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105K EAST ION EXCHANGE & CARTRIDGE FILTER RESTART
COMPUTER SOFTWARE DESIGN DESCRIPTION

Pages: 43

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105 K EAST ION EXCHANGE AND CARTRIDGE FILTER RESTART COMPUTER SOFTWARE DESIGN DESCRIPTION

DS SCHERMERHORN

Westinghouse Hanford Co., Richland, WA 99352
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RESTART PROJECT

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Release Approval

2/11/95
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Rev. 0

105 K East Ion Exchange and Cartridge Filter
Restart Computer Software Design Description

Author: DS Schermerhorn
Date: December 8, 1995

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1.0 INTRODUCTION

1.1 Purpose

This document describes the software system designed for the 105 K East Ion Exchange and Cartridge Filter Restart Project. All personnel responsible for software maintenance should read this document.

1.2 Scope

This document describes the interface software and the Programmable Logic Controller (PLC) software associated with the system.

1.3 Overview

This document provides information on all the operator interface screen contents and the PLC program. Also discussed is the methodology for each interface script and precautions to take when changing either software environment. See figure 1 for an overview of the system.

1.4 Definitions

PLC Programmable Logic Controller. The computer system that directly interfaces with field devices (instrumentation, alarm horns, etc.).

WonderWare/Intouch The software platform for the operator interface. This is a graphical language with limited support for the typical "text" type program (scripts).

Sonalert A small alarm horn with a very high pitch.

Intouch is a trademark of ^{Wonderware Inc.} ~~Mallory Corporation~~ 12/11/95
Sonalert is a trademark of ^{Mallory Corporation} ~~Mallory Corporation~~ (JCB 12/11/95)

2.0 DECOMPOSITION DESCRIPTION

2.1 Module Decomposition

Figure 1 provides a broad outline of the hardware decomposition. Listed below are the software modules. Each software module is discussed in this document in a later section.

2.1.1 INTERFACE SOFTWARE MODULES

- 1 Basin Screen
- 2 Sump & Skimmer Screen
- 3 PLC Communication Screen
- 4 Alarm Screen
- 5 Flow Totalizer Screen
- 6 Real Time Trends Screen
- 7 Historical Trend Screen
- 8 Disabled Alarms Screen
- 9 Log On Screen
- 10 Auxiliary Control Screen
- 11 Script Modules

2.1.2 PLC SOFTWARE MODULES

- 1 Ladder Logic Module
- 2 Alarm Detection Module
- 3 Special Function Module

2.2 Concurrent Process Decomposition

The 'Windows' operating system must be in concurrent operation with the operator interface software.

2.3 Data Entity Decomposition

Analog data are decomposed in table 1.

Windows is a trademark of Microsoft Corp. (JCB 12/11/85)

3.0 DEPENDENCY DESCRIPTION

3.1 Intermodule Dependencies

The following list describes software module dependencies.

1. The operator interface software is dependent upon the PLC software for data and system status information.
2. The PLC software is not dependent on the operator interface software. It will continue to function normally irregardless of the state of the interface software.

3.2 Interprocess Dependencies

The interface software requires the "Windows" operating system to be operating.

3.3 Data Dependencies

1. The cartridge filter op is dependent on the recirc pump pressure and cartridge filter outlet pressure.
2. The flow totalizers for the cartridge filters and the IXM's are dependent on the flow transmitters for the cartridge filters and IXM's.
3. The basin flow balance is dependent on the flowmeters for the cartridge filters, downcomers and IXM's. The basin flow balance is obtained from the following equation.

$$FB = (C1 + C2) - (D1 + D2 + D3) - (I1 + I2)$$

FB = Basin Flow Balance

CX = Cartridge Filter Flow

DX = Downcomer Flow

IX = IXM Flow

3.4 Conversion Dependencies

None

4.0 INTERFACE DESCRIPTION

4.1 Module Interface

All operator interface software modules use either the mouse device, keyboard or touchscreen for an interface.

4.2 Process Interface

The PLC software relies on the operator interface software for an interface. The interface occurs via a serial communications computer port.

5.0 DETAILED DESIGN

This section provides details of each software module, refer to figures 2-13 for an illustration of each interface module.

5.1 Module Detail Design

OPERATOR INTERFACE SOFTWARE

5.1.1 Main Screen

The main screen is used for accessing the cartridge filter, IXM and basin screens. It serves as a central selection and alarm point for basin instrumentation.

5.1.2 Filter Screen

The filter screen contains analog instrumentation displays for parameters associated with the basin cartridge filters. Each parameter display can be activated to display more detailed information, see the overview screen description for more information.

5.1.3 IXM Screen

The IXM screen contains analog instrumentation displays for parameters associated with the IXM's. Each parameter display can be activated to display more detailed information, see the overview screen description for more information.

5.1.4 Basin Screen

The basin screen contains analog instrumentation displays for parameters associated with the basin. Each parameter display can be activated to display more detailed information, see the overview screen description for more information.

5.1.5 Overview Screen

The overview screen contains instrumentation readouts associated with the basin. Each readout is used for displaying the parameters value and associated engineering units. If the parameter alarms, the readout will flash red and will become solid red when the alarm is acknowledged.

Clicking or touching a readout will activate a window that displays pertinent information associated with the alarm functions of the readout. For example HI/LO alarm setpoints, instrument range etc. See Alarm Control Screen for further information

Alarms can be acknowledged on this screen by pressing the ACK button or by pressing the ACK button located on the individual Alarm Control Screens.

5.1.6 Sump & Skimmer Screen

The sump and skimmer screen contains instrumentation readouts associated with the basin. Each readout is used for displaying the parameters value and associated engineering units. If the parameter alarms, the readout will flash red and will become solid red when the alarm is acknowledged.

Clicking or touching a readout will activate a window that displays pertinent information associated with the alarm functions of the readout. For example HI/LO alarm setpoints, instrument range etc. See Alarm Control Screen for further information.

Alarms can be acknowledged on this screen by pressing the ACK button or by pressing the ACK button located on the individual Alarm Control Screens.

5.1.7 PLC Communication Screen

This screen is used for displaying the status of the PLC communication status. Auxiliary purposes include display of historical logging and removable disk drive status.

There are no operator inputs on this screen.

The PLC base status screen is accessed from this screen.

Alarms on this screen are acknowledged by the ACK button.

5.1.8 Alarm Screen

The alarm screen is for displaying the basin annunciator alarms. Each annunciator alarm originates from the basin Honeywell recorder.

The alarm summary and alarm history screen can be accessed from this screen.

Any alarm on this screen is acknowledged by pressing the ACK button.

5.1.9 PLC Base Status

The base status screen displays the status of the PLC and displays the status of each I/O card in the PLC base

Any alarm on this screen can be acknowledged by pressing the ACK button.

5.1.10 Alarm Control Screen

The alarm control screen is a "pop-up" window that appears anytime an analog parameter display is clicked by the user.

The screen provides range information on the analog parameter plus it provides alarm information.

A programmer password allows changing of any parameter on the window.

The time delay parameter should not be set excessively high because the setpoint directly affects the parameter scan time. It is recommended that the delay be set no higher than 2 approximately seconds.

The ACK button on this screen acknowledges only the displayed parameter

A supervisor password provides access to disable or enable each alarm.

5.1.11 Flow Totalizer Screen

The totalizers sample the associated flow once every minute and accumulate the total.

A supervisor password allows access for changing the serial number and for resetting the totalizer.

The ACK button provides alarm acknowledgment for any flow related alarm on the screen.

5.1.12 Real Time Trends Screen

The real time trend screen(s) are live trends of various data points associated with the basin. The trends can not be controlled by the operator.

5.1.13 Historical Trend Screen

This screen displays trending of data back in time for 35 days. The trend can be controlled by the operator.

5.1.14 Disabled Alarms Screen

This screen provides a central location for listing all alarms that have been disabled by the supervisor.

5.1.15 Log On Screen

The screen is used for entering or changing individual passwords.

5.1.16 Auxiliary Control Screen

This screen provides auxiliary control functions as follows:

1. Terminal acknowledge enable/disable function. If terminal acknowledge is disabled then the operator interface will not be capable of acknowledging alarms. This feature provides for a remote "observe only" terminal capability without interfering with basin operations. This feature is accessed via a supervisor password.
2. Alarm test function. This is a simple test of the alarm horns.
3. Programmers window function. This allows a system programmer to access the programming window. The programming window provides access to raw data from the analog instrumentation.
4. Alarm horn disable. This function is accessed by the programmer to disable the alarm horns for various system testing evolutions. If an alarm horn is disabled a red flashing banner will appear in the menu section. The flashing banner can not be disabled by any password.

5.1.17 Script Modules

Program scripts run continuously to detect and control system status.

PLC SOFTWARE

5.1.18 Ladder Logic Module

The ladder logic section controls alarm transmission and alarm horn actuation.

5.1.19 Alarm Detection Module

The alarm modules control alarm detection and control the translation of raw instrumentation data into engineering data.

5.1.20 Special Function Module

The special function modules control flow totalization and derived parameter calculation. For example differential pressure is calculated in a special function program.

5.2 Data Detail Design

See table 1 and table 2

6.0 REFERENCES

WHC-CM-3-10 SOFTWARE PRACTICES.

Figure 1
Block Diagram of System

This figure provides an overview of the functional relationship of the system components.

Figure 2
Main Screen

This screen displays is the central point from which the filter, IXM and basin screens are accessed.

Figure 3
Filter Screen

This screen displays all information associated with the basin cartridge filters.

This screen displays all the analog instrumentation associated with the IXM's.

Figure 5
Basin Screen

This screen displays all the analog instrumentation for the basin.

This screen displays an overview of analog instrumentation for the basin.

Figure 7
Sump & Skimmer Screen

This screen displays the instrumentation readouts for the sump and skimmer.

Figure 8

PLC Communication Screen

This screen displays the status of the PLC communications.

This screen displays the status of the PLC and the I/O cards. If a fault is detected the associated status will display "ERROR".

Development

K-EAST

SUMP HIGH LEVEL REACTOR DISC. (LLA-2)	SUMP HIGH LEVEL STORAGE BASIN (LLA-3)	SUMP HIGH LEVEL TRANSFER STORAGE (LLA-5)	396 STORAGE BASIN LEVEL HIGH (LLA-1A, LLA-1B)	396 STORAGE BASIN LEVEL LOW (LLA-1A, LLA-1B)
395 HIGH RADIATION ALARM	395 INTMD RADIATION ALARM	395 LOW RADIATION ALARM	396 MAIN CIRC PUMP FAILURE (P1A, P1C)	396 STORAGE BASIN HI/LO pH ALARM
396 STORAGE BASIN HIGH TEMPERATURE ALARM				

K-WEST

394 SYSTEM FAILURE 105-KW	393 HIGH RADIATION 105-KW
---------------------------------	---------------------------------

ACK

FAIL-Reset

HORN TEST

Bypass Switches

Alarm Status

ALARM LIST

Summary List

History List

Figure 11
Annunciator Bypass Screen

Figure 12
Alarm Summary Screen

Development		
MM/DD/YY	HH:MM:SS	EVT Name
12/07/95	08:01:33	ALM PLC_COMMUNICATION_ERROR_1
12/07/95	08:01:33	ALM PLC_COMMUNICATION_ERROR_2

Figure 1 shows the front panel of the 1000 Series Flowmeter. It features four digital displays for flow rate and totalization. The top-left display is labeled "FILTER F1A FLOW TOTALIZER" and shows "0 CPM" and "0 GAL". The top-right display is labeled "FILTER F1B FLOW TOTALIZER" and also shows "0 CPM" and "0 GAL". The bottom-left display is labeled "IXM1 FLOW TOTALIZER" and shows "0 CPM" and "0 GAL". The bottom-right display is labeled "IXM2 FLOW TOTALIZER" and also shows "0 CPM" and "0 GAL". Each display has a "Days" and "Mins" section. A central "ACK" button is located between the top and bottom displays. The bottom of the panel has a row of six small indicator lights and a large "0.00" display on the right.

Figure 14
Real Time Trend Screen

[illegible]

Figure 16
Auxilliary Screen

File Edit View Options Help Development					
Programmer			Supervisor
Disable alarm horns.			Acknowledge all alarms.
Programming window.			Disable alarm ack on this terminal
Set alarm horn timers.			Skimmer Lineup Option.
Test file write to D: drive					
			Operator
			Load Retainer
			Ack Alarm
			Alarm Silence

Figure 17
Log On Screen

Table 1
Instrumentation Ranges

Instrument Description	Instrument Number	Instrument Units	Instrument Range
Filter 1A Flow	FE-208-1	GPM	0-600
Filter 1B Flow	FE-208-2	GPM	0-600
Rec Pump Disch Pressure	PIT-207-9	GPM	0-600
Filter 1A Outlet Press.	PIT-208-1	PSIG	0-150
Filter 1B Outlet Press.	PIT-208-2	PSIG	0-150
Basin Conductivity Probe A	CE-226-1	uS	0-20
Basin Conductivity Probe B	CE-226-2	uS	0-20
IXM 1 Flow	FE-220-2	GPM	0-200
IXM 2 Flow	FE-220-3	GPM	0-200
IXM 1 Conductivity	CE-220-1	uS	0-20
IXM 2 Conductivity	CE-220-2	uS	0-20
Downcomer Flow A	FE-1	GPM	0-600
Downcomer Flow B	FE-2	GPM	0-600
Downcomer Flow C	FE-3	GPM	0-600
Basin pH	PHT-226-1	pH	0-14
Sump C Status	IT-233-1	mA	4-20
Sump D Status	IT-233-2	mA	4-20
Skimmer Pump Status	IT-204-1	mA	4-20
Basin level (future)	LE-Future	Feet	0-20
Basin Temperature A	TE-2A	DEG F	0-150
Basin Temperature B	TE-2B	DEG F	0-150

Table 2
Operator Interface and PLC Data Links

This table shows the links between the operator interface data and the PLC data. For example the interface "tag" F1A_FLOW is equivalent to the PLC "variable" APV1. Other links to the historical database are also shown for information.

Operator Interface	DDE	PLC
DATADIR	HIST	DATADIR
DBDIR	HIST	DBDIR
DURATION	HIST	DURATION
FILENAME	HIST	FILENAME
INTERVAL	HIST	INTERVAL
SENDDATA	HIST	SENDDATA
STARTDATE	HIST	STARTDATE
STARTTIME	HIST	STARTTIME
TAGS	HIST	TAGS
TAGS1	HIST	TAGS1
TAGS2	HIST	TAGS2
TAGS3	HIST	TAGS3
WRITEFILE	HIST	WRITEFILE
HDWDataDir	HistdataViewstr	DataDir
HDWDBDir	HistdataViewstr	DBDir
HDWDuration	HistdataViewstr	Duration
HDWError	HistdataViewstr	Error
HDWFilename	HistdataViewstr	Filename
HDWInterval	HistdataViewstr	Interval
HDWStartDate	HistdataViewstr	StartDate
HDWStartTime	HistdataViewstr	StartTime
HDWStatus	HistdataViewstr	Status
HDWTags	HistdataViewstr	Tags
HDWWriteFile	HistdataViewstr	WriteFile
ALARM_HORN	PLC1	Y194
ALARMAADB	PLC1	V1014.
ALARMAHA	PLC1	V1002.
ALARMAHHA	PLC1	V1000.
ALARMALA	PLC1	V1004.
ALARMALLA	PLC1	V1006.
ALARMAPVH	PLC1	V1008.
ALARMAPVL	PLC1	V1010.
ALARMATS	PLC1	V1012.
ALARMHORNSDISABLE	PLC1	C702
ALARMNUMBER	PLC1	V900
ALARMREAD	PLC1	C600
ALARMWRITE	PLC1	C601
BASCONDAALARMBYP	PLC1	C555

Operator Interface	DDE	PLC
BASCONDAFLAG	PLC1	V805
BASCONDBALARMBYP	PLC1	C556
BASCONDBFLAG	PLC1	V806
BASE_0_CARD_1_ERROR	PLC1	V1100:16
BASE_0_CARD_15_ERROR	PLC1	V1100:2
BASE_0_CARD_16_ERROR	PLC1	V1100:1
BASE_0_CARD_2_ERROR	PLC1	V1100:15
BASE_0_CARD_3_ERROR	PLC1	V1100:14
BASE_0_CARD_4_ERROR	PLC1	V1100:13
BASE_0_CARD_5_ERROR	PLC1	V1100:12
BASE_0_CARD_6_ERROR	PLC1	V1100:11
BASE_0_CARD_7_ERROR	PLC1	V1100:10
BASE_0_CARD_8_ERROR	PLC1	V1100:9
BASIN_CONDUCTIVITY_A	PLC1	APV6.
BASIN_CONDUCTIVITY_A_HIHI	PLC1	C320
BASIN_CONDUCTIVITY_A_LO	PLC1	C322
BASIN_CONDUCTIVITY_A_LOLO	PLC1	C323
BASIN_CONDUCTIVITY_B	PLC1	APV7.
BASIN_CONDUCTIVITY_B_HI	PLC1	C325
BASIN_CONDUCTIVITY_B_HIHI	PLC1	C324
BASIN_CONDUCTIVITY_B_LO	PLC1	C326
BASIN_CONDUCTIVITY_B_LOLO	PLC1	C327
BASIN_CONDUCTIVITY_A_HI	PLC1	C321
BASIN_FLOW_BALANCE	PLC1	APV28.
BASIN_FLOW_BALANCE_HI	PLC1	C409
BASIN_FLOW_BALANCE_HIHI	PLC1	C408
BASIN_FLOW_BALANCE_LO	PLC1	C410
BASIN_FLOW_BALANCE_LOLO	PLC1	C411
BASIN_LEVEL	PLC1	APV19.
BASIN_LEVEL_HI	PLC1	C373
BASIN_LEVEL_HIHI	PLC1	C372
BASIN_LEVEL_LO	PLC1	C374
BASIN_LEVEL_LOLO	PLC1	C375
BASIN_PH	PLC1	APV15.
BASIN_PH_HI	PLC1	C357
BASIN_PH_HIHI	PLC1	C356
BASIN_PH_LO	PLC1	C358
BASIN_PH_LOLO	PLC1	C359
BASIN_TEMPERATURE_A	PLC1	APV20.
BASIN_TEMPERATURE_A_HI	PLC1	C377
BASIN_TEMPERATURE_A_HIHI	PLC1	C376
BASIN_TEMPERATURE_A_LO	PLC1	C378
BASIN_TEMPERATURE_A_LOLO	PLC1	C379
BASIN_TEMPERATURE_B	PLC1	APV21.
BASIN_TEMPERATURE_B_HI	PLC1	C381
BASIN_TEMPERATURE_B_HIHI	PLC1	C380

Operator Interface	DDE	PLC
BASIN_TEMPERATURE_B_LO	PLC1	C382
BASIN_TEMPERATURE_B_LOLO	PLC1	C383
BASLEVELALARMBYP	PLC1	C568
BASLEVELFLAG	PLC1	V818
BASPHALARMBYP	PLC1	C564
BASPHFLAG	PLC1	V814
BASTEMPAALARMBYP	PLC1	C569
BASTEMPAFLAG	PLC1	V819
BASTEMPBALARMBYP	PLC1	C570
BASTEMPBFLAG	PLC1	V820
DCOMERAFLAG	PLC1	V811
DCOMERBFLAG	PLC1	V812
DCOMERCFLAG	PLC1	V813
DCOMERFLOWAALMBYP	PLC1	C561
DCOMERFLOWBALMBYP	PLC1	C562
DCOMERFLOWCALMBYP	PLC1	C563
DOWNCOMER_FLOW_A	PLC1	APV12.
DOWNCOMER_FLOW_A_HI	PLC1	C345
DOWNCOMER_FLOW_A_HIHI	PLC1	C344
DOWNCOMER_FLOW_A_LO	PLC1	C346
DOWNCOMER_FLOW_A_LOLO	PLC1	C347
DOWNCOMER_FLOW_B	PLC1	APV13.
DOWNCOMER_FLOW_B_HI	PLC1	C349
DOWNCOMER_FLOW_B_HIHI	PLC1	C348
DOWNCOMER_FLOW_B_LO	PLC1	C350
DOWNCOMER_FLOW_B_LOLO	PLC1	C351
DOWNCOMER_FLOW_C	PLC1	APV14.
DOWNCOMER_FLOW_C_HI	PLC1	C353
DOWNCOMER_FLOW_C_HIHI	PLC1	C352
DOWNCOMER_FLOW_C_LO	PLC1	C354
DOWNCOMER_FLOW_C_LOLO	PLC1	C355
F1A_DP	PLC1	APV22.
F1A_DP_HI	PLC1	C385
F1A_DP_HIHI	PLC1	C384
F1A_DP_LO	PLC1	C386
F1A_DP_LOLO	PLC1	C387
F1A_FLOW	PLC1	APV1.
F1A_FLOW_HI	PLC1	C301
F1A_FLOW_HIHI	PLC1	C300
F1A_FLOW_LO	PLC1	C302
F1A_FLOW_LOLO	PLC1	C303
F1A_PRESSURE	PLC1	APV4.
F1A_PRESSURE_HI	PLC1	C313
F1A_PRESSURE_HIHI	PLC1	C312
F1A_PRESSURE_LO	PLC1	C314
F1A_PRESSURE_LOLO	PLC1	C315

Operator Interface	DDE	PLC
F1A_TOTAL_FLOW	PLC1	APV24.
F1A_TOTAL_FLOW_HI	PLC1	C393
F1A_TOTAL_FLOW_HIHI	PLC1	C392
F1A_TOTAL_FLOW_LO	PLC1	C394
F1A_TOTAL_FLOW_LOLO	PLC1	C395
F1ADPALARMBYP	PLC1	C571
F1ADPFLAG	PLC1	V821
F1AELAPSEDDAYS	PLC1	TCC4
F1AELAPSEDHOURS	PLC1	TCC3
F1AELAPSEDMINUTES	PLC1	TCC2
F1AFLOWALARMBYP	PLC1	C550
F1AFLOWFLAG	PLC1	V800
F1AFLOWTOTALARMBYP	PLC1	C573
F1AFLOWTOTFLAG	PLC1	V823
F1APRESSALARMBYP	PLC1	C553
F1APRESSFLAG	PLC1	V803
F1ASERIAL_NUMBER	PLC1	V1200-1203
F1ASTARTDAY	PLC1	V952
F1ASTARTHOUR	PLC1	V953
F1ASTARTMINUTE	PLC1	V954
F1ASTARTMONTH	PLC1	V951
F1ASTARTSECOND	PLC1	V955
F1ASTARTSTOP	PLC1	C513
F1ASTARTYEAR	PLC1	V950
F1ATOTGALSRESET	PLC1	C100
F1B_DP	PLC1	APV23.
F1B_DP_HI	PLC1	C389
F1B_DP_HIHI	PLC1	C388
F1B_DP_LO	PLC1	C390
F1B_DP_LOLO	PLC1	C391
F1B_FLOW	PLC1	APV2.
F1B_FLOW_HI	PLC1	C305
F1B_FLOW_HIHI	PLC1	C304
F1B_FLOW_LO	PLC1	C306
F1B_FLOW_LOLO	PLC1	C307
F1B_PRESSURE	PLC1	APV5.
F1B_PRESSURE_HI	PLC1	C317
F1B_PRESSURE_HIHI	PLC1	C316
F1B_PRESSURE_LO	PLC1	C318
F1B_PRESSURE_LOLO	PLC1	C319
F1B_TOTAL_FLOW	PLC1	APV25.
F1B_TOTAL_FLOW_HI	PLC1	C397
F1B_TOTAL_FLOW_HIHI	PLC1	C396
F1B_TOTAL_FLOW_LO	PLC1	C398
F1B_TOTAL_FLOW_LOLO	PLC1	C399
F1BDPALARMBYP	PLC1	C572

Operator Interface	DDE	PLC
F1BDPFLAG	PLC1	V822
F1BELAPSEDDAYS	PLC1	TCC7
F1BELAPSEDHOURS	PLC1	TCC6
F1BELAPSEDMINUTES	PLC1	TCC5
F1BFLOWALARMBYP	PLC1	C551
F1BFLOWFLAG	PLC1	V801
F1BFLOWTOTALARMBYP	PLC1	C574
F1BFLOWTOTFLAG	PLC1	V824
F1BPRESSALARMBYP	PLC1	C554
F1BPRESSFLAG	PLC1	V804
F1BSERIAL_NUMBER	PLC1	V1204-1207
F1BSTARTDAY	PLC1	V958
F1BSTARTHOUR	PLC1	V959
F1BSTARTMINUTE	PLC1	V960
F1BSTARTMONTH	PLC1	V957
F1BSTARTSECOND	PLC1	V961
F1BSTARTSTOP	PLC1	C514
F1BSTARTYEAR	PLC1	V956
F1BTOTGALSRESET	PLC1	C101
FLOWBALALARMBYP	PLC1	C577
FLOWBALFLAG	PLC1	V827
HORN_DELAY	PLC1	TCP18
IXM1_CONDUCTIVITY	PLC1	APV10.
IXM1_CONDUCTIVITY_HI	PLC1	C337
IXM1_CONDUCTIVITY_HIH1	PLC1	C336
IXM1_CONDUCTIVITY_LO	PLC1	C338
IXM1_CONDUCTIVITY_LOLO	PLC1	C339
IXM1_FLOW	PLC1	APV8.
IXM1_FLOW_HI	PLC1	C329
IXM1_FLOW_HIH1	PLC1	C328
IXM1_FLOW_LO	PLC1	C330
IXM1_FLOW_LOLO	PLC1	C331
IXM1_TOTAL_FLOW	PLC1	APV26.
IXM1_TOTAL_FLOW_HI	PLC1	C401
IXM1_TOTAL_FLOW_HIH1	PLC1	C400
IXM1_TOTAL_FLOW_LO	PLC1	C402
IXM1_TOTAL_FLOW_LOLO	PLC1	C403
IXM1CONDAALARMBYP	PLC1	C559
IXM1CONDFLAG	PLC1	V809
IXM1ELAPSEDDAYS	PLC1	TCC10
IXM1ELAPSEDHOURS	PLC1	TCC9
IXM1ELAPSEDMINUTES	PLC1	TCC8
IXM1FLOWALARMBYP	PLC1	C557
IXM1FLOWFLAG	PLC1	V807
IXM1FLOWTOTALARMBYP	PLC1	C575
IXM1FLOWTOTFLAG	PLC1	V825

Operator Interface	DDE	PLC
IXM1SERIAL_NUMBER	PLC1	V1208-1211
IXM1STARTDAY	PLC1	V964
IXM1STARTHOUR	PLC1	V965
IXM1STARTMINUTE	PLC1	V966
IXM1STARTMONTH	PLC1	V963
IXM1STARTSECOND	PLC1	V967
IXM1STARTSTOP	PLC1	C515
IXM1STARTYEAR	PLC1	V962
IXM1TOTGALSRESET	PLC1	C102
IXM2_CONDUCTIVITY	PLC1	APV11
IXM2_CONDUCTIVITY_HI	PLC1	C341
IXM2_CONDUCTIVITY_HIHI	PLC1	C340
IXM2_CONDUCTIVITY_LO	PLC1	C342
IXM2_CONDUCTIVITY_LOLO	PLC1	C343
IXM2_FLOW	PLC1	APV9
IXM2_FLOW_HI	PLC1	C333
IXM2_FLOW_HIHI	PLC1	C332
IXM2_FLOW_LO	PLC1	C334
IXM2_FLOW_LOLO	PLC1	C335
IXM2_TOTAL_FLOW	PLC1	APV27
IXM2_TOTAL_FLOW_HI	PLC1	C405
IXM2_TOTAL_FLOW_HIHI	PLC1	C404
IXM2_TOTAL_FLOW_LO	PLC1	C406
IXM2_TOTAL_FLOW_LOLO	PLC1	C407
IXM2CONDBALARMBYP	PLC1	C560
IXM2CONDFLAG	PLC1	V810
IXM2ELAPSEDDAYS	PLC1	TCC13
IXM2ELAPSEDHOURS	PLC1	TCC12
IXM2ELAPSEDMINUTES	PLC1	TCC11
IXM2FLOWALARMBYP	PLC1	C558
IXM2FLOWFLAG	PLC1	V808
IXM2FLOWTOTALARMBYP	PLC1	C576
IXM2FLOWTOTFLAG	PLC1	V826
IXM2SERIAL_NUMBER	PLC1	V1212-1215
IXM2STARTDAY	PLC1	V970
IXM2STARTHOUR	PLC1	V971
IXM2STARTMINUTE	PLC1	V972
IXM2STARTMONTH	PLC1	V969
IXM2STARTSECOND	PLC1	V973
IXM2STARTSTOP	PLC1	C516
IXM2STARTYEAR	PLC1	V968
IXM2TOTGALSRESET	PLC1	C103
PLC_COMMUNICATION_ERROR	PLC1	STATUS
PLC_HANDSHAKE	PLC1	C800
PLCALARMACK	PLC1	C700
PLCSTAT	PLC1	STW1

Operator Interface	DDE	PLC
RECIRC_PRESSURE	PLC1	APV3.
RECIRC_PRESSURE_HI	PLC1	C309
RECIRC_PRESSURE_HIHI	PLC1	C308
RECIRC_PRESSURE_LO	PLC1	C310
RECIRC_PRESSURE_LOLO	PLC1	C311
RECIRCPRESSALARMBYP	PLC1	C552
RECPRESSFLAG	PLC1	V802
SILENCE_BUTTON	PLC1	X97
SKIMMER_AMPS	PLC1	APV18.
SKIMMER_AMPS_HI	PLC1	C369
SKIMMER_AMPS_HIHI	PLC1	C368
SKIMMER_AMPS_LO	PLC1	C370
SKIMMER_AMPS_LOLO	PLC1	C371
SKIMMER_NOT_PUMPING	PLC1	C532
SKIMMERAMPSALARMBYP	PLC1	C567
SKIMMERFLAG	PLC1	V817
SKIMMERLOADED	PLC1	C205
SKIMMERLOADLIMIT	PLC1	V410.
SKIMMERON	PLC1	C204
SKIMMERRUNLIMIT	PLC1	V408.
SKIMMERRUNTIMELIMIT	PLC1	TCP22
SONALERT	PLC1	Y193
SONALERT_DELAY	PLC1	TCP17
SUMP_C_AMPS	PLC1	APV16.
SUMP_C_AMPS_HI	PLC1	C361
SUMP_C_AMPS_HIHI	PLC1	C360
SUMP_C_AMPS_LO	PLC1	C362
SUMP_C_AMPS_LOLO	PLC1	C363
SUMP_C_NOT_PUMPING	PLC1	C530
SUMP_C_RUNTIME_EXCEEDED	PLC1	C580
SUMP_D_AMPS	PLC1	APV17.
SUMP_D_AMPS_HI	PLC1	C365
SUMP_D_AMPS_HIHI	PLC1	C364
SUMP_D_AMPS_LO	PLC1	C366
SUMP_D_AMPS_LOLO	PLC1	C367
SUMP_D_NOT_PUMPING	PLC1	C531
SUMP_D_RUNTIME_EXCEEDED	PLC1	C581
SUMPCAMPSALARMBYP	PLC1	C565
SUMPCFLAG	PLC1	V815
SUMPCLOADED	PLC1	C201
SUMPCLOADLIMIT	PLC1	V402.
SUMPCON	PLC1	C200
SUMPCRUNLIMIT	PLC1	V400.
SUMPCRUNTIMELIMIT	PLC1	TCP20
SUMPDAMPSALARMBYP	PLC1	C566
SUMPDFLAG	PLC1	V816

Operator Interface	DDE	PLC
SUMPDLOADED	PLC1	C203
SUMPDLOADLIMIT	PLC1	V406
SUMPDON	PLC1	C202
SUMPDRUNLIMIT	PLC1	V404
SUMPDRUNTIMELIMIT	PLC1	TCP21
WX1	PLC1	WX1
WX10	PLC1	WX10
WX11	PLC1	WX11
WX12	PLC1	WX12
WX13	PLC1	WX13
WX14	PLC1	WX14
WX15	PLC1	WX15
WX17	PLC1	WX17
WX18	PLC1	WX18
WX19	PLC1	WX19
WX2	PLC1	WX2
WX20	PLC1	WX20
WX21	PLC1	WX21
WX3	PLC1	WX3
WX33	PLC1	WX33
WX34	PLC1	WX34
WX4	PLC1	WX4
WX5	PLC1	WX5
WX6	PLC1	WX6
WX7	PLC1	WX7
WX9	PLC1	WX9

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	100 K Area Process Engineering	Date 12/7/95
Project Title/Work Order		EDT No. 605807
105 K East Ion Exchange and Cartridge Filter Restart Project		ECN No. NA

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
WIEMERS MJ	X3-B4	X			
WHITEHURST R	R3-B6	X			
SCHERMERHORN DS	L6-04	X			
EDWARDS PJ	A4-79	X			
MEDFORD DW	X3-74	X			
CENTRAL FILES	A3-B8	X (ORIG + 2)			
<i>Project Files</i>	<i>X3-B5</i>	<i>X</i>			