OPERATION - MAINTENANCE

MICROPROCESSOR CONTROL PANEL

THIS MANUAL CONTAINS OPERATION AND MAINTENANCE INSTRUCTIONS. READ THOROUGHLY. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN DAMAGE OR IMPROPER OPERATION OF THE UNIT.
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PREFACE

This manual has been prepared to acquaint the owner and service person with the OPERATION and TROUBLESHOOTING procedures as recommended by Frick Company for RXF PLUS Rotary Screw Compressor Units. It should be used in conjunction with the S70-400 IOM Manual.
The RXF compressor is controlled by a state-of-the-art microprocessor control system. The microprocessor continuously monitors the compressor unit’s condition and operation. The microprocessor also directs instructions to the various compressor unit subsystems.

The microprocessor has a membrane switch keyboard. Pressing the keyboard in the area outlined as a key will cause that function to be recognized by the microprocessor. The keyboard has 32 membrane-type keys.

In addition to the keyboard, there is an emergency stop button. Pushing the emergency stop will bypass the computer and remove all power from the outputs. This will shut down the compressor motor and all control power (120v) to the compressor auxiliary systems such as the oil pump and liquid injection solenoid. **THE EMERGENCY STOP BUTTON IS FOR EMERGENCY SHUTDOWN SITUATIONS ONLY and MUST NOT BE USED TO ROUTINELY SHUT OFF THE COMPRESSOR.**

The microprocessor hardware contains an internal watchdog circuit. If the microprocessor should fail, this circuit will disable (turn off) all outputs.
KEYS AND KEY FUNCTIONS

The [CHANGE] key rotates the display through the different display screens. The [CHANGE] key is also used to change the status of various setpoints. This key, when pressed, will cause the existing settings to be replaced with "#" symbol for each number of the setting. To change from pounds per square inch (G) to inches of mercury (Hg), press the [CHANGE] key when the (G) or (Hg) is flashing.

The [STEP] key steps or moves a set of flashing characters through the Adjustable setpoints on the Setpoints displays, the Auto-cycle displays, and the Security displays. The setpoint replaced by the flashing "#" symbol may be changed or updated. The [STEP] key is also used to step through the information displays when the Annunciator, Shutdown, or Freeze displays are selected.

NOTE: The [*] key is used to step or move to previous screens, described above, one at a time.

The [ENTER] key is used to change or enter new setpoints.

The [CLEAR] key will reset an alarm or cutout indication on the annunciator screen(s) and will clear the microprocessor to allow continued operation or restarting if all conditions have returned to normal and no other control lockouts are in force.

The [NUMERIC KEYPAD] is used to introduce new setpoint limits.

The [+] key will call up the Analog Offset display, page 1, then page 2.

The [RUN], [STOP], and [REMOTE START] keys control the starting and stopping of the compressor unit.

The [ALARM SILENCE] key will deenergize the alarm horn output.

The [AUTO], [REMOTE], and [MANUAL] keys control the operation of the compressor slide valve.

The [AUTO], [MANUAL 2.2], [MANUAL 3.5], and [MANUAL 5.0] keys control the operation of the compressor slide stop.

The [F1] function key will return the operator to the main operating display. This function may be invoked at any time, even during setpoint entry. While at the main display, pressing [F1] will jump directly to the annunciator if there are any annunciated fails.

The [F2] function key will call up the Security display.

The [F3] function key will call up the first menu of the Setback feature.

The [F4] function key will call up the Auto Cycle display.

NOTE: To exit the Auto Cycle display, press the [F1] key as prompted by the display.

The microprocessor has a liquid crystal display in a 2 line by 20 character format, for a total of 40 characters. When power is first applied to the control panel, the unit will be in the Operating display mode. To change to a different display mode, press the [CHANGE] key. The display modes in their order of rotation are:

1. Operating display (7 pages)
2. Annunciator display (43 possible pages)
3. Setpoints display (11 pages, 3 fixed Setpoint pages)
4. Communications display (1 page)

[F2] Security display (1 page)
[F3] Setback (3 pages)
[F4] Auto Cycle display (3 pages)
[+/-] Analog Offset display (4 pages)

OPERATING DISPLAYS

There are 7 operating displays which continuously update and provide a variety of information in regard to the current status of the compressor’s condition and performance.

OPERATING DISPLAY, Page 1*

| SUCT. =///.g  +///F |
| DISCH. =///G  +///F |

The information furnished by the Operating display is:

SUCT - Suction Pressure is measured at the compressor inlet and is displayed in pounds per square inch gauge (G) or in inches of mercury (Hg).

DISCH - Discharge Pressure is measured at the compressor outlet and is displayed in pounds per square inch gauge (G).

SUCT - Suction Temperature in degrees Fahrenheit is displayed. The shaded area will flash between cutout or alarm if a fail exists. It will also flash between MLSL (Motor Load Stop Load) or MLFU (Motor Load Force Unload) for motor amps load control indication.

DISCH - Discharge Temperature in degrees Fahrenheit is displayed.

OPERATING DISPLAY, Page 2*

| COMP-mode | DAY HH:MM |
| stat SS=/// SV=/// |

COMP-mode - mode displays the start status of the compressor unit. The mode of operation will be indicated as either manual (MAN) when the [RUN] key has been pressed, automatic (AUTO) when Auto Cycle has been activated, remote (RMT) when the [RMT] key has been pressed, or off (OFF MODE).

COMP-stat - stat displays the following messages: (OFF) not running, (RNG) running, (MLFU) motor load control force unload, (MLSL) motor load control stop load, and (CUT) cutout.

SS - Slide Stop position is the position selected by the microprocessor to provide the highest efficiency at any given suction and discharge pressure condition.

SV - Slide valve position is displayed as a percentage. This percentage reflects the mechanical position of the slide valve and does not reflect the percentage of full-load operation.

* Display for illustrative purposes only.
OPERATING DISPLAY, Page 3*

SUCT DISCH OIL
///.G /// /// ///

SUCT - Suction Pressure is measured at the compressor inlet and is displayed in pounds per square inch gauge (G) or in inches of mercury (hg).

DISCH - Discharge Pressure is measured at the compressor outlet and is displayed in pounds per square inch gauge (G).

OIL - Oil Pressure is measured prior to entering the compressor and is displayed in pounds per square inch gauge (G).

OPERATING DISPLAY, Page 4*

SUCT DISCH OIL SEP.
+///F ///F ///F ///F

SUCT - Suction Pressure is measured at the compressor inlet and is displayed in pounds per square inch gauge (G) or in inches of mercury (hg).

DISCH - Discharge Pressure is measured at the compressor outlet and is displayed in pounds per square inch gauge (G).

OIL - Oil Temperature is displayed in degrees Fahrenheit.

SEPARATOR - Separator displays the oil separator temperature in degrees Fahrenheit.

OPERATING DISPLAY, Page 5*

FLA HEATER PUMP
///% off on

FLA - Percent Full-Load Amps displays the percentage of the drive motor full-load amperage rating that the motor is currently using.

HEATER - Heater displays the condition of the oil separator heater(s), indicating ON or OFF.

PUMP - If unit has a pump, this will be displayed.

OPERATING DISPLAY, Page 6*

SV=///% C.C.=///.F
AUTO-L SUCT.P=///.G

SV - Slide valve position is displayed as a percentage. This percentage reflects the mechanical position of the slide valve and does not reflect the percentage of full-load operation. Immediately below this information, space has been provided to indicate whether the S.V. % is in the automatic (AUTO), manual (MAN), or remote (RMT) mode. The microprocessor will control this function in the automatic mode. To the right of the mode indicator, these messages may appear:

L (indicates Slide Valve loading)
U (indicates Slide Valve unloading)

C.C. - Actual Capacity Control setpoint or
S.B. - Actual Setback setpoint

TEMP = Current Capacity Control Temperature.

OPERATING DISPLAY, Page 7*

SV=///% C.C.=+///.F
AUTO-L Temp=+///.F

SLIDE STOP - Slide Stop position is the position selected by the microprocessor to provide the highest efficiency at any given suction and discharge pressure condition. Immediately below this, an information space has been provided to indicate whether V ratio is in the automatic (AUTO) or the manual (MAN) mode.

RECYCLE - A Recycle Delay message indicates that the compressor has started and has shut down within the time delay setpoint period. The Recycle Delay will prevent the compressor from starting until the delay time expires and is intended to prevent damage to the compressor motor from successive restarts. During Recycle Delay, the microprocessor will alternatively flash “RECYCLE DELAY” and the remaining delay time in minutes. The (RECYCLE . . .) message appears only when the compressor is in the recycle mode.

NOTE: Consult Motor Manufacturer for the recommended duration of the Recycle Delay.

CAUTION: If the [RUN] key is pushed while the unit is in Recycle Delay, the compressor will start at the end of the delay period.

ANNUNCIATOR DISPLAY

When a prealarm or cutout occurs, a flashing ALARM or SHUTD (shutdown) indicator will appear in the upper right hand corner of the “Operating Display, Page 1” and in the lower left hand corner of “Operating Display, Page 2”. To determine the fault, rotate to the Annunciator display by pressing the [CHANGE] key or press [F5] for direct jump to annunciator menu.

The Annunciator display will show all failures, individually. If there is only one failure, the annunciator display will appear as shown on the following “Annunciator Display”, pages. When the system has failed for more than one condition, (USE STEP) will appear in the upper right side of the dis-
play. The applicable failure displays will be individually rotated through by pressing the [STEP] key. Continued pressing of the [STEP] key will result in the applicable failure displays repeating.

At this time the alarm will stop flashing. Pressing the [CLEAR] key while at the Annunciator display will clear all alarms and/or cutouts.

In order to restore the Annunciator display and resume normal operation, it will be necessary to go through the following steps:

1. Correct the conditions causing the alarm.

2. Press the [ALARM SILENCE] key. (This action may precede correcting the conditions causing the alarm).

3. To clear or reset the Annunciator pages, press the [CLEAR] key. This will also clear the ALARM, SHUTD, or CUTOUT indicator from the Operating display.

4. Press [F1] to call up the Operating display. If the conditions causing the alarm have not been corrected or a new fault has occurred, the ALARM, SHUTD, or CUTOUT message will appear.

NOTE: Use of the Emergency Stop Button may trip one or more alarm setpoints.

5. After all failures have been corrected and the [CLEAR] key has been pressed and if there are no failures, the Annunciator display will show (NO FAILURES).

The remaining screens show additional failure messages that may appear.

ANNUNCIATOR DISPLAY*, ANNUNCIATOR OIL PRESSURE CUTOUT

ANNUNCIATOR DISPLAY*, ANNUNCIATOR OIL PRESS ALARM

ANNUNCIATOR DISPLAY*, ANNUNCIATOR HIGH PRESS CUTOUT

ANNUNCIATOR DISPLAY*, ANNUNCIATOR HI OIL TEMP CUTOUT

ANNUNCIATOR DISPLAY*, ANNUNCIATOR HI OIL TEMP ALARM

ANNUNCIATOR DISPLAY*, ANNUNCIATOR LOW PRESS CUTOUT

ANNUNCIATOR DISPLAY*, ANNUNCIATOR LO OIL TEMP CUTOUT

ANNUNCIATOR DISPLAY*, ANNUNCIATOR LO OIL TEMP ALARM

ANNUNCIATOR DISPLAY*, ANNUNCIATOR DISCH TEMP CUTOUT

ANNUNCIATOR DISPLAY*, ANNUNCIATOR DISCH TEMP ALARM

ANNUNCIATOR DISPLAY*, ANNUNCIATOR COMPRESSOR AUXILIARY

ANNUNCIATOR DISPLAY*, ANNUNCIATOR PUMP AUXILIARY

ANNUNCIATOR DISPLAY*, ANNUNCIATOR OIL LEVEL

ANNUNCIATOR DISPLAY*, ANNUNCIATOR COMP DIFFERENTIAL

* Display for illustrative purposes only.
<table>
<thead>
<tr>
<th>ANNUNCIATOR DISPLAY*</th>
<th>ANNUNCIATOR DISPLAY*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANNUNCIATOR LOW TEMP CUTOUT</td>
<td>ANNUNCIATOR SENSOR LO DISCH TEMP</td>
</tr>
<tr>
<td>ANNUNCIATOR LOW TEMP ALARM</td>
<td>ANNUNCIATOR SENSOR HI DISCH TEMP</td>
</tr>
<tr>
<td>ANNUNCIATOR AUX #1 ALARM</td>
<td>ANNUNCIATOR SENSOR LOW OIL TEMP</td>
</tr>
<tr>
<td>ANNUNCIATOR AUX #1 SHUTDOWN</td>
<td>ANNUNCIATOR SENSOR HIGH OIL TEMP</td>
</tr>
<tr>
<td>ANNUNCIATOR SUPERHEAT ALARM</td>
<td>ANNUNCIATOR SENSOR LOW OIL PRESS</td>
</tr>
<tr>
<td>ANNUNCIATOR SUPERHEAT CUTOUT</td>
<td>ANNUNCIATOR SENSOR HI OIL PRESS</td>
</tr>
<tr>
<td>ANNUNCIATOR SEP COND ALARM</td>
<td>ANNUNCIATOR SENSOR LO SUCT PRESS</td>
</tr>
<tr>
<td>ANNUNCIATOR SEP COND CUTOUT</td>
<td>ANNUNCIATOR SENSOR LO DISCH PRES</td>
</tr>
<tr>
<td>ANNUNCIATOR AUX #2 ALARM</td>
<td>ANNUNCIATOR SENSOR HI DISCH PRES</td>
</tr>
<tr>
<td>ANNUNCIATOR AUX #2 SHUTDOWN</td>
<td>ANNUNCIATOR LOW MOTOR AMPS</td>
</tr>
<tr>
<td>ANNUNCIATOR SENSOR LOW SEP TEMP</td>
<td>ANNUNCIATOR FACTORY DEFAULTS SET</td>
</tr>
</tbody>
</table>

* Display for illustrative purposes only.
**SHUTDOWN DISPLAYS, Top Page***

**SHUTDOWN: USE STEP KEY TO CHANGE PAGES**

The Shutdown Record display keeps a record of the last six shutdowns (cutouts). This information will help troubleshoot persistent operational problems. When a cutout occurs, all information is moved down one page and the new cutout appears at the top of page 2. When the display is full, the oldest record is dropped off the last display and is not retained in memory. The information presented is echoed from the Annunciator display, providing the type of cutout, the day, the date, and the time. **NOTE:** This information will not be lost due to power failure.

**FREEZE DISPLAYS, Top Page***

**FREEZE: USE STEP KEY TO CHANGE PAGES**

The Freeze display has the same appearance and contains the same information as the Operating display. (For a description of the information presented by the Freeze display, refer to the Operating display.) The Freeze display freezes the information of the Operating display **AT THE MOMENT OF A COMPRESSOR CUTOUT.** The information on the Freeze display can help the operator to identify the cause of a fault which occurred when no one was present. The Freeze display will retain the information generated by a cutout until a new cutout occurs or power is removed from the microprocessor.

**CAUTION:** Do not confuse the Freeze display with the Operating display. In order to avoid confusion remember that the displayed information on the Operating display is constantly being updated and changed. The Freeze display is fixed.

**NOTE:** The Freeze display pages will appear as blank screens when power is initially furnished to the unit, and it will return to a blank screen anytime power is removed from the microprocessor.

**SETPOINT DISPLAYS, Page 1***

**CAPACITY CONTROL MODE = ///////////**

**MODE** - This setpoint is used to select either Pressure Capacity Control or Temperature Capacity Control. **NOTE:** There are only two setpoints, "PRESSURE" for pressure capacity control and "TEMPERATURE" for temperature capacity control.

**SETPOINT DISPLAYS, Page 2***

<table>
<thead>
<tr>
<th>PRESS CC</th>
<th>LPCO=///.//G</th>
</tr>
</thead>
</table>

**CCSP** - The Capacity Control Setpoint, reported in pounds per square inch gauge (G) or inches of mercury ("Hg"), controls the loading and unloading of the compressor when S.V. is in the automatic (AUTO) mode and press control mode is selected.

**LPCO** - The Low Suction Pressure Cutout, reported in pounds per square inch gauge (G) or inches of mercury ("Hg"), will shut down the compressor if the suction pressure drops to this limit or lower, for 90 seconds or longer.

**LPA** - The Low Suction Pressure Alarm, reported in pounds per square inch gauge (G) or inches of mercury ("Hg"), will trigger a prealarm if the suction pressure drops to this limit or lower.

**SETPOINT DISPLAYS, Page 3***

<table>
<thead>
<tr>
<th>TEMP CC</th>
<th>LTCo+///.//F</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LTA+///.//F</td>
</tr>
</tbody>
</table>

**CC** - The capacity control setpoint is for normal temperature control operation, not setback.

**CCSP** - The Capacity Control Setpoint, reported in °F, controls the loading and unloading of the compressor when S.V. is in the automatic (AUTO) mode and press control mode is selected.

**LTCO** - This setpoint will stop the compressor if the CC Temperature drops below the setpoint. There is no time delay on the temperature cutout.

**LTA** - An alarm will be activated if the CC Temperature drops below the setpoint. There is no time delay on the temperature alarm.

**SETPOINT DISPLAYS, Page 4***

<table>
<thead>
<tr>
<th>PRESS PB DB CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>// // //</td>
</tr>
</tbody>
</table>

**SETPOINT DISPLAYS, Page 5***

<table>
<thead>
<tr>
<th>TEMP PB DB CT</th>
</tr>
</thead>
<tbody>
<tr>
<td>// // //</td>
</tr>
</tbody>
</table>

**Deadband** - This setpoint is a + (plus) or - (minus) value above or below the setpoint at which the compressor will neither load or unload. A "Dead band" of 1 is the default value. It is adjustable between .5 lb to 5.0 lb in increments of .5. Use the [Step] key to select this setpoint then press the [Change] key to toggle through the available selections.

**Proportional Band** - This setpoint is used to determine the amount of time the load/unload solenoid is energized, according to how far away from the setpoint the actual control pressure is. The smaller the number the longer a load/unload signal will be sent. A "Prop. Band" of 10% is the default value. It is adjustable to 2, 5, 10, 15, 20, or 25 percent. Use the [Step] key to select this setpoint then press the [Change] key to toggle through the available selections.

**Cycle Time** - The cycle time setpoint is the amount of time between the beginning of each load/unload response. A "Cycle Time" of 10 sec is the default value. It is adjustable to 5, 10, 15, 20, 25, or 30 seconds. Use the [Step] key to select this setpoint then press the [Change] key to toggle through the available selections.

*Display for illustrative purposes only.*
They are active only while the compressor is operating in Temperature Capacity Control Mode. The two new setpoints are Low Suction Pressure Stop Load and Low Suction Pressure Force Unload. Both are entered as a pressure in gauge or inches of mercury (Hg). When suction pressure reaches the stop-load setpoint, loading of the compressor is inhibited. When the suction reaches the force-unload setpoint, the compressor will unload until the suction pressure is greater than the force-unload setpoint. Control will then be released to allow normal operation.

MLC STOP LOAD - The Motor Load Control Stop Load, reported as a percentage of the motor full-load amps (FLA), will prevent the compressor capacity control from loading when the setpoint is equaled or exceeded. NOTE: Consult motor manufacturer for recommended setpoint.

MLC FORCE UNLD - The Motor Load Control Force Unload, reported as a percentage of the motor full-load amps (FLA), will force the compressor to unload until the motor full-load amps (FLA) fall within 1% of the setpoint or lower. NOTE: Consult motor manufacturer for recommended setpoint.

HPCO - The High Discharge Pressure Cutout, reported in pounds per square inch gauge (G), will shut down the compressor if the discharge pressure equals or exceeds this setpoint.

HPA - The High Discharge Pressure Alarm, reported in pounds per square inch gauge (G) will trigger a prealarm if the discharge pressure equals or exceeds this setpoint.

AUX 1 and AUX 2 - May be configured for either an alarm (AL) or shutdown (SH) and with either a normally closed (NC) or normally open (NO) contact.

The setpoints provided on this display allow monitoring of compressor superheat and condensing in the separator. The following setpoints apply to the monitoring of the superheat and condensing in the separator.

ALARM/(SHUTDOWN) - The Alarm(AL)/(shutdown)(SH) setpoints select the conditions for an alarm or shutdown. If alarm is selected, the alarm will occur after a 30 second delay. If shutdown is selected, the shutdown will occur 60 seconds after the alarm.

OFFSET - This setpoint is the degrees F above the saturation-point temperature where the alarm or shutdown will occur.

ACT - The function selects whether the alarm/shutdown is activated or not.

CT FACTOR - The Current Transformer Factor records the proper current transformer factor to match the compressor motor FLA rating to the current transformer primary amp rating. The CTF factor is programmable and its correct value is determined by the following formula:

\[ CTF = \frac{1024 \times FLA}{10 \times CT} \]

* See motor nameplate.
** See CT located in starter panel.

EXAMPLE: FLA = 230 Amps
CT = 300 (300:5)

\[ CTF = \frac{1024 \times 230}{10 \times 300} = 80 \] (Round to whole number)

Low Motor Amp Failure - This addition to the program was added for the purpose of detecting a broken coupling. If the micro detects that the motor current is at 20% FLA or below (adjustable setpoint) for 2 minutes, then a "Low Motor Amp Cutout" will occur. The default for the setpoint is 20% with a range from 0% to 100%. If a setpoint of 0% is entered, this will disable this feature.

Low % FLA - The low % FLA setpoint is used to determine if the coupling has broken. A "Low % FLA" setpoint of 20% is the default value. It is adjustable from 0 to 100% FLA. Use the [Step] key to select this setpoint then enter the desired setpoint and press the [Enter] key.

HDTC - The High Discharge Temperature Cutout, reported in degrees Fahrenheit, will shut down the compressor if the discharge temperature equals or exceeds this setpoint.

HDTA - The High Discharge Temperature Alarm, reported in degrees Fahrenheit, will shut down the compressor if the oil temperature equals or exceeds this setpoint.

* Display for illustrative purposes only.
HOTC - The High Oil Temperature Cutout, reported in degrees Fahrenheit, will shut down the compressor if the oil temperature equals or exceeds this setpoint.

HOTA - The High Oil Temperature Alarm, reported in degrees Fahrenheit, will trigger a prealarm if the oil temperature equals or exceeds this setpoint.

LOTC - The Low Oil Temperature Cutout, reported in degrees Fahrenheit, will shut down the compressor if the oil temperature equals or falls below this setpoint.

LOTA - The Low Oil Temperature Alarm, reported in degrees Fahrenheit, will trigger a prealarm if the oil temperature equals or falls below this setpoint.

HON - The setpoint, in degrees Fahrenheit, to turn on the oil heater when the oil temperature in the oil separator equals or falls below this setpoint.

HOFF - The setpoint, in degrees Fahrenheit, to turn off the oil heater when the oil temperature in the oil separator equals this setpoint.

SETPOINT DISPLAYS, Page 13*

| LOTC=49 | HON=113 |
| LOTA=58 | HOFF=122 |

No Pump version and Cycling Oil Pump version when pump is not running. If the oil pressure is 25 pounds below the discharge pressure or the oil pressure is within 10 pounds of the suction pressure for 30 seconds, then the Alarm occurs. If the oil pressure is 30 pounds below the discharge pressure or the oil pressure is within 7 pounds of the suction pressure for 120 seconds and the Oil Pressure Alarm has already been set, then the Cutout occurs.

Full-lube version and Cycling Oil Pump version when pump is running. If the oil pressure is within 10 pounds of the discharge pressure for 30 seconds then the Alarm occurs. If the oil pressure is within 5 pounds of the discharge pressure for 10 seconds and the Oil Pressure Alarm has already been set then the Cutout occurs.

SETPOINT DISPLAYS, Page 14*

LOW OIL CUT = 030
LOW OIL ALARM = 025

SETPOINT DISPLAYS, Page 15*

| RXF-PLUS REV://://// |
| NO PUMP/R717 mmddyy |

This display shows the type and current revision of the program.

SETPOINT DISPLAYS, Page 16*

| COM SETUP=FRICK STD |
| ID#=/// BAUD=//// |

ID - The ID number is a programmable identification code used in telecommunications to access a specific compressor.

BAUD - Shows the baud rate of the RS-422 communication port. Both ports are configured as follows: word = 8 bit, parity = none or even, stop = 1 bit. The communications port is programmable from 300 to 19200 baud.

SETPOINT DISPLAYS, Page 17*

DAY MMDDYY HH:MM:SS
// ///// /////

DATE - The Date displays the current date in the following format: Month - Day - Year.

DAY - Day will display the current day of the week.

TIME - The Time displays the current time in the following format: Hours - Minutes - Seconds. The time is in 24:00:00 hour clock format.

SECURITY DISPLAY*

KEYBD ENTRY enabled
enter code *****

The [F2] function key will call up the Security display. The Security display allows the operator to either enable or disable the microprocessor’s keyboard and, thereby, prevent unauthorized tampering with the various adjustable setpoints. When enabled, the microprocessor keyboard is fully operative and the security lockout is not in effect. When disabled, the keyboard is rendered partially nonfunctional. All displays will still be accessible through the keyboard. If any attempt is made to enter new adjustable setpoints, however, the microprocessor will default to the Security display.

TO ENABLE THE KEYBOARD, press the [STEP] key so that the brackets beside Enter Access Code flash; key the proper five digit access code and press [ENTER]. The Setpoints Access will toggle from disabled to enabled and adjustable setpoint entry is now possible.

TO DISABLE THE KEYBOARD, press the [F2] function key to call up the Security display; press the [STEP] key until the brackets beside Enter Access Code flash; key the proper five digit access code and press [ENTER]. Now press the [STEP] key until the brackets beside Setpoints Access flash, and press the [CHANGE] key to toggle from enabled to disabled.

TO CHANGE THE ACCESS CODE, press the [F2] function key to call up the Security display; press the [STEP] key until the brackets beside Enter Access Code flash; key the proper five digit access code and press [ENTER]. Now, select the Enter Access Code a second time by pressing the [STEP] key until the brackets beside Setpoints Access flash; key in the new five digit access code and press [ENTER].

NOTE: Power loss will not effect the Security display.


LOST OR FORGOTTEN ACCESS CODE: Consult Frick Company for assistance.

* Display for illustrative purposes only.
(Start) TIMER - This is a time delay used to start the compressor. The timer only accumulates time whenever the pressure rises to or above the “START” setpoint and will reset if the pressure drops below the “START” setpoint.

STOP - The suction pressure must be less than or equal to the displayed “STOP” setpoint limit in order to stop the compressor. This setpoint works in conjunction with the “TIMER” setpoint located to the right of it on the display. NOTE: This limit must be set higher than Low Suction Pressure Cut-out and the Low Suction Pressure Alarm setpoints.

(Stop) TIMER - The (stop) TIMER is a time delay used to stop the compressor. The timer only accumulates time whenever the pressure drops to or below the “STOP” setpoint.

The Auto Cycle display provides for independently adjustable setpoints to turn the compressor on and off in response to the suction pressure or as an adjustable setpoint to limit the minimum slide valve position. The compressor can be started and stopped by the following pressure setpoints, even if the capacity control is selected to pressure.

START - The CC (capacity control) Temperature must be greater than or equal to the “START” setpoint in order to start the compressor. This setpoint works in conjunction with the “TIMER” setpoint located to the right of it on the display.

(Start) TIMER - This is a time delay used to start the compressor. The timer only accumulates time whenever the CC temperature rises to or above the “START” setpoint and will reset if the CC temperature drops below the “START” setpoint.

STOP - The CC temperature must be less than or equal to the “STOP” setpoint in order to stop the compressor. This setpoint works in conjunction with the “TIMER” setpoint located to the right of it on the display.

(Stop) TIMER - The (stop) TIMER is a time delay used to stop the compressor. The timer only accumulates time whenever the CC temperature drops to or below the “STOP” setpoint.

The Analog Offset Display is accessed by pressing [+/-] key.

The Auto Cycle Pressure Control Display is accessed by pressing the [F4] key.

The Auto Cycle display provides for independently adjustable setpoints to turn the compressor on and off in response to the suction pressure or as an adjustable setpoint to limit the minimum slide valve position. The compressor can be started and stopped by the following pressure setpoints, even if the capacity control is selected to temperature.

START - The suction pressure must be greater than or equal to the “START” setpoint in order to start the compressor. This setpoint works in conjunction with the “TIMER” setpoint located to the right of it on the display.

The Auto Cycle display provides for independently adjustable setpoints to turn the compressor on and off in response to the suction pressure or as an adjustable setpoint to limit the minimum slide valve position. The compressor can be started and stopped by the following pressure setpoints, even if the capacity control is selected to temperature.

START - The suction pressure must be greater than or equal to the “START” setpoint in order to start the compressor. This setpoint works in conjunction with the “TIMER” setpoint located to the right of it on the display.
**ANALOG OFFSET DISPLAY, Page 4**

<table>
<thead>
<tr>
<th>SUCT SPARE TEMP</th>
<th>+/- /+// //////F</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISCH OIL SEP TEMP</td>
<td>+0 0 +2</td>
</tr>
</tbody>
</table>

All analog values can be offset + or - 5 units, depending on which value is being adjusted. Use the [STEP] key to step through the desired setpoint. Press the [CHANGE] key to change the value of the offset by 1. The actual analog value will be displayed under the word “PRESS” or “TEMP”.

**COMMUNICATIONS DISPLAY**

<table>
<thead>
<tr>
<th>COM IN:</th>
<th>## OUT:</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM IN - Displays character which the microprocessor has received in the RS-422 communications port.</td>
<td></td>
</tr>
<tr>
<td>COM OUT - Displays the first 12 characters of information which the microprocessor has transmitted out the RS-422 communications port.</td>
<td></td>
</tr>
<tr>
<td>## - Displays the number of characters the microprocessor has received after a “#” character.</td>
<td></td>
</tr>
</tbody>
</table>

**ADDITIONAL FEATURES**

Compressor Differential Cutout - If the compressor runs for 5 consecutive minutes with a suction to discharge pressure differential of 25 pounds or less, then the “Comp Differential” cutout occurs. The ability to run the compressor at a low differential pressure required the following changes to ensure oil flow at the main oil injection port.

**a.** The compressor will force unloaded to 50% slide valve and display an “F Unload” message when the following condition is true:

\[((\text{suction pressure (PSIA)} \times 1.5) + 10) - 14.7 \geq \text{Oil Pressure and slide valve >50%}\]

**b.** The compressor will be prohibited from loading and display a “Ld Inhib” message while the following condition is true:

\[((\text{suction pressure (PSIA)} \times 1.5) + 15) - 14.7 \geq \text{Oil Pressure}\]

Sensor Fault Failure - A “Sensor Fault” cutout was added to the program to stop the compressor if a temperature or pressure sensor is determined to be at its minimum or maximum limit for 5 seconds. The following channels and conditions can cause this cutout:

- **Channel 2** - Low or High Discharge Temp (32 or 212°F)
- **Channel 3** - Low or High Oil Temp (0 or 180°F)
- **Channel 4** - Low Separator Temp (0°F)
- **Channel 6** - Low or High Oil Pressure (<0g or 285g)
- **Channel 8** - Low or High Discharge Pressure (<0g or 285g)
- **Channel 9** - Low Suction Pressure (29" only)

Pulse Load at 100% slide valve position - A new feature has been added which will stop loading the compressor at the normal rate when 100% slide valve is displayed. The load signal will then be pulsed for 2 seconds every minute when the slide valve is displaying 100% and the pressure is above the setpoint.

**1 TO 4 STEP CONDENSER CONTROL**

The following information pertains to the RXF PLUS micro with the condenser control feature option. The SETBACK feature is removed to allow for the addition of the condenser control programming. Pressing [F3] will take the operator directly to the condensers main operating status menu. The condenser feature uses three menus.

**CONDENSER PRES /// G**

Main condenser status menu, first page.

**ON /// DELAY /// SEC**

Condenser menu, second page.

**OFF /// LEAD STEP 1**

Condenser menu, third page.

The first condenser page displays the current discharge pressure and the current output status of up to four possible steps of condenser control. This menu displays status only and does NOT have any programmable setpoints.

Page 2 has four setpoints:

**ON 160 DELAY 030 SEC OFF 150 LEAD STEP 1**

This represents the setpoint at which the micro will sequence on additional steps of condenser capacity.

Page 3 has two setpoints:

**ACTIVE WHEN RUNNING**

**ACTIVE STEPS 1-3**

This setpoint allows the operator to program a given step as the LEAD step.

This setpoint has three possible settings that determine when the condenser control feature is active. They are: “ACTIVE RUNNING”, “ALWAYS”, and “NEVER”.

**OPERATION**
This setpoint allows the operator to select how many steps of condenser is required to be sequenced by the condenser control feature.

**NOTE:** Operator may select more steps that are available. (Supported by hardware)

### 3 LEAD LAG OPTION

Before operating the equipment, the operator must review this entire section. Both hardware and software must be installed accordingly, to ensure proper operation.

There are 3 primary areas that must be considered:

1. Eprom chips
2. Hardware wiring
3. Master Control Settings

Lead Lag capable chips sets are identified by the LL option designation. For example, a standard set of lead lag chips would have the following printed on its label:

**ORDER#**

- RXF-LL (a standard nonlead lag set would show just RXF)
- DATE U4 (U# indicates eprom chip socket location) or U5

In a group, at least one RXF Plus must have a 3 lead lag set of eproms installed. Further, the RXF Plus acting as the sequence controller must have its communication cabling wired according to the diagram under section “Wiring Diagrams”. While it is possible to use lead lag chips on all RXF Plus compressors, it is best to use standard chips on the OTHER compressors. Incorporating a complete programmable sequencing control program into the RXF Plus chip set necessitated removing features such as Setback and Auto-Cycle. Using standard chips on the other compressors allows those compressors to switch to their Auto-Cycle mode of operation automatically should communications be lost. All lead lag based control is via the controlling RXF Plus. Consult Section “Description of Menus and Their Setpoints” for definitions on the various setpoints regarding lead lag operation.

### Description of Menus and Their Setpoints

The following menus have been added:

**NOTE !** The operator may gain access to these menus by pressing the [CHANGE] key until the desired menu is reached or by pressing the Function key [F3] and then pressing the [change] or [ ] keys to move forward or backward through the available displays.

**LEAD LAG STATUS # 1**

- IS NOT LL SELECTED

# _ Represents compressor 1, 2, or 3.

The shaded area may show the following:

- OFF IN RMT START (Off in remote start.)
- OFF IN MAN START (Off in manual start.)
- OFF IN A/C START (Off in Auto-Cycle mode.)
- OFF ANTI-RECYCLE (Off with Recycle delay time remaining.)
- CUTOUT OR FAILED (Compressor is off due to a shutdown.)
- RUNNING RMT START (Running in remote start.)
- RUNNING MAN START (Running in manual start.)
- RUNNING A/C START (Running in Auto-Cycle mode.)
- NOT COMMUNICATING (While selected to operate in LL this compressor is not communicating.)
- NOT IN RMT START (Compressor is not available to start remotely.)
- S.V. NOT IN REM. (Compressor Capacity Control is not in Remote.)
- NOT LL SELECTED (Compressor has not been selected to operate in lead lag sequence.)

**LEAD LAG CONTROL MODE = PRESSURE**

This menu allows the operator to enable the lead lag control to operate by either temperature or pressure capacity control. Selecting DISABLED will turn the lead lag control feature OFF.

**NOTE:** Lead lag capacity control uses the pressure and temperature settings as entered on the controlling RXF Plus.

Displayable modes (in shaded area of display above) are:

- PRESSURE
- TEMPERATURE
- DISABLED

**START 085.3G 060 SEC**

**STOP 029.9 hg 060 SEC**

This menu allows the operator to enter a start and stop PRESSURE setpoint with a respective programmable time delay.

**START +99.9F 060 SEC**

**STOP -51.0F 060 SEC**

This menu allows the operator to enter a start and stop TEMPERATURE setpoint with a respective programmable time delay.

**Definition of Start Stop Sec. Terms:**

**START** - The “Comp Start” setpoint is the differential pressure or temperature above setpoint that must be equaled or exceeded in order to bring another compressor on line. This setpoint works in conjunction with the “Start Delay” setpoint.
START DELAY IN SECONDS - This is a common time delay used between each step in the load sequence to ensure that the need to add an additional compressor is justified. This will prevent a compressor starting due to momentary load surges. The timer only accumulates time whenever the pressure or temperature rises to within the “Stop” deadband.

STOP - The “Comp Stop” setpoint is the differential pressure or temperature below the setpoint that must be equaled or exceeded before a compressor is taken off line. This setpoint works in conjunction with the “Stop Delay” setpoint.

STOP DELAY IN SECONDS - This is a common time delay used between each step in the unload sequence to ensure that the need to stop a compressor is justified. This will prevent the stopping of a compressor in response to a momentary load dip and subsequently needing to restart it in a short period of time. The timer only accumulates time whenever the pressure or temperature is equal to or below the “Stop” setpoint, and resets any time the suction pressure rises to within the “Stop” deadband.

MINIMUM SLIDE VALVE
COMP. #1 = 50 % SV

From this menu the operator may enter a minimum slide valve setpoint for each compressor.

SEQUENCE SELECTION
COMP. #1 USES ID=01

This menu determines what compressors are to operate as the #1=LEAD, #2=INTERMEDIATE and #3=LAG. A unique ID code must be entered into the control panel of each compressor. The ID codes do not have to be in any particular sequence. However, for simplicity’s sake, it is usually best to use the ID codes 01 for the lead compressor, 02 in the intermediate, and 03 in the lag compressor. So, from this menu the compressor #1 entry should show ID=01, compressor #2’s entry should show ID=02, and compressor #3 should show ID=03.

NOTE: to change compressor sequence, the operator must change either the ID codes on each compressor or a better method would be to simply change the designated ID’s from this menu. Entering 00 will disable or remove a given control ID code.

Example: compressor #1 running, compressor #2 ID’d to 00, and compressor #3 off. Should the sequence require another compressor to come on line, then #2 would be skipped and #3 would be started.

Notes:

a. Compressor designated as #1 is always LEAD. Compressor designated as #2 is always the INTERMEDIATE. Compressor designated as #3 is always LAG.

b. For the compressor to be controlled it must be in REMOTE start and have its capacity control selected to remote.

c. If the machine is failed, cutout, not in remote, or not lead lag selected, then the compressor will not be controlled.

d. Any compressor below its minimum slide valve position will be loaded for one second each minute to ensure that they are within 5% of their minimum slide valve position.

If a compressor were allowed to unload further, it would not allow proper load balance and correct compressor sequencing would be difficult.

COMPRESSOR SEQUENCING

NOTE: The following references to pressure also apply to temperature since this is a temperature/pressure capable system.

On system start-up, as the high-stage pressure exceeds the Start setpoint for the Start Time Delay period, compressor #1 will come on line and modulate in response to pressure.

With #1 running:

If the load falls - #1 will unload to #1 Min SV setpoint. If the suction pressure drops below the Stop setpoint for the Stop Time Delay period, then #1 will turn off.

If the load rises - #1 will load up in response to pressure. If the Start setpoint is exceeded for the Start time delay period, then #2 will start.

With #1 and #2 running:

If the load falls - #2 will unload first to the #2 min. SV setpoint, then #1 will unload to its #1 min. SV setpoint. If the pressure drops below the Stop setpoint for the Stop time delay period, then #2 will stop.

If the load rises - #1 and #2 will load up in response to pressure. If the Start setpoint is exceeded for the Start time delay period, then #3 will start.

With #1, #2, and #3 running:

If the load falls - #1 will remain fully loaded, #3 will unload to the #3 min. SV setpoint, then #2 will unload to the #2 min. SV setpoint. If the pressure drops below the Stop setpoint for the Stop time delay period, then #3 will stop.

If the load rises - #1 will remain fully loaded, #2 and #3 will load up in response to pressure.

Differences between the RXF Plus 3 Lead Lag Program and the Standard RXF Plus Control Program

As was mentioned in the beginning of the 3 Lead Lag section, there are several differences between the lead lag and the standard version of the RXF Plus control programs. With the addition of the lead lag feature, the Setback feature was removed. Pressing the [F3] key will jump you directly to the lead lag control menus. It was also necessary to remove the Auto-Cycle feature. Pressing the [F4] key will show an appropriate message indicating this.

When using the lead lag program but not enabling the lead lag feature, a minimal communications capability was retained. The Information request command, the start and stop commands, and the motor amps request commands were left in the program. These commands are needed in situations where all program EPROM’s are of the lead lag version. All other commands were removed.
Since the lead lag version does not incorporate Auto-Cycle, it is best to use standard programs on the compressors that the RXF Plus controller sequences. This allows those compressors to automatically switch to their respective Auto-Cycle modes upon a 5 minute period of communications loss.

**TROUBLESHOOTING**

Most problems encountered with lead lag controls concern two main areas:

1. Communications problems
2. Optimizing control sequencing

The RXF Plus lead lag control program has a new feature that can be used to help diagnose communications problems. This feature may be accessed on a new display by pressing the \[F1\] key, then pressing the \[*\] key once. This new menu is actually the last menu in the program.

The period after the word COM will blink for each character received. While this may not be much help during normal data exchanges, it will help the operator notice when the micro is receiving abnormal single character hits. The ## shows actual number of characters received since the last pound # code was encountered, which will also reset this counter to zero. Should the micro not receive a valid command sequence (most commands are less than 14 characters long) starting with a pound character, this counter will count excessively high, up to 99 and stop, only resetting upon receiving a pound code. The shaded area to the right of IN: will show actual reception of data flow from right to left. This information should be the normal data responses from the compressors that the RXF Plus lead lag controller is requesting data from. The shaded area to the right of OUT: displays the actual command that the RXF Plus lead lag controller is sending. This does not represent a feedback loop verifying actual data sent; it only verifies what the micro is attempting to send.

The RXF Plus lead lag program has additional communications failure annunciation which will, on communication failure to a given compressor, report a message such as “COMP. #1 COMM. FAIL”, with its associated time of failure. This feature is enabled once a nonzero ID code is entered to add a compressor to the lead lag sequence and lead lag is enabled. The controller must get 3 successive communications failures to actually set the failure, which also will turn on the RXF Plus controllers alarm output. Individual (single hit) communications errors will actually display “NOT COMMUNICATING” in the LEAD LAG STATUS display. This message will disappear once normal communications have resumed.

Optimizing control sequence is combining an educated guess with trial and error. Every system is to some degree unique, either due to operating conditions, equipment calibration, or simply the operators desired control. The RXF Plus lead lag program, on initial power-up, defaults all setpoints to known values, such as all minimum slide valve settings will default to 50%. Start / Stop setpoints are actually defaulted to values that will prevent actual sequencing from occurring. Hence the need for an operator to work through all menus, entering setpoints as required for the system. Note that on initial power-up or simply on a loss of setpoints the micro will display a NEW annunciation message “FACTORY DEFAULTS SET”. If you need assistance in optimizing setpoints, contact the FRICK Service Dept.

**MICROPROCESSOR TELECOMMUNICATIONS**

The Frick RXF Microprocessor comes with an onboard telecommunications interface. The telecommunications feature permits interfacing the microprocessor with a modem, remote data communications terminal, or master computer via RS-422 protocol. In the case of a modem, telephone lines are used for the actual transmission of data permitting communications from a remote location.

The components necessary to utilize the telecommunications feature will vary with the application. Information concerning these items may be obtained from Frick Company, Waynesboro, Pa.

**COMMUNICATIONS PROTOCOL SPECIFICATIONS:**

All commands must be in ASCII (CAPS) to be recognized. A compressor with an ID code of [00] is considered disabled. ID Codes from [01] thru [99] are valid and are recognized by the microprocessor.

The following is a complete list of available command types:
The following is a detailed description of each command:

**RETURN COMPRESSOR STATUS INFORMATION: #IDI**

- **#** Start of command sequence.
- **ID** Compressor ID code.
- **I** Return Status information command.

**RETURNED ANSWER, ie: 090RRRN340**

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
<th>Position of returned data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2,3</td>
<td>Capacity control position.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Remote, Auto, Manual (Cap control)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Delay-recycle, Running, Off.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Rem, Man, Off, Auto (Compressor mode)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Cutout, Alarm, Normal.</td>
<td></td>
</tr>
<tr>
<td>8,9,10</td>
<td>Suction in PSIA.</td>
<td></td>
</tr>
</tbody>
</table>

*(Carriage return, line feed.)*

**COMPRESSOR STOP COMMAND: #IDSID**

- **#** Start command sequence.
- **ID** Compressor ID code.
- **S** Stop compressor command.
- **ID** ID code repeated for verification

**NOTE:** The compressor must be in the remote start mode for this command to be executed.

**RETURNED ANSWER:** A01

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
<th>Position of returned data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acknowledge of command sent.</td>
<td></td>
</tr>
<tr>
<td>2,3</td>
<td>ID code of compressor.</td>
<td></td>
</tr>
</tbody>
</table>

*(Carriage return, line feed.)*

**COMPRESSOR SLIDE VALVE CONTROL COMMANDS: #IDVLXX**

- **#** Start command sequence.
- **ID** Compressor ID code.
- **V** Compressor control command.
- **L** Load slide valve command.
- **U** Unload slide valve command.
- **XX** = 00 Turns selected output off.
- **XX** = 01 to 15 Turns selected output on for XX seconds.
- **XX** = 99 Turns selected output on.
- **S** Return slide valve position value.
- **P** Return slide stop position value.

If the command was #01VL00, then the load slide valve output on compressor #1 would be turned off. If the command was #01VL05, then the load slide valve output on compressor #1 would be turned on for 5 seconds, and would then automatically turn off. **NOTE:** The slide valve must be in the remote mode for this command to be executed.

**RETURNED ANSWER** *(for L or U commands): AID*

<table>
<thead>
<tr>
<th>Character</th>
<th>Description</th>
<th>Position of returned data</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Acknowledge of command sent.</td>
<td></td>
</tr>
<tr>
<td>2,3</td>
<td>ID code of compressor.</td>
<td></td>
</tr>
</tbody>
</table>

*(Carriage return, line feed.)*

**RETURNED ANSWER** *(for S command), ie: 090*

| 1,2,3     | Slide valve position.        |                           |

**RETURNED ANSWER** *(for P command), ie: 2.2*

*(Carriage return, line feed.)*

**RETURN PRESSURES COMMAND: #IDPX**

- **#** Start command sequence.
- **ID** Compressor ID code.
- **P** Return pressures command.

**X = S** Return suction pressure (PSIA).
**X = D** Return discharge pressure (g/hg).
**X = O** Return oil pressure (g).
**X = A** Return all pressures.

If the command was #01PS, then the microprocessor would dump the suction pressure.

**RETURNED ANSWER:** XXXX = 3 characters followed by a carriage return, line feed.

If using the “A” command, then the returned data would be:

XXXXXXXXXXXXX = 12 characters followed by a carriage return, line feed.

**RETURN TEMPERATURES COMMAND: #IDTX**

- **#** Start command sequence.
- **ID** Compressor ID code.
- **T** Return temperature command.

**X = D** Return discharge temperature.
**X = O** Return oil temperature.
**X = P** Return separator temperature.
**X = A** Return all temperatures as a string of data.

If the command was #01TS, then the microprocessor would dump the suction temperature.

**RETURNED ANSWER:**

XXXXX = 4 characters followed by a carriage return, line feed.

XXX = 3 characters followed by a carriage return, line feed for discharge, oil, and separator.

If using the “A” command, then the returned data would be:

XXXXXXXXXXXXX = 13 characters followed by carriage return, line feed.
RXF PLUS MICROPROCESSOR CONTROL PANEL

OPERATION

COMPRESSOR DISPLAY SCREENS COMMAND: #IDDX
# Start command sequence.
ID Compressor ID code.
D Compressor control command.
X = O Operating displays (7 pages, 308 chars)
X = S Adjustable Setpoints displays (10 pages, 440 characters)
X = X Fixed Setpoints displays (4 pages, 176 chars)
X = C Autocycle displays (3 pages, 132 chars)
X = B Setback displays (3 pages, 132 chars)
X = P Security display (1 page, 44 chars)
X +++ Analog Offset displays (4 pages, 176 chars)
X = F Freeze displays (7 pages, 308 chars)
X = R Shutdown Record displays (6 pages, 264 chars)
If the command was #01DX, then the microprocessor would dump the operating display.

RETURN FULL LOAD AMPS COMMAND: #IDA
# Start command sequence.
ID Compressor ID code.
A Return full load amps command.
If the command was #01A, then the microprocessor would dump the full load amps value.

RETURNED ANSWER:
XXX = 3 characters followed by a carriage return, line feed.

CHANGE SETPOINTS COMMAND: #IDC
# Start command sequence.
ID Compressor ID code.
C Change setpoint command.
xxx New setpoint
xx New setpoint
y g or h for gauge or inches
The following is the complete list of the setpoints that may be changed while in the change setpoints command:

01xxxx Capacity Control (pressure)
02xxxxx Change Low Pressure Cutout
03xxxxx Change Low Pressure Alarm
04xxxxx Change High Pressure Cutout
05xxxxx Change High Pressure Alarm
06xxxxx Change MLC Stop Load
07xxxxx Change MLC Force Unload
08xx Change Recycle Delay
09xxxxx Change CTF
10xxxxx Proportional Band (pressure)
11xxxx Dead Band (pressure)
12xx Cycle Time (pressure)
13xxxx Capacity Control (temperature)
14xxxxx Low Temp Cutout (temperature)
15xxxxx Low Temp Alarm (temperature)
16xxxxx Proportional Band (temperature)
17xxxxx Dead Band (temperature)
18xx Cycle Time (temperature)
19x Cap Control (temp/press mode switch)
01 Compressor ID code.

RETURNED ANSWER:
Axxxx The new setpoint which was sent followed by a carriage return, line feed.
If the command was sent #01DC01300g01, the capacity control setpoint would be changed to 30.0g and the returned answer is A300g followed by a carriage return, line feed.
If the command sent was #01CD0711001, the MLC force unload setpoint would be changed to 110% and the returned answer is A110 followed by a carriage return, line feed.
If the command sent was #01CD0520002, the returned answer is "BAD" followed by the ID number and a carriage return, line feed.

READ FAILURES COMMAND: #IDF
# Start command sequence.
ID Compressor ID Code.
F Read failures command.
Returned Answer:
0000000000000000000000000000000000000000000
Character Description
Position
1 High Press Cutout
2 High Press Alarm
3 Low Press Cutout
4 Low Press Alarm
5 Oil Press Cutout
6 Oil Press Alarm
7 Hi Oil Temp Cutout
8 Hi Oil Temp Alarm
9 Lo Oil Temp Cutout
10 Lo Oil Temp Alarm
11 Disch Temp Cutout
12 Disch Temp Alarm
13 Comp Auxiliary
14 Pump Auxiliary
15 Oil Level
16 Comp Differential
17 Low Temp Cutout
18 Low Temp Alarm
19 Aux. #1 Alarm
20 Aux. #1 Shutdown
21 Superheat Alarm
22 Superheat Cutout
23 Sep. Cond. Alarm
24 Sep. Cond. Cutout
25 Aux. #2 Alarm
26 Aux. #2 Shutdown
27 Sensor Low Sep Temp
28 Sensor High Sep Temp
29 Sensor Lo Disch Temp
30 Sensor Hi Disch Temp
31 Sensor Low Oil Temp
32 Sensor High Oil Temp
33 Sensor Low Oil Press
34 Sensor Hi Oil Press
35 Sensor Lo Suct Press
36 Future
37 Sensor Lo Disch Press
38 Sensor Hi Disch Press
39 Low Motor Amps
40 Future
41 Future
42 Future
43 Factory Defaults Set
Example:
If the answer returned was
00000000000000000000000000000000000000000033,
compressor #2 has an oil Press Alarm.

READ PROCESS TEMPERATURE COMMAND #IDTT
# Start command sequence.
ID Compressor ID Code.
TT Return process temperature command
Returned Answer:
XXX = 3 characters followed by a carriage return, line feed.

g or h : must be lower case - exception to "All commands must be caps" statement at beginning of section.
TROUBLESHOOTING THE RXF PLUS MICROPROCESSOR

This section contains information on troubleshooting and making corrections to the microprocessor and control circuits of the RXF unit. This section is composed of three parts: a general information section, a troubleshooting guide, and a section with illustrative schematics and data.

GENERAL INFORMATION

⚠️ CAUTION

THE COMPONENTS WITHIN THE MICROPROCESSOR CONSOLE CAN BE INADVERTENTLY DAMAGED BY STATIC ELECTRICITY OR MISHANDLING. ONLY QUALIFIED TECHNICIANS SHOULD DIRECTLY HANDLE THESE COMPONENTS.

1. DO NOT REMOVE the microprocessor console cover or attempt to make corrections to the microprocessor power supply without shutting off the control power. Accidental shorts can irreparably damage the SBC (single board computer) or the display screen.

2. DO NOT HANDLE the SBC or the display screen board when their cables are disconnected without first attaching a ground strap to prevent static electrical discharge from your body.

Most problems encountered with the microprocessor and control circuits will be the result of a wiring fault, blown fuse, or failure of a peripheral control such as a solenoid coil or a pressure transducer. Faults in the computer, while possible, are unlikely. If a fault develops in the computer, all functions will cease and the display screen will go blank.

The control system of the RXF compressor consists of a 120 volt AC (high voltage) side and a DC (low voltage) side. The 120 volt side actuates solenoids, relays, alarms, and other electromechanical functions. The DC side operates the computer and its various sensors. The microprocessor console contains the SBC (single board computer) and one display screen.

⚠️ WARNING

When working within the microprocessor console, DISCONNECT POWER. 120 VOLTS CAN CAUSE INJURY OR DEATH.

To troubleshoot the low voltage side of the RXF control circuits, it is necessary to have the following tools:

1. Accurate digital multimeter.*
2. Small wire stripper.
4. Small snip nose pliers.
5. 15 watt soldering iron (no larger).
6. .032, 60/40 rosin core solder.
7. IC chip extraction and insertion tools.*
8. Grounding strap.*
9. Static-free grounded work surface.

* Available from Frick.

Order kit 451862, P/N 111Q0451862.
## TROUBLESHOOTING FRICK SBC MICROPROCESSOR SYSTEM
(Refer to Wiring Diagrams)

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSES and CORRECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISPLAY IS INOPERATIVE</td>
<td>Check the 10 amp fuse (2FU) which controls all voltage going to the microprocessor. Shut off power to the microprocessor and confirm that all cable and wire connections are made.</td>
</tr>
<tr>
<td>COMPRESSOR AUXILIARY SHUTDOWN</td>
<td>Output 1 controls the Compressor Start Relay (2CR). If the compressor does not start and the LED for Output 1 is on, check the fuse FU1 (1.5 amp). If the problem persists, check the interposing relay (2CR). The Compressor Starter Auxiliary Contacts turn on Input 5 when they are closed. These contacts are located on the Compressor Starter.</td>
</tr>
<tr>
<td>OIL HEATERS DO NOT OPERATE</td>
<td>The oil heaters should operate only when the compressor is NOT running and the oil in the separator sump is cold. If the oil heaters do not work, check fuse 1FU (15 amp). If the fuse is not blown, check between Wires 25 and 2. If 120VAC is not found, check between wires 26 and 2. If 120VAC is found between wires 26 and 2, the Oil Heater Relay is defective. Next, check the voltage between Wires 11 and 2. If 120VAC is present, the Oil Heater Relay is defective. If you do not read 120VAC between Wires 11 and 2 when the LED for output 8 is on, check the fuse (FU8).</td>
</tr>
<tr>
<td>SLIDE VALVE DOES NOT LOAD and/or UNLOAD</td>
<td>Verify that the Slide Valve is in the AUTO mode and that capacity control is calling for loading or unloading (AUTO L or AUTO U will appear on the Operating display). Output 2 controls the Slide Valve Load Solenoid. If 120VAC is found across Wires 17 and 2, the Slide Valve Load Solenoid should be energized. If not, the solenoid is defective. If 120VAC is not found when the LED for Output 2 is on, check the fuse (FU2). Output 3 controls the Slide Valve Unload Solenoid. If 120VAC is found across Wires 16 and 2, the Slide Valve Unload Solenoid should be energized. If not, the solenoid is defective. If 120VAC is not found across Wires 16 and 2 when the LED for Output 3 is on, check the fuse (FU3).</td>
</tr>
<tr>
<td>SLIDE STOP DOES NOT INCREASE and/or DECREASE</td>
<td>Output 4 controls the Slide Stop 3.5 Vi Solenoid. If 120VAC is found across Wires 15 and 2, the Slide Stop 3.5 Vi Solenoid should be energized. If not, the solenoid is defective. If 120VAC is not found across Wires 15 and 2 when the LED for Output 4 is on, check the fuse (FU4). Outputs 4 and 5 control the Slide Stop 2.2 Vi Solenoid. If 120VAC is found across Wires 14 and 2, the Slide Stop 2.2 Vi Solenoid should be energized. If not, the solenoid is defective. If 120VAC is not found across Wires 14 and 2 when the LED for Output 5 is on, check the fuse (FU5).</td>
</tr>
<tr>
<td>LIQUID INJECTION SOLENOID DOES NOT ENERGIZE (LICO ONLY)</td>
<td>Verify that the Liquid Injection TXV is modulating properly and not feeding excessive liquid to the compressor. When oil temperature drops too low, the microprocessor SHOULD deenergize this solenoid. Output 6 controls the Liquid Injection Solenoid. If 120VAC is found across Wires 13 and 2, the Liquid Injection Solenoid should be energized. If not, the solenoid is defective. If 120VAC is not found when the LED for Output 6 is on, check the fuse (FU6).</td>
</tr>
<tr>
<td>HI VI LIQUID INJECTION PORT</td>
<td>Output 7 controls the Hi VI Liquid Injection Port solenoid. If 120VAC is found across Wires 12 and 2, the Hi VI Liquid Injection Port Solenoid should be energized. If not, the solenoid is defective. If 120VAC is not found when the LED for output 7 is on, check the fuse (FU7). <strong>NOTE:</strong> This output should only be on when the Vi is at 5.0.</td>
</tr>
<tr>
<td>ALARM CIRCUIT DOES NOT ENERGIZE</td>
<td>Output 9 controls the Alarm Circuit. The Alarm should turn on only when there is a prealarm or shutdown. If the Alarm does not sound when these conditions are found, check for 120VAC across Wires 10 and 2. If 120VAC is not found, check the fuse (FU9).</td>
</tr>
<tr>
<td>CONTROL PANEL DOES NOT RESPOND TO REMOTE CONTROL SIGNALS</td>
<td>Inputs 2 through 4 can be used to operate the compressor from a remote location. <strong>NOTE:</strong> Check the Operating display to verify that the compressor and the Slide Valve are in the REMOTE MODE. If 120VAC is found (across Wires 21 and 2, 22 and 2, and 23 and 2) and the input does not turn on, consult Frick Company.</td>
</tr>
</tbody>
</table>
## TROUBLESHOOTING FRICK SBC MICROPROCESSOR SYSTEM (Continued)

<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>PROBABLE CAUSES and CORRECTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTOR LOAD CONTROL (FORCED UNLOAD) OCCURS</td>
<td>The current transducer is used to convert the AC motor amps to a DC voltage signal for the microprocessor. If the %FLA reading from the Operating display is incorrect, consult Frick Co.</td>
</tr>
</tbody>
</table>
| PRESSURES ON THE OPERATING DISPLAY DO NOT APPEAR CORRECT | TEST 1 - Shut down the compressor and allow pressures to equalize. Discharge pressure and oil pressure should have the same reading.  
TEST 2 - If either oil pressure or discharge pressure read different pressures, one or both transducers are at fault. Valve off the suction transducer from the unit and open the vent valve on transducer manifold to atmosphere. If the suction transducer reads atmospheric pressure, then the suction transducer is correct.  
NOTE: A 1% tolerance is allowed for all transducers. |
| OIL PUMP DOES NOT START (Optional)     | Verify that the Oil Pump HAND-OFF-AUTO switch (1SS) is in the AUTO position and that the Emergency Stop Button is not depressed.  
Output 11 controls the Oil Pump Starter Relay (3CR) when in the AUTO mode. If HAND is selected on 1SS, Output 11 will not have any effect on the operation of the oil pump starter.  
If AUTO has been selected and the oil pump does not start, check for 120VAC between Wires 39 and 2. If 120VAC is not found when the LED for Output 11 is on, check the fuse (FU11).  
If the problem persists, check the control relay (3CR).  
The Oil Pump Starter Auxiliary Contact switches voltage to Input 6 (Wires 28 and 2) when the auxiliary contacts are closed and the AUTO mode is selected on 1SS. If the Input does not turn on and voltage is present at Input 6, consult Frick Company. |
| OIL PUMP IS RUNNING BUT THE COMPRESSOR DOES NOT START (Optional) | The (HAND-OFF-AUTO) Oil Pump Selector Switch (1SS) controls oil pump operation and must be in the AUTO position before the compressor can be started.  
Verify that the Slide Valve has unloaded to 5% or less. If the Slide Valve has not unloaded, troubleshoot the hydraulic system. The compressor will not start until the Slide Valve is unloaded.  
Output 1 controls the motor starter. Check between terminals 38 and 2 for 120VAC. If 120VAC is not found when the LED for Output 1 is on, check the fuse (FU1). |
| COMRESSOR DOES NOT AUTOMATICALLY LOAD OR UNLOAD | Verify that the [AUTO] key has been pressed and AUTO appears under SV Pos on the Operating display #4.  
If the problem persists, see the Troubleshooting section SLIDE VALVE DOES NOT LOAD and/or UNLOAD. |
| DISPLAY SCREENS DISPLAY SCRAMMBLED PATTERN OR LIST ALPHABET | A loose or improper connection between the displays and the SBC is indicated. Remove fuse (2FU, 10 amp) for 15 seconds, then restore to reset the displays. |
| ANNUNCIATOR DISPLAY MESSAGE "BAD E2PROM CHIP U6" | E2PROM chip malfunction or bad. The system may still be run by resetting all Adjustable Setpoints and clearing Annunciator Display. If condition repeats, replace E2PROM chip in slot U6. |
WIRING DIAGRAM

NOTE A:
If Compr. motor starter is a Frick supplied starter or
conforms to Frick starter specs, wire as shown on line 40
only, jumper 36 to 38.
If SCR is used as a isolated contact, wire as shown between
the hot & neutral links on line 63.
Same notes apply to oil pump starter circuit on line 63.

NOTE B:
For optional alarms & shutdowns: High level shutdown
et al., when referencing micro power to operate compr.
Motor starter (paragraph 1 note A), remove jumper 36 to 42
and insert isolated contact(s). Jump 42 to either 29 or 30
(aux 1 or aux 2). Program Aux to Shutdown normally closed.
When using SCR as a isolated contact (paragraph 1, note A),
remove jumper 36 to 42 & insert isolated contact(s). A
separate isolated contact should be inserted between 5
and 29 or 36, program Aux as above, see 1 PSI wiring below
for example. Aux 1 & Aux 2 can be programmed to alarm or
shutdown, nor, open or nor, closed.

NOTE C:
A surge suppressor or MOV to be installed across
all inductive loads in control center.

Surge suppression

Suppressor specifications:
NC network consisting of a 1 mfd capacitor, 600
Volts in series with a 47 ohm resistor.
Use Electrocore 750-975-3-6 or equal.

Varistor
Metal oxide varistor (MOV) specifications:
GE #H05A1ABA or equal for 175 volts
GE #H05A1BAA or equal for 230 volts

HIGH DISCH PREV SWITCH CUTOUT OPTION
5 MELCO
10 PROGRAM AUX 1 AS NOR, CLOSED
35 SHUTDOWN
36

38

42

COMP. Motor starter
If starter containing multiple
contactors, relays, & timers,
add suppressors or varistors
at each coil. (see note C)

Oil pump starter
Suppressor or varistor
installed at oil
pump starter's coil
(see note C)

* Indicates furnished or required with Oil Pump only
--- Indicates Devices supplied "by others" or Frick
When Optional or Required
--- Wiring by Others, all Wiring entering control
center (including Ground & Neutral) to be #14
AWG stranded wires unless specified otherwise.

5 TERMINALS in control center
No three phase wiring shall enter or leave micro panel
or be run in same conduit as any micro control wiring
entering or leaving micro panel.
No single phase over 300 volts shall enter or leave
micro panel.
For proper installation of electronic equipment,
see Frick publication 99-4068 Service Manual,
All control center wiring to be #16 AWG
stranded wire unless specified otherwise.

For installation of microprocessor board
and I/F cards, see MBM no 4.11.10.71
For High Pot Test Procedures, see MBM no 4.11.10.72
See 640-00606 for standard control center assembly

CUSTOMER'S CONNECTIONS TO CONTROL CIRCUIT (MINIMUM OPTIONS)

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<tr>
<th>Line No.</th>
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<td>3</td>
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<tr>
<td>SHT-2-24</td>
<td>9,4</td>
<td>Current Transformer</td>
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</table>
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING.

TEMPERATURE WIRING SPECIFICATIONS:
- 6' TEMPERATURE SENSOR WIRING IS IN CONDUIT, USE #7861 Belden Cable or Equal. 6' OPEN WIRING, USE #7603 Belden Cable or Equal. GROUND DRAIN WIRE AT PANEL END ONLY ON 4" SENSORS. GROUND AT SENSOR END ONLY ON 1" SENSORS. INSULATE DRAIN WIRE OPPOSITE END, 5000 FT. MAXIMUM DISTANCE.

NOTE 3A:
SPECIFICATIONS FOR TEMP. CAPACITY CONTROL
- SETPOINT RANGE: -60°F TO 110°F, SETPOINT RANGE: -50°F.
- TEMP PROBE 24" LONG, 3/16" I.D. (2) 24" LEADS
- MOUNTING IN WELL IS DESIRABLE
- USE HEAT TRANSFER COMPOUND
- WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING
- USE Belden #7861 Cable or Equal.

TEMP PROBE FRICK PN: 440A00351050
WELL FOR ABOVE, 3/16" NPT WELL CONNECTION. 1/2" NPT FOR CONNECTION BOX PN: 960A0025701
HEAT TRANSFER COMPOUND PN: 11132031807
SEE 64000031 FOR TEMPERATURE SENSOR ASSEMBLY Y65000001911

OPTIONAL WIRING FOR LEAD-LAG SEQUENCING

- USE Belden #777 OR EQUAL. (3 TWISTED PAIRS)
- COLOR CODING SHOWN IS Belden #777
- RS-422 WIRING SHALL BE SEPARATE FROM ALL OTHER WIRING
- WIRED AT FRICK IF BOTH UNITS ARE ON THE SAME RING.

NOTE: WHEN USING THE RS-422 PORTS FOR LEAD-LAG, THEY CANNOT BE USED FOR ANY OTHER COMMUNICATIONS.

FRONT PANEL
- DISPLAY
- POT
- KEY 1
- PAD
- STUD
- 15 CONG RIBBON CABLE
- 12 CONG RIBBON CABLE
- GREEN WIRE STUD
- SET SW 1 TO CORRECT VOLTAGE
- WRAP WIRES THROUGH TOROID TWO TIMES, ALL IN THE SAME DIRECTION
- TOROID FERRITE RING
- NO CONNECTION OR 350 FOR GROUNDED CIRCUITS
RXF PLUS MODELS 12, 15, & 19 without OIL PUMP (See OIL COOLING ADDITIONS)

* See additional Legend items on opposite page.
RXF PLUS MODELS 12, 15, & 19 with OIL PUMP (See OIL COOLING ADDITIONS)

**CONNECTIONS**

| 1. MAIN OIL SUPPLY | 1. PRESSURE TRANSDUCERS INDICATE: |
| 2. LOW VI LIQUID INJECTION | PE-1 OIL PRESSURE |
| 3. HIGH VI LIQUID INJECTION | PE-3 DISCHARGE PRESSURE |
| 4. ECONOMIZER | PE-4 SUCTION PRESSURE |
| 5. SUCTION PRESSURE | 2. TEMPERATURE PROBES INDICATE: |
| 6. CLOSED THREAD PRESSURE | TE-1 SUCTION GAS TEMPERATURE |
| 7. DISCHARGE PRESSURE | TE-2 DISCHARGE GAS TEMPERATURE |
| 8. LIQ. INJ. BLEED LINE | TE-3 LUBE OIL TEMPERATURE |
| 9. COALESCER BLEED LINE | TE-4 SEPARATOR OIL TEMPERATURE |
| 10. THERMOWELL (SUCT. TEMP.) | 3. TERMINATIONS "A" THROUGH "C" REFER TO |
| 11. MAIN OIL INJECTION | CONNECTION POINTS FOR VARIOUS |
| 12. OIL PRESSURE | OPTIONS. |
| 13. EVACUATION PORT | |

**NOTES:**

1. PRESSURE TRANSDUCERS INDICATE: PE-1 OIL PRESSURE, PE-3 DISCHARGE PRESSURE, PE-4 SUCTION PRESSURE.
2. TEMPERATURE PROBES INDICATE: TE-1 SUCTION GAS TEMPERATURE, TE-2 DISCHARGE GAS TEMPERATURE, TE-3 LUBE OIL TEMPERATURE, TE-4 SEPARATOR OIL TEMPERATURE.
3. TERMINATIONS "A" THROUGH "C" REFER TO CONNECTION POINTS FOR VARIOUS OPTIONS.
RXF PLUS MODELS 24, 30, 36, & 50 without OIL PUMP (See OIL COOLING ADDITIONS)

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* See additional Legend items on opposite page.
RXF MODELS 24, 30, 36, & 50 with OIL PUMP (See OIL COOLING ADDITIONS)

CONNECTIONS

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | MAIN OIL SUPPLY | 16 | THERMOWELL | NOTES: |
| 2 | SLIDE VALVE PISTON | 18 | SOLENOID FEED | 1. PRESSURE TRANSDUCERS INDICATE: |
| 3 | LOW VI LIQUID INJECTION | 19 | SUCTION PRESSURE | PE-1 OIL PRESSURE |
| 4 | HIGH VI LIQUID INJECTION | 20 | SEAL WEEPAGE | PE-3 DISCHARGE PRESSURE |
| 5 | ECONOMIZER |   |   | PE-4 SUCTION PRESSURE |
| 6 | OIL DRAIN |   |   |   |
| 7 | SUCTION PRESSURE |   |   |   |
| 8 | CLOSED THREAD |   |   |   |
| 9 | DISCHARGE PRESSURE |   |   |   |
| 10 | LIQ. INJ. BLEED LINE |   |   |   |
| 11 | COALESCER BLEED LINE |   |   |   |
| 12 | VENT - UNLOADING |   |   |   |

LEGEND (Cont.)

NOTES:

1. PRESSURE TRANSDUCERS INDICATE:
   - PE-1 OIL PRESSURE
   - PE-3 DISCHARGE PRESSURE
   - PE-4 SUCTION PRESSURE

2. TEMPERATURE PROBES INDICATE:
   - TE-1 SUCTION GAS TEMPERATURE
   - TE-2 DISCHARGE GAS TEMPERATURE
   - TE-3 LUBE OIL TEMPERATURE
   - TE-4 SEPARATOR OIL TEMPERATURE

3. TERMINATIONS "A" THROUGH "C" REFER TO CONNECTION POINTS FOR VARIOUS OPTIONS.
RXF MODELS 58, 68, 85, & 101 without OIL PUMP (See OIL COOLING ADDITIONS)

**LEGEND**

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RXF MODELS 58, 68, 85, & 101 with OIL PUMP (See OIL COOLING ADDITIONS)

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<tr>
<td>8 DISCHARGE PRESSURE</td>
<td>TE-3 LUBE OIL TEMPERATURE</td>
</tr>
<tr>
<td>9 LIQ. INJ. BLEED LINE</td>
<td>TE-4 SEPARATOR OIL TEMPERATURE</td>
</tr>
<tr>
<td>10 COALESKER BLEED LINE</td>
<td>3. TERMINATIONS &quot;A&quot; THROUGH &quot;C&quot; REFER TO</td>
</tr>
<tr>
<td>11 THERMOWELL (SUCT. TEMP.)</td>
<td>CONNECTION POINTS FOR VARIOUS</td>
</tr>
<tr>
<td></td>
<td>OPTIONS.</td>
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</tbody>
</table>
## RECOMMENDED SPARE PARTS *

<table>
<thead>
<tr>
<th>Description</th>
<th>QTY</th>
<th>MODELS</th>
<th>ITEM NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuse - 10 AMP</td>
<td>2</td>
<td>ALL</td>
<td>111Q0280687</td>
</tr>
<tr>
<td>Microprocessor Cover and Keypad</td>
<td>1</td>
<td>ALL</td>
<td>640D0010H01</td>
</tr>
<tr>
<td>Display</td>
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<td>ALL</td>
<td>333Q0000709</td>
</tr>
<tr>
<td>Output Module</td>
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<td>111Q0281061</td>
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<tr>
<td>Input Module</td>
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<tr>
<td>SBC Board</td>
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<td>ALL</td>
<td>333Q0000548</td>
</tr>
<tr>
<td>3 PDT Relay</td>
<td>1</td>
<td>ALL</td>
<td>333Q0000206</td>
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<tr>
<td>Base for 333Q0000206</td>
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<td>ALL</td>
<td>333Q0000207</td>
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<td>Fuse - 5 AMP</td>
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<td>333Q0000117</td>
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<tr>
<td>Cable Assy. - 16 Conductor, SBC to Display</td>
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<td>ALL</td>
<td>640B0020H01</td>
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<tr>
<td>Cable Assy. - 12 Conductor, SBC to Keypad</td>
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<td>ALL</td>
<td>640B0019H03</td>
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<td>Suppressor</td>
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<td>Fuse 1.5 AMP (may be supplied as 2 AMP)</td>
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<td>333Q0000573</td>
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<tr>
<td>Temperature Probe</td>
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<td>Pressure Transducer 0–100 PSIA</td>
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<tr>
<td>Pressure Transducer 0–300 PSIA</td>
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<td>Switch, Liquid Level 12–50</td>
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<td>12–50</td>
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<tr>
<td>Switch, Liquid Level 58–101</td>
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<td>58–101</td>
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<td>Button, Emergency Stop</td>
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<tr>
<td>Contact Block for Emergency Stop Button</td>
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<td>Fuse - 15 AMP</td>
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<td>Microprocessor Service Tool Kit</td>
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</table>

*Microprocessor parts; see S-70-400 IOM for recommended spare parts for unit.*