Applicable Field Changes _____

UNCONTROLLED

SOP 63-5

VITRIFICATION OPERATIONS DISTRIBUTED CONTROL SYSTEM PROCEDURE

Rev. 0

Approved _____ Operations Manager

Date 11/13/87

Approved _____ Cognizant Engineering Manager

Date 11/3/87

Approved _____ Radiation and Safety Manager

Date 11/3/87

Approved _____ Quality Assurance

Date 11/3/87

System Quality Level C

System Safety Class N

The estimated accumulated dose for the work described in this document exceeds is less than 100 mrem.

WEST VALLEY NUCLEAR SERVICES CO., INC.

October 1987

Prepared by: _____ B. J. Stout

MSS0305:ENG-356

RECORD OF REVISION

PROCEDURE

If there are changes to the procedure, the revision number increases by one. These changes are indicated in the left margin of the body by an arrow (>) at the beginning of the paragraph that contains a change. If the paragraph or section contains a partial revision and/or addition, the revised section is enclosed with arrows (>> ... <<).

Example:

> The arrow in the margin indicates a change. >>These arrows indicate that this section has been revised and/or added.<<

Procedure No. SOP 63-5, Rev. 0 Date: October 1987

Rev. No.	Description of Changes	No. of Page
0	Initial Document	

LIST OF EFFECTIVE PAGES

Page	Revision	Date

SOP 63-5

VITRIFICATION OPERATIONS
DISTRIBUTED CONTROL SYSTEM PROCEDURE

TABLE OF CONTENTS

TABLE OF CONTENTS - Continued

SOP 63-5

VITRIFICATION OPERATIONS
DISTRIBUTED CONTROL SYSTEM PROCEDURE

REV. 0

1.0 SCOPE

This procedure describes the basic operations of the Vitrification Operations Distributed Control System (DCS).

2.0 DEFINITIONS AND ABBREVIATIONS

2.1 Definitions

2.1.1 Analog signal - signal representing a process variable which can be continuously observed and continuously represented.

2.1.2 Cathode Ray Tube (CRT) - convenient operator interface which provides visual aid to the operator for system status and processes.

2.1.3 Configure - to utilize programs already written and stored in the microcomputer memory to create control strategy that will produce the best process operation.

2.1.4 Data Historian (DH) - DCS subsystem used to save process data on storage discs.

2.1.5 DCS Activities Log Book - a journal which provides a written history of all activities performed by individuals on the DCS system. Includes date, operator initials, and a detailed description of the activity.

2.1.6 DCS Disk Inventory Log Book - a journal which allows tracking of removable discs. Includes disc number (in sequential order), disc serial number, description of what the removable disc was used for (i.e. CRT No. 1, CRT No. 2 or Data Historian), date the disc was initialized or logging was initiated, date logging was completed (applicable only to the Data Historian Disc), and description of the disc contents.

2.1.7 Discrete Signal - signal representing a process variable which is expressed in all or nothing values (i.e. on-off).

2.1.8 Distributed Control System (DCS) - overall process control and data handling equipment.

2.1.9 Downloading - When copying from a disk to a MICON.

2.1.10 Firmware - packages of software which contain the rules the computer uses to perform functions which are used repeatedly; preprogrammed control software contained in plug-in modules.

2.1.11 Main Signal Value (MSV) - the numerical quantity that is set at the beginning of a function and subsequently passed from function to function during loop execution.

2.1.12 Melter Operations Log Book - a journal which provides a written history of all activities performed by individuals on CTS related equipment or processes. Includes date, operator initials, and a detailed description of the activity.

2.1.13 Signal Reference Code (SRC) - identifies a specific function within a loop.

2.1.14 Software - set of instructions in the computer that tells it how to function.

2.1.15 Uploading - when copying from a MICON to a disk.

2.1.16 VAX - Digital Corporation computer Model 8200 used as a data gathering and process computer.

2.1.17 Virtual Analog - internal software generated analog signals; usually analog inputs mathematically combined.

2.1.18 Virtual Discrete - internal software locations which allow for simple discrete signal access and facilitate configuration of logic/sequence applications.

2.2 Abbreviations

2.2.1 CPU - Central Processing Unit
2.2.2 CRT - Cathode Ray Tube
2.2.3 CSRF- Contact Size Reduction Facility
2.2.4 CTS - Component Test Stand
2.2.5 DCS - Distributed Control System
2.2.6 DH - Data Historian
2.2.7 IPL - Initiate Program Load

2.2.8 LED - Light Emitting Diode
2.2.9 MSV - Main Signal Value
2.2.10 PROM - Programmable Read Only Memory
2.2.11 RAM - Random Access Memory
2.2.12 ROM - Read Only Memory
2.2.13 RTD - Resistance Temperature Detector
2.2.14 SRC - Signal Reference Code
2.2.15 UPS - Uninterruptible Power Supply

3.0 RESPONSIBILITIES

3.1 The Vitrification Test Group Manager is responsible for directing the overall operation of the Vitrification System.

3.2 Vitrification Test Engineering is responsible for the technical operation of the Vitrification System.

3.3 The Vitrification Operations Shift Supervisor is responsible for assignment of properly trained and qualified operators at the Vitrification Facility and for day-to-day direction of those operators.

3.4 The Vitrification Operator is responsible for operation of the plant according to approved operating procedures, run plans, sample schedules, and the operating procedures in this SOP. When a situation is not covered by a procedure, he/she is responsible for notifying the Vitrification Operations Shift Supervisor.

3.5 Quality Assurance will perform surveillance of the ongoing work as deemed appropriate to verify compliance with this SOP.

4.0 TOOLS, EQUIPMENT, COMPONENTS, AND REFERENCES

4.1 Tools and Equipment - None

4.2 Components

4.2.1 CRT No. 1, CRT No. 2, CRT No. 3 (Data Historian) and associated keyboards.

4.2.2 MDC-200 Communicator

4.2.3 MICON P-200 Controllers

4.2.4 MX-60 Multiplexers

4.2.5 Texas Instrument OMNI 800, 810 RO Terminal, Printer A with ATC Model 190 Graphics

4.2.6 Texas Instrument OMNI 800, 810 RO Terminal, Printer B

4.2.7 TRACOR Westronics DDR10 Printer

4.2.8 TRACOR Westronics DDS7800 Screen & Control Panel

4.2.9 DCS UPS

4.2.10 VAX UPS

4.3 References

4.3.1 MICON MDC-200, The MICON Distributed Control System, Powell-Process Systems, Inc.

4.3.2 MICON MDC-200, Distributed Control with Centralized Operations, Powell-Process Systems, Inc.

4.3.3 Technical Manual for 5000 Series Uninterruptible Power Systems Model 5249A-2, P/N 05132360B, August 1984.

4.3.4 Memorex, MRX 410, 5-1/4" Fixed/Removable OEM Disc Drive Product Specification, September 1983 edition.

4.3.5 MICON P-200, Operation and Service Manual, Powell-Process Systems, Inc.

4.3.6 DDS7800 Digital Data System Operator Manual

4.3.7 DDR10 Digital Data Recorder Operators Manual

4.3.8 Model 810 Printer Operating Instructions, Texas-Instrument

4.3.9 ATC Graphics 810, Model 190 Raster Graphic Printer Controller Operating Instructions for Model 810 RO Printer, Analog Technology Corporation, March 7, 1984

5.0 GENERAL INFORMATION

5.1 Distributed Control System (DCS)

The Vitrification Distributed Control System (DCS) consists of microprocessor based measuring and controlling devices distributed throughout the CTS and 01-14 Building and a control room operating station from which operators control the system processes. The following hardware make up the DCS: distributed multiloop controllers (MICON P-200's), central communicator (MICON MDC-200), operator interface, data acquisition system, data historian system, and recorder and printers.

5.1.1 Distributed Multiloop Controllers

The multiloop MICON P-200 controllers convert analog inputs into digital form, processes them and then reconverts the results into analog outputs. Each MICON is a self-contained stand alone instrument which may control up to eight (8) control loops, define alarms and perform logic and sequence operations.

Of the eight (8) multiloop controllers designated for the melter feed system, scrubber and canister monitoring, only seven (7) of these are used. The eighth is a standby or back-up controller. Of the five (5) controllers designated for the 01-14 Off-Gas Treatment area, four (4) controllers are used. The fifth controller acts as back-up. When a controller fails, the loop control is transferred automatically and without interruption to the standby controller. The standby MICON takes over all the functions of the primary MICON. The operator's control ability with the reserve MICON remains the same as with the primary MICON.

The MICON has two types of memory, (1) the Programmed Read Only Memory (PROM) which is unchangeable and contains the basic functions and operating systems, and (2) the working Random Access Memory (RAM), power backed up by a NI-CAD battery and a primary Lithium battery, which contains the configuration data and will maintain data security without external power for five years. The RAM is backed up by a memory "standby" card (back-up RAM) which stores the same configuration data as the working RAM. The bidirectional data transfer between working and back-up (standby) RAM is

user-controlled (not automatic) and can be utilized to reconfigure a spare unit in case of MICON malfunction. The back-up RAM board has on-board batteries, so it can be removed from the faulty MICON, plugged into the spare MICON, and down loaded into the spare MICON for quick configuration. In addition, the back-up RAM provides a convenient way to test new control strategies with the ability to quickly bring back the old strategies if problems develop. After test of revised configuration or aux data, the content of the working RAM should be transferred to the back-up RAM.

For a complete description of the MICON P-200 controller features, refer to Reference No. 4.3.5, Pages 11-16. A discussion on the standby MICON is given on Pages 90 and 91.

5.1.2 Central Communicator

The MDC-200 Central Communicator is the heart of the control room operating station. It controls the flow of information between the keyboard/CRT displays, the printer, and the MICON controller. Communications with the MICON controller are handled through four slave communications; each of which can communicate with up to eight MICONS and a MICON backup unit. The central communicator allows the operator to remotely read or alter any data in up to 32 MICONS (256 loops). Except for putting a MICON on backup, anything an operator can do using the MICON data entry or control/display panels, an operator can do from the control room. The communicator also controls the data logging printers and recorders and interfaces with the data acquisition system. Each MDC-200 system can accommodate over 3200 tags.

5.1.3 Operator Interface

A CRT-based operating center is used in the Vitrification Facility for operator interface. It uses a combination of analog-like bar graphs, alpha numeric descriptions and graphic displays to aid the operator in rapidly analyzing and correcting off-normal process conditions.

There are 3 CRT consoles located in the DCS Control Room, each with its own keyboard:

CRT No. 1 is the primary CRT console. CRT No. 1, Disk 0 has the most up-to-date information. If a change is made to the system process, it is performed on this CRT. CRT No. 2 is a duplicate of CRT No. 1. It is used as a backup to CRT No. 1. Both CRT No. 1 and CRT No. 2 have graphics abilities. Both have a removable disc drive and a fixed disk. The removable disc drive is numbered "0" and the fixed disk is numbered "1".

CRT No. 3 is the Data Historian for the DCS system. It has 2 removable disc drives and 2 fixed disks. The removable disc drives are numbered "0" and "2" and the fixed disks are numbered "1" and "3". The Data Historian does not have graphics capabilities.

5.1.4 Data Acquisition System

The Data Acquisition System, TRACOR Westronics Model DDS7800, is a microprocessor based digital data system used primarily to monitor noncontrolling thermocouple and/or RTD inputs. Other inputs, such as melter power supply voltages, current and power are also brought into

the system. The Data Acquisition System is linked to the MDC-200 Communicator thereby allowing data points to be displayed on the CRT. The Data Acquisition System has the capability of accepting 400 acquisition points. Presently, data from up to 120 acquisition points can be requested.

The Data Acquisition system is a stand alone system with a local operator station. The local operator interface contains an integral CRT, operator/configuration keyboard and a data cartridge.

Refer to Reference No. 4.3.6 for a detailed description of the operation and functions of the DDS7800 Digital Data System.

5.1.5 Data Historian

The Data Historian is used to record data from an on-going process for future reference. It can log up to 250 data points on a regular interval. Recorded data can be reviewed by trend display or tabular report on the system printers. This reviewing is possible from the disk while the data is being recorded or after it has stopped.

5.1.6 Recorder and Printers

5.1.6.1 Recorder

The TRACOR Westronics DDR10 integrates the functions of a multipoint recorder, data logger and digital indicator into a single instrument. Refer to Reference No. 4.3.7 for a detailed description of the operation and functions of the DDR10 recorder.

5.1.6.2 Printers

The Texas Instruments Omni Model 810 printers are receive-only forms-programmable impact printers. They have a microprocessor system which controls all character recognition, printing and paper movement. All operator controls and indicators on the Model 810 printers are located on the control panel and the auxiliary control panel (located under the access door) except for the power ON/OFF switch and the printhead adjust lever. The power ON/OFF switch is located on the left rear corner of the printer. The printhead adjust lever is located on the right side under the access door. Refer to Attachment No. 7.10 for a diagram of the control panel and the basic auxiliary control panel as well as a brief description on how each operates.

Of the two Model 810 printers located in the CTS control room, Printer A and Printer B, Printer A has an ATC Model 190 Graphics 810 plug-in conversion board which transforms the Model 810 printer into a graphics printer. The operating instructions regarding manual control and indicator actions are the same as for Printer B. For in-depth operating instructions for the Model 810 printers refer to Reference No. 4.3.8. The supplemental operating instructions for the ATC Model 190 Graphics 810 printer are in Reference No. 4.3.9.

5.2 Standard CRT Displays

Various CRT displays can be called up from the keyboard to convey process information to the operator. Refer to Attachment No. 7.1 for a layout of the CRT keyboard. For specific details on keyboard functions, refer to Reference No. 4.3.2 Pages 47 - 56. The following displays are of interest to the operator:

MICON & Group Overview Displays
MICON Displays
MICON Loop Displays
MICON Input Displays
Group Displays
Bulk Group Displays
Profile Trend Displays
Annunciator Display
Alarm Summaries
Function Value & Input-Output Displays
Special Keys
Graphic Displays

5.2.1 MICON & Group Overview Displays

The Group Overview displays provide "at-a-glance" identification of off-normal and alarm conditions. Each square represents a MICON controller and each of the eight loops in a controller square is represented by a bar-graph showing deviation of process value above or below the set-point. Up to 32 MICONS can be shown on this display. See Attachment No. 7.2.1 for the display which appears on the CRT console.

There are three Group Overview displays available. Ninety-six (96) group displays are available. See Attachment No. 7.2.1.A for Group Overview No. 1 display.

5.2.2 MICON Displays

The MICON display gives graphic and numeric presentation of up to eight control loops, as well as miscellaneous information relating to calculated values and/or discrete statuses in the bonus tag display area above the loop bar graphs. The eight miscellaneous displays can be configured to indicate signal values or discrete status. Each of the loops and accessible bonus displays can be operated from this display through the loop select keys on the keyboard. See Attachment No. 7.2.2 for MICON No. 1 display. For specific details on changing set points, control modes or status of discretes, refer to Reference No. 4.3.2 Page 57.

NOTE: Control Operating modes are:

Automatic (auto) - allows operator to change set point.

Manual (man) - allows operator to change output.

Cascade (cas) - allows operator to change percent of output.

Remote (R) - allows operator to make changes at the CRT console.

Local (L) - allows operator to make changes at the MICON and locks out remote capabilities.

5.2.3 MICON Loop Displays

From a MICON display, the operator can call up a loop detail by depressing "LOOP" and entering the loop number. Values associated with the selected loop can be monitored and manipulated from this display. There are 8 loops available for each MICON.

The display provides bar-graph (analog) and digital indication of the set-point, process variable and valve output for each loop. The loop tag, scale unit, a brief description and control mode are displayed. The last character of the mode status indicates whether the loop is in local or remote access position. If there is no output from a loop then the loop output bar-graph and the output values are blanked.

See Attachment No. 7.2.3 for display of Loop No. 5 in MICON No. 1. For specific details on changing set points, control modes, status of discretes and ratio or bias settings, refer to Reference No. 4.3.2 Page 57.

5.2.4 MICON Input Displays

The input display gives bar graph and numeric presentation of the selected input as well as a trend display. The trend display can be shown in two speeds - high or low. The speed is adjustable from the keyboard by pressing "H" for high speed or "L" for low speed. See Attachment No. 7.2.4 for display of Input No. 5 in MICON No. 1.

5.2.5 Group Displays

The Group Displays are similar in format to the MICON display. Ninety-six Group displays are available. See Attachment No. 7.2.5 for Group display of Group No. 27.

5.2.6 Bulk Group Displays

There are two Bulk Group displays, each containing 77 windows. This display allows operators to monitor any tags of interest. See Attachment No. 7.2.6 for Bulk 2 display.

5.2.7 Profile Trend Displays

This display is used to call up the Historical Trend display of up to three variables. Trend variables must be preconfigured for the display. Up to eight trend variables per MICON are available. The display can be selected as; 20-second averages for 20 minutes, 3-minute averages for 3 hours, or 30-minute averages for 30 hours. To obtain a directory of the Trend Groups enter "TREND". See Attachment No. 7.2.7. Thirty-two "Trend" Group displays are available to the operator. See Attachment No. 7.2.7.A.

5.2.8 Annunciator Display

The Annunciator display represents a view of a selected number of alarm annunciator light boxes normally associated with critical plant alarm points. This display can have up to 77 alarm points. See Attachment No. 7.2.8.

5.2.9 Alarm Summaries

This display identifies and summarizes all new alarm points along with any other acknowledged alarm points. It also identifies the time the alarm set-point was reached. The Alarm Summary display shows 44 alarms per page with three pages showing a maximum of 100 active alarms. See Attachment 7.2.9.

5.2.10 Function Value & Input-Output Displays

This display provides a simultaneous view of all variables within the MICON to facilitate tracing and testing the operation of the MICON; i.e., troubleshooting a MICON loop that is not operating correctly. See Attachment No. 7.2.10.

For additional details on any of these displays, refer to References No. 4.3.1 Pages 13 - 16 and No: 4.3.2 Pages 9 - 28.

5.3 Uninterruptible Power Supply (UPS)

The DCS is equipped with a GOULD UPS System designed to provide regulated transient-free AC power to sensitive loads. The basic system consists of a Rectifier-Battery Charger, a DC-AC Power Inverter and a Bypass Switch. Combined with an external battery bank, it protects against a power line outage or low line voltage for the battery discharge time.

Built in sensors, accessory controls and alarm circuits are combined with front panel status indicators, remote contact closures and an audio alarm to automatically alert the operator to

or power line status. The flow diagram on the upper portion of the UPS front panel provides indications of operating conditions at key points in the system. Green indicates a normal condition, red an alarm and amber an intermediate condition. Refer to Attachment No. 7.3.1 for the GOULD UPS System panel layout, Attachment 7.3.2 for Single Phase Input/Output Block Diagram, and Attachment No. 7.3.3 for descriptions of alarms and status indications.

The DCS is provided with a minimum of one (1) hour of battery back-up power. If there is a loss of CTS power, shut down the melter feed and go to idle mode. If the melter feed was on, cool the Submerged Bed Scrubber to the maximum extent possible until the feed has burned off (approximately 2 hours). Check that the back-up Closed Loop Cooling Water pump and back-up off-gas blower are operating. Melter temperatures may be checked by hand held thermocouple meters.

If the power outage is expected to last for more than one (1) hour and the main plant still has a power supply, notify Plant System Operations Supervisor to provide Process Building emergency power to the CTS Building Services 480 volt power panel (Breaker CTS/CSRF in Main Process Building 480 volt switchgear). A qualified electrician is needed to rewire the UPS systems to the CTS 480 volt utility outlets. Refer to schematics and instructions in Attachment No. 7.3.4 for backfeeding the CTS UPS.

For additional information on the DCS UPS system, see Reference No. 4.3.3.

5.4 Configuration

The MICON P-200 controller can be configured by engineers or operators by selecting preprogrammed functions to satisfy specific control requirements. A listing of MICON P-200 control functions is given in Attachment No. 7.6. For each MICON, there are eight (8) loops, each with 20 blocks ("steps"), resulting in a total of 160 blocks into which any one of the control functions can be placed.

Before a configuration change is made, print a copy of the existing configuration. After the configuration change is made, print a copy of the new configuration. Store these print outs in an appropriate file in the CTS Control Room file cabinet. Record the changes made in the DCS Activities and Melter Operations Log Books.

CRT Configuration and MICON Configuration Menus allow for an effective interface for configuring. See Attachment No. 7.7 and Attachment No. 7.8 for the CRT Configuration Menu and the MICON Configuration Menu, respectively. For the Data Historian System Menu, refer to Attachment No. 7.9.

For specific information on configuration capacity and configuration instructions, refer to Reference No. 4.3.5, Pages 17-30.

5.5 OPERATORS SHOULD PERFORM FREQUENT CHECKS ON SYSTEMS THAT ARE TURNED ON OR SHUT DOWN TO ASSURE THAT THE SYSTEM DOES WHAT IS EXPECTED, I.E., WATER FLOWS, PRESSURE RISES, LEVEL INDICATORS, ETC. IF THE REQUIRED ACTION THAT IS SUPPOSED TO HAPPEN DOES NOT HAPPEN, (1) STOP - DO NOT ATTEMPT TO PERFORM THE NEXT STEP, (2) SECURE SYSTEM IN A SAFE MODE, AND (3) NOTIFY SHIFT SUPERVISOR IMMEDIATELY.

6.0 PROCEDURES

ALL STEPS IN THIS PROCEDURE THAT REQUIRE AN INSPECTION, THE RECORDING OF DATA, OR A SIGN-OFF WILL BE DENOTED BY [+] IN THE LEFT HAND MARGIN. THE INSPECTION RESULTS, DATA, OR SIGN-OFF WILL BE RECORDED ON THE APPROPRIATE PROCEDURE DATA SHEET(S). THE OPERATOR PERFORMING THE TEST STEPS SIGNS THE DATA SHEET UNLESS OTHERWISE INDICATED ON THE DATA SHEET.

NOTE: Attachment No. 7.4 provides definitions for the error codes which may appear during execution of the following procedures.

6.1 Cartridge (Disc) Installation and Removal

See Attachment No. 7.5 for the removable disc front panel layout.

Installation

1. Open back panel of CRT.

2. Turn off "Run" switch by depressing switch to the left. Green light will begin flashing then turn off indicating drive is now ready to accept a cartridge.

3. Lift door release latch located to the right of the "WRT" switch to open the door.

4. Insert cartridge into cartridge receiver. The cartridge should be held by the hand grip with the write protect tab furthest away from the control panel when inserting. Do not touch the silver section of the disc.

NOTE: On blank discs only, leave red write protect tab on the removable disc in place. If it is removed, the disc can not be written on. Tab must be removed on a completed data filled removeable disc.

5. Close door. This should be done slowly to allow the cartridge to assume final location alignment and seating. Never force the door against hard resistance.

6. On CRT No. 1 and CRT No. 2, verify the "WRT" switch is depressed to the left to ensure fixed disk is write protected. On CRT No. 3, verify the "WRT" switch is depressed to the right to ensure data can be continually written to the fixed disks for Data Historian logging.

7. Turn on "Run" switch by depressing switch to the right. Green light will blink for approximately 30 seconds while drive is getting up to speed. When light stops flashing, cartridge is ready.

8. Close back panel of CRT.

Removal

1. Repeat Steps No. 1 - No. 3 under installation procedure.

2. Remove cartridge from cartridge receiver. Do not touch the silver section of the disc.

3. Close back panel of CRT.

For more in-depth details on the MRX 410 5-1/4" fixed/removable disk drive unit, refer to Reference No. 4.3.4.

6.2 Formatting and Initializing Discs for CRT No. 1 or CRT No. 2

This procedure will copy the current console and MICON configuration and graphics programs to a removeable disc. Any data on a removeable disc will be destroyed during the formatting process.

At location CRT No. 1:

1. Check the DCS Disk Inventory Log Book to determine the next sequentially numbered removable disc to be used. Obtain this disc, remove the blue wrapping - DO NOT touch the silver colored part of disc, then insert it in CRT No. 1 disk drive unit 0 by following instruction in Step 6.1.

2. Enter "CONF CRT" on keyboard.

3. Verify "0" is indicated as the disk unit in operation. If it is not, change the disk unit number by entering "GRAPH 1" until disk unit "0" is indicated.

   NOTE: Disk Unit 0 corresponds to removable disc. Disk Unit 1 corresponds to fixed disk.

4. Insert security key or enter "PASSWORD", password number and "ENTER".

5. Enter "2" and "ENTER" for disk utility menu.

6. Enter "F" to format.

7. Enter "0" to format to removable disc from fixed disk.

8. The following message will be noted on CRT:

   "Warning. All Data On Disk Will Be Lost!". This is to prevent someone from reformatting a disc which has already been formatted and has data on it. Assuming this removable disc has not been formatted and has no data on it, enter "C" to continue.

   Note: If a bad track is indicated on the CRT begin again with Step No. 4. If disc still has a bad track, discard removable disc.

9. When formatting is complete it will be noted on CRT as "Complete".

10. Copy from fixed disk to the removable disc by entering "C".

11. Enter "1" to read from fixed disk.

12. Enter "0" to write to removable disc.

13. Enter "C" to continue. It will take approximately 15 minutes to complete the copy. The removable disc has been initialized when "COPY COMPLETE" is noted on the CRT. The removable disk has now been initialized as a Configuration/Graphics Disc. This disc can now be used for CRT No. 1 or CRT No. 2.

14. Record initialization of the disc in the DCS Activities Log Book and in the DCS Disk Inventory Log Book.

6.3 Initializing Discs for CRT No. 3 - (Data Historian)

This procedure will take a removeable disc produced in Step 6.2 and replace the graphics programs with those of the Data Historian. The disc will no longer be usable in CRT No. 1 or CRT No. 2.

At location CRT No. 3:

1. Insert in removable disk drive unit 0 or 2 a disc which has been initialized for CRT No. 1 or CRT No. 2.

2. Enter "CONF CRT".

3. Insert security key or enter "PASSWORD", password number and "ENTER".

4. Verify "0" or "2" is indicated as the disk unit in operation depending on which removable disc drive unit is being initialized for the Data Historian. If it is not, change the disk unit number by entering "GRAPH 1".

   NOTE: Disk Unit 0 and 2 correspond to removable discs. Disk Unit 1 and 3 correspond to fixed disks.

5. Enter "19" and "ENTER" for Data Historian system menu.

6. Enter "7" and "ENTER" to initialize historian disk.

7. Enter "0" or "2" depending on which removable disk drive unit is being initialized and "ENTER" for disk unit to be initialized.

8. Enter "C" to initialize. When initializing is complete, it will be noted as complete. The removable disc has now been initialized as a Configuration/Data Historian Disc.

9. Record initialization of the disc in the DCS Activities Log Book and in the DCS Disk Inventory Log Book and Melter Operations Log Book.

6.4 CRT No. 1 and CRT No. 2 Disc Updating Procedure

At location CRT No. 1 (the most current up-to-date CRT):

1. Depress "WRT" switch on the removable disc drive unit to the right to allow the fixed disk to be written to.

2. Enter "CONF CRT" on keyboard.

3. Verify "0" is indicated as the disk unit in operation. If it is not, change the disk unit number by entering "GRAPH 1" until disk unit "0" is indicated.

   NOTE: Disk Unit 0 corresponds to removable disc. Disk Unit 1 corresponds to fixed disk.

4. Insert security key or enter "PASSWORD", password number and "ENTER".

5. Enter "2" and "ENTER" for disk utility menu.

6. Enter "C" to copy from removable disc to fixed disk.

7. Enter "0" to read from removable disc.

8. Enter "1" to write to fixed disk.

9. Enter "C" to continue.

10. When copy is complete, depress "WRT" switch to the left to prevent fixed disk to be written over.

11. Remove disc from disk unit 0 in CRT No. 1 for use in CRT No. 2 by following removal sequence in Step 6.1

At location CRT No. 2:

1. Remove disc from disk unit 0 in CRT No. 2 and set aside.

2. Insert removable disc from CRT No. 1 into disk unit 0 in CRT No. 2. by following installation sequence No. 1-5 in Step 6.1.

3. Depress "WRT" switch on the removable disc drive unit to the right to allow the fixed disk to be written to.

4. Turn on "run" switch by depressing switch to the right and close back panel of CRT.

5. Enter "CONF CRT" on keyboard.

6. Verify "0" is indicated as the disk unit in operation. If it is not, change the disk unit number by entering "GRAPH 1" until disk unit "0" is indicated.

7. Insert security key or enter "PASSWORD", password number and "ENTER".

8. Enter "2" and "ENTER" for disk utility menu.

9. Enter "C" to copy from removable disc to fixed disk.

10. Enter "0" to read from removable disc.

11. Enter "1" to write to fixed disk.

12. Enter "C" to continue.

13. When copy is complete, depress "WRT" switch to the left to prevent fixed disk to be written over.

14. Remove disc from disk unit 0 in CRT No. 2 and return it to CRT No. 1 disk unit 0. CRT No. 1 updating procedure is now completed.

15. Reinsert the disc set aside in Step No. 1 into disk unit 0 at CRT No. 2.

16. Enter "CONF CRT" on keyboard.

17. Verify "0" is indicated as the disk unit in operation. If it is not, change the disk unit number by entering "GRAPH 1" until disk unit "0" is indicated.

18. Insert security key or enter "PASSWORD", password number and "ENTER".

19. Enter "2" and "ENTER" for disk utility menu.

20. Enter "C" to copy from fixed disk to removable disc.

21. Enter "1" to read from fixed disk.

22. Enter "0" to write to removable disk.

23. Enter "C" to continue. When copy is completed, CRT No. 2 updating procedure is completed.

24. Record updating of CRT No. 1 and CRT No. 2 in the DCS Activities Log Book and Melter Operations Log Book.

6.5 CRT No. 3 Disc Updating Procedure

The only time CRT No. 3 would need to be updated is if a tag must be added or deleted or if a range has been changed on one of the tags being logged by the Data Historian.

1. Terminate Data Historian logging.

2. Enter "CONF CRT".

3. Insert security key or enter "PASSWORD", password number and "ENTER".

4. Enter "19" for the Data Historian Menu.

5. Enter "1" for the Configuration Menu.

6. Verify the disk unit in operation is the disk unit to be logged to. If it is not, change the disk unit number by entering "GRAPH 1".

7. Enter "E" to Edit.

8. Make the required changes.

9. Enter "W" to update the disk.

10. Initialize Data Historian logging.

11. Record the changes made in the DCS Activities Log Book and Melter Operations Log Book.

6.6 Uploading from MICON

This procedure is used to update the CRT's if a change has been made to any of the MICONS.

1. Enter "CONF MICON"

2. Verify "0" is indicated as the disk unit in operation. If it is not, change the disk unit number by entering "GRAPH 1" until disk unit "0" is indicated.

3. Insert security key or enter "PASSWORD", password number, and "ENTER".

4. Enter "7" and "ENTER" for upload MICON menu.

5. Enter "+", "+", and "+".

6. Enter MICON number to upload from and "ENTER".

7. Enter disk MICON to upload to and "ENTER.

NOTE: MICON number and disk MICON number will be the same.

8. Enter "D" to transfer data from the MICON to the removable disc.

9. Repeat Steps 6, 7 and 8 for each MICON a change has been made to.

   NOTE: After uploading from the MICON's, the CRT's are normally updated. See CRT No. 1 and CRT No. 2 Updating Procedure.

10. Record uploading of the MICONS in the DCS Activities Log Book and Melter Operations Log Book.

6.7 Downloading to MICON

This procedure is normally used after a MICON has had repair work.

1. Enter "CONF MICON".

2. Verify "0" is indicated as the disk unit in operation. If it is not, change the disk unit number by entering "GRAPH 1" until disk unit "0" is indicated.

3. Insert security key or enter "PASSWORD", password number and "ENTER".

4. Enter "7" and "ENTER" for download MICON menu.

5. Enter "+", "+", and "+".

6. Enter MICON number to download to and "ENTER".

7. Enter disk MICON to download from and "ENTER".

NOTE: MICON number and Disk MICON number will be the same.

8. Enter "M" to transfer from removable disk to the MICON.

9. Repeat Steps 6, 7 and 8 for each MICON to be downloaded to.

10. At each MICON down loaded to:

    a. Insert security key or enter "PASSWORD", password number and "ENTER".
    b. Depress and hold "RAM ENABLE" button located on the MICON Side Panel.
    c. Enter function "55" and "ENT".
    d. Release "RAM ENABLE". "COPYdOnE" will be displayed in the DATA/VALUE window.

11. Record downloading to the MICONS in the DCS Activities Log Book and Melter Operations Log Book.

6.8 Disk Back-Up

There are two back-up discs. The DCS Master Disc is stored in the control room. The Back-up to the DCS Master Disc is stored by the DCS System Administrator in the Test Engineering Group. Back-ups are updated when CRT No. 1 and CRT No. 2 are updated.

At location CRT No. 1 (after completing CRT No. 1 & No. 2 updating procedure):

1. Insert the Master Disc into disk drive unit 0 following Installation Procedure in Step 6.1.

2. Enter "CONF CRT".

3. Verify "0" is indicated as the disk unit in operation. If it is not, change the disk unit number by entering "GRAPH 1" until disk unit "0" is indicated.

4. Insert security key or enter "PASSWORD", password number and "ENTER".

5. Enter "2" and "ENTER" for disk utility menu.

6. Enter "C" to copy from fixed disk to back-up disc.

7. Enter "1" to read from fixed disk.

8. Enter "0" to write to removable disc.

9. Enter "C" to continue.

10. After back-up is complete on the Master Disc, remove and repeat for the Back-up to the Master Disc.

11. Record disk back-up in the DCS Activities Log Book and Melter Operations Log Book.

6.9 View of Standard CRT Displays on CRT No. 1 or CRT No. 2

6.9.1 MICON & Group Overview Displays

6.9.1.1 MICON Overview Displays (Attachment No. 7.2.1)

1. Enter "OVERVIEW"

6.9.1.2 Group Overview Displays (Attachment No. 7.2.1.A)

1. Enter "GROUP OVER 1", "GROUP OVER

2. OR "GROUP OVER 3"

6.9.2 MICON Displays (Attachment No. 7.2.2)

1. Enter "MICON number of interest (No. 1-32)" from MICON/Display select keys. For example:

   If the Concentrator Feed Tank is of interest, from the MICON Overview display, MICON No. 1 deals with this subject. Therefore, enter "1" at the MICON/Display Select keys.

6.9.3 MICON Loop Displays (Attachment No. 7.2.3)

1. Enter "MICON number of interest (No. 1-32)" from the MICON/Display Select keys.

2. Enter "LOOP".

3. Enter "the loop number of interest (No. 1-8)" from MICON/Display Select keys or Loop Select keys.

6.9.4 MICON Input Displays (Attachment No. 7.2.4)

1. Enter "MICON number of interest (No. 1-32)" from the MICON/Display Select keys.

2. Enter "INPUT".

3. Enter "the input number of interest (No. 1-16).

4. Enter "L" or "H" to select time base for trend display.

   NOTE: L = 30 seconds for last 30 minutes H = 1 second for last 60 seconds

6.9.5 Group Displays (Attachment No. 7.2.5)

1. Enter "GROUP"

2. Enter "the group number of interest (No. 1-96)" from the MICON/Display Select keys or the numeric keys.

6.9.6 Bulk Group Displays (Attachment No. 7.2.6)

1. Enter "BULK 1" or "BULK 2"

6.9.7 Profile Trend Displays (Attachment No. 7.2.7 and 7.2.7.A)

1. Enter "TREND" for directory.

2. Determine trend group of interest then enter "the trend group number" from the numeric keys.

3. Enter "1", "2" or "3" for time base.

   NOTE: 1 = 20 minutes
   2 = 3 hours
   3 = 30 hours

4. Trend groups can be customized by using the arrow keys to position the display over a trend tag number and entering "a new trend tag number".

NOTE: The new trend tag number must already be configured as a trend variable.

6.9.8 Annunciator Display (Attachment No. 7.2.8)

1. Enter "ANNUNCIATOR".

6.9.9 Alarm Summaries (Attachment No. 7.2.9)

1. Enter "ALARM SUMM".

6.9.10 Function Value and Input-Output Displays (Attachment No. 7.2.10)

1. Enter "FNC VALUE".

2. Enter "the MICON number of interest" from the MICON/Display Select keys.

6.10 <u>Initialize Process Data Logger</u>

At location CRT No. 1:

1. Enter "CONF CRT".

2. Insert security key or enter "PASSWORD", password number and "ENTER".

3. Enter "16" and "ENTER" to configure process logs.

4. Enter page number wanted (No. 1-24) and "ENTER".

5. Move cursor to TAG column using cursor control "→".

6. Enter tag number to be logged and "ENTER".

7. Enter code value and "ENTER'.

NOTE: Code values

"0" = No logging

"1" = Log every 15 minutes

"2" = Log hourly

"3" = Log at end of shift

"4" = Log daily

"5" = Log on virtual discrete

3. Repeat Steps No. 5 - 7 for each tag to be monitored.

9. Move cursor to space allotted for updating disk and enter "Y".

10. Move cursor to space allotted for updating system and enter "Y".

11. Record initialization of process data logger in DCS Activities Log Book and Melter Operations Log Book.

6.11 Print List of System Tags

At CRT No. 1 or CRT No. 2:

1. Enter "CONF CRT".

2. Insert security key or enter "PASSWORD", password number and "ENTER".

3. Enter "11" and "ENTER" to print system tags.

4. Enter "1" and "ENTER" to start system tag report or enter "0" and "ENTER" to terminate report in progress.

6.12 Print List of Data Historian Numbers Corresponding to System Tag Numbers

At CRT No. 3:

1. Enter "CONF CRT".

2. Insert security key or enter "PASSWORD', password number and "ENTER".

3. Enter "19" and "ENTER" for Data Historian.

4. Enter "1" and "ENTER" for configuration menu.

5. Enter "PRINT" for print out of what is displayed.

6. Enter "N" for next page.

7. Repeat Steps No. 4 - 6 until all tags are printed.

6.13 Verify Back-Up MICON is Functioning

This procedure is to be performed once per week. If any unusual conditions exist notify Vitrification Operations Shift Supervisor.

1. Open MICON cabinet to locate automatic transfer adapters.

2. Observe the status of the display on all adapters. Both green indicators for the "Keep Alive Signal" should be illuminated. The "Standby Not Available" indicator should be off on all units.

3. Press the "Force to Standby" red button on one of the MICON transfer adapters. The following should occur:

   a. The "Keep Alive Interrupted" yellow indicators for the local and standby MICON will be on. The "Keep Alive Signal" green indicator will be on for all other MICONS.

   b. The "Transfer In Progress" yellow indicator for the local and standby MICON will be on.

   c. The "Standby" red indicator for the local MICON will be on. The "Local" green indicator will be on for all other MICONS.

   d. The "Standby Not Available" red indicator will be on for all MICONS.

   e. The audible alarm will sound at the CRT control panel. All MICONS except the MICON forced to standby and the standby MICON will be noted on the alarm summary display in an alarm condition.

f. The display on the front panel of each MICON will read "no backup".

4. For all MICONS, except the standby MICON, press the "ACK" button located under the front hinged cover on the front MICON panel. The display on the front of each MICON, except the MICON forced to backup, will read "no backup". The MICON forced to backup will read "on backup".

5. Press the "Reset to Primary" green button to transfer control back to the primary adapter.

6. If the "Keep Alive Interrupted" yellow indicator remains on, depress the "Reset to Primary" button on the corresponding adapter.

7. Clear standby MICON memory by pressing the "RAM ENABLE" button on the side panel of the standby MICON at the same time entering "99". The standby MICON front panel display will read "bu ready".

   NOTE: A security key or password number is not needed for Function 99. Function 99 uploads the backup RAM to the CPU RAM.

8. Repeat Steps No. 3 - 7 for each MICON.

9. Record this activity in the DCS Activities Log Book and Melter Operations Log Book.

6.14 MICON Memory Transfer Functions (Procedures must be performed at the MICON's)

6.14.1 Transfer Sequence To Back-Up RAM:

1. Insert security key or enter "PASSWORD", password number, and "ENTER".

2. Depress and hold "RAM ENABLE" button.

3. Enter "55" and depress "ENT". "COPYdOnE" will now be displayed in the DATA/VALUE window.

6.14.2 Transfer Sequence From Back-Up RAM:

Password or security key is not required.

1. Depress and hold "RAM ENABLE" button.

2. Enter "99" and depress "ENT". "COPYdOnE" will now be displayed in the DATA/VALUE window.

6.14.3 Compare Back-Up RAM With Main RAM:

1. Depress and release "RAM ENABLE" button.

   "COPYdOnE" indicates RAM's contain same data.
   "COPYErrOr" shows that RAM's have different data.

6.14.4 Clear Main RAM (Requires Back-Up Memory):

1. Insert security key or Enter "PASSWORD", password number, and "ENTER".

2. Depress and hold "RAM ENABLE" button.

3. Enter "75" and depress "ENT". "CLEAr" indicates a complete sequence.

4. Release "RAM ENABLE" button. The display will show "COPYErrOr" indicating that main and back-up RAMS contain different data.

6.14.5 Clear Backup RAM

1. Complete Step 6.14.4.

2. Complete Step 6.14.1 to move "zero" RAM data into back-up RAM.

7.0 ATTACHMENTS

7.1 CRT Keyboard Layout

7.2 DCS Displays

7.2.1 MICON & Group Overview Display

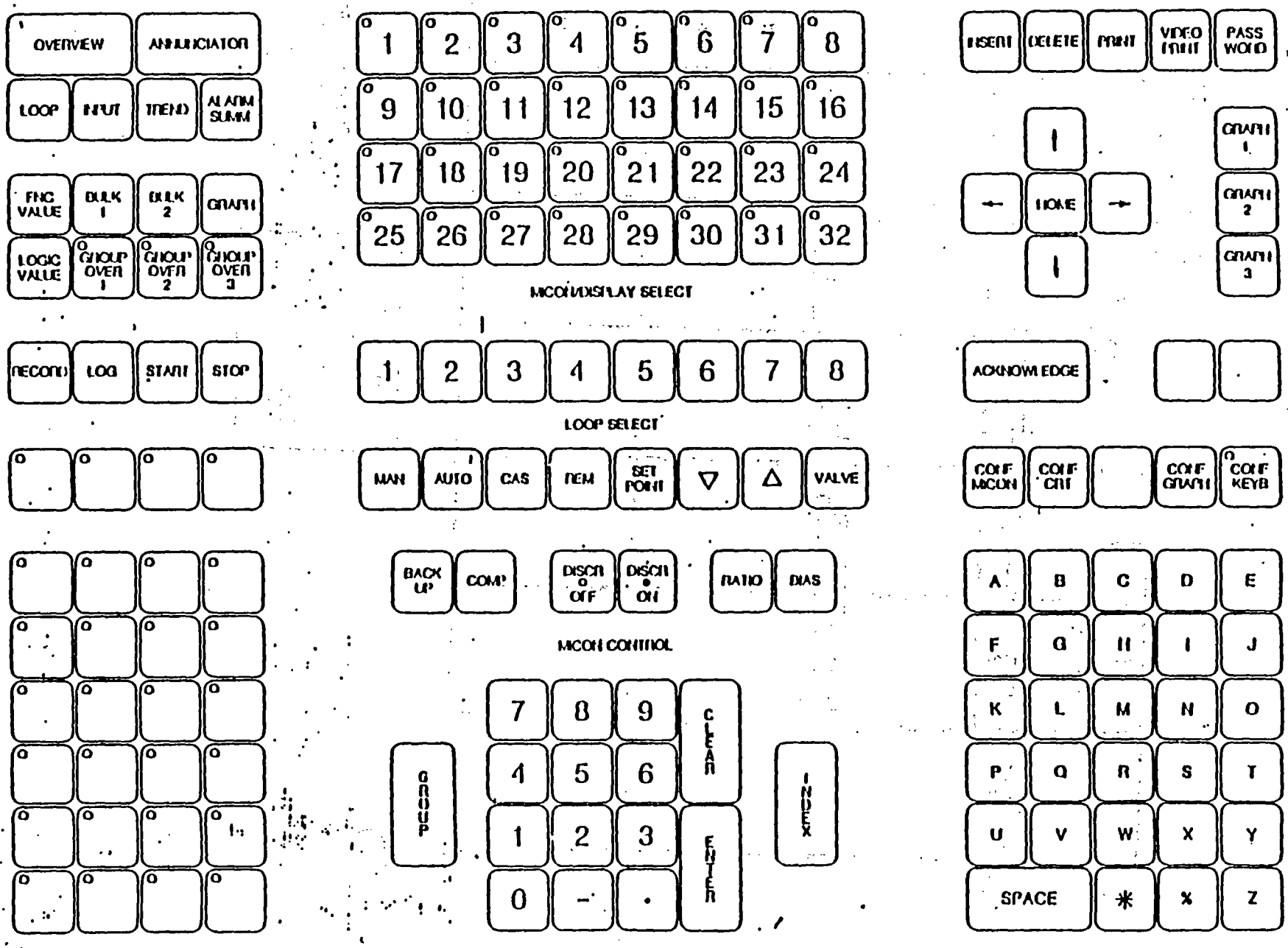
7.2.1.A Group Overview No. 1 Display

7.2.2 MICON No. 1 Display

7.2.3 MICON No. 1 Loop No. 5 Display

7.2.4 MICON No. 1 Input No. 5 Display

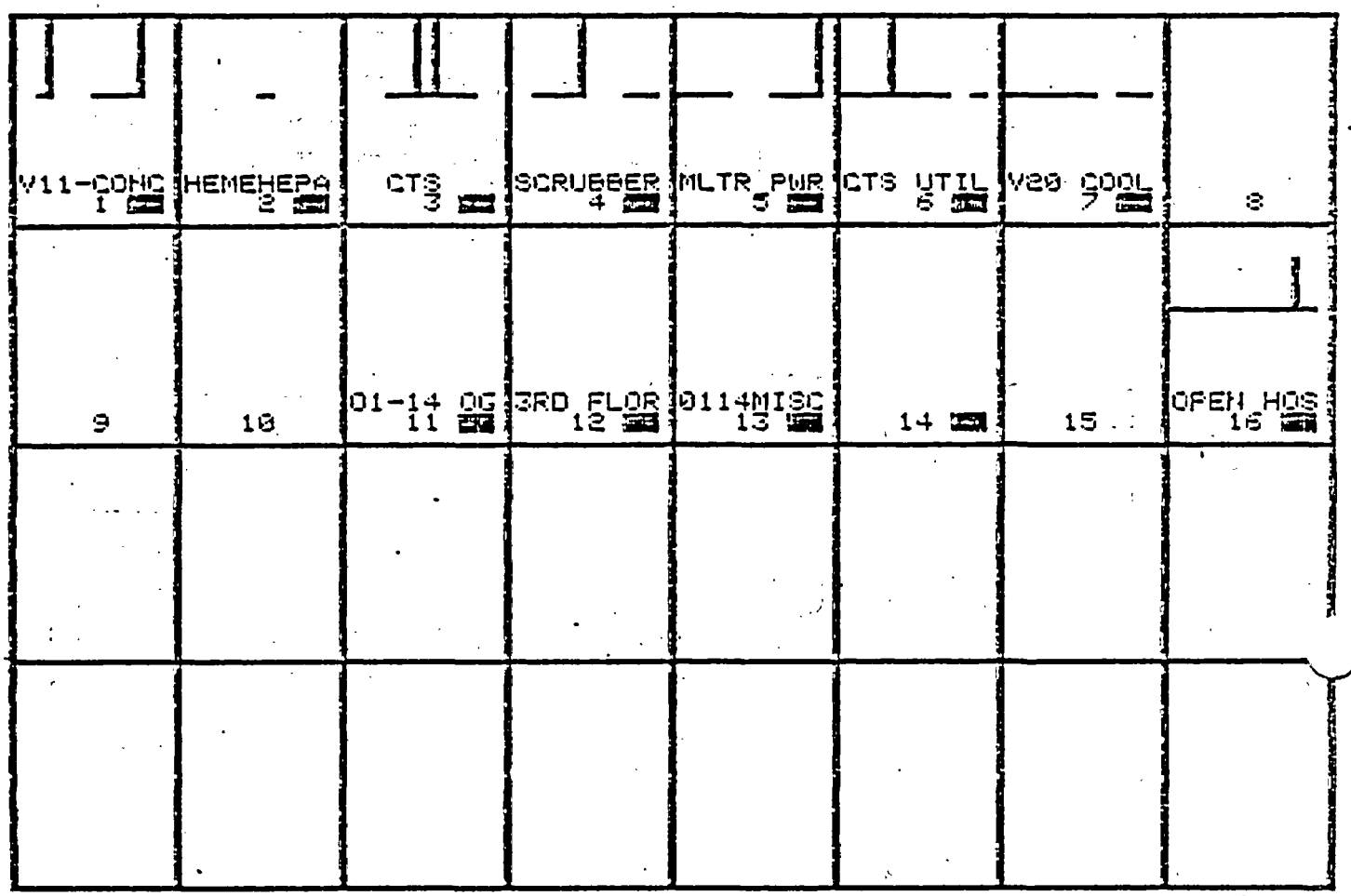
7.2.5 Group No. 27 Display



Configurable Keys

WVNS CTS DIST CTRL SYS 10/21/87 09:36:5

LOGGING 10/21/87 09:36:



OVERVIEW

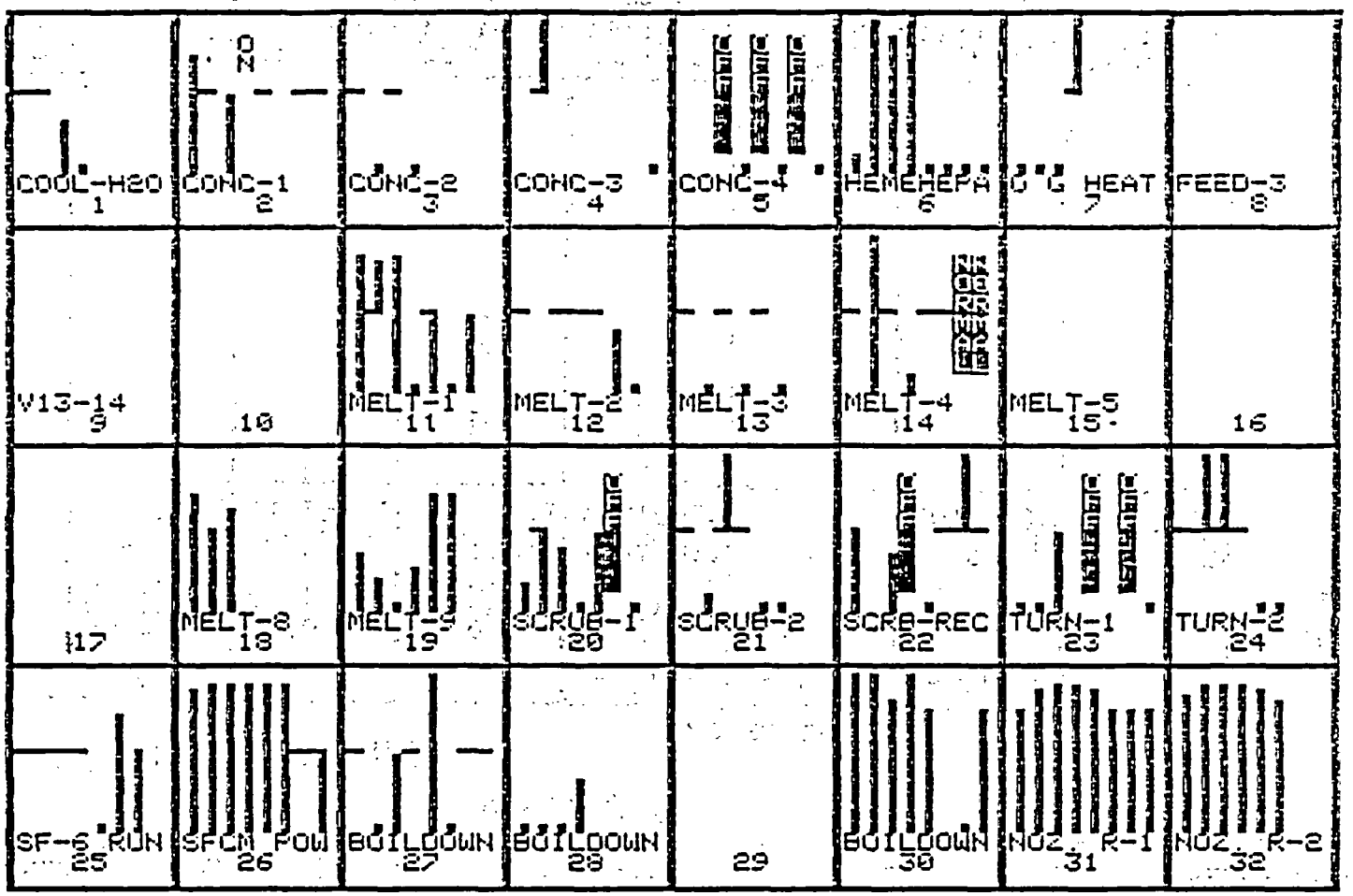
Data Bar Format Micon Description Micon #

- Has up to 32 Micons
- Each Square Represents a Micon and the Bar Graphs represent the deviation of the eight Micon loops.

WVNS CTS DIST CTRL SYS

10/21/87 09:38:16

10/21/87 09:38:11



GROUP OVER

Data in Bar Format

Group Description
Group #

WVNS CTS DIST CTRL SYS 10/21/87 09:38:

10/21/87 09:38:

ON	17.50 AMP	110.26 INCHES	1.46 SPGR	75.67 INCHES	NORMAL	[illegible]	3464.43 LITER
HIN-1111 AGITATOR	IT--1111 AGITATOR	LT--1101 CFMUT	OT--1101 CFMUT	LIX-1101 CALC-LEV	PIN-3611 LO-STEAM	HIN-3301 HEATER	FIX-2004 ADS TOT
HIC-1106 PCT CHEM-ADD	HIC-1107 PCT GLASS		LI--1301 INCHES 11K TANK	TIC-1111 DEG C LIQUID	TIC-3611 DEG C PREHEATR	TIC-3301 DEG C E OG HTR	
	0.00			50.02	14.32	21.00	
	0.00		46.31	50.02	14.32	21.00	
	0.00			0.00	0.00	0.00	
MAN 1 /L	MAN 2 /L	MAN 3 /L	MAN 4 /L	MAN 5 /L	MAN 6 /L	MAN 7 /L	MAN 8 /L

RESERVE READY

0 0 0 0 0 0 0 0 0 1 1 1 1 1 1
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5

ANALOG
DISCRETE+20
DEVIATION
PROCESS
SELF TEST

MICON 1 V11-CONC
CONCENTRATOR FEED TK

OVERVIEW , 1

Micon/Display Select

STATUS
Tag Number

Bonus Display Area

Tag Number Eng. Units Set Point Process Value Output Control Mode Loop Number

Micon Loop Display Area

WVNS CTS DIST CTRL SYS 10/21/87 09:40:32

10/21/87 09:40:3

ON	17.48 AMP	112.37 INCHES	1.43 SPGR	78.13 INCHES	NORMAL	[illegible]	3464.43 LITER
HIN-1111 AGITATOR	IT--1111 AGITATOR	LT--1101 CFMUT	DT--1101 CFMUT	LIX-1101 CALC-LEV	PIN-3611 LO-STEAM	HIN-3301 HEATER	FIX-2904 ADS TOT

Output (yellow)
Set Point (green)
Process Value (white).

TIC-1111
DEG C
LIQUID

SP /W 50.06
PV /X 50.06
OUT/Y 0.00

MAN /R
5

AUXILIARY DATA

LOOP SCALE LO	0.00
LOOP SCALE HI	100.00
PV ALARM LO	-999.00
PV ALARM HI	999.00
DEV IND LO	10.00
DEV IND HI	10.00
DEV ALARM LO	10.00
DEV ALARM HI	10.00
OUTPUT LIMIT LO	0.00
OUTPUT LIMIT HI	100.00
S-P RAMP/MIN	0.50
SCAN TIME	0.30
OUTPUT SLEW LO	99.00
OUTPUT SLEW HI	99.00
RATIO	0.00
BIAS	0.00

TUNING PARAMETERS

P GAIN	2.00
I REP/MIN	3.00
D RATE MIN	0.00
MANUAL RESET	0.00
PV SLOPE	0.00
P1	0.00
P2	0.00
SLOPE	0.00
DEV SLOPE	0.00
P1	0.00
P2	0.00
SLOPE	0.00
OUT SLOPE	0.00
P1	0.00
P2	0.00
SLOPE	0.00
CONTACT NR	0
STATUS	0
GAIN	0.00
REPLACE	0
GAIN LIMIT	100.00

RESERVE READY

0 0 0 0 0 0 0 0 1 1 1 1 1 1
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6

ANALOG
DISCRETE+20
DEVIATION
PROCESS
SELF TEST

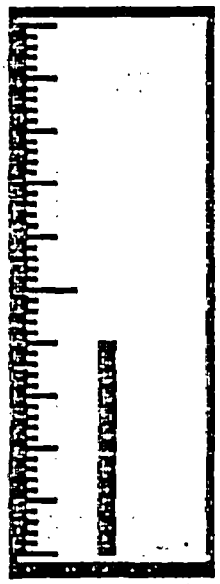
MICON 1 V11-CONC LOOP 5
CONCENTRATOR FEED TK

OVERVIEW, 1 Micon/Display Select, LOOP, 5 Micon/Display Select

Tag Number
Eng. Units
Process Description
Set Point
Process Value
Output (in %)
Control Mode
Loop Number

WVNS CTS DIST CTRL SYS 10/21/87 09:46:5

10/21/87 09:46:5

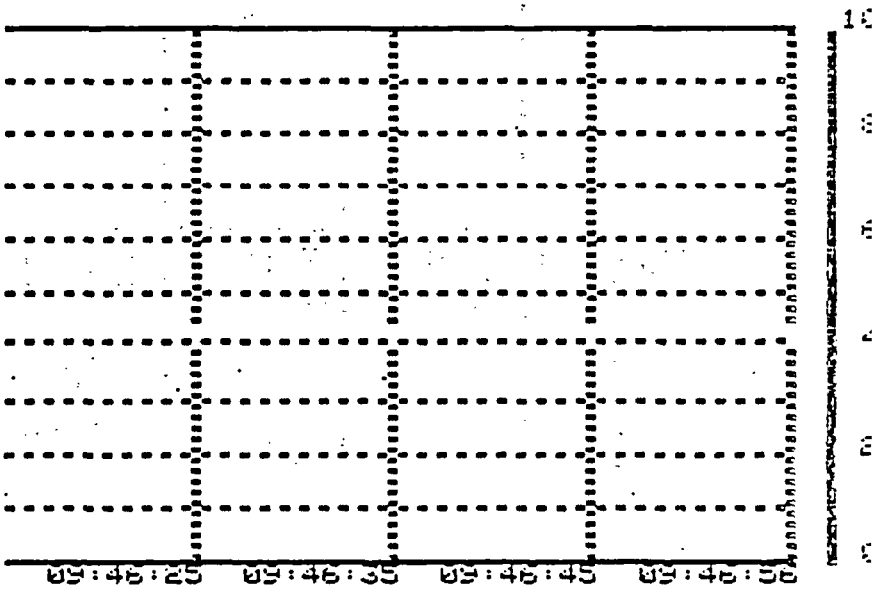


TT--1111
DEG C
LIQUID

INPUT 50.01

AUXILIARY DATA

XMTR RANGE LO	0.00
XMTR RANGE HI	120.00
XMTR ALARM LO	0.00
XMTR ALARM HI	110.00
SIV LIMIT LO	-1000.24
SAFE VALUE	0.00
SIV LIMIT HI	999.99
DIGITAL FILTER	1.00
TOTALIZED INPUT	0.00



MICON 1 V11-CONC INPUT 5
CONCENTRATOR FEED TK

OVERVIEW , 1 Micon/Display Select , INPUT , 5 Micon/Display Select , H

WVNS CTS DIST CTRL SYS

10/21/87 09:56:2

10/21/87 09:58:3

50.03 DEG C	110.98 INCHES	1.33 SPGR	80.92 INCHES	15.71 DEG C	15.76 DEG C	-114.77 SCFM	85.65 SCFM
TT--1111 LIQUID	LT--1101 CFMUT	DT--1101 CFMUT	LIX-1101 CALC-LEV	TT--8802 BLR INLT	TT--8801 BLR OUT	FT--3701 HEPA OUT	FT--6101 PRI INLT
FIC-1110 LB-HR STEAM	PT--1110 PSIG STEAM XM	PT--1101 INCHES VACUUM	LIC-300 INCHES COND-POT	PT--8801 INCHES BLR VAC	IT--8801 AMP ELEC BLR	UIX-9903 PPM NOX CONC	UIX-9907 PPM NO CONC
SP /W 79.99 /X 79.99 T/Y 0.00 MAN /R	12.00	0.10	16.41 16.41 0.00 MAN /L	-0.01	-0.34	0.00 1.53	0.00 0.
7	4	13	5	9	1	1	5
03	03	01	02	12	13	13	13

GROUP 27
BOILDOWN

GROUP , 27 Micon/Display Select

or

GROUP , 2 , 7

TAG VALUE ENGINEERING UNIT
TAG NUMBER DESCRIPTION
BAR GRAPH
TAG NUMBER ENGINEERING UNITS DESCRIPTION SET POINT PROCESS VARIABLE OUTPUT OPERATION MODE LOOP, INPUT or DISCRETE NUMBER

MICON NUMBER

WVNS CTS DIST CTRL SYS

10/21/87 09:58:26

10/21/87 09:58:22

TT--2071 924.078 01	02	03	04	05	06	07
TT--2061 923.703 08	09	10	11	12	13	14
TT--2051 949.391 15	16	17	18	19	20	21
22	23	24	25	26	27	ZIX-2039 6.000 28
ET--2031 108.600 29	IT--2031 376.100 30	KT--2031 34.000 31	32	33	34	35
36	37	38	39	40	41	TIN-2012 ON 42
ET--2032 68.200 43	IT--2032 359.693 44	KT--2032 19.800 45	46	47	48	TIN-2013 ON 49
50	51	52	53	54	55	TIN-2014 ON 56
ET--2033 72.798 57	IT--2033 403.194 58	KT--2033 23.600 59	60	61	62	TIN-2022 ON 63
64	65	66	67	68	69	TIN-2023 ON 70
TT--2005 960.078 71	TT--2012 1126.519 72	TT--2022 1145.956 73	TT--2023 695.011 74	75	76	TIN-2024 ON 77

BULK 2

10/21/87 09:59:0

TREND GROUPS

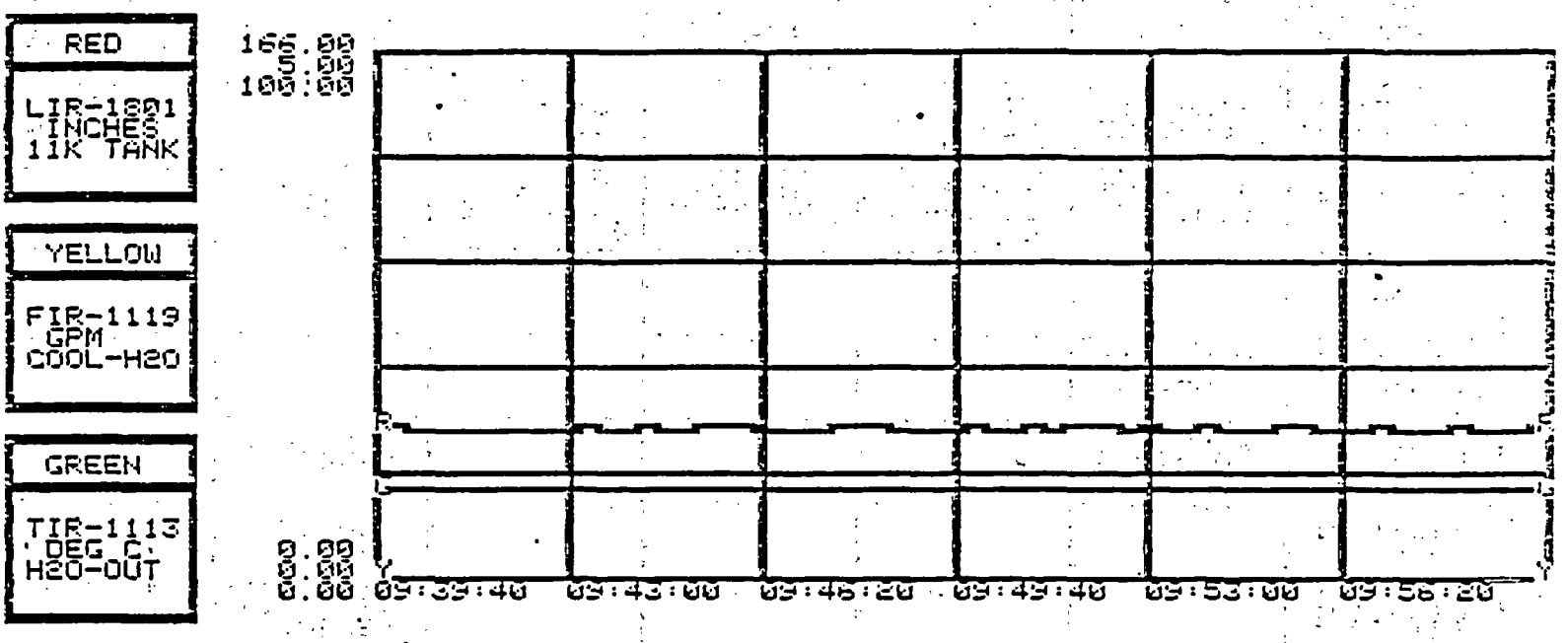
01	LIR-1101	DIR-1101	PIR-1101	17	LIR-3111	DIR-3111	
02	IIR-1111	TIR-1112		18	FIR-3117	FIR-3118	
03	LIR-1801	FIR-1119	TIR-1113	19	WIR-4101		IIR-4101
04	FIR-1110	PIR-1110	LIR-300	20	PIR-4102	TIR-4102	FIR-4109
05	TIR-3112	TIR-3103		21	FIR-040		
06	TIR-2037		TIR-4101	22	FIR-2003	PIR-2002	
07	FIR-6101	POR-6101	POR-7101	23	IIR-8801	IIR-2501	
08				24	LIR-3111	LIR-3101	
09	TIR-2039	TIR-2031	TIR-2113	25		FIR-2004	
10	LIR-2001	DIR-2001	PIR-2002	26	TIR-3301		
11	LIR-2011	PIR-2011	PIR-2012	27	TT--2017	TIX-2039	
12	TIR-002	FIR-2015	FIR-2016	28			
13	FIR-2031	FIR-2032	FIR-2033	29			
14	FIR-2034	FIR-2035		30			
	LIR-3101	DIR-3101	PIR-3102	31			
16	TIR-3101	TIR-3102	TIR-3101	32			

TREND

WVNS CTS DIST CTRL SYS

10/21/87 09:59:49

10/21/87 09:59:46



SELECT TIME BASE 1 20 MINUTES
2 3 HOURS
3 30 HOURS

TREND, 3 , 1
Micon/Display Select 20 Minutes

TREND GROUP NO. 3

WVNS CTS DIST CTRL SYS

10/21/87 10:02:04

10/21/87 10:02:04

FSL-1101 LO-PURGE 01	FSL-1104 LO-SWEEP 01	KIN-2502 LOW BAT 04	IIN-2503 HI CURNT 04		FIN-2001 LO-PURGE 06	FIN-2011 LO-PURGE 06
FIN-3101 LO-PURGE 04	FIN-3111 LO-PURGE 06	FIN-4101 LO-PURGE 03 LOW		LIN-1001 LOLO LVL 04	LIN-1002 LO LEVEL 04	LIN-1003 HIGH LVL 04
PIN-2002 LO-VAC 06	FIN-2005 LOAIR-TV 06	FIN-2015 LOAIR-TV 06	FIN-2041 CA WSHRO 07	FIN-2042 CA BSHRO 07	FIN-2043 CA ESHRO 07	
PSL-2002 LOLO-VAC 06						
UIN-1110 STM-LOCK 03	UIN-3611 STM-LOCK 01					
PIN-1110 LO-STEAM 03 ON	PIN-3611 LO-STEAM 01				TIN-2012 SELECT 05	
PSL-1101 LO VAC 01					TIN-2013 SELECT 05	
LIN-1101 AGITATOR 03					TIN-2014 SELECT 05	
PIN-3105 AIR-BLOW 04					TIN-2022 SELECT 05	
	PIN-1105 AIR-BLOW 01	PIN-1121 AIR-BLOW 02	PIN-1122 AIR-BLOW 02		TIN-2023 SELECT 05	
PIN-3114 STM-DROP 06	PIN-4107 AIR-BLOW 03				TIN-2024 SELECT 05	

ANNUNCIATOR

TAG NUMBER
DESCRIPTION

MICON NUMBER

WVNS CTS DIST CTRL SYS 10/21/87 10:06:5

10/21/87 10:06:4

PAGE 1 OF 1

TIME ON	TAG	ALARM	MICON	TIME ON	TAG	ALARM	MICON
03:55:07	LT--4101	XM	03				
14:49:42-	IIN-8801	OFF	13				
10:46:04-	FIN-4101	LOW	03				
21:24:16-	DI 23	ALARM	03				
12:46:33-	PT--1110	XM	03				
10:32:14-	PIN-1110	ON	03				

ALARM SUMM

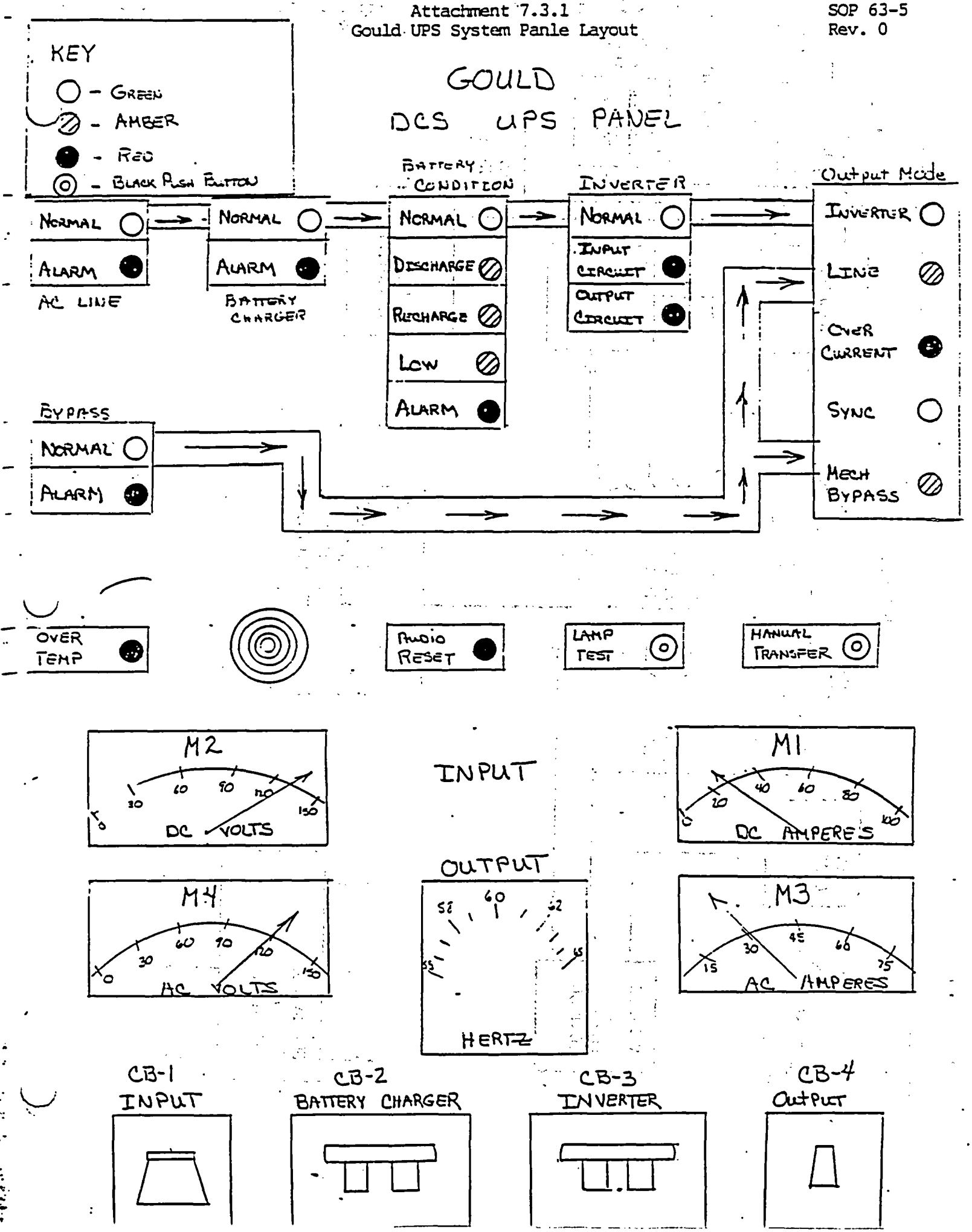
WVNS CTS DIST CTRL SYS 10/21/87 11:13:

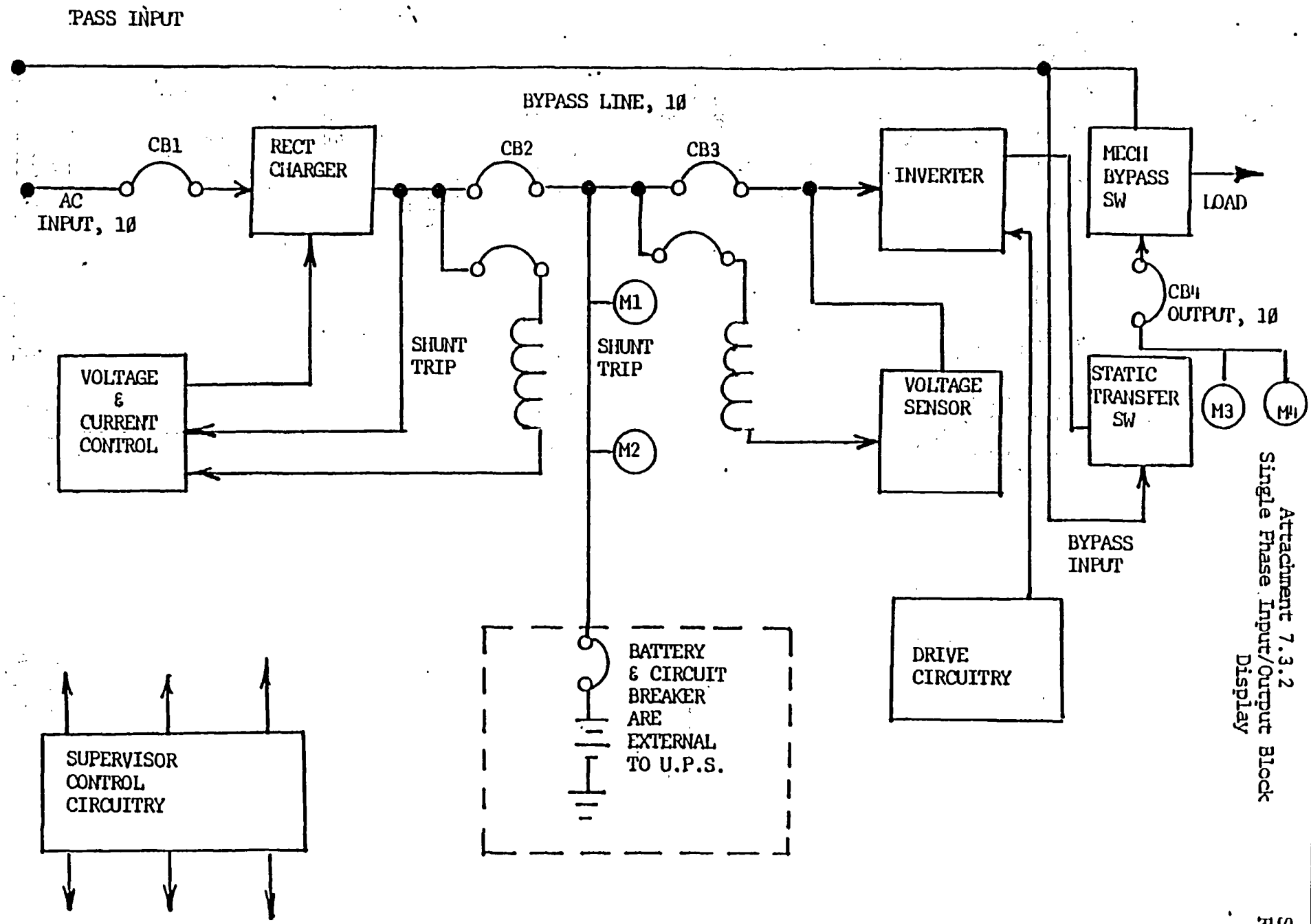
10/21/87 11:13:

MICON NUMBER	Loop 1 1	Loop 2	Loop 3	Loop 4	Loop 5	Loop 6	Loop 7	
STEP	CHEM-ADD	V11-CONC GLASS		CONCENTRATOR 11K TANK	FEED TK. LIQUID	PREHEATR	E OG HTR	
01	0.00	0.00	110.33	51.48	1.24	14.07	20.84	
02	1.00	0.00	17.76	51.48	1.24	14.07	0.00	
03	1.00	0.00	17.76	51.48	49.37	0.00	0.00	
04	1.00	0.00	110.66	51.48	1.00	0.00	0.00	
05	43.09	0.00	110.66		1.00	0.00	0.00	
06	43.09	-37.49	110.66			0.00		
07	18.04	-37.49	110.66			0.00		
08	18.04	-37.49	83.84			0.00		
09	18.04	-0.93	83.84			0.00		
10	1.24	-0.93	1.33			1.00		
11	3464.43	-0.93	1.33			1.00		
12	3464.43	1049.08	1.33			1.00		
13		1049.08	0.11			1.00		
14		1049.08	0.11			0.04		
15		1049.08	0.11			508.57		
16			0.11			508.57		
17			110.66			508.57		
18			0.00					
19								
	1/09	2/10	3/11	4/12	5/13	6/14	7/15	8/16
IN /X	43.14	17.40	18.03	51.51	49.94	0.05	14.09	-0.00
	20.79	-37.49	109.25	1.33	0.11	2.07	1.24	0.00
OUT/Y	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	21/29	22/30	23/31	24/32	25/33	26/34	27/35	28/36
DIG IN	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0
DIG OUT	0	0	0	0	1	1	1	0

FNC VALUE (1), Micon/Display Select

Analog Input #1-16
Analog Output #1-8
Discrete Input #21-36
Discrete Output #21-28
Virtual Discrete Input #41-
Internal Switches #61-90


KEY
- GREEN
- AMBER
- RED
- BLACK PUSH BUTTON
GOULD
DCS UPS PANEL
NORMAL
ALARM
AC LINE
NORMAL
ALARM
BATTERY CHARGER
BATTERY CONDITION
NORMAL
DISCHARGE
RECHARGE
LOW
ALARM
INVERTER
NORMAL
INPUT CIRCUIT
OUTPUT CIRCUIT
Output Mode
INVERTER
LINE
OVER CURRENT
SYNC
MECH BYPASS
BYPASS
NORMAL
ALARM
OVER TEMP
AUDIO RESET
LAMP TEST
MANUAL TRANSFER
M2
DC VOLTS
INPUT
M1
DC AMPERES
M4
AC VOLTS
OUTPUT
HERTZ
M3
AC AMPERES
CB-1
INPUT
CB-2
BATTERY CHARGER
CB-3
INVERTER
CB-4
OUTPUT



Attachment 7.3.2
Single Phase Input/Output Block
Display

SOP 63-5
Rev. 0

Front panel status indicators monitor the UPS operation. In conjunction with the status indicators, contact closures are provided by wiring to the Mother Board J-2 for 3Ø UPSs and J-20 for 1Ø UPSs. The relay contacts close under fault conditions.

Status Indication	Contact Closure	Meaning
AC LINE		
Normal (Green)		AC input is normal.
Alarm (Red)	BAT CH AC LO (1Ø) J20-12, 13 (3Ø) J2-12, 13	AC input is below 90% of nominal.
BYPASS		
Normal (Green)		Bypass input is normal
Alarm (Red)	BYPASS LO (1Ø) J20-15, 16 (3Ø) J2-15, 16	Bypass input is below 85% of nominal
BATTERY CHARGER		
Normal (Green)		Battery charger output is normal
Alarm (Red)	BAT CH FLT (1Ø) J20-4, 6 (3Ø) J2-4, 6	Battery charger output is greater than E_{HI}* or battery is discharging while AC line is normal
BATTERY CONDITION		
Normal (Green)		Battery voltage is between E_{EW}* and E_{HI}*
Discharge (Amber)		Battery is discharging
Recharge (Amber)		Battery charging current is greater than 1 ampere
Low (Amber)	BAT EW (1Ø) J20-14, 17 (3Ø) J2-14, 17	Battery voltage is less than E_{EW}*
Alarm (Red)	BAT ALA (1Ø) J20-1, 3 (3Ø) J2-1, 3	Battery voltage is greater than E_{HI}* or less than E_{LO}*

(continued)

MEANING OF STATUS INDICATORS AND CONTACT CLOSURES

Status Indication	Contact Closure	Meaning
INVERTER		
Normal (Green)		Inverter output is normal.
Input (Red)	INV FLT (1Ø) J20-5, 7 (3Ø) J2-5, 7	Inverter drive is abnormal or a sync error exists.
Output (Red)	INV FLT (1Ø) J20-5, 7 (3Ø) J2-5, 7	Inverter output voltage is greater than 106% of nominal or less than 94% of nominal
OUTPUT MODE		
Inverter (Green)		The inverter is supplying the critical load
Line (Amber)	BYPASS SS (1Ø) J20-9, 11 (3Ø) J2-5, 7	The bypass AC line is supplying the critical load
Overcurrent (Red)	I_o FLT (1Ø) J20-2, 18 (3Ø) J2-2, 18	The load current is greater than 130% of the UPS rating
Sync (Green)		The phase difference between the inverter AC and the bypass AC is less than 10°
MECH BYPASS (Amber		The Mechanical Bypass switch is in the "Bypass" position
OVER TEMP (Red)	O.T. (1Ø) J20-8, 10 (3Ø) J2-8, 10	The battery charger, inverter, or static switch (optional) heat sink temperature is excessive

Contact closures are available through J20 on the Mother Board. J20 is a 22 pin connector with mating plug for access.

ATTACHMENT NO. 7.3.4

EMERGENCY BACKFEED TIE-IN PROCEDURE FOR FEEDING CTS'S UPS SYSTEMS FROM PROCESS BUILDING'S EMERGENCY GENERATOR

[+] NOTE: ALL STEPS REQUIRE A SIGN-OFF

STEP NO.	DESCRIPTION	SIGN-OFF/DATE
1.	For an extended uplanned (or planned) outage on the CTS Voltage System, the CTS Operations staff will supply the "UPS" backfeed cord assembly which is being stored by them.	_____
2.	Maintenance electricians shall bring burndy lugs, tape, VOM, phase meter, and miscellaneous tools to CTS MCC No. 1 area (northwest corner of CTS Building).	_____
3.	Turn off and lockout VAX UPS 15A, 3 pole and MICON UPS 60A, 3 pole (2 poles wired) circuit breakers in MCC No. 1 (Sections 4B and 4C).	_____
4.	With 480 volt, 60 amp utility outlet disconnect on west inside wall of CTS off, run 4/c - No. 4 AWG SO cord from utility outlet to MCC No. 1.	_____

ATTACHMENT NO. 7.3.4 (CONTINUED)

STEP NO.	DESCRIPTION	SIGN-OFF/DATE
5.	Disconnect load wiring from VAX and MICON UPS circuit breaker and lug to emergency backfeed cable in wireway -see Sketch PEOB102587, Sheet. No. 1.	_____
6.	Before any energization of the UPS panels, turn off the backfeed 120V, 100 AMP Disconnect Switch and both main circuit breakers on UPS's front panels.	_____
7.	Verify that voltage is present at utility outlets disconnect switch. Request Plant Operations to close CTS/CSRF Main 480 breaker in Process Building Switchgear Room if CTS Power Panel in CTS southeast corner is not energized (utility outlet fed from this panel).	_____
8.	Turn on Utility Outlet Disconnect Switch and verify line voltage is present on UPS panels line lugs.	_____
9.	Using phase meter, verify proper phasing of voltage source at line lugs of UPS cabinets.	_____
10.	Turn on 100A, 120V Bypass Disconnect Switch.	_____

ATTACHMENT NO. 7.3.4 (CONTINUED)

STEP NO.	DESCRIPTION	SIGN-OFF/DATE
11.	Turn on both UPS cabinets main breakers.	_____
12.	CTS personnel to verify that units are operating properly.	_____
13.	At the end of the outage, the return to normal condition can begin under CTS Operations directions.	_____
14.	Observe that UPS charging current is at normal levels (batteries should be fully charged before changeover is made).	_____
15.	Turn off utility outlet's 60 AMP disconnect switch - CTS Operations to verify that UPS Systems are on battery backup - unplug feeder cable.	_____
16.	Turn off both main breaker switches on front panels of UPS cabinets.	_____
17.	Turn off bypass 100A Disconnect Switch.	_____
18.	Verify no voltage on spliced terminations.	_____

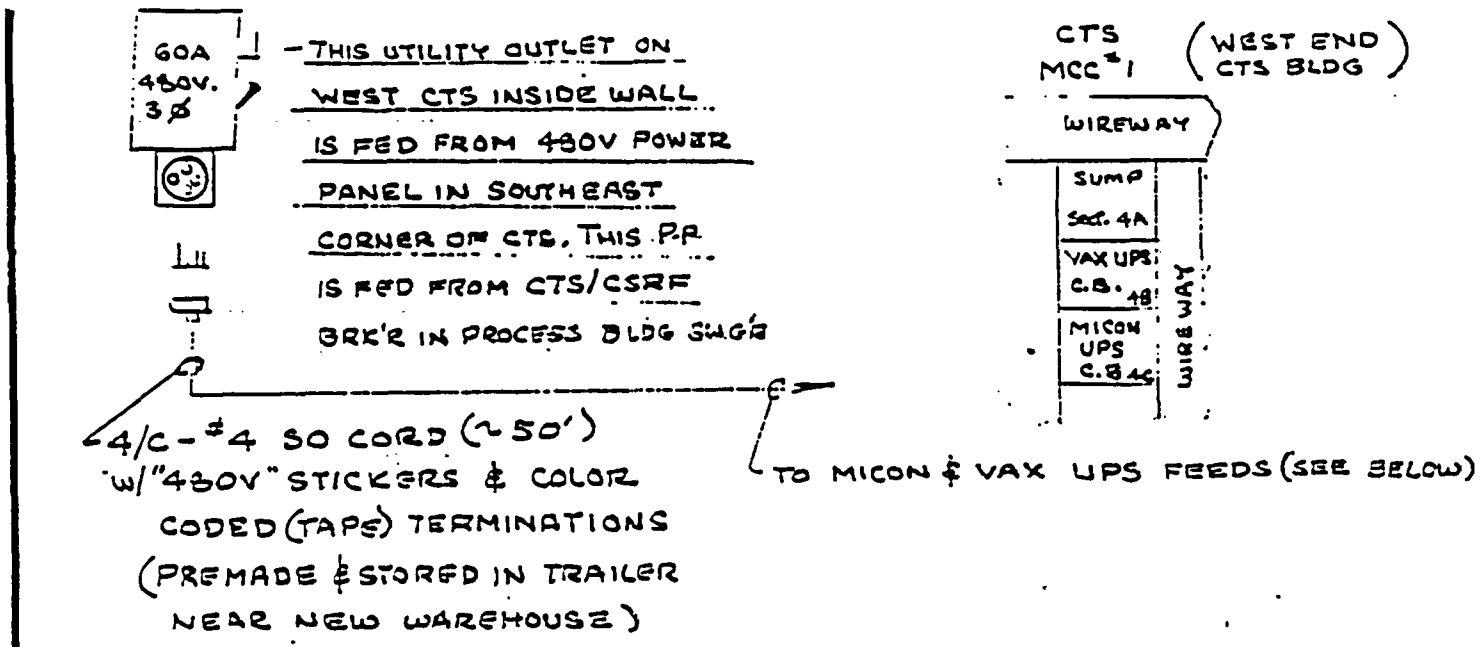
ATTACHMENT NO. 7.3.4 (CONTINUED)

STEP NO.	DESCRIPTION	SIGN-OFF/DATE
19.	Undo splice terminations and reterminate MICON UPS's 2 - No. 6 wires on its 60A circuit breaker in MCC No. 1, Section 4C. Observe color code.	_____
20.	Reterminate VAX UPS's 3 - No. 8 wires on the VAX UPS 15A circuit breaker in MCC No. 1, Section 4B - observe color code.	_____
21.	Remove lock and tag on MICON UPS 15A circuit breaker cubicle and turn on circuit breaker. Verify 120 volts on input lugs of MICON UPS cabinet.	_____
22.	Remove lock and tag on VAX UPS 60A circuit breaker cubicle and turn on circuit breaker. Verify 480V and proper polarity on VAX UPS's line lugs.	_____
23.	Turn on 100A, 120V, bypass disconnect.	_____
24.	Turn on VAX UPS main circuit breaker on front of VAX UPS cabinet - CTS Operations to verify correct operation.	_____
25.	Turn on MICON UPS main circuit breaker on front of MICON UPS cabinet - CTS Operations to verify correct operation.	_____

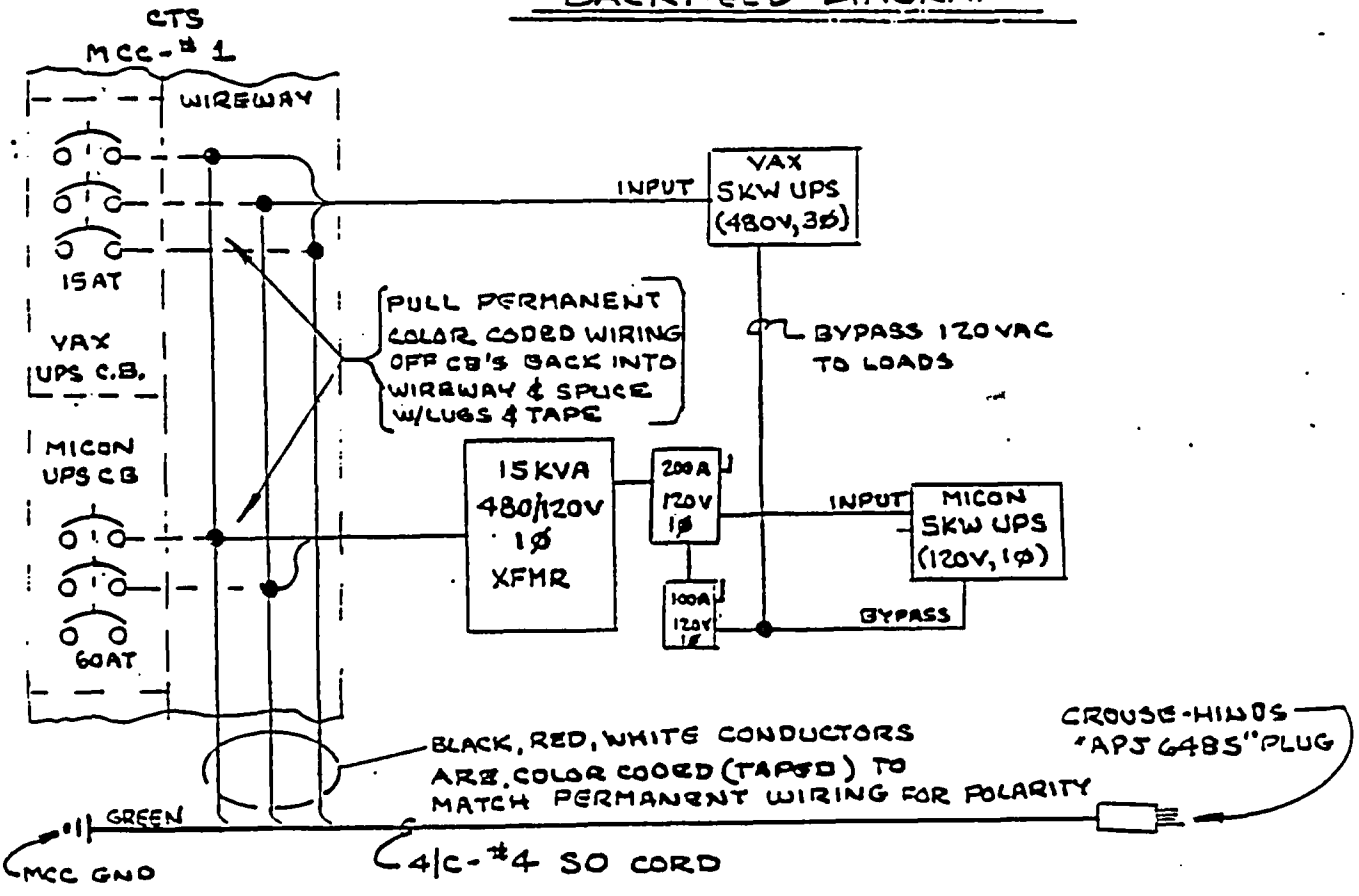
ATTACHMENT NO. 7.3.4 (CONTINUED)

STEP NO.	DESCRIPTION	SIGN-OFF/DATE
26.	Roll up and tap 4/c - No. 4 SO cord and return to CTS Operations personnel for storage.	_____
27.	CTS Supervisor to verify UPS electrical system is in "normal" operation.	_____

West Valley Nuclear Services Co. Inc.
West Valley, New York



BACKFEED DIAGRAM



BACKFEED TERMINATION TO EXISTING UPS FEEDERS

SUBJECT: EMERGENCY CTS VAX & MICON	NUMBER: PEOB102587	PAGE 1 OF 1
UPS BACKFEED WIRING	PREPARED BY: P.E. O'BRIEN	DATE: 10/25/87
	CHECKED BY: B/ Stout	DATE: 10/28/87

ATTACHMENT 7.4

DISK AND SYSTEM ERROR CODES

DISK ERRORS

1	No Index
2	No Seek Complete
3	Write Fault
4	Drive Not Ready
5	Drive Not Selected
6	No Track 00
7	Multiple Drives Selected
13	Seek in Progress
16	ID Error
17	Data Error (Hard)
18	No ID AM
19	No Data AM
20	No Record Found
21	Seek Error
23	Write Protected
24	Data Error (Soft)
25	Bad Track Flag
26	Bad Interleave Code
28	Unable to Read Alternate Track
30	Illegal Access to Alternate Track
32	Invalid Command
33	Illegal Sector
34	Illegal Function
35	Volume Overflow
48	RAM Error
50	Selected Drive Wrong Type Disk
51	Drive Status Error
52	Read Error
53	Write Error
54	DC Power Off
55	Seek Errors
56	Invalid Sector Address
57	Write Protected
58	No TK00 Status
60	Required Revision Data Not on Disk
61	MICON Conf. Expansion Error
62	Special Function Overflow
63	Invalid Function
64	Buffer Overflow
65	Wrong Revision Disk

GRAPHIC ERRORS

70	Disk Not Found
71	Name Not Found

SYSTEM ERRORS

98	System Error
99	System Level Error

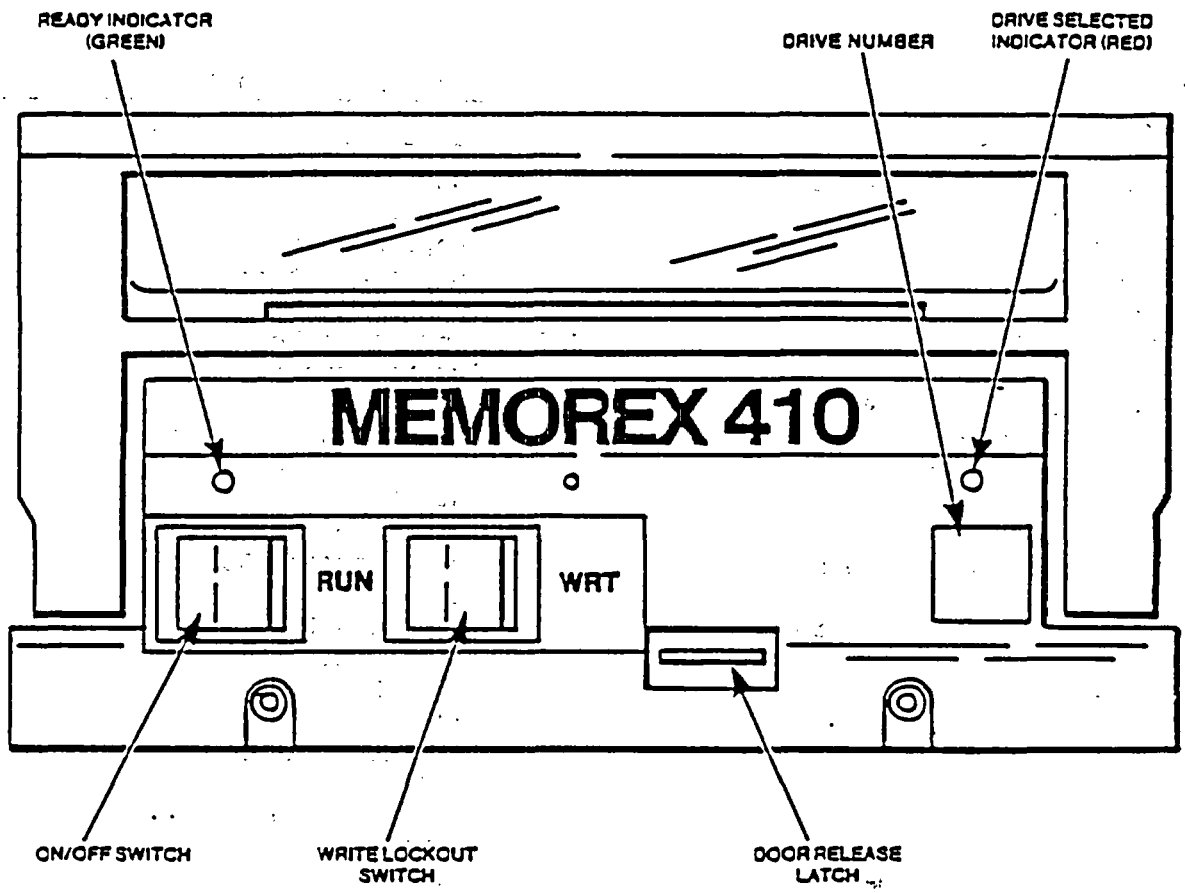
MICON CONF. DATA ERRORS

128	Could Not Find Function
129	Function Not Valid
130	Lengths Do Not Match Due to Question Overrun
131	Lengths Do Not Match Due to Invalid Question
132	Lengths Do Not Match
133	SRC Not Allowed
135	Data Not 0
136	Was Expecting Binary
141	Was Expecting Double Digit (0-99)
142	Below Low Limit or Above Limit for Real
144	Below Low Limit for Integer
146	Was Expecting Input or Virtual
147	Was Expecting Output or Virtual
149	Invalid SRC Controller Number
150	Invalid SRC Loop Number
151	Invalid SRC Step Number
152	LOC Range Error
255	Invalid Configuration Table Entry Question

MICON ENTRY ERRORS

E00	Invalid Key Sequence
E01	Invalid Step Input or loop Number
E02	Invalid Control Number
E03	Invalid Function Number
E04	Range Entry Error
E05	Configuration are full
E06	Overloaded Lateral Communication

Attachment 7.5
Removable Disc Front Panel Layout



4.6 MICON® P-200 CONTROL FUNCTIONS

INPUT CHARACTERIZATION

Analog Inputs
01 Analog Input Conversion
02 X-MTR Alarm Output
03 Fail-Back Alarm Output
04 Totalize Input
05 T/C-RTD Input Conversion

LOOP CONFIGURATION

Link Functions
10 Load (specified signal)
11 Char. Analog Input
12 Temp. Comp. (Gas Meas.)
13 Press. Comp. (Gas Meas.)
14 Input Signal Switch
15 Char. Discrete Input

PID Functions
20 PID Basic Controller
21 PID Ratio
22 PID Auto-Ratio
23 PID Auto-Bias
24 PID Cascade
25 PID Gap
26 Adaptive PID Parameters
27 Keyboard PID Parameters
28 Manual Station
29 External Output Tracking

Math Functions
30 Multiply
31 Divide
32 Summation (Bias)
33 Difference
34 Square Root
35 Square
36 Absolute Value
37 Logarithm
38 Exponential
39 Polynomial

Limit Functions
40 Low Select
41 High Select
42 Low Limit
43 High Limit
45 Constraint
46 Transfer on Discrete
47 Transfer on Analog

Discrete Inputs
07 Normal Contact Status
08 Status Alarm Output

Dynamic Functions
50 Lead/Lag
51 Dead Time
52 Velocity Limit
53 Totalize

Output Functions
54 Uncond. Analog Output
55 Analog Output (Valve)
56 Digital Output (Valve)
57 Uncond. Discrete Output
58 Digital Valve C.

Special PID Function
59 PID Incremental

Batch Functions
60 Transfer on Signal Value
61 Time-based Signal Transfer
62 Transfer on Discrete Status
63 Time-based Discr. Transfer
64 Uncond. Signal Transfer
65 Mode-based Signal Transfer
66 Mode-based Discrete Status

Logic Functions
70 And
71 Or
72 Invert
73 Latch
74 Timer (discrete)
75 Standard Discrete Output
76 Virtual Discrete Access
77 Counter

Special Output Functions
78 Start-Stop Output
79 Optional Discrete Output

Alarm Outputs
80 Signal Alarm Output
81 Dev Alarm Output
82 PV Alarm Output
83 Rate Alarm Output

Misc. Functions
84 Loop Mode Select
85 Value Display
86 Mode Select Interlock
87 Mode Selection
88 Oscillation Monitor
89 Look-up Table

CONTROLLER TEST OUTPUT
91 Self-Test Alarm Output
92 Comm. Alarm Output

STORE FUNCTIONS
96 Signal Scaling & Store
97 Signal Scaling & Trend

SPECIAL-USE FNC
00 Terminator
99 Filler (NO-OP)

4.7 MICON® P-200 OPERATING DATA AND TUNING FUNCTIONS

Operating Data

Transmitter Range . . . . . Hi-Lo
Process Scale . . . . . Hi-Lo
Deviation Indication (Bargraph). . Hi-Lo
Deviation Alarm Setting . . . . . Hi-Lo
Transmitter Input Alarm Setting . . Hi-Lo
Process Value Alarm Setting . . . . Hi-Lo
Output Limiting . . . . . Hi-Lo
Safe Value (Fall-back) Limits . . . . Hi-Lo

Safe Value (Fall-back value)
Set-point Ramp Limit
Digital Filter
Percent Input Calibration Readout
Loop Scan Time
Pass Word (Entry Code)

Adaptive Tuning

P...Gain
I...Rep/min
D...Rate min
Man. Reset
Adapt. Process
Adapt. Deviation
Adapt. Output
Adapt. Contact

Output Slu (Ramp)
Gain Limit

(Complete descriptions of each Function and associated Questions are presented in Appendix A. cf-Ref #4.3.51

```
WVNS  CTS  DIST CTRL SYS                                   09/02/87  09:59:42

                                                                   09/02/87 09:59:40
                              CRT CONFIGURATION
--  MENU
      1=SET TIME-DATE          8=CONF MICON TAGS          15=CONF PLC
      2=DISK UTILITY           9=CONF BULK GROUPS         16=CONF PROCESS LOGS
      3=TAG DICTIONARIES      10=IPL FUNCTIONS            17=CONF LOGIC VALUES
      4=STATUS DICTIONARY     11=PRINT SYSTEM TAGS        18=ISC UPLOAD
      5=CONF ANNUNCIATOR      12=CONF MISC DATA           19=DATA HISTORIAN SYSTEM
      6=CONF GROUP TAGS       13=CONF DATA ACQUISITION
      7=CONF TREND GROUPS     14=CONF PRINTERS
                                                          GRAPH 1=TOGGLE DISK UNIT
DISK UNIT=0
```

```
WVNS  CTS  DIST CTRL SYS                                   09/02/87  10:12:06

                                                                   09/02/87 10:12:03
                          MICON CONFIGURATION
--  MENU  1=UPDATE REVISION DIRECTORY        5=CONFIGURE INPUT AUX DATA
          2=CONFIGURE LOOP                   6=CONFIGURE DIGITAL INPUT
          3=CONFIGURE LOOP AUX DATA          7=UPLOAD OR DOWNLOAD MICON
          4=CONFIGURE ANALOG INPUT           GRAPH 1=TOGGLE DISK UNIT
DISK UNIT=0

MICON NUMBER 01  TYPE P  REV ---  LCN 01  LOOP/INPUT 01
DATA FROM D (D=DISK M=MICON)        DATE:
```

```
WVNS  CTS  DIST CTRL SYS                                   09/02/87  10:07:32

                                                   LOGGING   09/02/87 10:07:30
                        DATA HISTORIAN SYSTEM
-- MENU
      1=CONFIGURATION            5=PRINT TABULAR REPORT
      2=STATUS                   6=PRINT CONFIGURATION
      3=TABULAR REPORT           7=INITIALIZE HISTORIAN DISK
      4=TREND DISPLAY
                                 GRAPH 1=TOGGLE DISK
DISK UNIT=3
```