Valve
- To display % motor amps press **SSS MOTOR CURRENT/VOLTS** key, then press #7 **ENTRY** key.

OPERATING HOURS/START COUNTER
Not Used

After tests are completed, press "*" key to return to main menu.

DISPLAY TEST

This test will make sure the display is functioning. Upon entering this test the technician will be instructed to push a key to start the test. Once the test has started the technician will see different characters scroll past on the display. Any key may be pushed after the test has started to return to the main menu.

KEYPAD TEST

This test allows the service technician to make sure that all of the keys on the keypad are functioning. Upon entering this test the technician will be instructed to press any of the keys. Upon pressing any of the keys a description of that key will be displayed on the display to determine if the keypad is working correctly. To exit this routine and return to the main menu the "*" key must be pushed.

DIGITAL INPUT TEST

This test will monitor the digital input lines to the system and determine if the lines and their associated devices are functioning properly. A mnemonic for each line will be displayed with its associated state (1 if the line is high or 0 if the line is low). The lines monitored and their associated mnemonics are:

STOP—stop line
MOCON—motor controller
AUX—auxilliary digital input
START—start line
HP—high pressure
DFS—separator oil level switch
FLS—flow switch
SYSCY—remote/local cycling
MULCY—multi unit cycling
LEP—low evaporator pressure (brine application)
LWT—low water temp
J54—chilled water pump program jumper
JP5—current unbalance program jumper
JP6—prerun program jumper
RSTRT—remote start switch
UV—untervoltage
RSTOP—remote stop switch
RLCWT—remote LCWT setpoint
RCURR—remote current setpoint

After tests are completed, press "*" key to return to main menu.

DIGITAL OUTPUT TEST

This routine allows the technician to monitor and change the state of the digital output lines. The technician will see an output line listed along with its present state (1 if the line is high or 0 if the line is low). At this time if the technician wishes to change the state of the line, press 1 to make the line high or 0 to make the line low. To leave this routine to return to the main menu press "*". The digital output lines monitored are:

MOTOR STOP	SAFETY SD
OIL/WATER COOLER SOL (NOT USED)	CYCLING SD
	MOTOR START
OIL EDUCTOR SOLENOID*	SLIDE VALVE LOAD
OIL LINE SOL	SLIDE VALVE UNLOAD
OIL PUMP (NOT USED)	
CHILLED WATER PUMP	EMS (REMOTE MODE READY TO START)

*Not used on version 4.A EPROM

SECTION 13
TROUBLESHOOTING

INTRODUCTION

The failures or problems that could be encountered in the MicroComputer Control Center can be placed in six major categories as follows:

- Digital Inputs
- Relay Outputs
- Keypad
- Analog Inputs
- EMI Noise
- Remote Setpoint Interface (4-20MA, 0-10VDC, Contact Closure)

Each category requires a specific procedure to resolve the problem. These procedures direct the troubleshooter along the path that leads to the identification of the problem. The troubleshooter should understand the operation of the MicroComputer Control Center and the function of each major component and PC board contained within the cabinet. Also the troubleshooter must understand the system interface and is able to utilize unit wiring diagrams to follow signal flow throughout the system.

Several levels of documentation are required for the troubleshooting process. The Control Center wiring diagram, supplied with every MicroComputer Control Center is the top level document. It provides the overall wiring and configuration. Sections of this instruction provide the required lower levels. Specifically, block diagrams provide signal flow and simplified representations of PC board circuitry. The "Inputs and Outputs" of each board provide details of the required voltage levels at all connectors on the PC boards.

SYSTEM START-UP CHECKLIST

- Verify configuration of Micro Board program jumpers
  - Refer to Fig. 31, page 25.
- Start Real-Time Clock
  - Refer to micro board program jumper J57, Fig. 31, page 25.
- Program Setpoints
  - Refer to Operation Instruction Form 160.47-O1.1.
- Verify calibration (Ref. "System Calibration Procedures") page 49.
- **ELECTRO-MECHANICAL STARTER APPLICATIONS** – CM-2 Module
  - 100%
  - 105%
  - $\frac{\text{LRA}}{\text{FLA}}$ Ratio Pot-R16
  - Starter selection switch – S1
- **LCSSS APPLICATIONS**
  - Full load amps setpoint
  - Supply voltage range setpoint
  - LCSSS Logic Board "Start Current" and "Overload"
  - LCSSS Logic Board 300V/600V AC Power Line Jumper
- **ALL APPLICATIONS**
  - Slide valve position calibration

TROUBLESHOOTING PROCEDURES

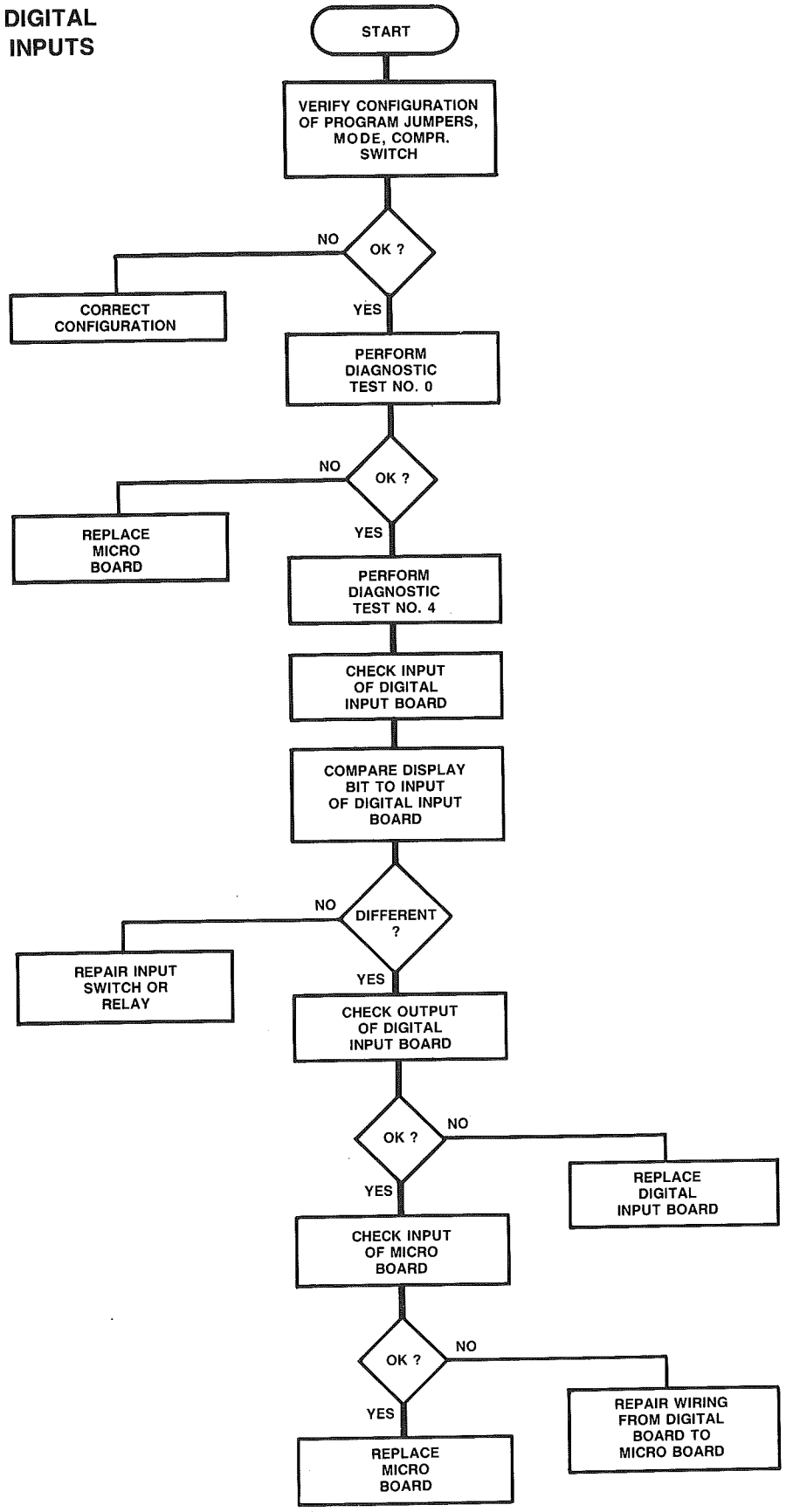
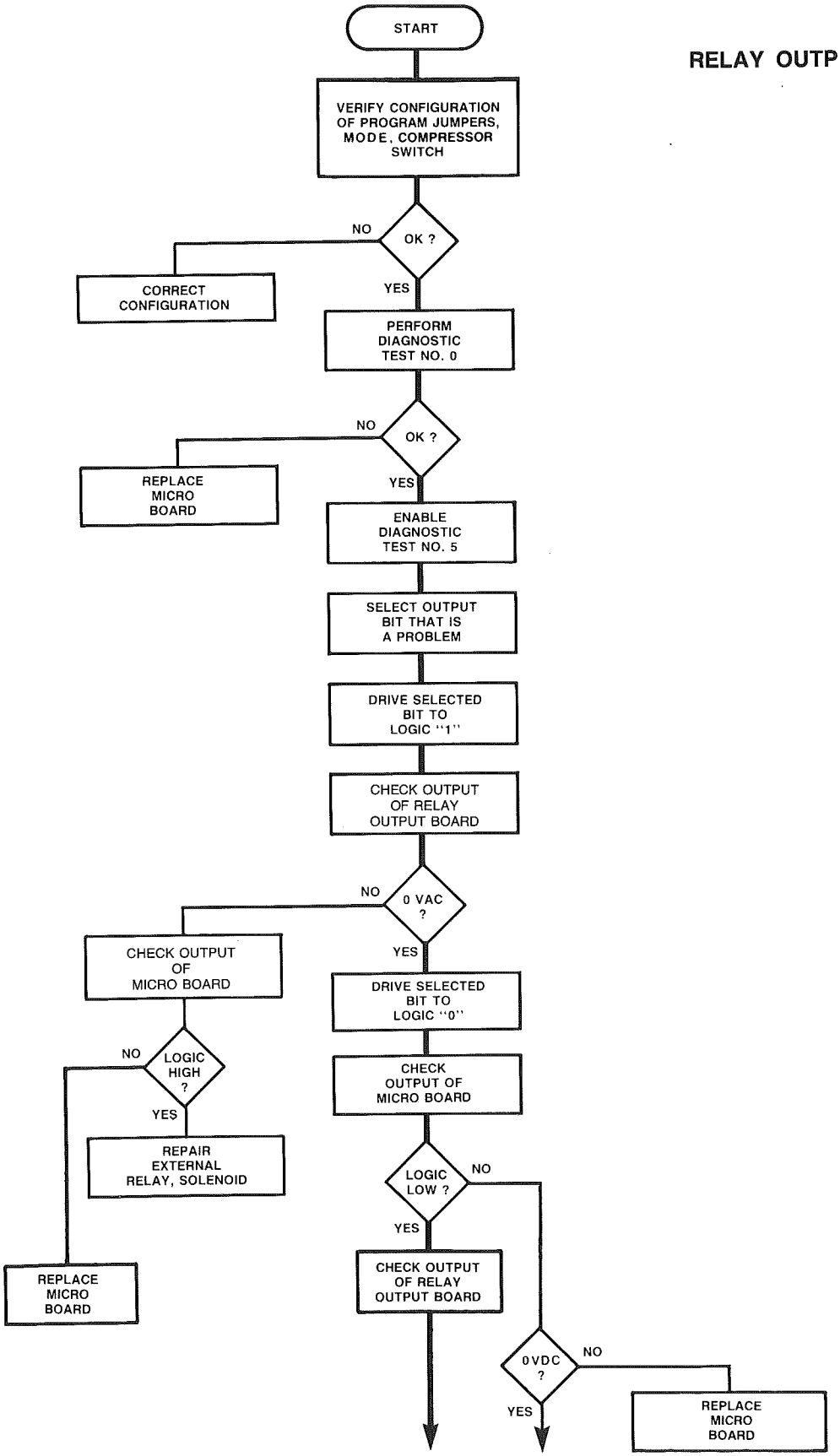


FIG. 43 — DIGITAL INPUTS TROUBLESHOOTING PROCEDURE

TROUBLESHOOTING PROCEDURES

RELAY OUTPUTS



Continued on page 58

FIG. 44 — RELAY OUTPUTS TROUBLESHOOTING PROCEDURE

Continued from page 57

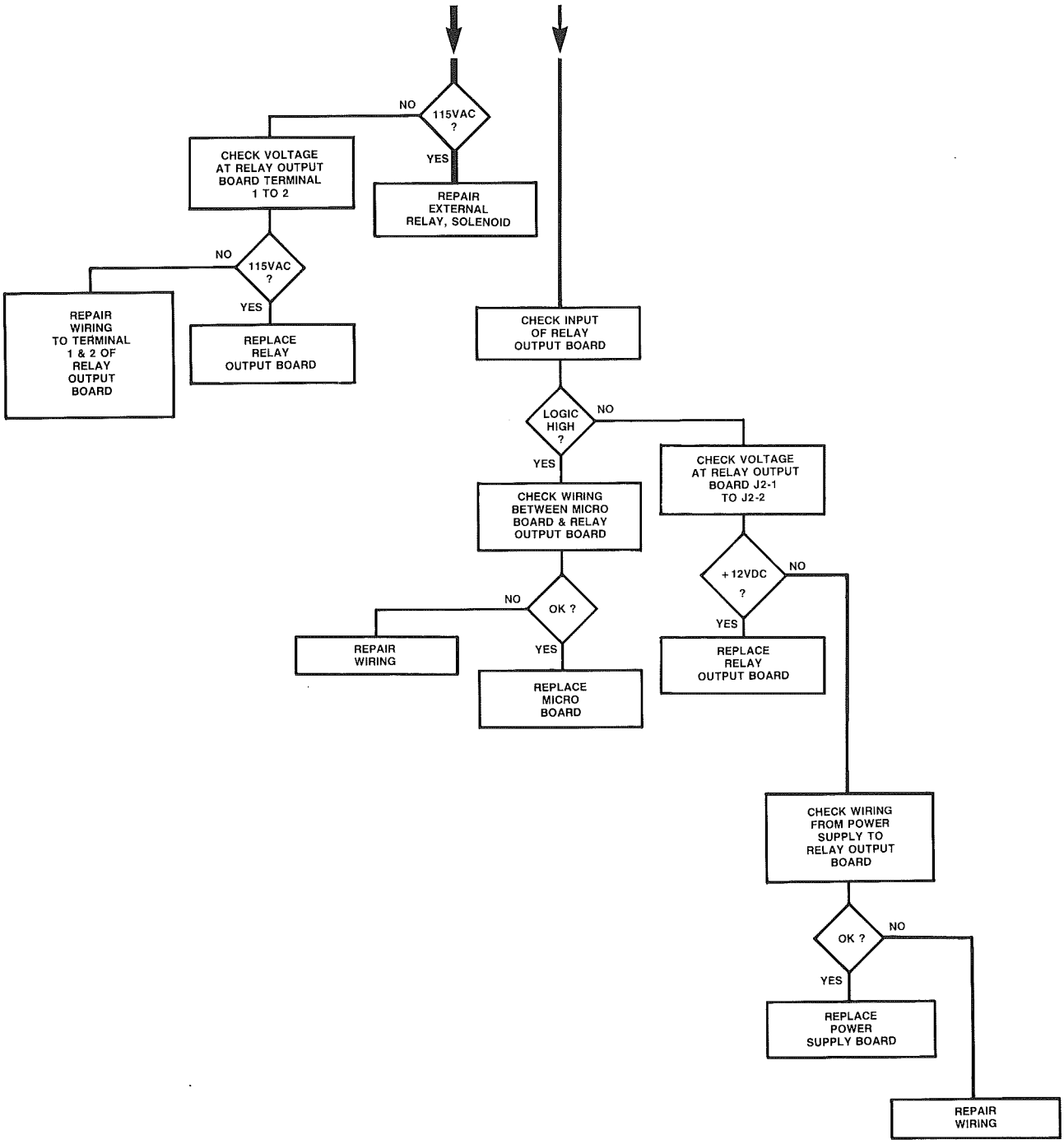


FIG. 44 — (CONTD.) RELAY OUTPUTS TROUBLESHOOTING PROCEDURE

TROUBLESHOOTING PROCEDURES

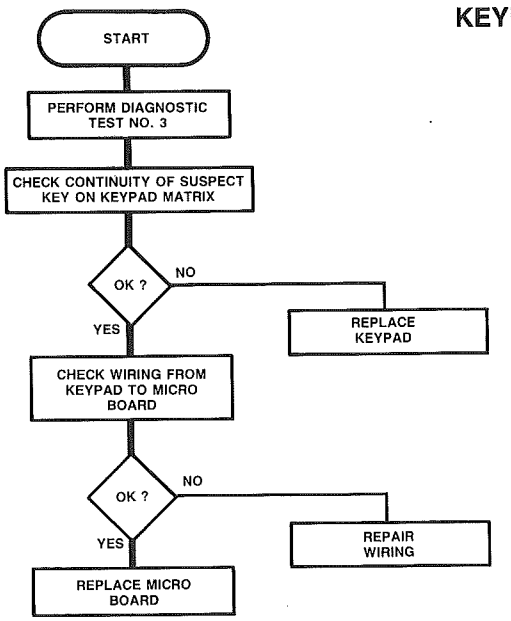


FIG. 45 — KEYPAD KEYS TROUBLESHOOTING PROCEDURE

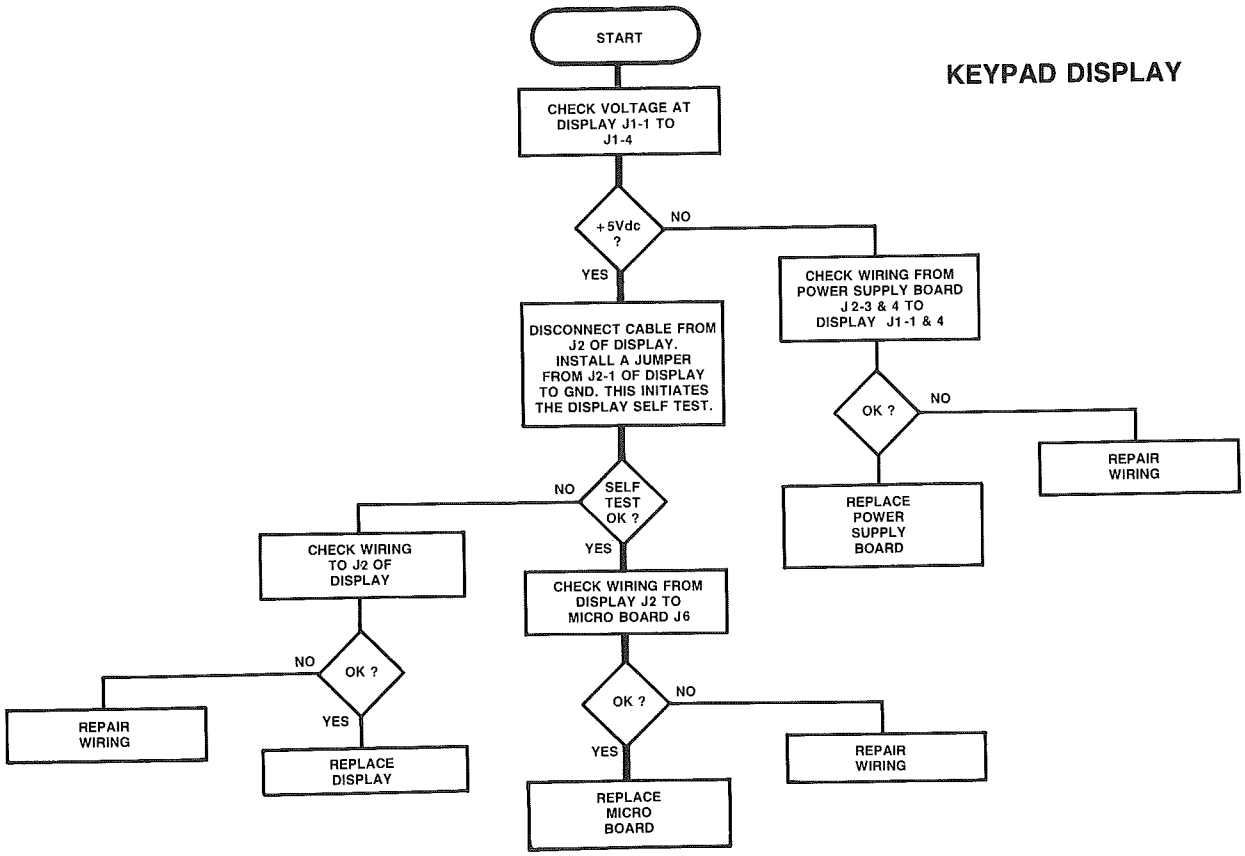


FIG. 46 — KEYPAD DISPLAY TROUBLESHOOTING PROCEDURE

SECTION 13

ANALOG INPUTS (TRANSDUCERS & THERMISTORS)

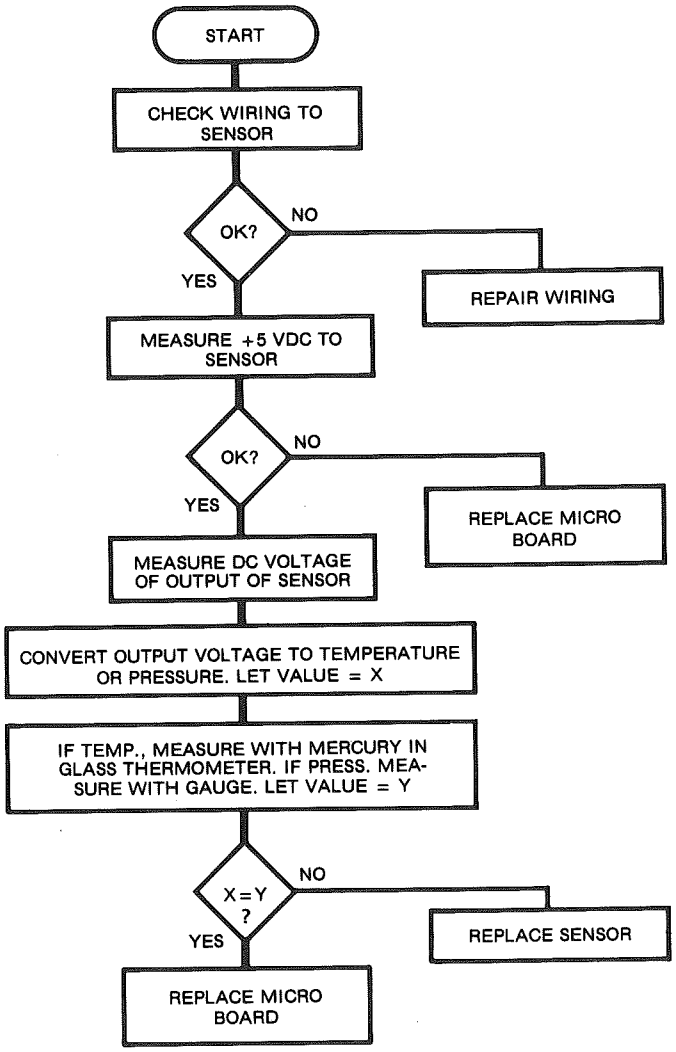


FIG. 47 — ANALOG INPUT-TRANSDUCERS AND THERMISTORS

TROUBLESHOOTING PROCEDURES

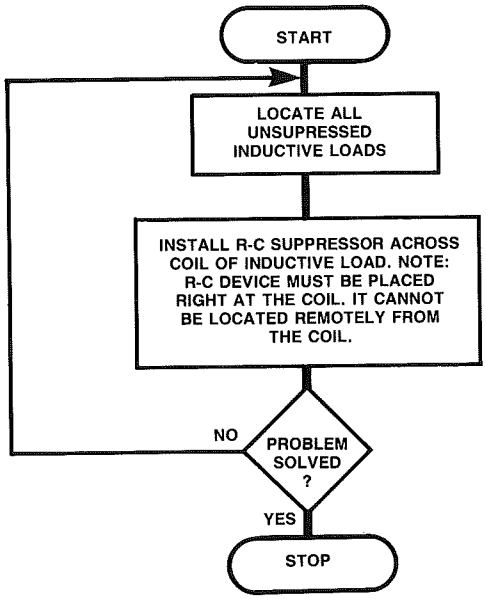


FIG. 48 — EMI NOISE TROUBLESHOOTING PROCEDURE

TROUBLESHOOTING PROCEDURES

CM-2 MODULE

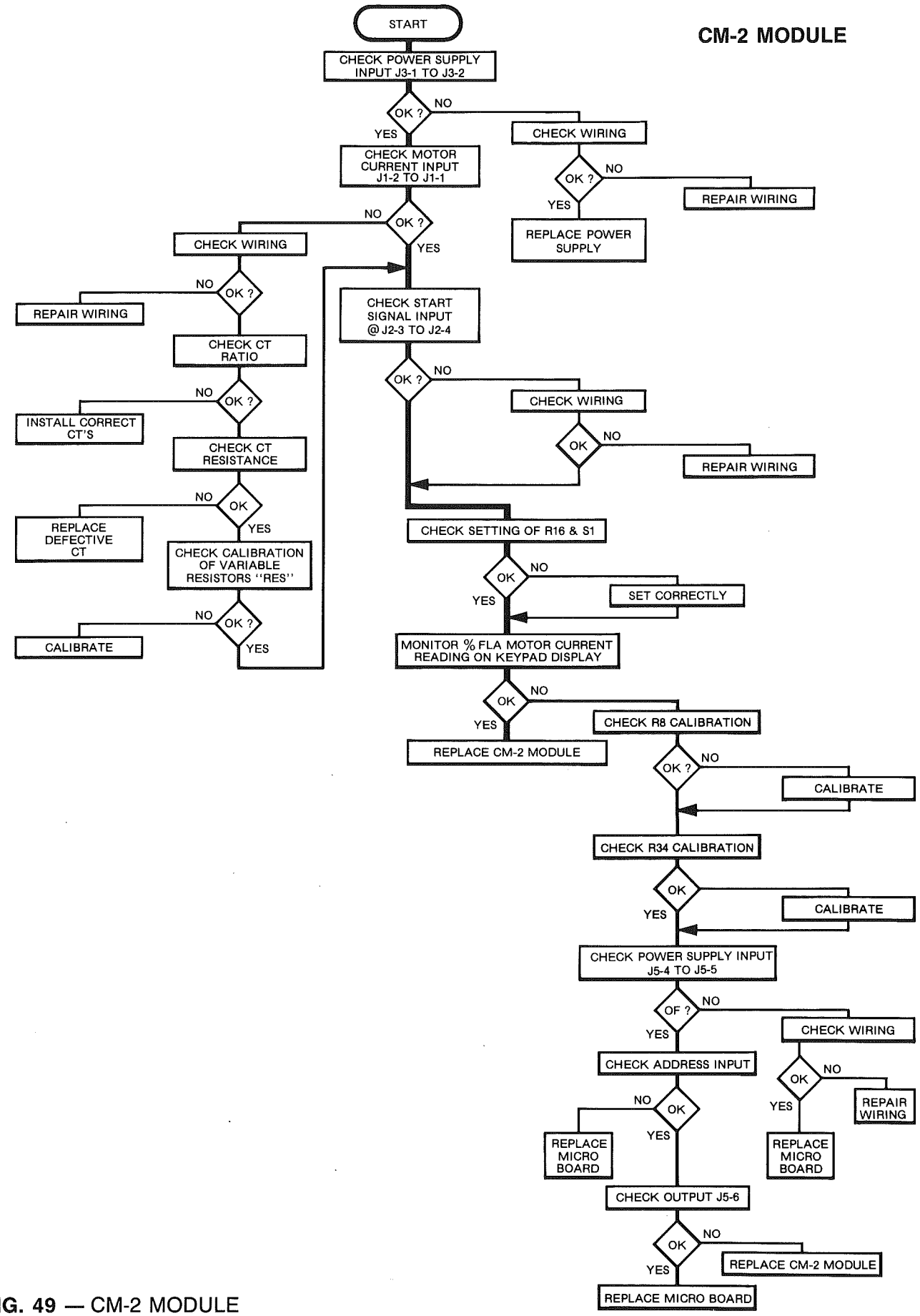


FIG. 49 — CM-2 MODULE

TROUBLESHOOTING PROCEDURES

REMOTE SETPOINT INTERFACE

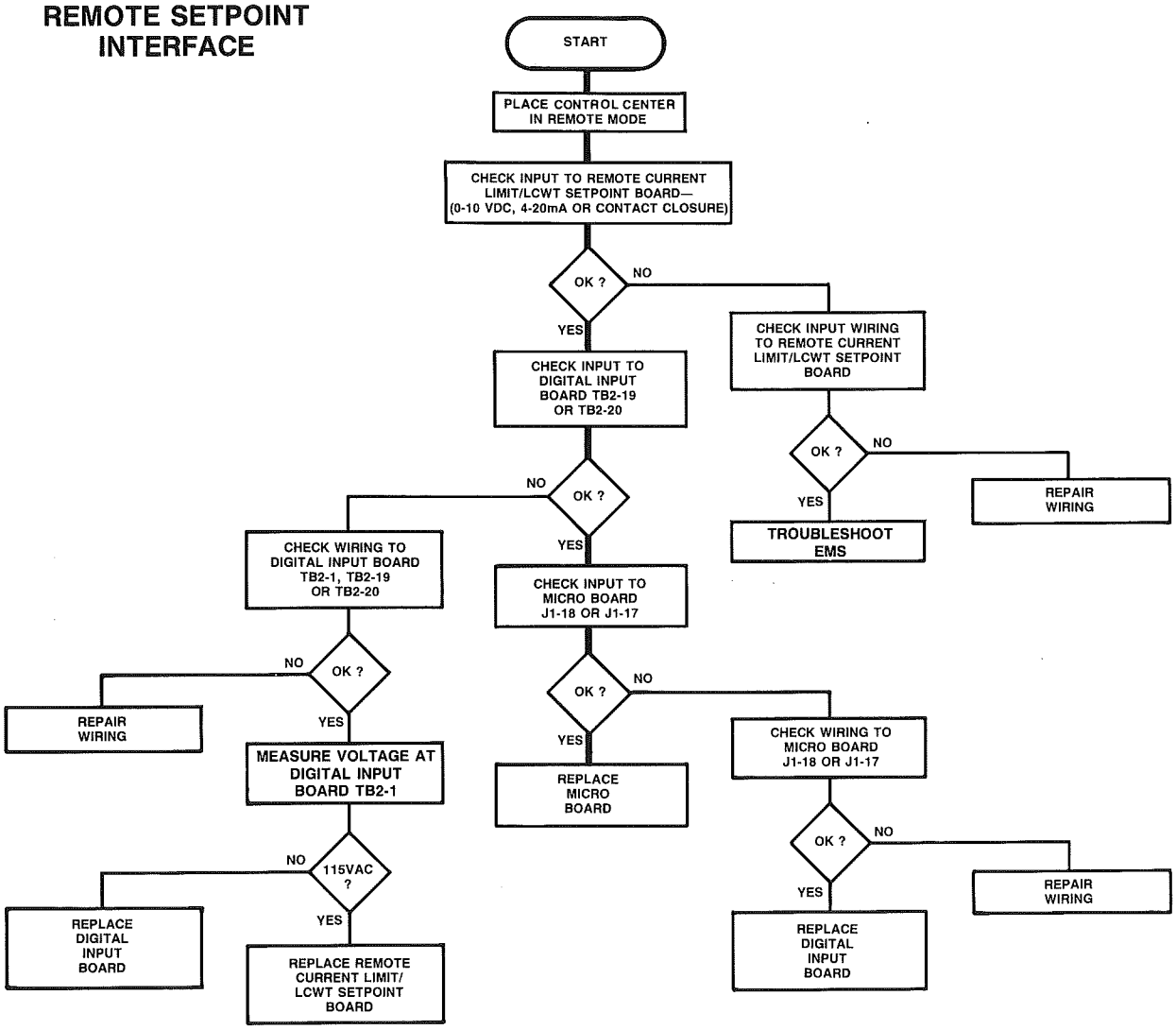


FIG. 50 — REMOTE SETPOINT INTERFACE

SECTION 13

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes:	491	Form 160.47-M2 (SB-1)
File with Form: 160.47-M2		

Make the following change in Screw Chiller (125 - 675 TR) Micro Panel Service Manual 160.47-M2.

Section 12, Page 61 - RAM Test.

If Control Center is equipped with Micro Board 031-01065-000, the RAM has only 2 areas; EXT and RTC.

S. L. Baer - 36BE
ELECTRONIC PRODUCTS SERVICE ENGINEER

DRW 2M 591 .05
CODE: SK

43091S-1

Form-AS102 (291)

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File in SK Manual(s).

SERVICE BULLETIN	Supersedes: Nothing	394	Form 160.47-M2 (SB-10)
94-12	File with Form: 160.47-M2		

**SUBJECT: SCREW CHILLER (125-675TR)
MICROCOMPUTER CONTROL CENTER -
VERSION S.01F.11 & S.01T.11 EPROM**

On/about March, 1994 the subject Screw Chillers will be shipped with EPROM Version S.01F.11 (Part Number 031-01102-002). New Version S.01T.11 (Part Number 031-01102-003) will be used in new Guardian Service/Remote Chiller Communications Installations. The new versions contain the following enhancements:

"LOW SEPARATOR OIL LEVEL" SAFETY SHUTDOWNS

Previous EPROM versions responded to a momentary opening of the Separator Oil Level Switch to initiate a safety shutdown. Under certain operating load conditions, this caused nuisance "LOW SEPARATOR OIL LEVEL" safety shutdowns. In this new version of EPROM, the Oil Level Switch must be open for 30 continuous seconds before a safety shutdown is initiated.

PROGRAMMABLE MINIMUM ALLOWABLE %FLA

Previous EPROM versions incorporated a "MINIMUM ALLOWABLE SLIDE VALVE POSITION" feature that inhibits the chiller from unloading to less than 5% slide valve position to prevent "LOW SEPARATOR OIL LEVEL" safety shutdowns at low loads. This feature was enabled by removing Micro Board Program Jumper JP4. The non-adjustable 5% threshold has proven to be inadequate for all chiller sizes and operating conditions. Therefore, this feature is eliminated and replaced by the programmable low load limit below.

This new feature allows the Field Service Technician to program a minimum allowable motor current value expressed as %FLA. It is programmable from 15% to 70% FLA; the default value is 15%. During operation, following a 3 minute bypass at start, if the motor current is less than the programmed minimum allowable value, "**SYSTEM RUN-MINIMUM LOAD CONTROL**" is displayed and the slide valve load solenoid is pulsed on for 1 second every 3 seconds until the motor current is greater than or equal to the minimum setpoint plus 2%. If the programmed minimum allowable %FLA threshold is greater than either the programmed "PULLDOWN DEMAND LIMIT" or "CURRENT LIMIT" values, the minimum allowable %FLA threshold shall have priority. However, manual slide valve control in **SERVICE MODE** overrides the "MINIMUM ALLOWABLE %FLA" operation. It is not necessary to remove Micro Board Program Jumper JP4 to enable this new feature.

The 15% FLA Default Value will provide proper operation in most chillers. However, on those chillers where the Upper Oil Return Eductor will not keep up with the suction connection oil dropout at low load, this value will have to be increased to a value where this no longer occurs. The operating point at which this occurs can be found by manually controlling the Slide Valve to load and unload the chiller while the chiller is running.

To enter the desired "**MINIMUM ALLOWABLE %FLA**" proceed as follows:

1) Enter **PROGRAM MODE** using **ACCESS CODE** 1 3 8 0.
2) Press **UNLOAD** Key. "MINIMUM CURRENT LOAD LIMIT = xx%" is displayed.
3) Using **ENTRY** keys, enter the desired value (15% to 70% in 1% increments). Pressing the **CANCEL** key displays the default Value 15%.
4) Press **ENTER** Key.
5. Press **PROGRAM** key to exit Program Mode.

SUCTION TROUGH EDUCTOR SOLENOID

In previous EPROM Versions, whenever the compressor was operating and the Slide Valve Position was less than or equal to 17%, the Suction Through Eductor Solenoid was energized (OPENED).

In this new EPROM Version, to eliminate dependence on the Slide Valve Potentiometer Position, the SUCTION TROUGH EDUCTOR SOLENOID is energized (OPENED) whenever the compressor is operating; If is de-energized (CLOSED) whenever the compressor is shutdown. On all new production units, the Suction Through Eductor Solenoid is no longer used.

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SERVICE BULLETIN

Supersedes: NOTHING	1294	Form 160.47-M2 (SB11)
File with Form: 160.47-M2		

SUBJECT: SCREW CHILLER (125-675TR)
MICROCOMPUTER CONTROL CENTER -
VERSION S.01F.13 AND S.01T.13 EPROM

ON/ABOUT DECEMBER 1994, THE SUBJECT SCREW CHILLERS WILL BE SHIPPED WITH EPROM VERSION S.01F.13 (P/N 031-01102-002). VERSION S.01T.13 (031-01102-003) WILL BE AVAILABLE FOR GUARDIAN SERVICE/REMOTE CHILLER COMMUNICATIONS APPLICATIONS. THESE EPROMS CONTAIN THE FOLLOWING ENHANCEMENTS:

BRINE OPERATING RANGE

WHEN OPERATING IN BRINE COOLING MODE (MICRO BOARD PROGRAM JUMPER JP3 REMOVED), THE ALLOWABLE "LEAVING CHILLED LIQUID TEMP SETPOINT" RANGE IS 20°F TO 45° F. IN PREVIOUS EPROM VERSIONS, THE RANGE WAS 10° F TO 45° F.

EXCESS CHARGE OVERRIDE

WHEN USING REFRIGERANT R-134a (MICRO BOARD PROGRAM JUMPER JP2 REMOVED), THE MESSAGE "SYSTEM RUN - EXCESS CHARGE OVERRIDE" IS NOW DISPLAYED WHEN THE DISCHARGE TEMP MINUS CONDENSER SATURATED TEMP IS LESS THAN-OR-EQUAL-TO 5° F. THIS WILL BE DISPLAYED UNTIL THE RELATIONSHIP IS EQUAL-TO OR GREATER-THAN 10° F. IN PREVIOUS EPROM VERSIONS THE THRESHOLDS WERE 10 F AND 15 F RESPECTIVELY. REFER TO OPERATION MANUAL 160.47-01.1 FOR DETAILS OF THIS MESSAGE.

WHEN USING REFRIGERANT R-22, THE THRESHOLDS ARE THE SAME AS PREVIOUS EPROM VERSIONS.

HOT GAS BYPASS

WHEN MICRO BOARD PROGRAM JUMPER JP4 IS REMOVED, HOT GAS BYPASS OPERATION IS ENABLED. IN PREVIOUS EPROM VERSIONS, THE HOT GAS OUTPUT (RELAY BOARD TB3-61) WAS ENERGIZED AND DE-ENERGIZED BASED ON SLIDE VALVE POSITION: AFTER A 3 MINUTE BYPASS AT START, ENERGIZED WHEN THE SLIDE VALVE POSITION DECREASED TO 5%; DE-ENERGIZED WHEN IT INCREASED TO 15%. IN THIS NEW VERSION, THE OUTPUT IS ENERGIZED AND DE-ENERGIZED BASED ON THE DIFFERENCE BETWEEN THE ENTERING CHILLED WATER TEMPERATURE AND THE LEAVING CHILLED WATER TEMP SETPOINT: THE SERVICE TECHNICIAN PROGRAMS THE DIFFERENTIAL THRESHOLD AT WHICH THE HOT GAS WILL TURN ON AND OFF AS FOLLOWS:

1.) ENTER **PROGRAM MODE** USING ACCESS CODE 1-3-8-0.
2.) PRESS **CHILLED LIQUID TEMPS** DISPLAY KEY. "(ECWT-LCWTSP): HOT GAS ON=XX°F;OFF=XX°F" IS DISPLAYED.
3.) USING **ENTRY** KEYS, ENTER THE DIFFERENTIAL THRESHOLD AT WHICH IT IS DESIRED TO TURN ON (ENERGIZE) THE HOT GAS BYPASS. IT IS PROGRAMMABLE FROM 1 TO 10°F. THE DEFAULT VALUE IS 1 F. USE LEADING ZEROES WHERE NECESSARY.
4.) USING **ENTRY** KEYS, ENTER THE DIFFERENTIAL THRESHOLD AT WHICH IT IS DESIRED TO TURN OFF (DE-ENERGIZE) THE HOT GAS BYPASS. IT IS PROGRAMMABLE FROM 2 TO 15°F. THE DEFAULT VALUE IS

2° F. USE LEADING ZEROES WHERE NECESSARY (ie,"08"). **IMPORTANT:** THE VALUE PROGRAMMED FOR HOT GAS OFF MUST BE AT LEAST 1° F HIGHER THAN THE VALUE PROGRAMMED FOR HOT GAS ON. IF NOT "OUT OF RANGE - TRY AGAIN) IS DISPLAYED.

5.) PRESS **ENTER** KEY. "PROGRAM MODE - SELECT SETPOINT" IS DISPLAYED.

6.) PRESS **PROGRAM** KEY TO EXIT.

ICE STORAGE MODE

ICE STORAGE MODE IS A NEW OPERATING MODE THAT ALLOWS THE CHILLER TO MAKE ICE AT A FASTER RATE THAN NORMAL BY INHIBITING UNLOAD PULSES TO THE SLIDE VALVE. THIS WILL RESULT IN THE CHILLER RUNNING UNTIL IT EVENTUALLY SHUTSDOWN ON LOW WATER TEMPERATURE (LWT @ 4° F BELOW SETPOINT); UNLESS A LOCAL/REMOTE STOP OR SAFETY SHUTDOWN OCCURS FIRST.

IN NORMAL OPERATION, WHEN THE LEAVING CHILLED LIQUID TEMPERATURE DECREASES TO THE LEAVING CHILLED WATER (LIQUID) TEMP SETPOINT, UNLOAD PULSES ARE APPLIED TO THE SLIDE VALVE PREVENTING THE CHILLER FROM SHUTTING DOWN ON LWT. HOWEVER, IF ICE STORAGE MODE IS SELECTED AND ENABLED, NO UNLOAD PULSES ARE APPLIED UNLESS THE MOTOR CURRENT INCREASES TO THE CURRENT LIMIT THRESHOLD.

IN ORDER FOR ICE STORAGE MODE TO BE SELECTED, THE CHILLER MUST BE CONFIGURED FOR BRINE COOLING MODE (MICRO BOARD PROGRAM JUMPER JP3 REMOVED), THE **LEAVING CHILLED LIQUID TEMP SETPOINT** MUST BE PROGRAMMED BETWEEN 20°F AND 32°F, AND THE OPERATOR MUST SELECT ICE STORAGE MODE AT THE KEYPAD. AFTER ICE STORAGE MODE HAS BEEN SELECTED, ANYTIME THE **LEAVING CHILLED LIQUID TEMP SETPOINT** IS SET ABOVE 32° F, ICE STORAGE MODE IS AUTOMATICALLY "DISABLED" (ALLOWS UNLOAD PULSES). IT WILL THEN BE AUTOMATICALLY "ENABLED" (INHIBITS UNLOAD PULSES) WHEN THE SETPOINT IS LOWERED TO BELOW 32° F. THIS ALLOWS THE CHILLER TO BE SWITCHED IN AND OUT OF ICE STORAGE MODE (AFTER IT HAS BEEN SELECTED AT THE KEYPAD) BY LOCAL OR REMOTE CHANGE OF THE **LEAVING CHILLED LIQUID TEMP SETPOINT**. THIS FEATURE ALLOWS THE CHILLER TO MAKE ICE IN THE NIGHT-TIME HOURS AND PERFORM AIR CONDITIONING DUTY DURING THE DAYTIME HOURS SIMPLY BY CHANGING THE SETPOINT.

TO ADD GREATER OPERATING FLEXIBILITY, TWO DIFFERENT **LOW WATER TEMP RESTART THRESHOLDS** (SEE EXPLANATION OF LWT RESTART OFFSET BELOW) CAN BE PROGRAMMED; ONE FOR WHEN ICE STORAGE MODE IS ENABLED AND ONE FOR WHEN IT IS DISABLED. FOR EXAMPLE, IF ICE STORAGE IS SELECTED AND THE ICE STORAGE **LEAVING CHILLED LIQUID TEMP SETPOINT** IS 20° F AND THE **ICE STORAGE LWT RESTART OFFSET** IS PROGRAMMED FOR 10°F, AND THE CHILLER SHUTDOWN ON LOW WATER TEMP, THE CHILLER WOULD RESTART WHEN THE LEAVING CHILLED WATER INCREASED TO 30°F. HOWEVER, WHEN THE **LEAVING CHILLED LIQUID TEMP SETPOINT** IS THEN INCREASED TO 40° F, AND THE NON ICE STORAGE **LWT RESTART OFFSET** IS PROGRAMMED FOR 5°F, THE CHILLER WOULD RESTART WHEN THE **LEAVING CHILLED LIQUID TEMP** REACHED 45 °F.

WHEN THE **CHILLED LIQUID TEMP SETPOINT** KEY IS PRESSED AND THE FOLLOWING MESSAGE IS DISPLAYED, ICE STORAGE MODE IS ENABLED AND THE DISPLAYED **LEAVING CHILLED LIQUID TEMP SETPOINT** AND **LWT RESTART OFFSET** ARE IN EFFECT:

"ICE LEAVING SETP = XX.X°F RESTART = +XX°F"

WHEN THE **CHILLED LIQUID TEMP SETPOINT** KEY IS PRESSED AND THE FOLLOWING IS DISPLAYED, ICE STORAGE MODE IS NOT ENABLED AND THE DISPLAYED **LEAVING CHILLED LIQUID TEMP SETPOINT** AND **LWT RESTART THRESHOLD** ARE IN EFFECT:

"LEAVING SETP = XX.X°F RESTART = +XX°F"

TO SELECT ICE STORAGE MODE AND PROGRAM DESIRED **LEAVING CHILLED LIQUID TEMP SETPOINT** AND **LWT RESTART OFFSET** (FOR ICE STORAGE MODE ENABLED AND DISABLED), PROCEED AS FOLLOWS:

1.) REMOVE MICRO BOARD PROGRAM JUMPER JP3.
2.) ENTER **PROGRAM** MODE USING ACCESS CODE 9-6-7-5.
3.) PRESS **CHILLED LIQUID TEMP** SETPOINT KEY.
"LEAVING SETPOINT = XX°F (BASE)" IS DISPLAYED
4.) USING **ENTRY** KEYS, ENTER DESIRED VALUE BETWEEN 20°F AND 32°F. IF **CANCEL** KEY IS PRESSED, DEFAULT VALUE 45.0 IS DISPLAYED.
5.) PRESS **ENTER** KEY.
6.) PRESS **ADVANCE DAY/SCROLL** KEY.
"LWT RESTART OFFSET = XX°F" IS DISPLAYED.
7.) USING **ENTRY** KEYS, ENTER THE DESIRED VALUE BETWEEN 0°F AND 15°F. THIS IS THE OFFSET VALUE THAT WILL BE IN EFFECT WHEN ICE STORAGE MODE IS DISABLED. USE LEADING ZEROES WHERE NECESSARY (ie; 05). IF **CANCEL** KEY IS PRESSED, DEFAULT VALUE "0" IS DISPLAYED. REFER TO BELOW FOR EXPLANATION OF LWT RESTART OFFSET.
8.) PRESS **ENTER** KEY.
9.) PRESS **ADVANCE DAY/SCROLL** KEY.
"SELECT ICE STORAGE MODE? 0 (YES=1;NO=0)" IS DISPLAYED.
10.) USING **ENTRY** KEYS, PRESS "1" TO SELECT ICE STORAGE MODE; OTHERWISE, PRESS "0". IF **CANCEL** KEY IS PRESSED, DEFAULT VALUE "0" IS DISPLAYED.
11.) PRESS **ENTER** KEY.
12.) PRESS **ADVANCE DAY/SCROLL** KEY.
"ICE STORAGE LWT RESTART OFFSET = XX°F"
13.) USING **ENTRY** KEYS, ENTER THE DESIRED VALUE BETWEEN 0°F AND 15°F. THIS IS THE OFFSET VALUE THAT WILL BE IN EFFECT WHEN ICE STORAGE MODE IS ENABLED. USE LEADING ZEROES WHERE NECESSARY (ie; 06). IF **CANCEL** KEY IS PRESSED, DEFAULT VALUE "15" IS DISPLAYED. REFER TO BELOW FOR EXPLANATION OF LWT RESTART OFFSET.
14.) PRESS **ENTER** KEY.
15.) PRESS **PROGRAM** KEY TO EXIT.

LOW WATER TEMP SHUTDOWN RESTART THRESHOLD

PREVIOUS EPROM VERSIONS HAD A FIXED LOW WATER TEMP (LWT) SHUTDOWN RESTART THRESHOLD. THE CHILLER WOULD RESTART WHEN THE LEAVING CHILLED LIQUID TEMPERATURE INCREASED TO THE PROGRAMMED LEAVING CHILLED LIQUID TEMP SETPOINT VALUE. IN CERTAIN LIGHT LOAD APPLICATIONS, THIS COULD CAUSE EXCESSIVE CHILLER CYCLING.

TO DELAY THE CHILLER STARTING UNTIL THE LOAD IS GREATER, THE LWT RESTART THRESHOLD IS NOW PROGRAMMABLE FROM 0°F TO 15°F ABOVE THE **LEAVING CHILLED LIQUID TEMP SETPOINT**. WHEN THE CHILLER SHUTSDOWN ON A **LOW WATER TEMP** CYCLING SHUTDOWN, IT WILL AUTOMATICALLY RESTART WHEN THE LEAVING CHILLED LIQUID TEMP REACHES THE PROGRAMMED RESTART THRESHOLD. THE RESTART THRESHOLD IS THE SUM OF THE SETPOINT AND THE OFFSET. FOR EXAMPLE, IF THE LWT RESTART OFFSET THRESHOLD IS PROGRAMMED FOR 5°F, AND THE **LEAVING CHILLED LIQUID TEMP SETPOINT** IS PROGRAMMED FOR 42°F, THE CHILLER WILL RESTART WHEN THE LEAVING CHILLED LIQUID TEMP INCREASES TO 47°F (42+5=47). IF THE OFFSET IS PROGRAMMED FOR 0°F, THE CHILLER WILL RESTART WHEN THE LEAVING CHILLED LIQUID TEMP REACHES THE SETPOINT.

WHEN OPERATING IN BRINE MODE AND ICE STORAGE MODE (SEE ABOVE) HAS BEEN SELECTED, TWO DIFFERENT OFFSET VALUES CAN BE PROGRAMMED; ONE IS IN EFFECT WHEN ICE STORAGE MODE IS ENABLED (LEAVING CHILLED LIQUID TEMP SETPOINTS 20 TO 32°F), THE OTHER IS IN EFFECT WHEN ICE STORAGE MODE IS DISABLED (LEAVING CHILLED LIQUID TEMP SETPOINTS GREATER THAN 32°F.

THE LWT RESTART OFFSET THAT IS IN EFFECT AT ANY TIME, CAN BE DISPLAYED BY PRESSING THE **LEAVING CHILLED LIQUID TEMP SETPOINT** KEY. IF ICE STORAGE MODE IS IN EFFECT,
"ICE LEAVING SETP = XX.X °F RESTART = +XX °F" IS DISPLAYED.
OTHERWISE, "LEAVING SETP = XX.X°F RESTART = +XX°F" IS DISPLAYED.

TO PROGRAM THE **LWT RESTART OFFSET** (IF NOT OPERATING IN BRINE MODE), PROCEED AS FOLLOWS. IF OPERATING IN BRINE COOLING MODE, FOLLOW INSTRUCTIONS ABOVE UNDER ICE STORAGE MODE.

1.) ENTER **PROGRAM MODE** USING ACCESS CODE 9-6-7-5.
2.) PRESS **CHILLED LIQUID TEMP** SETPOINT KEY.
3.) PRESS **ADVANCE DAY/SCROLL** KEY.
    "LWT RESTART OFFSET = XX°F" IS DISPLAYED.
4.) USING **ENTRY** KEYS, ENTER DESIRED VALUE BETWEEN 0°F AND 15°F. USE LEADING ZEROES WHERE NECESSARY (ie; 05). IF **CANCEL** KEY IS PRESSED, DEFAULT VALUE "0" IS DISPLAYED.
5.) PRESS **ENTER** KEY.
6.) PRESS **PROGRAM** KEY TO EXIT.

FAX-4500 DATA

THE ABOVE ENHANCEMENTS REQUIRE THE FOLLOWING DATA TO BE SENT TO THE FAX-4500 VIA THE MICRO BOARD RS-485 SERIAL DATA PORT:

A.) ICE STORAGE MODE STATUS; SELECTED OR NOT SELECTED. SENT AS FEATURE 54, PAGE 55.

B.) LWT RESTART OFFSET. SENT AS FEATURE 54, PAGE 66. IF CHILLER IS OPERATING IN ICE STORAGE MODE (ICE STORAGE MODE ENABLED), THE ICE STORAGE MODE LWT RESTART OFFSET IS SENT. IF CHILLER IS NOT OPERATING IN ICE STORAGE MODE, (ICE STORAGE MODE DISABLED), THE NORMAL LWT RESTART OFFSET IS SENT.

LOW WATER TEMP SHUTDOWN THRESHOLD - BRINE MODE

IN BRINE OPERATING MODE (MICRO BOARD PROGRAM JUMPER JP3 REMOVED), ANYTIME THE LEAVING CHILLED LIQUID TEMP SETPOINT IS INCREASED, THE LOW WATER TEMP CYCLING SHUTDOWN THRESHOLD REMAINS THE SAME FOR THE NEXT TEN MINUTES TO ELIMINATE NUISANCE TRIPS. FOR EXAMPLE, IF THE SETPOINT IS 30 °F THE LWT SHUTDOWN THRESHOLD IS 26 °F (4 °F BELOW SETPOINT). IF THE SETPOINT IS RAISED TO 40 °F, THE SHUTDOWN THRESHOLD REMAINS AT 26°F FOR THE NEXT 10 MINUTES; THEN IT BECOMES 36 °F.

S.L. BAER
ELECTRONICS PRODUCT
SERVICE ENGINEER

CODE:SK

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SERVICE BULLETIN	Supersedes: Nothing	695	Form 160.47-M2 (SB12)
95-1	File with Form: 160.47-M2		

SUBJECT: SCREW CHILLER (125-675TR) MICROCOMPUTER CONTROL CENTER - EPROM VERSION S.01F.14 & S.01T.14

ON/ABOUT JULY 1995, THE SUBJECT CHILLERS WILL BE SHIPPED WITH EPROM VERSION S.01F.14 (P/N 031-01102-002). ALSO, VERSION S.01T.14 (P/N 031-01102-003) WILL BE AVAILABLE FOR GUARDIAN SERVICE/REMOTE CHILLER COMMUNICATIONS APPLICATIONS. THESE EPROMS CONTAIN ENHANCEMENTS THAT REVISE THE SERVICE MANUAL 160.47-M2 AS FOLLOWS:

MICRO BOARD PROGRAM JUMPER JP1

IN - ALL MESSAGES DISPLAYED IN ENGLISH LANGUAGE
OUT - APPLICABLE ONLY TO THOSE UNITS EQUIPPED WITH THE OPTIONAL CHINESE DISPLAY, P/N 031-01616-000. PROVIDES SIMULTANEOUS DISPLAY OF BOTH ENGLISH AND CHINESE MESSAGES.

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ELECTRONIC PRODUCT
SERVICE ENGINEER

CODE:SK

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SERVICE BULLETIN

Supersedes: NOTHING	895	Form 160.47-M2 (SB13)
File with Form: 160.47-M2		

SUBJECT: MICROCOMPUTER CONTROL CENTER (YS SCREW CHILLER 125-675TR) - CHINESE LANGUAGE DISPLAY

ON/ABOUT SEPTEMBER 1995, THE SUBJECT UNITS CAN BE EQUIPPED WITH AN OPTIONAL CHINESE LANGUAGE DISPLAY, EITHER AS A FACTORY INSTALLED OPTION OR AS A RETROFIT KIT.

GENERAL

THE CHINESE LANGUAGE DISPLAY IS MOUNTED ON THE CONTROL CENTER DOOR ABOVE THE STANDARD 1 X 40 VACUUM FLUORESCENT DISPLAY. BOTH DISPLAYS WILL BE PRESENT DISPLAYING MESSAGES IN ENGLISH AND CHINESE SIMULTANEOUSLY. THE CHINESE LANGUAGE DISPLAY CONSISTS OF A 240 X 64 GRAPHICS LCD DISPLAY (P/N 031-01653-000) MOUNTED ON A PRINTED CIRCUIT BOARD (P/N 031-01616-000). EITHER TRADITIONAL OR SIMPLIFIED CHINESE CHARACTERS WILL BE DISPLAYED, DEPENDING ON THE CONFIGURATION OF CHINESE PRINTED CIRCUIT BOARD PROGRAM JUMPERS.

IN OPERATION, THE MICRO BOARD FEEDS THE CHINESE LANGUAGE PRINTED CIRCUIT BOARD WITH ENGLISH DATA FOR DISPLAY. THIS DATA IS SIMULTANEOUSLY ROUTED THRU THE CHINESE DISPLAY TO THE STANDARD VACUUM FLUORESCENT DISPLAY, DISPLAYING THE MESSAGE IN ENGLISH. ON THE CHINESE DISPLAY PRINTED CIRCUIT BOARD, THE ENGLISH DATA IS TRANSLATED INTO EITHER SIMPLIFIED OR TRADITIONAL CHINESE CHARACTERS DEPENDING ON THE POSITION OF PROGRAM JUMPER **PT0**. EPROM P/N 031-01639-001 (IC-U13, VERSION CS.01F.00) PERFORMS THE TRANSLATION TO SIMPLIFIED CHINESE. EPROM P/N 031-01639-002 (IC-U14, VERSION CS.01F.00) PERFORMS THE TRANSLATION TO TRADITIONAL CHINESE.

SINCE BOTH THE LCD DISPLAY AND THE PRINTED CIRCUIT BOARD HAVE PART NUMBERS, EITHER PART CAN BE REPLACED INDEPENDENT OF THE OTHER. EITHER OF TWO DISPLAYS COULD BE SUPPLIED UNDER YORK P/N 031-01653-000; "OPTREX" (P/N DMF5005NY-LY), OR "VL ELECTRONICS" (P/N MGLS-24064-TC-HV-G-LED4G). THE ACTUAL DISPLAY SUPPLIED DETERMINES THE POSITION OF PROGRAM JUMPER **DS1** AS DESCRIBED BELOW. THE POSITION OF THIS JUMPER DETERMINES THE CONTRAST BIAS VOLTAGE TO THE LCD DISPLAY. IF THE LCD DISPLAY IS REPLACED, THIS PROGRAM JUMPER MUST BE PUT IN THE APPROPRIATE POSITION FOR THE DISPLAY TYPE AND THE BIAS VOLTAGE (AS MEASURED AT TPC ON CHINESE DISPLAY PRINTED CIRCUIT BOARD) MUST BE ADJUSTED TO THE APPROPRIATE LEVEL USING POT "R7" AS DESCRIBED BELOW.

THE MICRO BOARD MUST BE EQUIPPED WITH EPROM VERSION S.01F.14 (OR LATER) OR S.01T.14 (OR LATER) TO ENABLE OPERATION OF THE CHINESE DISPLAY. CHINESE DISPLAY OPERATION IS ENABLED BY PERFORMING THE PROCEDURE DESCRIBED BELOW.

PROGRAM JUMPERS

PROGRAM JUMPERS, LOCATED ON THE CHINESE DISPLAY PRINTED CIRCUIT BOARD, ARE USED AS FOLLOWS:

JUMPER	POSITION	FUNCTION
PT0	SHUNT ON PINS 1 & 2	SIMPLIFIED CHINESE
	SHUNT ON PINS 2 & 3	TRADITIONAL CHINESE
PT1	NOT USED	
PT2	NOT USED	
PT3	NOT USED	
PT4	SHUNT ON	NORMAL OPERATION
	SHUNT OFF	DISPLAY TEST MODE (SEE BELOW)
PT5	NOT USED	
PT6	NOT USED	
PT7	NOT USED	
DS1	SHUNT ON PINS 1 & 2	CONTRAST - VL ELECTRONICS LCD DISPLAY
	SHUNT ON PINS 2 & 3	CONTRAST - OPTREX LCD DISPLAY

CHINESE DISPLAY ENABLE

THE MICRO BOARD MUST BE EQUIPPED WITH EPROM VERSION S.01F.14 (OR LATER) OR S.01T.14 (OR LATER) AND MICRO BOARD PROGRAM JUMPER **JP1** MUST BE REMOVED.

IMPORTANT!!! - IF THE CHINESE DISPLAY IS NOT PRESENT AND MICRO BOARD PROGRAM JUMPER JP1 IS REMOVED, THE STANDARD DISPLAY WILL NOT OPERATE PROPERLY!!

1.) ENTER "PROGRAM" MODE USING ACCESS CODE 1-3-8-0.
2.) PRESS THE HIDDEN UNEMBOSSED, UNLABLED KEYPAD KEY LOCATED DIRECTLY BELOW THE **CLOCK** SETPOINT KEY. "CHINESE DISPLAY NOT SELECTED" OR "CHINESE DISPLAY SELECTED" IS DISPLAYED.
3.) USE **ADVANCE DAY/SCROLL** KEY TO SELECT CHINESE DISPLAY IF CHINESE DISPLAY IS PRESENT. EACH TIME THE KEY IS PRESSED, THE DISPLAY ALTERNATES.
4.) PRESS **ENTER** KEY. "PROGRAM MODE, SELECT SETPOINT" IS DISPLAYED.
5.) PRESS **PROGRAM** KEY TO EXIT.

TESTING

THE FOLLOWING TESTING PROCEDURES CAN BE USED TO VERIFY OPERATION OF

THE CHINESE LANGUAGE DISPLAY.

SIMPLIFIED CHINESE CHARACTER TEST

1.) REMOVE PROGRAM JUMPER PT4 FROM CHINESE DISPLAY PRINTED CIRCUIT BOARD.
2.) PLACE PROGRAM JUMPER PT0 ON PINS 1 & 2 OF PT0.
3.) PRESS **CHILLED LIQUID TEMPS** KEYPAD KEY.
4.) VERIFY THAT ENTERING & LEAVING CHILLED WATER TEMPERATURES ARE DISPLAYED ON BOTH THE ENGLISH AND CHINESE DISPLAY AND THAT ENGLISH LETTERS "SIMP" ARE DISPLAYED IN THE UPPER RIGHT CORNER OF THE CHINESE DISPLAY.
5.) REPLACE PROGRAM JUMPER PT4, REMOVED IN STEP 1.

TRADITIONAL CHINESE CHARACTER TEST

1.) REMOVE PROGRAM JUMPER PT4 FROM CHINESE DISPLAY PRINTED CIRCUIT BOARD.
2.) PLACE PROGRAM JUMPER PT0 ON PINS 2 & 3 OF PT0.
3.) PRESS **CHILLED LIQUID TEMPS** KEYPAD KEY.
4.) VERIFY THAT ENTERING & LEAVING CHILLED WATER TEMPERATURES ARE DISPLAYED ON BOTH THE ENGLISH AND CHINESE DISPLAY AND THAT ENGLISH LETTERS "TRAD" ARE DISPLAYED IN THE UPPER RIGHT CORNER OF THE CHINESE DISPLAY.
5.) REPLACE PROGRAM JUMPER JP4, REMOVED IN STEP 1.

CHINESE LCD DISPLAY TEST

1.) REMOVE PROGRAM JUMPER PT4 FROM CHINESE DISPLAY PRINTED CIRCUIT BOARD.
2.) PRESS **HOLIDAY** KEYPAD KEY. VERIFY ALL PIXELS OF CHINESE DISPLAY ILLUMINATE AND THE ENGLISH DISPLAY SHOWS NORMAL HOLIDAY DISPLAY.
3.) PRESS **DAILY SCHEDULE** KEYPAD KEY. VERIFY "YORK LOGO" APPEARS ON THE CHINESE DISPLAY AND NORMAL DAILY SCHEDULE DATA APPEARS ON THE ENGLISH DISPLAY.
4.) REPLACE PROGRAM JUMPER JP4, REMOVED IN STEP 1.

SERVICE REPLACEMENT & DISPLAY ADJUSTMENT

THERE ARE TWO DIFFERENT LCD DISPLAYS THAT COULD BE SUPPLIED UNDER YORK PART NUMBER 031-01653-000: "OPTREX" P/N DMF5005NY-LY OR "VL ELECTRONICS" P/N MGLS-24064-TC-HV-G-LED4G. THESE DISPLAYS REQUIRE DIFFERENT CONTRAST BIAS VOLTAGES. THIS VOLTAGE CAN BE READ AT TEST POINT **TPC** ON THE CHINESE DISPLAY PRINTED CIRCUIT BOARD. THE POSITION OF PROGRAM JUMPER **DS1** AND SETTING OF POT "R7" ON THE CHINESE DISPLAY PRINTED CIRCUIT BOARD DETERMINES THIS VOLTAGE. THEREFORE, ANYTIME THE DISPLAY IS REPLACED, **DS1** MUST BE PLACED IN THE CORRECT POSITION AND "R7" MAY HAVE TO BE ADJUSTED TO ACHIEVE THE APPROPRIATE VOLTAGE AT **TPC** AS FOLLOWS:

DS1	DISPLAY	TPC
SHUNT ON PINS 1 & 2	VL ELECTRONICS	-9.5 VDC
SHUNT ON PINS 2 & 3	OPTREX	-7.8 VDC

INPUTS/OUTPUTS & TEST POINTS

J1 - ENGLISH DATA INPUT TO CHINESE DISPLAY PRINTED CIRCUIT BOARD.

J2 - ENGLISH DATA OUTPUT TO VACUUM FLOURESCENT DISPLAY.

J3 - CHINESE DATA TO CHINESE LCD DISPLAY.

J4-1 - +8 VDC BACKLIGHT POWER TO CHINESE LCD DISPLAY.
J4-2 - GND.
J5-1 - 24 VAC POWER SUPPLY INPUT TO CHINESE DISPLAY PRINTED CIRCUIT BOARD.
J5-2 - 24 VAC RETURN.
J5-3 - GND.

TPA - +5 VDC
TPB - GND
TPC - CONTRAST VOLTAGE OUTPUT TO CHINESE LCD DISPLAY. -9.5VDC WITH SHUNT ON PINS 1 & 2. -7.8VDC WITH **DS1** SHUNT ON PINS 2 & 3. ADJUSTED WITH POT **R7**.

RETROFIT KIT

THE CHINESE LANGUAGE DISPLAY CAN BE RETROFIT TO EXISTINNG CHILLERS THAT ARE PRESENTLY EQUIPPED WITH MICROCOMPUTER CONTROL CENTER P/N 371-01112-001 OR 371-01200-003 THAT CONTAIN MICRO BOARD P/N 031-01065-000 OR -001.

RETROFIT KIT P/N 371-01708-002 CONTAINS A COMPLETE MICROCOMPUTER CONTROL CENTER DOOR THAT REPLACES THE EXISTING DOOR. MOUNTED ON THE DOOR IS A KEYPAD, ROCKER SWITCH, LOCK, RIBBON CABLES, DECALS, VACUUM FLOURESCENT ENGLISH LANGUAGE DISPLAY AND CHINESE LANGUAGE DISPLAY. THE APPROPRIATE EPROM FOR THE MICRO BOARD IS SUPPLIED. ALSO, INSTALLATION INSTRUCTIONS ARE INCLUDED. THIS KIT CAN BE ORDERED FROM THE SERVICE PARTS DISTRIBUTION CENTER.

S.L. BAER
ELECTRONICS PRODUCTS
SERVICE ENGINEER

YORK®

File in SK Manual(s).

SERVICE BULLETIN

Supersedes: NOTHING	796	Form 160.47-M2 (SB14)
File with Form: 160.47-M2		

SUBJECT: SCREW CHILLER (125-675TR) MICROCOMPUTER CONTROL CENTER - PRESSURE TRANSDUCER THREADS

Screw chillers shipped after 1/1/96 have straight-cut threads in all piping. New pressure transducers with straight-cut threads and a neoprene o-ring are supplied on these chillers and are available for service replacement.

The previous transducers with NPTF threads will continue to be used as service replacements for pipe thread chillers built prior to 1/1/96. The straight-cut thread transducers have the same pressure range and identical operation as the NPTF thread transducers; the only diference is the threads.

	TRANSDUCER	
FUNCTION (PRESSURE)	**NPTF**	**STRAIGHT-CUT**
condenser, oil, oil filter	025-28678-001	025-28678-006
evaporator -R22, water	025-28678-002*	025-28678-007
R22, brine	025-28678-003	025-28678-009
R134a, water & brine	025-28678-005	025-28678-008

* If control center is equipped with micro board 031-00940-001 (production until Feb. 1991), transducer -002 is used for both water and brine R22 applications and -005 transducer is not applicable.

S.L. BAER
ELECTRONICS PRODUCT
SERVICE ENGINEER

YORK®	SERVICE BULLETIN	
SERVICE BULLETIN	Supersedes::NOTHING	Form 160.47-M2 (SB15) (1196)
	File with form: 160.47-M2 SK Manual	

SUBJECT: SCREW CHILLER (125-675TR)
MICROCOMPUTER CONTROL CENTER -
VERSION S.01F.15 & S.01T.15 EPROM

On/about November 1996, the subject chillers will be shipped with eprom version S.01F.15 (P/N 031-01102-002). Version S.01T.15 (P/N 031-01102-003) will be available for GUARDIAN SERVICE/REMOTE CHILLER COMMUNICATIONS applications. These eproms contain the following enhancements that revise SERVICE MANUAL 160.47-M2 as follows:

VARIABLE ORIFICE

A solenoid valve, located in the orifice bypass line, is opened or closed by the microcomputer control center to create a VARIABLE ORIFICE. This new solenoid valve is designated 2SOL and is wired to the RELAY BOARD TB3-29.

When the chiller is not running, the solenoid is open while the 2-MINUTE LOCKOUT is in effect; closed thereafter.

While the chiller is running, the solenoid is energized (opened) or de-energized (closed) under program control by the following conditions:

1.) **DELTA P** - This is the difference between condenser pressure and evaporator pressure. This value is compared to the DELTA P SETPOINT. If the DELTA P decreases to $\leq$ the setpoint, the solenoid is opened. It will remain open until the DELTA P increases to $\geq$ (DELTA P SETPOINT + 10); then it will close. Conditions in either 2.) or 3.) below will override the DELTA P control.

2.) **LOW EVAPORATOR PRESSURE** - If the evaporator pressure decreases to the threshold that displays "SYSTEM RUN - LOW PRESSURE LIMIT IN EFFECT" (R22 - 56.2 PSIG; R134a 27PSIG), the solenoid is opened. This condition will override the DELTA P control above. The solenoid will remain open until the low pressure limit condition is no longer in effect (R22 $\geq$57.5 PSIG; R134a $\geq$28 PSIG), then the LOW PRESSURE override of the above DELTA P control will be released.

3.) **DISCHARGE SUPERHEAT** - This is the difference between discharge temperature and condenser saturated temperature. If the DISCHARGE SUPERHEAT is < 15 F (R22), < 10 F (R134a), the solenoid is closed. This condition will override 1.) and 2.) above. The solenoid will remain closed until the DISCHARGE SUPERHEAT increases to ≥ 20 F (R22), 15 F (R134a), then the DISCHARGE SUPERHEAT override of 1.) and 2.) above will be released.

"DELTA P" SETPOINT PROGRAMMING

To program the DELTA P SETPOINT, proceed as follows:

1.) Use ACCESS CODE 1-3-8-0 to gain access to PROGRAM mode. "PROGRAM MODE, SELECT SETPOINT" is displayed.
2.) Press CONDENSER LIQUID TEMPS key. The prompt message displayed is dependent upon the position of micro board program jumper JP2 as follows:

    JP2 in - R22 applications
      "DELTA P (RANGE 25 TO 130) = XXXPSID"

    JP2 out - R134a applications
      "DELTA P (RANGE 15 TO 90) = XXXPSID"

3.) Using the ENTRY keys, enter the desired value. Use leading zeroes where necessary. If the CANCEL key is pressed, default value "25" is displayed.

4.) Press ENTER key. "PROGRAM MODE SELECT SETPOINT" is displayed.
5.) Press PROGRAM key to exit.

OIL PRESSURE TRANSDUCER AUTO-ZERO ENABLE/DISABLE

In all eprom versions since S.01F.08/S.01T.08, the auto-zeroing that occurs between the evaporator transducer and oil pressure transducer could be enabled/disabled using a procedure in Service Manual 160.47-M2. This procedure now also includes the auto-zeroing that occurs between the filter oil pressure transducer and the oil pressure transducer. In the procedure below, all auto-zeroing is enabled if "enabled" is selected; all auto-zeroing is disabled if "disabled" is selected.

CAUTION!! THE AUTO-ZEROING SHOULD ONLY BE DISABLED AFTER CONSULTATION WITH THE YORK FACTORY.

1.) Enter **PROGRAM** mode using access code 1-3-8-0.
2.) Press **OIL/FILTER PRESSURES** display key. "PRESSURE TRANSDUCERS AUTO ZERO ENABLED" or "PRESSURE TRANSDUCERS AUTO ZERO DISABLED" is displayed.
3.) Use **ADVANCE DAY/SCROLL** key to select enabled or disabled as

desired. Each time this key is pressed, the display alternates between "ENABLED" or "DISABLED". The default value is "ENABLED".

4.) Press **ENTER** key. "PROGRAM MODE, SELECT SETPOINT" is displayed.

5.) Press **PROGRAM** key to exit. The normal foreground message is displayed.

S.L. BAER
ELECTRONICS PRODUCT
SERVICE ENGINEER

YORK®	SERVICE BULLETIN	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB16) (997)
	File with form:160.47-M2 (SK Manual)	

Subject: YS Screw Chiller - Microcomputer Control Center
Chinese Language Display

Beginning on/about April 1997, Chinese language displays will be supplied with either: two Simplified translation eproms or two Traditional translation eproms. If Simplified translation is desired, both of the Simplified eproms below are required. If Traditional translation is desired, both of the Traditional eproms below are required. The eprom part numbers and on-board socket locations are as follows:

EPROM	TRANSLATION	SOCKET LOCATION
031-01699-001	Simplified	U13
031-01699-002	Simplified	U14
031-01699-003	Traditional	U13
031-01699-004	Traditional	U14

Previously, Chinese Language displays contained one eprom (031-01639-001)(socket location U13) that translated to Simplified Chinese and one eprom (031-01639-002)(socket location U14) that translated to Traditional Chinese. The desired translation was then selected by program jumper PT0, located on the Chinese language display board. Due to the addition of messages, two eproms are now required for each translation as described above. When equipped with these new eproms, Program Jumper PT0 can no longer be used to select between Simplified or Traditional translation. If one of the earlier version eproms fail, refer to renewal parts list 160.47-RP3 for replacement.

S.L. Baer
York Factory Service

YORK®

ROTARY SCREW LIQUID CHILLERS

SERVICE BULLETIN | Supersedes: Nothing | 198 | Form 160.47-M2 (SB17)

File with Form: 160.47-M2

SUBJECT: " YS " PTS. CONFIGURATIONS

THERE ARE SEVERAL DIFFERENT PARTS AND JUMPER COMBINATIONS IN THE "YS" CHILLER DEPENDING ON THE REFRIGERANT (R 22 / R 134A) YOU ARE USING THAT MUST BE USED TOGETHER FOR YOUR CHILLER TO RUN PROPERLY.

AN EXAMPLE OF USING PARTS THAT ARE INCOMPATIBLE WITH THE REFRIGERANT IN THE CHILLER WOULD RESULT IN A MESSAGE ON YOUR DISPLAY OF : **"EVAP. TRANSD. OR PROBE ERROR"**

TABLE NO. 1 (USING A MICRO BOARD WITH YORK PART NO. 031-01065-000)

	R22	R134A
JP2	IN	OUT
JP3	OUT (BRINE)	OUT
EVAP. COND.	025-28678-003 (WITH PIPE THREADS)	-005
	025-28678-009 (STRAIGHT CUT THREADS)	-008
E-PROM	031-01102-002 (SO1F.XX)	S.O1F.08 (OR HIGHER)

ALSO REFER TO YORK FORM NO. 160.47 - M2 (291), PAGE NO. 30 (FIG NO. 31A) FOR ADDITIONAL JP3 INFORMATION.

TABLE NO. 2 (USING A MICRO BOARD WITH YORK PART NO. 031-00940-001)

	R22
JP3	OUT (BRINE)
EVAP. TRANSD.	025-28678-002 (PIPE THREAD)
	025-28678-007 (STRAIGHT CUT THREAD)
E-PROM	031-01051-001 (4.E)

THE ABOVE TABLES WILL HELP YOU ASSURE THAT YOU HAVE THE PROPER WORKING PARTS COMBINATIONS FOR YOUR CHILLER.

YORK®	MILLENNIUM ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB18) (298)
	File With 160.47-M2	

Subject: Screw Chiller (125-675TR) Microcomputer Control Center -
Eprom Version S.01F.17

On/about February 1998, the subject chillers will be shipped with Eprom version S.01F.17 (P/N 031-01102-002). It contains the following enhancements that revise Service Manual 160.47-M2 as follows:

SEAL OIL PRESSURE

A transducer (P/N 025-28678-001) and piping enhancements have been added to monitor a new parameter called **SEAL OIL PRESSURE**. It is displayed as "SEAL OIL PRESSURE = XXX.X PSIG" as one of the scrolled messages using the DISPLAY DATA key. The Evaporator Pressure is subtracted from this pressure to create a differential pressure called **SEAL OIL DIFFERENTIAL PRESSURE** and displayed as "SEAL OIL DIFF PRESSURE = XXX.X PSID" using the OIL/FILTER PRESSURE key. If this Differential value decreases to < 20.0 PSID for 2 continuous seconds after the compressor has been running for 3 minutes, a safety shutdown is performed and "DAY-TIME-LOW SEAL OIL PRESSURE" is displayed.

As with the other chiller transducers, the Seal Oil transducer is "Auto-Zeroed" with the Evaporator transducer during the first 15 seconds of "Start Sequence Initiated". Auto-Zeroing influences the displayed differential value as explained in Operation Manual 160.47-01.1. Also, as with the other transducers the Auto-Zeroing can be disabled as detailed below.

To calculate the expected Transducer voltage output for a given pressure input, refer to Service Manual 160.47-M2.

The new Seal Oil Pressure transducer connects to the Micro Board J17 as follows:

J17-9 - +5vdc to transducer
J17-10 - Gnd to transducer
J17-15 - Output of transducer

This eprom version can also be used on chillers that do not contain this new Seal Oil Pressure transducer and associated piping enhancements. Therefore, the following procedure is used to "Enable" or "Disable" this feature and associated display messages. This should not be performed by anyone other than a qualified Service Technician.

1.) Enter PROGRAM MODE using Access Code 1 3 8 0.
2.) Press OIL PRESSURE key. Use ADVANCE DAY/SCROLL key to scroll to display the following message. Each time the key is pressed, the display scrolls to the next message.
"SEAL OIL PRS XDCR ENABLED=X;(0=NO;1=YES)"
3.) Using ENTRY keys, press 0 key if chiller not equipped with the Seal Oil Pressure transducer and associated piping. Press 1 key if chiller is equipped with these items.
4.) Press ENTER key.
5.) Press PROGRAM key to exit.

STANDBY CHILLER FREEZE PROTECTION

In multiple chiller applications, it may be possible for the chilled liquid (water or brine) from an operating chiller to flow through the evaporator of a standby chiller. This presents a possible freeze threat to the standby chiller.

To minimize the freeze potential in the standby chiller, the Program will now cycle the Condenser Pump based upon the Evaporator Saturation Temperature while the chiller is shutdown. Also, if this temperature indicates a freeze potential exists, an alarm message is displayed on the Microcomputer Control Center Display and alarm contacts close. These contacts can be used to provide an alarm to a remote device or sound an audible alarm.

The Program operates Relay Board output terminals TB4-55 & 56 (dry contacts of Relay K0) (Relay Board 031-00932-002 is required; -001 does not contain K0) to control the Condenser pump. They close to start the pump coincident with compressor start. At chiller shutdown, they remain closed until the Evaporation Saturation Temperature increases to >45 Degrees F, whereupon they open to shutdown the pump.

While the chiller is shutdown, the Program continues to monitor the Evaporator Saturation Temperature. If it decreases to < 35 Degrees F, the Program closes the contacts to run the Condenser Pump until the temperature increases to > 45 Degrees F. Further, if the chiller has been shutdown for more than 10 minutes and the temperature decreases to < 32 Degrees F, "FREEZE THREAT FROM OPERATING CHILLER" is displayed and Relay Board Relay K6 is energized, closing contacts between TB3-34 and TB3-1. This applies 115VAC to TB3-34. This signal can be used for alarm purposes. When the

temperature increases to > 35 degrees F, the warning message clears and status relay K6 de-energizes.

NOTE - Early vintage chillers have the Oil Eductor Solenoid Valve connected to TB3-34. Later vintage chillers do not use this solenoid. If this eprom is retrofit to this vintage chiller, and it is desired to use this alarm output, the solenoid wiring will have to be disconnected.

TRANSDUCER AUTO-ZEROING ENABLE/DISABLE

The procedure in previous eprom versions to Enable/Disable transducer auto-zeroing has been modified and is now as follows:

1.) Enter PROGRAM mode using Access Code 1 3 8 0.
2.) Press OIL PRESSURE key. Use ADVANCE DAY/SCROLL key to display the following message. Each time the key is pressed, the display scrolls to the next message.
"PRS XDCR AUTO ZERO ENABLED=X;(0=NO;1=YES)"
3.) Using ENTRY keys, press 0 if it is desired to disable transducer auto-zeroing. Press 1 if it is desired to enable auto-zeroing.
4.) Press ENTER key.
5.) Press PROGRAM key to exit.

SLIDE VALVE UNLOAD AT SHUTDOWN

In previous eprom versions, the Slide Valve Unload solenoid valve is energized (opened) at the completion of the 2 minute Lockout Period after a chiller shutdown. In this version, if Micro Board Program Jumper JP4 is removed, the Unload solenoid valve is energized coincident with the compressor turnoff. In addition to this new feature, the previous features as detailed in Service Manual 160.47-M2, Figure 31A are retained when this jumper is removed as follows:

1.) Hot - Gas Bypass operation is enabled
2.) 30% Slide Valve start inhibit

VARIABLE ORIFICE SETPOINTS

The range over which the Variable Orifice "DELTA P" setpoint can be programmed has been changed as follows. Refer to Service Bulletin 160.47-M2 (SB15) for explanation of the Variable Orifice feature.

Previous eprom versions:

R22 - 25 to 130 PSID R134a - 15 to 90 PSID

This eprom version:

R22 - 25 to 150 PSID R134a - 15 to 110 PSID

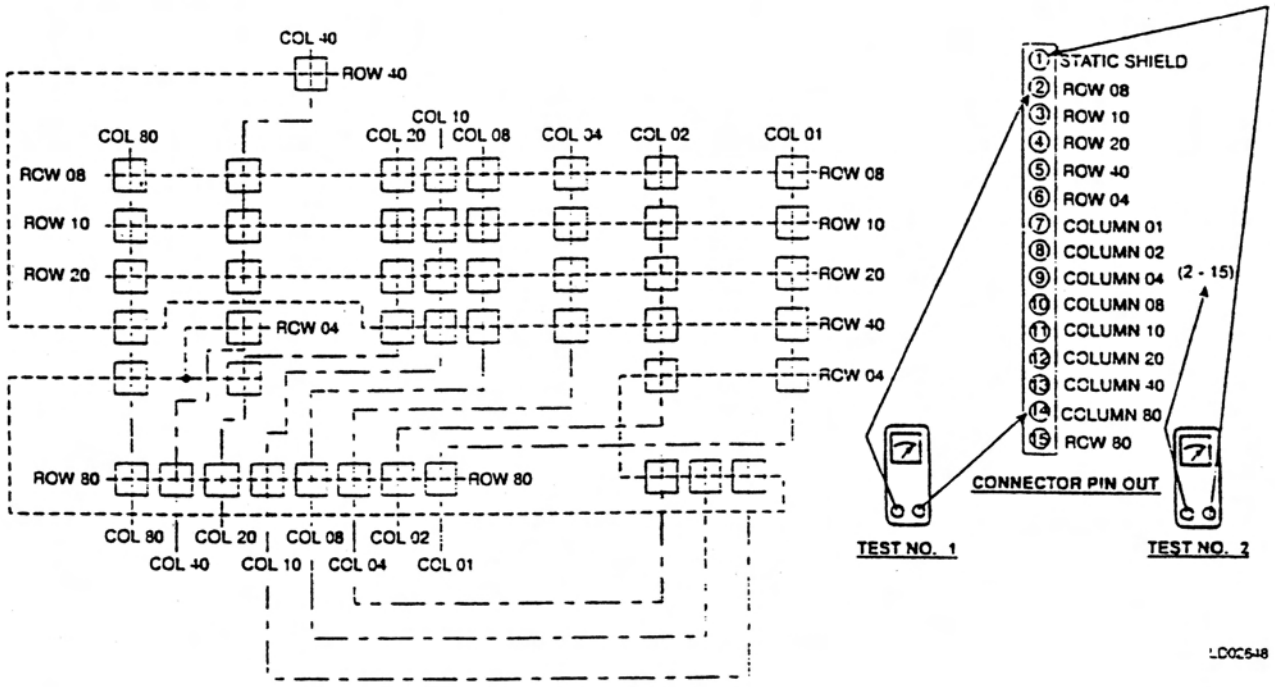
S.L. Baer
YORK Factory Service

YORK®	ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB19) (598)
SUBJECT: HOW TO CHECK FOR DEFECTIVE KEY PAD. (YT-YK-YS-YG-YB- PARAFLOW - ISOFLOW MICRO PANELS)	File With 160.47-M2	

GENTLEMEN,

YOU WILL FIND BELOW A PROCEDURE ON HOW TO CHECK OUT THE KEY PAD ON THE MICRO PANEL TO DETERMINE IF YOU HAVE ONE OR MORE DEFECTIVE KEYS.

NOTE : FOR THOSE OF YOU THAT HAVE YG / YB LITERATURE , THIS TEST IS IN YORK FORM NO.160.60-M1 , PAGE NO. 112 , UNDER PROBLEMS AND SOLUTIONS. ***IMPORTANT*** : PLEASE MAKE NOTE THAT IN TEST NO.1 , ITEMS 7 AND 8 BELOW, THE READINGS ARE DIFFERENT AND SHOULD BE CHANGED AS SHOWN BELOW IN YOUR YG / YB LITERATURE.



TEST NO. 1

1. Remove power from the micro panel.
2. EXAMPLE: To check out the "CHILLED LIQUID TEMP" key.
3. The "CHILLED LIQUID TEMP" key is in the upper left corner of the display.
4. The "CHILLED LIQUID TEMP" key is in Row 8. Col 80 (see above Fig.)
5. Place the ohm meter in the "Keypad Connector" in Pin 2 (Row 3) and Pin 14 (Col 80). See above.
6. Press the "CHILLED LIQUID TEMP" key.
7. OHM METER READING MUST READ GREATER THAN 10.000 OHMS (KEY NOT DEPRESSED)
8. OHM METER READING MUST READ LESS THAN 100 OHMS (KEY DEPRESSED)

TEST NO. 2

With power removed, use the onmmeter to read from Pin No. 1 to all of the other pins (2-15) on the keypad connector. This is to assure there is no shorts between the static shield and the keys.

YORK®	ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB20)(698)
	File With 160.47-M2	

SUBJ.: PRINTER READINGS ARE ALL ZERO (0)

PROBLEM: **WHEN USING ANY OF THE APPROVED YORK PRINTERS ON ANY OF THE ABOVE CHILLERS, YOU EXPERIENCE THAT THE PRINT OUT SHOWS ALL ZERO'S AFTER THE DEVICE / COMPONENT DESCRIBED.**

SOLUTION: 1. THE CHILLER HAS NOT RUN, THEREFORE THERE IS NOTHING STORED IN THE BUFFER ON THE MICRO BOARD, THUS *ALL READINGS WILL BE ZERO* ON THE PRINTOUT.

2. ALSO CHECK:
   A. DIP SWITCH SETTINGS ON THE PRINTER
   B. CHECK THE JUMPER ON THE MICRO BOARD TO ASSURE IT IS IN THE PROPER POSITION.
   C. RE-CHECK THE WIRING OF THE PRINTER TO THE PANEL.

SUBJ.: CHECKING THE 5 VOLT SUPPLY

PROBLEM: DISPLAY SHOWS NO.'S, LETTERS, CHARACTERS, ETC.....

SOLUTION:

THE PROBLEM DESCRIBED ABOVE DEPICTS THAT THE 5 VOLT SUPPLY IS BEING PULLED DOWN.

TO TROUBLE SHOOT THIS PROBLEM, PLACE YOUR METER LEADS ON TPA (+5V) AND TPC (GND.) TO MONITOR THE 5 VOLT SUPPLY. THESE TEST POINTS ARE LOCATED ON THE MICRO BOARD AT THE BOTTOM CENTER OF THE BOARD.

ONCE YOUR METER IS CONNECTED , START REMOVING ALL THE COMPONENTS (ONE AT A TIME) THAT THE 5 VOLT SUPPLY FEEDS (IE.. TRANSDUCERS, THERMISTORS, ETC..).

WHEN YOU REMOVE THE COMPONENT THAT IS PULLING DOWN THE SUPPLY YOUR METER WILL RISE BACK UP TO 5 VOLTS. REPLACE THE DEFECTIVE COMPONENT.

YORK®	ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB21)(698)
	File With 160.47-M2	

SUBJ.: CARD FILE PROBLEM ?
(2 CHILLERS READING
DIFFERENT TEMPS. WITH SAME VOLTAGE)
PRODUCTS: YT / YK / YS / YG /YB
ISO FLOW / PARAFLOW

PROBLEM: THERE ARE TWO CHILLERS AT THE JOB USING A 0 TO 10 VOLT DC SIGNAL FOR THE REMOTE RESET TEMP. RANGE

CHILLER NO. ONE IS READING : 44 DEG. AT A ZERO VDC SIGNAL.

CHILLER NO. TWO IS READING : 46 DEG. AT A ZERO VDC SIGNAL

" THERE ARE NO ADJUSTMENTS ON THE BOARDS IN THE CARD FILE NOR ON THE FILE RACK ITSELF TO ADJUST TO HAVE THESE TWO READ THE SAME "

SOLUTION : CHECK THE FOLLOWING IN THE ORDER SHOWN:

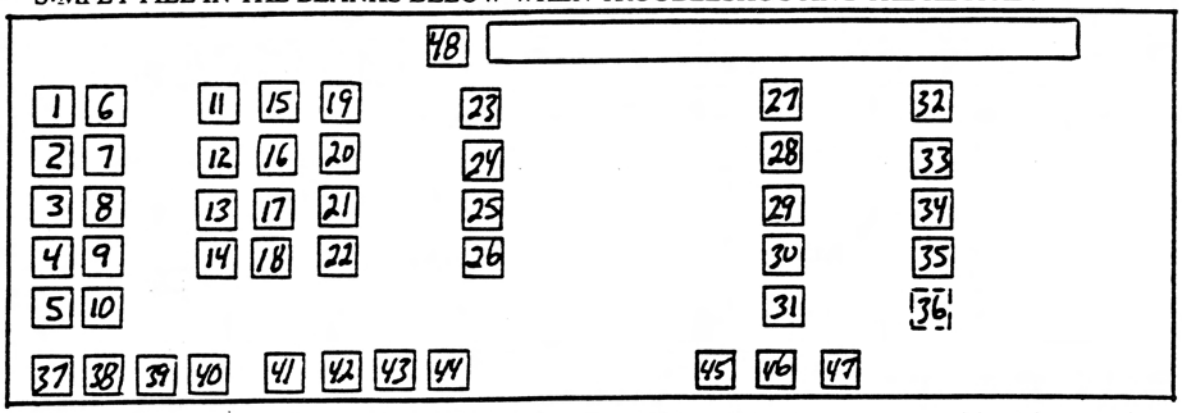
1. IS THE REMOTE TEMP. RANGE SETTING THE SAME ON BOTH CHILLERS. VIEW ON THE DISPLAY. (SHOULD BE THE SAME)
2. IS THE LEAVING SET POINT BASE SETTING DIFFERENT BETWEEN THE TWO CHILLERS. VIEW ON THE DISPLAY. (SHOULD BE THE SAME)
3. IS THE ZERO VOLTS BEING SUPPLIED TO US FROM THE JOHNSON / HONEYWELL / ETC.... SUPPLIER A CONSTANT / STABLE ZERO VOLTS.
4. THE PLUG IN BOARD IN THE CARD FILE IS DEFECTIVE. TRY SWAPPING THE BOARDS TO SEE IF THE TEMPERATURE FOLLOWS.

YORK®	ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB22)(798)
	File With 160.47-M2	

SUBJ.:KEY PAD CHECK OUT

PRODUCTS: YT,YK,YS,YG,YB,
PARAFLOW, ISO FLOW

YOU WILL FIND BELOW A LAYOUT OF THE YORK KEYPAD. I NUMBERED EACH KEY TO HELP YOU LOCATE THE KEY THAT COROSPONDS TO THE PIN LAYOUT SHOWN BELOW. SIMPLY FILL IN THE BLANKS BELOW WHEN TROUBLESHOOTING THE KEYPAD:

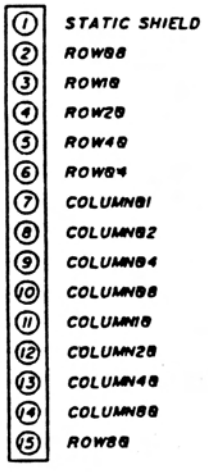


KEY	PIN	PIN	Depressed / not depressed
1	2	14	
2	3	14	
3	4	14	
4	5	14	
5	6	14	
6	2	13	
7	3	13	
8	4	13	
9	6	13	
10	6	12	
11	2	12	
12	3	12	
13	4	12	
14	6	12	
15	2	11	
16	3	11	
17	4	11	
18	5	11	
19	2	10	
20	3	10	
21	4	10	
22	5	10	
23	2	9	
24	3	9	

KEY	PIN	PIN	Depressed / not depressed
25	4	9	
26	5	9	
27	2	8	
28	3	8	
29	4	8	
30	5	8	
31	6	8	
32	2	7	
33	3	7	
34	4	7	
35	5	7	
36	6	7	
37	15	14	
38	15	13	
39	15	12	
40	15	11	
41	15	10	
42	15	9	
43	15	8	
44	15	7	
45	6	9	
46	6	10	
47	6	11	
48	13	5	

Key *not depressed* **must read greater** than 1MEG ohm (note: this reading used to be 10,000 ohms)
Key *depressed* **must read less** than 100 ohms

MAKE EXTRA COPIES OF THIS SHEET FOR FUTURE JOBS



CONNECTOR PIN OUT

YORK®	MILLENNIUM ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supercedes: Nothing	Form 160.47-M2 (SB23) (200)
	File with: 160.47-M2	

Subject: Screw Chiller (125-675TR) Non-Graphic Control Center –
Eprom Version S.01F.19

On/about March 2000, Eprom Version S.01F.19 (York P/N 031-01102-002) will be available for non-Graphic Control Centers equipped with Micro Board 031-01065-XXX. It contains the following enhancements that revise Service Manual 160.47-M2 as follows:

SLIDE VALVE UNLOAD BEFORE SHUTDOWN

To assure the Slide Valve unloads to < 30% position during shutdown, it is unloaded to < 30% prior to shutting down the chiller on certain shutdowns.

While the chiller is running, if one of the below listed shutdown commands occur and the slide valve position is > 30%, a continuous unload signal is applied to the slide valve until its position is < 30%. While the slide valve is unloading, "SYSTEM SHUTTING DOWN – SV UNLOADING' is displayed. If the Status key is pressed, a message describing the cause of shutdown is displayed. When the slide valve position becomes < 30%, the chiller shutsdown and the normal 2-minute lockout period begins. The shutdown commands that initiate this operation are:

- Multi-Unit Sequence TB2-9
- Remote/Local Cycling TB2-13
- Remote Stop TB2-8
- Low Water Temp
- Daily Schedule Internal Time Clock

To assure that a defective slide valve actuator or mechanical problems cannot prevent a chiller shutdown, if the slide valve has not unloaded to < 30% within 210 seconds of receiving the shutdown command, a shutdown occurs regardless of slide valve position.

MINIMUM LOAD CONTROL

There are now two selectable methods of preventing Separator oil loss under low load conditions: **Minimum Allowed Slide Valve Position** and **Minimum Allowed Motor Current**. Although both of these methods have been previously used in various eprom versions, they were never available in the same eprom. The actual method that should be used is determined by the application. While the slide valve minimum position is being limited by either method, "System run – Minimum Load Control" is displayed.

A description of each follows:
Minimum Allowed Slide Valve Position: Following a 3 minute bypass at chiller start and after the slide valve is loaded to at least a 25% position, it is not permitted to unload to < 5% position.
Minimum Allowed Motor Current: Following a 3 minute bypass at chiller start, if the motor current is < the programmed "Minimum Allowed Motor Current" value, "System Run- Minimum Load Control" is displayed and a 1 second load pulse is applied to the slide valve every 3 seconds until the motor current is ≥ the setpoint plus 2%. Manual slide valve control overrides this feature. The programmed "Minimum Allowed Motor Current" value has priority over any is "Pulldown Demand" or "Current Limit" setpoint.

Select the desired method using Access Code 1380 and the % MOTOR AMPS/% SLIDE VALVE key. When prompt message "Low Limit Control = x (0=%SV;1=%FLA)" is displayed, enter "0" or "1" for the desired method. If "%FLA" method is selected, use UNLOAD service key to enter the desired motor current value. When prompt message "Minimum Current Load Limit = XX%FLA", enter desired value between 15% and 70% FLA. Both methods are selectable, regardless of the position of Program Jumper JP4.

The method selected is displayed as a scrolled message of the DISPLAY DATA key as either "% Slide Valve Determines low Limit" or "Motor % FLA determines Low Limit".

STANDBY CHILLER FREEZE PROTECTION

In this Eprom version, this feature has been modified as described below.

In previous eprom version S.01F.17, detailed in 160.47-M2 (SB18), the freeze threat was based on the **Evaporator Saturation Temperature** decreasing below 32° F and the warning was displayed after the chiller was shutdown for at least 10 minutes. The warning cleared when the temperature increased above 35° F. During shutdown, the condenser pump was turned on when the temperature decreased below 35° F and was turned off when it was greater than 45° F.

In this version, freeze threat is based the **Condenser Saturation Temperature** as follows: After the chiller has been shutdown for at the least the user programmed bypass time (30-60 minutes), programmed with the "Freeze Warning Delay Time" setpoint below, if the temperature decreases below 28° F, "Freeze Threat From Operating Chiller" is displayed and the Warning Relay is energized. The Warning Relay is K6 on the Relay Board and when energized, the contacts close between TB3-34 and TB3-1. As before, closure of these contacts applies 115Vac to TB3-34 and this signal can be used for alarm purposes. The warning clears and the relay is de-energized when the temperature increases above 28° F.

As before, the Condenser Pump is driven from Relay Board TB4-55 & 56 (dry closure contacts of relay K0)(Relay Board 031-00932-02 is required; -001 does not contain K0). The relay is energized to turn on the pump and de-energized to turn it off. Normally, the pump is started at the beginning of "Start Sequence Initiated". At chiller shutdown, the pump continues to run until the Condenser Saturation temperature increases above 35° F. During shutdown, anytime the temperature decreases below 30° F, the pump is turned on until it rises above 35° F.

Program the "Freeze Warning Delay Time" using Access code 9675 or 1380 and the REFRIGERANT PRESSURES key. When prompt message "Freeze Warning Delay Time =

XXMin" is displayed, enter desired time between 30 and 60 minutes.

With this Eprom, a Condenser Water Flow Switch can be connected between Digital Input Board terminals TB1-71 and TB2-1 (or TB1-1). The flow switch is bypassed for 60 seconds after the Condenser Pump is turned on with TB4-55 & 56 as described above. After the bypass, if it opens continuously for 2 seconds, a cycling shutdown is performed and "Day-Time-Cond Flow Switch-Autostart" is displayed. If the Condenser Pump is being run due to a low Condenser Saturation Temperature as described above, and the flow switch opens continuously for 2 seconds. "Freeze Threat – Cond Water Flow Fault" is displayed.

DISPLAY DATA KEY - CORRECTION

In previous eprom versions, when the Seal Oil Pressure Transducer operation was enabled, the Evaporator and Condenser Saturation Temperatures were no longer displayed as one of the scrolled messages of the Display Data Key. In this version, the Saturation Temperatures are displayed regardless of Seal Oil Pressure Transducer status.

HOT GAS BYPASS CONTROL SELECTION

In Eprom versions S.01F.12 and earlier, the Hot Gas Bypass control was based on Slide valve Position as follows: After a 3 minute bypass at start, the valve was opened (energized) when the Slide Valve position decreases to $\leq$ 5%. When it increases to $\geq$15%, it is de-energized (closed).

In Eprom version S.01F.13 and later, it was controlled, after a 3 minute bypass at start, per the difference between the Entering Chilled Water Temperature and the Leaving Chilled Liquid Temperature Setpoint as follows: When the Entering Chilled Water Temperature minus the Leaving Chilled Water Temperature Setpoint differential decreases to the programmed ON threshold (1 to 10° F), the valve is energized (opened). When the differential increases to the programmed OFF threshold (2 to 15° F), the valve is de-energized (closed).

The position of Micro Board Program Jumper JP4 does not affect Hot Gas operation as it did previously.

Both of these methods are available in this new Eprom version. The desired method is selectable as follows:

1.) Enter PROGRAM mode using Access code 1 3 8 0.
2.) Press CHILLED LIQUID TEMPS Display key.
"HOT GAS USES-X (0=%SLD VLV;1=TEMP DIFF)" is displayed.
3.) Using ENTRY keys, press 0 to select Slide Valve method or 1 for Setpoint Differential method.
4.) Press ENTER key.
5.) If 0 was entered in step no.3, press PROGRAM key to exit. If 1 was entered, press ADVANCE DAY/SCROLL key.
"(ECWT – LCWSP): HOT GAS ON = XX°F; OFF=XX°F" is displayed.
6.) Using ENTRY keys, enter differential threshold (1 to 10° F) at which it is desired to turn on the Hot Gas Bypass. Use leading zeroes where necessary (ie, 03). The Cursor will automatically move to the OFF entry. Enter the differential threshold (2 to 15° F) at which it is desired to turn off the Hot Gas Bypass.
7.) Press PROGRAM key to exit.

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File in SK Manual(s).

SERVICE BULLETIN	Supersedes:	192	Form 160.47-M2 (SB-3
	File with Form: 160.47-M2		

SUBJECT: Centrifugal and Screw (125 - 675 TR)
Chiller Microcomputer Control Center -
Display 031-00775-000

Display 031-00775-000 (Babcock VF-140-04) will no longer be available as a Replacement Part.

This Display will be replaced by a Kit (331-00775-600) consisting of:

- Display 031-00775-001 (Babcock VF-140-02 or IEE33383-01)
- Display Reset Board 031-01305-000
- Installation Instructions.

Since Display 031-00775-001 does not contain an Onboard Reset Circuit as the Line - 000 Display does, the Display Reset Board is required. The Reset Board is mounted to the rear of the Display in piggy-back fashion to prevent Display latch-ups.

Continue to order Display Part Number 031-00775-000. When stock is exhausted, the Kit will be automatically substituted.

Display 031-00775-000 is used only in the following microcomputer Control Centers:

031-00846-000	Style "D" Centrifugal
031-00954-000	Style "E" Centrifugal
371-01112-001	Style "A" Screw

For reference, the Display Reset Board is shown on FIG. 1.

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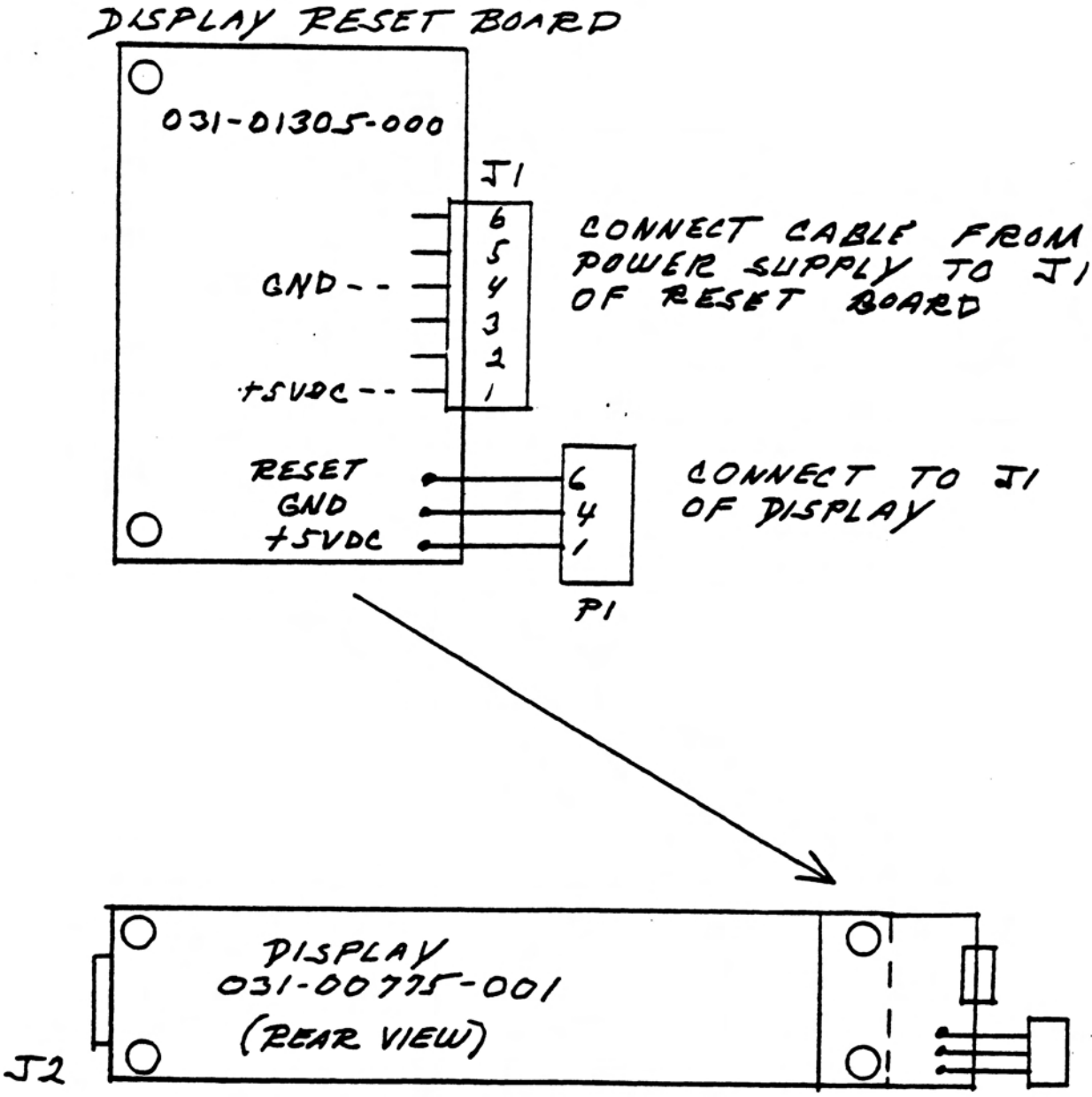
FIG. 1



MOUNT DISPLAY RESET BOARD IN PIGGY-BACK FASHION TO REAR OF DISPLAY USING #6-32 3/4 LNG MACHINE SCREWS SUPPLIED WITH DISPLAY RESET BOARD.

DISPLAY RESET BOARD INSTALLATION INSTRUCTIONS

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes:	292	Form 160.47-M2 (SB4)
File with Form:	160.47-M2 (291)	

SUBJECT: Centrifugal and Screw (125 - 675 TR)
Chiller Microcomputer Control Center -
Micro Board 031-01065-001

Micro Board 031-01065-001 is now in production. It supersedes Micro Board 031-01065-000.

The Line -001 Board contains triac drivers that have a higher voltage rating than those on the Line -000 Board. This is the only difference. All other circuits, plug connections, program jumpers, etc., are identical to the Line -000 Board. The same troubleshooting procedures apply.

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SERVICE BULLETIN

Supersedes: 392 Form 160.47-M2 (SB- 5

File with Form: 160.47-M2 (291)

SUBJECT: Screw Chiller (125 - 675 TR)
Microcomputer Control Center -
EPROM Enhancements

The following enhancements are included in these EPROMS:

SLIDE VALVE OPERATION (Versions S.01S.05, S.01F.05, S.01S,06, S.01F.06)

Previous EPROM versions enable "Hot Gas Bypass" operation and prevent the slide valve from unloading to less than 5% position after 4 minutes of chiller run time when Micro Board Program Jumper JP4 is cut.

These new versions change this timer to 3 minutes.

Refer to Service Manual 160.47-M2 (291) FIG. 31A.

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: Nothing	1192	Form 160.47-M2 (SB-6)
File with Form: 160.47-M2		

**SUBJECT: Screw Chiller (125-675 TR)
Microcomputer Control Center -
Version S.01S.08, S.01F.08,
S.01T.08 EPROMS**

The following enhancements are included in the above EPROMS. They will be in production on/about December 1992. It is not necessary to retrofit to existing units.

CHILLED WATER PUMP CONTROL CONTACTS

As with previous versions of EPROM, the chilled water pump control contacts on relay board TB4-44/45 remain closed on **LOW WATER TEMP** shutdowns. They also remain closed on **MULTI-UNIT SEQUENCE** and **SYSTEM CYCLING** shutdowns if Micro Board Program Jumper J54 is removed. However, previous versions would not open the contacts if the unit is already shutdown one of these shutdowns and the **COMPRESSOR** switch is moved to the "STOP/RESET" position. This version opens the contacts if unit is already shutdown on one of these shutdowns and the **COMPRESSOR** switch is moved to the "STOP/RESET" position.

REFRIGERANT R134A CAPABILITY

This version of EPROM can be used on Refrigerant R22 or R134A applications. The actual refrigerant used determines the position of Micro Board Program Jumper JP2. The software will interpret the appropriate pressures per the JP2 position as follows:

JP2

IN = R22 Applications, requires use of transducers 025-28678-001 (Condenser, Oil, Oil Filter), 025-28678-002 (Evap-Water) or 025-28678-003 (Evap-Brine).

OUT = R134A Applications, requires use of transducers 025-28678-001 (Condenser, Oil, Oil Filter), and 025-28678-005 (Evap-water and brine).

ALLOWABLE SLIDE VALVE POSITION TO START

Previous versions of software allowed the unit to start only if the slide valve position is <10%. Since some compressors do not consistently return the slide valve to <10% at unit shutdown, provision has been made to allow those units to start if the slide valve position is <30%. To invoke the 30% permissive start, cut the Wire Program Jumper JP4 on the Micro Board.

It is important to note that cutting this Jumper also invokes all of the previous functions invoked by removal of this jumper. Specifically, Hot Gas Bypass Outputs and 5% minimum Slide Valve Position during run. Refer to Form 160.47-M2 (291) FIG. 31A for other details of this jumper.

LOAD LIMIT

OPERATION

This feature limits the motor current to the programmed value when the leaving chilled water temperature is equal to or greater than the programmed threshold. White this limit is in effect, **"SYSTEM RUN-LOAD LIMIT IN EFFECT"** is displayed. The leaving chilled water threshold is programmable from 50°F to 70°F; the default value is 70°F. The motor current value is programmable from 60% to 100% FLA; the default value is 100% FLA.

This feature is only required when using certain compressor/chiller combinations under certain operating conditions, consult factory for requirement.

PROGRAMMING

1) Enter **PROGRAM** mode by using access code **1 3 8 0**.
2) Press slide valve **LOAD** Service Key.
   "LOAD LIMIT H20 TEMP=XX.X°F;CURR=XXX%FLA" is displayed.
3) Enter desired values. Use leading zeroes where necessary.
4) Press **ENTER** Key. **"PROGRAM MODE, SELECT SETPOINT"** is displayed.
5) Press **PROGRAM** key to exit.

OIL/EVAP TRANSDUCER AUTO-ZERO ENABLE/DISABLE

OPERATION

This feature allows the serviceman to enable or disable the auto-zeroing of the evaporator and oil pressure transducers. When enabled, the output of the evaporator transducer is compared to the output of the oil pressure transducer (that is located at the input to the compressor) during the first 15 seconds of "Start Sequence, Initiated" to determine the **OFFSET PRESSURE** (refer to Form 160.47-01.1, Page 5 for explanation of offset press.). This is to compensate for minor differences in transducer accuracy and is the normal mode of operation. However, this can cause an error in the **DIFFERENTIAL OIL PRESSURE** calculation on units where evaporator and condenser water loops with common pumps are shared among multiple units. The evaporator water that is being cooled and the condenser water that is being heated by another unit causes the evaporator and condenser of the shutdown unit to be at different pressures. Therefore, during the auto-zero sequence, the evaporator transducer and oil pressure transducer will be sensing a pressure differential that includes the small transducer accuracy tolerance **plus** the large differential of the evaporator and condenser pressures. This results in a large **OFFSET PRESSURE**. While the unit is running, this large **OFFSET PRESSURE** causes the calculated **DIFFERENTIAL OIL PRESSURE** to be much less than it really is. Therefore, the Auto-Zeroing should be **DISABLED** under these conditions only.

CAUTION !!: THE AUTO-ZEROING SHOULD ONLY BE DISABLED AFTER CONSULTATION WITH THE FACTORY.

NOTE: THE OIL PRESSURE TRANSDUCER IS STILL AUTO-ZEROED WITH THE OIL FILTER TRANSDUCER EVEN THOUGH THE AUTO-ZEROING HAS BEEN DISABLED.

PROGRAMMING

1) Enter **PROGRAM** mode by using access code **1 3 8 0**.
2) Press **OIL/FILTER PRESSURES** Display Key. **"OIL/EVAP TRANSDUCERS AUTO ZERO ENABLED"** is displayed.
3) Use the **ADVANCE DAY/SCROLL** key to select **ENABLED** or **DISABLED**. Each time the **ADVANCE DAY/SCROLL** key is pressed, the display alternates between **ENABLED** and **DISABLED**. The default value is **ENABLED**. Pressing the **CANCEL** key selects the default value.
4) Press **ENTER** key. **"PROGRAM MODE, SELECT SETPOINT"** is displayed.
5) Press **PROGRAM** key to exit.

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: Nothing	1292	Form 160.47-M2 (SB- 7
File with Form: 160.47-M2		

SUBJECT: **MICROCOMPUTER CONTROL CENTER (SCREW CHILLER - 125 - 675 TR) REFRIGERANT R134a APPLICATIONS**

The following enhancements have been made to the Control Center to allow the use of Refrigerant R134a:

EPROM

Chillers shipped after January 1, 1993 will be equipped with versions S.01S.08, S.01F.08, S.01T.08 or higher. These versions can be used with either R22 or R134a. The actual refrigerant used determines the position of Micro Board Program Jumper JP2. The software will interpret the correct pressures per the position of JP2 as follows:

MICRO BOARD PROGRAM JUMPER JP2

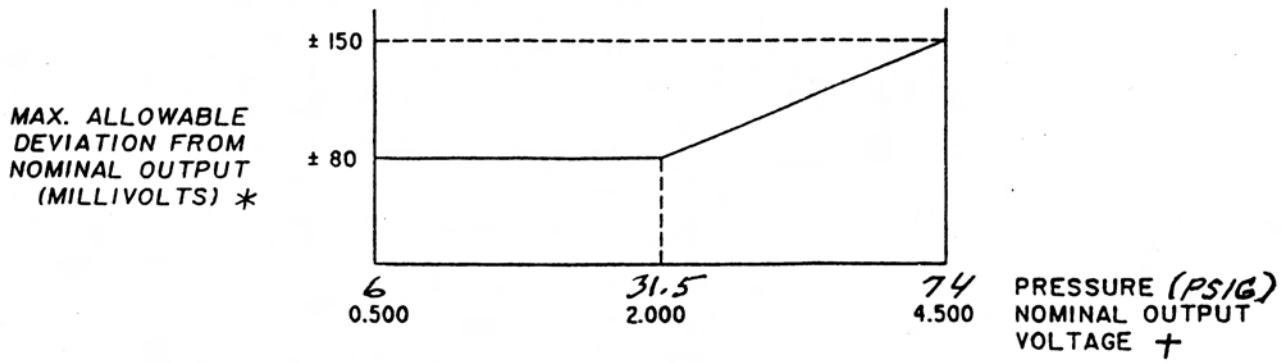
IN = R22 Applications. Requires use of Transducers 025-28678-001 (condenser, oil, oil filter), 025-28678-002 (Evap-Water) or 025-28678-003 (Evap-Brine).

OUT = R134a Applications. Requires use of Transducers 025-28678-001 (Condenser, Oil, Oil Filter), and 025-28678-005 (Evap-Water and Brine).

EVAPORATOR TRANSDUCER

Chillers supplied with R134a will be equipped with Evaporator Transducer Part No. 025-28678-005. When this transducer is used, Micro Board Program Jumper JP2 must be **OUT**. This Transducer is applicable to Water or Brine Applications. It is able to operate at the lower pressure range required by R134a as follows: (X's will be displayed below 6.9 PSIG and above 77.3 PSIG).

025-28678-005



$P = 17 \times V - 2.5$

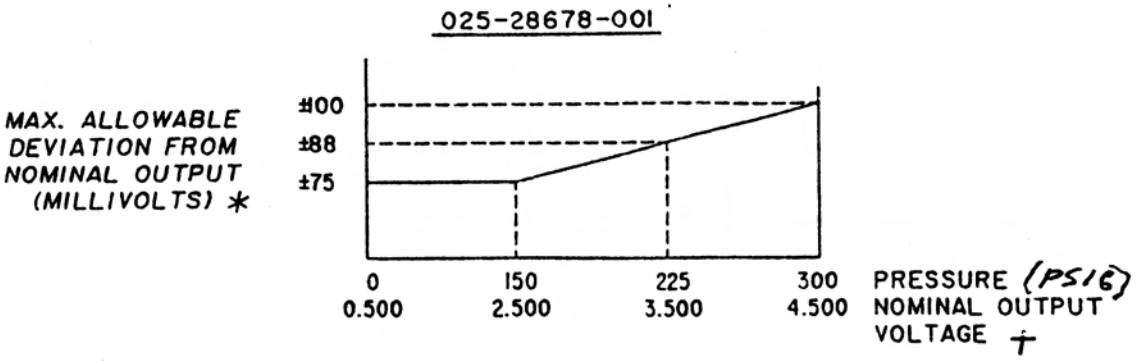
$V = \frac{P + 2.5}{17}$

P = Pressure
V = Volts

CONDENSER, OIL & OIL FILTER TRANSDUCERS

These Transducers, Part No. 025-28678-001, are the same as has been used on R22 Applications. However, when the Control Center is equipped with the Eprom listed above, the range is extended from 65-300 PSIG to 0-300 PSIG. X's will be displayed as follows:

- Oil, & Oil Filter = < 0 PSIG; >315 PSIG
- Condenser = < 6.8 PSIG; >315 PSIG (R134a)
  <24.2 PSIG; >315 PSIG (R22)



$P = 75 \times V - 37.5$

$V = \frac{P + 37.5}{75}$

LOW EVAPORATOR PRESSURE THRESHOLDS

When Micro Board Program Jumper JP2 is **OUT**, the Control Center uses the following R134a Thresholds:

- LEP Cutout/Cutin = 25.0/25.1 PSIG
- Inhibit/Allow Slide Valve Loading = 27.0/28.0 PSIG

DRW 3M 193 .10
CODE:SK

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File in SK Manual(s).

SERVICE BULLETIN	Supersedes: Nothing	693	Form 160.47-M2 (SB-8
	File with Form: 160.47-M2		

SUBJECT: SCREW CHILLER (125-675 TR) MICROCOMPUTER CONTROL CENTER VERSION S.01S.10, S.01F.10 and S.01T.10 EPROMS

The following enhancement is included in the above EPROMS. They will be in production on/about June 1993. It is not necessary to retrofit to existing units.

LEAVING CHILLED WATER TEMP CONTROL - SENSITIVITY

Previous versions of EPROM had only one Slide Valve Control Routine, with no sensitivity adjustment. The Load and Unload pulses were of equal duration. Every 10 seconds it applied a 1-second long load or unload pulse to the Slide Valve as required to control the leaving chilled water temperature to the desired setpoint. In applications where a large amount of load is quickly removed from the chiller, it may not unload fast enough to compensate for this loss of load. Therefore, sensitivity adjustment is now provided with Micro Board Program Jumper J53 per below. With the jumper removed, all unload pulses are 2-seconds long. This provides for faster unloading.

J53

IN - Standard Slide Valve Control. All load and unload pulses are 1-second long. Will provide proper operation in most applications.

OUT - Sensitive (Fast Unload) Slide Valve Control. All load pulses are 1-second long. All unload pulses are 2-seconds long. Provides faster unloading. Could be required in those applications where the LEAVING CHILLED WATER TEMP setpoint is occasionally raised by an external Building Automation System or any other application where load is quickly removed from the chiller.

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SSP 3M 793 .05
CODE:SK

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File in SK Manual(s).

SERVICE BULLETIN	Supersedes: None	194	Form 160.47-M2 (SB 9)
94-4	File with Form: 160.47-M2		

SUBJECT: FAX 4000 / ANDOVER INTERFACING TO STYLE "A" SCREW CHILLER

Microcomputer Control Panels supplied on York Style "A" Screw Chillers built in the past two years are compatible with FAX 4500 only. Some field offices have overcome this situation by retrofitting the microboard in the panel to the older part number 031-00940-000 board. THIS IS NOT A WARRANTY SITUATION. Warranty claims of this type will be rejected.

If you encounter this situation in the field, your office will need to contact the salesperson who sold the chiller. Any costs to provide FAX4000 / Andover compatibility must be charged to the equipment order. Our marketing department has agreed, that cost of extra hardware and BAS programming support MUST be addressed in the pricing of the original equipment order.

Also .be aware that retrofitting panels to the older style of microboard requires very careful attention to compatibility between microboard, EPROM, transducers, 32K/64K jumpers, and the refrigerant used in the system. Compatibility information is found in the parts manuals. If any one of these items is incorrect, the panel will not operate, or will operate incorrectly.

CODE:SK

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Form 160.47-M2 (291)
Supersedes: 160.47-M2 (390)

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YORK®	Form Number: 160.47-M2 (LS01)	205
	Supersedes: None	
LITERATURE SUPPLEMENT	File with: 160.47-M2 (291)	

Subject: Disabling Discharge Superheat Oil Recovery Feature on YS Chillers Using "1-line Display" Microcomputer Center

General

Beginning February 2003, an enhanced version of software for YS chillers using the "1-line" Display Microcomputer Control Center was released. The enhancements are listed below.

The eprom version and part number is:

Version……. S.01F.21

Part Number……..031-01102-002

This eprom can only be used in 031-01065 Microboards

Oil Recovery Feature - Disable

In the previous software version (S.01F.20), the Discharge Superheat Oil Recovery feature (as described in Service Instruction SI0023) was active all the time. Since this feature recovers oil that has accumulated in the evaporator refrigerant by limiting slide valve loading per the discharge superheat, chiller capacity is affected while the routine is in effect. Therefore, under normal operating conditions, the feature should be disabled.

In this software version, a service technician can enable or disable the feature at the keypad. When enabled, the oil recovery routine operates automatically. When disabled, the oil recovery routine does not operate. The default is "Disabled".

The feature is enabled and disabled by the value entered for the load pulse multiplier. It is disabled by setting the value to zero (0). Entering any number greater than zero enables the feature.

Use the following procedure to disable the feature:

1. Press ACCESS CODE key.
2. Using ENTRY keys, enter access code 1 3 8 0.
3. Press PROGRAM key.
4. Press OPEN key. Use the ADVANCE DAY/SCROLL key to display the following message. Each time the key is pressed, the display scrolls to the next message.

   "S'Heat Load Cycle Time = X Sec (x5)"
5. Using ENTRY keys, enter "0".
6. Press PROGRAM key to exit.

When disabled, the message "DSH Count = XX.XºF", displayed via the DISPLAY DATA key, is replaced by "Discharge Superheat Not Selected". This provides a visual indication that the feature is disabled.

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Form 160.47-M2 (LS01)
New Release

YORK®	MILLENNIUM ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supercedes: Nothing	Form 160.47-M2 (SB23) (200)
	File with: 160.47-M2	

Subject: Screw Chiller (125-675TR) Non-Graphic Control Center –
Eprom Version S.01F.19

On/about March 2000, Eprom Version S.01F.19 (York P/N 031-01102-002) will be available for non-Graphic Control Centers equipped with Micro Board 031-01065-XXX. It contains the following enhancements that revise Service Manual 160.47-M2 as follows:

SLIDE VALVE UNLOAD BEFORE SHUTDOWN

To assure the Slide Valve unloads to < 30% position during shutdown, it is unloaded to < 30% prior to shutting down the chiller on certain shutdowns.

While the chiller is running, if one of the below listed shutdown commands occur and the slide valve position is > 30%, a continuous unload signal is applied to the slide valve until its position is < 30%. While the slide valve is unloading, "SYSTEM SHUTTING DOWN – SV UNLOADING' is displayed. If the Status key is pressed, a message describing the cause of shutdown is displayed. When the slide valve position becomes < 30%, the chiller shutsdown and the normal 2-minute lockout period begins. The shutdown commands that initiate this operation are:

- Multi-Unit Sequence TB2-9
- Remote/Local Cycling TB2-13
- Remote Stop TB2-8
- Low Water Temp
- Daily Schedule Internal Time Clock

To assure that a defective slide valve actuator or mechanical problems cannot prevent a chiller shutdown, if the slide valve has not unloaded to < 30% within 210 seconds of receiving the shutdown command, a shutdown occurs regardless of slide valve position.

MINIMUM LOAD CONTROL

There are now two selectable methods of preventing Separator oil loss under low load conditions: **Minimum Allowed Slide Valve Position** and **Minimum Allowed Motor Current**. Although both of these methods have been previously used in various eprom versions, they were never available in the same eprom. The actual method that should be used is determined by the application. While the slide valve minimum position is being limited by either method, "System run – Minimum Load Control" is displayed.

A description of each follows:
Minimum Allowed Slide Valve Position: Following a 3 minute bypass at chiller start and after the slide valve is loaded to at least a 25% position, it is not permitted to unload to < 5% position.
Minimum Allowed Motor Current: Following a 3 minute bypass at chiller start, if the motor current is < the programmed "Minimum Allowed Motor Current" value, "System Run- Minimum Load Control" is displayed and a 1 second load pulse is applied to the slide valve every 3 seconds until the motor current is ≥ the setpoint plus 2%. Manual slide valve control overrides this feature. The programmed "Minimum Allowed Motor Current" value has priority over any is "Pulldown Demand" or "Current Limit" setpoint.

Select the desired method using Access Code 1380 and the % MOTOR AMPS/% SLIDE VALVE key. When prompt message "Low Limit Control = x (0=%SV;1=%FLA)" is displayed, enter "0" or "1" for the desired method. If "%FLA" method is selected, use UNLOAD service key to enter the desired motor current value. When prompt message "Minimum Current Load Limit = XX%FLA", enter desired value between 15% and 70% FLA. Both methods are selectable, regardless of the position of Program Jumper JP4.

The method selected is displayed as a scrolled message of the DISPLAY DATA key as either "% Slide Valve Determines low Limit" or "Motor % FLA determines Low Limit".

STANDBY CHILLER FREEZE PROTECTION

In this Eprom version, this feature has been modified as described below.

In previous eprom version S.01F.17, detailed in 160.47-M2 (SB18), the freeze threat was based on the **Evaporator Saturation Temperature** decreasing below 32° F and the warning was displayed after the chiller was shutdown for at least 10 minutes. The warning cleared when the temperature increased above 35° F. During shutdown, the condenser pump was turned on when the temperature decreased below 35° F and was turned off when it was greater than 45° F.

In this version, freeze threat is based the **Condenser Saturation Temperature** as follows: After the chiller has been shutdown for at the least the user programmed bypass time (30-60 minutes), programmed with the "Freeze Warning Delay Time" setpoint below, if the temperature decreases below 28° F, "Freeze Threat From Operating Chiller" is displayed and the Warning Relay is energized. The Warning Relay is K6 on the Relay Board and when energized, the contacts close between TB3-34 and TB3-1. As before, closure of these contacts applies 115Vac to TB3-34 and this signal can be used for alarm purposes. The warning clears and the relay is de-energized when the temperature increases above 28° F.

As before, the Condenser Pump is driven from Relay Board TB4-55 & 56 (dry closure contacts of relay K0)(Relay Board 031-00932-02 is required; -001 does not contain K0). The relay is energized to turn on the pump and de-energized to turn it off. Normally, the pump is started at the beginning of "Start Sequence Initiated". At chiller shutdown, the pump continues to run until the Condenser Saturation temperature increases above 35° F. During shutdown, anytime the temperature decreases below 30° F, the pump is turned on until it rises above 35° F.

Program the "Freeze Warning Delay Time" using Access code 9675 or 1380 and the REFRIGERANT PRESSURES key. When prompt message "Freeze Warning Delay Time =

XXMin" is displayed, enter desired time between 30 and 60 minutes.

With this Eprom, a Condenser Water Flow Switch can be connected between Digital Input Board terminals TB1-71 and TB2-1 (or TB1-1). The flow switch is bypassed for 60 seconds after the Condenser Pump is turned on with TB4-55 & 56 as described above. After the bypass, if it opens continuously for 2 seconds, a cycling shutdown is performed and "Day-Time-Cond Flow Switch-Autostart" is displayed. If the Condenser Pump is being run due to a low Condenser Saturation Temperature as described above, and the flow switch opens continuously for 2 seconds, "Freeze Threat – Cond Water Flow Fault" is displayed.

DISPLAY DATA KEY - CORRECTION

In previous eprom versions, when the Seal Oil Pressure Transducer operation was enabled, the Evaporator and Condenser Saturation Temperatures were no longer displayed as one of the scrolled messages of the Display Data Key. In this version, the Saturation Temperatures are displayed regardless of Seal Oil Pressure Transducer status.

HOT GAS BYPASS CONTROL SELECTION

In Eprom versions S.01F.12 and earlier, the Hot Gas Bypass control was based on Slide valve Position as follows: After a 3 minute bypass at start, the valve was opened (energized) when the Slide Valve position decreases to $\leq$ 5%. When it increases to $\geq$15%, it is de-energized (closed).

In Eprom version S.01F.13 and later, it was controlled, after a 3 minute bypass at start, per the difference between the Entering Chilled Water Temperature and the Leaving Chilled Liquid Temperature Setpoint as follows: When the Entering Chilled Water Temperature minus the Leaving Chilled Water Temperature Setpoint differential decreases to the programmed ON threshold (1 to 10° F), the valve is energized (opened). When the differential increases to the programmed OFF threshold (2 to 15° F), the valve is de-energized (closed).

The position of Micro Board Program Jumper JP4 does not affect Hot Gas operation as it did previously.

Both of these methods are available in this new Eprom version. The desired method is selectable as follows:

1.) Enter PROGRAM mode using Access code 1 3 8 0.
2.) Press CHILLED LIQUID TEMPS Display key.
    "HOT GAS USES-X (0=%SLD VLV;1=TEMP DIFF)" is displayed.
3.) Using ENTRY keys, press 0 to select Slide Valve method or 1 for Setpoint Differential method.
4.) Press ENTER key.
5.) If 0 was entered in step no.3, press PROGRAM key to exit. If 1 was entered, press ADVANCE DAY/SCROLL key.
    "(ECWT – LCWSP): HOT GAS ON = XX°F; OFF=XX°F" is displayed.
6.) Using ENTRY keys, enter differential threshold (1 to 10° F) at which it is desired to turn on the Hot Gas Bypass. Use leading zeroes where necessary (ie, 03). The Cursor will automatically move to the OFF entry. Enter the differential threshold (2 to 15° F) at which it is desired to turn off the Hot Gas Bypass.
7.) Press PROGRAM key to exit.

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: 491 Form 160.47-M2 (SB-1)

File with Form: 160.47-M2

Make the following change in Screw Chiller (125 - 675 TR) Micro Panel Service Manual 160.47-M2.

Section 12, Page 61 - RAM Test.

If Control Center is equipped with Micro Board 031-01065-000, the RAM has only 2 areas; EXT and RTC.

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DRW 2M 591 .05
CODE: SK

43091S-1

Form-AS102 (291)

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: 192 Form 160.47-M2 (SB-3

File with Form: 160.47-M2

SUBJECT: Centrifugal and Screw (125 - 675 TR)
Chiller Microcomputer Control Center -
Display 031-00775-000

Display 031-00775-000 (Babcock VF-140-04) will no longer be available as a Replacement Part.

This Display will be replaced by a Kit (331-00775-600) consisting of:

- Display 031-00775-001 (Babcock VF-140-02 or IEE33383-01)
- Display Reset Board 031-01305-000
- Installation Instructions.

Since Display 031-00775-001 does not contain an Onboard Reset Circuit as the Line - 000 Display does, the Display Reset Board is required. The Reset Board is mounted to the rear of the Display in piggy-back fashion to prevent Display latch-ups.

Continue to order Display Part Number 031-00775-000. When stock is exhausted, the Kit will be automatically substituted.

Display 031-00775-000 is used only in the following microcomputer Control Centers:

031-00846-000	Style "D" Centrifugal
031-00954-000	Style "E" Centrifugal
371-01112-001	Style "A" Screw

For reference, the Display Reset Board is shown on FIG. 1.

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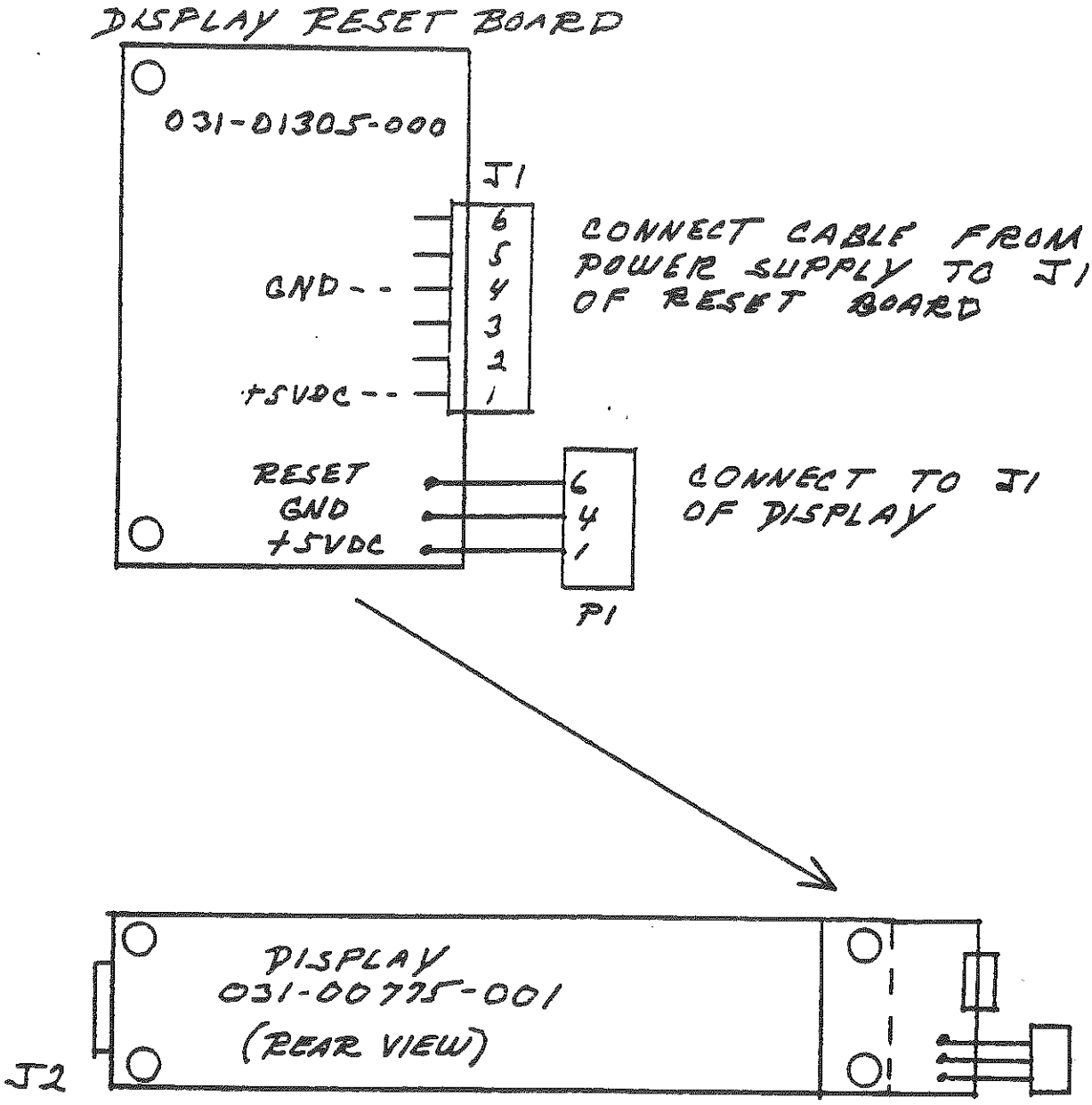
FIG. 1



MOUNT DISPLAY RESET BOARD IN PIGGY-BACK FASHION TO REAR OF DISPLAY USING #6-32 3/4 LNG MACHINE SCREWS SUPPLIED WITH DISPLAY RESET BOARD.

DISPLAY RESET BOARD INSTALLATION INSTRUCTIONS

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: 292 - Form 160.47-M2 (SB4)

File with Form: 160.47-M2 (291)

SUBJECT: Centrifugal and Screw (125 - 675 TR)
Chiller Microcomputer Control Center -
Micro Board 031-01065-001

Micro Board 031-01065-001 is now in production. It supersedes Micro Board 031-01065-000.

The Line -001 Board contains triac drivers that have a higher voltage rating than those on the Line -000 Board. This is the only difference. All other circuits, plug connections, program jumpers, etc., are identical to the Line -000 Board. The same troubleshooting procedures apply.

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: 392 Form 160.47-M2 (SB- 5

File with Form: 160.47-M2 (291)

SUBJECT: Screw Chiller (125 - 675 TR)
Microcomputer Control Center -
EPROM Enhancements

The following enhancements are included in these EPROMS:

SLIDE VALVE OPERATION (Versions S.01S.05, S.01F.05, S.01S,06, S.01F.06)

Previous EPROM versions enable "Hot Gas Bypass" operation and prevent the slide valve from unloading to less than 5% position after 4 minutes of chiller run time when Micro Board Program Jumper JP4 is cut.

These new versions change this timer to 3 minutes.

Refer to Service Manual 160.47-M2 (291) FIG. 31A.

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: Nothing	1192	Form 160.47-M2 (SB-6)
File with Form: 160.47-M2		

SUBJECT: Screw Chiller (125-675 TR)
Microcomputer Control Center -
Version S.01S.08, S.01F.08,
S.01T.08 EPROMS

The following enhancements are included in the above EPROMS. They will be in production on/about December 1992. It is not necessary to retrofit to existing units.

CHILLED WATER PUMP CONTROL CONTACTS

As with previous versions of EPROM, the chilled water pump control contacts on relay board TB4-44/45 remain closed on **LOW WATER TEMP** shutdowns. They also remain closed on **MULTI-UNIT SEQUENCE** and **SYSTEM CYCLING** shutdowns if Micro Board Program Jumper J54 is removed. However, previous versions would not open the contacts if the unit is already shutdown one of these shutdowns and the **COMPRESSOR** switch is moved to the "STOP/RESET" position. This version opens the contacts if unit is already shutdown on one of these shutdowns and the **COMPRESSOR** switch is moved to the "STOP/RESET" position.

REFRIGERANT R134A CAPABILITY

This version of EPROM can be used on Refrigerant R22 or R134A applications. The actual refrigerant used determines the position of Micro Board Program Jumper JP2. The software will interpret the appropriate pressures per the JP2 position as follows:

JP2

IN = R22 Applications, requires use of transducers 025-28678-001 (Condenser, Oil, Oil Filter), 025-28678-002 (Evap-Water) or 025-28678-003 (Evap-Brine).

OUT = R134A Applications, requires use of transducers 025-28678-001 (Condenser, Oil, Oil Filter), and 025-28678-005 (Evap-water and brine).

ALLOWABLE SLIDE VALVE POSITION TO START

Previous versions of software allowed the unit to start only if the slide valve position is <10%. Since some compressors do not consistently return the slide valve to <10% at unit shutdown, provision has been made to allow those units to start if the slide valve position is <30%. To invoke the 30% permissive start, cut the Wire Program Jumper JP4 on the Micro Board.

It is important to note that cutting this Jumper also invokes all of the previous functions invoked by removal of this jumper. Specifically, Hot Gas Bypass Outputs and 5% minimum Slide Valve Position during run. Refer to Form 160.47-M2 (291) FIG. 31A for other details of this jumper.

LOAD LIMIT

OPERATION

This feature limits the motor current to the programmed value when the leaving chilled water temperature is equal to or greater than the programmed threshold. White this limit is in effect, **"SYSTEM RUN-LOAD LIMIT IN EFFECT"** is displayed. The leaving chilled water threshold is programmable from 50°F to 70°F; the default value is 70°F. The motor current value is programmable from 60% to 100% FLA; the default value is 100% FLA.

This feature is only required when using certain compressor/chiller combinations under certain operating conditions, consult factory for requirement.

PROGRAMMING

1) Enter **PROGRAM** mode by using access code **1 3 8 0**.
2) Press slide valve **LOAD** Service Key.
   "LOAD LIMIT H20 TEMP=XX.X°F;CURR=XXX%FLA" is displayed.
3) Enter desired values. Use leading zeroes where necessary.
4) Press **ENTER** Key. **"PROGRAM MODE, SELECT SETPOINT"** is displayed.
5) Press **PROGRAM** key to exit.

OIL/EVAP TRANSDUCER AUTO-ZERO ENABLE/DISABLE

OPERATION

This feature allows the serviceman to enable or disable the auto-zeroing of the evaporator and oil pressure transducers. When enabled, the output of the evaporator transducer is compared to the output of the oil pressure transducer (that is located at the input to the compressor) during the first 15 seconds of "Start Sequence, Initiated" to determine the **OFFSET PRESSURE** (refer to Form 160.47-01.1, Page 5 for explanation of offset press.). This is to compensate for minor differences in transducer accuracy and is the normal mode of operation. However, this can cause an error in the **DIFFERENTIAL OIL PRESSURE** calculation on units where evaporator and condenser water loops with common pumps are shared among multiple units. The evaporator water that is being cooled and the condenser water that is being heated by another unit causes the evaporator and condenser of the shutdown unit to be at different pressures. Therefore, during the auto-zero sequence, the evaporator transducer and oil pressure transducer will be sensing a pressure differential that includes the small transducer accuracy tolerance **plus** the large differential of the evaporator and condenser pressures. This results in a large **OFFSET PRESSURE**. While the unit is running, this large **OFFSET PRESSURE** causes the calculated **DIFFERENTIAL OIL PRESSURE** to be much less than it really is. Therefore, the Auto-Zeroing should be **DISABLED** under these conditions only.

CAUTION !!: THE AUTO-ZEROING SHOULD ONLY BE DISABLED AFTER CONSULTATION WITH THE FACTORY.

NOTE: THE OIL PRESSURE TRANSDUCER IS STILL AUTO-ZEROED WITH THE OIL FILTER TRANSDUCER EVEN THOUGH THE AUTO-ZEROING HAS BEEN DISABLED.

PROGRAMMING

1) Enter **PROGRAM** mode by using access code **1 3 8 0**.
2) Press **OIL/FILTER PRESSURES** Display Key.
   "OIL/EVAP TRANSDUCERS AUTO ZERO ENABLED" is displayed.
3) Use the **ADVANCE DAY/SCROLL** key to select **ENABLED** or **DISABLED**. Each time the **ADVANCE DAY/SCROLL** key is pressed, the display alternates between **ENABLED** and **DISABLED**. The default value is **ENABLED**. Pressing the **CANCEL** key selects the default value.
4) Press **ENTER** key. **"PROGRAM MODE, SELECT SETPOINT"** is displayed.
5) Press **PROGRAM** key to exit.

File in SK Manual(s).

SERVICE BULLETIN

Supersedes: Nothing	1292	Form 160.47-M2 (SB- 7)
File with Form: 160.47-M2		

SUBJECT: **MICROCOMPUTER CONTROL CENTER (SCREW CHILLER - 125 - 675 TR) REFRIGERANT R134a APPLICATIONS**

The following enhancements have been made to the Control Center to allow the use of Refrigerant R134a:

EPROM

Chillers shipped after January 1, 1993 will be equipped with versions S.01S.08, S.01F.08, S.01T.08 or higher. These versions can be used with either R22 or R134a. The actual refrigerant used determines the position of Micro Board Program Jumper JP2. The software will interpret the correct pressures per the position of JP2 as follows:

MICRO BOARD PROGRAM JUMPER JP2

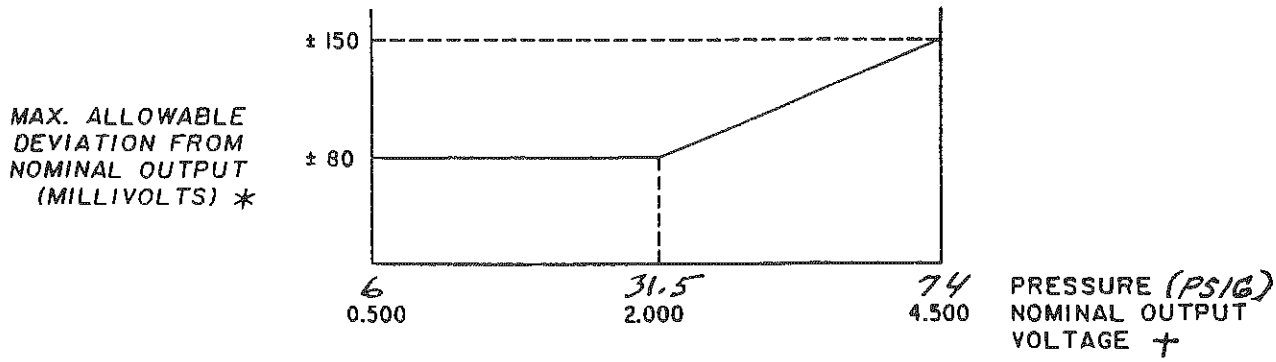
IN = R22 Applications. Requires use of Transducers 025-28678-001 (condenser, oil, oil filter), 025-28678-002 (Evap-Water) or 025-28678-003 (Evap-Brine).

OUT = R134a Applications. Requires use of Transducers 025-28678-001 (Condenser, Oil, Oil Filter), and 025-28678-005 (Evap-Water and Brine).

EVAPORATOR TRANSDUCER

Chillers supplied with R134a will be equipped with Evaporator Transducer Part No. 025-28678-005. When this transducer is used, Micro Board Program Jumper JP2 must be **OUT**. This Transducer is applicable to Water or Brine Applications. It is able to operate at the lower pressure range required by R134a as follows: (X's will be displayed below 6.9 PSIG and above 77.3 PSIG).

025-28678-005



$P = 17 \times V - 2.5$

$V = \frac{P + 2.5}{17}$

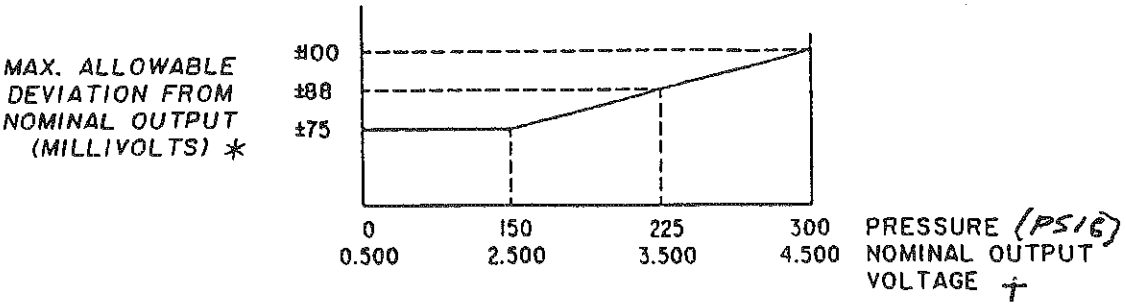
P = Pressure
V = Volts

CONDENSER, OIL & OIL FILTER TRANSDUCERS

These Transducers, Part No. 025-28678-001, are the same as has been used on R22 Applications. However, when the Control Center is equipped with the Eprom listed above, the range is extended from 65-300 PSIG to 0-300 PSIG. X's will be displayed as follows:

- Oil, & Oil Filter = < 0 PSIG; >315 PSIG
- Condenser = < 6.8 PSIG; >315 PSIG (R134a)
  <24.2 PSIG; >315 PSIG (R22)

025-28678-001



$P = 75 \times V - 37.5$

$V = \frac{P + 37.5}{75}$

LOW EVAPORATOR PRESSURE THRESHOLDS

When Micro Board Program Jumper JP2 is OUT, the Control Center uses the following R134a Thresholds:

- LEP Cutout/Cutin = 25.0/25.1 PSIG
- Inhibit/Allow Slide Valve Loading = 27.0/28.0 PSIG

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: Nothing	693	Form 160.47-M2 (SB-8
File with Form: 160.47-M2		

SUBJECT: **SCREW CHILLER (125-675 TR) MICROCOMPUTER CONTROL CENTER VERSION S.01S.10, S.01F.10 and S.01T.10 EPROMS**

The following enhancement is included in the above EPROMS. They will be in production on/about June 1993. It is not necessary to retrofit to existing units.

LEAVING CHILLED WATER TEMP CONTROL - SENSITIVITY

Previous versions of EPROM had only one Slide Valve Control Routine, with no sensitivity adjustment. The Load and Unload pulses were of equal duration. Every 10 seconds it applied a 1-second long load or unload pulse to the Slide Valve as required to control the leaving chilled water temperature to the desired setpoint. In applications where a large amount of load is quickly removed from the chiller, it may not unload fast enough to compensate for this loss of load. Therefore, sensitivity adjustment is now provided with Micro Board Program Jumper J53 per below. With the jumper removed, all unload pulses are 2-seconds long. This provides for faster unloading.

J53

IN - Standard Slide Valve Control. All load and unload pulses are 1-second long. Will provide proper operation in most applications.

OUT - Sensitive (Fast Unload) Slide Valve Control. All load pulses are 1-second long. All unload pulses are 2-seconds long. Provides faster unloading. Could be required in those applications where the LEAVING CHILLED WATER TEMP setpoint is occasionally raised by an external Building Automation System or any other application where load is quickly removed from the chiller.

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SSP 3M 793 .05
CODE:SK

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: None	194	Form 160.47-M2 (SB 9)
File with Form: 160.47-M2		

94-4

SUBJECT: FAX 4000 / ANDOVER INTERFACING TO STYLE "A" SCREW CHILLER

Microcomputer Control Panels supplied on York Style "A" Screw Chillers built in the past two years are compatible with FAX 4500 only. Some field offices have overcome this situation by retrofitting the microboard in the panel to the older part number 031-00940-000 board. THIS IS NOT A WARRANTY SITUATION. Warranty claims of this type will be rejected.

If you encounter this situation in the field, your office will need to contact the salesperson who sold the chiller. Any costs to provide FAX4000 / Andover compatibility must be charged to the equipment order. Our marketing department has agreed, that cost of extra hardware and BAS programming support MUST be addressed in the pricing of the original equipment order.

Also be aware that retrofitting panels to the older style of microboard requires very careful attention to compatibility between microboard, EPROM, transducers, 32K/64K jumpers, and the refrigerant used in the system. Compatibility information is found in the parts manuals. If any one of these items is incorrect, the panel will not operate, or will operate incorrectly.

CODE:SK

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: Nothing | 394 | Form 160.47-M2 (SB-10)

94-12

File with Form: 160.47-M2

SUBJECT: SCREW CHILLER (125-675TR)
MICROCOMPUTER CONTROL CENTER -
VERSION S.01F.11 & S.01T.11 EPROM

On/about March, 1994 the subject Screw Chillers will be shipped with EPROM Version S.01F.11 (Part Number 031-01102-002). New Version S.01T.11 (Part Number 031-01102-003) will be used in new Guardian Service/Remote Chiller Communications Installations. The new versions contain the following enhancements:

"LOW SEPARATOR OIL LEVEL" SAFETY SHUTDOWNS

Previous EPROM versions responded to a momentary opening of the Separator Oil Level Switch to initiate a safety shutdown. Under certain operating load conditions, this caused nuisance "LOW SEPARATOR OIL LEVEL" safety shutdowns. In this new version of EPROM, the Oil Level Switch must be open for 30 continuous seconds before a safety shutdown is initiated.

PROGRAMMABLE MINIMUM ALLOWABLE %FLA

Previous EPROM versions incorporated a "MINIMUM ALLOWABLE SLIDE VALVE POSITION" feature that inhibits the chiller from unloading to less than 5% slide valve position to prevent "LOW SEPARATOR OIL LEVEL" safety shutdowns at low loads. This feature was enabled by removing Micro Board Program Jumper JP4. The non-adjustable 5% threshold has proven to be inadequate for all chiller sizes and operating conditions. Therefore, this feature is eliminated and replaced by the programmable low load limit below.

This new feature allows the Field Service Technician to program a minimum allowable motor current value expressed as %FLA. It is programmable from 15% to 70% FLA; the default value is 15%. During operation, following a 3 minute bypass at start, if the motor current is less than the programmed minimum allowable value, "**SYSTEM RUN-MINIMUM LOAD CONTROL**" is displayed and the slide valve load solenoid is pulsed on for 1 second every 3 seconds until the motor current is greater than or equal to the minimum setpoint plus 2%. If the programmed minimum allowable %FLA threshold is greater than either the programmed "PULLDOWN DEMAND LIMIT" or "CURRENT LIMIT" values, the minimum allowable %FLA threshold shall have priority. However, manual slide valve control in **SERVICE MODE** overrides the "MINIMUM ALLOWABLE %FLA" operation. It is not necessary to remove Micro Board Program Jumper JP4 to enable this new feature.

The 15% FLA Default Value will provide proper operation in most chillers. However, on those chillers where the Upper Oil Return Eductor will not keep up with the suction connection oil dropout at low load, this value will have to be increased to a value where this no longer occurs. The operating point at which this occurs can be found by manually controlling the Slide Valve to load and unload the chiller while the chiller is running.

To enter the desired "**MINIMUM ALLOWABLE %FLA**" proceed as follows:

1) Enter **PROGRAM MODE** using **ACCESS CODE** 1 3 8 0.
2) Press **UNLOAD** Key. "MINIMUM CURRENT LOAD LIMIT = xx%" is displayed.
3) Using **ENTRY** keys, enter the desired value (15% to 70% in 1% increments). Pressing the **CANCEL** key displays the default Value 15%.
4) Press **ENTER** Key.
5. Press **PROGRAM** key to exit Program Mode.

SUCTION TROUGH EDUCTOR SOLENOID

In previous EPROM Versions, whenever the compressor was operating and the Slide Valve Position was less than or equal to 17%, the Suction Through Eductor Solenoid was energized (OPENED).

In this new EPROM Version, to eliminate dependence on the Slide Valve Potentiometer Position, the SUCTION TROUGH EDUCTOR SOLENOID is energized (OPENED) whenever the compressor is operating; If is de-energized (CLOSED) whenever the compressor is shutdown. On all new production units, the Suction Through Eductor Solenoid is no longer used.

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ELECTRONIC PRODUCTS SERVICE ENGINEER

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: NOTHING	1294	Form 160.47-M2 (SB11)
File with Form: 160.47-M2		

SUBJECT: SCREW CHILLER (125-675TR)
MICROCOMPUTER CONTROL CENTER -
VERSION S.01F.13 AND S.01T.13 EPROM

ON/ABOUT DECEMBER 1994, THE SUBJECT SCREW CHILLERS WILL BE SHIPPED WITH EPROM VERSION S.01F.13 (P/N 031-01102-002). VERSION S.01T.13 (031-01102-003) WILL BE AVAILABLE FOR GUARDIAN SERVICE/REMOTE CHILLER COMMUNICATIONS APPLICATIONS. THESE EPROMS CONTAIN THE FOLLOWING ENHANCEMENTS:

BRINE OPERATING RANGE

WHEN OPERATING IN BRINE COOLING MODE (MICRO BOARD PROGRAM JUMPER JP3 REMOVED), THE ALLOWABLE "LEAVING CHILLED LIQUID TEMP SETPOINT" RANGE IS 20°F TO 45°F. IN PREVIOUS EPROM VERSIONS, THE RANGE WAS 10° F TO 45°F.

EXCESS CHARGE OVERRIDE

WHEN USING REFRIGERANT R-134a (MICRO BOARD PROGRAM JUMPER JP2 REMOVED), THE MESSAGE "SYSTEM RUN - EXCESS CHARGE OVERRIDE" IS NOW DISPLAYED WHEN THE DISCHARGE TEMP MINUS CONDENSER SATURATED TEMP IS LESS THAN-OR-EQUAL-TO 5°F. THIS WILL BE DISPLAYED UNTIL THE RELATIONSHIP IS EQUAL-TO OR GREATER-THAN 10°F. IN PREVIOUS EPROM VERSIONS THE THRESHOLDS WERE 10 F AND 15 F RESPECTIVELY. REFER TO OPERATION MANUAL 160.47-01.1 FOR DETAILS OF THIS MESSAGE.

WHEN USING REFRIGERANT R-22, THE THRESHOLDS ARE THE SAME AS PREVIOUS EPROM VERSIONS.

HOT GAS BYPASS

WHEN MICRO BOARD PROGRAM JUMPER JP4 IS REMOVED, HOT GAS BYPASS OPERATION IS ENABLED. IN PREVIOUS EPROM VERSIONS, THE HOT GAS OUTPUT (RELAY BOARD TB3-61) WAS ENERGIZED AND DE-ENERGIZED BASED ON SLIDE VALVE POSITION: AFTER A 3 MINUTE BYPASS AT START, ENERGIZED WHEN THE SLIDE VALVE POSITION DECREASED TO 5%; DE-ENERGIZED WHEN IT INCREASED TO 15%. IN THIS NEW VERSION, THE OUTPUT IS ENERGIZED AND DE-ENERGIZED BASED ON THE DIFFERENCE BETWEEN THE ENTERING CHILLED WATER TEMPERATURE AND THE LEAVING CHILLED WATER TEMP SETPOINT: THE SERVICE TECHNICIAN PROGRAMS THE DIFFERENTIAL THRESHOLD AT WHICH THE HOT GAS WILL TURN ON AND OFF AS FOLLOWS:

1.) ENTER PROGRAM MODE USING ACCESS CODE 1-3-8-0.
2.) PRESS CHILLED LIQUID TEMPS DISPLAY KEY.
"(ECWT-LCWTSP): HOT GAS ON=XX°F;OFF=XX°F" IS DISPLAYED.
3.) USING ENTRY KEYS, ENTER THE DIFFERENTIAL THRESHOLD AT WHICH IT IS DESIRED TO TURN ON (ENERGIZE) THE HOT GAS BYPASS. IT IS PROGRAMMABLE FROM 1 TO 10°F. THE DEFAULT VALUE IS 1 F. USE LEADING ZEROES WHERE NECESSARY.
4.) USING ENTRY KEYS, ENTER THE DIFFERENTIAL THRESHOLD AT WHICH IT IS DESIRED TO TURN OFF (DE-ENERGIZE) THE HOT GAS BYPASS. IT IS PROGRAMMABLE FROM 2 TO 15°F. THE DEFAULT VALUE IS

2° F. USE LEADING ZEROES WHERE NECESSARY (ie,"08"). **IMPORTANT:** THE VALUE PROGRAMMED FOR HOT GAS OFF MUST BE AT LEAST 1° F HIGHER THAN THE VALUE PROGRAMMED FOR HOT GAS ON. IF NOT "OUT OF RANGE - TRY AGAIN) IS DISPLAYED.

5.) PRESS **ENTER** KEY. "PROGRAM MODE - SELECT SETPOINT" IS DISPLAYED.

6.) PRESS **PROGRAM** KEY TO EXIT.

ICE STORAGE MODE

ICE STORAGE MODE IS A NEW OPERATING MODE THAT ALLOWS THE CHILLER TO MAKE ICE AT A FASTER RATE THAN NORMAL BY INHIBITING UNLOAD PULSES TO THE SLIDE VALVE. THIS WILL RESULT IN THE CHILLER RUNNING UNTIL IT EVENTUALLY SHUTSDOWN ON LOW WATER TEMPERATURE (LWT @ 4° F BELOW SETPOINT); UNLESS A LOCAL/REMOTE STOP OR SAFETY SHUTDOWN OCCURS FIRST.

IN NORMAL OPERATION, WHEN THE LEAVING CHILLED LIQUID TEMPERATURE DECREASES TO THE LEAVING CHILLED WATER (LIQUID) TEMP SETPOINT, UNLOAD PULSES ARE APPLIED TO THE SLIDE VALVE PREVENTING THE CHILLER FROM SHUTTING DOWN ON LWT. HOWEVER, IF ICE STORAGE MODE IS SELECTED AND ENABLED, NO UNLOAD PULSES ARE APPLIED UNLESS THE MOTOR CURRENT INCREASES TO THE CURRENT LIMIT THRESHOLD.

IN ORDER FOR ICE STORAGE MODE TO BE SELECTED, THE CHILLER MUST BE CONFIGURED FOR BRINE COOLING MODE (MICRO BOARD PROGRAM JUMPER JP3 REMOVED), THE **LEAVING CHILLED LIQUID TEMP SETPOINT** MUST BE PROGRAMMED BETWEEN 20° F AND 32° F, AND THE OPERATOR MUST SELECT ICE STORAGE MODE AT THE KEYPAD. AFTER ICE STORAGE MODE HAS BEEN SELECTED, ANYTIME THE **LEAVING CHILLED LIQUID TEMP SETPOINT** IS SET ABOVE 32° F, ICE STORAGE MODE IS AUTOMATICALLY "DISABLED" (ALLOWS UNLOAD PULSES). IT WILL THEN BE AUTOMATICALLY "ENABLED" (INHIBITS UNLOAD PULSES) WHEN THE SETPOINT IS LOWERED TO BELOW 32° F. THIS ALLOWS THE CHILLER TO BE SWITCHED IN AND OUT OF ICE STORAGE MODE (AFTER IT HAS BEEN SELECTED AT THE KEYPAD) BY LOCAL OR REMOTE CHANGE OF THE **LEAVING CHILLED LIQUID TEMP SETPOINT**. THIS FEATURE ALLOWS THE CHILLER TO MAKE ICE IN THE NIGHT-TIME HOURS AND PERFORM AIR CONDITIONING DUTY DURING THE DAYTIME HOURS SIMPLY BY CHANGING THE SETPOINT.

TO ADD GREATER OPERATING FLEXIBILITY, TWO DIFFERENT **LOW WATER TEMP RESTART THRESHOLDS** (SEE EXPLANATION OF LWT RESTART OFFSET BELOW) CAN BE PROGRAMMED; ONE FOR WHEN ICE STORAGE MODE IS ENABLED AND ONE FOR WHEN IT IS DISABLED. FOR EXAMPLE, IF ICE STORAGE IS SELECTED AND THE ICE STORAGE **LEAVING CHILLED LIQUID TEMP SETPOINT** IS 20° F AND THE **ICE STORAGE LWT RESTART OFFSET** IS PROGRAMMED FOR 10° F, AND THE CHILLER SHUTDOWN ON LOW WATER TEMP, THE CHILLER WOULD RESTART WHEN THE LEAVING CHILLED WATER INCREASED TO 30°F. HOWEVER, WHEN THE **LEAVING CHILLED LIQUID TEMP SETPOINT** IS THEN INCREASED TO 40° F, AND THE NON ICE STORAGE **LWT RESTART OFFSET** IS PROGRAMMED FOR 5°F, THE CHILLER WOULD RESTART WHEN THE **LEAVING CHILLED LIQUID TEMP** REACHED 45 °F.

WHEN THE **CHILLED LIQUID TEMP SETPOINT** KEY IS PRESSED AND THE FOLLOWING MESSAGE IS DISPLAYED, ICE STORAGE MODE IS ENABLED AND THE DISPLAYED **LEAVING CHILLED LIQUID TEMP SETPOINT** AND **LWT RESTART OFFSET** ARE IN EFFECT:

"ICE LEAVING SETP = XX.X'F RESTART = +XX'F"

WHEN THE **CHILLED LIQUID TEMP SETPOINT** KEY IS PRESSED AND THE FOLLOWING IS DISPLAYED, ICE STORAGE MODE IS NOT ENABLED AND THE DISPLAYED **LEAVING CHILLED LIQUID TEMP SETPOINT** AND **LWT RESTART THRESHOLD** ARE IN EFFECT:

"LEAVING SETP = XX.X'F RESTART = +XX°F"

TO SELECT ICE STORAGE MODE AND PROGRAM DESIRED **LEAVING CHILLED LIQUID TEMP SETPOINT** AND **LWT RESTART OFFSET** (FOR ICE STORAGE MODE ENABLED AND DISABLED), PROCEED AS FOLLOWS:

1.) REMOVE MICRO BOARD PROGRAM JUMPER JP3.
2.) ENTER **PROGRAM** MODE USING ACCESS CODE 9-6-7-5.
3.) PRESS **CHILLED LIQUID TEMP** SETPOINT KEY.
"LEAVING SETPOINT = XX°F (BASE)" IS DISPLAYED
4.) USING **ENTRY** KEYS, ENTER DESIRED VALUE BETWEEN 20°F AND 32°F. IF **CANCEL** KEY IS PRESSED, DEFAULT VALUE 45.0 IS DISPLAYED.
5.) PRESS **ENTER** KEY.
6.) PRESS **ADVANCE DAY/SCROLL** KEY.
"LWT RESTART OFFSET = XX°F" IS DISPLAYED.
7.) USING **ENTRY** KEYS, ENTER THE DESIRED VALUE BETWEEN 0°F AND 15°F. THIS IS THE OFFSET VALUE THAT WILL BE IN EFFECT WHEN ICE STORAGE MODE IS DISABLED. USE LEADING ZEROES WHERE NECESSARY (ie; 05). IF **CANCEL** KEY IS PRESSED, DEFAULT VALUE "0" IS DISPLAYED. REFER TO BELOW FOR EXPLANATION OF LWT RESTART OFFSET.
8.) PRESS **ENTER** KEY.
9.) PRESS **ADVANCE DAY/SCROLL** KEY.
"SELECT ICE STORAGE MODE? 0 (YES=1;NO=0)" IS DISPLAYED.
10.) USING **ENTRY** KEYS, PRESS "1" TO SELECT ICE STORAGE MODE; OTHERWISE, PRESS "0". IF **CANCEL** KEY IS PRESSED, DEFAULT VALUE "0" IS DISPLAYED.
11.) PRESS **ENTER** KEY.
12.) PRESS **ADVANCE DAY/SCROLL** KEY.
"ICE STORAGE LWT RESTART OFFSET = XX°F"
13.) USING **ENTRY** KEYS, ENTER THE DESIRED VALUE BETWEEN 0°F AND 15'F. THIS IS THE OFFSET VALUE THAT WILL BE IN EFFECT WHEN ICE STORAGE MODE IS ENABLED. USE LEADING ZEROES WHERE NECESSARY (ie; 06). IF **CANCEL** KEY IS PRESSED, DEFAULT VALUE "15" IS DISPLAYED. REFER TO BELOW FOR EXPLANATION OF LWT RESTART OFFSET.
14.) PRESS **ENTER** KEY.
15.) PRESS **PROGRAM** KEY TO EXIT.

LOW WATER TEMP SHUTDOWN RESTART THRESHOLD

PREVIOUS EPROM VERSIONS HAD A FIXED LOW WATER TEMP (LWT) SHUTDOWN RESTART THRESHOLD. THE CHILLER WOULD RESTART WHEN THE LEAVING CHILLED LIQUID TEMPERATURE INCREASED TO THE PROGRAMMED LEAVING CHILLED LIQUID TEMP SETPOINT VALUE. IN CERTAIN LIGHT LOAD APPLICATIONS, THIS COULD CAUSE EXCESSIVE CHILLER CYCLING.

TO DELAY THE CHILLER STARTING UNTIL THE LOAD IS GREATER, THE LWT RESTART THRESHOLD IS NOW PROGRAMMABLE FROM 0°F TO 15°F ABOVE THE LEAVING CHILLED LIQUID TEMP SETPOINT. WHEN THE CHILLER SHUTSDOWN ON A LOW WATER TEMP CYCLING SHUTDOWN, IT WILL AUTOMATICALLY RESTART WHEN THE LEAVING CHILLED LIQUID TEMP REACHES THE PROGRAMMED RESTART THRESHOLD. THE RESTART THRESHOLD IS THE SUM OF THE SETPOINT AND THE OFFSET. FOR EXAMPLE, IF THE LWT RESTART OFFSET THRESHOLD IS PROGRAMMED FOR 5°F, AND THE LEAVING CHILLED LIQUID TEMP SETPOINT IS PROGRAMMED FOR 42°F, THE CHILLER WILL RESTART WHEN THE LEAVING CHILLED LIQUID TEMP INCREASES TO 47°F (42+5=47). IF THE OFFSET IS PROGRAMMED FOR 0°F, THE CHILLER WILL RESTART WHEN THE LEAVING CHILLED LIQUID TEMP REACHES THE SETPOINT.

WHEN OPERATING IN BRINE MODE AND ICE STORAGE MODE (SEE ABOVE) HAS BEEN SELECTED, TWO DIFFERENT OFFSET VALUES CAN BE PROGRAMMED; ONE IS IN EFFECT WHEN ICE STORAGE MODE IS ENABLED (LEAVING CHILLED LIQUID TEMP SETPOINTS 20 TO 32°F), THE OTHER IS IN EFFECT WHEN ICE STORAGE MODE IS DISABLED (LEAVING CHILLED LIQUID TEMP SETPOINTS GREATER THAN 32°F.

THE LWT RESTART OFFSET THAT IS IN EFFECT AT ANY TIME, CAN BE DISPLAYED BY PRESSING THE LEAVING CHILLED LIQUID TEMP SETPOINT KEY. IF ICE STORAGE MODE IS IN EFFECT,
"ICE LEAVING SETP = XX.X °F RESTART = +XX °F" IS DISPLAYED.
OTHERWISE, "LEAVING SETP = XX.X°F RESTART = +XX°F" IS DISPLAYED.

TO PROGRAM THE LWT RESTART OFFSET (IF NOT OPERATING IN BRINE MODE), PROCEED AS FOLLOWS. IF OPERATING IN BRINE COOLING MODE, FOLLOW INSTRUCTIONS ABOVE UNDER ICE STORAGE MODE.

1.) ENTER PROGRAM MODE USING ACCESS CODE 9-6-7-5.
2.) PRESS CHILLED LIQUID TEMP SETPOINT KEY.
3.) PRESS ADVANCE DAY/SCROLL KEY.
"LWT RESTART OFFSET = XX°F" IS DISPLAYED.
4.) USING ENTRY KEYS, ENTER DESIRED VALUE BETWEEN 0°F AND 15°F. USE LEADING ZEROES WHERE NECESSARY (ie; 05). IF CANCEL KEY IS PRESSED, DEFAULT VALUE "0" IS DISPLAYED.
5.) PRESS ENTER KEY.
6.) PRESS PROGRAM KEY TO EXIT.

FAX-4500 DATA

THE ABOVE ENHANCEMENTS REQUIRE THE FOLLOWING DATA TO BE SENT TO THE FAX-4500 VIA THE MICRO BOARD RS-485 SERIAL DATA PORT:

A.) ICE STORAGE MODE STATUS; SELECTED OR NOT SELECTED. SENT AS FEATURE 54, PAGE 55.

B.) LWT RESTART OFFSET. SENT AS FEATURE 54, PAGE 66. IF CHILLER IS OPERATING IN ICE STORAGE MODE (ICE STORAGE MODE ENABLED), THE ICE STORAGE MODE LWT RESTART OFFSET IS SENT. IF CHILLER IS NOT OPERATING IN ICE STORAGE MODE, (ICE STORAGE MODE DISABLED), THE NORMAL LWT RESTART OFFSET IS SENT.

LOW WATER TEMP SHUTDOWN THRESHOLD - BRINE MODE

IN BRINE OPERATING MODE (MICRO BOARD PROGRAM JUMPER JP3 REMOVED), ANYTIME THE LEAVING CHILLED LIQUID TEMP SETPOINT IS INCREASED, THE LOW WATER TEMP CYCLING SHUTDOWN THRESHOLD REMAINS THE SAME FOR THE NEXT TEN MINUTES TO ELIMINATE NUISANCE TRIPS. FOR EXAMPLE, IF THE SETPOINT IS 30 °F THE LWT SHUTDOWN THRESHOLD IS 26 °F (4 °F BELOW SETPOINT). IF THE SETPOINT IS RAISED TO 40 °F, THE SHUTDOWN THRESHOLD REMAINS AT 26°F FOR THE NEXT 10 MINUTES; THEN IT BECOMES 36 °F.

S.L. BAER
ELECTRONICS PRODUCT
SERVICE ENGINEER

CODE:SK

YORK®

File in SK Manual(s).

SERVICE BULLETIN	Supersedes: Nothing	695	Form 160.47-M2 (SB12)
95-1	File with Form: 160.47-M2		

SUBJECT: SCREW CHILLER (125-675TR) MICROCOMPUTER CONTROL CENTER - EPROM VERSION S.01F.14 & S.01T.14

ON/ABOUT JULY 1995, THE SUBJECT CHILLERS WILL BE SHIPPED WITH EPROM VERSION S.01F.14 (P/N 031-01102-002). ALSO, VERSION S.01T.14 (P/N 031-01102-003) WILL BE AVAILABLE FOR GUARDIAN SERVICE/REMOTE CHILLER COMMUNICATIONS APPLICATIONS. THESE EPROMS CONTAIN ENHANCEMENTS THAT REVISE THE SERVICE MANUAL 160.47-M2 AS FOLLOWS:

MICRO BOARD PROGRAM JUMPER JP1

IN - ALL MESSAGES DISPLAYED IN ENGLISH LANGUAGE
OUT - APPLICABLE ONLY TO THOSE UNITS EQUIPPED WITH THE OPTIONAL CHINESE DISPLAY, P/N 031-01616-000. PROVIDES SIMULTANEOUS DISPLAY OF BOTH ENGLISH AND CHINESE MESSAGES.

S. L. BAER
ELECTRONIC PRODUCT
SERVICE ENGINEER

CODE:SK

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SERVICE BULLETIN

Supersedes: NOTHING	895	Form 160.47-M2 (SB13)
File with Form: 160.47-M2		

SUBJECT: MICROCOMPUTER CONTROL CENTER (YS SCREW CHILLER 125-675TR) - CHINESE LANGUAGE DISPLAY

ON/ABOUT SEPTEMBER 1995, THE SUBJECT UNITS CAN BE EQUIPPED WITH AN OPTIONAL CHINESE LANGUAGE DISPLAY, EITHER AS A FACTORY INSTALLED OPTION OR AS A RETROFIT KIT.

GENERAL

THE CHINESE LANGUAGE DISPLAY IS MOUNTED ON THE CONTROL CENTER DOOR ABOVE THE STANDARD 1 X 40 VACUUM FLUORESCENT DISPLAY. BOTH DISPLAYS WILL BE PRESENT DISPLAYING MESSAGES IN ENGLISH AND CHINESE SIMULTANEOUSLY. THE CHINESE LANGUAGE DISPLAY CONSISTS OF A 240 X 64 GRAPHICS LCD DISPLAY (P/N 031-01653-000) MOUNTED ON A PRINTED CIRCUIT BOARD (P/N 031-01616-000). EITHER TRADITIONAL OR SIMPLIFIED CHINESE CHARACTERS WILL BE DISPLAYED, DEPENDING ON THE CONFIGURATION OF CHINESE PRINTED CIRCUIT BOARD PROGRAM JUMPERS.

IN OPERATION, THE MICRO BOARD FEEDS THE CHINESE LANGUAGE PRINTED CIRCUIT BOARD WITH ENGLISH DATA FOR DISPLAY. THIS DATA IS SIMULTANEOUSLY ROUTED THRU THE CHINESE DISPLAY TO THE STANDARD VACUUM FLUORESCENT DISPLAY, DISPLAYING THE MESSAGE IN ENGLISH. ON THE CHINESE DISPLAY PRINTED CIRCUIT BOARD, THE ENGLISH DATA IS TRANSLATED INTO EITHER SIMPLIFIED OR TRADITIONAL CHINESE CHARACTERS DEPENDING ON THE POSITION OF PROGRAM JUMPER **PT0**. EPROM P/N 031-01639-001 (IC-U13, VERSION CS.01F.00) PERFORMS THE TRANSLATION TO SIMPLIFIED CHINESE. EPROM P/N 031-01639-002 (IC-U14, VERSION CS.01F.00) PERFORMS THE TRANSLATION TO TRADITIONAL CHINESE.

SINCE BOTH THE LCD DISPLAY AND THE PRINTED CIRCUIT BOARD HAVE PART NUMBERS, EITHER PART CAN BE REPLACED INDEPENDENT OF THE OTHER. EITHER OF TWO DISPLAYS COULD BE SUPPLIED UNDER YORK P/N 031-01653-000; "OPTREX" (P/N DMF5005NY-LY), OR "VL ELECTRONICS" (P/N MGLS-24064-TC-HV-G-LED4G). THE ACTUAL DISPLAY SUPPLIED DETERMINES THE POSITION OF PROGRAM JUMPER **DS1** AS DESCRIBED BELOW. THE POSITION OF THIS JUMPER DETERMINES THE CONTRAST BIAS VOLTAGE TO THE LCD DISPLAY. IF THE LCD DISPLAY IS REPLACED, THIS PROGRAM JUMPER MUST BE PUT IN THE APPROPRIATE POSITION FOR THE DISPLAY TYPE AND THE BIAS VOLTAGE (AS MEASURED AT TPC ON CHINESE DISPLAY PRINTED CIRCUIT BOARD) MUST BE ADJUSTED TO THE APPROPRIATE LEVEL USING POT "R7" AS DESCRIBED BELOW.

THE MICRO BOARD MUST BE EQUIPPED WITH EPROM VERSION S.01F.14 (OR LATER) OR S.01T.14 (OR LATER) TO ENABLE OPERATION OF THE CHINESE DISPLAY. CHINESE DISPLAY OPERATION IS ENABLED BY PERFORMING THE PROCEDURE DESCRIBED BELOW.

PROGRAM JUMPERS

PROGRAM JUMPERS, LOCATED ON THE CHINESE DISPLAY PRINTED CIRCUIT BOARD, ARE USED AS FOLLOWS:

JUMPER	POSITION	FUNCTION
PT0	SHUNT ON PINS 1 & 2	SIMPLIFIED CHINESE
	SHUNT ON PINS 2 & 3	TRADITIONAL CHINESE
PT1	NOT USED	
PT2	NOT USED	
PT3	NOT USED	
PT4	SHUNT ON	NORMAL OPERATION
	SHUNT OFF	DISPLAY TEST MODE (SEE BELOW)
PT5	NOT USED	
PT6	NOT USED	
PT7	NOT USED	
DS1	SHUNT ON PINS 1 & 2	CONTRAST - VL ELECTRONICS LCD DISPLAY
	SHUNT ON PINS 2 & 3	CONTRAST - OPTREX LCD DISPLAY

CHINESE DISPLAY ENABLE

THE MICRO BOARD MUST BE EQUIPPED WITH EPROM VERSION S.01F.14 (OR LATER) OR S.01T.14 (OR LATER) AND MICRO BOARD PROGRAM JUMPER **JP1** MUST BE REMOVED.

IMPORTANT!!! - IF THE CHINESE DISPLAY IS NOT PRESENT AND MICRO BOARD PROGRAM JUMPER JP1 IS REMOVED, THE STANDARD DISPLAY WILL NOT OPERATE PROPERLY!!

1.) ENTER "PROGRAM" MODE USING ACCESS CODE 1-3-8-0.
2.) PRESS THE HIDDEN UNEMBOSSED, UNLABLED KEYPAD KEY LOCATED DIRECTLY BELOW THE **CLOCK** SETPOINT KEY. "CHINESE DISPLAY NOT SELECTED" OR "CHINESE DISPLAY SELECTED" IS DISPLAYED.
3.) USE **ADVANCE DAY/SCROLL** KEY TO SELECT CHINESE DISPLAY IF CHINESE DISPLAY IS PRESENT. EACH TIME THE KEY IS PRESSED, THE DISPLAY ALTERNATES.
4.) PRESS **ENTER** KEY. "PROGRAM MODE, SELECT SETPOINT" IS DISPLAYED.
5.) PRESS **PROGRAM** KEY TO EXIT.

TESTING

THE FOLLOWING TESTING PROCEDURES CAN BE USED TO VERIFY OPERATION OF

THE CHINESE LANGUAGE DISPLAY.

SIMPLIFIED CHINESE CHARACTER TEST

1.) REMOVE PROGRAM JUMPER PT4 FROM CHINESE DISPLAY PRINTED CIRCUIT BOARD.
2.) PLACE PROGRAM JUMPER PT0 ON PINS 1 & 2 OF PT0.
3.) PRESS **CHILLED LIQUID TEMPS** KEYPAD KEY.
4.) VERIFY THAT ENTERING & LEAVING CHILLED WATER TEMPERATURES ARE DISPLAYED ON BOTH THE ENGLISH AND CHINESE DISPLAY AND THAT ENGLISH LETTERS "SIMP" ARE DISPLAYED IN THE UPPER RIGHT CORNER OF THE CHINESE DISPLAY.
5.) REPLACE PROGRAM JUMPER PT4, REMOVED IN STEP 1.

TRADITIONAL CHINESE CHARACTER TEST

1.) REMOVE PROGRAM JUMPER PT4 FROM CHINESE DISPLAY PRINTED CIRCUIT BOARD.
2.) PLACE PROGRAM JUMPER PT0 ON PINS 2 & 3 OF PT0.
3.) PRESS **CHILLED LIQUID TEMPS** KEYPAD KEY.
4.) VERIFY THAT ENTERING & LEAVING CHILLED WATER TEMPERATURES ARE DISPLAYED ON BOTH THE ENGLISH AND CHINESE DISPLAY AND THAT ENGLISH LETTERS "TRAD" ARE DISPLAYED IN THE UPPER RIGHT CORNER OF THE CHINESE DISPLAY.
5.) REPLACE PROGRAM JUMPER JP4, REMOVED IN STEP 1.

CHINESE LCD DISPLAY TEST

1.) REMOVE PROGRAM JUMPER PT4 FROM CHINESE DISPLAY PRINTED CIRCUIT BOARD.
2.) PRESS **HOLIDAY** KEYPAD KEY. VERIFY ALL PIXELS OF CHINESE DISPLAY ILLUMINATE AND THE ENGLISH DISPLAY SHOWS NORMAL HOLIDAY DISPLAY.
3.) PRESS **DAILY SCHEDULE** KEYPAD KEY. VERIFY "YORK LOGO" APPEARS ON THE CHINESE DISPLAY AND NORMAL DAILY SCHEDULE DATA APPEARS ON THE ENGLISH DISPLAY.
4.) REPLACE PROGRAM JUMPER JP4, REMOVED IN STEP 1.

SERVICE REPLACEMENT & DISPLAY ADJUSTMENT

THERE ARE TWO DIFFERENT LCD DISPLAYS THAT COULD BE SUPPLIED UNDER YORK PART NUMBER 031-01653-000: "OPTREX" P/N DMF5005NY-LY OR "VL ELECTRONICS" P/N MGLS-24064-TC-HV-G-LED4G. THESE DISPLAYS REQUIRE DIFFERENT CONTRAST BIAS VOLTAGES. THIS VOLTAGE CAN BE READ AT TEST POINT **TPC** ON THE CHINESE DISPLAY PRINTED CIRCUIT BOARD. THE POSITION OF PROGRAM JUMPER **DS1** AND SETTING OF POT "R7" ON THE CHINESE DISPLAY PRINTED CIRCUIT BOARD DETERMINES THIS VOLTAGE. THEREFORE, ANYTIME THE DISPLAY IS REPLACED, **DS1** MUST BE PLACED IN THE CORRECT POSITION AND "R7" MAY HAVE TO BE ADJUSTED TO ACHIEVE THE APPROPRIATE VOLTAGE AT **TPC** AS FOLLOWS:

DS1	DISPLAY	TPC
SHUNT ON PINS 1 & 2	VL ELECTRONICS	-9.5 VDC
SHUNT ON PINS 2 & 3	OPTREX	-7.8 VDC

INPUTS/OUTPUTS & TEST POINTS

J1 - ENGLISH DATA INPUT TO CHINESE DISPLAY PRINTED CIRCUIT BOARD.

J2 - ENGLISH DATA OUTPUT TO VACUUM FLOURESCENT DISPLAY.

J3 - CHINESE DATA TO CHINESE LCD DISPLAY.

J4-1 - +8 VDC BACKLIGHT POWER TO CHINESE LCD DISPLAY.
J4-2 - GND.
J5-1 - 24 VAC POWER SUPPLY INPUT TO CHINESE DISPLAY PRINTED CIRCUIT BOARD.
J5-2 - 24 VAC RETURN.
J5-3 - GND.

TPA - +5 VDC
TPB - GND
TPC - CONTRAST VOLTAGE OUTPUT TO CHINESE LCD DISPLAY. -9.5VDC WITH SHUNT ON PINS 1 & 2. -7.8VDC WITH **DS1** SHUNT ON PINS 2 & 3. ADJUSTED WITH POT **R7**.

RETROFIT KIT

THE CHINESE LANGUAGE DISPLAY CAN BE RETROFIT TO EXISTINNG CHILLERS THAT ARE PRESENTLY EQUIPPED WITH MICROCOMPUTER CONTROL CENTER P/N 371-01112-001 OR 371-01200-003 THAT CONTAIN MICRO BOARD P/N 031-01065-000 OR -001.

RETROFIT KIT P/N 371-01708-002 CONTAINS A COMPLETE MICROCOMPUTER CONTROL CENTER DOOR THAT REPLACES THE EXISTING DOOR. MOUNTED ON THE DOOR IS A KEYPAD, ROCKER SWITCH, LOCK, RIBBON CABLES, DECALS, VACUUM FLOURESCENT ENGLISH LANGUAGE DISPLAY AND CHINESE LANGUAGE DISPLAY. THE APPROPRIATE EPROM FOR THE MICRO BOARD IS SUPPLIED. ALSO, INSTALLATION INSTRUCTIONS ARE INCLUDED. THIS KIT CAN BE ORDERED FROM THE SERVICE PARTS DISTRIBUTION CENTER.

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File in SK Manual(s).

SERVICE BULLETIN

Supersedes: NOTHING	796	Form 160.47-M2 (SB14)
File with Form: 160.47-M2		

SUBJECT: SCREW CHILLER (125-675TR) MICROCOMPUTER CONTROL CENTER - PRESSURE TRANSDUCER THREADS

Screw chillers shipped after 1/1/96 have straight-cut threads in all piping. New pressure transducers with straight-cut threads and a neoprene o-ring are supplied on these chillers and are available for service replacement.

The previous transducers with NPTF threads will continue to be used as service replacements for pipe thread chillers built prior to 1/1/96. The straight-cut thread transducers have the same pressure range and identical operation as the NPTF thread transducers; the only diference is the threads.

FUNCTION (PRESSURE)	TRANSDUCER NPTF	TRANSDUCER STRAIGHT-CUT
condenser, oil, oil filter	025-28678-001	025-28678-006
evaporator -R22, water	025-28678-002*	025-28678-007
R22, brine	025-28678-003	025-28678-009
R134a, water & brine	025-28678-005	025-28678-008

* If control center is equipped with micro board 031-00940-001 (production until Feb. 1991), transducer -002 is used for both water and brine R22 applications and -005 transducer is not applicable.

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YORK®	SERVICE BULLETIN	
SERVICE BULLETIN	Supersedes::NOTHING	Form 160.47-M2 (SB15) (1196)
	File with form: 160.47-M2 SK Manual	

SUBJECT: SCREW CHILLER (125-675TR)
MICROCOMPUTER CONTROL CENTER -
VERSION S.01F.15 & S.01T.15 EPROM

On/about November 1996, the subject chillers will be shipped with eprom version S.01F.15 (P/N 031-01102-002). Version S.01T.15 (P/N 031-01102-003) will be available for GUARDIAN SERVICE/REMOTE CHILLER COMMUNICATIONS applications. These eproms contain the following enhancements that revise SERVICE MANUAL 160.47-M2 as follows:

VARIABLE ORIFICE

A solenoid valve, located in the orifice bypass line, is opened or closed by the microcomputer control center to create a VARIABLE ORIFICE. This new solenoid valve is designated 2SOL and is wired to the RELAY BOARD TB3-29.

When the chiller is not running, the solenoid is open while the 2-MINUTE LOCKOUT is in effect; closed thereafter.

While the chiller is running, the solenoid is energized (opened) or de-energized (closed) under program control by the following conditions:

1.) **DELTA P** - This is the difference between condenser pressure and evaporator pressure. This value is compared to the DELTA P SETPOINT. If the DELTA P decreases to $\leq$ the setpoint, the solenoid is opened. It will remain open until the DELTA P increases to $\geq$ (DELTA P SETPOINT + 10); then it will close. Conditions in either 2.) or 3.) below will override the DELTA P control.

2.) **LOW EVAPORATOR PRESSURE** - If the evaporator pressure decreases to the threshold that displays "SYSTEM RUN - LOW PRESSURE LIMIT IN EFFECT" (R22 - 56.2 PSIG; R134a 27PSIG), the solenoid is opened. This condition will override the DELTA P control above. The solenoid will remain open until the low pressure limit condition is no longer in effect (R22 $\geq$57.5 PSIG; R134a $\geq$28 PSIG), then the LOW PRESSURE override of the above DELTA P control will be released.

3.) **DISCHARGE SUPERHEAT** - This is the difference between discharge temperature and condenser saturated temperature. If the DISCHARGE SUPERHEAT is < 15 F (R22), < 10 F (R134a), the solenoid is closed. This condition will override 1.) and 2.) above. The solenoid will remain closed until the DISCHARGE SUPERHEAT increases to ≥ 20 F (R22), 15 F (R134a), then the DISCHARGE SUPERHEAT override of 1.) and 2.) above will be released.

"DELTA P" SETPOINT PROGRAMMING

To program the DELTA P SETPOINT, proceed as follows:

1.) Use ACCESS CODE 1-3-8-0 to gain access to PROGRAM mode. "PROGRAM MODE, SELECT SETPOINT" is displayed.
2.) Press CONDENSER LIQUID TEMPS key. The prompt message displayed is dependent upon the position of micro board program jumper JP2 as follows:

    JP2 in - R22 applications
      "DELTA P (RANGE 25 TO 130) = XXXPSID"

    JP2 out - R134a applications
      "DELTA P (RANGE 15 TO 90) = XXXPSID"

3.) Using the ENTRY keys, enter the desired value. Use leading zeroes where necessary. If the CANCEL key is pressed, default value "25" is displayed.

4.) Press ENTER key. "PROGRAM MODE SELECT SETPOINT" is displayed.
5.) Press PROGRAM key to exit.

OIL PRESSURE TRANSDUCER AUTO-ZERO ENABLE/DISABLE

In all eprom versions since S.01F.08/S.01T.08, the auto-zeroing that occurs between the evaporator transducer and oil pressure transducer could be enabled/disabled using a procedure in Service Manual 160.47-M2. This procedure now also includes the auto-zeroing that occurs between the filter oil pressure transducer and the oil pressure transducer. In the procedure below, all auto-zeroing is enabled if "enabled" is selected; all auto-zeroing is disabled if "disabled" is selected.

CAUTION!! THE AUTO-ZEROING SHOULD ONLY BE DISABLED AFTER CONSULTATION WITH THE YORK FACTORY.

1.) Enter **PROGRAM** mode using access code 1-3-8-0.
2.) Press **OIL/FILTER PRESSURES** display key. "PRESSURE TRANSDUCERS AUTO ZERO ENABLED" or "PRESSURE TRANSDUCERS AUTO ZERO DISABLED" is displayed.
3.) Use **ADVANCE DAY/SCROLL** key to select enabled or disabled as

desired. Each time this key is pressed, the display alternates between "ENABLED" or "DISABLED". The default value is "ENABLED".

4.) Press **ENTER** key. "PROGRAM MODE, SELECT SETPOINT" is displayed.

5.) Press **PROGRAM** key to exit. The normal foreground message is displayed.

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YORK®	SERVICE BULLETIN	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB16) (997)
	File with form:160.47-M2 (SK Manual)	

Subject: YS Screw Chiller - Microcomputer Control Center
Chinese Language Display

Beginning on/about April 1997, Chinese language displays will be supplied with either: two Simplified translation eproms or two Traditional translation eproms. If Simplified translation is desired, both of the Simplified eproms below are required. If Traditional translation is desired, both of the Traditional eproms below are required. The eprom part numbers and on-board socket locations are as follows:

EPROM	TRANSLATION	SOCKET LOCATION
031-01699-001	Simplified	U13
031-01699-002	Simplified	U14
031-01699-003	Traditional	U13
031-01699-004	Traditional	U14

Previously, Chinese Language displays contained one eprom (031-01639-001)(socket location U13) that translated to Simplified Chinese and one eprom (031-01639-002)(socket location U14) that translated to Traditional Chinese. The desired translation was then selected by program jumper PT0, located on the Chinese language display board. Due to the addition of messages, two eproms are now required for each translation as described above. When equipped with these new eproms, Program Jumper PT0 can no longer be used to select between Simplified or Traditional translation. If one of the earlier version eproms fail, refer to renewal parts list 160.47-RP3 for replacement.

S.L. Baer
York Factory Service

YORK®

ROTARY SCREW LIQUID CHILLERS

SERVICE BULLETIN | Supersedes: Nothing | 198 | Form 160.47-M2 (SB17)

File with Form: 160.47-M2

SUBJECT: " YS " PTS. CONFIGURATIONS

THERE ARE SEVERAL DIFFERENT PARTS AND JUMPER COMBINATIONS IN THE "YS" CHILLER DEPENDING ON THE REFRIGERANT (R 22 / R 134A) YOU ARE USING THAT MUST BE USED TOGETHER FOR YOUR CHILLER TO RUN PROPERLY.

AN EXAMPLE OF USING PARTS THAT ARE INCOMPATIBLE WITH THE REFRIGERANT IN THE CHILLER WOULD RESULT IN A MESSAGE ON YOUR DISPLAY OF : **"EVAP. TRANSD. OR PROBE ERROR"**

TABLE NO. 1 (USING A MICRO BOARD WITH YORK PART NO. 031-01065-000)

	R22	R134A
JP2	IN	OUT
JP3	OUT (BRINE)	OUT
EVAP. COND.	025-28678-003 (WITH PIPE THREADS)	-005
	025-28678-009 (STRAIGHT CUT THREADS)	-008
E-PROM	031-01102-002 (SO1F.XX)	S.O1F.08 (OR HIGHER)

ALSO REFER TO YORK FORM NO. 160.47 - M2 (291), PAGE NO. 30 (FIG NO. 31A) FOR ADDITIONAL JP3 INFORMATION.

TABLE NO. 2 (USING A MICRO BOARD WITH YORK PART NO. 031-00940-001)

	R22
JP3	OUT (BRINE)
EVAP. TRANSD.	025-28678-002 (PIPE THREAD)
	025-28678-007 (STRAIGHT CUT THREAD)
E-PROM	031-01051-001 (4.E)

THE ABOVE TABLES WILL HELP YOU ASSURE THAT YOU HAVE THE PROPER WORKING PARTS COMBINATIONS FOR YOUR CHILLER.

YORK	MILLENNIUM ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB18) (298)
	File With 160.47-M2	

Subject: Screw Chiller (125-675TR) Microcomputer Control Center -
Eprom Version S.01F.17

On/about February 1998, the subject chillers will be shipped with Eprom version S.01F.17 (P/N 031-01102-002). It contains the following enhancements that revise Service Manual 160.47-M2 as follows:

SEAL OIL PRESSURE

A transducer (P/N 025-28678-001) and piping enhancements have been added to monitor a new parameter called **SEAL OIL PRESSURE**. It is displayed as "SEAL OIL PRESSURE = XXX.X PSIG" as one of the scrolled messages using the DISPLAY DATA key. The Evaporator Pressure is subtracted from this pressure to create a differential pressure called **SEAL OIL DIFFERENTIAL PRESSURE** and displayed as "SEAL OIL DIFF PRESSURE = XXX.X PSID" using the OIL/FILTER PRESSURE key. If this Differential value decreases to < 20.0 PSID for 2 continuous seconds after the compressor has been running for 3 minutes, a safety shutdown is performed and "DAY-TIME-LOW SEAL OIL PRESSURE" is displayed.

As with the other chiller transducers, the Seal Oil transducer is "Auto-Zeroed" with the Evaporator transducer during the first 15 seconds of "Start Sequence Initiated". Auto-Zeroing influences the displayed differential value as explained in Operation Manual 160.47-01.1. Also, as with the other transducers the Auto-Zeroing can be disabled as detailed below.

To calculate the expected Transducer voltage output for a given pressure input, refer to Service Manual 160.47-M2.

The new Seal Oil Pressure transducer connects to the Micro Board J17 as follows:

J17-9 - +5vdc to transducer
J17-10 - Gnd to transducer
J17-15 - Output of transducer

This eprom version can also be used on chillers that do not contain this new Seal Oil Pressure transducer and associated piping enhancements. Therefore, the following procedure is used to "Enable" or "Disable" this feature and associated display messages. This should not be performed by anyone other than a qualified Service Technician.

1.) Enter PROGRAM MODE using Access Code 1 3 8 0.
2.) Press OIL PRESSURE key. Use ADVANCE DAY/SCROLL key to scroll to display the following message. Each time the key is pressed, the display scrolls to the next message.
"SEAL OIL PRS XDCR ENABLED=X;(0=NO;1=YES)"
3.) Using ENTRY keys, press 0 key if chiller not equipped with the Seal Oil Pressure transducer and associated piping. Press 1 key if chiller is equipped with these items.
4.) Press ENTER key.
5.) Press PROGRAM key to exit.

STANDBY CHILLER FREEZE PROTECTION

In multiple chiller applications, it may be possible for the chilled liquid (water or brine) from an operating chiller to flow through the evaporator of a standby chiller. This presents a possible freeze threat to the standby chiller.

To minimize the freeze potential in the standby chiller, the Program will now cycle the Condenser Pump based upon the Evaporator Saturation Temperature while the chiller is shutdown. Also, if this temperature indicates a freeze potential exists, an alarm message is displayed on the Microcomputer Control Center Display and alarm contacts close. These contacts can be used to provide an alarm to a remote device or sound an audible alarm.

The Program operates Relay Board output terminals TB4-55 & 56 (dry contacts of Relay K0) (Relay Board 031-00932-002 is required; -001 does not contain K0) to control the Condenser pump. They close to start the pump coincident with compressor start. At chiller shutdown, they remain closed until the Evaporation Saturation Temperature increases to >45 Degrees F, whereupon they open to shutdown the pump.

While the chiller is shutdown, the Program continues to monitor the Evaporator Saturation Temperature. If it decreases to < 35 Degrees F, the Program closes the contacts to run the Condenser Pump until the temperature increases to > 45 Degrees F. Further, if the chiller has been shutdown for more than 10 minutes and the temperature decreases to < 32 Degrees F, "FREEZE THREAT FROM OPERATING CHILLER" is displayed and Relay Board Relay K6 is energized, closing contacts between TB3-34 and TB3-1. This applies 115VAC to TB3-34. This signal can be used for alarm purposes. When the

temperature increases to > 35 degrees F, the warning message clears and status relay K6 de-energizes.

NOTE - Early vintage chillers have the Oil Eductor Solenoid Valve connected to TB3-34. Later vintage chillers do not use this solenoid. If this eprom is retrofit to this vintage chiller, and it is desired to use this alarm output, the solenoid wiring will have to be disconnected.

TRANSDUCER AUTO-ZEROING ENABLE/DISABLE

The procedure in previous eprom versions to Enable/Disable transducer auto-zeroing has been modified and is now as follows:

1.) Enter PROGRAM mode using Access Code 1 3 8 0.
2.) Press OIL PRESSURE key. Use ADVANCE DAY/SCROLL key to display the following message. Each time the key is pressed, the display scrolls to the next message.
"PRS XDCR AUTO ZERO ENABLED=X;(0=NO;1=YES)"
3.) Using ENTRY keys, press 0 if it is desired to disable transducer auto-zeroing. Press 1 if it is desired to enable auto-zeroing.
4.) Press ENTER key.
5.) Press PROGRAM key to exit.

SLIDE VALVE UNLOAD AT SHUTDOWN

In previous eprom versions, the Slide Valve Unload solenoid valve is energized (opened) at the completion of the 2 minute Lockout Period after a chiller shutdown. In this version, if Micro Board Program Jumper JP4 is removed, the Unload solenoid valve is energized coincident with the compressor turnoff. In addition to this new feature, the previous features as detailed in Service Manual 160.47-M2, Figure 31A are retained when this jumper is removed as follows:

1.) Hot - Gas Bypass operation is enabled
2.) 30% Slide Valve start inhibit

VARIABLE ORIFICE SETPOINTS

The range over which the Variable Orifice "DELTA P" setpoint can be programmed has been changed as follows. Refer to Service Bulletin 160.47-M2 (SB15) for explanation of the Variable Orifice feature.

Previous eprom versions:

R22 - 25 to 130 PSID R134a - 15 to 90 PSID

This eprom version:

R22 - 25 to 150 PSID R134a - 15 to 110 PSID

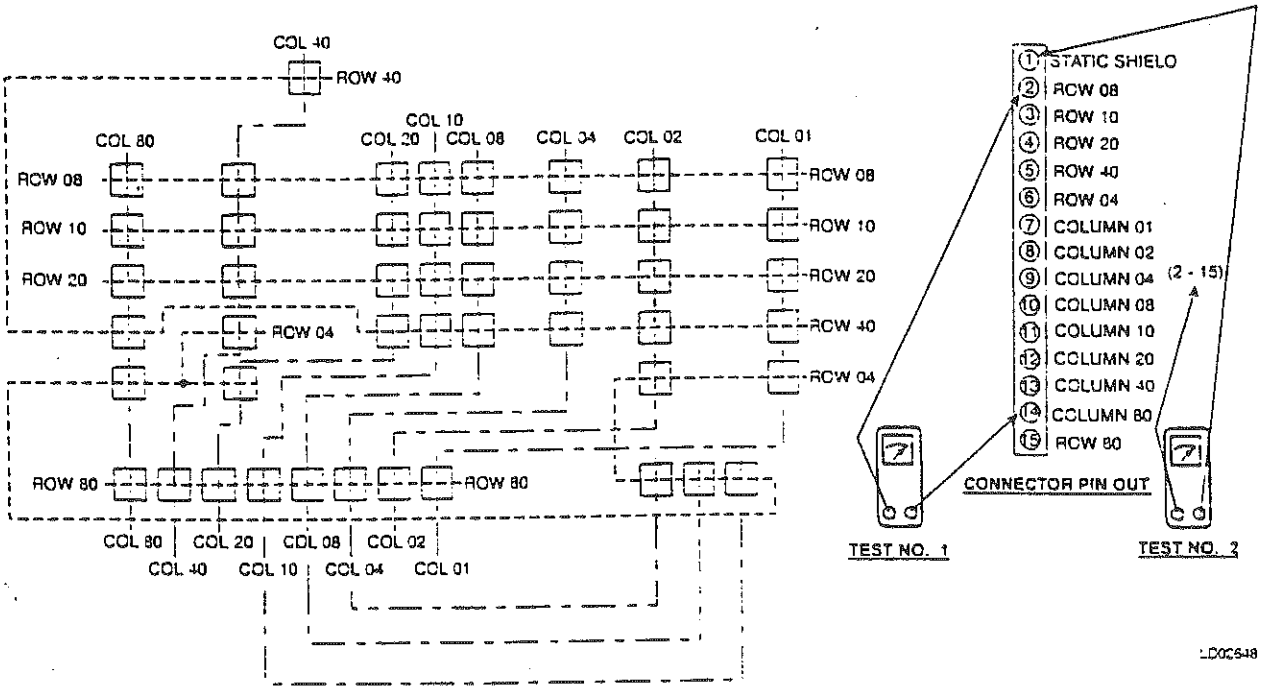
S.L. Baer
YORK Factory Service

YORK®	ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB19) (598)
SUBJECT: HOW TO CHECK FOR DEFECTIVE KEY PAD. (YT-YK-YS-YG-YB- PARAFLOW - ISOFLOW MICRO PANELS)	File With 160.47-M2	

GENTLEMEN,

YOU WILL FIND BELOW A PROCEDURE ON HOW TO CHECK OUT THE KEY PAD ON THE MICRO PANEL TO DETERMINE IF YOU HAVE ONE OR MORE DEFECTIVE KEYS.

NOTE : FOR THOSE OF YOU THAT HAVE YG / YB LITERATURE , THIS TEST IS IN YORK FORM NO.160.60-M1 , PAGE NO. 112 , UNDER PROBLEMS AND SOLUTIONS. ***IMPORTANT*** : PLEASE MAKE NOTE THAT IN TEST NO.1 , ITEMS 7 AND 8 BELOW, THE READINGS ARE DIFFERENT AND SHOULD BE CHANGED AS SHOWN BELOW IN YOUR YG / YB LITERATURE.



TEST NO. 1

1. Remove power from the micro panel.
2. EXAMPLE: To check out the "CHILLED LIQUID TEMP" key.
3. The "CHILLED LIQUID TEMP" key is in the upper left corner of the display.
4. The "CHILLED LIQUID TEMP" key is in Row 8, Col 80 (see above Fig.)
5. Place the ohm meter in the "Keypad Connector" in Pin 2 (Row 8) and Pin 14 (Col 80). See above.
6. Press the "CHILLED LIQUID TEMP" key.
7. OHM METER READING MUST READ GREATER THAN 10,000 OHMS (KEY NOT DEPRESSED)
8. OHM METER READING MUST READ LESS THAN 100 OHMS (KEY DEPRESSED)

TEST NO. 2

With power removed, use the ohmmeter to read from Pin No. 1 to all of the other pins (2-15) on the keypad connector. This is to assure there is no shorts between the static shield and the keys.

YORK®	ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB20)(698)
	File With 160.47-M2	

SUBJ.: PRINTER READINGS ARE ALL ZERO (0)

PROBLEM: **WHEN USING ANY OF THE APPROVED YORK PRINTERS ON ANY OF THE ABOVE CHILLERS, YOU EXPERIENCE THAT THE PRINT OUT SHOWS ALL ZERO'S AFTER THE DEVICE / COMPONENT DESCRIBED.**

SOLUTION: 1. THE CHILLER HAS NOT RUN, THEREFORE THERE IS NOTHING STORED IN THE BUFFER ON THE MICRO BOARD, THUS *ALL READINGS WILL BE ZERO* ON THE PRINTOUT.

2. ALSO CHECK:
   A. DIP SWITCH SETTINGS ON THE PRINTER
   B. CHECK THE JUMPER ON THE MICRO BOARD TO ASSURE IT IS IN THE PROPER POSITION.
   C. RE-CHECK THE WIRING OF THE PRINTER TO THE PANEL.

SUBJ.: CHECKING THE 5 VOLT SUPPLY

PROBLEM: DISPLAY SHOWS NO.'S, LETTERS, CHARACTERS, ETC.....

SOLUTION:

THE PROBLEM DESCRIBED ABOVE DEPICTS THAT THE 5 VOLT SUPPLY IS BEING PULLED DOWN.

TO TROUBLE SHOOT THIS PROBLEM, PLACE YOUR METER LEADS ON TPA (+5V) AND TPC (GND.) TO MONITOR THE 5 VOLT SUPPLY. THESE TEST POINTS ARE LOCATED ON THE MICRO BOARD AT THE BOTTOM CENTER OF THE BOARD.

ONCE YOUR METER IS CONNECTED , START REMOVING ALL THE COMPONENTS (ONE AT A TIME) THAT THE 5 VOLT SUPPLY FEEDS (IE.. TRANSDUCERS, THERMISTORS, ETC..).

WHEN YOU REMOVE THE COMPONENT THAT IS PULLING DOWN THE SUPPLY YOUR METER WILL RISE BACK UP TO 5 VOLTS. REPLACE THE DEFECTIVE COMPONENT.

YORK®	ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supersedes:Nothing	Form 160.47-M2 (SB21)(698)
	File With 160.47-M2	

SUBJ.: CARD FILE PROBLEM ?
(2 CHILLERS READING
DIFFERENT TEMPS. WITH SAME VOLTAGE)
PRODUCTS: YT / YK / YS / YG /YB
ISO FLOW / PARAFLOW

PROBLEM: THERE ARE TWO CHILLERS AT THE JOB USING A 0 TO 10 VOLT DC SIGNAL FOR THE REMOTE RESET TEMP. RANGE

CHILLER NO. ONE IS READING : 44 DEG. AT A ZERO VDC SIGNAL.

CHILLER NO. TWO IS READING : 46 DEG. AT A ZERO VDC SIGNAL

" THERE ARE NO ADJUSTMENTS ON THE BOARDS IN THE CARD FILE NOR ON THE FILE RACK ITSELF TO ADJUST TO HAVE THESE TWO READ THE SAME "

SOLUTION : CHECK THE FOLLOWING IN THE ORDER SHOWN:

1. IS THE REMOTE TEMP. RANGE SETTING THE SAME ON BOTH CHILLERS. VIEW ON THE DISPLAY. (SHOULD BE THE SAME)
2. IS THE LEAVING SET POINT BASE SETTING DIFFERENT BETWEEN THE TWO CHILLERS. VIEW ON THE DISPLAY. (SHOULD BE THE SAME)
3. IS THE ZERO VOLTS BEING SUPPLIED TO US FROM THE JOHNSON / HONEYWELL / ETC.... SUPPLIER A CONSTANT / STABLE ZERO VOLTS.
4. THE PLUG IN BOARD IN THE CARD FILE IS DEFECTIVE. TRY SWAPPING THE BOARDS TO SEE IF THE TEMPERATURE FOLLOWS.

ROTARY SCREW LIQUID CHILLERS

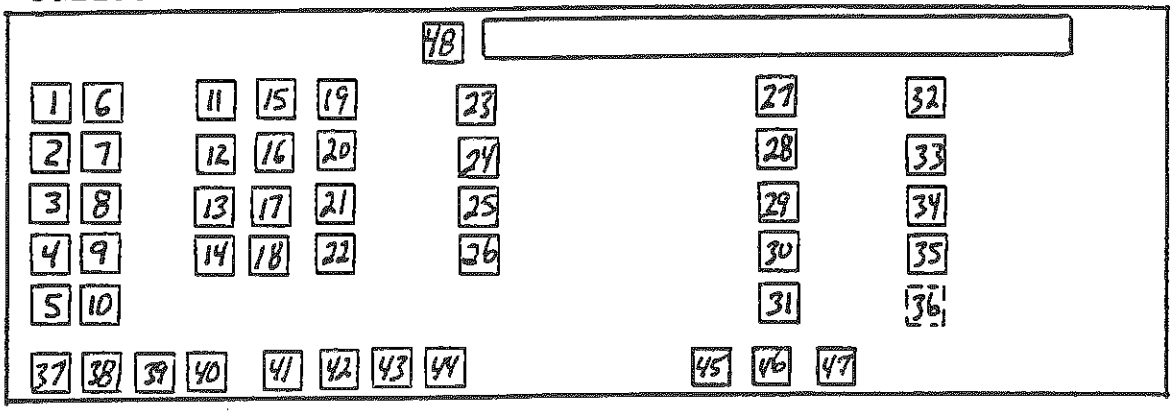
SERVICE BULLETIN | Supersedes:Nothing | Form 160.47-M2 (SB22)(798)

File With 160.47-M2

SUBJ.:KEY PAD CHECK OUT

PRODUCTS: YT,YK,YS,YG,YB,
PARAFLOW, ISO FLOW

YOU WILL FIND BELOW A LAYOUT OF THE YORK KEYPAD. I NUMBERED EACH KEY TO HELP YOU LOCATE THE KEY THAT COROSPONDS TO THE PIN LAYOUT SHOWN BELOW. SIMPLY FILL IN THE BLANKS BELOW WHEN TROUBLESHOOTING THE KEYPAD:

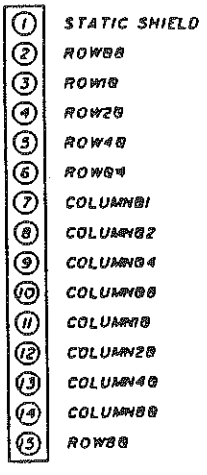


KEY	PIN	PIN	Depressed / not depressed
1	2	14	
2	3	14	
3	4	14	
4	5	14	
5	6	14	
6	2	13	
7	3	13	
8	4	13	
9	6	13	
10	6	12	
11	2	12	
12	3	12	
13	4	12	
14	6	12	
15	2	11	
16	3	11	
17	4	11	
18	5	11	
19	2	10	
20	3	10	
21	4	10	
22	5	10	
23	2	9	
24	3	9	

KEY	PIN	PIN	Depressed / not depressed
25	4	9	
26	5	9	
27	2	8	
28	3	8	
29	4	8	
30	5	8	
31	6	8	
32	2	7	
33	3	7	
34	4	7	
35	5	7	
36	6	7	
37	15	14	
38	15	13	
39	15	12	
40	15	11	
41	15	10	
42	15	9	
43	15	8	
44	15	7	
45	6	9	
46	6	10	
47	6	11	
48	13	5	

Key *not depressed* **must read greater** than 1MEG ohm (note: this reading used to be 10,000 ohms)
Key *depressed* **must read less** than 100 ohms

MAKE EXTRA COPIES OF THIS SHEET FOR FUTURE JOBS



CONNECTOR PIN OUT

YORK®	MILLENNIUM ROTARY SCREW LIQUID CHILLERS	
SERVICE BULLETIN	Supercedes: Nothing	Form 160.47-M2 (SB23) (200)
	File with: 160.47-M2	

Subject: Screw Chiller (125-675TR) Non-Graphic Control Center –
Eprom Version S.01F.19

On/about March 2000, Eprom Version S.01F.19 (York P/N 031-01102-002) will be available for non-Graphic Control Centers equipped with Micro Board 031-01065-XXX. It contains the following enhancements that revise Service Manual 160.47-M2 as follows:

SLIDE VALVE UNLOAD BEFORE SHUTDOWN

To assure the Slide Valve unloads to < 30% position during shutdown, it is unloaded to < 30% prior to shutting down the chiller on certain shutdowns.

While the chiller is running, if one of the below listed shutdown commands occur and the slide valve position is > 30%, a continuous unload signal is applied to the slide valve until its position is < 30%. While the slide valve is unloading, "SYSTEM SHUTTING DOWN – SV UNLOADING' is displayed. If the Status key is pressed, a message describing the cause of shutdown is displayed. When the slide valve position becomes < 30%, the chiller shutsdown and the normal 2-minute lockout period begins. The shutdown commands that initiate this operation are:

- Multi-Unit Sequence TB2-9
- Remote/Local Cycling TB2-13
- Remote Stop TB2-8
- Low Water Temp
- Daily Schedule Internal Time Clock

To assure that a defective slide valve actuator or mechanical problems cannot prevent a chiller shutdown, if the slide valve has not unloaded to < 30% within 210 seconds of receiving the shutdown command, a shutdown occurs regardless of slide valve position.

MINIMUM LOAD CONTROL

There are now two selectable methods of preventing Separator oil loss under low load conditions: **Minimum Allowed Slide Valve Position** and **Minimum Allowed Motor Current**. Although both of these methods have been previously used in various eprom versions, they were never available in the same eprom. The actual method that should be used is determined by the application. While the slide valve minimum position is being limited by either method, "System run – Minimum Load Control" is displayed.

A description of each follows:
Minimum Allowed Slide Valve Position: Following a 3 minute bypass at chiller start and after the slide valve is loaded to at least a 25% position, it is not permitted to unload to < 5% position.
Minimum Allowed Motor Current: Following a 3 minute bypass at chiller start, if the motor current is < the programmed "Minimum Allowed Motor Current" value, "System Run- Minimum Load Control" is displayed and a 1 second load pulse is applied to the slide valve every 3 seconds until the motor current is ≥ the setpoint plus 2%. Manual slide valve control overrides this feature. The programmed "Minimum Allowed Motor Current" value has priority over any is "Pulldown Demand" or "Current Limit" setpoint.

Select the desired method using Access Code 1380 and the % MOTOR AMPS/% SLIDE VALVE key. When prompt message "Low Limit Control = x (0=%SV;1=%FLA)" is displayed, enter "0" or "1" for the desired method. If "%FLA" method is selected, use UNLOAD service key to enter the desired motor current value. When prompt message "Minimum Current Load Limit = XX%FLA", enter desired value between 15% and 70% FLA. Both methods are selectable, regardless of the position of Program Jumper JP4.

The method selected is displayed as a scrolled message of the DISPLAY DATA key as either "% Slide Valve Determines low Limit" or "Motor % FLA determines Low Limit".

STANDBY CHILLER FREEZE PROTECTION

In this Eprom version, this feature has been modified as described below.

In previous eprom version S.01F.17, detailed in 160.47-M2 (SB18), the freeze threat was based on the **Evaporator Saturation Temperature** decreasing below 32° F and the warning was displayed after the chiller was shutdown for at least 10 minutes. The warning cleared when the temperature increased above 35° F. During shutdown, the condenser pump was turned on when the temperature decreased below 35° F and was turned off when it was greater than 45° F.

In this version, freeze threat is based the **Condenser Saturation Temperature** as follows: After the chiller has been shutdown for at the least the user programmed bypass time (30-60 minutes), programmed with the "Freeze Warning Delay Time" setpoint below, if the temperature decreases below 28° F, "Freeze Threat From Operating Chiller" is displayed and the Warning Relay is energized. The Warning Relay is K6 on the Relay Board and when energized, the contacts close between TB3-34 and TB3-1. As before, closure of these contacts applies 115Vac to TB3-34 and this signal can be used for alarm purposes. The warning clears and the relay is de-energized when the temperature increases above 28° F.

As before, the Condenser Pump is driven from Relay Board TB4-55 & 56 (dry closure contacts of relay K0)(Relay Board 031-00932-02 is required; -001 does not contain K0). The relay is energized to turn on the pump and de-energized to turn it off. Normally, the pump is started at the beginning of "Start Sequence Initiated". At chiller shutdown, the pump continues to run until the Condenser Saturation temperature increases above 35° F. During shutdown, anytime the temperature decreases below 30° F, the pump is turned on until it rises above 35° F.

Program the "Freeze Warning Delay Time" using Access code 9675 or 1380 and the REFRIGERANT PRESSURES key. When prompt message "Freeze Warning Delay Time =

XXMin" is displayed, enter desired time between 30 and 60 minutes.

With this Eprom, a Condenser Water Flow Switch can be connected between Digital Input Board terminals TB1-71 and TB2-1 (or TB1-1). The flow switch is bypassed for 60 seconds after the Condenser Pump is turned on with TB4-55 & 56 as described above. After the bypass, if it opens continuously for 2 seconds, a cycling shutdown is performed and "Day-Time-Cond Flow Switch-Autostart" is displayed. If the Condenser Pump is being run due to a low Condenser Saturation Temperature as described above, and the flow switch opens continuously for 2 seconds, "Freeze Threat – Cond Water Flow Fault" is displayed.

DISPLAY DATA KEY - CORRECTION

In previous eprom versions, when the Seal Oil Pressure Transducer operation was enabled, the Evaporator and Condenser Saturation Temperatures were no longer displayed as one of the scrolled messages of the Display Data Key. In this version, the Saturation Temperatures are displayed regardless of Seal Oil Pressure Transducer status.

HOT GAS BYPASS CONTROL SELECTION

In Eprom versions S.01F.12 and earlier, the Hot Gas Bypass control was based on Slide valve Position as follows: After a 3 minute bypass at start, the valve was opened (energized) when the Slide Valve position decreases to $\leq$ 5%. When it increases to $\geq$15%, it is de-energized (closed).

In Eprom version S.01F.13 and later, it was controlled, after a 3 minute bypass at start, per the difference between the Entering Chilled Water Temperature and the Leaving Chilled Liquid Temperature Setpoint as follows: When the Entering Chilled Water Temperature minus the Leaving Chilled Water Temperature Setpoint differential decreases to the programmed ON threshold (1 to 10° F), the valve is energized (opened). When the differential increases to the programmed OFF threshold (2 to 15° F), the valve is de-energized (closed).

The position of Micro Board Program Jumper JP4 does not affect Hot Gas operation as it did previously.

Both of these methods are available in this new Eprom version. The desired method is selectable as follows:

1.) Enter PROGRAM mode using Access code 1 3 8 0.
2.) Press CHILLED LIQUID TEMPS Display key.
"HOT GAS USES-X (0=%SLD VLV;1=TEMP DIFF)" is displayed.
3.) Using ENTRY keys, press 0 to select Slide Valve method or 1 for Setpoint Differential method.
4.) Press ENTER key.
5.) If 0 was entered in step no.3, press PROGRAM key to exit. If 1 was entered, press ADVANCE DAY/SCROLL key.
"(ECWT – LCWSP): HOT GAS ON = XX°F; OFF=XX°F" is displayed.
6.) Using ENTRY keys, enter differential threshold (1 to 10° F) at which it is desired to turn on the Hot Gas Bypass. Use leading zeroes where necessary (ie, 03). The Cursor will automatically move to the OFF entry. Enter the differential threshold (2 to 15° F) at which it is desired to turn off the Hot Gas Bypass.
7.) Press PROGRAM key to exit.

YORK®

ESG Service Information

File In/With: SK Behind General Tab | SI0023 | New 3-02

Equipment Affected: YS Chillers Using MicroComputer Control Center

Software Enhancements Effective March 2002

General

Beginning March 7, 2002 an enhanced version of software for YS chillers (R-22 and R134A) using the MicroComputer Control Panel was released. YS chillers Style " D " or earlier experiencing oil management problems should consider installing the new version of EPROM. Programming changes are outlined below.

The EPROM version and part number is:

Version S.01F.20
Csum 4D1F
Part Number 031-01102-002

Note: This EPROM can only be used in the 031-01065 board

This EPROM is available from the Baltimore Parts Distribution Center for retrofit to existing chillers.

Discharge Superheat Recovery:

An improved supplemental discharge superheat recovery operation, which operates based upon change of discharge superheat, has been added. As long as the discharge superheat value lies between 15.0 and 25.0°F, or the % of the slide valve is less than 40, the routine will control the discharge superheat.

After a 3 minute hold off delay at the beginning of the compressor energize signal, the routine samples the discharge superheat and change of discharge superheat (delta superheat) value every 5 seconds. If the delta discharge superheat is 0°F or greater, the slide valve will load. If the discharge superheat experiences a negative change greater than 1°F, the slide valve will unload. If the change is between 0 and –0.9, both load and unload outputs are turned off. The unload pulse is fixed at 0.5 seconds pulse width and can occur each time the routine is entered (every 5 seconds). The load pulse also uses a 0.5 second pulse width, but can be configured to occur in multiples of 5 seconds, from 25 seconds.

The 'Load' key and the 1380 access code are used. The appropriate message, "S' HEAT LOAD CYCLE TIME=XSEC (x5)", is displayed as the 2nd scrolled message. Acceptable entries are 1 to 5, with 1 being the default value. If the superheat falls below 15°F, the slide valve outputs are both held off, until the overcharge detection routine causes an unload, if required. If the superheat continues to fall below 10°F, the previous overcharge detection routine will attempt to increase the discharge superheat and provide a warning, just as before.

XXMin".is displayed, enter desired time between 30 and 60 minutes.

With this Eprom, a Condenser Water Flow Switch can be connected between Digital Input Board terminals TB1-71 and TB2-1 (or TB1-1). The flow switch is bypassed for 60 seconds after the Condenser Pump is turned on with TB4-55 & 56 as described above. After the bypass, if it opens continuously for 2 seconds, a cycling shutdown is performed and "Day-Time-Cond Flow Switch-Autostart" is displayed. If the Condenser Pump is being run due to a low Condenser Saturation Temperature as described above, and the flow switch opens continuously for 2 seconds, "Freeze Threat – Cond Water Flow Fault" is displayed.

DISPLAY DATA KEY - CORRECTION

In previous eprom versions, when the Seal Oil Pressure Transducer operation was enabled, the Evaporator and Condenser Saturation Temperatures were no longer displayed as one of the scrolled messages of the Display Data Key. In this version, the Saturation Temperatures are displayed regardless of Seal Oil Pressure Transducer status.

HOT GAS BYPASS CONTROL SELECTION

In Eprom versions S.01F.12 and earlier, the Hot Gas Bypass control was based on Slide valve Position as follows: After a 3 minute bypass at start, the valve was opened (energized) when the Slide Valve position decreases to $\leq$ 5%. When it increases to $\geq$15%, it is de-energized (closed).

In Eprom version S.01F.13 and later, it was controlled, after a 3 minute bypass at start, per the difference between the Entering Chilled Water Temperature and the Leaving Chilled Liquid Temperature Setpoint as follows: When the Entering Chilled Water Temperature minus the Leaving Chilled Water Temperature Setpoint differential decreases to the programmed ON threshold (1 to 10° F), the valve is energized (opened). When the differential increases to the programmed OFF threshold (2 to 15° F), the valve is de-energized (closed).

The position of Micro Board Program Jumper JP4 does not affect Hot Gas operation as it did previously.

Both of these methods are available in this new Eprom version. The desired method is selectable as follows:

1.) Enter PROGRAM mode using Access code 1 3 8 0.
2.) Press CHILLED LIQUID TEMPS Display key.
"HOT GAS USES-X (0=%SLD VLV;1=TEMP DIFF)" is displayed.
3.) Using ENTRY keys, press 0 to select Slide Valve method or 1 for Setpoint Differential method.
4.) Press ENTER key.
5.) If 0 was entered in step no.3, press PROGRAM key to exit. If 1 was entered, press ADVANCE DAY/SCROLL key.
"(ECWT – LCWSP): HOT GAS ON = XX°F; OFF=XX°F" is displayed.
6.) Using ENTRY keys, enter differential threshold (1 to 10° F) at which it is desired to turn on the Hot Gas Bypass. Use leading zeroes where necessary (ie, 03). The Cursor will automatically move to the OFF entry. Enter the differential threshold (2 to 15° F) at which it is desired to turn off the Hot Gas Bypass.
7.) Press PROGRAM key to exit.

YORK®	Form Number: 160.47-M2 (LS01)	205
	Supersedes: None	
LITERATURE SUPPLEMENT	File with: 160.47-M2 (291)	

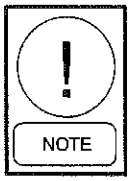
Subject: Disabling Discharge Superheat Oil Recovery Feature on YS Chillers Using "1-line Display" Microcomputer Center

General

Beginning February 2003, an enhanced version of software for YS chillers using the "1-line" Display Microcomputer Control Center was released. The enhancements are listed below.

The eprom version and part number is:

Version..... S.01F.21
Part Number.....031-01102-002



This eprom can only be used in 031-01065 Microboards

Oil Recovery Feature - Disable

In the previous software version (S.01F.20), the Discharge Superheat Oil Recovery feature (as described in Service Instruction SI0023) was active all the time. Since this feature recovers oil that has accumulated in the evaporator refrigerant by limiting slide valve loading per the discharge superheat, chiller capacity is affected while the routine is in effect. Therefore, under normal operating conditions, the feature should be disabled.

In this software version, a service technician can enable or disable the feature at the keypad. When enabled, the oil recovery routine operates automatically. When disabled, the oil recovery routine does not operate. The default is "Disabled".

The feature is enabled and disabled by the value entered for the load pulse multiplier. It is disabled by setting the value to zero (0). Entering any number greater than zero enables the feature.

Use the following procedure to disable the feature:

1. Press ACCESS CODE key.
2. Using ENTRY keys, enter access code 1 3 8 0.
3. Press PROGRAM key.
4. Press OPEN key. Use the ADVANCE DAY/SCROLL key to display the following message. Each time the key is pressed, the display scrolls to the next message.

   "S'Heat Load Cycle Time = XX Sec (x5)"
5. Using ENTRY keys, enter "0".
6. Press PROGRAM key to exit.

When disabled, the message "DSH Count = XX.X°F", displayed via the DISPLAY DATA key, is replaced by "Discharge Superheat Not Selected". This provides a visual indication that the feature is disabled.

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ESG Service Information

File In/With: SK (Behind General Tab)	SI0007 New 6-01
Equipment Affected: YS Chillers Using Optiview Control Center	
Software Enhancements Effective May 2001	

General

Beginning May 2001, an enhanced Flash Memory Card will be supplied with new production Nema 1-4 and CE chillers. New features are outlined below and are also included in YORK Operation Manual 160.80-O1 and Service Manual 160.80-M1.

Flash Memory Card versions and part numbers are applied as follows:

- Nema 1-4 Chillers C.MLM.03.02A.101 (031-02005-001)
- CE Chillers C.MLM.03.02A.201 (031-02005-002)

The enhanced flash cards are also available from the Baltimore Parts Distribution Center for retrofit to existing chillers.

Trend Screen – Triggered Chart

A "TRIGGERED" chart can now be created. This is in addition to the ONE SCREEN and CONTINUOUS chart types that can be created in previous Flash Memory Card versions. With the TRIGGERED chart type, data collection can be set to START or STOP based upon the status of up to two Operator selected conditions (TRIGGERS) and a selected TRIGGER DELAY. If START is selected, data collection will not begin until all triggers have been satisfied and any selected TRIGGER DELAY has elapsed. Data collection will stop at the completion of one screen of data. If STOP is selected, data collection will begin when manually initiated, and will stop when all triggers have been satisfied and any selected TRIGGER DELAY has elapsed.

This feature is a valuable troubleshooting tool for Service technicians. It allows an event that occurs during unattended hours to be captured for viewing at a later time. The trigger event results in a screen of frozen trend data that will remain on the screen until manually cleared.

Display of Service Phone Numbers

Two service phone numbers (Regional and Local), with labels, can be displayed on the OPERATIONS Screen. The Default value for the Regional number is the North American Toll Free number. However, the label and number can be changed to any desired value. The Local label and number can also be entered.

"Evaporator-Transducer or Temperature Sensor" Safety Shutdown

In Previous Flash Memory Card versions, the conditions for this safety shutdown were checked after the first 10 minutes of chiller run. Under certain operating conditions this would result in unnecessary shutdowns. In this version, in addition to the previous criteria, the shutdown conditions are not checked unless Smart Freeze is enabled and the Evaporator Refrigerant Temperature RT7 (if enabled) or Evaporator Saturation Temperature (derived from the evaporator pressure transducer) is < 32° F.

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ESG Service Information

File In/With: SK (Behind General Tab)
SI0024
New 3-02

Equipment Affected: YS Chillers Using Optiview Control Center

Software Enhancements Effective March 2002

General

Beginning March 2002, an enhanced Flash Memory Card will be supplied in new production YS Nema 1-4 and CE chillers. The new features are outlined below.

The Flash Memory Card versions and part numbers are as follows:

- Nema 1-4 Chillers.....C.MLM.03.03.100 (031-02005-001)
- CE Chillers C.MLM.03.03.200 (031-02005-002)

These versions are also available from the Baltimore Parts Distribution Center for retrofit to existing chillers.

Record Setpoint Changes

This feature provides a record of the last 75 Setpoint changes. The date and time the Setpoint was changed, the new Setpoint value and the Access Level and User ID used to make the change are stored in the BRAM. The Security Log Screen and the Security Log Details Screen display levels of this information. Both screens are available in Service Access level or higher.

On the Security Log Screen, accessible from the History Screen, the Setpoint, Setpoint Category and new Setpoint value are listed and numbered in reverse order in which they were changed. The most recent is listed as number 1; the next most recent as number 2, etc. A PRINT key allows printing this entire list. Since 15 changes can be displayed at one time, multiple pages could be necessary to display all the changes. PAGE-UP and PAGE-DOWN keys are provided to view the entire list. If it is desired to view the details of a particular Setpoint change, select the Setpoint change number with the LOG ENTRY key and then press the VIEW DETAILS key. This moves to the Security Log details Screen.

The Security Log Details Screen, accessible from the Security Log Screen, displays the following Setpoint change details. The Setpoint is selected from the list on the Security Log Screen as explained in the previous paragraph. A PRINT key is provided to print this information.

- Setpoint Category
- Setpoint
- Date and time of change
- Access Level and User ID used to make the change
- Old Value
- New Value

The following Setpoint changes are not logged:

- Clock Mode
- Custom Screen slot numbers
- Advanced Diagnostics communication port tests
- Advanced Diagnostics secondary multiplexer freeze
- Soft shutdown initiated by operator
- System language
- Display units
- Any Print report
- Cancel any print report
- Schedule clear
- Schedule repeat exception days
- Schedule start and stop times
- Log in/log out
- User attributes for ID, Password and Level
- Trend start/stop
- Trend slot numbers, minimums and maximums
- Trend trigger data
- Trend print mode
- Trend view mode

History

Chiller Run Time is now included on History Details display and print.

Oil Recovery

Extended operation at low load, entering condenser water temperatures that are below design, oil cooler supply problems or oil solenoid valve problems can allow oil to migrate from the oil separator to the evaporator refrigerant charge. This reduces the quantity of oil in the separator and can result in “Oil Separator – Low Level” safety shutdowns.

Excess oil mixed with the refrigerant in the evaporator will cause severe foaming when the chiller is started. This foaming carries liquid refrigerant into the compressor, lowering the compressor discharge temperature. As the compressor discharge temperature approaches the condenser saturation temperature (low discharge superheat), the refrigerant gas has a greater affinity to absorb more oil. When the discharge superheat is reduced, oil cannot be separated from the refrigerant gas in the oil separator.

The Oil Recovery feature is used to automatically recover the oil that has accumulated in the evaporator refrigerant. It accomplishes this by applying load, unload or hold outputs to the slide valve in 5-second intervals according to the rate of change of the discharge superheat in each interval. This operation is detailed below. The feature can be Enabled or Disabled. The Default is Disabled.

Pertinent information for this feature is displayed on the Oil Separator Screen. The change in superheat that occurs in each 5-second interval is displayed as “Change in Discharge Superheat = xx.x ºF”. Increases are displayed as xx.x. Decreases are displayed as –xx.x. The Oil recovery feature is Enabled and Disabled on this screen.

Oil Recovery operation is performed as follows:

1. If the discharge superheat is [>15.0 ºF (R22) (10.0ºF for R134a) and <25.0 ºF (R22) (13.0ºF for R134a)] or the Slide Valve position is < 40%, the superheat and superheat rate of change are evaluated every 5 seconds and the following action is taken at the end of each 5-second period. While this operation is in effect, "Warning – Oil Recovery limit" is displayed on the System Details line of the display.
   If the change in discharge superheat:
   - Remains the same or increases, apply 0.5 second load pulse
   - Decreases by 0.1 to 0.9ºF, hold the slide valve
   - Decreases >1ºF, apply 0.5 second unload pulse.

2. If the discharge superheat is <15.0ºF(R22) (10.0ºF for R134a) but >10ºF(R22) (5.0ºF for R134a), hold the slide valve.

3. If the discharge superheat is ≤10.0ºF(R22) (5.0ºF for R134a):
   - Inhibit loading
   - If condition exists for ≥ 10 seconds, invoke "Excess Charge Override' routine as follows:
     Apply 0.5 second unload pulses every 3 seconds (during which "Warning – Low Discharge Superheat Limit" is displayed) until Superheat ≥15.0ºF (whereupon "Warning-Low Discharge Superheat Detected" replaces the message "Warning – Low Discharge Superheat Limit").

4. When both the superheat increases to ≥ 25.0 ºF (R22)(13.0ºF for R134a) and the slide valve position is ≥ 40%, "Warning – Oil Recovery Limit" is cleared, Oil Recovery operation terminates and normal operation resumes.

If the Oil recovery feature is Enabled, the restart criteria following an "Oil Separator – Low Level" safety shutdown is different than if the feature is Disabled. With the feature Disabled, the Separator Oil Level Switch (SOLS) must be closed before a restart is allowed. This requirement is the same as in all previous software versions. However, to eliminate the need to manually bypass the SOLS in order to restart a chiller that has already suffered oil loss, the SOLS does not have to be closed to start the chiller when the feature is Enabled.