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
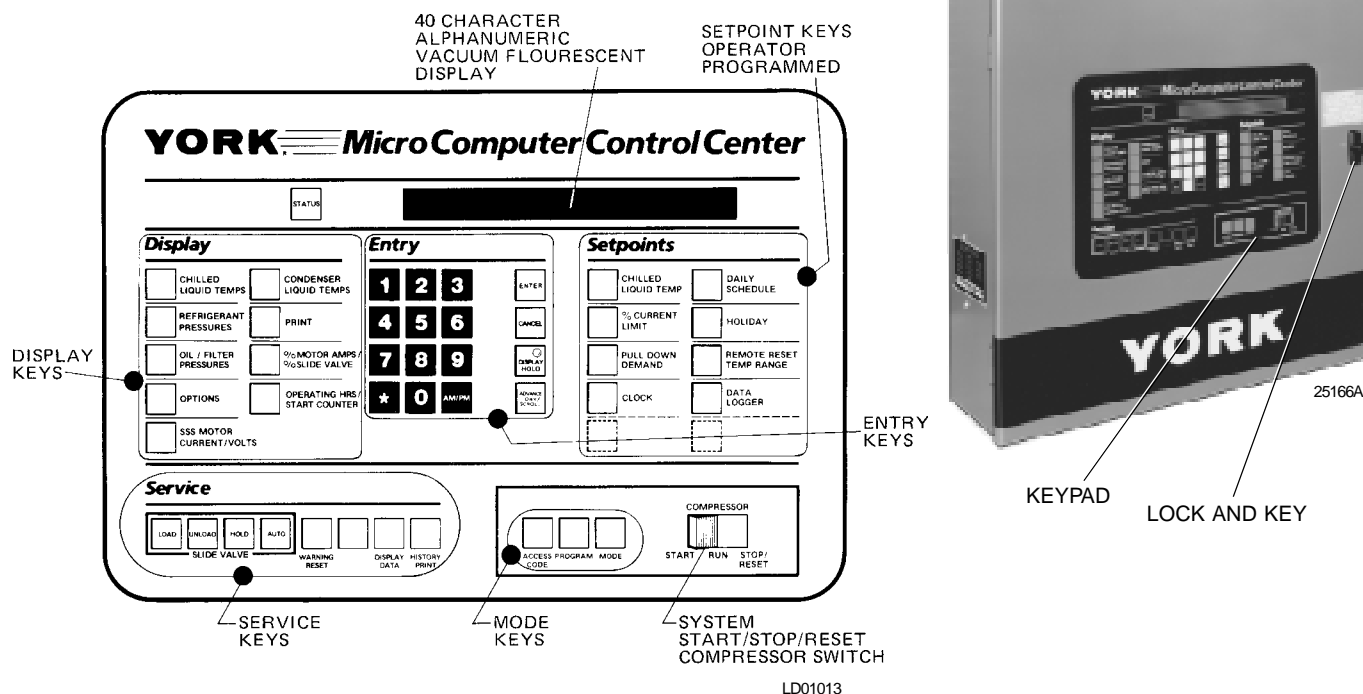

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FIG. 1 – MICROCOMPUTER CONTROL CENTER AND KEYPAD

INTRODUCTION

The York MicroComputer Control Center is a microprocessor based control system for R-134a 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 YORK Solid State Starter, and electromechanical starter applications.

A keypad mounted on the front of the Control Center (see Fig. 1) allows the operator to display system operating parameters on a 40 character alphanumeric display that is part of the keypad. These readings are displayed via "Display" keys as follows: (In the English mode; temperatures in °F pressures in (PSIG) (in the metric mode, temperatures in °C, Pressures in KPa).

• CHILLED LIQUID TEMPERATURES –
    LEAVING AND RETURN
• REFRIGERANT PRESSURES –
    EVAPORATOR AND CONDENSER
• OIL PRESSURE –
    • INPUT TO COMPRESSOR
    • INPUT TO OIL FILTER
    • OIL FILTER DIFFERENTIAL
    • DIFFERENTIAL OIL (OIL PRESSURE –
      EVAP PRESSURE)
• OPTIONS - FUTURE USE
• 3-PHASE MOTOR CURRENT &
    3-PHASE POWER LINE VOLTAGE
    (SOLID STATE STARTER APPLICATIONS ONLY)

• CONDENSER LIQUID TEMPERATURES –
    LEAVING AND RETURN
    (CUSTOMER OPTION; FIELD INSTALLED)
• PRINT
• HISTORY PRINT
• MOTOR CURRENT IN % OF FULL LOAD AMPS
• SLIDE VALVE POSITION IN % OF
    MAXIMUM TRAVEL
• OPERATING HOURS
• ACCUMULATED COMPRESSOR STARTS COUNTER
• SATURATION TEMPERATURES EVAPORATOR AND
    CONDENSER DISCHARGE TEMPERATURE
• OIL TEMPERATURE

The system setpoints (see Fig. 1) are operator entered on the front control center **"Setpoints"** keypad. These setpoints can also be displayed on the 40 character alphanumeric display. The system setpoints are:

• LEAVING CHILLED WATER TEMPERATURE
• % CURRENT LIMIT
• CHILLER FULL LOAD AMPS
    (SOLID STATE STARTER APPLICATIONS ONLY)
• PULLDOWN DEMAND LIMIT
• CLOCK (DAY, TIME, CALENDAR DATE)
• DAILY SCHEDULE (7 DAY TIME-CLOCK
    PROGRAMMING) WITH PROVISION FOR
    SPECIAL HOLIDAY SCHEDULE
• REMOTE LEAVING CHILLED WATER
    TEMPERATURE RESET RANGE
• DATA LOGGER – AUTO INTERVAL AND START TIME

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

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

1. Remote Start

2. Remote Stop

3. Remote LCWT Setpoint
   (Pulse Width Modulated signal)

4. Remote Current Limit Setpoint
   (Pulse Width Modulated signal)

5. A "Remote Mode Ready to Start" Status Contacts

6. Safety Shutdown Status Contacts

7. Cycling Shutdown Status Contacts

As an enhancement to the standard EMS features, an optional card file with plug-in printed circuit boards is available. These optional cards will accept a remote LCWT 0 to 10°F or 0 to 20°F setpoint offset and/or remote current limit setpoint interface from three user input choices:

1. 4-20mA

2. 0-10 VDC

3. contact closures

CONTROL CENTER

The Control Center front panel layout consists of five key groups, one switch, and a 1 line by 40 character alphanumeric vacuum fluorescent display: (See Fig. 1.)

CHARACTER DISPLAY – The alphanumeric vacuum fluorescent display is located to the right of the **STATUS** key. All messages, parameters, set points, and data can be viewed at this location. The main communications between the operator or service technician and the Micro Computer Control Center occurs on this display.

DISPLAY – Provide a direct read out of each monitored parameter on the alphanumeric display.

ENTRY – These keys are used to enter the values for the operator programmed setpoints. These keys are used in conjunction with the **SETPOINT** keys while in program mode.

SETPOINTS – These keys are used as follows:
1. To view each setpoint, in any Mode, or
2. To select the individual setpoints that are programmed by the operator in Program Mode only.

Pressing the appropriate key enables the operator to program that setpoint pressing the **ENTRY** keys.

SERVICE – Included in this group of keys are those functions that are only relevant to servicing the chiller.

Typically, these keys would not be used for daily chiller operation.

ACCESS CODE – Permits operator to access the program.

PROGRAM – Permits operator to program the Control Center.

MODE – Permits operator to check what mode the control center is presently in (LOCAL, REMOTE or SERVICE).

1. **Service** – allows manual slide valve control with visual display readout of slide valve operation.

2. **Local** – allows manual compressor start from the **"COMPRESSOR"** switch on control center front.

3. **Program** – allows operator programming of system setpoints.

4. **Remote** – allows remote start, remote stop of compressor and remote reset of LCWT and % current limit.

COMPRESSOR-START, RUN, STOP/RESET SWITCH – This 3-position rocker switch is used to start (except in remote mode), stop/run/reset the system.

OPERATION

The chiller will be permitted to start only if there are no SAFETY or CYCLING shutdown conditions in effect and the slide valve position is < 10 %. Units equipped with EPROM version S.01F(T).08 or later, allow a chiller start with the slide valve up to 30\ open if program jumper JP4 is removed.

When the **UNIT** switch is moved to the **START** position, the 30 second start sequence is initiated.

START SEQUENCE INITIATED is displayed and the oil line solenoid valve 1SOL (125-400TR chillers only) is energized (opened) for 15 seconds. During this 15 second period, the pressure transducer AUTO-ZEROING SEQUENCE is performed. The output of the oil pressure transducer is compared to the output of the evaporator transducer. Because these transducers are sensing the same pressure at this time, the outputs should be the same. However, due to accuracy tolerances in transducer design, differences can exist. Therefore, to compensate for possible differences, and assure differential pressure sensing accuracy, the offset will be added or subtracted from the differential value during system run. This same AUTO-ZEROING is performed between the oil pressure transducer and the filter oil pressure transducer. (Certain operating conditions could require AUTO-ZEROING to be disabled. On units equipped with EPROM version S.01F(T).08 thru S.01F(T).14, the AUTO-ZEROING between the oil and evaporator transducer can be disabled. On units equipped with EPROM version S.01F(T).15 and later, all transducer AUTO-ZEROING can be disabled using procedure in "Service" manual, Form 160.47-M2. This feature must never be disabled by anyone other than a qualified service technician.

After the 15 second auto-zeroing period has elapsed, the oil line solenoid valve is de-energized (closed) for the remainder of the start sequence period. 10 seconds later, the chilled liquid flow switch is checked, and if not closed, a cycling shutdown is initiated and **DAY-TIME-FLOW SWITCH-AUTOSTART** is displayed.

At the completion of the 30 second start sequence, the oil line solenoid valve 1SOL is energized, **SYSTEM RUN** is displayed and the start signal is sent to the motor starter.

Upon entering SYSTEM RUN, to aid in developing oil pressure, a continuous load signal is applied to the slide valve until it achieves a position of 25%. During the first 3 minutes of chiller run, the program will attempt to keep the slide valve at a minimum position of 25%. If the position decreases to 22%, a load signal is applied until it reaches 25%. After the initial position of 25% is achieved, it will not be allowed to decrease below 22%. Only CURRENT LIMIT, LOW or HIGH PRESSURE LIMIT and

manual slide valve operation will be allowed to drive the slide valve below 22% during the first 3 minutes of chiller operation.

After the chiller has been running for 3 minutes, to prevent oil loss in the oil separator, the chiller will not be permitted to unload to less than the programmed minimum allowable motor current expressed as %FLA. This motor current value (15% to 70% FLA) is programmed by a qualified service technician using procedure in "Service" manual, Form 160.47-M2. If the motor current is above the minimum allowed value, the slide valve is loaded and unloaded to achieve the Chilled Liquid Temperature Setpoint. If less than the minimum allowed value, **SYSTEM RUN-MINIMUM LOAD CONTROL** is displayed and a 1 second load signal is applied to the slide valve every 3 seconds until the motor current (FLA) is greater than or equal to the programmed setpoint plus 2%. If the minimum allowed value is greater than either the programmed **PULLDOWN DEMAND LIMIT** or **CURRENT LIMIT** setpoints, the minimum allowed %FLA threshold shall have priority. However, the chiller can be unloaded to less than the programmed minimum allowed %FLA by manually operating the slide valve in **SERVICE** mode. Chillers equipped with EPROM version S.01F(T).10 or earlier allow the chiller to fully unload to 0% slide valve position (after 3 minutes of operation) unless Program Jumper JP4 is removed, then the slide valve is not permitted to unload to less than 5% position. (A few early production chillers are equipped with EPROM version 4.E. The slide valve is not allowed to unload to less than 5% position after the chiller has been running for 4 minutes, regardless of the position of JP4).

If the chiller is equipped with the hot-gas bypass feature, after the chiller has been running 3 minutes, the hot gas valve is opened and closed based on the difference between the **ENTERING CHILLED WATER TEMPERATURE** and the **LEAVING CHILLED WATER TEMPERATURE** setpoint. The differential at which it is opened and closed is determined by setpoints programmed by a qualified service technician following procedures in "Service" manual, Form 160.47-M2. The open differential is programmable over the range of 1° to 10°F; the close differential is programmable over the range of 2° to 15°F. Chillers equipped with EPROM version S.01F(T).12 and earlier, operate the hot-gas based on slide valve position. The hot-gas valve is opened when the slide valve decreases to 5% position and it is closed when the slide valve increases to 15% position.

During chiller run, the slide valve is loaded and unloaded under program control to control the leaving chilled liquid temperature to the leaving chilled liquid temperature setpoint. As required, a 1 second load or unload signal is applied at 10 second intervals to maintain the leaving

chilled water temperature to the setpoint. Chillers equipped with EPROM version S.01F(T).10 and later have a sensitivity adjustment that controls the duration of the unload signal. If Micro Board Program Jumper J53 is removed, all unload signals are 2 seconds in duration instead of the standard 1 second. This provides faster unloading in applications where large loads are quickly removed from the chiller.

The chiller can operate in **WATER**, **BRINE** or **ICE STORAGE** cooling mode. **WATER** can be cooled over a setpoint range of 38° to 70°F. The range for **BRINE** is 20° to 70°F. **ICE STORAGE** mode cools a brine solution over a setpoint range of 20° to 32°F. The **BRINE** setpoint range can vary with EPROM version level as noted in other sections of this book. Chillers equipped with EPROM version level S.01F(T).12 and earlier do not have **ICE STORAGE** mode capability.

If the Leaving Chilled Liquid Temp decreases to 4° F below the Leaving Chilled Liquid Temp Setpoint, the chiller will shutdown and display

`DAY-TIME-LOW WATER TEMP-AUTOSTART` .

In **WATER** cooling mode, if the setpoint is increased while the chiller is running, this shutdown threshold becomes 36°F for the next 10 minutes. This prevents the chiller from shutting down every time the setpoint is increased. In **BRINE** and **ICE STORAGE** cooling mode, this shutdown threshold remains the same for the next 10 minutes as it was before the setpoint was increased. The chiller will automatically restart when the chilled liquid temperature increases to the **RESTART** setpoint threshold, programmed as 0° to 10°F offset above the **LEAVING CHILLED LIQUID TEMP** setpoint. The **RESTART** setpoint range can vary with EPROM version level as noted in other sections of this book. Chillers equipped with EPROM version S.01F(T).12 and earlier do not have a programmable **RESTART** setpoint. They automatically restart when the liquid temperature increases to the **LEAVING CHILLED LIQUID TEMP** setpoint.

ICE STORAGE mode is an operating mode within **BRINE** operating mode that allows the chiller to make ice at a faster than normal rate by inhibiting unload outputs to the slide valve. This causes the chiller to load until it shuts down on "DAY-TIME-LOW WATER TEMP-AUTOSTART" at 4° F below the **LEAVING CHILLED LIQUID TEMP** setpoint. No unload outputs are applied to the slide valve unless the motor current exceeds the programmed **CURRENT LIMIT** setpoint threshold. The chiller will automatically restart when the leaving chilled liquid temperature increases to the programmed ice storage mode **RESTART** setpoint threshold. Once selected, using a keypad programming procedure in "Programming" section of this book, **ICE STORAGE** mode will be automatically enabled (inhibits unload outputs) or disabled (allows unload outputs) by the value programmed for **LEAVING CHILLED LIQUID TEMP** setpoint. Setpoint

values between 20° and 32°F enable **ICE STORAGE** mode; > 32° to 70°F disables **ICE STORAGE** mode. This allows the chiller to be switched in and out of **ICE STORAGE** mode (once selected) 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 day-time hours, simply by changing the setpoint. When **ICE STORAGE** mode is enabled,

`ICE LEAVING SETP = XX. X°F RESTART = +XX°F` is displayed when the **LEAVING CHILLED LIQUID TEMP** keypad key is pressed; when disabled,

`LEAVING SETP = XX.X°F RESTART = +XX°F` is displayed. There are two different **RESTART** setpoints employed: one is used when **ICE STORAGE** mode is enabled and one is used when **ICE STORAGE** mode is disabled. Each can be programmed to a different value.

Chillers produced prior to March, 1994 are equipped with a Suction Trough Eductor Solenoid (3SOL). If any of these chillers are equipped with EPROM version S.01F(T).10 or earlier, the solenoid is energized (opened) during system run whenever the slide valve position is 17% or less. If any of these chillers are equipped with EPROM version S.01F(T).11 and later, this solenoid is energized (opened) whenever the compressor is operating and de-energized (closed) whenever the compressor is shutdown.

A solenoid valve (2SOL), located in the orifice bypass line is energized (opened) and de-energized (closed) under program control to create a variable orifice. When the chiller is not running, the solenoid valve is opened during the 2-MINUTE LOCKOUT period; closed thereafter. While the chiller is running, it is opened and closed per the following conditions: (chillers equipped with EPROM version S.01F(T).14 and earlier do not have variable orifice control capability).

1. **DELTA P** – This is the differential between the condenser pressure and the evaporator pressure. This value is compared to the **DELTA P** setpoint (R22 = 25 to 130 PSID; R134a = 15 to 90 PSID) that has been programmed by a qualified service technician following instructions in "Service" manual, Form 160.47-M2. If the **DELTA P** decreases to $\leq$ the setpoint, the solenoid valve 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 **DELTA P** control.

2. **LOW EVAPORATOR PRESSURE** – If the evaporator pressure decreases to the threshold that displays

`SYSTEM RUN - LOW PRESSURE IN EFFECT`

(R22 @ 56.2 PSIG; R134a @ 27.0 PSIG), the solenoid valve is opened. This condition will override **DELTA P** control above. The solenoid will remain open until the low pressure limit condition no longer in effect (R22 @ $\geq$ 57.5 PSIG; R134a @ $\geq$ 28.0 PSIG),

then the LOW PRESSURE override of the above **DELTA P** control will be released.

3. **DISCHARGE SUPERHEAT –** This is the difference between the discharge temperature and condenser saturated temperature. If the DISCHARGE SUPER-HEAT is < 15°F (R22), < 10°F (R134a), the solenoid valve is closed. This condition will override #1 and #2 above. The solenoid valve 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.

If the chiller shuts down on a CYCLING shutdown, it will automatically restart when the condition that caused the shutdown no longer exists. SAFETY shutdowns require the operator to perform a manual reset at the keypad. The event that caused the CYCLING or SAFETY shut-down is displayed when the **STATUS** key is pressed. A complete listing of these shutdowns and conditions that cause them are in the DISPLAY MESSAGES section of this book.

Anytime the chiller shuts down, for any reason, it cannot be restarted for 2 minutes. During this 2 minute period, X.X MINUTE LOCKOUT DELAY is displayed as a fore-ground message.

DISPLAYING SYSTEM PARAMETERS

The **Display** keys are used to display selected moni-tored parameters as follows: (Refer to Fig. 1.)

• Press and release the appropriate **Display** key – the message will be displayed for 2 seconds.

— or —

• Press and hold the appropriate **Display** key – the mes-sage will be displayed and updated every 0.5 seconds until the **Display** key is released.

— or —

• Press and release appropriate **Display** key, then press and release the **DISPLAY HOLD** key – the message will be displayed and updated every 2 seconds until the **DISPLAY HOLD** key is again pressed and released, or 10 minutes have elapsed, whichever comes first.

NOTE: If the display actually displays X's, then the moni-tored parameter is out of normal operating range (Ref. Fig. 2.). If the "English/Metric" jumper is in-stalled on the Micro Board, all temperatures are displayed in degrees Fahrenheit (°F) and all pres-sures are displayed in pounds per sq. inch gauge (PSIG). If the "English/Metric" jumper is not in-stalled, all temperatures are displayed in degrees Centigrade (°C) and all pressures are displayed in Kilo-Pascals (KPa).

Chillers equipped with EPROM version S.01F(T).14 and later can be equipped with a Chinese language display, either as a field retrofit or factory supplied option on new units. The display mounts on the control center door di-rectly above the standard display. Both the standard dis-play and Chinese language display will be present, pro-viding display messages simultaneously in both English and Chinese language. Micro board program jumper JP1 must be removed to enable this feature.

			DISPLAY READS
EVAPORATOR PRESSURE	=	< 49.4 PSIG; >128.7 PSIG	XXX.X PSIG
CONDENSER PRESSURE	=	< 59 PSIG; > 315 PSIG	XXX.X PSIG
OIL PRESSURE	=	< 59 PSIG; > 315 PSIG	XXX.X PSIG
OIL FILTER PRESSURE	=	< 59 PSIG > 315 PSIG	59.0 PSIG 315.0 PSIG
DISCHARGE TEMP.	=	< 20.3°F; > 226.4°F	XXX.X°F
OIL TEMP.	=	< 20.3°F; > 226.4°F	XXX.X°F
LEAVING EVAPORATOR WATER TEMPERATURE	=	< 0°F; > 81.1°F	XXX.X°F
ENTERING CONDENSER WATER TEMPERATURE	=	< .1°F; > 93°F	XXX.X°F
LEAVING CONDENSER WATER TEMPERATURE	=	< 8.4°F; > 114.4°F	XX.X°F
ENTERING CONDENSER WATER TEMPERTURE	=	< 8.4°F; > 114.4°F	XXX.X°F

NOTE: IF **BOTH** ENTERING AND LEAVING CONDENSER WATER DIS-PLAYS ARE OUT-OF-RANGE OR THE ENTERING **AND** LEAVING CON-DENSER WATER THERMISTORS ARE NOT CONNECTED, THE ENTIRE DISPLAY WILL BLANK WHEN THE **CONDENSER LIQUID TEMPS** KEYPAD KEY IS PRESSED.

FIG. 2 – SYSTEM PARAMETERS – OUT OF RANGE READINGS

To Display **CHILLED LIQUID TEMPERATURES:**

Press **CHILLED LIQUID TEMPS** display key as described on page 7 to produce the following alphanumeric display message:

`CHILLED LEAVING = XX.X°F,  RETURN = XX.X°F`

To Display **REFRIGERANT PRESSURE:**

Use **REFRIGERANT PRESSURE** display key as described on page 7 to produce the following alphanumeric display message:

`EVAP = XX.X PSIG,  COND = XXX.X PSIG`

To Display **OIL/FILTER PRESSURE:**

Use **OIL/FILTER PRESSURE** display key as described on page 7 to produce the following alphanumeric display message:

`DIFF OIL = XXX.X PSID;  DIFF FLTR = XX.X PSID`

`DIFF OIL = XXX.X PSID` is the pressure difference between the oil pressure (as sensed at the input to the compressor) and the evaporator pressure. Displayed value includes transducer offset factor.

The differential oil pressure is calculated by the software as follows:

DIFF OIL PRESS = (Oil Press – Evap Press) –
                              Offset Pressure
WHERE:

OIL PRESS = Oil Pressure at Input to Compressor

EVAP PRESS = Evaporator Pressure

OFFSET PRESS = Pressure differential between the oil pressure and evaporator transducer outputs during the first 15 seconds of START SEQUENCE INITIATED. This is the transducer AUTO-ZEROING. During this time the transducers will be sensing the same pressure and their outputs should be equal. However, due to accuracy tolerances in transducer design, differences can exist. Therefore, to compensate for differences between transducers and assure differential pressure sensing accuracy, the **OFFSET PRESS** is subtracted algebraically from the differential pressure. (Certain operating conditions could require the AUTO-ZEROING to be disabled. On units equipped with EPROM version S.01F(T).08 and later, AUTO-ZEROING between the oil pressure transducer and the evaporator transducer can be disabled. This must be never be done by anyone other than a qualified service technician).

`DIFF FILTER = XXX.X PSID` is the pressure differential between the input to the oil filter and the input to the compressor. Displayed value includes transducer offset factor.

Filter Differential Pressure is calculated by the software as follows:

FILTER DIFF = (Filter Press – Oil Press) – Offset Press.

WHERE:

FILTER PRESS = Oil Pressure at input to Oil Filter

OIL PRESS = Oil Pressure at input to Compressor

OFFSET PRESS = Pressure differential between the filter oil pressure transducer and oil pressure transducer outputs during the first 15 seconds of "Start Sequence Initiated". This is the transducer AUTO-ZEROING. During this time the transducers will be sensing the same pressure and their outputs should be equal. However, due to accuracy tolerances in transducer design, differences can exist. Therefore, to compensate for differences between transducers and assure differential pressure sensing accuracy, the **OFFSET PRESS** is subtracted algebraically from the differential pressure. (Certain operating conditions could require the AUTO-ZEROING to be disabled. On units equipped with EPROM version S.01F(T).15 or later, both the oil/evaporator transducer and oil/filter transducer AUTO-ZEROING can be disabled. This must never be done by anyone other than a qualified service technician).

To Display **OPTIONS**:

Future Use

To Display **SSS MOTOR CURRENT/VOLTS**:
(Solid State Starter Applications Only)

If chiller is equipped with a YORK Solid State Starter, use **SSS MOTOR CURRENT/VOLTS** key to display 3-phase compressor motor current and 3-phase solid state starter input line voltage.

Continuously pressing this key will display the motor current and line voltage alternately. When used with the **DISPLAY HOLD** key, motor current and line voltage will alternately be displayed each time this key is pressed.

The messages are as follows:

`A AMPS = XXXX; B AMPS = XXXX; C AMPS = XXXX`

`V A-B = XXXX; V B-C = XXXX; V C-A = XXXX`

If chiller is not equipped with a Solid State Starter, this key produces the following message:

SOLID STATE STARTER NOT INSTALLED

In **PROGRAM** mode, this key is used to display the applicable line voltage range (200-208 VAC, 220- 240 VAC, 380 VAC, 400 VAC, 415 VAC, 440-480 VAC, 500-600 VAC, Supply Voltage Range Disabled). The correct line voltage range is programmed at the YORK factory and is checked by the service technician at start-up. For security reasons, a special access code is required to program the line voltage range. The line voltage range is used to determine a low line voltage threshold for cycling shutdown. Refer to "System Setpoints" section for Trip/Reset values.

To Display **CONDENSER LIQUID TEMPERATURES (Field Installed Option Package):**

Use **CONDENSER LIQUID TEMPS** display key as described above to produce the following alphanumeric display message:

COND LEAVING = XXXX.X°F, RETURN = XXX.X°F

NOTE: If the condenser liquid thermistors are not connected, or both thermistors are "out-of-range" the display will blank when this key is pressed.

To Initiate a **PRINT** to Printer:
Press the **PRINT** key to initiate a printout to an optional printer. When the key is pressed
PRINT ENABLE
is displayed. Refer to "MicroComputer Control Center - System Status Printers" instruction, Form 160.47-NO1.2 for details of the optional printers.

To Display **% MOTOR AMPS AND SLIDE VALVE POSITION**:

Use the **% MOTOR AMPS / % SLIDE VALVE** display key as described above to produce the following message:

MOTOR CURRENT = ___ ___ % FLA; SLIDE VALVE = % ___ ___

The **MOTOR CURRENT** is displayed as a percent of Full Load Amps.

NOTE: • Liquid-Cooled Solid State Starter Applications - the % Motor Current displayed is the highest of three line currents divided by the programmed chiller FLA value x l00%.

• Electro-Mechanical Starter Applications - the % Motor Current displayed is the highest of the three line currents.

The SLIDE VALVE value displayed represents the position of the slide valve relative to fully closed or fully open; 0% = fully closed, 50% = half open, l00% = fully open, etc.

To Display **OPERATING HOURS & COMPRESSOR STARTS**:

Use the **OPERATING HRS./START COUNTER** key as described above to produce the following message:

ACCUMULATED RUN TIME = XXXX HOURS; START COUNTER = XXXX

The accumulated run time represents the total number of hours the compressor has operated. The start counter value represents the total number of times the compressor has been started. Both values automatically reset @ 65535.

NOTE: Both values can be manually reset to zero. Refer to "Programming The MicroComputer Control Center" page 14. However, they should never be arbitrarily reset.

SYSTEM SETPOINTS

The system setpoints may be programmed by the system operator. The **Setpoints** keys are located on the Control Center keypad (See Fig. 1.). To program, see "Programming System Setpoints" page 14. The following is a description of these setpoints (with the English/Metric jumper installed on the Micro Board):

CHILLED LIQUID TEMP – This key displays the **LEAVING CHILLED LIQUID TEMPERATURE** setpoint that is in effect for WATER, BRINE or BRINE/ICE storage operation. Under program control, the slide valve will be modulated in water cooling or brine cooling mode to achieve this chilled liquid temperature leaving the evaporator. In brine/ice storage mode, unload pulses are inhibited, allowing the chiller to make ice at a faster rate as explained in the "Operation" section. The water cooling setpoint range is 38° to 70°F. The **BRINE** setpoint range is 20° to 70°F; 20° to 45° F (EPROM version S.01F(T).13; 10° to 45°F EPROM version S.01F(T).12 and earlier). If not programmed, default value is 45° F. When **ICE STORAGE** mode is selected, it is automatically enabled and disabled by the setpoint that is entered: 20° to 32°F enables ice storage mode, > 32° to 70°F disables **ICE STORAGE** mode. This allows the chiller to be switched

in and out of **ICE STORAGE** mode (after it has been selected) by local or remote change of the **LEAVING CHILLED LIQUID TEMP** Setpoint.

Also displayed is the **RESTART** setpoint. This is the leaving chilled liquid temperature at which the chiller will automatically restart after it has shut down on "DAY-TIME-LOW WATER TEMP-AUTOSTART". It is expressed as an offset above the **LEAVING CHILLED LIQUID TEMP** setpoint. The actual temperature at which the chiller will restart is the sum of the **LEAVING CHILLED LIQUID TEMP** setpoint and the **RESTART** setpoint. For example, if the **LEAVING CHILLED LIQUID** setpoint is programmed for 45°F and the **RESTART** setpoint is programmed for 5°F, the chiller will automatically restart when the leaving chilled liquid temperature increases to 50°F. When operating in **ICE STORAGE** mode, there are two **RESTART** setpoints that can be programmed; one used when **ICE STORAGE** mode is enabled and one for when **ICE STORAGE** mode is disabled. The **RESTART** setpoint can be programmed from 0° to +10°F (0° to +15°F for EPROM version S.01F(T).13). If not programmed, the default value is +0°F.

Chillers equipped with EPROM version S.01F(T).12 and earlier do not have a programmable **RESTART** threshold or **ICE STORAGE** mode of operation. These chillers automatically restart when the **LEAVING CHILLED LIQUID TEMPERATURE** increases to the setpoint.

NOTE: If an ENERGY MANAGEMENT SYSTEM is connected to the Control Center to reset the **LEAVING CHILLED LIQUID TEMP** setpoint using the PULSE WIDTH MODULATION (PWM) technique or the optional Remote Reset Boards (4-20mA, 0-10VDC or contact closure), then the chilled liquid temp setpoint programmed by the operator is the base or lowest setpoint available to the Energy Management System (EMS). The EMS can only reset this setpoint to a higher value allowed by the programmed **REMOTE RESET TEMP RANGE** setpoint; the Control Center will not accept a lower value.

% **CURRENT LIMIT –** This key displays the maximum value of motor current permitted by its programmed setting. The value is in terms of percent of Full Load Amps (FLA) over range of 40 - 100%. If not programmed, the default value is 100% (See "Programming System Setpoints", page 16).

If chiller is equipped with a YORK Solid State Starter, the system FLA is also displayed. This value is programmed by the factory and should never be changed. The Micro Board uses this value to calculate and display the % motor current parameter that is displayed when the **% MOTOR CURRENT** display key is pressed. Also, proper

current limit control depends on the correctly programmed FLA value. For security reasons, a special access code is required to program the FLA value. It should only be changed by a service technician.

PULL DOWN DEMAND – This function is used to provide energy savings following the chiller start-up. This key displays a programmable motor current limit (40 - 100%) and a programmable period of time (1 - 255 minutes). Operation is as follows: Whenever the system starts, the Pull Down Demand Limit is maintained for the programmed time, then the current limit control returns to **% CURRENT LIMIT** setpoint. The maximum permitted motor current is in terms of % FLA. The duration of time that the current is limited is in terms of minutes (to a maximum of 255). If not programmed, the default value is 100% FLA for 00 minutes (See "Programming Systems Setpoints" page 17). Thus, no pull down demand limit is imposed following system start, and the **% CURRENT LIMIT** setpoint is used.

CLOCK – This key displays the day of the week, time of day and calendar date. If not programmed, the default value is `SUNDAY 12:00 AM 1/1/90`.
(See "Programming System Setpoints", page 17.)

DAILY SCHEDULE – This key displays the programmed daily start and stop times, from Sunday thru Saturday plus Holiday. If desired, the Control Center can be programmed to automatically start and stop the chiller as desired. This schedule will repeat on a 7-day calendar basis. If the Daily Schedule is not programmed, the default value is 00:00 AM start and stop times for all days of the week and the holiday. (Note that the system will not automatically start and stop on a daily basis with these default values because 00:00 is an "Impossible" time for the Micro Board, See "Programming System Setpoints", page 14). Finally, one or more days in the week can be designated as a holiday (See description under **HOLIDAY** setpoint) and the Control Center can be programmed (using **DAILY SCHEDULE** setpoint) to automatically start and stop the chiller on those days so designated. The operator can override the time clock at any time using the **COMPRESSOR** switch.

Note that if only a start time is entered for a particular day, the compressor will not automatically stop until a scheduled stop time is encountered on a subsequent day.

HOLIDAY – This key indicates which days in the upcoming week are holidays. On those designated days, the chiller will automatically start and stop via the holiday start and stop times programmed in the **DAILY SCHEDULE** setpoint. It will do this one time only and the following week will revert to the normal daily schedule for that day.

REMOTE/RESET TEMP RANGE – This key displays the maximum offset of remote LCWT setpoint reset. This offset is 10°, 20°, 30° or 40°F (5.6°, 11.1°, 16.6° or 22.2°C) as programmed. Offset is 10° or 20°F on chillers equipped with EPROM version S.01F(T).13 and earlier.

When in the **REMOTE** mode, this value is added to the operator programmed chilled liquid temp setpoint and the sum equals the temperature range in which the LCWT can be reset. For example, if the operator programmed chilled liquid temp setpoint is programmed with a value of 10°F, then the chilled liquid temp setpoint can be remotely reset over a range of 46°F to 56°F (46 + 10 = 56). If not programmed, the default value for this parameter is 20°F.

For additional information on remote LCWT reset, refer to Form 160.47-PA4.1.

NOTE: If an Energy Management System is interfaced to the Control Center for the purpose of remote LCWT setpoint reset, then the operator programmed **REMOTE RESET TEMP RANGE** value determines the maximum value of temperature reset controlled by the Energy Management System.

DATA LOGGER – This key is used when an optional printer is connected to the MicroComputer Control Center. Refer to Form 160.47-NO1.2 for operation instructions.

SSS MOTOR CURRENT/VOLTS – This key is used on Solid State Starter applications only. Although this is a **DISPLAY KEY**, it is also used to program the applicable AC power line voltage range (200-208 VAC, 220-240 VAC, 380 VAC, 400 VAC, 415 VAC, 440-480 VAC, 550- 600 VAC). The MicroComputer Control Center uses this entry to determine the AC powerline undervoltage and overvoltage shutdown thresholds. For each line voltage range there is a undervoltage and overvoltage threshold. If the line voltage is less than the undervoltage threshold for 20 continuous seconds, the chiller shuts down and MONDAY 10:00 AM LOW LINE VOLTAGE is displayed. If the line voltage exceeds the overvoltage threshold for 20 continuous seconds, the chiller shuts down and MONDAY 10:00 AM HIGH LINE VOLTAGE is displayed. The over and under voltage protection can be disabled. Refer to explanation of shutdown messages later in this instruction.

The selectable supply voltage ranges and their shutdown thresholds are as follows:

LOW/HIGH LINE VOLTAGE TRIP/RESET VALUES				
COMPRESSOR MOTOR SUPPLY VOLTAGE RANGE - (V)	LOW LINE VOLTAGE OPERATING POINT		HIGH LINE VOLTAGE OPERATING POINT	
	CUTOUT-(V) (ON FALL)	CUTIN-(V) (ON RISE)	CUTOUT-(V) (ON RISE)	CUTIN-(V) (ON FALL)
200-208	160	174	227	220
220-240	185	200	262	254
380	305	331	415	402
400	320	349	436	423
415	335	362	454	440
440-480	370	400	524	508
550-600	460	502	655	635
SUPPLY VOLTAGE RANGE DISABLED	NONE	0	NONE	0

For security reasons, a special access code is required to program the supply voltage range. The supply voltage range is programmed at the factory and should only be changed by a service technician.

DISPLAYING SYSTEM SETPOINTS

The currently programmed **Setpoint** values can be viewed at any time (see page 24) in **SERVICE, LOCAL** or **REMOTE** operating mode as follows:

• Press and release the appropriate **Setpoint** key – the message will be displayed for 2 seconds.

— or —

• Press and hold the appropriate **Setpoint** key – the message will be displayed as long as the key is pressed.

— or —

• Press and release the appropriate **Setpoint** key, then press and release the **DISPLAY HOLD** key. The message will be displayed until the **DISPLAY HOLD** key is again pressed and released, or 10 minutes have elapsed, whichever comes first.

To Display **CHILLED LIQUID TEMP** Setpoint: (EPROM version S.01F(T) .12 and earlier)

Use the **CHILLED LIQUID TEMP** key as described above to display the following:

LEAVING STPOINT = XX . X°F

To Display **CHILLED LIQUID TEMP** and **RESTART** Setpoints: (EPROM version S.01F(T).13 and later)

Use the Chilled Liquid Temp key as described above. One of the following messages will be displayed:

If **ICE STORAGE** mode is not enabled, the following will be displayed:

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

If **ICE STORAGE** mode is enabled, the following is displayed:

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

NOTES:
1. In order for **ICE STORAGE** mode to be enabled, all of the following conditions must be met:
    a. **BRINE** mode must be selected by removal of micro board program jumper JP3.
    b. **ICE STORAGE** mode must be selected using procedure in "Programming the Microcomputer Control Center" section.
    c. **LEAVING CHILLED LIQUID** setpoint must be programmed to a value between 20° and 32°F.

2. Chillers equipped with EPROM version S.01F(T).12 and earlier do not have a programmable **RESTART** threshold or **ICE STORAGE** mode capability.

3. The Leaving Chilled Liquid Temp setpoint value displayed in **LOCAL** or **PROGRAM** mode is the value programmed at the keypad by the operator. In **REMOTE** mode, the value displayed is that which has been set by the Energy Management System (if one is connected; if no EMS connected, the value displayed is that which has been programmed by the operator).

———————————

To Display **% CURRENT LIMIT** Setpoint:

Use **% CURRENT LIMIT** setpoint key as described above to produce the following message:

`CURRENT LIMIT = XXX% FLA`

NOTE: The value displayed is the actual % current limit setpoint. For example: the value displayed in the **LOCAL** or **PROGRAM** mode is that which is operator programmed. The value displayed in the **REMOTE** mode is that which has been programmed by the Energy Management System via the remote current limit setpoint input.

If chiller is equipped with a YORK Solid State Starter, the message is:

`CURRENT LIMIT = XXX % FLA; *MTR CUR = 000 FLA`

NOTE: On Solid State Starter applications, this value is programmed at the YORK factory. A special access code is required.

———————————

To Display **PULL DOWN DEMAND** Setpoint:

Use **PULL DOWN DEMAND** setpoint key as described on page 10 to produce the following message:

`SETPOINT = XX MIN @ XX% FLA XX MIN LEFT`

———————————

To Display **CLOCK** Setpoint (Time of Day):

Use **CLOCK** setpoint key as described previously to produce the following message:

`TODAY IS DAY XX:XX AM/PM 1/1/90`

———————————

To Display **DAILY SCHEDULE** Setpoints:

• Press and hold the **DAILY SCHEDULE** setpoint key.

The chiller start and stop times for each day of the week are sequentially displayed, beginning with Sunday and ending with Holiday. The display will continuously scroll until the **DAILY SCHEDULE** key is released.

— or —

• Press and release the **DAILY SCHEDULE** setpoint key. Then press and release the **DISPLAY HOLD** key. The chiller start and stop times for each day of the week are sequentially displayed beginning with Sunday and ending with Holiday. The display will continuously scroll until the **DISPLAY HOLD** key is again pressed and released, or 10 minutes have elapsed, whichever comes first.

———————————

The display message for **DAILY SCHEDULE** will scroll in the following sequence:

`SUN START = 08:30 AM     STOP = 06:00 PM`

`MON START = 05:00 AM     STOP = 07:00 PM`

`TUE START = 05:00 AM     STOP = 07:00 PM`

```
WED START = 05:00 AM    STOP = 07:00 PM
```

```
THU START = 05:00 AM    STOP = 07:00 PM
```

```
FRI START = 05:00 AM    STOP = 07:00 PM
```

```
SAT START = 05:00 AM    STOP = 07:00 PM
```

```
HOL START = 00:00 AM    STOP = 00:00 PM
```

To Display **HOLIDAY** Setpoints:

Use **HOLIDAY** setpoint key as described in the beginning of this section to produce the following message:

```
S__M__T__W__T__F__S__  HOLIDAY NOTED BY *
```

NOTE: On the days that are designated by an *, the chiller will automatically start and stop per the holiday SCHEDULE established in **DAILY SCHEDULE** setpoints.

To Display **REMOTE RESET TEMP RANGE** Setpoint:

Use **REMOTE RESET TEMP RANGE** setpoint key as described above to produce the following message:

```
REMOTE RESET TEMP RANGE = XX°F
```

To Display **DATA LOGGER** setpoints:

Refer to YORK Form 160.47-NO1.2 for operation of this key.

To Display **UNDERVOLTAGE** setpoints:
(Solid State Starter Applications Only)

Press **SSS MOTOR CURRENT/VOLTS** key in **PROGRAM** mode to display the selected voltage range. One of the following messages will be displayed:

```
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
```

A special access code is required to program the Supply Voltage Range. The Supply Voltage Range is programmed at the factory and checked at system start-up. (Note to service technician: Refer to programming instructions in Service Instruction 160.47-M2).

PROGRAMMING
THE MICROCOMPUTER
CONTROL CENTER

PROGRAMMING SYSTEM SETPOINTS

The system setpoints can be entered at any time.....even when the system is running. Proceed as follows to enter system setpoints. (Refer to Fig. 3)

1. Press **ACCESS CODE** key.

2. **ENTER VALID ACCESS CODE ___ ___ ___ ___**
   is displayed

3. Using **Entry** keys, enter **9 6 7 5**.

4. As each digit is entered, the characters **Y O R K** are displayed.

   NOTE: If digits other than **9 6 7 5** are entered,
   Y O R K is still displayed.

NOTE: For ease in remembering the code, note that the letters **Y O R K** correspond to the digits **9 6 7 5** on a telephone dial.
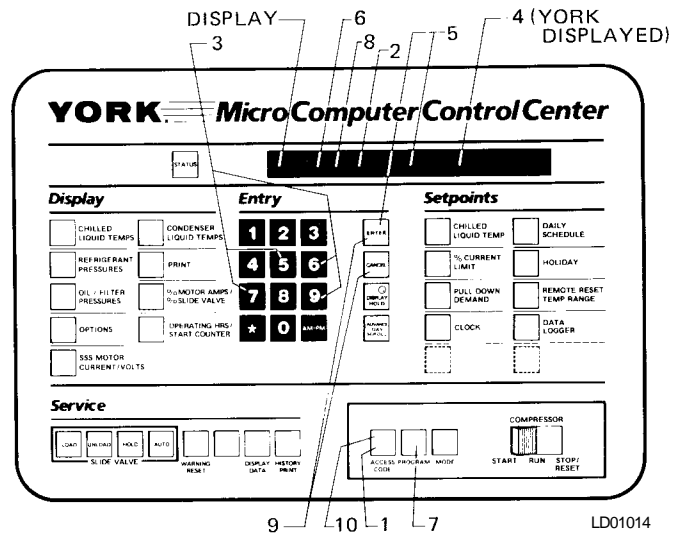
5. Press **ENTER** key.

NOTE: If digits other **9 6 7 5** 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 (9675) 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. I to gain access.

7. Press **PROGRAM** key.

8. **PROGRAM MODE, SELECT SETPOINT** is displayed.

FIG. 3 – KEYPAD – PROGRAMMING SYSTEM SETPOINTS

9. Enter setpoints as detailed below. If you make a mistake when entering a value, press **CANCEL** key and then **ENTER** key. The display will revert to the default values and the cursor will return to the first changeable digit. You can then proceed to enter the correct values. If the entered value exceeds acceptable limits, **OUT OF RANGE - TRY AGAIN!** Message will be displayed for 2 seconds, then the **PROGRAM MODE, SELECT SETPOINT** message will reappear.

10. When all the desired setpoints have been entered, 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 **CHILLED LIQUID TEMP** Setpoints:
(Refer to Fig. 4.)

CHILLERS EQUIPPED WITH EPROM VERSION S.01F(T).13 AND LATER ONLY:

The following procedure is used to enter the **CHILLED LIQUID TEMP** setpoint, **RESTART** setpoints and select **ICE STORAGE** mode. To enter all of these setpoints, start at step no. 1 and perform the entire procedure. Otherwise, press the **CHILLED LIQUID TEMP** key and use the **ADVANCE DAY/SCROLL** key to display the desired setpoint prompt message. Each time the **ADVANCE DAY/ SCROLL** key is pressed, the next prompt message is displayed. (Refer to Fig. 4)

1. Press and release **CHILLED LIQUID TEMP** setpoint key. The following prompt message is displayed. This is the leaving chilled liquid temperature setpoint for **WATER, BRINE** or **ICE STORAGE** cooling mode. (Micro Board Program Jumper JP3 must be removed for **BRINE** or **ICE STORAGE** mode)

   ```
   LEAVING SETPOINT = XX.X°F (BASE)
   ```

   BASE refers to the base or lowest setpoint available to a Building Automation System that is using the PULSE WIDTH MODULATION (PWM) technique or the optional Remote Reset Boards (4-20mA, 0-10VDC or contact closure) to reset this setpoint over the range allowed by the **REMOTE RESET TEMP RANGE** setpoint.

2. Using **ENTRY** keys, enter desired value per the application as follows (if **CANCEL** key is pressed, default value **45°F** is displayed):
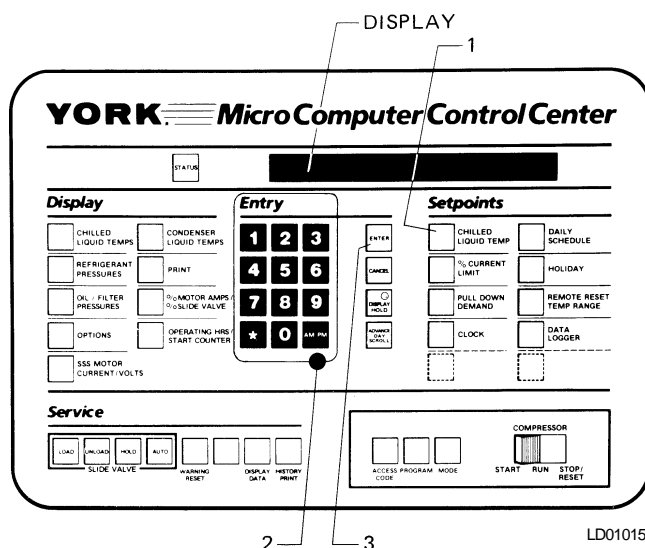
   Water cooling application - 38° to 70°F.
   Brine cooling application -
   　　　10° to 45°F (EPROM version S.01F(T).12 and earlier)
   　　　20° to 45°F (EPROM version S.01F(T).13)
   　　　20° to 70°F (EPROM version S.01F(T).14 and later)
   Ice storage application - 20° to 32°F

3. Press **ENTER** key.

FIG. 4 – KEYPAD – PROGRAMMING "LEAVING CHILLED WATER TEMP" SETPOINT

4. Press **ADVANCE DAY/SCROLL** key.

   ```
   LWT RESTART OFFSET = XX°F
   ```
   is displayed. This is the offset value that will be used in **WATER** or **BRINE** cooling mode or when **ICE STORAGE** mode is disabled. **ICE STORAGE** mode is "disabled" when not selected in the procedure below or when selected but with a LEAVING SETPOINT of > 32°F.

5. Using **Entry** keys, enter desired value as follows: (use leading zeroes where necessary; i.e., 05) (if **CANCEL** key is pressed, default value **0** is displayed)

   0° to 15°F (EPROM version S.01F(T).13)
   0° to 10°F (EPROM version S.01F(T).14 and later)

6. Press **ENTER** key. If Micro Board Program Jumper JP3 is installed (water cooling application), this completes the setpoint entry process. Press **PROGRAM** key to exit **PROGRAM** mode or press another **SETPOINTS** key to enter other setpoints. If JP3 is removed (Brine cooling application), proceed to next step.

7. Press **ADVANCE DAY/SCROLL** key.

   ```
   SELECT ICE STORAGE MODE? 0 (YES=1;NO=0)
   ```

8. Using **Entry** keys, press "1" to select **ICE STORAGE** mode. Otherwise, press "0". Once selected, **ICE STORAGE** mode will be enabled whenever the setpoint is between 20° and 32°F; disabled when setpoint is greater than 32°F.

9. Press **ENTER** key.

10. Press **ADVANCE DAY/SCROLL** key.

   ICE STORAGE LWT RESTART OFFSET = XX°F is displayed. This is the offset value that will be used when ice storage mode is enabled.

11. Using **Entry** keys, enter desired value as follows: (use leading zeroes where necessary; i.e., 05) (if **CANCEL** key is pressed, default value **0** is displayed)

   0° to 15°F (EPROM version S.01F(T).13)
   0° to 10°F (EPROM version S.01F(T).14 and later)
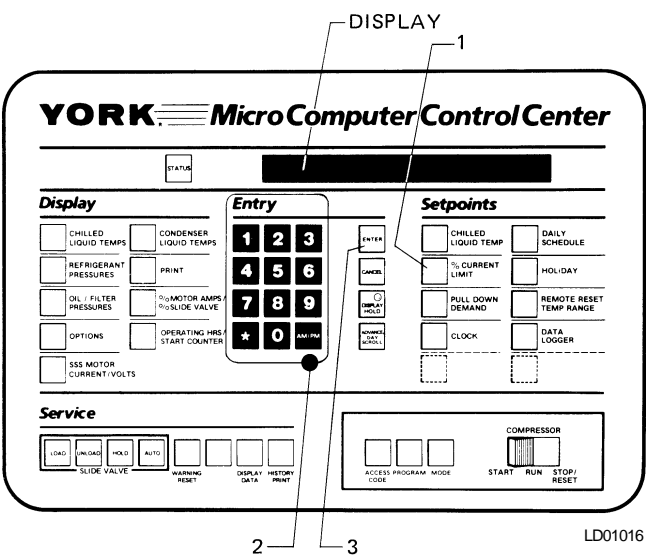
12. Press **ENTER** key.

13. Press **PROGRAM** key to exit **PROGRAM** mode or press another **SETPOINTS** key to enter other setpoints.

To Enter **% CURRENT LIMIT** Setpoint:
(Electro-Mechanical Starter – Refer to Fig. 5)

1. Press and release **% CURRENT LIMIT** setpoint key. The following program prompt message is displayed:

   CURRENT LIMIT = XXX% FLA

2. Use **ENTRY** keys to enter desired value.

FIG. 5 – KEYPAD – PROGRAMMING "% CURRENT LIMIT" SETPOINT

CHILLERS EQUIPPED WITH EPROM VERSION S.01F(T).12 AND EARLIER ONLY:

The following procedure is used to enter the **CHILLED LIQUID TEMP** setpoint:

1. Press and release **CHILLED LIQUID TEMP** setpoint key. The following prompt message is displayed:

   LEAVING SETPOINT = XX . X°F

   (BASE refers to the base or lowest setpoint available to a Building Automation System that is using the PULSE WIDTH MODULATION (PWM) technique or the optional Remote Reset Boards (4-mA, 0-10VDC or contact closure) to reset this setpoint over the range allowed by the **REMOTE RESET TEMP RANGE** setpoint.

2. Use **ENTRY** keys to enter the desired value.

3. Press and release **ENTER** key

   PROGRAM MODE, SELECT SETPOINT is displayed.

3. Press and release **ENTER** key.

   PROGRAM MODE, SELECT SETPOINT
   message is displayed.

(Solid State Starter – Refer to Fig. 5)

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 desired current limit value.

NOTE: Motor Current FLA value is entered by YORK factory and checked at system startup. It cannot be changed without special access code. (Note to service technician: refer to "Programming Instructions" in Service Instruction Form 160.47-M2.)

On chillers equipped with EPROM version S.01F(T).11 and later, the **MINIMUM ALLOWABLE %FLA** setpoint, programmed by a qualified service technician, determines the lowest allowable motor current permitted after the chiller has been running for 3 minutes. The chiller will not be allowed to unload below this motor current value. If the programmed value is greater than the programmed CURRENT LIMIT value, **MINIMUM ALLOWABLE %FLA** setpoint shall have priority.

3. Press and release **ENTER** key.

   PROGRAM MODE, SELECT SETPOINT is displayed.

To Enter **PULL DOWN DEMAND** Setpoint:
(Refer to Fig. 6)

1. Press and release **PULL DOWN DEMAND** setpoint key. The following program prompt message is displayed:

   **SETPOINT = XXX MIN @ XXX% FLA, XX MIN LEFT**

2. Use **Entry** keys to enter desired values. For explanation, see **PULL DOWN DEMAND**, page 10. Note that 'XX MIN LEFT' is not an operator entered value.

3. Press and release **ENTER** key.
   PROGRAM MODE, SELECT SETPOINT
   message is displayed.

   On chillers equipped with EPROM version S.01F(T).11 and later, the **MINIMUM ALLOWABLE %FLA** setpoint, programmed by a qualified service technician, determines the lowest allowable motor current permitted after the chiller has been running for 3 minutes. The chiller will not be allowed to unload below this motor

current value. If the programmed value is greater than the programmed PULLDOWN DEMAND LIMIT value, **MINIMUM ALLOWABLE %FLA** setpoint shall have priority.
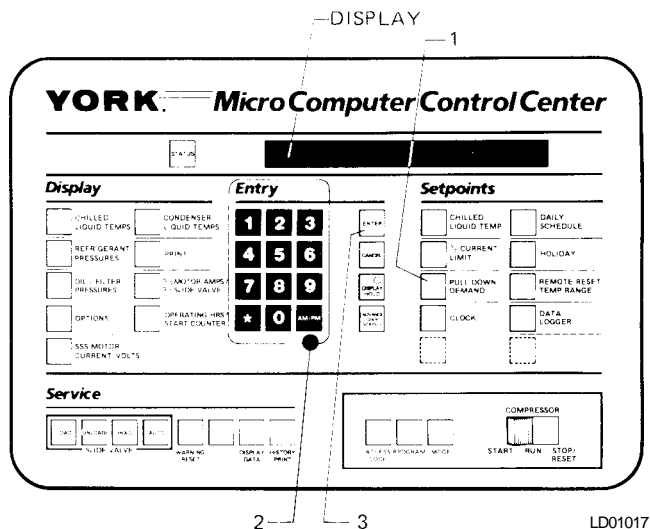
FIG. 6 – KEYPAD – PROGRAMMING "PULLDOWN DEMAND" SETPOINT

To Enter **CLOCK** Setpoint:
(Refer to Fig. 7)

1. Assure Micro Board Program jumper J57 is in "CLKON" position.

2. Press and release **CLOCK** setpoint key. The following program prompt message is displayed:

   TODAY IS MON 10:30 PM   1/1/90

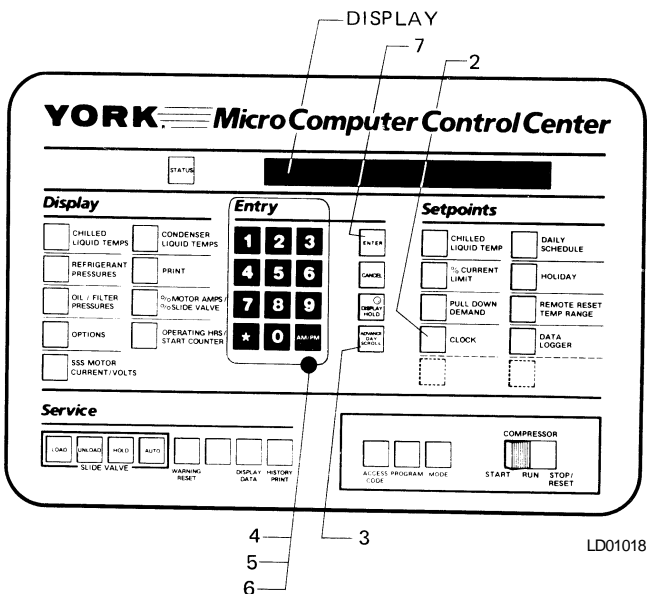3. Press **ADVANCE DAY SCROLL** key until the proper day of week appears on the display.

4. Use **Entry** keys to enter proper time of day.

5. Press **AM/PM** key to change the AM to PM or vice versa.

6. Use **ENTRY** keys to enter proper calendar date. (MONTH/DAY/YR) If month and day are single digit entries, precede the entry with "0". For example 02/04/90.

7. Press and release **ENTER** key.
   PROGRAM MODE, SELECT SETPOINT
   message is displayed

FIG. 7 – KEYPAD – PROGRAMMING "CLOCK" SETPOINT

To Enter **DAILY SCHEDULE** Setpoint (Refer to Fig. 8.)

1. Press and release **DAILY SCHEDULE** setpoint key. The following program prompt message is displayed:

   `DAY START XX:XX AM/PM   STOP  XX:XX AM/PM`

2. Press **ADVANCE DAY SCROLL** key until the day you wish to program appears on the display.

3. Use **Entry** keys to enter desired start time.
   If you wish to cancel the scheduled start and stop times for a particular day, press **CANCEL** key and then **ENTER** key.

4. Press **AM/PM** key to change the AM to PM or vice versa. If the desired entry is already displayed, proceed to enter the stop time. The cursor will automatically move to the stop time.

5. Use **Entry** keys to enter desired stop time.

6. Press **AM/PM** key to change the AM to PM or vice versa.

7. Press and release **ENTER** key.

   `PROGRAM MODE, SELECT SETPOINT`

   message is displayed.

   — or —

   Press **ADVANCE DAY SCROLL** key. The display will advance to the next consecutive day and the previous day will be automatically entered.

On chillers equipped with EPROM version S.01F(T).05 and later, provision has been made to expedite programming the Daily Start / Stop Schedule. After entering the desired start and stop times for Monday, this schedule can be repeated for Tuesday thru Friday by pressing only one keypad key as follows:

1. Press the **DAILY SCHEDULE** setpoint key.

2. Enter the desired Sunday schedule. Don't press the **ENTER** key.

3. Press **ADVANCE DAY / SCROLL** key.
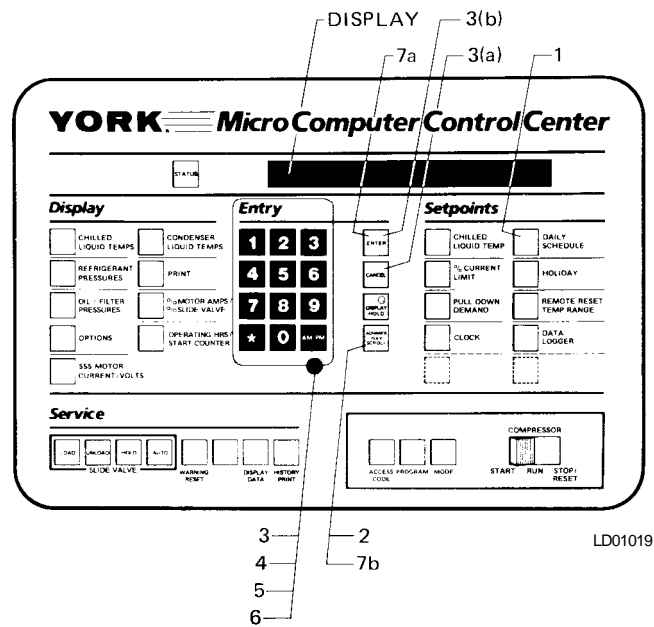
FIG. 8 – KEYPAD – PROGRAMMING "DAILY SCHEDULE" SETPOINT

4. Enter the desired Monday schedule. Don't press the **ENTER** key.

5. Press **ADVANCE DAY / SCROLL** key.

6. `REPEAT MON. SCHEDULE MON-FRI ? YES = 1; NO = 0`
   is displayed. If you want the same Start and Stop times for MON thru FRI., press the **1** key. If you want different Start and Stop times for MON thru FRI press the **2** key.

7. If you pressed the **1** key in the previous step, press **ADVANCE DAY / SCROLL** key to advance to SAT. Enter the desired Saturday schedule.

   Press **ADVANCE DAY / SCROLL** Key to advance to HOL. Enter the DESIRED HOLIDAY SCHEDULE and press **ENTER** key. The entire Start/Stop schedule for the week will be entered.

8. If you pressed the **0** key in step No. 6, enter the desired start/stop times for the remainder of the week. Use the **ADVANCE DAY / SCROLL** key to advance days. Upon completion, press the **ENTER** key. The entire week's schedule will be entered.

To Enter **HOLIDAY** Setpoint: (Refer to Fig. 9.)

1. Press and release **HOLIDAY** setpoint key. The following program prompt message is displayed:

   S__M__T__W__T__F__S__ HOLIDAY NOTED BY *

2. Press and release **ADVANCE DAY SCROLL** key to move cursor to the day that you wish to designate as a holiday.

3. Press and release * entry key. An * will appear next to the selected day.

4. After you have placed an * next to each of the days that you wish to designate a holiday, press **ENTER** key. PROGRAM MODE, SELECT SETPOINT message is displayed.

   To cancel all of the designated holidays: perform Step 1, press **CANCEL** key, and then press **ENTER** key.

   PROGRAM MODE, SELECT SETPOINT
   message is displayed.

   To cancel one of the designated holidays, perform Step 1, press **ADVANCE DAY SCROLL** key until the cursor appears to the right of the desired day. Press the * key, then press the **ENTER** key.
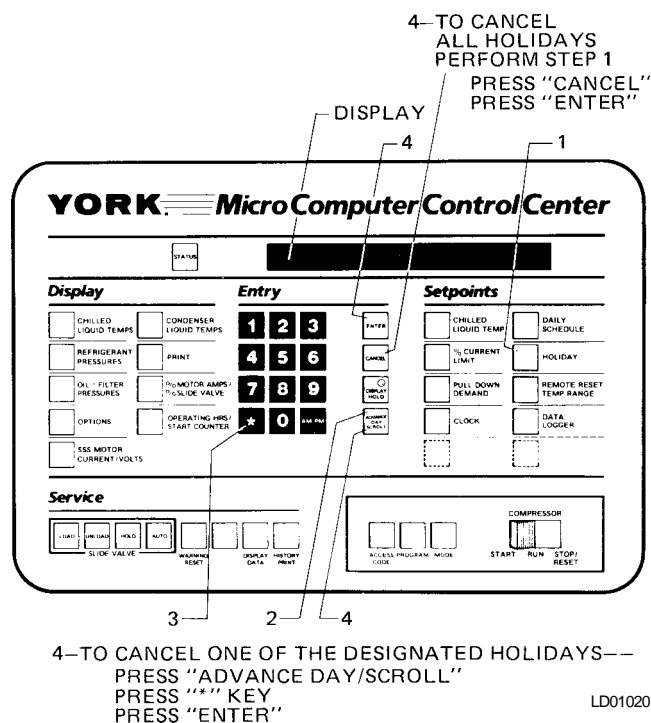
FIG. 9 – KEYPAD – PROGRAMMING "HOLIDAY" SETPOINT

To Enter **REMOTE/RESET TEMP RANGE** Setpoint:
(Refer to Fig. 10)

1. Press the **REMOTE RESET TEMP RANGE** key.

   `REMOTE RESET RANGE (10.0 OR 20.0) = XX.X°F`
   is displayed in English mode.

   `REMOTE RESET RANGE (5.6 OR 11.1) = XX.X°C`
   is displayed in Metric mode.

2. If either of the above ranges are desired, enter the appropriate number using the **Entry** keys. Otherwise, press the **ADVANCE DAY / SCROLL** key.

   `REMOTE RESET RANGE (30.0 OR 40.0) = XX.X°F`
   is displayed in English mode.

   `REMOTE RESET RANGE (16.6 OR 22.2) = XX.X°C`
   is displayed in Metric mode.

   Using the **Entry** keys, enter the appropriate number.

3. Press the **ENTER** key.

   `PROGRAM MODE, SELECT SETPOINT`
   is displayed.

CHILLERS EQUIPPED WITH EPROM VERSION S.01F (T) .13 AND EARLIER
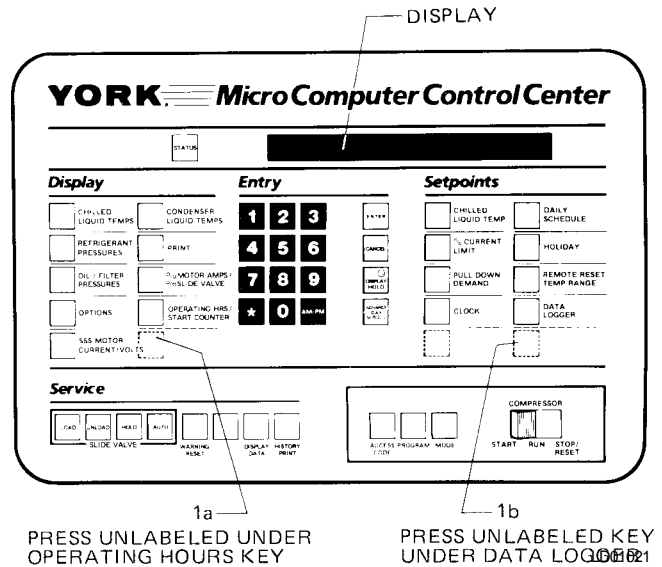
1. Press and release **REMOTE/RESET TEMP RANGE**

1a — PRESS UNLABELED UNDER OPERATING HOURS KEY
1b — PRESS UNLABELED KEY UNDER DATA LOGGER
LD01021

FIG. 10 – KEYPAD – PROGRAMMING "REMOTE RESET TEMP RANGE" SETPOINT

setpoint key. The following program prompt message is displayed:

`REMOTE / RESET TEMP RANGE = XX°F`

2. Use **Entry** keys to enter desired value (10 or 20).

3. Press and release **ENTER** key.

   `PROGRAM MODE, SELECT SETPOINT`
   message is displayed.

To Enter **DATA LOGGER** Setpoint:

Refer to Form 160.47-NO1.2 for operation of this key.

To Reset **OPERATING HOURS AND START COUNTER**

NOTE: These should not be arbitrarily reset.

1. In **PROGRAM** mode, press and release the unlabeled/unembossed key located under the **OPERATING HOURS/START COUNTER** key. Then press and release the unlabeled/unembossed key located under the **DATA LOGGER** key.

2. The operating hours and start counter will reset to zero.

1a — PRESS UNLABELED UNDER OPERATING HOURS KEY
1b — PRESS UNLABELED KEY UNDER DATA LOGGER
LD01022

FIG. 11 – KEYPAD – RESETTING THE OPERATING HOURS AND START COUNTER.

SERVICE KEYS

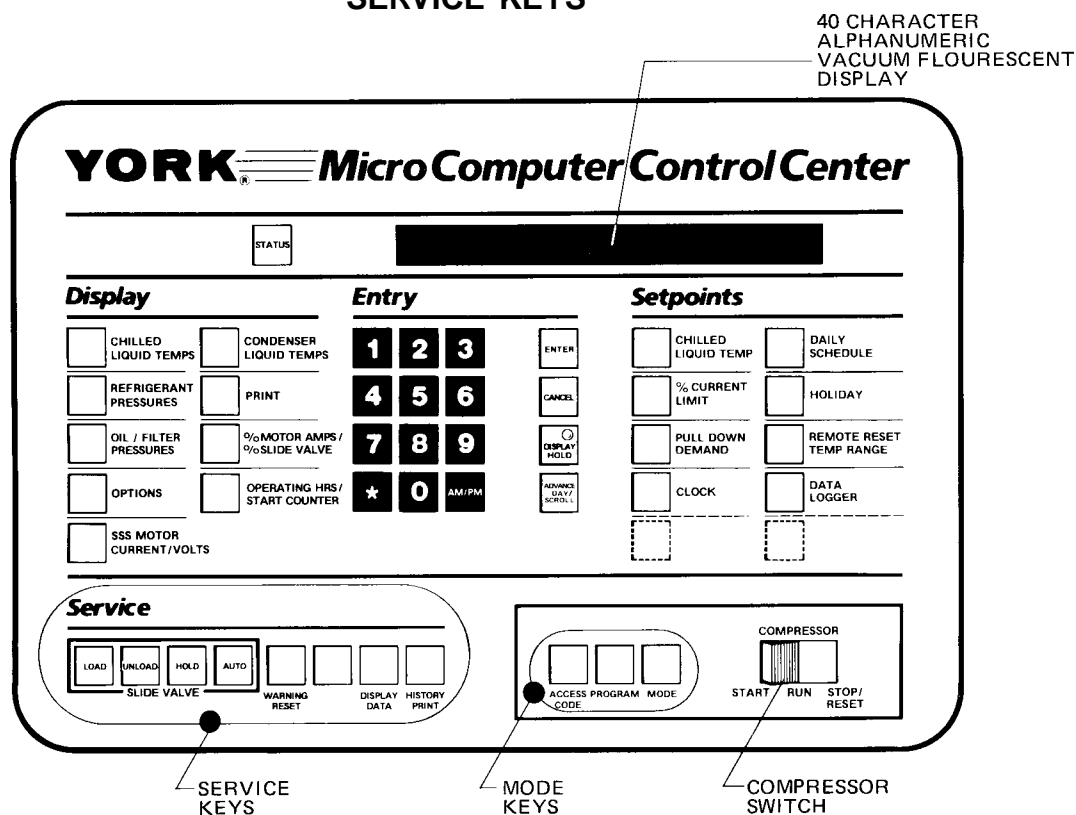**FIG. 12 –** KEYPAD – SERVICE KEYS LOCATION

The **Service** keys are provided for the service technician's use when performing routine maintenance or when trouble-shooting the system. The **WARNING RESET** and **SLIDE VALVE** keys are enabled in **SERVICE** mode only. The remainder of the **Service** keys are enabled in **SERVICE, LOCAL** or **REMOTE** mode.

SLIDE VALVE KEYS

LOAD – Press and release this key to load the **SLIDE VALVE**. If the chiller is running,
`SYSTEM RUN-SLIDE VALVE LOADING`
is displayed. If chiller is not running,
`SYS READY TO START-SLIDE VALVE LOADING`
is displayed. The **SLIDE VALVE** will continue to load until the **UNLOAD, HOLD,** or **AUTO** (if temperature error requires it) keys are pressed and released.

HOLD – Press and release this key to hold the **SLIDE VALVE** in its present position. If chiller is running,
`SYSTEM RUN-SLIDE VALVE HOLDING`
is displayed. If chiller is not running,
`SYS READY TO START-SLIDE VALVE HOLDING`
is displayed. The **SLIDE VALVE** will remain stationary until the **LOAD, HOLD** or **AUTO** keys are pressed and released.

AUTO – Press and release this key to put the **SLIDE VALVE** under LCWT control as long as the current limit setpoint is not reached, which causes the current limit function to override the LCWT control. If system is running, `SYSTEM RUN-AUTO SLIDE VALVE` is displayed. The actual loading and unloading of the **SLIDE VALVE** is indicated on the display. When the **SLIDE VALVE** is loading, `SYSTEM RUN-SLIDE VALVE LOADING` is displayed. If the **SLIDE VALVE** is unloading, `SYSTEM RUN-SLIDE VALVE UNLOADING` is displayed.

Whenever the Control Center is in **LOCAL, REMOTE** or **PROGRAM** mode, the **SLIDE VALVE** control circuitry is automatically placed in **AUTO** mode and the **SLIDE VALVE** operates to control the leaving chilled water temperature to the programmed setpoint.

UNLOAD – Press and release this key to unload the **SLIDE VALVE**. If the chiller is running,
`SYSTEM RUN-SLIDE VALVE UNLOADING` is displayed.
If chiller is not running,
`SYS READY TO START-SLIDE VALVE UNLOADING` is displayed.

The **SLIDE VALVE** will continue to unload until the **LOAD, HOLD** or **AUTO** keys are pressed.

OTHER SERVICE KEYS

WARNING RESET – Press and release this key to reset. Any "WARNING" or "STATUS" message can be reset with this key, unless the condition still exists. To reset any cycling or warning message, place the Control Center in **SERVICE** mode and press **WARNING RESET** key. To reset any safety shutdown message, press **WARNING RESET** key in **SERVICE** mode with the **COMPRESSOR** switch in the **STOP/RESET** position.

DISPLAY DATA – This key is operational in any three of the Control Center modes of operation (**SERVICE, LOCAL** or **REMOTE**). It is used to display certain system operating parameters that are relevant to troubleshooting the chiller system.

Press and hold the **DISPLAY DATA** key. The following messages will sequentially scroll on the display. Each message will be displayed for 2 seconds.

No. 1
`SAT TEMPS EVAP = XX.X°F, COND = XX.X°F`

No. 2
`DISCHARGE TEMP = XXX.X°F, OIL TEMP = XXX.X°F`

No. 3
`OIL = XX.X PSIG:  FILTER = XXX.X PSIG`

To hold each of the above messages, press and release the **DISPLAY DATA** key, then press and release the **DISPLAY HOLD** key. Message No. 1 above will be displayed

and updated every 2 seconds until the **DISPLAY DATA** key is again pressed and released.

Message No. 2 is then displayed and updated every 2 seconds until the **DISPLAY DATA** key is again pressed and released.

Message No. 3 is then displayed and updated every 2 seconds until either the **DISPLAY DATA** key is again pressed and released (whereupon message No. 1 is displayed), or the **DISPLAY HOLD** key is pressed and released (whereupon the **DISPLAY DATA** messages are removed from the display.)

No. 1 – The saturated temperatures displayed are derived from the evaporator and condenser pressures. The pressures are compared to a "PRESSURE/TEMPERATURE" chart in software and the appropriate temperature is displayed.

No. 2 – The discharge and oil temperatures displayed are the actual temperatures as sensed by thermistors.

No. 3 – The **OIL PRESSURE** and the **OIL FILTER PRESSURE** are sensed as follows:

`OIL = XXX.X PSIG` is the oil pressure at the input to the compressor.

`FILTER = XXX.X PSIG` is the oil pressure at the input to the oil filter.

HISTORY PRINT – This key is used to initiate a history print to the optional printer. Refer for Form 160.47-NO1.2 for operation of this key.

OPERATING MODES

The MicroComputer Control Center can be operated in four different operating modes as follows:

SERVICE – enables all the **Service** keys except **DISPLAY DATA**, **MANUAL OIL PUMP**, and **HISTORY PRINT, which** are enabled in all modes. See "Service Keys" page 15.

LOCAL – This is the normal operating mode. The compressor can be started and stopped from the Control Center. Also, the **Display** and **Setpoints** parameters can be displayed.

PROGRAM – Allows the operator to program the **Set points** parameters, and change operating modes.

REMOTE – In this mode, the Control Center will accept control signals from a remote device (i.e., Energy Management System) or cycling inputs. The control signal inputs are:

1. Remote Start
2. Remote Stop

3. Remote LCWT Setpoint
4. Remove Current Limit Setpoint

NOTE: The compressor can be stopped by the **COMPRESSOR** switch, regardless of the operating mode. The switch must be in **RUN** position to enable **REMOTE** mode. The operator cannot locally start the compressor using the **COMPRESSOR** switch when in the **REMOTE** mode.

To determine which operating mode the Control Center is presently in, simply press the **MODE** key.

- If the Control Center is in **LOCAL** mode, `LOCAL OPERATING MODE IN EFFECT` is displayed.

- If the Control Center is in **REMOTE** mode, `REMOTE OPERATING MODE IN EFFECT` is displayed.

- If the Control Center is in **SERVICE** mode, `SERVICE OPERATING MODE IN EFFECT` is displayed.

To change operating mode, proceed as follows:

1. Press **ACCESS CODE** key.

   `ENTER VALID ACCESS CODE ___ ___ ___ ___`
   is displayed.

3. Using **Entry** keys, enter **9 6 7 5**.

4. As each digit is entered, the characters **Y O R K** are displayed.

   NOTE: If digits other than **9 6 7 5** are entered, **Y O R K** is still displayed.

5. Press **ENTER** key.

   NOTE: If digits other than **9 6 7 5** 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 **(9675)** 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. Press **MODE** key.

10. The mode that has been previously selected will be displayed as follows:

    `LOCAL MODE SELECTED`

    — or —

    `SERCVICE MODE SELECTED`

    — or —

    `REMOTE MODE SELECTED`

11. Press **ADVANCE DAY** key to scroll to desired mode. Each time this key is pressed, a different mode is displayed as above:

12. When the desired mode is displayed, press **ENTER** key.

13. `PROGRAM MODE, SELECT SETPOINT` is displayed.

14. Press **ACCESS CODE** key to exit **PROGRAM** mode and terminate access to **PROGRAM** mode.

15. `ACCESS TO PROGRAM MODE DISABLED` is displayed.

COMPRESSOR SWITCH

(See Fig. 12, page 21)

This rocker switch is used to locally operate the compressor. It is used to start, run and stop the compressor. Also, it resets the Control Center after a safety shutdown.

To **START*** chiller compressor in **LOCAL** mode:

   Move **COMPRESSOR** switch from **STOP/RESET** to **START** position. Switch will spring-return to **RUN** position.

To **STOP** compressor:

Move switch from **RUN** to **STOP/RESET** position.

To **RESET** Control Center:

   Following a safety shutdown, the operator is required to reset the Control Center prior to restarting the system. Move switch from **RUN** to **STOP/RESET** position.

NOTE: The operator cannot start the compressor (using this switch) when the Control Center is in **REMOTE** mode.

DISPLAY MESSAGES

The following displayed messages will be automatically displayed unless the operator is requesting additional information via the keypad.

SYSTEM RUN - CURRENT LIMIT IN EFFECT

Displayed when the chiller is running, and the motor current is equal-to or greater-than the operator- programmed "XXX % FLA" current limit value. When the motor current reaches 100% of this value, the slide valve is not permitted to load further. If the current continues to rise to 104% of this value, the slide valve will be unloaded - not fully unloaded only far enough to allow the current to decrease to a value less than 104% of the operator programmed "XXX % FLA" current limit.

For example:

With the operator-programmed "% CURRENT LIMIT" set at 50% and the FLA of the chiller equal to 200A, the current limit circuit would perform as follows:

(100%) (50% x FLA) = Slide Valve inhibited from loading further

(104%) (50% x FLA) = Slide Valve unloaded

Therefore:

(100%) (50% x 200) = 100A = Slide Valve stop loading

(104%) (50% x 200) = 104A = Slide Valve unloaded.

SYSTEM RUN-AUTO SLIDE VALVE

Displayed when the chiller is running, the MicroComputer Control Center is in **SERVICE** mode, and the slide valve is operating in **AUTO** mode.

SYSTEM RUN-SLIDE VALVE LOADING

Displayed when the chiller is running and the MicroComputer Control Center is in **SERVICE** mode with:

• The slide valve operating in **AUTO** mode and loading to maintain the leaving chilled water temperature setpoint.

— or —

• The operator has pressed the slide valve **LOAD** key on the keypad.

SYSTEM RUN-SLIDE VALVE UNLOADING

Displayed when the chiller is running and the MicroComputer Control Center is in **SERVICE** mode with:

• The slide valve operating in **AUTO** mode and unloading to maintain the leaving chilled water temperature setpoint.

— or —

• The operator has pressed the slide valve **UNLOAD** key on the keypad.

SYSTEM RUN-SLIDE VALVE HOLDING

Displayed when the chiller is running, the MicroComputer Control Center is in SERVICE mode, and the operator has pressed the slide valve HOLD key.

SYS READY TO START-SLIDE VALVE LOADING

Displayed when the chiller is not running and the operator has pressed the slide valve **LOAD** key on the keypad.

SYS READY TO START-SLIDE VALVE UNLOADING

Displayed when the chiller is not running and the operator has pressed the slide valve **UNLOAD** key on the keypad.

SYS READY TO START-SLIDE VALVE HOLDING

Displayed when the chiller is not running and the operator has pressed the slide valve **HOLD** key on the keypad.

SYSTEM RUN-LOW PRESSURE LIMIT IN EFFECT

Displayed when the chiller is running and the evaporator pressure falls to 56.2 PSIG (R22); 27.0 PSIG (R134a). Simultaneously, the slide valve will be prevented from further loading. This action maintains chiller operation to prevent low- evaporator pressure shutdown at 54.3 PSIG (R22); 25.0 PSIG (R134a). When evaporator pressure rises to 57.5 PSIG (R22); 28.0 PSIG (R134a), the slide valve will be permitted to load. This feature not used when Micro Board program jumper JP3 is removed (brine applications).

SYSTEM RUN-HIGH PRESSURE LIMIT IN EFFECT

Displayed when the chiller is running and the condenser pressure rises to 251.3 PSIG. Simultaneously, the slide valve will be inhibited from further loading. This action occurs to prevent system shutdown on high condenser pressure at 270.0 PSIG. When the condenser pressure falls to 250.0 PSIG, the slide valve will be permitted to load.

SYSTEM RUN-PRESS STATUS

Displayed when the chiller is running. It instructs the operator to press the STATUS key, whereupon one of the following messages will be displayed:

• **WARNING: DIRTY OIL FILTER**

  Displayed if the oil filter differential pressure (See OIL/ FILTER PRESSURES keypad key) exceeds 20 PSID for 5 continuous seconds. This message automatically clears when the condition clears.

• **WARNING: HIGH OIL TEMPERATURE**

  Displayed when the oil temperature rises to 165°F. This message automatically clears when the condition clears.

• **WARNING: COND TRANSDUCER ERROR**

  Displayed if condenser pressure transducer indicates a pressure equal-to or greater-than 310 PSIG for 10 continuous minutes. Message can be reset in service mode using **WARNING RESET** key.

• **WARNING: EXCESS REFRIGERANT CHARGE**

  Refer to explanation of
  SYSTEM RUN-EXCESS CHARGE OVERRIDE

NOTE: If the **STATUS** key is arbitrarily pressed, without the operator being prompted by the **PRESS STATUS** message, the following message shall be displayed.

NO MALFUNCTION DETECTED

SYSTEM RUN-LEAVING TEMP CONTROL

Displayed while the chiller is running. Indicates that the slide valve is being controlled by the leaving chilled water temperature (LCWT). This is the normal mode of chiller operation.

SYSTEM RUN-EXCESS CHARGE OVERRIDE

If the chiller has been running for at least 3 minutes and the (Discharge Temp-Condenser Saturated Temp) is less than or equal-to 10°F (R22); 5°F (R134a) then this message is displayed and the slide valve is inhibited from loading. If this condition exists continuously for 10 seconds, the slide valve unload solenoid will be driven with .5 second pulses at 3 second intervals until the (Discharge Temp-Condenser Saturated Temp) is equal-to or greater than 15°F whereupon **SYSTEM RUN-PRESS STATUS** is displayed. Pressing the status key produces the following message:

• **WARNING: EXCESS REFRIGERANT CHARGE**

SYSTEM RUN-MIN SLIDE VALVE OVERRIDE

Displayed if the chiller has been running for at least 60 seconds and the condenser pressure exceeds the evaporator pressure by 33 PSIG or greater and the actual slide valve position is "equal-to" or "less-than" the **"minimum slide valve position*."**

If "equal-to", then the slide valve is inhibited from unloading.

If "less-than", then the slide valve load solenoid will be driven by .1 second pulses at .5 second intervals until the **"minimum slide valve position*"** is reached.

*The **"minimum slide valve position"** is calculated as follows:

MIN SV POS (%) = .1228 [(COND PRESS - EVAP PRESS) - 33]

SYSTEM RUN - MINIMUM LOAD CONTROL
(EPROM version S.01F(T) .11 and later)

Displayed after a 3 minute bypass at start if the motor current (%FLA) is less than "MINIMUM ALLOWABLE %FLA" setpoint (15% to 70% FLA) programmed by a qualified service technician. While this is displayed, a 1 second load signal is applied to the slide valve every 3 seconds until the motor current is greater than or equal to the programmed setpoint plus 2%. This setpoint maintains the chiller loading above the point at which separator oil loss would occur. Instructions for programming this setpoint are in "Service" manual, Form 160.47-M2 .

SYSTEM RUN - LOAD LIMIT IN EFFECT
(EPROM version S.01F(T) .08 and later)

To prevent overloading the oil separator on certain compressor/chiller combinations operating at extreme conditions, a special setpoint can be programmed by a qualified service technician to limit chiller loading to a %FLA motor current value (60% to 100%) until the leaving chilled water temperature is less than a programmed limit (50° to 70°F). Instruction for programming this setpoint are in "Service" manual, Form 160.47-M2 .

This message is displayed while the chiller loading is being limited to this programmed %FLA motor current setpoint value (60% to 100%) because the leaving chilled water temperature is above the programmed limit (50° to 70°F).

SYSTEM READY TO START

Indicates that the system is not running, but will start upon application of a start signal.

Displayed when chiller is shut down on a cycling shutdown, safety shutdown (operator must move the **COMPRESSOR** switch to **STOP/RESET** in order to restart) or operator-initiated shutdown (within 30 minutes of initial start-up). The status message consists of the day and time of shutdown, cause of shutdown, and type of restart required. Upon pressing **STATUS** key, System Shutdown Message will be displayed for 2 seconds and then return to

Display can be held indefinitely by depressing **DISPLAY HOLD** key. For examples of System Shutdown Messages, see below.

SYSTEM SHUTDOWN MESSAGES

Day of Week

Time of Day

Cause of Shutdown

Type of Restart

`MON 10:00 AM  -  LOW WATER TEMP  -  AUTOSTART`
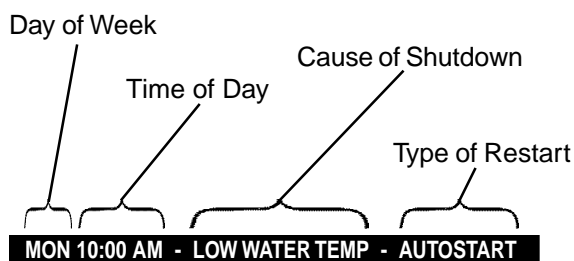
Chiller has shutdown on Monday at 10:00 AM because the Leaving Chilled Liquid Temperature decreased to the Low Liquid Temperature shutdown threshold.

On water cooling applications, the shutdown threshold is 4°F below the Leaving Chilled Liquid Temperature setpoint, unless the setpoint is less than 40°F (range is 38° to 70°F) then the shutdown threshold is 36°F. Anytime the setpoint is increased, the shutdown threshold is 36°F for 10 minutes to prevent nuisance shutdowns.

On Brine cooling applications, the shutdown threshold is 4°F below the setpoint. However, if the chiller is equipped with EPROM version S.01F(T) .13 or .14, anytime the setpoint is increased, the shutdown threshold remains the same as it was before the increase for the next 10 minutes. This prevents nuisance shutdowns. When 10 minutes have elapsed, the shutdown threshold is again 4°F below the setpoint. For example, if the setpoint is 30°F, the shutdown threshold is 26°F (4°F below setpoint). If the setpoint is increased to 40°F, the shutdown threshold remains at 26°F for the next 10 minutes; then it becomes 36°F. Chillers equipped with EPROM version S.01F(T) .15 and later have an additional feature that further prevents nuisance low water temp shutdowns: the first time the setpoint is increased, a 10 minute timer is started. For the next 10 minutes, the shutdown threshold remains the same as it was before the increase, as above. When the timer has elapsed, the threshold will again be 4°F below the setpoint. However, if the setpoint

is increased while the timer is running, the 10 minute timer starts over. Each time the setpoint is increased, the timer is reset back to 10 minutes but the shutdown threshold remains the same as it was when the setpoint was initially increased starting the timer for the first time. In all cases, if the setpoint is decreased, the shutdown threshold is 4°F below the new setpoint.

The chiller will automatically restart when the Leaving Chilled Liquid Temperature increases to the programmed restart threshold. The temperature at which it will restart is operator programmable over a range of 0 - 10°F (0 - 15°F on EPROM version S.01F(T) .13) above the setpoint. For example, if the restart offset 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 temperature reaches the setpoint. When operating in both **BRINE** and **ICE STORAGE** mode, two different restart thresholds can be programmed; one is in effect when **ICE STORAGE** mode is in effect (leaving chilled liquid temp setpoints 20° to 32°F), the other is in effect when **ICE STORAGE** mode is not in effect (leaving chilled liquid temp setpoints greater than 32°F). Refer to "Programming the Microcomputer Control Center" section of this book for programming instructions. The restart threshold that is presently in effect 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. On chillers equipped with EPROM version S.01F(T) .12 and earlier, the restart threshold is not programmable and it only has to increase to the setpoint in order for it to restart.

`MON XX:XX AM - FLOW SWITCH - AUTOSTART`

Chiller is shut down because a chilled-liquid flow switch has opened. The flow switch must open for a minimum of 2 seconds in order to cause a shutdown. The flow switch is checked 25 seconds into "Start Sequence Initiated" and continuously thereafter.

`MON XX:XX AM - SYSTEM CYCLING - AUTOSTART`

A remote command (computer relay contact or manual switch) connected to the Remote/Local cycling input of the digital input board has shut down the chiller.

`MON XX:XX AM - MULTI UNIT CYCLING - AUTOSTART`

Lead/Lag sequence control accessory has shut down the chiller.

MON XX:XX AM - POWER FAILURE - AUTOSTART

The chiller is shut down because there has been a power interruption or failure. The chiller will automatically restart when power is restored. This message will be displayed if the Micro Board is configured for **AUTO RESTART AFTER POWER FAILURE**. The Micro Board is factory set for manual restart after power failure. To convert it to auto-restart after power failure, remove one of the two-pin program jumpers from the cloth bag located inside the control center and place it on the terminals labeled "Auto R" (J60) on the Micro Board.

MON XX:XX AM - POWER FAILURE

The chiller is shut down because there has been a power interruption or failure. When power is restored, the chiller can be restarted by pressing the **COMPRESSOR** switch to **STOP/RESET** position and then to **START** position. This message will be displayed if the Micro Board is configured for **MANUAL RESTART AFTER POWER FAILURE**. The Micro Board is factory set for manual restart after power failure. This has been accomplished by removing the two-pin jumper from the terminals labeled "Auto R" (J60) on the Micro Board.

MON XX:XX AM - AC UNDERVOLTAGE - AUTOSTART

The chiller is shut down because the MicroComputer Control Center was in **RUN** mode, displaying

SYSTEM RUN - LEAVING TEMP CONTROL

but the motor current was less than 10% FLA for 25 continuous seconds. This is indicative of an AC undervoltage condition that has caused the start relay (1R) in the MicroComputer Control Center to de-energize. This condition is checked when the MicroComputer Control Center goes into **RUN** mode. This condition can also be caused by failure of any component that would cause a loss of the start signal from the Control Center. In essence, this check assures that the compressor is running when the Control Center is displaying

SYSTEM RUN - LEAVING TEMP CONTROL

MON XX:XX AM - INTERNAL CLOCK - AUTOSTART

The operator-programmed daily stop schedule has shut down the chiller. The chiller will automatically restart when the operator-programmed daily start schedule initiates a start. It can be overridden by pressing the **COMPRESSOR** switch to the **START** position.

REMOTE STOP

This message will be displayed when a remote device (typically an Energy Management System) has commanded the chiller to shut down. The chiller will restart upon application of a separate start signal from the remote device. This message will only be displayed when Control Center is in **REMOTE** mode.

ANTI-RECYCLE, XX MIN LEFT

The chiller may not restart more frequently than every 30 minutes. Displayed when chiller is shut down and there is time remaining on the anti-recycle timer. In normal operation, chiller cannot be restarted until

ANTI-RECYCLE, 00 MIN is displayed. However, when servicing the chiller, it may be desirable to inhibit this 30-minute timer. If so, simply install a jumper plug in the unmarked terminals of the Micro Board directly under Auto-Restart jack.

> **WARNING:** *Remove this jumper after servicing. Failure to do this voids the Warranty.*

MON XX:XX AM - LOW EVAP PRESSURE

The chiller is shut down because the evaporator pressure has decreased to 54.3 PSIG (R22); 25.0 PSIG (R134a). The chiller will be allowed to start when the pressure increases to 54.4 PSIG (R22); 25.1 PSIG (R134a). To restart chiller, press the **COMPRESSOR** switch to the **STOP/RESET** position and then to the **START** position.

MON XX:XX AM - LOW EVAP PRESSURE - BRINE

The chiller is shut down because the brine Low Evaporator Pressure (LEP, not included with standard Control Center) safety contacts have opened. The brine LEP safety is located external to the Control Center. Safety cut-out settings will vary with the brine application. To restart the chiller, wait until the safety contacts close, press the **COMPRESSOR** switch to the **STOP/RESET** position and then to the **START** position.

MON XX:XX AM - HIGH PRESSURE

The chiller is shut down because condenser pressure has increased to 270 PSIG. System will be allowed to restart when pressure decreases to 210 PSIG. Pressure is sensed by a High Pressure (HP) safety control that is located on the condenser. This message is prompted by the opening of the HP safety control contacts. To restart chiller, press **COMPRESSOR** switch to the **STOP/RESET** position and then to the **START** position.

MON XX:XX AM - LOW OIL PRESSURE

The chiller is shut down because the differential oil pressure (oil pressure - evaporator pressure) was less than 20 PSIG (15 PSID on chillers equipped with EPROM version S.01F(T).14 and earlier) while the chiller was running. This check is bypassed during the first 3 minutes of chiller run time. The oil pressure in the formula is that which is measured at the compressor input. The evaporator pressure is that which is measured at the evaporator. To restart the chiller, press **COMPRESSOR** switch to **STOP/RESET** position, then to **START** position.

MON XX:XX AM - FAULTY OIL OR CONDENSER XDCR

The chiller is shut down because the oil pressure was greater than the (condenser pressure + 20 PSIG) for 10 continuous minutes while the chiller was running. The condenser pressure in the formula is that which is measured at the condenser. The oil pressure is that which is measured at the input to the compressor. To restart the chiller, press **COMPRESSOR** switch to **STOP/RESET** position, then to **START** position.

MON XX:XX AM - LOW SEPARATOR OIL LEVEL

The chiller is shut down because the separator oil level switch has opened, indicating a low oil level in the separator. To restart the chiller, press **COMPRESSOR** switch to **STOP/RESET** position, then to **START** position.

On chillers equipped with eprom version S.01F(T) .11 and later, the oil level switch must be open for 30 continuous seconds in order for this safety shutdown to be initiated. This prevents momentary switch fluctuations from causing nuisance shutdowns.

MON XX:XX AM - CLOGGED OIL FILTER

The chiller is shut down because the **OIL FILTER DIF-FERENTIAL PRESSURE** (Refer to **OIL/FILTER PRES-SURES** keypad display key) exceeded 25 PSID for 5 continuous seconds. To restart the chiller, press **COM-PRESSOR** switch to **STOP/RESET** position, then to **START** position.

MON XX:XX AM - EVAP TRANS OR PROBE ERROR

The chiller is shut down because the (Leaving Chilled Water Temperature - Evaporator Saturation Temperature is outside the range of - 2.5 °F to 25 °F continuously for 10 minutes. On brine applications, this check is not performed below 49.4 PSIG evaporator pressure because the evaporator transducer is "out-of-range" at this pressure. To restart the chiller, press **COMPRESSOR** switch to **STOP/RESET** position and then to **START** position.

If chiller is equipped with EPROM version S.01F(T).14 and later and configured for **BRINE** mode (Micro Board Program Jumper JP3 out) and hot-gas bypass operation (Micro Board Program Jumper JP4 out), this safety shutdown is not performed. This prevents nuisance safety shutdowns due to the abnormal difference between the leaving chilled water temperature and the evaporator saturation temperature created by the hot-gas bypass.

MON XX:XX AM - SLIDE VALVE ABOVE 10%

Indicates the following:

1. A chiller start was initiated but the slide valve position was greater than 10%.

— or —

2. The chiller was shut down by any stop signal but the slide valve did not return to a position of less than 10% within the 2 minute lockout period.

The system is shut down and will automatically restart when the slide valve position is less than 10% and the **COMPRESSOR** switch is in the **RUN** position.

MON XX: XX AM - SLIDE VALVE ABOVE 30%
(EPROM version S.01F(T) .08 and later)

Indicates the same as message "DAY-TIME-SLIDE VALVE ABOVE 10%" listed above, except the slide valve position is greater than 30%. Chillers equipped with EPROM version S.01F(T).08 and greater that have Micro Board Program Jumper JP4 cut, allow the chiller to be started with the slide valve as much as 30% open. Only qualified service technicians are permitted to configure program jumpers.

MON XX:XX AM - OIL PRESSURE TRANSDUCER

Chiller is shut down because the oil pressure transducer that is sensing oil pressure at the input to the compressor, indicated 300 PSIG while the chiller was running. The chiller will be allowed to restart when the pressure decreases to 299 PSIG. This safety shutdown is provided as a verification of transducer accuracy. Display of this message is generally indicative of a defective transducer or interface. To restart the chiller, press **COMPRESSOR** switch to **STOP/RESET** position and then to **START** position.

MON XX:XX AM - MOTOR CONTROLLER - EXT. RESET

The chiller is shut down because a current module (CM-2 Electro-Mechanical starter application), or the YORK Solid State Starter initiated a shutdown. To restart system, reset the external device that caused the shutdown. The chiller will automatically restart.

NOTE: The following motor controller shutdowns do not require an external reset to restart chiller.

1. Solid State Starter - power fault, 110°F start inhibit, phase rotation/loss, out of lock.

2. Current module - power fault

MON XX:XX AM - POWER FAULT - AUTO START

The chiller is shut down because of a Solid State Starter or current module (CM-2 Electro-Mechanical starter application) "Power Fault" shutdown. The chiller will automatically restart. This function is sensed by the motor controller input to the digital input board. A power- fault shutdown is initiated by the motor controller contacts (CM-1) opening and reclosing in less than 3 seconds.

MON XX:XX AM HIGH DISCHARGE TEMP

The chiller is shut down because the discharge temperature has increased to 212°F. The system will be allowed to restart when the temperature has decreased to 211°F. Temperature is sensed by a thermistor RT2. To restart the chiller, press **COMPRESSOR** switch to **STOP/RESET** position and then to the **START** position.

MON XX:XX AM HIGH OIL TEMP

The chiller is shut down because the oil temperature has increased to 170°F. The system will be allowed to restart when the temperature decreases to 169°F. The temperature is sensed by a thermistor RT3. To restart the chiller, press **COMPRESSOR** switch to **STOP/RESET** position and then to the **START** position.

MON XX:XX AM - STARTER MALFUNCTION DETECTED

The chiller is shut down because the Control Center has detected a motor-current value greater than 15% FLA for 10 seconds minimum anytime when the compressor start signal is not energized. To restart the chiller, press **COMPRESSOR** switch to **STOP/RESET** position and then to the **START** position.

MON XX:XX AM - PROGRAM INITIATED RESET

The chiller is shut down because Micro Board did not receive a hardware-generated interrupt on schedule. Typical is an Analog/Digital Converter interrupt. This message is indicative of a Micro Board hardware failure or electrical noise on Micro Board. The chiller will automatically restart. This message indicates that the watchdog timer-circuit has reset the microprocessor. This occurs when the time needed to step through program is longer than allowable, thus the software program is initialized at its beginning.

START SEQUENCE INITIATED

Indicates the Micro Board has received a local or remote start signal and has initiated the chiller start sequence. Message is displayed for 30 seconds.

The oil line solenoid valve is energized (opened) during the first 15 seconds to allow auto-zeroing of the:

• Oil filter pressure transducer and compressor oil pressure transducer.

• Evaporator pressure transducer and compressor oil pressure transducer.

Refer to explanation of **OIL/FILTER PRESSURES** and **DISPLAY DATA** keypad keys for details of transducers auto-zeroing.

X.X MINUTE LOCKOUT DELAY

This message is displayed anytime the chiller shuts down. It indicates that a restart delay is in effect. While the delay is in effect, the message will indicate the time remaining with .1 minute resolution. The purpose of this restart delay is to allow system pressures to decrease and equalize so that transducers can be "auto-zeroed." The duration of this period is determined by the position of "CSTDN" program jumper (JP4) on the Micro Board as follows:

DELAY PERIOD	JP4 POSITION
2 Minutes	IN
*6 Minutes	OUT

*Use for steam turbine applications only. Applicable to version 4.D and earlier EPROM only.

X.X MINUTE LOCKOUT DELAY - PRESS STATUS

This message indicates same as above but instructs the operator to press the keypad **STATUS** key to obtain further information about the shutdown.

MON XX:XX AM - LOW LINE VOLTAGE
(Solid State Starter Application Only)

Chiller is shut down because the voltage in any phase of the line voltage has decreased to the undervoltage shut down threshold for 20 consecutive seconds while the chiller was running or during **START SEQUENCE INITIATED**.

Refer to threshold chart and explanation under "System Setpoints—SSS Motor Current/Volts", Page 11. The system will automatically restart when all phases of line voltage increase to the acceptable level.

MON XX:XX AM - HIGH LINE VOLTAGE
(Solid State Starter Applications Only)

Chiller is shut down because the voltage in any phase of line voltage has increased to the over-voltage shutdown threshold for 20 consecutive seconds while the chiller was running or during **START SEQUENCE INITIATED**.

Refer to threshold chart and explanation under "SYSTEM SETPOINTS - SSS MOTOR CURRENT/VOLTS" Page 11. The system will automatically restart when all phases of line voltage decrease to the acceptable level.

MON XX:XX AM - MTR PHASE CURRENT UNBALANCE
(Solid State Starter Applications Only)

The chiller is shut down because the compressor-motor current was unbalanced while the chiller was running. The current balance is only checked after the motor has

been running for a minimum of 45 seconds and the motor current is 80% FLA or greater. If the current in any phase deviates from the average ($\frac{a+b+c}{3}$) current by greater than 30% for a minimum of 45 consecutive seconds, a shutdown is initiated. To restart the system, press the **COMPRESSOR** switch to **STOP/RESET** position and then to the **START** position. An example of the conditions for shutdown is as follows:

IF:
$$I_{\varnothing A} \ = \ 200A$$
$$I_{\varnothing B} \ = \ 200A$$
$$I_{\varnothing C} \ = \ 118A$$

THEN:
$$I_{AV} \ = \ \frac{200 + 200 + 118}{3}$$

$$I_{AV} \ = \ 173A$$

$$I_{ACCEPTABLE} \ = \ 173 \pm 30\% \ = \ 121A \text{ or } 225A$$

THEREFORE:
Since $I_{\varnothing C} = 118A$ which is less than the acceptable 121A, the chiller would shut down if this unbalance exists for 45 consecutive seconds.

MON 09:30 AM LOW OIL TEMPERATURE - AUTOSTART
(Not applicable to chillers equipped with EPROM version S.01F .06 and later)

Whenever the oil temperature falls below 49°F, or the oil temperature sensor is disconnected from the Micro Board, the preceding message will appear. The system will automatically restart when the display indicates 58°F.

MON XX:XX AM FAULTY DISCHARGE TEMP SENSOR

Whenever the discharge temperature falls below 29.9°F, or the discharge temperature sensor is disconnected from the Micro Board, this message will appear. To restart the system when the discharge temperature rises to 30°F or the sensor has been connected, press the **COMPRESSOR** switch to the **STOP/RESET** position and then to the **START** position.

MON XX:XX - AUX SAFETY SHUTDOWN

The system is shut down because an external device, connected to digital input board TB1-31 (Aux Safety Shutdown Input), has initiated a system shutdown. This input is a general purpose input that can be used to annunciate a user-defined safety shutdown. To restart chiller, press **COMPRESSOR SWITCH** to **STOP/RESET** position and then to **START** position.

### SYSTEM READY TO START - PRESS STATUS

The chiller was shut down on a safety shutdown and will start upon application of a local or remote start signal. Since the message states that the chiller is "Ready to Start", it means that the condition that caused the shutdown no longer exists and the Control Center has been manually reset. When the Status key is pressed, a message is displayed that describes the reason for shutdown. The message will be displayed for 2 seconds and then return to

SYSTEM READY TO START - PRESS STATUS
Those messages that could be displayed are any of the previously described safety-shutdown messages or warning messages. They can be cleared from the display by entering **Service** mode and pressing **WARNING RESET** key. Or, the message will be cleared by initiating a compressor start.

REPLACE RTC, U16 - REPROGRAM SETPOINTS

Indicates that the battery located inside the **REAL-TIME CLOCK** IC Chip (U16 on the Micro Board) is defective. This battery provides back-up power to the RTC memory (RAM) in the event of a utility AC power failure. This assures the system setpoints will be maintained. If this message appears, the RTC IC chip (U16) on the Micro Board must be replaced. If there had been a power failure while this message is displayed, the setpoints will have been lost and must be reprogrammed. Order a replacement RTC IC chip (York part number 031-00955-000) from the YORK Parts Distribution Center. With AC power removed from system, locate RTC chip U16 on the Micro Board and remove existing RTC chip from socket and discard. Observe anti-static precautions and install new RTC chip in socket. Assure proper IC orientation – orientation notch must be UP. (Refer to Fig. 13)

U16
RTC 1C
CHIP
REAL
TIME
CLOCK
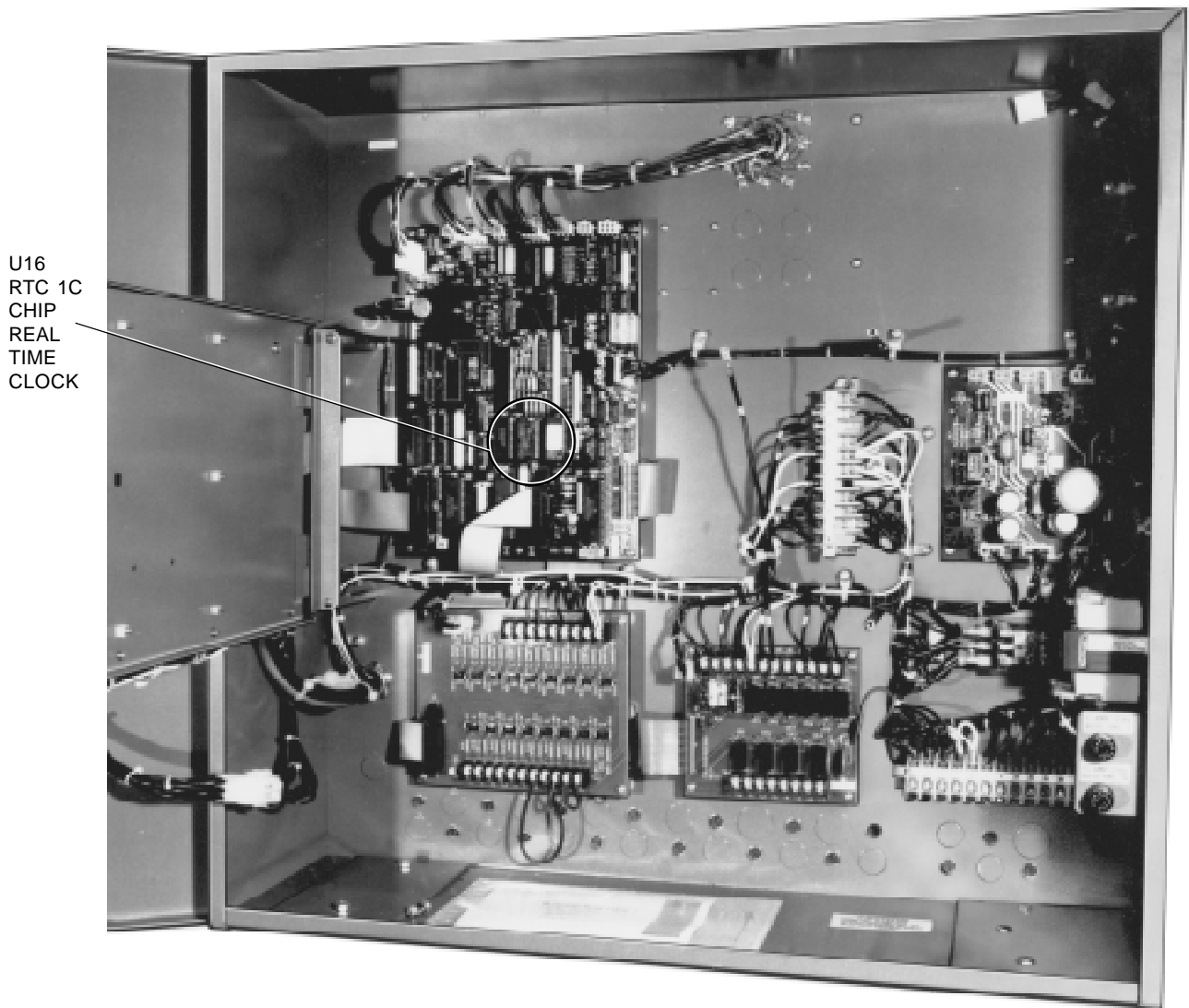
FIG. 13 – MICROCOMPUTER CONTROL CENTER – INTERIOR – WITH PANEL OPEN – LOCATION OF REAL TIME CLOCK U16 RTC IC CHIP.

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