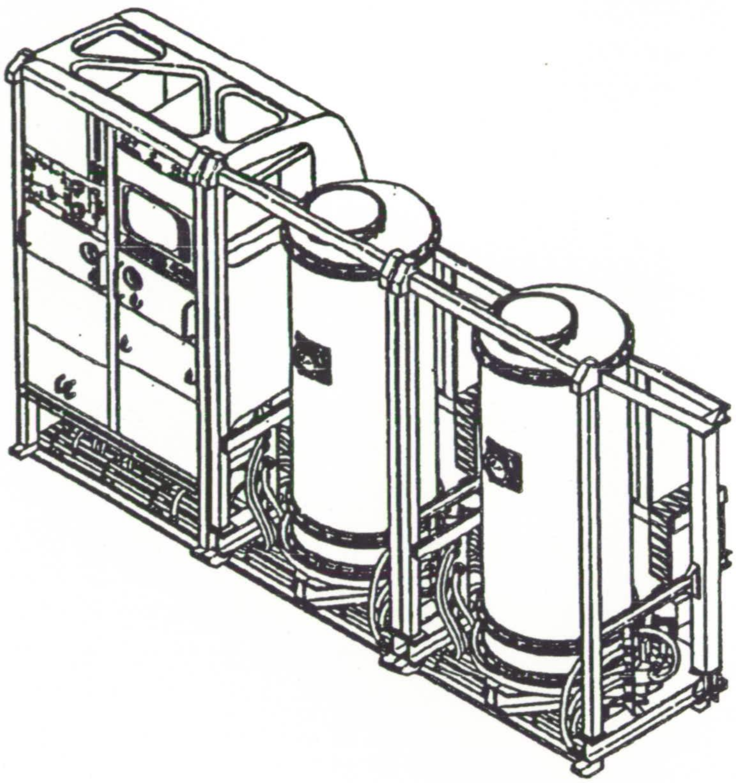
SPACE STATION FURNACE FACILITY
Experiment/Facility Requirements Document (E/FRD)



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May 1992

Volume II, Appendix 5
Final Study Report (DR-8) of
Space Station Furnace Facility
Contract No. NAS8-38077

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EXPERIMENT/FACILITY REQUIREMENTS DOCUMENT FOR THE SPACE STATION FURNACE FACILITY

DR-10

MAY 1992

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This was prepared by Teledyne Brown Engineering under contract to NASA. It was developed for the Payload Projects Office at the Marshall Space Flight Center.

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Contracting Officer: Craig C. Mitchell
NASA/Marshall Space Flight Center

Contract Monitor: Arthur S. Kirkindall
NASA/Marshall Space Flight Center

Contract Number: NAS8-38077

Contractor: Teledyne Brown Engineering
Cummings Research Park
300 Sparkman Drive, NW
P. O. Box 070007
Huntsville, Alabama 35807-7007

Project Manger: G. P. Jenkins

Project Engineer: R. C. Seabrook

Prepared by:

Nancy Kephart

Nancy Kephart, Systems Engineer
SSFF

Approved by:

Greg P. Jenkins

Greg P. Jenkins, Project Manager
SSFF

Approved By:

A. Sharpe, Manager
Advanced Programs Department

DATA REQUIREMENT (DR) - 10

EXPERIMENT/FACILITY REQUIREMENTS DOCUMENT FOR THE SPACE STATION FURNACE FACILITY

SECTION 1: INTEGRATED CONFIGURATION-1

MAY 1992

FOREWORD

The Space Station Furnace Facility (SSFF) is designed to accommodate and support a variety of furnace modules throughout the operational lifetime of the facility. Since the SSFF will be operational for 30 years, and various furnace modules will be accommodated, the Experiment/Facility Requirements Document (E/FRD) is divided into two separate sections. Section 1 describes the integrated SSFF-to-SSF interface, which includes the SSFF Core subsystem requirements and the furnace module requirements based on the information obtained from the Furnace Developer's Section 2, and Section 2 describes the furnace module-to-SSFF interface. Multiple Section 2s may be required for each E/FRD, depending on how many furnace modules the SSFF will accommodate per mission, since a separate Section 2 will be written for each furnace module. Both sections will be replaced for each mission with the appropriate mission-peculiar furnace module interface requirements since the Core configuration is a function of the furnace module(s).

This E/FRD reflects the Initial Configuration-1 (IC1), which is the initial integration of the SSFF Core and Furnace Module-1 into the SSF U. S. Laboratory Module-A. IC1 is planned for 1997, based on the assumption that Utilization Flight 3 (UF-3) is the carrier. Furnace Module-1 is scheduled to be an upgrade of the present Crystal Growth Furnace (CGF), and Section 2 reflects the requirements of that module.

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ACRONYM LIST

AA	Avionics Air
CCF	Centralized Core Function
CCOS	Centralized Core Operating System
CCU	Core Control Unit
CdTe	Cadmium Telluride
CGF	Crystal Growth Furnace
cm	Centimeter
CMCU	Core Monitor and Control Unit
CP	Coldplate
CPC	Core Power Conditioners
CPCS	Core Power Conditioners Stimulus
CRW	Crew
CSF	Core-Specific Function
DC	Direct Current
DCF	Distributed Core Function
DCMU	Distributed Core Monitoring Unit
DCOS	Distributed Core Operating System
dia	Diameter
DMS	Data Management System (SSF) Data Management Subsystem (SSFF)
DR	Data Requirement
E/FRD	Experiment/Facility Requirements Document
EAC	Experiment Apparatus Container
EPS	Electrical Power System
ESF	Experiment-Specific Function
Ess	Essential
FAU	Furnace Actuator Unit
FCU	Furnace Control Unit
FDACS	Furnace Data Acquisition and Control System
FDDI	Fiber Distributed Data Interface
FDIR	Fault Detection, Isolation, and Recovery
FDS	Fire Detection and Suppression
FM-1	Furnace Module-1
FO	Functional Objective
ft	Foot

ACRONYM LIST (Cont.)

ft^2	Square foot
FTM	Furnace Translation Mechanism
g	Gravity
GaAs	Gallium Arsenide
GDS	Gas Distribution Subsystem
GHE	Gaseous Helium
GN_2	Gaseous Nitrogen
GND	Ground
GSE	Ground Support Equipment
H/W	Hardware
H_2O	Water
HDR	High-Density Recorder
HgZnTe	Mercury Zinc Telluride
HRDL	High-Rate Data Link
h	Hour
HX	Heat Exchanger
Hz	Hertz
IC1	Integrated Configuration-1
IROP	Integrated Requirements on Payloads
IFEA	Integrated Furnace Enclosure Apparatus
ISPR	International Standard Payload Rack
ISS	Internal Support Structure
JSC	Johnson Space Center
kg	Kilogram
KSC	Kennedy Space Center
kW	Kilowatt
kWh	Kilowatthour
LAN	Local Area Network
lbm	Pound Mass
LNS	Liquid Nitrogen System
MBPS	Megabytes per Second
MDM	Multiplexer/Demultiplexer
mm	Millimeter
MPAC	Multipurpose Application Console

ACRONYM LIST (Cont.)

MPLM	Mini-Pressurized Logistics Module
MSFC	Marshall Space Flight Center
MSS	Mechanical Structures Subsystem
NASA	National Aeronautics and Space Administration
NTSC	National Television Standard Committee
OMIS	Operations Management Information System
ORU	Orbital Replacement Unit
PAM	Payload Accommodations Manager
PCDS	Power Conditioning and Distribution Subsystem
PED	Payload Element Developer
PES	Payload Executive Software
PI	Payload Investigator
PIC	Payload Integration Center
PIM	Payload Increment Manager
PLM	Pressurized Logistics Module
POIC	Payload Operations Integration Center
ppm	Parts per Million
psia	Pounds per Square Inch Absolute
PTRD	Payload Training Requirements Document
QD	Quick Disconnect
RFM	Reconfigurable Furnace Module
RPC	Remote Power Controller
RPCM	Remote Power Controller Module
RPDA	Remote Power Distribution Assembly
S/W	Software
SACA	Sample Ampoule/Cartridge Assembly
sec	Second
SEM	Sample Exchange Mechanism
SIP	Sample Insertion Port
SS	Subsystem
SSF	Space Station Freedom
SSFF	Space Station Furnace Facility
STS	Space Transportation System
SW	Software

ACRONYM LIST (Conc.)

TAT	Training Assessment Team
TBD	To Be Determined
TCS	Thermal Control System (SSF) Thermal Control Subsystem (SSFF)
UF-3	Utilization Flight 3
UPTP	User Payload Training Plan
USL	United States Laboratory
V	Volt
Vdc	Volts Direct Current
VES	Vacuum Exhaust System
W	Watt
µm	Micrometer
MΩ	Megohm

1.1. FUNCTIONAL OBJECTIVES AND EQUIPMENT IDENTIFICATION

1.1.1 SYSTEM DESCRIPTION

The function of the Space Station Furnace Facility (SSFF) is to support materials research into the crystal growth and solidification processes of electronic and photonic materials, metals and alloys, and glasses and ceramics. To support this broad base of research requirements, the SSFF will employ a variety of furnace modules operated, regulated, and supported by a core of common subsystems. Furnace modules may be reconfigured or specifically developed to provide unique solidification conditions for each set of experiments. The SSFF modular approach permits the addition of new or scaled-up furnace modules to support the evolution of the facility as new science requirements are identified. The SSFF Core is of modular design to permit augmentation for enhanced capabilities.

The fully integrated configuration of the SSFF will consist of three racks with the capability of supporting up to two furnace modules per rack. The initial configuration of the SSFF will consist of two of the three racks and one furnace module. This Experiment/Facility Requirements Document (E/FRD) describes the integrated facility requirements for the Space Station Freedom (SSF) Integrated Configuration-1 (IC1) mission. The IC1 SSFF will consist of two racks: the Core Rack, with the centralized subsystem equipment, and the Experiment Rack-1, with Furnace Module-1 and the distributed subsystem equipment to support the furnace.

The IC1 SSFF configuration is shown in Figure 1.1-1. It consists of two double rack replacement structures, the centralized and distributed components to support furnace operations, and Furnace Module-1. The SSFF support functions are provided by the following Core subsystems:

- Power Conditioning and Distribution Subsystem (SSFF PCDS)
- Data Management Subsystem (SSFF DMS)
- Thermal Control Subsystem (SSFF TCS)
- Gas Distribution Subsystem (SSFF GDS)
- Mechanical Structures Subsystem (SSFF MSS)

1.1.2 FUNCTIONAL OBJECTIVES

There are 13 functional objectives (FOs) for the SSFF which are structured as one FO for payload checkout: one FO for Core activation; one FO for the distributed equipment activation; eight FOs for experiment sample operations, calibration/bakeout, and vent and purge cycles; one FO for furnace sample loading or shutdown; and one FO for SSFF shutdown. The actual FO numbering is as follows:

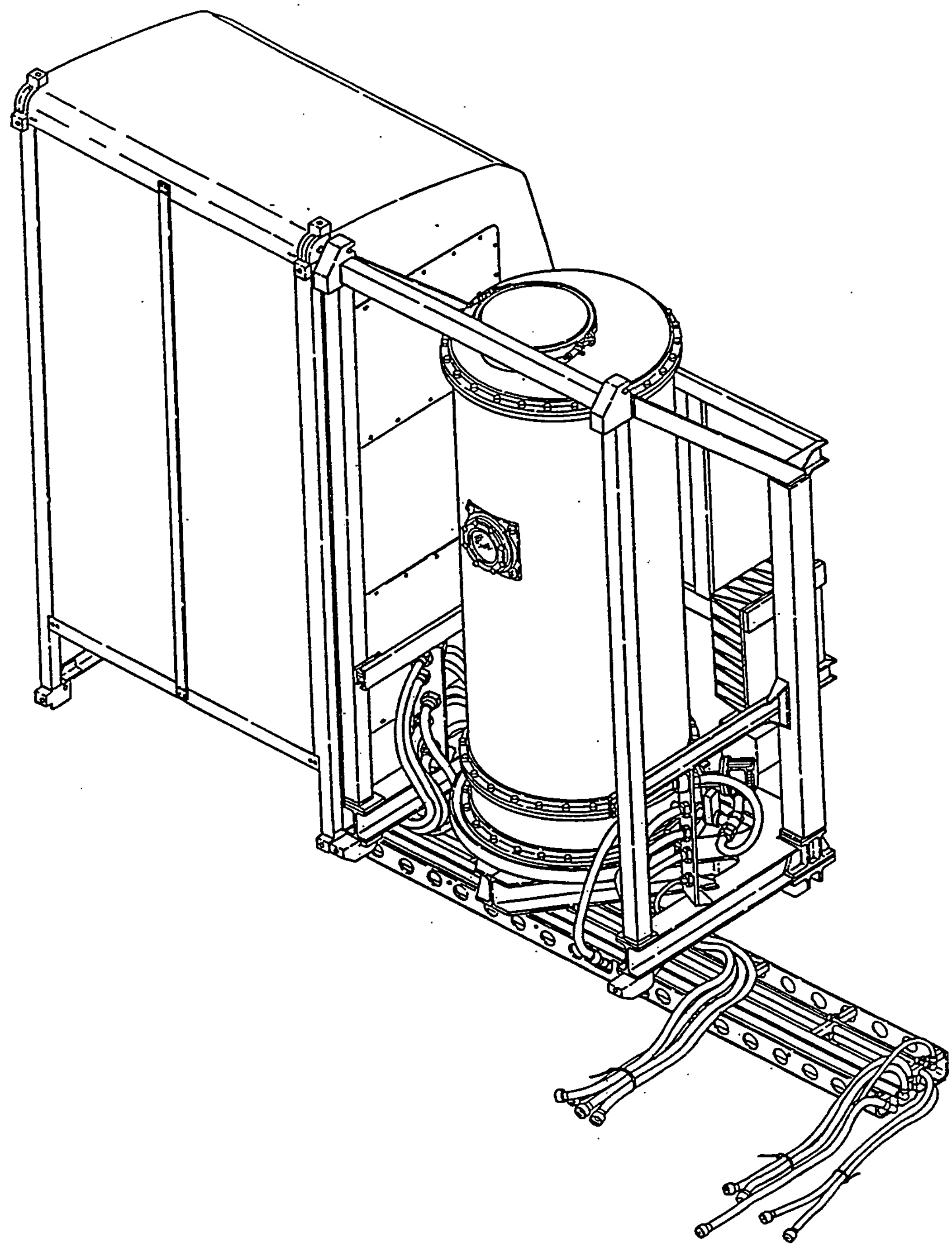


FIGURE 1.1-1. SSFF IC1 CONFIGURATION

FO-0 Payload Checkout
FO-1 Core Activation
FO-2 Distributed Equipment Activation
FO-3 Furnace Module-1 Sample Exchange
FO-4 Furnace Module-1 Vent/Purge
FO-5 Furnace Module-1 Process Sample HgCdTe
FO-6 Furnace Module-1 Process Sample HgZnTe
FO-6A Furnace Module-1 Process Sample Extended HgZnTe
FO-7 Furnace Module-1 Process Sample CdTe
FO-8 Furnace Module-1 Process Sample GaAs
FO-9 Configure Furnace Module-1 for Sample Loading or Shutdown
FO-10 SSFF Shutdown
FO-11 Furnace Module-1 Process Calibration/Bakeout

Table 1.1-1 shows a listing of the SSFF FOs along with the equipment associated with each step of each FO. Step duration, crew time requirements, and average power requirements for each step of each FO are defined in Table 1.1-2, Functional Objective Requirements Sheets.

1.1.3 EQUIPMENT IDENTIFICATION

The SSFF will occupy two double rack locations in the U. S. Laboratory (USL) for IC1. The Core Rack, modified [relative to the International Standard Payload Rack (ISPR)] to permit interconnections to the adjacent experiment rack, will provide mechanical/structural interface for the centralized SSFF subsystem components. Experiment Rack-1 will provide mechanical/structural interface for distributed SSFF subsystem equipment required to support the furnace operation, and Furnace Module-1. Figures 1.1-2 through 1.1-5 show the SSFF centralized and distributed equipment to the Orbital Replacement Unit (ORU) level per subsystem. Figure 1.1-6 shows the Furnace Module-1 equipment. A block diagram of the SSFF is shown in Figure 1.1-7, which identifies and shows the interrelationship of each item of SSFF equipment and the interfaces with SSF and the furnace module.

1.1.4 OPERATIONAL FUNCTIONAL FLOWS

Preliminary functional flows are shown in Table 1.1-3 for each FO. Functional flows define the function performed, the performing element, and decisions involved in accomplishing each FO.

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 1 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-1 Step 1	CCU and CMCU Activation	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors
FO-1 Step 2	SSFF to Ground Link	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors
FO-1 Step 3	Test CMCU	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors
FO-1 Step 4	Configure and Test TCS in Core Rack	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 2 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-1 Step 5	Test CPC	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Core Power Conditioners
FO-1 Step 6	GDS Test	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Latching Solonoid Valves Contamination Monitor
FO-1 Step 7	Activate Camera and Videolink	NOT USED IN IC1
FO-1 Step 8	Core Readiness Check	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 3 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-1 Step 8 (Cont.)	Core Readiness Check	Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers
FO-2 Step 1	CCU Powers RPCM/DCMU	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit
FO-2 Step 2	CCU Powers FCU	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit
FO-2 Step 3	FCU Checkout	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 4 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-2 Step 3 (Cont.)	FCU Checkout	Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit
FO-2 Step 4	FAU Powered	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-2 Step 5	FAU Checkout	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 5 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-2 Step 6	Configure and Test TCS in Furnace Rack	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducer Video Processor Unit Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-2 Step 7	GDS Test	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 6 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-2 Step 8	Furnace-Specific Tests	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 1	Command Manual Sample Exchange	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 7 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3 Step 2	Vent/Fill Furnace Module-1	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 3	Equalize Furnace Module-1 Pressure	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Manual Valve
FO-3 Step 4	Prep Equipment	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 8 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3 Step 4 (Cont.)	Prep Equipment	Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 5	Open SIP	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 6	Insert Samples	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 9 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3 Step 7	Close SIP	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 8	Open Valves	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Manual Valves
FO-3 Step 9	Command Manual Sample Exchange Off	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 10 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3 Step 9 (Cont.)	Command Manual Sample Exchange Off	Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-3 Step 10	Perform Seal Check	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-4 Step 1	GN_2 Purge Furnace	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 11 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-4 Step 2	Argon Backfill	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-4 Step 3	Command Sample Process	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-4 Step 4	TCS Configured	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 12 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-4 Step 3 (Cont.)	TCS Configured	Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit
FO-5	Vapor Crystal Growth of HgCdTe	All equipment listed below
FO-6	Meltback and Regrowth of HgZnTe	All equipment listed below
FO-6a	Meltback and Regrowth of HgZnTe	All equipment listed below
FO-7	Growth of CdTe by Dir. Solidification	All equipment listed below
FO-8	Growth of GaAs by Dir. Solidification	All equipment listed below
		Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 13 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-9 Step 1	Verify Furnace in HOME Position	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-9 Step 2	Furnace-Specific Tests	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Video Processor Unit Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-9 Step 3	Furnace-Specific Tests	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 14 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-9 Step 3 (Cont.)	Furnace-Specific Tests	RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-10 Step 1	Distributed Equipment Shutdown	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers
FO-10 Step 2	Verify Experiment Shutdown	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 15 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-10 Step 3	Shut Down GDS Subsystems	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers
FO-10 Step 4	DMS Nonessentials Shutdown	Core Control Unit Core Monitor Control Unit RPCM Essentials Power Supply Voltage and Current Sensors Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers
FO-10 Step 5	TCS Shutdown	Core Control Unit Core Monitor Control Unit Essentials Power Supply Voltage and Current Sensors
FO-10 Step 6	CCU Shutdown	

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 16 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-11 Step 1	Activate Calibration/Bakeout	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-11 Step 2	Initiate Calibration Process	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1
FO-11 Step 3	Bakeout Process	Core Control Unit Removable Hard Drive CDROM/WORM Drive High-Density Recorder Core Monitor Control Unit Crew Interface CPCS RPCM

TABLE 1.1-1. SSFF FUNCTIONAL OBJECTIVES (Sheet 17 of 17)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-11 Step 3 (Cont.)	Bakeout Process	Essentials Power Supply Voltage and Current Sensors Shutoff Valves Pump Package Flow Meters Flow Control Valves Temperature Sensors Pressure Transducers Distributed Core Monitoring Unit Furnace Control Unit Furnace Actuator Unit Furnace Module-1

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 1 of 19)

EXPERMENT NAME: Space Station Furnace Facility — FO NUMBER: 0

FO NAME: Payload Activation — PREREQUISITE: ____

NO. OF PERFORMANCES: MIN.____ DES.____ — SEQUENCE: ____

REQUIRED TIMEFRAME (MET): MIN.____ MAX.____ — JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	5:00	5:00	1:00			
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		0.00	0.00	0.00			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Open TCS manual valves
2	Open GDS manual valves
3	Verify Station services activated at rack

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 2 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 1
FO NAME: Core Activation
PREREQUISITE: FO-0
NO. OF PERFORMANCES: MIN.________ DES.________
SEQUENCE: ________
REQUIRED TIMEFRAME (MET): MIN.____ MAX.________
JOINT OPS WITH: ________

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	5:00	2:00	1:00	4:00	3:00	7:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		1.008	1.008	1.008	1.1479	1.4637	1.2926
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate CCU and CMCU
2	SSF to ground initial link
3	Test CMCU
4	Configure and test TCS in Core
5	Test CPC
6	GDS tests in Core

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 3 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 1
FO NAME: Core Activation
PREREQUISITE: FO-0
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE: _____
REQUIRED TIMEFRAME (MET): MIN._____ MAX._____
JOINT OPS WITH: _____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	5:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		1.1479	1.1479				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Activate camera and test videolink and high rate link (not used during MTC)
8	Core readiness check

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 4 of 19)

EXPERMENT NAME: Space Station Furnace Facility　　FO NUMBER: 2
FO NAME: Distributed Equipment　　PREREQUISITE: FO-1
NO. OF PERFORMANCES: MIN.____ DES.____　　SEQUENCE: ____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____　　JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	1:00	2:00	2:00	2:00	2:00	5:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		1.3220	1.7620	1.7620	2.0988	2.0988	2.1136
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	CCU activates RPCM
2	CCU activates FCU
3	FCU checkout
4	FAU activation
5	FAU checkout
6	CCU configuration of TCS

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 5 of 19)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 2

FO NAME: Distributed Equipment

PREREQUISITE: FO-1

NO. OF PERFORMANCES: MIN._____ DES._____

SEQUENCE: _____

REQUIRED TIMEFRAME (MET): MIN._____ MAX._____

JOINT OPS WITH: _____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	:17	12:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1835	2.1336				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Checkout GDS components
8	Furnace specific tests

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 6 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NAME: Manual Sample Exchange
NO. OF PERFORMANCES: MIN.________ DES.________
REQUIRED TIMEFRAME (MET): MIN.____ MAX.______
FO NUMBER: 3
PREREQUISITE: FO-2
SEQUENCE: ________
JOINT OPS WITH: ________

STEP NUMBER			1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM							
	MAXIMUM							
	PREFERRED		1:00	32:00	10:00	10:00	7:00	20:00
STEP DELAY (HRS:MINS)	MINIMUM							
	MAXIMUM							
	PREFERRED							
CREW	NUMBER							
	PREFERRED		1		1	1	1	1
MICROGRAVITY (g's)								
VACUUM VENT								
CONSUMABLES								
AVERAGE POWER REQUIRED (kW)			2.1336	2.1487	2.1336	2.1336	2.1336	2.1336
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS							
	EXPERIMENT APPLICATIONS							
DATA	DOWNLINK DIGITAL (MBPS)							
	REAL-TIME (RT) OR DUMP (D)							
	COMMANDING							
	PES (P), ISE (I), MPAC (M), POIC (PC)							
	VIDEO STANDARD/NONSTANDARD NTSC							
	REAL-TIME/DUMP/STORE							
SPECIAL EQUIPMENT OR CONSTRAINTS								

STEP NO.	STEP DESCRIPTION
1	Command "Manual Sample Exchange" on
2	Vent/fill furnace module
3	Equalize furnace module pressure
4	Prep equipment
5	Open SIP
6	Insert samples

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 7 of 19)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 3

FO NAME: Manual Sample Exchange

PREREQUISITE: FO-2

NO. OF PERFORMANCES: MIN.______ DES.______

SEQUENCE: ______

REQUIRED TIMEFRAME (MET): MIN._____ MAX.______

JOINT OPS WITH: ______

STEP NUMBER			7	8	9	10	11	
STEP DURATION (MINS:SECS)	MINIMUM							
	MAXIMUM							
	PREFERRED		3:00	3:00	1:00	65:00	4:00	
STEP DELAY (HRS:MINS)	MINIMUM							
	MAXIMUM							
	PREFERRED							
CREW	NUMBER							
	PREFERRED		1	1	1	1	1	
MICROGRAVITY (g's)								
VACUUM VENT								
CONSUMABLES								
AVERAGE POWER REQUIRED (kW)			2.1336	2.1336	2.1336	2.1338	2.1336	
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS							
	EXPERIMENT APPLICATIONS							
DATA	DOWNLINK DIGITAL (MBPS)							
	REAL-TIME (RT) OR DUMP (D)							
	COMMANDING							
	PES (P), ISE (I), MPAC (M), POIC (PC)							
	VIDEO STANDARD/NONSTANDARD NTSC							
	REAL-TIME/DUMP/STORE							
SPECIAL EQUIPMENT OR CONSTRAINTS								

STEP NO.	STEP DESCRIPTION
7	Close SIP
8	Open valves
9	Command "Manual Sample Exchange" off
10	Perform seal check
11	Load list process

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 8 of 19)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 4

FO NAME: Purge Furnace Module

PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN.____ DES.____

SEQUENCE: ____

REQUIRED TIMEFRAME (MET): MIN.____ MAX.____

JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	32:00	10:00	2:00	2:00		
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1487	2.1487	2.1336	2.1639		
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	GN2 purge furnace
2	Argon backfill
3	Command sample process
4	TCS configured

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 9 of 19)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 5

FO NAME: Vapor Crystal Growth of HgCdTe

PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN._____ DES._____

SEQUENCE: _____

REQUIRED TIMEFRAME (MET): MIN._____ MAX._____

JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	188:00	60:00	480:00	240:00	21:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	3.2496	2.5996	2.5996	2.2536	2.536
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Activate and process heat cycle
3	Anneal sample
4	Initiate vapor crystal growth processing
5	Cool sample and extract
6	Cool and stow

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 10 of 19)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 6

FO NAME: Meltback and Regrowth of HgZnTe

PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN.______ DES.______

SEQUENCE: ______

REQUIRED TIMEFRAME (MET): MIN.____ MAX.______

JOINT OPS WITH: ______

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	340:00	120:00	125:00	600:00	7390:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	2.7316	2.6496	2.6496	2.6496	2.6496
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Process heat cycle
3	Initial soak
4	Translation to growth position
5	Final soak
6	Directional solidification

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 11 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 6
FO NAME: Meltback & Regrowth of HgZnTe
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN._____ DES._____
SEQUENCE: _____
REQUIRED TIMEFRAME (MET): MIN._____ MAX._____
JOINT OPS WITH: _____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	372:00	115:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.3246	2.1946				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool sample
8	Stow sample

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 12 of 19)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 6A

FO NAME: Meltback and Regrowth of HgZnTe (Extended)

PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN.____ DES.____

SEQUENCE: ____

REQUIRED TIMEFRAME (MET): MIN.____ MAX.____

JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	340:00	120:00	125:00	600:00	59957:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	2.7316	2.6496	2.6496	2.6496	2.6496
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Process heat cycle
3	Initial soak
4	Translation to growth position
5	Final soak
6	Directional solidification

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 13 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 6A
FO NAME: Meltback and Regrowth of HgZnTe (Extended)
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN.____ DES.____
SEQUENCE: ____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____
JOINT OPS WITH: ____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	372:00	115:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.3246	2.1946				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool sample
8	Internally stow sample

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 14 of 19)

EXPERMENT NAME: Space Station Furnace Facility FO NUMBER: 7
FO NAME: Growth of CdTe by Directional Solidification PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN.____ DES.____ SEQUENCE: ____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____ JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	538:00	120:00	4278:00	438:00	208:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	3.4786	3.3746	3.2996	2.7244	2.3746
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace module for processing
2	Process heat cycle
3	Soak
4	Process sample, directional solidification
5	Cool sample to 400 °C
6	Cool sample to 200 °C and internally stow sample

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 15 of 19)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 8

FO NAME: Growth of GaAs by Directional Solidification

PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN._____ DES._____

SEQUENCE: _____

REQUIRED TIMEFRAME (MET): MIN._____ MAX._____

JOINT OPS WITH: _____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	45:00	227:00	68:00	720:00	210:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536	2.9916	4.4866	3.4776	3.3926	2.8016
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace module processing
2	Preheat cycle
3	Process heat cycle
4	Soak
5	Translate furnace/process sample
6	Cool down to 800 °C

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 16 of 19)

EXPERMENT NAME: Space Station Furnce Facility
FO NUMBER: 8
FO NAME: Growth of GaAs by Directional Solidification
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN.____ DES.____
SEQUENCE: ____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____
JOINT OPS WITH: ____

STEP NUMBER		7					
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	466:00					
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.2536					
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool down to 200 °C and internally stow

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 17 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 9
FO NAME: Configure Furnace for Shutdown/Sample Loading
PREREQUISITE:
NO. OF PERFORMANCES: MIN.______ DES.______
SEQUENCE:
REQUIRED TIMEFRAME (MET): MIN.____ MAX.______
JOINT OPS WITH:

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	5:00	1:00			
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1336	2.1336	2.1336			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Verify furnace is in home position
2	Furnace specific tests
3	CCU secures power from furnace module

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 18 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 10
FO NAME: SSFF Shutdown
PREREQUISITE: FO-9
NO. OF PERFORMANCES: MIN.____ DES.____
SEQUENCE: ____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____
JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	3:00	5:00	1:00	1:00	1:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		1.1479	1.1479	1.1479	0.5612	0.3102	0.00
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Distributed Core Eq. shutdown
2	Verify experiment/furnace shutdown
3	GDS shutdown
4	DMS nonessential shutdown
5	TCS shutdown
6	CCU shutdown

TABLE 1.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 19 of 19)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 11
FO NAME: Furnace Calibration/Bakeout
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN.______ DES.______
SEQUENCE: ______
REQUIRED TIMEFRAME (MET): MIN.____ MAX.______
JOINT OPS WITH: ______

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	1:00	TBD	480:00			
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1336	TBD	TBD			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REAL-TIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POIC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate calibration/bakeout
2	Initiate calibration
3	Bakeout/calibration process

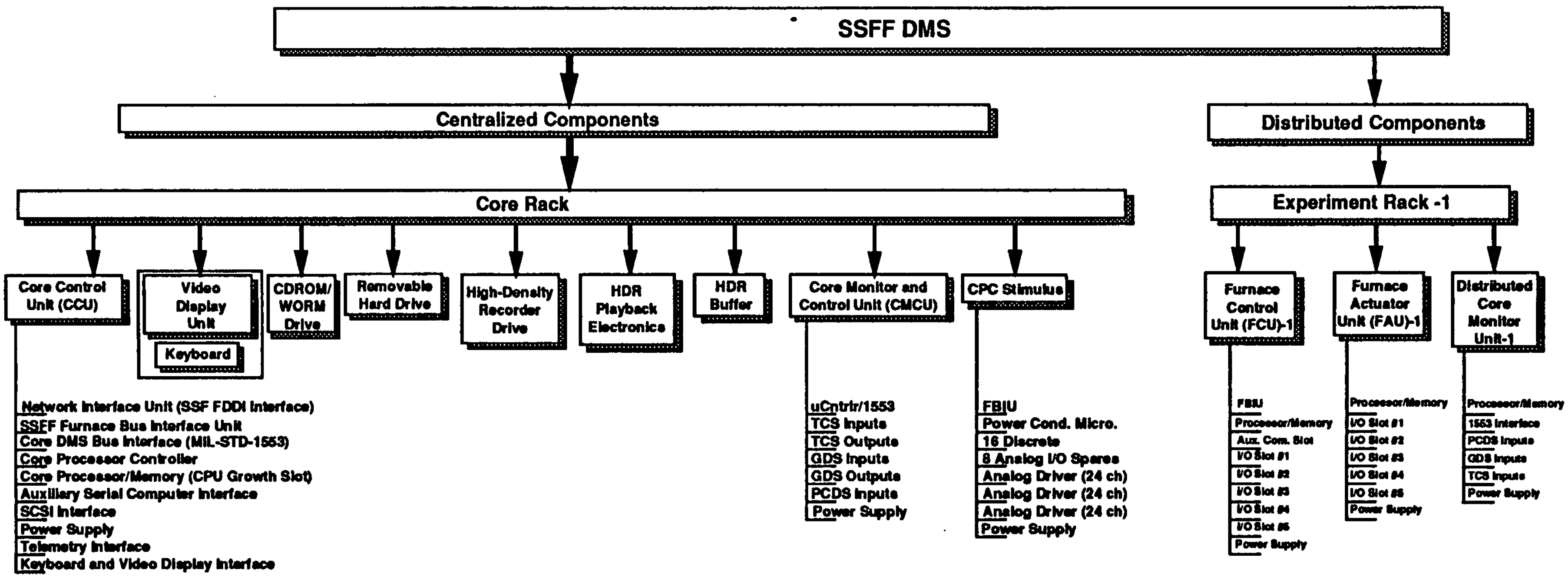


FIGURE 1.1-2. DMS COMPONENT TREE

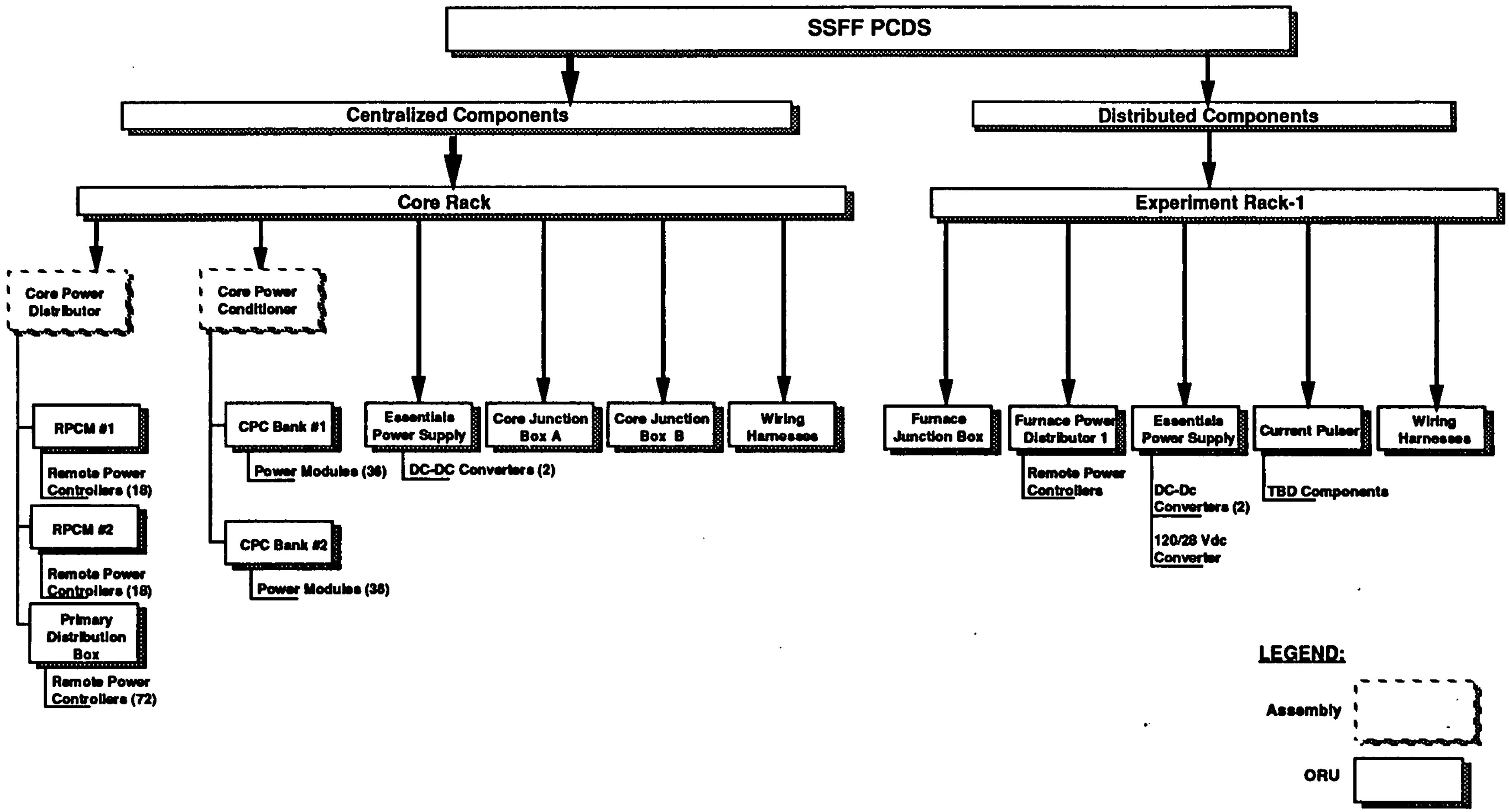
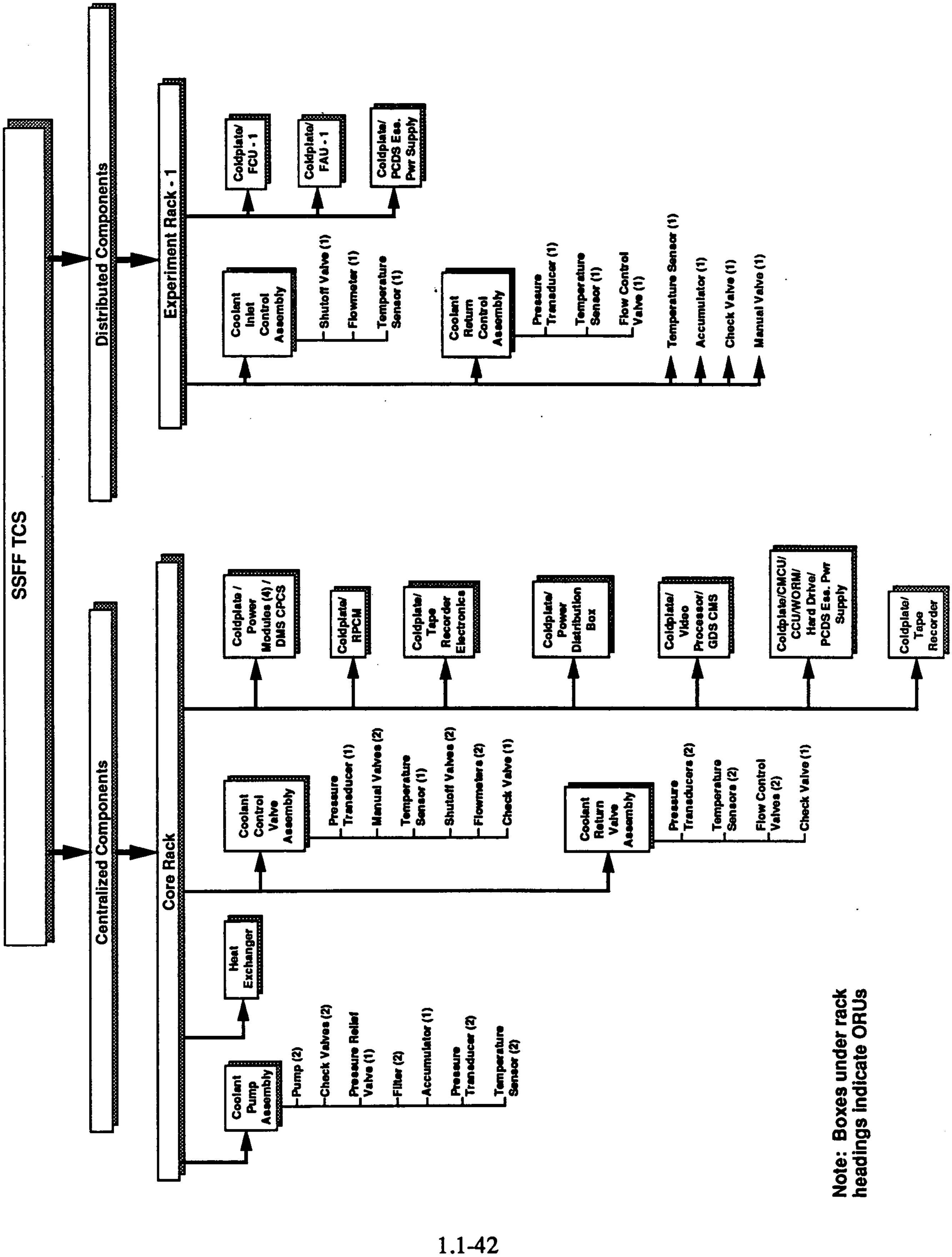


FIGURE 1.1-3. PCDS COMPONENT TREE



Note: Boxes under rack headings indicate ORUs

FIGURE 1.1-4. TCS COMPONENT TREE

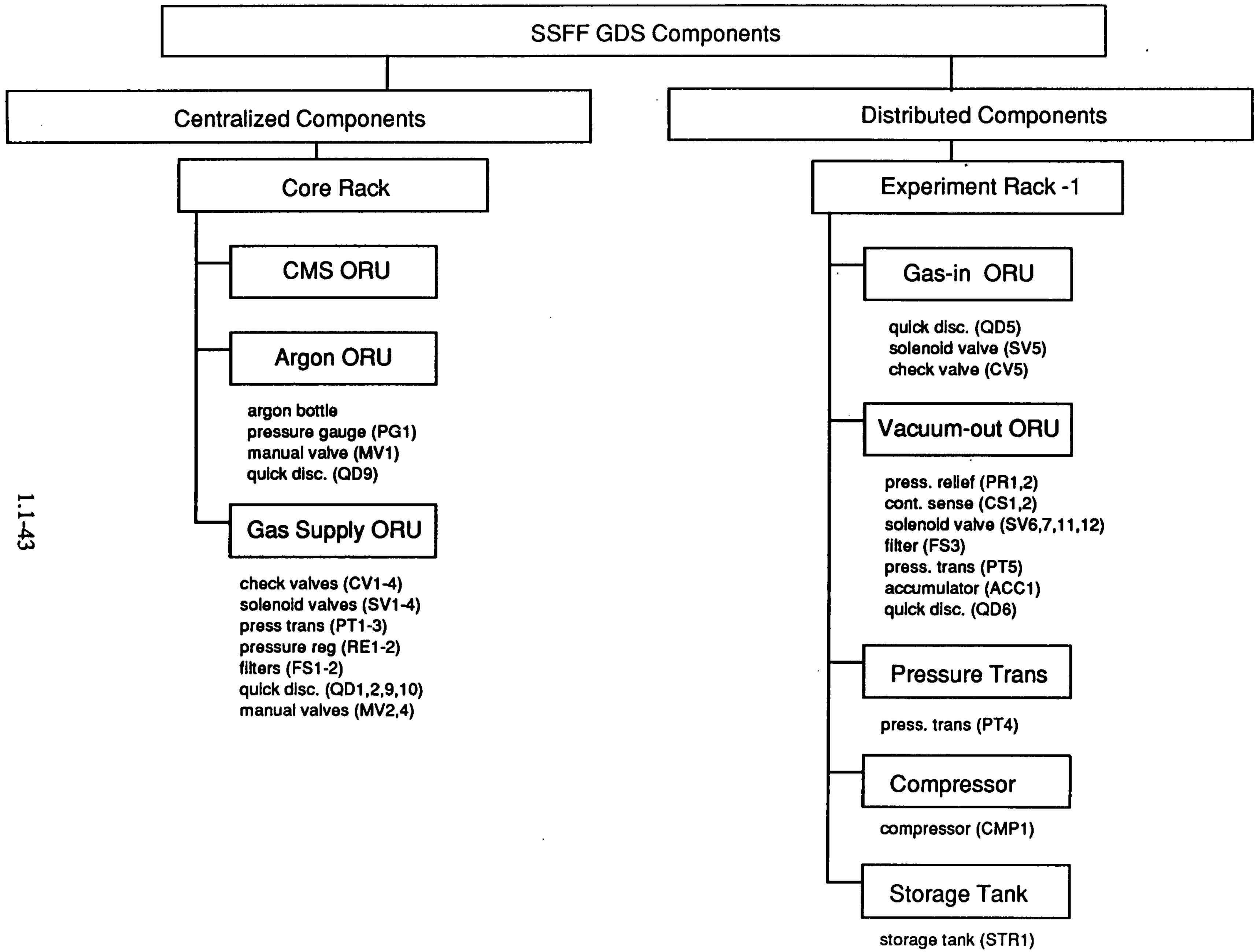


FIGURE 1.1-5. GDS COMPONENT TREE

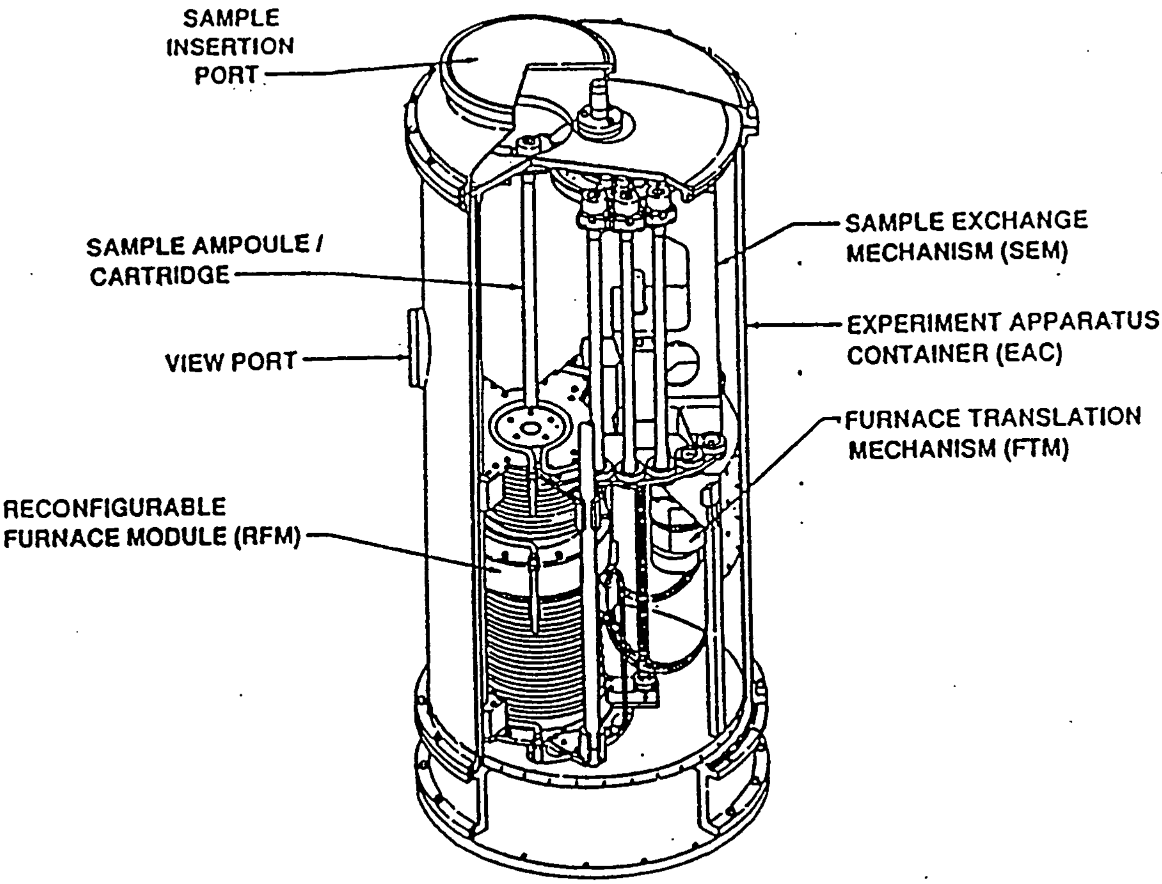
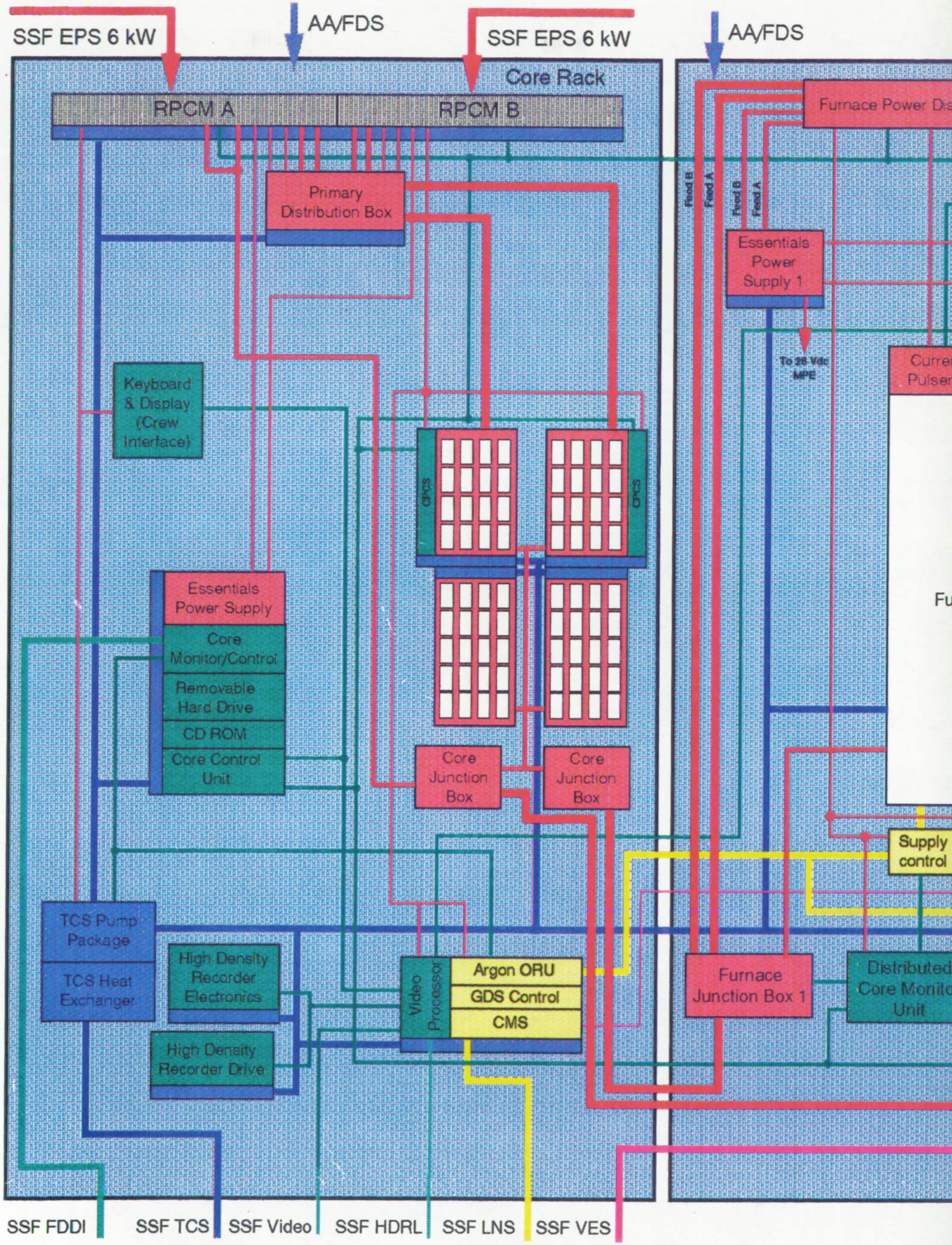


FIGURE 1.1-6. FURNACE MODULE-1 EQUIPMENT PICTORIAL REPRESENTATION

1.

FOLDOUT FRAME

FIGURE 1.1-7.



p45.

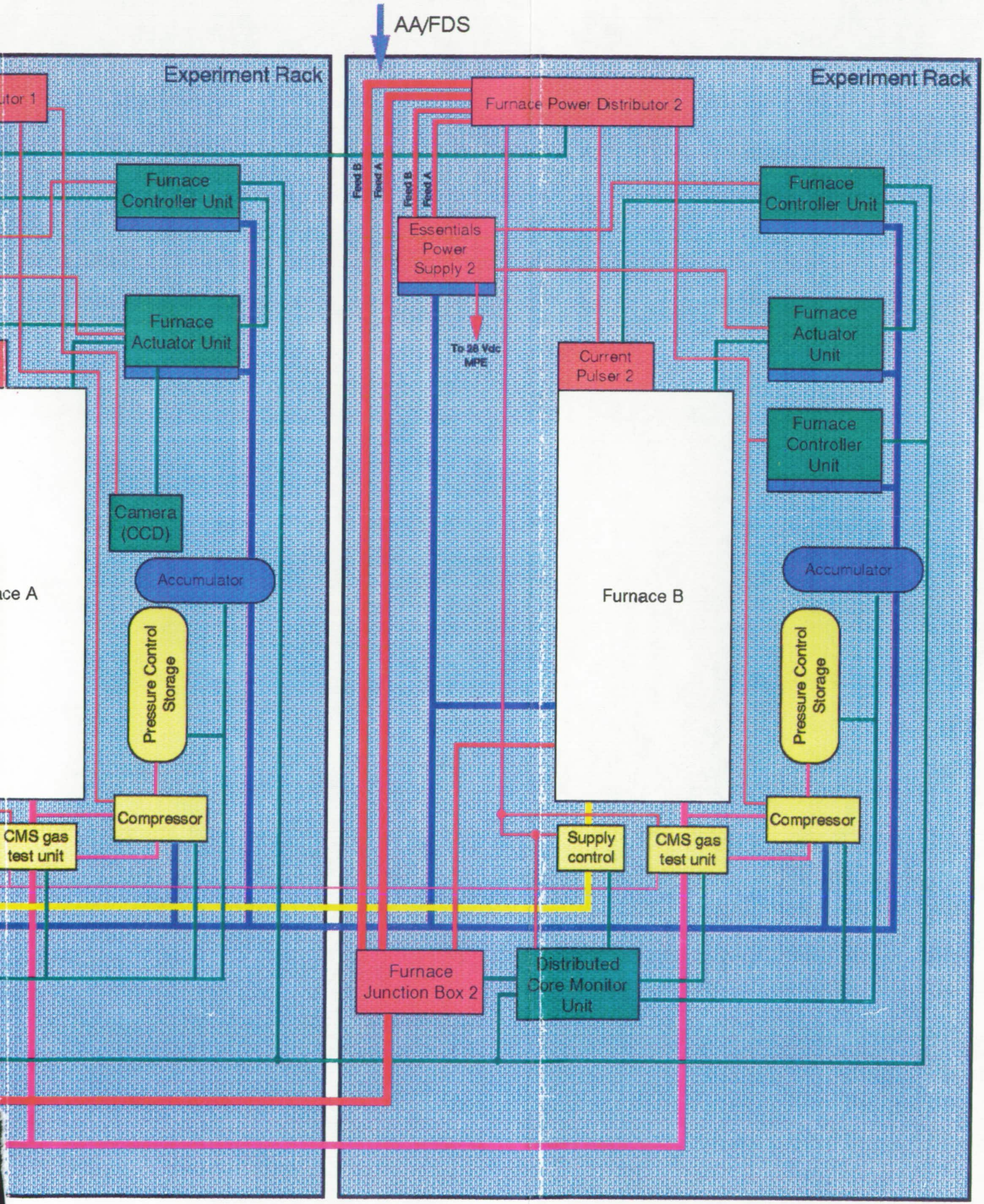

AA/FDS
Experiment Rack
Furnace Controller Unit
Furnace Actuator Unit
Camera (CCD)
Accumulator
Pressure Control Storage
Compressor
CMS gas test unit
Experiment Rack
Furnace Power Distributor 2
Feed B
Feed A
Feed B
Feed A
Essentials Power Supply 2
To 28 Vdc MPE
Current Pulser 2
Furnace Controller Unit
Furnace Actuator Unit
Furnace Controller Unit
Furnace B
Accumulator
Pressure Control Storage
Supply control
CMS gas test unit
Compressor
Furnace Junction Box 2
Distributed Core Monitor Unit

TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 1 of 19)

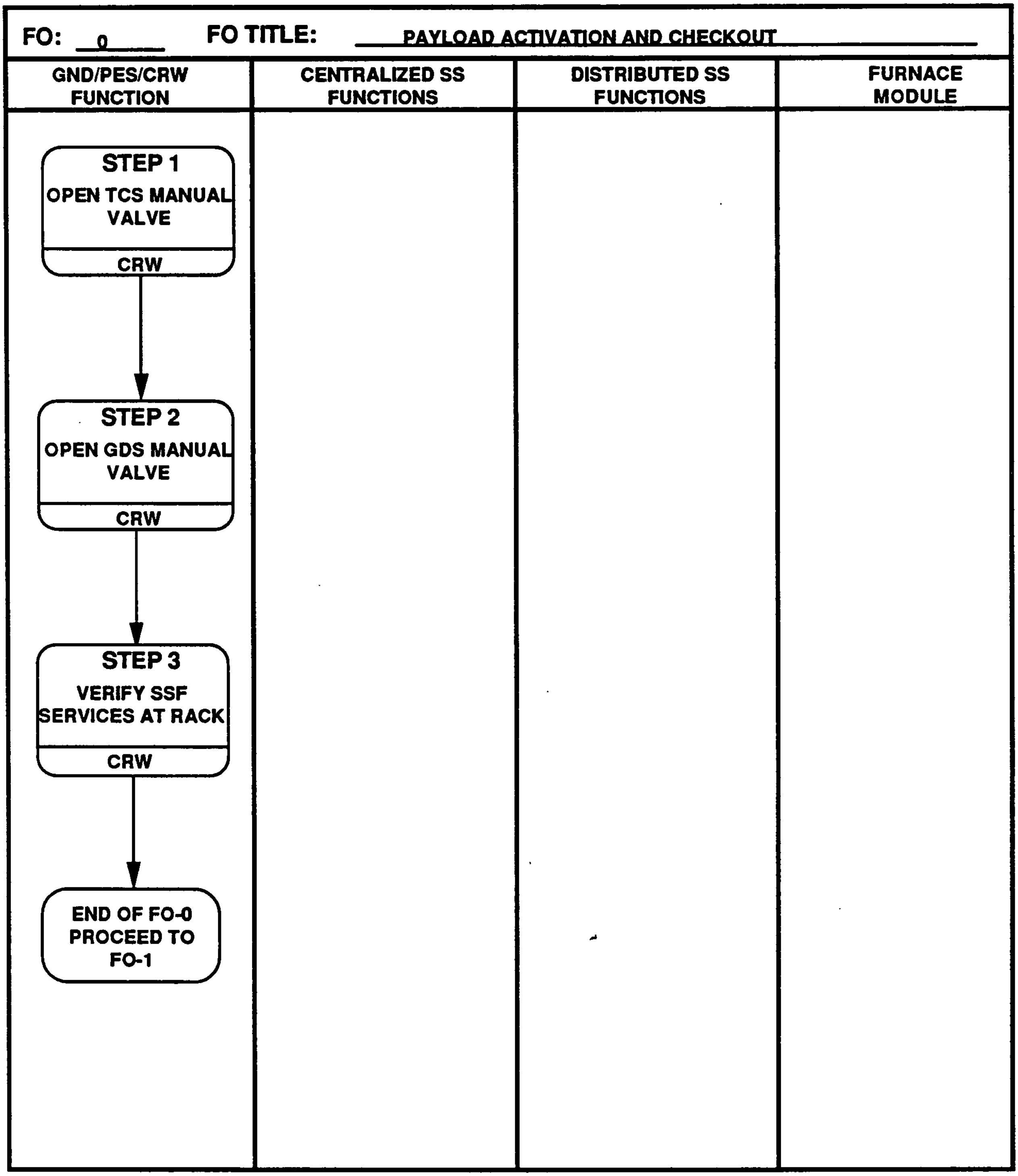


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 2 of 19)

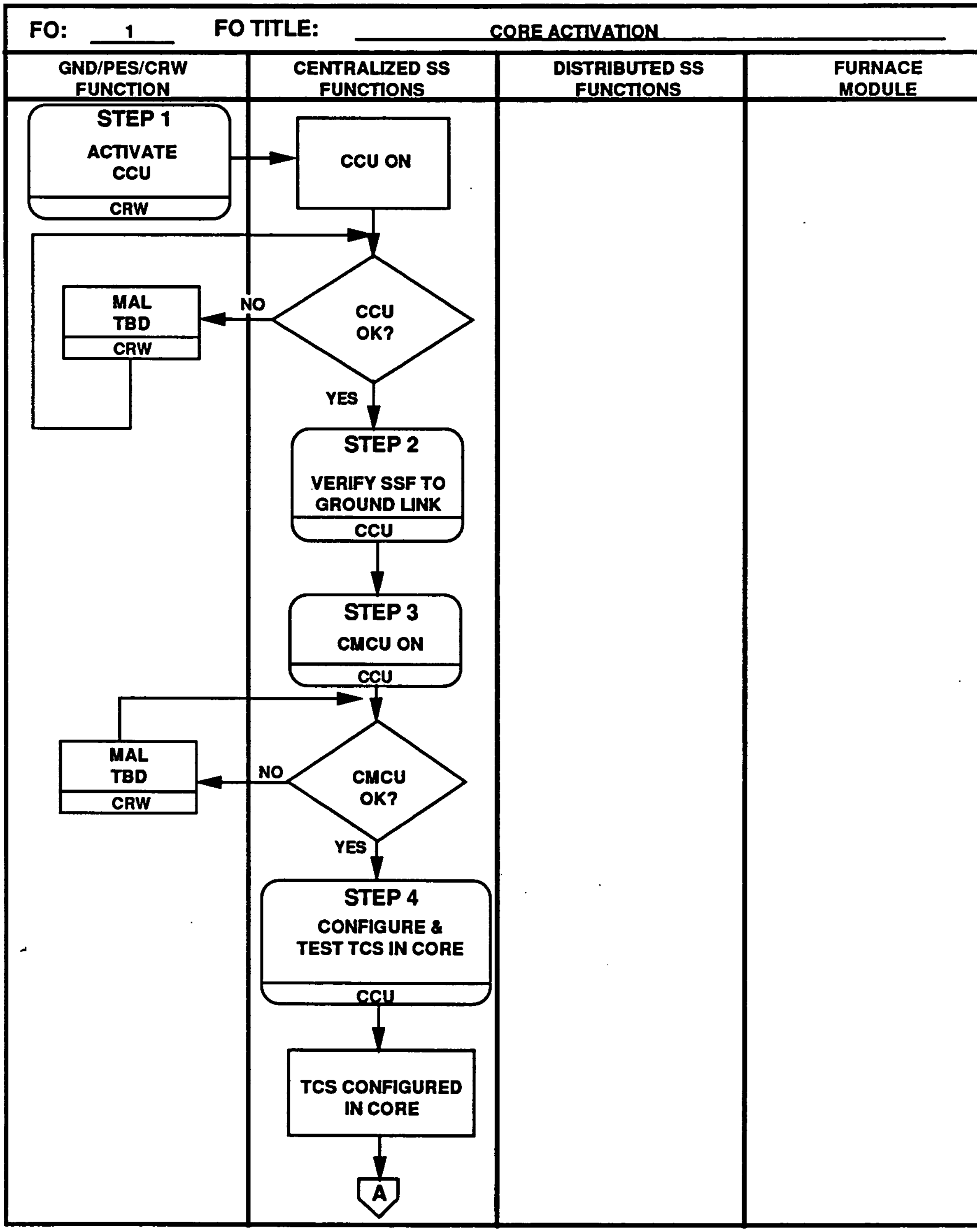


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 3 of 19)

FO: 1 FO TITLE: CORE ACTIVATION

GND/PES/CRW FUNCTION	CENTRALIZED SS FUNCTIONS	DISTRIBUTED SS FUNCTIONS	FURNACE MODULE

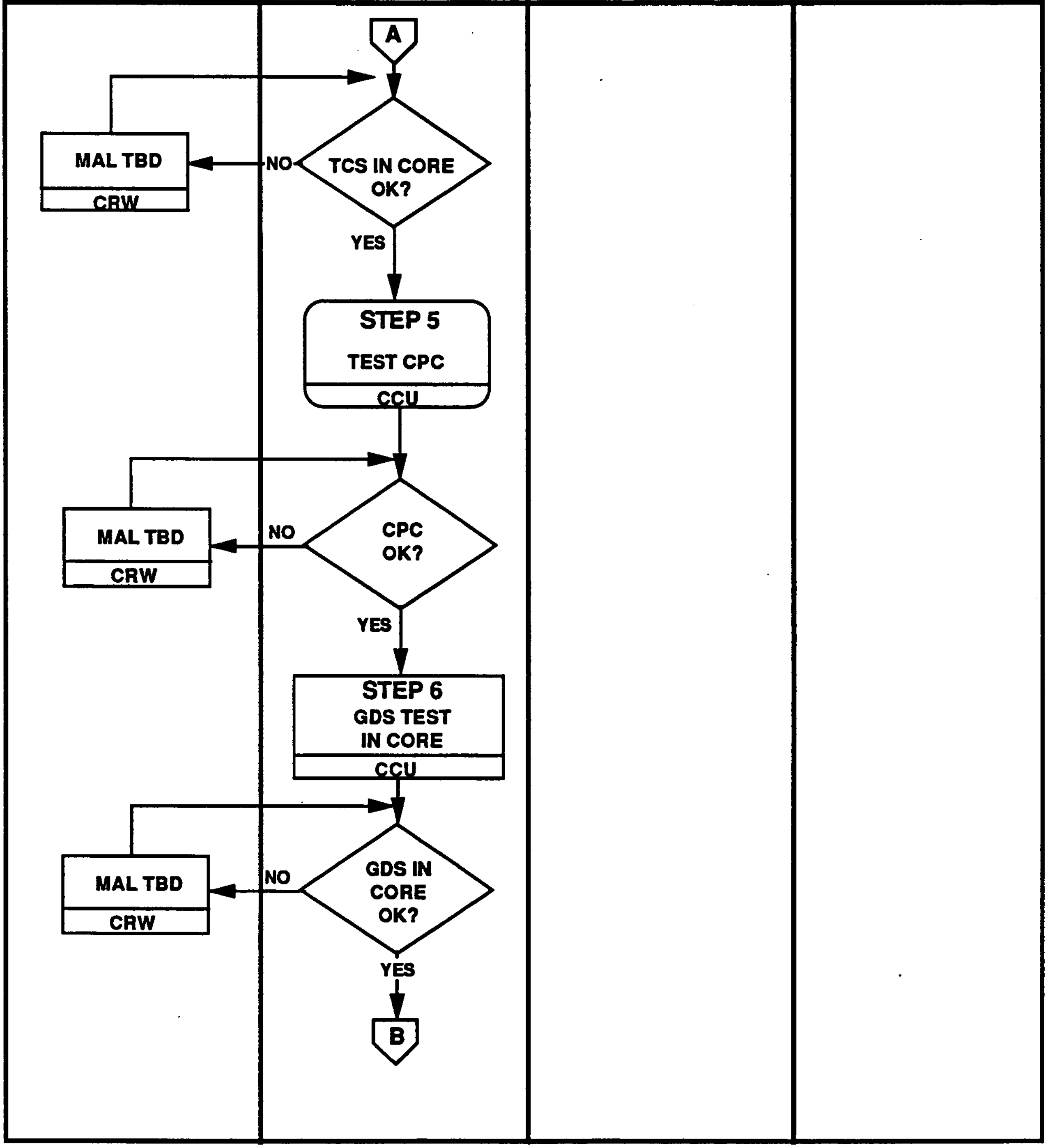


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 4 of 19)

FO: 1 FO TITLE: CORE ACTIVATION

GND/PES/CRW FUNCTION	CENTRALIZED SS FUNCTIONS	DISTRIBUTED SS FUNCTIONS	FURNACE MODULE

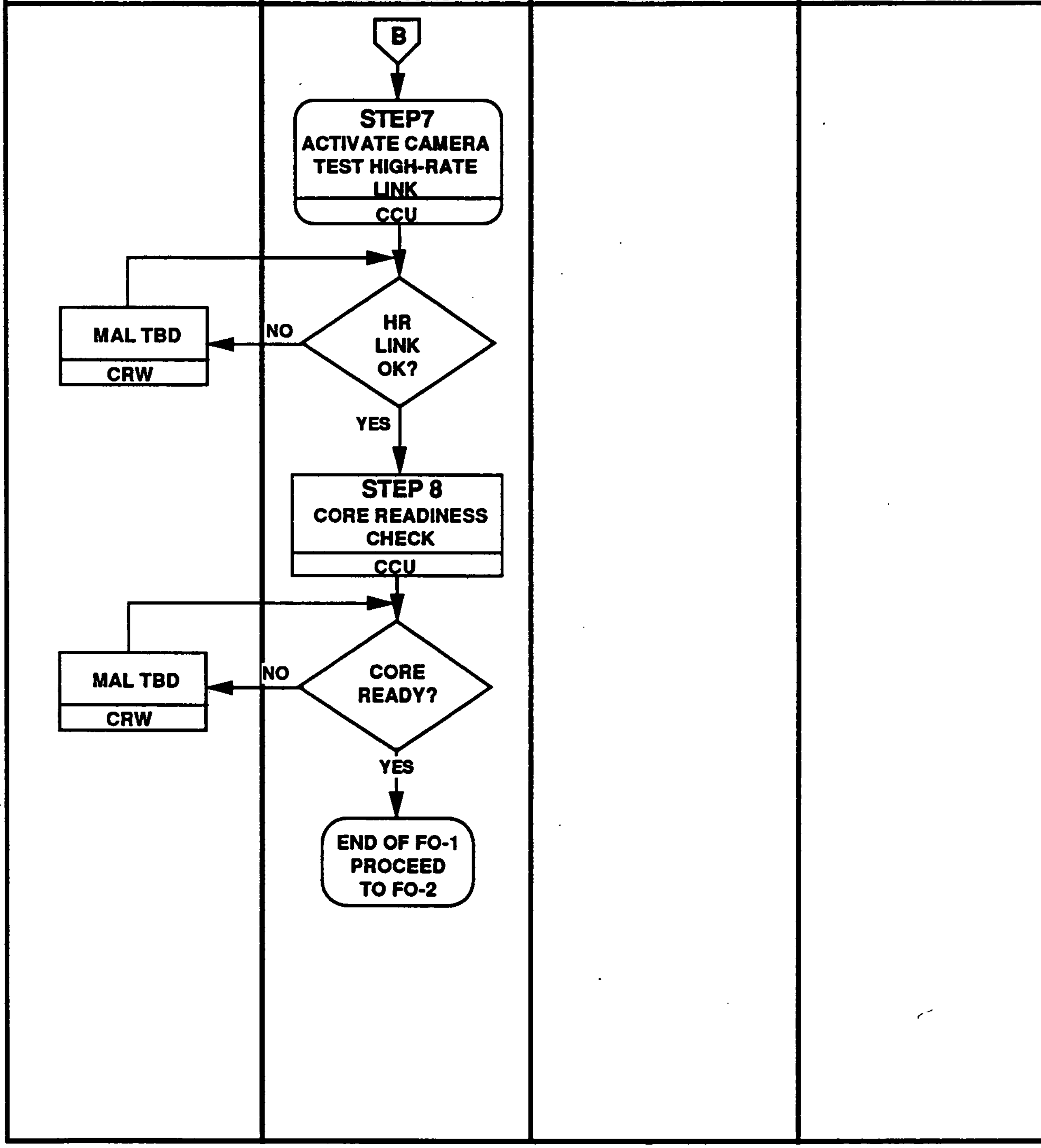


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 5 of 19)

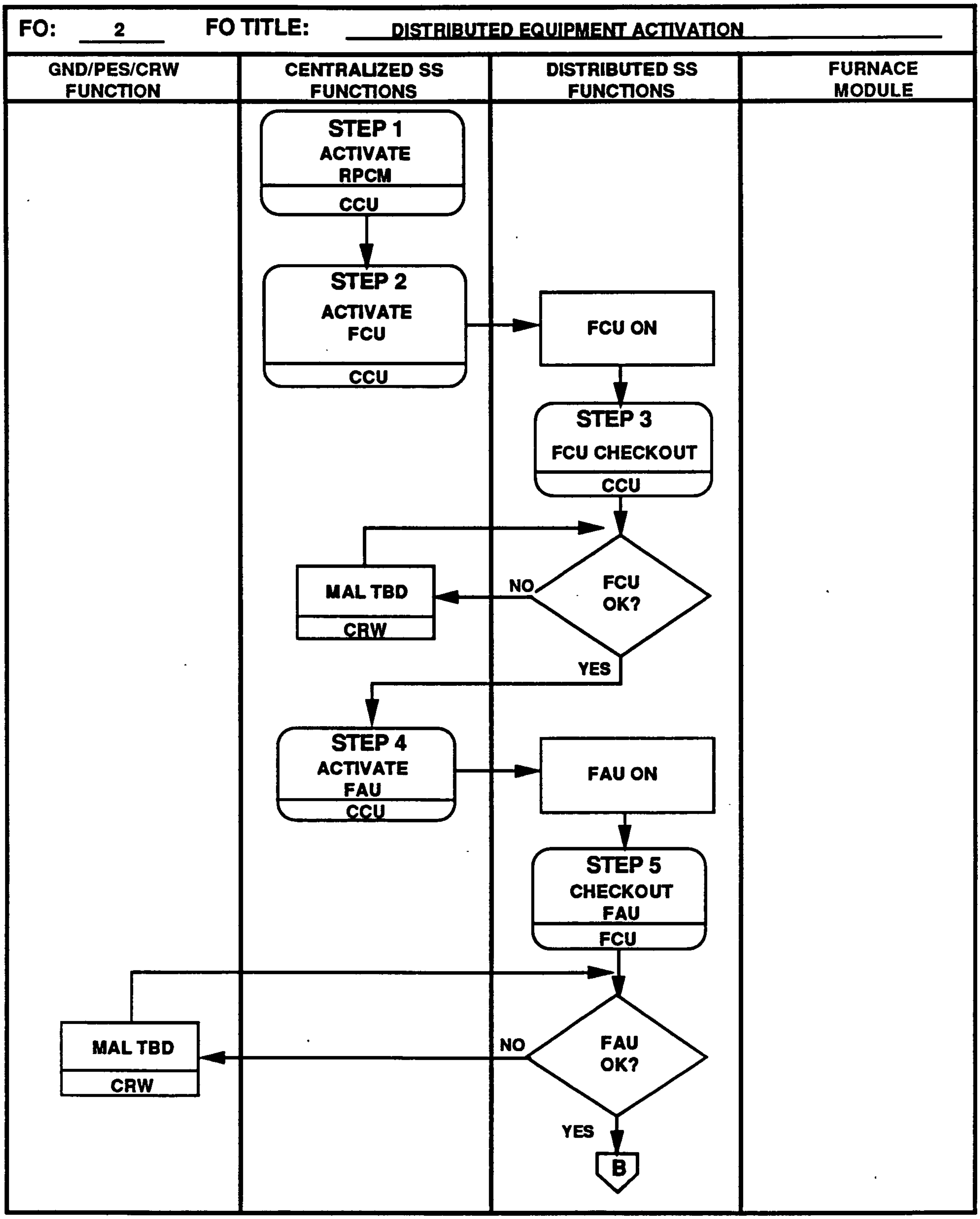


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 6 of 19)

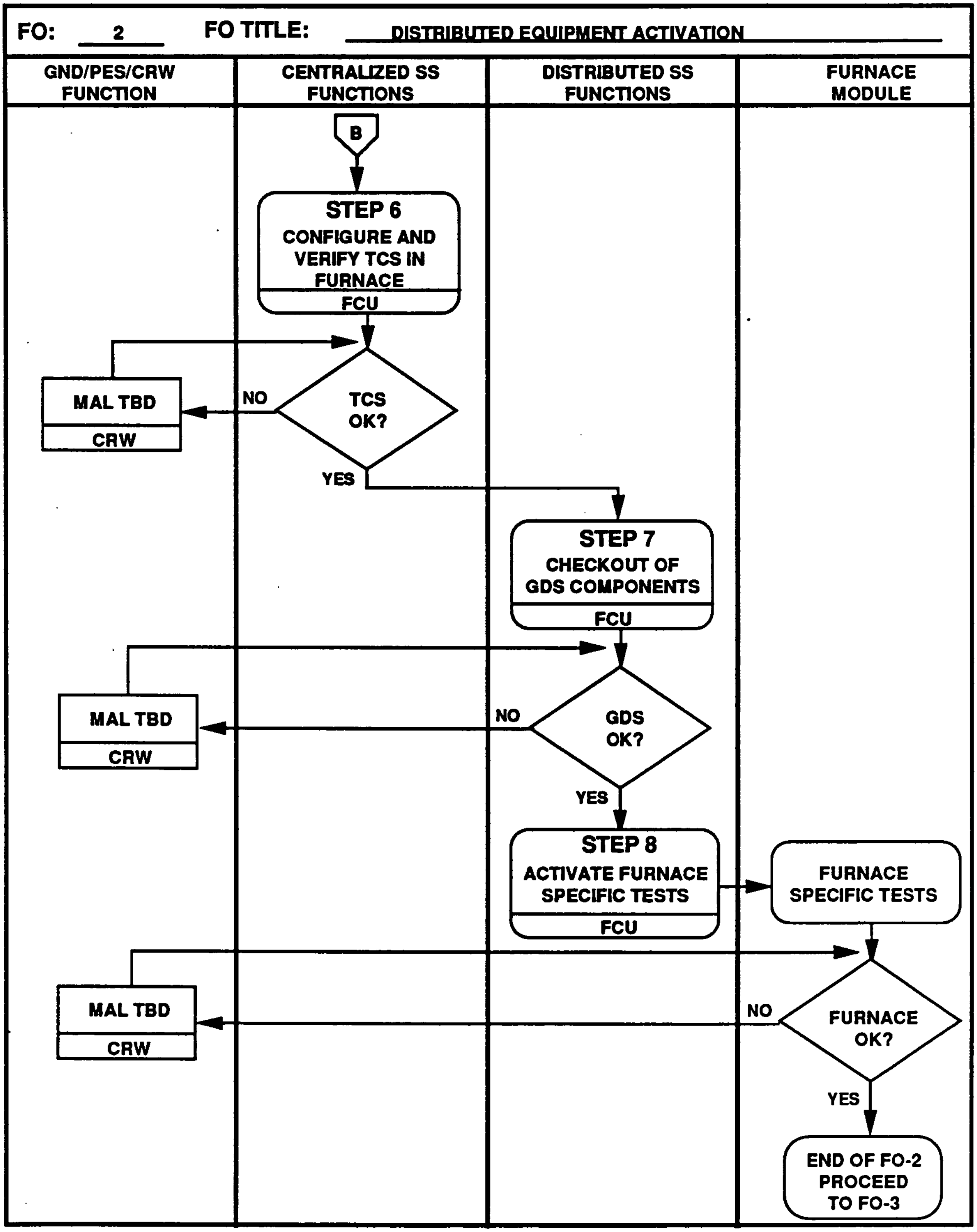


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 7 of 19)

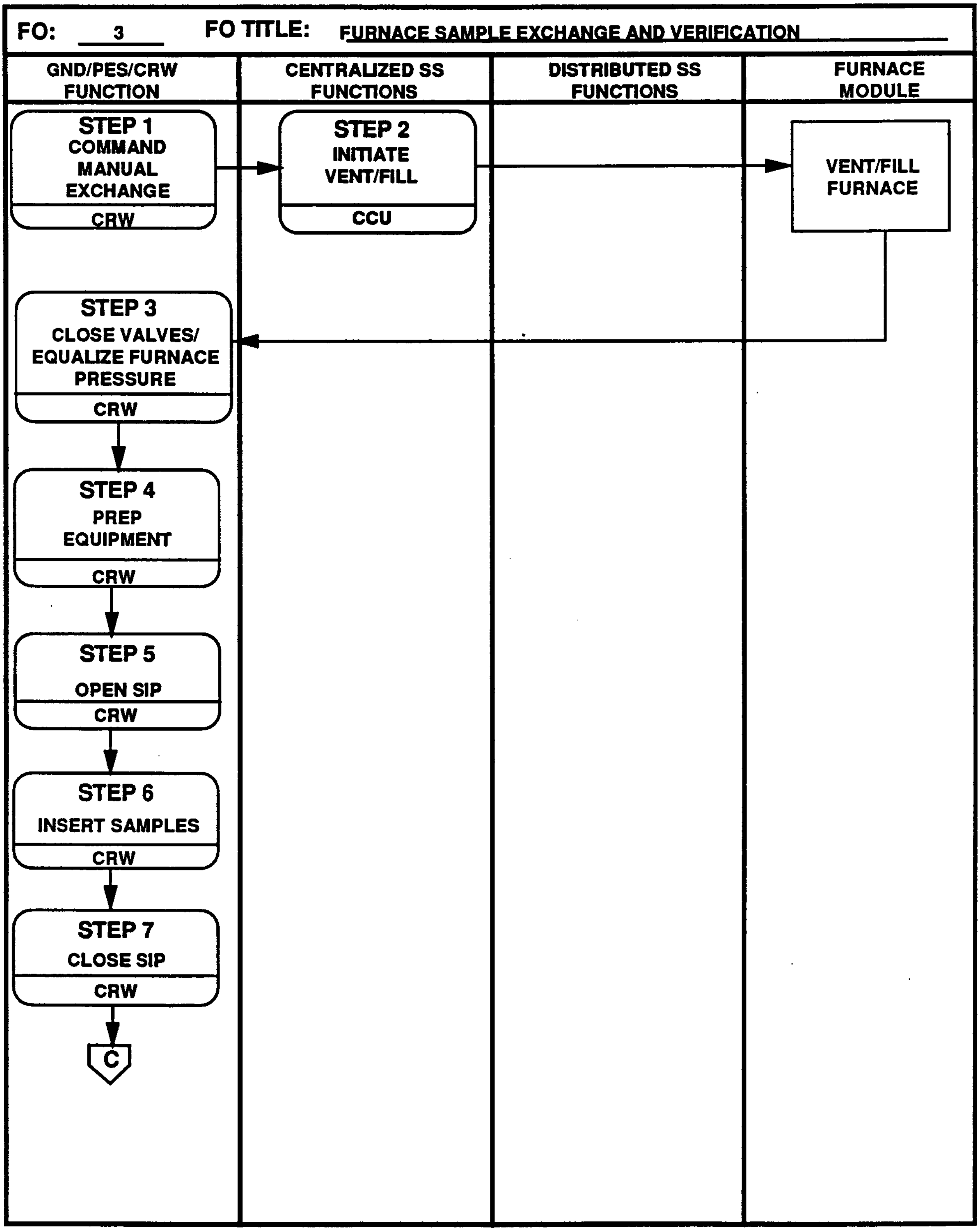


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 8 of 19)

FO: 3 FO TITLE: FURNACE SAMPLE EXCHANGE AND VERIFICATION

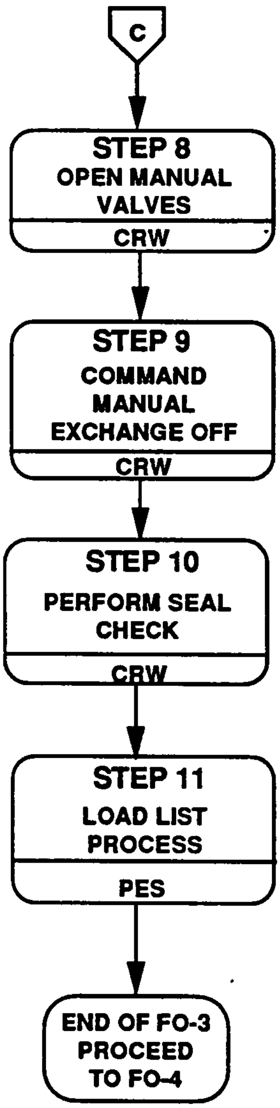
GND/PES/CRW FUNCTION	CENTRALIZED SS FUNCTIONS	DISTRIBUTED SS FUNCTIONS	FURNACE MODULE
			

TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 9 of 19)

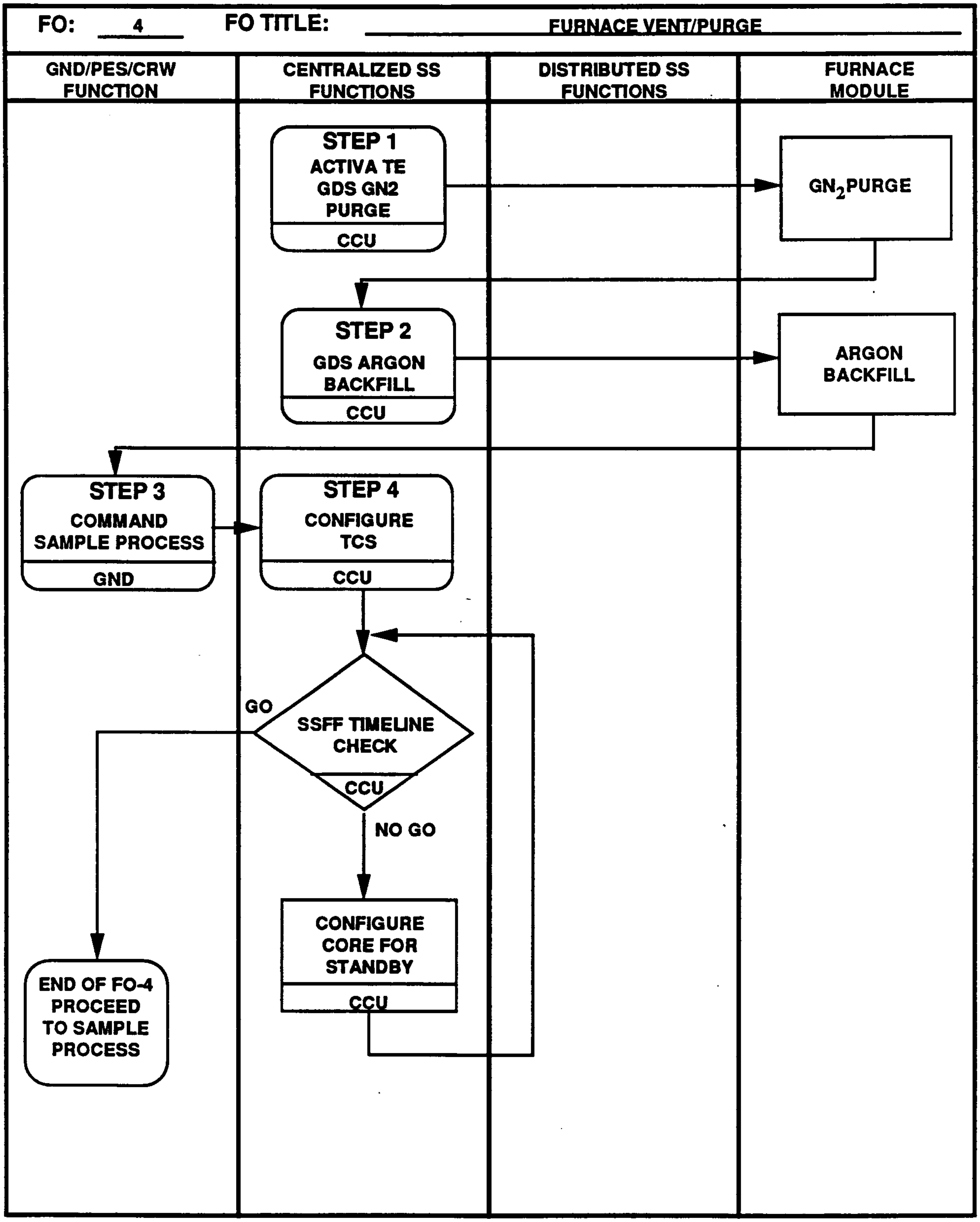


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 10 of 19)

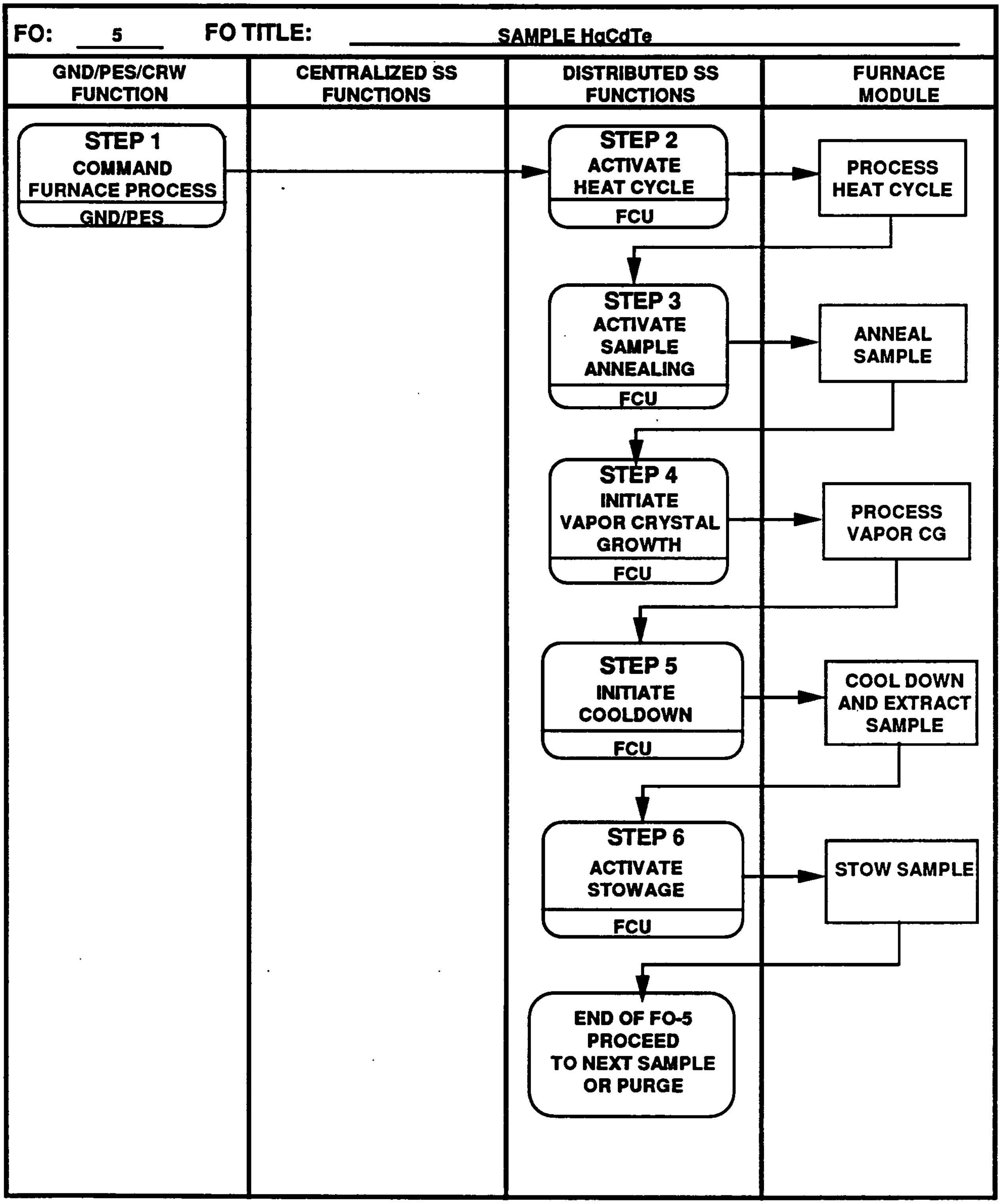


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 11 of 19)

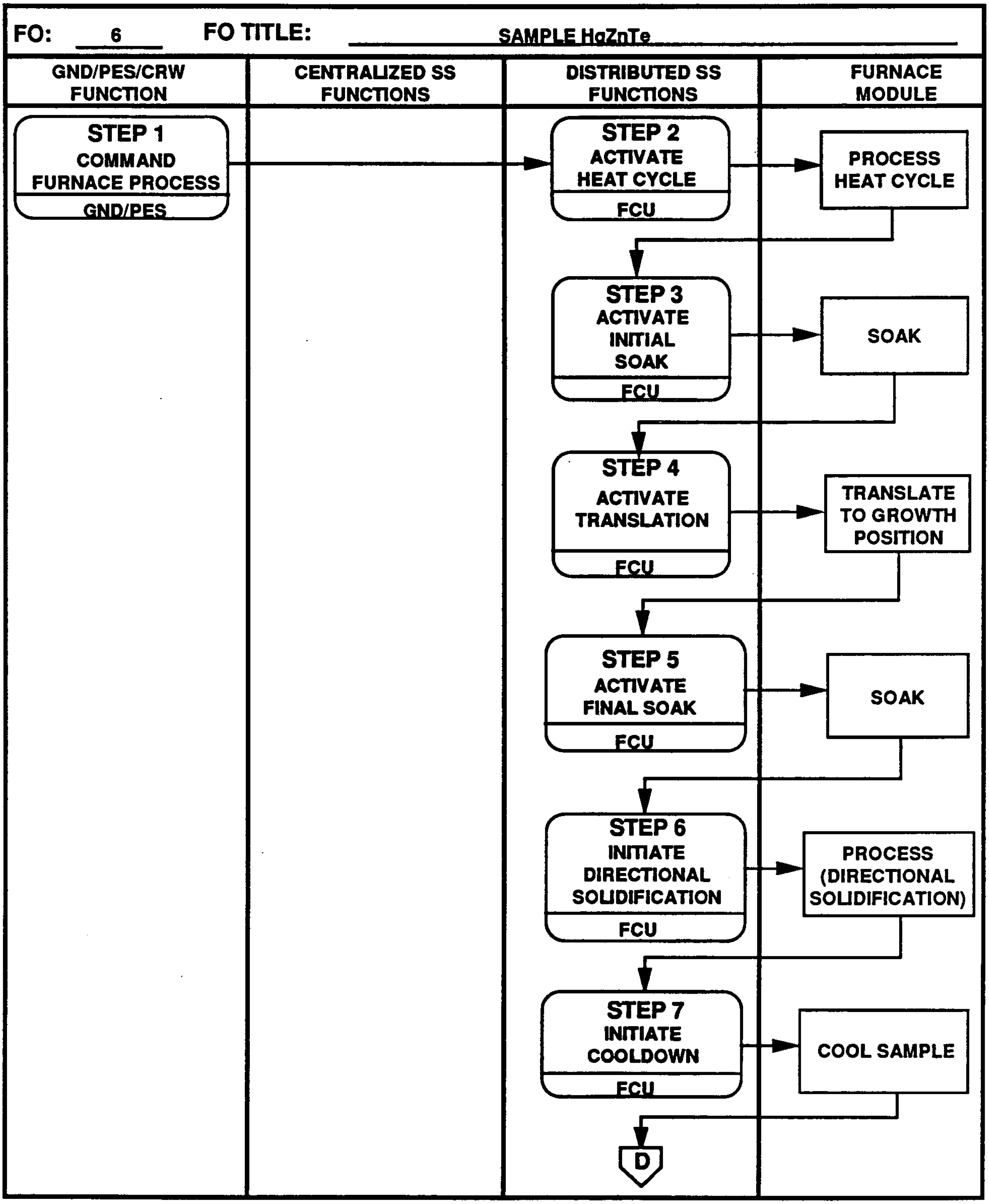


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 12 of 19)

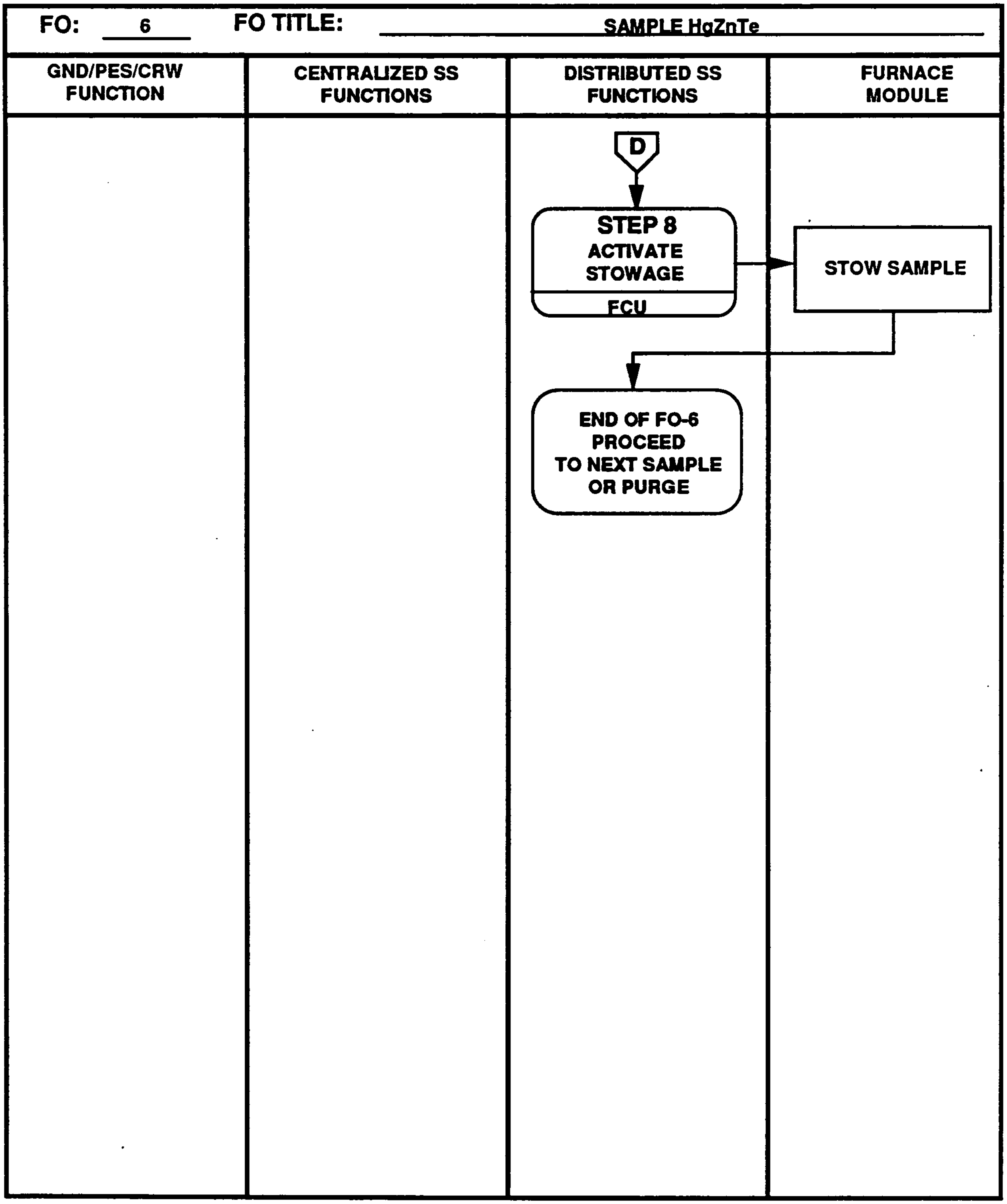


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 13 of 19)

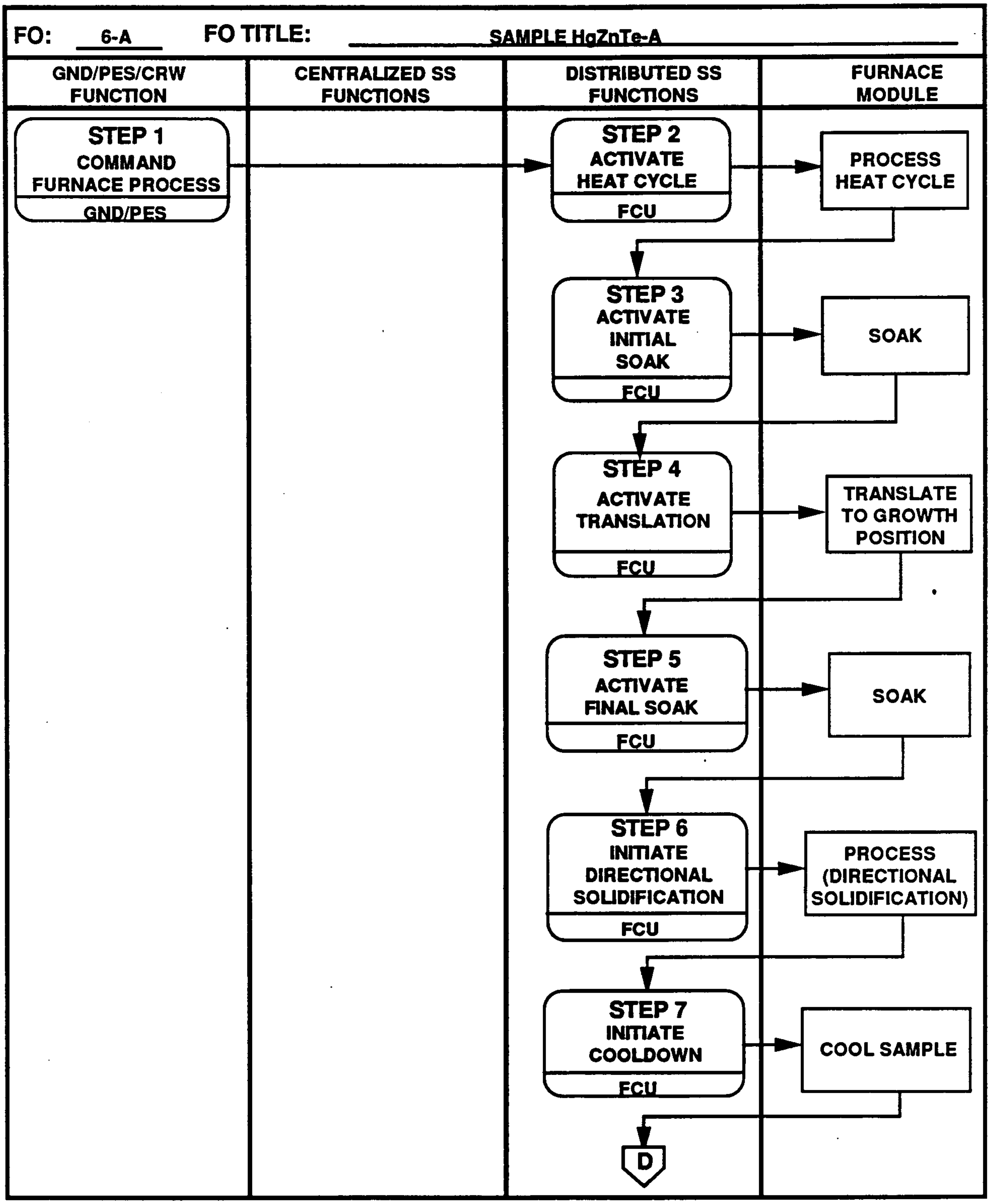


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 14 of 19)

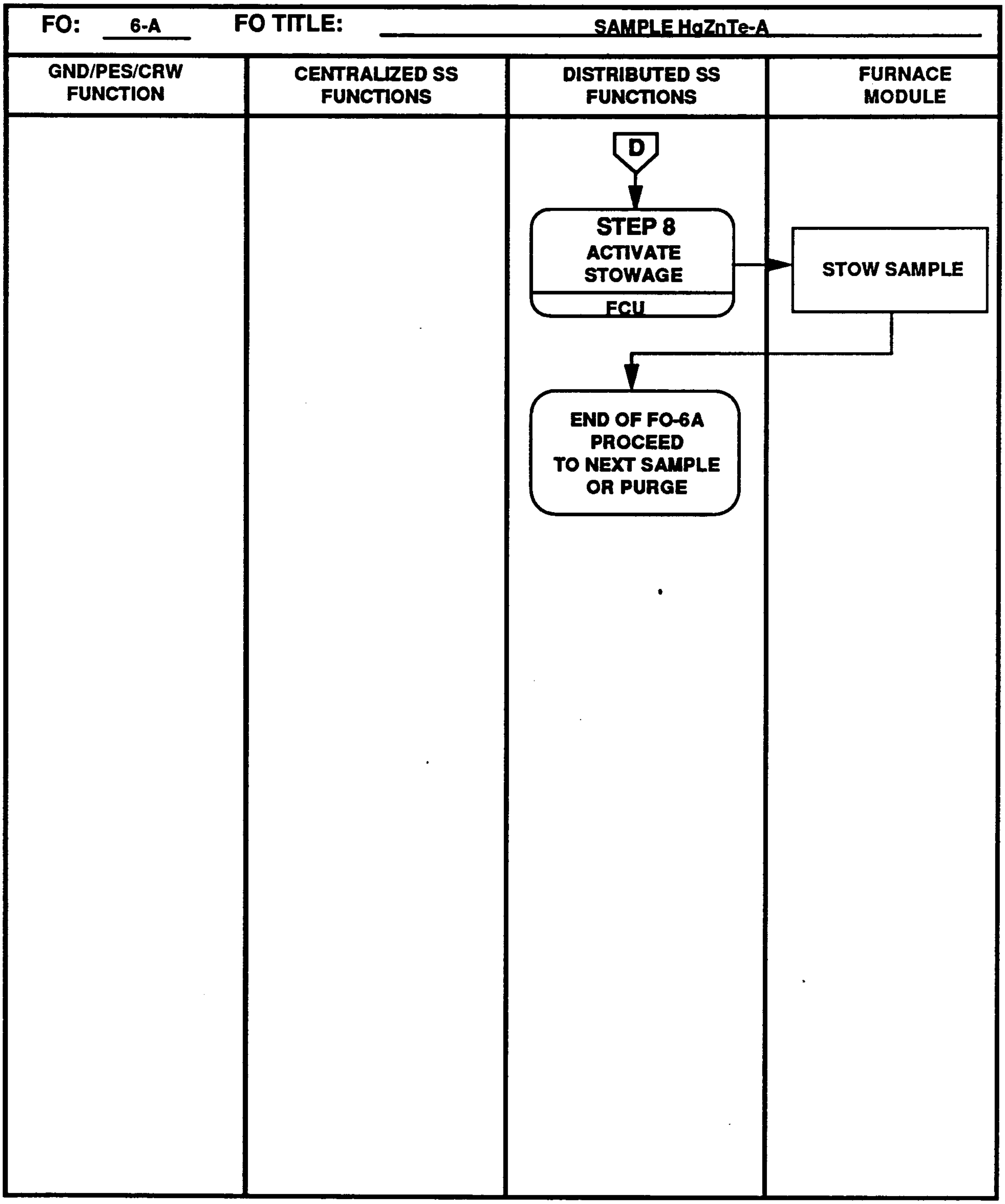


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 15 of 19)

FO: 7 **FO TITLE:** SAMPLE CdTe

GND/PES/CRW FUNCTION	CENTRALIZED SS FUNCTIONS	DISTRIBUTED SS FUNCTIONS	FURNACE MODULE
STEP 1 COMMAND FURNACE PROCESS — GND/PES		**STEP 2** ACTIVATE HEAT CYCLE — FCU	PROCESS HEAT CYCLE
		STEP 3 INITIATE SOAK — FCU	SOAK
		STEP 4 INITIATE DIRECTIONAL SOLIDIFICATION — FCU	PROCESS (DIRECTIONAL SOLIDIFICATION)
		STEP 5 INITIATE COOLDOWN — FCU	COOL SAMPLE
		STEP 6 ACTIVATE STOWAGE — FCU	STOW SAMPLE
		END OF FO-7 PROCEED TO NEXT SAMPLE OR PURGE	

TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 16 of 19)

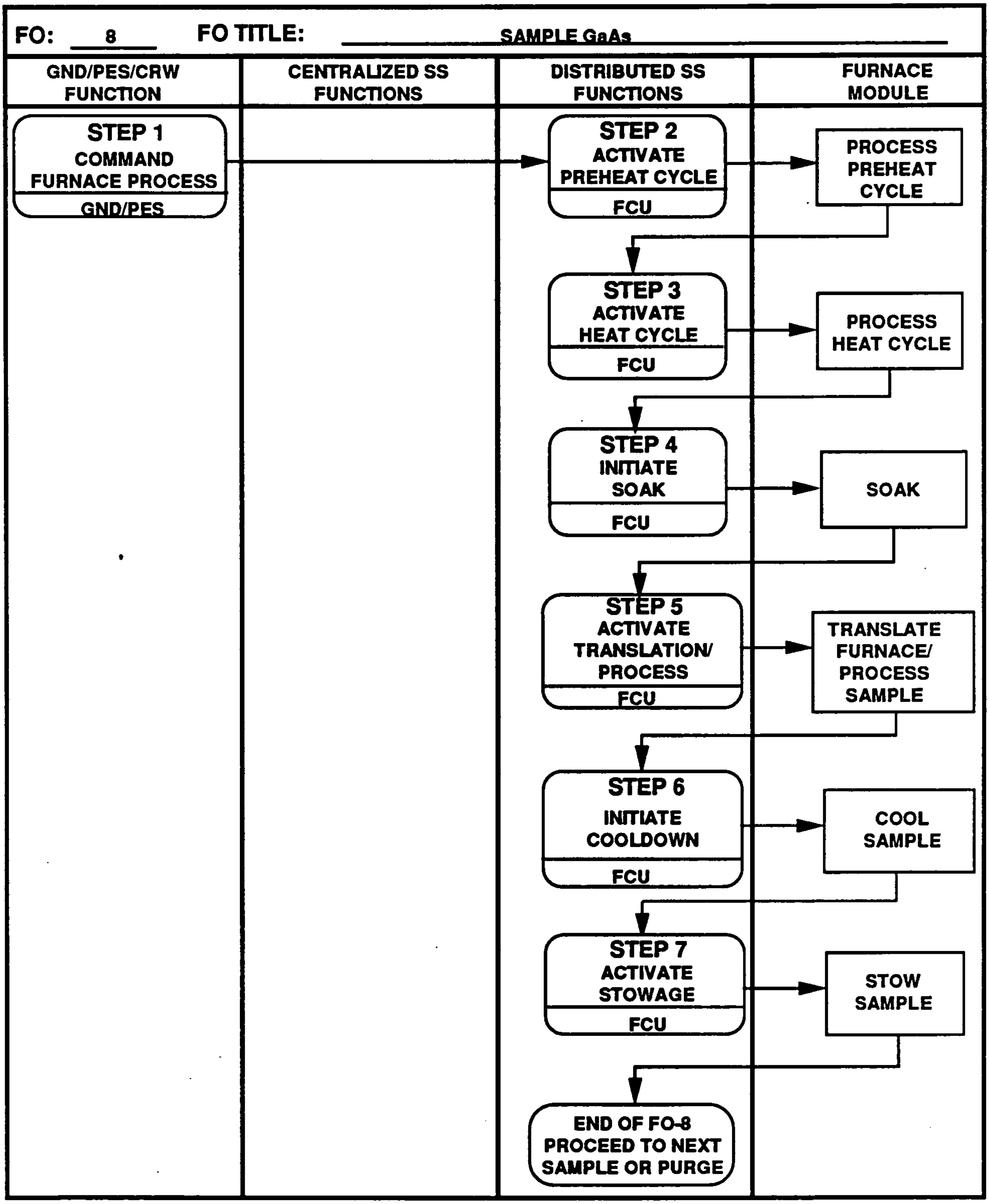


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 17 of 19)

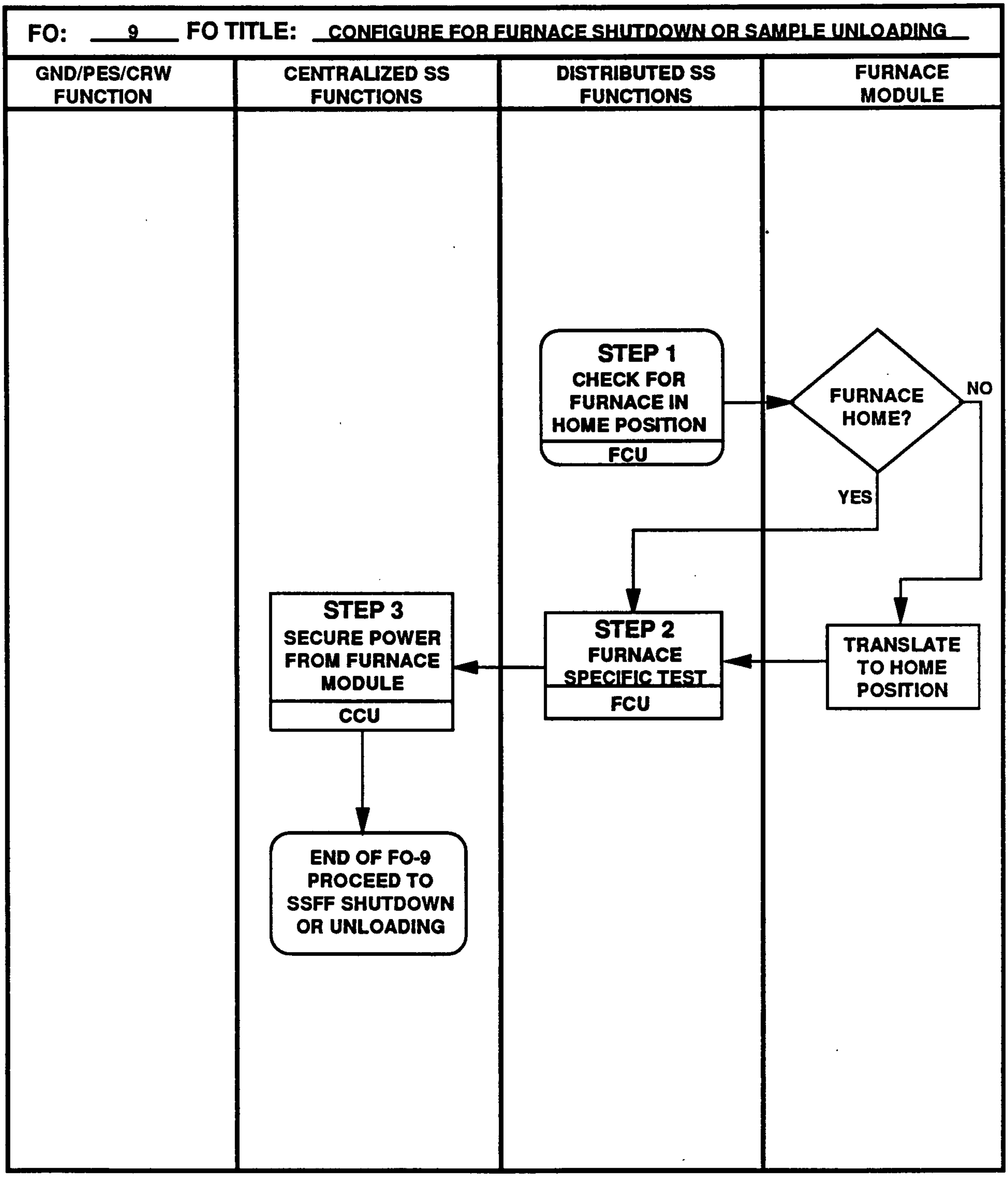


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 18 of 19)

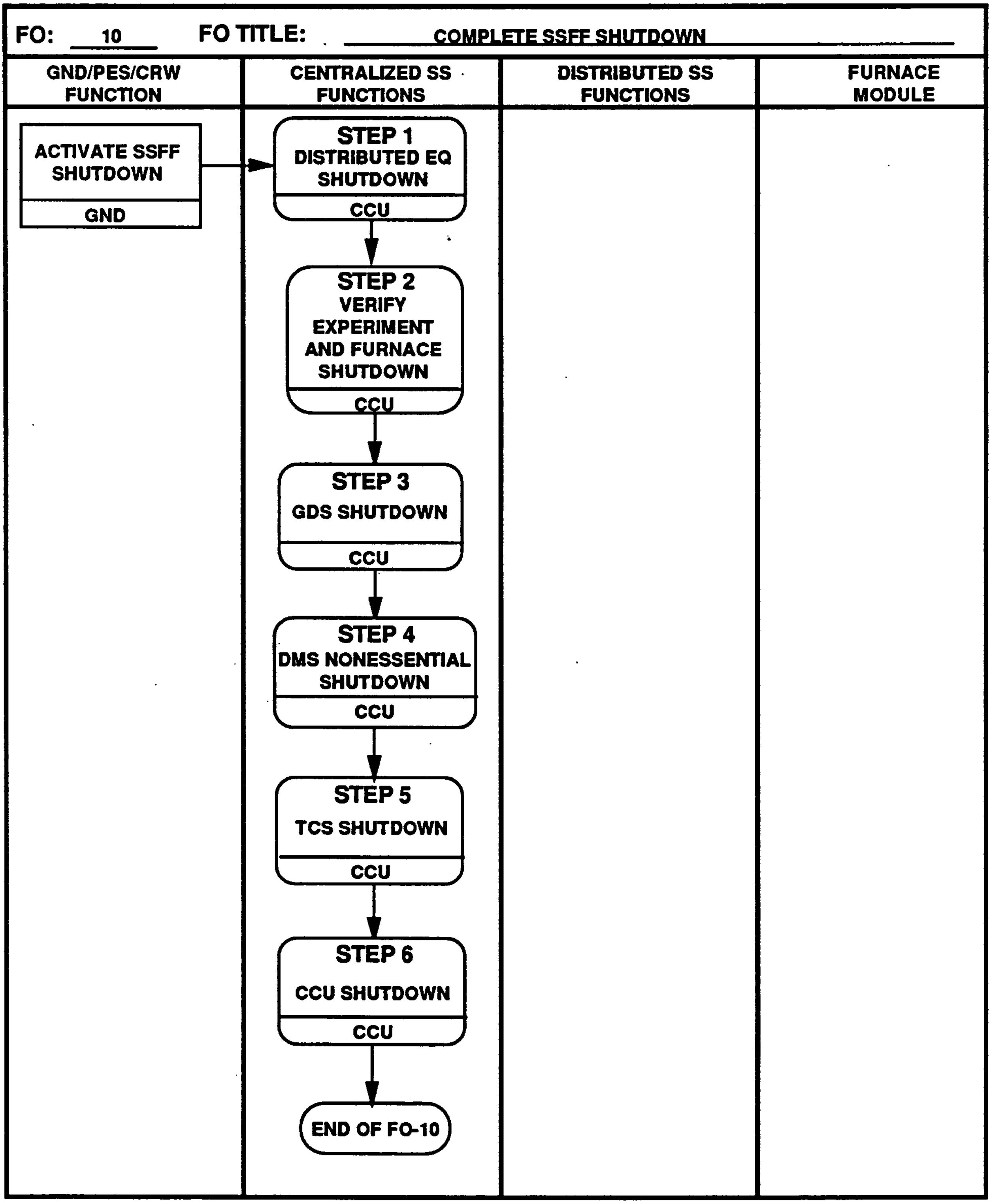
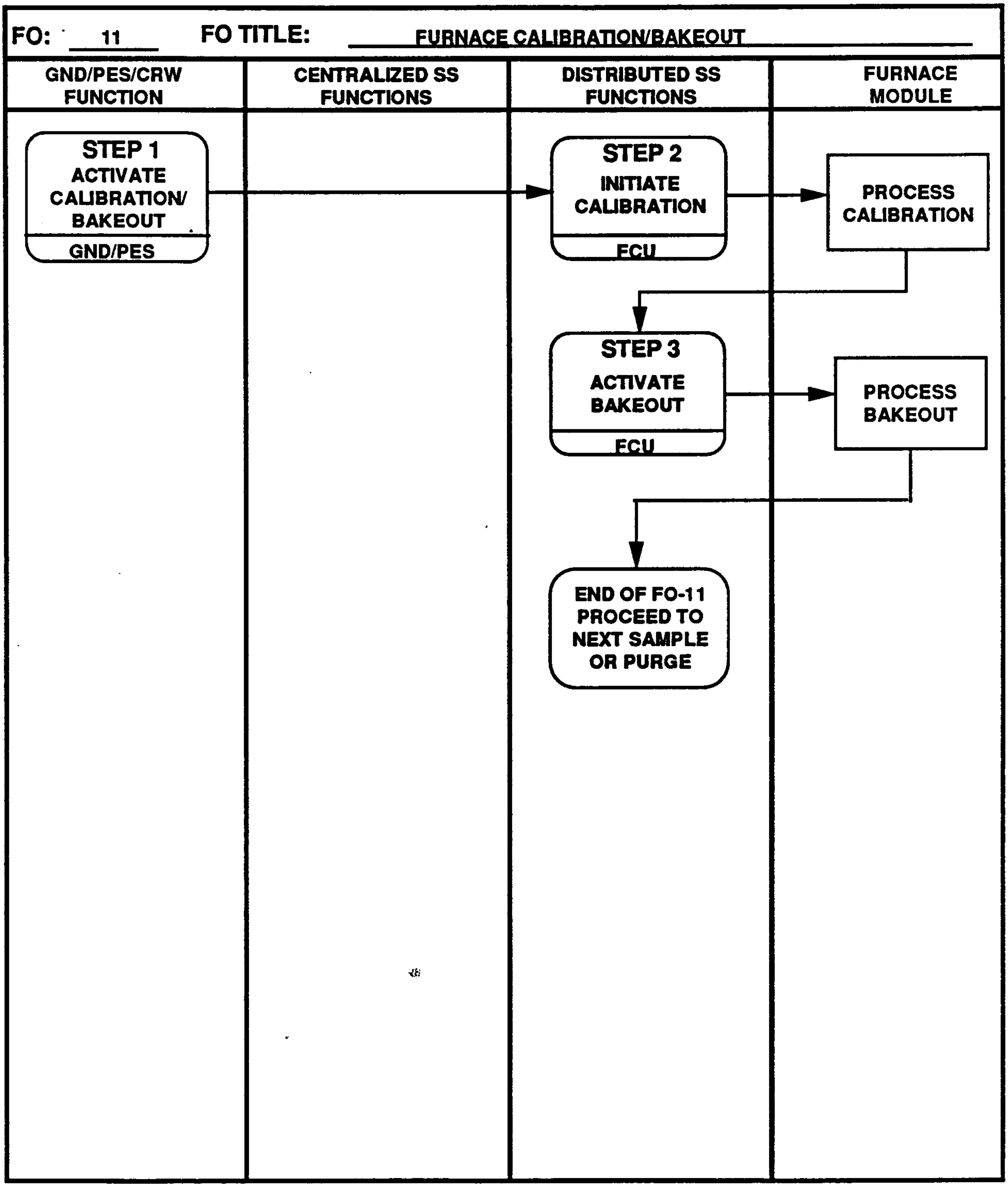


TABLE 1.1-3. SSFF OPERATIONAL FUNCTIONAL FLOW (Sheet 19 of 19)



1.2. STRUCTURAL/MECHANICAL

The Integrated Configuration-1 (IC1) Space Station Furnace Facility (SSFF) will be mounted in the U. S. Laboratory (USL) Module-A. The SSFF Core Rack will be mounted in a double rack location, and Experiment Rack-1 will be mounted in an adjacent double rack location. Figure 1.2-1 shows the SSFF system interface with Space Station Freedom (SSF). The physical and functional interfaces defined herein between SSFF and the USL are as follows:

- SSF-to-SSFF Mechanical Structures Subsystem (MSS) Physical Interfaces:
  - SSFF Core Rack to USL Module-A
  - SSFF Experiment Rack-1 to USL Module-A
  - SSFF Interconnect Tray Assembly to USL Module-A
- SSF-to-SSFF Core Rack Services Functional Interfaces:
  - SSF Electrical Power System (EPS) to SSFF Core Rack
  - SSF Data Management Subsystem (DMS) to SSFF Core Rack
  - SSF Thermal Control Subsystem (TCS) to SSFF Core Rack
  - SSF Vacuum Exhaust System (VES) to SSFF Core Rack
  - SSF Liquid Nitrogen System (LNS) to SSFF Core Rack
  - SSF avionics air to SSFF Core Rack
  - SSF fire detection and suppression to SSFF Core Rack
- SSF-to-SSFF Experiment Rack-1 Services Functional Interfaces:
  - SSF avionics air to SSFF Experiment Rack-1
  - SSF fire detection and suppression to SSFF Experiment Rack-1
- Crew Interface

1.2.1 EQUIPMENT LIST AND MASS PROPERTIES

Mass properties of the SSFF are shown in Table 1.2-1. Stowage items and their properties are shown in Table 1.2-2.

1.2.2 INTERFACE DETAIL

1.2.2.1 SSF-to-SSFF MSS Interface

The SSFF MSS will interface with SSF by physical connections of the Core Rack, Experiment Rack-1, and the MSS Interconnect Tray Assembly. The Core Rack and Experiment Rack-1 are rack replacement structures modified from an International Standard Payload Rack (ISPR), and they attach to the USL at the ISPR pivot points and attach fitting locations. Figure 1.2-2 shows the Core Rack interface with SSF, and Figure 1.2-3 shows the Experiment Rack-1 interface with SSF. Figure 1.2-4 shows the Interconnect Tray Assembly, which provides support for the cabling and plumbing between the Core Rack and Experiment Rack-1. The Interconnect Tray Assembly attaches to the USL in the standoff.

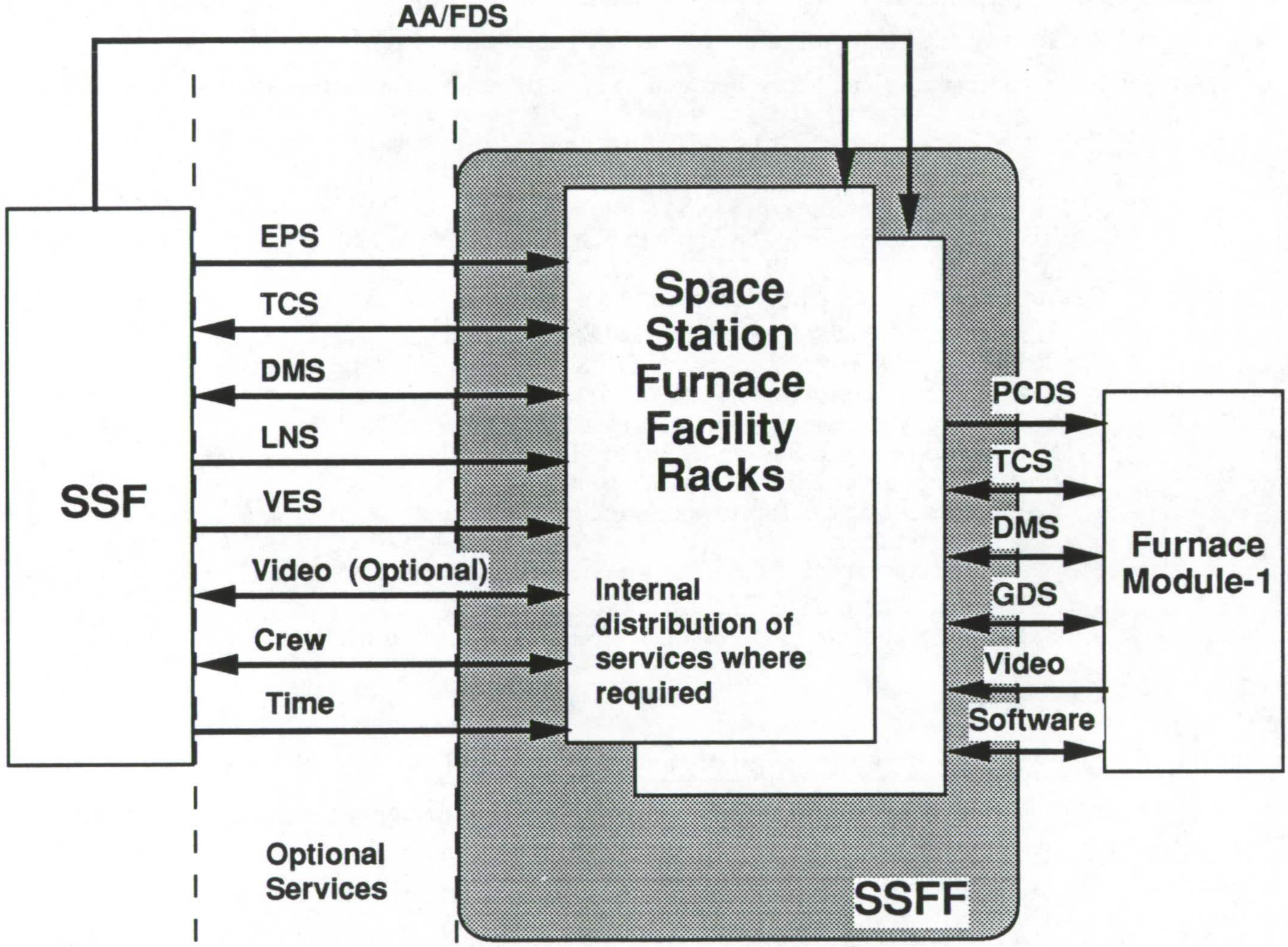


FIGURE 1.2-1. SSFF TO SSF RESOURCE INTERFACES

TABLE 1.2-1. LIST OF EQUIPMENT PROPERTIES (Sheet 1 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
GAS DISTRIBUTION SUBSYSTEM:														
Centralized Equipment:														
Argon+bottle (1)	17.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Latching Sol. Valves (4)	4.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Manual Valves, 1/4" (4)	0.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Manual Valve, 1" (1)	2.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Regulators (2)	1.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Filter, 1/4" (2)	0.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Sensors (3)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Gauge (1)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Contamin. Monitor (1)	18.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valve, 1/4" (4)	0.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
QD (with cap), 1/4" (4)	0.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
QD (with cap), 1" (2)	3.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Plumbing/hose/fittings	6.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Latch. Sol Valve (6)	6.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Press. Relief Valves (2)	0.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Filter, 1" (1)	3.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Compressor (1)	15.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Storage Tank (1)	17.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Accumulator (1)	8.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valves (2)	0.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
CM Sensor (2)	6.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Sensors (3)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
QD (with cap), 1/4" (1)	0.1	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
QD (with cap), 1" (1)	1.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valve, 1/4" (1)	0.1	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Plumbing/hose/fittings	1.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 1.2-1. LIST OF EQUIPMENT PROPERTIES (Sheet 2 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
DATA MANAGEMENT SUBSYSTEM														
Centralized Equipment:														
Core Control Unit (1)	29.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Hard Drive (1)	22.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
CDROM/WORM (1)	7.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
High-Density Recorder (1)	57.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Core Monitor & Control Unit (1)	20.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Crew Interface (1)	23.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
CPCS (2)	36.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Cabling (AR)	20.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Furnace Control Unit (1)	43.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Furnace Actuator Unit (1)	29.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
DCMU (1)	20.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Cabling (AR)	6.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
POWER CONDITIONING AND DISTRIB. SUBSYSTEM														
Centralized Equipment:														
Core Power Distrib. (1)	42.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Core Pwr Conditioner (1)	47.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Core Junction Box-A (1)	4.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Core Junction Box-B (1)	4.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 1.2-1. LIST OF EQUIPMENT PROPERTIES (Sheet 3 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
POWER CONDITIONING AND DISTRIB. SUBSYSTEM (Cont.)														
Centralized Equip. (cont.)														
Essentials Pwr Supp. (1)	3.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Volt./Current Sensors (4)	2.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Line and Connectors	11.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Current Pulsing Equipment (1)	13.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Furnace Pwr. Dist. (1)	7.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Furnace Junction Box (1)	9.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Essentials Pwr Supp. (1)	4.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Volt./Current Sens. (66)	33.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Line and Connectors	3.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
THERMAL CONTROL SUBSYSTEM														
Centralized Equipment:														
Heat Exchanger (1)	13.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pump Package (1)	15.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Flow Meters (2)	1.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Flow Control Valves (2)	3.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Temperature Sensors (5)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Transducers (3)	1.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Custom Coldplates (4)	24.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
-5 Coldplates (2)	3.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 2-1. List of Equipment Properties (Sheet 4 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
THERMAL CONTROL SUBSYSTEM														
Centralized Equip. (Cont.):														
Pwr Mod CP-Upper (2)	12.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pwr Mod CP-Lower (2)	9.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Plumbing (25 m)	13.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Quick Disconnects (37)	3.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valves (2)	0.1	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Manual Valves (2)	0.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Shutoff Valves (2)	3.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Water	10.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Modified -7 CPs (3)	11.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Temperature Sensors (3)	0.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Pressure Transducer (1)	0.5	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Flow Meter (1)	0.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Flow Control Valve (1)	1.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Check Valve (1)	0.1	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Manual Valve (1)	0.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Shutoff Valve (1)	1.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Plumbing (12 m)	6.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Quick Disconnects (16)	1.6	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Water	7.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 1.2-1. LIST OF EQUIPMENT PROPERTIES (Sheet 5 of 5)

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
MECHANICAL STRUCTURES SUBSYSTEM:														
Interconnect Tray	72.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Centralized Equipment:														
TCS	22.9	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
PCDS	31.8	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
GDS	21.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
DMS	56.2	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Distributed Equipment:														
Exp. Rack-1 MSS	28.4	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Rack Replacement Structures:														
Core Rack	92.3	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Experiment Rack-1	128.7	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Furnaces:														
Furnace Module-1	327.0	100	0	0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 1.2-2. STOWAGE LIST

Item	Number Required	Mass Each	Dimensions (cm) LxWxH or LxDia	Stowage Responsiblity		Stowage Phase			Special Requirements
		(kg)		Ex	PL	L	O	R	
TBD									

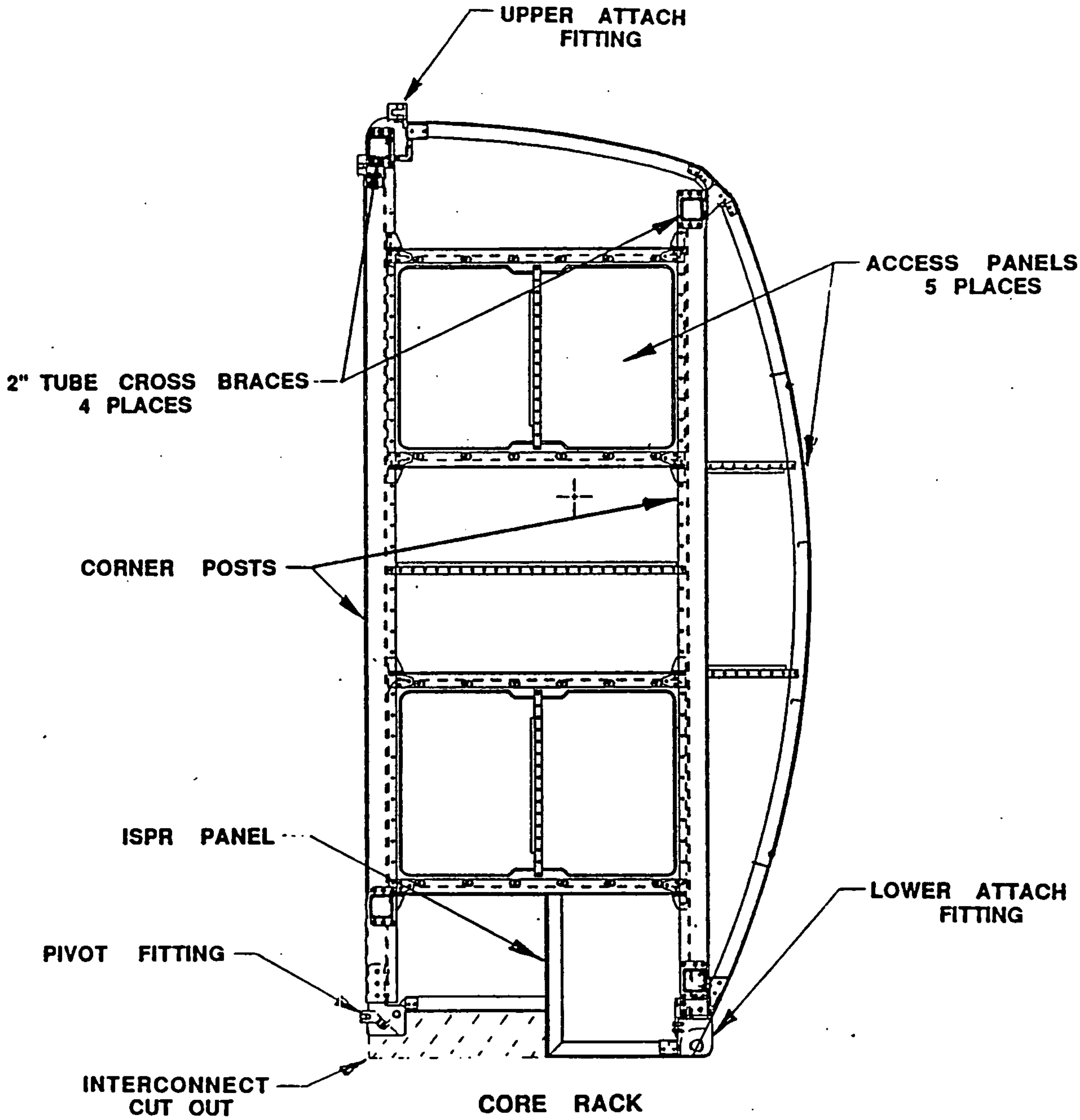


FIGURE 1.2-2. SSF TO SSFF CORE RACK PHYSICAL INTERFACE

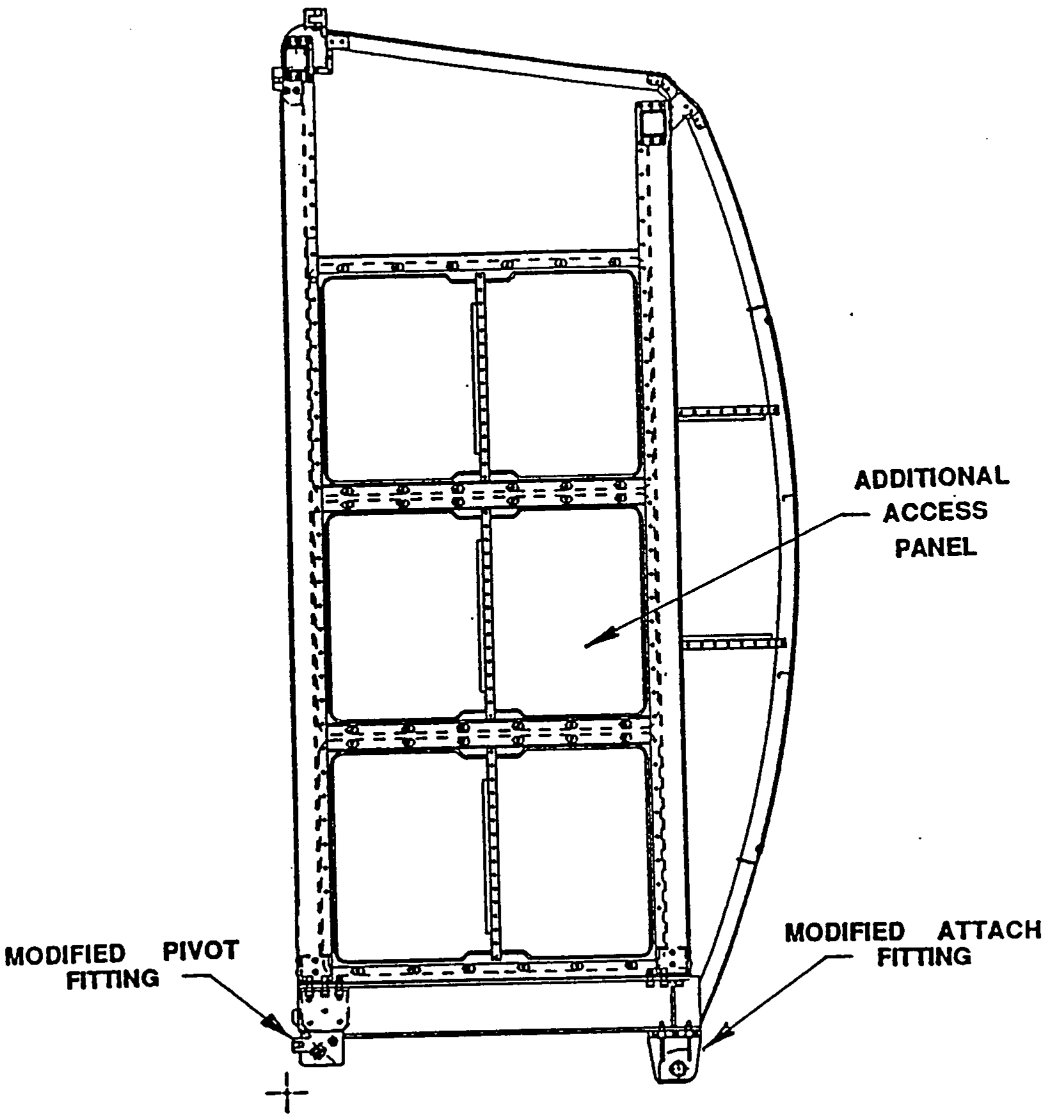


FIGURE 1.2-3. SSF TO SSFF EXPERIMENT RACK-1 PHYSICAL INTERFACE

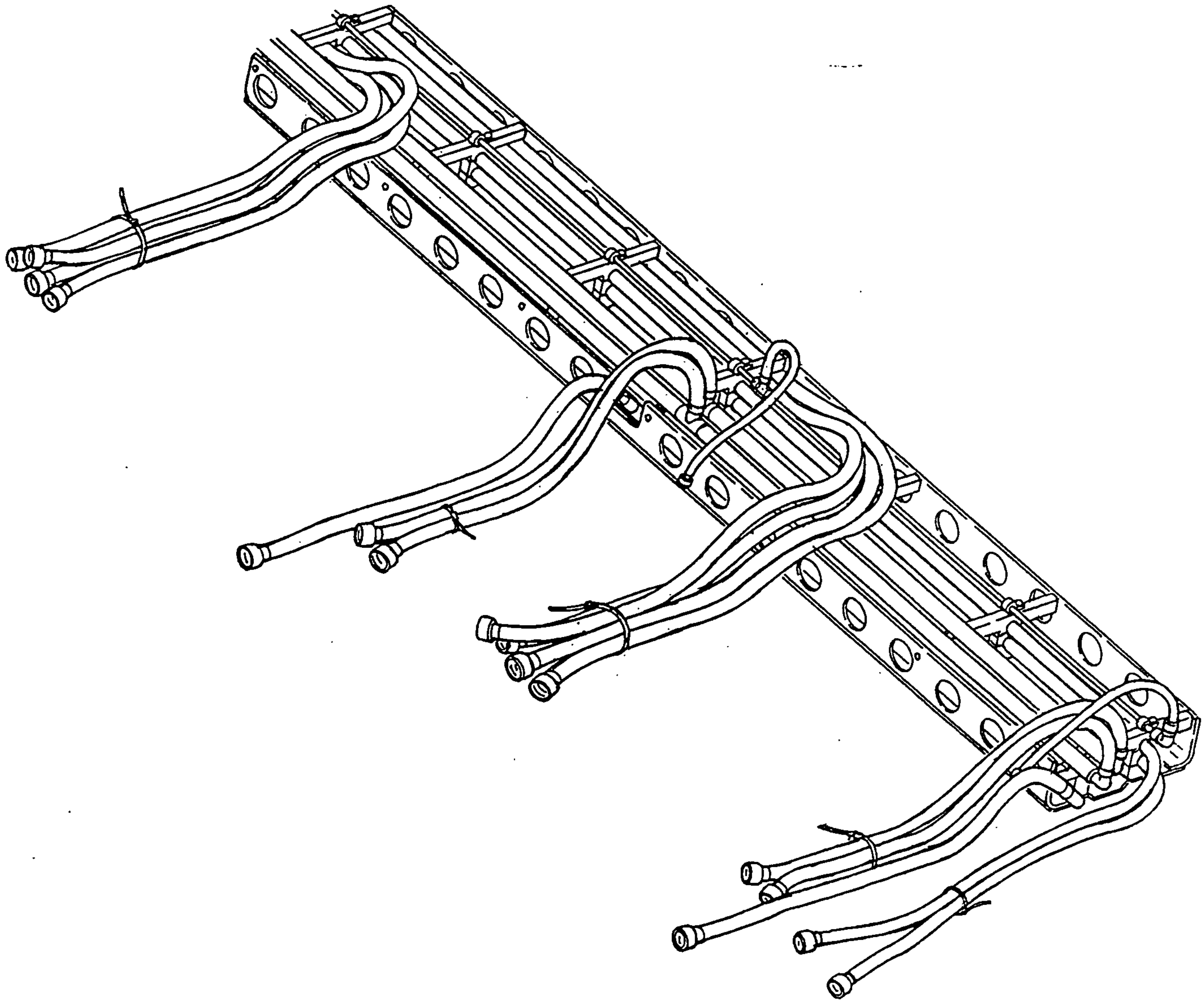


FIGURE 1.2-4. SSFF INTERCONNECT TRAY ASSEMBLY

1.2.2.2 SSF-to-SSFF Core Rack Interface

The SSFF will interface with SSF services in the standoff through an ISPR passthrough rack panel in the Core Rack. Figure 1.2-5 shows this Core Rack panel layout. SSFF subsystems receive the SSF services at the Core Rack, and then those services are routed out to Experiment Rack-1. All SSF services are provided at the Core Rack except avionics air and fire detection and suppression, which are provided at each rack location. Subsystem interfaces with SSF are described below.

1.2.2.2.1 SSF EPS-to-SSFF Core Rack - The SSFF Power Conditioning and Distribution Subsystem (PCDS) will interface with the SSF EPS by connecting to two 6-kW, 120-Vdc power buses in the Core Rack.

1.2.2.2.2 SSF DMS-to-SSFF Core Rack - The SSFF DMS will interface with the SSF DMS by connecting to the MIL-STD-1553 bus or the payload fiber distributed data interface (FDDI) at the Core Rack panel. The SSFF DMS will also require a high-rate data link (HRDL) interface at the Core Rack panel to accommodate transfer of high-rate data.

1.2.2.2.3 SSF TCS-to-SSFF Core Rack - The SSFF TCS will interface with the SSF TCS by connecting to the moderate temperature cooling loop with hoses from a payload rack heat exchanger behind the Core Rack panel.

1.2.2.2.4 SSF VES-to-SSFF Core Rack - The SSFF Gas Distribution Subsystem (GDS) will interface with the SSF VES by connecting a vacuum line at the Core Rack panel.

1.2.2.2.5 SSF LNS-to-SSFF Core Rack - The SSFF GDS will interface with the SSF LNS by connecting a nitrogen line at the Core Rack panel.

1.2.2.3 SSF-to-SSFF Experiment Rack-1 Interface

The only services provided directly from SSF to Experiment Rack-1 are avionics air and fire detection and suppression. The SSF will interface with SSFF Experiment Rack-1 at the furnace interface panel as shown in Figure 1.2-6. An SSFF-provided hose assembly will connect between this panel and the standoff interface service connection. All other Experiment Rack-1 services will be provided by the SSFF Core Rack.

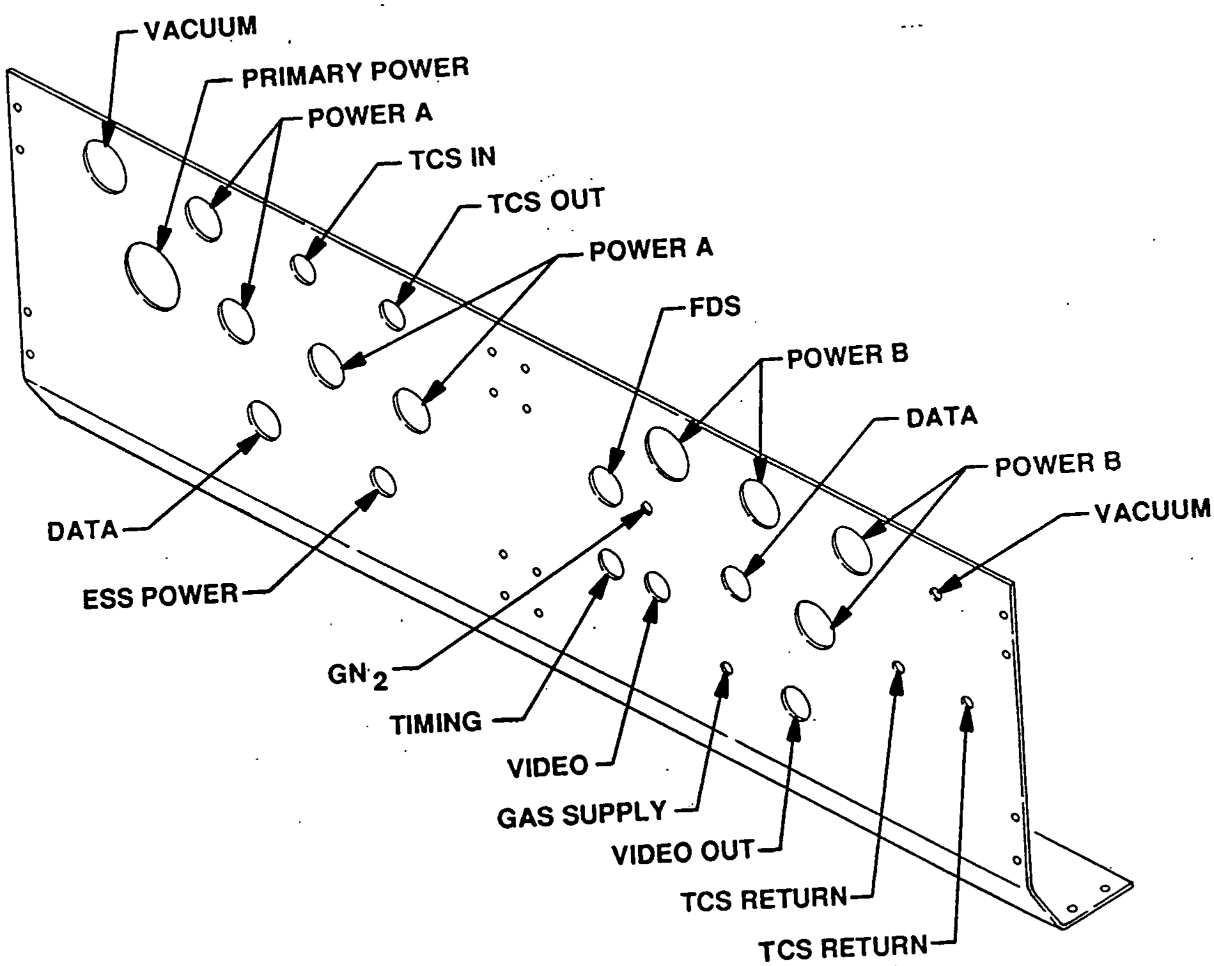


FIGURE 1.2-5. CORE RACK PANEL LAYOUT

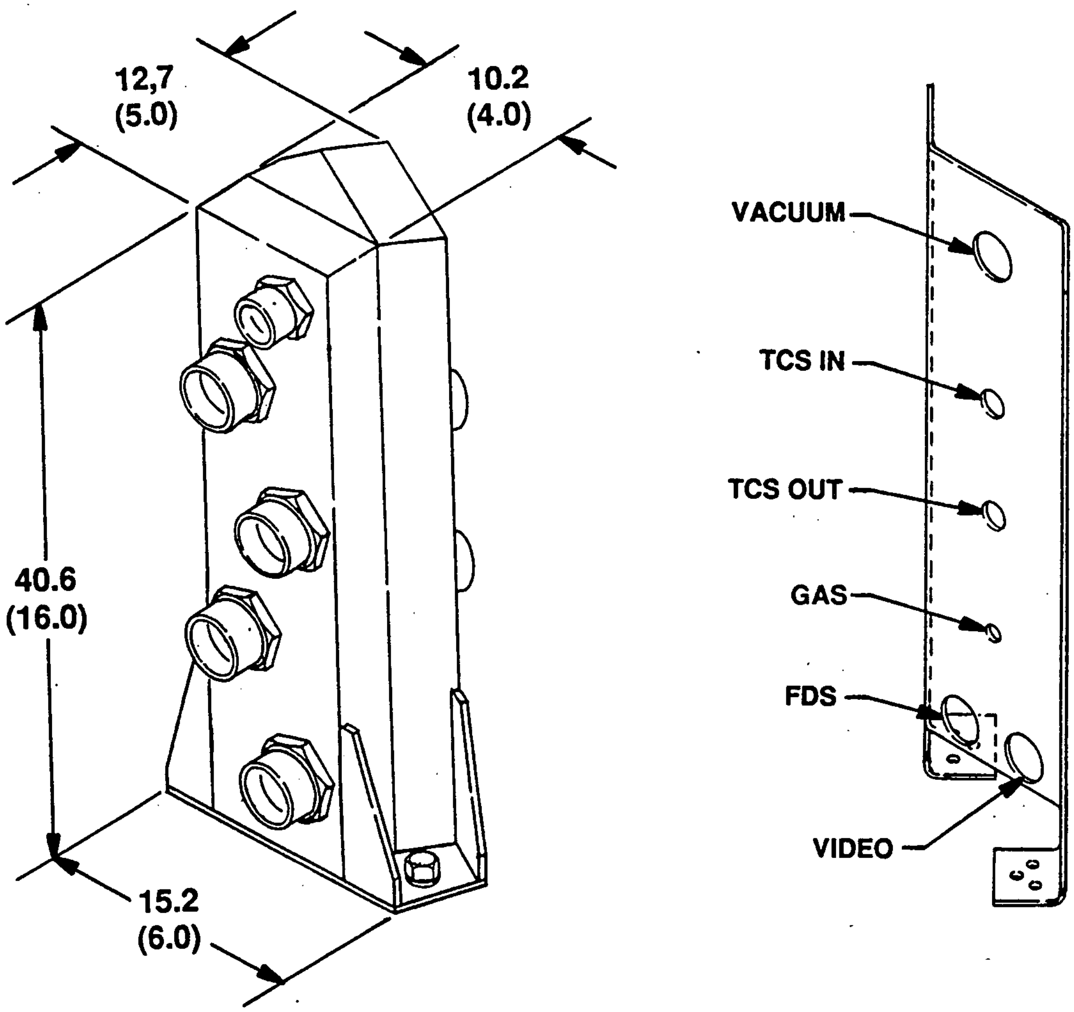


FIGURE 1.2-6. EXPERIMENT RACK-1 PANEL LAYOUTS

1.2.2.4 Crew Interface

A keyboard and display interface will be provided for crew interaction at the Core Rack. This system will have a standard QWERTY-type keyboard which can accept crew input commands for operation or configuration of the SSFF subsystems as required. Experiment sample exchanges will also require crew interface at Furnace Module-1, and opening and closing of manual valves will require crew interface at both rack locations.

1.3. POINTING/STABILIZATION AND ALIGNMENT

The Space Station Furnace Facility (SSFF) is required to provide for the alignment of the axis of selected solidification modules to within 5° of the residual g-vector. An acceleration of approximately 1.8 by 10^{-6} g_o is required to prevent a 100-μm particle from moving 1 diameter in 1000 sec.

The allowable acceleration level requirements are as follows for a 1-cm diameter sample:

1. $g \leq 1.0 \times 10^{-6}\, g_o$ for $0 \leq f \leq 0.020$ for periods up to 90 days
2. $g \leq 1.0 \times 10^{-6}\, g_o \times \left(\frac{f}{0.020\ \text{Hz}}\right)$ for $f \geq 0.020$ along residual g-vector
3. $g' \leq 1.6 \times 10^{-7}\, g_o \times \left(\frac{f}{0.020\ \text{Hz}}\right)$ for $f \geq 0.012$ along any axis perpendicular to the residual g-vector

where,

g = Acceleration level within the experimental sample fluid (melt, solution, or vapor) and at the solidification/fluid interface.

go = Acceleration at sea level on Earth.

g' = Acceleration level perpendicular to direction of solidification front or desired fluid motion.

f = Frequency of periodic accelerations in hertz.

Furnace Module-1 requires that there shall be 1-mm maximum lateral displacement between sample and furnace centerlines at any point along centerlines at any time during processing. This does not include any contribution from the sample's being not straight or out of round. It does include heater assembly and translation system contributions.

1.4. ORBITAL REQUIREMENTS AND CONSTRAINTS

TBD

1.5. ELECTRICAL REQUIREMENTS

The Space Station Furnace Facility (SSFF) Power Conditioning and Distribution Subsystem (PCDS) is composed of the equipment necessary to condition and distribute power provided by the Space Station Freedom (SSF) Electrical Power System (EPS) to SSFF subsystems. Figure 1.5-1 shows the PCDS block diagram. The SSFF PCDS will interface with the SSF by connecting to two 6-kW, 120-Vdc power buses. Since 3- and 6-kW SSF payload racks use one bus as a primary feed and the other as an essential feed, 12-kW racks are required to maintain 1 MΩ of electrical isolation between the two buses at all times (SSF Electric Power Specifications and Standards, SSP 30482). No true essentials bus exists at this time, only the two main buses. This means that a 12-kW rack must tie the two buses together whenever backup essentials power will be required. The two SSFF power buses (Bus A and Bus B) will feed the PCDS via SSF-provided Remote Power Distribution Assemblies (RPDAs) or through an SSFF-designed assembly (similar in function).

The bulk of the power to be distributed by the PCDS will be consumed by the Furnace Module-1 heaters with the remainder serving as housekeeping power to the SSFF subsystems. The Integrated Configuration-1 (IC1) configuration of the SSFF will require maximum peak power from the SSF of 4.6 kW. The operational power profile defining the use of the SSF-provided power by the SSFF during each functional objective (FO) is shown in Figure 1.5-2. The power profile data given here represent power requirement estimates to cover any of the the SSFF-accommodated Furnace Module-1 needs. The power levels defined in Figure 1.5-2 are considered maximums. Time duration for peak power requirements is 72 h. The average power required is 2.7 kW. The total energy requirement is 3800 kWh.

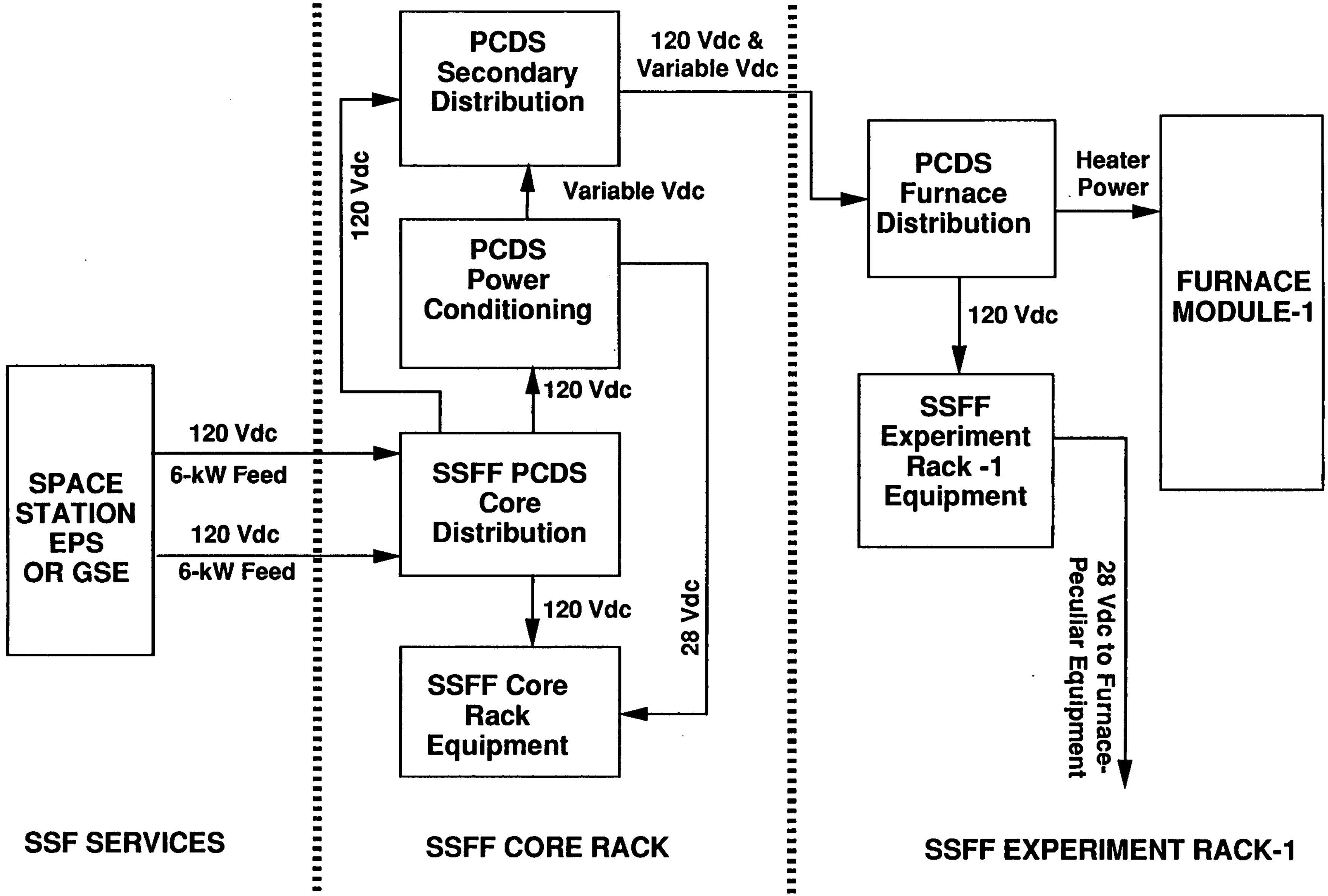
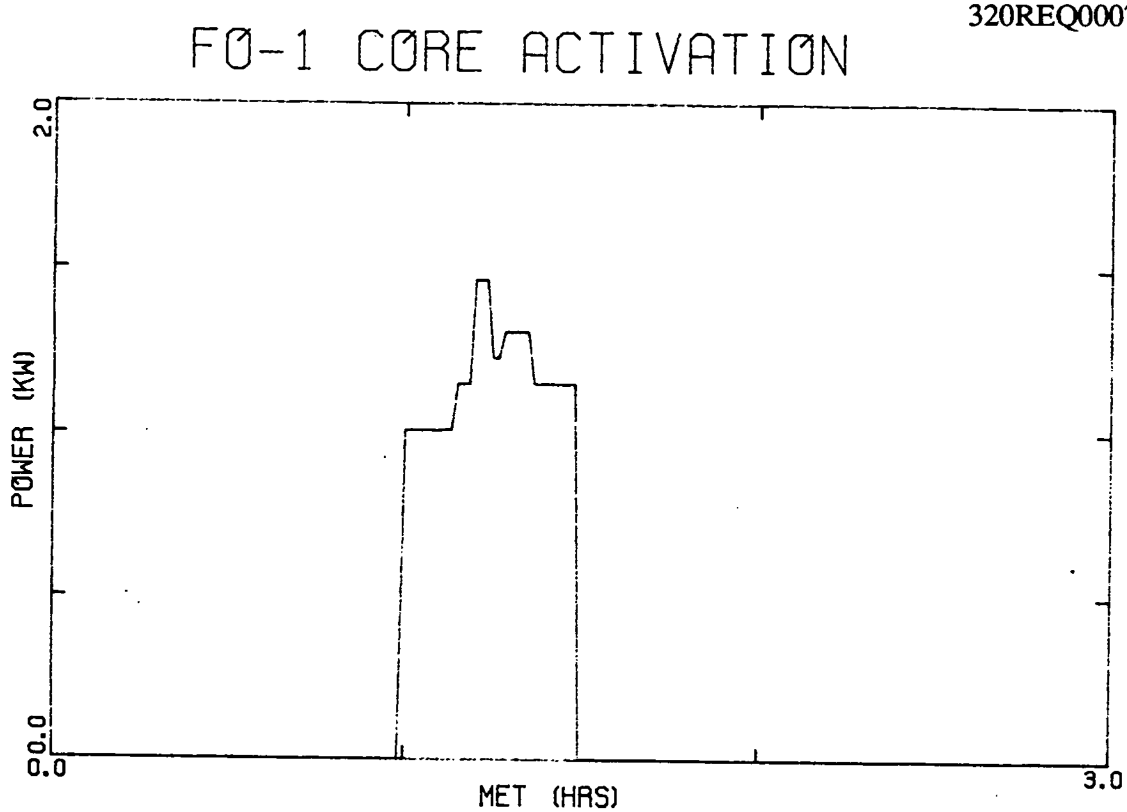


FIGURE 1.5-1. PCDS INTERFACE BLOCK DIAGRAM

C-2



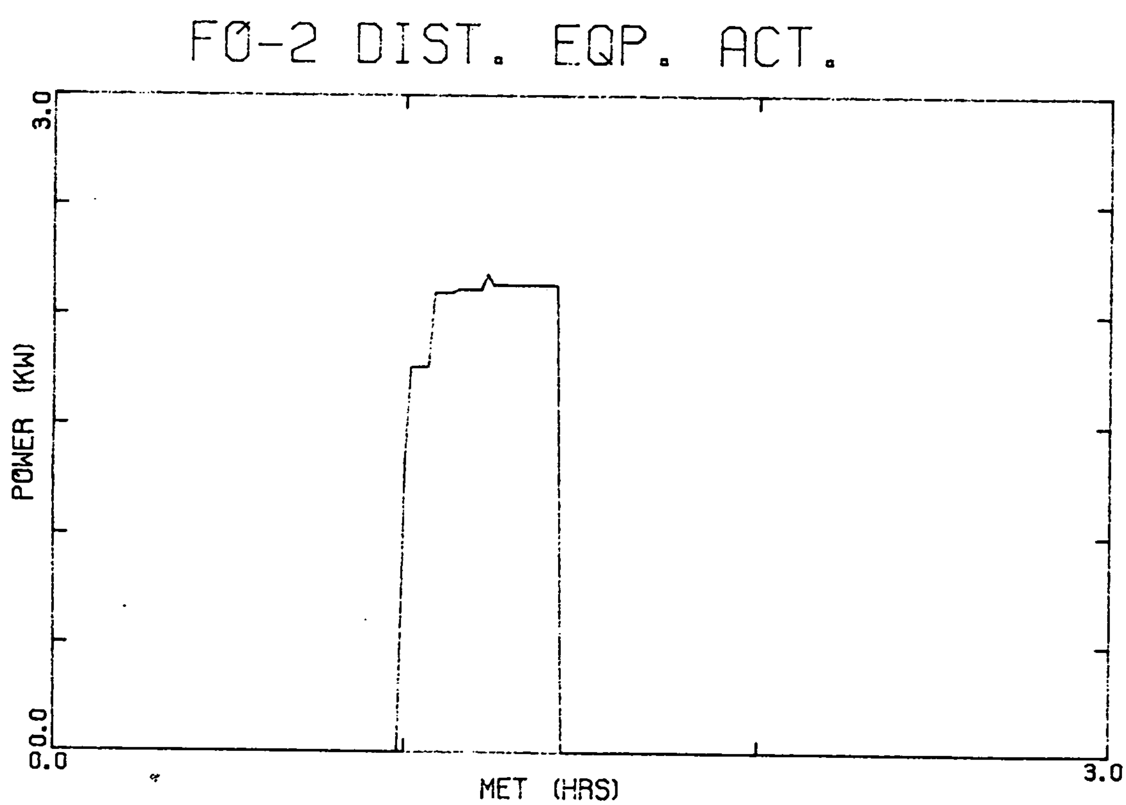
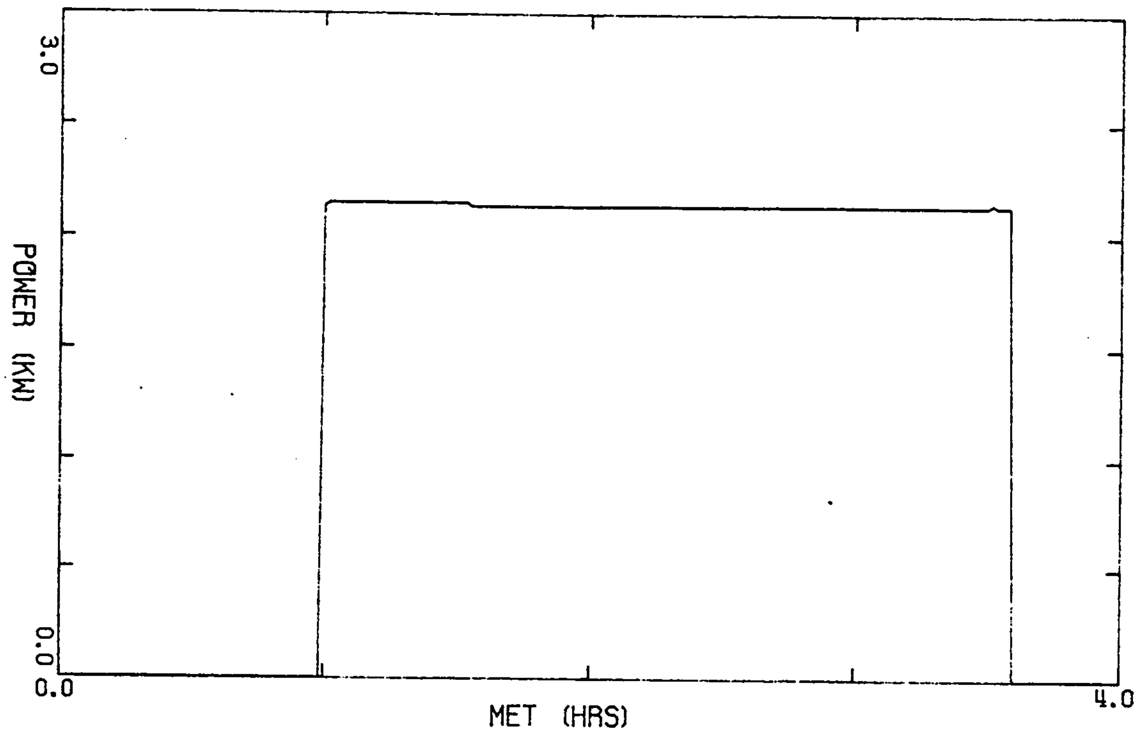


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 1 of 6)

FØ-3 MSE



FØ-4 VENT/PURGE

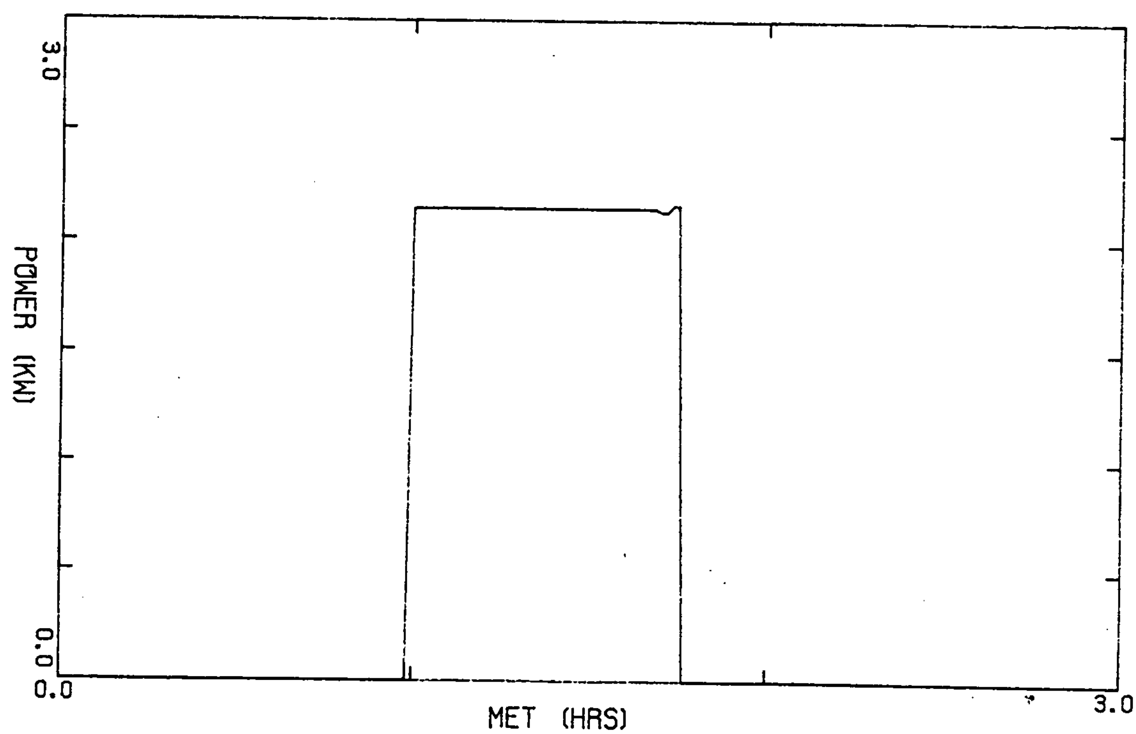
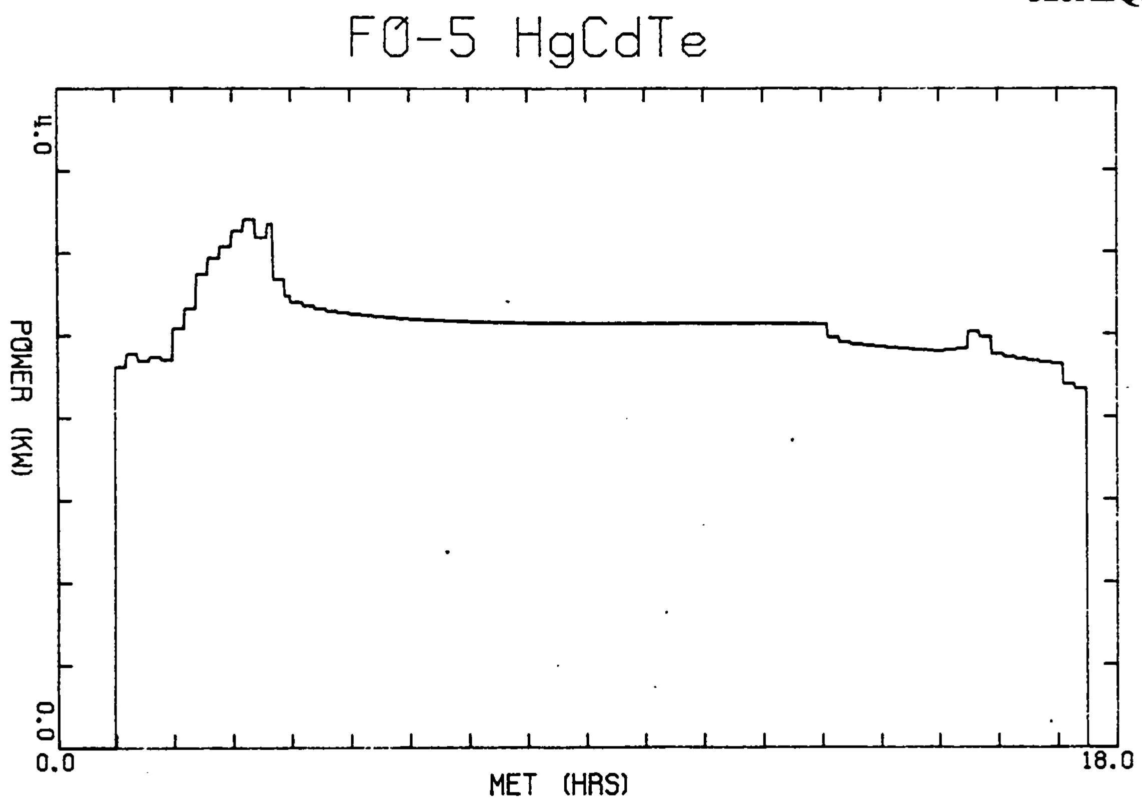


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 2 of 6)



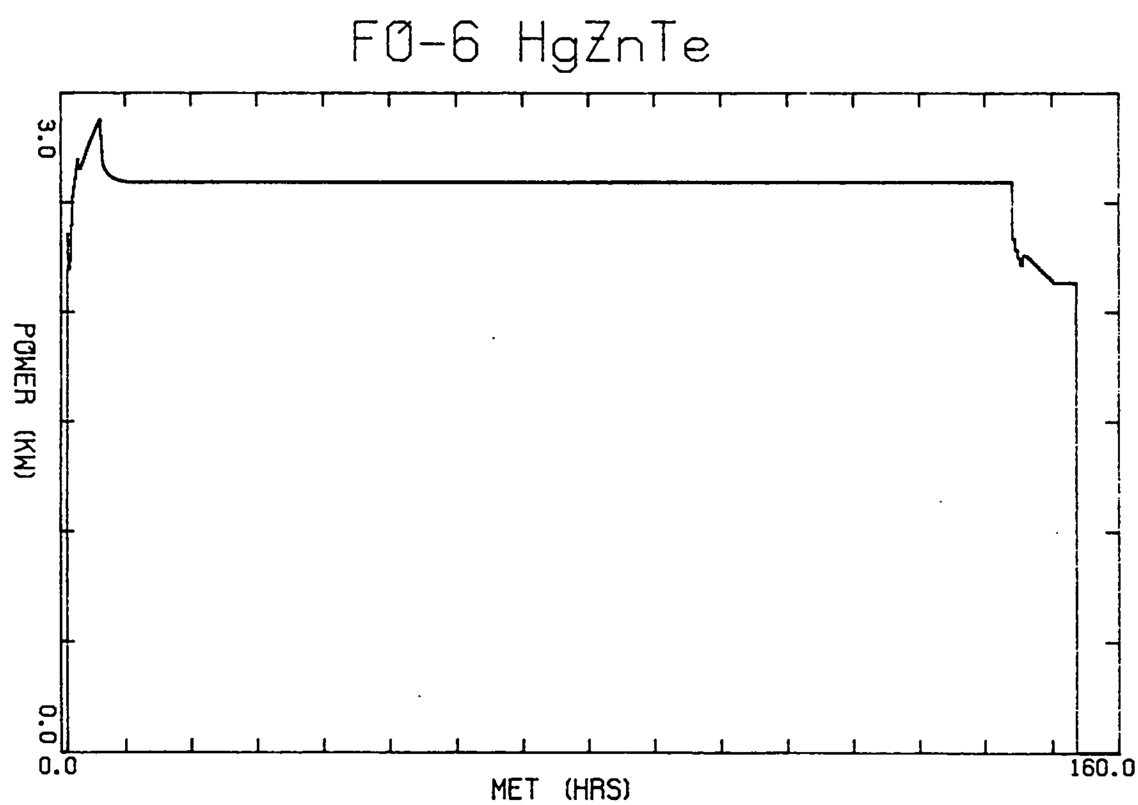
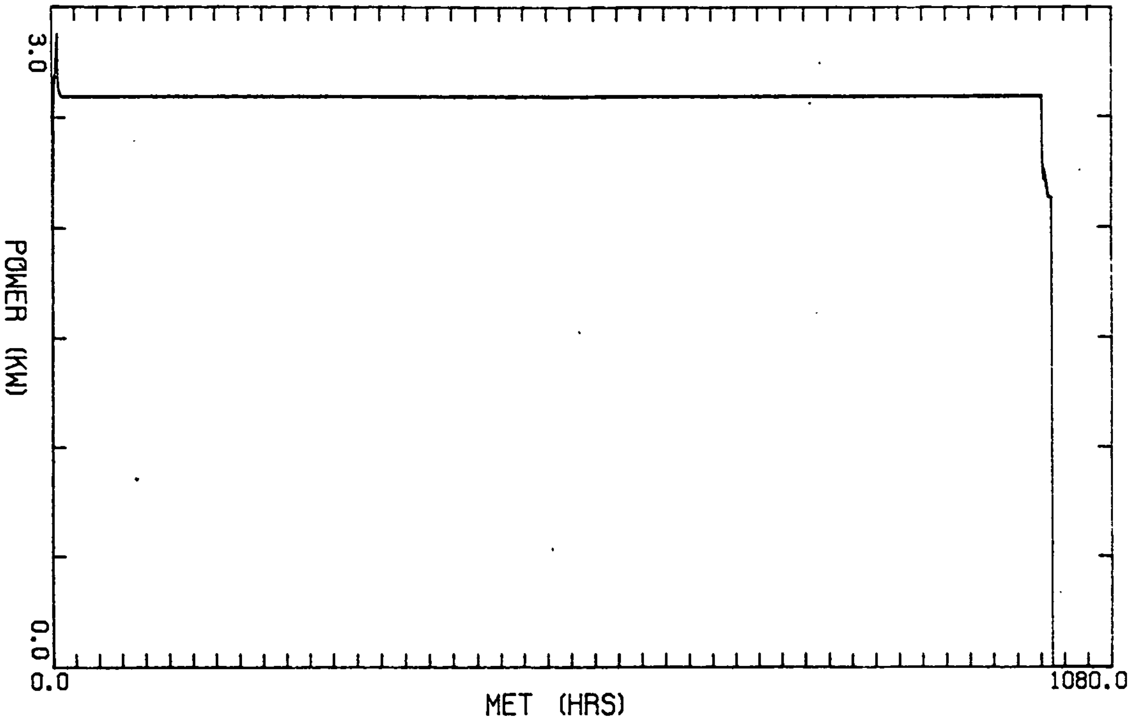


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 3 of 6)

FØ-6A HgZnTe



FØ-7 CdTe

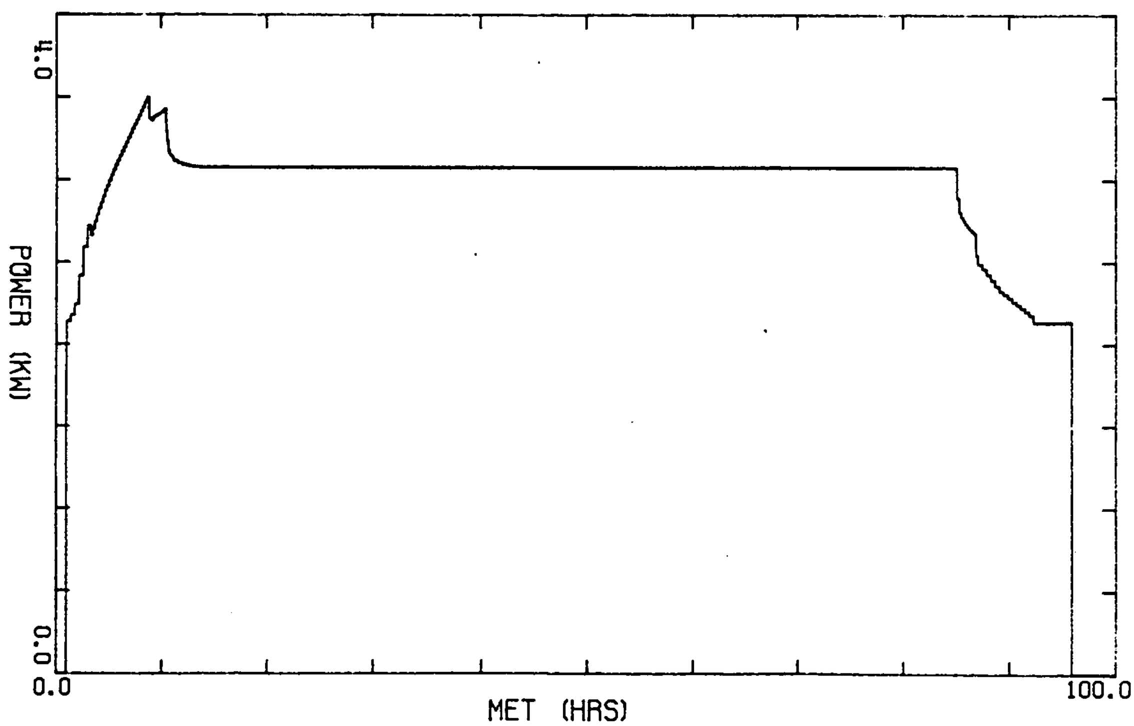
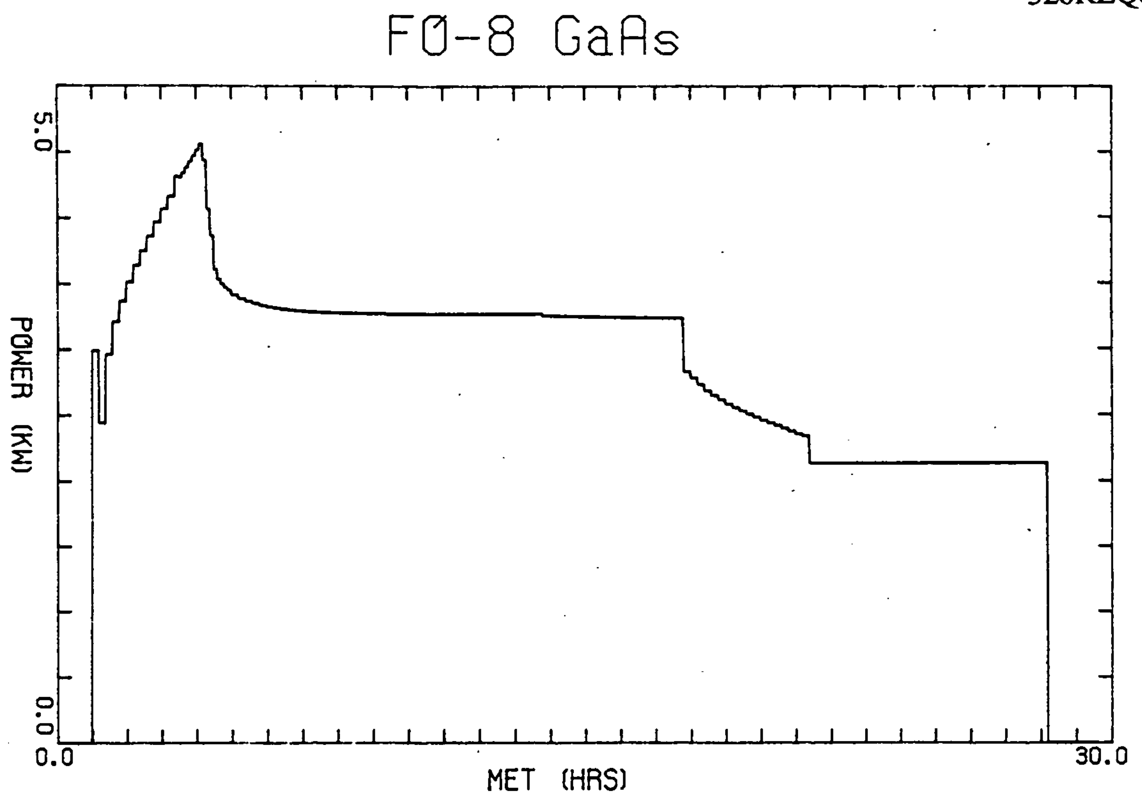


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 4 of 6)



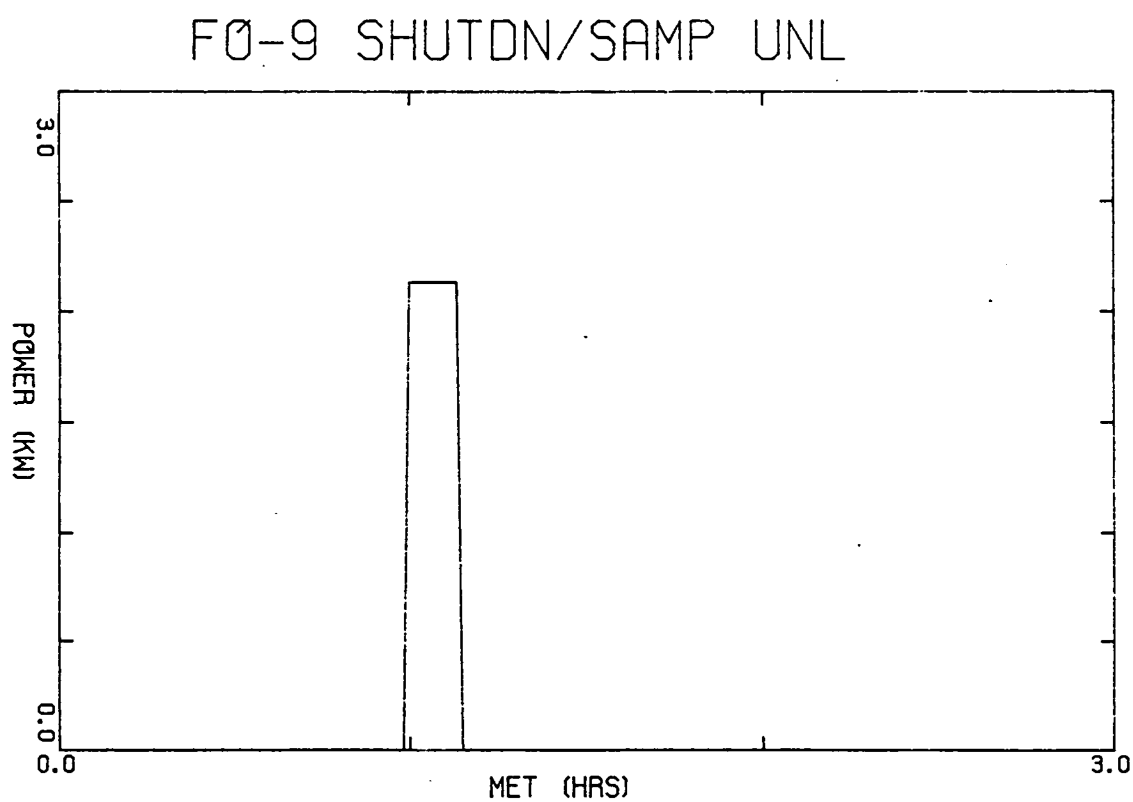


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 5 of 6)

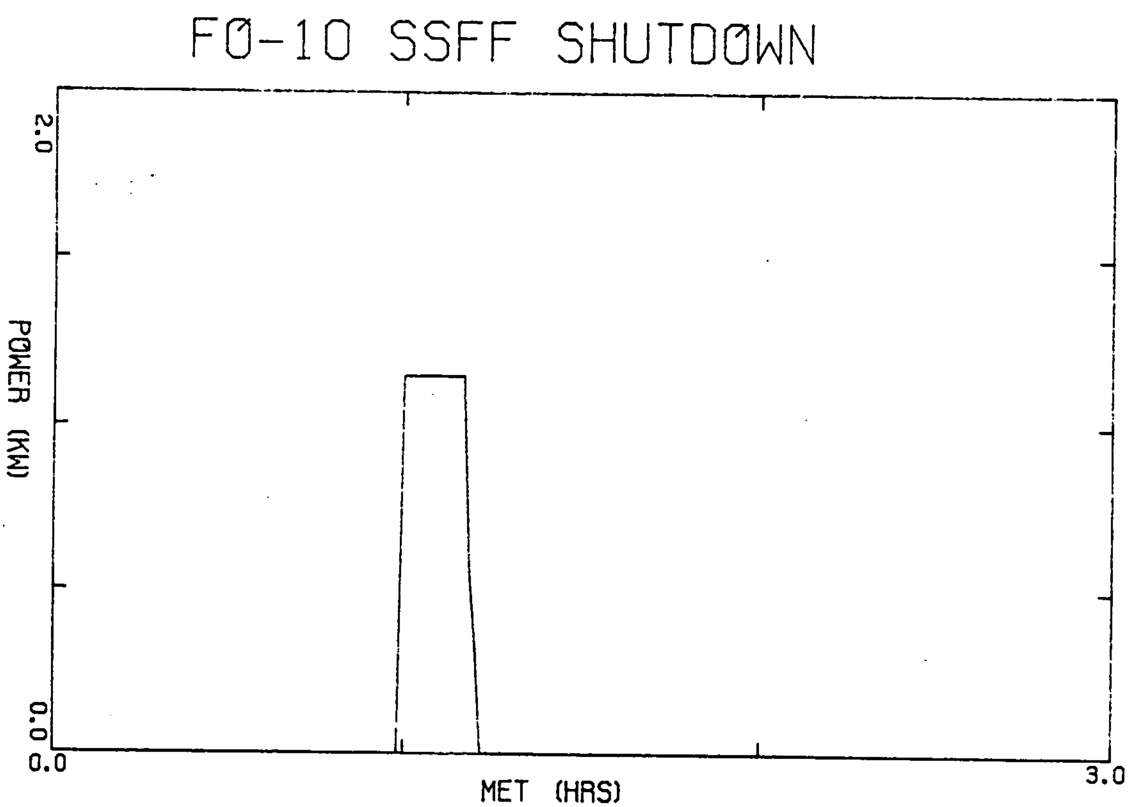


FIGURE 1.5-2. POWER PROFILES BY FUNCTIONAL OBJECTIVES (Sheet 6 of 6)

1.6. THERMAL/FLUID REQUIREMENTS

1.6.1 HEAT TRANSFER CHARACTERISTICS

The Space Station Furnace Facility (SSFF) Thermal Control System (TCS) water cooling loop will collect heat from Furnace Module-1 and the Core Rack electronics. The collected heat will then be transferred to the Space Station Freedom (SSF) TCS moderate temperature loop via the Core Rack heat exchanger. Figure 1.6-1 shows the TCS block diagram. On-orbit thermal requirements of the SSFF are shown in Table 1.6-1.

The SSFF TCS water cooling loop collects heat from the furnace modules and subsystem electronics. The collected heat is then transferred to the SSF TCS via the Core Rack heat exchanger. Total maximum heat dissipation of the Integrated Configuration-1 (IC1) configuration of SSFF to the SSF TCS is 4518 W.

Avionics air will be required to cool some SSFF subsystem equipment in both racks. Total maximum heat dissipation to avionics air is 371 W in the Core Rack and 366 W in Experiment Rack-1.

1.6.2 FLUID/VENT REQUIREMENTS

The Gas Distribution Subsystem (GDS) provides the distribution of SSF-provided gases and vacuum to Furnace Module-1. It also provides contamination monitoring of waste gases and gaseous argon to Furnace Module-1. The GDS block diagram is shown in Figure 1.6-2.

The IC1 configuration of the SSFF GDS will require 10.4 kg of SSF-provided dry nitrogen at the Core Rack per 90-day mission, supplied at 618 to 756 kPa (90 to 110 psia). This will be regulated down internally in the core to approximately 137 to 240 kPa (20 to 35 psia) for safe pressurization of the furnace enclosures. The GDS will also require the SSF-provided vacuum at the Core Rack, which furnishes the furnace modules access to the 1 x 10^{-3} torr vacuum line.

Gas and vacuum requirements for the IC1 configuration of SSFF are shown in Table 1.6-2.

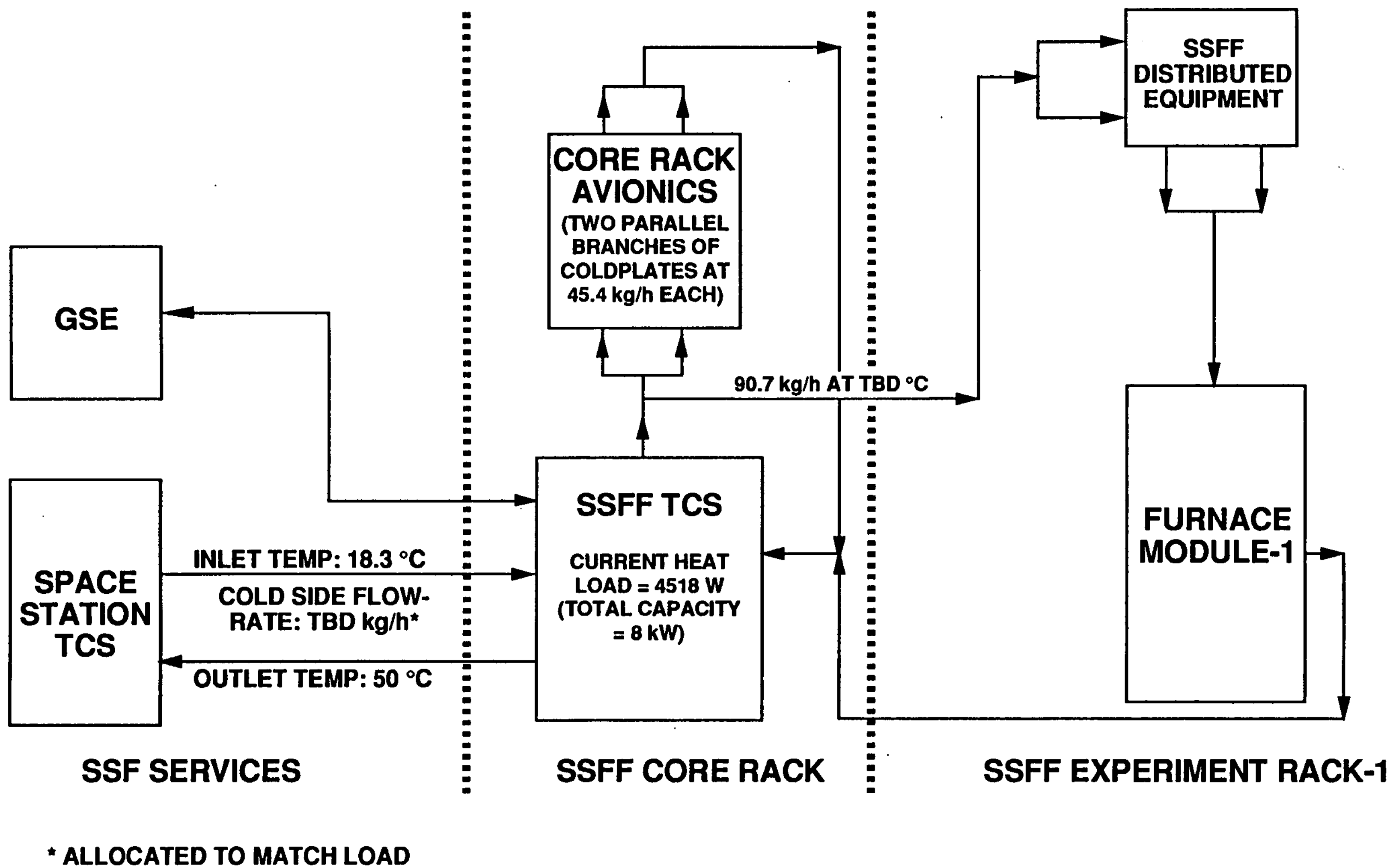


FIGURE 1.6-1. TCS INTERFACE BLOCK DIAGRAM

TABLE 1.6-1. ON-ORBIT THERMAL REQUIREMENTS (Sheet 1 of 2)

Equipment	Heat-Sink Type					Cooling Load (W)			Min/Max Temp (°C)			Thermal	Special
Item and FO No.	Cabin	Av. Air (nonducted)	Av. Air (ducted)	Exp CP (SSFF)	Exp. HX	Standby	Operate	Peak* or other	Standby	Operate	Non-Operate	Capacitance (W-h-°C)	Considerations (as applicable)
FO-1		X					134	200		17/43		TBD	
FO-1				X			1053	1327		18/50		TBD	
FO-2		X					310	391		17/43		TBD	
FO-2				X			1653	1817		18/50		TBD	
FO-3		X					323	332		17/43		TBD	
FO-3				X			1817	1817		18/50		TBD	
FO-4		X					332	347		17/43		TBD	
FO-4				X			1817	1817		18/50		TBD	
FO-5		X					317	317		17/43		TBD	
FO-5				X			1817	1817		18/50		TBD	
FO-5					X		232	270		TBD		TBD	
FO-6		X					317	317		17/43		TBD	
FO-6				X			1817	1817		18/50		TBD	
FO-6					X		283	285		TBD		TBD	
FO-6A		X					317	317		17/43		TBD	
FO-6A				X			1817	1817		18/50		TBD	
FO-6A					X		283	285		TBD		TBD	
FO-7		X					317	317		17/43		TBD	
FO-7				X			1817	1817		18/50		TBD	
FO-7					X		525	580		TBD		TBD	
FO-8		X					317	317		17/43		TBD	
FO-8				X			1817	1817		18/50		TBD	
FO-8					X		524	697		TBD		TBD	

TABLE 1.6-1. ON-ORBIT THERMAL REQUIREMENTS (Sheet 2 of 2)

Equipment	Heat-Sink Type					Cooling Load (W)			Min/Max Temp (°C)			Thermal	Special
Item and FO No.	Cabin	Av. Air (nonducted)	Av. Air (ducted)	Exp CP (SSFF)	Exp. HX	Standby	Operate	Peak* or other	Standby	Operate	Non-Operate	Capacitance (W-h-°C)	Considerations (as applicable)
FO-9		X					317	317		17/43		TBD	
FO-9					X		1817	1817		18/50		TBD	
FO-10		X					44	121		17/43		TBD	
FO-10					X		465	1026		18/50		TBD	
FO-11		X					317	317		17/43		TBD	
FO-11					X		2000	2016		18/50		TBD	

* Each FO contains multiple steps; therefore, peak water-cooled load and peak avionics air load may not occur on the same step.

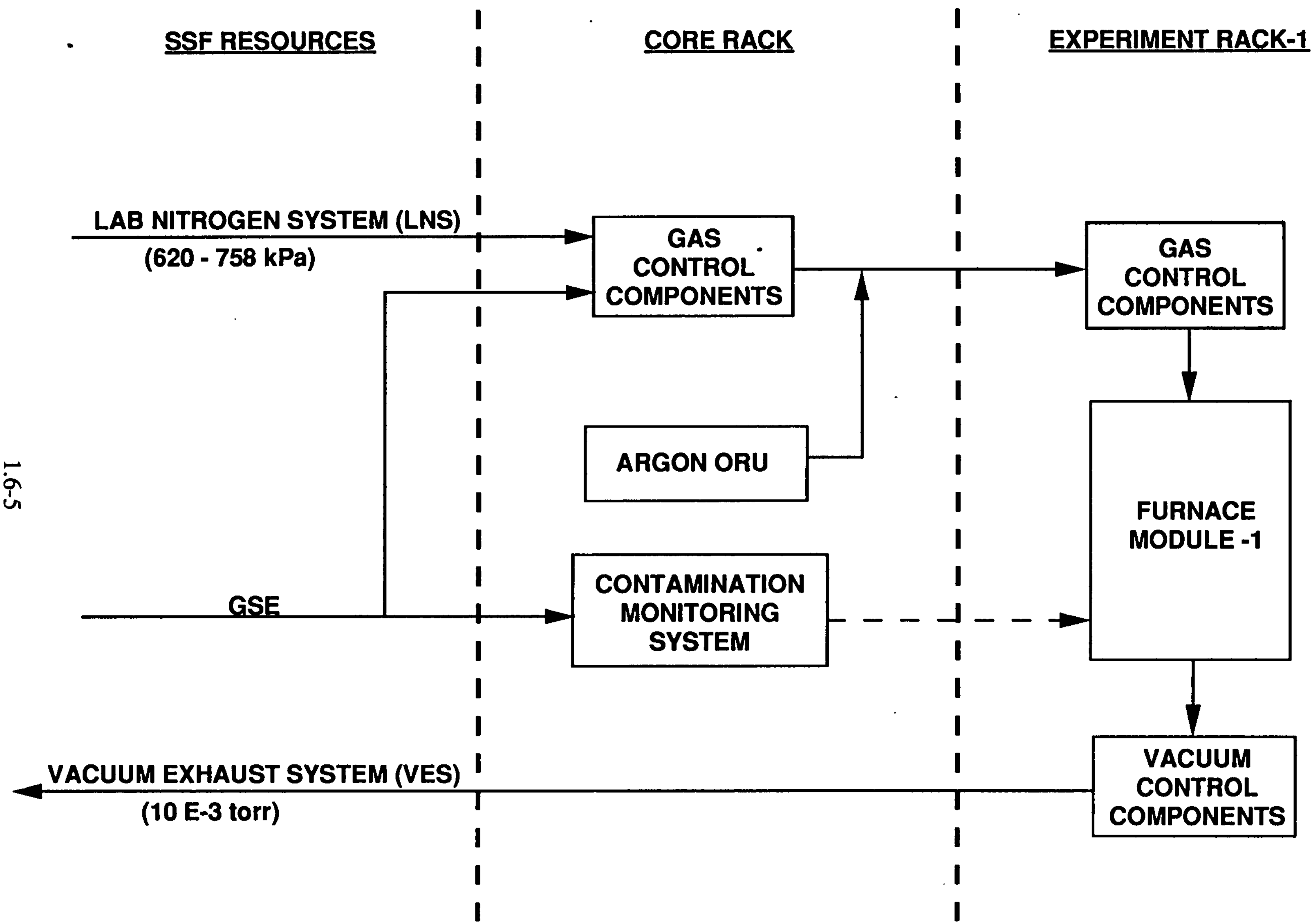


FIGURE 1.6-2. GDS INTERFACE BLOCK DIAGRAM

TABLE 1.6-2. FLUID REQUIREMENTS

Equipment Item and FO No.	Functional Requirement (Pressure, Purge, Vent Vacuum)	Gas or Liquid Parameters					Vent		Vacuum Vent Rate: torr-l/sec	Special Considerations (as applicable)
		Type	Quantity Stored (kg)	Pressure Limits (N/m2)	Flow-rate (kg/h)	Pressure Drop (N/m2)	Pressure (Pa)	When Required and Duration		
FO-1	N/A									
FO-2	N/A									
FO-3	Purge/vent	GN_2	1.4 (supp. by SSF)	TBD	TBD	TBD	0.133	TBD	1.2×10^{-3}	
FO-4	N_2 purge/vent	GN_2	1.4	TBD	TBD	TBD	0.133	TBD	1.2×10^{-3}	
FO-4	Ar purge/vent	Ar	1.9	TBD	TBD	TBD	0.133	TBD	1.2×10^{-3}	
FO-5	N/A									
FO-6	N/A									
FO-6A	N/A									
FO-7	N/A									
FO-8	N/A									
FO-9	Vent						0.133	TBD	1.2×10^{-3}	
FO-10	N/A									
FO-11	N/A									

1.7. DATA SYSTEM REQUIREMENTS

This section describes the Space Station Furnace Facility (SSFF) Data Management System (DMS) and the data system requirements of the SSFF to Space Station Freedom (SSF). The SSFF DMS contains the electronics for control and monitoring of subsystems associated with SSFF Core and Furnace Module-1 operations, including the Thermal Control Subsystem (TCS), the Power Conditioning and Distribution Subsystem (PCDS), and the Gas Distribution Subsystem (GDS). In addition to these subsystem tasks, the DMS also monitors and controls the unique functions of Furnace Module-1 including closed loop control of heater temperatures via thermocouple inputs (and other sensors), sensing and control of furnace translation (i.e., movement of the relative sample position to the hot/cold zones), and sensing and control of the Furnace Module-1 actuators and effectors. The DMS provides a communications media for the facility, stores digitized experiment data, and provides an interface to the SSF DMS. The SSFF DMS, as shown in Figure 1.7-1, consists of the Core and distributed components. Subsections 1.7.1 through 1.7.5 and Tables 1.7-1 through 1.7-5 define the DMS interface data and resource requirements of the SSFF.

1.7.1 SIGNAL INTERFACE DEFINITION

Table 1.7-1 defines the following data signals and control:

- Onboard and uplink commands to the SSFF and SSFF Furnace Module-1
- Routing of SSFF Core housekeeping data
- Routing of Furnace Module-1 housekeeping data
- Routing of Furnace Module-1 science data

1.7.2 SIGNAL INTERFACE DEFINITION EXPANSION

Table 1.7-2 is an expansion of the data from Table 1.7-1.

1.7.3 EVENT/EXCEPTION MONITORING REQUIREMENTS

Onboard event and exception monitoring requirements for SSFF and Furnace Module-1 are defined in Table 1.7-3.

1.7.4 PAYLOAD OPERATIONS INTEGRATION CENTER DISPLAY REQUIREMENTS

The Payload Operations Integration Center (POIC) controls all payload operations and is equipped with consoles for data management, operations control, and mission planning. The data to provide this capability are shown in Table 1.7-4.

1.7.5 POIC LIMIT SENSING/EXCEPTION MONITORING REQUIREMENTS

Limit sensing and exception monitoring is provided to the POIC via downlink and is defined in Table 1.7-5.

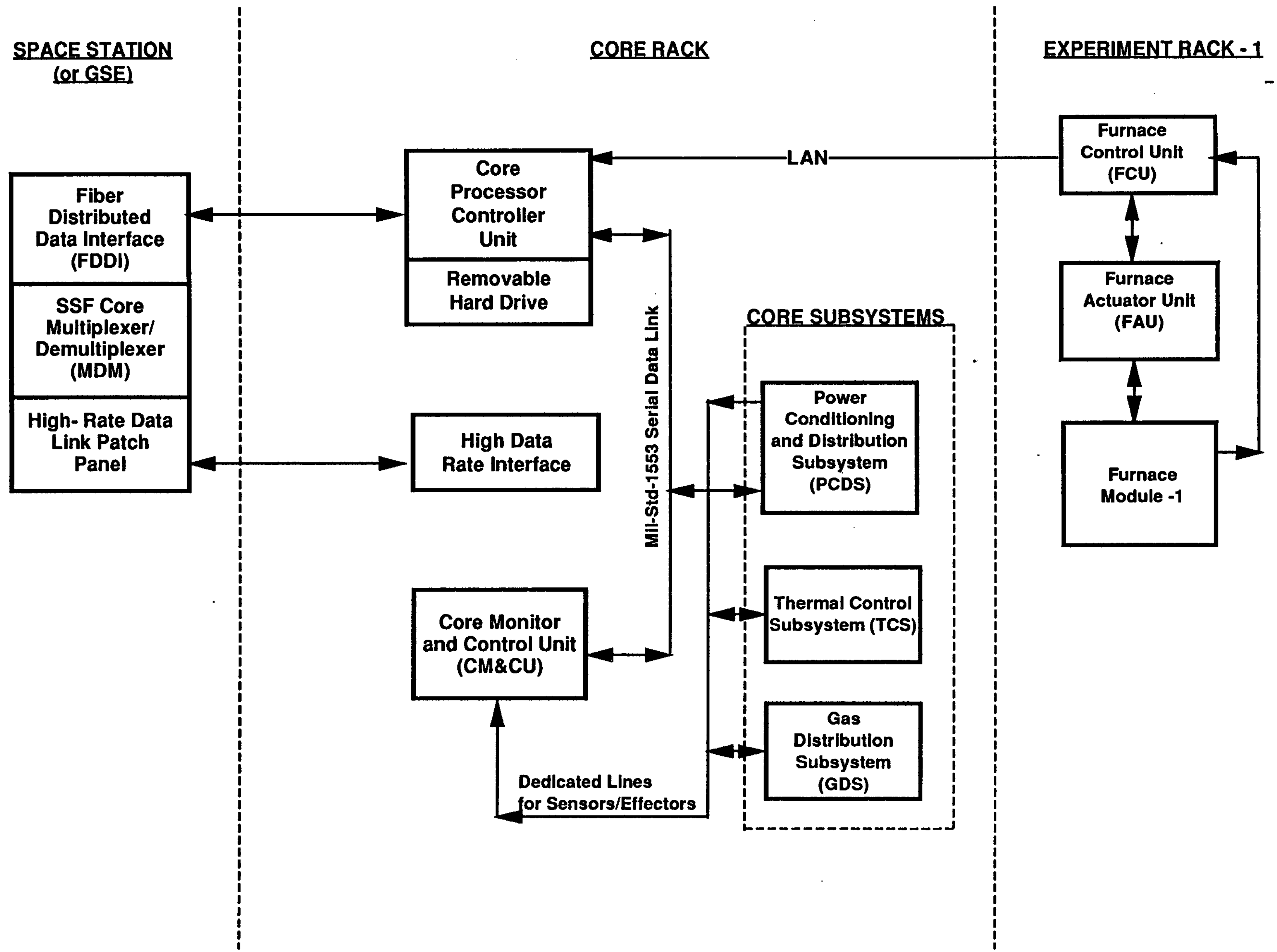


FIGURE 1.7-1. DMS INTERFACE BLOCK DIAGRAM

TABLE 1.7-1. SIGNAL INTERFACE DEFINITION

```
-----------------------------------------------------------------------------------------------------------
|   |                                   |C|S D|I N|SER.DATA |E|E|C|S R|///////////////RESERVED///////////////|
|   |                                   |M|I E|N O|---------|V|X|A|A A|-----------|---------|--------------|
|   |                                   |D|G F|T .|NM|NW|S|T|E|C|L|M T|   |   | |  |  | |  |   | |        |
|ENT|                                   | |N .|R  |OS|OO|O|Y|N|P|.|P E|   |   | |  |  | |  |   | |        |
|NO.|          DESCRIPTION              |U|A  |F  |.G|.R| |P|T|M|C|L  |   |   | |  |  | |  |   | |        |
|   |                                   |L|L  |A  |OS|OD|F|E| |O|O|E  |   |   | |  |  | |  |   | |        |
|   |                                   |K|   |C  |F |FS|X| | |N|F|    |   |   | |  |  | |  |   | |        |
-----------------------------------------------------------------------------------------------------------
|106|FURNACE MODULE HOUSEKEEPING DATA| |SI |  1| 3|32| |N| | | |  1|   |   | |  |  | |  |   | |        |
|107|SSFF HOUSEKEEPING DATA           | |SI |  1| 3|32| |N| | | |  1|   |   | |  |  | |  |   | |        |
|850|FURNACE SCIENCE DATA             | |SI |  1| 3|32| |N| | | |  1|   |   | |  |  | |  |   | |        |
|851|FURNACE SCIENCE DATA             | |SI |  1| 3|32| |N| | | |  1|   |   | |  |  | |  |   | |        |
|900|SSF CMDS & S/W PATCHES TO SSFF    |Y|SO |  1|  |  | |N| | | |  1|   |   | |  |  | |  |   | |        |
-----------------------------------------------------------------------------------------------------------
              1         2         3         4         5         6         7         8
123 45678901234567890123456789012345 6 789 012 34 56 7 8 9 0 1 234 567 890 123 4 567 890 1 23 4567 89 0
```

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 1 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD/ULK	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	START WD#	START BT	END WD#	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
001	107	SSFF HOUSEKEEPING DATA		SS																41	2
200	106	Go/NoGo Error Override		DI	01			B	00	00	00	00					Y		3330	41	2
201	106	Process Elapsed Time - Seconds		DG	01	06		U	00	01	00	06					Y		3331	41	2
202	106	CGF Sytstem State		DG	01	03		U	00	07	00	09					Y		3332	41	2
203	106	Sample Number (Mode)		DG	01	06		U	00	10	00	15					Y		3333	41	2
204	106	Process Elapsed Time - Hours		DG	01	10		U	01	00	01	09					Y		3334	41	2
205	106	Process Elapsed Time - Minutes		DG	01	06		U	01	10	01	15					Y		3335	41	2
207	106	IFEA Water Outlet Temp		AI	01			S	03	00	03	07			Y	Y	Y		3336	41	2
208	106	IFEA Lower Humidity		AI	01			S	04	00	04	07			Y	Y	Y		3337	41	2
209	106	IFEA Upper Humidity		AI	01			S	05	00	05	07			Y	Y	Y		3338	41	2
210	106	IFEA Upper Atmosphere Temp		AI	01			S	12	00	12	07			Y	Y	Y		3355	41	2
211	106	RFM Cold End Shell Temp		AI	01			S	13	00	13	07			Y	Y	Y		3356	41	2
212	106	RFM Hot End Shell Temp		AI	01			S	14	00	14	07			Y	Y	Y		3357	41	2
213	106	Ampoule Alignment Arm Temp		AI	01			S	15	00	15	07				Y	Y		3358	41	2
214	106	SEM Track Temp		AI	01			S	16	00	16	07				Y	Y		3359	41	2
215	106	IFEA Absolute Pressure 1		AI	01			S	17	00	17	07			Y	Y	Y		3360	41	2
216	106	IFEA Absolute Pressure 2		AI	01			S	18	00	18	07			Y	Y	Y		3361	41	2
217	106	Furnace Linear Position		AI	01			S	19	00	19	07				Y	Y		3362	41	2
218	106	Indexing CAM Rotary Position		AI	01			S	20	00	20	07				Y	Y		3363	41	2
219	106	Experiment Main Bus Current		AI	01			S	21	00	21	07			Y	Y	Y		3364	41	2
220	106	Experiment Main Bus Voltage		AI	01			S	22	00	22	07			Y	Y	Y		3365	41	2
221	106	Water Outlet Vlv RCCB Off Status		DI	01			B	23	00	23	00					Y		3250	41	2
222	106	Water Outlet Vlv RCCB On Status		DI	01			B	23	01	23	01					Y		3251	41	2
223	106	IFEA Coolant Flow #1 Status		DI	01			B	23	02	23	02			Y		Y		3366	41	2
224	106	IFEA Coolant Flow #2 Status		DI	01			B	23	03	23	03			Y		Y		3367	41	2
225	106	Vacuum Vent Vlv RCCB Off Status		DI	01			B	23	04	23	04					Y		3368	41	2
226	106	Vacuum Vent Vlv RCCB On Status		DI	01			B	23	05	23	05					Y		3369	41	2
227	106	Hot Boost Mod A RCCB Off Status		DI	01			B	23	06	23	06					Y		3370	41	2
228	106	Hot Boost Mod A RCCB On Status		DI	01			B	23	07	23	07					Y		3371	41	2
229	106	Hot Boost Mod B RCCB Off Status		DI	01			B	23	08	23	08					Y		3372	41	2
230	106	Hot Boost Mod B RCCB On Status		DI	01			B	23	09	23	09					Y		3373	41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 2 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMDULK	USAGE	MN SO G.	NM OS /G/ WDS/	S O FIXD	TYPE	START WD#	START BT#	END WD#	END BT#	DATA TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
231	106		COLD Main Prim Mod RCCB Off Stat		DI	01			B	23	10	23	10						Y		3374	41	2
232	106		COLD Main Prim Mod RCCB On Stat		DI	01			B	23	11	23	11						Y		3375	41	2
233	106		HotMain Prim Mod A RCCB Off Stat		DI	01			B	23	12	23	12						Y		3376	41	2
234	106		HotMain Prim Mod A RCCB On Stat		DI	01			B	23	13	23	13						Y		3377	41	2
235	106		Water Inlet Valve RCCB Off Stat		DI	01			B	23	14	23	14						Y		3378	41	2
236	106		Water Inlet Valve RCCB On Status		DI	01			B	23	15	23	15						Y		3379	41	2
237	106		PDS Airflow 1 Status		DI	01			B	24	00	24	00				Y		Y		3380	41	2
238	106		SCS Airflow 1 Status		DI	01			B	24	01	24	01				Y		Y		3381	41	2
239	106		PCS Airflow 1 Status		DI	01			B	24	02	24	02				Y		Y		3382	41	2
240	106		PCS Airflow 2 Status		DI	01			B	24	03	24	03				Y		Y		3383	41	2
241	106		Argon Fill Valve RCCB Off Status		DI	01			B	24	04	24	04						Y		3384	41	2
242	106		Argon Fill Valve RCCB On Status		DI	01			B	24	05	24	05						Y		3385	41	2
243	106		PCS Utility RCCB Off Status		DI	01			B	24	06	24	06						Y		3386	41	2
244	106		PCS Utility RCCB On Status		DI	01			B	24	07	24	07						Y		3387	41	2
245	106		Peltier Conn Motor RCCB Off Stat		DI	01			B	24	08	24	08						Y		3388	41	2
246	106		Peltier Conn Motor RCCB On Stat		DI	01			B	24	09	24	09						Y		3389	41	2
247	106		Cold Main Red Mod RCCB Off Stat		DI	01			B	24	10	24	10						Y		3390	41	2
248	106		Cold Main Red Mod RCCB On Status		DI	01			B	24	11	24	11						Y		3391	41	2
249	106		Hot Main Prim Mod B RCCB Off Sta		DI	01			B	24	12	24	12						Y		3392	41	2
250	106		Hot Main Prim Mod B RCCB On Stat		DI	01			B	24	13	24	13						Y		3393	41	2
251	106		Hot Guard Module RCCB Off Status		DI	01			B	24	14	24	14						Y		3394	41	2
252	106		Hot Guard Module RCCB On Status		DI	01			B	24	15	24	15						Y		3395	41	2
253	106		Mech Pulsing Mod RCCB Off Status		DI	01			B	25	00	25	00						Y		3252	41	2
254	106		Mech Pulsing Mod RCCB On Status		DI	01			B	25	01	25	01						Y		3253	41	2
255	106		IFEA ABS Press 2 RCCB Off Status		DI	01			B	25	02	25	02						Y		3396	41	2
256	106		IFEA ABS Press 2 RCCB On Status		DI	01			B	25	03	25	03						Y		3397	41	2
257	106		IFEA ABS Press 1 RCCB Off Status		DI	01			B	25	04	25	04						Y		3398	41	2
258	106		IFEA ABS Press 1 RCCB On Status		DI	01			B	25	05	25	05						Y		3399	41	2
259	106		Vacuum Vent Valve Closed Status		DI	01			B	25	06	25	06						Y		3400	41	2
260	106		Vacuum Vent Valve Open Status		DI	01			B	25	07	25	07						Y		3401	41	2

Column positions: 03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 3 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WD S/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
261	106		Argon Fill Valve Closed Status		DI	01			B	25	08	25	08					Y		3402	41	2
262	106		Argon Fill Valve Open Status		DI	01			B	25	09	25	09					Y		3403	41	2
263	106		Hot Main Red Mod A RCCB Off Stat		DI	01			B	25	10	25	10					Y		3254	41	2
264	106		Hot Main Red Mod A RCCB On Stat		DI	01			B	25	11	25	11					Y		3255	41	2
265	106		Water Outlet Valve Normal Stat		DI	01			B	25	12	25	12			Y		Y		3404	41	2
266	106		Water Outlet Valve Bypass Stat		DI	01			B	25	13	25	13			Y		Y		3405	41	2
267	106		Water Inlet Valve Normal Status		DI	01			B	25	14	25	14			Y		Y		3406	41	2
268	106		Water Inlet Valve Bypass Status		DI	01			B	25	15	25	15			Y		Y		3407	41	2
269	106		Fail Safe Brake RCCB Off Status		DI	01			B	26	00	26	00					Y		3408	41	2
270	106		Fail Safe Brake RCCB On Status		DI	01			B	26	01	26	01					Y		3409	41	2
271	106		Core Hold Down Not Retracted		DI	01			B	26	02	26	02					Y		3410	41	2
272	106		Core Hold Down Retracted		DI	01			B	26	03	26	03					Y		3411	41	2
273	106		Core Hold Down Not Extended		DI	01			B	26	04	26	04					Y		3412	41	2
274	106		Core Hold Down Extended		DI	01			B	26	05	26	05					Y		3413	41	2
275	106		Core HD Motor RCCB Off Status		DI	01			B	26	06	26	06					Y		3414	41	2
276	106		Core HD Motor RCCB On Status		DI	01			B	26	07	26	07					Y		3415	41	2
277	106		Step Motor Clutch RCCB Off Stat		DI	01			B	26	08	26	08					Y		3416	41	2
278	106		Step Motor Clutch RCCB On Status		DI	01			B	26	09	26	09					Y		3417	41	2
279	106		Step Motor Drive RCCB Off Stat		DI	01			B	26	10	26	10					Y		3418	41	2
280	106		Step Motor Drive RCCB On Stat		DI	01			B	26	11	26	11					Y		3419	41	2
281	106		Rapid Xlation Clutch RCCB Off St		DI	01			B	26	12	26	12					Y		3420	41	2
282	106		Rapid Xlation Clutch RCCB On St		DI	01			B	26	13	26	13					Y		3421	41	2
283	106		Rapid Xlation Mtr RCCB Off Stat		DI	01			B	26	14	26	14					Y		3422	41	2
284	106		Rapid Xlation Mtr RCCB On Status		DI	01			B	26	15	26	15					Y		3423	41	2
285	106		Furnace Position Not Home		DI	01			B	27	00	27	00					Y		3424	41	2
286	106		Furnace Position Home		DI	01			B	27	01	27	01					Y		3425	41	2
287	106		Furn Extreme Trvl Not Exceeded		DI	01			B	27	02	27	02			Y		Y		3426	41	2
288	106		Furn Extreme Trvl Exceeded		DI	01			B	27	03	27	03			Y		Y		3427	41	2
289	106		Ampoule Alignment Not Retracted		DI	01			B	27	04	27	04					Y		3428	41	2
290	106		Ampoule Alignment Retracted		DI	01			B	27	05	27	05					Y		3429	41	2

003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 4 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
291	106		Ampoule Alignment Not Extended		DI	01			B	27	06	27	06					Y		3430	41	2
292	106		Ampoule Alignment Extended		DI	01			B	27	07	27	07					Y		3431	41	2
293	106		Ampoule Align Mtr RCCB Off Stat		DI	01			B	27	08	27	08					Y		3432	41	2
294	106		Ampoule Align Mtr RCCB On Stat		DI	01			B	27	09	27	09					Y		3433	41	2
295	106		Ampoule Support Not Retracted		DI	01			B	27	10	27	10					Y		3434	41	2
296	106		Ampoule Support Retracted		DI	01			B	27	11	27	11					Y		3435	41	2
297	106		Ampoule Support Not Secure		DI	01			B	27	12	27	12					Y		3436	41	2
298	106		Ampoule Support Secure		DI	01			B	27	13	27	13					Y		3437	41	2
299	106		Ampoule Spt Plt Mtr RCCB Off St		DI	01			B	27	14	27	14					Y		3438	41	2
300	106		Ampoule Spt Plt Mtr RCCB On Stat		DI	01			B	27	15	27	15					Y		3439	41	2
301	106		Cold Guard Mod RCCB Off Status		DI	01			B	28	00	28	00					Y		3256	41	2
302	106		Cold Guard Mod RCCB On Status		DI	01			B	28	01	28	01					Y		3257	41	2
303	106		Carousel Spacer Plt Gap Lim-Not		DI	01			B	28	02	28	02					Y		3440	41	2
304	106		Carousel Spacer Plt Gap Limit		DI	01			B	28	03	28	03					Y		3441	41	2
305	106		Indexing Cam Not Stowed		DI	01			B	28	04	28	04					Y		3442	41	2
306	106		Indexing Cam Stowed		DI	01			B	28	05	28	05					Y		3443	41	2
307	106		Carousel Trk Extr Left Lim-Not		DI	01			B	28	06	28	06					Y		3444	41	2
308	106		Carousel Trk Extr Left Limit		DI	01			B	28	07	28	07					Y		3445	41	2
309	106		Carousel Trk Extr Right Lim-Not		DI	01			B	28	08	28	08					Y		3446	41	2
310	106		Carousel Trk Extr Right Lim		DI	01			B	28	09	28	09					Y		3447	41	2
311	106		Hot Main Red Mod B RCCB Off Stat		DI	01			B	28	10	28	10					Y		3258	41	2
312	106		Hot Main Red Mod B RCCB On Stat		DI	01			B	28	11	28	11					Y		3259	41	2
313	106		SEM Index Motor RCCB Off Status		DI	01			B	28	12	28	12					Y		3448	41	2
314	106		SEM Index Motor RCCB On Status		DI	01			B	28	13	28	13					Y		3449	41	2
315	106		SEM Indexing Jog CCW Status		DI	01			B	28	14	28	14					Y		3450	41	2
316	106		SEM Indexing Jog CW Status		DI	01			B	28	15	28	15					Y		3451	41	2
317	106		Ampoule Not Processing		DI	01			B	29	00	29	00					Y		3452	41	2
318	106		Ampoule Processing		DI	01			B	29	01	29	01					Y		3453	41	2
319	106		System Bus Relay Off Status		DI	01			B	29	02	29	02			Y		Y		3454	41	2
320	106		System Bus Relay On Status		DI	01			B	29	03	29	03			Y		Y		3455	41	2

003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 5 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SOF FIX D	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL.	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
321	106		Peltier Pulsing Drv RCCB Off St		DI	01			B	29	04	29	04						Y		3260	41	2
322	106		Peltier Pulsing Drv RCCB On Stat		DI	01			B	29	05	29	05						Y		3261	41	2
001	850		Sync			02																41	2
002	850		Frame Count (SFID)			02																41	2
003	850		Spacelab Experiment ID			02																41	2
004	850		Sample Number (Mode)			02																41	2
005	850		Mission ID			02																41	2
006	850		Furnace Position Not Home			02																41	2
007	850		Furnace Position Home			02																41	2
008	850		Furn Extreme Trvl Not Exceeded			02																41	2
009	850		Furn Extreme Trvl Exceeded			02																41	2
010	850		Core Hold Down Not Retracted			02																41	2
011	850		Core Hold Down Retracted			02																41	2
012	850		Core Hold Down Not Extended			02																41	2
013	850		Core Hold Down Extended			02																41	2
014	850		Water Outlet Valve Normal Stat			02																41	2
015	850		Water Outlet Valve Bypass Stat			02																41	2
016	850		Water Inlet Valve Normal Status			02																41	2
017	850		Water Inlet Valve Bypass Status			02																41	2
018	850		Vacuum Vent Valve Open Status			02																41	2
019	850		Vacuum Vent Valve Closed Status			02																41	2
020	850		Argon Fill Valve Open Status			02																41	2
021	850		Argon Fill Valve Closed Status			02																41	2
022	850		Ampoule Support Not Retracted			02																41	2
023	850		Ampoule Support Retracted			02																41	2
024	850		Ampoule Alignment Not Retracted			02																41	2
025	850		Ampoule Alignment Retracted			02																41	2
026	850		Ampoule Alignment Not Extended			02																41	2
027	850		Ampoule Alignment Extended			02																41	2
028	850		SEM Indexing Jog CCW Status			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 6 of 38)

ENT NO.	CORR. / NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G/ W D S /	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA TYPE	DATA VALUE	MON REQ EVNT	EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
029	850	SEM Indexing Jog CW Status			02																41	2
030	850	Ampoule Not Processing			02																41	2
031	850	Ampoule Processing			02																41	2
032	850	Indexing Cam Not Stowed			02																41	2
033	850	Indexing Cam Stowed			02																41	2
034	850	Peltier Connector Not Retracted			02																41	2
035	850	Peltier Connector Retracted			02																41	2
036	850	Peltier Connector Not Extended			02																41	2
037	850	Peltier Connector Extended			02																41	2
038	850	Ampoule 4 Failure 2 Status			02																41	2
039	850	Ampoule 4 Failure 1 Status			02																41	2
040	850	Ampoule 3 Failure 2 Status			02																41	2
041	850	Ampoule 3 Failure 1 Status			02																41	2
042	850	Ampoule 2 Failure 2 Status			02																41	2
043	850	Ampoule 2 Failure 1 Status			02																41	2
044	850	Ampoule 1 Failure 2 Status			02																41	2
045	850	Ampoule 1 Failure 1 Status			02																41	2
046	850	PDS Airflow 1 Status			02																41	2
047	850	PCS Airflqw 1 Status			02																41	2
048	850	IFEA ABS Press 2 RCCB Off Status			02																41	2
049	850	IFEA ABS Press 2 RCCB On Status			02																41	2
050	850	Spare RCCB Off Stat			02																41	2
051	850	Spare RCCB On Stat			02																41	2
052	850	IFEA Coolant Flow #1 Status			02																41	2
053	850	SCS Airflow 1 Status			02																41	2
054	850	Cartridge 2 Failure 2 Status			02																41	2
055	850	Cartridge 2 Failure 1 Status			02																41	2
056	850	Cartridge 1 Failure 2 Status			02																41	2
057	850	Cartridge 1 Failure 1 Status			02																41	2
058	850	Ampoule 6 Failure 2 Status			02																41	2
03	06 07		39	40	43	45	47	48	51	53	55	57			65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 7 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
059	850	Ampoule 6 Failure 1 Status			02															41	2
060	850	Ampoule 5 Failure 2 Status			02															41	2
061	850	Ampoule 5 Failure 1 Status			02															41	2
062	850	Water Outlet Vlv RCCB Off Status			02															41	2
063	850	Water Outlet Vlv RCCB On Status			02															41	2
064	850	Vacuum Vent Vlv RCCB Off Status			02															41	2
065	850	Vacuum Vent Vlv RCCB On Status			02															41	2
066	850	SEM Index Motor RCCB Off Status			02															41	2
067	850	SEM Index Motor RCCB On Status			02															41	2
068	850	Core HD Motor RCCB Off Status			02															41	2
069	850	Core HD Motor RCCB On Status			02															41	2
070	850	Hot Boost Mod A RCCB Off Status			02															41	2
071	850	Hot Boost Mod A RCCB On Status			02															41	2
072	850	Hot Boost Mod B RCCB Off Status			02															41	2
073	850	Hot Boost Mod B RCCB On Status			02															41	2
074	850	Cold Main Prim Mod RCCB Off Stat			02															41	2
075	850	Cold Main Prim Mod RCCB On Stat			02															41	2
076	850	HotMain Prim Mod A RCCB Off Stat			02															41	2
077	850	HotMain Prim Mod A RCCB On Stat			02															41	2
078	850	Carousel Trk Extr Right Lim-Not			02															41	2
079	850	Carousel Trk Extr Right Lim			02															41	2
080	850	Ampoule Support Not Secure			02															41	2
081	850	Ampoule Support Secure			02															41	2
082	850	Carousel Trk Extr Left Lim-Not			02															41	2
083	850	Carousel Trk Extr Left Limit			02															41	2
084	850	Carousel Spacer Plt Gap Lim-Not			02															41	2
085	850	Carousel Spacer Plt Gap Limit			02															41	2
086	850	Ampoule Spt Plt Mtr RCCB Off St			02															41	2
087	850	Ampoule Spt Plt Mtr RCCB On Stat			02															41	2
088	850	Ampoule Align Mtr RCCB Off Stat			02															41	2
03	06 07		39	40	43	45	47	48	51	53	55	57		65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 8 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD/UL K	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
089	850	Ampoule Align Mtr RCCB On Stat			02																41	2
090	850	Water Inlet Valve RCCB Off Stat			02																41	2
091	850	Water Inlet Valve RCCB On Status			02																41	2
092	850	Argon Fill Valve RCCB Off Status			02																41	2
093	850	Argon Fill Valve RCCB On Status			02																41	2
094	850	System Bus Relay Off Status			02																41	2
095	850	System Bus Relay On Status			02																41	2
096	850	IFEA Coolant Flow #2 Status			02																41	2
097	850	PCS Airflow 2 Status			02																41	2
098	850	Cartridge 6 Failure 2 Status			02																41	2
099	850	Cartridge 6 Failure 1 Status			02																41	2
100	850	Cartridge 5 Failure 2 Status			02																41	2
101	850	Cartridge 5 Failure 1 Status			02																41	2
102	850	Cartridge 4 Failure 2 Status			02																41	2
103	850	Cartridge 4 Failure 1 Status			02																41	2
104	850	Cartridge 3 Failure 2 Status			02																41	2
105	850	Cartridge 3 Failure 1 Status			02																41	2
106	850	PCS Utility RCCB Off Status			02																41	2
107	850	PCS Utility RCCB On Status			02																41	2
108	850	Step Motor Drive RCCB Off Stat			02																41	2
109	850	Step Motor Drive RCCB On Stat			02																41	2
110	850	IFEA ABS Press 1 RCCB Off Status			02																41	2
111	850	IFEA ABS Press 1 RCCB On Status			02																41	2
112	850	Peltier Conn Motor RCCB Off Stat			02																41	2
113	850	Peltier Conn Motor RCCB On Stat			02																41	2
114	850	Step Motor Clutch RCCB Off Stat			02																41	2
115	850	Step Motor Clutch RCCB On Status			02																41	2
116	850	Rapid Xlation Clutch RCCB Off St			02																41	2
117	850	Rapid Xlation Clutch RCCB On St			02																41	2
118	850	Rapid Xlation Mtr RCCB Off Stat			02																41	2

Column positions: 03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 9 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD ULK	USAGE	MN SOG.	NM OS/G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
119	850	Rapid Xlation Mtr RCCB On Status			02																41	2
120	850	Fail Safe Brake RCCB Off Status			02																41	2
121	850	Fail Safe Brake RCCB On Status			02																41	2
122	850	Cold Main Red Mod RCCB Off Stat			02																41	2
123	850	Cold Main Red Mod RCCB On Status			02																41	2
124	850	Hot Main Prim Mod B RCCB Off Sta			02																41	2
125	850	Hot Main Prim Mod B RCCB On Stat			02																41	2
126	850	Hot Guard Module RCCB Off Status			02																41	2
127	850	Hot Guard Module RCCB On Status			02																41	2
128	850	Mech Pulsing Mod RCCB Off Status			02																41	2
129	850	Mech Pulsing Mod RCCB On Status			02																41	2
130	850	Hot Main Red Mod A RCCB Off Stat			02																41	2
131	850	Hot Main Red Mod A RCCB On Stat			02																41	2
132	850	Cold Guard Mod RCCB Off Status			02																41	2
133	850	Cold Guard Mod RCCB On Status			02																41	2
134	850	Hot Main Red Mod B RCCB Off Stat			02																41	2
135	850	Hot Main Red Mod B RCCB On Stat			02																41	2
136	850	Peltier Pulsing Drv RCCB Off St			02																41	2
137	850	Peltier Pulsing Drv RCCB On Stat			02																41	2
138	850	Sample to Process #1			02																41	2
139	850	Sample to Process #2			02																41	2
140	850	Sample to Process #3			02																41	2
141	850	Sample to Process #4			02																41	2
142	850	Sample to Process #5			02																41	2
143	S850	ample to Process #6			02																41	2
144	850	Processed Sample #1			02																41	2
145	850	Processed Sample #2			02																41	2
146	850	Processed Sample #3			02																41	2
147	850	Processed Sample #4			02																41	2
148	850	Processed Sample #5			02																41	2

03 06 0.07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 10 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD#	START BT#	END WD#	END BT#	DATA TYPE	DATA VALUE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
149	850		Processed Sample #6			02																41	2
150	850		Last Sample Index			02																41	2
151	850		GMT Day			02																41	2
152	850		GMT Milliseconds of Day			02																41	2
153	850		GMT Fractional Milliseconds			02																41	2
154	850		Last Command Received Word #0			02																41	2
155	850		Last Command Received Word #1			02																41	2
156	850		Last Command Received Word #2			02																41	2
157	850		Last Command Received Word #3			02																41	2
158	850		Last Command Received Word #4			02																41	2
159	850		Last Command Received Word #5			02																41	2
160	850		Last Command Received Word #6			02																41	2
161	850		Last Command Received Word #7			02																41	2
162	850		Last Command Received Word #8			02																41	2
163	850		Last Command Received Word #9			02																41	2
164	850		Last Command Received Word #10			02																41	2
165	850		Last Command Received Word #11			02																41	2
166	850		Last Command Received Word #12			02																41	2
167	850		Last Command Received Word #13			02																41	2
168	850		Last Command Received Word #14			02																41	2
169	850		Last Command Received Word #15			02																41	2
170	850		Last Command Received Word #16			02																41	2
171	850		Last Command Received Word #17			02																41	2
172	850		Last Command Received Word #18			02																41	2
173	850		Last Command Received Word #19			02																41	2
174	850		Last Command Received Word #20			02																41	2
175	850		Last Command Received Word #21			02																41	2
176	850		Last Command Received Word #22			02																41	2
177	850		Last Command Received Word #23			02																41	2
178	850		Last Command Received Word #24			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 11 of 38)

ENT NO.	COR R.	NO.	DESCRIPTION	CMD/ UDLK	USAGE	MN SO G.	NM OS /GW DS/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
179	850		Last Command Received Word #25			02															41	2
180	850		Last Command Received Word #26			02															41	2
181	850		Last Command Received Word #27			02															41	2
182	850		Last Command Received Word #28			02															41	2
183	850		Last Command Received Word #29			02															41	2
184	850		Last Command Received Word #30			02															41	2
185	850		Last Command Received Word #31			02															41	2
186	850		Invalid Command Flag			02															41	2
187	850		User Requested Data			02															41	2
188	850		ECS Next Timeline Record			02															41	2
189	850		FTS Next Timeline Record			02															41	2
190	850		FHS Cold Guard Next Timeline Rec			02															41	2
191	850		FHS Cold Zone Next Timeline Rec			02															41	2
192	850		FHS Booster Next Timeline Rec			02															41	2
193	850		FHS Hot Zone Next Timeline Rec			02															41	2
194	850		FHS Hot Guard Next Timeline Rec			02															41	2
195	850		SIDS Next Timeline Record			02															41	2
196	850		ECS Current Segment Start Time			02															41	2
197	850		ECS Current Segment Stop Time			02															41	2
198	850		FTS Current Segment Start Time			02															41	2
199	850		FTS Current Segment Stop Time			02															41	2
200	850		FHS Cold Guard Cur Seg Start Tim			02															41	2
201	850		FHS Cold Guard Cur Seg Stop Time			02															41	2
202	850		FHS Cold Zone Cur Seg Start Time			02															41	2
203	850		FHS Cold Zone Cur Seg Stop Time			02															41	2
204	850		FHS Booster Cur Seg Start Time			02															41	2
205	850		FHS Booster Cur Seg Stop Time			02															41	2
206	850		FHS Hot Zone Cur Seg Start Time			02															41	2
207	850		FHS Hot Zone Cur Seg Stop Time			02															41	2
208	850		FHS Hot Guard Cur Seg Start Time			02															41	2

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0  00   34  4 4 44  5 5 5 5  666  77  7 7  8
3  67   90  3 5 78  1 3 5 7  567  12  5 8  0
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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 12 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
209	850		FHS Hot Guard Cur Seg Stop Time			02															41	2
210	850		SIDS Current Segment Start Time			02															41	2
211	850		SIDS Current Segment Stop Time			02															41	2
212	850		Experiment Main Bus Current			02															41	2
213	850		Experiment Main Bus Voltage			02															41	2
214	850		IFEA Lower Humidity			02															41	2
215	850		IFEA Upper Humidity			02															41	2
216	850		IFEA Absolute Pressure 1			02															41	2
217	850		IFEA Absolute Pressure 2			02															41	2
218	850		IFEA Lower Atmosphere Temp			02															41	2
219	850		IFEA Upper Atmosphere Temp			02															41	2
220	850		IFEA Water Inlet Temp			02															41	2
221	850		IFEA Water Outlet Temp			02															41	2
222	850		RFM Cold End Shell Temp			02															41	2
223	850		RFM Hot End Shell Temp			02															41	2
224	850		RFM Water Outlet Temp			02															41	2
225	850		Sample 1 Temp 1			02															41	2
226	850		Sample 1 Temp 2			02															41	2
227	850		Sample 1 Temp 3			02															41	2
228	850		Sample 1 Temp 4			02															41	2
229	850		Sample 1 Temp 5			02															41	2
230	850		Sample 1 Temp 6			02															41	2
231	850		Sample 2 Temp 1			02															41	2
232	850		Sample 2 Temp 2			02															41	2
233	850		Sample 2 Temp 3			02															41	2
234	850		Sample 2 Temp 4			02															41	2
235	850		Sample 2 Temp 5			02															41	2
236	850		Sample 2 Temp 6			02															41	2
237	850		Sample 3 Temp 1			02															41	2
238	850		Sample 3 Temp 2			02															41	2
03	06	07		39	40	43	45	47	48	51	53	55	57		65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 13 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	S O F I X D	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
239	850		Sample 3 Temp 3			02															41	2
240	850		Sample 3 Temp 4			02															41	2
241	850		Sample 3 Temp 5			02															41	2
242	850		Sample 3 Temp 6			02															41	2
243	850		Sample 4 Temp 1			02															41	2
244	850		Sample 4 Temp 2			02															41	2
245	850		Sample 4 Temp 3			02															41	2
246	850		Sample 4 Temp 4			02															41	2
247	850		Sample 4 Temp 5			02															41	2
248	850		Sample 4 Temp 6			02															41	2
249	850		Sample 5 Temp 1			02															41	2
250	850		Sample 5 Temp 2			02															41	2
251	850		Sample 5 Temp 3			02															41	2
252	850		Sample 5 Temp 4			02															41	2
253	850		Sample 5 Temp 5			02															41	2
254	850		Sample 5 Temp 6			02															41	2
255	850		Sample 6 Temp 1			02															41	2
256	850		Sample 6 Temp 2			02															41	2
257	850		Sample 6 Temp 3			02															41	2
258	850		Sample 6 Temp 4			02															41	2
259	850		Sample 6 Temp 5			02															41	2
260	850		Sample 6 Temp 6			02															41	2
261	850		Stepping Motor Phase A Current			02															41	2
262	850		Stepping Motor Phase A Voltage			02															41	2
263	850		Stepping Motor Phase B Current			02															41	2
264	850		Stepping Motor Phase B Voltage			02															41	2
265	850		Furnace Linear Position			02															41	2
266	850		FTS Stepping Motor Temp			02															41	2
267	850		Rapid Translation Motor RPM			02															41	2
268	850		Cold Guard Heater Current			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 14 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	S O P F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA TYPE	DATA VALUE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
269	850		Cold Guard Heater Voltage			02																41	2
270	850		Cold Main Primary Heater Current			02																41	2
271	850		Cold Main Primary Heater Voltage			02																41	2
272	850		Cold Main Red Heater Current			02																41	2
273	850		Cold Main Red Heater Voltage			02																41	2
274	850		Hot Boost Heater Current			02																41	2
275	850		Hot Boost Heater Voltage			02																41	2
276	850		Hot Guard Heater Current			02																41	2
277	850		Hot Guard Heater Voltage			02																41	2
278	850		Hot Main Primary Heater Current			02																41	2
279	850		Hot Main Primary Heater Voltage			02																41	2
280	850		Hot Main Red Heater Current			02																41	2
281	850		Hot Main Red Heater Voltage			02																41	2
282	850		Cold Zone CJ Block Temp 1			02																41	2
283	850		Cold Zone CJ Block Temp 2			02																41	2
284	850		Hot Zone CJ Block Temp 1			02																41	2
285	850		Hot Zone CJ Block Temp 2			02																41	2
286	850		Sample 1 CJ Block Temp 1			02																41	2
287	850		Sample 1 CJ Block Temp 2			02																41	2
288	850		Sample 2 CJ Block Temp 1			02																41	2
289	850		Sample 2 CJ Block Temp 2			02																41	2
290	850		Sample 3 CJ Block Temp 1			02																41	2
291	850		Sample 3 CJ Block Temp 2			02																41	2
292	850		Sample 4 CJ Block Temp 1			02																41	2
293	850		Sample 4 CJ Block Temp 2			02																41	2
294	850		Sample 5 CJ Block Temp 1			02																41	2
295	850		Sample 5 CJ Block Temp 2			02																41	2
296	850		Sample 6 CJ Block Temp 1			02																41	2
297	850		Sample 6 CJ Block Temp 2			02																41	2
298	850		Booster Heater Control Temp 1			02																41	2

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|   | |                                    | |   |   |   | |     |   |   |   |       | | |    | |     |   |     |
0   0 0                                    3 4   4   4   4 4     5   5   5   5       6 6 6    7 7     7   7     8
3   6 7                                    9 0   3   5   7 8     1   3   5   7       5 6 7    1 2     5   8     0
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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 15 of 38)

ENT NO.	COR. / NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXP ID	TABLE
299	850	Booster Heater Control Temp 2			02															41	2
300	850	Cold Guard Heater Control Temp 1			02															41	2
301	850	Cold Guard Heater Control Temp 2			02															41	2
302	850	Cold Main Prim Htr Cntrl Temp 1			02															41	2
303	850	Cold Main Prim Htr Cntrl Temp 2			02															41	2
304	850	Cold Main Red Htr Control Temp 1			02															41	2
305	850	Cold Main Red Htr Control Temp 2			02															41	2
306	850	Hot Guard Heater Control Temp 1			02															41	2
307	850	Hot Guard Heater Control Temp 2			02															41	2
308	850	Hot Main Prim Htr Control Temp 1			02															41	2
309	850	Hot Main Prim Htr Control Temp 2			02															41	2
310	850	Hot Main Red Htr Control Temp 1			02															41	2
311	850	Hot Main Red Htr Control Temp 2			02															41	2
312	850	Indexing CAM Rotary Position			02															41	2
313	850	Ampoule Alignment Arm Temp			02															41	2
314	850	SEM Track Temp			02															41	2
315	850	RTD Mux 1 Calibration - High			02															41	2
316	850	RTD Mux 1 Calibration - Low			02															41	2
317	850	RTD Mux 2 Calibration - High			02															41	2
318	850	RTD Mux 2 Calibration - Low			02															41	2
319	850	RTD Mux 3 Calibration - High			02															41	2
320	850	RTD Mux 3 Calibration - Low			02															41	2
321	850	RTD Mux 4 Calibration - High			02															41	2
322	850	RTD Mux 4 Calibration - Low			02															41	2
323	850	RTD Mux 5 Calibration - High			02															41	2
324	850	RTD Mux 5 Calibration - Low			02															41	2
325	850	RTD Mux 6 Calibration - High			02															41	2
326	850	RTD Mux 6 Calibration - Low			02															41	2
327	850	RTD Mux 7 Calibration - High			02															41	2
328	850	RTD Mux 7 Calibration - Low			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 16 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
329	850	RTD Mux 8 Calibration - High			02															41	2
330	850	RTD Mux 8 Calibration - Low			02															41	2
331	850	TC Group A Calibration Type K			02															41	2
332	850	TC Group A Calibration Type S			02															41	2
333	850	TC Group A Calibration Type B			02															41	2
334	850	TC Group B Calibration Type K			02															41	2
335	850	TC Group B Calibration Type S			02															41	2
336	850	TC Group B Calibration Type B			02															41	2
337	850	TC Group C Calibration Type K			02															41	2
338	850	TC Group C Calibration Type S			02															41	2
339	850	TC Group C Calibration Type B			02															41	2
340	850	TC Group D Calibration Type K			02															41	2
341	850	TC Group D Calibration Type S			02															41	2
342	850	TC Group D Calibration Type B			02															41	2
343	850	SMS Board Velocity Reading			02															41	2
344	850	Cold Guard Zone CJ Blck Act Temp			02															41	2
345	850	Cold Main CJ Block Act Temp			02															41	2
346	850	Booster Zone CJ Block Act Temp			02															41	2
347	850	Hot Main Zone CJ Block Act Temp			02															41	2
348	850	Hot Guard Zone CJ Block Act Temp			02															41	2
349	850	Total Calculated Power			02															41	2
350	850	Cold Guard Htr Cmd Current			02															41	2
351	850	Unused			02															41	2
352	850	Cold Main Prim Htr Cmd Current			02															41	2
353	850	Cold Main Red Htr Cmd Current			02															41	2
354	850	Booster Htr Cmd Current			02															41	2
355	850	Unused			02															41	2
356	850	Hot Main Prim Htr Cmd Current			02															41	2
357	850	Hot Main Red Htr Cmd Current			02															41	2
358	850	Hot Guard Htr Cmd Current			02															41	2

003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 17 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SOFIXD	TYPE	DATA DESCRIPTION START WD#	START BT	END WD#	END BT	TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
359	850		Unused			02																41	2
360	850		Cold Guard Zone Setpoint Temp			02																41	2
361	850		Cold Main Zone Setpoint Temp			02																41	2
362	850		Booster Zone Setpoint Temp			02																41	2
363	850		Hot Main Zone Setpoint Temp			02																41	2
364	850		Hot Guard Zone Setpoint Temp			02																41	2
365	850		Cold Guard Htr Calc Temp 1			02																41	2
366	850		Cold Guard Htr Calc Temp 2			02																41	2
367	850		Unused			02																41	2
368	850		Unused			02																41	2
369	850		Cold Main Prim Htr Calc Temp 1			02																41	2
370	850		Cold Main Prim Htr Calc Temp 2			02																41	2
371	850		Cold Main Red Htr Calc Temp 1			02																41	2
372	850		Cold Main Red Htr Calc Temp 2			02																41	2
373	850		Booster Htr Calc Temp 1			02																41	2
374	850		Booster Htr Calc Temp 2			02																41	2
375	850		Unused			02																41	2
376	850		Unused			02																41	2
377	850		Hot Main Prim Htr Calc Temp 1			02																41	2
378	850		Hot Main Prim Htr Calc Temp 2			02																41	2
379	850		Hot Main Red Htr Calc Temp 1			02																41	2
380	850		Hot Main Red Htr Calc Temp 2			02																41	2
381	850		Hot Guard Htr Calc Temp 1			02																41	2
382	850		Hot Guard Htr Calc Temp 2			02																41	2
383	850		Unused			02																41	2
384	850		Unused			02																41	2
385	850		Cold Guard Zone Act Temp			02																41	2
386	850		Cold Main Zone Act Temp			02																41	2
387	850		Booster Zone Act Temp			02																41	2
388	850		Hot Main Zone Act Temp			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 18 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UNLK	USAGE	MN SO G.	NM OS /G/ W D S /	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COEF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
389	850		Hot Guard Zone Act Temp			02															41	2
390	850		Cold Guard Zone Delta Temp			02															41	2
391	850		Cold Main Zone Delta Temp			02															41	2
392	850		Booster Zone Delta Temp			02															41	2
393	850		Hot Main Zone Delta Temp			02															41	2
394	850		Hot Guard Zone Delta Temp			02															41	2
395	850		Cold Guard Zone Uncpld Power			02															41	2
396	850		Cold Main Zone Uncpld Power			02															41	2
397	850		Booster Zone Uncpld Power			02															41	2
398	850		Hot Main Zone Uncpld Power			02															41	2
399	850		Hot Guard Zone Uncpld Power			02															41	2
400	850		Cold Guard Zone Prop Power			02															41	2
401	850		Cold Main Zone Prop Power			02															41	2
402	850		Booster Zone Prop Power			02															41	2
403	850		Hot Main Zone Prop Power			02															41	2
404	850		Hot Guard Zone Prop Power			02															41	2
405	850		Cold Guard Zone Int Power			02															41	2
406	850		Cold Main Zone Int Power			02															41	2
407	850		Booster Zone Int Power			02															41	2
408	850		Hot Main Zone Int Power			02															41	2
409	850		Hot Guard Zone Int Power			02															41	2
410	850		Cold Guard Zone Power			02															41	2
411	850		Cold Main Zone Power			02															41	2
412	850		Booster Zone Power			02															41	2
413	850		Hot Main Zone Power			02															41	2
414	850		Hot Guard Zone Power			02															41	2
415	850		Cold Guard Htr Calc Voltage			02															41	2
416	850		Unused			02															41	2
417	850		Cold Main Prim Htr Calc Voltage			02															41	2
418	850		Cold Main Red Htr Calc Voltage			02															41	2
03	06	07		39	40	43	45	47	48	51	53	55	57		65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 19 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD ULK	USAGE	MNSO G.	NMOS /G W D S /	SOF IXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXP ID	TABLE
419	850	Booster Htr Calc Voltage			02																41	2
420	850	Unused			02																41	2
421	850	Hot Main Prim Htr Calc Voltage			02																41	2
422	850	Hot Main Red Htr Calc Voltage			02																41	2
423	850	Hot Guard Htr Calc Voltage			02																41	2
424	850	Unused			02																41	2
425	850	Cold Guard Htr Act Current			02																41	2
426	850	Unused			02																41	2
427	850	Cold Main Prim Htr Act Current			02																41	2
428	850	Cold Main Red Htr Act Current			02																41	2
429	850	Booster Htr Act Current			02																41	2
430	850	Unused			02																41	2
431	850	Hot Main Prim Htr Act Current			02																41	2
432	850	Hot Main Red Htr Act Current			02																41	2
433	850	Hot Guard Htr Act Current			02																41	2
434	850	Unused			02																41	2
435	850	Cold Guard Htr Calc Resistance			02																41	2
436	850	Unused			02																41	2
437	850	ColdMain Prim Htr Calc Resistnce			02																41	2
438	850	ColdMain Red Htr Calc Resistance			02																41	2
439	850	Booster Htr Resistance			02																41	2
440	850	Unused			02																41	2
441	850	HOTMain Prim Htr Calc Resistance			02																41	2
442	850	Hot Main Red Htr Calc Resistance			02																41	2
443	850	Hot Guard Htr Calc Resistance			02																41	2
444	850	Unused			02																41	2
445	850	Cold Guard Htr Limited Power			02																41	2
446	850	Unused			02																41	2
447	850	Cold Main Prim Htr Limited Power			02																41	2
448	850	Cold Main Red Htr Limited Power			02																41	2
03	06	07	39	40	43	45	47	48	51	53	55	57			65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 20 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	S O F I X D	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
449	850	Booster Htr Limited Power			02																41	2
450	850	Unused			02																41	2
451	850	Hot Main Prim Htr Limited Power			02																41	2
452	850	Hot Main Red Htr Limited Power			02																41	2
453	850	Hot Guard Htr Limited Power			02																41	2
454	850	Unused			02																41	2
455	850	Cold Guard Htr Des Current			02																41	2
456	850	Unused			02																41	2
457	850	Cold Main Prim Htr Des Current			02																41	2
458	850	Cold Main Red Htr Des Current			02																41	2
459	850	Booster Htr Des Current			02																41	2
460	850	Unused			02																41	2
461	850	Hot Main Prim Htr Des Current			02																41	2
462	850	Hot Main Red Htr Des Current			02																41	2
463	850	Hot Guard Htr Des Current			02																41	2
464	850	Unused			02																41	2
465	850	Cold Guard Zone Saturation Flag			02																41	2
466	850	Cold Main Zone Saturation Flag			02																41	2
467	850	Booster Zone Saturation Flag			02																41	2
468	850	Hot Main Zone Saturation Flag			02																41	2
469	850	Hot Guard Zone Saturation Flag			02																41	2
470	850	Integral Power Fault Time			02																41	2
471	850	Fault Sum Delta Power			02																41	2
472	850	Fault Integral Gain			02																41	2
473	850	Fault Proportional Gain			02																41	2
474	850	Fault Intermediate Calc. Value 1			02																41	2
475	850	Fault Intermediate Calc. Value 2			02																41	2
476	850	Fault Delta Power - Previous			02																41	2
477	850	Fault Delta Power - 2nd Previous			02																41	2
478	850	Faulted Zone			02																41	2
03	06 07		39	40	43	45	47	48	51	53	55	57			65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 21 of 38)

ENT NO.	CONR.	NO.	DESCRIPTION	CMD UL K	US AGE	MNSO G.	NMOS /GW D S/	SO FIX D	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
479	850		Integral Gain Array 1			02															41	2
480	850		Integral Gain Array 2			02															41	2
481	850		Integral Gain Array 3			02															41	2
482	850		Integral Gain Array 4			02															41	2
483	850		Integral Gain Array 5			02															41	2
484	850		Proportional Gain Array 1			02															41	2
485	850		Proportional Gain Array 2			02															41	2
486	850		Proportional Gain Array 3			02															41	2
487	850		Proportional Gain Array 4			02															41	2
488	850		Proportional Gain Array 5			02															41	2
489	850		FF Ampoule Align Not Extended			02															41	2
490	850		FF Ampoule Align Extended			02															41	2
491	850		FF Ampoule Align Mtr RCCB Off			02															41	2
492	850		FF Ampoule Align Mtr RCCB On			02															41	2
493	850		FF Car Trk Extr Right Lim-Not			02															41	2
494	850		FF Car Trk Extr Right Lim			02															41	2
495	850		FF Car Trk Extr Left Limit-Not			02															41	2
496	850		FF Car Trk Extr Left Limit			02															41	2
497	850		FF Car Spacer Plt Gap Lim-Not			02															41	2
498	850		FF Car Spacer Plt Gap Lim			02															41	2
499	850		FF Indexing Cam Not Stowed			02															41	2
500	850		FF Indexing Cam Stowed			02															41	2
501	850		FF Ampoule Not Processing			02															41	2
502	850		FF Ampoule Processing			02															41	2
503	850		FF SEM Index Motor RCCB On Stat			02															41	2
504	850		FF SEM Index Motor RCCB Off Stat			02															41	2
505	850		FF Fail Safe Brake RCCB Off			02															41	2
506	850		FF Fail Safe Brake RCCB On			02															41	2
507	850		FF Core Hold Down Not Retracted			02															41	2
508	850		FF Core Hold Down Retracted			02															41	2

003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 22 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G. .	NM OS /G W D S /	S O F I X D	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
509	850	FF	Core Hold Down Not Extended			02																41	2
510	850	FF	Core Hold Down Extended			02																41	2
511	850	FF	Core HD Motor RCCB Off			02																41	2
512	850	FF	Core HD Motor RCCB On			02																41	2
513	850	FF	Ampoule Support Not Retracted			02																41	2
514	850	FF	Ampoule Support Retracted			02																41	2
515	850	FF	Ampoule Support Not Secure			02																41	2
516	850	FF	Ampoule Support Secure			02																41	2
517	850	FF	Ampoule Spt Plt Mtr RCCB Off			02																41	2
518	850	FF	Ampoule Spt Plt Mtr RCCB On			02																41	2
519	850	FF	Ampoule Align Not Retracted			02																41	2
520	850	FF	Ampoule Align Retracted			02																41	2
521	850	FF	PCS Utility RCCB Off			02																41	2
522	850	FF	PCS Utility RCCB On			02																41	2
523	850	FF	System Bus Relay Off			02																41	2
524	850	FF	System Bus Relay On			02																41	2
525	850	FF	Furnace Position Not Home			02																41	2
526	850	FF	Furnace Position Home			02																41	2
527	850	FF	Furn Extrme Trvl Not Exceeded			02																41	2
528	850	FF	Furn Extreme Trvl Exceeded			02																41	2
529	850	FF	Step Motor Drive RCCB Off			02																41	2
530	850	FF	Step Motor Drive RCCB On			02																41	2
531	850	FF	Step Motor Clutch RCCB Off			02																41	2
532	850	FF	Step Motor Clutch RCCB On			02																41	2
533	850	FF	Rapid Xlation Mtr RCCB Off			02																41	2
534	850	FF	Rapid Xlation Mtr RCCB On			02																41	2
535	850	FF	Rapid Xlation Clutch RCCB Off			02																41	2
536	850	FF	Rapid Xlation Clutch RCCB On			02																41	2
537	850	FF	Water Inlet Valve RCCB Off			02																41	2
538	850	FF	Water Inlet Valve RCCB On			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 23 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
539	850	FF	Vacuum Vent Valve Closed			02															41	2
540	850	FF	Vacuum Vent Valve Open			02															41	2
541	850	FF	Vacuum Vent Vlv RCCB Off			02															41	2
542	850	FF	Vacuum Vent Vlv RCCB On			02															41	2
543	850	FF	IFEA ABS Press 2 RCCB Off			02															41	2
544	850	FF	IFEA ABS Press 2 RCCB On			02															41	2
545	850	FF	IFEA ABS Press 1 RCCB Off			02															41	2
546	850	FF	IFEA ABS Press 1 RCCB On			02															41	2
547	850	FF	Argon Fill Valve Closed			02															41	2
548	850	FF	Argon Fill Valve Open			02															41	2
549	850	FF	Argon Fill Valve RCCB Off			02															41	2
550	850	FF	Argon Fill Valve RCCB On			02															41	2
551	850	FF	SEM Indexing Jog CW Status			02															41	2
552	850	FF	SEM Indexing Jog CCW Status			02															41	2
553	850	FF	Ampoule 5 Failure 2 Status			02															41	2
554	850	FF	Ampoule 5 Failure 1 Status			02															41	2
555	850	FF	Ampoule 4 Failure 2 Status			02															41	2
556	850	FF	Ampoule 4 Failure 1 Status			02															41	2
557	850	FF	Ampoule 3 Failure 2 Status			02															41	2
558	850	FF	Ampoule 3 Failure 1 Status			02															41	2
559	850	FF	Ampoule 2 Failure 2 Status			02															41	2
560	850	FF	Ampoule 2 Failure 1 Status			02															41	2
561	850	FF	Ampoule 1 Failure 2 Status			02															41	2
562	850	FF	Ampoule 1 Failure 1 Status			02															41	2
563	850	FF	Water Outlet Valve Bypass			02															41	2
564	850	FF	Water Outlet Valve Normal			02															41	2
565	850	FF	Water Outlet Vlv RCCB Off			02															41	2
566	850	FF	Water Outlet Vlv RCCB On			02															41	2
567	850	FF	Water Inlet Valve Bypass			02															41	2
568	850	FF	Water Inlet Valve Normal			02															41	2

Column positions: 03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 24 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	S O F I X D	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
569	850	FF	Mech Pulsing Mod RCCB Off			02																41	2
570	850	FF	Mech Pulsing Mod RCCB On			02																41	2
571	850	FF	Cartridge 6 Failure 2 Status			02																41	2
572	850	FF	Cartridge 6 Failure 1 Status			02																41	2
573	850	FF	Cartridge 5 Failure 2 Status			02																41	2
574	850	FF	Cartridge 5 Failure 1 Status			02																41	2
575	850	FF	Cartridge 4 Failure 2 Status			02																41	2
576	850	FF	Cartridge 4 Failure 1 Status			02																41	2
577	850	FF	Cartridge 3 Failure 2 Status			02																41	2
578	850	FF	Cartridge 3 Failure 1 Status			02																41	2
579	850	FF	Cartridge 2 Failure 2 Status			02																41	2
580	850	FF	Cartridge 2 Failure 1 Status			02																41	2
581	850	FF	Cartridge 1 Failure 2 Status			02																41	2
582	850	FF	Cartridge 1 Failure 1 Status			02																41	2
583	850	FF	Ampoule 6 Failure 2 Status			02																41	2
584	850	FF	Ampoule 6 Failure 1 Status			02																41	2
585	850	FF	Hot Boost Mod A RCCB Off			02																41	2
586	850	FF	Hot Boost Mod A RCCB On			02																41	2
587	850	FF	Cold Main Red Mod RCCB Off			02																41	2
588	850	FF	Cold Main Red Mod RCCB On			02																41	2
589	850	FF	Cold Main Prim Mod RCCB Off			02																41	2
590	850	FF	Cold Main Prim Mod RCCB On			02																41	2
591	850	FF	Cold Guard Mod RCCB Off			02																41	2
592	850	FF	Cold Guard Mod RCCB On			02																41	2
593	850	FF	Peltier Conn Retracted-Not			02																41	2
594	850	FF	Peltier Conn Retracted			02																41	2
595	850	FF	Peltier Conn Extended-Not			02																41	2
596	850	FF	Peltier Conn Extended			02																41	2
597	850	FF	Peltier Conn Motor RCCB Off			02																41	2
598	850	FF	Peltier Conn Motor RCCB On			02																41	2
03	06	07		39	40	43	45	47	48	51	53	55	57			65	66	67	71 / 72	75	78		80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 25 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SOG.	NM OS /GW DS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COEF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
599	850	FF	Peltier Pulsing Drv RCCB Off			02															41	2
600	850	FF	Peltier Pulsing Drv RCCB On			02															41	2
601	850	FF	SCS Airflow 1 Status			02															41	2
602	850	FF	PDS Airflow 1 Status			02															41	2
603	850	FF	PCS Airflow 2 Status			02															41	2
604	850	FF	PCS Airflow 1 Status			02															41	2
605	850	FF	Hot Main Red Mod B RCCB Off			02															41	2
606	850	FF	Hot Main Red Mod B RCCB On			02															41	2
607	850	FF	Hot Main Red Mod A RCCB Off			02															41	2
608	850	FF	Hot Main Red Mod A RCCB On			02															41	2
609	850	FF	Hot Main Prim Mod B RCCB Off			02															41	2
610	850	FF	Hot Main Prim Mod B RCCB On			02															41	2
611	850	FF	HotMain Prim Mod A RCCB Off			02															41	2
612	850	FF	HotMain Prim Mod A RCCB On			02															41	2
613	850	FF	Hot Guard Module RCCB Off			02															41	2
614	850	FF	Hot Guard Module RCCB On			02															41	2
615	850	FF	Hot Boost Mod B RCCB Off			02															41	2
616	850	FF	Hot Boost Mod B RCCB On			02															41	2
617	850	FF	Hot Main Prim Htr Ctl Temp 1			02															41	2
618	850	FF	Cold Main Red Htr Ctl Temp 1			02															41	2
619	850	FF	TC Group A Calibration Type B			02															41	2
620	850	FF	TC Group A Calibration Type S			02															41	2
621	850	FF	TC Group A Calibration Type K			02															41	2
622	850	FF	Cold Guard Heater Ctl Temp 2			02															41	2
623	850	FF	Cold Main Prim Htr Ctl Temp 2			02															41	2
624	850	FF	Booster Heater Ctl Temp 2			02															41	2
625	850	FF	Hot Main Red Htr Ctl Temp 2			02															41	2
626	850	FF	Hot Main Prim Htr Ctl Temp 2			02															41	2
627	850	FF	Hot Guard Heater Ctl Temp 2			02															41	2
628	850	FF	TC Group B Calibration Type B			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 26 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD/ULK	USAGE	MNSOG.	NMOS/GWDS/	SOFIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA TYPE	DATA VALUE	MON REQ EVENT	MON REQ EXCP	CAL. COEF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
629	850	FF	TC Group B Calibration Type S			02																41	2
630	850	FF	TC Group B Calibration Type K			02																41	2
631	850	FF	IFEA Coolant Flow #2 Status			02																41	2
632	850	FF	IFEA Coolant Flow #1 Status			02																41	2
633	850	FF	Sample 4 Temp 1			02																41	2
634	850	FF	Sample 3 Temp 1			02																41	2
635	850	FF	Sample 2 Temp 1			02																41	2
636	850	FF	Sample 1 Temp 1			02																41	2
637	850	FF	Cold Main Red Htr Ctl Temp 2			02																41	2
638	850	FF	TC Group D Calibration Type B			02																41	2
639	850	FF	TC Group D Calibration Type S			02																41	2
640	850	FF	TC Group D Calibration Type K			02																41	2
641	850	FF	Cold Guard Heater Ctl Temp 1			02																41	2
642	850	FF	Cold Main Prim Htr Ctl Temp 1			02																41	2
643	850	FF	Booster Heater Ctl Temp 1			02																41	2
644	850	FF	Hot Guard Heater Ctl Temp 1			02																41	2
645	850	FF	TC Group C Calibration Type B			02																41	2
646	850	FF	TC Group C Calibration Type S			02																41	2
647	850	FF	TC Group C Calibration Type K			02																41	2
648	850	FF	Hot Main Red Htr Ctl Temp 1			02																41	2
649	850	FF	Sample 2 Temp 4			02																41	2
650	850	FF	Sample 1 Temp 4			02																41	2
651	850	FF	Sample 6 Temp 3			02																41	2
652	850	FF	Sample 5 Temp 3			02																41	2
653	850	FF	Sample 4 Temp 3			02																41	2
654	850	FF	Sample 3 Temp 3			02																41	2
655	850	FF	Sample 2 Temp 3			02																41	2
656	850	FF	Sample 1 Temp 3			02																41	2
657	850	FF	Sample 6 Temp 2			02																41	2
658	850	FF	Sample 5 Temp 2			02																41	2
03	06	07		39	40	43	45	47	48	51	53	55	57		65	66	67		71 72	75	78		80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 27 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	SO F I X D	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
659	850	FF	Sample 4 Temp 2			02															41	2
660	850	FF	Sample 3 Temp 2			02															41	2
661	850	FF	Sample 2 Temp 2			02															41	2
662	850	FF	Sample 1 Temp 2			02															41	2
663	850	FF	Sample 6 Temp 1			02															41	2
664	850	FF	Sample 5 Temp 1			02															41	2
665	850	FF	Sample 6 Temp 6			02															41	2
666	850	FF	Sample 5 Temp 6			02															41	2
667	850	FF	Sample 4 Temp 6			02															41	2
668	850	FF	Sample 3 Temp 6			02															41	2
669	850	FF	Sample 2 Temp 6			02															41	2
670	850	FF	Sample 1 Temp 6			02															41	2
671	850	FF	Sample 6 Temp 5			02															41	2
672	850	FF	Sample 5 Temp 5			02															41	2
673	850	FF	Sample 4 Temp 5			02															41	2
674	850	FF	Sample 3 Temp 5			02															41	2
675	850	FF	Sample 2 Temp 5			02															41	2
676	850	FF	Sample 1 Temp 5			02															41	2
677	850	FF	Sample 6 Temp 4			02															41	2
678	850	FF	Sample 5 Temp 4			02															41	2
679	850	FF	Sample 4 Temp 4			02															41	2
680	850	FF	Sample 3 Temp 4			02															41	2
681	850	FF	Sample 4 CJ Block Temp 1			02															41	2
682	850	FF	Sample 3 CJ Block Temp 2			02															41	2
683	850	FF	Sample 3 CJ Block Temp 1			02															41	2
684	850	FF	Sample 2 CJ Block Temp 2			02															41	2
685	850	FF	Sample 2 CJ Block Temp 1			02															41	2
686	850	FF	Sample 1 CJ Block Temp 2			02															41	2
687	850	FF	Sample 1 CJ Block Temp 1			02															41	2
688	850	FF	RFM Water Outlet Temp			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 28 of 38)

ENT NO.	COOR R.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	//// CDT?	RC IO DE	SID NO.	EXPID	TABLE
689	850	FF	Cold Zone CJ Block Temp 2			02															41	2
690	850	FF	Cold Zone CJ Block Temp 1			02															41	2
691	850	FF	Hot Zone CJ Block Temp 1			02															41	2
692	850	FF	Hot Zone CJ Block Temp 2			02															41	2
693	850	FF	RFM Hot End Shell Temp			02															41	2
694	850	FF	RFM Cold End Shell Temp			02															41	2
695	850	FF	IFEA Water Inlet Temp			02															41	2
696	850	FF	IFEA Water Outlet Temp			02															41	2
697	850	FF	RTD Mux 3 Calibration - Low			02															41	2
698	850	FF	RTD Mux 3 Calibration - High			02															41	2
699	850	FF	RTD Mux 2 Calibration - Low			02															41	2
700	850	FF	RTD Mux 2 Calibration - High			02															41	2
701	850	FF	RTD Mux 1 Calibration - Low			02															41	2
702	850	FF	RTD Mux 1 Calibration - High			02															41	2
703	850	FF	IFEA Upper Atmosphere Temp			02															41	2
704	850	FF	IFEA Lower Atmosphere Temp			02															41	2
705	850	FF	FTS Stepping Motor Temp			02															41	2
706	850	FF	SEM Track Temp			02															41	2
707	850	FF	Ampoule Alignment Arm Temp			02															41	2
708	850	FF	Sample 6 CJ Block Temp 2			02															41	2
709	850	FF	Sample 6 CJ Block Temp 1			02															41	2
710	850	FF	Sample 5 CJ Block Temp 2			02															41	2
711	850	FF	Sample 5 CJ Block Temp 1			02															41	2
712	850	FF	Sample 4 CJ Block Temp 2			02															41	2
713	850	FF	Cold Main Red Heater Current			02															41	2
714	850	FF	Cold Main Red Heater Voltage			02															41	2
715	850	FF	Cold Main Primary Heater Cur			02															41	2
716	850	FF	Cold Main Primary Heater Volt			02															41	2
717	850	FF	Cold Guard Heater Current			02															41	2
718	850	FF	Cold Guard Heater Voltage			02															41	2
03	06	07		39	40	43	45	47	48		51	53	55	57	65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 29 of 38)

ENT NO.	COR R.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WD S/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCPT	CAL. COEF	CD T?	RC IO DE	SID NO.	EXP ID	TABLE
719	850	FF	RTD Mux 8 Calibration - Low			02															41	2
720	850	FF	RTD Mux 8 Calibration - High			02															41	2
721	850	FF	RTD Mux 7 Calibration - Low			02															41	2
722	850	FF	RTD Mux 7 Calibration - High			02															41	2
723	850	FF	RTD Mux 6 Calibration - Low			02															41	2
724	850	FF	RTD Mux 6 Calibration - High			02															41	2
725	850	FF	RTD Mux 5 Calibration - Low			02															41	2
726	850	FF	RTD Mux 5 Calibration - High			02															41	2
727	850	FF	RTD Mux 4 Calibration - Low			02															41	2
728	850	FF	RTD Mux 4 Calibration - High			02															41	2
729	850	FF	IFEA Lower Humidity			02															41	2
730	850	FF	Rapid Translation Motor RPM			02															41	2
731	850	FF	Indexing CAM Rotary Position			02															41	2
732	850	FF	Furnace Linear Position			02															41	2
733	850	FF	Stepping Motor Phase B Cur			02															41	2
734	850	FF	Stepping Motor Phase B Volt			02															41	2
735	850	FF	Stepping Motor Phase A Cur			02															41	2
736	850	FF	Stepping Motor Phase A Volt			02															41	2
737	850	FF	Hot Main Red Heater Current			02															41	2
738	850	FF	Hot Main Red Heater Voltage			02															41	2
739	850	FF	Hot Main Primary Heater Cur			02															41	2
740	850	FF	Hot Main Primary Heater Volt			02															41	2
741	850	FF	Hot Guard Heater Current			02															41	2
742	850	FF	Hot Guard Heater Voltage			02															41	2
743	850	FF	Hot Boost Heater Current			02															41	2
744	850	FF	Hot Boost Heater Voltage			02															41	2
745	850	FF	SMS Board Velocity Reading			02															41	2
746	850	FF	Experiment Main Bus Voltage			02															41	2
747	850	FF	Experiment Main Bus Current			02															41	2
748	850	FF	IFEA Absolute Pressure 2			02															41	2

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03  06 07   39 40  43 45 47 48  51 53 55 57  65 66 67  71 72  75 78  80
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TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 30 of 38)

ENT NO.	C O R R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVENT	MON REQ EXCP	C A L . C O F	C D T ?	RC IO DE	SID NO.	E X P I D	T A B L E
749	850	FF	IFEA Absolute Pressure 1			02																41	2
750	850	FF	IFEA Upper Humidity			02																41	2
001	851	RC	SEM Index Motor RCCB On Stat			02																41	2
002	851	RC	SEM Index Motor RCCB Off Stat			02																41	2
003	851	RC	Ampoule Not Processing			02																41	2
004	851	RC	Ampoule Processing			02																41	2
005	851	RC	Indexing Cam Not Stowed			02																41	2
006	851	RC	Indexing Cam Stowed			02																41	2
007	851	RC	Car Spacer Plt Gap Lim-Not			02																41	2
008	851	RC	Car Spacer Plt Gap Lim			02																41	2
009	851	RC	Car Trk Extr Left Limit-Not			02																41	2
010	851	RC	Car Trk Extr Left Limit			02																41	2
011	851	RC	Car Trk Extr Right Lim-Not			02																41	2
012	851	RC	Car Trk Extr Right Lim			02																41	2
013	851	RC	Ampoule Align Mtr RCCB Off			02																41	2
014	851	RC	Ampoule Align Mtr RCCB On			02																41	2
015	851	RC	Ampoule Align Not Extended			02																41	2
016	851	RC	Ampoule Align Extended			02																41	2
017	851	RC	Ampoule Align Not Retracted			02																41	2
018	851	RC	Ampoule Align Retracted			02																41	2
019	851	RC	Ampoule Spt Plt Mtr RCCB Off			02																41	2
020	851	RC	Ampoule Spt Plt Mtr RCCB On			02																41	2
021	851	RC	Ampoule Support Not Secure			02																41	2
022	851	RC	Ampoule Support Secure			02																41	2
023	851	RC	Ampoule Support Not Retracted			02																41	2
024	851	RC	Ampoule Support Retracted			02																41	2
025	851	RC	Core HD Motor RCCB Off			02																41	2
026	851	RC	Core HD Motor RCCB On			02																41	2
027	851	RC	Core Hold Down Not Extended			02																41	2
028	851	RC	Core Hold Down Extended			02																41	2
03	06	07		39	40	43	45	47	48		51	53	55	57		65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 31 of 38)

ENT NO.	COR R.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G W D S /	SOFIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
029	851	RC Core Hold Down Not Retracted			02															41	2
030	851	RC Core Hold Down Retracted			02															41	2
031	851	RC Fail Safe Brake RCCB Off			02															41	2
032	851	RC Fail Safe Brake RCCB On			02															41	2
033	851	RC Rapid Xlation Clutch RCCB Off			02															41	2
034	851	RC Rapid Xlation Clutch RCCB On			02															41	2
035	851	RC Rapid Xlation Mtr RCCB Off			02															41	2
036	851	RC Rapid Xlation Mtr RCCB On			02															41	2
037	851	RC Step Motor Clutch RCCB Off			02															41	2
038	851	RC Step Motor Clutch RCCB On			02															41	2
039	851	RC Step Motor Drive RCCB Off			02															41	2
040	851	RC Step Motor Drive RCCB On			02															41	2
041	851	RC Furn Extrme Trvl Not Exceeded			02															41	2
042	851	RC Furn Extrdme Trvl Exceeded			02															41	2
043	851	RC Furnace Position Not Home			02															41	2
044	851	RC Furnace Position Home			02															41	2
045	851	RC System Bus Relay Off			02															41	2
046	851	RC System Bus Relay On			02															41	2
047	851	RC PCS Utility RCCB Off			02															41	2
048	851	RC PCS Utility RCCB On			02															41	2
049	851	RC SEM Indexing Jog CW Status			02															41	2
050	851	RC SEM Indexing Jog CCW Status			02															41	2
051	851	RC Argon Fill Valve RCCB Off			02															41	2
052	851	RC Argon Fill Valve RCCB On			02															41	2
053	851	RC Argon Fill Valve Closed			02															41	2
054	851	RC Argon Fill Valve Open			02															41	2
055	851	RC IFEA ABS Press 1 RCCB Off			02															41	2
056	851	RC IFEA ABS Press 1 RCCB On			02															41	2
057	851	RC IFEA ABS Press 2 RCCB Off			02															41	2
058	851	RC IFEA ABS Press 2 RCCB On			02															41	2

Column positions: 003, 006, 007, 039, 040, 043, 045, 047, 048, 051, 053, 055, 057, 065, 066, 067, 071, 072, 075, 078, 080

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 32 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD UULK	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	START WD#	START BT	END WD#	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVENT	MON REQ EXCP	CAL. COF•	CDT?	RC IO DE	SID NO.	EXPID	TABLE
059	851	RC Vacuum Vent Vlv RCCB Off			02																41	2
060	851	RC Vacuum Vent Vlv RCCB On			02																41	2
061	851	RC Vacuum Vent Valve Closed			02																41	2
062	851	RC Vacuum Vent Valve Open			02																41	2
063	851	RC Water Inlet Valve RCCB Off			02																41	2
064	851	RC Water Inlet Valve RCCB On			02																41	2
065	851	RC Water Inlet Valve Bypass			02																41	2
066	851	RC Water Inlet Valve Normal			02																41	2
067	851	RC Water Outlet Vlv RCCB Off			02																41	2
068	851	RC Water Outlet Vlv RCCB On			02																41	2
069	851	RC Water Outlet Valve Bypass			02																41	2
070	851	RC Water Outlet Valve Normal			02																41	2
071	851	RC Ampoule 1 Failure 2 Status			02																41	2
072	851	RC Ampoule 1 Failure 1 Status			02																41	2
073	851	RC Ampoule 2 Failure 2 Status			02																41	2
074	851	RC Ampoule 2 Failure 1 Status			02																41	2
075	851	RC Ampoule 3 Failure 2 Status			02																41	2
076	851	RC Ampoule 3 Failure 1 Status			02																41	2
077	851	RC Ampoule 4 Failure 2 Status			02																41	2
078	851	RC Ampoule 4 Failure 1 Status			02																41	2
079	851	RC Ampoule 5 Failure 2 Status			02																41	2
080	851	RC Ampoule 5 Failure 1 Status			02																41	2
081	851	RC Ampoule 6 Failure 2 Status			02																41	2
082	851	RC Ampoule 6 Failure 1 Status			02																41	2
083	851	RC Cartridge 1 Failure 2 Status			02																41	2
084	851	RC Cartridge 1 Failure 1 Status			02																41	2
085	851	RC Cartridge 2 Failure 2 Status			02																41	2
086	851	RC Cartridge 2 Failure 1 Status			02																41	2
087	851	RC Cartridge 3 Failure 2 Status			02																41	2
088	851	RC Cartridge 3 Failure 1 Status			02																41	2

Column positions: 003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 33 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD	USAGE ULK	MNSOG.	NMOS/G WDS/	SOFIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
089	851	RC Cartridge 4 Failure 2 Status			02															41	2
090	851	RC Cartridge 4 Failure 1 Status			02															41	2
091	851	RC Cartridge 5 Failure 2 Status			02															41	2
092	851	RC Cartridge 5 Failure 1 Status			02															41	2
093	851	RC Cartridge 6 Failure 2 Status			02															41	2
094	851	RC Cartridge 6 Failure 1 Status			02															41	2
095	851	RC Mech Pulsing Mod RCCB On			02															41	2
096	851	RC Mech Pulsing Mod RCCB Off			02															41	2
097	851	RC Peltier Pulsing Drv RCCB Off			02															41	2
098	851	RC Peltier Pulsing Drv RCCB On			02															41	2
099	851	RC Peltier Conn Motor RCCB Off			02															41	2
100	851	RC Peltier Conn Motor RCCB On			02															41	2
101	851	RC Peltier Conn Extended-Not			02															41	2
102	851	RC Peltier Conn Extended			02															41	2
103	851	RC Peltier Conn Retracted-Not			02															41	2
104	851	RC Peltier Conn Retracted			02															41	2
105	851	RC Cold Guard Mod RCCB Off			02															41	2
106	851	RC Cold Guard Mod RCCB On			02															41	2
107	851	RC Cold Main Prim Mod RCCB Off			02															41	2
108	851	RC Cold Main Prim Mod RCCB On			02															41	2
109	851	RC Cold Main Red Mod RCCB Off			02															41	2
110	851	RC Cold Main Red Mod RCCB On			02															41	2
111	851	RC Hot Boost Mod A RCCB Off			02															41	2
112	851	RC Hot Boost Mod A RCCB On			02															41	2
113	851	RC Hot Boost Mod B RCCB Off			02															41	2
114	851	RC Hot Boost Mod B RCCB On			02															41	2
115	851	RC Hot Guard Module RCCB Off			02															41	2
116	851	RC Hot Guard Module RCCB On			02															41	2
117	851	RC HotMain Prim Mod A RCCB Off			02															41	2
118	851	RC HotMain Prim Mod A RCCB On			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 34 of 38)

ENT NO.	CORR. / NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COEF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
119	851	RC Hot Main Prim Mod B RCCB Off			02															41	2
120	851	RC Hot Main Prim Mod B RCCB On			02															41	2
121	851	RC Hot Main Red Mod A RCCB Off			02															41	2
122	851	RC Hot Main Red Mod A RCCB On			02															41	2
123	851	RC Hot Main Red Mod B RCCB Off			02															41	2
124	851	RC Hot Main Red Mod B RCCB On			02															41	2
125	851	RC PCS Airflow 2 Status			02															41	2
126	851	RC PCS Airflow 1 Status			02															41	2
127	851	RC SCS Airflow 1 Status			02															41	2
128	851	RC PDS Airflow 1 Status			02															41	2
129	851	RC IFEA Coolant Flow #2 Status			02															41	2
130	851	RC IFEA Coolant Flow #1 Status			02															41	2
131	851	RC TC Group B Calibration Type S			02															41	2
132	851	RC TC Group B Calibration Type K			02															41	2
133	851	RC Hot Guard Heater Ctl Temp 2			02															41	2
134	851	RC TC Group B Calibration Type B			02															41	2
135	851	RC Hot Main Red Htr Ctl Temp 2			02															41	2
136	851	RC Hot Main Prim Htr Ctl Temp 2			02															41	2
137	851	RC Cold Main Prim Htr Ctl Temp 2			02															41	2
138	851	RC Booster Heater Ctl Temp 2			02															41	2
139	851	RC TC Group A Calibration Type K			02															41	2
140	851	RC Cold Guard Heater Ctl Temp 2			02															41	2
141	851	RC TC Group A Calibration Type B			02															41	2
142	851	RC TC Group A Calibration Type S			02															41	2
143	851	RC Hot Main Prim Htr Ctl Temp 1			02															41	2
144	851	RC Cold Main Red Htr Ctl Temp 1			02															41	2
145	851	RC TC Group C Calibration Type K			02															41	2
146	851	RC Hot Main Red Htr Ctl Temp 1			02															41	2
147	851	RC TC Group C Calibration Type B			02															41	2
148	851	RC TC Group C Calibration Type S			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 35 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD/ULK	USAGE	MN SO G.	NM OS /G W D S /	SO FIX D	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXC P	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
149	851	RC	Booster Heater Ctl Temp 1			02															41	2
150	851	RC	Hot Guard Heater Ctl Temp 1			02															41	2
151	851	RC	Cold Guard Heater Ctl Temp 1			02															41	2
152	851	RC	Cold Main Prim Htr Ctl Temp 1			02															41	2
153	851	RC	TC Group D Calibration Type S			02															41	2
154	851	RC	TC Group D Calibration Type K			02															41	2
155	851	RC	Cold Main Red Htr Ctl Temp 2			02															41	2
156	851	RC	TC Group D Calibration Type B			02															41	2
157	851	RC	Sample 2 Temp 1			02															41	2
158	851	RC	Sample 1 Temp 1			02															41	2
159	851	RC	Sample 4 Temp 1			02															41	2
160	851	RC	Sample 3 Temp 1			02															41	2
161	851	RC	Sample 6 Temp 1			02															41	2
162	851	RC	Sample 5 Temp 1			02															41	2
163	851	RC	Sample 2 Temp 2			02															41	2
164	851	RC	Sample 1 Temp 2			02															41	2
165	851	RC	Sample 4 Temp 2			02															41	2
166	851	RC	Sample 3 Temp 2			02															41	2
167	851	RC	Sample 6 Temp 2			02															41	2
168	851	RC	Sample 5 Temp 2			02															41	2
169	851	RC	Sample 2 Temp 3			02															41	2
170	851	RC	Sample 1 Temp 3			02															41	2
171	851	RC	Sample 4 Temp 3			02															41	2
172	851	RC	Sample 3 Temp 3			02															41	2
173	851	RC	Sample 6 Temp 3			02															41	2
174	851	RC	Sample 5 Temp 3			02															41	2
175	851	RC	Sample 2 Temp 4			02															41	2
176	851	RC	Sample 1 Temp 4			02															41	2
177	851	RC	Sample 4 Temp 4			02															41	2
178	851	RC	Sample 3 Temp 4			02															41	2

Column positions: 003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 36 of 38)

ENT NO.	C O R R .	N O .	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE T Y P E	MON REQ E V N T	MON REQ E X C P	C A L . C O F	C D T ?	RC IO D E	SID NO.	E X P I D	T A B L E
179	851	RC	Sample 6 Temp 4			02															41	2
180	851	RC	Sample 5 Temp 4			02															41	2
181	851	RC	Sample 2 Temp 5			02															41	2
182	851	RC	Sample 1 Temp 5			02															41	2
183	851	RC	Sample 4 Temp 5			02															41	2
184	851	RC	Sample 3 Temp 5			02															41	2
185	851	RC	Sample 6 Temp 5			02															41	2
186	851	RC	Sample 5 Temp 5			02															41	2
187	851	RC	Sample 2 Temp 6			02															41	2
188	851	RC	Sample 1 Temp 6			02															41	2
189	851	RC	Sample 4 Temp 6			02															41	2
190	851	RC	Sample 3 Temp 6			02															41	2
191	851	RC	Sample 5 Temp 6			02															41	2
192	851	RC	Sample 6 Temp 6			02															41	2
193	851	RC	IFEA Water Inlet Temp			02															41	2
194	851	RC	IFEA Water Outlet Temp			02															41	2
195	851	RC	RFM Hot End Shell Temp			02															41	2
196	851	RC	RFM Cold End Shell Temp			02															41	2
197	851	RC	Hot Zone CJ Block Temp 1			02															41	2
198	851	RC	Hot Zone CJ Block Temp 2			02															41	2
199	851	RC	Cold Zone CJ Block Temp 2			02															41	2
200	851	RC	Cold Zone CJ Block Temp 1			02															41	2
201	851	RC	Sample 1 CJ Block Temp 1			02															41	2
202	851	RC	RFM Water Outlet Temp			02															41	2
203	851	RC	Sample 2 CJ Block Temp 1			02															41	2
204	851	RC	Sample 1 CJ Block Temp 2			02															41	2
205	851	RC	Sample 3 CJ Block Temp 1			02															41	2
206	851	RC	Sample 2 CJ Block Temp 2			02															41	2
207	851	RC	Sample 4 CJ Block Temp 1			02															41	2
208	851	RC	Sample 3 CJ Block Temp 2			02															41	2
03	06	07		39	40	43	45	47	48	51	53	55	57		65	66	67	71	72	75	78	80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 37 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UNLK	USAGE	MNSOG.	NMOS/GWDS/	SOFIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COEF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
209	851	RC	Sample 5 CJ Block Temp 1			02															41	2
210	851	RC	Sample 4 CJ Block Temp 2			02															41	2
211	851	RC	Sample 6 CJ Block Temp 1			02															41	2
212	851	RC	Sample 5 CJ Block Temp 2			02															41	2
213	851	RC	Ampoule Alignment Arm Temp			02															41	2
214	851	RC	Sample 6 CJ Block Temp 2			02															41	2
215	851	RC	FTS Stepping Motor Temp			02															41	2
216	851	RC	SEM Track Temp			02															41	2
217	851	RC	IFEA Upper Atmosphere Temp			02															41	2
218	851	RC	IFEA Lower Atmosphere Temp			02															41	2
219	851	RC	RTD Mux 1 Calibration - Low			02															41	2
220	851	RC	RTD Mux 1 Calibration - High			02															41	2
221	851	RC	RTD Mux 2 Calibration - Low			02															41	2
222	851	RC	RTD Mux 2 Calibration - High			02															41	2
223	851	RC	RTD Mux 3 Calibration - Low			02															41	2
224	851	RC	RTD Mux 3 Calibration - High			02															41	2
225	851	RC	RTD Mux 4 Calibration - Low			02															41	2
226	851	RC	RTD Mux 4 Calibration - High			02															41	2
227	851	RC	RTD Mux 5 Calibration - Low			02															41	2
228	851	RC	RTD Mux 5 Calibration - High			02															41	2
229	851	RC	RTD Mux 6 Calibration - Low			02															41	2
230	851	RC	RTD Mux 6 Calibration - High			02															41	2
231	851	RC	RTD Mux 7 Calibration - Low			02															41	2
232	851	RC	RTD Mux 7 Calibration - High			02															41	2
233	851	RC	RTD Mux 8 Calibration - Low			02															41	2
234	851	RC	RTD Mux 8 Calibration - High			02															41	2
235	851	RC	Cold Guard Heater Current			02															41	2
236	851	RC	Cold Guard Heater Voltage			02															41	2
237	851	RC	Cold Main Primary Heater Cur			02															41	2
238	851	RC	Cold Main Primary Heater Volt			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 38 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MNSO G.	NMOS /G/ WDS/	SOFIXD	TYPE	START WD #	START BT #	END WD #	END BT #	DATA VALUE TYPE	DATA VALUE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
239	851		RC Cold Main Red Heater Current			02																41	2
240	851		RC Cold Main Red Heater Voltage			02																41	2
241	851		RC Hot Boost Heater Current			02																41	2
242	851		RC Hot Boost Heater Voltage			02																41	2
243	851		RC Hot Guard Heater Current			02																41	2
244	851		RC Hot Guard Heater Voltage			02																41	2
245	851		RC Hot Main Primary Heater Cur			02																41	2
246	851		RC Hot Main Primary Heater Volt			02																41	2
247	851		RC Hot Main Red Heater Current			02																41	2
248	851		RC Hot Main Red Heater Voltage			02																41	2
249	851		RC Stepping Motor Phase A Cur			02																41	2
250	851		RC Stepping Motor Phase A Volt			02																41	2
251	851		RC Stepping Motor Phase B Cur			02																41	2
252	851		RC Stepping Motor Phase B Volt			02																41	2
253	851		RC Indexing CAM Rotary Position			02																41	2
254	851		RC Furnace Linear Position			02																41	2
255	851		RC IFEA Lower Humidity			02																41	2
256	851		RC Rapid Translation Motor RPM			02																41	2
257	851		RC IFEA Absolute Pressure 1			02																41	2
258	851		RC IFEA Upper Humidity			02																41	2
259	851		RC Experiment Main Bus Current			02																41	2
260	851		RC IFEA Absolute Pressure 2			02																41	2
261	851		RC SMS Board Velocity Reading			02																41	2
262	851		RC Experiment Main Bus Voltage			02																41	2
263	851		Process Elapsed Time - Seconds			02																41	2
264	851		Go/NoGo Error Override			02																41	2
265	851		CGF Sytstem State			02																41	2
266	851		Auto Pressure Ctl			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 1.7-3. EVENT/EXCEPTION MONITOR REQUIREMENTS

ENTRY NUMBER	CORR NO	EXCPTION MONITOR RATE	MONITOR VALUES: UPPER LIMIT	MONITOR VALUES: LOWER LIMIT/ EXPT'D STATE	MSG CLS	MESSAGE (HIGH/SINGLE)	ERROR MSG. GRP	ERROR MSG. NO.	MESSAGE LOW	ERROR MSG. GRP	ERROR MSG. NO.	INTRLOCK TIME	OUT LIMT COUNT	3 CHA"R PAGE ID	EXP ID	TABLE
207	106	001	-073	-128	1	HI WATER TEMP	41	14		41		300	10	CGF	41	4
208	106	001	-077	-128	1	HI HUMIDITY LWR	41	16		41		300	10	CGF	41	4
209	106	001	-077	-128	1	HI HUMIDITY UPR	41	18		41		300	10	CGF	41	4
210	106	001	-004	-128	1	HI ATMOS TEMP	41	1A		41		300	10	MAN	41	4
211	106	001	-073	-128	1	HI CLD END TEMP	41	1C		41		300	10	MAN	41	4
212	106	001	-073	-128	1	HI HOT END TEMP	41	1E		41		300	10	MAN	41	4
215	106	001	-009	-073	1	HI IFEA PRES 1	41	20	LO IFEA PRES 1	41	21	300	10	CGF	41	4
216	106	001	-009	-073	1	HI IFEA PRES 2	41	22	LO IFEA PRES 2	41	23	300	10	CGF	41	4
219	106	001	+105	-128	1	HI MAIN CURRENT	41	24		41		300	10	CGF	41	4
220	106	001	+076	+018	1	HI MAIN VOLTAGE	41	26	LO MAIN VOLTAGE	41	27	300	10	CGF	41	4
223	106	001		1	1	LO WATER FLOW	41	28		41		300	05	CGF	41	4
224	106	001		1	1	LO WATER FLOW	41	2A		41		300	05	CGF	41	4
237	106	001		1	1	NO AVIONICS AIR	41	2C		41		300	05	CGF	41	4
238	106	001		1	1	NO AVIONICS AIR	41	2E		41		300	05	CGF	41	4
239	106	001		1	1	NO AVIONICS AIR	41	30		41		300	05	CGF	41	4
240	106	001		1	1	NO AVIONICS AIR	41	32		41		300	05	CGF	41	4
265	106	001		1	1	WTR OUT BYPASS	41	34		41		300	05	MAN	41	4
266	106	001		0	1	WTR OUT BYPASS	41	36		41		300	05	MAN	41	4
267	106	001		1	1	WTR IN BYPASS	41	38		41		300	05	MAN	41	4
268	106	001		0	1	WTR IN BYPASS	41	3A		41		300	05	MAN	41	4
287	106	001		1	1	EXTRM TRVL LIM	41	3C		41		300	05	FTS	41	4
288	106	001		0	1	EXTRM TRVL LIM	41	3E		41		300	05	FTS	41	4
319	106	001		0	1	EXP BUS PWR OFF	41	40		41		300	05	CGF	41	4
320	106	001		1	1	EXP BUS PWR OFF	41	42		41		300	05	CGF	41	4
003	006	009	017	025	026	027	043	045	046	062	064	067	069	072	079	080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 1 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXP ID	TABLE
			A0	A1	A2	A3	A4	A5		
001	850	PC	+0000000+00	+1000000+01					41	6
002	850	PC	+0000000+00	+1000000+01					41	6
003	850	PC	+0000000+00	+1000000+01					41	6
004	850	PC	+0000000+00	+1000000+01					41	6
005	850	PC	+0000000+00	+1000000+01					41	6
138	850	PC	+0000000+00	+1000000+01					41	6
139	850	PC	+0000000+00	+1000000+01					41	6
140	850	PC	+0000000+00	+1000000+01					41	6
141	850	PC	+0000000+00	+1000000+01					41	6
142	850	PC	+0000000+00	+1000000+01					41	6
143	850	PC	+0000000+00	+1000000+01					41	6
144	850	PC	+0000000+00	+1000000+01					41	6
145	850	PC	+0000000+00	+1000000+01					41	6
146	850	PC	+0000000+00	+1000000+01					41	6
147	850	PC	+0000000+00	+1000000+01					41	6
148	850	PC	+0000000+00	+1000000+01					41	6
149	850	PC	+0000000+00	+1000000+01					41	6
150	850	PC	+0000000+00	+1000000+01					41	6
151	850	PC	+0000000+00	+1000000+01					41	6
152	850	PC	+0000000+00	+1000000+01					41	6
153	850	PC	+0000000+00	+1000000+01					41	6
154	850	PC	+0000000+00	+1000000+01					41	6
155	850	PC	+0000000+00	+1000000+01					41	6
156	850	PC	+0000000+00	+1000000+01					41	6
157	850	PC	+0000000+00	+1000000+01					41	6
158	850	PC	+0000000+00	+1000000+01					41	6
159	850	PC	+0000000+00	+1000000+01					41	6
160	850	PC	+0000000+00	+1000000+01					41	6
161	850	PC	+0000000+00	+1000000+01					41	6
162	850	PC	+0000000+00	+1000000+01					41	6
163	850	PC	+0000000+00	+1000000+01					41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 2 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	//// EXP ID	//// TABLE
164	850	PC	+0000000+00	+1000000+01					41	6
165	850	PC	+0000000+00	+1000000+01					41	6
166	850	PC	+0000000+00	+1000000+01					41	6
167	850	PC	+0000000+00	+1000000+01					41	6
168	850	PC	+0000000+00	+1000000+01					41	6
169	850	PC	+0000000+00	+1000000+01					41	6
170	850	PC	+0000000+00	+1000000+01					41	6
171	850	PC	+0000000+00	+1000000+01					41	6
172	850	PC	+0000000+00	+1000000+01					41	6
173	850	PC	+0000000+00	+1000000+01					41	6
174	850	PC	+0000000+00	+1000000+01					41	6
175	850	PC	+0000000+00	+1000000+01					41	6
176	850	PC	+0000000+00	+1000000+01					41	6
177	850	PC	+0000000+00	+1000000+01					41	6
178	850	PC	+0000000+00	+1000000+01					41	6
179	850	PC	+0000000+00	+1000000+01					41	6
180	850	PC	+0000000+00	+1000000+01					41	6
181	850	PC	+0000000+00	+1000000+01					41	6
182	850	PC	+0000000+00	+1000000+01					41	6
183	850	PC	+0000000+00	+1000000+01					41	6
184	850	PC	+0000000+00	+1000000+01					41	6
185	850	PC	+0000000+00	+1000000+01					41	6
187	850	PC	+0000000+00	+1000000+01					41	6
188	850	PC	+0000000+00	+1000000+01					41	6
189	850	PC	+0000000+00	+1000000+01					41	6
190	850	PC	+0000000+00	+1000000+01					41	6
191	850	PC	+0000000+00	+1000000+01					41	6
192	850	PC	+0000000+00	+1000000+01					41	6
193	850	PC	+0000000+00	+1000000+01					41	6
194	850	PC	+0000000+00	+1000000+01					41	6
195	850	PC	+0000000+00	+1000000+01					41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 3 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABL
196	850	PC	+0000000+00	+5000000-01					41	6
197	850	PC	+0000000+00	+5000000-01					41	6
198	850	PC	+0000000+00	+5000000-01					41	6
199	850	PC	+0000000+00	+5000000-01					41	6
200	850	PC	+0000000+00	+5000000-01					41	6
201	850	PC	+0000000+00	+5000000-01					41	6
202	850	PC	+0000000+00	+5000000-01					41	6
203	850	PC	+0000000+00	+5000000-01					41	6
204	850	PC	+0000000+00	+5000000-01					41	6
205	850	PC	+0000000+00	+5000000-01					41	6
206	850	PC	+0000000+00	+5000000-01					41	6
207	850	PC	+0000000+00	+5000000-01					41	6
208	850	PC	+0000000+00	+5000000-01					41	6
209	850	PC	+0000000+00	+5000000-01					41	6
210	850	PC	+0000000+00	+5000000-01					41	6
211	850	PC	+0000000+00	+5000000-01					41	6
212	850	PC	+0000000+00	+3663000-01					41	6
213	850	PC	+0000000+00	+9768000-02					41	6
214	850	PC	+0000000+00	+2442000-01					41	6
215	850	PC	+0000000+00	+2442000-01					41	6
216	850	PC	+0000000+00	+7326000-02					41	6
217	850	PC	+0000000+00	+7326000-02					41	6
218	850	PC	-2419000+03	+2325500+01	+9104500-03	+2442500-06			41	6
219	850	PC	-2419000+03	+2325500+01	+9104500-03	+2442500-06			41	6
220	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
221	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
222	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
223	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
224	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
225	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
226	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 4 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABL
227	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
228	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
229	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
230	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
231	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
232	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
233	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
234	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
235	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
236	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
237	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
238	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
239	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
240	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
241	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
242	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
243	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
244	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
245	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
246	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
247	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
248	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
249	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
250	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
251	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
252	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
253	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
254	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
255	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
256	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
257	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 5 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABLE
258	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
259	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
260	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
261	850	PC	+0000000+00	+1743900-02					41	6
262	850	PC	+0000000+00	+5086300-02					41	6
263	850	PC	+0000000+00	+1743900-02					41	6
264	850	PC	+0000000+00	+5086300-02					41	6
265	850	PC	-2566000+01	+1364100+00					41	6
266	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
267	850	PC	+0000000+00	+1627600+01					41	6
268	850	PC	+0000000+00	+7326000-02					41	6
269	850	PC	+0000000+00	+1953600-01					41	6
270	850	PC	+0000000+00	+7326000-02					41	6
271	850	PC	+0000000+00	+1953600-01					41	6
272	850	PC	+0000000+00	+7326000-02					41	6
273	850	PC	+0000000+00	+1953600-01					41	6
274	850	PC	+0000000+00	+7326000-02					41	6
275	850	PC	+0000000+00	+1953600-01					41	6
276	850	PC	+0000000+00	+7326000-02					41	6
277	850	PC	+0000000+00	+1953600-01					41	6
278	850	PC	+0000000+00	+7326000-02					41	6
279	850	PC	+0000000+00	+1953600-01					41	6
280	850	PC	+0000000+00	+7326000-02					41	6
281	850	PC	+0000000+00	+1953600-01					41	6
282	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
283	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
284	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
285	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
286	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
287	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
288	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 6 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	A0	A1	A2	A3	A4	A5	EXP ID	TABLE
			CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
289	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
290	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
291	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
292	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
293	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
294	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
295	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
296	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
297	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
298	850	PC	+0000000+00	+1000000+01					41	6
299	850	PC	+0000000+00	+1000000+01					41	6
300	850	PC	+0000000+00	+1000000+01					41	6
301	850	PC	+0000000+00	+1000000+01					41	6
302	850	PC	+0000000+00	+1000000+01					41	6
303	850	PC	+0000000+00	+1000000+01					41	6
304	850	PC	+0000000+00	+1000000+01					41	6
305	850	PC	+0000000+00	+1000000+01					41	6
306	850	PC	+0000000+00	+1000000+01					41	6
307	850	PC	+0000000+00	+1000000+01					41	6
308	850	PC	+0000000+00	+1000000+01					41	6
309	850	PC	+0000000+00	+1000000+01					41	6
310	850	PC	+0000000+00	+1000000+01					41	6
311	850	PC	+0000000+00	+1000000+01					41	6
312	850	PC	+0000000+00	+8302800-01					41	6
313	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
314	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
315	850	PC	+9760000+03	+2442000+00					41	6
316	850	PC	+9760000+03	+2442000+00					41	6
317	850	PC	+9760000+03	+2442000+00					41	6
318	850	PC	+9760000+03	+2442000+00					41	6
319	850	PC	+9760000+03	+2442000+00					41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 7 of 20)

ENTRY	NUMBER	COLOR	CALIBRATION TYPE	A0	A1	A2	A3	A4	A5	EXP ID	TABLE
				CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
320	850	PC	+9760000+03	+2442000+00						41	6
321	850	PC	+6810000+02	+2442000-01						41	6
322	850	PC	+6810000+02	+2442000-01						41	6
323	850	PC	+9760000+03	+2442000+00						41	6
324	850	PC	+9760000+03	+2442000+00						41	6
325	850	PC	+9760000+03	+2442000+00						41	6
326	850	PC	+9760000+03	+2442000+00						41	6
327	850	PC	+9760000+03	+2442000+00						41	6
328	850	PC	+9760000+03	+2442000+00						41	6
329	850	PC	+6810000+02	+2442000-01						41	6
330	850	PC	+6810000+02	+2442000-01						41	6
331	850	PC	+0000000+00	+1000000+01						41	6
332	850	PC	+0000000+00	+3125000+00						41	6
333	850	PC	+0000000+00	+2500000+00						41	6
334	850	PC	+0000000+00	+1000000+01						41	6
335	850	PC	+0000000+00	+3125000+00						41	6
336	850	PC	+0000000+00	+2500000+00						41	6
337	850	PC	+0000000+00	+1000000+01						41	6
338	850	PC	+0000000+00	+3125000+00						41	6
339	850	PC	+0000000+00	+2500000+00						41	6
340	850	PC	+0000000+00	+1000000+01						41	6
341	850	PC	+0000000+00	+3125000+00						41	6
342	850	PC	+0000000+00	+2500000+00						41	6
343	850	PC	+0000000+00	+7096670-04						41	6
344	850	PC	+0000000+00	+1000000+01						41	6
345	850	PC	+0000000+00	+1000000+01						41	6
346	850	PC	+0000000+00	+1000000+01						41	6
347	850	PC	+0000000+00	+1000000+01						41	6
348	850	PC	+0000000+00	+1000000+01						41	6
349	850	PC	+0000000+00	+1000000+01						41	6
350	850	PC	+0000000+00	+1000000+01						41	6
03	05	07	18	29	40	51	62	73		79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 8 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						EXP ID	TABL
			A0	A1	A2	A3	A4	A5		
352	850	PC	+0000000+00	+1000000+01					41	6
353	850	PC	+0000000+00	+1000000+01					41	6
354	850	PC	+0000000+00	+1000000+01					41	6
356	850	PC	+0000000+00	+1000000+01					41	6
357	850	PC	+0000000+00	+1000000+01					41	6
358	850	PC	+0000000+00	+1000000+01					41	6
360	850	PC	+0000000+00	+1000000+01					41	6
361	850	PC	+0000000+00	+1000000+01					41	6
362	850	PC	+0000000+00	+1000000+01					41	6
363	850	PC	+0000000+00	+1000000+01					41	6
364	850	PC	+0000000+00	+1000000+01					41	6
365	850	PC	+0000000+00	+1000000+01					41	6
366	850	PC	+0000000+00	+1000000+01					41	6
369	850	PC	+0000000+00	+1000000+01					41	6
370	850	PC	+0000000+00	+1000000+01					41	6
371	850	PC	+0000000+00	+1000000+01					41	6
372	850	PC	+0000000+00	+1000000+01					41	6
373	850	PC	+0000000+00	+1000000+01					41	6
374	850	PC	+0000000+00	+1000000+01					41	6
377	850	PC	+0000000+00	+1000000+01					41	6
378	850	PC	+0000000+00	+1000000+01					41	6
379	850	PC	+0000000+00	+1000000+01					41	6
380	850	PC	+0000000+00	+1000000+01					41	6
381	850	PC	+0000000+00	+1000000+01					41	6
382	850	PC	+0000000+00	+1000000+01					41	6
385	850	PC	+0000000+00	+1000000+01					41	6
386	850	PC	+0000000+00	+1000000+01					41	6
387	850	PC	+0000000+00	+1000000+01					41	6
388	850	PC	+0000000+00	+1000000+01					41	6
389	850	PC	+0000000+00	+1000000+01					41	6
390	850	PC	+0000000+00	+1000000+01					41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 9 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	//// EXP ID	TABLB
391	850		PC	+0000000+00	+1000000+01					41	6
392	850		PC	+0000000+00	+1000000+01					41	6
393	850		PC	+0000000+00	+1000000+01					41	6
394	850		PC	+0000000+00	+1000000+01					41	6
395	850		PC	+0000000+00	+1000000+01					41	6
396	850		PC	+0000000+00	+1000000+01					41	6
397	850		PC	+0000000+00	+1000000+01					41	6
398	850		PC	+0000000+00	+1000000+01					41	6
399	850		PC	+0000000+00	+1000000+01					41	6
400	850		PC	+0000000+00	+1000000+01					41	6
401	850		PC	+0000000+00	+1000000+01					41	6
402	850		PC	+0000000+00	+1000000+01					41	6
403	850		PC	+0000000+00	+1000000+01					41	6
404	850		PC	+0000000+00	+1000000+01					41	6
405	850		PC	+0000000+00	+1000000+01					41	6
406	850		PC	+0000000+00	+1000000+01					41	6
407	850		PC	+0000000+00	+1000000+01					41	6
408	850		PC	+0000000+00	+1000000+01					41	6
409	850		PC	+0000000+00	+1000000+01					41	6
410	850		PC	+0000000+00	+1000000+01					41	6
411	850		PC	+0000000+00	+1000000+01					41	6
412	850		PC	+0000000+00	+1000000+01					41	6
413	850		PC	+0000000+00	+1000000+01					41	6
414	850		PC	+0000000+00	+1000000+01					41	6
415	850		PC	+0000000+00	+1000000+01					41	6
417	850		PC	+0000000+00	+1000000+01					41	6
418	850		PC	+0000000+00	+1000000+01					41	6
419	850		PC	+0000000+00	+1000000+01					41	6
421	850		PC	+0000000+00	+1000000+01					41	6
422	850		PC	+0000000+00	+1000000+01					41	6
423	850		PC	+0000000+00	+1000000+01					41	6
003	005		007	018	029	040	051	062	073	079	080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 10 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABLB
425	850	PC	+0000000+00	+1000000+01						41	6
427	850	PC	+0000000+00	+1000000+01						41	6
428	850	PC	+0000000+00	+1000000+01						41	6
429	850	PC	+0000000+00	+1000000+01						41	6
431	850	PC	+0000000+00	+1000000+01						41	6
432	850	PC	+0000000+00	+1000000+01						41	6
433	850	PC	+0000000+00	+1000000+01						41	6
435	850	PC	+0000000+00	+1000000+01						41	6
437	850	PC	+0000000+00	+1000000+01						41	6
438	850	PC	+0000000+00	+1000000+01						41	6
439	850	PC	+0000000+00	+1000000+01						41	6
441	850	PC	+0000000+00	+1000000+01						41	6
442	850	PC	+0000000+00	+1000000+01						41	6
443	850	PC	+0000000+00	+1000000+01						41	6
445	850	PC	+0000000+00	+1000000+01						41	6
447	850	PC	+0000000+00	+1000000+01						41	6
448	850	PC	+0000000+00	+1000000+01						41	6
449	850	PC	+0000000+00	+1000000+01						41	6
451	850	PC	+0000000+00	+1000000+01						41	6
452	850	PC	+0000000+00	+1000000+01						41	6
453	850	PC	+0000000+00	+1000000+01						41	6
455	850	PC	+0000000+00	+1000000+01						41	6
457	850	PC	+0000000+00	+1000000+01						41	6
458	850	PC	+0000000+00	+1000000+01						41	6
459	850	PC	+0000000+00	+1000000+01						41	6
461	850	PC	+0000000+00	+1000000+01						41	6
462	850	PC	+0000000+00	+1000000+01						41	6
463	850	PC	+0000000+00	+1000000+01						41	6
470	850	PC	+0000000+00	+1000000+01						41	6
471	850	PC	+0000000+00	+1000000+01						41	6
472	850	PC	+0000000+00	+1000000+01						41	6
03	05	07	18	29	40	51	62	73		79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 11 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABL
473	850	PC	+0000000+00	+1000000+01						41	6
474	850	PC	+0000000+00	+1000000+01						41	6
475	850	PC	+0000000+00	+1000000+01						41	6
476	850	PC	+0000000+00	+1000000+01						41	6
477	850	PC	+0000000+00	+1000000+01						41	6
478	850	PC	+0000000+00	+1000000+01						41	6
479	850	PC	+0000000+00	+1000000+01						41	6
480	850	PC	+0000000+00	+1000000+01						41	6
481	850	PC	+0000000+00	+1000000+01						41	6
482	850	PC	+0000000+00	+1000000+01						41	6
483	850	PC	+0000000+00	+1000000+01						41	6
484	850	PC	+0000000+00	+1000000+01						41	6
485	850	PC	+0000000+00	+1000000+01						41	6
486	850	PC	+0000000+00	+1000000+01						41	6
487	850	PC	+0000000+00	+1000000+01						41	6
488	850	PC	+0000000+00	+1000000+01						41	6
001	851	PC	+0000000+00	+1000000+01						41	6
002	851	PC	+0000000+00	+1000000+01						41	6
003	851	PC	+0000000+00	+1000000+01						41	6
004	851	PC	+0000000+00	+1000000+01						41	6
005	851	PC	+0000000+00	+1000000+01						41	6
006	851	PC	+0000000+00	+1000000+01						41	6
007	851	PC	+0000000+00	+1000000+01						41	6
008	851	PC	+0000000+00	+1000000+01						41	6
009	851	PC	+0000000+00	+1000000+01						41	6
010	851	PC	+0000000+00	+1000000+01						41	6
011	851	PC	+0000000+00	+1000000+01						41	6
012	851	PC	+0000000+00	+1000000+01						41	6
013	851	PC	+0000000+00	+1000000+01						41	6
014	851	PC	+0000000+00	+1000000+01						41	6
015	851	PC	+0000000+00	+1000000+01						41	6
003	005	007	018	029	040	051	062	073		079	080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 12 of 20)

ENTRY	NUMBER	CORR	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	///// EXP ID	TABLE
016	851	PC	+0000000+00	+1000000+01						41	6
017	851	PC	+0000000+00	+1000000+01						41	6
018	851	PC	+0000000+00	+1000000+01						41	6
019	851	PC	+0000000+00	+1000000+01						41	6
020	851	PC	+0000000+00	+1000000+01						41	6
021	851	PC	+0000000+00	+1000000+01						41	6
022	851	PC	+0000000+00	+1000000+01						41	6
023	851	PC	+0000000+00	+1000000+01						41	6
024	851	PC	+0000000+00	+1000000+01						41	6
025	851	PC	+0000000+00	+1000000+01						41	6
026	851	PC	+0000000+00	+1000000+01						41	6
027	851	PC	+0000000+00	+1000000+01						41	6
028	851	PC	+0000000+00	+1000000+01						41	6
029	851	PC	+0000000+00	+1000000+01						41	6
030	851	PC	+0000000+00	+1000000+01						41	6
031	851	PC	+0000000+00	+1000000+01						41	6
032	851	PC	+0000000+00	+1000000+01						41	6
033	851	PC	+0000000+00	+1000000+01						41	6
034	851	PC	+0000000+00	+1000000+01						41	6
035	851	PC	+0000000+00	+1000000+01						41	6
036	851	PC	+0000000+00	+1000000+01						41	6
037	851	PC	+0000000+00	+1000000+01						41	6
038	851	PC	+0000000+00	+1000000+01						41	6
039	851	PC	+0000000+00	+1000000+01						41	6
040	851	PC	+0000000+00	+1000000+01						41	6
041	851	PC	+0000000+00	+1000000+01						41	6
042	851	PC	+0000000+00	+1000000+01						41	6
043	851	PC	+0000000+00	+1000000+01						41	6
044	851	PC	+0000000+00	+1000000+01						41	6
045	851	PC	+0000000+00	+1000000+01						41	6
046	851	PC	+0000000+00	+1000000+01						41	6

003 005 007 018 029 040 051 062 073 079 080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 13 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	//// EXP ID	//// TABLB
047	851	PC	+0000000+00	+1000000+01					41	6
048	851	PC	+0000000+00	+1000000+01					41	6
049	851	PC	+0000000+00	+1000000+01					41	6
050	851	PC	+0000000+00	+1000000+01					41	6
051	851	PC	+0000000+00	+1000000+01					41	6
052	851	PC	+0000000+00	+1000000+01					41	6
053	851	PC	+0000000+00	+1000000+01					41	6
054	851	PC	+0000000+00	+1000000+01					41	6
055	851	PC	+0000000+00	+1000000+01					41	6
056	851	PC	+0000000+00	+1000000+01					41	6
057	851	PC	+0000000+00	+1000000+01					41	6
058	851	PC	+0000000+00	+1000000+01					41	6
059	851	PC	+0000000+00	+1000000+01					41	6
060	851	PC	+0000000+00	+1000000+01					41	6
061	851	PC	+0000000+00	+1000000+01					41	6
062	851	PC	+0000000+00	+1000000+01					41	6
063	851	PC	+0000000+00	+1000000+01					41	6
064	851	PC	+0000000+00	+1000000+01					41	6
065	851	PC	+0000000+00	+1000000+01					41	6
066	851	PC	+0000000+00	+1000000+01					41	6
067	851	PC	+0000000+00	+1000000+01					41	6
068	851	PC	+0000000+00	+1000000+01					41	6
069	851	PC	+0000000+00	+1000000+01					41	6
070	851	PC	+0000000+00	+1000000+01					41	6
071	851	PC	+0000000+00	+1000000+01					41	6
072	851	PC	+0000000+00	+1000000+01					41	6
073	851	PC	+0000000+00	+1000000+01					41	6
074	851	PC	+0000000+00	+1000000+01					41	6
075	851	PC	+0000000+00	+1000000+01					41	6
076	851	PC	+0000000+00	+1000000+01					41	6
077	851	PC	+0000000+00	+1000000+01					41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 14 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	A0	A1	A2	A3	A4	A5	EXP ID	TABLE
078	851	PC	+0000000+00	+1000000+01					41	6
079	851	PC	+0000000+00	+1000000+01					41	6
080	851	PC	+0000000+00	+1000000+01					41	6
081	851	PC	+0000000+00	+1000000+01					41	6
082	851	PC	+0000000+00	+1000000+01					41	6
083	851	PC	+0000000+00	+1000000+01					41	6
084	851	PC	+0000000+00	+1000000+01					41	6
085	851	PC	+0000000+00	+1000000+01					41	6
086	851	PC	+0000000+00	+1000000+01					41	6
087	851	PC	+0000000+00	+1000000+01					41	6
088	851	PC	+0000000+00	+1000000+01					41	6
089	851	PC	+0000000+00	+1000000+01					41	6
090	851	PC	+0000000+00	+1000000+01					41	6
091	851	PC	+0000000+00	+1000000+01					41	6
092	851	PC	+0000000+00	+1000000+01					41	6
093	851	PC	+0000000+00	+1000000+01					41	6
094	851	PC	+0000000+00	+1000000+01					41	6
095	851	PC	+0000000+00	+1000000+01					41	6
096	851	PC	+0000000+00	+1000000+01					41	6
097	851	PC	+0000000+00	+1000000+01					41	6
098	851	PC	+0000000+00	+1000000+01					41	6
099	851	PC	+0000000+00	+1000000+01					41	6
100	851	PC	+0000000+00	+1000000+01					41	6
101	851	PC	+0000000+00	+1000000+01					41	6
102	851	PC	+0000000+00	+1000000+01					41	6
103	851	PC	+0000000+00	+1000000+01					41	6
104	851	PC	+0000000+00	+1000000+01					41	6
105	851	PC	+0000000+00	+1000000+01					41	6
106	851	PC	+0000000+00	+1000000+01					41	6
107	851	PC	+0000000+00	+1000000+01					41	6
108	851	PC	+0000000+00	+1000000+01					41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 15 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABLE
109	851	PC	+0000000+00	+1000000+01					41	6
110	851	PC	+0000000+00	+1000000+01					41	6
111	851	PC	+0000000+00	+1000000+01					41	6
112	851	PC	+0000000+00	+1000000+01					41	6
113	851	PC	+0000000+00	+1000000+01					41	6
114	851	PC	+0000000+00	+1000000+01					41	6
115	851	PC	+0000000+00	+1000000+01					41	6
116	851	PC	+0000000+00	+1000000+01					41	6
117	851	PC	+0000000+00	+1000000+01					41	6
118	851	PC	+0000000+00	+1000000+01					41	6
119	851	PC	+0000000+00	+1000000+01					41	6
120	851	PC	+0000000+00	+1000000+01					41	6
121	851	PC	+0000000+00	+1000000+01					41	6
122	851	PC	+0000000+00	+1000000+01					41	6
123	851	PC	+0000000+00	+1000000+01					41	6
124	851	PC	+0000000+00	+1000000+01					41	6
125	851	PC	+0000000+00	+1000000+01					41	6
126	851	PC	+0000000+00	+1000000+01					41	6
127	851	PC	+0000000+00	+1000000+01					41	6
128	851	PC	+0000000+00	+1000000+01					41	6
129	851	PC	+0000000+00	+1000000+01					41	6
130	851	PC	+0000000+00	+1000000+01					41	6
131	851	PC	+0000000+00	+1000000+01					41	6
132	851	PC	+0000000+00	+1000000+01					41	6
133	851	PC	+0000000+00	+1000000+01					41	6
134	851	PC	+0000000+00	+1000000+01					41	6
135	851	PC	+0000000+00	+1000000+01					41	6
136	851	PC	+0000000+00	+1000000+01					41	6
137	851	PC	+0000000+00	+1000000+01					41	6
138	851	PC	+0000000+00	+1000000+01					41	6
139	851	PC	+0000000+00	+1000000+01					41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 16 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABL
140	851	PC	+0000000+00	+1000000+01					41	6
141	851	PC	+0000000+00	+1000000+01					41	6
142	851	PC	+0000000+00	+1000000+01					41	6
143	851	PC	+0000000+00	+1000000+01					41	6
144	851	PC	+0000000+00	+1000000+01					41	6
145	851	PC	+0000000+00	+1000000+01					41	6
146	851	PC	+0000000+00	+1000000+01					41	6
147	851	PC	+0000000+00	+1000000+01					41	6
148	851	PC	+0000000+00	+1000000+01					41	6
149	851	PC	+0000000+00	+1000000+01					41	6
150	851	PC	+0000000+00	+1000000+01					41	6
151	851	PC	+0000000+00	+1000000+01					41	6
152	851	PC	+0000000+00	+1000000+01					41	6
153	851	PC	+0000000+00	+1000000+01					41	6
154	851	PC	+0000000+00	+1000000+01					41	6
155	851	PC	+0000000+00	+1000000+01					41	6
156	851	PC	+0000000+00	+1000000+01					41	6
157	851	PC	+0000000+00	+1000000+01					41	6
158	851	PC	+0000000+00	+1000000+01					41	6
159	851	PC	+0000000+00	+1000000+01					41	6
160	851	PC	+0000000+00	+1000000+01					41	6
161	851	PC	+0000000+00	+1000000+01					41	6
162	851	PC	+0000000+00	+1000000+01					41	6
163	851	PC	+0000000+00	+1000000+01					41	6
164	851	PC	+0000000+00	+1000000+01					41	6
165	851	PC	+0000000+00	+1000000+01					41	6
166	851	PC	+0000000+00	+1000000+01					41	6
167	851	PC	+0000000+00	+1000000+01					41	6
168	851	PC	+0000000+00	+1000Q00+01					41	6
169	851	PC	+0000000+00	+1000000+01					41	6
170	851	PC	+0000000+00	+1000000+01					41	6

003 005 007 018 029 040 051 062 073 079 080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 17 of 20)

ENTRY	NUMBER	CONV	CALIBRATION TYPE	A0	A1	A2	A3	A4	A5	EXP ID	TABL
171	851	PC	+0000000+00	+1000000+01						41	6
172	851	PC	+0000000+00	+1000000+01						41	6
173	851	PC	+0000000+00	+1000000+01						41	6
174	851	PC	+0000000+00	+1000000+01						41	6
175	851	PC	+0000000+00	+1000000+01						41	6
176	851	PC	+0000000+00	+1000000+01						41	6
177	851	PC	+0000000+00	+1000000+01						41	6
178	851	PC	+0000000+00	+1000000+01						41	6
179	851	PC	+0000000+00	+1000000+01						41	6
180	851	PC	+0000000+00	+1000000+01						41	6
181	851	PC	+0000000+00	+1000000+01						41	6
182	851	PC	+0000000+00	+1000000+01						41	6
183	851	PC	+0000000+00	+1000000+01						41	6
184	851	PC	+0000000+00	+1000000+01						41	6
185	851	PC	+0000000+00	+1000000+01						41	6
186	851	PC	+0000000+00	+1000000+01						41	6
187	851	PC	+0000000+00	+1000000+01						41	6
188	851	PC	+0000000+00	+1000000+01						41	6
189	851	PC	+0000000+00	+1000000+01						41	6
190	851	PC	+0000000+00	+1000000+01						41	6
191	851	PC	+0000000+00	+1000000+01						41	6
192	851	PC	+0000000+00	+1000000+01						41	6
193	851	PC	+0000000+00	+1000000+01						41	6
194	851	PC	+0000000+00	+1000000+01						41	6
195	851	PC	+0000000+00	+1000000+01						41	6
196	851	PC	+0000000+00	+1000000+01						41	6
197	851	PC	+0000000+00	+1000000+01						41	6
198	851	PC	+0000000+00	+1000000+01						41	6
199	851	PC	+0000000+00	+1000000+01						41	6
200	851	PC	+0000000+00	+1000000+01						41	6
201	851	PC	+0000000+00	+1000000+01						41	6
03	05	07	18	29	40	51	62	73		79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 18 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	A0	A1	A2	A3	A4	A5	EXP ID	TABLE
			CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
202	851	PC	+0000000+00	+1000000+01					41	6
203	851	PC	+0000000+00	+1000000+01					41	6
204	851	PC	+0000000+00	+1000000+01					41	6
205	851	PC	+0000000+00	+1000000+01					41	6
206	851	PC	+0000000+00	+1000000+01					41	6
207	851	PC	+0000000+00	+1000000+01					41	6
208	851	PC	+0000000+00	+1000000+01					41	6
209	851	PC	+0000000+00	+1000000+01					41	6
210	851	PC	+0000000+00	+1000000+01					41	6
211	851	PC	+0000000+00	+1000000+01					41	6
212	851	PC	+0000000+00	+1000000+01					41	6
213	851	PC	+0000000+00	+1000000+01					41	6
214	851	PC	+0000000+00	+1000000+01					41	6
215	851	PC	+0000000+00	+1000000+01					41	6
216	851	PC	+0000000+00	+1000000+01					41	6
217	851	PC	+0000000+00	+1000000+01					41	6
218	851	PC	+0000000+00	+1000000+01					41	6
219	851	PC	+0000000+00	+1000000+01					41	6
220	851	PC	+0000000+00	+1000000+01					41	6
221	851	PC	+0000000+00	+1000000+01					41	6
222	851	PC	+0000000+00	+1000000+01					41	6
223	851	PC	+0000000+00	+1000000+01					41	6
224	851	PC	+0000000+00	+1000000+01					41	6
225	851	PC	+0000000+00	+1000000+01					41	6
226	851	PC	+0000000+00	+1000000+01					41	6
227	851	PC	+0000000+00	+1000000+01					41	6
228	851	PC	+0000000+00	+1000000+01					41	6
229	851	PC	+0000000+00	+1000000+01					41	6
230	851	PC	+0000000+00	+1000000+01					41	6
231	851	PC	+0000000+00	+1000000+01					41	6
232	851	PC	+0000000+00	+1000000+01					41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 19 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	//// EXP ID	TABL B
233	851		PC	+0000000+00	+1000000+01					41	6
234	851		PC	+0000000+00	+1000000+01					41	6
235	851		PC	+0000000+00	+1000000+01					41	6
236	851		PC	+0000000+00	+1000000+01					41	6
237	851		PC	+0000000+00	+1000000+01					41	6
238	851		PC	+0000000+00	+1000000+01					41	6
239	851		PC	+0000000+00	+1000000+01					41	6
240	851		PC	+0000000+00	+1000000+01					41	6
241	851		PC	+0000000+00	+1000000+01					41	6
242	851		PC	+0000000+00	+1000000+01					41	6
243	851		PC	+0000000+00	+1000000+01					41	6
244	851		PC	+0000000+00	+1000000+01					41	6
245	851		PC	+0000000+00	+1000000+01					41	6
246	851		PC	+0000000+00	+1000000+01					41	6
247	851		PC	+0000000+00	+1000000+01					41	6
248	851		PC	+0000000+00	+1000000+01					41	6
249	851		PC	+0000000+00	+1000000+01					41	6
250	851		PC	+0000000+00	+1000000+01					41	6
251	851		PC	+0000000+00	+1000000+01					41	6
252	851		PC	+0000000+00	+1000000+01					41	6
253	851		PC	+0000000+00	+1000000+01					41	6
254	851		PC	+0000000+00	+1000000+01					41	6
255	851		PC	+0000000+00	+1000000+01					41	6
256	851		PC	+0000000+00	+1000000+01					41	6
257	851		PC	+0000000+00	+1000000+01					41	6
258	851		PC	+0000000+00	+1000000+01					41	6
259	851		PC	+0000000+00	+1000000+01					41	6
260	851		PC	+0000000+00	+1000000+01					41	6
261	851		PC	+0000000+00	+1000000+01					41	6
262	851		PC	+0000000+00	+1000000+01					41	6
263	851		PC	+0000000+00	+5000000-01					41	6
03	05		07	18	29	40	51	62	73	79	80

TABLE 1.7-4. POIC DISPLAY REQUIREMENTS (Sheet 20 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							//////	
			A0	A1	A2	A3	A4	A5		EXP ID	TABLB
265	851	PC	+0000000+00	+1000000+01						41	6
03	05	07	18	29	40	51	62	73		79	80

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 1 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
001	850	EM				0	CDAS FAILURE-BITE #1 (Tbl 1)	OK	FAIL	41	7
002	850	EM				0	CDAS FAILURE-BITE #2 (Tbl 1)	OK	FAIL	41	7
003	850	EM				0	PDS PWR OFF (Tbl 1)	ON	OFF	41	7
004	850	EM				1	PDS PWR OFF (Tbl 1)	OFF	ON	41	7
005	850	EM				0	SCS PWR OFF (Tbl 1)	ON	OFF	41	7
006	850							YES	NO	41	7
006	850	EM				1	SCS PWR OFF (Tbl 1)	OFF	ON	41	7
007	850							NO	YES	41	7
007	850	EM				0	CDAS PWR OFF (Tbl 1)	ON	OFF	41	7
008	850	EM				1	EXTRM TRAVEL LIMIT EXCEEDED	YES	NO	41	7
008	850	EM				1	CDAS PWR OFF (Tbl 1)	OFF	ON	41	7
009	850	EM				0	EXTRM TRAVEL LIMIT EXCEEDED	NO	YES	41	7
010	850							YES	NO	41	7
011	850							NO	YES	41	7
011	850	EM				1	NO AVIONICS AIR-SCS #2 (Tbl	FAIL	OK	41	7
012	850	EM						YES	NO	41	7
012	850	EM				1	NO AVIONICS AIR-PDS #2 (Tbl	FAIL	OK	41	7
013	850							NO	YES	41	7
014	850	EM				1	WATER OUTLET BYPASS	BYPS	NORM	41	7
015	850	EM				0	WATER OUTLET BYPASS	NORM	BYPS	41	7
016	850	EM				1	WATER INLET BYPASS	BYPS	NORM	41	7
017	850	EM				0	WATER INLET BYPASS	NORM	BYPS	41	7
018	850							CLS	OPN	41	7
019	850							OPN	CLS	41	7
020	850							CLS	OPN	41	7
021	850							OPN	CLS	41	7
022	850							YES	NO	41	7
023	850							NO	YES	41	7
024	850							YES	NO	41	7
025	850							NO	YES	41	7
026	850							YES	NO	41	7
027	850							NO	YES	41	7
028	850							NO	YES	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 2 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXP ID	TABLE
029	850							NO	YES	41	7
030	850							YES	NO	41	7
031	850							NO	YES	41	7
032	850							YES	NO	41	7
033	850							NO	YES	41	7
034	850							YES	NO	41	7
035	850							NO	YES	41	7
036	850							YES	NO	41	7
037	850							NO	YES	41	7
038	850							OK	FAIL	41	7
039	850							OK	FAIL	41	7
040	850							OK	FAIL	41	7
041	850							OK	FAIL	41	7
042	850							OK	FAIL	41	7
043	850							OK	FAIL	41	7
044	850							OK	FAIL	41	7
045	850							OK	FAIL	41	7
046	850	EM				1	NO AVIONICS AIR - PDS #1	FAIL	OK	41	7
047	850	EM				1	NO AVIONICS AIR - PCS #1	FAIL	OK	41	7
048	850							ON	OFF	41	7
049	850							OFF	ON	41	7
050	850							ON	OFF	41	7
051	850							OFF	ON	41	7
052	850	EM				1	LO IFEA WATER FLOW #1	FAIL	OK	41	7
053	850	EM				1	NO AVIONICS AIR - SCS #1	FAIL	OK	41	7
054	850							OK	FAIL	41	7
055	850							OK	FAIL	41	7
056	850							OK	FAIL	41	7
057	850							OK	FAIL	41	7
058	850							OK	FAIL	41	7
059	850							OK	FAIL	41	7
060	850							OK	FAIL	41	7
061	850							OK	FAIL	41	7

Column positions: 03 05 12 20 28 36 38 66 72 79 81 83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 3 of 14)

ENTRY NUMBER	CONN OR	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
062	850							ON	OFF	41	7
063	850							OFF	ON	41	7
064	850							ON	OFF	41	7
065	850							OFF	ON	41	7
066	850							ON	OFF	41	7
067	850							OFF	ON	41	7
068	850							ON	OFF	41	7
069	850							OFF	ON	41	7
070	850							ON	OFF	41	7
071	850							OFF	ON	41	7
072	850							ON	OFF	41	7
073	850							OFF	ON	41	7
074	850							ON	OFF	41	7
075	850							OFF	ON	41	7
076	850							ON	OFF	41	7
077	850							OFF	ON	41	7
078	850							YES	NO	41	7
079	850							NO	YES	41	7
080	850							YES	NO	41	7
081	850							NO	YES	41	7
082	850							YES	NO	41	7
083	850							NO	YES	41	7
084	850							CLS	OPN	41	7
085	850							OPN	CLS	41	7
086	850							ON	OFF	41	7
087	850							OFF	ON	41	7
088	850							ON	OFF	41	7
089	850							OFF	ON	41	7
090	850							ON	OFF	41	7
091	850							OFF	ON	41	7
092	850							ON	OFF	41	7
093	850							OFF	ON	41	7
094	850							ON	OFF	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 4 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
095	850							OFF	ON	41	7
096	850	EM				1	LO IFEA WATER FLOW #2	FAIL	OK	41	7
097	850	EM				1	NO AVIONICS AIR - PCS #2	FAIL	OK	41	7
098	850							OK	FAIL	41	7
099	850							OK	FAIL	41	7
100	850							OK	FAIL	41	7
101	850							OK	FAIL	41	7
102	850							OK	FAIL	41	7
103	850							OK	FAIL	41	7
104	850							OK	FAIL	41	7
105	850							OK	FAIL	41	7
106	850	EM				0	PCS UTILITY PWR OFF	ON	OFF	41	7
107	850	EM				1	PCS UTILITY PWR OFF	OFF	ON	41	7
108	850							ON	OFF	41	7
109	850							OFF	ON	41	7
110	850							ON	OFF	41	7
111	850							OFF	ON	41	7
112	850							ON	OFF	41	7
113	850							OFF	ON	41	7
114	850							ON	OFF	41	7
115	850							OFF	ON	41	7
116	850							ON	OFF	41	7
117	850							OFF	ON	41	7
118	850							ON	OFF	41	7
119	850							OFF	ON	41	7
120	850							OFF	ON	41	7
121	850							ON	OFF	41	7
122	850							ON	OFF	41	7
123	850							OFF	ON	41	7
124	850							ON	OFF	41	7
125	850							OFF	ON	41	7
126	850							ON	OFF	41	7
127	850							OFF	ON	41	7

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 5 of 14)

ENTRY NUMBER	CONNECTOR NO.	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
128	850							ON	OFF	41	7
129	850							OFF	ON	41	7
130	850							ON	OFF	41	7
131	850							OFF	ON	41	7
132	850							ON	OFF	41	7
133	850							OFF	ON	41	7
134	850							ON	OFF	41	7
135	850							OFF	ON	41	7
136	850							ON	OFF	41	7
137	850							OFF	ON	41	7
186	850							NO	YES	41	7
200	850	EM				1		WAIT	RUN	41	7
212	850	LS	3740		3740		HI EXP MAIN BUS CURRENT			41	7
213	850	LS	3358	2396			EXP MAIN BUS VOLTAGE OOL			41	7
214	850	LS	410		819		HI IFEA LOWER HUMIDITY			41	7
215	850	LS	410		819		HI IFEA UPPER HUMIDITY			41	7
216	850	LS	1911	887	1979	887	IFEA PRESSURE 1 OOL			41	7
217	850	LS	1911	887	1979	887	IFEA PRESSURE 2 OOL			41	7
218	850	LS	1954		2035		HI LOWER ATMOS TEMP			41	7
219	850	LS	1954		2035		HI UPPER ATMOS TEMP			41	7
220	850	LS	504		585		HI IFEA WATER INLET TEMP			41	7
221	850	LS	827		907		HI IFEA WATER OUTLET TEMP			41	7
222	850	LS	827		907		HI CLD END SHELL TEMP			41	7
223	850	LS	827		907		HI HOT END SHELL TEMP			41	7
224	850	LS	827		907		HI RFM WATER OUTLET TEMP			41	7
261	850	LS	2007		2007		HI STEP MTR PHASE A CURRENT			41	7
262	850	LS	2163		2163		HI STEP MTR PHASE A VOLTAGE			41	7
263	850	LS	2007		2007		HI STEP MTR PHASE B CURRENT			41	7
264	850	LS	2163		2163		HI STEP MTR PHASE B VOLTAGE			41	7
266	850	LS	827		1067		HI FTS STEPPER MOTOR TEMP			41	7
268	850	LS	3003		3003		HI COLD GUARD HTR CURRENT			41	7
269	850	LS	1536		1536		HI COLD GUARD HTR VOLTAGE			41	7
270	850	LS	3003		3003		HI COLD PRIM HTR CURRENT			41	7

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 6 of 14)

ENTRY NUMBER	COR NOR	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
271	850	LS	1536		1536		HI COLD PRIM HTR VOLTAGE			41	7
272	850	LS	3003		3003		HI COLD RED HTR CURRENT			41	7
273	850	LS	1536		1536		HI COLD RED HTR VOLTAGE			41	7
274	850	LS	3003		3003		HI BOOST HTR CURRENT			41	7
275	850	LS	3072		3072		HI BOOST HTR VOLTAGE			41	7
276	850	LS	3003		3003		HI HOT GUARD HTR CURRENT			41	7
277	850	LS	1536		1536		HI HOT GUARD HTR VOLTAGE			41	7
278	850	LS	3003		3003		HI HOT PRIM HTR CURRENT			41	7
279	850	LS	3072		3072		HI HOT PRIM HTR VOLTAGE			41	7
280	850	LS	3003		3003		HI HOT RED HTR CURRENT			41	7
281	850	LS	3072		3072		HI HOT RED HTR VOLTAGE			41	7
282	850	LS	827		907		HI CJ TEMP - COLD ZONE #1			41	7
283	850	LS	827		907		HI CJ TEMP - COLD ZONE #2			41	7
284	850	LS	827		907		HI CJ TEMP - HOT ZONE #1			41	7
285	850	LS	827		907		HI CJ TEMP - HOT ZONE #2			41	7
286	850	LS	827		907		HI CJ TEMP-SAMPLE 1 SENSOR 1			41	7
287	850	LS	827		907		HI CJ TEMP-SAMPLE 1 SENSOR 2			41	7
288	850	LS	827		907		HI CJ TEMP-SAMPLE 2 SENSOR 1			41	7
289	850	LS	827		907		HI CJ TEMP-SAMPLE 2 SENSOR 2			41	7
290	850	LS	827		907		HI CJ TEMP-SAMPLE 3 SENSOR 1			41	7
291	850	LS	827		907		HI CJ TEMP-SAMPLE 3 SENSOR 2			41	7
292	850	LS	827		907		HI CJ TEMP-SAMPLE 4 SENSOR 1			41	7
293	850	LS	827		907		HI CJ TEMP-SAMPLE 4 SENSOR 2			41	7
294	850	LS	827		907		HI CJ TEMP-SAMPLE 5 SENSOR 1			41	7
295	850	LS	827		907		HI CJ TEMP-SAMPLE 5 SENSOR 2			41	7
296	850	LS	827		907		HI CJ TEMP-SAMPLE 6 SENSOR 1			41	7
297	850	LS	827		907		HI CJ TEMP-SAMPLE 6 SENSOR 2			41	7
313	850	LS	987		1227		HI ALIGN ARM TEMP			41	7
314	850	LS	827		907		HI SEM TRACK TEMP			41	7
465	850							NO	YES	41	7
466	850							NO	YES	41	7
467	850							NO	YES	41	7
468	850							NO	YES	41	7

003 005 012 020 028 036 038 066 072 079 081 083

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 7 of 14)

ENTRY NUMBER	CONN OR	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
469	850							NO	YES	41	7
489	850							OK	FAIL	41	7
490	850							OK	FAIL	41	7
491	850							OK	FAIL	41	7
492	850							OK	FAIL	41	7
493	850							OK	FAIL	41	7
494	850							OK	FAIL	41	7
495	850							OK	FAIL	41	7
496	850							OK	FAIL	41	7
497	850							OK	FAIL	41	7
498	850							OK	FAIL	41	7
499	850							OK	FAIL	41	7
500	850							OK	FAIL	41	7
501	850							OK	FAIL	41	7
502	850							OK	FAIL	41	7
503	850							OK	FAIL	41	7
504	850							OK	FAIL	41	7
505	850							OK	FAIL	41	7
506	850							OK	FAIL	41	7
507	850							OK	FAIL	41	7
508	850							OK	FAIL	41	7
509	850							OK	FAIL	41	7
510	850							OK	FAIL	41	7
511	850							OK	FAIL	41	7
512	850							OK	FAIL	41	7
513	850							OK	FAIL	41	7
514	850							OK	FAIL	41	7
515	850							OK	FAIL	41	7
516	850							OK	FAIL	41	7
517	850							OK	FAIL	41	7
518	850							OK	FAIL	41	7
519	850							OK	FAIL	41	7
520	850							OK	FAIL	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 8 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////	
			UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXPID	TABLE
521	850							OK	FAIL	41	7
522	850							OK	FAIL	41	7
523	850							OK	FAIL	41	7
524	850							OK	FAIL	41	7
525	850							OK	FAIL	41	7
526	850							OK	FAIL	41	7
527	850							OK	FAIL	41	7
528	850							OK	FAIL	41	7
529	850							OK	FAIL	41	7
530	850							OK	FAIL	41	7
531	850							OK	FAIL	41	7
532	850							OK	FAIL	41	7
533	850							OK	FAIL	41	7
534	850							OK	FAIL	41	7
535	850							OK	FAIL	41	7
536	850							OK	FAIL	41	7
537	850							OK	FAIL	41	7
538	850							OK	FAIL	41	7
539	850							OK	FAIL	41	7
540	850							OK	FAIL	41	7
541	850							OK	FAIL	41	7
542	850							OK	FAIL	41	7
543	850							OK	FAIL	41	7
544	850							OK	FAIL	41	7
545	850							OK	FAIL	41	7
546	850							OK	FAIL	41	7
547	850							OK	FAIL	41	7
548	850							OK	FAIL	41	7
549	850							OK	FAIL	41	7
550	850							OK	FAIL	41	7
551	850							OK	FAIL	41	7
552	850							OK	FAIL	41	7
553	850							OK	FAIL	41	7

Column positions: 03 05 12 20 28 36 38 66 72 79 81 83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 9 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
554	850							OK	FAIL	41	7
555	850							OK	FAIL	41	7
556	850							OK	FAIL	41	7
557	850							OK	FAIL	41	7
558	850							OK	FAIL	41	7
559	850							OK	FAIL	41	7
560	850							OK	FAIL	41	7
561	850							OK	FAIL	41	7
562	850							OK	FAIL	41	7
563	850							OK	FAIL	41	7
564	850							OK	FAIL	41	7
565	850							OK	FAIL	41	7
566	850							OK	FAIL	41	7
567	850							OK	FAIL	41	7
568	850							OK	FAIL	41	7
569	850							OK	FAIL	41	7
570	850							OK	FAIL	41	7
571	850							OK	FAIL	41	7
572	850							OK	FAIL	41	7
573	850							OK	FAIL	41	7
574	850							OK	FAIL	41	7
575	850							OK	FAIL	41	7
576	850							OK	FAIL	41	7
577	850							OK	FAIL	41	7
578	850							OK	FAIL	41	7
579	850							OK	FAIL	41	7
580	850							OK	FAIL	41	7
581	850							OK	FAIL	41	7
582	850							OK	FAIL	41	7
583	850							OK	FAIL	41	7
584	850							OK	FAIL	41	7
585	850							OK	FAIL	41	7
586	850							OK	FAIL	41	7

Column positions: 03 05 12 20 28 36 38 66 72 79 81 83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 10 of 14)

ENTRY	CONNOR NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
587	850							OK	FAIL	41	7
588	850							OK	FAIL	41	7
589	850							OK	FAIL	41	7
590	850							OK	FAIL	41	7
591	850							OK	FAIL	41	7
592	850							OK	FAIL	41	7
593	850							OK	FAIL	41	7
594	850							OK	FAIL	41	7
595	850							OK	FAIL	41	7
596	850							OK	FAIL	41	7
597	850							OK	FAIL	41	7
598	850							OK	FAIL	41	7
599	850							OK	FAIL	41	7
600	850							OK	FAIL	41	7
601	850							OK	FAIL	41	7
602	850							OK	FAIL	41	7
603	850							OK	FAIL	41	7
604	850							OK	FAIL	41	7
605	850							OK	FAIL	41	7
606	850							OK	FAIL	41	7
607	850							OK	FAIL	41	7
608	850							OK	FAIL	41	7
609	850							OK	FAIL	41	7
610	850							OK	FAIL	41	7
611	850							OK	FAIL	41	7
612	850							OK	FAIL	41	7
613	850							OK	FAIL	41	7
614	850							OK	FAIL	41	7
615	850							OK	FAIL	41	7
616	850							OK	FAIL	41	7
617	850							OK	FAIL	41	7
618	850							OK	FAIL	41	7
619	850							OK	FAIL	41	7

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TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 11 of 14)

ENTRY NUMBER	COMPONENT NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
620	850							OK	FAIL	41	7
621	850							OK	FAIL	41	7
622	850							OK	FAIL	41	7
623	850							OK	FAIL	41	7
624	850							OK	FAIL	41	7
625	850							OK	FAIL	41	7
626	850							OK	FAIL	41	7
627	850							OK	FAIL	41	7
628	850							OK	FAIL	41	7
629	850							OK	FAIL	41	7
630	850							OK	FAIL	41	7
631	850							OK	FAIL	41	7
632	850							OK	FAIL	41	7
633	850							OK	FAIL	41	7
634	850							OK	FAIL	41	7
635	850							OK	FAIL	41	7
636	850							OK	FAIL	41	7
637	850							OK	FAIL	41	7
638	850							OK	FAIL	41	7
639	850							OK	FAIL	41	7
640	850							OK	FAIL	41	7
641	850							OK	FAIL	41	7
642	850							OK	FAIL	41	7
643	850							OK	FAIL	41	7
644	850							OK	FAIL	41	7
645	850							OK	FAIL	41	7
646	850							OK	FAIL	41	7
647	850							OK	FAIL	41	7
648	850							OK	FAIL	41	7
649	850							OK	FAIL	41	7
650	850							OK	FAIL	41	7
651	850							OK	FAIL	41	7
652	850							OK	FAIL	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 12 of 14)

ENTRY NUMBER	CONNECTOR	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	1=	EXPID	TABLE
653	850							OK	FAIL	41	7
654	850							OK	FAIL	41	7
655	850							OK	FAIL	41	7
656	850							OK	FAIL	41	7
657	850							OK	FAIL	41	7
658	850							OK	FAIL	41	7
659	850							OK	FAIL	41	7
660	850							OK	FAIL	41	7
661	850							OK	FAIL	41	7
662	850							OK	FAIL	41	7
663	850							OK	FAIL	41	7
664	850							OK	FAIL	41	7
665	850							OK	FAIL	41	7
666	850							OK	FAIL	41	7
667	850							OK	FAIL	41	7
668	850							OK	FAIL	41	7
669	850							OK	FAIL	41	7
670	850							OK	FAIL	41	7
671	850							OK	FAIL	41	7
672	850							OK	FAIL	41	7
673	850							OK	FAIL	41	7
674	850							OK	FAIL	41	7
675	850							OK	FAIL	41	7
676	850							OK	FAIL	41	7
677	850							OK	FAIL	41	7
678	850							OK	FAIL	41	7
679	850							OK	FAIL	41	7
680	850							OK	FAIL	41	7
681	850							OK	FAIL	41	7
682	850							OK	FAIL	41	7
683	850							OK	FAIL	41	7
684	850							OK	FAIL	41	7
685	850							OK	FAIL	41	7

003 005 012 020 028 036 038 066 072 079 081 083

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 13 of 14)

ENTRY NUMBER	CONN NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
686	850							OK	FAIL	41	7
687	850							OK	FAIL	41	7
688	850							OK	FAIL	41	7
689	850							OK	FAIL	41	7
690	850							OK	FAIL	41	7
691	850							OK	FAIL	41	7
692	850							OK	FAIL	41	7
693	850							OK	FAIL	41	7
694	850							OK	FAIL	41	7
695	850							OK	FAIL	41	7
696	850							OK	FAIL	41	7
697	850							OK	FAIL	41	7
698	850							OK	FAIL	41	7
699	850							OK	FAIL	41	7
700	850							OK	FAIL	41	7
701	850							OK	FAIL	41	7
702	850							OK	FAIL	41	7
703	850							OK	FAIL	41	7
704	850							OK	FAIL	41	7
705	850							OK	FAIL	41	7
706	850							OK	FAIL	41	7
707	850							OK	FAIL	41	7
708	850							OK	FAIL	41	7
709	850							OK	FAIL	41	7
710	850							OK	FAIL	41	7
711	850							OK	FAIL	41	7
712	850							OK	FAIL	41	7
713	850							OK	FAIL	41	7
714	850							OK	FAIL	41	7
715	850							OK	FAIL	41	7
716	850							OK	FAIL	41	7
717	850							OK	FAIL	41	7
718	850							OK	FAIL	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 1.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 14 of 14)

ENTRY	NUMBER	CORR NO.	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
719		850							OK	FAIL	41	7
720		850							OK	FAIL	41	7
721		850							OK	FAIL	41	7
722		850							OK	FAIL	41	7
723		850							OK	FAIL	41	7
724		850							OK	FAIL	41	7
725		850							OK	FAIL	41	7
726		850							OK	FAIL	41	7
727		850							OK	FAIL	41	7
728		850							OK	FAIL	41	7
729		850							OK	FAIL	41	7
730		850							OK	FAIL	41	7
731		850							OK	FAIL	41	7
732		850							OK	FAIL	41	7
733		850							OK	FAIL	41	7
734		850							OK	FAIL	41	7
735		850							OK	FAIL	41	7
736		850							OK	FAIL	41	7
737		850							OK	FAIL	41	7
738		850							OK	FAIL	41	7
739		850							OK	FAIL	41	7
740		850							OK	FAIL	41	7
741		850							OK	FAIL	41	7
742		850							OK	FAIL	41	7
743		850							OK	FAIL	41	7
744		850							OK	FAIL	41	7
745		850							OK	FAIL	41	7
746		850							OK	FAIL	41	7
747		850							OK	FAIL	41	7
748		850							OK	FAIL	41	7
749		850							OK	FAIL	41	7
750		850							OK	FAIL	41	7
264		851							RUN	WAIT	42	7
266		851							NO	YES	42	7

03 05 12 20 28 36 38 66 72 79 81 83

1.8. FLIGHT SOFTWARE REQUIREMENTS

This section of the Experiment/Facility Requirements Document (E/FRD) defines the Space Station Freedom (SSF) Data Management System (DMS) software functions required to support the Space Station Furnace Facility (SSFF).

The SSFF Core Control Unit (CCU) software will interface to the SSF Payload Executive Software (PES) for DMS services and executive-level control. The SSFF Furnace Control Unit (FCU) and Furnace Actuator Unit (FAU) software provides networking, data processing, storage, and data acquisition and control for Furnace Module-1. The SSFF software external interface diagram is shown in Figure 1.8-1. The SSFF software component tree is shown in Figure 1.8-2. These components will reside in the DMS hardware. The following subsections define the required resources and data handling requirements.

1.8.1 COMMAND SUPPORT

The SSF via the PES software will support the issuance of commands and SSFF activation given by the ground, onboard crew, or Tier 1.

1.8.2 HEALTH AND STATUS DATA

The PES will acquire health and status data from the SSFF and distribute it to Tier 1 on board and to the Payload Operations Integration Center (POIC) on the ground.

1.8.3 ONBOARD STORAGE

The SSF will provide storage for SSFF and/or Furnace Module-1 program loads, operations, status, and science data.

1.8.4 DISPLAY

The SSF multipurpose application console (MPAC) will provide backup support of the SSFF crew interface for onboard SSFF configuration and preparations for Furnace Module-1 experiment operations.

1.8.5 PROGRAM LOADS AND MODIFICATIONS DOWNLOADING

The SSF software shall support the downloading of SSFF program loads and modifications.

1.8.6 ANCILLARY DATA

The SSF shall support requests for ancillary data.

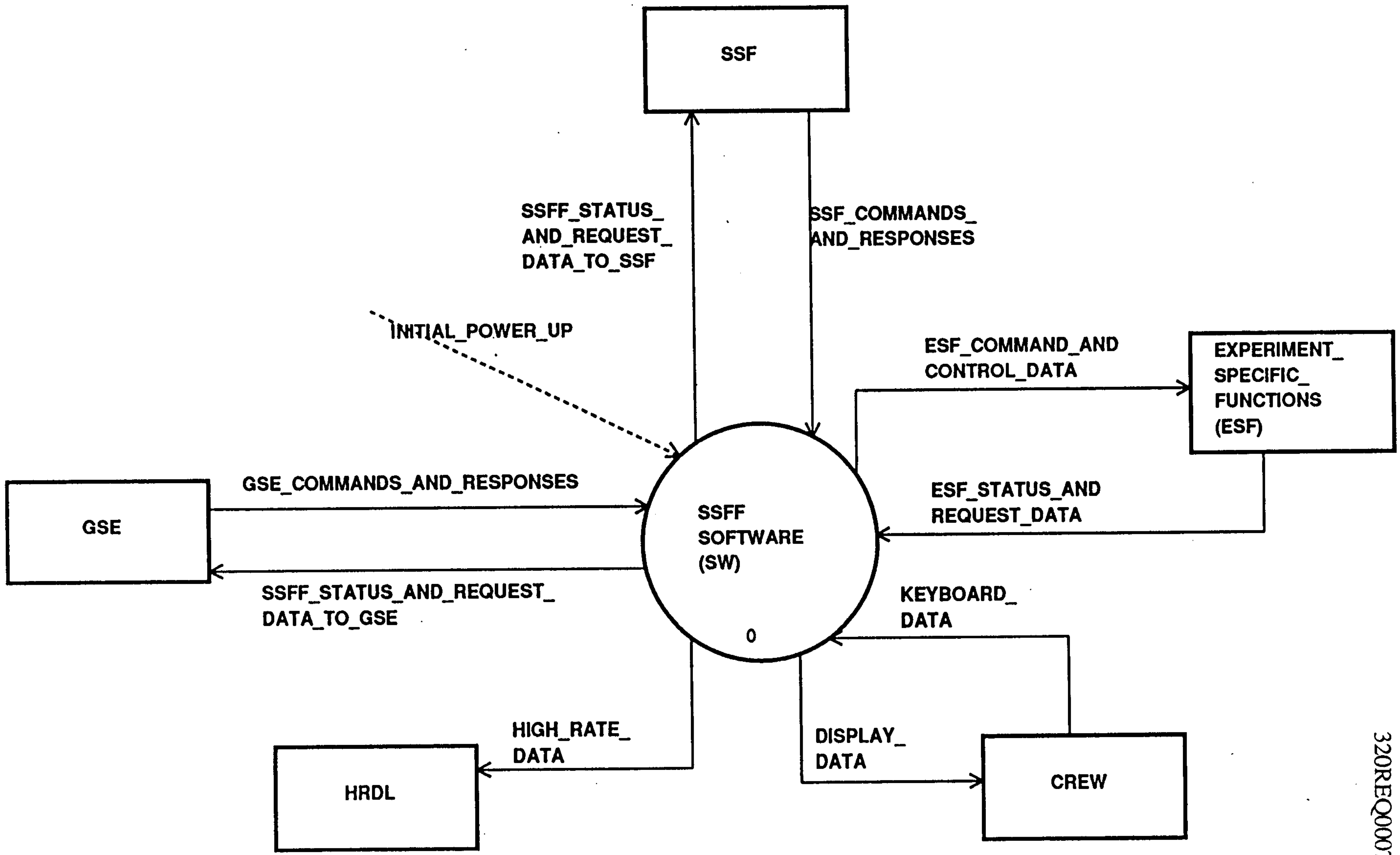

FIGURE 1.8-1. SSFF SOFTWARE EXTERNAL INTERFACE DIAGRAM

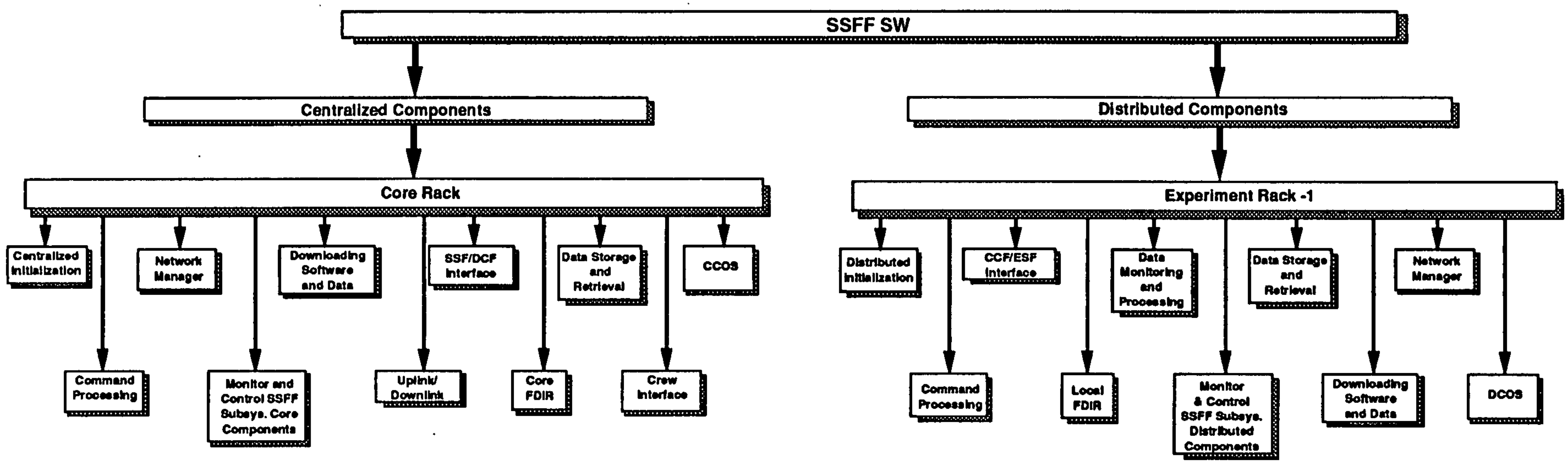

FIGURE 1.8-2. SOFTWARE COMPONENT TREE

1.9. PHYSICAL INTEGRATION

1.9.1 RACK INTEGRATION AND CHECKOUT

Physical integration during prelaunch consists of checkout and integration of Furnace Module-1, the individual Core Rack and Experiment Rack-1, and finally the SSFF as an integrated system. Interfaces are progressively verified as the buildup of the Space Station Furnace Facility (SSFF) is performed. Following shipment to Kennedy Space Center (KSC), the facility is visually checked for physical integrity, and a limited functional test is performed to ensure operability and Space Station Freedom (SSF) interface compatibility. The prelaunch activities flow is shown in Figure 1.9-1. Table 1.9-1 provides the integration facility requirements for each stage of integration. Table 1.9-2 describes the requirements and activities at each step of the integration process.

1.9.1.1 Core Rack Checkout

Tests, using the appropriate ground support equipment (GSE) including SSF and experiment rack interface simulators, will be performed to verify proper operations of the Core Rack. Testing will include operation of each SSFF subsystem and component to its operational limits, and an integrated SSFF exercising each of the interface functions, through the use of simulators, with the SSF and the experiment rack.

1.9.1.2 Experiment Rack-1 Checkout

The pre-experiment rack checkout will consist of verifying the performance of the SSFF distributed subsystems in Experiment Rack-1 and its interfaces to the Core Rack and Furnace Module-1.

1.9.1.3 Furnace Module-1 Checkout

Furnace Module-1 tests will be used to verify the performance to operational limits with the exception that heater limits will only be to the extent that they prove operability. The Furnace Module-1 interface to Experiment Rack-1 will be verified through the functional performance tests and the physical connects of the experiment rack simulator.

1.9.1.4 Integrated Furnace Rack Checkout

Following integration of Furnace Module-1 into Experiment Rack-1, the rack performance and interfaces will be verified using a Core Rack simulator and test set. Tests will be limited to only those required to verify Furnace Module-1 to Experiment Rack-1 interfaces.

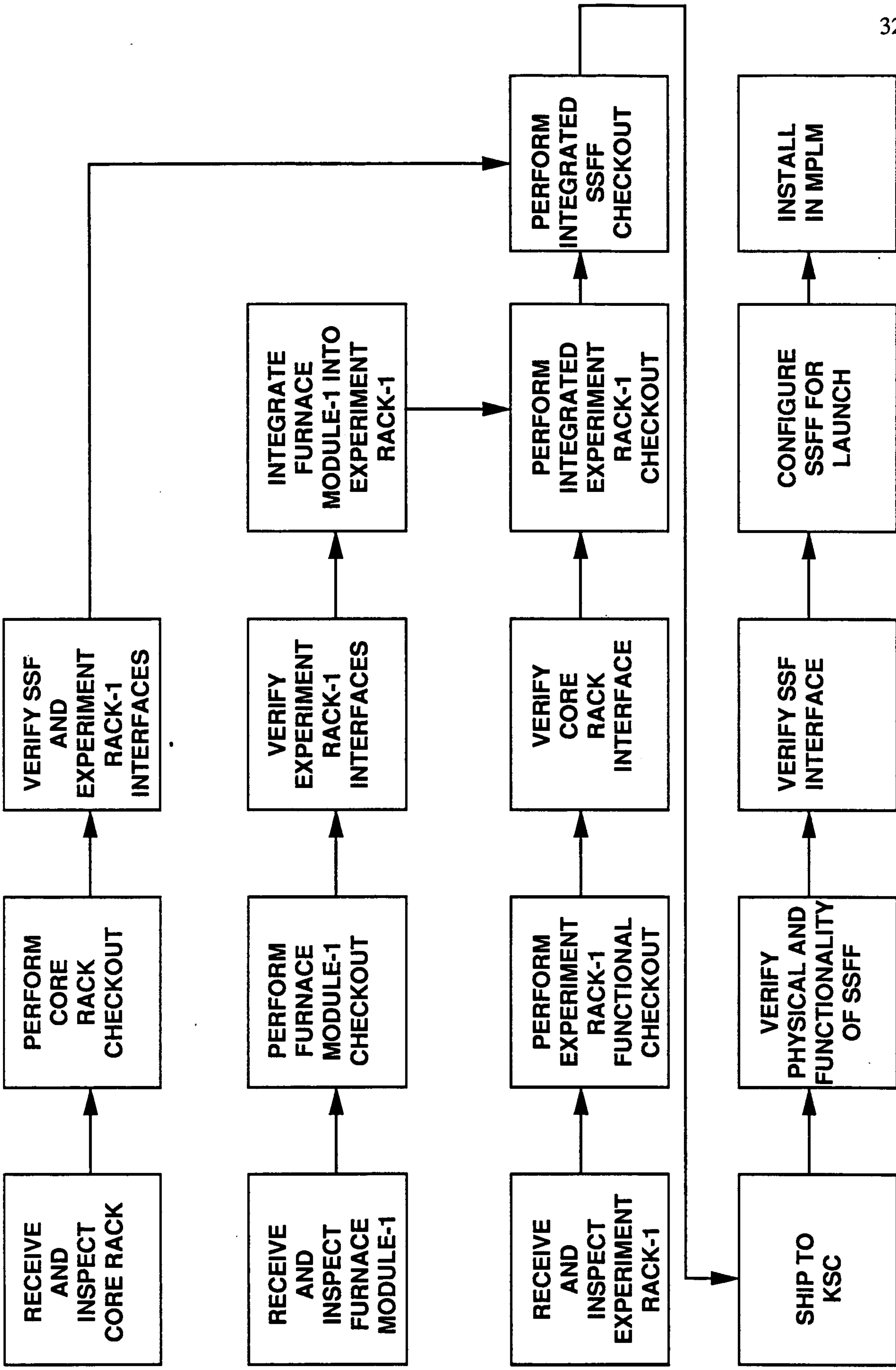

FIGURE 1.9-1. PHYSICAL INTEGRATION FLOW

TABLE 1.9-1. SSFF INTEGRATION GROUND PROCESSING REQUIREMENTS

(X) Experiment/Facility Preintegration
(   ) Experiment/Facility Preparation
(   ) Postmission Requirements

Description of Planned Activities:
Rack Integration, Rack Functional Tests, SSFF Systems Integrated Tests

Total Floor Space Required Including Space for GSE: 2000 ft^2

Ceiling Height Required: 10 ft

Overhead Crane Required: X Yes ____ No   Hook Height 8 ft

Facility Power Required:
X 120 V, 1 F, 60 Hz
____ 208 V, 3 F, 60 Hz
____ Other

Other Facility Support: Gases
X GN_2
____ GHe
GAr Other

Liquids Single Phase Precooled H_2O

Environment: X Standard ____ Other

Hazardous Operations: ____ Y e s X No

Total Anticipated Use Time: 45 Days

Other Facility Support Description:

GSE Test sets including the following interface simulators:

* Furnace Module-to-Experiment
* Core Rack-to-Experiment Rack
* Experiment Rack-to-Core Rack
* SSF-to-Core Rack
* Experiment Rack Subsystem-to-Furnace Module

TABLE 1.9-2. SSFF INTEGRATION REQUIREMENTS

Description of Special Alignment, Calibration, Servicing, or Performance Verification and Estimated Time to Perform:

* Vent & Purge test of Furnace Module-1 - 60 min
* Calibration of Analog Sensors - 90 min

Identification of Any Constraints on Experiment/Facility Operations During Tests:

None Identified

Description of Time-Critical Operations and Time Constraints:

None Identified

1.9.1.5 SSFF Facility Checkout

Following checkout of the individual racks, an overall SSFF integrated systems test will be performed. Tests will be limited to verify Core Rack-to-Experiment Rack-1 interfaces and to SSF.

1.9.2 KSC VERIFICATION

Physical integration at KSC will be limited to receiving/inspection of the SSFF hardware complement and to reverification of the physical and functional interfaces with the SSF.

1.9.3 POSTLANDING

Postlanding activities consist of the following: (1) Removing the SSFF equipment and experiment samples from the returning Mini-Pressurized Logistics Module (MPLM); (2) returning the Furnace Module-1 samples to the Payload Investigator; (3) removing the Furnace Module-1 from Experiment Rack-1 and returning it to the PED; and (4) refurbishing Experiment Rack-1. These activities are shown in Table 1.9-3 and Figure 1.9-2.

TABLE 1.9-3. SSFF POSTLANDING GROUND PROCESSING REQUIREMENTS

( ) Experiment/Facility Preintegration
( ) Experiment/Facility Preparation
(X) Postmission Requirements

Description of Planned Activities:
Remove flight samples from stowage and return to Experimenter.
Remove flight rack from MPLM.
Remove furnace module from experiment rack and return to PED.
Move experiment rack to the rack refurb area and refurbish experiment rack.
Ship rack to the rack integration and checkout area.

Total Floor Space Required Including Space for GSE: 2000 ft^2

Ceiling Height Required: 10 ft

Overhead Crane Required: X Yes __ No Hook Height 8 ft

Facility Power Required: ____ 120 V, 1 F, 60 Hz N/A
____ 208 V, 3 F, 60 Hz
____ Other

Other Facility Support: Gases N/A ____ GN_2 Liquids N / A
____ GHe ____
____ Other ____

Environment: X Standard ____ Other

Hazardous Operations: ____ Yes X No

Total Anticipated Use Time: 3 Days

Other Facility Support Description:

Module shipping container
Rack shipping container
Rack rotation stand

C-3

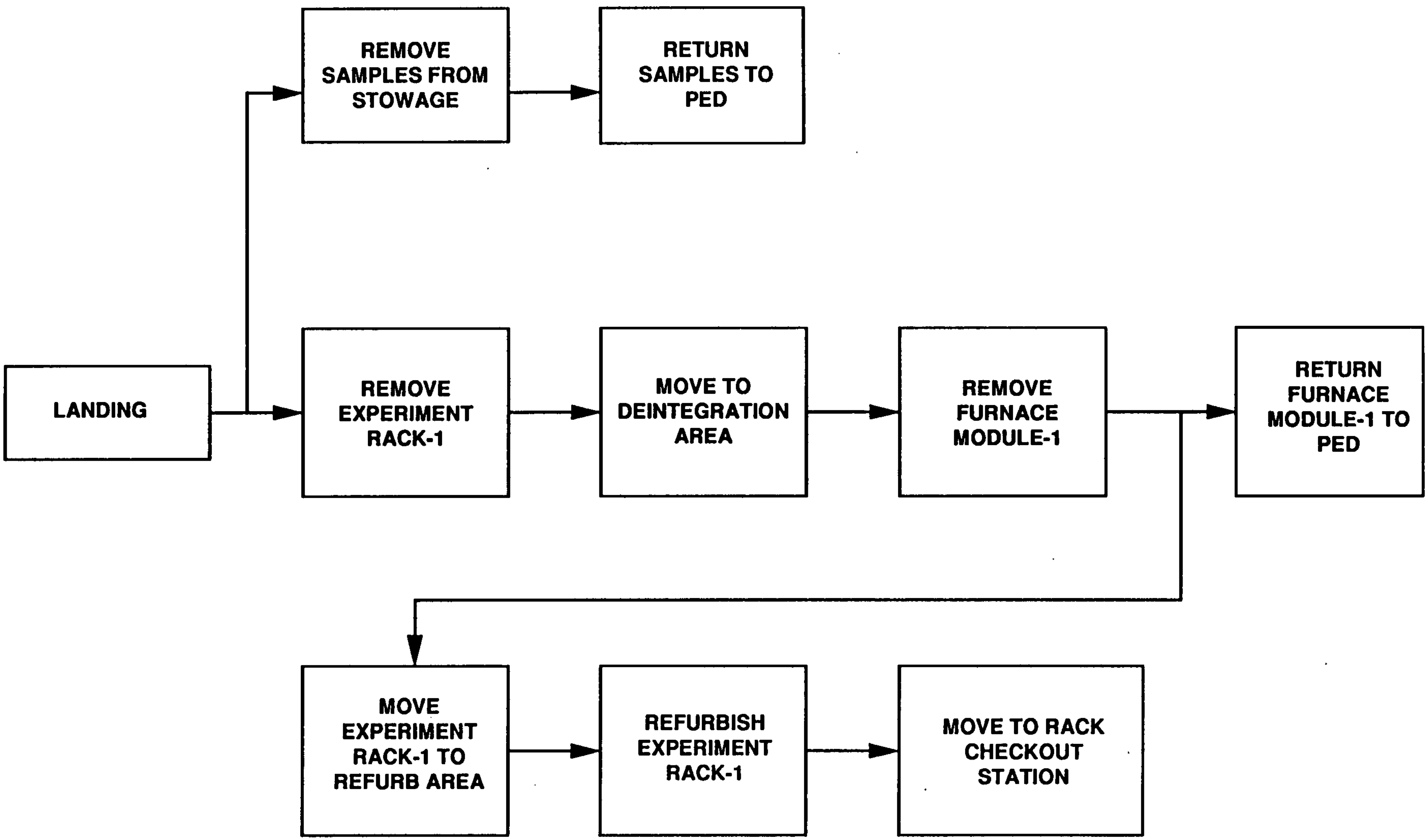

FIGURE 1.9-2. PHYSICAL DEINTEGRATION FLOW

1.10. OPERATIONS SUPPORT

Table 1.10-1 describes the physical and operational support required at the Ground Science Operations Control Center during flight of the Space Station Furnace Facility (SSFF).

TABLE 1.10-1. SSFF MISSION OPERATIONS SUPPORT

COMMUNICATIONS REQUIREMENTS:

Downlink Data

TBD

Uplink Commands/data

TBD

Voice Communications

TBD

Video

TBD

SUPPORT EQUIPMENT:

Description

TBD

Dimensions

TBD

Power Requirements

TBD

Data Interface

TBD

REMOTE SITE INTERFACE

Location

TBD

Describe interfaces

TBD

1.11. TRAINING OBJECTIVES

Table 1.11-1 correlates the training requirements with the appropriate trainees and trainers, and identifies the source of the training requirements. Table 1.11-2 summarizes the requirements for each training objective.

TABLE 1.11-1. TRAINING PARTICIPATION

Training Objectives	Trainee	Trainer
-PED/PI Defined TBD		
-PAM and PED/PI Jointly Defined TBD		
-PAM Defined TBD		

TABLE 1.11-2. TRAINING OBJECTIVES (Sheet 1 of 4)

NO.	TRAINING OBJECTIVE	TRAINEE	RESPON-SIBILITY	SIMULATOR Y/N	H/W FIDELITY	S/W Y/N	PROVIDER	COMMENTS
1.0	**SCIENCE BACKGROUND**							
1.1	Present science basis and significance of the SSFF	payload crew, cadre	PED/PI	N				
1.2	Present operational objectives	payload crew, cadre	PED/PI	N				
1.3	Present SSFF operational theory	payload crew, cadre	PED/PI	N				
1.4	Present operations philosophy	payload crew, cadre	PED/PI	N				
2.0	**SSFF SYSTEMS FAMILIARIZATION**							
2.1	Characterize the SSFF hardware elements	payload crew, cadre	PED/PI	Y	a	Y	PED/PI	
2.1.1	Rack location of the FM-1, rack location of the Core							
2.1.2	FM-1 and subsystem components							
2.1.3	Module stowage							
2.1.4	DMS							

TABLE 1.11-2. TRAINING OBJECTIVES (Sheet 2 of 4)

NO.	TRAINING OBJECTIVE	TRAINEE	RESPON-SIBILITY	SIMULATOR Y/N	SIMULATOR H/W FIDELITY	SIMULATOR S/W Y/N	SIMULATOR PROVIDER	COMMENTS
2.2	Characterize FM-1 software associated with the following:	payload crew, cadre	PED/PI	Y	a	Y	PED/PI	
2.2.1	DMS							
2.2.2	FM-1 command capabilities							
2.2.3	In-flight computer requirements							
2.2.4	Timeline requirements							
2.2.5	Furnace Control Units							
2.3	Characterize FM-1 data collection	payload crew, cadre	PED/PI	Y	a	Y	PED/PI	
2.3.1	Onboard routing/recording							
2.3.2	Downkink data and voice							
2.4	Characterize FM-1 GSE	payload crew, cadre	PED/PI	Y	a	Y	PED/PI	
2.5	Characterize SSF interface	payload crew, cadre	PED/PI	Y	a		PED/PI	
2.5.1	Power, fluids, and thermal interfaces							
2.6	Characterize the following SSFF operational requirements and constraints:	payload crew, cadre	PED/PI	Y			PED/PI	
2.6.1	Specific attitudes or conditions							
2.6.2	Microgravity requirements (limiting crew motion and g-level constraints)							

TABLE 1.11-2. TRAINING OBJECTIVES (Sheet 3 of 4)

NO.	TRAINING OBJECTIVE	TRAINEE	RESPON-SIBILITY	SIMULATOR Y/N	SIMULATOR H/W FIDELITY	SIMULATOR S/W Y/N	SIMULATOR PROVIDER	COMMENTS
3.0	**FM-1 OPs FAMILIARIZATION**							
3.1	Characterize FM-1 nominal operating procedures	payload crew, cadre	PED/PI				PED/PI	
3.1.1	Power on							
3.1.2	Sample changeout							
3.1.3	Power off							
3.1.4	FM-1 safing and stowage							
4.0	**FM-1 PROFICIENCY OBJECTIVES**							
4.1	Provide proficiency training in FM-1 operations	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	
4.2	Characterize malfunction/ alternate procedures including fault definition	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	
5.0	**INTEGRATED TIMELINE PROFICIENCY**							
5.1	Provide additional proficiency training in FM-1 ops as it relates to the joint operations	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	
5.2	Provide additional training as it pertains to off-nominal procedures for joint operations	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	
5.3	Provide proficiency training in integrated FM-1 ops including harware/software, SSF/Orbiter/PI interfaces	payload crew, cadre	PI/PAM	Y			PED/PI/ PAM	

TABLE 1.11-2. TRAINING OBJECTIVES (Sheet 4 of 4)

NO.	TRAINING OBJECTIVE	TRAINEE	RESPON-SIBILITY	SIMULATOR Y/N	SIMULATOR H/W FIDELITY	SIMULATOR S/W Y/N	SIMULATOR PROVIDER	COMMENTS
6.0	**SIMULATIONS**							
6.1	Conduct MSFC simulations in order to develop proficiency in the following: console operations, handover, voice protocols, crew/cadre/MCC interfaces, integrated payload operations, STS/SSF payload contingency operations	payload crew, cadre	PAM	Y			PED/PI/ PAM	
6.2	Conduct joint integrated simulations in order to demonstrate proficiency in the following: console positions, handover, voice protocols, crew/cadre/MCC interfaces, payload operations, furnace contingency operations, data retrieval systems, operational interfaces between ground control facilities, mission flight rules							
7.0	**MISSION-INDEPENDENT TRAINING**							
7.1	Provide STS/SSF mission-independent training	payload crew	PAM/JSC					
7.2	Provide mission-independent training	cadrePI/Sim Team	PAM	N				

1.12. ENVIRONMENTAL CONTAMINATION DATA REQUIREMENTS

Tables 1.12-1 and 1.12-2 illustrate the environmental contamination data requirements for the Space Station Furnace Facility (SSFF).

TABLE 1.12-1. FLIGHT ENVIRONMENT LIMITS

	SENSITIVITY LIMIT				EXPERIMENT GENERATED			
	OPERATING		NON-OPERATING		OPERATING		NON-OPERATING	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
PARTICULATES								
Size (micrometers)						• <1 micron normal operations • 0.1 to 50 microns following filter changeout		
Number/m^3						• <1,000 normal operations • <100,000 following filter changeout		
Composition						• Ceramic fibers, copper, steel, platinum, wire insulation, organic particles, and sample-sourced materials, including molybdenum, boron nitride, nickel alloys, quartz, silica, and semiconductor materials		
GASES								
Composition						•Cabin air, or inert pressurant with cleaning solvents and/or water contaminant		
Concentration						TBD		
Pressure (kN/m^2)						• <101.3 for experiment venting • 66.7 for vent of inert pressurants		

TABLE 1.12-2. EXTERNAL CONTAMINATION SOURCES

Does experiment/facility release (vent, purge) any material overboard on orbit?

Yes ______ **No** __X__

PARAMETER	DESCRIPTION
FOs of Occurrence	
Frequency	
Duration	
Composition	
Phase State (solid, liquid, or gas)	
Quantity or Rate of Release	

DATA REQUIREMENT (DR) - 10

EXPERIMENT/FACILITY REQUIREMENTS DOCUMENT FOR THE SPACE STATION FURNACE FACILITY

SECTION 2: FURNACE MODULE-1 INPUT

MAY 1992

FOREWORD

The Space Station Furnace Facility (SSFF) Core is designed to accommodate and support a variety of furnace modules throughout the operational lifetime of the facility. Since the SSFF will be operational for 30 years, and various furnace modules will be accommodated, the Experiment/Facility Requirements Document (E/FRD) is divided into two separate sections. Section 1 describes the integrated SSFF-to-SSF interface, which includes the SSFF Core subsystem requirements and the furnace module requirements based on the information obtained from the Furnace Developer's Section 2, and Section 2 describes the furnace module-to-SSFF interface. Multiple Section 2s may be required for each E/FRD, depending on how many furnace modules the SSFF will accommodate per mission, since a separate Section 2 will be written for each furnace module. Both sections will be replaced for each mission with the appropriate mission-peculiar furnace module and interface requirements.

This section describes the Furnace Module-1 requirements. Furnace Module-1 is scheduled to be an upgrade of the present Crystal Growth Furnace (CGF), and this section reflects the requirements of that module.

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2.1. FUNCTIONAL OBJECTIVES AND EQUIPMENT IDENTIFICATION

2.1.1 SYSTEM DESCRIPTION

The function of Furnace Module-1 is to grow crystals of semiconductor materials and metal and alloys using the directional solidification and vapor transport crystal growth techniques in a microgravity environment (at temperatures up to 1600 °C). Directional solidification is achieved by melting the sample and solidifying the same while applying a thermal gradient along the longitudinal axis of the sample and translating the furnace or the sample. In the case of Furnace Module-1, the furnace is translated.

The Furnace Module-1 system is shown in Figure 2.1-1. It consists of the following primary elements: the Sample Ampoule/Cartridge Assembly (SACA), the base ring, and the experiment apparatus container (EAC) in which the reconfigurable furnace module (RFM), the furnace translation mechanism (FTM), the sample exchange mechanism (SEM), the sample insertion port (SIP) and the internal support structure (ISS) are housed. The ISS, in addition to providing the structural support for the RFM, the FTM, and attach hardware for the plumbing, provides an interface for the SEM which will have the capability to hold up to six sample ampoules. The bottom section of the EAC is attached to the base ring, which includes the feedthroughs for power, data, fluid, and vent lines.

The Space Station Furnace Facility (SSFF) Thermal Control Subsystem (TCS) water loop will provide cooling for the RFM outer shell, the FTS stepping motor, and the SEM ampoule holding head.

The SSFF Gas Distribution Subsystem (GDS) will supply argon and nitrogen to the EAC in order to provide an inert processing atmosphere for crystal growth.

The SACA consists of a sealed ampoule in which the experiment sample material is contained. The SACA accommodates up to six sample thermocouples and has interfaces for sample ampoule/cartridge failure detection sensors.

At least three levels of containment will be provided during sample processing: The SACA, negative ΔP inside the EAC during processing, and the EAC.

At least two levels of containment will be provided during manual sample exchange: The SACA and the flexible glovebox container.

Multiple purge/vent/backfill will be performed prior to manual sample exchange. In addition, a view port is provided on the EAC for visual inspection of the sample ampoules by a crew-member. It is also planned to mount mirrored witness plates inside the EAC to augment

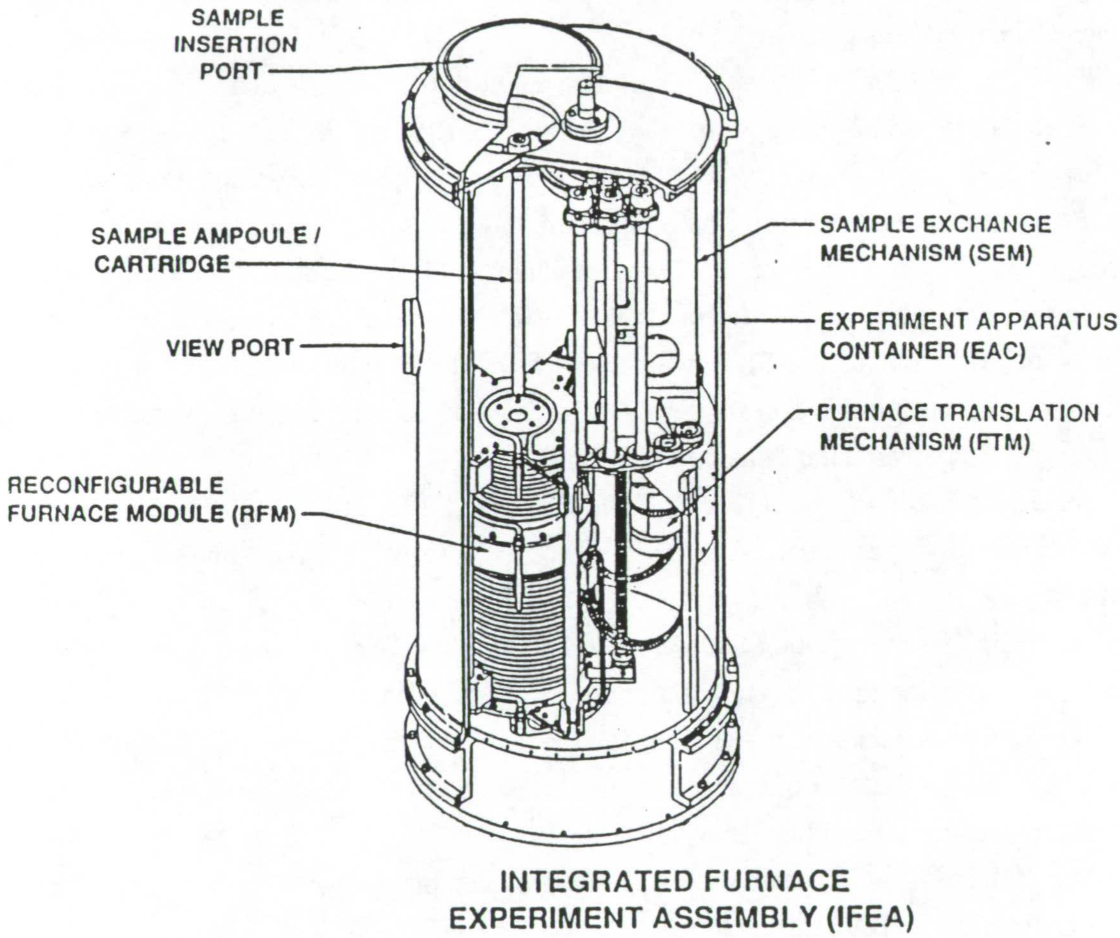


FIGURE 2.1-1. FURNACE MODULE-1 PICTORIAL REPRESENTATION

visual inspection for detecting any vapor deposition that may have resulted from the sample ampoule/cartridge failure. The design will be compatible with the SSFF.

2.1.2 FUNCTIONAL OBJECTIVES

There are nine functional objectives (FOs) for Furnace Module-1 which are structured as one FO for sample exchange, one FO for venting and purging, five FOs for sample processing, one FO for sample loading or shutdown, and one FO for calibration/bakeout. The actual FO numbering is as follows:

- FO-3 Furnace Module-1 Sample Exchange
- FO-4 Furnace Module-1 Vent/Purge
- FO-5 Furnace Module-1 Process Sample HgCdTe
- FO-6 Furnace Module-1 Process Sample HgZnTe
- FO-6A Furnace Module-1 Process Sample Extended HgZnTe
- FO-7 Furnace Module-1 Process Sample CdTe
- FO-8 Furnace Module-1 Process Sample GaAs
- FO-9 Configure Furnace Module-1 for Sample Loading or Shutdown
- FO-11 Furnace Module-1 Process Calibration/Bakeout

Table 2.1-1 shows a listing of the Furnace Module-1 FOs along with the equipment associated with each step of each FO. Step duration, crew time requirements, and average power requirements for each step of each FO are defined in Table 2.1-2, Functional Objective Requirements Sheets.

2.1.3 EQUIPMENT IDENTIFICATION

Figure 2.1-2 identifies the Furnace Module-1 components in a block diagram format. Figure 2.1-3 identifies the Furnace Module-1 to SSFF interfaces.

2.1.4 OPERATIONAL FUNCTIONAL FLOWS

Preliminary functional flows are shown in Table 2.1-3 for each FO. Functional flows define the function performed, the performing element, and decisions involved in accomplishing each FO.

TABLE 2.1-1. FURNACE MODULE-1 FUNCTIONAL OBJECTIVES (Sheet 1 of 3)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-3	Manual Sample Exchange	Crew Interaction Required
Step 1	Command Manual Exchange	DMS
Step 2	Vent/Fill EAC	GDS
Step 3	Equalize EAC Pressure	GDS, DMS
Step 4	Prep Equipment	
Step 5	Open SIP	EAC
Step 6	Insert Samples	EAC
Step 7	Close Sip	EAC
Step 8	Open Valves	
Step 9	Command Man. Exchange Off	DMS
Step 10	Perform Seal Check	DMS, GDS
Step 11	Load List process	DMS
FO-4	Purge EAC	
Step 1	GN_2 Purge Furnace	DMS, GDS
Step 2	Argon Backfill	DMS, GDS
Step 3	Command Sample Process	DMS
Step 4	TCS Configured	TCS
FO-5	Vapor Crystal Growth of HgCdTe	
Step 1	Activate Furnace for Processing	GDS, TCS, DMS
Step 2	Activate and Process Heat Cycle	GDS, TCS, DMS
Step 3	Anneal Sample	GDS, TCS, DMS
Step 4	Initiate Vapor Crystal Growth Processing	GDS, TCS, DMS
Step 5	Cool Sample and Extract	GDS, TCS, DMS
Step 6	Cool and Stow	

TABLE 2.1-1. FURNACE MODULE-1 FUNCTIONAL OBJECTIVES (Sheet 2 of 3)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-6	Meltback and Regrowth of HgZnTe	
Step 1	Activate Furnace for Processing	GDS, TCS, DMS
Step 2	Process Heat Cycle	GDS, TCS, DMS
Step 3	Initial Soak	GDS, TCS, DMS
Step 4	Translation to Growth Position	GDS, TCS, DMS
Step 5	Final Soak	GDS, TCS, DMS
Step 6	Directional Solidification	GDS, TCS, DMS
Step 7	Cool Sample	GDS, TCS, DMS
Step 8	Stow Sample	GDS, TCS, DMS
FO-6A	Meltback and Regrowth of HgZnTe (extended)	
Step 1	Activate Furnace for Processing	GDS, TCS, DMS
Step 2	Process Heat Cycle	GDS, TCS, DMS
Step 3	Initial Soak	GDS, TCS, DMS
Step 4	Translation to Growth Position	GDS, TCS, DMS
Step 5	Final Soak	GDS, TCS, DMS
Step 6	Directional Solidification	GDS, TCS, DMS
Step 7	Cool Sample	GDS, TCS, DMS
Step 8	Stow Sample	GDS, TCS, DMS
FO-7	Growth of CdTe by Dir. Solidification	
Step 1	Activate Furnace for Processing	GDS, TCS, DMS
Step 2	Process Heat Cycle	GDS, TCS, DMS
Step 3	Soak	GDS, TCS, DMS
Step 4	Process Sample, Directional Solidification	GDS, TCS, DMS
Step 5	Cool Sample to 400 °C	GDS, TCS, DMS
Step 6	Cool Sample to 200 °C and Stow Sample	GDS, TCS, DMS

TABLE 2.1-1. FURNACE MODULE-1 FUNCTIONAL OBJECTIVES (Sheet 3 of 3)

FUNCTIONAL OBJECTIVE		EQUIPMENT REQUIRED
NUMBER	TITLE	ITEM
FO-8	Growth of GaAs by Dir. Solidification	
Step 1	Activate Furnace Processing	GDS, TCS, DMS
Step 2	Preheat Cycle	GDS, TCS, DMS
Step 3	Process Heat Cycle	GDS, TCS, DMS
Step 4	Soak	GDS, TCS, DMS
Step 5	Translate Furnace/Process Sample	GDS, TCS, DMS
Step 6	Cool Down to 800 °C	GDS, TCS, DMS
Step 7	Cool Down to 200 °C and Stow	GDS, TCS, DMS
FO-9	Configure Furnace for Shutdown/Sample Loading	
Step 1	Verify Furnace Is in Home Position	DMS
Step 2	Furnace Specific Tests	DMS
Step 3	Secure Power From Furnace Module	DMS
FO-11	Furnace Calibration/Bakeout	
Step 1	Activate Calibration/Bakeout	DMS
Step 2	Initiate Calibration	DMS
Step 3	Bakeout/Calibration Process	DMS

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 1 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 3
FO NAME: Manual Sample Exchange
PREREQUISITE: FO-2
NO. OF PERFORMANCES: MIN.____ DES.____
SEQUENCE:
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____
JOINT OPS WITH:

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	1:00	32:00	10:00	10:00	7:00	20:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED	1		1	1	1	1
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		0	0	0	0	0	0
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Command "Manual Sample Exchange" on
2	Vent/fill furnace module
3	Equalize furnace module pressure
4	Prep equipment
5	Open SIP
6	Insert samples

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 2 of 13)

EXPERMENT NAME: Space Station Furnace Facility FO NUMBER: 3
FO NAME: Manual Sample Exchange PREREQUISITE: FO-2
NO. OF PERFORMANCES: MIN.____ DES.____ SEQUENCE: ____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____ JOINT OPS WITH: ____

STEP NUMBER		7	8	9	10	11	
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	3:00	1:00	65:00	4:00	
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED	1	1	1	1	1	
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		0	0	0	0	0	
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Close SIP
8	Open valves
9	Command "Manual Sample Exchange" off
10	Perform seal check
11	Load list process

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 3 of 13)

EXPERMENT NAME: Space Station Furnace Facility — FO NUMBER: 4

FO NAME: Purge Furnace Module — PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN.____ DES.____ — SEQUENCE: ____

REQUIRED TIMEFRAME (MET): MIN.____ MAX.____ — JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	32:00	10:00	2:00	2:00		
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		0	0	0	0		
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	GN2 purge furnace
2	Argon backfill
3	Command sample process
4	TCS configured

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 4 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 5
FO NAME: Vapor Crystal Growth of HgCdTe
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN.____ DES.____
SEQUENCE: ____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____
JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	188:00	60:00	480:00	240:00	21:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120	1.116	.466	.466	.120	.120
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Activate and process heat cycle
3	Anneal sample
4	Initiate vapor crystal growth processing
5	Cool sample and extract
6	Cool and stow

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 5 of 13)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 6

FO NAME: Meltback and Regrowth of HgZnTe

PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN.____ DES.____

SEQUENCE: ____

REQUIRED TIMEFRAME (MET): MIN.____ MAX.____

JOINT OPS WITH: ____

STEP NUMBER			1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM							
	MAXIMUM							
	PREFERRED		3:00	340:00	120:00	125:00	600:00	7390:00
STEP DELAY (HRS:MINS)	MINIMUM							
	MAXIMUM							
	PREFERRED							
CREW	NUMBER							
	PREFERRED							
MICROGRAVITY (g's)								
VACUUM VENT								
CONSUMABLES								
AVERAGE POWER REQUIRED (kW)			.120	.598	.516	.516	.516	.516
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS							
	EXPERIMENT APPLICATIONS							
DATA	DOWNLINK DIGITAL (MBPS)							
	REALTIME (RT) OR DUMP (D)							
	COMMANDING							
	PES (P), ISE (I), MPAC (M), POCC (PC)							
	VIDEO STANDARD/NONSTANDARD NTSC							
	REAL-TIME/DUMP/STORE							
SPECIAL EQUIPMENT OR CONSTRAINTS								

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Process heat cycle
3	Initial soak
4	Translation to growth position
5	Final soak
6	Directional solidification

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 6 of 13)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 6

FO NAME: Meltback & Regrowth of HgZnTe

PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN.____ DES.____

SEQUENCE:

REQUIRED TIMEFRAME (MET): MIN.____ MAX.____

JOINT OPS WITH:

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	372:00	115:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.191	.061				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool sample
8	Stow sample

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 7 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 6A
FO NAME: Meltback and Regrowth of HgZnTe (Extended)
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN.____ DES.____
SEQUENCE: ____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____
JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	340:00	120:00	125:00	600:00	59957:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120	.598	.516	.516	.516	.516
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace for processing
2	Process heat cycle
3	Initial soak
4	Translation to growth position
5	Final soak
6	Directional solidification

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 8 of 13)

EXPERMENT NAME: Space Station Furnace Facility

FO NUMBER: 6A

FO NAME: Meltback and Regrowth of HgZnTe (Extended)

PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN._____ DES._____

SEQUENCE: _____

REQUIRED TIMEFRAME (MET): MIN._____ MAX._____

JOINT OPS WITH: _____

STEP NUMBER		7	8				
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	372:00	115:00				
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.191	.061				
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool sample
8	Internally stow sample

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 9 of 13)

EXPERMENT NAME: Space Station Furnace Facility
FO NUMBER: 7
FO NAME: Growth of CdTe by Directional Solidification
PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN.______ DES.______
SEQUENCE: ______
REQUIRED TIMEFRAME (MET): MIN.____ MAX.______
JOINT OPS WITH: ______

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	538:00	120:00	4278:00	438:00	208:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120	1.345	1.241	1.166	.591	.241
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace module for processing
2	Process heat cycle
3	Soak
4	Process sample, directional solidification
5	Cool sample to 400 °C
6	Cool sample to 200 °C and internally stow sample

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 10 of 13)

EXPERMENT NAME: Space Station Furnace Facility FO NUMBER: 8

FO NAME: Growth of GaAs by directional Solidification PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN.____ DES.____ SEQUENCE:____

REQUIRED TIMEFRAME (MET): MIN.____ MAX.____ JOINT OPS WITH:____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	3:00	45:00	227:00	68:00	720:00	210:00
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120	.858	2.353	1.344	1.259	.668
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate furnace module processing
2	Preheat cycle
3	Process heat cycle
4	Soak
5	Translate furnace/process sample
6	Cool down to 800 °C

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 11 of 13)

EXPERMENT NAME: Space Station Furnce Facility FO NUMBER: 8

FO NAME: Growth of GaAs by Directional Solidification PREREQUISITE: FO-3

NO. OF PERFORMANCES: MIN._____ DES._____ SEQUENCE: _____

REQUIRED TIMEFRAME (MET): MIN._____ MAX._____ JOINT OPS WITH: _____

STEP NUMBER		7					
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	466:00					
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		.120					
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
7	Cool down to 200 °C and internally stow

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 12 of 13)

EXPERMENT NAME: Space Station Furnace Facility　　FO NUMBER: 9

FO NAME: Configure Furnace for Shutdown/Sample loading　　PREREQUISITE:

NO. OF PERFORMANCES: MIN.______ DES.______　　SEQUENCE:

REQUIRED TIMEFRAME (MET): MIN.____ MAX.______　　JOINT OPS WITH:

STEP NUMBER			1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM							
	MAXIMUM							
	PREFERRED		3:00	5:00	1:00			
STEP DELAY (HRS:MINS)	MINIMUM							
	MAXIMUM							
	PREFERRED							
CREW	NUMBER							
	PREFERRED							
MICROGRAVITY (g's)								
VACUUM VENT								
CONSUMABLES								
AVERAGE POWER REQUIRED (kW)			0	0	0			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS							
	EXPERIMENT APPLICATIONS							
DATA	DOWNLINK DIGITAL (MBPS)							
	REALTIME (RT) OR DUMP (D)							
	COMMANDING							
	PES (P), ISE (I), MPAC (M), POCC (PC)							
	VIDEO STANDARD/NONSTANDARD NTSC							
	REAL-TIME/DUMP/STORE							
SPECIAL EQUIPMENT OR CONSTRAINTS								

STEP NO.	STEP DESCRIPTION
1	Verify furnace is in home position
2	Furnace specific tests
3	CCU secures power from furnace module

TABLE 2.1-2. FUNCTIONAL OBJECTIVE REQUIREMENTS SHEET (Sheet 13 of 13)

EXPERMENT NAME: Space Station Furnace Facility FO NUMBER: 11
FO NAME: Furnace Calibration/Bakeout PREREQUISITE: FO-3
NO. OF PERFORMANCES: MIN.____ DES.____ SEQUENCE: ____
REQUIRED TIMEFRAME (MET): MIN.____ MAX.____ JOINT OPS WITH: ____

STEP NUMBER		1	2	3	4	5	6
STEP DURATION (MINS:SECS)	MINIMUM						
	MAXIMUM						
	PREFERRED	1:00	1:00	300:00			
STEP DELAY (HRS:MINS)	MINIMUM						
	MAXIMUM						
	PREFERRED						
CREW	NUMBER						
	PREFERRED						
MICROGRAVITY (g's)							
VACUUM VENT							
CONSUMABLES							
AVERAGE POWER REQUIRED (kW)		2.1336	2.1336	2.330			
ONBOARD COMPUTER SUPPORT	CORE APPLICATIONS						
	EXPERIMENT APPLICATIONS						
DATA	DOWNLINK DIGITAL (MBPS)						
	REALTIME (RT) OR DUMP (D)						
	COMMANDING						
	PES (P), ISE (I), MPAC (M), POCC (PC)						
	VIDEO STANDARD/NONSTANDARD NTSC						
	REAL-TIME/DUMP/STORE						
SPECIAL EQUIPMENT OR CONSTRAINTS							

STEP NO.	STEP DESCRIPTION
1	Activate calibration/bakeout
2	Initiate calibration
3	Bakeout/calibration process

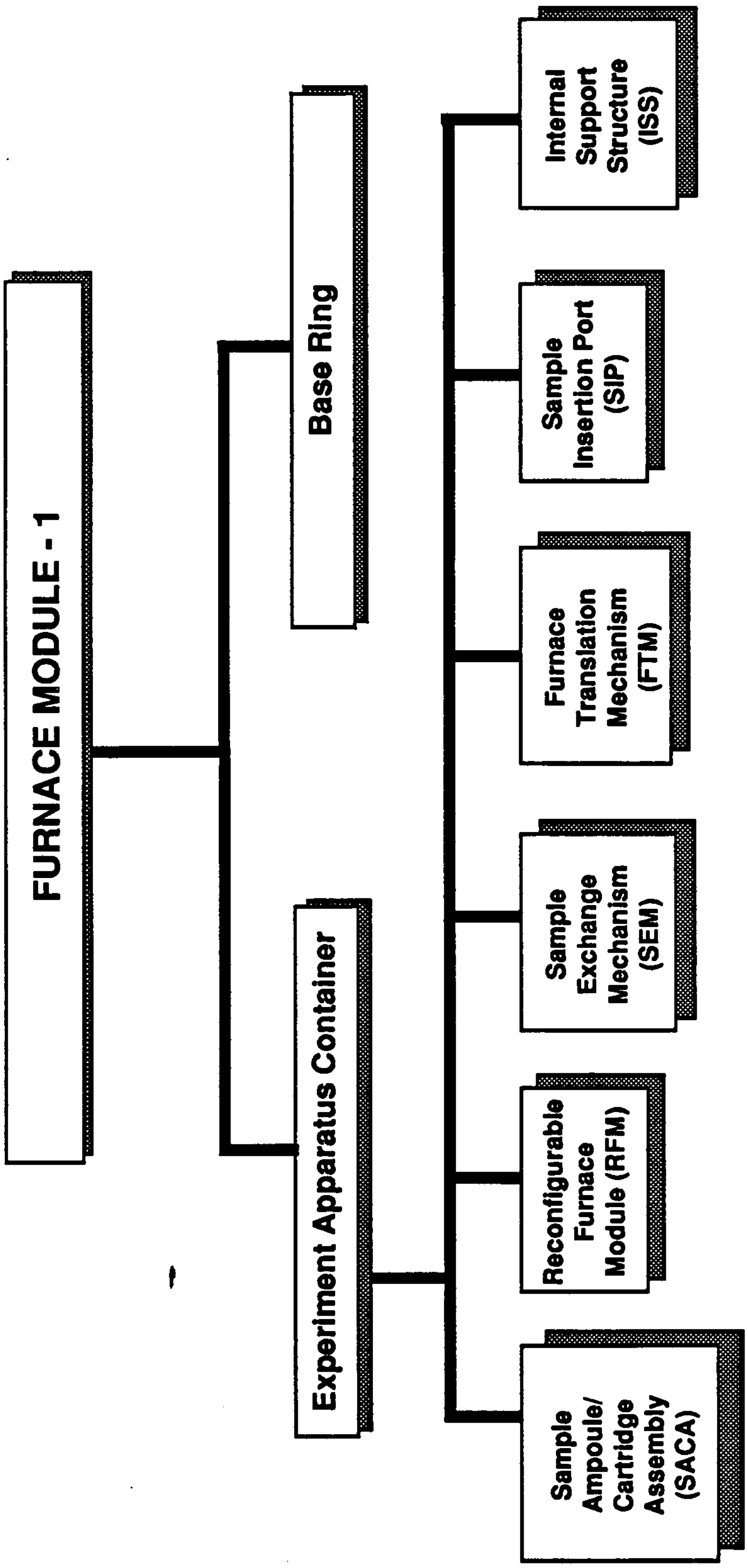


FIGURE 2.1-2. FURNACE MODULE-1 COMPONENT TREE

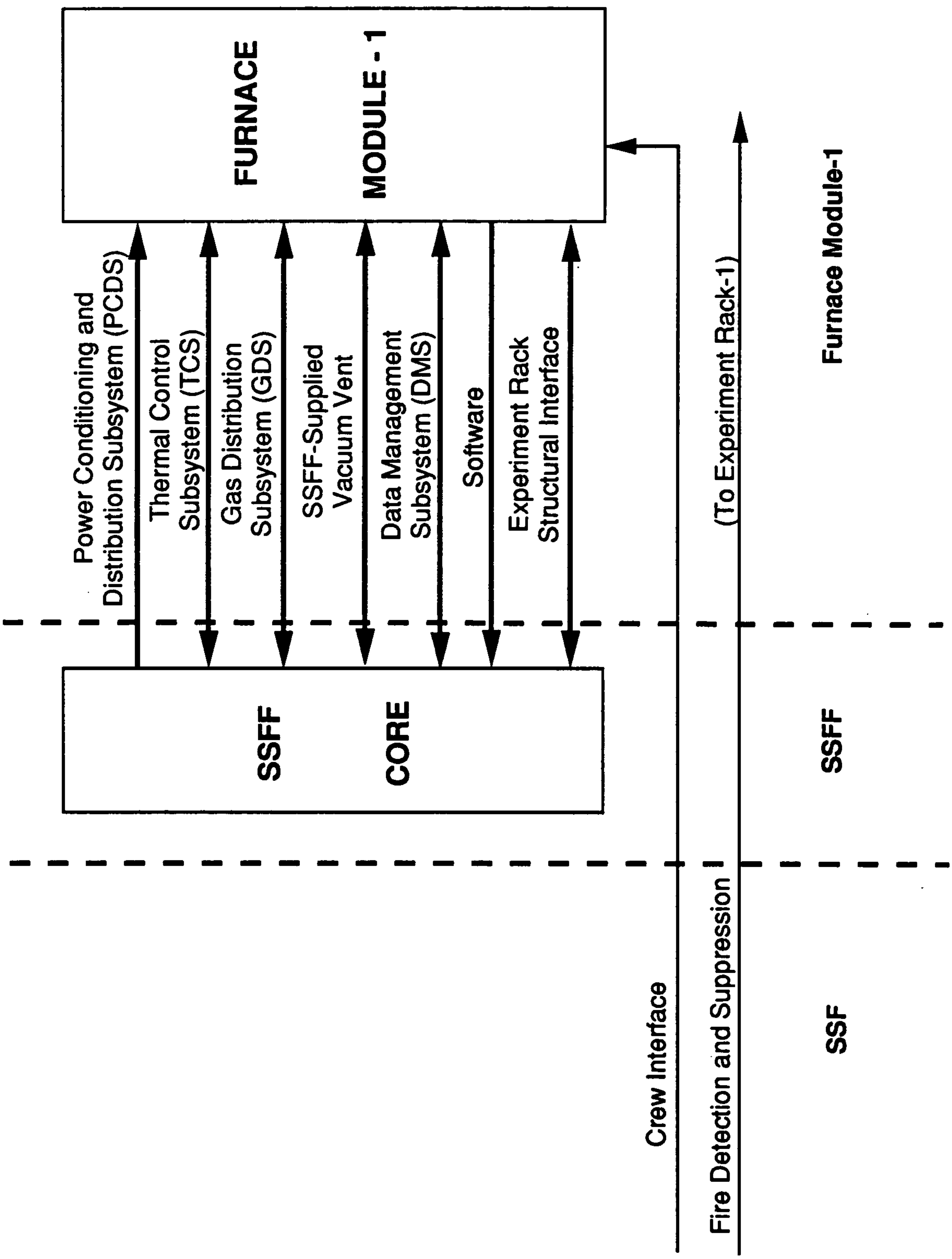


FIGURE 2.1-3. FURNACE MODULE-1 TO SSFF/SSF INTERFACE DIAGRAM

TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 1 of 12)

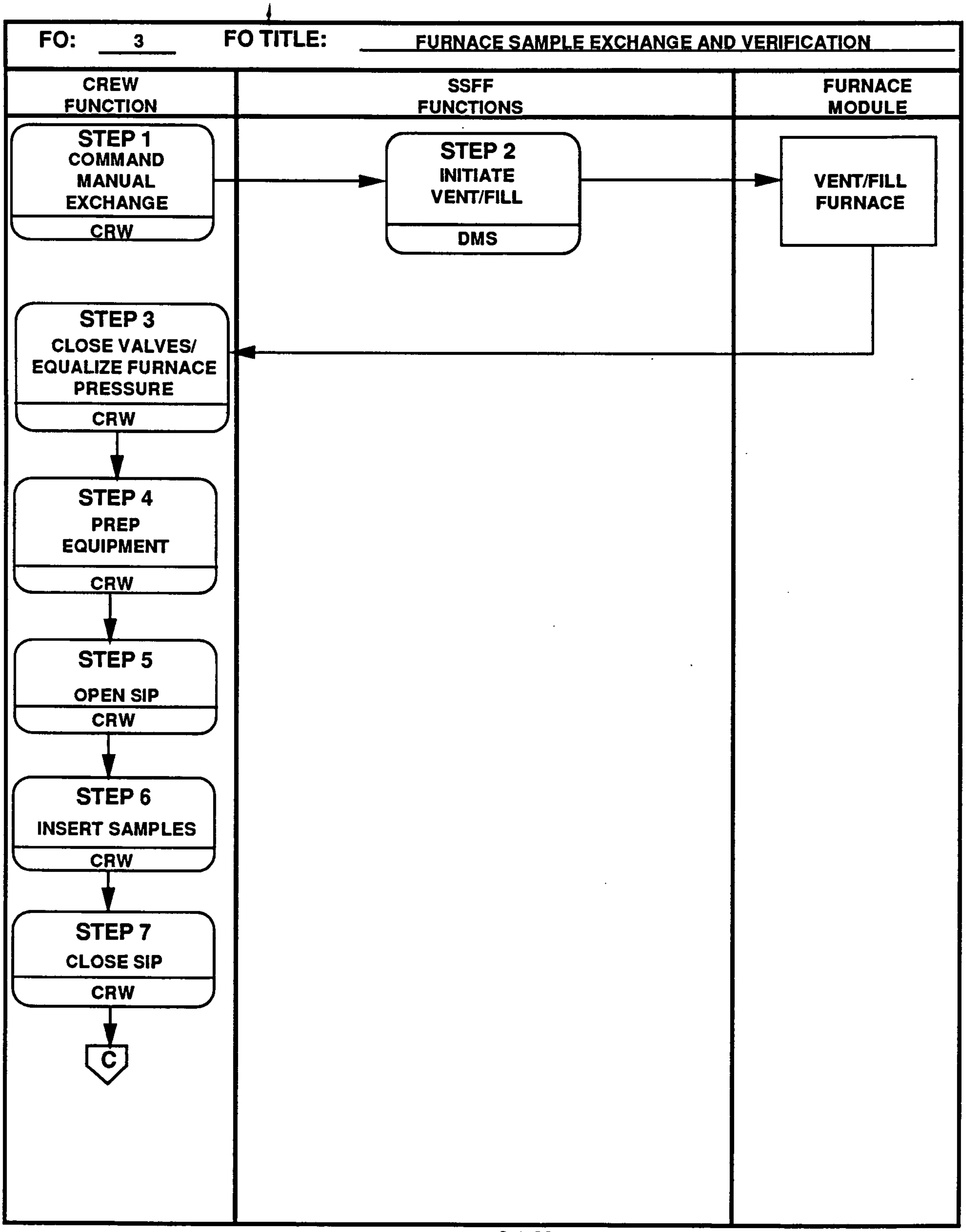


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 2 of 12)

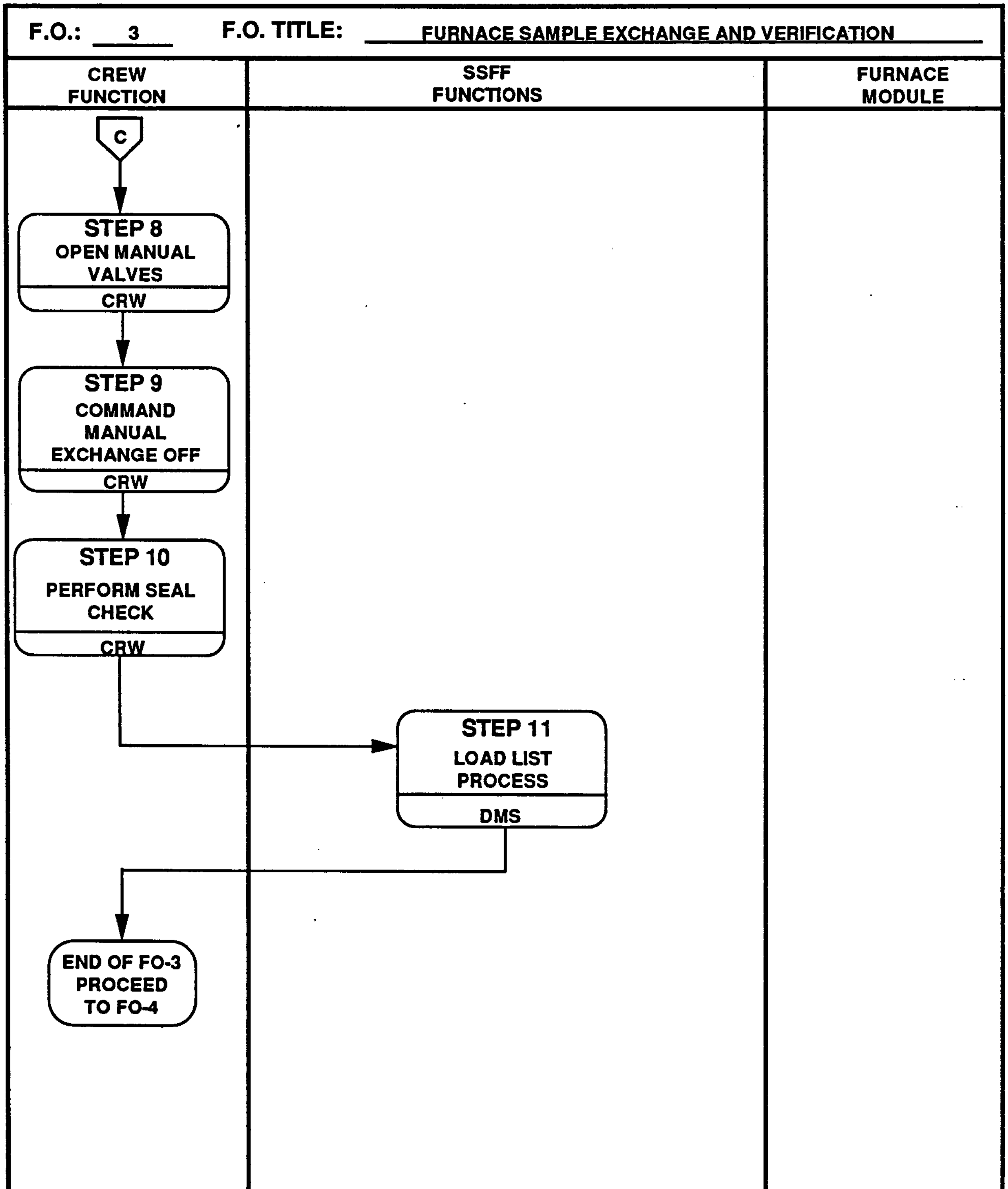


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 3 of 12)

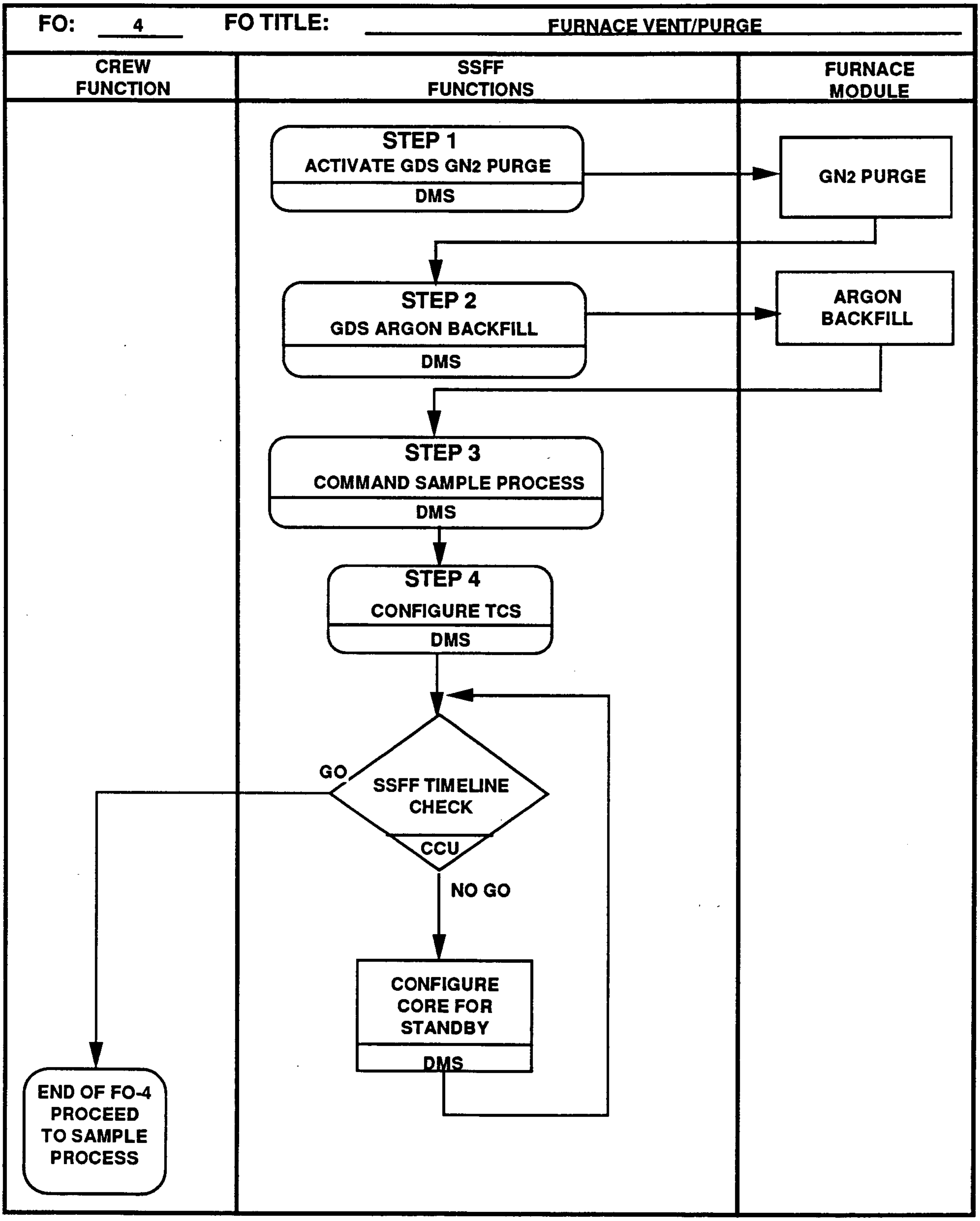


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 4 of 12)

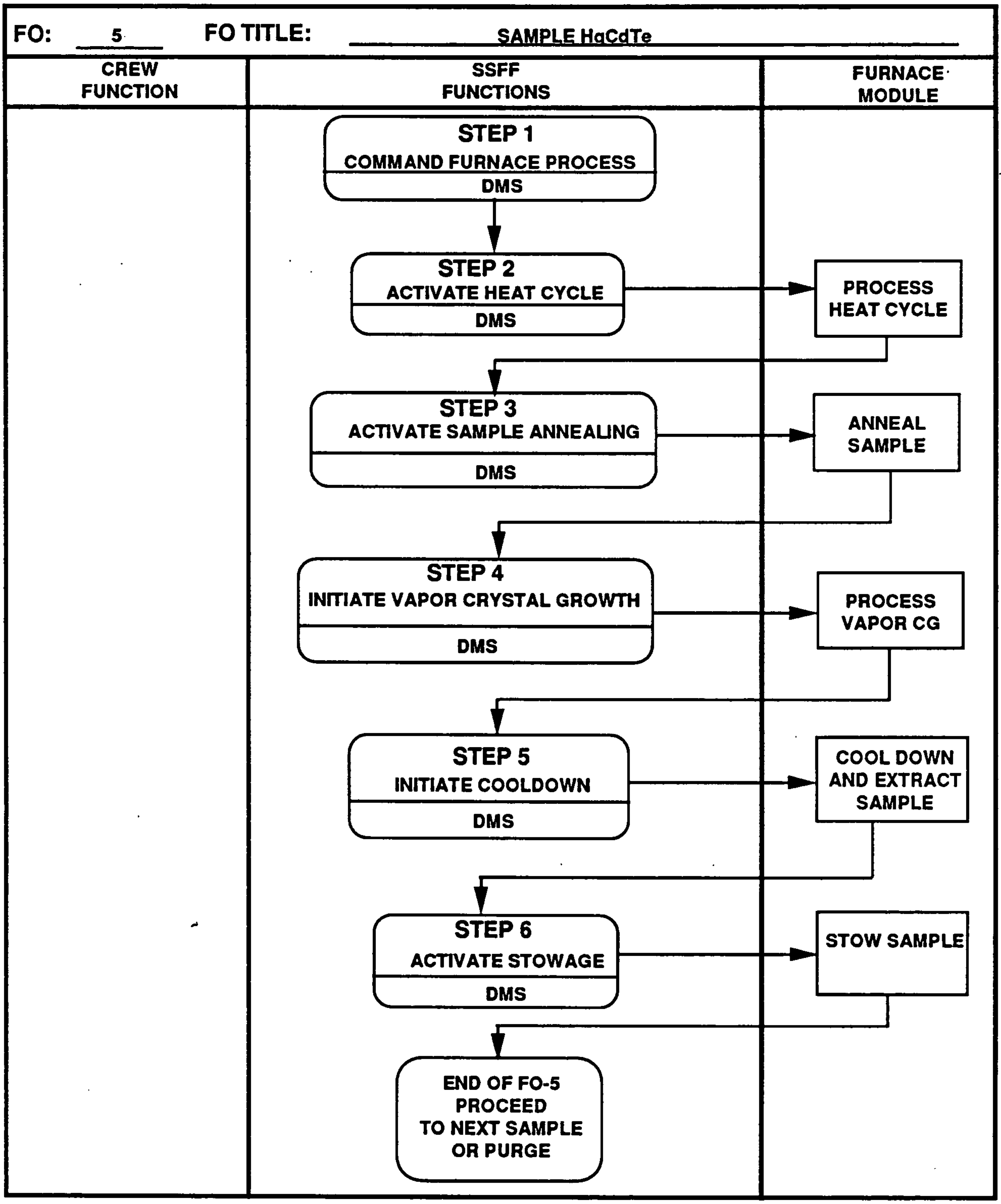


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 5 of 12)

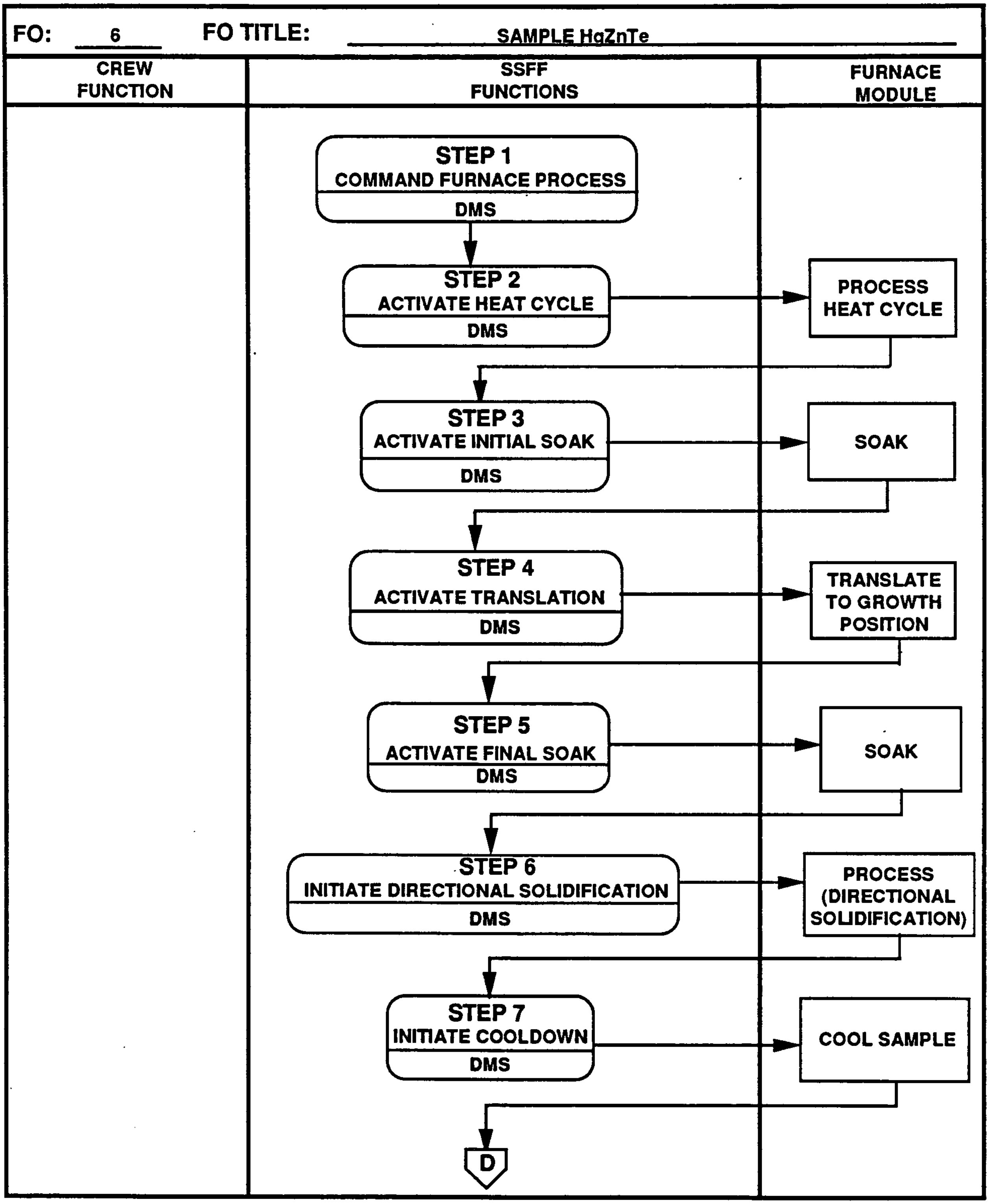


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 6 of 12)

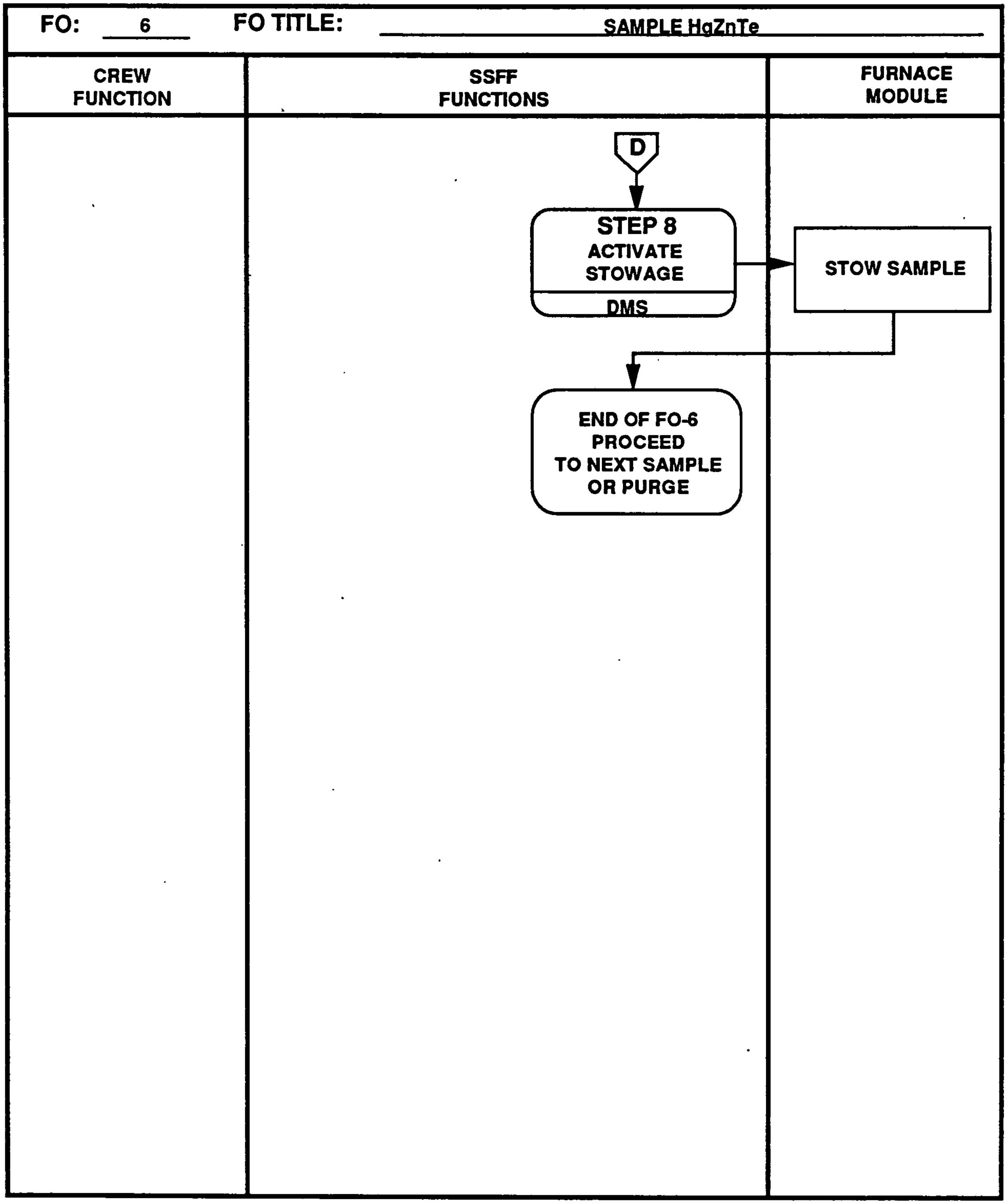


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 7 of 12)

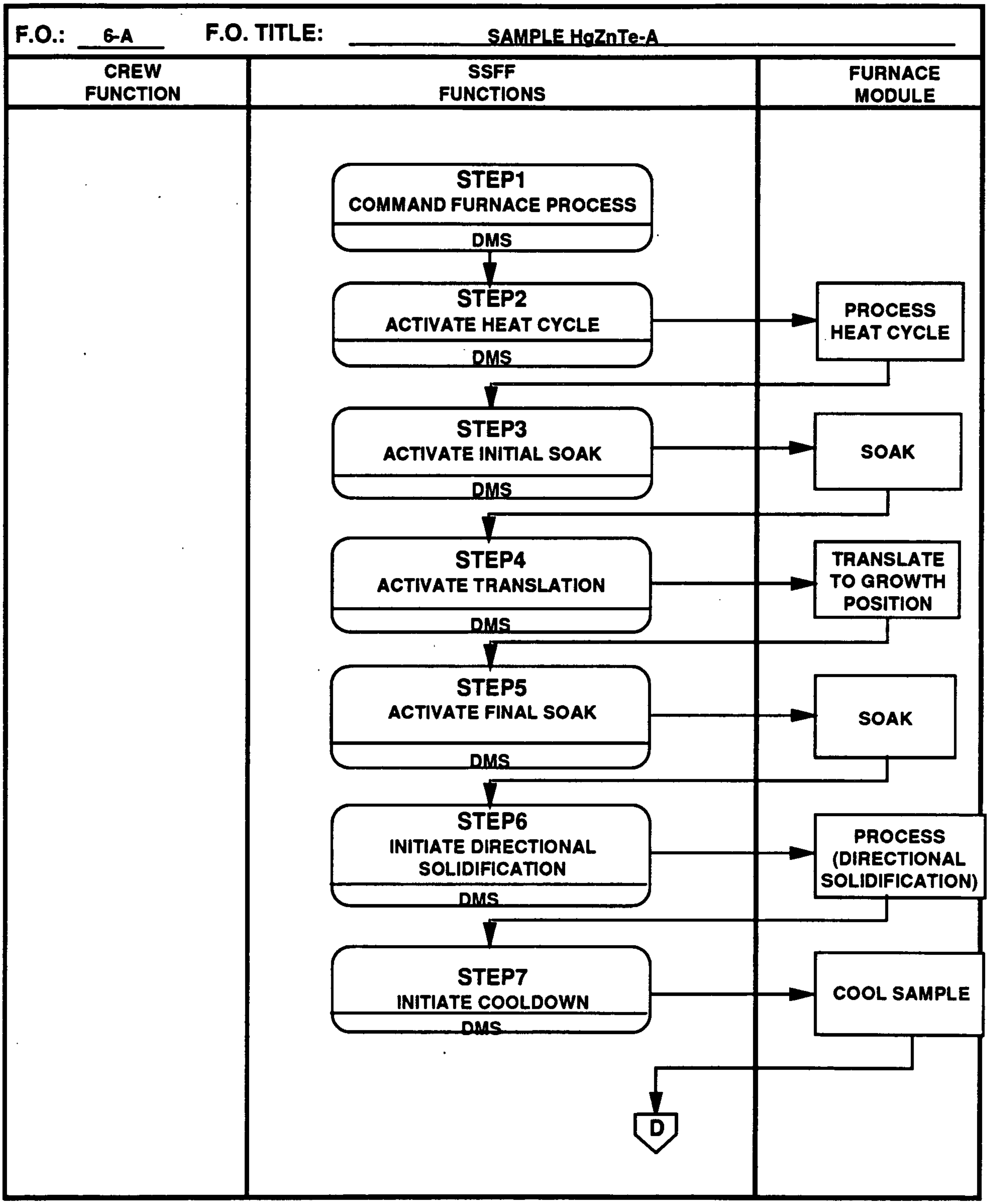


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 8 of 12)

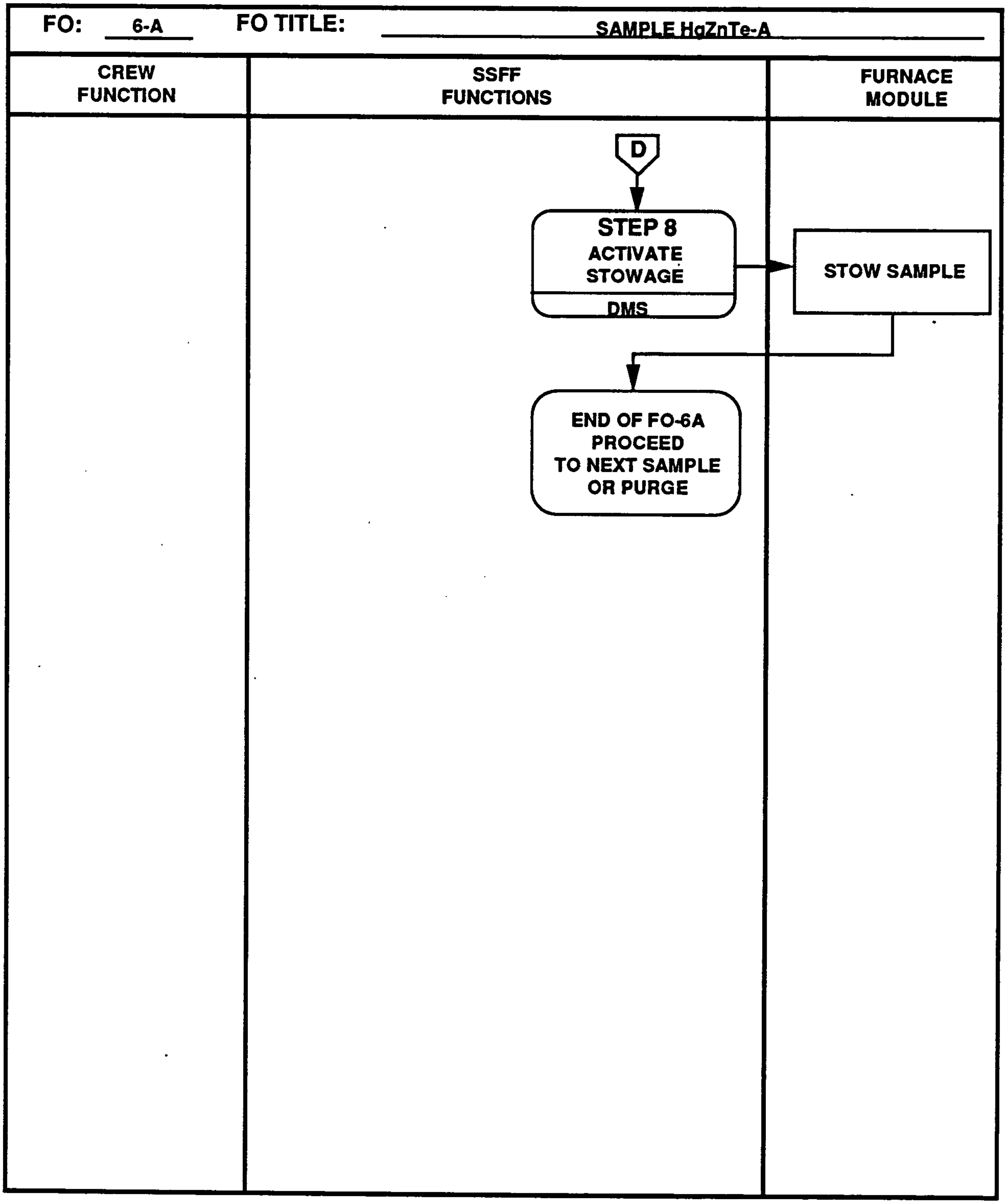


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 9 of 12)

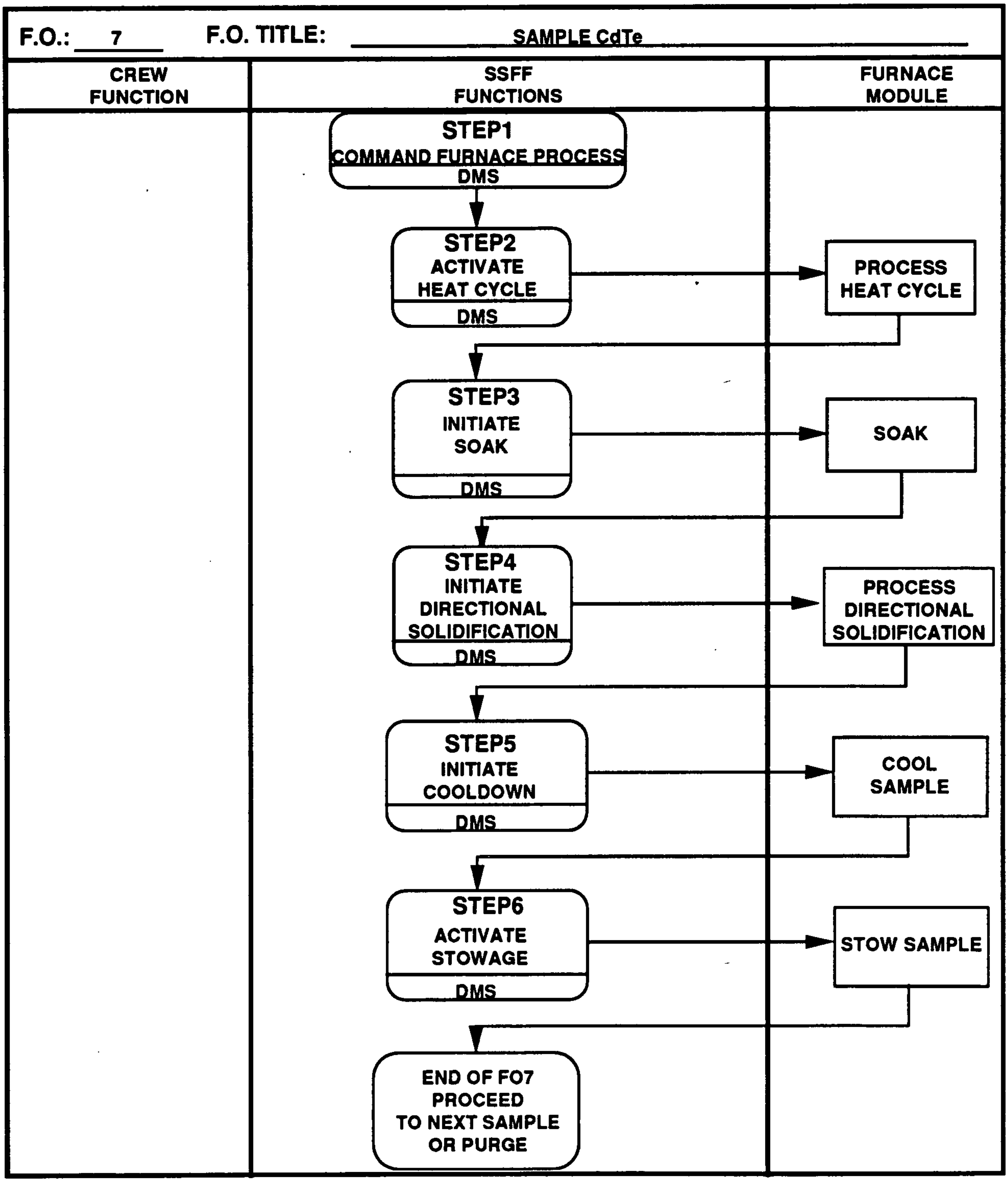


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 10 of 12)

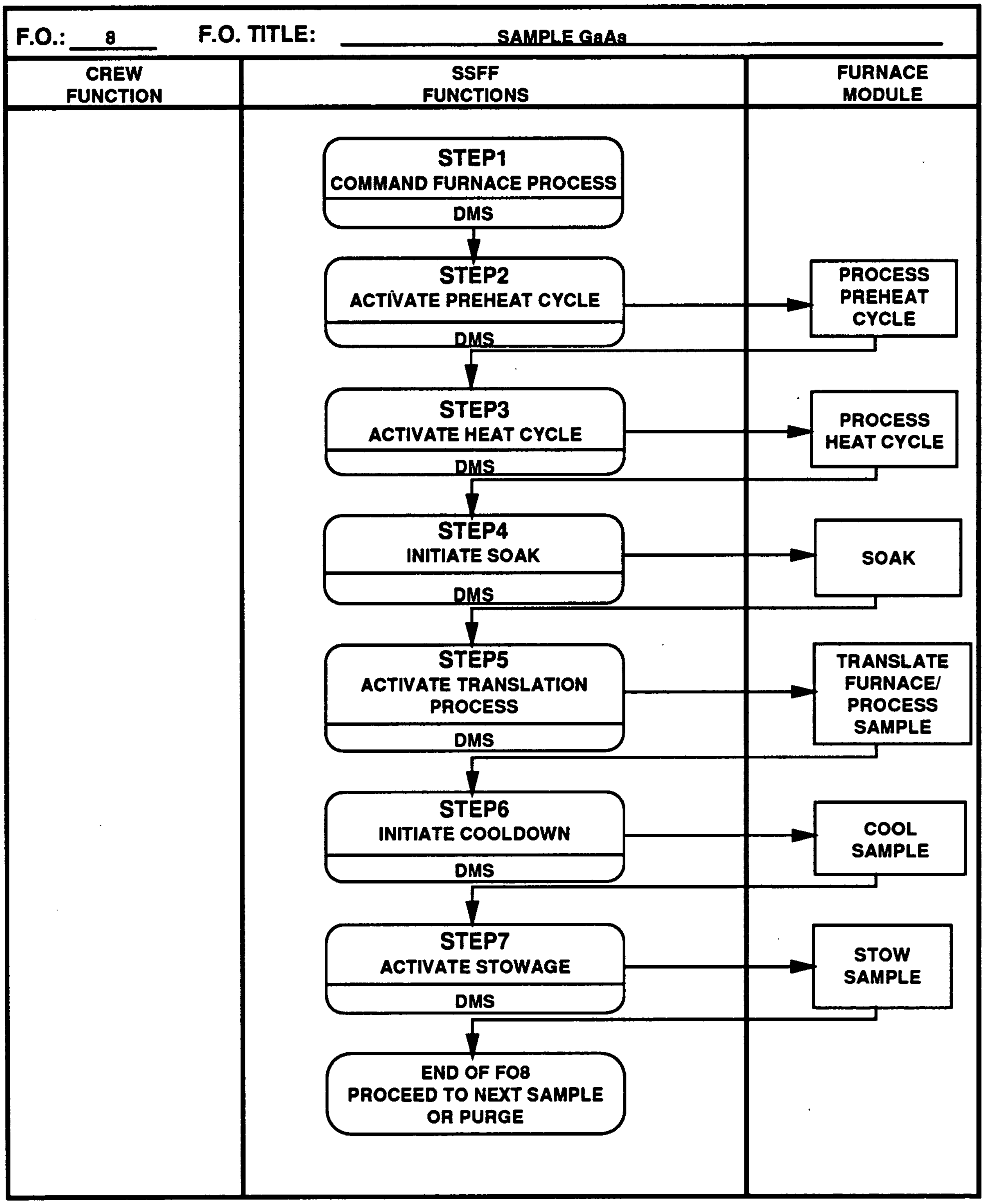


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 11 of 12)

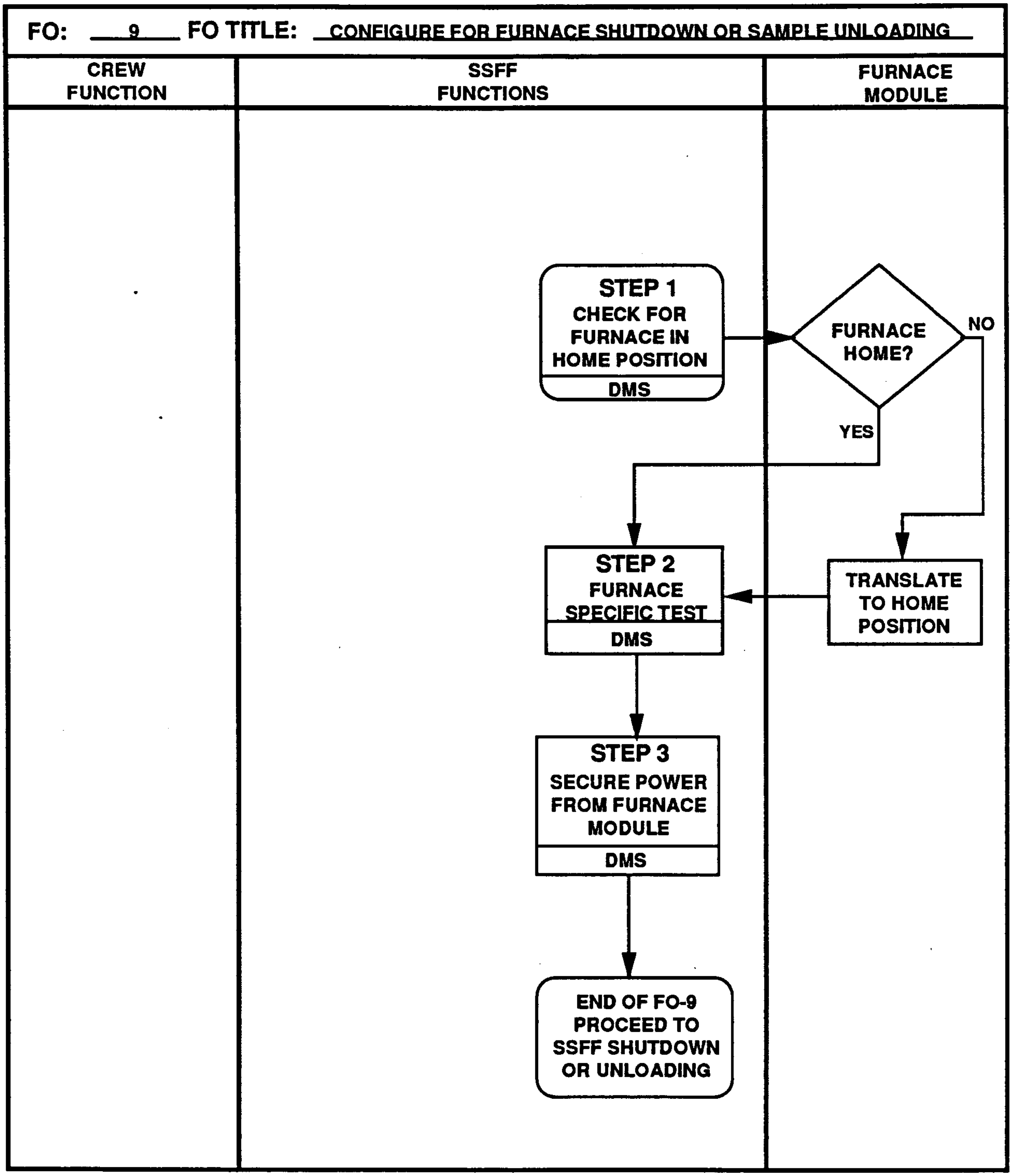
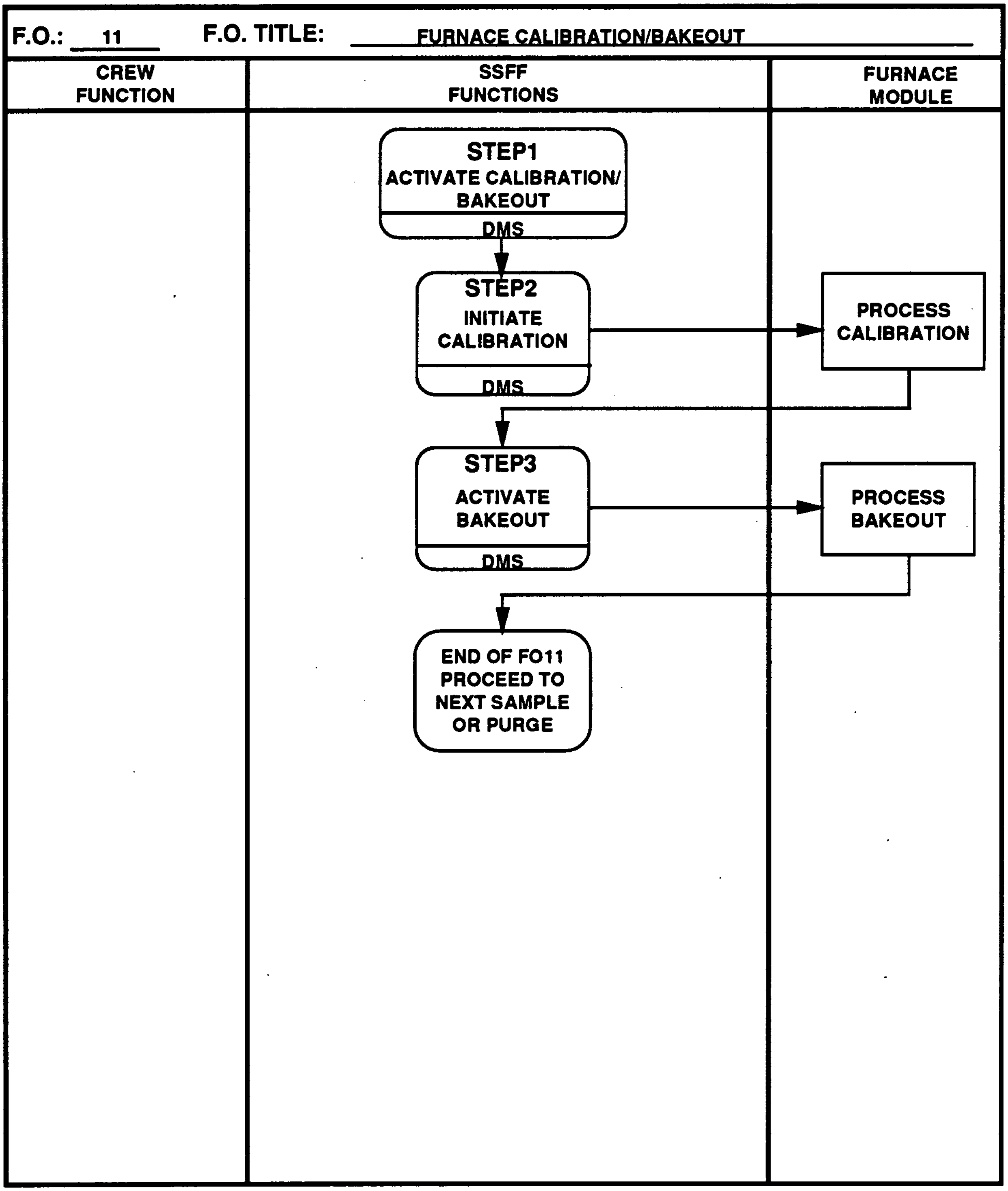


TABLE 2.1-3. FURNACE MODULE-1 OPERATIONAL FUNCTIONAL FLOW (Sheet 12 of 12)



2.2. STRUCTURAL/MECHANICAL

Furnace Module-1 will be mounted in the Space Station Furnace Facility (SSFF) Experiment Rack-1. The physical and functional interfaces defined herein between Furnace Module-1 and SSFF, and Furnace Module-1 and Space Station Freedom (SSF) are as follows:

- Furnace Module-1 to SSFF Experiment Rack-1
- Furnace Module-1 cooling jacket to SSFF Thermal Control System (TCS)
- Furnace Module-1 electrical connection to SSFF Power Conditioning and Distribution System (PCDS)
- Furnace Module-1 to SSFF-supplied argon and nitrogen
- Furnace Module-1 to SSFF-supplied vacuum vent
- Furnace Module-1 Data Management System (DMS) connections to SSFF DMS
- Furnace Module-1 software to SSFF software
- Furnace Module-1 to crew interface

2.2.1 EQUIPMENT LIST AND MASS PROPERTIES

Mass properties of Furnace Module-1 are shown in Table 2.2-1. Stowage items and their properties are shown in Table 2.2-2.

2.2.2 INTERFACE DETAIL

2.2.2.1 Furnace Module-1 to SSFF Experiment Rack-1

The Furnace Module-1 will interface with the experiment rack by way of the experiment apparatus container (EAC) base ring. The EAC connector locations for the TCS, PCDS, argon, nitrogen, vacuum vent, and DMS are identified in Figure 2.2-1. Further information on each of these interfaces is available in this section of this document.

All services will be provided to Furnace Module-1 by the Core Rack, except avionics air and fire detection and suppression, which will be provided at Experiment Rack-1 via the SSFF furnace interface panel. Other furnace-unique services which might be required will be the responsibility of the Furnace Developer and will be located in Experiment Rack-1.

2.2.2.2 Furnace Module-1 Cooling Jacket-to-SSFF TCS

Furnace Module-1 will interface with the SSFF TCS via quick disconnects located at the Furnace Module-1 base ring.

TABLE 2.2-1. LIST OF EQUIPMENT PROPERTIES

Equipment Nomenclature	Mass (kg)	Mass Maturity (%)			Mounting Preferred	Center of Gravity Station (cm)			Moment of Inertia (kg-m2)			Product of Inertial (kg-m2)		
		est.	cal.	act.		X	Y	Z	Ix	Iy	Iz	Ixy	Ixz	Iyz
Furnace Module-1	327.0	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Utilities Interface Panel	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Interface Cables and Fluid Lines	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

TABLE 2.2-2. FURNACE MODULE-1 STOWAGE LIST

Item	Number Required	Mass Each (kg)	Dimensions (cm) LxWxH or LxDia	Stowage Responsiblity		Stowage Phase			Special Requirements
				Ex	PL	L	O	R	
Sample Ampoule/Cartridge Assembly with Stowage Bag (5 flight and 5 spares)	10	1.60	73.7 x 13.2 dia.			√		√	
Work Bag	TBD	0.07	45.7 x 5.1 dia.			√		√	
Glovebox Cover	1	TBD	TBD			√		√	
Flexible Glovebox	1	TBD	TBD			√		√	
Torque Wrench, 1/4 in. (30-200 in-lb)	1	0.31	24.1 x 2.1 X 1.9			√		√	
Socket, 1/2 in. deep, (1/4-in. drive)	1	0.09	5.1 x 1.7 dia.			√		√	
Extender, 10 in. (1/4-in. drive)	1	0.10	25.4 x 1.3 dia.			√		√	
Hex Head Driver, 5/32 in. (3/8-in. drive)	1	0.01	5.2 x 1.3 dia.			√		√	
Hex Head Driver, 1/4 in. (3/8-in. drive)	1	0.01	5.2 x 1.3 dia.			√		√	
Adapter, 1/4 to 3/8 in. (1/4-in. drive)	1	0.02	2.4 x 1.3 dia.			√		√	
Viton Gloves (pair)	1	0.41	14.0 x 22.9 x 3.8			√		√	
Filter Test Bags	10	0.01	15.2 x 15.2 x 0.5			√		√	
SACA Wrench	1	0.26	76.2 x 5.2 dia.			√		√	
Torque Wrench (0-30 in-lb)	1	0.40	17.8 x 3.2 dia.			√		√	
Transfer Units	10	0.26	20.6 x 9.1 dia.			√		√	

TBD

FIGURE 2.2-1. FURNACE MODULE-1 EAC CONNECTOR LOCATIONS

2.2.2.3 Furnace Module-1 Electrical Connection-to-SSFF PCDS

The furnace module will interface with the SSFF PCDS via the furnace junction box located within Experiment Rack-1 to the Furnace Module-1 base ring connection.

2.2.2.4 Furnace Module-1 to SSFF-Supplied Argon and Nitrogen

Furnace Module-1 will interface with the SSFF Core Rack-supplied argon and nitrogen through a connection at the Furnace Module-1 base ring.

2.2.2.5 Furnace Module-1 to SSFF-Supplied Vacuum Vent

Furnace Module-1 will interface with the SSF-supplied vacuum vent through a connection at the Furnace Module-1 base ring.

2.2.2.6 Furnace Module-1 DMS Connections-to-SSFF DMS

The furnace module will interface with the SSFF DMS via the Furnace Data Acquisition and Control System (FDACS) located within Experiment Rack-1.

2.2.2.7 Furnace Module-1 Software-to-SSFF Software

The Furnace Module-1 software will require an interface with the SSFF software to support operation of the furnace module. This interface will include (1) downloading software and data to the Furnace Module-1 software; (2) collecting and processing (if necessary) data received from the Furnace Module-1 software; (3) responding to requests for SSFF resources such as power, gas, cooling, etc.; (4) retrieving stored data to be output to Furnace Module-1 for analysis; (5) network management of the local area network (LAN) connected to the Furnace Module-1 processor; (6) fault, detection, isolation, and recovery (FDIR) services; and (6) operating system services. Furnace Module-1 will also require interface from the SSFF software to the furnace heating system, the furnace translation system (if present), the furnace cavity pressure system, and the furnace current pulsing system.

2.2.2.8 Furnace Module-1 to Crew Interface

There are two ways the crew may interface with Furnace Module 1. The first way is through the top end of the EAC where the crew interfaces with the integrated furnace enclosure apparatus (IFEA) via the sample insertion port during manual sample exchange.

The second way the crew may interface with Furnace Module-1 is through the crew interface to the SSFF DMS (display and keyboard). Through the display and keyboard, a crewmember can direct the furnace to perform any number of operations including changing temperature profiles or rotating and loading a different sample into the processing position.

2.3. POINTING/STABILIZATION AND ALIGNMENT

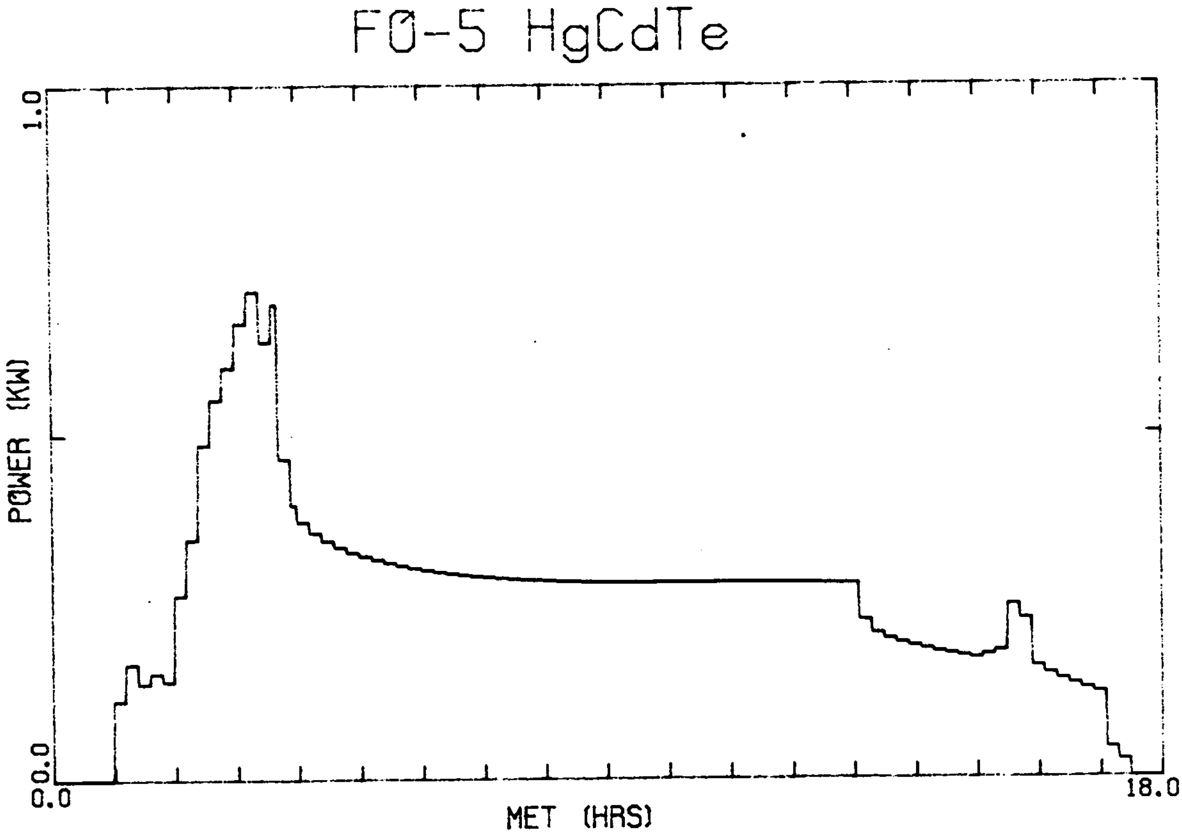
Furnace Module-1 requires specific alignment of the center line of the sample during processing. This requirement is that the residual dc acceleration vector (i.e., dc component of the acceleration vector at the sample due to all factors such as drag, orbital mechanics, etc.) should be aligned with the center line of the sample precisely enough that the component of the acceleration perpendicular to the center line is less than 10^{-7}g. The direction of the vector may be required to be from hot zone to cold zone of the furnace or the opposite direction. The required direction will be determined separately for each sample.

2.4. ORBITAL REQUIREMENTS AND CONSTRAINTS

Furnace Module-1 requires specific Orbiter attitudes during processing in order to satisfy the requirement for orienting the reconfiguring furnace module (RFM) axis in relation to the residual dc acceleration vector. Details of the attitude requirements are to meet the requirements of Section 2.3.

2.5. ELECTRICAL REQUIREMENTS

All power conditioning will be accomplished by Space Station Furnace Facility (SSFF) prior to any distribution to Furnace Module-1. Furnace Module-1 heaters will interface with the Power Conditioning and Distribution System (PCDS) at the furnace junction boxes. The operational power profile defining the use of the SSFF-provided power to Furnace Module-1 during each functional objective (FO) is shown in Figure 2.5-1. The power profile data shown in these figures represent power requirement estimates to cover any of the the SSFF-accommodated furnace needs. Only FO-5 through FO-8 power profiles are shown since no power is associated with the furnace in FO-3, FO-4, FO-9, or FO-11. The power levels defined in Figure 2.5-1 are considered maximums. Time duration for peak power requirements is 72 h. The maximum peak power required is 1650 W. The average power required is 570 W.



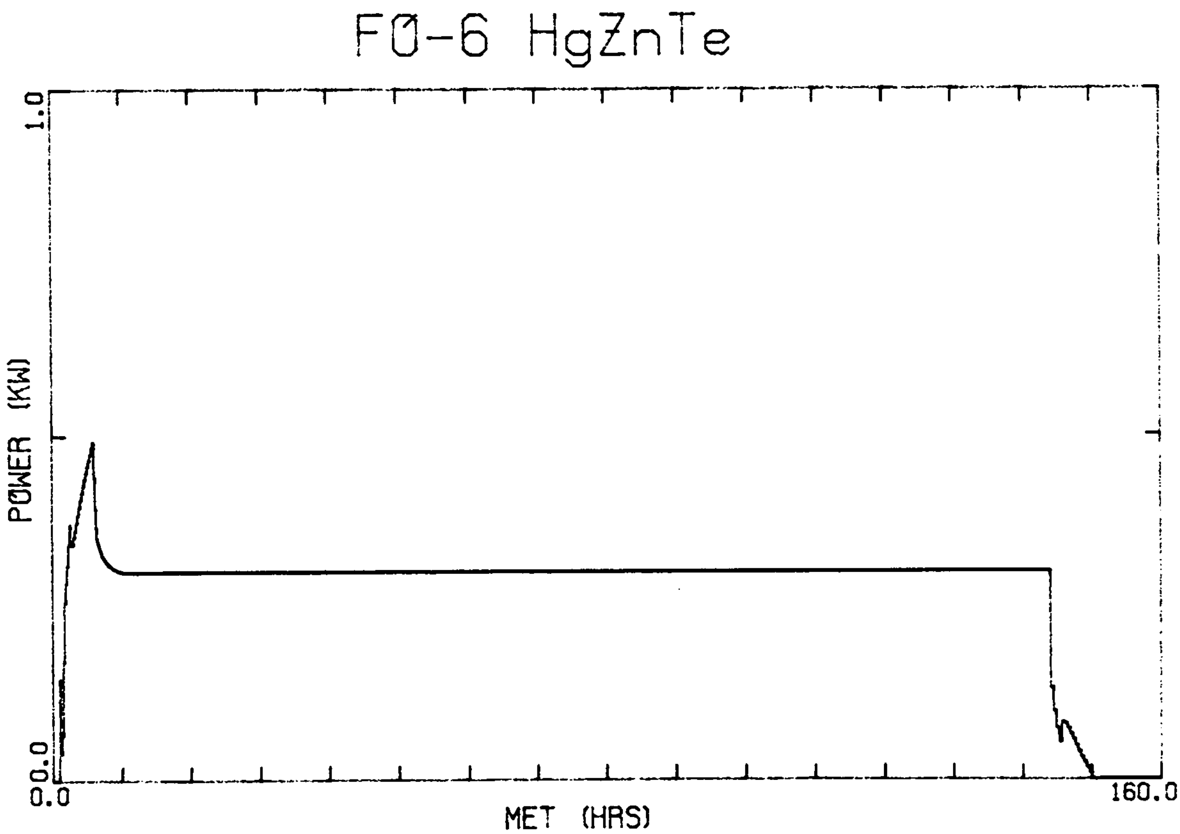
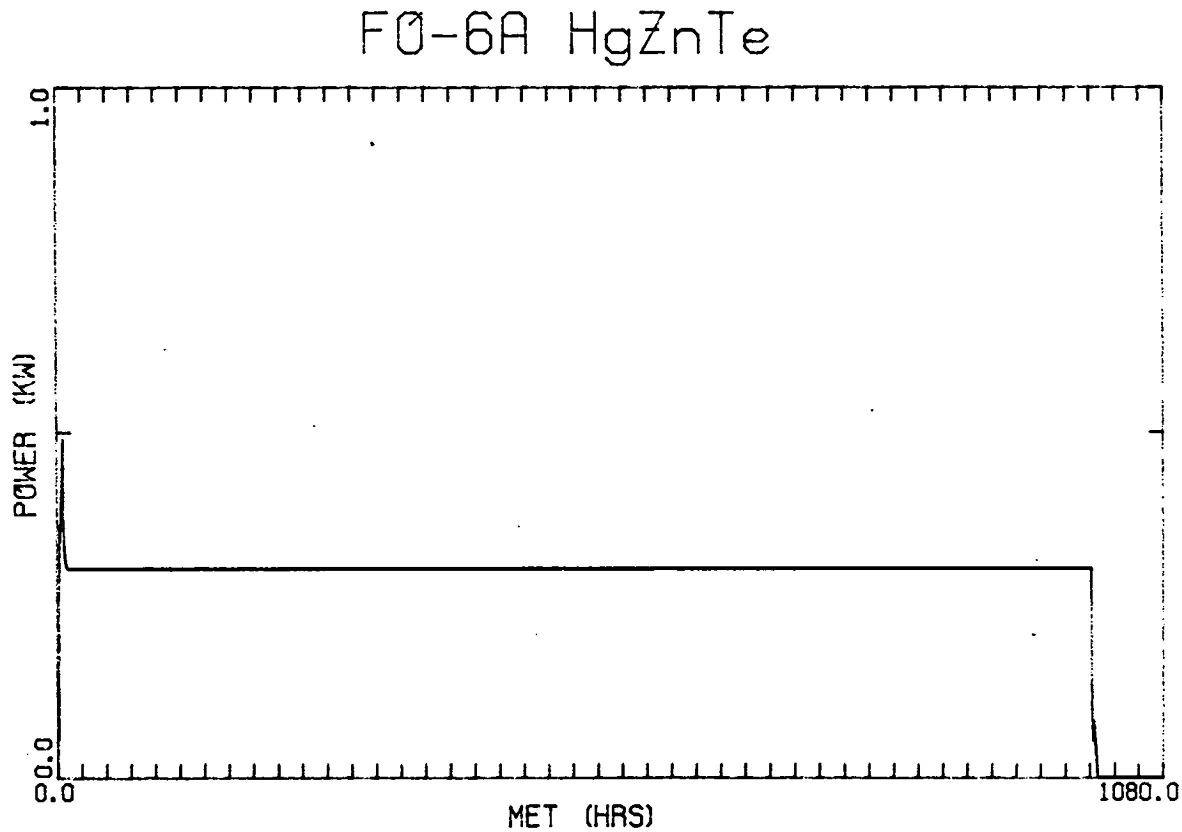


FIGURE 2.5-1. POWER PROFILES BY FO (Sheet 1 of 3)



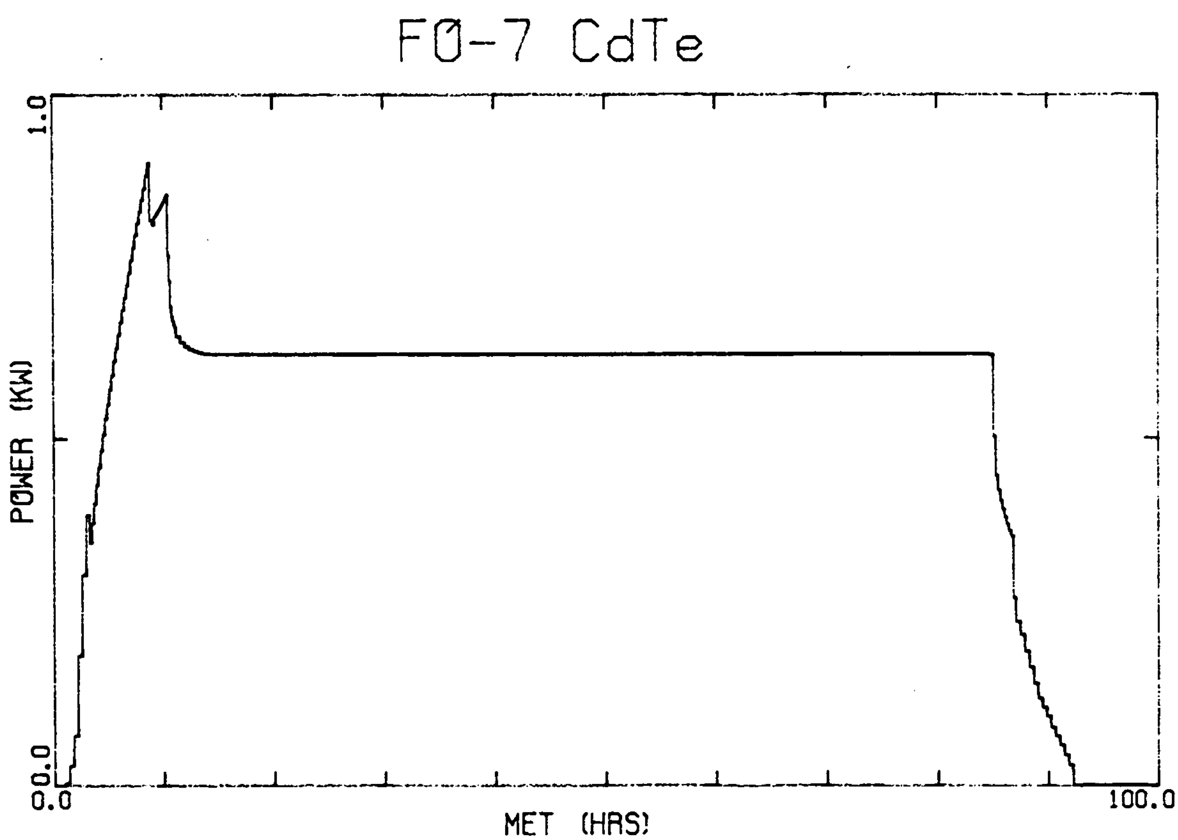


FIGURE 2.5-1. POWER PROFILES BY FO (Sheet 2 of 3)

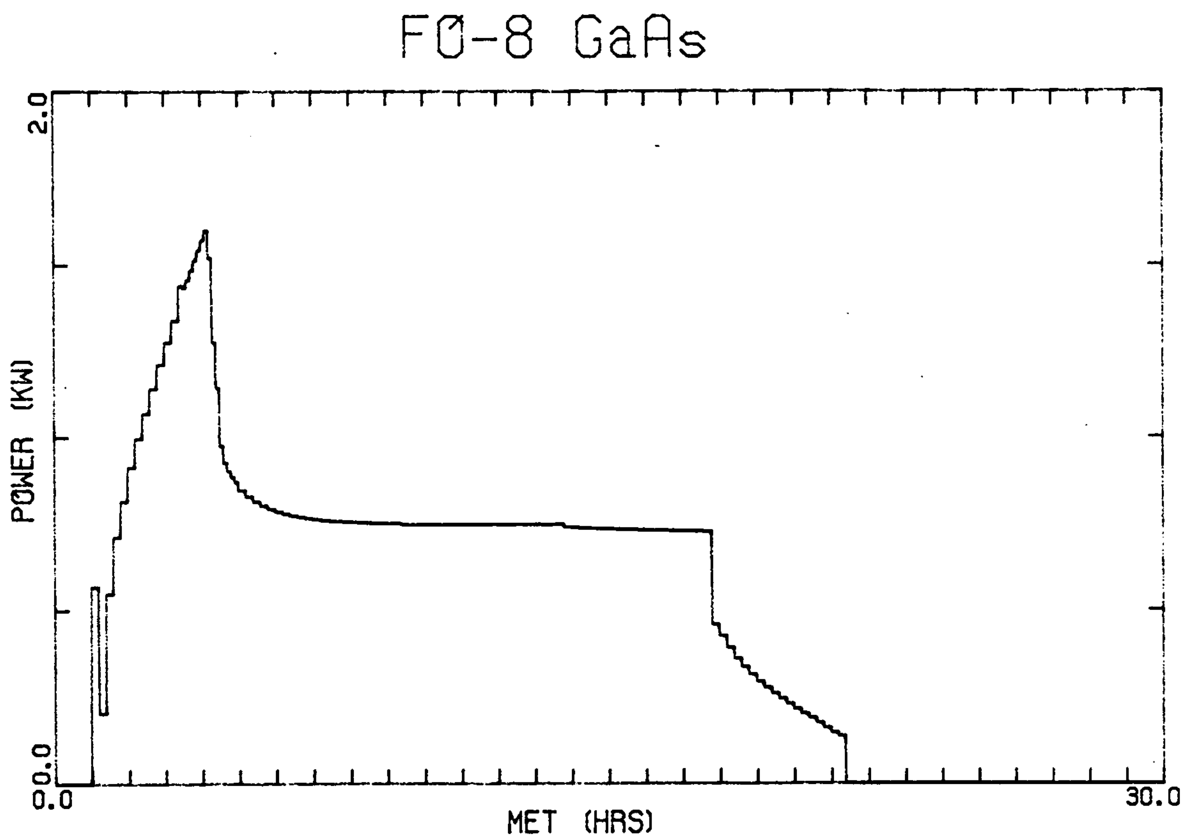


FIGURE 2.5-1. POWER PROFILES BY FO (Sheet 3 of 3)

2.6. THERMAL/FLUID REQUIREMENTS

2.6.1 HEAT TRANSFER CHARACTERISTICS

Furnace Module-1 utilizes the Space Station Furnace Facility (SSFF) water cooling loop for experiment cooling and will not require avionics air cooling. Thermal requirements for Furnace Module-1 are shown in Table 2.6-1. Maximum water-cooled heat dissipation from Experiment Rack-1 is 1500 W for Furnace Module-1. Required inlet temperature of the cooling water for Furnace Module-1 is 39.9 °C.

2.6.2 FLUID/VENT REQUIREMENTS

Furnace Module-1 requires an argon processing atmosphere. Argon required by Furnace Module-1 for the Integrated Configuration-1 (IC1) mission is 7.5 kg. The supplied argon is required to be research grade having the following contaminant levels:

99.9995 % pure	$N_2 < 3.0$ ppm
$CO_2 < 0.5$ ppm	$N_2O < 0.1$ ppm
$CO < 1.0$ ppm	$O_2 < 1.0$ ppm
$H_2 < 1.0$ ppm	$THC < 0.5$ ppm
$CH_4 < 0.5$ ppm	$H_2O < 0.5$ ppm
dewpoint = -112 °F	

During nominal operating conditions, the vent products for Furnace Module-1 will be argon and nitrogen. Vent products during off-nominal conditions are TBD. Gas and vacuum requirements for Furnace Module-1 are shown in Table 2.6-2.

Furnace Module-1 has two paths to the SSF Vacuum System. The use of these paths is defined as follows:

- Path One - Active Pressure Control
  - Path one is used for Gas Distribution System (GDS)-controlled, or nominal venting.
  - Path one requires access to the Space Station Freedom (SSF) Vacuum System during the sample processing phases of Furnace Module-1 operations.
  - Venting episodes using path one will be SSF timelined activities. Typical vents will occur every 15 min to 1 h.

- Path Two - Emergency Pressure Relief
  - Path two provides for emergency relief of experiment apparatus container (EAC) overpressure through redundant pressure relief valves.
  - Path two must have access to the SSF Vacuum System during all on-orbit phases after installation into the U.S. Laboratory module.

TABLE 2.6-1. ON-ORBIT THERMAL REQUIREMENTS

Equipment	Heat Sink Type					Cooling Load (W)			Min/Max Temp (°C)			Thermal	Special
Item and FO No.	Cabin	Rack Air (nonducted)	Rack Air (ducted)	Exp Coldplate (Module)	SSFF Core HX	Standby	Operate	Peak or other	Standby	Operate	Non-Operate	Capacitance (W-h-°C)	Considerations (as applicable)
FO-3					X	0	0	0	0/50	0/50	0/50	TBD	
FO-4					X	0	0	0	0/50	0/50	0/50	TBD	
FO-5					X	TBD	232	270	0/50	0/50	0/50	TBD	
FO-6					X	TBD	274	285	0/50	0/50	0/50	TBD	
FO-6A					X	TBD	283	285	0/50	0/50	0/50	TBD	
FO-7					X	TBD	525	580	0/50	0/50	0/50	TBD	
FO-8					X	TBD	524	697	0/50	0/50	0/50	TBD	
FO-9					X	0	0	0	0/50	0/50	0/50	TBD	
FO-11					X	0	0	0	0/50	0/50	0/50	TBD	

TABLE 2.6-2. FLUID REQUIREMENTS

Equipment Item and FO No.	Functional Requirement (Pressure, Purge, Vent Vacuum)	Gas or Liquid Parameters					Vent		Vacuum Vent Rate: torr-l/sec	Special Considerations (as applicable)
		Type	Quantity Stored (kg)	Pressure Limits (N/m2)	Flow-rate (kg/h)	Pressure Drop (N/m2)	Pressure (N/m2)	When Required and Duration		
FO-3										
Step 2	Vacuum Vent	Argon	0	1.38×10^5	>4.1	TBD	0.133	TBD	1.2×10^{-3}	
FO-4										
Step 1	Vacuum Vent	Nitrogen	0	1.38×10^5	TBD	TBD	0.133	TBD	1.2×10^{-3}	
Step 2	Pressurize	Argon	0	1.38×10^5	>4.1	TBD	0.133	TBD	1.2×10^{-3}	
FO-5	N/A									
FO-6	N/A									
FO-6A	N/A									
FO-7	N/A									
FO-8	N/A									
FO-9	Vent		0				0.133	TBD	1.2×10^{-3}	
FO-11	N/A									

2.7. DATA SYSTEM REQUIREMENTS

Furnace Module-1 will require the use of the Furnace Data Acquisition and Control System (FDACS) consisting of a Furnace Control Unit (FCU) and a Furnace Actuator Unit (FAU), which will monitor and collect data from Furnace Module-1 and provide control stimulus as needed for the positioning of samples. The requirements from the Furnace Module-1 to the SSFF Core are defined in subsections 2.7.1 through 2.7.5 and in Tables 2.7-1 through 2.7-5..

2.7.1 SIGNAL INTERFACE DEFINITION

Table 2.7-1 defines the following data signals and control to perform the following data handling and operations functions:

- Furnace Module-1 activation and control
- Acquisition, formatting, and routing of Furnace Module-1 housekeeping data
- Acquisition, formatting, and routing of Furnace Module-1 science data

2.7.2 SIGNAL INTERFACE DEFINITION EXPANSION

Table 2.7-2 is an expansion of the input and output data streams identified in Table 2.7-1.

2.7.3 EVENT/EXCEPTION MONITORING REQUIREMENTS

Onboard event and exception monitoring requirements for data transmitted to the SSFF are defined in Table 2.7-3.

2.7.4 PAYLOAD OPERATIONS INTEGRATION CENTER DISPLAY REQUIREMENTS

The Payload Operations Integration Center (POIC) controls all payload operations and is equipped with consoles for data management, operations control, and mission planning. The data to provide this capability are shown in Table 2.7-4.

2.7.5 POIC LIMIT SENSING/EXCEPTION MONITORING REQUIREMENTS

Limit sensing and exception monitoring are provided to the POIC via downlink and are defined in Table 2.7-5.

TABLE 2.7-1. SIGNAL INTERFACE DEFINITION

```
------------------------------------------------------------------------------------------------------------
|   |                                |C|S D|I N|SER.DATA |E|E|C|S R|///////////////RESERVED/////////////|
|   |                                |M|I E|N O|---------|V|X|A|A A|-----------|---------|-------------|
|   |                                |D|G F|T .|NM|NW|S|T|E|C|L|M T|   |   | | |   | | |   |    |  | |
|ENT|                                | |N .|R  |OS|OO|O|Y|N|P|.|P E|   |   | | |   | | |   |    |  | |
|NO.|         DESCRIPTION            |U|A  |F  |.G|.R| |P|T|M|C|L  |   |   | | |   | | |   |    |  | |
|   |                                |L|L  |A  |OS|OD|F|E| |O|O|E  |   |   | | |   | | |   |    |  | |
|   |                                |K|   |C  |F |FS|X| | |N|F|    |   |   | | |   | | |   |    |  | |
------------------------------------------------------------------------------------------------------------
|106|FURNACE MODULE HOUSEKEEPING DATA| |SI |  1| 3|32| |N| | | |  1|   |   | | |   | | |   |    |  | |
|107|SSFF HOUSEKEEPING DATA          | |SI |  1| 3|32| |N| | | |  1|   |   | | |   | | |   |    |  | |
|850|FURNACE SCIENCE DATA            | |SI |  1| 3|32| |N| | | |  1|   |   | | |   | | |   |    |  | |
|851|FURNACE SCIENCE DATA            | |SI |  1| 3|32| |N| | | |  1|   |   | | |   | | |   |    |  | |
------------------------------------------------------------------------------------------------------------
              1         2         3           4           5         6          7            8
123 45678901234567890123456789012345 6 789 012 34 56 7 8 9 0 1 234 567 890 123 4 567 890 1 23 4567 89 0
```

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 1 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. CONF	CDT?.	RCIO DE	SID NO.	EXPID	TABLE
200	106		Go/NoGo Error Override		DI	01			B	00	00	00	00						Y		3330	41	2
201	106		Process Elapsed Time - Seconds		DG	01	06		U	00	01	00	06						Y		3331	41	2
202	106		CGF Sytstem State		DG	01	03		U	00	07	00	09						Y		3332	41	2
203	106		Sample Number (Mode)		DG	01	06		U	00	10	00	15						Y		3333	41	2
204	106		Process Elapsed Time - Hours		DG	01	10		U	01	00	01	09						Y		3334	41	2
205	106		Process Elapsed Time - Minutes		DG	01	06		U	01	10	01	15						Y		3335	41	2
207	106		IFEA Water Outlet Temp		AI	01			S	03	00	03	07				Y	Y	Y		3336	41	2
208	106		IFEA Lower Humidity		AI	01			S	04	00	04	07				Y	Y	Y		3337	41	2
209	106		IFEA Upper Humidity		AI	01			S	05	00	05	07				Y	Y	Y		3338	41	2
210	106		IFEA Upper Atmosphere Temp		AI	01			S	12	00	12	07				Y	Y	Y		3355	41	2
211	106		RFM Cold End Shell Temp		AI	01			S	13	00	13	07				Y	Y	Y		3356	41	2
212	106		RFM Hot End Shell Temp		AI	01			S	14	00	14	07				Y	Y	Y		3357	41	2
213	106		Ampoule Alignment Arm Temp		AI	01			S	15	00	15	07					Y	Y		3358	41	2
214	106		SEM Track Temp		AI	01			S	16	00	16	07					Y	Y		3359	41	2
215	106		IFEA Absolute Pressure 1		AI	01			S	17	00	17	07				Y	Y	Y		3360	41	2
216	106		IFEA Absolute Pressure 2		AI	01			S	18	00	18	07				Y	Y	Y		3361	41	2
217	106		Furnace Linear Position		AI	01			S	19	00	19	07					Y	Y		3362	41	2
218	106		Indexing CAM Rotary Position		AI	01			S	20	00	20	07					Y	Y		3363	41	2
219	106		Experiment Main Bus Current		AI	01			S	21	00	21	07				Y	Y	Y		3364	41	2
220	106		Experiment Main Bus Voltage		AI	01			S	22	00	22	07				Y	Y	Y		3365	41	2
221	106		Water Outlet Vlv RCCB Off Status		DI	01			B	23	00	23	00						Y		3250	41	2
222	106		Water Outlet Vlv RCCB On Status		DI	01			B	23	01	23	01						Y		3251	41	2
223	106		IFEA Coolant Flow #1 Status		DI	01			B	23	02	23	02				Y		Y		3366	41	2
224	106		IFEA Coolant Flow #2 Status		DI	01			B	23	03	23	03				Y		Y		3367	41	2
225	106		Vacuum Vent Vlv RCCB Off Status		DI	01			B	23	04	23	04						Y		3368	41	2
226	106		Vacuum Vent Vlv RCCB On Status		DI	01			B	23	05	23	05						Y		3369	41	2
227	106		Hot Boost Mod A RCCB Off Status		DI	01			B	23	06	23	06						Y		3370	41	2
228	106		Hot Boost Mod A RCCB On Status		DI	01			B	23	07	23	07						Y		3371	41	2
229	106		Hot Boost Mod B RCCB Off Status		DI	01			B	23	08	23	08						Y		3372	41	2
230	106		Hot Boost Mod B RCCB On Status		DI	01			B	23	09	23	09						Y		3373	41	2

```
03  06 07  39 40  43 45  47 48  51 53 55 57  65 66 67  71 72  75 78  80
```

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 2 of 38)

ENT NO.	CONN NO.	DESCRIPTION	CMD ULK / USAGE	MN SOG.	NM OS/ WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
231	106	COLD Main Prim Mod RCCB Off Stat	DI	01			B	23	10	23	10					Y		3374	41	2
232	106	COLD Main Prim Mod RCCB On Stat	DI	01			B	23	11	23	11					Y		3375	41	2
233	106	HotMain Prim Mod A RCCB Off Stat	DI	01			B	23	12	23	12					Y		3376	41	2
234	106	HotMain Prim Mod A RCCB On Stat	DI	01			B	23	13	23	13					Y		3377	41	2
235	106	Water Inlet Valve RCCB Off Stat	DI	01			B	23	14	23	14					Y		3378	41	2
236	106	Water Inlet Valve RCCB On Status	DI	01			B	23	15	23	15					Y		3379	41	2
237	106	PDS Airflow 1 Status	DI	01			B	24	00	24	00			Y		Y		3380	41	2
238	106	SCS Airflow 1 Status	DI	01			B	24	01	24	01			Y		Y		3381	41	2
239	106	PCS Airflow 1 Status	DI	01			B	24	02	24	02			Y		Y		3382	41	2
240	106	PCS Airflow 2 Status	DI	01			B	24	03	24	03			Y		Y		3383	41	2
241	106	Argon Fill Valve RCCB Off Status	DI	01			B	24	04	24	04					Y		3384	41	2
242	106	Argon Fill Valve RCCB On Status	DI	01			B	24	05	24	05					Y		3385	41	2
243	106	PCS Utility RCCB Off Status	DI	01			B	24	06	24	06					Y		3386	41	2
244	106	PCS Utility RCCB On Status	DI	01			B	24	07	24	07					Y		3387	41	2
245	106	Peltier Conn Motor RCCB Off Stat	DI	01			B	24	08	24	08					Y		3388	41	2
246	106	Peltier Conn Motor RCCB On Stat	DI	01			B	24	09	24	09					Y		3389	41	2
247	106	Cold Main Red Mod RCCB Off Stat	DI	01			B	24	10	24	10					Y		3390	41	2
248	106	Cold Main Red Mod RCCB On Status	DI	01			B	24	11	24	11					Y		3391	41	2
249	106	Hot Main Prim Mod B RCCB Off Sta	DI	01			B	24	12	24	12					Y		3392	41	2
250	106	Hot Main Prim Mod B RCCB On Stat	DI	01			B	24	13	24	13					Y		3393	41	2
251	106	Hot Guard Module RCCB Off Status	DI	01			B	24	14	24	14					Y		3394	41	2
252	106	Hot Guard Module RCCB On Status	DI	01			B	24	15	24	15					Y		3395	41	2
253	106	Mech Pulsing Mod RCCB Off Status	DI	01			B	25	00	25	00					Y		3252	41	2
254	106	Mech Pulsing Mod RCCB On Status	DI	01			B	25	01	25	01					Y		3253	41	2
255	106	IFEA ABS Press 2 RCCB Off Status	DI	01			B	25	02	25	02					Y		3396	41	2
256	106	IFEA ABS Press 2 RCCB On Status	DI	01			B	25	03	25	03					Y		3397	41	2
257	106	IFEA ABS Press 1 RCCB Off Status	DI	01			B	25	04	25	04					Y		3398	41	2
258	106	IFEA ABS Press 1 RCCB On Status	DI	01			B	25	05	25	05					Y		3399	41	2
259	106	Vacuum Vent Valve Closed Status	DI	01			B	25	06	25	06					Y		3400	41	2
260	106	Vacuum Vent Valve Open Status	DI	01			B	25	07	25	07					Y		3401	41	2

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

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 3 of 38)

ENT NO.	CO NO. RR.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SOFIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
261	106	Argon Fill Valve Closed Status		DI	01			B	25	08	25	08						Y		3402	41	2
262	106	Argon Fill Valve Open Status		DI	01			B	25	09	25	09						Y		3403	41	2
263	106	Hot Main Red Mod A RCCB Off Stat		DI	01			B	25	10	25	10						Y		3254	41	2
264	106	Hot Main Red Mod A RCCB On Stat		DI	01			B	25	11	25	11						Y		3255	41	2
265	106	Water Outlet Valve Normal Stat		DI	01			B	25	12	25	12				Y		Y		3404	41	2
266	106	Water Outlet Valve Bypass Stat		DI	01			B	25	13	25	13				Y		Y		3405	41	2
267	106	Water Inlet Valve Normal Status		DI	01			B	25	14	25	14				Y		Y		3406	41	2
268	106	Water Inlet Valve Bypass Status		DI	01			B	25	15	25	15				Y		Y		3407	41	2
269	106	Fail Safe Brake RCCB Off Status		DI	01			B	26	00	26	00						Y		3408	41	2
270	106	Fail Safe Brake RCCB On Status		DI	01			B	26	01	26	01						Y		3409	41	2
271	106	Core Hold Down Not Retracted		DI	01			B	26	02	26	02						Y		3410	41	2
272	106	Core Hold Down Retracted		DI	01			B	26	03	26	03						Y		3411	41	2
273	106	Core Hold Down Not Extended		DI	01			B	26	04	26	04						Y		3412	41	2
274	106	Core Hold Down Extended		DI	01			B	26	05	26	05						Y		3413	41	2
275	106	Core HD Motor RCCB Off Status		DI	01			B	26	06	26	06						Y		3414	41	2
276	106	Core HD Motor RCCB On Status		DI	01			B	26	07	26	07						Y		3415	41	2
277	106	Step Motor Clutch RCCB Off Stat		DI	01			B	26	08	26	08						Y		3416	41	2
278	106	Step Motor Clutch RCCB On Status		DI	01			B	26	09	26	09						Y		3417	41	2
279	106	Step Motor Drive RCCB Off Stat		DI	01			B	26	10	26	10						Y		3418	41	2
280	106	Step Motor Drive RCCB On Stat		DI	01			B	26	11	26	11						Y		3419	41	2
281	106	Rapid Xlation Clutch RCCB Off St		DI	01			B	26	12	26	12						Y		3420	41	2
282	106	Rapid Xlation Clutch RCCB On St		DI	01			B	26	13	26	13						Y		3421	41	2
283	106	Rapid Xlation Mtr RCCB Off Stat		DI	01			B	26	14	26	14						Y		3422	41	2
284	106	Rapid Xlation Mtr RCCB On Status		DI	01			B	26	15	26	15						Y		3423	41	2
285	106	Furnace Position Not Home		DI	01			B	27	00	27	00						Y		3424	41	2
286	106	Furnace Position Home		DI	01			B	27	01	27	01						Y		3425	41	2
287	106	Furn Extreme Trvl Not Exceeded		DI	01			B	27	02	27	02				Y		Y		3426	41	2
288	106	Furn Extreme Trvl Exceeded		DI	01			B	27	03	27	03				Y		Y		3427	41	2
289	106	Ampoule Alignment Not Retracted		DI	01			B	27	04	27	04						Y		3428	41	2
290	106	Ampoule Alignment Retracted		DI	01			B	27	05	27	05						Y		3429	41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 4 of 38)

ENT NO.	CONN NO.	DESCRIPTION	CMD ULK	USAGE	MNSOG.	NMOS/GWDS/	SOFIXD	TYPE	START WD#	START BT	END WD#	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXC.	CAL COEF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
291	106	Ampoule Alignment Not Extended		DI	01			B	27	06	27	06					Y		3430	41	2
292	106	Ampoule Alignment Extended		DI	01			B	27	07	27	07					Y		3431	41	2
293	106	Ampoule Align Mtr RCCB Off Stat		DI	01			B	27	08	27	08					Y		3432	41	2
294	106	Ampoule Align Mtr RCCB On Stat		DI	01			B	27	09	27	09					Y		3433	41	2
295	106	Ampoule Support Not Retracted		DI	01			B	27	10	27	10					Y		3434	41	2
296	106	Ampoule Support Retracted		DI	01			B	27	11	27	11					Y		3435	41	2
297	106	Ampoule Support Not Secure		DI	01			B	27	12	27	12					Y		3436	41	2
298	106	Ampoule Support Secure		DI	01			B	27	13	27	13					Y		3437	41	2
299	106	Ampoule Spt Plt Mtr RCCB Off St		DI	01			B	27	14	27	14					Y		3438	41	2
300	106	Ampoule Spt Plt Mtr RCCB On Stat		DI	01			B	27	15	27	15					Y		3439	41	2
301	106	Cold Guard Mod RCCB Off Status		DI	01			B	28	00	28	00					Y		3256	41	2
302	106	Cold Guard Mod RCCB On Status		DI	01			B	28	01	28	01					Y		3257	41	2
303	106	Carousel Spacer Plt Gap Lim-Not		DI	01			B	28	02	28	02					Y		3440	41	2
304	106	Carousel Spacer Plt Gap Limit		DI	01			B	28	03	28	03					Y		3441	41	2
305	106	Indexing Cam Not Stowed		DI	01			B	28	04	28	04					Y		3442	41	2
306	106	Indexing Cam Stowed		DI	01			B	28	05	28	05					Y		3443	41	2
307	106	Carousel Trk Extr Left Lim-Not		DI	01			B	28	06	28	06					Y		3444	41	2
308	106	Carousel Trk Extr Left Limit		DI	01			B	28	07	28	07					Y		3445	41	2
309	106	Carousel Trk Extr Right Lim-Not		DI	01			B	28	08	28	08					Y		3446	41	2
310	106	Carousel Trk Extr Right Lim		DI	01			B	28	09	28	09					Y		3447	41	2
311	106	Hot Main Red Mod B RCCB Off Stat		DI	01			B	28	10	28	10					Y		3258	41	2
312	106	Hot Main Red Mod B RCCB On Stat		DI	01			B	28	11	28	11					Y		3259	41	2
313	106	SEM Index Motor RCCB Off Status		DI	01			B	28	12	28	12					Y		3448	41	2
314	106	SEM Index Motor RCCB On Status		DI	01			B	28	13	28	13					Y		3449	41	2
315	106	SEM Indexing Jog CCW Status		DI	01			B	28	14	28	14					Y		3450	41	2
316	106	SEM Indexing Jog CW Status		DI	01			B	28	15	28	15					Y		3451	41	2
317	106	Ampoule Not Processing		DI	01			B	29	00	29	00					Y		3452	41	2
318	106	Ampoule Processing		DI	01			B	29	01	29	01					Y		3453	41	2
319	106	System Bus Relay Off Status		DI	01			B	29	02	29	02			Y		Y		3454	41	2
320	106	System Bus Relay On Status		DI	01			B	29	03	29	03			Y		Y		3455	41	2

Column positions: 03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 5 of 38)

ENT NO.	CONR.	DESCRIPTION	CMD LK	USAGE	MN SO G.	NM OS /G WD IS /	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
321	106	Peltier Pulsing Drv RCCB Off St		DI	01			B	29	04	29	04						Y		3260	41	2
322	106	Peltier Pulsing Drv RCCB On Stat		DI	01			B	29	05	29	05						Y		3261	41	2
001	850	Sync			02																41	2
002	850	Frame Count (SFID)			02																41	2
003	850	Spacelab Experiment ID			02																41	2
004	850	Sample Number (Mode)			02																41	2
005	850	Mission ID			02																41	2
006	850	Furnace Position Not Home			02																41	2
007	850	Furnace Position Home			02																41	2
008	850	Furn Extreme Trvl Not Exceeded			02																41	2
009	850	Furn Extreme Trvl Exceeded			02																41	2
010	850	Core Hold Down Not Retracted			02																41	2
011	850	Core Hold Down Retracted			02																41	2
012	850	Core Hold Down Not Extended			02																41	2
013	850	Core Hold Down Extended			02																41	2
014	850	Water Outlet Valve Normal Stat			02																41	2
015	850	Water Outlet Valve Bypass Stat			02																41	2
016	850	Water Inlet Valve Normal Status			02																41	2
017	850	Water Inlet Valve Bypass Status			02																41	2
018	850	Vacuum Vent Valve Open Status			02																41	2
019	850	Vacuum Vent Valve Closed Status			02																41	2
020	850	Argon Fill Valve Open Status			02																41	2
021	850	Argon Fill Valve Closed Status			02																41	2
022	850	Ampoule Support Not Retracted			02																41	2
023	850	Ampoule Support Retracted			02																41	2
024	850	Ampoule Alignment Not Retracted			02																41	2
025	850	Ampoule Alignment Retracted			02																41	2
026	850	Ampoule Alignment Not Extended			02																41	2
027	850	Ampoule Alignment Extended			02																41	2
028	850	SEM Indexing Jog CCW Status			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 6 of 38)

ENT NO.	COR.	NO.	DESCRIPTION	CMD BULK	USAGE	MN SOG.	NM OS/G WDS/	SOFIXD	TYPE	START WD#	START BT	END WD#	END BT	DATA VALUE TYPE	MON REQ --- EVENT	MON REQ --- EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
029	850		SEM Indexing Jog CW Status			02															41	2
030	850		Ampoule Not Processing			02															41	2
031	850		Ampoule Processing			02															41	2
032	850		Indexing Cam Not Stowed			02															41	2
033	850		Indexing Cam Stowed			02															41	2
034	850		Peltier Connector Not Retracted			02															41	2
035	850		Peltier Connector Retracted			02															41	2
036	850		Peltier Connector Not Extended			02															41	2
037	850		Peltier Connector Extended			02															41	2
038	850		Ampoule 4 Failure 2 Status			02															41	2
039	850		Ampoule 4 Failure 1 Status			02															41	2
040	850		Ampoule 3 Failure 2 Status			02															41	2
041	850		Ampoule 3 Failure 1 Status			02															41	2
042	850		Ampoule 2 Failure 2 Status			02															41	2
043	850		Ampoule 2 Failure 1 Status			02															41	2
044	850		Ampoule 1 Failure 2 Status			02															41	2
045	850		Ampoule 1 Failure 1 Status			02															41	2
046	850		PDS Airflow 1 Status			02															41	2
047	850		PCS Airflow 1 Status			02															41	2
048	850		IFEA ABS Press 2 RCCB Off Status			02															41	2
049	850		IFEA ABS Press 2 RCCB On Status			02															41	2
050	850		Spare RCCB Off Stat			02															41	2
051	850		Spare RCCB On Stat			02															41	2
052	850		IFEA Coolant Flow #1 Status			02															41	2
053	850		SCS Airflow 1 Status			02															41	2
054	850		Cartridge 2 Failure 2 Status			02															41	2
055	850		Cartridge 2 Failure 1 Status			02															41	2
056	850		Cartridge 1 Failure 2 Status			02															41	2
057	850		Cartridge 1 Failure 1 Status			02															41	2
058	850		Ampoule 6 Failure 2 Status			02															41	2
03	06	07		39	40	43	45	47	48	51	53	55	57		65	66	67	71	72	75	78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 7 of 38)

ENT NO.	COR. NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS /	SO FIXD	TY PE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
059	850	Ampoule 6 Failure 1 Status			02																41	2
060	850	Ampoule 5 Failure 2 Status			02																41	2
061	850	Ampoule 5 Failure 1 Status			02																41	2
062	850	Water Outlet Vlv RCCB Off Status			02																41	2
063	850	Water Outlet Vlv RCCB On Status			02																41	2
064	850	Vacuum Vent Vlv RCCB Off Status			02																41	2
065	850	Vacuum Vent Vlv RCCB On Status			02																41	2
066	850	SEM Index Motor RCCB Off Status			02																41	2
067	850	SEM Index Motor RCCB On Status			02																41	2
068	850	Core HD Motor RCCB Off Status			02																41	2
069	850	Core HD Motor RCCB On Status			02																41	2
070	850	Hot Boost Mod A RCCB Off Status			02																41	2
071	850	Hot Boost Mod A RCCB On Status			02																41	2
072	850	Hot Boost Mod B RCCB Off Status			02																41	2
073	850	Hot Boost Mod B RCCB On Status			02																41	2
074	850	Cold Main Prim Mod RCCB Off Stat			02																41	2
075	850	Cold Main Prim Mod RCCB On Stat			02																41	2
076	850	HotMain Prim Mod A RCCB Off Stat			02																41	2
077	850	HotMain Prim Mod A RCCB On Stat			02																41	2
078	850	Carousel Trk Extr Right Lim-Not			02																41	2
079	850	Carousel Trk Extr Right Lim			02																41	2
080	850	Ampoule Support Not Secure			02																41	2
081	850	Ampoule Support Secure			02																41	2
082	850	Carousel Trk Extr Left Lim-Not			02																41	2
083	850	Carousel Trk Extr Left Limit			02																41	2
084	850	Carousel Spacer Plt Gap Lim-Not			02																41	2
085	850	Carousel Spacer Plt Gap Limit			02																41	2
086	850	Ampoule Spt Plt Mtr RCCB Off St			02																41	2
087	850	Ampoule Spt Plt Mtr RCCB On Stat			02																41	2
088	850	Ampoule Align Mtr RCCB Off Stat			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 8 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	S O FIX D	TYPE	DATA DESCRIPTION: START WD #	START BT	END WD #	END BT	TYPE	DATA VALUE	MON REQ: EVENT	MON REQ: EXEC	CAL. COF	C D T ?	RC IO D E	SID NO.	EXP ID	TABLE
089	850	Ampoule Align Mtr RCCB On Stat			02																41	2
090	850	Water Inlet Valve RCCB Off Stat			02																41	2
091	850	Water Inlet Valve RCCB On Status			02																41	2
092	850	Argon Fill Valve RCCB Off Status			02																41	2
093	850	Argon Fill Valve RCCB On Status			02																41	2
094	850	System Bus Relay Off Status			02																41	2
095	850	System Bus Relay On Status			02																41	2
096	850	IFEA Coolant Flow #2 Status			02																41	2
097	850	PCS Airflow 2 Status			02																41	2
098	850	Cartridge 6 Failure 2 Status			02																41	2
099	850	Cartridge 6 Failure 1 Status			02																41	2
100	850	Cartridge 5 Failure 2 Status			02																41	2
101	850	Cartridge 5 Failure 1 Status			02																41	2
102	850	Cartridge 4 Failure 2 Status			02																41	2
103	850	Cartridge 4 Failure 1 Status			02																41	2
104	850	Cartridge 3 Failure 2 Status			02																41	2
105	850	Cartridge 3 Failure 1 Status			02																41	2
106	850	PCS Utility RCCB Off Status			02																41	2
107	850	PCS Utility RCCB On Status			02																41	2
108	850	Step Motor Drive RCCB Off Stat			02																41	2
109	850	Step Motor Drive RCCB On Stat			02																41	2
110	850	IFEA ABS Press 1 RCCB Off Status			02																41	2
111	850	IFEA ABS Press 1 RCCB On Status			02																41	2
112	850	Peltier Conn Motor RCCB Off Stat			02																41	2
113	850	Peltier Conn Motor RCCB On Stat			02																41	2
114	850	Step Motor Clutch RCCB Off Stat			02																41	2
115	850	Step Motor Clutch RCCB On Status			02																41	2
116	850	Rapid Xlation Clutch RCCB Off St			02																41	2
117	850	Rapid Xlation Clutch RCCB On St			02																41	2
118	850	Rapid Xlation Mtr RCCB Off Stat			02																41	2

003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 9 of 38)

ENT NO.	C O R R.	N O.	DESCRIPTION	C M D U L K	U S A G E	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	C A L. C O F	C D T ?	RC IO DE	SID NO.	E X P I D	T A B L E
119	850		Rapid Xlation Mtr RCCB On Status			02															41	2
120	850		Fail Safe Brake RCCB Off Status			02															41	2
121	850		Fail Safe Brake RCCB On Status			02															41	2
122	850		Cold Main Red Mod RCCB Off Stat			02															41	2
123	850		Cold Main Red Mod RCCB On Status			02															41	2
124	850		Hot Main Prim Mod B RCCB Off Sta			02															41	2
125	850		Hot Main Prim Mod B RCCB On Stat			02															41	2
126	850		Hot Guard Module RCCB Off Status			02															41	2
127	850		Hot Guard Module RCCB On Status			02															41	2
128	850		Mech Pulsing Mod RCCB Off Status			02															41	2
129	850		Mech Pulsing Mod RCCB On Status			02															41	2
130	850		Hot Main Red Mod A RCCB Off Stat			02															41	2
131	850		Hot Main Red Mod A RCCB On Stat			02															41	2
132	850		Cold Guard Mod RCCB Off Status			02															41	2
133	850		Cold Guard Mod RCCB On Status			02															41	2
134	850		Hot Main Red Mod B RCCB Off Stat			02															41	2
135	850		Hot Main Red Mod B RCCB On Stat			02															41	2
136	850		Peltier Pulsing Drv RCCB Off St			02															41	2
137	850		Peltier Pulsing Drv RCCB On Stat			02															41	2
138	850		Sample to Process #1			02															41	2
139	850		Sample to Process #2			02															41	2
140	850		Sample to Process #3			02															41	2
141	850		Sample to Process #4			02															41	2
142	850		Sample to Process #5			02															41	2
143	S850		ample to Process #6			02															41	2
144	850		Processed Sample #1			02															41	2
145	850		Processed Sample #2			02															41	2
146	850		Processed Sample #3			02															41	2
147	850		Processed Sample #4			02															41	2
148	850		Processed Sample #5			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 10 of 38)

ENT NO.	CORR. / NO.	DESCRIPTION	CMD BULK	USAGE	MN SO G.	NM OS /G/ WDS/	SO FIXD	TYPE	START WD#	START BT	END WD#	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
149	850	Processed Sample #6			02															41	2
150	850	Last Sample Index			02															41	2
151	850	GMT Day			02															41	2
152	850	GMT Milliseconds of Day			02															41	2
153	850	GMT Fractional Milliseconds			02															41	2
154	850	Last Command Received Word #0			02															41	2
155	850	Last Command Received Word #1			02															41	2
156	850	Last Command Received Word #2			02															41	2
157	850	Last Command Received Word #3			02															41	2
158	850	Last Command Received Word #4			02															41	2
159	850	Last Command Received Word #5			02															41	2
160	850	Last Command Received Word #6			02															41	2
161	850	Last Command Received Word #7			02															41	2
162	850	Last Command Received Word #8			02															41	2
163	850	Last Command Received Word #9			02															41	2
164	850	Last Command Received Word #10			02															41	2
165	850	Last Command Received Word #11			02															41	2
166	850	Last Command Received Word #12			02															41	2
167	850	Last Command Received Word #13			02															41	2
168	850	Last Command Received Word #14			02															41	2
169	850	Last Command Received Word #15			02															41	2
170	850	Last Command Received Word #16			02															41	2
171	850	Last Command Received Word #17			02															41	2
172	850	Last Command Received Word #18			02															41	2
173	850	Last Command Received Word #19			02															41	2
174	850	Last Command Received Word #20			02															41	2
175	850	Last Command Received Word #21			02															41	2
176	850	Last Command Received Word #22			02															41	2
177	850	Last Command Received Word #23			02															41	2
178	850	Last Command Received Word #24			02															41	2

003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 11 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD/BLK	USAGE	MNSO G.	NMOS /GWDS/	SOFIXD	TYPE	START WD#	START BT	END WD#	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COEF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
179	850	Last Command Received Word #25			02															41	2
180	850	Last Command Received Word #26			02															41	2
181	850	Last Command Received Word #27			02															41	2
182	850	Last Command Received Word #28			02															41	2
183	850	Last Command Received Word #29			02															41	2
184	850	Last Command Received Word #30			02															41	2
185	850	Last Command Received Word #31			02															41	2
186	850	Invalid Command Flag			02															41	2
187	850	User Requested Data			02															41	2
188	850	ECS Next Timeline Record			02															41	2
189	850	FTS Next Timeline Record			02															41	2
190	850	FHS Cold Guard Next Timeline Rec			02															41	2
191	850	FHS Cold Zone Next Timeline Rec			02															41	2
192	850	FHS Booster Next Timeline Rec			02															41	2
193	850	FHS Hot Zone Next Timeline Rec			02															41	2
194	850	FHS Hot Guard Next Timeline Rec			02															41	2
195	850	SIDS Next Timeline Record			02															41	2
196	850	ECS Current Segment Start Time			02															41	2
197	850	ECS Current Segment Stop Time			02															41	2
198	850	FTS Current Segment Start Time			02															41	2
199	850	FTS Current Segment Stop Time			02															41	2
200	850	FHS Cold Guard Cur Seg Start Tim			02															41	2
201	850	FHS Cold Guard Cur Seg Stop Time			02															41	2
202	850	FHS Cold Zone Cur Seg Start Time			02															41	2
203	850	FHS Cold Zone Cur Seg Stop Time			02															41	2
204	850	FHS Booster Cur Seg Start Time			02															41	2
205	850	FHS Booster Cur Seg Stop Time			02															41	2
206	850	FHS Hot Zone Cur Seg Start Time			02															41	2
207	850	FHS Hot Zone Cur Seg Stop Time			02															41	2
208	850	FHS Hot Guard Cur Seg Start Time			02															41	2

Column positions: 03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 12 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MNSO G.	NMOS /GWDS/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
209	850		FHS Hot Guard Cur Seg Stop Time			02															41	2
210	850		SIDS Current Segment Start Time			02															41	2
211	850		SIDS Current Segment Stop Time			02															41	2
212	850		Experiment Main Bus Current			02															41	2
213	850		Experiment Main Bus Voltage			02															41	2
214	850		IFEA Lower Humidity			02															41	2
215	850		IFEA Upper Humidity			02															41	2
216	850		IFEA Absolute Pressure 1			02															41	2
217	850		IFEA Absolute Pressure 2			02															41	2
218	850		IFEA Lower Atmosphere Temp			02															41	2
219	850		IFEA Upper Atmosphere Temp			02															41	2
220	850		IFEA Water Inlet Temp			02															41	2
221	850		IFEA Water Outlet Temp			02															41	2
222	850		RFM Cold End Shell Temp			02															41	2
223	850		RFM Hot End Shell Temp			02															41	2
224	850		RFM Water Outlet Temp			02															41	2
225	850		Sample 1 Temp 1			02															41	2
226	850		Sample 1 Temp 2			02															41	2
227	850		Sample 1 Temp 3			02															41	2
228	850		Sample 1 Temp 4			02															41	2
229	850		Sample 1 Temp 5			02															41	2
230	850		Sample 1 Temp 6			02															41	2
231	850		Sample 2 Temp 1			02															41	2
232	850		Sample 2 Temp 2			02															41	2
233	850		Sample 2 Temp 3			02															41	2
234	850		Sample 2 Temp 4			02															41	2
235	850		Sample 2 Temp 5			02															41	2
236	850		Sample 2 Temp 6			02															41	2
237	850		Sample 3 Temp 1			02															41	2
238	850		Sample 3 Temp 2			02															41	2
03	06	07		39	40	43	45	47	48	51	53	55	57		65	66	67	71	72	75	78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 13 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD BLK	USAGE	MNSOG.	NMOS/G WDS/	SOFIXD	TYPE	START WD #	START BT #	END WD #	END BT #	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL.COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
239	850	Sample 3 Temp 3			02															41	2
240	850	Sample 3 Temp 4			02															41	2
241	850	Sample 3 Temp 5			02															41	2
242	850	Sample 3 Temp 6			02															41	2
243	850	Sample 4 Temp 1			02															41	2
244	850	Sample 4 Temp 2			02															41	2
245	850	Sample 4 Temp 3			02															41	2
246	850	Sample 4 Temp 4			02															41	2
247	850	Sample 4 Temp 5			02															41	2
248	850	Sample 4 Temp 6			02															41	2
249	850	Sample 5 Temp 1			02															41	2
250	850	Sample 5 Temp 2			02															41	2
251	850	Sample 5 Temp 3			02															41	2
252	850	Sample 5 Temp 4			02															41	2
253	850	Sample 5 Temp 5			02															41	2
254	850	Sample 5 Temp 6			02															41	2
255	850	Sample 6 Temp 1			02															41	2
256	850	Sample 6 Temp 2			02															41	2
257	850	Sample 6 Temp 3			02															41	2
258	850	Sample 6 Temp 4			02															41	2
259	850	Sample 6 Temp 5			02															41	2
260	850	Sample 6 Temp 6			02															41	2
261	850	Stepping Motor Phase A Current			02															41	2
262	850	Stepping Motor Phase A Voltage			02															41	2
263	850	Stepping Motor Phase B Current			02															41	2
264	850	Stepping Motor Phase B Voltage			02															41	2
265	850	Furnace Linear Position			02															41	2
266	850	FTS Stepping Motor Temp			02															41	2
267	850	Rapid Translation Motor RPM			02															41	2
268	850	Cold Guard Heater Current			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 14 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD BULK	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVENT	MON REQ EXCP	CAL. COEF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
269	850	Cold Guard Heater Voltage			02																41	2
270	850	Cold Main Primary Heater Current			02																41	2
271	850	Cold Main Primary Heater Voltage			02																41	2
272	850	Cold Main Red Heater Current			02																41	2
273	850	Cold Main Red Heater Voltage			02																41	2
274	850	Hot Boost Heater Current			02																41	2
275	850	Hot Boost Heater Voltage			02																41	2
276	850	Hot Guard Heater Current			02																41	2
277	850	Hot Guard Heater Voltage			02																41	2
278	850	Hot Main Primary Heater Current			02																41	2
279	850	Hot Main Primary Heater Voltage			02																41	2
280	850	Hot Main Red Heater Current			02																41	2
281	850	Hot Main Red Heater Voltage			02																41	2
282	850	Cold Zone CJ Block Temp 1			02																41	2
283	850	Cold Zone CJ Block Temp 2			02																41	2
284	850	Hot Zone CJ Block Temp 1			02																41	2
285	850	Hot Zone CJ Block Temp 2			02																41	2
286	850	Sample 1 CJ Block Temp 1			02																41	2
287	850	Sample 1 CJ Block Temp 2			02																41	2
288	850	Sample 2 CJ Block Temp 1			02																41	2
289	850	Sample 2 CJ Block Temp 2			02																41	2
290	850	Sample 3 CJ Block Temp 1			02																41	2
291	850	Sample 3 CJ Block Temp 2			02																41	2
292	850	Sample 4 CJ Block Temp 1			02																41	2
293	850	Sample 4 CJ Block Temp 2			02																41	2
294	850	Sample 5 CJ Block Temp 1			02																41	2
295	850	Sample 5 CJ Block Temp 2			02																41	2
296	850	Sample 6 CJ Block Temp 1			02																41	2
297	850	Sample 6 CJ Block Temp 2			02																41	2
298	850	Booster Heater Control Temp 1			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 15 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G W D S /	S O FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
299	850	Booster Heater Control Temp 2			02																41	2
300	850	Cold Guard Heater Control Temp 1			02																41	2
301	850	Cold Guard Heater Control Temp 2			02																41	2
302	850	Cold Main Prim Htr Cntrl Temp 1			02																41	2
303	850	Cold Main Prim Htr Cntrl Temp 2			02																41	2
304	850	Cold Main Red Htr Control Temp 1			02																41	2
305	850	Cold Main Red Htr Control Temp 2			02																41	2
306	850	Hot Guard Heater Control Temp 1			02																41	2
307	850	Hot Guard Heater Control Temp 2			02																41	2
308	850	Hot Main Prim Htr Control Temp 1			02																41	2
309	850	Hot Main Prim Htr Control Temp 2			02																41	2
310	850	Hot Main Red Htr Control Temp 1			02																41	2
311	850	Hot Main Red Htr Control Temp 2			02																41	2
312	850	Indexing CAM Rotary Position			02																41	2
313	850	Ampoule Alignment Arm Temp			02																41	2
314	850	SEM Track Temp			02																41	2
315	850	RTD Mux 1 Calibration - High			02																41	2
316	850	RTD Mux 1 Calibration - Low			02																41	2
317	850	RTD Mux 2 Calibration - High			02																41	2
318	850	RTD Mux 2 Calibration - Low			02																41	2
319	850	RTD Mux 3 Calibration - High			02																41	2
320	850	RTD Mux 3 Calibration - Low			02																41	2
321	850	RTD Mux 4 Calibration - High			02																41	2
322	850	RTD Mux 4 Calibration - Low			02																41	2
323	850	RTD Mux 5 Calibration - High			02																41	2
324	850	RTD Mux 5 Calibration - Low			02																41	2
325	850	RTD Mux 6 Calibration - High			02																41	2
326	850	RTD Mux 6 Calibration - Low			02																41	2
327	850	RTD Mux 7 Calibration - High			02																41	2
328	850	RTD Mux 7 Calibration - Low			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 16 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD ULK	USAGE	MNSO G.	NMOS /GWDS/	SOFIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
329	850	RTD Mux 8 Calibration - High			02															41	2
330	850	RTD Mux 8 Calibration - Low			02															41	2
331	850	TC Group A Calibration Type K			02															41	2
332	850	TC Group A Calibration Type S			02															41	2
333	850	TC Group A Calibration Type B			02															41	2
334	850	TC Group B Calibration Type K			02															41	2
335	850	TC Group B Calibration Type S			02															41	2
336	850	TC Group B Calibration Type B			02															41	2
337	850	TC Group C Calibration Type K			02															41	2
338	850	TC Group C Calibration Type S			02															41	2
339	850	TC Group C Calibration Type B			02															41	2
340	850	TC Group D Calibration Type K			02															41	2
341	850	TC Group D Calibration Type S			02															41	2
342	850	TC Group D Calibration Type B			02															41	2
343	850	SMS Board Velocity Reading			02															41	2
344	850	Cold Guard Zone CJ Blck Act Temp			02															41	2
345	850	Cold Main CJ Block Act Temp			02															41	2
346	850	Booster Zone CJ Block Act Temp			02															41	2
347	850	Hot Main Zone CJ Block Act Temp			02															41	2
348	850	Hot Guard Zone CJ Block Act Temp			02															41	2
349	850	Total Calculated Power			02															41	2
350	850	Cold Guard Htr Cmd Current			02															41	2
351	850	Unused			02															41	2
352	850	Cold Main Prim Htr Cmd Current			02															41	2
353	850	Cold Main Red Htr Cmd Current			02															41	2
354	850	Booster Htr Cmd Current			02															41	2
355	850	Unused			02															41	2
356	850	Hot Main Prim Htr Cmd Current			02															41	2
357	850	Hot Main Red Htr Cmd Current			02															41	2
358	850	Hot Guard Htr Cmd Current			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 17 of 38)

ENT NO.	COR NO.	DESCRIPTION	CMD BULK	USAGE	MNSO G.	NMOS /G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
359	850	Unused			02																41	2
360	850	Cold Guard Zone Setpoint Temp			02																41	2
361	850	Cold Main Zone Setpoint Temp			02																41	2
362	850	Booster Zone Setpoint Temp			02																41	2
363	850	Hot Main Zone Setpoint Temp			02																41	2
364	850	Hot Guard Zone Setpoint Temp			02																41	2
365	850	Cold Guard Htr Calc Temp 1			02																41	2
366	850	Cold Guard Htr Calc Temp 2			02																41	2
367	850	Unused			02																41	2
368	850	Unused			02																41	2
369	850	Cold Main Prim Htr Calc Temp 1			02																41	2
370	850	Cold Main Prim Htr Calc Temp 2			02																41	2
371	850	Cold Main Red Htr Calc Temp 1			02																41	2
372	850	Cold Main Red Htr Calc Temp 2			02																41	2
373	850	Booster Htr Calc Temp 1			02																41	2
374	850	Booster Htr Calc Temp 2			02																41	2
375	850	Unused			02																41	2
376	850	Unused			02																41	2
377	850	Hot Main Prim Htr Calc Temp 1			02																41	2
378	850	Hot Main Prim Htr Calc Temp 2			02																41	2
379	850	Hot Main Red Htr Calc Temp 1			02																41	2
380	850	Hot Main Red Htr Calc Temp 2			02																41	2
381	850	Hot Guard Htr Calc Temp 1			02																41	2
382	850	Hot Guard Htr Calc Temp 2			02																41	2
383	850	Unused			02																41	2
384	850	Unused			02																41	2
385	850	Cold Guard Zone Act Temp			02																41	2
386	850	Cold Main Zone Act Temp			02																41	2
387	850	Booster Zone Act Temp			02																41	2
388	850	Hot Main Zone Act Temp			02																41	2

003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 18 of 38)

ENT NO.	COOR. NO.	DESCRIPTION	CMD ULK	USAGE	MN SOG.	NM OS /GW DS/	SO FIXD	TYPE	DATA DESCRIPTION START WD#	START BT#	END WD#	END BT#	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
389	850	Hot Guard Zone Act Temp			02															41	2
390	850	Cold Guard Zone Delta Temp			02															41	2
391	850	Cold Main Zone Delta Temp			02															41	2
392	850	Booster Zone Delta Temp			02															41	2
393	850	Hot Main Zone Delta Temp			02															41	2
394	850	Hot Guard Zone Delta Temp			02															41	2
395	850	Cold Guard Zone Uncpld Power			02															41	2
396	850	Cold Main Zone Uncpld Power			02															41	2
397	850	Booster Zone Uncpld Power			02															41	2
398	850	Hot Main Zone Uncpld Power			02															41	2
399	850	Hot Guard Zone Uncpld Power			02															41	2
400	850	Cold Guard Zone Prop Power			02															41	2
401	850	Cold Main Zone Prop Power			02															41	2
402	850	Booster Zone Prop Power			02															41	2
403	850	Hot Main Zone Prop Power			02															41	2
404	850	Hot Guard Zone Prop Power			02															41	2
405	850	Cold Guard Zone Int Power			02															41	2
406	850	Cold Main Zone Int Power			02															41	2
407	850	Booster Zone Int Power			02															41	2
408	850	Hot Main Zone Int Power			02															41	2
409	850	Hot Guard Zone Int Power			02															41	2
410	850	Cold Guard Zone Power			02															41	2
411	850	Cold Main Zone Power			02															41	2
412	850	Booster Zone Power			02															41	2
413	850	Hot Main Zone Power			02															41	2
414	850	Hot Guard Zone Power			02															41	2
415	850	Cold Guard Htr Calc Voltage			02															41	2
416	850	Unused			02															41	2
417	850	Cold Main Prim Htr Calc Voltage			02															41	2
418	850	Cold Main Red Htr Calc Voltage			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 19 of 38)

ENT NO.	CORR. NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL .COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
419	850	Booster Htr Calc Voltage			02																41	2
420	850	Unused			02																41	2
421	850	Hot Main Prim Htr Calc Voltage			02																41	2
422	850	Hot Main Red Htr Calc Voltage			02																41	2
423	850	Hot Guard Htr Calc Voltage			02																41	2
424	850	Unused			02																41	2
425	850	Cold Guard Htr Act Current			02																41	2
426	850	Unused			02																41	2
427	850	Cold Main Prim Htr Act Current			02																41	2
428	850	Cold Main Red Htr Act Current			02																41	2
429	850	Booster Htr Act Current			02																41	2
430	850	Unused			02																41	2
431	850	Hot Main Prim Htr Act Current			02																41	2
432	850	Hot Main Red Htr Act Current			02																41	2
433	850	Hot Guard Htr Act Current			02																41	2
434	850	Unused			02																41	2
435	850	Cold Guard Htr Calc Resistance			02																41	2
436	850	Unused			02																41	2
437	850	ColdMain Prim Htr Calc Resistnce			02																41	2
438	850	ColdMain Red Htr Calc Resistance			02																41	2
439	850	Booster Htr Resistance			02																41	2
440	850	Unused			02																41	2
441	850	HOTMain Prim Htr Calc Resistance			02																41	2
442	850	Hot Main Red Htr Calc Resistance			02																41	2
443	850	Hot Guard Htr Calc Resistance			02																41	2
444	850	Unused			02																41	2
445	850	Cold Guard Htr Limited Power			02																41	2
446	850	Unused			02																41	2
447	850	Cold Main Prim Htr Limited Power			02																41	2
448	850	Cold Main Red Htr Limited Power			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 20 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD BULK	USAGE	MN SO G.	NM OS /G/ WDS/	S O FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
449	850		Booster Htr Limited Power			02																41	2
450	850		Unused			02																41	2
451	850		Hot Main Prim Htr Limited Power			02																41	2
452	850		Hot Main Red Htr Limited Power			02																41	2
453	850		Hot Guard Htr Limited Power			02																41	2
454	850		Unused			02																41	2
455	850		Cold Guard Htr Des Current			02																41	2
456	850		Unused			02																41	2
457	850		Cold Main Prim Htr Des Current			02																41	2
458	850		Cold Main Red Htr Des Current			02																41	2
459	850		Booster Htr Des Current			02																41	2
460	850		Unused			02																41	2
461	850		Hot Main Prim Htr Des Current			02																41	2
462	850		Hot Main Red Htr Des Current			02																41	2
463	850		Hot Guard Htr Des Current			02																41	2
464	850		Unused			02																41	2
465	850		Cold Guard Zone Saturation Flag			02																41	2
466	850		Cold Main Zone Saturation Flag			02																41	2
467	850		Booster Zone Saturation Flag			02																41	2
468	850		Hot Main Zone Saturation Flag			02																41	2
469	850		Hot Guard Zone Saturation Flag			02																41	2
470	850		Integral Power Fault Time			02																41	2
471	850		Fault Sum Delta Power			02																41	2
472	850		Fault Integral Gain			02																41	2
473	850		Fault Proportional Gain			02																41	2
474	850		Fault Intermediate Calc. Value 1			02																41	2
475	850		Fault Intermediate Calc. Value 2			02																41	2
476	850		Fault Delta Power - Previous			02																41	2
477	850		Fault Delta Power - 2nd Previous			02																41	2
478	850		Faulted Zone			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 21 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD LUK	USAGE	MN SO G.	NM OS /G/ W D S /	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXC P	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
479	850		Integral Gain Array 1			02															41	2
480	850		Integral Gain Array 2			02															41	2
481	850		Integral Gain Array 3			02															41	2
482	850		Integral Gain Array 4			02															41	2
483	850		Integral Gain Array 5			02															41	2
484	850		Proportional Gain Array 1			02															41	2
485	850		Proportional Gain Array 2			02															41	2
486	850		Proportional Gain Array 3			02															41	2
487	850		Proportional Gain Array 4			02															41	2
488	850		Proportional Gain Array 5			02															41	2
489	850		FF Ampoule Align Not Extended			02															41	2
490	850		FF Ampoule Align Extended			02															41	2
491	850		FF Ampoule Align Mtr RCCB Off			02															41	2
492	850		FF Ampoule Align Mtr RCCB On			02															41	2
493	850		FF Car Trk Extr Right Lim-Not			02															41	2
494	850		FF Car Trk Extr Right Lim			02															41	2
495	850		FF Car Trk Extr Left Limit-Not			02															41	2
496	850		FF Car Trk Extr Left Limit			02															41	2
497	850		FF Car Spacer Plt Gap Lim-Not			02															41	2
498	850		FF Car Spacer Plt Gap Lim			02															41	2
499	850		FF Indexing Cam Not Stowed			02															41	2
500	850		FF Indexing Cam Stowed			02															41	2
501	850		FF Ampoule Not Processing			02															41	2
502	850		FF Ampoule Processing			02															41	2
503	850		FF SEM Index Motor RCCB On Stat			02															41	2
504	850		FF SEM Index Motor RCCB Off Stat			02															41	2
505	850		FF Fail Safe Brake RCCB Off			02															41	2
506	850		FF Fail Safe Brake RCCB On			02															41	2
507	850		FF Core Hold Down Not Retracted			02															41	2
508	850		FF Core Hold Down Retracted			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 22 of 38)

ENT NO.	COR R.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W D S /	SO FIX D	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
509	850	FF	Core Hold Down Not Extended			02															41	2
510	850	FF	Core Hold Down Extended			02															41	2
511	850	FF	Core HD Motor RCCB Off			02															41	2
512	850	FF	Core HD Motor RCCB On			02															41	2
513	850	FF	Ampoule Support Not Retracted			02															41	2
514	850	FF	Ampoule Support Retracted			02															41	2
515	850	FF	Ampoule Support Not Secure			02															41	2
516	850	FF	Ampoule Support Secure			02															41	2
517	850	FF	Ampoule Spt Plt Mtr RCCB Off			02															41	2
518	850	FF	Ampoule Spt Plt Mtr RCCB On			02															41	2
519	850	FF	Ampoule Align Not Retracted			02															41	2
520	850	FF	Ampoule Align Retracted			02															41	2
521	850	FF	PCS Utility RCCB Off			02															41	2
522	850	FF	PCS Utility RCCB On			02															41	2
523	850	FF	System Bus Relay Off			02															41	2
524	850	FF	System Bus Relay On			02															41	2
525	850	FF	Furnace Position Not Home			02															41	2
526	850	FF	Furnace Position Home			02															41	2
527	850	FF	Furn Extrme Trvl Not Exceeded			02															41	2
528	850	FF	Furn Extreme Trvl Exceeded			02															41	2
529	850	FF	Step Motor Drive RCCB Off			02															41	2
530	850	FF	Step Motor Drive RCCB On			02															41	2
531	850	FF	Step Motor Clutch RCCB Off			02															41	2
532	850	FF	Step Motor Clutch RCCB On			02															41	2
533	850	FF	Rapid Xlation Mtr RCCB Off			02															41	2
534	850	FF	Rapid Xlation Mtr RCCB On			02															41	2
535	850	FF	Rapid Xlation Clutch RCCB Off			02															41	2
536	850	FF	Rapid Xlation Clutch RCCB On			02															41	2
537	850	FF	Water Inlet Valve RCCB Off			02															41	2
538	850	FF	Water Inlet Valve RCCB On			02															41	2

Column positions: 03, 06, 07, 39, 40, 43, 45, 47, 48, 51, 53, 55, 57, 65, 66, 67, 71, 72, 75, 78, 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 23 of 38)

ENT NO.	COR.R.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W DS/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
539	850	FF	Vacuum Vent Valve Closed			02																41	2
540	850	FF	Vacuum Vent Valve Open			02																41	2
541	850	FF	Vacuum Vent Vlv RCCB Off			02																41	2
542	850	FF	Vacuum Vent Vlv RCCB On			02																41	2
543	850	FF	IFEA ABS Press 2 RCCB Off			02																41	2
544	850	FF	IFEA ABS Press 2 RCCB On			02																41	2
545	850	FF	IFEA ABS Press 1 RCCB Off			02																41	2
546	850	FF	IFEA ABS Press 1 RCCB On			02																41	2
547	850	FF	Argon Fill Valve Closed			02																41	2
548	850	FF	Argon Fill Valve Open			02																41	2
549	850	FF	Argon Fill Valve RCCB Off			02																41	2
550	850	FF	Argon Fill Valve RCCB On			02																41	2
551	850	FF	SEM Indexing Jog CW Status			02																41	2
552	850	FF	SEM Indexing Jog CCW Status			02																41	2
553	850	FF	Ampoule 5 Failure 2 Status			02																41	2
554	850	FF	Ampoule 5 Failure 1 Status			02																41	2
555	850	FF	Ampoule 4 Failure 2 Status			02																41	2
556	850	FF	Ampoule 4 Failure 1 Status			02																41	2
557	850	FF	Ampoule 3 Failure 2 Status			02																41	2
558	850	FF	Ampoule 3 Failure 1 Status			02																41	2
559	850	FF	Ampoule 2 Failure 2 Status			02																41	2
560	850	FF	Ampoule 2 Failure 1 Status			02																41	2
561	850	FF	Ampoule 1 Failure 2 Status			02																41	2
562	850	FF	Ampoule 1 Failure 1 Status			02																41	2
563	850	FF	Water Outlet Valve Bypass			02																41	2
564	850	FF	Water Outlet Valve Normal			02																41	2
565	850	FF	Water Outlet Vlv RCCB Off			02																41	2
566	850	FF	Water Outlet Vlv RCCB On			02																41	2
567	850	FF	Water Inlet Valve Bypass			02																41	2
568	850	FF	Water Inlet Valve Normal			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 24 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MSG.	NMOS/G WD S/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
569	850	FF	Mech Pulsing Mod RCCB Off			02															41	2
570	850	FF	Mech Pulsing Mod RCCB On			02															41	2
571	850	FF	Cartridge 6 Failure 2 Status			02															41	2
572	850	FF	Cartridge 6 Failure 1 Status			02															41	2
573	850	FF	Cartridge 5 Failure 2 Status			02															41	2
574	850	FF	Cartridge 5 Failure 1 Status			02															41	2
575	850	FF	Cartridge 4 Failure 2 Status			02															41	2
576	850	FF	Cartridge 4 Failure 1 Status			02															41	2
577	850	FF	Cartridge 3 Failure 2 Status			02															41	2
578	850	FF	Cartridge 3 Failure 1 Status			02															41	2
579	850	FF	Cartridge 2 Failure 2 Status			02															41	2
580	850	FF	Cartridge 2 Failure 1 Status			02															41	2
581	850	FF	Cartridge 1 Failure 2 Status			02															41	2
582	850	FF	Cartridge 1 Failure 1 Status			02															41	2
583	850	FF	Ampoule 6 Failure 2 Status			02															41	2
584	850	FF	Ampoule 6 Failure 1 Status			02															41	2
585	850	FF	Hot Boost Mod A RCCB Off			02															41	2
586	850	FF	Hot Boost Mod A RCCB On			02															41	2
587	850	FF	Cold Main Red Mod RCCB Off			02															41	2
588	850	FF	Cold Main Red Mod RCCB On			02															41	2
589	850	FF	Cold Main Prim Mod RCCB Off			02															41	2
590	850	FF	Cold Main Prim Mod RCCB On			02															41	2
591	850	FF	Cold Guard Mod RCCB Off			02															41	2
592	850	FF	Cold Guard Mod RCCB On			02															41	2
593	850	FF	Peltier Conn Retracted-Not			02															41	2
594	850	FF	Peltier Conn Retracted			02															41	2
595	850	FF	Peltier Conn Extended-Not			02															41	2
596	850	FF	Peltier Conn Extended			02															41	2
597	850	FF	Peltier Conn Motor RCCB Off			02															41	2
598	850	FF	Peltier Conn Motor RCCB On			02															41	2

Column positions: 03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 25 of 38)

ENT NO.	COR R.	NO.	DESCRIPTION	CMD/ UL K	USAGE	MN SO G.	NM OS /G W D S /	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	TYPE	DATA VALUE	MON REQ --- EVENT	MON REQ --- EXCP	CAL. COEF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
599	850	FF	Peltier Pulsing Drv RCCB Off			02																41	2
600	850	FF	Peltier Pulsing Drv RCCB On			02																41	2
601	850	FF	SCS Airflow 1 Status			02																41	2
602	850	FF	PDS Airflow 1 Status			02																41	2
603	850	FF	PCS Airflow 2 Status			02																41	2
604	850	FF	PCS Airflow 1 Status			02																41	2
605	850	FF	Hot Main Red Mod B RCCB Off			02																41	2
606	850	FF	Hot Main Red Mod B RCCB On			02																41	2
607	850	FF	Hot Main Red Mod A RCCB Off			02																41	2
608	850	FF	Hot Main Red Mod A RCCB On			02																41	2
609	850	FF	Hot Main Prim Mod B RCCB Off			02																41	2
610	850	FF	Hot Main Prim Mod B RCCB On			02																41	2
611	850	FF	HotMain Prim Mod A RCCB Off			02																41	2
612	850	FF	HotMain Prim Mod A RCCB On			02																41	2
613	850	FF	Hot Guard Module RCCB Off			02																41	2
614	850	FF	Hot Guard Module RCCB On			02																41	2
615	850	FF	Hot Boost Mod B RCCB Off			02																41	2
616	850	FF	Hot Boost Mod B RCCB On			02																41	2
617	850	FF	Hot Main Prim Htr Ctl Temp 1			02																41	2
618	850	FF	Cold Main Red Htr Ctl Temp 1			02																41	2
619	850	FF	TC Group A Calibration Type B			02																41	2
620	850	FF	TC Group A Calibration Type S			02																41	2
621	850	FF	TC Group A Calibration Type K			02																41	2
622	850	FF	Cold Guard Heater Ctl Temp 2			02																41	2
623	850	FF	Cold Main Prim Htr Ctl Temp 2			02																41	2
624	850	FF	Booster Heater Ctl Temp 2			02																41	2
625	850	FF	Hot Main Red Htr Ctl Temp 2			02																41	2
626	850	FF	Hot Main Prim Htr Ctl Temp 2			02																41	2
627	850	FF	Hot Guard Heater Ctl Temp 2			02																41	2
628	850	FF	TC Group B Calibration Type B			02																41	2
03	06	07		39	40	43	45	47	48	51	53	55	57			65	66	67	71	72	75	78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 26 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MNSOG.	NMOS/G WDS/	SOFIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
629	850	FF	TC Group B Calibration Type S			02															41	2
630	850	FF	TC Group B Calibration Type K			02															41	2
631	850	FF	IFEA Coolant Flow #2 Status			02															41	2
632	850	FF	IFEA Coolant Flow #1 Status			02															41	2
633	850	FF	Sample 4 Temp 1			02															41	2
634	850	FF	Sample 3 Temp 1			02															41	2
635	850	FF	Sample 2 Temp 1			02															41	2
636	850	FF	Sample 1 Temp 1			02															41	2
637	850	FF	Cold Main Red Htr Ctl Temp 2			02															41	2
638	850	FF	TC Group D Calibration Type B			02															41	2
639	850	FF	TC Group D Calibration Type S			02															41	2
640	850	FF	TC Group D Calibration Type K			02															41	2
641	850	FF	Cold Guard Heater Ctl Temp 1			02															41	2
642	850	FF	Cold Main Prim Htr Ctl Temp 1			02															41	2
643	850	FF	Booster Heater Ctl Temp 1			02															41	2
644	850	FF	Hot Guard Heater Ctl Temp 1			02															41	2
645	850	FF	TC Group C Calibration Type B			02															41	2
646	850	FF	TC Group C Calibration Type S			02															41	2
647	850	FF	TC Group C Calibration Type K			02															41	2
648	850	FF	Hot Main Red Htr Ctl Temp 1			02															41	2
649	850	FF	Sample 2 Temp 4			02															41	2
650	850	FF	Sample 1 Temp 4			02															41	2
651	850	FF	Sample 6 Temp 3			02															41	2
652	850	FF	Sample 5 Temp 3			02															41	2
653	850	FF	Sample 4 Temp 3			02															41	2
654	850	FF	Sample 3 Temp 3			02															41	2
655	850	FF	Sample 2 Temp 3			02															41	2
656	850	FF	Sample 1 Temp 3			02															41	2
657	850	FF	Sample 6 Temp 2			02															41	2
658	850	FF	Sample 5 Temp 2			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 27 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MNSO G.	NMOS /G WDS/	SO FIX D	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
659	850	FF	Sample 4 Temp 2			02															41	2
660	850	FF	Sample 3 Temp 2			02															41	2
661	850	FF	Sample 2 Temp 2			02															41	2
662	850	FF	Sample 1 Temp 2			02															41	2
663	850	FF	Sample 6 Temp 1			02															41	2
664	850	FF	Sample 5 Temp 1			02															41	2
665	850	FF	Sample 6 Temp 6			02															41	2
666	850	FF	Sample 5 Temp 6			02															41	2
667	850	FF	Sample 4 Temp 6			02															41	2
668	850	FF	Sample 3 Temp 6			02															41	2
669	850	FF	Sample 2 Temp 6			02															41	2
670	850	FF	Sample 1 Temp 6			02															41	2
671	850	FF	Sample 6 Temp 5			02															41	2
672	850	FF	Sample 5 Temp 5			02															41	2
673	850	FF	Sample 4 Temp 5			02															41	2
674	850	FF	Sample 3 Temp 5			02															41	2
675	850	FF	Sample 2 Temp 5			02															41	2
676	850	FF	Sample 1 Temp 5			02															41	2
677	850	FF	Sample 6 Temp 4			02															41	2
678	850	FF	Sample 5 Temp 4			02															41	2
679	850	FF	Sample 4 Temp 4			02															41	2
680	850	FF	Sample 3 Temp 4			02															41	2
681	850	FF	Sample 4 CJ Block Temp 1			02															41	2
682	850	FF	Sample 3 CJ Block Temp 2			02															41	2
683	850	FF	Sample 3 CJ Block Temp 1			02															41	2
684	850	FF	Sample 2 CJ Block Temp 2			02															41	2
685	850	FF	Sample 2 CJ Block Temp 1			02															41	2
686	850	FF	Sample 1 CJ Block Temp 2			02															41	2
687	850	FF	Sample 1 CJ Block Temp 1			02															41	2
688	850	FF	RFM Water Outlet Temp			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 28 of 38)

ENT NO.	COR R.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SOG.	NMOS /GW DS/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RCIO DE	SID NO.	EXPID	TABLE
689	850	FF	Cold Zone CJ Block Temp 2			02															41	2
690	850	FF	Cold Zone CJ Block Temp 1			02															41	2
691	850	FF	Hot Zone CJ Block Temp 1			02															41	2
692	850	FF	Hot Zone CJ Block Temp 2			02															41	2
693	850	FF	RFM Hot End Shell Temp			02															41	2
694	850	FF	RFM Cold End Shell Temp			02															41	2
695	850	FF	IFEA Water Inlet Temp			02															41	2
696	850	FF	IFEA Water Outlet Temp			02															41	2
697	850	FF	RTD Mux 3 Calibration - Low			02															41	2
698	850	FF	RTD Mux 3 Calibration - High			02															41	2
699	850	FF	RTD Mux 2 Calibration - Low			02															41	2
700	850	FF	RTD Mux 2 Calibration - High			02															41	2
701	850	FF	RTD Mux 1 Calibration - Low			02															41	2
702	850	FF	RTD Mux 1 Calibration - High			02															41	2
703	850	FF	IFEA Upper Atmosphere Temp			02															41	2
704	850	FF	IFEA Lower Atmosphere Temp			02															41	2
705	850	FF	FTS Stepping Motor Temp			02															41	2
706	850	FF	SEM Track Temp			02															41	2
707	850	FF	Ampoule Alignment Arm Temp			02															41	2
708	850	FF	Sample 6 CJ Block Temp 2			02															41	2
709	850	FF	Sample 6 CJ Block Temp 1			02															41	2
710	850	FF	Sample 5 CJ Block Temp 2			02															41	2
711	850	FF	Sample 5 CJ Block Temp 1			02															41	2
712	850	FF	Sample 4 CJ Block Temp 2			02															41	2
713	850	FF	Cold Main Red Heater Current			02															41	2
714	850	FF	Cold Main Red Heater Voltage			02															41	2
715	850	FF	Cold Main Primary Heater Cur			02															41	2
716	850	FF	Cold Main Primary Heater Volt			02															41	2
717	850	FF	Cold Guard Heater Current			02															41	2
718	850	FF	Cold Guard Heater Voltage			02															41	2
03	06	07		39	40	43	45	47	48	51	53	55	57		65	66	67	71	72	75	78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 29 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD UL K	USAGE	MN SO G.	NM OS /G W DS /	SOFIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVENT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
719	850	FF	RTD Mux 8 Calibration - Low			02															41	2
720	850	FF	RTD Mux 8 Calibration - High			02															41	2
721	850	FF	RTD Mux 7 Calibration - Low			02															41	2
722	850	FF	RTD Mux 7 Calibration - High			02															41	2
723	850	FF	RTD Mux 6 Calibration - Low			02															41	2
724	850	FF	RTD Mux 6 Calibration - High			02															41	2
725	850	FF	RTD Mux 5 Calibration - Low			02															41	2
726	850	FF	RTD Mux 5 Calibration - High			02															41	2
727	850	FF	RTD Mux 4 Calibration - Low			02															41	2
728	850	FF	RTD Mux 4 Calibration - High			02															41	2
729	850	FF	IFEA Lower Humidity			02															41	2
730	850	FF	Rapid Translation Motor RPM			02															41	2
731	850	FF	Indexing CAM Rotary Position			02															41	2
732	850	FF	Furnace Linear Position			02															41	2
733	850	FF	Stepping Motor Phase B Cur			02															41	2
734	850	FF	Stepping Motor Phase B Volt			02															41	2
735	850	FF	Stepping Motor Phase A Cur			02															41	2
736	850	FF	Stepping Motor Phase A Volt			02															41	2
737	850	FF	Hot Main Red Heater Current			02															41	2
738	850	FF	Hot Main Red Heater Voltage			02															41	2
739	850	FF	Hot Main Primary Heater Cur			02															41	2
740	850	FF	Hot Main Primary Heater Volt			02															41	2
741	850	FF	Hot Guard Heater Current			02															41	2
742	850	FF	Hot Guard Heater Voltage			02															41	2
743	850	FF	Hot Boost Heater Current			02															41	2
744	850	FF	Hot Boost Heater Voltage			02															41	2
745	850	FF	SMS Board Velocity Reading			02															41	2
746	850	FF	Experiment Main Bus Voltage			02															41	2
747	850	FF	Experiment Main Bus Current			02															41	2
748	850	FF	IFEA Absolute Pressure 2			02															41	2

Column positions: 03, 06, 07, 39, 40, 43, 45, 47, 48, 51, 53, 55, 57, 65, 66, 67, 71, 72, 75, 78, 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 30 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MNSO G.	NMOS /G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
749	850	FF	IFEA Absolute Pressure 1			02																41	2
750	850	FF	IFEA Upper Humidity			02																41	2
001	851	RC	SEM Index Motor RCCB On Stat			02																41	2
002	851	RC	SEM Index Motor RCCB Off Stat			02																41	2
003	851	RC	Ampoule Not Processing			02																41	2
004	851	RC	Ampoule Processing			02																41	2
005	851	RC	Indexing Cam Not Stowed			02																41	2
006	851	RC	Indexing Cam Stowed			02																41	2
007	851	RC	Car Spacer Plt Gap Lim-Not			02																41	2
008	851	RC	Car Spacer Plt Gap Lim			02																41	2
009	851	RC	Car Trk Extr Left Limit-Not			02																41	2
010	851	RC	Car Trk Extr Left Limit			02																41	2
011	851	RC	Car Trk Extr Right Lim-Not			02																41	2
012	851	RC	Car Trk Extr Right Lim			02																41	2
013	851	RC	Ampoule Align Mtr RCCB Off			02																41	2
014	851	RC	Ampoule Align Mtr RCCB On			02																41	2
015	851	RC	Ampoule Align Not Extended			02																41	2
016	851	RC	Ampoule Align Extended			02																41	2
017	851	RC	Ampoule Align Not Retracted			02																41	2
018	851	RC	Ampoule Align Retracted			02																41	2
019	851	RC	Ampoule Spt Plt Mtr RCCB Off			02																41	2
020	851	RC	Ampoule Spt Plt Mtr RCCB On			02																41	2
021	851	RC	Ampoule Support Not Secure			02																41	2
022	851	RC	Ampoule Support Secure			02																41	2
023	851	RC	Ampoule Support Not Retracted			02																41	2
024	851	RC	Ampoule Support Retracted			02																41	2
025	851	RC	Core HD Motor RCCB Off			02																41	2
026	851	RC	Core HD Motor RCCB On			02																41	2
027	851	RC	Core Hold Down Not Extended			02																41	2
028	851	RC	Core Hold Down Extended			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

C-4

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 31 of 38)

ENT NO.	COR R.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G W D S /	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	DATA VALUE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
029	851	RC	Core Hold Down Not Retracted			02																41	2
030	851	RC	Core Hold Down Retracted			02																41	2
031	851	RC	Fail Safe Brake RCCB Off			02																41	2
032	851	RC	Fail Safe Brake RCCB On			02																41	2
033	851	RC	Rapid Xlation Clutch RCCB Off			02																41	2
034	851	RC	Rapid Xlation Clutch RCCB On			02																41	2
035	851	RC	Rapid Xlation Mtr RCCB Off			02																41	2
036	851	RC	Rapid Xlation Mtr RCCB On			02																41	2
037	851	RC	Step Motor Clutch RCCB Off			02																41	2
038	851	RC	Step Motor Clutch RCCB On			02																41	2
039	851	RC	Step Motor Drive RCCB Off			02																41	2
040	851	RC	Step Motor Drive RCCB On			02																41	2
041	851	RC	Furn Extrme Trvl Not Exceeded			02																41	2
042	851	RC	Furn Extrdme Trvl Exceeded			02																41	2
043	851	RC	Furnace Position Not Home			02																41	2
044	851	RC	Furnace Position Home			02																41	2
045	851	RC	System Bus Relay Off			02																41	2
046	851	RC	System Bus Relay On			02																41	2
047	851	RC	PCS Utility RCCB Off			02																41	2
048	851	RC	PCS Utility RCCB On			02																41	2
049	851	RC	SEM Indexing Jog CW Status			02																41	2
050	851	RC	SEM Indexing Jog CCW Status			02																41	2
051	851	RC	Argon Fill Valve RCCB Off			02																41	2
052	851	RC	Argon Fill Valve RCCB On			02																41	2
053	851	RC	Argon Fill Valve Closed			02																41	2
054	851	RC	Argon Fill Valve Open			02																41	2
055	851	RC	IFEA ABS Press 1 RCCB Off			02																41	2
056	851	RC	IFEA ABS Press 1 RCCB On			02																41	2
057	851	RC	IFEA ABS Press 2 RCCB Off			02																41	2
058	851	RC	IFEA ABS Press 2 RCCB On			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 32 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD/ULK	USAGE	MN SO G.	NM OS /G/ WDS/	SO FIXD	TYPE	START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
059	851	RC	Vacuum Vent Vlv RCCB Off			02															41	2
060	851	RC	Vacuum Vent Vlv RCCB On			02															41	2
061	851	RC	Vacuum Vent Valve Closed			02															41	2
062	851	RC	Vacuum Vent Valve Open			02															41	2
063	851	RC	Water Inlet Valve RCCB Off			02															41	2
064	851	RC	Water Inlet Valve RCCB On			02															41	2
065	851	RC	Water Inlet Valve Bypass			02															41	2
066	851	RC	Water Inlet Valve Normal			02															41	2
067	851	RC	Water Outlet Vlv RCCB Off			02															41	2
068	851	RC	Water Outlet Vlv RCCB On			02															41	2
069	851	RC	Water Outlet Valve Bypass			02															41	2
070	851	RC	Water Outlet Valve Normal			02															41	2
071	851	RC	Ampoule 1 Failure 2 Status			02															41	2
072	851	RC	Ampoule 1 Failure 1 Status			02															41	2
073	851	RC	Ampoule 2 Failure 2 Status			02															41	2
074	851	RC	Ampoule 2 Failure 1 Status			02															41	2
075	851	RC	Ampoule 3 Failure 2 Status			02															41	2
076	851	RC	Ampoule 3 Failure 1 Status			02															41	2
077	851	RC	Ampoule 4 Failure 2 Status			02															41	2
078	851	RC	Ampoule 4 Failure 1 Status			02															41	2
079	851	RC	Ampoule 5 Failure 2 Status			02															41	2
080	851	RC	Ampoule 5 Failure 1 Status			02															41	2
081	851	RC	Ampoule 6 Failure 2 Status			02															41	2
082	851	RC	Ampoule 6 Failure 1 Status			02															41	2
083	851	RC	Cartridge 1 Failure 2 Status			02															41	2
084	851	RC	Cartridge 1 Failure 1 Status			02															41	2
085	851	RC	Cartridge 2 Failure 2 Status			02															41	2
086	851	RC	Cartridge 2 Failure 1 Status			02															41	2
087	851	RC	Cartridge 3 Failure 2 Status			02															41	2
088	851	RC	Cartridge 3 Failure 1 Status			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 33 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD/UL/K	USAGE	MN SO G.	NM OS /G W D S /	S O F I X D	T Y P E	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
089	851		RC Cartridge 4 Failure 2 Status			02															41	2
090	851		RC Cartridge 4 Failure 1 Status			02															41	2
091	851		RC Cartridge 5 Failure 2 Status			02															41	2
092	851		RC Cartridge 5 Failure 1 Status			02															41	2
093	851		RC Cartridge 6 Failure 2 Status			02															41	2
094	851		RC Cartridge 6 Failure 1 Status			02															41	2
095	851		RC Mech Pulsing Mod RCCB On			02															41	2
096	851		RC Mech Pulsing Mod RCCB Off			02															41	2
097	851		RC Peltier Pulsing Drv RCCB Off			02															41	2
098	851		RC Peltier Pulsing Drv RCCB On			02															41	2
099	851		RC Peltier Conn Motor RCCB Off			02															41	2
100	851		RC Peltier Conn Motor RCCB On			02															41	2
101	851		RC Peltier Conn Extended-Not			02															41	2
102	851		RC Peltier Conn Extended			02															41	2
103	851		RC Peltier Conn Retracted-Not			02															41	2
104	851		RC Peltier Conn Retracted			02															41	2
105	851		RC Cold Guard Mod RCCB Off			02															41	2
106	851		RC Cold Guard Mod RCCB On			02															41	2
107	851		RC Cold Main Prim Mod RCCB Off			02															41	2
108	851		RC Cold Main Prim Mod RCCB On			02															41	2
109	851		RC Cold Main Red Mod RCCB Off			02															41	2
110	851		RC Cold Main Red Mod RCCB On			02															41	2
111	851		RC Hot Boost Mod A RCCB Off			02															41	2
112	851		RC Hot Boost Mod A RCCB On			02															41	2
113	851		RC Hot Boost Mod B RCCB Off			02															41	2
114	851		RC Hot Boost Mod B RCCB On			02															41	2
115	851		RC Hot Guard Module RCCB Off			02															41	2
116	851		RC Hot Guard Module RCCB On			02															41	2
117	851		RC HotMain Prim Mod A RCCB Off			02															41	2
118	851		RC HotMain Prim Mod A RCCB On			02															41	2

Column positions: 03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 34 of 38)

ENT NO.	CONR. NO.	DESCRIPTION	CMD UELK	USAGE	MNSOG.	NMOS/G WDS/	SOFIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RCIODE	SID NO.	EXPID	TABLE
119	851	RC Hot Main Prim Mod B RCCB Off			02															41	2
120	851	RC Hot Main Prim Mod B RCCB On			02															41	2
121	851	RC Hot Main Red Mod A RCCB Off			02															41	2
122	851	RC Hot Main Red Mod A RCCB On			02															41	2
123	851	RC Hot Main Red Mod B RCCB Off			02															41	2
124	851	RC Hot Main Red Mod B RCCB On			02															41	2
125	851	RC PCS Airflow 2 Status			02															41	2
126	851	RC PCS Airflow 1 Status			02															41	2
127	851	RC SCS Airflow 1 Status			02															41	2
128	851	RC PDS Airflow 1 Status			02															41	2
129	851	RC IFEA Coolant Flow #2 Status			02															41	2
130	851	RC IFEA Coolant Flow #1 Status			02															41	2
131	851	RC TC Group B Calibration Type S			02															41	2
132	851	RC TC Group B Calibration Type K			02															41	2
133	851	RC Hot Guard Heater Ctl Temp 2			02															41	2
134	851	RC TC Group B Calibration Type B			02															41	2
135	851	RC Hot Main Red Htr Ctl Temp 2			02															41	2
136	851	RC Hot Main Prim Htr Ctl Temp 2			02															41	2
137	851	RC Cold Main Prim Htr Ctl Temp 2			02															41	2
138	851	RC Booster Heater Ctl Temp 2			02															41	2
139	851	RC TC Group A Calibration Type K			02															41	2
140	851	RC Cold Guard Heater Ctl Temp 2			02															41	2
141	851	RC TC Group A Calibration Type B			02															41	2
142	851	RC TC Group A Calibration Type S			02															41	2
143	851	RC Hot Main Prim Htr Ctl Temp 1			02															41	2
144	851	RC Cold Main Red Htr Ctl Temp 1			02															41	2
145	851	RC TC Group C Calibration Type K			02															41	2
146	851	RC Hot Main Red Htr Ctl Temp 1			02															41	2
147	851	RC TC Group C Calibration Type B			02															41	2
148	851	RC TC Group C Calibration Type S			02															41	2

Column positions: 003 006 007 039 040 043 045 047 048 051 053 055 057 065 066 067 071 072 075 078 080

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 35 of 38)

ENT NO.	COOR.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G W D S /	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COEF	CDT?	RC IO DE	SID NO.	EXP ID	TABLE
149	851	RC	Booster Heater Ctl Temp 1			02															41	2
150	851	RC	Hot Guard Heater Ctl Temp 1			02															41	2
151	851	RC	Cold Guard Heater Ctl Temp 1			02															41	2
152	851	RC	Cold Main Prim Htr Ctl Temp 1			02															41	2
153	851	RC	TC Group D Calibration Type S			02															41	2
154	851	RC	TC Group D Calibration Type K			02															41	2
155	851	RC	Cold Main Red Htr Ctl Temp 2			02															41	2
156	851	RC	TC Group D Calibration Type B			02															41	2
157	851	RC	Sample 2 Temp 1			02															41	2
158	851	RC	Sample 1 Temp 1			02															41	2
159	851	RC	Sample 4 Temp 1			02															41	2
160	851	RC	Sample 3 Temp 1			02															41	2
161	851	RC	Sample 6 Temp 1			02															41	2
162	851	RC	Sample 5 Temp 1			02															41	2
163	851	RC	Sample 2 Temp 2			02															41	2
164	851	RC	Sample 1 Temp 2			02															41	2
165	851	RC	Sample 4 Temp 2			02															41	2
166	851	RC	Sample 3 Temp 2			02															41	2
167	851	RC	Sample 6 Temp 2			02															41	2
168	851	RC	Sample 5 Temp 2			02															41	2
169	851	RC	Sample 2 Temp 3			02															41	2
170	851	RC	Sample 1 Temp 3			02															41	2
171	851	RC	Sample 4 Temp 3			02															41	2
172	851	RC	Sample 3 Temp 3			02															41	2
173	851	RC	Sample 6 Temp 3			02															41	2
174	851	RC	Sample 5 Temp 3			02															41	2
175	851	RC	Sample 2 Temp 4			02															41	2
176	851	RC	Sample 1 Temp 4			02															41	2
177	851	RC	Sample 4 Temp 4			02															41	2
178	851	RC	Sample 3 Temp 4			02															41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 36 of 38)

ENT NO.	CONR R.	NO.	DESCRIPTION	CMDULK	USAGE	MNSOG.	NMOS/G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
179	851	RC	Sample 6 Temp 4			02															41	2
180	851	RC	Sample 5 Temp 4			02															41	2
181	851	RC	Sample 2 Temp 5			02															41	2
182	851	RC	Sample 1 Temp 5			02															41	2
183	851	RC	Sample 4 Temp 5			02															41	2
184	851	RC	Sample 3 Temp 5			02															41	2
185	851	RC	Sample 6 Temp 5			02															41	2
186	851	RC	Sample 5 Temp 5			02															41	2
187	851	RC	Sample 2 Temp 6			02															41	2
188	851	RC	Sample 1 Temp 6			02															41	2
189	851	RC	Sample 4 Temp 6			02															41	2
190	851	RC	Sample 3 Temp 6			02															41	2
191	851	RC	Sample 5 Temp 6			02															41	2
192	851	RC	Sample 6 Temp 6			02															41	2
193	851	RC	IFEA Water Inlet Temp			02															41	2
194	851	RC	IFEA Water Outlet Temp			02															41	2
195	851	RC	RFM Hot End Shell Temp			02															41	2
196	851	RC	RFM Cold End Shell Temp			02															41	2
197	851	RC	Hot Zone CJ Block Temp 1			02															41	2
198	851	RC	Hot Zone CJ Block Temp 2			02															41	2
199	851	RC	Cold Zone CJ Block Temp 2			02															41	2
200	851	RC	Cold Zone CJ Block Temp 1			02															41	2
201	851	RC	Sample 1 CJ Block Temp 1			02															41	2
202	851	RC	RFM Water Outlet Temp			02															41	2
203	851	RC	Sample 2 CJ Block Temp 1			02															41	2
204	851	RC	Sample 1 CJ Block Temp 2			02															41	2
205	851	RC	Sample 3 CJ Block Temp 1			02															41	2
206	851	RC	Sample 2 CJ Block Temp 2			02															41	2
207	851	RC	Sample 4 CJ Block Temp 1			02															41	2
208	851	RC	Sample 3 CJ Block Temp 2			02															41	2
03	06	07		39	40	43	45	47	48	51	53	55	57	65	66	67		71	72	75	78	80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 37 of 38)

ENT NO.	CORR.	NO.	DESCRIPTION	CMD ULK	USAGE	MN SO G.	NM OS /G WDS/	SOP	TYPE FIXD	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	DATA VALUE TYPE	MON REQ EVNT	MON REQ EXCP	CAL. COF	CDT?	RC IO DE	SID NO.	EXPID	TABLE
209	851	RC	Sample 5 CJ Block Temp 1			02															41	2
210	851	RC	Sample 4 CJ Block Temp 2			02															41	2
211	851	RC	Sample 6 CJ Block Temp 1			02															41	2
212	851	RC	Sample 5 CJ Block Temp 2			02															41	2
213	851	RC	Ampoule Alignment Arm Temp			02															41	2
214	851	RC	Sample 6 CJ Block Temp 2			02															41	2
215	851	RC	FTS Stepping Motor Temp			02															41	2
216	851	RC	SEM Track Temp			02															41	2
217	851	RC	IFEA Upper Atmosphere Temp			02															41	2
218	851	RC	IFEA Lower Atmosphere Temp			02															41	2
219	851	RC	RTD Mux 1 Calibration - Low			02															41	2
220	851	RC	RTD Mux 1 Calibration - High			02															41	2
221	851	RC	RTD Mux 2 Calibration - Low			02															41	2
222	851	RC	RTD Mux 2 Calibration - High			02															41	2
223	851	RC	RTD Mux 3 Calibration - Low			02															41	2
224	851	RC	RTD Mux 3 Calibration - High			02															41	2
225	851	RC	RTD Mux 4 Calibration - Low			02															41	2
226	851	RC	RTD Mux 4 Calibration - High			02															41	2
227	851	RC	RTD Mux 5 Calibration - Low			02															41	2
228	851	RC	RTD Mux 5 Calibration - High			02															41	2
229	851	RC	RTD Mux 6 Calibration - Low			02															41	2
230	851	RC	RTD Mux 6 Calibration - High			02															41	2
231	851	RC	RTD Mux 7 Calibration - Low			02															41	2
232	851	RC	RTD Mux 7 Calibration - High			02															41	2
233	851	RC	RTD Mux 8 Calibration - Low			02															41	2
234	851	RC	RTD Mux 8 Calibration - High			02															41	2
235	851	RC	Cold Guard Heater Current			02															41	2
236	851	RC	Cold Guard Heater Voltage			02															41	2
237	851	RC	Cold Main Primary Heater Cur			02															41	2
238	851	RC	Cold Main Primary Heater Volt			02															41	2

Column positions: 03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-2. SIGNAL INTERFACE DEFINITION EXPANSION (Sheet 38 of 38)

ENT NO.	CONR. MSG NO.	DESCRIPTION	CMD/UL	USAGE	MN SO G.	NM OS /G WDS/	SO FIXD	TYPE	DATA DESCRIPTION START WD #	START BT	END WD #	END BT	TYPE	DATA VALUE	MON REQ EVNT	EXCP	CAL. COF	CDT?	RCIO	SID NO.	EXPID	TABLE
239	851	RC Cold Main Red Heater Current			02																41	2
240	851	RC Cold Main Red Heater Voltage			02																41	2
241	851	RC Hot Boost Heater Current			02																41	2
242	851	RC Hot Boost Heater Voltage			02																41	2
243	851	RC Hot Guard Heater Current			02																41	2
244	851	RC Hot Guard Heater Voltage			02																41	2
245	851	RC Hot Main Primary Heater Cur			02																41	2
246	851	RC Hot Main Primary Heater Volt			02																41	2
247	851	RC Hot Main Red Heater Current			02																41	2
248	851	RC Hot Main Red Heater Voltage			02																41	2
249	851	RC Stepping Motor Phase A Cur			02																41	2
250	851	RC Stepping Motor Phase A Volt			02																41	2
251	851	RC Stepping Motor Phase B Cur			02																41	2
252	851	RC Stepping Motor Phase B Volt			02																41	2
253	851	RC Indexing CAM Rotary Position			02																41	2
254	851	RC Furnace Linear Position			02																41	2
255	851	RC IFEA Lower Humidity			02																41	2
256	851	RC Rapid Translation Motor RPM			02																41	2
257	851	RC IFEA Absolute Pressure 1			02																41	2
258	851	RC IFEA Upper Humidity			02																41	2
259	851	RC Experiment Main Bus Current			02																41	2
260	851	RC IFEA Absolute Pressure 2			02																41	2
261	851	RC SMS Board Velocity Reading			02																41	2
262	851	RC Experiment Main Bus Voltage			02																41	2
263	851	Process Elapsed Time - Seconds			02																41	2
264	851	Go/NoGo Error Override			02																41	2
265	851	CGF Sytstem State			02																41	2
266	851	Auto Pressure Ctl			02																41	2

03 06 07 39 40 43 45 47 48 51 53 55 57 65 66 67 71 72 75 78 80

TABLE 2.7-3. EVENT/EXCEPTION MONITOR REQUIREMENTS

ENTRY NUMBER	CORR NO	EXCEPTION MONITOR RATE	MONITOR VALUES: UPPER LIMIT	MONITOR VALUES: LOWER LIMIT/ EXPT'D STATE	MSG CLS	MESSAGE (HIGH/SINGLE)	////// ERROR MSG. GRP	////// ERROR MSG. NO.	MESSAGE LOW	////// ERROR MSG. GRP	////// ERROR MSG. NO.	INTRLOCK TIME	OUT LIMT COUNT	/// 3PI AD CG HE A "R	///// EXPID	///// TABLE
207	106	001	-073	-128	1	HI WATER TEMP	41	14		41		300	10	CGF	41	4
208	106	001	-077	-128	1	HI HUMIDITY LWR	41	16		41		300	10	CGF	41	4
209	106	001	-077	-128	1	HI HUMIDITY UPR	41	18		41		300	10	CGF	41	4
210	106	001	-004	-128	1	HI ATMOS TEMP	41	1A		41		300	10	MAN	41	4
211	106	001	-073	-128	1	HI CLD END TEMP	41	1C		41		300	10	MAN	41	4
212	106	001	-073	-128	1	HI HOT END TEMP	41	1E		41		300	10	MAN	41	4
215	106	001	-009	-073	1	HI IFEA PRES 1	41	20	LO IFEA PRES 1	41	21	300	10	CGF	41	4
216	106	001	-009	-073	1	HI IFEA PRES 2	41	22	LO IFEA PRES 2	41	23	300	10	CGF	41	4
219	106	001	+105	-128	1	HI MAIN CURRENT	41	24		41		300	10	CGF	41	4
220	106	001	+076	+018	1	HI MAIN VOLTAGE	41	26	LO MAIN VOLTAGE	41	27	300	10	CGF	41	4
223	106	001		1	1	LO WATER FLOW	41	28		41		300	05	CGF	41	4
224	106	001		1	1	LO WATER FLOW	41	2A		41		300	05	CGF	41	4
237	106	001		1	1	NO AVIONICS AIR	41	2C		41		300	05	CGF	41	4
238	106	001		1	1	NO AVIONICS AIR	41	2E		41		300	05	CGF	41	4
239	106	001		1	1	NO AVIONICS AIR	41	30		41		300	05	CGF	41	4
240	106	001		1	1	NO AVIONICS AIR	41	32		41		300	05	CGF	41	4
265	106	001		1	1	WTR OUT BYPASS	41	34		41		300	05	MAN	41	4
266	106	001		0	1	WTR OUT BYPASS	41	36		41		300	05	MAN	41	4
267	106	001		1	1	WTR IN BYPASS	41	38		41		300	05	MAN	41	4
268	106	001		0	1	WTR IN BYPASS	41	3A		41		300	05	MAN	41	4
287	106	001		1	1	EXTRM TRVL LIM	41	3C		41		300	05	FTS	41	4
288	106	001		0	1	EXTRM TRVL LIM	41	3E		41		300	05	FTS	41	4
319	106	001		0	1	EXP BUS PWR OFF	41	40		41		300	05	CGF	41	4
320	106	001		1	1	EXP BUS PWR OFF	41	42		41		300	05	CGF	41	4

Column positions: 03 06 09 17 25 26 27 43 45 46 62 64 67 69 72 79 80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 1 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABLB
001	850	PC	+0000000+00	+1000000+01					41	6
002	850	PC	+0000000+00	+1000000+01					41	6
003	850	PC	+0000000+00	+1000000+01					41	6
004	850	PC	+0000000+00	+1000000+01					41	6
005	850	PC	+0000000+00	+1000000+01					41	6
138	850	PC	+0000000+00	+1000000+01					41	6
139	850	PC	+0000000+00	+1000000+01					41	6
140	850	PC	+0000000+00	+1000000+01					41	6
141	850	PC	+0000000+00	+1000000+01					41	6
142	850	PC	+0000000+00	+1000000+01					41	6
143	850	PC	+0000000+00	+1000000+01					41	6
144	850	PC	+0000000+00	+1000000+01					41	6
145	850	PC	+0000000+00	+1000000+01					41	6
146	850	PC	+0000000+00	+1000000+01					41	6
147	850	PC	+0000000+00	+1000000+01					41	6
148	850	PC	+0000000+00	+1000000+01					41	6
149	850	PC	+0000000+00	+1000000+01					41	6
150	850	PC	+0000000+00	+1000000+01					41	6
151	850	PC	+0000000+00	+1000000+01					41	6
152	850	PC	+0000000+00	+1000000+01					41	6
153	850	PC	+0000000+00	+1000000+01					41	6
154	850	PC	+0000000+00	+1000000+01					41	6
155	850	PC	+0000000+00	+1000000+01					41	6
156	850	PC	+0000000+00	+1000000+01					41	6
157	850	PC	+0000000+00	+1000000+01					41	6
158	850	PC	+0000000+00	+1000000+01					41	6
159	850	PC	+0000000+00	+1000000+01					41	6
160	850	PC	+0000000+00	+1000000+01					41	6
161	850	PC	+0000000+00	+1000000+01					41	6
162	850	PC	+0000000+00	+1000000+01					41	6
163	850	PC	+0000000+00	+1000000+01					41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 2 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABL
164	850	PC	+0000000+00	+1000000+01						41	6
165	850	PC	+0000000+00	+1000000+01						41	6
166	850	PC	+0000000+00	+1000000+01						41	6
167	850	PC	+0000000+00	+1000000+01						41	6
168	850	PC	+0000000+00	+1000000+01						41	6
169	850	PC	+0000000+00	+1000000+01						41	6
170	850	PC	+0000000+00	+1000000+01						41	6
171	850	PC	+0000000+00	+1000000+01						41	6
172	850	PC	+0000000+00	+1000000+01						41	6
173	850	PC	+0000000+00	+1000000+01						41	6
174	850	PC	+0000000+00	+1000000+01						41	6
175	850	PC	+0000000+00	+1000000+01						41	6
176	850	PC	+0000000+00	+1000000+01						41	6
177	850	PC	+0000000+00	+1000000+01						41	6
178	850	PC	+0000000+00	+1000000+01						41	6
179	850	PC	+0000000+00	+1000000+01						41	6
180	850	PC	+0000000+00	+1000000+01						41	6
181	850	PC	+0000000+00	+1000000+01						41	6
182	850	PC	+0000000+00	+1000000+01						41	6
183	850	PC	+0000000+00	+1000000+01						41	6
184	850	PC	+0000000+00	+1000000+01						41	6
185	850	PC	+0000000+00	+1000000+01						41	6
187	850	PC	+0000000+00	+1000000+01						41	6
188	850	PC	+0000000+00	+1000000+01						41	6
189	850	PC	+0000000+00	+1000000+01						41	6
190	850	PC	+0000000+00	+1000000+01						41	6
191	850	PC	+0000000+00	+1000000+01						41	6
192	850	PC	+0000000+00	+1000000+01						41	6
193	850	PC	+0000000+00	+1000000+01						41	6
194	850	PC	+0000000+00	+1000000+01						41	6
195	850	PC	+0000000+00	+1000000+01						41	6
03	05	07	18	29	40	51	62	73	79	80	

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 3 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	////: EXP ID	////: TABL B
196	850	PC	+0000000+00	+5000000-01						41	6
197	850	PC	+0000000+00	+5000000-01						41	6
198	850	PC	+0000000+00	+5000000-01						41	6
199	850	PC	+0000000+00	+5000000-01						41	6
200	850	PC	+0000000+00	+5000000-01						41	6
201	850	PC	+0000000+00	+5000000-01						41	6
202	850	PC	+0000000+00	+5000000-01						41	6
203	850	PC	+0000000+00	+5000000-01						41	6
204	850	PC	+0000000+00	+5000000-01						41	6
205	850	PC	+0000000+00	+5000000-01						41	6
206	850	PC	+0000000+00	+5000000-01						41	6
207	850	PC	+0000000+00	+5000000-01						41	6
208	850	PC	+0000000+00	+5000000-01						41	6
209	850	PC	+0000000+00	+5000000-01						41	6
210	850	PC	+0000000+00	+5000000-01						41	6
211	850	PC	+0000000+00	+5000000-01						41	6
212	850	PC	+0000000+00	+3663000-01						41	6
213	850	PC	+0000000+00	+9768000-02						41	6
214	850	PC	+0000000+00	+2442000-01						41	6
215	850	PC	+0000000+00	+2442000-01						41	6
216	850	PC	+0000000+00	+7326000-02						41	6
217	850	PC	+0000000+00	+7326000-02						41	6
218	850	PC	-2419000+03	+2325500+01	+9104500-03	+2442500-06				41	6
219	850	PC	-2419000+03	+2325500+01	+9104500-03	+2442500-06				41	6
220	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
221	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
222	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
223	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
224	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
225	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
226	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02		41	6
003	005	007		018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 4 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						////	
			A0	A1	A2	A3	A4	A5	EXP ID	TABL
227	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
228	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
229	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
230	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
231	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
232	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
233	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
234	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
235	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
236	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
237	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
238	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
239	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
240	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
241	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
242	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
243	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
244	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
245	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
246	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
247	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
248	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
249	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
250	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
251	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
252	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
253	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
254	850	PC	-1089200+02	+2705600+02	-1504300+00	+1159800-02	+4582500-04	-5337600-06	41	6
255	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
256	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
257	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 5 of 20)

ENTRY NUMBER	CONV NO	CALIBRATION TYPE	A0	A1	A2	A3	A4	A5	EXP ID	TABL
258	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
259	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
260	850	PC	+1493200+02	+1381000+03	-8505200+01	+9220100+00	-5706400-01	+1394700-02	41	6
261	850	PC	+0000000+00	+1743900-02					41	6
262	850	PC	+0000000+00	+5086300-02					41	6
263	850	PC	+0000000+00	+1743900-02					41	6
264	850	PC	+0000000+00	+5086300-02					41	6
265	850	PC	-2566000+01	+1364100+00					41	6
266	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
267	850	PC	+0000000+00	+1627600+01					41	6
268	850	PC	+0000000+00	+7326000-02					41	6
269	850	PC	+0000000+00	+1953600-01					41	6
270	850	PC	+0000000+00	+7326000-02					41	6
271	850	PC	+0000000+00	+1953600-01					41	6
272	850	PC	+0000000+00	+7326000-02					41	6
273	850	PC	+0000000+00	+1953600-01					41	6
274	850	PC	+0000000+00	+7326000-02					41	6
275	850	PC	+0000000+00	+1953600-01					41	6
276	850	PC	+0000000+00	+7326000-02					41	6
277	850	PC	+0000000+00	+1953600-01					41	6
278	850	PC	+0000000+00	+7326000-02					41	6
279	850	PC	+0000000+00	+1953600-01					41	6
280	850	PC	+0000000+00	+7326000-02					41	6
281	850	PC	+0000000+00	+1953600-01					41	6
282	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
283	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
284	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
285	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
286	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
287	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
288	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09			41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 6 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	//// EXP ID	//// TABL B
289	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
290	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
291	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
292	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
293	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
294	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
295	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
296	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
297	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
298	850	PC	+0000000+00	+1000000+01						41	6
299	850	PC	+0000000+00	+1000000+01						41	6
300	850	PC	+0000000+00	+1000000+01						41	6
301	850	PC	+0000000+00	+1000000+01						41	6
302	850	PC	+0000000+00	+1000000+01						41	6
303	850	PC	+0000000+00	+1000000+01						41	6
304	850	PC	+0000000+00	+1000000+01						41	6
305	850	PC	+0000000+00	+1000000+01						41	6
306	850	PC	+0000000+00	+1000000+01						41	6
307	850	PC	+0000000+00	+1000000+01						41	6
308	850	PC	+0000000+00	+1000000+01						41	6
309	850	PC	+0000000+00	+1000000+01						41	6
310	850	PC	+0000000+00	+1000000+01						41	6
311	850	PC	+0000000+00	+1000000+01						41	6
312	850	PC	+0000000+00	+8302800-01						41	6
313	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
314	850	PC	-2414600+03	+2297900+00	+1211300-04	-4356500-09				41	6
315	850	PC	+9760000+03	+2442000+00						41	6
316	850	PC	+9760000+03	+2442000+00						41	6
317	850	PC	+9760000+03	+2442000+00						41	6
318	850	PC	+9760000+03	+2442000+00						41	6
319	850	PC	+9760000+03	+2442000+00						41	6
003	005	007	018	029	040	051	062	073		079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 7 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	//// EXP ID	TABL B
320	850	PC	+9760000+03	+2442000+00					41	6
321	850	PC	+6810000+02	+2442000-01					41	6
322	850	PC	+6810000+02	+2442000-01					41	6
323	850	PC	+9760000+03	+2442000+00					41	6
324	850	PC	+9760000+03	+2442000+00					41	6
325	850	PC	+9760000+03	+2442000+00					41	6
326	850	PC	+9760000+03	+2442000+00					41	6
327	850	PC	+9760000+03	+2442000+00					41	6
328	850	PC	+9760000+03	+2442000+00					41	6
329	850	PC	+6810000+02	+2442000-01					41	6
330	850	PC	+6810000+02	+2442000-01					41	6
331	850	PC	+0000000+00	+1000000+01					41	6
332	850	PC	+0000000+00	+3125000+00					41	6
333	850	PC	+0000000+00	+2500000+00					41	6
334	850	PC	+0000000+00	+1000000+01					41	6
335	850	PC	+0000000+00	+3125000+00					41	6
336	850	PC	+0000000+00	+2500000+00					41	6
337	850	PC	+0000000+00	+1000000+01					41	6
338	850	PC	+0000000+00	+3125000+00					41	6
339	850	PC	+0000000+00	+2500000+00					41	6
340	850	PC	+0000000+00	+1000000+01					41	6
341	850	PC	+0000000+00	+3125000+00					41	6
342	850	PC	+0000000+00	+2500000+00					41	6
343	850	PC	+0000000+00	+7096670-04					41	6
344	850	PC	+0000000+00	+1000000+01					41	6
345	850	PC	+0000000+00	+1000000+01					41	6
346	850	PC	+0000000+00	+1000000+01					41	6
347	850	PC	+0000000+00	+1000000+01					41	6
348	850	PC	+0000000+00	+1000000+01					41	6
349	850	PC	+0000000+00	+1000000+01					41	6
350	850	PC	+0000000+00	+1000000+01					41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 8 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABL
352	850	PC	+0000000+00	+1000000+01					41	6
353	850	PC	+0000000+00	+1000000+01					41	6
354	850	PC	+0000000+00	+1000000+01					41	6
356	850	PC	+0000000+00	+1000000+01					41	6
357	850	PC	+0000000+00	+1000000+01					41	6
358	850	PC	+0000000+00	+1000000+01					41	6
360	850	PC	+0000000+00	+1000000+01					41	6
361	850	PC	+0000000+00	+1000000+01					41	6
362	850	PC	+0000000+00	+1000000+01					41	6
363	850	PC	+0000000+00	+1000000+01					41	6
364	850	PC	+0000000+00	+1000000+01					41	6
365	850	PC	+0000000+00	+1000000+01					41	6
366	850	PC	+0000000+00	+1000000+01					41	6
369	850	PC	+0000000+00	+1000000+01					41	6
370	850	PC	+0000000+00	+1000000+01					41	6
371	850	PC	+0000000+00	+1000000+01					41	6
372	850	PC	+0000000+00	+1000000+01					41	6
373	850	PC	+0000000+00	+1000000+01					41	6
374	850	PC	+0000000+00	+1000000+01					41	6
377	850	PC	+0000000+00	+1000000+01					41	6
378	850	PC	+0000000+00	+1000000+01					41	6
379	850	PC	+0000000+00	+1000000+01					41	6
380	850	PC	+0000000+00	+1000000+01					41	6
381	850	PC	+0000000+00	+1000000+01					41	6
382	850	PC	+0000000+00	+1000000+01					41	6
385	850	PC	+0000000+00	+1000000+01					41	6
386	850	PC	+0000000+00	+1000000+01					41	6
387	850	PC	+0000000+00	+1000000+01					41	6
388	850	PC	+0000000+00	+1000000+01					41	6
389	850	PC	+0000000+00	+1000000+01					41	6
390	850	PC	+0000000+00	+1000000+01					41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 9 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS: A0	A1	A2	A3	A4	A5	EXP ID	TABLE
391	850	PC	+0000000+00	+1000000+01					41	6
392	850	PC	+0000000+00	+1000000+01					41	6
393	850	PC	+0000000+00	+1000000+01					41	6
394	850	PC	+0000000+00	+1000000+01					41	6
395	850	PC	+0000000+00	+1000000+01					41	6
396	850	PC	+0000000+00	+1000000+01					41	6
397	850	PC	+0000000+00	+1000000+01					41	6
398	850	PC	+0000000+00	+1000000+01					41	6
399	850	PC	+0000000+00	+1000000+01					41	6
400	850	PC	+0000000+00	+1000000+01					41	6
401	850	PC	+0000000+00	+1000000+01					41	6
402	850	PC	+0000000+00	+1000000+01					41	6
403	850	PC	+0000000+00	+1000000+01					41	6
404	850	PC	+0000000+00	+1000000+01					41	6
405	850	PC	+0000000+00	+1000000+01					41	6
406	850	PC	+0000000+00	+1000000+01					41	6
407	850	PC	+0000000+00	+1000000+01					41	6
408	850	PC	+0000000+00	+1000000+01					41	6
409	850	PC	+0000000+00	+1000000+01					41	6
410	850	PC	+0000000+00	+1000000+01					41	6
411	850	PC	+0000000+00	+1000000+01					41	6
412	850	PC	+0000000+00	+1000000+01					41	6
413	850	PC	+0000000+00	+1000000+01					41	6
414	850	PC	+0000000+00	+1000000+01					41	6
415	850	PC	+0000000+00	+1000000+01					41	6
417	850	PC	+0000000+00	+1000000+01					41	6
418	850	PC	+0000000+00	+1000000+01					41	6
419	850	PC	+0000000+00	+1000000+01					41	6
421	850	PC	+0000000+00	+1000000+01					41	6
422	850	PC	+0000000+00	+1000000+01					41	6
423	850	PC	+0000000+00	+1000000+01					41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 10 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	A0	A1	A2	A3	A4	A5		EXP ID	TABLE
			CALIBRATION COEFFICIENTS/LINEAR SEGMENTS							////	
425	850	PC	+0000000+00	+1000000+01						41	6
427	850	PC	+0000000+00	+1000000+01						41	6
428	850	PC	+0000000+00	+1000000+01						41	6
429	850	PC	+0000000+00	+1000000+01						41	6
431	850	PC	+0000000+00	+1000000+01						41	6
432	850	PC	+0000000+00	+1000000+01						41	6
433	850	PC	+0000000+00	+1000000+01						41	6
435	850	PC	+0000000+00	+1000000+01						41	6
437	850	PC	+0000000+00	+1000000+01						41	6
438	850	PC	+0000000+00	+1000000+01						41	6
439	850	PC	+0000000+00	+1000000+01						41	6
441	850	PC	+0000000+00	+1000000+01						41	6
442	850	PC	+0000000+00	+1000000+01						41	6
443	850	PC	+0000000+00	+1000000+01						41	6
445	850	PC	+0000000+00	+1000000+01						41	6
447	850	PC	+0000000+00	+1000000+01						41	6
448	850	PC	+0000000+00	+1000000+01						41	6
449	850	PC	+0000000+00	+1000000+01						41	6
451	850	PC	+0000000+00	+1000000+01						41	6
452	850	PC	+0000000+00	+1000000+01						41	6
453	850	PC	+0000000+00	+1000000+01						41	6
455	850	PC	+0000000+00	+1000000+01						41	6
457	850	PC	+0000000+00	+1000000+01						41	6
458	850	PC	+0000000+00	+1000000+01						41	6
459	850	PC	+0000000+00	+1000000+01						41	6
461	850	PC	+0000000+00	+1000000+01						41	6
462	850	PC	+0000000+00	+1000000+01						41	6
463	850	PC	+0000000+00	+1000000+01						41	6
470	850	PC	+0000000+00	+1000000+01						41	6
471	850	PC	+0000000+00	+1000000+01						41	6
472	850	PC	+0000000+00	+1000000+01						41	6

03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 11 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABLE
473	850	PC	+0000000+00	+1000000+01					41	6
474	850	PC	+0000000+00	+1000000+01					41	6
475	850	PC	+0000000+00	+1000000+01					41	6
476	850	PC	+0000000+00	+1000000+01					41	6
477	850	PC	+0000000+00	+1000000+01					41	6
478	850	PC	+0000000+00	+1000000+01					41	6
479	850	PC	+0000000+00	+1000000+01					41	6
480	850	PC	+0000000+00	+1000000+01					41	6
481	850	PC	+0000000+00	+1000000+01					41	6
482	850	PC	+0000000+00	+1000000+01					41	6
483	850	PC	+0000000+00	+1000000+01					41	6
484	850	PC	+0000000+00	+1000000+01					41	6
485	850	PC	+0000000+00	+1000000+01					41	6
486	850	PC	+0000000+00	+1000000+01					41	6
487	850	PC	+0000000+00	+1000000+01					41	6
488	850	PC	+0000000+00	+1000000+01					41	6
001	851	PC	+0000000+00	+1000000+01					41	6
002	851	PC	+0000000+00	+1000000+01					41	6
003	851	PC	+0000000+00	+1000000+01					41	6
004	851	PC	+0000000+00	+1000000+01					41	6
005	851	PC	+0000000+00	+1000000+01					41	6
006	851	PC	+0000000+00	+1000000+01					41	6
007	851	PC	+0000000+00	+1000000+01					41	6
008	851	PC	+0000000+00	+1000000+01					41	6
009	851	PC	+0000000+00	+1000000+01					41	6
010	851	PC	+0000000+00	+1000000+01					41	6
011	851	PC	+0000000+00	+1000000+01					41	6
012	851	PC	+0000000+00	+1000000+01					41	6
013	851	PC	+0000000+00	+1000000+01					41	6
014	851	PC	+0000000+00	+1000000+01					41	6
015	851	PC	+0000000+00	+1000000+01					41	6

003 005 007 018 029 040 051 062 073 079 080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 12 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABLE
016	851		PC	+0000000+00	+1000000+01					41	6
017	851		PC	+0000000+00	+1000000+01					41	6
018	851		PC	+0000000+00	+1000000+01					41	6
019	851		PC	+0000000+00	+1000000+01					41	6
020	851		PC	+0000000+00	+1000000+01					41	6
021	851		PC	+0000000+00	+1000000+01					41	6
022	851		PC	+0000000+00	+1000000+01					41	6
023	851		PC	+0000000+00	+1000000+01					41	6
024	851		PC	+0000000+00	+1000000+01					41	6
025	851		PC	+0000000+00	+1000000+01					41	6
026	851		PC	+0000000+00	+1000000+01					41	6
027	851		PC	+0000000+00	+1000000+01					41	6
028	851		PC	+0000000+00	+1000000+01					41	6
029	851		PC	+0000000+00	+1000000+01					41	6
030	851		PC	+0000000+00	+1000000+01					41	6
031	851		PC	+0000000+00	+1000000+01					41	6
032	851		PC	+0000000+00	+1000000+01					41	6
033	851		PC	+0000000+00	+1000000+01					41	6
034	851		PC	+0000000+00	+1000000+01					41	6
035	851		PC	+0000000+00	+1000000+01					41	6
036	851		PC	+0000000+00	+1000000+01					41	6
037	851		PC	+0000000+00	+1000000+01					41	6
038	851		PC	+0000000+00	+1000000+01					41	6
039	851		PC	+0000000+00	+1000000+01					41	6
040	851		PC	+0000000+00	+1000000+01					41	6
041	851		PC	+0000000+00	+1000000+01					41	6
042	851		PC	+0000000+00	+1000000+01					41	6
043	851		PC	+0000000+00	+1000000+01					41	6
044	851		PC	+0000000+00	+1000000+01					41	6
045	851		PC	+0000000+00	+1000000+01					41	6
046	851		PC	+0000000+00	+1000000+01					41	6

03 05 07 18 29 40 51 62 73 79 80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 13 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	EXP ID	TABL
047	851		PC	+0000000+00	+1000000+01					41	6
048	851		PC	+0000000+00	+1000000+01					41	6
049	851		PC	+0000000+00	+1000000+01					41	6
050	851		PC	+0000000+00	+1000000+01					41	6
051	851		PC	+0000000+00	+1000000+01					41	6
052	851		PC	+0000000+00	+1000000+01					41	6
053	851		PC	+0000000+00	+1000000+01					41	6
054	851		PC	+0000000+00	+1000000+01					41	6
055	851		PC	+0000000+00	+1000000+01					41	6
056	851		PC	+0000000+00	+1000000+01					41	6
057	851		PC	+0000000+00	+1000000+01					41	6
058	851		PC	+0000000+00	+1000000+01					41	6
059	851		PC	+0000000+00	+1000000+01					41	6
060	851		PC	+0000000+00	+1000000+01					41	6
061	851		PC	+0000000+00	+1000000+01					41	6
062	851		PC	+0000000+00	+1000000+01					41	6
063	851		PC	+0000000+00	+1000000+01					41	6
064	851		PC	+0000000+00	+1000000+01					41	6
065	851		PC	+0000000+00	+1000000+01					41	6
066	851		PC	+0000000+00	+1000000+01					41	6
067	851		PC	+0000000+00	+1000000+01					41	6
068	851		PC	+0000000+00	+1000000+01					41	6
069	851		PC	+0000000+00	+1000000+01					41	6
070	851		PC	+0000000+00	+1000000+01					41	6
071	851		PC	+0000000+00	+1000000+01					41	6
072	851		PC	+0000000+00	+1000000+01					41	6
073	851		PC	+0000000+00	+1000000+01					41	6
074	851		PC	+0000000+00	+1000000+01					41	6
075	851		PC	+0000000+00	+1000000+01					41	6
076	851		PC	+0000000+00	+1000000+01					41	6
077	851		PC	+0000000+00	+1000000+01					41	6
003	005		007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 14 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5		//// EXP ID	TABLE
078	851	PC	+0000000+00	+1000000+01						41	6
079	851	PC	+0000000+00	+1000000+01						41	6
080	851	PC	+0000000+00	+1000000+01						41	6
081	851	PC	+0000000+00	+1000000+01						41	6
082	851	PC	+0000000+00	+1000000+01						41	6
083	851	PC	+0000000+00	+1000000+01						41	6
084	851	PC	+0000000+00	+1000000+01						41	6
085	851	PC	+0000000+00	+1000000+01						41	6
086	851	PC	+0000000+00	+1000000+01						41	6
087	851	PC	+0000000+00	+1000000+01						41	6
088	851	PC	+0000000+00	+1000000+01						41	6
089	851	PC	+0000000+00	+1000000+01						41	6
090	851	PC	+0000000+00	+1000000+01						41	6
091	851	PC	+0000000+00	+1000000+01						41	6
092	851	PC	+0000000+00	+1000000+01						41	6
093	851	PC	+0000000+00	+1000000+01						41	6
094	851	PC	+0000000+00	+1000000+01						41	6
095	851	PC	+0000000+00	+1000000+01						41	6
096	851	PC	+0000000+00	+1000000+01						41	6
097	851	PC	+0000000+00	+1000000+01						41	6
098	851	PC	+0000000+00	+1000000+01						41	6
099	851	PC	+0000000+00	+1000000+01						41	6
100	851	PC	+0000000+00	+1000000+01						41	6
101	851	PC	+0000000+00	+1000000+01						41	6
102	851	PC	+0000000+00	+1000000+01						41	6
103	851	PC	+0000000+00	+1000000+01						41	6
104	851	PC	+0000000+00	+1000000+01						41	6
105	851	PC	+0000000+00	+1000000+01						41	6
106	851	PC	+0000000+00	+1000000+01						41	6
107	851	PC	+0000000+00	+1000000+01						41	6
108	851	PC	+0000000+00	+1000000+01						41	6
03	05	07	18	29	40	51	62	73		79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 15 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	//// EXP ID	TABLE
109	851	PC	+0000000+00	+1000000+01					41	6
110	851	PC	+0000000+00	+1000000+01					41	6
111	851	PC	+0000000+00	+1000000+01					41	6
112	851	PC	+0000000+00	+1000000+01					41	6
113	851	PC	+0000000+00	+1000000+01					41	6
114	851	PC	+0000000+00	+1000000+01					41	6
115	851	PC	+0000000+00	+1000000+01					41	6
116	851	PC	+0000000+00	+1000000+01					41	6
117	851	PC	+0000000+00	+1000000+01					41	6
118	851	PC	+0000000+00	+1000000+01					41	6
119	851	PC	+0000000+00	+1000000+01					41	6
120	851	PC	+0000000+00	+1000000+01					41	6
121	851	PC	+0000000+00	+1000000+01					41	6
122	851	PC	+0000000+00	+1000000+01					41	6
123	851	PC	+0000000+00	+1000000+01					41	6
124	851	PC	+0000000+00	+1000000+01					41	6
125	851	PC	+0000000+00	+1000000+01					41	6
126	851	PC	+0000000+00	+1000000+01					41	6
127	851	PC	+0000000+00	+1000000+01					41	6
128	851	PC	+0000000+00	+1000000+01					41	6
129	851	PC	+0000000+00	+1000000+01					41	6
130	851	PC	+0000000+00	+1000000+01					41	6
131	851	PC	+0000000+00	+1000000+01					41	6
132	851	PC	+0000000+00	+1000000+01					41	6
133	851	PC	+0000000+00	+1000000+01					41	6
134	851	PC	+0000000+00	+1000000+01					41	6
135	851	PC	+0000000+00	+1000000+01					41	6
136	851	PC	+0000000+00	+1000000+01					41	6
137	851	PC	+0000000+00	+1000000+01					41	6
138	851	PC	+0000000+00	+1000000+01					41	6
139	851	PC	+0000000+00	+1000000+01					41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 16 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	///// EXP ID	TABLB
140	851	PC	+0000000+00	+1000000+01					41	6
141	851	PC	+0000000+00	+1000000+01					41	6
142	851	PC	+0000000+00	+1000000+01					41	6
143	851	PC	+0000000+00	+1000000+01					41	6
144	851	PC	+0000000+00	+1000000+01					41	6
145	851	PC	+0000000+00	+1000000+01					41	6
146	851	PC	+0000000+00	+1000000+01					41	6
147	851	PC	+0000000+00	+1000000+01					41	6
148	851	PC	+0000000+00	+1000000+01					41	6
149	851	PC	+0000000+00	+1000000+01					41	6
150	851	PC	+0000000+00	+1000000+01					41	6
151	851	PC	+0000000+00	+1000000+01					41	6
152	851	PC	+0000000+00	+1000000+01					41	6
153	851	PC	+0000000+00	+1000000+01					41	6
154	851	PC	+0000000+00	+1000000+01					41	6
155	851	PC	+0000000+00	+1000000+01					41	6
156	851	PC	+0000000+00	+1000000+01					41	6
157	851	PC	+0000000+00	+1000000+01					41	6
158	851	PC	+0000000+00	+1000000+01					41	6
159	851	PC	+0000000+00	+1000000+01					41	6
160	851	PC	+0000000+00	+1000000+01					41	6
161	851	PC	+0000000+00	+1000000+01					41	6
162	851	PC	+0000000+00	+1000000+01					41	6
163	851	PC	+0000000+00	+1000000+01					41	6
164	851	PC	+0000000+00	+1000000+01					41	6
165	851	PC	+0000000+00	+1000000+01					41	6
166	851	PC	+0000000+00	+1000000+01					41	6
167	851	PC	+0000000+00	+1000000+01					41	6
168	851	PC	+0000000+00	+1000000+01					41	6
169	851	PC	+0000000+00	+1000000+01					41	6
170	851	PC	+0000000+00	+1000000+01					41	6
03	05	07	18	29	40	51	62	73	79	80

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 17 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	A0	A1	A2	A3	A4	A5	EXP ID	TABL
			CALIBRATION COEFFICIENTS/LINEAR SEGMENTS						/////	
171	851	PC	+0000000+00	+1000000+01					41	6
172	851	PC	+0000000+00	+1000000+01					41	6
173	851	PC	+0000000+00	+1000000+01					41	6
174	851	PC	+0000000+00	+1000000+01					41	6
175	851	PC	+0000000+00	+1000000+01					41	6
176	851	PC	+0000000+00	+1000000+01					41	6
177	851	PC	+0000000+00	+1000000+01					41	6
178	851	PC	+0000000+00	+1000000+01					41	6
179	851	PC	+0000000+00	+1000000+01					41	6
180	851	PC	+0000000+00	+1000000+01					41	6
181	851	PC	+0000000+00	+1000000+01					41	6
182	851	PC	+0000000+00	+1000000+01					41	6
183	851	PC	+0000000+00	+1000000+01					41	6
184	851	PC	+0000000+00	+1000000+01					41	6
185	851	PC	+0000000+00	+1000000+01					41	6
186	851	PC	+0000000+00	+1000000+01					41	6
187	851	PC	+0000000+00	+1000000+01					41	6
188	851	PC	+0000000+00	+1000000+01					41	6
189	851	PC	+0000000+00	+1000000+01					41	6
190	851	PC	+0000000+00	+1000000+01					41	6
191	851	PC	+0000000+00	+1000000+01					41	6
192	851	PC	+0000000+00	+1000000+01					41	6
193	851	PC	+0000000+00	+1000000+01					41	6
194	851	PC	+0000000+00	+1000000+01					41	6
195	851	PC	+0000000+00	+1000000+01					41	6
196	851	PC	+0000000+00	+1000000+01					41	6
197	851	PC	+0000000+00	+1000000+01					41	6
198	851	PC	+0000000+00	+1000000+01					41	6
199	851	PC	+0000000+00	+1000000+01					41	6
200	851	PC	+0000000+00	+1000000+01					41	6
201	851	PC	+0000000+00	+1000000+01					41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 18 of 20)

ENTRY	NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5		EXP ID	TABL B
202	851		PC	+0000000+00	+1000000+01						41	6
203	851		PC	+0000000+00	+1000000+01						41	6
204	851		PC	+0000000+00	+1000000+01						41	6
205	851		PC	+0000000+00	+1000000+01						41	6
206	851		PC	+0000000+00	+1000000+01						41	6
207	851		PC	+0000000+00	+1000000+01						41	6
208	851		PC	+0000000+00	+1000000+01						41	6
209	851		PC	+0000000+00	+1000000+01						41	6
210	851		PC	+0000000+00	+1000000+01						41	6
211	851		PC	+0000000+00	+1000000+01						41	6
212	851		PC	+0000000+00	+1000000+01						41	6
213	851		PC	+0000000+00	+1000000+01						41	6
214	851		PC	+0000000+00	+1000000+01						41	6
215	851		PC	+0000000+00	+1000000+01						41	6
216	851		PC	+0000000+00	+1000000+01						41	6
217	851		PC	+0000000+00	+1000000+01						41	6
218	851		PC	+0000000+00	+1000000+01						41	6
219	851		PC	+0000000+00	+1000000+01						41	6
220	851		PC	+0000000+00	+1000000+01						41	6
221	851		PC	+0000000+00	+1000000+01						41	6
222	851		PC	+0000000+00	+1000000+01						41	6
223	851		PC	+0000000+00	+1000000+01						41	6
224	851		PC	+0000000+00	+1000000+01						41	6
225	851		PC	+0000000+00	+1000000+01						41	6
226	851		PC	+0000000+00	+1000000+01						41	6
227	851		PC	+0000000+00	+1000000+01						41	6
228	851		PC	+0000000+00	+1000000+01						41	6
229	851		PC	+0000000+00	+1000000+01						41	6
230	851		PC	+0000000+00	+1000000+01						41	6
231	851		PC	+0000000+00	+1000000+01						41	6
232	851		PC	+0000000+00	+1000000+01						41	6

003 005 007 018 029 040 051 062 073 079 080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 19 of 20)

ENTRY NUMBER	CORR NO	CALIBRATION TYPE	CALIBRATION COEFFICIENTS/LINEAR SEGMENTS A0	A1	A2	A3	A4	A5	//// EXP ID	TABL
233	851	PC	+0000000+00	+1000000+01					41	6
234	851	PC	+0000000+00	+1000000+01					41	6
235	851	PC	+0000000+00	+1000000+01					41	6
236	851	PC	+0000000+00	+1000000+01					41	6
237	851	PC	+0000000+00	+1000000+01					41	6
238	851	PC	+0000000+00	+1000000+01					41	6
239	851	PC	+0000000+00	+1000000+01					41	6
240	851	PC	+0000000+00	+1000000+01					41	6
241	851	PC	+0000000+00	+1000000+01					41	6
242	851	PC	+0000000+00	+1000000+01					41	6
243	851	PC	+0000000+00	+1000000+01					41	6
244	851	PC	+0000000+00	+1000000+01					41	6
245	851	PC	+0000000+00	+1000000+01					41	6
246	851	PC	+0000000+00	+1000000+01					41	6
247	851	PC	+0000000+00	+1000000+01					41	6
248	851	PC	+0000000+00	+1000000+01					41	6
249	851	PC	+0000000+00	+1000000+01					41	6
250	851	PC	+0000000+00	+1000000+01					41	6
251	851	PC	+0000000+00	+1000000+01					41	6
252	851	PC	+0000000+00	+1000000+01					41	6
253	851	PC	+0000000+00	+1000000+01					41	6
254	851	PC	+0000000+00	+1000000+01					41	6
255	851	PC	+0000000+00	+1000000+01					41	6
256	851	PC	+0000000+00	+1000000+01					41	6
257	851	PC	+0000000+00	+1000000+01					41	6
258	851	PC	+0000000+00	+1000000+01					41	6
259	851	PC	+0000000+00	+1000000+01					41	6
260	851	PC	+0000000+00	+1000000+01					41	6
261	851	PC	+0000000+00	+1000000+01					41	6
262	851	PC	+0000000+00	+1000000+01					41	6
263	851	PC	+0000000+00	+5000000-01					41	6
003	005	007	018	029	040	051	062	073	079	080

TABLE 2.7-4. POIC DISPLAY REQUIREMENTS (Sheet 20 of 20)

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---------------------------------------------------------------------------------------------------
|E N|C N|CT|                                                                      |    |////|
|N U|O O|AY|            CALIBRATION COEFFICIENTS/LINEAR SEGMENTS                  |    |----|
|T M|R  |LP|                                                                      |    |E |T|
|R B|R  |IE|                                                                      |    |X |A|
|Y E|   |B |----------------------------------------------------------------------|    |P |B|
|  R|   |R |           |           |           |           |           |           |    |  |L|
|   |   |A |           |           |           |           |           |           |    |I |B|
|   |   |T |    A0     |    A1     |    A2     |    A3     |    A4     |    A5     |    |D | |
|   |   |I |           |           |           |           |           |           |    |  | |
|   |   |O |           |           |           |           |           |           |    |  | |
|   |   |N |           |           |           |           |           |           |    |  | |
---------------------------------------------------------------------------------------------------
|265|851|PC|+0000000+00|+1000000+01|           |           |           |           |    |41|6|
---------------------------------------------------------------------------------------------------
   |   |  |           |           |           |           |           |           |     | |
   0   0  0           1           2           4           5           6           7     7 8
   3   5  7           8           9           0           1           2           3     9 0
```

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 1 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
001	850	EM				0	CDAS FAILURE-BITE #1 (Tbl 1)	OK	FAIL	41	7
002	850	EM				0	CDAS FAILURE-BITE #2 (Tbl 1)	OK	FAIL	41	7
003	850	EM				0	PDS PWR OFF (Tbl 1)	ON	OFF	41	7
004	850	EM				1	PDS PWR OFF (Tbl 1)	OFF	ON	41	7
005	850	EM				0	SCS PWR OFF (Tbl 1)	ON	OFF	41	7
006	850							YES	NO	41	7
006	850	EM				1	SCS PWR OFF (Tbl 1)	OFF	ON	41	7
007	850							NO	YES	41	7
007	850	EM				0	CDAS PWR OFF (Tbl 1)	ON	OFF	41	7
008	850	EM				1	EXTRM TRAVEL LIMIT EXCEEDED	YES	NO	41	7
008	850	EM				1	CDAS PWR OFF (Tbl 1)	OFF	ON	41	7
009	850	EM				0	EXTRM TRAVEL LIMIT EXCEEDED	NO	YES	41	7
010	850							YES	NO	41	7
011	850							NO	YES	41	7
011	850	EM				1	NO AVIONICS AIR-SCS #2 (Tbl	FAIL	OK	41	7
012	850	EM						YES	NO	41	7
012	850	EM				1	NO AVIONICS AIR-PDS #2 (Tbl	FAIL	OK	41	7
013	850							NO	YES	41	7
014	850	EM				1	WATER OUTLET BYPASS	BYPS	NORM	41	7
015	850	EM				0	WATER OUTLET BYPASS	NORM	BYPS	41	7
016	850	EM				1	WATER INLET BYPASS	BYPS	NORM	41	7
017	850	EM				0	WATER INLET BYPASS	NORM	BYPS	41	7
018	850							CLS	OPN	41	7
019	850							OPN	CLS	41	7
020	850							CLS	OPN	41	7
021	850							OPN	CLS	41	7
022	850							YES	NO	41	7
023	850							NO	YES	41	7
024	850							YES	NO	41	7
025	850							NO	YES	41	7
026	850							YES	NO	41	7
027	850							NO	YES	41	7
028	850							NO	YES	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 2 of 14)

ENTRY NUMBER	CONR NOR	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXP ID	TABLE
029	850							NO	YES	41	7
030	850							YES	NO	41	7
031	850							NO	YES	41	7
032	850							YES	NO	41	7
033	850							NO	YES	41	7
034	850							YES	NO	41	7
035	850							NO	YES	41	7
036	850							YES	NO	41	7
037	850							NO	YES	41	7
038	850							OK	FAIL	41	7
039	850							OK	FAIL	41	7
040	850							OK	FAIL	41	7
041	850							OK	FAIL	41	7
042	850							OK	FAIL	41	7
043	850							OK	FAIL	41	7
044	850							OK	FAIL	41	7
045	850							OK	FAIL	41	7
046	850	EM				1	NO AVIONICS AIR - PDS #1	FAIL	OK	41	7
047	850	EM				1	NO AVIONICS AIR - PCS #1	FAIL	OK	41	7
048	850							ON	OFF	41	7
049	850							OFF	ON	41	7
050	850							ON	OFF	41	7
051	850							OFF	ON	41	7
052	850	EM				1	LO IFEA WATER FLOW #1	FAIL	OK	41	7
053	850	EM				1	NO AVIONICS AIR - SCS #1	FAIL	OK	41	7
054	850							OK	FAIL	41	7
055	850							OK	FAIL	41	7
056	850							OK	FAIL	41	7
057	850							OK	FAIL	41	7
058	850							OK	FAIL	41	7
059	850							OK	FAIL	41	7
060	850							OK	FAIL	41	7
061	850							OK	FAIL	41	7

003 005 012 020 028 036 038 066 072 079 081 083

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 3 of 14)

ENTRY NUMBER	CONOR NOR	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
062	850							ON	OFF	41	7
063	850							OFF	ON	41	7
064	850							ON	OFF	41	7
065	850							OFF	ON	41	7
066	850							ON	OFF	41	7
067	850							OFF	ON	41	7
068	850							ON	OFF	41	7
069	850							OFF	ON	41	7
070	850							ON	OFF	41	7
071	850							OFF	ON	41	7
072	850							ON	OFF	41	7
073	850							OFF	ON	41	7
074	850							ON	OFF	41	7
075	850							OFF	ON	41	7
076	850							ON	OFF	41	7
077	850							OFF	ON	41	7
078	850							YES	NO	41	7
079	850							NO	YES	41	7
080	850							YES	NO	41	7
081	850							NO	YES	41	7
082	850							YES	NO	41	7
083	850							NO	YES	41	7
084	850							CLS	OPN	41	7
085	850							OPN	CLS	41	7
086	850							ON	OFF	41	7
087	850							OFF	ON	41	7
088	850							ON	OFF	41	7
089	850							OFF	ON	41	7
090	850							ON	OFF	41	7
091	850							OFF	ON	41	7
092	850							ON	OFF	41	7
093	850							OFF	ON	41	7
094	850							ON	OFF	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 4 of 14)

ENTRY	CON NUMBER	MONITOR	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
095	850							OFF	ON	41	7
096	850	EM				1	LO IFEA WATER FLOW #2	FAIL	OK	41	7
097	850	EM				1	NO AVIONICS AIR - PCS #2	FAIL	OK	41	7
098	850							OK	FAIL	41	7
099	850							OK	FAIL	41	7
100	850							OK	FAIL	41	7
101	850							OK	FAIL	41	7
102	850							OK	FAIL	41	7
103	850							OK	FAIL	41	7
104	850							OK	FAIL	41	7
105	850							OK	FAIL	41	7
106	850	EM				0	PCS UTILITY PWR OFF	ON	OFF	41	7
107	850	EM				1	PCS UTILITY PWR OFF	OFF	ON	41	7
108	850							ON	OFF	41	7
109	850							OFF	ON	41	7
110	850							ON	OFF	41	7
111	850							OFF	ON	41	7
112	850							ON	OFF	41	7
113	850							OFF	ON	41	7
114	850							ON	OFF	41	7
115	850							OFF	ON	41	7
116	850							ON	OFF	41	7
117	850							OFF	ON	41	7
118	850							ON	OFF	41	7
119	850							OFF	ON	41	7
120	850							OFF	ON	41	7
121	850							ON	OFF	41	7
122	850							ON	OFF	41	7
123	850							OFF	ON	41	7
124	850							ON	OFF	41	7
125	850							OFF	ON	41	7
126	850							ON	OFF	41	7
127	850							OFF	ON	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 5 of 14)

ENTRY	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
128	850							ON	OFF	41	7
129	850							OFF	ON	41	7
130	850							ON	OFF	41	7
131	850							OFF	ON	41	7
132	850							ON	OFF	41	7
133	850							OFF	ON	41	7
134	850							ON	OFF	41	7
135	850							OFF	ON	41	7
136	850							ON	OFF	41	7
137	850							OFF	ON	41	7
186	850							NO	YES	41	7
200	850	EM				1		WAIT	RUN	41	7
212	850	LS	3740		3740		HI EXP MAIN BUS CURRENT			41	7
213	850	LS	3358	2396			EXP MAIN BUS VOLTAGE OOL			41	7
214	850	LS	410		819		HI IFEA LOWER HUMIDITY			41	7
215	850	LS	410		819		HI IFEA UPPER HUMIDITY			41	7
216	850	LS	1911	887	1979	887	IFEA PRESSURE 1 OOL			41	7
217	850	LS	1911	887	1979	887	IFEA PRESSURE 2 OOL			41	7
218	850	LS	1954		2035		HI LOWER ATMOS TEMP			41	7
219	850	LS	1954		2035		HI UPPER ATMOS TEMP			41	7
220	850	LS	504		585		HI IFEA WATER INLET TEMP			41	7
221	850	LS	827		907		HI IFEA WATER OUTLET TEMP			41	7
222	850	LS	827		907		HI CLD END SHELL TEMP			41	7
223	850	LS	827		907		HI HOT END SHELL TEMP			41	7
224	850	LS	827		907		HI RFM WATER OUTLET TEMP			41	7
261	850	LS	2007		2007		HI STEP MTR PHASE A CURRENT			41	7
262	850	LS	2163		2163		HI STEP MTR PHASE A VOLTAGE			41	7
263	850	LS	2007		2007		HI STEP MTR PHASE B CURRENT			41	7
264	850	LS	2163		2163		HI STEP MTR PHASE B VOLTAGE			41	7
266	850	LS	827		1067		HI FTS STEPPER MOTOR TEMP			41	7
268	850	LS	3003		3003		HI COLD GUARD HTR CURRENT			41	7
269	850	LS	1536		1536		HI COLD GUARD HTR VOLTAGE			41	7
270	850	LS	3003		3003		HI COLD PRIM HTR CURRENT			41	7

003 005 012 020 028 036 038 066 072 079 081 083

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 6 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
271	850	LS	1536		1536		HI COLD PRIM HTR VOLTAGE			41	7
272	850	LS	3003		3003		HI COLD RED HTR CURRENT			41	7
273	850	LS	1536		1536		HI COLD RED HTR VOLTAGE			41	7
274	850	LS	3003		3003		HI BOOST HTR CURRENT			41	7
275	850	LS	3072		3072		HI BOOST HTR VOLTAGE			41	7
276	850	LS	3003		3003		HI HOT GUARD HTR CURRENT			41	7
277	850	LS	1536		1536		HI HOT GUARD HTR VOLTAGE			41	7
278	850	LS	3003		3003		HI HOT PRIM HTR CURRENT			41	7
279	850	LS	3072		3072		HI HOT PRIM HTR VOLTAGE			41	7
280	850	LS	3003		3003		HI HOT RED HTR CURRENT			41	7
281	850	LS	3072		3072		HI HOT RED HTR VOLTAGE			41	7
282	850	LS	827		907		HI CJ TEMP - COLD ZONE #1			41	7
283	850	LS	827		907		HI CJ TEMP - COLD ZONE #2			41	7
284	850	LS	827		907		HI CJ TEMP - HOT ZONE #1			41	7
285	850	LS	827		907		HI CJ TEMP - HOT ZONE #2			41	7
286	850	LS	827		907		HI CJ TEMP-SAMPLE 1 SENSOR 1			41	7
287	850	LS	827		907		HI CJ TEMP-SAMPLE 1 SENSOR 2			41	7
288	850	LS	827		907		HI CJ TEMP-SAMPLE 2 SENSOR 1			41	7
289	850	LS	827		907		HI CJ TEMP-SAMPLE 2 SENSOR 2			41	7
290	850	LS	827		907		HI CJ TEMP-SAMPLE 3 SENSOR 1			41	7
291	850	LS	827		907		HI CJ TEMP-SAMPLE 3 SENSOR 2			41	7
292	850	LS	827		907		HI CJ TEMP-SAMPLE 4 SENSOR 1			41	7
293	850	LS	827		907		HI CJ TEMP-SAMPLE 4 SENSOR 2			41	7
294	850	LS	827		907		HI CJ TEMP-SAMPLE 5 SENSOR 1			41	7
295	850	LS	827		907		HI CJ TEMP-SAMPLE 5 SENSOR 2			41	7
296	850	LS	827		907		HI CJ TEMP-SAMPLE 6 SENSOR 1			41	7
297	850	LS	827		907		HI CJ TEMP-SAMPLE 6 SENSOR 2			41	7
313	850	LS	987		1227		HI ALIGN ARM TEMP			41	7
314	850	LS	827		907		HI SEM TRACK TEMP			41	7
465	850							NO	YES	41	7
466	850							NO	YES	41	7
467	850							NO	YES	41	7
468	850							NO	YES	41	7

03	05	12	20	28	36	38	66	72	79	81	83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 7 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
469	850							NO	YES	41	7
489	850							OK	FAIL	41	7
490	850							OK	FAIL	41	7
491	850							OK	FAIL	41	7
492	850							OK	FAIL	41	7
493	850							OK	FAIL	41	7
494	850							OK	FAIL	41	7
495	850							OK	FAIL	41	7
496	850							OK	FAIL	41	7
497	850							OK	FAIL	41	7
498	850							OK	FAIL	41	7
499	850							OK	FAIL	41	7
500	850							OK	FAIL	41	7
501	850							OK	FAIL	41	7
502	850							OK	FAIL	41	7
503	850							OK	FAIL	41	7
504	850							OK	FAIL	41	7
505	850							OK	FAIL	41	7
506	850							OK	FAIL	41	7
507	850							OK	FAIL	41	7
508	850							OK	FAIL	41	7
509	850							OK	FAIL	41	7
510	850							OK	FAIL	41	7
511	850							OK	FAIL	41	7
512	850							OK	FAIL	41	7
513	850							OK	FAIL	41	7
514	850							OK	FAIL	41	7
515	850							OK	FAIL	41	7
516	850							OK	FAIL	41	7
517	850							OK	FAIL	41	7
518	850							OK	FAIL	41	7
519	850							OK	FAIL	41	7
520	850							OK	FAIL	41	7
03	05		12	20	28	36 38	66	72	79	81	83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 8 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////	
			UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXPID	TABLE
521	850							OK	FAIL	41	7
522	850							OK	FAIL	41	7
523	850							OK	FAIL	41	7
524	850							OK	FAIL	41	7
525	850							OK	FAIL	41	7
526	850							OK	FAIL	41	7
527	850							OK	FAIL	41	7
528	850							OK	FAIL	41	7
529	850							OK	FAIL	41	7
530	850							OK	FAIL	41	7
531	850							OK	FAIL	41	7
532	850							OK	FAIL	41	7
533	850							OK	FAIL	41	7
534	850							OK	FAIL	41	7
535	850							OK	FAIL	41	7
536	850							OK	FAIL	41	7
537	850							OK	FAIL	41	7
538	850							OK	FAIL	41	7
539	850							OK	FAIL	41	7
540	850							OK	FAIL	41	7
541	850							OK	FAIL	41	7
542	850							OK	FAIL	41	7
543	850							OK	FAIL	41	7
544	850							OK	FAIL	41	7
545	850							OK	FAIL	41	7
546	850							OK	FAIL	41	7
547	850							OK	FAIL	41	7
548	850							OK	FAIL	41	7
549	850							OK	FAIL	41	7
550	850							OK	FAIL	41	7
551	850							OK	FAIL	41	7
552	850							OK	FAIL	41	7
553	850							OK	FAIL	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 9 of 14)

ENTRY NUMBER	CONOR NUMBER	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
554	850							OK	FAIL	41	7
555	850							OK	FAIL	41	7
556	850							OK	FAIL	41	7
557	850							OK	FAIL	41	7
558	850							OK	FAIL	41	7
559	850							OK	FAIL	41	7
560	850							OK	FAIL	41	7
561	850							OK	FAIL	41	7
562	850							OK	FAIL	41	7
563	850							OK	FAIL	41	7
564	850							OK	FAIL	41	7
565	850							OK	FAIL	41	7
566	850							OK	FAIL	41	7
567	850							OK	FAIL	41	7
568	850							OK	FAIL	41	7
569	850							OK	FAIL	41	7
570	850							OK	FAIL	41	7
571	850							OK	FAIL	41	7
572	850							OK	FAIL	41	7
573	850							OK	FAIL	41	7
574	850							OK	FAIL	41	7
575	850							OK	FAIL	41	7
576	850							OK	FAIL	41	7
577	850							OK	FAIL	41	7
578	850							OK	FAIL	41	7
579	850							OK	FAIL	41	7
580	850							OK	FAIL	41	7
581	850							OK	FAIL	41	7
582	850							OK	FAIL	41	7
583	850							OK	FAIL	41	7
584	850							OK	FAIL	41	7
585	850							OK	FAIL	41	7
586	850							OK	FAIL	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 10 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE)		CRITICAL VALUES (RED LINE)		EXCEPTION MONITOR MESSAGE	DI STATE CODE		/////	
			UPPER LIMIT	LOWER LIMIT	UPPER LIMIT	LOWER LIMIT/ EXPECTED STATE		0=	1=	EXPID	TABLE
587	850							OK	FAIL	41	7
588	850							OK	FAIL	41	7
589	850							OK	FAIL	41	7
590	850							OK	FAIL	41	7
591	850							OK	FAIL	41	7
592	850							OK	FAIL	41	7
593	850							OK	FAIL	41	7
594	850							OK	FAIL	41	7
595	850							OK	FAIL	41	7
596	850							OK	FAIL	41	7
597	850							OK	FAIL	41	7
598	850							OK	FAIL	41	7
599	850							OK	FAIL	41	7
600	850							OK	FAIL	41	7
601	850							OK	FAIL	41	7
602	850							OK	FAIL	41	7
603	850							OK	FAIL	41	7
604	850							OK	FAIL	41	7
605	850							OK	FAIL	41	7
606	850							OK	FAIL	41	7
607	850							OK	FAIL	41	7
608	850							OK	FAIL	41	7
609	850							OK	FAIL	41	7
610	850							OK	FAIL	41	7
611	850							OK	FAIL	41	7
612	850							OK	FAIL	41	7
613	850							OK	FAIL	41	7
614	850							OK	FAIL	41	7
615	850							OK	FAIL	41	7
616	850							OK	FAIL	41	7
617	850							OK	FAIL	41	7
618	850							OK	FAIL	41	7
619	850							OK	FAIL	41	7
03	05		12	20	28	36 38	66	72	79	81	83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 11 of 14)

ENTRY	NUMBER	CONN	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
620	850								OK	FAIL	41	7
621	850								OK	FAIL	41	7
622	850								OK	FAIL	41	7
623	850								OK	FAIL	41	7
624	850								OK	FAIL	41	7
625	850								OK	FAIL	41	7
626	850								OK	FAIL	41	7
627	850								OK	FAIL	41	7
628	850								OK	FAIL	41	7
629	850								OK	FAIL	41	7
630	850								OK	FAIL	41	7
631	850								OK	FAIL	41	7
632	850								OK	FAIL	41	7
633	850								OK	FAIL	41	7
634	850								OK	FAIL	41	7
635	850								OK	FAIL	41	7
636	850								OK	FAIL	41	7
637	850								OK	FAIL	41	7
638	850								OK	FAIL	41	7
639	850								OK	FAIL	41	7
640	850								OK	FAIL	41	7
641	850								OK	FAIL	41	7
642	850								OK	FAIL	41	7
643	850								OK	FAIL	41	7
644	850								OK	FAIL	41	7
645	850								OK	FAIL	41	7
646	850								OK	FAIL	41	7
647	850								OK	FAIL	41	7
648	850								OK	FAIL	41	7
649	850								OK	FAIL	41	7
650	850								OK	FAIL	41	7
651	850								OK	FAIL	41	7
652	850								OK	FAIL	41	7

03	05	12	20	28	36	38	66	72	79	81	83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 12 of 14)

ENTRY NUMBER	CONNOR	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
653	850							OK	FAIL	41	7
654	850							OK	FAIL	41	7
655	850							OK	FAIL	41	7
656	850							OK	FAIL	41	7
657	850							OK	FAIL	41	7
658	850							OK	FAIL	41	7
659	850							OK	FAIL	41	7
660	850							OK	FAIL	41	7
661	850							OK	FAIL	41	7
662	850							OK	FAIL	41	7
663	850							OK	FAIL	41	7
664	850							OK	FAIL	41	7
665	850							OK	FAIL	41	7
666	850							OK	FAIL	41	7
667	850							OK	FAIL	41	7
668	850							OK	FAIL	41	7
669	850							OK	FAIL	41	7
670	850							OK	FAIL	41	7
671	850							OK	FAIL	41	7
672	850							OK	FAIL	41	7
673	850							OK	FAIL	41	7
674	850							OK	FAIL	41	7
675	850							OK	FAIL	41	7
676	850							OK	FAIL	41	7
677	850							OK	FAIL	41	7
678	850							OK	FAIL	41	7
679	850							OK	FAIL	41	7
680	850							OK	FAIL	41	7
681	850							OK	FAIL	41	7
682	850							OK	FAIL	41	7
683	850							OK	FAIL	41	7
684	850							OK	FAIL	41	7
685	850							OK	FAIL	41	7

03 05 12 20 28 36 38 66 72 79 81 83

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 13 of 14)

ENTRY NUMBER	CONN OR	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
686	850							OK	FAIL	41	7
687	850							OK	FAIL	41	7
688	850							OK	FAIL	41	7
689	850							OK	FAIL	41	7
690	850							OK	FAIL	41	7
691	850							OK	FAIL	41	7
692	850							OK	FAIL	41	7
693	850							OK	FAIL	41	7
694	850							OK	FAIL	41	7
695	850							OK	FAIL	41	7
696	850							OK	FAIL	41	7
697	850							OK	FAIL	41	7
698	850							OK	FAIL	41	7
699	850							OK	FAIL	41	7
700	850							OK	FAIL	41	7
701	850							OK	FAIL	41	7
702	850							OK	FAIL	41	7
703	850							OK	FAIL	41	7
704	850							OK	FAIL	41	7
705	850							OK	FAIL	41	7
706	850							OK	FAIL	41	7
707	850							OK	FAIL	41	7
708	850							OK	FAIL	41	7
709	850							OK	FAIL	41	7
710	850							OK	FAIL	41	7
711	850							OK	FAIL	41	7
712	850							OK	FAIL	41	7
713	850							OK	FAIL	41	7
714	850							OK	FAIL	41	7
715	850							OK	FAIL	41	7
716	850							OK	FAIL	41	7
717	850							OK	FAIL	41	7
718	850							OK	FAIL	41	7

003 005 012 020 028 036 038 066 072 079 081 083

TABLE 2.7-5. POIC LIMIT SENSING/EXCEPTION MONITOR REQUIREMENTS (Sheet 14 of 14)

ENTRY NUMBER	CORR NO	MONITOR TYPE	WARNING VALUES (YELLOW LINE) UPPER LIMIT	WARNING VALUES (YELLOW LINE) LOWER LIMIT	CRITICAL VALUES (RED LINE) UPPER LIMIT	CRITICAL VALUES (RED LINE) LOWER LIMIT/ EXPECTED STATE	EXCEPTION MONITOR MESSAGE	DI STATE CODE 0=	DI STATE CODE 1=	EXPID	TABLE
719	850							OK	FAIL	41	7
720	850							OK	FAIL	41	7
721	850							OK	FAIL	41	7
722	850							OK	FAIL	41	7
723	850							OK	FAIL	41	7
724	850							OK	FAIL	41	7
725	850							OK	FAIL	41	7
726	850							OK	FAIL	41	7
727	850							OK	FAIL	41	7
728	850							OK	FAIL	41	7
729	850							OK	FAIL	41	7
730	850							OK	FAIL	41	7
731	850							OK	FAIL	41	7
732	850							OK	FAIL	41	7
733	850							OK	FAIL	41	7
734	850							OK	FAIL	41	7
735	850							OK	FAIL	41	7
736	850							OK	FAIL	41	7
737	850							OK	FAIL	41	7
738	850							OK	FAIL	41	7
739	850							OK	FAIL	41	7
740	850							OK	FAIL	41	7
741	850							OK	FAIL	41	7
742	850							OK	FAIL	41	7
743	850							OK	FAIL	41	7
744	850							OK	FAIL	41	7
745	850							OK	FAIL	41	7
746	850							OK	FAIL	41	7
747	850							OK	FAIL	41	7
748	850							OK	FAIL	41	7
749	850							OK	FAIL	41	7
750	850							OK	FAIL	41	7
264	851							RUN	WAIT	42	7
266	851							NO	YES	42	7
03	05		12	20	28	36 38	66	72	79	81	83

2.8. FLIGHT SOFTWARE REQUIREMENTS

This section of the Experiment/Facility Requirements Document (E/FRD) defines the Space Station Furnace Facility (SSFF) Data Management System (DMS) software functions required to support the Furnace Module-1. Furnace Module-1 will require the SSFF Furnace Control Unit (FCU) and Furnace Actuator Unit (FAU) software to provide networking, data processing, storage and data acquisition and control for Furnace Module-1. The following subsections define the required resources and data handling requirements of Furnace Module-1.

2.8.1 COMMAND SUPPORT

The SSFF software will support the issuance of commands by the Furnace Module-1 application software or commands issued by Tier 1 or the SSFF Core Control Unit (CCU).

2.8.2 DATA ACQUISITION

The SSFF software will support the acquisition of the Furnace Module-1 data defined in Section 2.7 of this E/FRD.

2.8.3 DATA PROCESSING

The SSFF software shall support limited processing of Furnace Module-1 data defined in Section 2.7 of this E/FRD.

2.8.4 DATA ROUTING/FORMATTING

The SSFF software shall support formatting and routing of Furnace Module-1 data, defined in Section 2.7 of this E/FRD, to the SSFF CCU.

2.8.5 DOWNLOADING APPLICATION SOFTWARE AND DATA

The SSFF software shall support downloading of Furnace Module-1 application software and data.

2.8.6 DOWNLOADING ANCILLARY DATA

The SSFF software shall support the retrieval and downloading of ancillary data to the Furnace Module-1 application software.

2.8.7 FDIR SUPPORT

The SSFF software shall provide fault detection, isolation, and recovery (FDIR) support for Furnace Module-1.

2.8.8 OPERATING SYSTEM SERVICES

The SSFF software shall provide operating system services for the Furnace Module-1 application software.

2.8.9 HEALTH AND STATUS DATA

The SSFF shall acquire health and status data from the Furnace Module-1 application software for SSFF storage or transfer to the SSF.

2.9. PHYSICAL INTEGRATION

This section describes the Furnace Module-1 integration/deintegration requirements and flow. Figure 2.9-1 illustrates the Furnace Module-1 physical integration activity flow from the beginning of prelaunch site activities, through deintegration after return from space.

Table 2.9-1 provides the integration facility requirements for each stage of integration. Table 2.9-2 describes the requirements and activities at each step of the integration process.

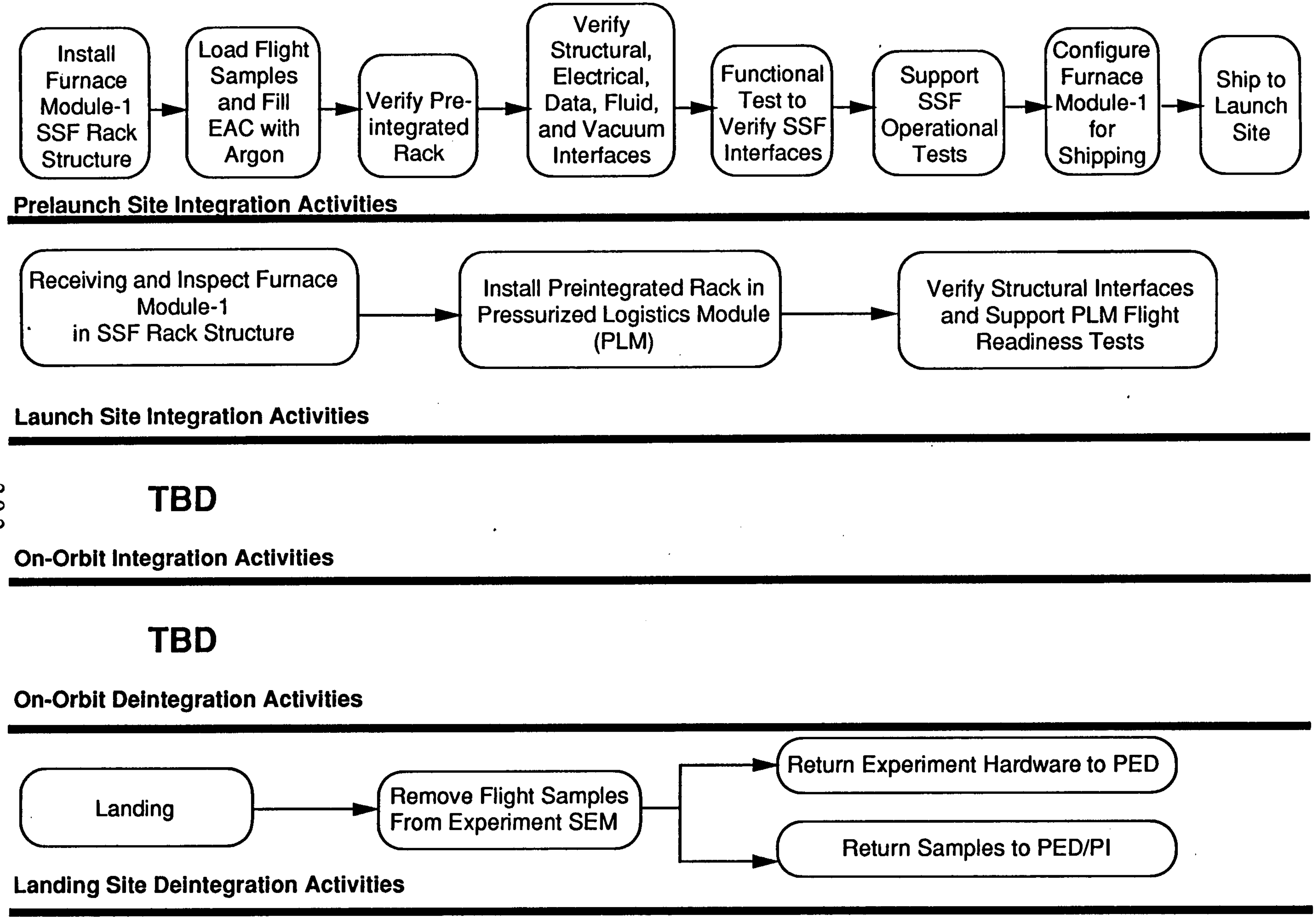

FIGURE 2.9-1. PHYSICAL INTEGRATION FLOW

TABLE 2.9-1. FURNACE MODULE-1 GROUND PROCESSING REQUIREMENTS
(Sheet 1 of 2)

(√) Experiment/Facility Preintegration
(   ) Experiment/Facility Preparation
(   ) Postmission Requirements

Description of Planned Activities:

Functional tests, sample loading, and closeout will be performed after the EAC is mounted on the rotation fixture.

Total Floor Space Required Including Space for GSE: 2000 ft^2

Ceiling Height Required: 10 ft

Overhead Crane Required: √ Yes ____ No   Hook Height 8 ft

Facility Power Required:
√ 120 V, 1 F, 60 Hz
√ 208 V, 3 F, 60 Hz
√ Other 220 V, Single Phase, 60 Hz

Other Facility Support: Gases
√ GN_2 Liquids Water
√ GHe
Argon Other

Environment: √ Standard ____ Other

Hazardous Operations: ____ Yes √ No

Total Anticipated Use Time: 21 Days

Other Facility Support Description:

Mass spectrometer leak test

TABLE 2.9-1. FURNACE MODULE-1 GROUND PROCESSING REQUIREMENTS
(Sheet 2 of 2)

(√) Experiment/Facility Preintegration
(   ) Experiment/Facility Preparation
(   ) Postmission Requirements

Description of Planned Activities:

Functional tests, sample loading, and closeout will be performed after the EAC is mounted on the rotation fixture.

Total Floor Space Required Including Space for GSE: 2000 ft^2

Ceiling Height Required: 10 ft

Overhead Crane Required: √ Yes ____ No   Hook Height 8 ft

Facility Power Required
- √ 120 V, 1 F, 60 Hz
- ___ 208 V, 3 F, 60 Hz
- ___ Other 220 V, Single Phase, 60 Hz

Other Facility Support: Gases
- ____ GN_2
- ____ GHe
- ____ Other

Liquids Water

Environment √ Standard ____ Other

Hazardous Operations: ____ Yes √ No

Total Anticipated Use Time: 3 Days

Other Facility Support Description:

Mass spectrometer leak test

TABLE 2.9-2. FURNACE MODULE-1 INTEGRATION REQUIREMENTS

Description of Special Alignment, Calibration, Servicing, or Performance Verification and Estimated Time to Perform: TBD
Identification of Any Constraints on Experiment/Facility Operations During Tests: TBD
Description of Time-Critical Operations and Time Constraints: TBD

2.10. OPERATIONS SUPPORT

Table 2.10-1 describes the physical and operational support required at the Ground Science Operations Control Center, during flight of the Space Station Furnace Facility (SSFF). Specifically, this facility has been designated as the Payload Operations and Integration Center (POIC) by the Space Station Freedom (SSF) Program.

TABLE 2.10-1. FURNACE MODULE-1 MISSION OPERATIONS SUPPORT

COMMUNICATIONS REQUIREMENTS:

Downlink Data

Three terminals

Uplink Commands/data

Three terminals

Voice Communications

Access for three

Video

Real-time and recorded

SUPPORT EQUIPMENT:

Description

Dimensions

Power Requirements

Data Interface

REMOTE SITE INTERFACE

Location

Off-line room for three scientists with access to monitor voice, video, and data.

Describe interfaces

2.11. TRAINING OBJECTIVES

Presently, the training objectives are TO BE SUPPLIED. The following is a detailed generic explanation of the Integrated Requirements on Payloads (IROP) requirements.

Training required for a successful mission begins with the Principal Investigator (PI)/Payload Element Developer (PED) team identifying the training objectives for each task of the experiment. This section shall identify and describe training objectives, trainees, and instructors necessary for experiment operation. This section shall also identify the hardware and software trainers required to support flight-like training.

There are three categories of personnel who will require training to support the mission. Training objectives will be required for each category. These categories are:

- Crew
- POIC cadre
- PI/PED team

Table 2.11-1 identifies the major training objectives, the trainees, and the organizations responsible for developing and conducting required mission payload training. The Furnace Module-1 PED may develop and conduct the training or identify training to be provided by the Core facility PED and/or POIC training function.

The PI/PED team and the Payload Increment Manager (PIM) shall jointly define the training objectives for training at NASA facilities and for integrated training with other mission experiments.

The PIM shall define the increment-independent training objectives for the POIC cadre and will define the increment-independent training objectives for the crew and PI/PED team for training conducted at Marshall Space Flight Center (MSFC).

The PI/PED and PIM shall provide information detailing training objectives for each operational task. The requirements for a trainer and its fidelity shall also be specified. MSFC POIC will develop increment training requirements based on inputs from each payload flown on a specific increment.

2.11.1 PI/PED-DEFINED TRAINING

The Furnace Module-1 (FM-1) PI/PED shall define the training objectives necessary for the crew to understand the required science to operate the furnace module to obtain science data. The FM-1 PI/PED shall also define training objectives required for the POIC cadre and the PIM support of experiment operations. The FM-1 PI/PED will specify the training equipment such as flight-like hardware or trainers required to support the training objectives. Table 2.11-2 will identify the equipment to be supplied by the PI/PED and the equipment requested to be furnished by the SSFP.

TABLE 2.11-1. TRAINING PARTICIPATION

Training Objectives	Trainee	Instructor
PI/PED defined		
Science Background/ Experiment Objectives	Crew Cadre	SSFF PI/PED
FM-1 Systems Familiarization	Crew Cadre	FM-1 PED
FM-1 Operations	Crew Cadre	FM-1 PED
PIM and PI/PED Jointly Defined		
Experiment Proficiency Training	Crew Cadre*	PI/PED, PTC
Integrated Training	Crew Cadre*	PI/PED, PTC
Simulations	Crew Cadre	PI/PED, PTC
PIM Defined		
Increment Independent	Crew Cadre	POIC
POIC Facility Training	Cadre	PI/PED, POIC

* Limited cadre participation

TABLE 2.11-2. FURNACE MODULE-1 TRAINING OBJECTIVES

TRAINING OBJECTIVE		TRAINEE	LEVEL	RESPONSIBLIITY	SIMULATOR REQUIRED				COMMENTS
NO.	DESCRIPTION				YES/ NO	H/W FIDELITY	S/W Y/N	PROVIDER	
1.0	**SCIENCE BACKGROUND**	Crew, cadre	c/a	FM-1 PI/PED	NO				Classroom Instruction
1.1	FM-1 Science Basis and Significance	Crew, cadre	c/a	FM-1 PI/PED	NO				
1.2	FM-1 Science Objectives	Crew, cadre	c/a	FM-1 PI/PED	NO				
1.3	FM-1 Science Theory	Crew, cadre	c/a	FM-1 PI/PED	NO				
1.4	FM-1 Experiment Operations Philosophy	Crew, cadre	c/a	FM-1 PI/PED	NO				
2.0	**FM-1 SYSTEMS FAMILIARIZATION**								
2.1 2.1.1 2.1.2 2.1.3 2.1.4 2.1.5	Hardware Rack location Instrument Components Stowage locations FM-1 Command & Display DMS Interfaces	Crew, cadre	b/a	FM-1 PI/PED	YES	a	YES	FM-1 PI/PED	
2.2 2.2.1 2.2.2 2.2.3 2.2.4	Software DMS Displays Command Capabilities Keyboard/MPAC/uplink Timeline requirements	Crew, cadre	b/a	FM-1 PI/PED	YES	a	YES	FM-1 PI/PED	
2.3 2.3.1 2.3.2	Data Collection Onboard Downlink	Crew, cadre	b/a	FM-1 PI/PED	YES	a	YES	FM-1 PI/PED	

The PI/PED shall supply objectives for training in the following areas. Other areas may also be included.

- Science Background and Experiment Objectives - Basis and significance of experiment, relationship to precursor experiments, specific objectives of experiment.
- Experiment Systems Familiarization (hardware and software) - Hardware and software elements [both on-orbit and ground support equipment (GSE)] that constitute the experiment system.
- Experiment Operations (nominal, malfunction, in-flight maintenance) - Hands-on training using breadboards, simulators, or flight hardware/software.

The knowledge and skill level for each operational task shall be identified. Tables 2.11-3 and 2.11-4 provide a means of coding the level of proficiency to which the student should be trained in order to accomplish the task. The information will also be used in developing course materials and training equipment.

2.11.2 PIM AND PI/PED JOINTLY DEFINED TRAINING

The PIM and the PI/PED team will jointly define the following training objectives:

- Experiment Proficiency Training - Repetitive exercise of specific experiment operations to develop and maintain operational skills at a flight readiness level.
- Integrated Training - Repetitive exercise of selected portions of the integrated timeline conducted within a simulated mission operations environment and with onboard crew operations as its focus.
- Simulations - Exercise of major portions of the integrated timeline conducted at the highest level of fidelity. Includes all payload elements and may include element of the SSF operations. Exercise crew, POIC cadre, PI/PED team, and SSF operations teams in nominal and contingency operations with emphasis on developing specific skills, strategies, and interactions.

Table 2.11-2 shall be completed using inputs provided by the PIM and PI/PED team. This information is normally obtained from the Increment Training Assessment Team (TAT). The TAT is composed of representatives from POIC, PIM, and PI/PED team who gather, review, and assess mission training needs. The TAT reviews mission documentation and obtains experiment operations and interface requirements for the PIs and from design reviews. It reviews available training equipment and assess the need for development of trainers by the PI/PED team or NASA to accomplish training objectives.

Experiment/PTC/POIC operational training interface needs such as data flow, power and thermal requirements, trainer control and display, and experiment GSE shall be identified in this paragraph.

TABLE 2.11-3. KNOWLEDGE LEVELS

CODE	TRAINEE WILL BE ABLE TO:
a	Recall nomenclature, simple facts, or simple procedures involved in the task or operation.
b	Determine step-by-step procedures for sets of tasks or operations or for accomplishing important decisions.
c	Explain why and when each task or operation must be done.
d	Predict, identify, and solve problems related to the task or operation.

TABLE 2.11-4. SKILL PROFICIENCY LEVELS

CODE	TRAINEE WILL BE ABLE TO:
1	Accomplish most task activities only by being told or shown how.
2	Accomplish most of the behaviors in task or activity, but not necessarily to desired levels of speed or accuracy.
3	Accomplish behaviors in a task or activity at minimum acceptable levels of speed or accuracy.
4	Accomplish all behaviors in an activity at highest levels of speed or accuracy and be able to tell or show others how to do the activities.

Note: This is not a design requirement, but an instrument to document training objectives that present an early need for training equipment and interfaces with the training facility.

2.11.3 PIM-DEFINED TRAINING

The PIM will define the following training objectives:

- Increment-Independent Training - Includes training on SSF and payload support systems and subsystems that remain relatively constant from increment to increment. Examples are Data Management System (DMS), SSF overview, SSF Caution and Warning System, etc.
- POIC Facility Training - Classroom and hands-on opportunities for training on specific POIC facilities such as Operations Management Information System (OMIS), communications protocols, and generic POIC procedures.

2.11.3.1 Increment-Independent Training - Crew

The increment-independent training for the crew on SSF systems and procedures shall be defined by Johnson Space Center (JSC) in JSC training documents and shall be provided at JSC/Kennedy Space Center (KSC).

Increment-independent training for the crew to support payload operations shall be defined by the PIM and provided at Marshall Space Flight Center (MSFC).

The training objectives, trainee responsibility, and any required training equipment shall be listed in Table 2.11-2.

2.11.3.2 Increment-Independent Training - PI/PED Team

The increment-independent training required for the PI/PED team to support the increment at MSFC is defined in this E/FRD. Trainee responsibility and required training equipment shall be listed in Table 2.11-2.

2.11.3.3 Increment-Independent Training - POIC Cadre

The increment-independent training required for the POIC cadre to support the increment is defined in the MSFC Increment-Independent Training Plan.

2.11.4 TRAINING SIMULATION

Experiment trainers will be developed by the PI/PED based upon analysis of training objectives, available training tools, existing trainers, and availability of training opportunities on flight hardware.

The FM-1 PI/PED shall participate in trainer development by identifying training needs in this document. The PI/PED shall provide detailed data inputs to the TAT and Payload Training

Requirement Document (PTRD) and shall participate in Payload Trainer design acceptance reviews.

Training objectives that require a trainer to accomplish the training task shall be listed in this paragraph outlining the overall desired capabilities.

Examples:

Joystick Operation - Capable of interaction with control panel and trainer software.

Scene Generation - Capable of tracking any predefined target.

2.11.5 TRAINING PARTICIPATION

The PI/PED shall participate as instructor or trainee in formal training programs as outlined in Tables 2.11-1, 2.11-2, 2.11-3 and 2.11-4. Schedules and detailed objectives will be developed and maintained in the User Payload Training Plan (UPTP).

2.12. ENVIRONMENTAL CONTAMINATION DATA REQUIREMENTS

Tables 2.12-1, 2.12-2, and 2.12-3 define the environmental contamination requirements for Furnace Module-1.

TABLE 2.12-1. FLIGHT ENVIRONMENTAL LIMITS

	SENSITIVITY LIMIT				EXPERIMENT GENERATED			
	OPERATING		NONOPERATING		OPERATING		NONOPERATING	
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
CONTAMINATION MODULE ITEMS	N/A	N/A	N/A	N/A	0	0	0	0
A. PARTICULATE SIZE (μm), number/m^3	N/A	N/A	N/A	N/A	0	0	0	0
B. TRACE GASES (type & ppm)	N/A	N/A	N/A	N/A	-	-	-	-
PRESSURE (N/m^2)								

TABLE 2.12-2. EXTERNAL CONTAMINATION SOURCES

Does experiment/facility release (vent, purge) any material overboard on orbit?

Yes __√__ **No** ____

PARAMETER	DESCRIPTION
FOs of Occurrence	ALL
Frequency	TBD
Duration	TBD
Composition	Argon, Nitrogen, Air
Phase State (solid, liquid, or gas)	Gas
Quantity or Rate of Release	7 to 37 lbm*

* Maximum, assumes active pressure control for four samples and one manual sample exchange.

TABLE 2.12-3. ON-ORBIT EXTERNAL CONTAMINATION CONTROL SENSITIVITY

To understand and satisfy the on-orbit external contamination limits required by this experiment, please answer the following questions:

1. Is the equipment subject to corona? Yes ☐ No ☒

2. Are the experiment data affected by deposition of contaminants on sensitive surfaces? Yes ☐ No ☒

   - If yes, then answer the following:

     - Is the concern for deposition from particles, film/molecular, or both?
     - What is the FOV for receiving deposition from return flux?
     - What is the surface temperature of the sensitive element?
     - What are the limits of deposition in terms of experiment effects (e.g., 10% degradation at 1400 Å)?
     - List the FOs where deposition is a concern.
     - Is a controllable cover provided for non-data-collecting periods?

3. Is the experiment affected by induced contamination, such as water, CO_2, etc., in the FOV of the sensor? Yes ☐ No ☒

   - If yes, then answer the following:

     - Is the concern for particles, molecular, or both?
     - Breifly explain the allowable effects on the experiment; qualify the limits if possible (e.g., 10% modification of ambient environment composition; or 10% degradation of 1400 Å waveband; or allowable molecules/cm^2 column density).
     - List the FOs where induced contamination is a concern.