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PLC/DTAM SOFTWARE PROGRAMS FOR PUMPING INSTRUMENTATION AND CONTROL SKID "N"

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Abstract:

This document describe the software programs for the Programmable Logic Controller and the Datable Access Module for Pumping Instrumentation and Control skid "N". The Appendices contains copies of the printouts of these software programs.

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ACRONYMS AND ABBREVIATIONS

PLC - Programmable Logic Controller
DTAM - Data Table Access Module
OCS - Operator Control Station
FSAR - Basis for Interim Operation
TSR - Technical Safety Requirements
COB - Clean Out Box
LFL - Lower Flammability Limit
LCO - Limiting Condition for Operation
DOV - Diaphragm Operated Valve
RFPT - Recirculation Flush Pressure Transducer
JFPT - Jumper Flush Pressure Transducer
FGM - Flammable Gas Monitor
CGM - Combustible Gas Monitor
PXPT - Pump Transfer Pressure Transducer
OPT - Operational Test Procedure
ATP - Acceptance Test Procedure

PLC/DTAM SOFTWARE PROGRAMS FOR PUMPING INSTRUMENTATION AND CONTROL SKID "N"

1.0 INTRODUCTION

1.1 BACKGROUND

This document describes the software programs for the Allen-Bradley SLC 500 programmable logic controller (PLC) and the Allen-Bradley DTAM PLUS operator interface module used on Pumping Instrumentation and Control (PIC) skid "N". The software programs for the SLC 500 and DTAM Plus are based on the core programs provided by Allen-Bradley. The PLC and DTAM software programs on skid "D" for SX-104 are the baseline programs. These baselines have been tailored for U-farm skids. The skid "N" program for U-109 is similar to the skid "M" program for U-102. An Acceptance Test Procedure (ATP) and an Operational Test Procedure (OTP) verify that the software programs meet the specific requirements for U-109 pumping.

This document represents the final PLC and DTAM programs for PIC skid "N" at U-109. These programs were printed out after the performance of the OTP. The OTP acts as the final qualification test for the software programs. Functional requirements and details of the PLC ladder logic are described in this document. The final programs entered into the PLC and DTAM Plus are included as Appendices to this document.

1.2 SOFTWARE PROGRAM CONTROL

This is the official software control document for the PLC and DTAM program for PIC skid "N". Changes to the programs shall be documented as changes and/or revisions to this document. This is to comply with HNF-5034 for software configuration control for the PIC skid software programs.

2.0 FUNCTIONAL REQUIREMENTS

2.1 BASICS

The basic functional requirements for the software program are identified below.

- 2.1.1 Control the jet pump and dilution pump
- 2.1.2 Monitor conditions and provide alarm and pump shutdown for off normal conditions
- 2.1.3 Provide PIC status information to the Operator Control Station (OCS) and other PIC skids that are on the same transfer line
- 2.1.4 Provide flow information on the amount of waste being pumped

Functional requirements PIC skid "N" must meet are in the Authorization Basis documents which include the Final Safety Analysis Report, HNF-SD-WM-SAR-067, Revision 1; and Technical Safety Requirements, HNF-SD-WM-TSR-006, Revision 1. The applicable sections of the FSAR and TSR are listed below along with the requirements for the PIC skid controls.

2.2 FSAR REQUIREMENTS

FSAR chapter 2, Section 2.5.2, Waste Transfer identifies the following for PIC skid functional characteristics and controls and monitoring that impact the software program for the PIC skid PLC.

- 2.2.1 Section 2.5.2.1 (lines 33 and 34) states the salt well pump is allowed to run in an automatic mode.
- 2.2.2 Section 2.5.2.1.3 (lines 4 and 5) states the JR-1 valve has position indication that is monitored by the control system.
- 2.2.3 Section 2.5.2.1.4 has the following requirements for instrumentation and control.

PUMP DISCHARGE PRESSURE SENSORS: One discharge header pressure sensor provides a signal to the PLC for monitoring low and high pressures. A low or high pressure determined by the PLC will cause an alarm and pump shutdown. (See USQ evaluation TF-99-0830, rev. 0)

FLUSH WATER SUPPLY PRESSURE DETECTION SYSTEM: A pressure switch on the flush water line is activated upon change in pressure in the supply line, which results in an alarm and pump trip.

PROCESS FLOW TRANSMITTER AND TOTALIZER: A flow totalizer displays flow rates and totals gallons pumped.

PUMP SUCTION AND DISCHARGE PRESSURE TRANSMITTERS: Pump suction and discharge pressure transmitters provide pressure readings. The transmitters are connected to the control systems and can be used as a backup to the pressure switches for pressure interlocks.

- 2.2.4 Section 2.5.2.1.5 states that salt well pumps on different tanks pumping into a common line are interlocked with each other. The control is to provide a safe and orderly shutdown of the group of pumps in the event a single pump shuts down.
- 2.2.5 Section 2.5.2.1.5.5 states that leak detectors connected to the skid control system are interlocked such that upon detection of a leak, a visual alarm and pump shutdown causing an audible alarm will occur.

- 2.2.6 Section 2.5.2.1.5.6 requires flammable gas monitoring and automatic interlock with the pump controls to shut down the pump upon reaching of 25% of the lower flammability limit (LFL) in the pump pit.

2.3 COMPLIANCE WITH FSAR FUNCTIONAL REQUIREMENTS AND CONTROLS

- 2.3.1 Software design requirements must meet the functional requirements and controls stated above. The paragraphs below describe how these are met.

2.3.1.1 Salt well pump automatic mode:

An Auto/Manual selection is provided on the DTAM, which interfaces, with the PLC ladder logic.

2.3.1.2 JR-1 valve position indication:

Transducers LS-1 and LS-2 input to the PLC. The PLC logic interprets these inputs and the DTAM displays the JR-1 valve position as "PROCESS" or as "NON-PROCESS" when JR-1 is in the flush or prime positions.

2.3.1.3 Low discharge pressure causes alarm and pump shutdown:

Pressure sensor SALW-PT-6015N inputs to the PLC. The PLC processes an alarm for pressures below 15psig or above 140psig. The alarm signal goes to the DTAM and strobe light. A low-pressure condition opens the pump motor control interlock circuit after a 30 second delay causing the pump to shutdown. The high-pressure condition opens the pump motor control interlock circuit after a 3 second delay causing the pump to shutdown.

2.3.1.4 A pressure transducer on the flush water line causes alarm and pump shutdown:

Pressure transducer SALW-PT-6014N inputs to the PLC. The PLC processes an alarm for pressure in the jumper flush line. The alarm must actuate before the pressure reaches 18 psig. The alarm signal goes to the DTAM and strobe light. The high flush pressure opens the pump motor control interlock circuit after a 3 second delay causing the pump to shutdown.

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2.3.1.5 A flow totalizer displays flow rate and total gallons pumped:

A flow head measures the flow in the pump jumper and sends the information to a flow converter inside the Instrument Enclosure. The flow converter sends a 4 to 20mA signal to the PLC. The PLC processes the signal and the flow rate and total gallons are displayed on the DTAM.

2.3.1.6 Pump suction and discharge pressures are displayed: *Signals from transducers are sent to digital display units in the Instrument Enclosure. The discharge pressure signal is also processed by the PLC and displayed on the DTAM.*

2.3.1.7 Salt well pumps on different tanks that pump into a common line are interlocked with each other:

All eight U-farm tanks will pump into a common line going to tank SY-102. The following interlocks will be set up between the skids.

2.3.1.7.1 *A 30-minute timer starts when any skid is shutdown and has JR-1 **not** in the prime position and. Upon timing out, the other skids will shutdown.*

2.3.1.7.2 *High jumper flush pressure and high recirculation pressure on any skid starts a 20-minute timer and shuts down the other skids upon timing out.*

2.3.1.7.3 *Skids with JR-1 in flush position; leak detection; and leak detector trouble, loss of recirculation flush signal, or loss of jumper flush signal will cause pump shutdowns after a 3-second delay.*

2.3.1.8 Leak detectors connected to the skid are interlocked to cause visible and audible alarms upon leak detection:

Leak detector relays provide discrete inputs to the PLC. Upon detection of a leak or leak detector trouble, alarms and pump shutdown occur after a 3 second delay. For U-109, leak detection at the skid monitors the U-109 distribution pit, pump pit and the Over-ground transfer line that runs between these two pits.

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2.3.1.10 Flammable gas monitoring and automatic interlock to shut down pump upon reaching 25% of LFL.

The Combustible gas monitor (CGM) provides a discrete input to the PLC. Upon reaching 20% of the LFL, the PLC immediately shuts down the pump. The PLC also removes power from the pump and jumper heat trace cables by deenergizing the heat trace relays in the Instrument Enclosure if the heat trace is ON or prevents the heat trace relays from energizing if the heat trace is OFF. A CGM trouble alarm is also monitored by the PLC and shuts down the pump after a 3-second delay when the trouble contact opens.

2.3.1.11 There are other conditions that will cause an individual skid to shutdown. These conditions are communications failure with the software, signal loss from the jumper flush and recirculation flush transducers, and low flow in the recirculation line. There are other conditions monitored by all the skids on a common line causing pump shutdowns. These conditions for U-farm are leaks or detector troubles at Leak Detector station 4 (valve pits U-C, U-D, and COB 30) and Leak Detector station 5 (valve pits U-A, U-B, and COB 33); no dilution water flow; leaks or trouble at the SY-B valve pit; and if the portable exhaustor is on line. All of these conditions for individual and all the skids are tied into the interlock circuit in the PLC ladder logic for the pump permissive.

2.4 TSR REQUIREMENTS

2.4.1 The software program meets the following Technical Safety Requirements. A description of how the program meets the requirements is explained.

LCO 3.1.2: Service Water Pressure Detection System. The recirc flush pressure and jumper flush pressure signals from the transducers are fed to the PLC. Upon the jumper flush line pressure reaching 15psig, an alarm activates and the jet pump shuts down. Upon the recirculation flush line pressure reaching 15psig, an alarm activates and the jet pump shuts down.

LCO 3.1.3: Transfer Leak Detection Systems. The primary leak detector for the pump pit is monitored for leaks and/or trouble with the signals being sent to the PLC. The PLC logic activates an alarm and shuts down the jet pump upon receiving leak or trouble signals from the leak detection systems. Leak detection signals from other leak detection systems along the transfer route are also fed to the PLC and cause a jet pump shut down.

Administrative Control 5.10.2.c.6: Ignition Controls, Ignition Source Control Set #2. The jet pump does not meet Class I, Division 2, Group B design. Therefore, the jet pump must be automatically shut down upon detection of combustible gas in the pump pit. The Combustible Gas Monitor (CGM) monitors the pump pit for combustible gas. Contacts in the CGM transmitter open upon sensing greater than 20% of the Lower Flammability Limit (LFL) or CGM trouble. The PLC monitors the CGM contacts. Upon detecting opening of the CGM contacts for high LFL or trouble, the jet pump will shut down and power is removed from the pump and jumper heat trace.

3.0 SOFTWARE DESCRIPTION

3.1 U-109 SOFTWARE

The software programs for the PLC and DTAM at U-109 are based upon the program for U-102. Software changes made specifically for U-109 are identified below.

- 3.1.1 Temperature in the Water and WFIE cabinets is monitored by the PLC. An alarm occurs when the temperature equals or less than 35 degrees F. The alarm resets at 40 degrees F.
- 3.1.2 The CGM signal display at the DTAM has a range of 0 to 100% instead of 0 to 30%.
- 3.1.3 The U-109 program incorporates changes made to the other U-farm skids at U-103, U-105 and U-102. These changes include a minimum dilution flow rate and an increase in the communications inputs from other skids over the DH-485 network.

3.2 PLC INPUTS/OUTPUTS

- 3.2.1 Outputs:
 - 3.2.1.1 Current to Pneumatic (I/P) converter control consisting of a 4 to 20mA signal to control airflow to the DOV.
 - 3.2.1.2 Dilution metering pump control consisting of a 4 to 20mA signal.
 - 3.2.1.3 Motor starter permissive is 120vac power to the jet pump motor contactor to allow the pump to start.
 - 3.2.1.4 A 120vac-output power signal is sent as appropriate to the four indicator lights (red, green, blue and amber) on the instrument panel.
 - 3.2.1.5 A 120vac-output power to the pump and jumper heat trace relays.
 - 3.2.1.6 An 120vac-output signal to the dilution-metering pump control circuit.
 - 3.2.1.7 An 120vac-output signal to the dilution contactor.
 - 3.2.1.8 A 120vac output power to the strobe when alarms occur.
 - 3.2.1.9 A 120vac-output power to the horn when the jet pump shuts down.

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3.2.1.10 Output to the DH-485 line as to skid status for JR-1 prime and flush positions, leak detection alarms, skid shutdown, loss of recirculation and/or jumper flush signals, and high recirculation flush or high jumper flush pressures.

3.2.2 Inputs:

3.2.2.1 Combustible gas monitor flammability levels are received on a 4 to 20mA signal representing a 0 to 100 percent range of the lower flammability limit.

3.2.2.2 Discharge pressure signal of 4 to 20mA from transducer on jumper representing 0 to 300-psig.

3.2.2.3 Specific gravity signal of 4 to 20mA from transmitter in WFIE cabinet representing 0 to 20 inches.

3.2.2.4 Weight factor signal of 4 to 20mA from transmitter in WFIE cabinet representing 0 to 500 inches.

3.2.2.5 Water tank level signal of 4 to 20mA from transmitter in Water cabinet representing 0 to 62 inches.

3.2.2.6 Flow converter signal of 4 to 20mA from transmitter in Instrument cabinet representing 0 to 8gpm.

3.2.2.7 Recirculation flush pressure signal of 4 to 20mA from transducer on flush line representing 0 to 30psig.

3.2.2.8 Flush line pressure from transducer (old PS-2) of 4 to 20mA representing 0 to 30psig.

3.2.2.9 Discrete input from dilution system. Contact opens on no dilution water flow to provide alarm.

3.2.2.10 Discrete input from Combustible Gas Monitor (CGM) instruments. Two inputs are received. One for flammable gas levels greater than 20% of the LFL and one for CGM trouble. Either will cause an alarm, jet pump shutdown and the deenergizing of the pump and jumper heat trace relays.

3.2.2.11 Discrete inputs from the leak detection relays. Contacts from the MTL2313A relay open upon leak detection circuit trouble to cause an alarm and jet pump shutdown. Contacts from the 5300 relay open upon detection of a leak to cause an alarm and jet pump shutdown.

3.2.2.12 Discrete input from the recirculation flow meter located in the Water Cabinet. Contact opens upon low flow in the recirculation line to cause an alarm and jet pump shutdown.

3.2.2.13 Discrete inputs from transducers LS-1 and LS-2 located on the pump assembly. These transducers monitor the position of the JR-1 three-way valve. The inputs feed into displays, alarms and/or pump permissive inputs.

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- 3.2.2.14 A 4 to 20mA signal from the transfer line pressure transducer. The PLC uses this signal to monitor for low and high pressures on the transfer line.
- 3.2.2.15 Discrete input MR-1 from the jet pump motor starter. This contact closes when the motor contactor is energized.
- 3.2.2.16 Thermocouple inputs from the PLC enclosure, air compressor enclosure, water cabinet, WFIE cabinet, jet pump motor bearing, and pump jumper assembly.
- 3.2.2.17 Input from the DH-485 line as to the status of other skids and leak detector stations along the waste line transfer path. This input is used for alarms and jet pump shutdown when appropriate.

3.3 DTAM DISPLAYS, DATA ENTRY AND ALARMS

3.3.1 DTAM DISPLAYS

- 3.3.1.1 Alarm signals from the PLC.
- 3.3.1.2 Analog data inputs from the PLC for specific gravity, discharge pressure, recirculation flush pressure, jumper flush pressure, flammable gas levels, Diaphragm Operated Valve (DOV) parameters, and dilution ratio.
- 3.3.1.3 Temperatures for the Instrument Enclosure, the Air compressor cabinet, WFIE cabinet, Water cabinet, Pump motor, and jumper assembly

3.3.2 DTAM DATA ENTRY

- 3.3.2.1 Signal to turn jumper and pump heat trace ON or OFF.
- 3.3.2.2 Signal to set pump operation to Manual or Automatic.
- 3.3.2.3 Alarm acknowledge signal.
- 3.3.2.4 DOV set point and parameters.
- 3.3.2.5 Pump ON or OFF input.
- 3.3.2.6 Jumper temperature setpoint.
- 3.3.2.7 Dilution ratio setpoint input.
- 3.3.2.8 Dilution minimum flow input.

3.3.3 DTAM ALARMS

- 3.3.3.1 Individual alarm screens for each incoming alarm.
- 3.3.3.2 Screens 101 to 153 for individual alarm acknowledge.

3.4 JET PUMP INTERLOCKS

There are two jet pump interlock strings in the ladder diagram. One string is for equipment along the transfer path that monitors or feed into the transfer route. The other interlock string consists of the local PIC skid conditions. These two interlock strings are identified below for the U-109 ladder logic. All the interlock conditions must be satisfied for the jet pump to run or if the pump is running and a condition becomes unsatisfied, the pump is shut down.

3.4.1 Interlock string for other equipment along the transfer route:

- 3.4.1.1 COB U-33 leak
- 3.4.1.2 COB U-33 trouble
- 3.4.1.3 Dilution tank no flow
- 3.4.1.4 Leak detected by any of the seven other U-farm PIC skids
- 3.4.1.5 Any of the seven other U-farm PIC skids with JR-1 in flush position
- 3.4.1.6 Leak detector station #4 trouble
- 3.4.1.7 The 30 minute time out by any of the other seven U-farm PIC skids being shutdown and JR-1 not in the prime position
- 3.4.1.8 Valve pit U-C leak
- 3.4.1.9 Valve pit U-C trouble
- 3.4.1.10 Valve pit U-D leak
- 3.4.1.11 Valve pit U-D trouble
- 3.4.1.12 Any of the other seven U-farm PIC skids with high jumper flush pressure
- 3.4.1.13 Leak station #5 trouble
- 3.4.1.14 Valve pit U-A leak
- 3.4.1.15 Valve pit U-A trouble
- 3.4.1.16 Valve pit U-B leak
- 3.4.1.17 Valve pit U-B trouble
- 3.4.1.18 COB U-30 leak
- 3.4.1.19 COB U-30 trouble
- 3.4.1.20 Any of the other seven U-farm PIC skids with high recirculation line pressure
- 3.4.1.21 Any of the other seven U-farm PIC skids with loss of recirculation flush pressure signal
- 3.4.1.22 Any of the other seven U-farm PIC skids with loss of jumper flush pressure signal
- 3.4.1.23 Portable exhaustor on line
- 3.4.1.24 Leak or trouble alarm from SY-02A and SY-B valve pits

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- 3.4.2 Interlock string monitoring the U-109 PIC skid conditions:
 - 3.4.2.1 Low pressure from the PXPT transducer while pump is running
 - 3.4.2.2 High pressure from the PXPT transducer
 - 3.4.2.3 High jumper flush pressure
 - 3.4.2.4 JR-1 in the flush or prime position
 - 3.4.2.5 Pump pit leak
 - 3.4.2.6 Data communications failure on the DH-485 link
 - 3.4.2.7 Recirculation line low flow
 - 3.4.2.8 FGM greater than 25% of LFL (Not used, replaced by CGM interlocks.)
 - 3.4.2.9 Jumper flush pressure signal loss
 - 3.4.2.10 Pump pit leak detector trouble
 - 3.4.2.11 Recirculation line high flush pressure
 - 3.4.2.12 Leak detector 1 trouble
 - 3.4.2.13 Recirculation flush pressure signal loss
 - 3.4.2.14 Leak detector 1 leak
 - 3.4.2.15 CGM greater than 20% of LFL
 - 3.4.2.16 CGM trouble
 - 3.4.2.17 Other equipment interlock (the above string)

3.5 INTERLOCK and ALARM CONDITIONS

Alarms occur at the PIC skid when the above interlocks are not satisfied. Some alarms are immediate while some are delayed. The alarm conditions are listed below along with the response time for the alarm to occur and whether the jet pump shuts down.

CONDITION	TIME DELAY	PUMP SHUTDOWN
Low transfer pressure	30 seconds	Yes
Recirc low flow	30 seconds	Yes
Communications failure	60 seconds	Yes
High flush press on other skids	20 minutes	Yes
Other skids shutdown and in JR-1 not in prime position	30 minute, then 3 second delay	Yes
JR-1 in flush # or prime*	None	Yes
Pump shutdown*	None	---
FGM greater than 25% LFL	None(not used)	Yes(not used)
High transfer pressure	3 seconds	Yes
Jumper flush pressure greater than 15-psig #	3 seconds	Yes
Pump trouble	3 seconds	Yes
Distribution Pit leak #	3 seconds	Yes
Distribution Pit leak detector trouble	3 seconds	Yes
Leak detector 1 leak in (Pump pit and OGT)	3 seconds	Yes
Leak detector 1 trouble (Pump pit and OGT)	3 seconds	Yes
Recirc flush pressure signal loss #	3 seconds	Yes
Another U-farm skid with JR-1 in flush position	3 seconds	Yes
Jumper flush pressure signal loss #	3 seconds	Yes
Another U-farm skid with leak alarms	3 seconds	Yes
Another U-farm skid with loss of jumper flush pressure signal	3 seconds	Yes
Another U-farm skid with loss of recirculation flush pressure signal.	3 seconds	Yes
Leak Station 4 trouble	3 seconds	Yes
Leak Station 5 trouble	3 seconds	Yes
Valve Pit U-A Leak	3 seconds	Yes
Valve Pit U-A trouble	3 seconds	Yes
Valve Pit U-B Leak	3 seconds	Yes
Valve Pit U-B trouble	3 seconds	Yes

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CONDITION	TIME DELAY	PUMP SHUTDOWN
Valve Pit U-C Leak	3 seconds	Yes
Valve Pit U-C trouble	3 seconds	Yes
Valve Pit U-D Leak	3 seconds	Yes
Valve Pit U-D trouble	3 seconds	Yes
COB U-30 Leak	3 seconds	Yes
COB U-30 Trouble	3 seconds	Yes
COB U-33 Leak	3 seconds	Yes
COB U-33 Trouble	3 seconds	Yes
Valve Pits SY-A or SY-B or SY-02A pump pit alarm	3 seconds	Yes
Another U-farm skid with high recirc pressure	20 minutes	Yes
Dilution tank no flow	5 minutes	Yes
Recirc pressure greater than 15PSIG #	3 seconds	Yes
Portable Exhauster on line (exhauster not physically installed)	3 seconds	Yes
CGM high LFL	None	Yes
CGM trouble	3 seconds	Yes
Pump is less than 40 degrees F or the jumper is greater than 225 degrees F	3 seconds	No
Pump trouble	3 seconds	No
Water tank low level	None	No
Instrument enclosure greater than 130 degrees F	None	No
Air compressor enclosure greater than 130 degrees F	None	No
Water cabinet less than 35 degrees F	None	No
WFIE cabinet less than 35 degrees F	None	No
Salt well low level	None	No. DOV closes

* If the U-109 skid "N" shuts down and the JR-1 valve is not in the prime position, a 30-minute timer starts. Upon timing out, any other skids on the same transfer route will shut down.

These alarms will also cause any other skids on the same transfer route to shut down.

3.6 PIC SKID COMMUNICATIONS

The PIC skid at U-109 communicates with the computer at 271-U over a DH-485 link. The PLC monitors the link to verify the communications link is functional. This communications link monitoring ties into the interlock circuit for the jet pump control.

PIC skid status information is sent over the link to the 271-U computer. Skid status information monitored is listed below.

- 3.6.1 JR-1 in prime position
- 3.6.2 JR-1 in flush position
- 3.6.3 PIC skid shut down
- 3.6.4 Leak detected or leak detector trouble in pump pit
- 3.6.5 Skid high flush pressure
- 3.6.6 Skid high recirc flush pressure
- 3.6.7 RFPT signal loss
- 3.6.8 JFPT signal loss

When other PIC skids are installed in U-farm, the above information will affect those skid's operation. Other skids connected in U-farm will shut down either immediately or after some delay should the U-109 skid be shut down conditions 3.6.2, or 3.6.4 through 3.6.8 occurring. Should the U-109 skid shut down and JR-1 is not placed in the prime position within 30 minutes, then other skids connected in U-farm will shut down. A similar type of condition will exist for the skid at U-109 which will shutdown upon shut down of other U-farm skids.

The software is written such if other skids are not connected, no alarm or shut down conditions exist. Fault conditions from other U-farm skids are provided to the U-109 skid over the DH-485 link. As explained in the interlock section above, a loss of the DH-485 communications causes jet pump to shut down. There is also communications between the U-farm OCS and the S/SX-farm OCS computers. This communication is used to send information concerning leak detection alarm or trouble in the SY-02A pump pit and the SY-B valve pit.

4.0 SOFTWARE PROGRAM DESCRIPTION

This section explains the input and output requirements of the PLC; alarm set points and control system functions. These requirements are used to develop the ladder logic for pump control and alarm actuation. The complete ladder logic is in Appendix B for the PLC and Appendix C for the DTAM program.

4.1 Program locations

The program for the PLC is stored in the CPU located in the PIC skid Instrument Enclosure. The DTAM program is stored in the DTAM unit located on the door of the Instrument Enclosure. The programs for the PLC and DTAM are developed from software on a laptop computer. After the program is written on the laptop, it is downloaded to the PLC and DTAM through an interface link.

Backup copies of the PLC and DTAM programs are stored on 3-1/2" disks. There are two backup copies, one for the design agent and one for file. The backup copies represent the final program in the PLC and DTAM. The PLC file is "U109NEW1R1" and the DTAM file is "U109NEW1."

4.2 Program layout

- 4.2.1 The program is written where ladder 2 is the main program. Ladders 3 through 20 are subroutines. The main program uses the subroutines as required during running of the program. The subroutines are listed below as to what function each performs.
- 4.2.2 Subroutine 3: Program initial conditions are set including initializing the thermocouple module to receive inputs.
- 4.2.3 Subroutine 4: Inputs to the PLC modules are gathered and placed into an N60:*/ address location. The rest of the program when needing that particular input uses this address.
- 4.2.4 Subroutine 5: Checks for alarm conditions and has the logic for the main interlock for jet pump control.
- 4.2.5 Subroutine 6: Contains the logic for the interlock logic for other equipment connected to the transfer route.
- 4.2.6 Subroutine 7: Contains the logic for the jet pump and dilution pump controls to run these pumps. The logic for the total flow calculation to be displayed on the DTAM is this subroutine.

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- 4.2.7 Subroutine 8: This subroutine is the master alarm acknowledge logic.
- 4.2.8 Subroutine 9: Heat trace control logic
- 4.2.9 Subroutines 10 and 14: These subroutines are for the DH-485 communications link.
- 4.2.10 Subroutine 11: This subroutine is only used if the jet and dilution pumps are to be run by control from the 271-U computer. (This is not used nor was this function tested.)
- 4.2.11 Subroutine 12: This subroutine handles the inputs for the other equipment status on the transfer route.
- 4.2.12 Subroutines 13 and 16: Flow meter output routines.
- 4.2.13 Subroutine 15: This subroutine is the 30-minute time for the other skids in U-farm when a skid is shut down and in the process position. When the 30-minute timer times out, the skid shuts down unless JR-1 of the shut down skid is placed in the prime position.
- 4.2.14 Subroutine 17: Individual alarm acknowledge routine.
- 4.2.15 Subroutine 18: Alarm output to the strobe light, horn and/or instrument panel amber, blue, green or red indicator lights.
- 4.2.16 Subroutine 19: Sends outputs to the PLC output modules.
- 4.2.17 Subroutine 20: Sends an output to the dilution metering pump controls.

4.3 Inputs and Outputs

Inputs are brought into the PLC through modules 1 through 12. For U-109 the inputs are assigned addresses N60:*. Appendix A lists the addressing for the inputs to the PLC. Outputs are also assigned an N60:* address and can be found in Appendix A.

4.4 Temperature

The jumper and pump temperatures are to remain between 40 degrees F and 225 degrees F when the heat trace is ON. An alarm actuates for temperatures outside these limits. The temperature is monitored by the PLC through thermocouple probes at the pump and jumper assemblies.

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The temperature of the Instrument Enclosure is not to exceed 130 degrees F. An alarm actuates for temperatures equal to or greater than 130 degrees F. The alarm resets when the temperature drops below 125 degrees F.

The temperature of the Air Compressor Enclosure is not to exceed 130 degrees F. An alarm actuates for temperatures equal to or greater than 130 degrees F. The alarm resets when the temperature drops below 125 degrees F.

The temperature of the WFIE Cabinet is not to decrease below 35 degrees F. An alarm actuates for temperatures less than 35 degrees F. The alarm resets when the temperature rises above 40 degrees F.

The temperature of the Water Cabinet is not to decrease below 35 degrees F. An alarm actuates for temperatures less than 35 degrees F. The alarm resets when the temperature rises above 40 degrees F.

4.5 Alarms

Various inputs to the PLC provide information to determine if an alarm condition exists. Alarm conditions are processed in subroutine 5 in the PLC ladder logic program. Addresses N20:15/*, N20:16/*, N20:55/* and N20:56/* are actuated upon alarm conditions and turn on the strobe light (subroutine 18 of the PLC ladder logic) at the Instrument Enclosure. The horn is turned on when a pump shutdown occurs. Addresses N20:24/*, N20:25/*, N20:51/* and N20:52/* provide alarm input to the DTAM.

Alarms are acknowledged at the DTAM on screen #23. Acknowledging the alarm clears the signal to the strobe and horn only (subroutine 17 of the PLC ladder logic). The visual alarm remains on the DTAM screen until the alarm condition clears in the field.

Appendix A lists all the alarm conditions monitored, the addresses and alarm messages. Appendix C is a copy of the DTAM program containing all the alarm screens.

4.6 Pump Control

Subroutine 7 outputs to the motor starter for the jet pump. Three conditions in the software logic must be satisfied to provide the signal for the motor contactor to close. These are: 1) the interlocks must be satisfied. These interlocks include the skid interlocks in subroutine 5 and interlocks to any other tanks on the same transfer line as required in subroutine 6. 2) Pump to the ON position from the DTAM and 3) pump trouble cleared in subroutine 5. Pump trouble clears when the pump is ON from the DTAM and the auxiliary contact at the motor starter is closed.

4.7 Program Set Points

The set points for U-109 are the same as U-102. Each set points is identified below along with the PLC logic values.

- 4.7.1 Jumper flush pressure alarm point: The jumper flush pressure is set to alarm at pressures greater than 15PSI. This is to meet the requirements of LCO 3.1.2 that requires the service water pressure to be less than 20psi. The pressure transducer range is 0 to 30psi, with a 4 to 20mA output signal to the PLC. The internal logic value of the PLC for a 4 to 20mA signal is 3277 to 16384. The PLC logic value for an alarm set point of 15psi is 9830.
- 4.7.2 Recirculation flush pressure set point: The recirculation flush pressure is set to alarm at 15psi. This set point is to meet the same requirements as the jumper flush pressure, but is set to detect any leakage past the check valves in the recirculation line during pumping of the waste. The transducer range is 0 to 30psi, with a 4 to 20mA signal output to the PLC. The PLC logic value for 15psi is 9830.
- 4.7.3 Jumper and recirculation flush pressure signal loss: The input signal from the jumper and recirculation flush pressure transducers is not fail-safe. Therefore, the 4 to 20mA signal is monitored to a signal loss due to a failed transducer, broken wire or failure of the intrinsic safe module. The PLC logic value is set at 2500. This value is selected because the steady state value of the transducer is below the 3277 when the piping has no liquid inside. The 2500 value will prevent nuisance alarms and pump shutdowns.
- 4.7.4 Water tank level: PIC skid "N" has a 62-inch high water tank. The set points for low water level and reset were calculated to correspond to the relative volume as in the older skids with a 50-inch high tank. The alarm level is set at 12.25 inches and the reset level is set at 15.5 inches. The level transmitter outputs a 4 to 20mA signal to the PLC. The corresponding PLC logic value for 12.25 inches is 5867 and for 15.5 inches is 6554.
- 4.7.5 Low and High pressure: a pressure transducer monitors the pressure on the pump and jumper assembly transfer line. A 4 to 20mA signal is sent to the PLC. The PLC program determines a low and a high pressure alarm point. The low pressure is set at 15psig and the high pressure is set at 140psig. The PLC logic value for 15psig is 3932 and for 140psig is 9394.

4.8 Other U-farm Skids

Other U-farm skids when installed will interface over the DH-485 data link to the U-109 skid "N". The PLC ladder logic is set up for these future interfaces. Future skids in U-farm will be at tanks U-106, U-107, U-108, U-111, and the emergency skid. The types of interfaces are identified below. The PLC logic is an open contact, which is monitored for a closed condition causing a timer to start and/or the skid to shut down.

- 4.8.1 Skid JR-1 alarm conditions: When another skid has JR-1 in the flush position, the U-109 skid will shut down after 3 second delay upon receiving the signal over the DH-485 link. If another skid has JR-1 in the process position and that skid is in the shut down mode, a 30-minute timer starts. Upon timing out of the timer, the U-109 skid will shut down after a 3-second delay. The 30-minute timer allows operations personnel time to move the JR-1 to the prime position upon skid shut down.
- 4.8.2 High flush pressures: Upon high flush pressure in the jumper of an on-line skid, a 20-minute timer starts. Timing out of the timer will cause the U-109 skid to shut down. The 20-minute timer allows operations personnel time to perform work on an on-line skid without immediately shutting down the other on-line skids. High recirculation pressure on a skid will cause the shut down of the other on-line skids after a 20-minute delay upon receiving the signal over the DH-485 link.
- 4.8.3 Leak detection or leak detector trouble: Leak detection or trouble at Leak Detector Stations 4 and/or 5 in U-farm, at the SY-02A, SY-A or SY-B valve pits, and/or at any other on-line skid in U-farm, will cause the U-109 skid to shut down after a 3 second delay upon receiving the signal over the DH-485 link.
- 4.8.4 Flush pressure signal losses: The loss of signal to the PLC from either the jumper flush pressure or the recirculation flush pressure transducers on any of the other seven U-farm skids, will cause the U-109 skid to shutdown after a 3-second delay upon receiving the signal over the DH-485 link.

APPENDICES

APPENDIX A: PLC AND DTAM ADDRESSING

APPENDIX B: PLC LADDER LOGIC PROGRAM

APPENDIX C: DTAM PROGRAM

APPENDIX A

PLC ADDRESSES

TERMINATION	SIGNAL	TAG	ADDRESS	DESCRIPTION
O:1.0	ANALOG OUTPUT		N60:0	
O:1.1	ANALOG OUTPUT		N60:1	
I:1.0	ANALOG INPUT	CGM	N60:2	CGM ANALOG (PIT)
I:1.1	ANALOG INPUT	FGM	N60:3	FGM ANALOG (DOME)(RESERVED)
O:2.0	ANALOG OUTPUT	EPC	N60:4	OUTPUT TO DOV
O:2.1	ANALOG OUTPUT	DIL	N60:5	OUTPUT TO METERING PUMP
I:2.0	ANALOG INPUT	PDPT	N60:6	PUMP DISCHARGE PRESSURE
I:2.1	ANALOG INPUT		N60:7	
O:3.0	ANALOG OUTPUT		N60:8	
O:3.1	ANALOG OUTPUT		N60:9	
I:3.0	ANALOG INPUT		N60:10	
I:3.1	ANALOG INPUT		N60:11	
I:4.0	4-20mA	SGT	N60:12	SPECIFIC GRAVITY 0-20 IN. H2O
I:4.1	4-20mA	WFT	N60:13	WEIGHT FACTOR 0-500 IN. H2O
I:4.2	4-20mA	LT	N60:14	WATER TANK LEVEL 0-62 INCHES
I:4.3	4-20mA	CNV	N60:15	FLOW METER 0-8GPM
I:5.0	4-20mA	RFPT	N60:16	RECIRC FLUSH PRESSURE
I:5.1	4-20mA	JFPT	N60:17	JUMPER FLUSH PRESSURE (PS-2)
I:5.2	4-20mA	PXPT	N60:18	TRANSFER PRESSURE (PS-1)
I:5.3			N60:19	
I:6.0			N60:20	
I:6.1			N60:21	
I:6.2			N60:22	
I:6.3			N60:23	
I:7.0	T/C	TE-6002	N60:24	PUMP TEMPERATURE
I:7.1	T/C	TE-6003	N60:25	JUMPER TEMPERATURE
I:7.2	T/C	TE-6001	N60:26	AIR COMPR. CABINET TEMPERATURE
I:7.3	T/C	TE-6004	N60:27	INSTRU. CABINET TEMPERATURE
O:8.0	DISCRETE OUTPUT		N60:28/0	
O:8.1	DISCRETE OUTPUT	DIL-P	N60:28/1	DILUTION CONTACTOR
O:8.2	DISCRETE OUTPUT		N60:28/2	
O:8.3	DISCRETE OUTPUT	DIL-C	N60:28/3	DILUTION METERING PUMP
O:8.4	DISCRETE OUTPUT		N60:28/4	
O:8.5	DISCRETE OUTPUT		N60:28/5	
I:8.0	DISCRETE INPUT		N60:28/6	
I:8.1	DISCRETE INPUT	DIL-F	N60:28/7	DILUTION TANK FLOW
I:8.2	DISCRETE INPUT	CGM-AX	N60:28/8	CGM HIGH LFL
I:8.3	DISCRETE INPUT	FGM	N60:28/9	FGM INTERLOCK(RESERVED)
I:8.4	DISCRETE INPUT	CGM-F	N60:28/10	CGM FAULT
I:8.5	DISCRETE INPUT		N60:28/11	

PLC ADDRESSES

TERMINATION	SIGNAL	TAG	ADDRESS	DESCRIPTION
O:9.0	DISCRETE OUTPUT		N60:29/0	
O:9.1	DISCRETE OUTPUT	DO2	N60:29/1	JUMPER HEAT TRACE ON
O:9.2	DISCRETE OUTPUT		N60:29/2	
O:9.3	DISCRETE OUTPUT	DO3	N60:29/3	JUMPER HEAT TRACE HIGH SHUTOFF
O:9.4	DISCRETE OUTPUT		N60:29/4	
O:9.5	DISCRETE OUTPUT		N60:29/5	
I:9.0	DISCRETE INPUT	LD3-2	N60:29/6	LEAK DETECTOR #1 TROUBLE
I:9.1	DISCRETE INPUT	LD1-1	N60:29/7	PIT LEAK DETECTOR
I:9.2	DISCRETE INPUT		N60:29/8	
I:9.3	DISCRETE INPUT	LD3-1	N60:29/9	PIT LEAK DETECTOR TROUBLE
I:9.4	DISCRETE INPUT		N60:29/10	
I:9.5	DISCRETE INPUT	LD1-2	N60:29/11	LEAK DETECTOR #1
O:10.0	DISCRETE OUTPUT		N60:30/0	
O:10.1	DISCRETE OUTPUT	BUZZ	N60:30/1	OUTPUT TO HORN
O:10.2	DISCRETE OUTPUT		N60:30/2	
O:10.3	DISCRETE OUTPUT	STRB	N60:30/3	OUTPUT TO STROBE LIGHT
O:10.4	DISCRETE OUTPUT		N60:30/4	
O:10.5	DISCRETE OUTPUT		N60:30/5	
I:10.0	DISCRETE INPUT	LS-1	N60:30/6	PROXIMITY LS-1
I:10.1	DISCRETE INPUT		N60:30/7	
I:10.2	DISCRETE INPUT	LS-2	N60:30/8	PROXIMITY LS-2
I:10.3	DISCRETE INPUT		N60:30/9	
I:10.4	DISCRETE INPUT	RECIRC	N60:30/10	RECIRC. FLUSH PRESS. ALARM
I:10.5	DISCRETE INPUT		N60:30/11	
O:11.0	DISCRETE OUTPUT	LGTR	N60:31/0	OUTPUT TO RED LIGHT
O:11.1	DISCRETE OUTPUT	LGTA	N60:31/1	OUTPUT TO AMBER LIGHT
O:11.2	DISCRETE OUTPUT	MS-1	N60:31/2	PUMP MOTOR SWITCH ON
O:11.3	DISCRETE OUTPUT	LGTB	N60:31/3	OUTPUT TO BLUE LIGHT
O:11.4	DISCRETE OUTPUT		N60:31/4	
O:11.5	DISCRETE OUTPUT	LGTG	N60:31/5	OUTPUT TO GREEN LIGHT
I:11.0	DISCRETE INPUT	MR-1	N60:31/6	MOTOR POWER MONITOR
I:11.1	DISCRETE INPUT		N60:31/7	
I:11.2	DISCRETE INPUT		N60:31/8	
I:11.3	DISCRETE INPUT		N60:31/9	
I:11.4	DISCRETE INPUT		N60:31/10	
I:11.5	DISCRETE INPUT		N60:31/11	
I:12.0	T/C		N60:32	WATER CAB TEMP
I:12.1	T/C		N60:33	WFIE TEMP
I:12.2	T/C		N60:34	
I:12.3	T/C		N60:35	

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APPENDIX A
PLC/DTAM ALARM ADDRESSES

ALARM ADDRESS	ALARM ACK ADDRESS	DATA DISPLAY MESSAGE	ALARM WINDOW MESSAGE	INPUT/SOURCE	DTAM ACK ADDRESS	DTAM DIS. SCREEN #	DTAM ALARM SCREEN	ALARM #
N20:24/0	N20:15/0				N12:0/0			100 ACK.
N20:24/1	N20:15/1	XFR PRESSURE LOW	ACKNOWLEDGE STROBE	I:5.2	N12:0/1	41/1		101
N20:24/2	N20:15/2	XFR PRESSURE HIGH	XFR PRESSURE LOW	I:5.2	N12:0/2	41/2		102
N20:24/3	N20:15/3	FLUSH PRESSURE HIGH	XFR PRESSURE HIGH	I:5.1	N12:0/3	41/3		103
N20:24/4	N20:15/4	PUMP TROUBLE	FLUSH PRESSURE HI	I:11.0	N12:0/4	41/4		104
N20:24/5	N20:15/5	JR-1 NON-PROCESS	JET PUMP TROUBLE	I:10.2	N12:0/5	42/1		105
N20:24/6	N20:15/6	PUMP PIT LEAK	JR-1 POSITION, NON-PROCESS	I:9.1	N12:0/6	42/2		106
N20:24/7	N20:15/7	PUMP PIT TROUBLE	PUMP PIT LEAK	I:9.3	N12:0/7	42/3		107
N20:24/8	N20:15/8	JMPR HT TROUBLE	PUMP PIT LEAK TROUBLE		N12:0/8	42/4		108
N20:24/9	N20:15/9	PIC WATER LOW	JMPR HEAT TRACE TROUBLE	I:4.2	N12:0/9	43/1		109
N20:24/10	N20:15/10	PLC TEMP HIGH	PIC WATER LEVEL LOW	I:7.3	N12:0/10	43/2		110
N20:24/11	N20:15/11	CMPSR TEMP HIGH	PLC ENCLOSURE HI	I:7.2	N12:0/11	43/3		111
N20:24/12	N20:15/12	JET PUMP SHUTDOWN	AIR COMPRESSOR TEMP HI	I:11.0	N12:0/12	43/4		112
N20:24/13	N20:15/13	SGT LEVEL LOW	JET PUMP SHUTDOWN	I:4.1	N12:0/13	44/1		113
N20:24/14	N20:15/14	RFPT SIGNAL LOST	SGT LOW	I:5.0	N12:0/14			114
N20:24/15	N20:15/15	NETWORK FAILURE	RFPT SIGNAL LOSS ALARM	S:9/2	N12:0/15	44/2		115
N20:25/0	N20:16/0	JFPT SIGNAL LOST	PLC COMMUNICATIONS FAILURE					
N20:25/1	N20:16/1	U-FARM LEAK ALARM	JFPT SIGNAL LOSS ALARM	I:5.1	N12:1/0	44/3		116
N20:25/2	N20:16/2	ILK 1 COB U29 ALARM	U FARM LEAK ALARM	DH-485	N12:1/1	45/1		117
N20:25/3	N20:16/3	LEAK 1 CK ALARM	LEAK DETECTOR NO 1 LEAK DETECTED	I:9.5	N12:1/2	45/2		118
N20:25/4	N20:16/4	U FLUSH POS ALARM	LEAK DETECTOR NO 1 TROUBLE	I:9.0	N12:1/3	45/3		119
N20:25/5	N20:16/5	RECIRC ALARM	U TANK IN FLUSH	DH-485	N12:1/4	45/4		120
N20:25/6	N20:16/6	FGM ALARM	RECIRCULATION FAILURE	I:10.4	N12:1/5	46/1		121
N20:25/7	N20:16/7	LEAK ST #4 ALARM	FLAMMABLE GAS HIGH	I:8.3	N12:1/6	46/2		122
N20:25/8	N20:16/8	U TANK SHUTDOWN ALARM	LEAK STATION 4 TROUBLE	DH-485	N12:1/7	46/3		123
N20:25/9	N20:16/9	HI LFL CGM	U TANK SHUTDOWN TIMER ACTIVATED	DH-485	N12:1/8	46/4		124
N20:25/10	N20:16/10	PIT U-C LK LEAK	HIGH LFL ON CGM	I:8.2	N12:1/9	50/2		125
N20:25/11	N20:16/11	PIT U-C CK ALARM	VALVE PIT U-C LEAK	N20:49/0	N12:1/10	48/1		126
N20:25/12	N20:16/12	PIT U-D LK LEAK	VALVE PIT U-C TROUBLE	N20:49/1	N12:1/11	48/2		127
N20:25/13	N20:16/13	PIT U-D LEAK CK ALARM	VALVE PIT U-D LEAK	N20:49/2	N12:1/12	48/3		128
N20:25/14	N20:16/14	CGM FAULT	VALVE PIT U-D TROUBLE	N20:49/3	N12:1/13	50/1		129
N20:25/15	N20:16/15	LEAK ST #5 ALARM	CGM TROUBLE	I:8.4	N12:1/14	50/2		131
N20:51/0	N20:55/0	COB U33 LEAK ALARM	LEAK STATION 5 TROUBLE	DH-485	N12:1/15	50/3		132
N20:51/1	N20:55/1	DILUTION TK ALARM	COB U-33 LEAK	N20:50/4	N12:2/0	52/1		133
N20:51/2	N20:55/2	COB U33 CK ALARM			N12:2/1	52/2		134
N20:51/3	N20:55/3	U FLUSH PRES ALARM	DILUTION TANK NO FLOW	I:8.1	N12:2/2	52/3		135
N20:51/4	N20:55/4	U RECIRC PRES ALARM	COB U-33 TROUBLE	N20:50/5	N12:2/3	52/4		136
N20:51/5	N20:55/5	RECIRC PRES ALARM	U FARM HIGH FLUSH PRESS	DH-485	N12:2/4	53/1		137
N20:51/6	N20:55/6	PIT U-A LK ALARM	U FARM HIGH RECIRC PRESS	DH-485	N12:2/5	53/2		138
N20:51/7	N20:55/7	PIT U-A CK ALARM	RECIRC FLUSH PRESS HI	I:5.0	N12:2/6	53/3		139
N20:51/8	N20:55/8	PIT U-B LK ALARM	VALVE PIT U-A LEAK	N20:50/0	N12:2/7	53/4		140
N20:51/9	N20:55/9	PIT U-B CK ALARM	VALVE PIT U-A TROUBLE	N20:50/1	N12:2/8	54/1		141
N20:51/10	N20:55/10		VALVE PIT U-B LEAK	N20:50/2	N12:2/9	54/2		142
			VALVE PIT U-B TROUBLE	N20:50/3	N12:2/10	54/3		143

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APPENDIX A
PLC/DTAM ALARM ADDRESSES

ALARM	ALARM ACK	DATA DISPLAY MESSAGE	ALARM WINDOW MESSAGE	INPUT/OUTPUT	DTAM ACK	DTAM DIS	DTAM ALARM	ALARM #
N20:51/11	N20:55/11	COB U-30 LK ALARM	CIB U-30 LEAK	N20:49/4	N12:2/11	54/4	144	44
N20:51/12	N20:55/12	COB U-30 CK ALARM	COB U-30 TROUBLE	N20:49/5	N12:2/12	55/1	145	45
N20:51/13	N20:55/13	RECIRC LOSS ALARM	U-FARM RECIRC FLUSH SIGNAL LOSS	DH-485	N12:2/13	55/2	146	46
N20:51/14	N20:55/14	FLUSH LOSS ALARM	U-FARM JUMPER FLUSH SIGNAL LOSS	DH-485	N12:2/14	55/3	147	47
N20:51/15	N20:55/15	SY-B LEAK AL ALARM	VALVE PIT SY-B LEAK ALARM	DH-485	N12:2/15	55/4	148	48
N20:52/0	N20:56/0	WATER CAB TEMP LOW	WTR CAB TEMP LOW	I:12.0	N12:3/0	56/1	149	49
N20:52/1	N20:56/1	WFIE TEMP LOW	WFIE TEMP LOW	I:12.1	N12:3/1	56/2	150	50
N20:52/2	N20:56/2				N12:3/2	56/3	151	51
N20:52/3	N20:56/3				N12:3/3	56/4	152	52
N20:52/4	N20:56/4	EXHAUSTER ONLINE	EXHST ONLINE ALARM	DH-485	N12:3/4	57/1	153	53
N20:52/5	N20:56/5				N12:3/5	57/2	154	54
N20:52/6	N20:56/6				N12:3/6	57/3	155	55
N20:52/7	N20:56/7				N12:3/7	57/4	156	56
N20:52/8	N20:56/8				N12:3/8	58/1	157	57
N20:52/9	N20:56/9				N12:3/9			
N20:52/10	N20:56/10				N12:3/10			
N20:52/11	N20:56/11				N12:3/11			
N20:52/12	N20:56/12				N12:3/12			
N20:52/13	N20:56/13				N12:3/13			
N20:52/14	N20:56/14				N12:3/14			
N20:52/15	N20:56/15				N12:3/15			

RPP-5492 REVISION 0
APPENDIX A
U-FARM NODE ADDRESSES

NODE #	LOCATION
0	
1	
2	U-102, SKID M
3	EMERG SKID
4	U-103, SKID K
5	U-105, SKID L
6	U-106, SKID P
7	U-107, SKID R
8	U-108, SKID Q
9	U-109, SKID N
10	U-111, SKID U
11	271-U, PLC
12	LEAK DET. STATION 4
13	LEAK DET. STATION 5

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APPENDIX A

U-FARM ADDRESSES

CONTROL ADD.	CONTROL ADD.	DESCRIPTION	DTAM SCREEN/POSITION
	N20:17/0	MOTOR PERMISSIVE	
	N20:17/1	SUB INTERLOCK	
	N20:17/2	INTERLOCK	
	N20:17/3	SUB INTERLOCK	
	N20:17/4	HEATER ON	31/1 AND 2
	N20:17/5	CLEAR COUNTER	
	N20:17/6	AUTO/MANUAL	13/1, 15/1 AND 2, 22/1
	N20:17/7	SIMULATE	
	N20:17/8	SEND MESSAGE	
	N20:17/9		
	N20:17/10	MASTER ACKNOWLEDGE	23/1
	N20:17/11	TRANSMIT TROUBLE	
	N20:17/12	RETRY MESSAGE	
	N20:17/13		
	N20:17/14		
	N20:17/15	RESET COUNTER	
N10:2	N20:18	PID SET POINT	14/3 AND 4
N10:3	N20:19	PID GAIN	18/2 AND 3
N10:4	N20:20	PID RESET	19/2 AND 3
N10:5	N20:21	PID RATE	21/2 AND 3
N10:28	N20:22	PROCESS VARIABLE	
N10:29	N20:23	PID OUTPUT	13/3, 14/1, 18/1, 19/1, 21/1, 22/2 AND 3
N10:13	N20:26	LOOP UPDATE	
S:9	N20:27	STATION ON DH485	
N15:0	N20:28		
N15:5	N20:29		
C5:1,ACC	N20:30	TOTAL 1	26/4, 27/5
C5:2,ACC	N20:31	TOTAL 2	26/3, 27/6
S:10		WATCH FOR EXHAUST SKID	
	N20:32/0	SKID PRIME	
	N20:32/1	SKID FLUSH	
	N20:32/2	SKID SHUTDOWN	
	N20:32/3	SKID PIT LEAK	
	N20:32/4	PIT2/OGT LEAK	
	N20:32/5	SKID HI PRESS FLUSH	
	N20:32/6	SKID HI PRESS RECIRC	
	N20:32/7	RFPT SIGNAL LOSS	
	N20:32/8	JFPT SIGNAL LOSS	
	N20:32/9		
	N20:32/10		
	N20:32/11		
	N20:32/12		
	N20:32/13		
	N20:32/14		
	N20:32/15		

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APPENDIX A

U-FARM ADDRESSES

CONTROL ADD.	CONTROL ADD.	DESCRIPTION	DTAM SCREEN/POSITION
NODE#1	N20:33/0	SPARE	
	N20:33/1		
	N20:33/2		
	N20:33/3		
	N20:33/4		
	N20:33/5		
	N20:33/6		
	N20:33/7		
	N20:33/8		
	N20:33/9		
	N20:33/10		
	N20:33/11		
	N20:33/12		
	N20:33/13		
	N20:33/14		
	N20:33/15		
NODE#2	N20:34/0	U-102 PRIME	
	N20:34/1	U-102 FLUSH	
	N20:34/2	U-102 SHUTDOWN	
	N20:34/3	U-102 PIT LEAK	
	N20:34/4	U-102 LEAK #1 (COB U-32)	
	N20:34/5	U-102 HI PRESS FLUSH	
	N20:34/6	U-102 HI PRESS RECIRC	
	N20:34/7	U-102 RFPT SIGNAL LOSS	
	N20:34/8	U-102 JFPT SIGNAL LOSS	
	N20:34/9		
	N20:34/10		
	N20:34/11		
	N20:34/12		
	N20:34/13		
	N20:34/14		
	N20:34/15		
NODE#3	N20:35/0	EMERG PRIME	
	N20:35/1	EMERG FLUSH	
	N20:35/2	EMERG SHUTDOWN	
	N20:35/3	EMERG PIT LEAK	
	N20:35/4	EMERG LEAK 1	
	N20:35/5	EMERG HI PRESS FLUSH	
	N20:35/6	EMERG HI PRESS RECIRC	
	N20:35/7	EMERG RFPT SIGNAL LOSS	
	N20:35/8	EMERG JFPT SIGNAL LOSS	
	N20:35/9		
	N20:35/10		
	N20:35/11		
	N20:35/12		

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APPENDIX A

U-FARM ADDRESSES

CONTROL ADD.	CONTROL ADD.	DESCRIPTION	DTAM SCREEN/POSITION
	N20:35/13		
	N20:35/14		
	N20:35/15		
NODE#4	N20:36/0	U-103 PRIME	
	N20:36/1	U-103 FLUSH	
	N20:36/2	U-103 SHUTDOWN	
	N20:36/3	U-103 PIT LEAK	
	N20:36/4	U-103 LEAK 1 (COB 34)	
	N20:36/5	U-103 HI PRESS FLUSH	
	N20:36/6	U-103 HI PRESS RECIRC	
	N20:36/7	U-103 RFPT SIGNAL LOSS	
	N20:36/8	U-103 JFPT SIGNAL LOSS	
	N20:36/9		
	N20:36/10		
	N20:36/11		
	N20:36/12		
	N20:36/13		
	N20:36/14		
	N20:36/15		
NODE#5	N20:37/0	U-105 PRIME	
	N20:37/1	U-105 FLUSH	
	N20:37/2	U-105 SHUTDOWN	
	N20:37/3	U-105 PIT LEAK	
	N20:37/4	U-105 LEAK #1	
	N20:37/5	U-105 HI PRESS FLUSH	
	N20:37/6	U-105 HI PRESS RECIRC	
	N20:37/7	U-105 RFPT SIGNAL LOSS	
	N20:37/8	U-105 JFPT SIGNAL LOSS	
	N20:37/9		
	N20:37/10		
	N20:37/11		
	N20:37/12		
	N20:37/13		
	N20:37/14		
	N20:37/15		
NODE#6	N20:38/0	U-106 PRIME	
	N20:38/1	U-106 FLUSH	
	N20:38/2	U-106 SHUTDOWN	
	N20:38/3	U-106 PIT LEAK	
	N20:38/4	U-106 LEAK #1 (COB U-35)	
	N20:38/5	U-106 HI PRESS FLUSH	
	N20:38/6	U-106 HI PRESS RECIRC	
	N20:38/7	U-106 RFPT SIGNAL LOSS	
	N20:38/8	U-106 JFPT SIGNAL LOSS	
	N20:38/9		

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APPENDIX A

U-FARM ADDRESSES

CONTROL ADD.	CONTROL ADD.	DESCRIPTION	DTAM SCREEN/POSITION
	N20:38/10		
	N20:38/11		
	N20:38/12		
	N20:38/13		
	N20:38/14		
	N20:38/15		
NODE#7	N20:39/0	U-107 PRIME	
	N20:39/1	U-107 FLUSH	
	N20:39/2	U-107 SHUTDOWN	
	N20:39/3	U-107 PIT LEAK	
	N20:39/4	U-107 LEAK 1	
	N20:39/5	U-107 HI PRESS FLUSH	
	N20:39/6	U-107 HI PRESS RECIRC	
	N20:39/7	U-107 RFPT SIGNAL LOSS	
	N20:39/8	U-107 JFPT SIGNAL LOSS	
	N20:39/9		
	N20:39/10		
	N20:39/11		
	N20:39/12		
	N20:39/13		
	N20:39/14		
	N20:39/15		
NODE#8	N20:40/0	U-108 PRIME	
	N20:40/1	U-108 FLUSH	
	N20:40/2	U-108 SHUTDOWN	
	N20:40/3	U-108 PIT LEAK	
	N20:40/4	U-108 LEAK 1	
	N20:40/5	U-108 HI PRESS FLUSH	
	N20:40/6	U-108 HI PRESS RECIRC	
	N20:40/7	U-108 RFPT SIGNAL LOSS	
	N20:40/8	U-108 JFPT SIGNAL LOSS	
	N20:40/9		
	N20:40/10		
	N20:40/11		
	N20:40/12		
	N20:40/13		
	N20:40/14		
	N20:40/15		
NODE#9	N20:41/0	U-109 PRIME	
	N20:41/1	U-109 FLUSH	
	N20:41/2	U-109 SHUTDOWN	
	N20:41/3	U-109 PIT LEAK	
	N20:41/4	PIT2/OGT LEAK	
	N20:41/5	U-109 HI PRESS FLUSH	
	N20:41/6	U-109 HI PRESS RECIRC	

U-FARM ADDRESSES

CONTROL ADD.	CONTROL ADD.	DESCRIPTION	DTAM SCREEN/POSITION
	N20:41/7	U-109 RFPT SIGNAL LOSS	
	N20:41/8	U-109 JFPT SIGNAL LOSS	
	N20:41/9		
	N20:41/10		
	N20:41/11		
	N20:41/12		
	N20:41/13		
	N20:41/14		
	N20:41/15		
NODE#10	N20:42/0	U-111 PRIME	
	N20:42/1	U-111 FLUSH	
	N20:42/2	U-111 SHUTDOWN	
	N20:42/3	U-111 PIT LEAK	
	N20:42/4	U-111 LEAK 1	
	N20:42/5	U-111 HI PRESS FLUSH	
	N20:42/6	U-111 HI PRESS RECIRC	
	N20:42/7	U-111 RFPT SIGNAL LOSS	
	N20:42/8	U-111 JFPT SIGNAL LOSS	
	N20:42/9		
	N20:42/10		
	N20:42/11		
	N20:42/12		
	N20:42/13		
	N20:42/14		
	N20:42/15		
		271-U PLC	
NODE#11	N20:43/0		
	N20:43/1	VALVE PIT SY-B LEAK ALARM	
	N20:43/2		
	N20:43/3		
	N20:43/4		
	N20:43/5	LEAK DET. STATION #5 TROUBLE	
	N20:43/6	LEAK DET. STATION #4 TROUBLE	
	N20:43/7		
	N20:43/8		
	N20:43/9		
	N20:43/10		
	N20:43/11		
	N20:43/12		
	N20:43/13		
	N20:43/14		
	N20:43/15		
		LEAK DETECTOR STATION 4	
NODE#12	N20:49/0	VALVE PIT U-C LEAK	
	N20:49/1	VALVE PIT U-C TROUBLE	

U-FARM ADDRESSES

CONTROL ADD.	CONTROL ADD.	DESCRIPTION	DTAM SCREEN/POSITION
	N20:49/2	VALVE PIT U-D LEAK	
	N20:49/3	VALVE PIT U-D TROUBLE	
	N20:49/4	COB U-30 LEAK	
	N20:49/5	COB U-30 TROUBLE	
	N20:49/6		
	N20:49/7		
	N20:49/8		
	N20:49/9		
	N20:49/10		
	N20:49/11		
	N20:49/12		
	N20:49/13		
	N20:49/14		
	N20:49/15		
		LEAK DETECTOR STATION 5	
NODE#13	N20:50/0	VALVE PIT U-A LEAK	
	N20:50/1	VALVE PIT U-A TROUBLE	
	N20:50/2	VALVE PIT U-B LEAK	
	N20:50/3	VALVE PIT U-B TROUBLE	
	N20:50/4	COB U-33 LEAK	
	N20:50/5	COB U-33 TROUBLE	
	N20:50/6		
	N20:50/7		
	N20:50/8		
	N20:50/9		
	N20:50/10		
	N20:50/11		
	N20:50/12		
	N20:50/13		
	N20:50/14		
	N20:50/15	ADSL TIE TO SY	

LAD 2 - --- Total Rungs in File = 18

LAD 2 - --- Total Rungs in File = 18

0016

5

U109NEW1R1 PIC SKID N

Clear
Dest

RPP-5492
C5:1.ACC
REVISION 0
APPENDIX B

LAD 2 - --- Total Rungs in File = 18

CLR
Clear
Dest C5:2.ACC
0<

0017

<END>

LAD 3 - --- Total Rungs in File = 16

LAD 3 - --- Total Rungs in File = 16

Node
Address/
Baud Rate

---MVM---

Masked Move

Source N7:50

9<

Mask 00FFh

255<

Dest S:15

1033<

JSR

Jump To Subroutine

SBR File Number U:10

CLR

Clear

Dest N20:32

4<

---MOV---

Move

Source N13:1

-1<

Dest N40:15

4<

CLR

Clear

Dest N15:2

14388<

N13:1

1

N12:0

12

MOV

Move

Source 41

41<

Dest N15:10

41<

---MOV---

Move

Source N15:10

41<

Dest N7:5

41<

LAD 3 - --- Total Rungs in File = 16

MOV
Move
Source N15:10
41<
Dest N7:25
41<

MOV
Move
Source N15:10
41<
Dest N7:45
41<

MOV
Move
Source N15:10
41<
Dest N7:65
41<

MOV
Move
Source N15:10
41<
Dest N7:85
41<

MOV
Move
Source N15:10
41<
Dest N7:105
41<

MOV
Move
Source N15:10
41<
Dest N7:125
41<

LAD 3 - --- Total Rungs in File = 16

LAD 4 - --- Total Rungs in File = 10

GET INPUTS FROM MODULES 1, 2 AND 3

0000

SBR
Subroutine

COP	
Copy File	
Source	#I:1.0
Dest	#N60:2
Length	2

COP	
Copy File	
Source	#I:2.0
Dest	#N60:6
Length	2

COP	
Copy File	
Source	#I:3.0
Dest	#N60:10
Length	2

GET INPUTS FROM MODULES 4, 5 AND 6

0001

COP	
Copy File	
Source	#I:4.0
Dest	#N60:12
Length	4

COP	
Copy File	
Source	#I:5.0
Dest	#N60:16
Length	4

COP	
Copy File	
Source	#I:6.0
Dest	#N60:20
Length	4

GET TEMPERATURE INPUTS FROM MODULE 7

0002

COP	
Copy File	
Source	#I:7.0
Dest	#N60:24
Length	4

LAD 4 - --- Total Rungs in File = 10

GET INPUTS FROM MODULE 8

0003

MVM	
Masked Move	
Source	I:8.0 20<
Mask	003Fh 63<
Dest	N17:0 20<

MUL	
Multiply	
Source A	N17:0 20<
Source B	64 64<
Dest	N17:1 1280<

MVM	
Masked Move	
Source	N17:1 1280<
Mask	0FC0h 4032<
Dest	N60:28 1280<

GET INPUTS FROM MODULE 9

0004

MVM	
Masked Move	
Source	I:9.0 43<
Mask	003Fh 63<
Dest	N17:2 43<

MUL	
Multiply	
Source A	N17:2 43<
Source B	64 64<
Dest	N17:3 2752<

LAD 4 - --- Total Rungs in File = 10

GET INPUTS FROM MODULE 10

0005

MVM	
Masked Move	
Source	N17:3 2752<
Mask	0FC0h 4032<
Dest	N60:29 2762<

MVM	
Masked Move	
Source	I:10.0 20<
Mask	003Fh 63<
Dest	N17:4 20<

MUL	
Multiply	
Source A	N17:4 20<
Source B	64 64<
Dest	N17:5 1280<

MVM	
Masked Move	
Source	N17:5 1280<
Mask	0FC0h 4032<
Dest	N60:30 1280<

GET INPUTS FROM MODULE 11

0006

MVM	
Masked Move	
Source	#I:11.0 0<
Mask	003Fh 63<
Dest	N17:6 0<

LAD 4 - --- Total Rungs in File = 10

---MUL	
Multiply	
Source A	N17:6
	0<
Source B	64
	64<
Dest	N17:7
	0<

---MVM	
Masked Move	
Source	N17:7
	0<
Mask	0FC0h
	4032<
Dest	N60:31
	34<

GET TEMPERATURES FROM MODULE 12

0007

---COP	
Copy File	
Source	#I:12.0
Dest	#N60:32
Length	4

0008

---RET	
Return	

0009

<END>

LAD 5 - --- Total Rungs in File = 110

MONITOR FOR LOW TRANSFER PRESS AFTER PUMP STARTS

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

0024

CHECK IF RFPT SIGNAL
LESS THAN 4mA

LES	
Less Than (A<B)	
Source A	N60:16
	2714<
Source B	2500
	2500<

N16:0	ALARM 13
OSR	N20:15
13	(L)
	13

TON	
Timer On Delay	
Timer	T4:9
Time Base	1.0
Preset	3<
Accum	0<
	(EN)
	(DN)

0025

3 SEC DELAY

T4:9
DN

RFPT SIGNAL LOSS
INTLK

N20:24
(L)
14

N16:0	ALARM 14
OSR	N20:15
14	(L)
	14

0026

STATION ON DH-485 (PRESENT)

AND	
Bitwise AND	
Source A	S:9
	3A35h<
Source B	N15:5
	3834h<
Dest	N15:2
	3834h<

0027

STATION ON DH-485 (PREVIOUS)

MVM	
Masked Move	
Source	N15:0
	14388<
Mask	N15:5
	3834h<
Dest	N15:3
	14388<

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

U-103 LEAK
N20:36

3

COB U34 LEAK
N20:36

4

U-106 LEAK
N20:38

3

COB U35 LEAK
N20:38

4

U-107 LEAK
N20:39

3

U-107 DET 1 LEAK
N20:39

4

U-108 LEAK
N20:40

3

U-108 DET 1 LEAK
N20:40

4

U-102 LEAK
N20:34

3

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

N16:10 ALARM 37
OSR N20:55
10 (L)
 4

OTHER U SKIDS JFPT SIGNAL LOSS

U105 JFPT SIG

N20:37

8

EMERG JFPT SIG

N20:35

8

U103 JFPT SIG

N20:36

8

U106 JFPT SIG

N20:38

8

U107 JFPT SIG

N20:39

8

U108 JFPT SIG

N20:40

8

U102 JFPT SIG

N20:34

8

U111 JFPT SIG

N20:42

8

--- TON ---
Timer On Delay
Timer T4:51
Time Base 1.0
Preset 3<
Accum 0<

(EN)

(DN)

3 SEC DELAY

T4:51

DN

OTHER U SKID JFPT
SIGNAL LOSS INTLK

N20:51

14

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

T4:39

U109NEW1R1 PIC SKID N

RPP-5492
REVISION 0
APPENDIX B

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

LAD 5 - --- Total Rungs in File = 110

-NEQ	
Not Equal	
Source A	N20:16
	0<
Source B	N13:0
	0<

-NEQ	
Not Equal	
Source A	N20:55
	0<
Source B	N13:0
	0<

-NEQ	
Not Equal	
Source A	N20:56
	0<
Source B	N13:0
	0<

INPUT TO WONDERWARE

COLOR CHANGE FOR
ALARM CONDITIONS

N20:17

13

0105

-NEQ	
Not Equal	
Source A	N20:24
	12288<
Source B	N13:0
	0<

-NEQ	
Not Equal	
Source A	N20:25
	0<
Source B	N13:0
	0<

-NEQ	
Not Equal	
Source A	N20:51
	0<
Source B	N13:0
	0<

Source B N13:0 U109NEW1R1 PIC SKID N

LAD 5 - --- Total Rungs in File = 110

NEQ
Not Equal
Source A N20:52
Source B N13:0

LAD 6 - --- Total Rungs in File = 6 .

LAD 6 - --- Total Rungs in File = 6

0005

END

LAD 7 - --- Total Rungs in File = 22

LAD 7 - --- Total Rungs in File = 22

0005

SCL

Scale	
Source	N60:12
	3070<
Rate [/10000]	12499
	12499<
Offset	-4096
	-4096<
Dest	N10:28
	-259<

0006

PID

PID	
Control Block	N10:0
Process Variable	N10:28
Control Variable	N10:29
Control Block Length	23
Setup Screen	

0007

SGT LOW
N20:24

13

SCL

Scale	
Source	N10:29
	0<
Rate [/10000]	15239
	15239<
Offset	6242
	6242<
Dest	N60:4
	3277<

0008

SGT LOW
N20:24

13

LEQ

Less Than or Eq1 (A<=B)	
Source A	N60:12
	3070<
Source B	3277
	3277<

MOV

Move	
Source	3277
	3277<
Dest	N60:4
	3277<

0009

GRT

Greater Than (A>B)	
Source A	N60:12
	3070<
Source B	16384
	16384<

MOV

Move	
Source	16384
	16384<
Dest	N60:4
	3277<

0010

COP

Copy File	
Source	#N20:18
Dest	#N10:2
Length	4

LAD 7 - --- Total Rungs in File = 22

0011		<div>MOV Move Source N10:28 -259< Dest N20:22 -259<</div>
0012	<div>N20:17 6</div>	<div>MOV Move Source N20:23 0< Dest N10:29 0<</div> <div>N10:0 1</div>
0013	<div>N20:17 6</div>	<div>MOV Move Source N10:29 0< Dest N20:23 0<</div>
0014		<div>COP Copy File Source #N20:26 Dest #N10:13 Length 1</div>
0015		<div>MOV Move Source S:9 14901< Dest N20:27 14901<</div>
0016		<div>MOV Move Source N20:28 14388< Dest N15:0 14388<</div>
0017		<div>MOV Move Source N20:29 14388< Dest N15:5 14388<</div>

LAD 7 - --- Total Rungs in File = 22

0018		<div>MOV Move Source C5:1.ACC 8736< Dest N20:30 8736<</div>
0019		<div>MOV Move Source C5:2.ACC 0< Dest N20:31 0<</div>
0020		<div>RET Return</div>
0021		<END>

LAD 8 - --- Total Rungs in File = 6

LAD 8 - --- Total Rungs in File = 6

LAD 9 - --- Total Rungs in File = 6

LAD 10 - --- Total Rungs in File = 14

0000	SBR Subroutine	CLR Clear Dest N7:0 0<
0001		CLR Clear Dest N7:20 8192<
0002		CLR Clear Dest N7:40 0<
0003		CLR Clear Dest N7:60 8192<
0004		CLR Clear Dest N7:80 8192<
0005		CLR Clear Dest N7:100 0<
0006		CLR Clear Dest N7:120 0<
0007		CLR Clear Dest N7:140 0<
0008		CLR Clear Dest N7:160 0<
0009		CLR Clear Dest N7:180 0<

LAD 10 - --- Total Rungs in File = 14

LAD 11 - --- Total Rungs in File = 3

LAD 12 - --- Total Rungs in File = 10

LAD 12 - --- Total Rungs in File = 10

Source B 14388<
N15:1

U109NEW1R1 PIC SKID N

4< RPP-5492
REVISION 0
APPENDIX B

LAD 12 - --- Total Rungs in File = 10

MOV

Move
Source N15:0
14388<
Dest N15:1
14388<

RET

Return

0008

0009

END

LAD 13 - --- Total Rungs in File = 6

LAD 13 - --- Total Rungs in File = 6

LAD 14 - --- Total Rungs in File = 14

LAD 14 - --- Total Rungs in File = 14

LAD 14 - --- Total Rungs in File = 14

0004

Q14:4
LBL

LAD 14 - --- Total Rungs in File = 14

LAD 14 - --- Total Rungs in File = 14

LAD 14 - --- Total Rungs in File = 14

LAD 14 - --- Total Rungs in File = 14

0008

LAD 14 - --- Total Rungs in File = 14

LAD 14 - --- Total Rungs in File = 14

LAD 14 - --- Total Rungs in File = 14

LAD 14 - --- Total Rungs in File = 14

LAD 14 - --- Total Rungs in File = 14

0012

0013

RET
Return

(END)

LAD 15 - --- Total Rungs in File = 16

LAD 15 - --- Total Rungs in File = 16

LAD 15 - --- Total Rungs in File = 16

0015

<END>

LAD 16 - --- Total Rungs in File = 6

LAD 16 - --- Total Rungs in File = 6

LAD 17 - --- Total Rungs in File = 65

LAD 17 - --- Total Rungs in File = 65

LAD 17 - --- Total Rungs in File = 65

LAD 17 - --- Total Rungs in File = 65

LAD 17 - --- Total Rungs in File = 65

0046	VALVE PIT SY-B LEAK N12:2 15	N20:55 (U) 15
0047	WATER CAB TEMP LOW N12:3 0	N20:56 (U) 0
0048	WFIE CAB TEMP LOW N12:3 1	N20:56 (U) 1
0049	N12:3 2	N20:56 (U) 2
0050	N12:3 3	N20:56 (U) 3
0051	EXHAUSTER ON LINE N12:3 4	N20:56 (U) 4
0052	N12:3 5	N20:56 (U) 5
0053	N12:3 6	N20:56 (U) 6
0054	N12:3 7	N20:56 (U) 7
0055	N12:3 8	N20:56 (U) 8
0056	N12:3 9	N20:56 (U) 9
0057	N12:3 10	N20:56 (U) 10
0058	N12:3 11	N20:56 (U) 11
0059	N12:3 12	N20:56 (U) 12

LAD 17 - --- Total Rungs in File = 65

LAD 18 - --- Total Rungs in File = 70

PUMP SHUTDOWN
N20:15

N16:5 U109NEW1R1 PIC SKID N

OUTPUT TO STROBE **RPP-5492**
N60:30 **REVISION 0**
APPENDIX B

LAD 18 - --- Total Rungs in File = 70

LAD 18 - --- Total Rungs in File = 70

LAD 18 - --- Total Rungs in File = 70

LAD 18 - --- Total Rungs in File = 70

LAD 18 - --- Total Rungs in File = 70

LAD 18 - --- Total Rungs in File = 70

LAD 19 - --- Total Rungs in File = 8

LAD 19 - --- Total Rungs in File = 8

MOVE OUTPUTS TO MODULE 11

0005

MVM	
Masked Move	
Source	N60:31
	34<
Mask	003Fh
	63<
Dest	O:11.0
	34<

0006

RET
Return

0007

END

LAD 20 - --- Total Rungs in File = 12

0000		<div>MOV Move Source N60:15 6547< Dest N30:0 6547<</div>
0001		<div>SUB Subtract Source A N30:0 6547< Source B 3277 3277< Dest N30:1 3270<</div>
0002	<div>LES Less Than (A<B) Source A N30:1 3270< Source B 0 0<</div>	<div>CLR Clear Dest N30:1 3270<</div>
0003	<div>GRT Greater Than (A>B) Source A N30:1 3270< Source B 13107 13107<</div>	<div>MOV Move Source 13107 13107< Dest N30:1 3270<</div>
0004		<div>MUL Multiply Source A N30:3 50< Source B 100 100< Dest N30:4 5000<</div>
0005		<div>SCL Scale Source N30:1 3270< Rate [/10000] N30:4 5000< Offset 0 0< Dest N30:5 1635<</div>

LAD 20 - --- Total Rungs in File = 12

0006	GRT		MOV	
	Greater Than (A>B)		Move	
	Source A	N30:5	Source	4095
		1635<		4095<
	Source B	4096	Dest	N30:5
		4096<		1635<

SCALE DILUTION UNIT(GPM) TO PLC OUTPUT UNIT (6242 - 31208) 4-20mA

0007	SCP	
	Scale w/Parameters	
	Input	N30:5
		1635<
	Input Min.	41
		41<
	Input Max.	4095
		4095<
	Scaled Min.	6242
		6242<
	Scaled Max.	31208
		31208<
	Output	N30:2
		16058<

IF CALCULATED DILUTION OUTPUT IS LESS THAN THE MINIMUM FLOW INPUT FROM THE DTAM, THEN
FORCE DILUTION OUTPUT TO BE THE MINIMUM FLOW VALUE

0008	LES		MOV	
	Less Than (A<B)		Move	
	Source A	N30:2	Source	N30:6
		16058<		6240<
	Source B	N30:6	Dest	N30:2
		6240<		16058<

0009	MOV	
	Move	
	Source	N30:2
		16058<
	Dest	N60:5
		16058<

0010	RET	
	Return	

0011 <--- END --->

[illegible]

BACKGROUND REGISTER 1: BIT DATA

MONITOR REGISTER NUMBER: N20:15

BIT#	ALARM STATE	GOTO SCREEN#	BIT#	ALARM STATE	GOTO SCREEN#
0	ON (1)	100	8	ON (1)	108
1	ON (1)	101	9	ON (1)	109
2	ON (1)	102	10	ON (1)	110
3	ON (1)	103	11	ON (1)	111
4	ON (1)	104	12	ON (1)	112
5	ON (1)	105	13	ON (1)	113
6	ON (1)	106	14	ON (1)	114
7	ON (1)	107	15	ON (1)	115

[illegible]

BACKGROUND REGISTER 2: BIT DATA

MONITOR REGISTER NUMBER: N20:16

BIT#	ALARM STATE	GOTO SCREEN#	BIT#	ALARM STATE	GOTO SCREEN#
0	ON (1)	116	8	ON (1)	124
1	ON (1)	117	9	ON (1)	125
2	ON (1)	118	10	ON (1)	126
3	ON (1)	119	11	ON (1)	127
4	ON (1)	120	12	ON (1)	128
5	ON (1)	121	13	ON (1)	129
6	ON (1)	122	14	ON (1)	131
7	ON (1)	123	15	ON (1)	132

~~~~~

BACKGROUND REGISTER 3: BIT DATA

MONITOR REGISTER NUMBER: N20:55

BIT#	ALARM STATE	GOTO SCREEN#	BIT#	ALARM STATE	GOTO SCREEN#
0	ON (1)	133	8	ON (1)	141
1	ON (1)	134	9	ON (1)	142
2	ON (1)	135	10	ON (1)	143
3	ON (1)	136	11	ON (1)	144
4	ON (1)	137	12	ON (1)	145
5	ON (1)	138	13	ON (1)	146
6	ON (1)	139	14	ON (1)	147
7	ON (1)	140	15	ON (1)	148

[illegible]

BACKGROUND REGISTER 4: BIT DATA

MONITOR REGISTER NUMBER: N20:56

BIT#	ALARM STATE	GOTO SCREEN#	BIT#	ALARM STATE	GOTO SCREEN#
0	ON (1)	149	8	ON (1)	157
1	ON (1)	150	9	THIS BIT IS NOT MONITORED	
2	ON (1)	151	10	THIS BIT IS NOT MONITORED	
3	ON (1)	152	11	THIS BIT IS NOT MONITORED	
4	ON (1)	153	12	THIS BIT IS NOT MONITORED	
5	ON (1)	154	13	THIS BIT IS NOT MONITORED	

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6	ON (1)	155	14	THIS BIT IS NOT MONITORED
7	ON (1)	156	15	THIS BIT IS NOT MONITORED

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SCREEN#	TYPE	SCREEN#	TYPE
001	MAIN MENU	116	ALARM
010	SUB-MENU	117	ALARM
011	DATA ENTRY	118	ALARM
012	SUB-MENU	119	ALARM
013	DATA DISPLAY	120	ALARM
014	DATA ENTRY	121	ALARM
015	DATA ENTRY	122	ALARM
016	SECURITY	123	ALARM
017	SUB-MENU	124	ALARM
018	DATA ENTRY	125	ALARM
019	DATA ENTRY	126	ALARM
020	DATA DISPLAY	127	ALARM
021	DATA ENTRY	128	ALARM
022	DATA ENTRY	129	ALARM
023	DATA ENTRY	130	ALARM
024	DATA DISPLAY	131	ALARM
025	DATA DISPLAY	132	ALARM
026	DATA DISPLAY	133	ALARM
027	DATA DISPLAY	134	ALARM
028	DATA DISPLAY	135	ALARM
029	DATA DISPLAY	136	ALARM
030	SUB-MENU	137	ALARM
031	DATA ENTRY	138	ALARM
032	DATA ENTRY	139	ALARM
033	DATA DISPLAY	140	ALARM
034	SUB-MENU	141	ALARM
035	DATA ENTRY	142	ALARM
036	DATA ENTRY	143	ALARM
037	DATA DISPLAY	144	ALARM
040	SUB-MENU	145	ALARM
041	DATA DISPLAY	146	ALARM
042	DATA DISPLAY	147	ALARM
043	DATA DISPLAY	148	ALARM
044	DATA DISPLAY	149	ALARM
045	DATA DISPLAY	150	ALARM
046	DATA DISPLAY	151	ALARM
048	DATA DISPLAY	152	ALARM
050	DATA DISPLAY	153	ALARM
052	DATA DISPLAY	154	ALARM
053	DATA DISPLAY	155	ALARM
054	DATA DISPLAY	156	ALARM
055	DATA DISPLAY	157	ALARM
056	DATA DISPLAY	158	ALARM
057	DATA DISPLAY	159	ALARM
058	DATA DISPLAY	200	ALARM
100	ALARM		
101	ALARM		
102	ALARM		
103	ALARM		
104	ALARM		
105	ALARM		
106	ALARM		
107	ALARM		
108	ALARM		
109	ALARM		
110	ALARM		
111	ALARM		

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112 ALARM
113 ALARM
114 ALARM

[illegible]

Item/Key # 4 is unlinked **PAGE C** 2 of ~~Item/Key~~ 50

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```

SCREEN #014: DATA ENTRY
SCREEN MEMORY USED:    207 BYTES
PREVIOUS MENU:         012
NEXT SCREEN:           001
PREVIOUS SCREEN:       UNLINKED
DATA POSITION #1:  16 BIT UNSIGNED INTEGER DISPLAY

```

```

REGISTER:          N20:23          REGISTER LOW:      0
DECIMAL RIGHT:     0                REGISTER HIGH:     100
DECIMAL LEFT:      3                DISPLAY LOW:       0
NO SIGN PLACE                                     DISPLAY HIGH:     100
LEADING ZEROS NOT SHOWN

```

```

DATA POSITION #2:  16 BIT UNSIGNED INTEGER DISPLAY

REGISTER:          N60:12          REGISTER LOW:          3277
DECIMAL RIGHT:     2                REGISTER HIGH:         16384
DECIMAL LEFT:      3                DISPLAY LOW:             0.00
NO SIGN PLACE                               DISPLAY HIGH:         20.00
LEADING ZEROS NOT SHOWN

```

```
DATA POSITION #3:  16 BIT UNSIGNED INTEGER DISPLAY

REGISTER:          N20:18          REGISTER LOW:          0
DECIMAL RIGHT:     1                REGISTER HIGH:         16383
DECIMAL LEFT:      2                DISPLAY LOW:            0.0
NO SIGN PLACE
LEADING ZEROS NOT SHOWN             DISPLAY HIGH:         20.0
```

DATA POSITION #4: 16 BIT UNSIGNED INTEGER ENTRY			
REGISTER:	N20:18	REGISTER LOW:	0
DECIMAL RIGHT:	1	REGISTER HIGH:	16383
DECIMAL LEFT:	2	DISPLAY LOW:	0.0
NO SIGN PLACE		DISPLAY HIGH:	20.0
DEFAULT:	NONE	LOW INPUT LIMIT:	4.0
		HIGH INPUT LIMIT:	9.0

[illegible]

```

SCREEN #015: DATA ENTRY
SCREEN MEMORY USED:      114 BYTES
PREVIOUS MENU:          012
NEXT SCREEN:            013
PREVIOUS SCREEN:        UNLINKED
DATA POSITION #1:  BIT DISPLAY

```

REGISTER:	N20:17	OFF BIT TEXT:	Manual
BIT NUMBER:	6	ON BIT TEXT:	Auto
TEXT LENGTH:	6		

DATA POSITION #2: BIT ENTRY

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REGISTER:
BIT NUMBER:

N20:17
6

ENTRY FORMAT:
DEFAULT:

1 & 0 KEYS
NONE

[illegible]

SCREEN #019: DATA ENTRY

```
íëëëëëëëëëëëëëëëëëëëëëëëëëëë;

```

SCREEN MEMORY USED: 177 BYTES

°Reset 0.1 to 327.67 °

°DOV OUTPUT: 111% °

PREVIOUS MENU: 017

°Reset: 2 in/rp°

NEXT SCREEN: 021

°Enter: PPP3PP °

PREVIOUS SCREEN: UNLINKED

aëèěēēēēēēēēēēēēēēēf

DATA POSITION #1: 16 BIT UNSIGNED INTEGER DISPLAY

REGISTER: N20:23

REGISTER LOW: 0

DECIMAL RIGHT: 0

REGISTER HIGH: 16383

DECIMAL LEFT: 3

DISPLAY LOW: 0

NO SIGN PLACE

DISPLAY HIGH: 100

LEADING ZEROS NOT SHOWN

DATA POSITION #2: 16 BIT UNSIGNED INTEGER DISPLAY

REGISTER: N20:20

REGISTER LOW: 1

DECIMAL RIGHT: 2

REGISTER HIGH: 16383

DECIMAL LEFT: 3

DISPLAY LOW: 0.01

NO SIGN PLACE

DISPLAY HIGH: 327.67

LEADING ZEROS NOT SHOWN

DATA POSITION #3: 16 BIT UNSIGNED INTEGER ENTRY

REGISTER: N20:20

REGISTER LOW: 1

DECIMAL RIGHT: 2

REGISTER HIGH: 16383

DECIMAL LEFT: 3

DISPLAY LOW: 0.01

NO SIGN PLACE

DISPLAY HIGH: 327.67

DEFAULT: NONE

LOW INPUT LIMIT: 0.01

HIGH INPUT LIMIT: 327.67

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SCREEN #021: DATA ENTRY

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íëëëëëëëëëëëëëëëëëëëëëë;

```

SCREEN MEMORY USED: 185 BYTES

°Derv 0.01 to 327.67 °

PREVIOUS MENU: 017

°DOV OUTPUT: BB1BB% °

NEXT SCREEN: 018

°Derivative: 𐐀𐐀𐐀2𐐀𐐀 °

PREVIOUS SCREEN: UNLINKED

°Enter: PPP3PP °

DATA POSITION #1: 16 BIT UNSIGNED INTEGER DISPLAY

REGISTER: N20:23

REGISTER LOW: 0

DECIMAL RIGHT: 0

REGISTER HIGH: 16383

DECIMAL LEFT: 5

DISPLAY LOW: 0

NO SIGN PLACE

DISPLAY HIGH: 100

LEADING ZEROS NOT SHOWN

DATA POSITION #2: 16 BIT UNSIGNED INTEGER DISPLAY

REGISTER: N20:21

REGISTER LOW: 1

DECIMAL RIGHT: 2

REGISTER HIGH: 16383

DECIMAL LEFT: 3

DISPLAY LOW: 0.01

NO SIGN PLACE

DISPLAY HIGH: 327.67

LEADING ZEROS NOT SHOWN

DATA POSITION #3: 16 BIT UNSIGNED INTEGER ENTRY

REGISTER: N20:21

REGISTER LOW: 1

DECIMAL RIGHT: 2

REGISTER HIGH: 16383

DECIMAL LEFT: 3

DISPLAY LOW: 0.01

NO SIGN PLACE

DISPLAY HIGH: 327.67

DEFAULT: NONE

LOW INPUT LIMIT: 0.01

HIGH INPUT LIMIT: 327.67

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SCREEN #022: DATA ENTRY

SCREEN MEMORY USED: 157 BYTES

PREVIOUS MENU: 010

NEXT SCREEN: 013

PREVIOUS SCREEN: UNLINKED

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:17

BIT NUMBER: 6

TEXT LENGTH: 6

OFF BIT TEXT: Manual

ON BIT TEXT: AUTO

DATA POSITION #2: 16 BIT UNSIGNED INTEGER DISPLAY

REGISTER: N20:23

DECIMAL RIGHT: 0

DECIMAL LEFT: 3

NO SIGN PLACE

LEADING ZEROS NOT SHOWN

REGISTER LOW: 0

REGISTER HIGH: 16383

DISPLAY LOW: 0

DISPLAY HIGH: 100

DATA POSITION #3: 16 BIT UNSIGNED INTEGER ENTRY

REGISTER: N20:23

DECIMAL RIGHT: 0

DECIMAL LEFT: 3

NO SIGN PLACE

DEFAULT: NONE

REGISTER LOW: 0

REGISTER HIGH: 16384

DISPLAY LOW: 0

DISPLAY HIGH: 100

LOW INPUT LIMIT: 0

HIGH INPUT LIMIT: 100

aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
 aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa

SCREEN #023: DATA ENTRY

SCREEN MEMORY USED: 94 BYTES

PREVIOUS MENU: 001

NEXT SCREEN: 001

PREVIOUS SCREEN: UNLINKED

DATA POSITION #1: BIT ENTRY

REGISTER: N20:17

BIT NUMBER: 10

ENTRY FORMAT: 1 & 0 KEYS

DEFAULT: NONE

[illegible]

SCREEN #025: DATA DISPLAY

SCREEN MEMORY USED: 210 BYTES

PREVIOUS MENU: UNLINKED

NEXT SCREEN: 026

PREVIOUS SCREEN: UNLINKED

DATA POSITION #1: 16 BIT SIGNED INTEGER DISPLAY

REGISTER: N60:26

DECIMAL RIGHT: 0

DECIMAL LEFT: 3

SHOW SIGN

LEADING ZEROS NOT SHOWN

REGISTER LOW: -454

REGISTER HIGH: 752

DISPLAY LOW: -454

DISPLAY HIGH: 752

DATA POSITION #2: 16 BIT SIGNED INTEGER DISPLAY

REGISTER: N60:24

DECIMAL RIGHT: 0

DECIMAL LEFT: 3

SHOW SIGN

LEADING ZEROS NOT SHOWN

REGISTER LOW: -454

REGISTER HIGH: 752

DISPLAY LOW: -454

DISPLAY HIGH: 752

DATA POSITION #3: 16 BIT SIGNED INTEGER DISPLAY

REGISTER: N60:25

DECIMAL RIGHT: 0

DECIMAL LEFT: 3

SHOW SIGN

LEADING ZEROS NOT SHOWN

REGISTER LOW: -454

REGISTER HIGH: 752

DISPLAY LOW: -454

DISPLAY HIGH: 752

DATA POSITION #4: 16 BIT SIGNED INTEGER DISPLAY

REGISTER: N60:27

DECIMAL RIGHT: 0

DECIMAL LEFT: 3

SHOW SIGN

LEADING ZEROS NOT SHOWN

REGISTER LOW: -454

REGISTER HIGH: 752

DISPLAY LOW: -454

DISPLAY HIGH: 752

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SCREEN #028: DATA DISPLAY

[illegible]

SCREEN MEMORY USED: 172 BYTES

°PIT CGM   PP1PP% °

°DOME FGM BB2BB% °

PREVIOUS MENU: UNLINKED

°DIL RATIO   P3 %   °

NEXT SCREEN: 029

°TIME 08:50 °

PREVIOUS SCREEN: UNLINKED

[illegible]

DATA POSITION #1: 16 BIT UNSIGNED INTEGER DISPLAY

REGISTER: N60:2

REGISTER LOW: 3277

DECIMAL RIGHT: 1

REGISTER HIGH: 16383

DECIMAL LEFT: 3

DISPLAY LOW: 0.0

NO SIGN PLACE

DISPLAY HIGH: 100.0

LEADING ZEROS NOT SHOWN

DATA POSITION #2: 16 BIT UNSIGNED INTEGER DISPLAY

REGISTER: N60:3

REGISTER LOW: 3277

DECIMAL RIGHT: 1

REGISTER HIGH: 16383

DECIMAL LEFT: 3

DISPLAY LOW: 0.0

NO SIGN PLACE

DISPLAY HIGH: 100.0

LEADING ZEROS NOT SHOWN

DATA POSITION #3: 16 BIT SIGNED INTEGER DISPLAY

REGISTER: N30:3

REGISTER LOW: 0

DECIMAL RIGHT: 0

REGISTER HIGH: 50

DECIMAL LEFT: 2

DISPLAY LOW: 0

NO SIGN PLACE

DISPLAY HIGH: 50

SHOW LEADING ZEROS

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```

SCREEN #033: DATA DISPLAY
SCREEN MEMORY USED:      211 BYTES
PREVIOUS MENU:           030
NEXT SCREEN:             001
PREVIOUS SCREEN:         UNLINKED
DATA POSITION #1:  16 BIT SIGNED INTEGER DISPLAY

```

```

REGISTER:          N31:2          REGISTER LOW:      -454
DECIMAL RIGHT:     0              REGISTER HIGH:     752
DECIMAL LEFT:      5              DISPLAY LOW:       -454
SHOW SIGN                                DISPLAY HIGH:     752
LEADING ZEROS NOT SHOWN

```

DATA POSITION #2: 16 BIT SIGNED INTEGER DISPLAY

```

REGISTER:          N31:5          REGISTER LOW:      -454
DECIMAL RIGHT:     0              REGISTER HIGH:     752
DECIMAL LEFT:      5              DISPLAY LOW:       -454
SHOW SIGN                                     DISPLAY HIGH:     752
LEADING ZEROS NOT SHOWN

```

DATA POSITION #3: 16 BIT SIGNED INTEGER DISPLAY

```

REGISTER:      N31:1      REGISTER LOW:      -454
DECIMAL RIGHT: 0          REGISTER HIGH:       752
DECIMAL LEFT:  5          DISPLAY LOW:        -454
SHOW SIGN                                DISPLAY HIGH:       752
LEADING ZEROS NOT SHOWN

```

DATA POSITION #4: 16 BIT SIGNED INTEGER DISPLAY

```

REGISTER:      N31:4      REGISTER LOW:      -454
DECIMAL RIGHT: 0          REGISTER HIGH:       752
DECIMAL LEFT:  5          DISPLAY LOW:        -454
SHOW SIGN                                DISPLAY HIGH:       752
LEADING ZEROS NOT SHOWN

```

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```
SCREEN #034: SUB-MENU                                     íëèèèèèèèèèèèèèèèèèè;
                                                           °   DILUTION MENU       °
                                                           °                         °
                                                           ° 1. DILUTION RATIO    °
                                                           ° 2. MIN DIL FLOW      °
PREVIOUS MENU:     001                                   âèèèèèèèèèèèèèèèèèèf
```

Item/Key # 1	links to screen 035	Item/Key # 5	is unlinked
Item/Key # 2	links to screen 036	Item/Key # 6	is unlinked
Item/Key # 3	is unlinked	Item/Key # 7	is unlinked
Item/Key # 4	is unlinked	Item/Key # 8	is unlinked

[illegible]

SCREEN #042: DATA DISPLAY

[illegible]

SCREEN MEMORY USED: 191 BYTES

° JR-1 P P P P P 1 P P P P P °

PREVIOUS MENU: 040

° Pump Pit BB2B °

NEXT SCREEN: 043

° Pump Pit BBB3BBB °

PREVIOUS SCREEN: UNLINKED

° JMPR HT BBB4BBB °

DATA POSITION #1: BIT DISPLAY

aëëëëëëëëëëëëëëëëëëëëëëëf

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 5

ON BIT TEXT: NON-PROCESS

TEXT LENGTH: 11

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 6

ON BIT TEXT: LEAK

TEXT LENGTH: 4

LEAK

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 7

ON BIT TEXT: TROUBLE

TEXT LENGTH: 7

TROUBLE

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 8

ON BIT TEXT: TROUBLE

TEXT LENGTH: 7

TROUBLE

[illegible]

SCREEN #043: DATA DISPLAY

```
íëëëëëëëëëëëëëëëëë;

```

SCREEN MEMORY USED: 182 BYTES

° PIC Water PP1P °

PREVIOUS MENU: 040

° PLC Temp . PP2P °

NEXT SCREEN: 044

° CMPRSR Temp BB3B °

PREVIOUS SCREEN: UNLINKED

° Jet Pump 1111141111 °

[illegible]

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 9

ON BIT TEXT: LOW

TEXT LENGTH: 4

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 10

ON BIT TEXT: HIGH

TEXT LENGTH: 4

HIGH

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 11

ON BIT TEXT: HIGH

TEXT LENGTH: 4

HIGH

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 12

ON BIT TEXT: SHUTDOWN

TEXT LENGTH: 8

SHUTDOWN

[illegible]

SCREEN #044: DATA DISPLAY

[illegible]

SCREEN MEMORY USED: 181 BYTES

° SGT Level BB1B°

PREVIOUS MENU: 040

° RFPT SIGNAL BB2B °

NEXT SCREEN: 045

◦ Network PPP3PPP◦

PREVIOUS SCREEN: UNLINKED

° JFPT SIGNAL BB4BB °

[illegible]

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 13

ON BIT TEXT: LOW

TEXT LENGTH: 4

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 14

ON BIT TEXT: LOST

TEXT LENGTH: 4

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:24

OFF BIT TEXT: norm

BIT NUMBER: 15

ON BIT TEXT: FAILURE

TEXT LENGTH: 7

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:25

OFF BIT TEXT: norm

BIT NUMBER: 0

ON BIT TEXT: LOST

TEXT LENGTH: 5

[illegible]

SCREEN #045: DATA DISPLAY

```
īēēēēēēēēēēēēēēēēēēēēēēēēēēē;
```

SCREEN MEMORY USED: 182 BYTES

° U Farm leak PP1PP °

PREVIOUS MENU: 040

° Lk 1 COB U29 BB2BB °

NEXT SCREEN: 046

° Leak 1 ck PP3PP °

PREVIOUS SCREEN: UNLINKED

◦ U Flush pos bb4bb ◦

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:25

OFF BIT TEXT: norm

BIT NUMBER: 1

ON BIT TEXT: alarm

TEXT LENGTH: 5

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:25

OFF BIT TEXT: norm

BIT NUMBER: 2

ON BIT TEXT: alarm

TEXT LENGTH: 5

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:25

OFF BIT TEXT: norm

BIT NUMBER: 3

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:25

OFF BIT TEXT: norm

BIT NUMBER: 4

ON BIT TEXT: alarm

TEXT LENGTH: 5

[illegible]

SCREEN #046: DATA DISPLAY

[illegible]

SCREEN MEMORY USED: 182 BYTES

° Recirc Loop PP1PP °

PREVIOUS MENU: 040

◦ FGM BB2BB ◦

NEXT SCREEN: 048

° Leak ST#4 PP3PP °

PREVIOUS SCREEN: UNLINKED

◦ U Shtdown bb4bb ◦

DATA POSITION #1: BIT DISPLAY

äë

REGISTER: N20:25

OFF BIT TEXT: norm

BIT NUMBER: 5

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:25

OFF BIT TEXT: norm

BIT NUMBER: 6

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:25

OFF BIT TEXT: norm

BIT NUMBER: 7

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:25

OFF BIT TEXT: norm

BIT NUMBER: 8

ON BIT TEXT: Alarm

TEXT LENGTH: 5

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SCREEN #048: DATA DISPLAY

SCREEN MEMORY USED: 178 BYTES

PREVIOUS MENU: 040

NEXT SCREEN: 050

PREVIOUS SCREEN: 046

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:25

BIT NUMBER: 9

TEXT LENGTH: 5

OFF BIT TEXT: NORM

ON BIT TEXT: ALARM

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:25

BIT NUMBER: 10

TEXT LENGTH: 4

OFF BIT TEXT: norm

ON BIT TEXT: Leak

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:25

BIT NUMBER: 11

TEXT LENGTH: 5

OFF BIT TEXT: norm

ON BIT TEXT: Alarm

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:25

BIT NUMBER: 12

TEXT LENGTH: 4

OFF BIT TEXT: norm

ON BIT TEXT: Leak

aa

SCREEN #050: DATA DISPLAY

SCREEN MEMORY USED: 139 BYTES

PREVIOUS MENU: UNLINKED

NEXT SCREEN: 052

PREVIOUS SCREEN: 048

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:25

BIT NUMBER: 13

TEXT LENGTH: 5

OFF BIT TEXT: norm

ON BIT TEXT: Alarm

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:25

BIT NUMBER: 14

TEXT LENGTH: 5

OFF BIT TEXT: norm

ON BIT TEXT: Alarm

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:25

BIT NUMBER: 15

TEXT LENGTH: 5

OFF BIT TEXT: norm

ON BIT TEXT: Alarm

[illegible]

SCREEN #052: DATA DISPLAY

[illegible]

SCREEN MEMORY USED: 182 BYTES

° COB U33 Leak PP1PP °

◦ Unused PP2PP ◦

PREVIOUS MENU: UNLINKED

◦ Dilution tk $\mathbb{P}^3\mathbb{P}$ ◦

NEXT SCREEN: 053

° COB U33 ck PP4PP °

PREVIOUS SCREEN: UNLINKED

åëèéêë

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 0

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 1

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 2

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 3

ON BIT TEXT: Alarm

TEXT LENGTH: 5

[illegible]

SCREEN #053: DATA DISPLAY

[illegible]

SCREEN MEMORY USED: 182 BYTES

° U Flush Pres PP1PP °

PREVIOUS MENU: UNLINKED

° U Recir Pres bb2bb °

NEXT SCREEN: 054

° Recirc Press PP3PP °

PREVIOUS SCREEN: 052

° Pit U-A lk BB4BB °

[illegible]

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 4

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 5

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 6

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 7

ON BIT TEXT: Alarm

TEXT LENGTH: 5

[illegible]

SCREEN #054: DATA DISPLAY

```
íëëëëëëëëëëëëëëëë;

```

SCREEN MEMORY USED: 182 BYTES

° Pit U-A ck PP1PP °

PREVIOUS MENU: UNLINKED

° Pit U-B lk BB2BB °

NEXT SCREEN: 055

° Pit U-B ck BB3BB °

PREVIOUS SCREEN: 053

° COB U-30 lk BB4BB °

äëööööööööööööööööööööööööf

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 8

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 9

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 10

ON BIT TEXT: Alarm

TEXT LENGTH: 5

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:51

OFF BIT TEXT: norm

BIT NUMBER: 11

ON BIT TEXT: Alarm

TEXT LENGTH: 5

[illegible]

```

SCREEN #055: DATA DISPLAY
SCREEN MEMORY USED:      182 BYTES
PREVIOUS MENU:           UNLINKED
NEXT SCREEN:             056
PREVIOUS SCREEN:         054
DATA POSITION #1:  BIT DISPLAY

```

REGISTER:	N20:51	OFF BIT TEXT:	norm
BIT NUMBER:	12	ON BIT TEXT:	Alarm
TEXT LENGTH:	5		

```
DATA POSITION #2:  BIT DISPLAY

REGISTER:          N20:51          OFF BIT TEXT:      norm
BIT NUMBER:        13              ON BIT TEXT:         Alarm
TEXT LENGTH:       5
```

```
DATA POSITION #3:  BIT DISPLAY

REGISTER:          N20:51          OFF BIT TEXT:      norm
BIT NUMBER:        14              ON BIT TEXT:         Alarm
TEXT LENGTH:       5
```

DATA POSITION #4: BIT DISPLAY			
REGISTER:	N20:51	OFF BIT TEXT:	norm
BIT NUMBER:	15	ON BIT TEXT:	Alarm
TEXT LENGTH:	5		

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SCREEN #056: DATA DISPLAY

SCREEN MEMORY USED: 178 BYTES

PREVIOUS MENU: UNLINKED

NEXT SCREEN: 057

PREVIOUS SCREEN: 055

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:52

BIT NUMBER: 0

TEXT LENGTH: 4

OFF BIT TEXT: norm

ON BIT TEXT: LOW

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:52

BIT NUMBER: 1

TEXT LENGTH: 4

OFF BIT TEXT: norm

ON BIT TEXT: LOW

DATA POSITION #3: BIT DISPLAY

REGISTER: N20:52

BIT NUMBER: 2

TEXT LENGTH: 5

OFF BIT TEXT: norm

ON BIT TEXT: Alarm

DATA POSITION #4: BIT DISPLAY

REGISTER: N20:52

BIT NUMBER: 3

TEXT LENGTH: 5

OFF BIT TEXT: norm

ON BIT TEXT: Alarm

aa

SCREEN #057: DATA DISPLAY

SCREEN MEMORY USED: 110 BYTES

PREVIOUS MENU: UNLINKED

NEXT SCREEN: 058

PREVIOUS SCREEN: 056

DATA POSITION #1: BIT DISPLAY

REGISTER: N20:52

BIT NUMBER: 4

TEXT LENGTH: 5

OFF BIT TEXT: norm

ON BIT TEXT: Alarm

DATA POSITION #2: BIT DISPLAY

REGISTER: N20:52

BIT NUMBER: 6

TEXT LENGTH: 5

OFF BIT TEXT: norm

ON BIT TEXT: Alarm

[illegible]

```

SCREEN #058: DATA DISPLAY
SCREEN MEMORY USED:      53 BYTES
PREVIOUS MENU:           UNLINKED
NEXT SCREEN:             UNLINKED
PREVIOUS SCREEN:         057
DATA POSITION #1:  BIT DISPLAY

```

REGISTER:	N20:52	OFF BIT TEXT:	norm
BIT NUMBER:	8	ON BIT TEXT:	Alarm
TEXT LENGTH:	5		

[illegible][illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 0  
BIT WILL BE: SET.
```

[illegible]

```
SCREEN #101: ALARM                                     íëëëëëëëëëëëëëëëëëëë;
° Alarm 1 °
SCREEN MEMORY USED:    79 BYTES                        ° XFR Pressure LOW   °
°                                                    °
° PRESS 'Y' TO CLEAR °
äëëëëëëëëëëëëëëëëëëf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 1  
BIT WILL BE: SET.
```

[illegible][illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 2  
BIT WILL BE: SET.
```

[illegible]

SCREEN #103: ALARM

SCREEN MEMORY USED: 81 BYTES

```

ïèèèèèèèèèèèèèèèèèèèèèèè;
  °           Alarm 3             °
  ° Flush Pressure HI            °
  °                               °
  ° PRESS 'Y' TO CLEAR          °
äèèèèèèèèèèèèèèèèèèèèèèèf

```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 3  
BIT WILL BE: SET.
```

[illegible]

SCREEN #104: ALARM

SCREEN MEMORY USED: 81 BYTES

```

íëèèèèèèèèèèèèèèèèèè;
◦           Alarm 4          ◦
◦   JET PUMP TROUBLE       ◦
◦                               ◦
◦ PRESS 'Y' TO CLEAR      ◦
äèèèèèèèèèèèèèèèèèèf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 4  
BIT WILL BE: SET.
```

[illegible]

SCREEN #105: ALARM

SCREEN MEMORY USED: 93 BYTES

```

1ēēēēēēēēēēēēēēēēēēēēēēēēē;
◦      Alarm 5                      ◦
◦      JR-1 Position                ◦
◦      NON-PROCESS                  ◦
◦      PRESSRESS 'Y' TO CLEAR       ◦
āēēēēēēēēēēēēēēēēēēēēēēēēēf

```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 5  
BIT WILL BE: SET.
```

[illegible]

SCREEN #106: ALARM

SCREEN MEMORY USED: 79 BYTES

```
iëèèèèèèèèèèèèèèèèèèèèèè;
°      Alarm 6             °
°    PUMP PIT   LEAK       °
°                               °
° PRESS 'Y' TO CLEAR     °
äèèèèèèèèèèèèèèèèèèèèèèf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 6  
BIT WILL BE: SET.
```

[illegible]

SCREEN #107: ALARM

SCREEN MEMORY USED: 91 BYTES

```
iēēēēēēēēēēēēēēēēēēēē;
o      Alarm 7              o
o    PUMP PIT LEAK         o
o    TROUBLE                o
o  PRESS 'Y' TO CLEAR     o
āēēēēēēēēēēēēēēēēēēēēf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 7  
BIT WILL BE: SET.
```

aáãäåæçàéêëìíîïðñúûüýþÿ

SCREEN #108: ALARM

SCREEN MEMORY USED: 92 BYTES

```

1ēēēēēēēēēēēēēēēēēēēēēēēēēj
◦      Alarm 8                      ◦
◦    JMPR HEAT TRACE                ◦
◦      TROUBLE                      ◦
◦  PRESS 'Y' TO CLEAR              ◦
āēēēēēēēēēēēēēēēēēēēēēēēēf

```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 8  
BIT WILL BE: SET.
```

[illegible]

SCREEN #109: ALARM

SCREEN MEMORY USED: 81 BYTES

[illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 9  
BIT WILL BE: SET.
```

[illegible]

SCREEN #110: ALARM

SCREEN MEMORY USED: 81 BYTES

[illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 10  
BIT WILL BE: SET.
```

[illegible]

SCREEN #111: ALARM

SCREEN MEMORY USED: 92 BYTES

```

ïèèèèèèèèèèèèèèèèèèèèèèè;
 °      Alarm 11          °
 °Air Compressor Temp   °
 °           HI          °
 ° PRESS 'Y' TO CLEAR  °
 ðèèèèèèèèèèèèèèèèèèèèèèf

```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 11  
BIT WILL BE: SET.
```

[illegible]

SCREEN #112: ALARM

SCREEN MEMORY USED: 81 BYTES

[illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 12  
BIT WILL BE: SET.
```

[illegible]

SCREEN #113: ALARM

SCREEN MEMORY USED: 76 BYTES

```
iēēēēēēēēēēēēēēēēēēēēj  
o      Alarm 13          o  
o      SGT LOW           o  
o                           o  
o PRESS 'Y' TO CLEAR    o  
āēēēēēēēēēēēēēēēēēēēēf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 13  
BIT WILL BE: SET.
```

~~~~~

SCREEN #114: ALARM

SCREEN MEMORY USED: 92 BYTES

```

ïëëëëëëëëëëëëëëëëëëëë;
°          Alarm 14           °
°   RFPT SIGNAL LOSS        °
°         ALARM              °
°Press 'Y' to Clear         °
äëëëëëëëëëëëëëëëëëëëëf

```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:0  
BIT NUMBER: 14  
BIT WILL BE: SET.
```


áâãäåæçèéêëìíîïðñòóôõö÷øùúûüýþÿ

SCREEN #131: ALARM

SCREEN MEMORY USED: 77 BYTES

```
iëëëëëëëëëëëëëëëëëë;
o      ALARM 31          o
o     CGM TROUBLE       o
o                               o
o   PRESS 'Y' TO CLEAR  o
äëëëëëëëëëëëëëëëëëf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:1  
BIT NUMBER: 14  
BIT WILL BE: SET.
```

[illegible]

SCREEN #132: ALARM

SCREEN MEMORY USED: 92 BYTES

[illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:1  
BIT NUMBER: 15  
BIT WILL BE: SET.
```

[illegible]

SCREEN #133: ALARM

SCREEN MEMORY USED: 77 BYTES

```
iēēēēēēēēēēēēēēēēēēē;
o      ALARM 33              o
o    COB U-33 LEAK          o
o                             o
o PRESS 'Y' TO CLEAR       o
āēēēēēēēēēēēēēēēēēēēf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 0  
BIT WILL BE: SET.
```

[illegible]

SCREEN #134: ALARM

SCREEN MEMORY USED: 63 BYTES

```
iëëëëëëëëëëëëëëëëëëëëëëë;
o          ALARM 34              o
o                                  o
o                                  o
o PRESS 'Y' TO CLEAR            o
äëëëëëëëëëëëëëëëëëëëëëëf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 1  
BIT WILL BE: SET.
```

[illegible]

SCREEN #135: ALARM

SCREEN MEMORY USED: 91 BYTES

[illegible]

ACKNOWLEDGE ALARM TO REGISTER: N12:2

BIT NUMBER:

BIT WILL BE:

2

SET.

áâãäåæçèéêëìíîïðñúûüýþÿ

SCREEN #136: ALARM

SCREEN MEMORY USED: 87 BYTES

```
iēēēēēēēēēēēēēēēēēēēēēēē;
°      ALARM 36                      °
°      COB U-33                     °
°      TROUBLE                       °
° PRESS 'Y' TO CLEAR                °
āēēēēēēēēēēēēēēēēēēēēēēf
```

ACKNOWLEDGE ALARM TO REGISTER: N12:2

BIT NUMBER:

BIT WILL BE:

3

SET.

aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa

SCREEN #137: ALARM

SCREEN MEMORY USED: 90 BYTES

```
iēēēēēēēēēēēēēēēēēēēēēēē;
°      ALARM 37                       °
°      U FARM HIGH                     °
°      FLUSH PRESS                      °
°      PRESS 'Y' TO CLEAR              °
āēēēēēēēēēēēēēēēēēēēēēēēf
```

ACKNOWLEDGE ALARM TO REGISTER: N12:2

BIT NUMBER:

BIT WILL BE:

4

SET.

[illegible]

SCREEN #138: ALARM

SCREEN MEMORY USED: 91 BYTES

[illegible]

ACKNOWLEDGE ALARM TO REGISTER: N12:2

BIT NUMBER:

BIT WILL BE:

5

SET.

[illegible]

SCREEN #139: ALARM

SCREEN MEMORY USED: 92 BYTES

```
iēēēēēēēēēēēēēēēēēēē;
o      ALARM 39          o
o    RECIRC FLUSH PRESS   o
o           HI            o
o  PRESS 'Y' TO CLEAR     o
āēēēēēēēēēēēēēēēēēēf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 6  
BIT WILL BE: SET.
```

[illegible]

SCREEN #140: ALARM

SCREEN MEMORY USED: 90 BYTES

```

1ēēēēēēēēēēēēēēēēēēēēēēēēēēēēj;
o      ALARM 40                                o
o    VALVE PIT U-A                             o
o      LEAK                                    o
o PRESS 'Y' TO CLEAR                          o
āēēēēēēēēēēēēēēēēēēēēēēēēēēēēf

```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 7  
BIT WILL BE: SET.
```

[illegible]

SCREEN #141: ALARM

SCREEN MEMORY USED: 89 BYTES

[illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 8  
BIT WILL BE: SET.
```

[illegible]

SCREEN #142: ALARM

SCREEN MEMORY USED: 89 BYTES

```

1ëëëëëëëëëëëëëëëëëëëëëë;
°      ALARM 42          °
°    VALVE PIT U-B       °
°      LEAK              °
° PRESS 'Y' TO CLEAR   °
äëëëëëëëëëëëëëëëëëëëëëf

```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 9  
BIT WILL BE: SET.
```

[illegible]

SCREEN #143: ALARM

SCREEN MEMORY USED: 88 BYTES

[illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 10  
BIT WILL BE: SET.
```

[illegible]

SCREEN #144: ALARM

SCREEN MEMORY USED: 78 BYTES

[illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 11  
BIT WILL BE: SET.
```

a

SCREEN #145: ALARM

SCREEN MEMORY USED: 90 BYTES

```

ïèèèèèèèèèèèèèèèèèèèèèèè;
°          ALARM 45           °
°          COB U-30          °
°          TROUBLE           °
° PRESS 'Y' TO CLEAR        °
äèèèèèèèèèèèèèèèèèèèèèèèf

```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 12  
BIT WILL BE: SET.
```

[illegible]

SCREEN #146: ALARM

SCREEN MEMORY USED: 97 BYTES

```
1ēēēēēēēēēēēēēēēēēēēē;
°      ALARM 46 °
° U FARM RECIRC FLUSH°
°     SIGNAL LOSS   °
° PRESS 'Y' TO CLEAR °
āēēēēēēēēēēēēēēēēēēēēf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 13  
BIT WILL BE: SET.
```

[illegible]

SCREEN #147: ALARM

SCREEN MEMORY USED: 97 BYTES

```
iēēēēēēēēēēēēēēēēēēēēēēēēēēēē;
°          ALARM 47              °
° U FARM JUMPER FLUSH           °
°      SIGNAL LOSS               °
° PRESS 'Y' TO CLEAR            °
āēēēēēēēēēēēēēēēēēēēēēēēēēēēēf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 14  
BIT WILL BE: SET.
```

[illegible]

SCREEN #148: ALARM

SCREEN MEMORY USED: 94 BYTES

[illegible]

```
ACKNOWLEDGE ALARM TO REGISTER: N12:2  
BIT NUMBER: 15  
BIT WILL BE: SET.
```

[illegible]

SCREEN #149: ALARM

SCREEN MEMORY USED: 89 BYTES

```
iëèèèèèèèèèèèèèèèèèè;
°          ALARM 49           °
°    WATER CAB TEMP         °
°      LOW                  °
° PRESS 'Y' TO CLEAR       °
äèèèèèèèèèèèèèèèèèèf
```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:3  
BIT NUMBER: 0  
BIT WILL BE: SET.
```

[illegible]

SCREEN #150: ALARM

SCREEN MEMORY USED: 86 BYTES

```

ïèèèèèèèèèèèèèèèèèèèèèèè;
°           ALARM 50             °
°          WFIE TEMP            °
°           LOW                 °
°   PRESS 'Y' TO CLEAR         °
àèèèèèèèèèèèèèèèèèèèèèèèf

```

```
ACKNOWLEDGE ALARM TO REGISTER: N12:3  
BIT NUMBER: 1  
BIT WILL BE: SET.
```