1.0 Introduction

E220/E500 HP, EHP, & EHPi
MEDUIM CURRENT
ION IMPLANTER
GEM MANUAL
Revision 9.1

Varian Semiconductor Equipment Associates, Inc.
35 Dory Road
Gloucester, MA 01930-2297

WARNING

General Equipment Warning

Only persons trained in the operation and maintenance of Varian ion implanters should attempt to perform these procedures.

Varian Semiconductor Equipment Associates Ion Implanters are complex systems that contain high current, high voltage power supplies, gases under high pressure, hot surfaces, toxic materials, ionizing and non- ionizing radiation and mechanical assemblies that are in motion or which can move rapidly and powerfully in response to a command, a component failure, or noise on a command line which is interpreted as a command. These can represent significant hazards with the potential to cause the death of or serious injury to any personnel not specifically trained in the operation and maintenance of these machines. It is the "machine specific" knowledge gained in this training, which makes the personnel aware of the nature and locations of the potential hazards and how to avoid exposure to them while servicing the machines.

1.0 General Information

This document contains the following documentation, arranged in three parts, in accordance with SEMI GEM standard E30-95, section 8:

General Information .

- Manufacturer and product number
- General description of equipment function
- Function of the GEM interface
- Software revision code
- Changes from previous versions

Message Summary .

The message summary contains two lists of all messages understood and all messages sent by the equipment in terms of their stream and function codes. All messages not listed on the received side are implied to cause an error message to the host. All messages not listed on the sent side are assumed never to be sent from the equipment.

Message Detail

The message detail contains the details for every message listed in the message summary. Messages that appear on both the sent and received sides shall be detailed separately.

1.1 Manufacturer And Product Number

The purpose of this manual is to describe the GEM implementation for the E220HP / E500HP Ion Implanters.

1.2 General Description Of Equipment Function

The Varian E220HP / E500HP is a Medium Current Ion Implanter which processes one or two cassettes of wafers as a batch, a single wafer at a time. A LOT ID (Material ID) can be specified for each cassette.

1.2.1 GEM Messages Defined

The following sections define the messages that are required for the GEM sub-system. Information in these sections follow the SEMI documentation standard as defined in SEMI E5-95 section 8.

1.2.2 Messages From The E220

The following GEM SECS II transactions shall be implemented in GEM:

H --> E	H <--E	
	S1F0	ABORT TRANSACTION S1
	S1F1	ARE YOU THERE REQUEST
S1F2		ON-LINE DATA
	S1F13	ESTABLISH COMMUNICATIONS REQUEST
S1F14		ESTABLISH COMMUNICATIONS ACKNOWLEDGE
	S2F17	DATE AND TIME REQUEST
S2F18		DATE AND TIME DATA
	S5F1	ALARM REPORT SEND
S5F2		ALARM REPORT ACKNOWLEDGE
	S6F1	TRACE DATA SEND
S6F2		TRACE DATA ACKNOWLEDGE
	S6F5	MULTI-BLOCK DATA SEND INQUIRE
S6F6		MULTI-BLOCK GRANT
	S6F11	EVENT REPORT SEND
S6F12		EVENT REPORT ACKNOWLEDGE
	S7F1	PROCESS PROGRAM LOAD INQUIRE
S7F2		PROCESS PROGRAM LOAD GRANT
	S7F3	PROCESS PROGRAM SEND
S7F4		PROCESS PROGRAM ACKNOWLEDGE
	S7F5	PROCESS PROGRAM REQUEST
S7F6		PROCESS PROGRAM DATA
	S7F23	FORMATTED PROCESS PROGRAM SEND
S7F24		FORMATTED PROCESS PROGRAM ACKNOWLEDGE
	S7F25	FORMATTED PROCESS PROGRAM REQUEST
S7F26		FORMATTED PROCESS PROGRAM DATA
	S7F27	PROCESS PROGRAM VERIFICATION SEND
S7F28		PROCESS PROGRAM VERIFICATION ACKNOWLEDGE
	S7F29	PROCESS PROGRAM VERIFICATION INQUIRE
S7F30		PROCESS PROGRAM VERIFICATION GRANT
	S9F1	UNRECOGNIZED DEVICE ID
	S9F3	UNRECOGNIZED STREAM TYPE
	S9F5	UNRECOGNIZED FUNCTION TYPE
	S9F7	ILLEGAL DATA
	S9F9	TRANSACTION TIMER TIMEOUT
	S9F11	DATA TOO LONG
	S10F1	TERMINAL REQUEST
S10F2		TERMINAL REQUEST ACKNOWLEDGE
	S10F7	MULTI-BLOCK NOT ALLOWED

1.2.3 Messages To The E220

The following GEM SECS II transactions shall be implemented in GEM:

H --> E	H <--E	
S1F0		ABORT TRANSACTION S1
S1F1		ARE YOU THERE
	S1F2	ON-LINE DATA
S1F3		SELECTED EQUIPMENT STATUS REQUEST
	S1F4	SELECTED EQUIPMENT STATUS DATA
S1F11		STATUS VARIABLE NAMELIST REQUEST
	S1F12	STATUS VARIABLE NAMELIST REPLY
S1F13		ESTABLISH COMMUNICATIONS REQUEST
	S1F14	ESTABLISH COMMUNICATIONS REQUEST ACKNOWLEDGE
S2F13		EQUIPMENT CONSTANT REQUEST
	S2F14	EQUIPMENT CONSTANT DATA
S2F15		NEW EQUIPMENT CONSTANT SEND
	S2F16	NEW EQUIPMENT CONSTANT ACKNOWLEDGE
S2F17		DATE AND TIME REQUEST
	S2F18	DATE AND TIME DATA
S2F23		TRACE INITIALIZE SEND
	S2F24	TRACE INITIALIZE ACKNOWLEDGE
S2F29		EQUIPMENT CONSTANT NAMELIST REQUEST
	S2F30	EQUIPMENT CONSTANT NAMELIST
S2F31		DATE AND TIME SET REQUEST
	S2F32	DATE AND TIME SET ACKNOWLEDGE
S2F33		DEFINE REPORT
	S2F34	ACKNOWLEDGE
S2F35		LINK EVENT REPORT
	S2F36	ACKNOWLEDGE
S2F37		ENABLE/DISABLE EVENT REPORT
	S2F38	ACKNOWLEDGE
S2F39		MULTI-BLOCK INQUIRE
	S2F40	MULTI-BLOCK GRANT
S2F41		HOST COMMAND SEND
	S2F42	HOST COMMAND ACKNOWLEDGE
S2F43		RESET SPOOLING STREAMS AND FUNCTIONS
	S2F44	RESET SPOOLING ACKNOWLEDGE
S2F45		DEFINE VARIABLE LIMIT ATTRIBUTES
	S2F46	VARIABLE LIMIT ATTRIBUTE ACKNOWLEDGE
S2F47		VARIABLE LIMIT ATTRIBUTE REQUEST
	S2F48	VARIABLE LIMIT ATTRIBUTE SEND
S2F49		ENHANCED REMOTE COMMAND
	S2F50	ENHANCED REMOTE COMMAND ACKNOWLEDGE
S2F71		Initiate Processing Request (Factory Automation Only)
	S2F72	Initiate Processing Acknow ledge
S5F3		ENABLE/DISABLE ALARM SEND
	S5F4	ACKNOWLEDGE
S5F5		LIST ALARMS
	S5F6	ACKNOWLEDGE
S615		EVENT REPORT REQUEST
	S6F16	EVENT REPORT DATA
S6F19		INDIVIDUAL REPORT REQUEST
	S6F20	INDIVIDUAL REPORT DATA
S6F23		REQUEST SPOOLED DATA
	S6F24	REQUEST SPOOLED DATA ACKNOWLEDGE
S7F1		PROCESS PROGRAM LOAD INQUIRE
	S7F2	PROCESS PROGRAM LOAD GRANT
S7F3		PROCESS PROGRAM SEND
	S7F4	PROCESS PROGRAM ACKNOWLEDGE
S7F5		PROCESS PROGRAM REQUEST
	S7F6	PROCESS PROGRAM DATA
S7F17		DELETE PROCESS PROGRAM SEND
	S7F18	DELETE PROCESS PROGRAM ACKNOWLEDGE
S7F19		CURRENT EPPD REQUEST
	S7F20	CURRENT EPPD DATA
S7F23		FORMATTED PROCESS PROGRAM SEND
	S7F24	FORMATTED PROCESS PROGRAM ACKNOWLEDGE
S7F25		FORMATTED PROCESS PROGRAM REQUEST
	S7F26	FORMATTED PROCESS PROGRAM DATA

1.3 Function Of The GEM Interface

The GEM sub-system is composed of hardware and software. The hardware component is a SECS interface board, SIB-311. The software has five components:

FORTH based GEM interface software which is integrated into the E220HP / E500HP control program.

A multi-tasking operating system to provide data sharing and intertask communication for the E220HP / E500HP application and the GEM functions.

The GEM task, 'C' code to initialize the link between the E220HP / E500HP application and integrate the GWGEM function library.

GWGEM, a 'C' function library, a product from GW Associates.

SDR, driver interfacing the SIB-311 to DOS and the E220HP / E500HP application

Protocol Parameter	Parameter Description	Units	Standard Default Value
T1	Inter Character Timeout	Sec.	0.5
T2	Protocol Timeout	Sec.	10
T3	Reply Timeout	Sec.	45
T4	Inter Block Timeout	Sec.	45
T5	Connect Separation Timeout (HSMS only)	Sec.	10
T6	Control Transaction Timeout (HSMS only)	Sec.	5
T7	NOT SELECTED TIMEOUT (HSMS only)	Sec.	10
T8	Netw ork Intercharacter Timeout (HSMS only)	Sec.	5
Baud	Baud Rate	Bits/Sec.	9600
Retry	Retry Limit	No. of	3

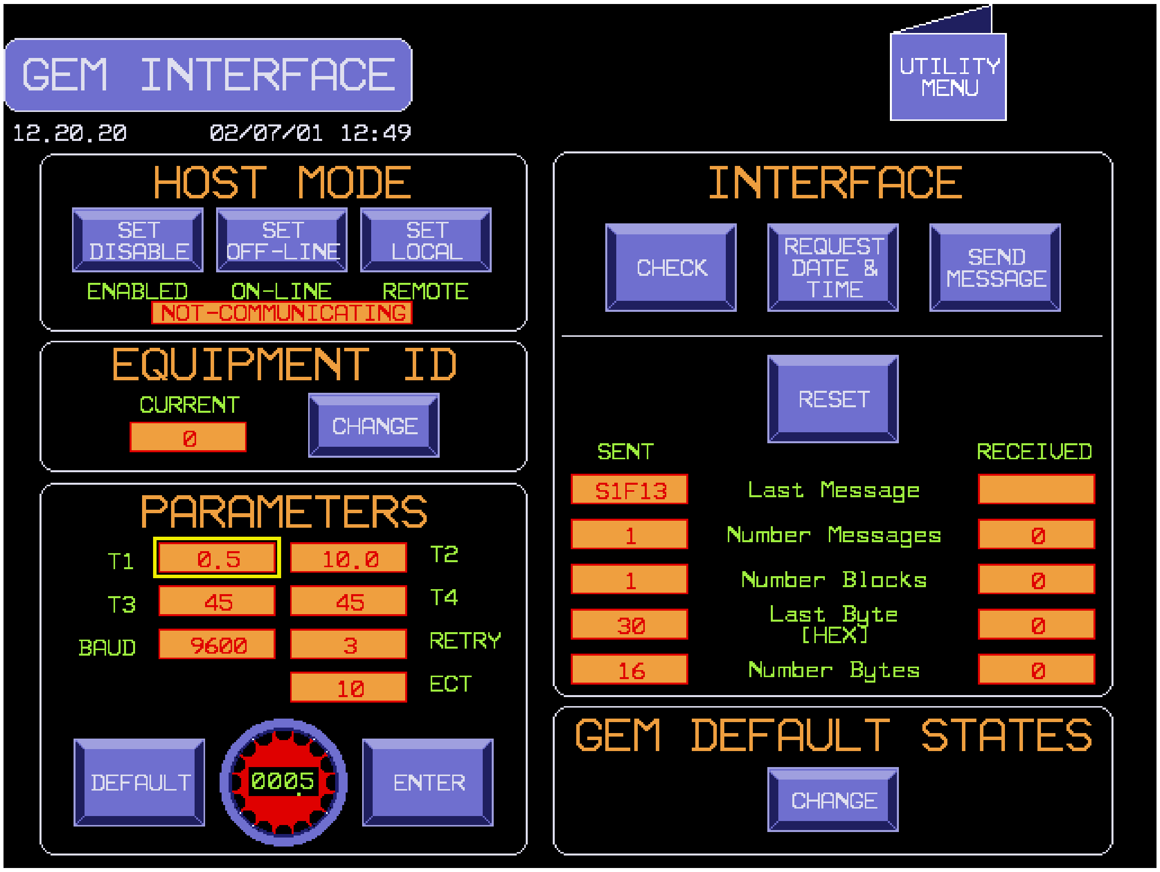
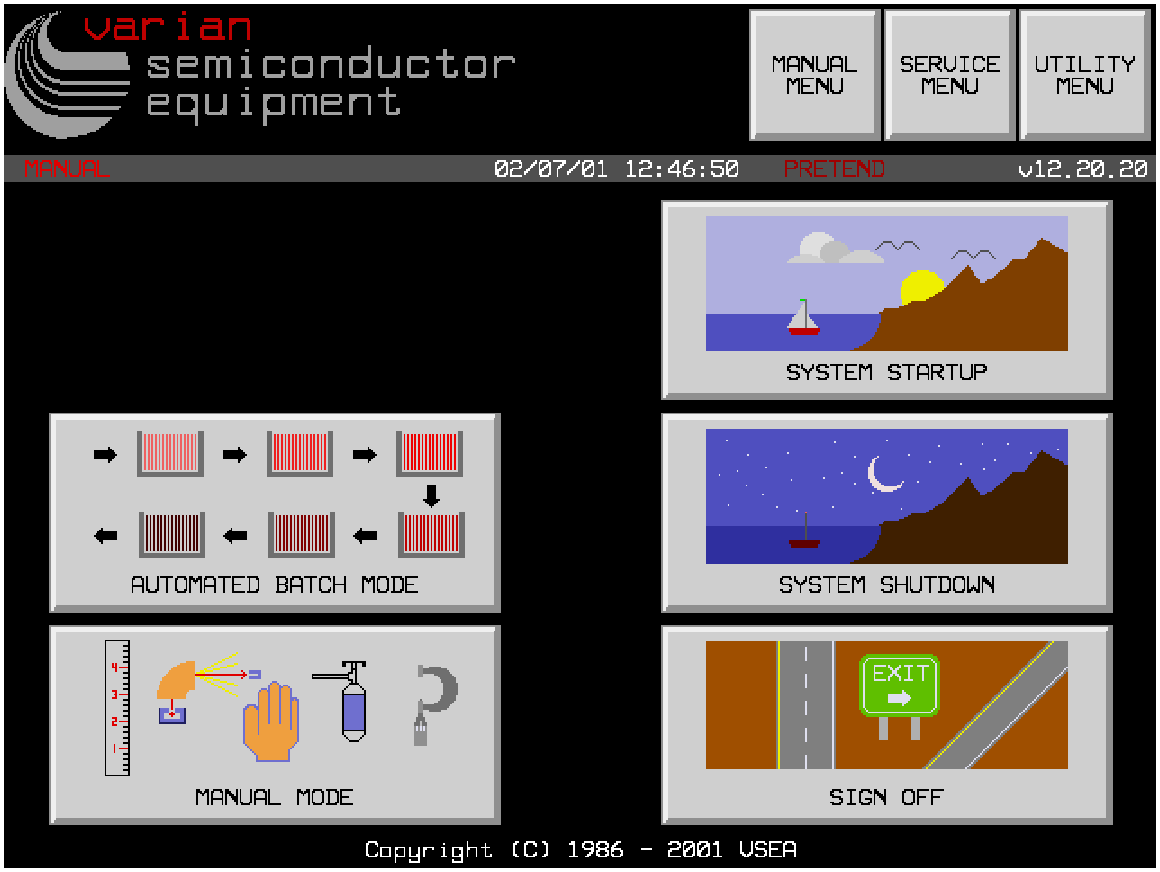


Figure 1 – SCREEN 1, HOST INTERFACE

The Host Mode section has two button icons that contain the present control state of the communications: ON-LINE or OFF-LINE, REMOTE or LOCAL. Touching the icon causes the control state to switch to the alternative state i.e.: REMOTE -> LOCAL, LOCAL -> REMOTE; ON-LINE -> OFF-LINE, OFF-LINE -> ON-LINE.

The MODE MENU screen, shown below in Screen 2, displays the HOST CONTROL button when the GEM option is active. Entry into the HOST CONTROL screen will be allowed if the equipment and Host have established communications. Upon entry into the HOST CONTROL screen the GEM control state will be set to on-line and remote.



VERSION INTRODUCED: 12.20

Figure 2 - SCREEN 2, MODE MENU

1.3.1 Hardware Component

The hardware is a SECS interface board, SIB-311. The SIB-311 is a single printed circuit board occupying one expansion slot on the ISA bus of the PC. The SIB-311 provides the following hardware: on-board CPU, RAM, I/O ports, interrupt request signal, RS 232C interface with a DB37F connector. The SECS interface board contains its own microprocessor, memory, and performs the entire SECS I, independently of the Intel 486. The SIB-311 interface includes addressing of the memory and I/O port.

The customer host must be connected to port #1 of the SIB board connector located at the back of the PC.
Ports #2 and #3 are serial connections to the SMIF interface box. Port #2 provides the left SMIF serial connection while port #3 provides serial communication to the right SMIF.

When option 125 (HSMS Host) is selected, the hardware used is 3COM ethernet card PCI-bus type. This configuration requires the faster AMD 400 type control computer.

1.3.2 Software Component

The software components of GEM are a sub-system within the E220HP / E500HP application, see figure below.

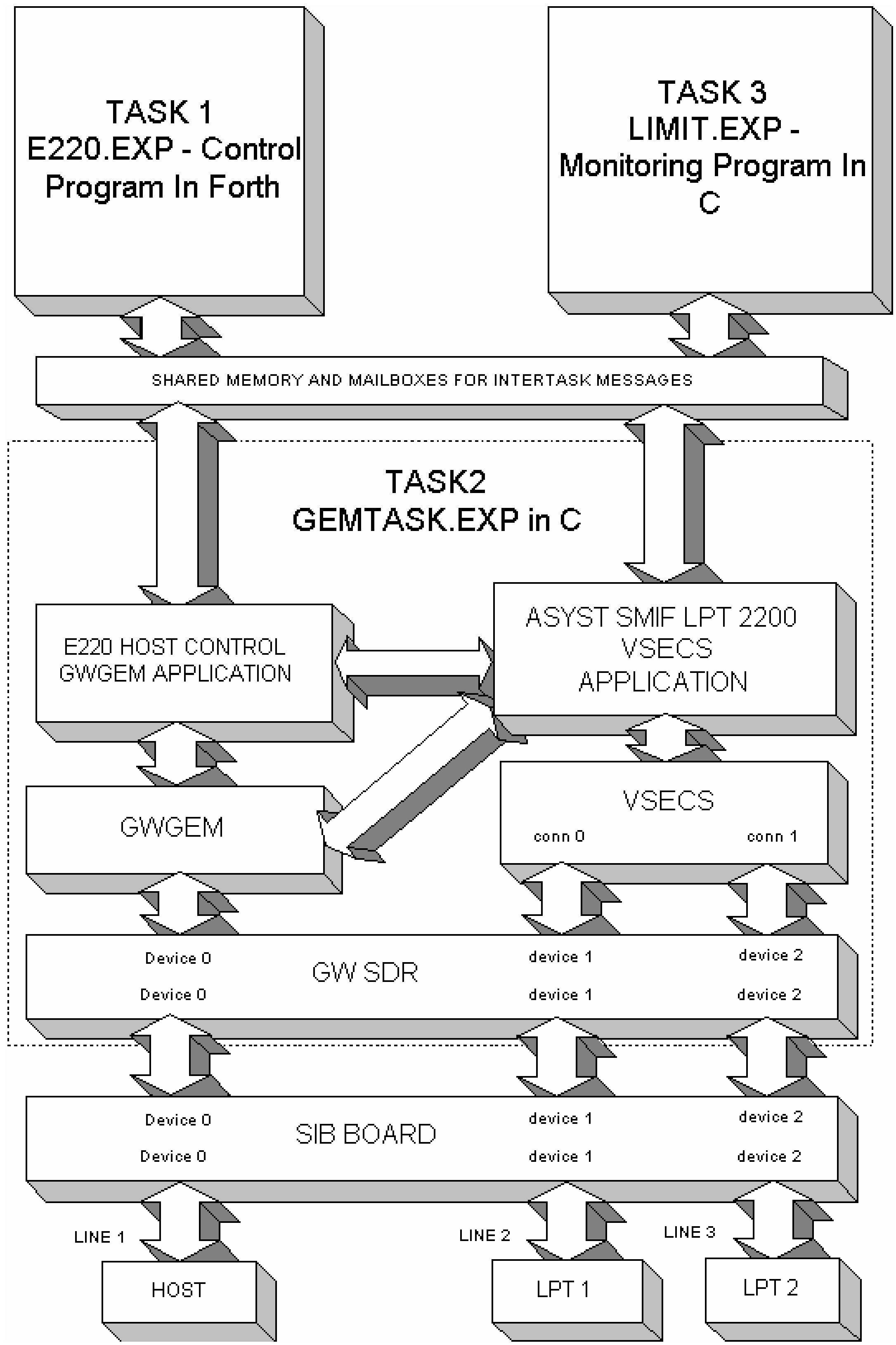


Figure 3 – SMIF Level 1 System Architecture

In E220/E500 software versions previous to Version 10, the main control computer was based on the IBM DOS (MS-DOS) operating system and the FORTH programming language. The SECS software was written completely in FORTH. This software handled the SECS I, SECS II and high level communications. Since it was interleaved with the other FORTH control software, the SECS I communications program and the control program of the implanter interfered with each other.

In Version 10, DOS has been replaced by a DOS compatible, preemtive multitasking operating system called TSX-32. This operating system was selected because of its ability to run 32 bit protected mode DOS programs (polyFORTH and the GEM tasks), its preemptive multitasking, intertask communications, shared memory support and built in realtime operating system features.

With this new architecture, the SIB board handles all of the SECS I protocol and timing. the GEM task (task 2 above) is a separate program written in the 'C' programming language which handles most of the SECS II message interpretation and creation. This allows the FORTH software (task 1) to independently control the implanter.

In Version 11.00.22, a multi-threader with an interface similar to PSOS, the VSECS component, and the Asyst SMIF LPT 2200 VSECS application was added to the TSX GEM task (task 2 above). This provides support for two Asyst SMIF LPT 2200 VSECS.

Acronym	Description
Control Program in FORTH	This is a modification of the most recent release of the E220HP / E500HP system softw are. It controls the implanter.
SECS	The FORTH SECS softw are has been modified to use the SECS and GEM functions provided by GWGEM and SDR. All FORTH calls to the SECS softw are by other E220HP / E500HP softw are modules (objects) w ill remain, but their processing has been moved to functions w ithin GWGEM, SDR or the SIB-311
Multi-task OS	A third party task schedule, intertask communications, and resource sharing program. The functions provided by the operating system allow the tw o tasks to interact through shared memory and intertask message passing
GEMTASK	A task w ritten in 'C' code to manage the link betw een the E220HP/E500HP application and GWGEM and SDR functions. This includes function location, variables, alarms, and process programs.
GWGEM	A 'C' function library w ritten by GW Associates, providing GEM compatibility.
Host Control Application	A GWGEM application that provides host control for the E220
SDR	An application interfacing the SIB-311 to the E220HP / E500HP application by a set of 'C' library functions.
LIMITS	This is a separate C program w hich executes the limits monitoring functions required by GEM.
VSECS	A "C" function component utilizing a PSOS style multi-threading component that provides similar GWGEM functionality for addition SDR ports
SMIF VSECS Application	An application that provides support for tw o Asyst SMIF LPT 2200 cassette handling robots.

These components linked together with the E220HP / E500HP application and additional hardware comprise the entire E220HP / E500HP Ion Implanter system with GEM compatibility as specified within this document.

1.3.3 Definitions, Acronyms, and Abbreviations

Acronym	Definition
ACH	Automatic Cassette Handler - Support for the Daihen buffer (ACH).
C	Compiled computer language used in the E220HP / E500HP control system
EPPD	Equipment Process Program Directory
Equipment	intelligent system that communicates with the host, in this document it is synonymous with the E220HP / E500HP
function	specific message of a stream (see stream in this section)
GEM	Generic Model for Communications and Control of SEMI Equipment (GEM) SEMI standard E30-95
GWGEM	'C' language library of functions producing GEM compatibility
Host	the intelligent system that communicates with the Equipment
operator	individual using the user interface of the Equipment
FORTH	threaded interpretative programming language, used in the E220 HP / E500HP control system.
SECS	Semiconductor Equipment Communications Standard
SECS I	the description of the physical connector, signal levels, data rate, and logical protocols required to exchange messages between the host and Equipment over a serial point to point data path
SECS II	the description that gives form and meaning to messages exchanged between Equipment and host using a message transfer protocol
SECSIM	SECS simulator with language that can produce SECS formatted messages, product of GW Associates
SEMI	Semiconductor Equipment Manufacturers International, standards organization
SIB	SECS Interface Board, product of GW Associates
SMIF	Standard Mechanical Interface - Asyst, Ergospeed II, and Jenoptic, and fixed Jenoptic SMIF units are supported with the E220 application.
stream	category of activity defined by SECS II
VILL	Vacuum Independent Loadlocks (ECO 90). An ECO that enables the equipment to load/unload a loadlock while the opposite loadlock's wafers are being implanted. (Feature available in V11.01)
VDLL	Vacuum Dependent Loadlocks. Wafers cannot be implanted while any loadlocks are loading or unloading. This operation is only operation available for V10.00.00 through V11.00.XX

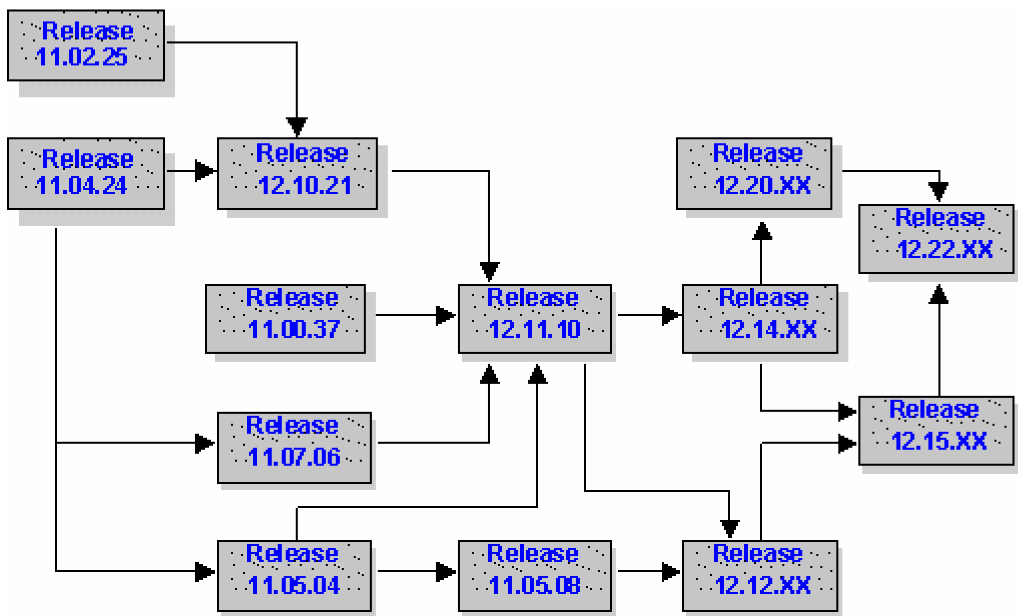
1.3.4 References

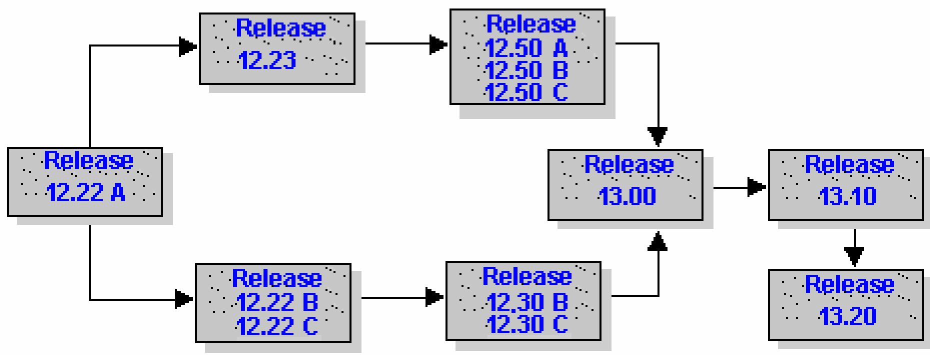
Name	Date	Vers / Rev	Originator
E30-95: Generic Model for Communications and Control of SEMI Equipment (GEM)	1995	E30-95	SEMI
E4-91: SEMI Equipment Communications Standard; Message Transfer (SECS-I)	1991	E4-91	SEMI
E5-95: SEMI Equipment Communications Standard 2 Message Content (SECS-II)	1995	E5-95	SEMI
EXTRION 220/500 Medium Current Ion Implanter SECS Communication Manual	Feb-93	Rev. 2	Varian

1.4 Software Revision Code

All major threads of the E220/E500 operating system incorporate added features to the GEM interface. This manual documents which revision certain features were added. To assist with a proper migration path, both a table and migration flowchart have been provided for reference. The table established the software version where major features which significantly impact the GEM interface were added. The flowchart provides a migration path to version 12 (and later) features.

Name	Version Introduced	Description
GEM	V10.00.00	Added the GEM interface.
SMIF1	V11.22.00	Added support for Asyst SMIF LPT 2200
MID1	V11.00.37	Added controller to coordinate factory automation, Material Identification (MID) readers, and E220 basic implanter. This software component is also referred to as MID Module.
VILL	V11.01.00	Vacuum Independent Load Locks.
Y2K	V11.00.37	Y2K support.
MID Update	V11.05.08	Updated GW Associates library introduced different buffers for host messages and complex variables linked to events.
HSMS	V12.12.00	Support for HSMS.
ERGOSMIF	V11.07.06	Support for Ergospeed SMIF
BCR	V12.12.00	Support for Bar Code Reader
LINEUP JOB QUEUE	V12.23 revA	User Interface for the Lineup Job Queue was introduced in V12.20 revA, and the host interface was introduced in V12.23 revA.
Productivity Plus	V12.50	Support for the Dual-Arm Hardware Upgrade.





1.5 Changes from Previous Versions

Revision	Date	Reason for Change	Author
1	1/16/1995	Original, created from Requirements Document Rev 7	Nick Parisi
2	4/3/1995	Moved events 55 thru 55 to 66 thru 69 to avoid conflicts with SECS2.	Jim Hamilton
3	5/20/1996	Update the change from Requirement Document Rev 9	Q. Wei
4	8/30/1997	Added Asyst Automation	R. Naugle
5	4/2/1998	Added flouroTrak Cassete ID reader	R. Naugle
6	11/16/1999	Finalized Revision	R. Cruz
7	3/1/2001	Updated manual and converted to on-line help format	K. Zeh
8	2/1/2002	Updated manual for V12.15 Rev B,C and D	R. Cruz
8.1	3/26/2002	Updates for V12.15 RevD Custom Software. Deleted unimplemented or obsolete DVIDs	R. Cruz
9	10/12/2004	Updated manual for V12.20 up to V13.10	R. Cruz
9.1	2/15/2005	Added General Equipment Warning Section	R. Cruz

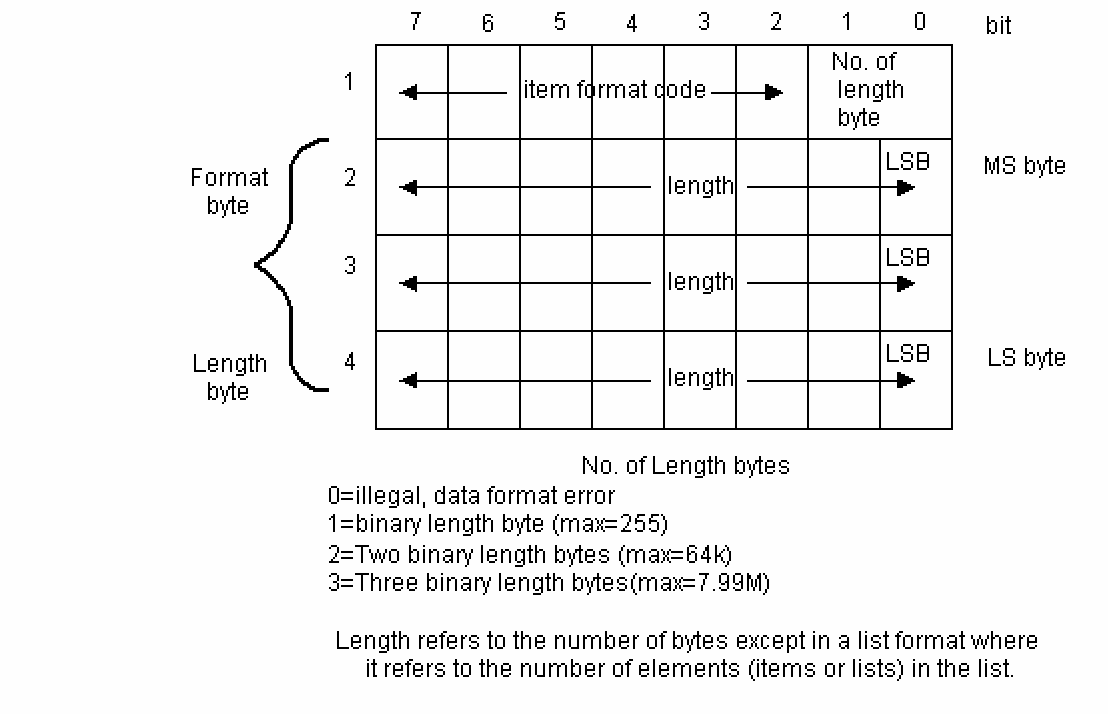
2.0 Data Item Directory

2.0 Data Item Directory

This section defines the data items used in the SECS II messages described in the Message Detail section. Each data item is defined by the following:

1. an unique mnemonic name
2. allowable item format code as complying to SEMI SECS-II E5-95 Section 6.2, Item Format Codes
3. a description of the specific values, and
4. the messages in which the data item is used.

An item is an information packet which has a length and format defined by the first 2, 3, or 4 bytes of the item. These first bytes are called the item header (IH). The item header consists of the format byte and the length byte(s) as shown in Figure 2. Bits one and two of the item header tell how many of the following bytes refer to the length of the item. This feature allows for long items without requiring the byte overhead for shorter items. The item length refers to the number of bytes following the item header, called the item body (IB), which is the actual data of the item. The item length refers only to the item body not including the item header, so the actual number of bytes in the message for one item is the item length plus 2, 3, or 4 bytes for the item header. All bytes in the item body are in the format specified in the format byte.



Item and List Header

A zero length in the format byte is illegal and produces an error. A zero length in the item length bytes has a special meaning as defined in the detailed message definitions.

Bits 3 through 8 of the format byte of the item header define the format of the data which follows. Of the 64 possible formats, fifteen are defined as shown in Table 1. Format code 0 is called a list and is defined in E5 6.3. The remaining 14 item formats define unspecified binary, code 10 (octal); Boolean, code 11 (octal); ASCII character strings, code 20 (octal); JIS-8 character strings, code 21 (octal) signed integer, codes 30, 31, 32, 34 (octal); floating point, codes 40, 44 (octal); and unsigned integer, codes 50, 51, 52, 54 (octal). These formats are used for groups of data which have the same representation in order to save repeated item headers. Signed integers will be two's complement values. Floating point numbers will conform to the IEEE standard 754. Boolean values will be byte quantities, with zero being equivalent to false, and non-zero being equivalent to true.

2.0.1 Item Format Codes

FORMAT								MEANING
Binary 765432	Octal	0-LB Symbol	0-LB Hex	n-LB Symbol	1-LB Hex	2-LB Hex	3-LB Hex	The data after the heading has the follow ing form
000000	00	L	0	L+n	1	2	3	LIST (length in elements)
001000	10	B1	20	B8+n	21	22	23	Binary
001001	11	BOOL	24	B2+n	25	26	27	Boolean
010000	20	A1	40	A1+n	41	42	43	ASCII 1
010001	21	J1	44	J1+n	45	46	47	JIS-8
100000	40	F8	80	F8+n	81	82	83	8-byte floating point 3
100100	44	F4	90	F4+n	91	92	93	4-byte floating point 3
101000	50	U8	A0	U8+n	A1	A2	A3	8-byte integer (unsigned) 2
101001	51	U1	A4	U1+n	A5	A6	A7	1-byte integer (unsigned)
101010	52	U2	A8	U2+n	A9	AA	AB	2-byte integer (unsigned) 2
101100	54	U4	B0	U4+n	B1	B2	B3	4-byte integer (unsigned) 2

1 Non-printing characters are equipment specific.
2 Most significant byte sent first.
3 IEEE 754. The byte containing the sign bit is sent first.

ABS -- Any binary string **Format: 10**

Where Used: S2F25, S2F26

ACHA -- ACH Acknowledge code **Format: 10**

0 = acknowledge, ok
1 = can not perform now
2 = requested recipe(PPID) not found
7 = Port is not enabled
10 = bad parameter in S2F71 left side list
11 = bad parameter in S2F71 right side list
12 = error in S2F71 message
13 = process parameter error
14 = cassette not loaded
15 = enqueue failed
16 = FA option or S2F71 queue disabled
Where Used: S2F72

ACKC5 -- Acknowledge code **Format: 10**

0 = accepted
>0 = error, not accepted
1-63 = reserved
Where Used: S5F2, S5F4

ACKC6 -- Acknowledge code **Format: 10**

0 = accepted

>0 = error, not accepted
1-63 = reserved
64 = Bad PPID
Where Used: S6F12, S6F14

ACKC7 -- Acknowledge code

Format: 10

0 = Accepted
1 = Permission not granted
2 = Length error
3 = Matrix overflow
4 = PPID not found
6 = Recipe with same name exists and can not overwrite (S7F4).
6-63 = reserved
Where Used: S7F4, S7F18

ACKC7A

Format: 31, 51

0 = Accepted
1 = MDLN is inconsistent
2 = SOFTREV is inconsistent
3 = Invalid CCODE
4 = Invalid PPARM value
5 = Other error (described by ERRW7)
6-63 = reserved
Where Used: S7F27

ACKC10 -- Acknowledge Code

Format: 10

0 = Accepted for display
1 = Message will not be displayed
2 = Terminal not available
3-63 reserved
64
Where Used: S10F2 , S10F4 , S10F6

ALCD -- Alarm code byte

Format: 10

bit 7 = 1 means alarm set
bit 7 = 0 means alarm cleared
bit 6-0 = alarm category
0 = not used
1 = Personal safety
2 = Equipment safety
3 = Parameter control warning
4 = Parameter control error
5 = Irrecoverable error

6 = Equipment status warning
7 = Attention flags
8 = Data integrity
>8 = other categories
9-63 = reserved
Where Used: S5F2, S5F6

ALED-- Alarm enable/disable code, 1 byte **Format: 10**

bit 7 = 1 means enable alarm
bit 7 = 0 means disable alarm
Where Used: S5F3

ALID – Alarm identification **Format: 5( )**

All alarm identifications can be found in Appendix B of this document.
Note: The format of ALID is 54 in S5F1
Where Used: S5F1, S5F3, S5F5, S5F6

ALTX -- Alarm text limited to 40 characters **Format: 20**

All alarm text can be found in Appendix B of this document. Only the first 40 characters of the text is sent to the Host.
Where Used: S5F1

CCODE -- Command Code **Format: 32, 52**

Each command code corresponds to a unique process operation the machine is capable of performing.

Process OperationCommand	Command Code (CCODE)	Description
DOPANT	1	Ion Name
PARAMETRIC MODE	2	Parametrics Operation
MULTIPLE	3	Number of Doses (Max. 12)
MASS	4	Ion Weight
CHARGE	5	Charge
SOURCE MODE	6	Gas/Vaporizer
ENERGY	7	Energy
EXT_V	8	Extraction Volts
ACL/DCL	9	Accel/Decel
# SCANS	10	Minimum Scans
X SIGMA	11	Xsigma
ES VAC	12	Es Vacuum
CHECK	13	Check Interval
PURITY	14	Purity (E500 only)
W TYPE	15	Wafer Type
eFLOOD	16	Electron Flood
COOLING	17	Gas Cooling
MIRROR V	18	Mirror Volts
FLOOD MA	19	eFlood Current
ROTATIONS	20	Rotate 1
TILT	21	Tilt 1
TWIST	22	Tw ist 1
DOSE MANTISSA	23	Mantissa
DOSE EXPONENT	24	Exponent
	25	Recipe Name
	26	Softw are Revision
	27	Recipe Version
	28	Edit Date
	29	Edit Time
	30	Operator ID
	31	Learn Date
	32	EHP Option
	33	Vaporizer Option
	34	Recipe Status
	35	Beam Slit
	36	Interval Units
	37	Dose Calibration
	38	Arc Voltage
	39	Arc Current
	40	Filament Voltage
	41	Filament Current
	42	Extraction Current
	43	Suppression Voltage
	44	Suppression Current
	45	Source Magnet Current
	46	Source Magnet Voltage
	47	Gas Pressure
	48	Source Pressure
	49	Pvaporizer Temperature
	50	Vaporizer Temperature
	51	X-Axis
	52	Y-Axis
	53	Z-Axis
	54	Setup Beam Current
	55	Setup Bias
	56	Analyzer Current
	57	Amu Tune Speed
	58	Analyzer Pressure
	59	Mirror Current
	60	Mirror shunt Current
	61	Quad1 Current
	62	Quad1 Voltage
	63	Quad2 Current
	64	Quad2 Voltage
	65	Deflector Voltage
	66	Lens Current

	68	BeamLine Pressure
	69	FocusBeam Current
	70	Source Type
	71	Target Cup Bias
	72	E Filament Voltage
	73	E Filament Current
	74	E Ripple Voltage
	75	E Extraction Voltage
	76	E Extraction Current
	77	E Target Current
	78	E Bias Voltage
	79	E Bias Current
	80	E Suppression Voltage
	81	E Secondary Current
	82	A Line
	83	Beam Width
	84	Target Beam Mantissa
	85	Target Beam Exponent
	86	Range Arc
	87	X-Tune Speed
	88	Y-Tune Speed
	89	Noise
	90	Ripple
	91	Q1 Tune Speed
	92	Q2 Tune Speed
	93	Deflector Tune Speed
	94	Beam Line Tune Speed
	95	Calculated Scans
	96	Gas String
	97	Source Magnet Type
	98	Num Pass
	99	Num Fail
	100	Last SetupDate
	101	Last Setup Time
	102	Spare 1
	103	Spare 2
	104	Spare 3
	105	Spare 4
	106	Spare 5
	107	Spare 6

Where Used: S7F23, S7F26

CEED -- Collection event enable/disable code, 1 byte — Format: 11

FALSE = Disable
TRUE = Enable
Where Used: S2F37

CEID -- Collected event ID — Format: : 5( )

Identifies the event and report that is being sent. The format of CEID is 54 in S6F11. Supported Event ID's are:

CEID Description

1	Start up started
2	Start up complete
3	Shut down started
4	Shut down complete
5	Source setup started
6	Source setup complete
7	Beamline setup started
8	Beamline setup complete
9	Beamscan setup or check started
10	Beamscan setup or check complete
11	Batch started (GEM Compliant Process Started Started)
12	Batch complete (GEM Compliant Process Started completed)
13	Wafer started
14	Wafer complete
15	Alarm generated (GEM Compliant Alarmn Detected)
16	Alarm silence button pressed (GEM Compliant Alarmn Cleared)
17	Implant Held (GEM Compliant Processing Stopped)
18	Implant Continued
19	Abort started
20	Abort complete
21	Elevator vent started
22	Elevator vent complete
23	Door open started
24	Door open complete
25	Door close started
26	Door close complete
27	Elevator pump started
28	Elevator pump completed
29	Entering host control mode
30	Entering host monitor mode (SECS-II only)
31	High voltage enabled
32	High voltage disabled
33	Entering host ignore mode (SECS-II only)
34	Unload Sequence Started Version available 12.20
35	Pivot Retract Started Version available 12.20
36	Pivot Retract Complete Version available 12.20
37	Setup Only Complete
38	Wafer mapping started
39	Wafer mapping completed
40	Processing started
41	Cassette(s) removed
42	Ready to Process
43	Ready to Implant
44	Port Availability change at ACH or Eqpt
45	Cassette status change at ACH
46	Cassette status change at equipment port
47	Entering Factory Automation Off mode
48	Entering Factory Automation Manual mode
49	Entering Factory Automation Semi Auto mode
50	Entering Factory Automation Full Auto mode
51	Load/Unload ACH port Request
52	Load/Unload ACH port Request Complete
53	System Backup Started
54	System Backup Complete
55	Unused
56	Unused
57	Uniformity Precheck

58 Unused
59 Move Into ACH Port Request
60 Move Out of ACH Port Request
61 Move Into ACH Port Request Complete
62 Move Out of ACH Port Request Complete
63 Go Displayed
64 Go or Cont Button Pressed or remote command START received from host
65 Pivot Extend Complete
66 Control State OFF-LINE
67 Control State ON-LINE, Local
68 Control State ON-LINE, Remote
69 Unused
70 Spool Activated
71 Spool Deactivated
72 Spool Transmit Failure
73 Operator Command Issued
74 Operator Command Complete
75 Processing State Change
76 Operator Changed Equipment Constant
77 Upper Trace Limit Exceeded
78 Lower Trace Limit Exceeded
79 Process Program Change
80 Process Program Selected
81 Message Recognition
82 Operator Log On
83 Operator Log Off
84 Ready to Receive Material
85 Material Sensed at Port
86 Host Command (Remote) Issued
87 Host Command (Remote) Complete
88 Job Created (Applicable to Process Job Queue)
Version available 12.20
89 Job Deleted (Applicable to Process Job Queue)
90 Job Completed (Applicable to Process Job Queue)
91 Queue Availability Changed (Applicable to Process Job Queue)
92 Job Processing Started (Applicable to Process Job Queue)
93 Job Processing Complete (Applicable to Process Job Queue)
94 Job Chain Modified (Applicable to Process Job Queue)
95 Timed Beam Run Started (Applicable to Process Job Queue)
96 Timed Beam Run Complete (Applicable to Process Job Queue)
97 Job Promoted (Applicable to Process Job Queue)
98 Job Preempt Successful (Applicable to Process Job Queue)
99 Job Preempt Unsuccessful (Applicable to Process Job Queue)
100 SMIF LPT Manual Control Mode
101 SMIF LPT Semi-Auto Control Mode
102 SMIF LPT Full-Auto Control Mode
103 SMIF LPT POD Placed
104 SMIF LPT POD Removed
105 SMIF LPT Load Ready
106 SMIF LPT Load Start
107 SMIF LPT Load Complete
108 SMIF LPT Unload Ready
109 SMIF LPT Unload Start
110 SMIF LPT Unload Complete
111 SMIF LPT Port Locked
112 SMIF LPT Port Unlocked
113 SMIF LPT Switched to Manual

114	SMIF LPT Switched to Auto
115	SMIF LPT Powered Up
116	SMIF LPT Load Aborted
117	SMIF LPT Unload Aborted
118	SMIF LPT init Started
119	SMIF LPT init Complete
120	SMIF LPT init aborted
121	SMIF LPT Cassette Placed on Equipment
122	SMIF LPT Port lock/unlock failed
123	Actual Smif Slot Map Available
124	EMID Actual Cassette ID Available Version available 12.15
125	EMID Actual Cassette ID Update Aborted Version available 12.15
126	Discard Job Version available 12.15
127	Actual SMIF Slot Map Validation Failed
128	Actual Cassette ID Validation Failed Version available 12.15
129	Actual Wafer ID Available
130	Actual Wafer ID Update Abort
131	Actual Wafer ID Validation Failed
132	Actual Equipment Slot Map Validation Failed
133	Actual Equipment Slot Map Update Aborted
134	Reject Pod
135	Actual Equipment Slot Map Validation Passed
136	Actual Smif Slot Map Validation Passed
137	EMID Validation Passed Version available 12.15
138	Actual Wafer ID Validation Passed
139	Actual Equipment Slot Map Validation Passed
140	Job Done Version available 11.05.04
141	Job Started Version available 11.05.04
142	Equipment Count Validation Failed Version available 11.05.04
143	Equipment Count Validation Passed Version available 11.05.04
144	SMIF Count Available Version available 11.05.04
145	SMIF Count Abort Version available 11.05.04
146	Smif Count Validation Failed Version available 11.05.04
147	SMIF Count Validation Passed Version available 11.05.04
160	SMART Tag Data Lot-id Available
161	SMART Tag File Data Available
162	SMART Tag Status Available
200	200+ Used for Limits Zone Transition for Analogs
2000	2000+ Used for Alarm On / Off

In addition, each alarm ID, ALID , has two CEIDs associated with it, one for alarm clear and one for alarm set. The alarm IDs are calculated at initialization time based on the contents of the MESSAGES.USA file. The formulas for calculating the alarm IDs are as follow:

Alarm Off CEID = (Alarm ID *2) + 300

Alarm On CEID = Alarm Off CEID + 1

VARIAN RESERVES THE RIGHT TO ADD ADDITIONAL EVENT CEIDs

The Varian GEM uses the CEID number for the SFCD and accesses the reports associated with the CEID.

Where Used: S2F35, S2F37, S6F11, S6F13

CEPACK -- Command Enhanced Parameter Acknowledge, 1 byte **Format:** 10, 51

0 = no error

1 = Parameter Name (CPNAME) does not exist

2 = Illegal Value specified for CEPVAL

3 = Illegal Format specified for CEPVAL

4 = Parameter name (CPNAME) not valid as used

5-63 = reserved

Where Used: S2F49

CEPVAL -- Command Enhanced Parameter Value Format: 0, 10, 11, 20, 21, 3( ), 4( ), 5( )

A specific application of CEPVAL shall always be identified with a specific value of CPNAME. A CEPVAL has the following forms: a single (non-list) value (eg. CPVAL), a list of single items of identical format and type, or a list of items of the form:

L,2

1. CPNAME
2. CEPVAL

Where Used: S2F49

COMMACK -- Establish Communications Acknowledge Code, 1 byte Format: 10

0 = Accepted
1 = Denied, Try Again
2-63 = Reserved
Where Used: S1F13, S1F14

CPACK -- Command Parameter Acknowledge Code, 1 byte Format: 10

1 = Parameter Name (CPNAME) does not exist
2 = Illegal Value specified for CPVAL
3 = Illegal Format specified for CPVAL
>3 = Other equipment=specific error
4-63 = reserved
64 = Discrepancy detected between WaferID and SlotMap parameters
Where Used: S2F42

CPNAME -- Command Parameter Name Format: 20

These are used in the remote command to designate the parameter being sent with the command. See the RCMD section for CPNAME applicable to each remote command.
Where Used: S2F41

CPVAL -- Command Parameter Value Format: 10, 11, 20, 21, 3( ), 5( )

These are used in the remote command to set parameter values. See the RCMD section for CPVAL applicable to each remote command.

Where Used: S2F41

DATAID -- Data ID Format: 5()

The data id is used to connect a multi- block request/grant message transaction with the actual multi- block message

transaction. In messages which originate from the Equipment, which include DATAID but are not multi- block, the DATAID is undefined. In messages which originate from the Host and which are not multi- block but do contain DATAID, DATAID will be ignored.
Note: The format of DATAID is 54 in S6F11
Where Used: S2F33, S235, S239, S6F5, S6F11, S6F13

DATALENGTH -- Total bytes to be sent — Format: 3( ),5( )

Where Used: S2F39, S6F5

DRACK -- Define Report Acknowledge Code, 1 byte — Format: 10

0 = Accept
1 = Denied. Insufficient space
2 = Denied. Invalid format
3 = Denied. At least one RPTID already defined
4 = Denied, At least VID does not exist
>4 = Other errors
5-63 = reserved
Where Used: S2F34

DSPER -- Data sample period — Format: 20

hhmmss, 6 bytes
Where Used: S2F23

DVID — Format: 5( )

The data variables may also be access with a VID of equivalent value using the functions appropriate for VID. See VID for table showing relationship between data variables identifcation (DVID), equipment constant identifications(ECID), and status variable identifications(SVID) . The data variable IDs are as follows:

DVID	DVNAME	DVID	DVNAME
	Implant And Machine Status Variables		Recipe Data Process Program Variables
100	A(LLOT)	200	PPID
101	A(RLOT)	201	ION- NAME
102	LWAF#	202	ION- AMU
103	RWAF#	203	DOSE- MANTISSA
104	OP- NAME	204	DOSE- EXPONENT
105	OPERATOR- ID	205	ENERGY
106	WAFER- NUMBER	206	SCANS
107	WAFER- START- TIME	207	COOLING
108	WAFER- END- TIME	208	FLOOD
109	BATCH- START- TIME	209	<TILT
110	BATCH- END- TIME	210	<TWIST
111	aXSIGMA	211	ION- CHARGE
112	cSCANS	212	EST- VAC
113	aDOSE	213	X- SIGMA

114	aSCANS
115	aYSIGMA
116	
117	STATUS
118	WAFER- HOLDS
119	BATCH- HOLDS
120	LOT
121	#WAFERS
122	REMOTE- CONTROL
123	TARGET- I
124	BEAM- WIDTH
125	HOST- CONTROL
126	FAUTO
127	ACH-STATUS
128	BPTN
129	CSTATUS
130	LPORT
131	RPORT
132	PORT-STATUS
133	WFR_CYC_TOT_LEFT
134	WFR_CYC_TOT_RIGHT
135	WFR_CYC_TOT_L/R
136	WFR_CYC_PM_LEFT
137	WFR_CYC_PM_RIGHT
138	WFR_CYC_PM_L/R
139	WAFERS_IMPLANTED
140	NUMBER_OF_SCANS
141	GAS1_TOTAL
142	GAS2_TOTAL
143	GAS3_TOTAL
144	GAS4_TOTAL
145	GAS1_4_TOTAL
146	GAS1_PM
147	GAS2_PM
148	GAS3_PM
149	GAS4_PM
150	GAS1_4_PM
151	PORT-ID
152	LPORT-STATUS
153	RPORT-STATUS
154	LMATERIAL-STATUS
155	RMATERIAL-STATUS
156	EXPECTED-SLOT-MAP(LLOT)
157	EXPECTED-SLOT-MAP(RLOT)
158	EXPECTED-WID(LLOT)
159	EXPECTED-WID(RLOT)
160	ACTUAL-MID(LLOT)
161	ACTUAL-MID(RLOT)
166	CURRENT-WAFER-ID
167	ID-VALIDATION(LLOT)
168	ID-VALIDATION(RLOT)
171	QUEUE-FULL
172	LEFT_WAFERS_IMPLANTED
173	RIGHT_WAFERS_IMPLANTED
174	BATCH_WAFERS_IMPLANTED
175	DI-WATER-FLOW
176	WHEREIS(LLOT)
214	Y- SIGMA
215	CHK- INT
216	Q- SOURCE
217	W- TYPE
218	F-LEARNED
219	#MULTIPLE
220	GAS/VAPOR
221	EXTRACTION
222	ACCEL/DECEL
223	PURITY
224	MIR-V
225	FLOOD-CURRENT
226	ROTATE
227	LEFT-PPID
228	RIGHT-PPID

177	WHEREIS(RLOT)
188	DOSE_CALIBRATION_FACTOR
193	JOB_ID_LIST
194	ECLAMP-I
195	JOB_ID
196	QUEUE_FREE_SLOTS
197	TAG-FILEDATA
198	LTAG-BATSTAT
199	RTAG-BATSTAT

GEM Compliant Data Variables

300	PPChangeStatus
301	PPChangeName
302	ProcessState
303	PreviousProcessState
304	PPExecName
305	Clock
306	EventsEnabled
307	AlarmsEnabled
308	AlarmsSet
309	ControlState
310	PreviousControlState
311	EventLimit
312	LimitVariable
313	TransitionType

GEM System Data Variables

502	ALARMID
503	DATAID
504	PREVIOUSCEID
509	SPOOLSTARTTIME
510	SPOOLFULLTIME
511	SPOOLCOUNTACTUAL
512	SPOOLCOUNTTOTAL
513	GemSpoolState
514	GemSpoolFull
515	GemSpoolLoadSubstate
516	GemSpoolUnloadSubstate

Pump Status Variables

600	a1ESTurboCommStatus[0]
601	a1ESTurboState[0]
602	a1ESTurboCommStatus[1]
603	a1ESTurboState[1]
604	1OnBoardCommStatus
605	a1OnBoardPumpStatus[0]
606	a1OnBoardRegenStatus[0]
607	a1OnBoardPurgeValveStatus[0]
608	a1OnBoardRoughValveStatus[0]
609	a1OnBoardDelayStart[0]
610	a1OnBoardDelayRestart[0]
611	a1OnBoardFastRoughTest[0]
612	a1OnBoardExtendedPurge[0]
613	a1OnBoardRepurgeTime[0]
614	a1OnBoardRepurgeCycles[0]
615	a1OnBoardRORLimit[0]
616	a1OnBoardRORCycles[0]
617	a1OnBoardPowerFailRecoveryTemp[0]
618	a1OnBoardFirstStageTempSetpoint[0]
619	a1OnBoardSecondStageTempSetpoint[0]
620	a1OnBoardPumpStatus[1]
621	a1OnBoardRegenStatus[1]
622	a1OnBoardPurgeValveStatus[1]
623	a1OnBoardRoughValveStatus[1]
624	a1OnBoardDelayStart[1]
625	a1OnBoardDelayRestart[1]
626	a1OnBoardFastRoughTest[1]
627	a1OnBoardExtendedPurge[1]
628	a1OnBoardRepurgeTime[1]
629	a1OnBoardRepurgeCycles[1]
630	a1OnBoardRORLimit[1]

Implanter and Processing Data

800	TARGET-FARADAY-DAC
801	LEFT-ELEV-SERVO-DAC
802	RIGHT-ELEV-SERVO-DAC
803	LEFT-ORIENTER-DAC
804	RIGHT-ORIENTER-DAC
805	LEFT-HANDLER-DAC
806	RIGHT-HANDLER-DAC
807	PLATEN-TILT-DAC
808	LEFT-ORIENTER-LIFTER-DAC
809	RIGHT-ORIENTER-LIFTER-DAC
810	ROTATING-PLATEN-DAC
811	ROPINS-MOTOR-DAC
812	ROTATION#
813	LINE#
814	IMPLANT-STEP-PROCESS-TIME
815	SHUFFLE-MODE
816	LEFT-UPPER-ARM
817	RIGHT-UPPER-ARM
818	PLATEN-ROTATION-SENSOR-COUNT
819	EXTR-HV-TIME
820	SOURCE-TIME
821	ECO_SETTINGS
822	OPTION_SETTINGS

631 a1OnBoardRORCycles[1]
632 a1OnBoardPowerFailRecoveryTemp[1]
633 a1OnBoardFirstStageTempSetpoint[1]
634 a1OnBoardSecondStageTempSetpoint[1]
635 a1OnBoardPumpStatus[2]
636 a1OnBoardRegenStatus[2]
637 a1OnBoardPurgeValveStatus[2]
638 a1OnBoardRoughValveStatus[2]
639 a1OnBoardDelayStart[2]
640 a1OnBoardDelayRestart[2]
641 a1OnBoardFastRoughTest[2]
642 a1OnBoardExtendedPurge[2]
643 a1OnBoardRepurgeTime[2]
644 a1OnBoardRepurgeCycles[2]
645 a1OnBoardRORLimit[2]
646 a1OnBoardRORCycles[2]
647 a1OnBoardPowerFailRecoveryTemp[2]
648 a1OnBoardFirstStageTempSetpoint[2]
649 a1OnBoardSecondStageTempSetpoint[2]

iQDP Pump Status Variables

650 lIqdpEndTask
651 lIqdpEnabled
652 alIqdpCommunicationsStatus[0]
653 alIqdpPumpStatus[0]
654 alIqdpPumpTemperature[0]
655 alIqdpPumpPower[0]
656 alIqdpPumpCurrent[0]
657 alIqdpExhaustPressure[0]
658 alIqdpWaterFlow[0]
659 alIqdpRunningTime[0]
660 alIqdpOilLevel[0]
661 alIqdpBlowerStatus[0]
662 alIqdpBlowerOilLevel[0]
663 alIqdpBlowerMotorTemperature[0]
664 alIqdpBlowerPower[0]
665 alIqdpBlowerPhaseCurrent[0]
666 alIqdpCommunicationsStatus[1]
667 alIqdpPumpStatus[1]
668 alIqdpPumpTemperature[1]
669 alIqdpPumpPower[1]
670 alIqdpPumpCurrent[1]
671 alIqdpExhaustPressure[1]
672 alIqdpWaterFlow[1]
673 alIqdpRunningTime[1]
674 alIqdpOilLevel[1]
675 alIqdpBlowerStatus[1]
676 alIqdpBlowerOilLevel[1]
677 alIqdpBlowerMotorTemperature[1]
678 alIqdpBlowerPower[1]
679 alIqdpBlowerPhaseCurrent[1]
680 alIqdpCommunicationsStatus[2]
681 alIqdpPumpStatus[2]
682 alIqdpPumpTemperature[2]
683 alIqdpPumpPower[2]
684 alIqdpPumpCurrent[2]
685 alIqdpExhaustPressure[2]
686 alIqdpWaterFlow[2]

687	alIqdpRunningTime[2]
688	alIqdpOilLevel[2]
689	alIqdpBlowerStatus[2]
690	alIqdpBlowerOilLevel[2]
691	alIqdpBlowerMotorTemperature[2]
692	alIqdpBlowerPower[2]
693	alIqdpBlowerPhaseCurrent[2]

	Left Ergospeed II SMIF Variables		Right Ergospeed II SMIF Variables
8300	Not Used	8400	Not Used
8301	Left ErgoSMIF Last Function	8401	Right ErgoSMIF Last Function
8302	Left ErgoSMIF RCMD Compl State	8402	Right ErgoSMIF RCMD Compl State
8303	Left ErgoSMIF Elevator State	8403	Right ErgoSMIF Elevator State
8304	Left ErgoSMIF Pod Placed	8404	Right ErgoSMIF Pod Placed
8305	Left ErgoSMIF Lock State	8405	Right ErgoSMIF Lock State
8306	Left ErgoSMIF Home State	8406	Right ErgoSMIF Home State
8307	Left ErgoSMIF Pneumatic Stroke State	8407	Right ErgoSMIF Pneumatic Stroke State
8308	Left ErgoSMIF Gripper State	8408	Right ErgoSMIF Gripper State
8309	Left ErgoSMIF Cassette in Gripper	8409	Right ErgoSMIF Cassette in Gripper
8310	Left ErgoSMIF Low Load	8410	Right ErgoSMIF Low Load
8311	Left ErgoSMIF Port Door State	8411	Right ErgoSMIF Port Door State
8312	Left ErgoSMIF Pressure State	8412	Right ErgoSMIF Pressure State
8313	Left ErgoSMIF FFU State	8413	Right ErgoSMIF FFU State

Where Used: S1F3, S1F11, S1F12, S2F23, S2F33, S2F45, S2F46, S2F47, S2F48; S6F13, S6F18, S6F22

DVNAME -- Data value name — Format: 3( ),20,5( )

Where Used: S1F12

DVVAL -- Data value — Format: 0, 10, 11, 20, 21, 3( ), 4( ), 5( )

Where Used:

EAC -- Equipment acknowledge code, 1 byte — Format: 10

0 = Acknowledge
1 = Denied, At least one constant does not exist
2 = Denied, Busy
3 = Denied, At least one constant out of range
>3 = Other equipment-specific error
4-63 = reserved
Where Used: S2F16

ECDEF -- Equipment constant default value — Format: 20, 5( )

Where Used: S2F30E5_S2F30_Equipment_Constant_Namelist

ECID -- Equipment Constant ID **Format: 5( )**

The equipment constants may also be access with a VID of equivalent value using the functions appropriate for VID. See VID for table showing relationship between data variables identification (DVID), equipment constant identifications(ECID), and status variable identifications(SVID). The Equipment constant IDs are as follows:

ECID	ECNAME	ECID	ECNAME
250	T1	290	Not Used
251	T2	291	EQUIPMENT IP ADR
252	T3	292	CONNECT MODE
253	RTY	293	PASSIVE IP ADDRESS
254	T4	294	PASSIVE TCP PORT
255	Obsolete (always set to 0)	295	T5
256	FORMAT	296	T6
257	MODES	297	T7
258	Mirror-mode	298	T8
259	Accel-mode	299	BCR Mode
260	Extraction-volts	350	Connection Establishment
261	TYPE-RCP	351	Circuit Assurance
262	Establish-Comm-Timeout	352	TimeoutGrace
263	FACTAUTO	353	MemoryStall
264	PPTF	354	WriteStall
265	GemInitCommState	355	Submask
266	GemInitControlState	356	Router
267	Baud-Rate	357	MidVersion (Not Supported)
268	Equipment-ID		
269	DEVICENAME		
270	RPTYPE		
271	CONFIGALARMS		
272	CONFIGCONNECT		
273	CONFIGEVENTS		
274	WBITS5		
275	WBITS6		
276	WBITS10		
277	HEARTBEAT		
278	EQPORT_ENABLE		
279	ACHPORT_ENABLE		
280	GemConfigSpool		
281	GemMaxSpoolFileSize		
282	GemMaxSpoolTransmit		
283	GemOverWriteSpool		
284	GemSpoolFileName		
285	GemMsgInterLv		
286	MID-MODE		
287	SMIF-MODE		
288	GEMTASK LOG SIZE		
289	EC TIMEFORMAT		

Constants 258, 259 and 260 are used for recipe conversion and should be treated as a set. They are only used when PPBODY1 recipes are used on version 9 software. These conversion numbers are ignored when using PPBODY2.

VARIAN RESERVES THE RIGHT TO ADD MORE EQUIPMENT CONSTANTS

Where Used: S1F3, S1F11, S1F12, S2F23, S2F13, S2F15, S2F29, S2F30, S2F33, S2F45, S2F46, S2F47, S2F48; S6F13, S6F18, S6F22

ECMAX -- Equipment constant maximum value **Format: 5( )**

Where Used: S2F30

ECMIN -- Equipment constant minimum value **Format: 5( )**

Where Used: S2F30

ECNAME -- Equipment constant name **Format: 20**

See ECID for list of equipment constant names.
Where Used: S2F30

ECV -- Equipment Constant Value **Format: 20, 5( )**

See variable dictionary for a list for individual ECV format.
Where Used: S2F15

EDID -- Expected data Identification **Format: 10, 20, 3( ), 5( )**

Three possible responses.

MEXP EDID EDID
S02F03, <SPID> A[6]
S03Fl3, <PTN> B[1]
S07F03, <PPID> A[16], B[16]
Where Used: S9F13

ERACK -- Enable/Disable Event Report **Format: 10**

Acknowledge Code, 1 byte
0 = Accepted
1 = Denied. At least one CEID does not exist
<1 = Other Errors
2-63 = reserved
Where Used: S2F38

ERRW7 **Format: 20**

Text string describing error found in process program
Where Used: S7F27

ESID - Equipment Port Number **Format: 10**

ESID designates the stage location of the Equipment Port Number

1 = Left
2 = Right

Note: Factory Automation Only
Where Used: S2F71

FCNID -- Function Identification **Format: 51**

Where Used: S2F43, S2F44

GRANT -- Grant code, 1 byte **Format: 10**

0 = Permission Granted
1 = Busy, Try Again
2 = No Space Available
3 = Duplicate DATAID
>3 = Equipment Specific Error Code
4-63 = reserved
Where Used: S2F40

GRANT6 -- Permission to send, 1 byte **Format: 10**

0 = Permission granted
1 = Busy, try again
2 = Not interested
>2 = Other errors
3-63 = reserved
Where Used: S6F6

HCACK -- Host Command Parameter Acknowledge Code, 1 byte **Format: 10**

0 = Acknowledge, command has been performed
1 = Command does not exist
2 = Cannot perform now
3 = At least one parameter is invalid
4 = Acknowledge, command will be performed with completion signaled later by an event

5 = Rejected, Already in Desired Condition
6 = Object does not exist
7-63 = reserved
64= Double Implant not allowed
65-127 = Left and right SMIF LPT (LPT must be present to occur)

							LSB
7	6	5	4	3	2	1	0
0	1	LPT1	LPT1	LPT1	LPT2	LPT2	LPT2
MSB							

Bit   6   1
bits 5-3   LPT HCACK code for the left LPT1
bits 2-0   LPT HCACK code for the right LPT2

LPT HCACK code
0h: LPT Completed command
1h: LPT in manual mode
2h: No Pod in place
3h: Host not ready
4h: Limit not reached
5h: LPT already in desired state
6h: LPT does not understand command
7h: LPT cannot perform command or E220 cannot send command to LPT
Where Used: S2F42

LENGTH — Format: 5( )

Length of the service program or process program in bytes
Where Used: S7F1

LIMITACK — Format: 10

Acknowledgment code for variable limit attribute set, 1 byte.
1 = LIMITID does not exist
2 = UPPERDB > LIMITMAX
3 = LOWERDB < LIMITMIN
4 = UPPERDB < LOWERDB
5 = Illegal format specified for UPPERDB or LOWERDB
6 = ASCII value cannot be translated to numeric
7 = Duplicate limit definition for this variable
>7 = Other equipment-specific error
8-63 = reserved
Where Used: S2F46

LIMITID — Format: 10

The identifier of a specific limit in the set of limits (as defined by UPPERDB and LOWERDB) for a variable to which the corresponding limit attributes refer, 1 byte. The range of allowable Ids is 0 - 6.
Where used: S2F45, S2F46, S2F48

LIMITMAX Format: 20

Presently the highest possible value for the SV's value (99.9, 9, 9.99999)
Where used: S2F48

LIMITMIN Format: 20

Presently the lowest possible value for the SV's value (0 or 0.0000099)
Where used: S2F48

LOTID - Material ID 16 bytes maximum Format: 20

This is the lot number for 1 cassette of wafers to be processed.
Note: Factory Automation only
Where used: S2F71

LOWERDB Format: 20

A variable limit attribute which defines the lower boundary of the deadband of a limit. The value applies to a single limit (LIMITID) for a specified VID. Thus, UPPERDB and LOWERDB as a pair define a limit.
Where used: S2F45, S2F48

LRACK - Link Report Acknowledge Code, 1 byte Format: 10

0 = Accepted
1 = Denied. Insufficient space
2 = Denied. Invalid format
3 = Denied. At least one CEID link already defined
4 = Denied. At least one CEID does not exist
5 = Denied. At least one RPTID does not exist
>5 = Other errors
6-63 = reserved
Where Used: S2F36

LVACK Format: 10

Variable limit definition acknowledge code, 1 byte. Defines the error with the limit attributes for the referenced VID.
1 = Variable does not exist
2 = Variable has no limits capability
3 = Variable repeated in message
4 = Limit value error as described in LIMITACK

5-63 = reserved
Where Used: S2F46

MDLN -- Equipment Model Type, 6 bytes max **Format: 20**

The Equipment model type of the E220 is a 4 character string and will be "E220"
Where Used: S1F2; S1F13 , S1F14

MEXP **Format: 20**

Message expected in the form SxxFyy where x is stream and y is function.
Where Used: S9F13

MHEAD **Format: 10**

SECS message block header associated with message block in error
Where Used: S9F1, S9F3, S9F5, S9F7, S9F11

MID 16 Characters maximum **Format: 20**

This is the lot name for one cassette of wafers to be processed.
Where Used: S2F41, S2F71

OFLACK **Format: 10**

Acknowledge code for OFF-LINE request.
0 = OFF-LINE Acknowledge
1-63 Reserved
Where Used: S1F16

ONLACK -- Acknowledge code for ON-LINE request. **Format: 10**

0 = ON-LINE Accepted
1 = ON-LINE Not Allowed
2 = Equipment Already ON-LINE
3-63 = Reserved
Where Used: S1F18

PPARM -- Process Parameter **Format: 11, 20, 3( ), 4( ), 5( )**

Numeric or Boolean SECS data item, single or multiple value, or text string which provides information required to complete the process command to which the parameter refers.

PPID used by the PPselect remote command.
Where Used: S7F23, S7F26

PPBODY -- Process program body

Format: 10

The process program describes to the equipment, in its own language, the actions to be taken in processing the material it receives. . Four process program formats are supported. They are supported for the sake of compatibility with former models and software revisions of the equipment.

The equipment can receive any format and convert it to the most recent format for operator editing and equipment use. Parameters not available in older formats are set to default values.

The equipment will transmit the format set by the TYPE-RCP equipment constant.
Where Used: S7F3, S7F6, S7F18

PPBODY1 -- Process program body (Version 8)

Format: 10

This process program is made up of 24 fields for each pass. All fields are two bytes long. If a field should not change from one pass to the next, it must be given a value of 32768. All items in the body are 2 byte integers (**format:** 32) except for Ion Name which consists of 2 ASCII characters. Each 2 byte field should be given in reverse order, that is, LSB first, MSB second. In the case of the Ion Name, the two letters should be in reverse order.

The Fields are:
Ion Name
Ion Weight
Dose Mantissa
Dose Exponent
Energy
Minimum Scans
Gas Cooling
Flood
Tilt
Twist
Charge
ES Vacuum
X-Sigma
Y-Sigma if value = 0 then Accel Mode; if -1 the Decel Mode
Check Interval
Quality if value > 5 it will be stored as Mirror.
Wafer type
Unused1
Unused2
Unused3
Unused4
Unused5
Unused6
Unused7

The Unused space is reserved for future additions and should be space filled. Each process will be a multiple of 48 bytes long.

Where Used: S7F3, S7F6, S7F18

PPBODY2 **Format: 10**

All quantities are 16 bit format.

Byte	Field name	Description
1	Ion Name	ASCII 2 characters
2	Learned	0 or 1 (Reset (0) after a Dow nload)
3	#multilines	1-12 If equipped w ith rotating platen
4	Ion Weight	
5	Charge	1, 2, or 3
6	Gas/Vapor	0 - Gas 1 - Vaporizer
7	Energy	1 - 750
8	Extraction Volts	Unit 0.1 0 - 400 E220 0 - 700 E500
9	Accel/Decel	0 - Accel 1 - Decel
10	Minimum scans	
11	Xsigma	Unit 0.01
12	Es Vacuum	Unit 10-7 torr
13	Check interval	Unit 1 minute
14	Purity	E500 only
15	Wafer Type	0 - 5
16	Electron Flood	0 - Disabled 1 - Enabled
17	Gas Cooling	0 - Disabled 1 - Enabled
18	Mirror volts	Units 0.1 0 - 300
19	Eflood Current	Unit 0.1 mA
20	Unused	
21	Unused	
22	Unused	
23	Unused	
24	Unused	
25	Unused	
26	Rotate 1	0, 1 no rotation 0 - 30
27	Tilt 1	0 - 90
28	Tw ist 1	0 - 359
29	Mantissa	3 digits
30	Exponent	Machine Specific Range
31	Unused	
32	Unused	
33	Unused	

Where Used: S7F3, S7F6, S7F18

PPBODY2 LONG **Format: 10**

Contains the data from a PPBODY2 SHORT in addition to the following:

Byte	Name	Byte	Name	Byte	Name
34	Rotate 2	42	Rotate 3	50	Rotate 4
35	Tilt 2	43	Tilt 3	51	Tilt 4
36	Twist 2	44	Twist 3	52	Twist 4
37	Mantissa	45	Mantissa	53	Mantissa
38	Exponent	46	Exponent	54	Exponent
39	Unused	47	Unused	55	Unused
40	Unused	48	Unused	56	Unused
41	Unused	49	Unused	57	Unused
58	Rotate 5	66	Rotate 6	74	Rotate 7
59	Tilt 5	67	Tilt 6	75	Tilt 7
60	Twist 5	68	Twist 6	76	Twist 7
61	Mantissa	69	Mantissa	77	Mantissa
62	Exponent	70	Exponent	78	Exponent
63	Unused	71	Unused	79	Unused
64	Unused	72	Unused	80	Unused
65	Unused	73	Unused	81	Unused
82	Rotate 8	90	Rotate 9	98	Rotate 10
83	Tilt 8	91	Tilt 9	99	Tilt 10
84	Twist 8	92	Twist 9	100	Twist 10
85	Mantissa	93	Mantissa	101	Mantissa
86	Exponent	94	Exponent	102	Exponent
87	Unused	95	Unused	103	Unused
88	Unused	96	Unused	104	Unused
89	Unused	97	Unused	105	Unused
106	Rotate 11	114	Rotate 12		
107	Tilt 11	115	Tilt 12		
108	Twist 11	116	Twist 12		
109	Mantissa	117	Mantissa		
110	Exponent	118	Exponent		
111	Unused	119	Unused		
112	Unused	120	Unused		
113	Unused	121	Unused		

Where Used: S7F3, S7F6, S7F18

PPBODY3 - High Performance Recipe **Format: 10**

PPBODY2 formatting contains all data from the PPBODY2 LONG format with the addition of learned parameters, maximum/minimum ranges for each parameter, and the type of interlock when a processing parameter exceeds the specified range. PPBODY3 is the recommended formatting for the E220/E500 medium current ion implanter

PPBODY3 has a total length of 1518 bytes. This lays out the length and possible values of each data item as it appears in SECS messages downloaded from or uploaded to the host. The possible data types used are:

Type	Description
ASCII	Plain text
Short	Signed 2-byte integer
Ushort	Unsigned 2-byte integer
Tgt_lim	8-byte structure consisting of: 2 bytes ushort Low Limit 2 bytes ushort Target 2 bytes ushort HiLimit 2 bytes ushort Interlock

The possible values for Interlock are:

0 = Ignore

1 = Warning

2 = Critical

Scaler is also included in the Remarks column. This number is applied to the raw value to get the final value as displayed in the E220/500 recipe screen. For example, a raw value of 2000 with a scaler of 2 will be displayed as 20.00. For data items with the Tgt_lim type, scalar is only applied to the LowLimit, Target and HiLimit.

Data items with format marked as "(learned)" are filled in by the E220/500 after the recipe has been learned in parametric setup.

Header Parameters

Parameter	Ccode	Bytes	Type	Offset	Raw Values	Remarks	Units
PPID Name	25	16	ASCII	0			16 Char
Software Rev	26	8	ASCII	16	xx.xx.xx		8 Char
Recipe Version	27	2	Ushort	24		Incremented after each edit	#NAME?
Edit Date	28	10	ASCII	26	mm/dd/yy	2 Trailing blanks	mm/dd/yy 10 Char
Edit Time	29	10	ASCII	36	hh:mm	5 Trailing blanks	hh:mm, 10 Char
Operator ID	30	8	ASCII	46			8 Char
Learn Status	2	2	Ushort	54	1=Learned 0=NotLearned		Y/N Short
Learn Date	31	10	ASCII	56	mm/dd/yy	2 Trailing blanks	mm/dd/yy 10 Char
Setup Difficulty	32	2	Ushort	66	99=Ehp 0= Not Ehp		Short
Vaporizer Option	33	2	Ushort	68	1=standard 59=dual vaporizer	59 valid only if option 59 is enabled	Short
Recipe Status	34	2	Ushort	70	0 - 300		ro/rw /appr Short
#Multilines	3	2	Ushort	72	12-Jan		Short
Last Setup Date	100	10	ASCII	74	mm/dd/yy	2 Trailing blanks	10 Char
Last Setup time	101	10	ASCII	84	hh:mm	5 Trailing blanks	10 Char
Dopant	1	2	ASCII	94			2 Char
Gas String	96	6	ASCII	96	(learned)	Gas Identifier	6 Char
Charge	5	2	Ushort	102	1 if DECEL 1,2,3 if ACCEL		1+/2+/3+, Short
Accel/Decel	9	2	Short	104	#NAME?		A/D, Short
Gas/Vapo Flag	6	2	Short	106	#NAME?	If option 1 or option 59 is set, vaporizer can be on or off, else must be vaporizer	G/V, Short
EFlood	16	2	Short	108	#NAME?	Must match Eflood option	ON/OFF, Short
Cooling	17	2	Short	110	-1 = On/ 0 or any other value = Off	Wafer cooling	ON/OFF, Short
Beam Slit	35	2	Ushort	112	If option 75 is set, 0,1,2 else, 0,1	0 = off 1 = narrow 2 = wide	OUT/NAR/WIDE, Short
Interval Units	36	2	Ushort	114	0 = wafers 1 = minutes		min/waf, Short
Check Interval	13	2	Ushort	116	0 - 60		Short
Beam Purity	14	2	Ushort	118	0 - 2000	Unit = % scaler = 2	%, Short
Dose Calibration	37	2	Ushort	120	0 - 20000	Unit = % scaler = 2	%, Short
Wafer Type	15	2	Ushort	122	0 - 20		#, Short
XSigma	11	2	Ushort	124	0 - 1000	Scaler = 2	#, Short

Source Parameters

Parameter	Units	Default Min / Max	Spec. Min / Max	Default Interlock
Arc V	V	5%	0/300	w arning
Arc I	amps (range dependent)	5%	0/999	w arning
Arc Range				
Filament V	V	20%	0/7.5	ignore
Filament I	V	20%	0/200	ignore
Extraction V	kV	1%	0/40.0	critical
Extraction I	mA	1%	0/25.0	ignore
Suppression V	kV	1%	0/2.00	critical
Suppression I	mA	1%	0/50.0	ignore
Src Magnet I	A	5%	0/50.0	w arning
Src Magnet V	V	5%	0/20.0	ignore
Gas Press	PSI	5%	0/9.99	w arning
Source Pressure	TORR	5%	0	ignore
Vap Temp	*C	5%	0/999	w arning
Heater Temp	*C	5%	0/999	w arning
X Axis	mm	5%	0/999.	w arning
Y Axis	mm	5%	0/999.	w arning
Z Axis	mm	5%	0/999.	w arning
X Tune Speed				
Y Tune Speed				
Set Up Beam I	amps (range dependent)	---	0/999	not monitored
Set Up Bias	V	5%		w arning
Spare 1				
Spare 2				
Spare 3				
Noise				
Ripple				

Parameter	Ccode	Bytes	Type	Offset	Raw Values	Remarks
Arc V	38	8	Tgt_lim	126	0 – 300	Unit = V, scaler = 0
Arc I	39	8	Tgt_lim	134	0 – 9999 for Non-EHP 0 – 15000 for EHP	Unit = Arc Range dependent (see item below), scaler = 0
Arc Range	86	2	Ushort	142	0 - 4	0 = A, 4 = uA, other value = mA
Filament V	40	8	Tgt_lim	144	0 - 750	Unit = V, scaler = 2
Filament I	41	8	Tgt_lim	152	0 - 200	Unit = A, scaler = 0
Extraction V	8	8	Tgt_lim	160	0 - 720	Unit = kV, scaler = 1
Extraction I	42	8	Tgt_lim	168	0 - 250	Unit = mA, scaler = 1
Suppression V	43	8	Tgt_lim	176	0 - 200	Unit = KV, scaler = 2
Suppression I	44	8	Tgt_lim	184	0 - 5000	Unit = mA, scaler = 2
Src Magnet I	45	8	Tgt_lim	192	0 - 500	Unit = A, scaler = 1
Src Magnet V	46	8	Tgt_lim	200	0 -200	Unit = V, scaler = 1
Gas Press	47	8	Tgt_lim	208	0 - 999	Unit = PSI, scaler = 2
Source Pressure	48	8	Tgt_lim	216	0 - 4000	Unit = uT, scaler = 2
PVap Temp	49	8	Tgt_lim	224	0 - 999	Unit = (prog lamp temperature)
Vap Temp	50	8	Tgt_lim	232	0 - 999	Unit =
X Axis	51	8	Tgt_lim	240	0 - 999	Unit = mm, scaler = 0
Y Axis	52	8	Tgt_lim	248	0 - 999	Unit = mm, scaler = 0
Z Axis	53	8	Tgt_lim	256	0 - 999	Unit = mm, scaler = 0
X Tune Speed	87	2	Ushort	264	(learned)	
Y Tune Speed	88	2	Ushort	266	(learned)	
Set Up Beam I	54	2	Ushort	268	(learned)	Unit = A (range dependent)
Set Up Bias	55	2	Ushort	270	(learned)	Unit = V
Spare 1	102	2	Ushort	272		Unused
Spare 2	103	2	Ushort	274		Unused
Spare 3	104	2	Ushort	276		Unused
Noise	89	2	Ushort	278	(learned)	
Ripple	90	2	Ushort	280	(learned)	

Beamline Parameters

Parameter	Units	Default Min / Max	Spec. Min / Max	Default Interlock
Analyzer I	A	0.20%	0/150	w arning
Analyzer AMU	AMU	0.5 AMU	0/200	critical
AMU tune speed	#	---	---	not monitored
Analyzer Pressure	TORR	5%	0	ignore
Mirror V	kV	5%	0/30.0	
0/60.0	critical			
Mirror I	mA	5%	0/2.50	ignore
Mirror Shunt I	mA	5%	0/2.50	ignore
Q1 I	A	5%	0/50.0	w arning
Q1 V	V	5%	0/20.0	ignore
Q2 I	A	5%	0/50.0	w arning
Q2 V	V	5%	0/20.0	ignore
Deflector V	kV	5%	0/20.0	w arning
Spare 4				
Spare 5				
Spare 6				
Q1 Tune Speed				
Q2 Tune Speed				
Deflector Tune Speed				
Bmln Y Tune Speed				
Lens I	mA	5%	0/150.0	w arning
Lens V	V	5%	0/40.0	ignore
Bmln Pressure				
Scans	#	10%	4000	w arning
Calculated Scans	#	---	0/4000	not monitored
Focus Cup Beam I	amps (range dependent)	---	0/999	not monitored
Src Type				
Src Mag Type				
Calculated Scans	#	---	0/4000	not monitored
Num Pass				
Num Fail				
Target Cup Beam I	amps (range dependent)	---	0/999	not monitored
Target Beam I Exponent				

Parameter	Ccode	Bytes	Type	Offset	Raw Values	Remarks
Analyzer I	56	8	Tgt_lim	282	0 – 1500 for non-EHP 0 – 1200 for EHP	Unit = A Scaler = 1 for non-EHP Scaler = 2 for EHP
Analyzer AMU	4	8	Tgt_lim	290	0 – 1500 for non-EHP 0 – 1200 for EHP	Unit = AMU scaler = 1 for non-EHP Unit = Gauss scaler = 2 for EHP
AMU tune speed	57	2	Ushort	298	(learned)	
Analyzer Pressure	58	8	Tgt_lim	300	0 - 4000	Unit = uT, scaler = 2, option = Analyzer CCIG
Mirror V	18	8	Tgt_lim	308	0 – 600	Unit = kV, scaler = 1 Option = 60kV Mirror
Mirror I	59	8	Tgt_lim	316	0 - 120	Unit = mA, scaler = 2
Mirror Shunt I	60	8	Tgt_lim	324	0 - 250	Unit = mA, scaler = 2
Q1 I	61	8	Tgt_lim	332	0 - 500	Unit = A, scaler = 1
Q1 V	62	8	Tgt_lim	340	0 - 200	Unit = V, scaler = 1
Q2 I	63	8	Tgt_lim	348	0 - 500	Unit = A, scaler = 1
Q2 V	64	8	Tgt_lim	356	0 - 200	Unit = V, scaler = 1
Deflector V	65	2	Ushort	364	(learned)	Unit = kV, scaler = 1
Spare 4	105	2	Ushort	366		Unused
Spare 5	106	2	Ushort	368		Unused
Spare 6	107	2	Ushort	370		Unused
Q1 Tune Speed	91	2	Ushort	372	(learned)	
Q2 Tune Speed	92	2	Ushort	374	(learned)	
Deflector Tune Speed	93	2	Ushort	376	(learned)	
Bmln Y Tune Speed	94	2	Ushort	378	(learned)	
Lens I	66	8	Tgt_lim	380	0 - 1500	Unit = mA, scaler = 1
Lens V	67	8	Tgt_lim	388	0 - 4000	Unit = V, scaler = 2
Bmln Pressure	68	8	Tgt_lim	396	0 - 4000	Unit = uT, scaler = 2
Scans	10	8	Tgt_lim	404	1-4000	Unit = #, scaler = 0
Calculated Scans	95	2	Ushort	412	(learned)	Unit = #
Focus Cup Beam I	69	2	Ushort	414	(learned)	Unit = A (range dependent)
Src Type	70	2	Ushort	416	(learned)	
Src Mag Type	97	2	Ushort	418	(learned)	
Num Pass	98	2	Ushort	420	(learned)	
Num Fail	99	2	Ushort	422	(learned)	
TargetCup Beam I	84	2	Ushort	424	(learned)	Unit = A (range dependent)
Target Beam I Exponent	85	2	Short	426	(learned)	

End Station Parameters

Parameter	Units	Default Min / Max	Spec. Min / Max	Default Interlock
ES Vac Pressure	TORR	1%	0	warning
Target Cup Bias V	V	5%	0/250	warning
Beam Width				
eFilament V	Volts	5%	0/20.0	ignore
eFilament I	Amps	5%	0/13.0	ignore
eRipple Volts	Volts	5%	0/50.0	ignore
eExtraction V	Volts	5%	0/350	ignore
eExtraction I	Amps	5%	0/99.9	ignore
eTarget I	mA	5%	0/99.9	ignore
eBias V	Volts	5%	0/25.0	ignore
eBias I	mA	5%	0/10.0	ignore
eSuppression V	Volts	5%	0/999	ignore
eSecondary I	mA	5%	0/10.0	ignore

Parameter	Ccode	Bytes	Type	Offset	Raw Values	Remarks
ES Vac Pressure	12	8	Tgt_lim	428	0 -5000	Unit = uT, scaler = 2
Target Cup Bias V	71	8	Tgt_lim	436	0 – 250 for non-flood gun 0 – 999 for flood gun	Unit = V, scaler = 0
Beam Width	83	2	Ushort	444	(learned)	
eFilament V	72	8	Tgt_lim	446	0 - 200	Unit = V, scaler= 1,option= eflood
eFilament I	73	8	Tgt_lim	454	0 - 130	Unit = A, scaler= 1,option= eflood
eRipple Volts	74	8	Tgt_lim	462	0 - 500	Unit = V, scaler= 1,option= eflood
eExtraction V	75	8	Tgt_lim	470	0 - 350	Unit = V, scaler= 0,option= eflood
eExtraction I	76	8	Tgt_lim	478	0 - 999	Unit = A, scaler= 1,option= eflood
eTarget I	77	8	Tgt_lim	486	0 - 999	Unit = mA, scaler= 1,option= eflood
eBias V	78	8	Tgt_lim	494	0 - 250	Unit = V, scaler= 1, option= eflood
eBias I	79	8	Tgt_lim	502	0 - 100	Unit= mA, scaler= 1, option= eflood
eSuppression V	80	8	Tgt_lim	510	0 - 999	Unit = V, scaler = 0, option = eflood
eSecondary I	81	8	Tgt_lim	518	0 - 100	Unit= mA, scaler= 1,option = eflood
AnalyzerG	109	8	Tgt_lim	526	0 - 1200	Unit= G, scaler= 2
Spares		192	Uchar	534		

Multi-line Parameters

Note: There are 12 recipe lines, each consisting of data with the structure shown below.
CCODE 82 is the whole multi-line section, consisting of the parameters below.
CCODE 108 is one line.

Parameter	Units	Default Min / Max	Spec. Min / Max	Default Interlock
Dose (mant+expo)	ions/cm²	----	1.00E+20	----
Dose Exponent				
Rotations	#	----	0 /16	critical
Tilt	DEG	----	0/90	critical
Tw ist	DEG	----	0/359	critical
Energy	keV	1%	1/400	w arning
Accel V	kV	1%	/200.	ignore
Accel I	mA	1%	5	ignore
Decel V	V	1%	30	ignore
Decel I	mA	1%	2.5	ignore
Accel Suppression V	V	5%	5	ignore
Accel Suppression I	mA	5%	5	ignore

Parameter	Ccode	Bytes	Type	Offset	Raw Values	Remarks
Dose Mantissa		2	Ushort	726	1000 - 9999	Unit= ions/cm², scaler = 3
Dose Exponent		2	Ushort	728	17-Sep	
Rotations		2	Ushort	730	0 - 30	Unit = #
Tilt		2	Ushort	732	0 -90	Unit = DEG
Tw ist		2	Ushort	734	0 - 359	Unit = DEG
Energy		8	Tgt_lim	736	0 - 750	Unit = keV, scaler = 0
Accel V		8	Tgt_lim	744	0 - 1950	Unit = kV, scaler = 1
Accel I		8	Tgt_lim	752	0 - 8000	Unit = mA, scaler = 3
Decel V		8	Tgt_lim	760	0 - 300	Unit = V, scaler = 1
Decel I		8	Tgt_lim	768	0 - 250	Unit = mA, scaler = 2
Accel Suppr V		8	Tgt_lim	776	0 - 500	Unit = V, scaler = 2
Accel Suppr I		8	Tgt_lim	784	0 - 500	Unit = mA, scaler = 2

Multiline 2 offset = 792
Multiline 3 offset = 858
Multiline 4 offset = 924
Multiline 5 offset = 990
Multiline 6 offset = 1056
Multiline 7 offset = 1122
Multiline 8 offset = 1188
Multiline 9 offset = 1254
Multiline 10 offset = 1320
Multiline 11 offset = 1386
Multiline 12 offset = 1452
End of recipe offset = 1518

Where Used: S7F3, S7F6, S7F18

PPGNT -- Process program grant status, 1 byte **Format: 10**

0 = OK
1 = already have
2 = no space
3 = invalid PPID
4 = busy, try later
5 = will not accept
>5 = other error
6-63 = reserved
Where Used: S7F2

PPID -- Process program ID. **Format: 20**

The recipe name as it appears in the process screens of the E220. Maximum of 16 characters. Trailing spaces are ignored

Where Used: S7F1, S7F3, S7F5, S7F6, S7F17, S7F20

RCMD **Format: 20**

Code	Name	Action commanded	Screens (See note on screens below)
1	START-UP	Pump vacuum system, initialize handler	Host Control
			Batch Status
2	SHUT-DOWN	Turn off ion source, idle vacuum system	Host Control
			Batch Status
3	STOP	Cease setting up or processing wafers	Host Control
			Batch Status
			Implant
			Auto Source
			Auto Scan
			Manual Beam
4	START	Start processing wafers or continue setting up	Host Control
			Batch Status
			Implant
			Auto Source
			Auto Scan
			Manual Beam
5	ABORT	Abort current operation and return wafers if aborting during implant	Host Control
			Batch Status
			Implant
			Auto Source
			Auto Scan
			Manual Beam
6	VENT-ONLY	Vent elevators (Doors not opened)	Host Control
			Batch Status
7	PUMP-ONLY	Pump elevators	Host Control
			Batch Status
8	OPEN-ONLY	Open elevator doors	Host Control
			Batch Status
9	CLOSE-ONLY	Close elevator doors	Host Control
			Batch Status
10	CLOSE&PUMP	Close elevator doors, pump elevators and maps wafers	Host Control
			Batch Status
11	VENT&OPEN	Vent elevators and open elevator doors	Host Control
			Batch Status
12	CYCLE-TEST	Map and cycle all wafers present	Host Control
		Not available in V11.01 and newer software	Batch Status
13	RR-PROCEED	Proceed, Response to E220 Operator Message	Any Screen after message appears
14	RR-NOT-	Do Not Proceed, Response to E220	

	PROCEED	Operator Message	
15	FACTORY-AUTO	Factory Automation Equipment lot scheduling start	Any Screen after message appears
16	PPSELECT	Choose Process Program for Batch Parameter Name CPNAME = PPID Parameter Value CPVAL (Format A) = 16-character PPID name CPNAME = LOC CPVAL (Format B) = 1 - Left 2 – Right 3 - Both CPNAME = MID1 CPVAL (Format A) = 16- character Left Lot Name CPNAME = MID2 CPVAL (Format A) = 16-character Right Lot Name CPNAME = START-WAF1 CPVAL (Format B) = starting slot to process on the left CPNAME = WAF-COUNT1 CPVAL (Format B) = number of wafers to process on the left CPNAME = START-WAF2 CPVAL (Format B) = starting slot to process on the right CPNAME = WAF-COUNT2 CPVAL (Format B) = number of wafers to process on the left CPNAME = JOB-TIME CPVAL (Format U2) = number of minutes to wait after a SETUP-ONLY job. 0 to 120 minutes. Applicable only if Process Job Queue is enabled. CPNAME = WAFER-RANGE-CHECK CPVAL (Format BOOLEAN) If true, the number of wafers to be processed as specified by START-WAF and WAF-COUNT are checked against the number of wafers mapped. If there is a conflict, an error message is displayed. CPNAME = SHUFFLE-MODE CPVAL (Format BOOLEAN)	Host Control Batch Status

		If true, a shuffle mode will be performed. Note: This command will be rejected if ECO 37 (Wafer Shuffle Mode) is not selected. CPNAME = JOB-ID CPVAL (Format A) = 16-character Host-assigned job-id. If the host specifies a JOB-ID that has a duplicate, the equipment replies with S2F42, HCACK=3, invalid JOB-ID. CPNAME = PPID-LIST CPVAL (Format L) = list of 16-character PPID names that the job's materials will be process with. (chained implant). S2F49 message should be used with this parameter. CPNAME = WaferID1 CPVAL (Format L) = list of 48-character WaferIDs on the left side that will be used to identify the wafer being processed. If the slot is empty, a blank WaferID should be used. Applicable only if MID Module is enabled. CPNAME = SlotMap1 CPVAL (Format L) = list of Format- B flags to specify that the wafer in a slot exists on the left. 0x00 – no wafer in the slot 0x01 – wafer exists in the slot Applicable only if MID Module is enabled. CPNAME = WaferID2 CPVAL (Format L) = list of 48-character WaferIDs on the right side that will be used to identify the wafer being processed. If the slot is empty, a blank WaferID should be used. Applicable only if MID Module is enabled. CPNAME = SlotMap2 CPVAL (Format L) = list of Format- B flags to specify that the wafer in a slot exists on the right. 0x00 – no wafer in the slot 0x01 – wafer exists in the slot Applicable only if MID Module is enabled.	
17	PPCLEAR-LEFT	Clears the selected process program and lot id for the left loadlock. Not applicable in FA semi or full-auto mode.	Any screen
18	PPCLEAR-RIGHT	Clears the selected process program and lot id for the right loadlock. Not applicable in FA semi or full-auto mode.	Any screen
19	SETUP-ONLY	Starts source, beamline and beamscan setups even if the loadlocks are not closed and pumped.	Any screen
20	START-PROCESS	Start the job at the top of the Process Job queue (V12.20 Feature).	

21	LEFT-VENT	Vent Left Loadlock	Host Control, Batch Status
22	LEFT-PUMP	Pump Left Loadlock	Host Control, Batch Status
23	LEFT-OPEN	Open Left Loadlock	Host Control, Batch Status
24	LEFT-CLOSE	Close Left Loadlock	Host Control, Batch Status
25	LEFT-CLOSE-PUMP	Close and pump Left Loadlock, and map wafers	Host Control, Batch Status
26	LEFT-VENT-OPEN	Vent and Open Left Loadlock	Host Control, Batch Status
27	START-DUAL	Applicable for both VILL and non-VILL processing. Starts set up on both sides if recipes are identical. If recipes are not identical, starts sequential processing	Host Control, Batch Status
28	START-LEFT	Starts set up on left side	Host Control, Batch Status
29	START-RIGHT	Starts set up on right side	Host Control, Batch Status
30	START-IMPLANT	Starts implanting wafers after setup	Host Control, Batch Status
31	RIGHT-VENT	Vent Right Loadlock	Host Control, Batch Status
32	RIGHT-PUMP	Pump Right Loadlock	Host Control, Batch Status
33	RIGHT-OPEN	Open Right Loadlock	Host Control, Batch Status
34	RIGHT-CLOSE	Close Right Loadlock	Host Control, Batch Status
35	RIGHT-CLOSE-PUMP	Close and pump Right Loadlock, and map wafers	Host Control, Batch Status
36	RIGHT-VENT-OPEN	Vent and Open Right Loadlock	Host Control, Batch Status
37	PPCLEAR-LINEUP-QUEUE	Removes all entries in the Process Job Queue except those that are already active. V12.20 Feature	
41	GO-LOCAL	Switches host control mode to LOCAL in GEM or MONITOR in SECS.	Any screen
42	GO-REMOTE	Switches host control mode to REMOTE in GEM or CONTROL in SECS.	Any screen
43	BUZZER-ON	Turns audible alarm on	Any screen
44	BUZZER-OFF	Turns audible alarm off. Note that this remote command will be rejected if it is sent while an alarm is unacknowledged. The audible alarm will be turned off by alarm acknowledgement through an operator or host	Any screen
45	BLUE-OFF	Signal tower BLUE light turns OFF	Any screen
46	BLUE-FLASH	Signal tower BLUE light FLASHES	Any screen
47	BLUE-ON	Signal tower BLUE light turns ON	Any screen
48	GREEN-OFF	Signal tower GREEN light turns OFF	Any screen
49	GREEN-FLASH	Signal tower GREEN light FLASHES	Any screen
50	GREEN-ON	Signal tower GREEN light turns ON	Any screen
51	YELLOW-OFF	Signal tower YELLOW light turns OFF	Any screen
52	YELLOW-FLASH	Signal tower YELLOW light FLASHES	Any screen
53	YELLOW-ON	Signal tower YELLOW light turns ON	Any screen
54	RED-OFF	Signal tower RED light turns OFF	Any screen
55	RED-FLASH	Signal tower RED light FLASHES	Any screen
56	RED-ON	Signal tower RED light turns ON	Any screen
57	(unnamed)	Sets run parameters LCASSETTE, RCASSETTE, HOST-OPERATOR-ID and OPERATION CPNAME = LCASSETTE CPVAL (Format A) = 16-character Cassette name CPNAME = RCASSETTE CPVAL (Format A) = 16-character Cassette name	Any screen

		CPNAME = HOST-OPERATOR-ID CPVAL (Format A) = operator id CPNAME = OPERATION CPVAL (Format A) = operation	
58	SET-LIGHTTOWER	Set signal tower lights with one remote command. CPNAME = RED CPVAL (Format U1) = 0 – Off 1 – On 2 – Flashing CPNAME = YELLOW CPVAL same as parameter value for RED CPNAME = GREEN CPVAL same as parameter value for RED CPNAME = BLUE CPVAL same as parameter value for RED NOTE: Setting for BLUE is ignored when a 3 light tower is used.	Any screen
60	PPQ	Specifies parameters PTN, PPID, and MID CPNAME = PTN CPVAL (Format B) = CPNAME = PPID CPVAL (Format A) = 16-character PPID name CPNAME = MID CPVAL (Format A) = 16-character Material ID name	
62	DELETE-JOB	Deletes the specified job from the Process Job Queue. CPNAME = JOB-ID CPVAL (Format A) = 16-character Host-assigned job-id. Applicable only if Process Job Queue is enabled.	Any screen
63	PROMOTE-JOB	Sets the specified job to be the next one to be processed in the Process Job Queue. CPNAME = JOB-ID CPVAL (Format A) = 16-character Host-assigned job-id. Applicable only if Process Job Queue is enabled.	Any screen
200	SMIF-Control-Mode	Perform a Load Cycle	
201			
202		CPNAME = MODE	

		CPVAL (Format U1) = 1 - Manual Mode 2 - Semi-auto Mode (Asyst smif only) 3 - Full-auto Mode	
203	SMIF-Load	Perform a Load Cycle	Any screen
204			
205		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	
206	SMIF-Unload	Perform a Unload Cycle	Any screen
207			
208		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	
209	SMIF-PortLock	Lock the POD	Any screen
210			
211		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	
212	SMIF-Port-UNlock	Unlock the POD	Any screen
213			
214		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	
215	Blink-POD-in-LED	Blink LED labled POD IN PLACE	Any screen
216			
217		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	
218	Emergency-Stop	Unconditionally Stop	Any screen
219			
220		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	
221	SMIF-Home	Perform a Home Cycle	Any screen
222			
223		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	
224	SMIF-Home-	Perform a Level 2 Home Cycle	Any screen

	Level2	(Ergospeed 2 Only)	
225			
226			
		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	
227	SMIF-Home-Level3	Perform a Level 3 Home Cycle (Ergospeed 2 Only)	Any screen
228			
229			
		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	
230	Stop-Blink	Stop Blinking of LED labled POD IN PLACE (Ergospeed 2 Only)	Any screen
231			
232		CPNAME (Format A) = SMIF CPVAL (Format U1) = 1 - Left SMIF 1 2 - Right SMIF 2 3 - Both	

Notes:

1) The list of remote commands (RCMD) is supported by the E220 GEM application. The maximum length of the RCMD is 20 printable characters. No spaces are allowed.

2) All RCMD names are case-sensitive.

3) CPNAMEs have ‘A’ format.

3) Codes 200-220 were added in V11.00.22. They are used to command dual SMIF LPTs. The dual SMIF LPTs must be present, selected, and communications established between the E220 and the SMIF LPTs before the E220 will accept these commands.

Codes 221-232 were added in V11.07.06. They are used to command Ergospeed SMIFs

4) In software versions before V11.01, remote commands are not always available for execution due to the state of the E220. This is most notable by the displayed screen. The column labeled Screens denotes when a command will be executed. Users must make sure the E220 is displaying the proper screen before leaving the machine. If a command cannot be executed the message will be NAKed. In software version V11.01 and later, remote commands can be executed independently from the screen.

5)

Examples of PPSELECT Remote Command Messages:

The structure for a dual sided PPSELECT will be as follows:

```
S2F41 W
<L [2]
       <A ‘PPSELECT’>
       <L [4]
                <L [2]
                   <A ‘PPID’>
                   <A ‘PP01’>
                >
                <L [2]
                   <A ‘LOC’>
```

```
                    <B 03>
                 >
                 <L [2]
                    <A ‘MID1’>
                    <A ‘LEFT LOT ID’>
                 >
                 <L [2]
                    <A ‘MID2’>
                    <A ‘RIGHT LOT ID’>
                 >

        >
>
```

The structure for a left single sided PPSELECT will be as follows:

```
S2F41 W
<L [2]
        <A ‘PPSELECT’>
        <L [4]
                 <L [2]
                    <A ‘PPID’>
                    <A ‘PP01’>
                 >
                 <L [2]
                    <A ‘LOC’>
                    <B 01>
                 >
                 <L [2]
                    <A ‘MID1’>
                    <A ‘LEFT LOT ID’>
                 >
                 <L [2]
                    <A ‘MID2’>
                    <A ‘ ’>
                 >
        >
   >
```

The structure for a dual sided PPSELECT with slotmap will be as follows (only wafers 1 and 2 have been specified):

```
S2F41 W
<L [2]
        <A ‘PPSELECT’>
        <L [6]
                 <L [2]
                    <A ‘PPID’>
                    <A ‘PP01’>
                 >
                 <L [2]
                    <A ‘LOC’>
                    <B 03>
                  >
                 <L [2]
                    <A ‘MID1’>
                    <A ‘LEFT LOT ID’>
                  >
                 <L [2]
                    <A ‘MID2’>
                    <A ‘RIGHT LOT ID’>
                 >
```

```
                <L [2]
                   <A[8/1] "SlotMap1">
                   <B[25/1] 0x01 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                            0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                            0x00 0x00 0x00>
                >
                <L [2]
                   <A[8/1] "SlotMap2">
                   <B[25/1] 0x01 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                            0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                            0x00 0x00 0x00>
                >

        >
>
```

The structure for a left sided PPSELECT with slotmap will be as follows (only wafers 1 and 2 have been specified):

```
S2F41 W
<L [2]
        <A 'PPSELECT'>
        <L [6]
                <L [2]
                   <A 'PPID'>
                   <A 'PP01'>
                >
                <L [2]
                   <A 'LOC'>
                   <B 01>
                 >
                <L [2]
                   <A 'MID1'>
                   <A 'LEFT LOT ID'>
                 >
                <L [2]
                   <A 'MID2'>
                   <A ' '>
                >
                <L [2]
                   <A[8/1] "SlotMap1">
                   <B[25/1] 0x01 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                            0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                            0x00 0x00 0x00>
                >
        >
>
```

The structure for a dual sided PPSELECT with wafer ID map will be as follows (only wafers 1 and 2 have been specified):

```
S2F41 W
<L [2]
        <A 'PPSELECT'>
        <L [6]
                <L [2]
                   <A 'PPID'>
                   <A 'PP01'>
                >
```

```
<L [2]
   <A ‘LOC’>
   <B 03>
>
<L [2]
   <A ‘MID1’>
   <A ‘LEFT LOT ID’>
>
<L [2]
   <A ‘MID2’>
   <A ‘RIGHT LOT ID’>
>
<L [2]
   <A[8/1] "WaferID1">
   <L[25/1]
      <A[6/1] "Wafer1">
      <A[6/1] "Wafer2">
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
   >
>

<L [2]
   <A[8/1] "WaferID2">
   <L[25/1]
      <A[6/1] "Wafer1">
      <A[6/1] "Wafer2">
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
      <A[0/1]>
```

```
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                  >
               >

       >
>
```

The structure for a left sided PPSELECT with Wafer ID map will be as follows (only wafers 1 and 2 have been specified):

```
S2F41 W
<L [2]
       <A ‘PPSELECT’>
       <L [6]
               <L [2]
                  <A ‘PPID’>
                  <A ‘PP01’>
               >
               <L [2]
                  <A ‘LOC’>
                  <B 01>
               >
               <L [2]
                  <A ‘MID1’>
                  <A ‘LEFT LOT ID’>
               >
               <L [2]
                  <A ‘MID2’>
                  <A ‘ ’>
               >
               <L [2]
                  <A[8/1] "WaferID1">
                  <L[25/1]
                    <A[6/1] "Wafer1">
                    <A[6/1] "Wafer2">
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
                    <A[0/1]>
```

```
                        <A[0/1]>
                        <A[0/1]>
                        <A[0/1]>
                        <A[0/1]>
                        <A[0/1]>
                        <A[0/1]>
                        <A[0/1]>
                        <A[0/1]>
                        <A[0/1]>
                        <A[0/1]>
                        <A[0/1]>
                    >
                >
        >
>
```

The structure for a left single sided PPSELECT with cassette slot and wafer ID map will be as follows (MID-MODE ECID 286 WCC bit must be set. Slot and wafer map comparison is made at the SMIF and not tool):

```
      <S2F41 W
      <L[2/1]
              <A[8/1] "PPSELECT">
              <L[6/1]
                     <L[2/1]
                            <A[4/1] "PPID">
                            <A[15/1] "PP01">
                     >
                     <L[2/1]
                            <A[3/1] "LOC">
                            <B[1/1] 0x01>
                     >
                     <L[2/1]
                            <A[4/1] "MID1">
                            <A[11/1] "LEFT LOT ID">
                     >
                     <L[2/1]
                            <A[4/1] "MID2">
                            <A[1/1] " ">
                     >
                     <L[2/1]
                            <A[8/1] "WaferID1">
                            <L[25/1]
                                   <A[6/1] "Wafer1">
                                   <A[6/1] "Wafer2">
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
                                   <A[0/1]>
```

```
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                >
                        >
                        <L[2/1]
                             <A[8/1] "SlotMap1">
                             <B[25/1] 0x01 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                               0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                               0x00 0x00 0x00>
                             >
                        >
                >
        >
```

The structure for a dual sided PPSELECT with cassette slot and wafer ID map will be as follows (MID-MODE ECID 286 WCC bit must be set. Slot and wafer map comparison is made at the SMIF and not tool):

```
        <S2F41 W
        <L[2/1]
                <A[8/1] "PPSELECT">
                <L[8/1]
                        <L[2/1]
                                <A[4/1] "PPID">
                                <A[15/1] "PP01">
                        >
                        <L[2/1]
                                <A[3/1] "LOC">
                                <B[1/1] 0x03>
                        >
                        <L[2/1]
                                <A[4/1] "MID1">
                                <A[11/1] "LEFT LOT ID">
                        >
                        <L[2/1]
                                <A[4/1] "MID2">
                                <A[12/1] "Right LOT ID">
                        >
                        <L[2/1]
                                <A[8/1] "WaferID1">
                                <L[25/1]
                                        <A[6/1] "Wafer1">
                                        <A[6/1] "Wafer2">
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
                                        <A[0/1]>
```

```
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
        >
>
<L[2/1]
        <A[8/1] "WaferID2">
        <L[25/1]
                <A[6/1] "Wafer1">
                <A[6/1] "Wafer2">
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
                <A[0/1]>
        >
>
<L[2/1]
     <A[8/1] "SlotMap1">
     <B[25/1] 0x01 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                    0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                    0x00 0x00 0x00 0x00>
     >
>
<L[2/1]
     <A[8/1] "SlotMap2">
     <B[25/1] 0x01 0x01 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                    0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00
                    0x00 0x00 0x00 0x00>
```

```
                    >
                >
            >
        >
```

The structure for a dual-sided PPSELECT specifying a 3-recipe chained implant and wafer ranges will be as follows:

```
S2F49 W
<L
    <U4  0>
    <A    " ">
     <A "PPSELECT">
     <L

          <L
               <A ‘PPID-LIST’>
               <L
                    <A ‘PP01’>
                    <A ‘PP02’>
                    <A ‘PP03’>
               >
          >

          <L
               <A ‘LOC’>
               <B 0x03>
          >

          <L
               <A ‘MID1’>
               <A ‘LEFTLOTID’>
          >

          <L
               <A ‘START-WAF1’>
               <B  1>
          >

          <L
               <A ‘WAF-COUNT1’>
               <B  2>
          >

          <L
               <A ‘MID2’>
               <A ‘RIGHTLOTID’>
          >

          <L
               <A ‘START-WAF2’>
               <B  1>
          >

          <L
               <A ‘WAF-COUNT2’>
```

<B 3>
>

>
>.

Where Used: S2F41

REPGSZ -- Reporting group size **Format: 5( )**

Where Used: S2F23

RPTID -- Report ID **Format: 5( )**

Identifier of a defined report. Either a default report or a report defined with S2F33 /S2F34 .
Where Used: S2F33, S2F35; S6F11, S6F13

RSACK -- Ready to Send Acknowledge code, 1 byte **Format: 10**

0 = acknowledge, OK (note that 'OK' differs from 'ready')
1 = invalid port number
2 = port is already occupied
3 = busy, unable to move material at this time. Try again
4 = receiver does not have permission to perform this operation
5-63 = reserved
Where Used:

RSDA -- Request Spool Data Acknowledge **Format: 10**

0 = OK
1 = Denied, busy try later
2 = Denied, spooled data does not exist
3-63 = Reserved
Where Used: S6F24

RSDC -- Request Spool Data Code **Format: 51**

0 = Transmit Spooled Messages
1 = Purge Spooled Messages
2-63 = Reserved
Where Used: S6F23

SEQNUM -- Command Number Format: 52

Value which identifies a unique process program command by its position in the list of commands relative to the first. For the first command of the process program, SEQNUM is l.
Where Used: S7F27

SFCD -- Status form code, 1 byte Format: 10

Where Used:

SHEAD -- Stored header related to the transaction timer Format: 10

Where Used: S9F9

SMPLN -- Sample number Format: 5( )

Where Used: S6F1

SOFTREV -- Software revision code 8 bytes maximum Format: 20

The software revision code for the E220 is a 4 to 8 character string of the form "10.00.00".
Where Used: S1F2, S1F13, S1F14

STIME -- Sample time, 12 bytes Format: 20

yymmddhhmmss
Where Used: S6F1

STRACK -- Spool Stream Acknowledge Format: 10

1 = Spooling not allowed for stream (i.e., Stream 1)
2 = Stream unknown
3 = Unknown function specified for this stream
4 = Secondary function specified for this stream
Where Used: S2F44

STRID -- Stream Identification Format: 51

Where Used: S2F43, S2F44

SV -- Status variable value **Format: 20, 5( )**

Where Used: S1F4, S6F1

SVID -- Status variable ID **Format: 5( )**

The status variables may also be access with a VID of equivalent value using the functions appropriate for VID. See VID for table showing relationship between data variables identifcation (DVID), equipment constant identifications(ECID), and status variable identifications(SVID)). The status variable IDs are as follows:

SVID	SVNAME	SVID	SVNAME
	Analog Readback Variables		Pump Analog Readback Variables
1	TERMINAL- MEGOHMS	400	a1ESTurboSpeed[0]
2	GROUND- MEGOHMS	401	a1ESTurboNormalizedSpeed[0]
3	TERMINAL- WATER- TEMP	402	a1ESTurboCurrent[0]
4	GROUND- WATER- TEMP	403	a1ESTurboVoltage[0]
5	CITY- WATER- TEMP	404	a1ESTurboTempC[0]
6	SOURCE- PRESSURE	405	a1ESTurboLifeHR[0]
7	SCANNER- PRESSURE	406	a1ESTurboCycles[0]
8	CHAMBER- PRESSURE	407	a1ESTurboCycleTimeMIN[0]
9	SOURCE- TURBO- SPEED	408	a1ESTurboSpeed[1]
10	SCANNER- TURBO- SPEED	409	a1ESTurboNormalizedSpeed[1]
11	LEFT- CRYO- TEMP	410	a1ESTurboCurrent[1]
12	CHAMBER- CRYO- TEMP	411	a1ESTurboVoltage[1]
13	RIGHT- CRYO- TEMP	412	a1ESTurboTempC[1]
14	LEFT- ELEVATOR- TC	413	a1ESTurboLifeHR[1]
15	CHAMBER- CRYO- TC	414	a1ESTurboCycles[1]
16	RIGHT- ELEVATOR- TC	415	a1ESTurboCycleTimeMIN[1]
17	GAS	416	a1OnBoardRegenStep[0]
18	G1- PRES	417	a1OnBoardFirstStageTemp[0]
19	G2- PRES	418	a1OnBoardSecondStageTemp[0]
20	G3- PRES	419	a1OnBoardTcGaugePress[0]
21	G4- PRES	420	a1OnBoardTotalOperatingTime[0]
22	FIL- I	421	a1OnBoardTempSinceLastFullRegen[0]
23	FIL- VOLTS	422	a1OnBoardTempSinceLastFastRegen[0]
24	ARC- I	423	a1OnBoardBasePressure[0]
25	RANGE- ARC	424	a1OnBoardRegenStep[1]
26	ARC- VOLTS	425	a1OnBoardFirstStageTemp[1]
27	MAG- I	426	a1OnBoardSecondStageTemp[1]
28	EXT- VOLTS	427	a1OnBoardTcGaugePress[1]
29	EXT- I	428	a1OnBoardTotalOperatingTime[1]
30	SUP- VOLTS	429	a1OnBoardTempSinceLastFullRegen[1]
31	SUP- I	430	a1OnBoardTempSinceLastFastRegen[1]
32	X- AXIS	431	a1OnBoardBasePressure[1]
33	Y- AXIS	432	a1OnBoardRegenStep[2]
34	Z- AXIS	433	a1OnBoardFirstStageTemp[2]
35	AMU- I	434	a1OnBoardSecondStageTemp[2]
36	AMU	435	a1OnBoardTcGaugePress[2]
37	BIAS	436	a1OnBoardTotalOperatingTime[2]

38	BEAM
39	BEAM- I- RANGE
40	MIR- VOLTS
41	MIR- I
42	MIR- SHUNT- I
43	Q1- I
44	Q2- I
45	DEFLECTOR
46	LENS- I
47	ACCEL- VOLTS
48	ACCEL- I
49	DEC- VOLTS
50	DEC- I
51	ENERGY-PROBE
52	TARGET- BIAS
53	VAP- TEMP
54	COOLING
55	eFIL- VOLTS
56	eFIL- I
57	eRPL- VOLTS
58	eEXT- VOLTS
59	eEXT- I
60	eTARGET- I
61	eBIAS- VOLTS
62	eBIAS- I
63	eSUP- VOLTS
64	ANALYZER- PRESSURE
65	DRY- PUMP- TC
66	Not Used
67	MAG-VOLTS
68	Q1-VOLTS
69	Q2-VOLTS
70	LENS-VOLTS
71	eSECOND-I
72	HTR-TEMP
73	DECEL-VOLTS
74	DECEL-I
75	AMU-G
76	HELIUM-PRESSURE
77	TERM-DI-RETURN-TEMP
78	ES-DIFFER-TC
79	DI-WATER-DELTA-TEMP
80	ANALYZER-TC
81	BEAMLINE-TC
82	DECEL-SUPPRESSION-VOLTS

437	a1OnBoardTempSinceLastFullRegen[2]
438	a1OnBoardTempSinceLastFastRegen[2]
439	a1OnBoardBasePressure[2]

GEM System Data Variables

506	TIME
507	MDLN
508	SOFTREV
517	ALARMSTATE

	Low Analog Readback On Last Wafer		Highest Analog Readback On Last Wafer
1001	lwTERMINAL- MEGOHMS	2001	hwTERMINAL- MEGOHMS
1002	lwGROUND- MEGOHMS	2002	hwGROUND- MEGOHMS
1003	lwTERMINAL- WATER- TEMP	2003	hwTERMINAL- WATER- TEMP
1004	lwGROUND- WATER- TEMP	2004	hwGROUND- WATER- TEMP
1005	lwCITY- WATER- TEMP	2005	hwCITY- WATER- TEMP
1006	lwSOURCE- PRESSURE	2006	hwSOURCE- PRESSURE
1007	lwSCANNER- PRESSURE	2007	hwSCANNER- PRESSURE
1008	lwCHAMBER- PRESSURE	2008	hwCHAMBER- PRESSURE
1009	lwSOURCE- TURBO- SPEED	2009	hwSOURCE- TURBO- SPEED
1010	lwSCANNER- TURBO- SPEED	2010	hwSCANNER- TURBO- SPEED
1011	lwLEFT- CRYO- TEMP	2011	hwLEFT- CRYO- TEMP

1012	lwCHAMBER- CRYO- TEMP	2012	hwCHAMBER- CRYO- TEMP
1013	lwRIGHT- CRYO- TEMP	2013	hwRIGHT- CRYO- TEMP
1014	lwLEFT- ELEVATOR- TC	2014	hwLEFT- ELEVATOR- TC
1015	lwCHAMBER- CRYO- TC	2015	hwCHAMBER- CRYO- TC
1016	lwRIGHT- ELEVATOR- TC	2016	hwRIGHT- ELEVATOR- TC
1017	lwGAS	2017	hwGAS
1018	lwG1- PRES	2018	hwG1- PRES
1019	lwG2- PRES	2019	hwG2- PRES
1020	lwG3- PRES	2020	hwG3- PRES
1021	lwG4- PRES	2021	hwG4- PRES
1022	lwFIL- I	2022	hwFIL- I
1023	lwFIL- VOLTS	2023	hwFIL- VOLTS
1024	lwARC- I	2024	hwARC- I
1025	lwRANGE- ARC	2025	hwRANGE- ARC
1026	lwARC- VOLTS	2026	hwARC- VOLTS
1027	lwMAG- I	2027	hwMAG- I
1028	lwEXT- VOLTS	2028	hwEXT- VOLTS
1029	lwEXT- I	2029	hwEXT- I
1030	lwSUP- VOLTS	2030	hwSUP- VOLTS
1031	lwSUP- I	2031	hwSUP- I
1032	lwX- AXIS	2032	hwX- AXIS
1033	lwY- AXIS	2033	hwY- AXIS
1034	lwZ- AXIS	2034	hwZ- AXIS
1035	lwAMU- I	2035	hwAMU- I
1036	lwAMU	2036	hwAMU
1037	lwBIAS	2037	hwBIAS
1038	lwBEAM	2038	hwBEAM
1039	lwBEAM- I- RANGE	2039	hwBEAM- I- RANGE
1040	lwMIR- VOLTS	2040	hwMIR- VOLTS
1041	lwMIR- I	2041	hwMIR- I
1042	lwMIR- SHUNT- I	2042	hwMIR- SHUNT- I
1043	lwQ1- I	2043	hwQ1- I
1044	lwQ2- I	2044	hwQ2- I
1045	lwDEFLECTOR	2045	hwDEFLECTOR
1046	lwLENS- I	2046	hwLENS- I
1047	lwACCEL- VOLTS	2047	hwACCEL- VOLTS
1048	lwACCEL- I	2048	hwACCEL- I
1049	lwDEC- VOLTS	2049	hwDEC- VOLTS
1050	lwDEC- I	2050	hwDEC- I
1051	lwENERGY-PROBE	2051	hwENERGY-PROBE
1052	lwTARGET- BIAS	2052	hwTARGET- BIAS
1053	lwVAP- TEMP	2053	hwVAP- TEMP
1054	lwCOOLING	2054	hwCOOLING
1055	lweFIL- VOLTS	2055	hweFIL- VOLTS
1056	lweFIL- I	2056	hweFIL- I
1057	lweRPL- VOLTS	2057	hweRPL- VOLTS
1058	lweEXT- VOLTS	2058	hweEXT- VOLTS
1059	lweEXT- I	2059	hweEXT- I
1060	lweTARGET- I	2060	hweTARGET- I
1061	lweBIAS- VOLTS	2061	hweBIAS- VOLTS
1062	lweBIAS- I	2062	hweBIAS- I
1063	lweSUP- VOLTS	2063	hweSUP- VOLTS
1064	lwANALYZER- PRESSURE	2064	hwANALYZER- PRESSURE
1065	lwDRY- PUMP- TC	2065	hwDRY- PUMP- TC
1066	Not Used	2066	Not Used
1067	lwMAG-VOLTS	2067	hwMAG-VOLTS
1068	lwQ1-VOLTS	2068	hwQ1-VOLTS

1069	lwQ2-VOLTS	2069	hwQ2-VOLTS
1070	lwLENS-VOLTS	2070	hwLENS-VOLTS
1071	lweSECOND-I	2071	hweSECOND-I
1072	lwHTR-TEMP	2072	hwHTR-TEMP
1073	lwDECEL-VOLTS	2073	hwDECEL-VOLTS
1074	lwDECEL-I	2074	hwDECEL-I
1075	lwAMU-G	2075	hwAMU-G
1076	lwHELIUM-PRESSURE	2076	hwHELIUM-PRESSURE
1077	lwTERM-DI-RETURN-TEMP	2077	hwTERM-DI-RETURN-TEMP
1078	lwES-DIFFER-TC	2078	hwES-DIFFER-TC
1079	lwDI-WATER-DELTA-TEMP	2079	hwDI-WATER-DELTA-TEMP
1080	lwANALYZER-TC	2080	hwANALYZER-TC
1081	lwBEMLINE-TC	2081	hwBEMLINE-TC
	Ave. Analog Readback On Last Wafer		Lowest Analog Readback On Last Batch
3001	awTERMINAL- MEGOHMS	4001	lbTERMINAL- MEGOHMS
3002	awGROUND- MEGOHMS	4002	lbGROUND- MEGOHMS
3003	awTERMINAL- WATER- TEMP	4003	lbTERMINAL- WATER- TEMP
3004	awGROUND- WATER- TEMP	4004	lbGROUND- WATER- TEMP
3005	awCITY- WATER- TEMP	4005	lbCITY- WATER- TEMP
3006	awSOURCE- PRESSURE	4006	lbSOURCE- PRESSURE
3007	awSCANNER- PRESSURE	4007	lbSCANNER- PRESSURE
3008	awCHAMBER- PRESSURE	4008	lbCHAMBER- PRESSURE
3009	awSOURCE- TURBO- SPEED	4009	lbSOURCE- TURBO- SPEED
3010	awSCANNER- TURBO- SPEED	4010	lbSCANNER- TURBO- SPEED
3011	awLEFT- CRYO- TEMP	4011	lbLEFT- CRYO- TEMP
3012	awCHAMBER- CRYO- TEMP	4012	lbCHAMBER- CRYO- TEMP
3013	awRIGHT- CRYO- TEMP	4013	lbRIGHT- CRYO- TEMP
3014	awLEFT- ELEVATOR- TC	4014	lbLEFT- ELEVATOR- TC
3015	awCHAMBER- CRYO- TC	4015	lbCHAMBER- CRYO- TC
3016	awRIGHT- ELEVATOR- TC	4016	lbRIGHT- ELEVATOR- TC
3017	awGAS	4017	lbGAS
3018	awG1- PRES	4018	lbG1- PRES
3019	awG2- PRES	4019	lbG2- PRES
3020	awG3- PRES	4020	lbG3- PRES
3021	awG4- PRES	4021	lbG4- PRES
3022	awFIL- I	4022	lbFIL- I
3023	awFIL- VOLTS	4023	lbFIL- VOLTS
3024	awARC- I	4024	lbARC- I
3025	awRANGE- ARC	4025	lbRANGE- ARC
3026	awARC- VOLTS	4026	lbARC- VOLTS
3027	awMAG- I	4027	lbMAG- I
3028	awEXT- VOLTS	4028	lbEXT- VOLTS
3029	awEXT- I	4029	lbEXT- I
3030	awSUP- VOLTS	4030	lbSUP- VOLTS
3031	awSUP- I	4031	lbSUP- I
3032	awX- AXIS	4032	lbX- AXIS
3033	awY- AXIS	4033	lbY- AXIS
3034	awZ- AXIS	4034	lbZ- AXIS
3035	awAMU- I	4035	lbAMU- I
3036	awAMU	4036	lbAMU
3037	awBIAS	4037	lbBIAS
3038	awBEAM	4038	lbBEAM
3039	awBEAM- I- RANGE	4039	lbBEAM- I- RANGE
3040	awMIR- VOLTS	4040	lbMIR- VOLTS
3041	awMIR- I	4041	lbMIR- I
3042	awMIR- SHUNT- I	4042	lbMIR- SHUNT- I
3043	awQ1- I	4043	lbQ1- I

3044 awQ2- I
3045 awDEFLECTOR
3046 awLENS- I
3047 awACCEL- VOLTS
3048 awACCEL- I
3049 awDEC- VOLTS
3050 awDEC- I
3051 awENERGY-PROBE
3052 awTARGET- BIAS
3053 awVAP- TEMP
3054 awCOOLING
3055 aweFIL- VOLTS
3056 aweFIL- I
3057 aweRPL- VOLTS
3058 aweEXT- VOLTS
3059 aweEXT- I
3060 aweTARGET- I
3061 aweBIAS- VOLTS
3062 aweBIAS- I
3063 aweSUP- VOLTS
3064 awANALYZER- PRESSURE
3065 awDRY- PUMP- TC
3066 Not Used
3067 awMAG-VOLTS
3068 awQ1-VOLTS
3069 awQ2-VOLTS
3070 awLENS-VOLTS
3071 aweSECOND-I
3072 awHTR-TEMP
3073 awDECEL-VOLTS
3074 awDECEL-I
3075 awAMU-G
3076 awHELIUM-PRESSURE
3077 awTERM-DI-RETURN-TEMP
3078 awES-DIFFER-TC
3079 awDI-WATER-DELTA-TEMP
3080 awANALYZER-TC
3081 awBEMLINE-TC

High Analog Readback On Last Batch

5001 hbTERMINAL- MEGOHMS
5002 hbGROUND- MEGOHMS
5003 hbTERMINAL- WATER- TEMP
5004 hbGROUND- WATER- TEMP
5005 hbCITY- WATER- TEMP
5006 hbSOURCE- PRESSURE
5007 hbSCANNER- PRESSURE
5008 hbCHAMBER- PRESSURE
5009 hbSOURCE- TURBO- SPEED
5010 hbSCANNER- TURBO- SPEED
5011 hbLEFT- CRYO- TEMP
5012 hbCHAMBER- CRYO- TEMP
5013 hbRIGHT- CRYO- TEMP
5014 hbLEFT- ELEVATOR- TC
5015 hbCHAMBER- CRYO- TC
5016 hbRIGHT- ELEVATOR- TC
5017 hbGAS
5018 hbG1- PRES

4044 lbQ2- I
4045 lbDEFLECTOR
4046 lbLENS- I
4047 lbACCEL- VOLTS
4048 lbACCEL- I
4049 lbDEC- VOLTS
4050 lbDEC- I
4051 lbENERGY-PROBE
4052 lbTARGET- BIAS
4053 lbVAP- TEMP
4054 lbCOOLING
4055 lbeFIL- VOLTS
4056 lbeFIL- I
4057 lbeRPL- VOLTS
4058 lbeEXT- VOLTS
4059 lbeEXT- I
4060 lbeTARGET- I
4061 lbeBIAS- VOLTS
4062 lbeBIAS- I
4063 lbeSUP- VOLTS
4064 lbANALYZER- PRESSURE
4065 lbDRY- PUMP- TC
4066 Not Used
4067 lbMAG-VOLTS
4068 lbQ1-VOLTS
4069 lbQ2-VOLTS
4070 lbLENS-VOLTS
4071 lbeSECOND-I
4072 lbHTR-TEMP
4073 lbDECEL-VOLTS
4074 lbDECEL-I
4075 lbAMU-G
4076 lbHELIUM-PRESSURE
4077 lbTERM-DI-RETURN-TEMP
4078 lbES-DIFFER-TC
4079 lbDI-WATER-DELTA-TEMP
4080 lbANALYZER-TC
4081 lbBEMLINE-TC

Average Analog Readback On Last Batch

6001 abTERMINAL- MEGOHMS
6002 abGROUND- MEGOHMS
6003 abTERMINAL- WATER- TEMP
6004 abGROUND- WATER- TEMP
6005 abCITY- WATER- TEMP
6006 abSOURCE- PRESSURE
6007 abSCANNER- PRESSURE
6008 abCHAMBER- PRESSURE
6009 abSOURCE- TURBO- SPEED
6010 abSCANNER- TURBO- SPEED
6011 abLEFT- CRYO- TEMP
6012 abCHAMBER- CRYO- TEMP
6013 abRIGHT- CRYO- TEMP
6014 abLEFT- ELEVATOR- TC
6015 abCHAMBER- CRYO- TC
6016 abRIGHT- ELEVATOR- TC
6017 abGAS
6018 abG1- PRES

5019	hbG2- PRES	6019	abG2- PRES
5020	hbG3- PRES	6020	abG3- PRES
5021	hbG4- PRES	6021	abG4- PRES
5022	hbFIL- I	6022	abFIL- I
5023	hbFIL- VOLTS	6023	abFIL- VOLTS
5024	hbARC- I	6024	abARC- I
5025	hbRANGE- ARC	6025	abRANGE- ARC
5026	hbARC- VOLTS	6026	abARC- VOLTS
5027	hbMAG- I	6027	abMAG- I
5028	hbEXT- VOLTS	6028	abEXT- VOLTS
5029	hbEXT- I	6029	abEXT- I
5030	hbSUP- VOLTS	6030	abSUP- VOLTS
5031	hbSUP- I	6031	abSUP- I
5032	hbX- AXIS	6032	abX- AXIS
5033	hbY- AXIS	6033	abY- AXIS
5034	hbZ- AXIS	6034	abZ- AXIS
5035	hbAMU- I	6035	abAMU- I
5036	hbAMU	6036	abAMU
5037	hbBIAS	6037	abBIAS
5038	hbBEAM	6038	abBEAM
5039	hbBEAM- I- RANGE	6039	abBEAM- I- RANGE
5040	hbMIR- VOLTS	6040	abMIR- VOLTS
5041	hbMIR- I	6041	abMIR- I
5042	hbMIR- SHUNT- I	6042	abMIR- SHUNT- I
5043	hbQ1- I	6043	abQ1- I
5044	hbQ2- I	6044	abQ2- I
5045	hbDEFLECTOR	6045	abDEFLECTOR
5046	hbLENS- I	6046	abLENS- I
5047	hbACCEL- VOLTS	6047	abACCEL- VOLTS
5048	hbACCEL- I	6048	abACCEL- I
5049	hbDEC- VOLTS	6049	abDEC- VOLTS
5050	hbDEC- I	6050	abDEC- I
5051	hbENERGY-PROBE	6051	abENERGY-PROBE
5052	hbTARGET- BIAS	6052	abTARGET- BIAS
5053	hbVAP- TEMP	6053	abVAP- TEMP
5054	hbCOOLING	6054	abCOOLING
5055	hbeFIL- VOLTS	6055	abeFIL- VOLTS
5056	hbeFIL- I	6056	abeFIL- I
5057	hbeRPL- VOLTS	6057	abeRPL- VOLTS
5058	hbeEXT- VOLTS	6058	abeEXT- VOLTS
5059	hbeEXT- I	6059	abeEXT- I
5060	hbeTARGET- I	6060	abeTARGET- I
5061	hbeBIAS- VOLTS	6061	abeBIAS- VOLTS
5062	hbeBIAS- I	6062	abeBIAS- I
5063	hbeSUP- VOLTS	6063	abeSUP- VOLTS
5064	hbANALYZER- PRESSURE	6064	abANALYZER- PRESSURE
5065	hbDRY- PUMP- TC	6065	abDRY- PUMP- TC
5066	Not Used	6066	Not Used
5067	hbMAG-VOLTS	6067	abMAG-VOLTS
5068	hbQ1-VOLTS	6068	abQ1-VOLTS
5069	hbQ2-VOLTS	6069	abQ2-VOLTS
5070	hbLENS-VOLTS	6070	abLENS-VOLTS
5071	hbeSECOND-I	6071	abeSECOND-I
5072	hbHTR-TEMP	6072	abHTR-TEMP
5073	hbDECEL-VOLTS	6073	abDECEL-VOLTS
5074	hbDECEL-I	6074	abDECEL-I
5075	hbAMU-G	6075	abAMU-G

5076	hbHELIUM-PRESSURE	6076	abHELIUM-PRESSURE
5077	hbTERM-DI-RETURN-TEMP	6077	abTERM-DI-RETURN-TEMP
5078	hbES-DIFFER-TC	6078	abES-DIFFER-TC
5079	hbDI-WATER-DELTA-TEMP	6079	abDI-WATER-DELTA-TEMP
5080	hbANALYZER-TC	6080	abANALYZER-TC
5081	hbBEMLINE-TC	6081	abBEMLINE-TC
	Analog Readback Non-ACSII Format		Asyst and Ergospeed II SMIF Common Variables
7001	TERMINAL- MEGOHMS	8000	SMIF Port Id
7002	GROUND- MEGOHMS	8001	SMIF1 Controls
7003	TERMINAL- WATER- TEMP	8002	SMIF Tool
7004	GROUND- WATER- TEMP		
7005	CITY- WATER- TEMP		
7006	SOURCE- PRESSURE		
7007	SCANNER- PRESSURE		
7008	CHAMBER- PRESSURE		
7009	SOURCE- TURBO- SPEED		
7010	SCANNER- TURBO- SPEED		
7011	LEFT- CRYO- TEMP		
7012	CHAMBER- CRYO- TEMP		
7013	RIGHT- CRYO- TEMP		
7014	LEFT- ELEVATOR- TC		
7015	CHAMBER- CRYO- TC		
7016	RIGHT- ELEVATOR- TC		
7017	GAS		
7018	G1- PRES		
7019	G2- PRES		
7020	G3- PRES		
7021	G4- PRES		
7022	FIL- I		
7023	FIL- VOLTS		
7024	ARC- I		
7025	RANGE- ARC		
7026	ARC- VOLTS		
7027	MAG- I		
7028	EXT- VOLTS		
7029	EXT- I		
7030	SUP- VOLTS		
7031	SUP- I		
7032	X- AXIS		
7033	Y- AXIS		
7034	Z- AXIS		
7035	AMU- I		
7036	AMU		
7037	BIAS		
7038	BEAM		
7039	BEAM- I- RANGE		
7040	MIR- VOLTS		
7041	MIR- I		
7042	MIR- SHUNT- I		
7043	Q1- I		
7044	Q2- I		
7045	DEFLECTOR		
7046	LENS- I		
7047	ACCEL- VOLTS		
7048	ACCEL- I		
7049	DEC- VOLTS		
7050	DEC- I		

7051	ENERGY-PROBE
7052	TARGET- BIAS
7053	VAP- TEMP
7054	COOLING
7055	eFIL- VOLTS
7056	eFIL- I
7057	eRPL- VOLTS
7058	eEXT- VOLTS
7059	eEXT- I
7060	eTARGET- I
7061	eBIAS- VOLTS
7062	eBIAS- I
7063	eSUP- VOLTS
7064	ANALYZER- PRESSURE
7065	DRY- PUMP- TC
7066	Not Used
7067	MAG-VOLTS
7068	Q1-VOLTS
7069	Q2-VOLTS
7070	LENS-VOLTS
7071	eSECOND-I
7072	HTR-TEMP
7073	DECEL-VOLTS
7074	DECEL-I
7075	AMU-G
7076	HELIUM-PRESSURE
7077	TERM-DI-RETURN-TEMP
7078	ES-DIFFER-TC
7079	DI-WATER-DELTA-TEMP
7080	ANALYZER-TC
7081	BEMLINE-TC

	Left Asyst SMIF Variables		Right Asyst SMIF Variables
8100	Left SMIF1 Full Status	8200	Right SMIF2 Full Status
8101	Left SMIF1 Ctl Status	8201	Right SMIF2 Ctl Status
8102	Left SMIF1 ARMTYPE	8202	Right SMIF2 ARMTYPE
8103	Left SMIF1 ARM_SW	8203	Right SMIF2 ARM_SW
8104	Left SMIF1 COLST	8204	Right SMIF2 COLST
8105	Left SMIF1 COUNT	8205	Right SMIF2 COUNT
8106	Left SMIF1 DIPSW	8206	Right SMIF2 DIPSW
8107	Left SMIF1 ELDN	8207	Right SMIF2 ELDN
8108	Left SMIF1 ELPOS	8208	Right SMIF2 ELPOS
8109	Left SMIF1 ELUP	8209	Right SMIF2 ELUP
8110	Left SMIF1 FUNC	8210	Right SMIF2 FUNC
8111	Left SMIF1 GPST	8211	Right SMIF2 GPST
8112	Left SMIF1 HOMEST	8212	Right SMIF2 HOMEST
8113	Left SMIF1 LFUNC	8213	Right SMIF2 LFUNC
8114	Left SMIF1 MARMDN	8214	Right SMIF2 MARMDN
8115	Left SMIF1 MARMPOS	8215	Right SMIF2 MARMPOS
8116	Left SMIF1 MARMUP	8216	Right SMIF2 MARMUP
8117	Left SMIF1 SWITCH MODE	8217	Right SMIF2 SWITCH MODE
8118	Left SMIF1 MOT	8218	Right SMIF2 MOT
8119	Left SMIF1 MVSTAT	8219	Right SMIF2 MVSTAT
8120	Left SMIF1 PIO_LOCK	8220	Right SMIF2 PIO_LOCK
8121	Left SMIF1 PIO_LRDY	8221	Right SMIF2 PIO_LRDY
8122	Left SMIF1 PIO_LU	8222	Right SMIF2 PIO_LU
8123	Left SMIF1 PIO_URDY	8223	Right SMIF2 PIO_URDY
8124	Left SMIF1 PIP	8224	Right SMIF2 PIP

8125	Left SMIF1 PLDN	8225	Right SMIF2 PLDN
8126	Left SMIF1 PLPOS	8226	Right SMIF2 PLPOS
8127	Left SMIF1 PRTST	8227	Right SMIF2 PRTST
8128	Left SMIF1 RDYST	8228	Right SMIF2 RDYST
8129	Left SMIF1 SWPOS	8229	Right SMIF2 SWPOS
8130	Left SMIF1 TLTDN	8230	Right SMIF2 TLTDN
8131	Left SMIF1 TLTPOS	8231	Right SMIF2 TLTPOS
8132	Left SMIF1 TLTUP	8232	Right SMIF2 TLTUP
8133	Left SMIF1 XPOS	8233	Right SMIF2 XPOS
8134	Left SMIF1 YPOS	8234	Right SMIF2 YPOS
8135	Left SMIF1 Position	8235	Right SMIF2 Position
8136	Left SMIF1 PIO Status	8236	Right SMIF2 PIO Status
8137	Left SMIF1 Wafer Map	8237	Right SMIF2 Wafer Map
8138	Left SMIF1 Wafer Count	8238	Right SMIF2 Wafer Count
8139	Left SMIF1 PLUP	8239	Right SMIF2 PLUP
8140	Left SMIF1 ECV	8240	Right SMIF2 ECV
8141	Left SMIF1 ALED	8241	Right SMIF2 ALED
	Left Ergospeed II SMIF Variables		Right Ergospeed II SMIF Variables
8314	Left ErgoSMIF MDLN	8414	Right ErgoSMIF MDLN
8315	Left ErgoSMIF SoftRev	8415	Right ErgoSMIF SoftRev
8316	Left ErgoSMIF Control State	8416	Right ErgoSMIF Control State
8317	Left ErgoSMIF Process State	8417	Right ErgoSMIF Process State
8318	Left ErgoSMIF PIO State	8418	Right ErgoSMIF PIO State

Where Used: S1F3, S1F11, S1F12, S2F23, S2F33, S2F45, S2F46, S2F47, S2F48; S6F13, S6F18, S6F22

SVNAME -- Status Variable Name **Format: 20**

Defined in the SVID table above.
Where Used: S1F12

TEXT -- A single line of characters. **Format: 20**

Where Used: S10F1, S10F3, S10E5

TIAACK -- Equipment acknowledgement code, 1 byte **Format: 10**

0 = everything correct
1 = too many SVIDs
2 = no more traces allowed
3 = invalid period
>3 = equipment specified error
4-63 reserved
Where Used: S2F24

TIACK -- Time Acknowledge Code, 1 byte **Format: 10**

0 = OK
1 = Error, not done
2-63 = reserved
Where Used: S2F32

TID -- Terminal number, 1 byte **Format: 10**

0 = single or main terminal
>0 = additional terminals at the same equipment
Where Used: S10F1, S10F3, S10F5, S10F7

TIME -- Time of day **Format: 20**

FOR the Y2K feature
IF EC 289 (TIMEFORMAT) = 0,
TIME is 12 bytes: yymmddhhmmss

ELSE IF EC 289 (TIMEFORMAT) = 1,
TIME is 16 bytes: yyyymmddhhmmsscc

OTHERWISE:
TIME is 12 bytes: yymmddhhmmss
Where Used: S2F18

TOTSMP -- Total samples to be made **Format: 20, 3( ), 5( )**

Where Used: S2F23

TRID -- Trace Request ID **Format: 20,.3( ), 5( )**

Where Used: S2F23, S6F1

TSID - Material Port Number (ACH) **Format: 20**

It designates the stage location of the automatic cassette handler. The stage is numbered from left to right facing the equipment, 1 to 4.

Note: For Factory Automation Only
Where Used: S2F71 S2F71

UNITS -- Units Identifier **Format: 20**

As allowed by E5 Section 9
Where Used: S1F12, S2F30, S2F48

UPPERDB - Upper Dead Band **Format: 20**

A variable limit attribute which defines the upper boundary of the deadband of a limit. The value applies to a single limit (LIMITID) for a specified VID. Thus, UPPERDB and LOWERDB as a pair define a limit.
Where used: S2F45, S2F48

V -- Variable data **Format: 20**

Where Used: S6F11, S6F13

VLAACK -- Variable Limit Attribute Acknowledge Code, 1 byte Format: **10**

0 = Acknowledge, command will be performed
1 = Limit attribute definition error
2 = Cannot perform now
>2 = Other equipment-specific error
3-63 = Reserved
Where Used: S2F46

VID -- Variable ID **Format: 20, 3( ), 5( )**

The variable id will be the identification of one of the three classes of identifications: data variable identification (DVID), equipment constant identification (ECID), or status variable identification (SVID).

VID	Description	Class
1 – 99	Analog readback variables (available for tracing)	SVID
100 - 199	Data variables (Implant and Machine Status) (not available for tracing)	DVID
200 - 249	Data process program variables (Recipe) (not available for tracing)	DVID
250 - 299	Equipment Constants	ECID
300 - 349	GEM compliant data variables	DVID
350 - 399	Equipment Constants	ECID
400 - 499	Status Variables (Pump Analog Readback)	SVID
500 - 599	GEM System data variables	DVID/ SVID
600 - 699	Data Variables (IQDP Status)	DVID
1001-1099	lowest analog readback SV value on last wafer	SVID
2001-2099	highest analog readback SV value on last wafer	SVID
3001-3099	average analog readback SV value on last wafer	SVID

4001-4099	lowest analog readback SV value on last batch	SVID
5001-5099	highest analog readback SV value on last batch	SVID
6001-6099	average analog readback SV value on last batch	SVID
7000-7099	Analog readback variables in a non-ASCII format. (available for tracing)	SVID
8000-8099	Asyst and Ergospeed common SMIF Variables	SVID
8100-8199	Left Asyst SMIF Variables	SVID
8200-8299	Right Asyst SMIF Variables	SVID
8300-8399	Left Ergospeed SMIF Variables	SVID /DVID
8400-8499	Right Ergospeed SMIF Variables	SVID /DVID

Where Used: S1F3, S1F11, S1F12, S2F23, S2F33, S2F45, S2F46, S2F47, S2F48; S6F13, S6F18, S6F22

VNAME -- Variable Name **Format: 20**

Variable names are defined in the VID table above. The name will be the name of one of the three classes of variables: data variable name (DVNAME), equipment constant name (ECNAME), or status variable name (SVNAME).

Where Used: S1F3, S1F11, S1F12, S2F23

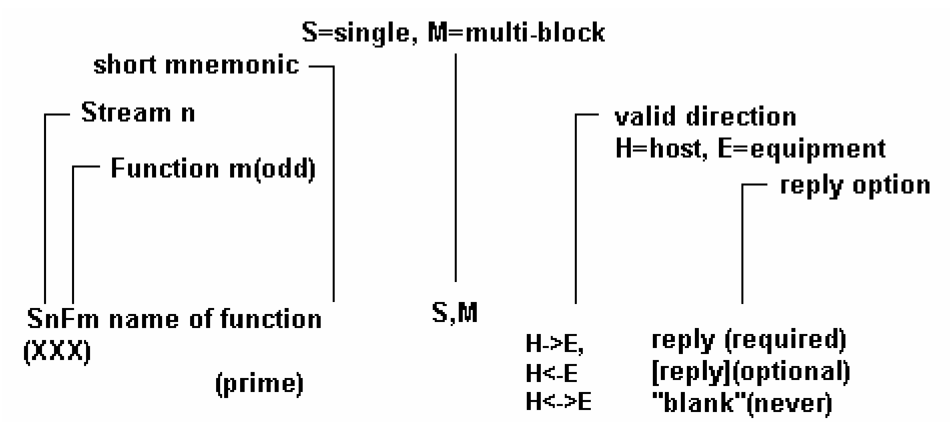
3.0 Message Detail

3.0 Message Detail

This section defines a number of specific functions in different streams to be used as the basis for the GEM communications between Equipment and Host. The functions are defined in the form of transaction message pairs. The transactions are described in a standard form, as defined by SEMI E5-95 section 7, which involves specification of the number, name, single or multiple block, direction of communication, nature of reply required, description, variable definition, and the detailed structure of the message in terms of lists and items. Double lines separate streams and single lines separate transactions to aid in readability.

The functions are described in a standard form which involves specification of the number, name, single or multiple block, direction of communication, nature of reply required, description, variable definition, and the detailed structure of the message in terms of lists and items. Double lines separate streams, and single lines separate transactions to aid readability.

The abbreviations used in each transaction are as follows:



Description: A description of the action generated by the function.

Structure: Detailed structure showing lists and defined items. Lists are denoted by a capital L followed by the length separated by a comma. The individual elements in the list are numbered on separate lines. Nested lists are indented to emphasize the structure. The detailed form of the items is given in the define section at the beginning of the transaction. The symbols "<" and ">" are used to enclose each item in the structure data and imply that there is an item header. A detailed description of each data item as well as a list of the allowable data formats can be found in the Data Item Dictionary.

Exception: Special cases in the structure that have a different meaning.

SnFm+1 Name of function (secondary) (same structure as above except never with reply)

Stream 1 Equipment Status

This stream provides a means for exchanging information about the status of the equipment, including its current mode, depletion of various consumable items, and the status of transfer operations.

S1F0 Abort Transaction (S1F0) S,H<->E

Description:

Used in lieu of an expected reply to abort a transaction. Function 0 is defined in every stream and has the same meaning in every stream.

Structure:

Header Only.

S1F1 Are You There Request (R) S,H<->E,reply

Description:

Establishes if the equipment is on-line. A function 0 response to this message means the communication is inoperative. In the equipment, a function 0 is equivalent to a timeout on the receive timer after issuing S1F1 to the host.

Structure:

Header only

S1F2 On Line Data (D) S,H<->E

Description:

Data signifying that the equipment is alive.

Structure:

```
[1]       <L,2
[1][1]        <MDLN>
[1][2]        <SOFTREV>
           >
```

Exception:

This will not change the ON-LINE/OFF-LINE state of the Equipment. The Host sends a zero length list

to the Equipment.

S1F3 Selected Equipment Status Request (SSR) S,H->E,reply

Description:

A request to the equipment to report selected values of its status.

Structure:

The following structure is approved for all item formats and should be used by all new implementations:

```
[1]              <L,n
[1] [1]              <VID1>
     .               .
     .               .
[1] [n]              <VIDn>
                 >
```

The following structure is included for compatibility with previous implementations and may only be used for items of format 3 ( ) and 5 ( ):

```
[1]  <Ux,n VID1 …  VIDn>   or  <Ix,n VID1 …  VIDn>
```

Exception:

A zero-length for list item [1] or item [1][x] means report all VIDs.

S1F4 Selected Equipment Status Data (SSD) M,H<-E

Description:

The equipment reports the value of each SVID requested in the order requested. The host remembers the names of values requested.

Structure:

```
[1]          <L,n
[1] [1]          <SV1>
     .           .
     .           .
[1] [n]          <SVn>
             >
```

Exceptions:

A zero length for item [1] means no response can be made. A zero-length for item [1][x], SVx, means that SVIDx does not exist.

S1F11 Status Variable Namelist Request (SVNR) S,H->E,reply

Description:

A request to the equipment to identify certain status variables.

Structure:

```
[1]           <L,n
[1][1]             <VID1>
    .              .
    .              .
[1][n]             <VIDn>
              >
```

Exception:

A zero length for item [1] means report all VIDs.

S1F12 Status Variable Namelist Reply (SVNRR) M,H<-E

Description:

The equipment reports to the host the name and units of the requested SV s.

Structure:

```
[1]            <L,n
[1][1]               <L,3
[1][1][1]                 <VID1>
[1][1][2]                 <VNAME1>
[1][1][3]                 <UNITS1>
                     >
    .                .
    .                .
[1][n]               <L,3
[1][n][1]              <VIDn>
[1][n][2]              <VNAMEn>
[1][n][3]              <UNITSn>
                     >
               >
```

S1F13 Establish Communications Request (CR) S,H<->E,reply

Description:

The purpose of this message is to provide a formal means of initializing communications at a logical application level both on power-up and following a break in commuications. It should be the first message sent following any period where host and Equipment SECS applications are unable to communicate. An attempt to send an Establish Communications Request (S1F13) should be repeated at programmable intervals until an Establish Communications Acknowledge (S1F14) is received within the transaction timeout period with an acknowledgement code accepting the establishment.

Structure:

```
[1]         <L,2
[1][1]           <MDLN>
[1][2]           <SOFTREV>
             >
```

Exception:

The host sends a zero-length list for item [1] to the equipment.

S1F14 Establish Communications Request Acknowledge (CRA) S,H<->E

Description:
Accept or deny Establish Communications Request (S1F13). MDLN and SOFTREV are on-line data and are valid only if COMMACK = 0.

Structure:
```
[1]                <L,2
[1][1]                  <COMMACK>
[1][2]                  < L,2
[1][2][1]                   <MDLN>
[1][2][2]                   <SOFTREV>
                        >
                    >
```

Exception:
The host sends a zero-length for list item [1][2] to the equipment

S1F15 Request OFF-LINE (ROFL) S,H->E,reply

Description:
The host requests that the equipment transition to the OFF-LINE state.

Structure:
Header only.

S1F16 OFF-LINE Acknowledge (OFLA) S,H<-E

Description:
Acknowledge or error.

Structure:
```
[1] <OFLACK>
```

S1F17 Request ON-LINE (RONL) S,H->E,reply

Description:
The host requests that the equipment transition to the ON-LINE state.

Structure:
Header only

S1F18 ON-LINE Acknowledge (ONLA) S,H<-E

Description:

Acknowledge or error.

Structure:

```
[1] <ONLACK>
```

Stream 2 Equipment Control and Diagnostics

Messages which deal with control of the equipment from the host. This includes all remote operations and equipment self-diagnostics and calibration but specifically excludes the control operations which are associated with material transfer (see stream 4), loading of executive and boot programs (stream 8), and all file and operating system calls (stream 10 and stream 13).

S2F0 Abort Transaction S,H<->E

Description:

Same form as S1F0

S2F13 Equipment Constant Request (ECR) S,H->E,reply

Description:

Constants such as for calibration, servo gain, alarm limits, data collection mode and other values that are changed infrequently can be obtained using this message.

Structure:

```
[1]       < L,n
[1] [1]     <ECID1>
    .       .
    .       .
[1] [n]     <ECIDn>
          >
```

The following structure is included for compatibility with previous implementations and may only be used for items of format 3 ( ) and 5 ( ) :

```
[1] <Ux,n ECID1 ... ECIDn >  or  <Ix,n ECID1 ... ECIDn >
```

Exceptions:

A zero-length for list item [1] or item [1][x] means report all ECV 's according to a predefined order.

S2F14 Equipment Constant Data (ECD) M,H<-E

Description:

Data Response to S2F13 in the order requested.

Structure:

```
[1]        <L,n
[1] [1]        <ECV1>
```

```
[1][2]          <ECV2>
    .           .
    .           .
[1][n]          <ECVn>
         >
```

Exceptions:

A zero-length for list item [1] means no response exists. A zero-length for list item [1][x], ECVx , means that ECIDx does not exist.

S2F15 New Equipment Constant Send (ECS) S,H->E,reply

Description:

Change one or more equipment constants.

Structure:

```
[1]             <L,n
[1][1]             <L,2
[1][1][1]              <ECID1>
[1][1][2]              <ECV1>
                 >
[1][2]             <L,2
[1][2][1]              <ECID2>
[1][2][2]              <ECV2>
                 >
    .               .
    .               .
    .               .
[1][n]             <L,2
[1][n][1]              <ECIDn>
[1][n][2]              <ECVn>
                   >
                >
```

S2F16 New Equipment Constant Acknowledge (ECA) S,H<-E

Description:

Acknowledge or error. If EAC contains a non-zero error code, the equipment should not change any of the ECIDs specified in S2F15.

Structure:

```
[1] <EAC>
```

Note:

Equipment constants cannot be changed if the E220 is displaying either the GEM SETUP or ECO & OPTION, and only can be changed when E220 is in the idle state. This is done to prevent conflict between operator and Host attempting to modify the same equipment constant and prevent a change during implanting.

S2F17 Date and Time Request (DTR) S,H<->E,reply

Description:

Useful to check equipment time base or for equipment to synchronize with the host time base.

Structure:

Header only.

S2F18 Data and Time Data (DTD) S,H<->E

Description

Actual time data.

Structure:

```
[1] <TIME>
```

Exceptions:

A zero-length item [1] means no time exists.

S2F23 Trace Initialize Send (TIS) S,H->E,reply

Description:

Status variables exist at all times. This function provides a way to sample a subset of those status variables as a function of time. The trace data is returned on S6F1 and is related to the original request by the TRID. Multiple trace requests may be made to that equipment allowing it. If equipment receives S2F23 with the same TRID as a trace function that is currently in progress, the equipment should terminate the old trace and then initiate the new trace. A trace function currently in progress may be terminated by S2F23 with TRID of that trace and TOTSMP=0.

Structure:

The following structure is approved for all item formats and should be used by all new implementations.

```
[1]            <L,5
[1][1]              <TRID>
[1][2]              <DSPER>
[1][3]              <TOTSMP>
[1][4]              <REPGSZ>
[1][5]              <L,n
[1][5][1]                  <SVID1>
         .                 .
         .                 .
[1][5][n]                  <SVIDn>
                    >
               >
```

The following structure is included for compatibility with previous implementations and may only be used for items whose SVID is format 3 ( ) and 5 ( ):

```
[1]        <L,5
[1][1]         <TRID>
[1][2]         <DSPER>
[1][3]         <TOTSMP>
```

```
[1][4]        <REPGSZ>
[1][5]        <U,n SVID1,..., SVIDn>   or   <I,n SVID1,..., SVIDn>
        >
```

S2F24 Trace Initialize Acknowledge (TIA) S,H<-E

Description:
Acknowledge or error.

Structure:
```
[1] <TIAACK>
```

S2F25 Loopback Diagnostic Request (LDR) S,H<->E,reply

Description:
A diagnostic message for checkout of protocol and communication circuits. The binary string sent is echoed back.

Structure:
```
[1] <ABS>
```

S2F26 Loopback Diagnostic Data (LDD) S,H<->E

Description:
The echoed binary string.

Structure:
```
[1] <ABS >
```

S2F29 Equipment Constant Namelist Request (ECNR) S,H->E,reply

Description:
This function allows the host to retrieve basic information about what equipment constants are available in the equipment.

Structure:
```
[1]        <L,n
[1][1]        <ECID1>
    .          .
    .          .
[1][n]        <ECIDn>
```

Exception:
A zero-length list item [1] means send information for all ECIDs.

S2F30 Equipment Constant Namelist (ECN) M,H<-E

Description:

Data Response.

Structure:

```
[1]             <L,n  (number of equipment constants)
[1][1]              <L,6
[1][1][1]               <ECID1>
[1][1][2]               <ECNAME1>
[1][1][3]               <ECMIN1>
[1][1][4]               <ECMAX1>
[1][1][5]               <ECDEF1>
[1][1][6]               <UNITS1>
                    >
    .               .
    .               .
[1][n]              <L,6
[1][n][1]               <ECIDn>
[1][n][2]               <ECNAMEn>
[1][n][3]               <ECMINn>
[1][n][4]               <ECMAXn>
[1][n][5]               <ECDEFn>
[1][n][6]               <UNITSn>
                    >
                >
```

S2F31 Date and Time Set Request (DTS) S,H->E,reply

Description:

Useful to synchronize the equipment time with the host time base.

Structure:

```
[1] <TIME>
```

S2F32 Date and Time Set Acknowledge (DTA) S,H<-E

Description:

Acknowledge the receipt of time and date.

Structure:

[1] <TIACK>

S2F33 Define Report (DR) M,H->E,reply

Description:

The purpose of this message is for the host to define a group of reports for the equipment.

The type of report to be transmitted is designated by a Boolean "Equipment Constant." An "Equipment Constant Value" of "False" means that an "Event Report" (S6F11) will be sent, and a value of "True" means that an "Annoted event Report" (S6F13) will be sent.

If S2F33 is Multi-block, it must be preceded by the S2F39/S2F40 Inquire/Grant transaction.

Structure:

```
[1]                   <L,2
[1][1]                    <DATAID>
[1][2]                    <L,n             // n reports
[1][2][1]                     <L,2         // report 1
[1][2][1][1]                      <RPTID1>
[1][2][1][2]                      <L,m     // m VIDs this report
[1][2][1][2][1]                       <VID1>
            .                         .
            .                         .
            .                         .
[1][2][1][2][m]                       <VIDm>
                                  >
                              >
      .                       .
      .                       .
      .                       .
[1][2][n]                     <L,2         // report n
[1][2][n][1]                      <RPTID1>
[1][2][n][2]                      <L,k     // k VIDs this report
[1][2][n][2][1]                       <VID1>
            .                         .
            .                         .
            .                         .
[1][2][n][2][k]                       <VIDk>
                                  >
                              >
                          >
                      >
```

Exceptions:

1. A zero-length list item [1][2] following <DATAID> [1][1] item deletes all report definitions and associated links. See S2F35 (Link Event/Report).

2. A zero-length list item [1][2][x][2] following <RPTIDx> [1][2][x][1] item deletes report type RPTID. All CEIDs linked to this RPTID are also deleted.

S2F34 Define Report Acknowledge (DRA) S,H<-E

Description:

Acknowledge or error. If an error condition is detected the entire message is rejected, i.e., partial changes are not allowed.

Structure:

```
[1]  <DRACK>
```

S2F35 Link Event Report (LER) M,H->E,reply

Description:

The purpose of this message is for the host to link n reports to an event (CEID). These linked event reports will default to 'disabled' upon linking. That is, the occurrence of an event would not cause the report to be sent until enabled. See S2F37 for enabling reports.

If S2F35 is Multi-block, it must be preceded by the S2F39/S2F40 Inquire/Grant transaction.

Structure:

```
[1]                            <L,2
[1][1]                            <DATAID>
[1][2]                            <L,n                      // n events
[1][2][1]                            <L,2                   // event 1
[1][2][1][1]                            <CEID1>
[1][2][1][2]                            <L,m                // m reports
[1][2][1][2][1]                            <RPTID1>
             .                             .
             .                             .
             .                             .
 [1][2][1][2][m]                            <RPTIDm>
                                   >
                                >
       .                              .
       .                              .
       .                              .
[1][2][n]                             <L,2                  // event n
[1][2][n][1]                            <CEID1>
[1][2][n][2]                            <L,k                // k reports
[1][2][n][2][1]                            <RPTID1>
             .                             .
             .                             .
             .                             .
[1][2][n][2][k]                            <RPTIDk>
                                   >
                                >
                            >
                         >
```

Exceptions:

A zero length list item [1][2][x][2] following <CEIDx > [1][2][x][1] deletes all report links to that event.

S2F36 Link Event Report Acknowledge (LERA) S,H<-E

Description:

Acknowledge or error. If an error condition is detected the entire message is rejected, i.e., partial changes are not allowed.

Structure:

```
[1] <LRACK>
```

S2F37 Enable/Disable Event Report (EDER) S,H->E,reply

Description:

The purpose of this message is for the host to enable or disable reporting for a group of events (CEIDs).

Structure:

```
[1]          <L,2
[1][1]          <CEED>      enable/disable
[1][2]          <L,n         #CEIDs
[1][2][1]           <CEID1>
       .            .
       .            .
       .            .
[1][2][n]           <CEIDn>
```

Exceptions:

A zero length list item [1][2] following <CEED> item [1][] means all CEID s.

S2F38 Enable/Disable Event Report Acknowledge (EERA) S,H<-E

Description

Acknowledge or error. If an error condition is detected the entire message is rejected, i.e., partial changes are not allowed.

Structure:

```
[1]   <ERACK>
```

S2F39 Multi-block Inquire (DMBI) S,H->E,reply

Description:

If a S2F33, S2F35, or S2F45message is more than one block, this transaction must precede the message.

Structure:

```
[1]      <L,2
[1][1]       <DATAID>
[1][2]       <DATALENGTH>
         >
```

S2F40 Multi-block Grant (DMBG) S,H<-E

Description:

Grant permission to send multi-block message.

Structure:

```
[1]   <GRANT>
```

S2F41 Host Command Send (HCS)

S,H->E,reply

Description:

The Host requests the Equipment to perform the specified remote command with the associated parameters.

Structure:

```
[1]              <L,2
[1][1]              <RCMD>
[1][2]              <L,n                        // # of parameters
[1][2][1]               <L,2
[1][2][1][1]                <CPNAME1>           // parameter 1 name
[1][2][1][2]                <CPVAL1>            // parameter 1 value
                        >
       .                .
       .                .
[1][2][n]               <L,2
[1][2][n][1]                <CPNAMEn>           // parameter n name
[1][2][n][2]                <CPVALn>            // parameter n value
                        >
                     >
                  >
```

S2F42 Host Command Acknowledge (HCA) S,H<-E

Description:

Acknowledge Host command or error. If command is not accepted due to one or more invalid parameters. (i.e., HCACK=3), then a list of invalid parameters will be returned containing the parameter name and reason for being invalid.

Structure:

```
[1]                 <L,2
[1][1]                  <HCACK>
[1][2]                  <L,n                        // # of parameters
[1][2][1]                   <L,2
[1][2][1][1]                    <CPNAME1>           // parameter 1 name
[1][2][1][2]                    <CPACK1>            // parameter 1 reason
                            >
       .                    .
       .                    .
[1][2][n]                   <L,2
[1][2][n][1]                    <CPNAMEn>           // parameter n name
[1][2][n][2]                    <CPACKn>            // parameter n reason
                            >
                         >
                      >
```

Exception:

If there are no invalid parameters, then a list of zero-length will be sent for list item [1][2].

Note:

Remote commands will not be executed unless the machine is in the proper state denoted by the screen being displayed. Examples of all the screens can be found in the E220 Operator's or Maintenance Manuals. See RCMD in the Data Item Dictionary section for further explanation

S2F43 Reset Spooling Streams and Functions (RSSF) S,H->E,reply

Description:

This message allows the host to select specific streams and functions to be spooled whenever spooling is active.

Structure:

```
[1]                        <L,m
[1][1]                         <L,2
[1][1][1]                          <STRID1>
[1][1][2]                          <L,n
[1][1][2][1]                           <FCNID1>
          .                            .
          .                            .
[1][1][2][n]                           <FCNIDn>
                                   >
                                >
    .                           .
    .                           .
[1][n]                          <L,2
[1][n][1]                          <STRIDn>
[1][n][2]                          <L,k
[1][n][2][1]                           <FCNID1>
          .                            .
          .                            .
[1][n][2][k]                           <FCNIDk>
                                   >
                                >
                            >
                        >
```

Exceptions:

1. A zero-length for list item[1], m=0, turns off spooling for all streams and functions.

2. A zero-length list item [1][x][2] after item [1][x][1], <STRIDx>, turns on spooling for all functions for the associated stream <STRIDx>.

Notes:

1. Turning off spooling for all functions for a specific stream is achieved by omitting reference to the stream from this message.

2. Spooling for Stream 1 is not allowed.

3. Equipment must allow host to spool all primary messages for a stream (except Stream 1).

4. A defined list of functions for a stream in this message will replace any previously selected functions.

S2F44 Reset Spooling Acknowledge (RSA) M,H<-E

Description:

Acknowledge or error.

Structure:

```
[1]                 <L,2
[1][1]                  <RSACK>   // accept or reject
```

```
[1][2]                  <L,m      // m=number of streams with errors
[1][2][1]                   <L,3
[1][2][1][1]                    <STRID1>
[1][2][1][2]                    <STRACK1>  // error in stream
[1][2][1][3]                    <L,n       // n = functions in error
[1][2][1][3][1]                     <FCNID1>
             .                      .
             .                      .
[1][2][1][3][n]                     <FCNIDn>
                                >
                            >
       .                    .
       .                    .
[1][2][m]                   <L,3
[1][2][m][1]                    <STRIDm>
[1][2][m][2]                    <STRACKm>  // error in stream
[1][2][m][3]                    <L,k       // k = functions in error
[1][2][m][3][1]                     <FCNID1>
             .                      .
             .                      .
[1][2][m][3][k]                     <FCNIDk>
                                >
                            >
                         >
                     >
```

Exceptions:

1. If item [1][1], RSACK, =0, list item [1][2] is always zero-length, m=0, indicating no streams or functions in error.

2. If zero-length list item [1][2][x][3] is zero-length, there are no functions in error for stream <STRIDx>

S2F45 Define Variable Limit Attributes (DVLA) M,H->E,reply

Structure:

```
[1]                        <L,2
[1][1]                         <DATAID>
[1][2]                         <L,m // # of variables
[1][2][1]                          <L,2
[1][2][1][1]                           <VID1>
[1][2][1][2]                           <L,n // # of limits
[1][2][1][2][1]                            <L,2
[1][2][1][2][1][1]                             <LIMITID1>
[1][2][1][2][1][2]                             <L,p  // p=0 or 2
[1][2][1][2][1][2][1]                             <UPPERDB1>
[1][2][1][2][1][2][2]                             <LOWERDB1>
                                               >
                                            >
             .                              .
             .                              .
[1][2][1][2][n]                             <L,2
[1][2][1][2][n][1]                             <LIMITIDn>
[1][2][1][2][n][2]                             <L,q  // q=0 or 2
[1][2][1][2][n][2][1]                             <UPPERDBn>
[1][2][1][2][n][2][2]                             <LOWERDBn>
```

```
                                                    >
                                                 >
                                             >
                                         >
       .                                 .
       .                                 .
[1][2][m]                                <L,2
[1][2][m][1]                                <VIDm>
[1][2][m][2]                                <L,k // # of limits
[1][2][m][2][1]                                 <L,2
[1][2][m][2][1][1]                                  <LIMITID1>
[1][2][m][2][1][2]                                  <L,r  // r=0 or 2
[1][2][m][2][1][2][1]                                  <UPPERDB1>
[1][2][m][2][1][2][2]                                  <LOWERDB1>
                                                    >
                                                 >
             .                                   .
             .                                   .
[1][2][m][2][k]                                  <L,2
[1][2][m][2][k][1]                                  <LIMITIDk>
[1][2][m][2][k][2]                                  <L,s  // s=0 or 2
[1][2][m][2][k][2][1]                                  <UPPERDBk>
[1][2][m][2][k][2][2]                                  <LOWERDBk>
                                                    >
                                                 >
                                             >
                                         >
                                     >
                                 >
```

Exceptions:

1. Zero-length, m=0, list item [1][2] means all deadband limits, UPPERDB and LOWERDB, for all monitored VIDs are "undefined."

2. Zero-length list item `[1][2][x][2]for VIDx means` all deadband limits, UPPERDB and LOWERDB for VIDx are "undefined."

3. Zero-length deadbands list item `[1][2][x][2][y][2]` means deadband limits UPPERDBy and LOWERDBy for VIDx are "undefined."

S2F46 Variable Limit Attribute Acknowledge (VLAA) M,H<-E

Description:

Acknowledge definition of variable limit attributes or report error. If S2F45 is not accepted due to one or more invalid parameters (e.g., LIMITACK=3), then a list of invalid parameters is returned containing the variable limit attribute and reason for rejection. If an error condition is detected, the entire message is rejected, i.e., partial changes are not allowed.

Structure:

```
[1]                     <L,2
[1][1]                      <VLAACK>
[1][2]                      <L,m // m=number of invalid parameters
[1][2][1]                       <L,3
[1][2][1][1]                        <VID1>    // VID with error
[1][2][1][2]                        <LVACK1> // reason
[1][2][1][3]                        <L,p    // p=0 or 2
[1][2][1][3][1]                         <LIMITID1> //limit in error
[1][2][1][3][2]                         <LIMITACK1> // reason
```

```
[1][2][1][3][0]                    >
[1][2][1][0]                   >
       .                       .
       .                       .
       .                  .
[1][2][m]                      <L,3
[1][2][m][1]                        <VIDm>   // VID with error
[1][2][m][2]                        <LVACKm> // reason
[1][2][m][3]                        <L,q    // q=0 or 2
[1][2][m][3][1]                         <LIMITIDm> //limit in error
[1][2][m][3][2]                         <LIMITACKm> // reason
[1][2][m][3]                        >
[1][2][m]                       >
[1][2]                      >
[1]                     >
```

Exceptions:

1. Zero-length, m=0, list item [1][2] means no invalid variable limit attributes.
2. Zero-length list item [1][2][x][3] means no invalid limit values for that VIDx.

S2F47 Variable Limit Attribute Request (VLAR) S,H->E,reply

Description:

This message allows the host to query the equipment for current variable limit attribute definitions.

Structure:

```
[1]       <L,m  // m=# VIDs this request)
[1][1]        <VID1>
    .         .
    .         .
[1][m]        <VIDm>
          >
```

Exceptions:

A zero-length list item [1], m=0, requests a list of all VID values that can have variable limit attributes.

S2F48 Variable Limit Attributes Send (VLAS) M,H<-E

Description:

Equipment sends values of requested variable limit attribute definitions in the order requested.

Structure:

```
[1]                     <L,m (m=# VIDs this request)
[1][1]                      <L,2
[1][1][1]                       <VID1>
[1][1][2]                       <L,p // p=0 or 4
[1][1][2][1]                        <UNITS1>
[1][1][2][2]                        <LIMITMIN1>
[1][1][2][3]                        <LIMITMAX1>
[1][1][2][4]                        <L,n  //n=# limits defined
[1][1][2][4][1]                         <L,3
[1][1][2][4][1][1]                          <LIMITID1>
[1][1][2][4][1][2]                          <UPPERDB1>
```

```
[1][1][2][4][1][3]                      <LOWERDB1>
                                    >
              .                     .
              .                     .
              .                .
[1][1][2][4][n]                     <L,3
[1][1][2][4][n][1]                      <LIMITIDn>
[1][1][2][4][n][2]                      <UPPERDBn>
[1][1][2][4][n][3]                      <LOWERDBn>
                                    >
                              >
                           >
                        >
    .                        .
    .                        .
    .                   .
[1][m]                        <L,2
[1][m][1]                        <VIDm>
[1][m][2]                        <L,q // q=0 or 4
[1][m][2][1]                         <UNITSm>
[1][m][2][2]                         <LIMITMINm>
[1][m][2][3]                         <LIMITMAXm>
[1][m][2][4]                         <L,r  //r=# limits defined
[1][m][2][4][1]                          <L,3
[1][m][2][4][1][1]                           <LIMITID1>
[1][m][2][4][1][2]                           <UPPERDB1>
[1][m][2][4][1][3]                           <LOWERDB1>
                                         >
              .                          .
              .                          .
              .                     .
[1][m][2][4][r]                          <L,3
[1][m][2][4][r][1]                           <LIMITIDr>
[1][m][2][4][r][2]                           <UPPERDBr>
[1][m][2][4][r][3]                           <LOWERDBr>
                                         >
                              >
                           >
                        >
                      >
                    >
```

Exceptions:

1. A zero-length list item [1][x][2] means that limits are not supported for the VIDx.

2. A zero-length list item [1][x][2][4] means no limits are currently defined for VIDx.

S2F49 Host Enhanced Remote Command

S,H->E,reply

Description:

The Host requests the Equipment to perform the specified remote command with the associated parameters.

Structure:

```
[1]           <L,4
```

```
[1][1]            <DATAID>
[1][2]            <OBJSPEC>
[1][3]            <RCMD>
[1][4]            <L,n                     // # of parameters
[1][4][1]             <L,2
[1][4][1][1]              <CPNAME1>        // parameter 1 name
[1][4][1][2]              <CEPVAL1>         // parameter 1 value
                      >
       .              .
       .              .
[1][4][n]             <L,2
[1][4][n][1]              <CPNAMEn>        // parameter n name
[1][4][n][2]              <CEPVALn>         // parameter n value
                      >
                   >
                >
```

Note: This is essentially the same as S2F41 except parameters in CEPVAL can also be lists. This why RCMD "PPSELECT" has to be in an S2F49 message only when it contains the "PPID-LIST" parameter. DATAID can be any number while OBJSPEC may be set to a null string.

S2F50 Enhanced Remote Command Acknowledge — S,H<-E

Description:

The equipment acknowledges Enhanced Remote Command or reports any errors. If the command is not accepted due to one or more invalid parameters, then a list of invalid parameters will be returned containing the parameter name and reason for being invalid.

Structure:

```
[1]               <L,2
[1][1]                <HCACK>
[1][2]                <L,n                     // # of parameters
[1][2][1]                 <L,2
[1][2][1][1]                  <CPNAME1>        // parameter 1 name
[1][2][1][2]                  <CEPACK1>         // parameter 1 reason
                          >
       .                  .
       .                  .
[1][2][n]                 <L,2
[1][2][n][1]                  <CPNAMEn>        // parameter n name
[1][2][n][2]                  <CEPACKn>         // parameter n reason
                          >
                      >

                   >
```

S2F71- AGV-ACH Automation Initiate Processing Request — S,H->E,reply

Description:

Initiate Processsing for AGV-ACH automation.

Structure:

```
[1]            <L, 2
[1][1]             <L, 4
[1][1][1]              <TSID1>
[1][1][2]              <ESID1>
[1][1][3]              <PPID1>
```

```
[1][1][4]            <LOTID1>
                  >
[1][2]            <L, 4
[1][2][1]            <TSID2>
[1][2][2]            <ESID2>
[1][2][3]            <PPID2>
[1][2][4]            <LOTID2>
                  >
         >
```

Notes:

1. $PPID_1$ and $PPID_2$ must be same for one batch

2. The E220 shall queue S2F71 while the equipment is processing wafers. The queuing buffer shall hold up to four S2F71s.

3. In case that only one cassette is processed during one batch, the structure of S2F71 shall be

```
[1]          <L, 2
[1][1]          <L, 4
[1][1][1]            <TSID1>
[1][1][2]            <ESID1>
[1][1][3]            <PPID1>
[1][1][4]            <LOTID1>
                  >
[1][2]            <L,4
[1][2][1]            <0>
[1][2][2]            <0>
[1][2][3]            <' '>
[1][2][4]            <' '>
                  >
         >
```

S2F72 - ACH Initiate Processing Acknowledge M,H<-E

Description:

Acknowledge or error.

Structure:

```
[1]   <ACHA >
```

Stream 3 Material Status

The functions of the material status stream are used to communicate material-in-process, time to completion information, and extraordinary material occurrences.

S3F0 Abort Transaction (S3F0) S,H<->E

Description:

Same form as S1F0

Stream 4 Material Control

The material control stream contains the original material control protocol and the newer protocol which supports the SEMI-E32 Material Movement Management Services standard.

S4F0 Abort Transaction (S4F0) S,H<->E

Description:

Same form as S1F0.

Stream 5 Exception Reporting

This stream contains messages regarding binary and analog equipment alarms. The alarms are generated by the equipment in response to changing conditions detected by the equipment. Alarms are divided into categories as follows:

1. Personal safety -- condition may be dangerous to people.
2. Equipment safety -- condition may harm equipment.
3. Parameter control warning -- parameter variation outside of preset limits -- may harm product.
4. Parameter control error -- parameter variation outside of reasonable control limits -- may indicate an equipment malfunction.
5. Irrecoverable error -- intervention required before normal use of equipment can resume.
6. Equipment status warning -- an unexpected condition has occurred, but operation can continue.
7. Attention flags -- a signal from a process program indicating that a particular step has been reached.
8. Data integrity -- a condition which may cause loss of data; usually related to Stream 6.

S5F0 Abort Transaction S,H<->E

Description:

Same form as S1F0.

S5F1 Alarm Report Send (ARS) S,H<-E,[reply]

Description:

This message reports a change in or presence of an alarm condition. One message will be issued when the alarm is set and one message will be issued when the alarm is cleared. Irrevocable errors and attention flags may not have a corresponding clear message.

Structure:

```
[1]       <L,3
[1][1]        <ALCD>
[1][2]        <ALID>
[1][3]        <ALTX>
          >
```

S5F2 Alarm Report Acknowledge (ARA) S,H->E

Description:

Acknowledge or error.

Structure:

```
[1] <ACKC5>
```

S5F3 Enable/Disable Alarm Send (EAS) — S,H->E,[reply]

Description:

This message will change the state of the enable bit in the equipment. The enable bit determines if the alarm will be sent to the host. Alarms which are not controllable in this way are unaffected by this message.

Structure:

```
[1]      <L,2
[1][1]       <ALED>
[1][2]       <ALID>
         >
```

Exception:

A zero-length item [1][2], ALID, means all alarms.

S5F4 Enable/Disable Alarm Acknowledge (EAA) — S,H<-E

Description:

Acknowledge or error.

Structure:

```
[1] <ACKC5>
```

S5F5 List Alarms Request (LAR) — S,H->E,reply

Description:

This message requests the equipment to send binary and analog alarm information to the host.

Structure:

```
[1] <ALID1,...,ALIDn>
```

Exception:

A zero-length item [1] means send all possible alarms regardless of the state of ALED.

S5F6 List Alarm Data (LAD) — M,H<-E

Description:

This message contains the alarm data known to the equipment. There are "m" alarms in the list.

Structure:

```
[1]             <L,m
[1][1]              <L,3
[1][1][1]               <ALCD1>
[1][1][2]               <ALID1>
[1][1][3]               <ALTX1>
                    >
     .              .
     .              .
[1][m]              <L,3
[1][m][1]               <ALCDm>
[1][m][2]               <ALIDm>
[1][m][3]               <ALTXm>
                    >
```

Exception:

A zero-length item [1], m=0, means no response can be made.

A zero-length item [1][x][1] ALCDx or item [1][x][2] ALIDx or item [1][x][3] ALTXx means that item does not exist.

S5F7 List Enabled Alarm Request (LEAR) — S,H->E,reply

Description:

List alarms which are enabled.

Structure:

Header only.

S5F8 List Enabled Alarm Data (LEAD) — M,H<-E

Description:

This message is similar to S5F6 except that it lists only alarms which are enabled.

Structure:

Same as S5F6 .

Stream 6 Data Collection

This stream is intended to cover the needs of in-process measurements and equipment monitoring.

S6F0 Abort Transaction (S6F0) — S,H<->E

Description:

Same form as S1F0.

S6F1 Trace Data Send (TDS) — S,H<-E,[reply]

Description:

This function sends samples to the host according to the trace setup done by S2,F23. Trace is a time-driven form of equipment status.

Structure:

```
[1]           <L,4
[1][1]            <TRID>
[1][2]            <SMPLN>
[1][3]            <STIME>
[1][4]            <L,n
[1][4][1]             <SV1>
       .              .
       .              .
[1][4][n]             <SVn>
                  >
                 >
```

Exception:

A zero-length [1][3] STIME item means no value is given and that the time is to be derived from [1][2] SMPLN item along with knowledge of the request.

S6F2 Trace Data Acknowledge (TDA) S,H->E

Description:

Acknowledge or error.

Structure:

```
[1]  <ACKC6>
```

S6F5 Multi-block Data Send Inquire (MBI) S,H<-E,reply

Description:

If the discrete data report S6F11 , S6F13, can involve more than one block, this transaction must precede the transmission.

Structure:

```
[1]         <L,2
[1][1]          <DATAID>
[1][2]          <DATALENGTH>
            >
```

S6F6 Multi-block Grant (MBG) S,H->E

Description:

Grant permission to send.

Structure:

```
[1]  <GRANT6>
```

S6F11 Event Report Send (ERS) — M,H<-E,reply

Description:

The purpose of this message is for the equipment to send a defined, linked, and enabled group of reports to the host upon the occurrences of an event (CEID).

If S6F11 is Multi-block, it must be preceded by the S6F5 /S6F6 Inquire/Grant transaction.

Structure:

```
[1]                    <L,3
[1][1]                     <DATAID>
[1][2]                     <CEID>
[1][3]                     <L,n
[1][3][1]                      <L,2
[1][3][1][1]                       <RPTID1>
[1][3][1][2]                       <L,p
[1][3][1][2][1]                        <V1>
             .                         .
             .                         .
[1][3][1][2][p]                        <Vp>
                                   >
                               >
       .                       .
       .                       .
[1][3][n]                      <L,2
[1][3][n][1]                       <RPTID1>
[1][3][n][2]                       <L,r
[1][3][n][2][1]                        <V1>
             .                         .
             .                         .
[1][3][n][2][r]                        <Vr>
                                   >
                               >
                           >
                       >
```

Exceptions:

A zero-length list item [1][3] for the number of reports means there are no reports linked to the given CEID and a 'null' report is assumed.

S6F12 Event Report Acknowledge (ERA) — S,H->E

Description:

Acknowledge or error.

Structure:

```
[1] <ACKC6>
```

S6F13 Annotated Event Report Send (AERS) M,H<-E,reply

Description:

This message is the same as S6F11 with the exception that VID's are sent with the data.
If S6F13 is Multi-block, it must be preceded by the S6F5 /S6F6 Inquire/Grant transaction.

Structure:

```
[1]                     <L,3
[1][1]                      <DATAID>
[1][2]                      <CEID>
[1][3]                      <L,n
[1][3][1]                       <L,2
[1][3][1][1]                        <RPTID1>
[1][3][1][2]                        <L,p
[1][3][1][2][1]                         <L,2
[1][3][1][2][1][1]                          <VID1>
[1][3][1][2][1][2]                          <V1>
                                        >
             .                          .
             .                          .
[1][3][1][2][p]                         <L,2
[1][3][1][2][p][1]                          <VIDp>
[1][3][1][2][p][2]                          <Vp>
                                        >
                                    >
                                 >
       .                         .
       .                         .
[1][3][n]                        <L,2
[1][3][n][1]                        <RPTIDn>
[1][3][n][2]                        <L,q
[1][3][n][2][1]                         <L,2
[1][3][n][2][1][1]                          <VID1>
[1][3][n][2][1][2]                          <V1>
                                        >
             .                          .
             .                          .
[1][3][n][2][q]                         <L,2
[1][3][n][2][q][1]                          <VIDq>
[1][3][n][2][q][2]                          <Vq>
                                        >
                                    >
                                 >
                              >
                           >
```

Exceptions:

A zero-length list item [1][3] for the number of reports means there are no reports linked to the given CEID and a 'null' report is assumed.

S6F14 Annoted Event Report Acknowledge (AERA) S,H->E

Description

Acknowledge or error.

Structure:

[1] <ACKC6>

S6F15 Event Report Request (ERR) S,H->E,reply

Description:

The purpose of this messge is for the host to demand the report group from the equipment linked to event CEID

Structure:

[1] <CEID>

S6F16 Event Report Data M,H<-E

Description:

Equipment sends reports linked to given CEID to host.

Structure:

Identical to structure of S6F11.

S6F17 Annoted Event Report Request (AERR) S,H->E,reply

Description:

Same as S6F15 , but requests annotated reports.

Structure:

[1] <CEID>

S6F18 Annoted Event Report Data (AERD) M,H<-E

Description:

Equipment sends annotated reports linked to given CEID.

Structure:

Same as S6F13.

S6F19 Individual Report Request (IRR) S,H->E,reply

Description:

The purpose of this message is for the host to request a defined report from the equipment.

Structure:

```
[1]  <RPTID>
```

S6F20 Individual Report Data (IRD) M,H<-E

Description:

Equipment sends variable data defined for the given RPTID to the host.

Structure:

```
[1]       <L,n # of variable data items
[1][1]        <V1>
    .         .
    .         .
[1][n]        <Vn>
        >
```

Exceptions:

A zero-length list item [1] means RPTID is not defined.

S6F21 Annoted Individual Report Request (AIRR) S,H->E,reply

Description:

The purpose of this message is for the host to request an annotated defined report from the equipment.

Structure:

```
<RPTID>
```

S6F22 Annoted Individual Report Data (AIRD) M,H<-E

Description:

Equipment sends annotated variable data defined for the given RPTID to the host.

Structure:

```
[1]          <L,n   //  number of variable data items
[1][1]           <L,2
[1][1][1]            <VID1>
[1][1][2]            <V1>
             >
    .
    .
[1][n]           <L,2
[1][n][1]            <VIDn>
[1][n][2]            <Vn>
                >
            >
```

Exceptions:

A zero-length for list item [1], n=0, means RPTID is not defined.

S6F23 Request Spooled Data (RSD) S,H->E,reply

Description:

The purpose of this message is for the host to request transmission or deletion of the messages currently spooled by the equipment.

Structure:

```
[1]  <RSDC>
```

S6F24 Request Spooled Data Acknowledgement Send (RSDAS) S,H<-E

Description:

The purpose of this message is to acknowledge the receipt of the Request Spooled Data (S6F23) and to respond with an appropriate acknowledge code.

Structure:

```
[1] <RSDA>
```

Stream 7 Process Program Management

The functions in this stream are used to manage and transfer process programs. Process programs are the equipment-specific descriptions that determine the procedure to be conducted on the material by a single piece of equipment. Methods are provided to transfer programs as well as establish the link between the process program and the material to be processed with that program.

NOTE -- The equipment-to-host transfer of the process program, denoted by the R bit in the header (R=1), provides the mechanism for the host computer to receive process programs created on the equipment. This allows use of the equipment without having process program generation capabilities on the host.

NOTE -- M/PM defines the Material/Process Matrix. The Material/Process Matrix is a table which links the material to the process program to be used in processing the material.

NOTE -- The matrix structure allows the program linkages to be extablished for each MID or the multi-MID production plans for an extended period of time. The host system makes the choice of operating mode. By continuous updates to the equipment matrix, automatic system backup is achieved.

S7F0 Abort Transaction (S7F0) S,H<->E

Description:

Same form as S1F0

S7F1 Process Program Load Inquire S,H<->E,reply

Description:

This message is used to initiate the transfer of a process program or to select from stored programs. The message may be used to initiate the transfer of an unformatted process program (S7F3/S7F4) or a formatted process program (S7F23/S7F24).

Structure:

```
[1]       <L,2
[1][1]        <PPID>
[1][2]        <LENGTH>
          >
```

S7F2 Process Program Load Grant (PPG) S,H<->E

Description:

This message gives permission for the process program to be loaded.

Structure:

```
[1] <PPGNT>
```

S7F3 Process Program Send (PPS) M,H<->E,reply

Description:

The program is sent. If S7F3 is multi-block, it must be preceded by the S7F1/S7F2 Inquire/Grant transaction.

Structure:

```
[1]      <L,2
[1][1]       <PPID>
[1][2]       <PPBODY>
         >
```

S7F4 Process Program Acknowledge (PPA) S,H<->E

Description:

Acknowledge or error.

Structure:

```
[1]  <ACKC7>
```

S7F5 Process Program Request S,H<->E,reply

Description:

This message is used to request the transfer of a process program.

Structure:

```
[1]  <PPID>
```

S7F6 Process Program Data (PPD) M,H<->E

Description:

This message is used to transfer a process program.

Structure:

```
[1]        <L,2
[1][1]         <PPID>
[1][2]         <PPBODY1>
           >
```

or

```
[1]        <L,2
[1][1]         <PPID>
[1][2]         <PPBODY2SHORT>
         >
```

or

```
[1]        <L,2
[1][1]         <PPID>
[1][2]         <PPBODY2LONG>
         >
```

or

```
[1]        <L,2
[1][1]         <PPID>
[1][2]         <PPBODY3>
         >
```

S7F17 Delete Process Program Send (DPS) S,H->E,reply

Description:

This message is used by the host to request the equipment to delete process program from equipment storage.

Structure:

```
[1]          <L,n  (Number of process programs to be deleted)
[1][1]           <PPID1>
    .            .
    .            .
[1][n]           <PPIDn>
             >
```

S7F18 Delete Process Program Acknowledge (DPA) S,H<-E

Description:

Acknowledge or error.

Structure:

```
[1] <ACKC7>
```

S7F19 Current EPPD Request (RER) — S,H->E,reply

Description:

This message is used to request the transmission of the current equipment process program directory (EPPD). This is a list of all the PPID s of the process programs stored in the equipment.

Structure:

Header only

S7F20 Current EPPD Data (RED) — M,H<-E

Description:

This message is used to transmit the current EPPD.

Structure:

```
[1]     <L,n (number of process programs in the directory)
[1][1]      <PPID1>
   .        .
   .        .
[1][n]      <PPIDn>
```

S7F23 Formatted Process Program Send (FPS) — M,H<->E,reply

Description:

This message allows movement of formatted process programs between a piece of equipment and its host system. The values of MDLN and SOFTREV are obtained from the PCD used to generate the process program. If S7F23 is multi-block, it must be preceded by the S7F1/S7F2 Inquire/Grant transaction.

Structure:

```
[1]                 <L,4
[1][1]                  <PPID>
[1][2]                  <MDLN>
[1][3]                  <SOFTREV>
[1][4]                  <L,n // n=Number of Process Commands)
[1][4][1]                    <L,2
[1][4][1][1]                    <CCODE1>
[1][4][1][2]                    <L,p (p=Number of Parameters)
[1][4][1][2][1]                     <PPARM1>
                .                     .
                .                     .
[1][4][1][2][p]                     <PPARMp>
                                >
                            >
         .                  .
         .                  .
[1][4][n]                     <L,2
[1][4][n][1]                    <CCODEn>
[1][4][n][2]                    <L,q // q=Number of Parameters)
[1][4][n][2][1]                     <PPARM1>
```

```
                    .                         .
                    .                         .
[1][4][n][2][q]                           <PPARMq>
                                      >
                                  >
                              >
                          >
```

S7F24 Formatted Process Program Acknowledge (FPA) S,H<->E

Description:

Acknowledges reception of a formatted process program at its destination and whether the process program was accepted by the interpreter. A returned status of "accepted" by the interpreter means only that the message is understood. The validity of the contents of the process program is determined through a separate transaction (S7F27/S728).

Structure:

```
[1] <ACKC7>
```

S7F25 Formatted Process Program Request (FPR) S,H<->E,reply

Description:

This message is used by either equipment or host to request a particular process program from the other.

Structure:

```
<PPID>
```

S7F26 Formatted Process Program Data (FPD) M,H<->E

Description:

This message transfers a process program in response to a request for the PPID. The values of MDLN and SOFTREV are obtained from the PCD used to generate the process program.

Structure:

```
[1]                  <L,4
[1][1]                   <PPID>
[1][2]                   <MDLN>
[1][3]                   <SOFTREV>
[1][4]                   <L,n // n=Number of Process Commands)
[1][4][1]                     <L,2
[1][4][1][1]                     <CCODE1>
[1][4][1][2]                     <L,p (p=Number of Parameters)
[1][4][1][2][1]                      <PPARM1>
                    .                         .
                    .                         .
[1][4][1][2][p]                          <PPARMp>
                                    >
                                 >
          .                .
          .                .
[1][4][n]                      <L,2
[1][4][n][1]                     <CCODEn>
```

```
[1][4][n][2]                  <L,q // q=Number of Parameters)
[1][4][n][2][1]                   <PPARM1>
          .                         .
          .                         .
[1][4][n][2][q]                   <PPARMq>
                              >
                           >
                        >
                     >
```

Exception:

A zero length for list item [1] means the request was denied.

S7F27 Process Program Verification Send (PVS) — S,H<-E,reply

Description:

This message indicates to the host that a process program has been received and checked by the equipment. The result of the check is specified by the list of errors. An empty error list (list of zero-length) or a one-element list with ACKC7A having a value of zero (0) indicates no errors were found in the process program. The equipment may report as many errors as it seems appropriate. The equipment is responsible for sending a single copy of this message to the host after any reception of a formatted process program (S7F23 or S7F26). If S7F27 is multi-block, it must be preceded by the S7F29/S7F30 Inquire/Grant Transaction.

Structure:

```
[1]               <L,2
[1][1]                <PPID>
[1][2]                    <L,n // n=number of errors being reported)
[1][2][1]                     <L,3
[1][2][1][1]                       <ACKC7A1>
[1][2][1][2]                       <SEQNUM1>
[1][2][1][3]                       <ERRW71>
                              >

[1][2][n]                     <L,3
[1][2][n][1]                       <ACKC7An>
[1][2][n][2]                       <SEQNUMn>
[1][2][n][3]                       <ERRW7n>
                              >
                      >
                  >
```

S7F28 Process Program Verification Acknowledge (PVA) — S,H->E

Description:

Reply by host to equipment acknowledging reception of Process Program Verification Send (PVS).

Structure:

Header only

S7F29 Process Program Verification Inquire (PVI) — S,H<-E,reply

Description:

This message allows a piece of equipment to ask a host for permission to send a multi-block PVS.

Structure:

[1] <LENGTH>

S7F30 Process Program Verification Grant (PVG) — S,H->E

Description:

Reply by host to equipment providing response to Process Program Verification Inquire (PVI).

Structure:

[1] <PPGNT>

Stream 8 Control Program Transfer

The purpose of this stream is to provide the method for transmitting the programs used in the equipment to perform the control function or to execute the transmitted process program.

S8F0 Abort Transaction (S8F0) — S,H<->E

Description:

Same form as S1F0.

Stream 9 System Errors

This stream provides a method of informing the host that a message block has been received which cannot be handled or that a timeout on a transaction (receive) timer has occurred. The messages indicate either a Message Fault or a Communications Fault has occurred but do not indicate a Communications Failure has occurred.

Communications Failure -- A Communications Failure occurs in a SECS-I environment when, and only when, the RTY limit is exceeded. Note: In the event of a Communications Failure, no Stream 9 message is sent.

Communications Fault -- A Communications Fault occurs when the equipment does not receive an expected message (when a transaction timer or a conversation timer has expired).

Message Fault -- A message Fault occurs when the equipment receives a message which it cannot process because of a fault that arises from the content, context, or length of the message.

S9F0 Abort Transaction — S,H<->E

Description:

Same form as S1F0.

S9F1 Unrecognized Device ID — S,H<-E

Description:

The device ID in the message block header did not correspond to any known device ID in the node detecting the error.

Structure:

[1] <MHEAD>

S9F2 Not Used

S9F3 Unrecognized Stream Type (USN) S,H<-E

Description:

The equipment does not recognize the stream type in the message block header.

Structure:

[1] <MHEAD>

S9F4 Not Used

S9F5 Unrecognized Function Type (UFN) S,H<-E

Description:

This message indicates that the function in the message ID is not recognized by the receiver.

Structure:

[1] <MHEAD>

S9F6 Not Used

S9F7 Illegal Data (IDN) S,H<-E

Description:

This message indicates that the stream and function were recognized, but the associated data format could not be interpreted.

Structure:

[1] <MHEAD>

S9F8 Not Used

S9F9 Transaction Timer Timeout (TTN) S,H<-E

Description:

This message indicates that a transaction (receive) timer has timed out and that the corresponding transaction has been aborted. It is up to the host to respond to this error in an appropriate manner to keep the system operational.

Structure:

```
[1] <SHEAD>
```

S9F10 Not Used

S9F11 Data Too Long (DLN) S,H<-E

Description:

This message to the host indicates that the equipment has been sent more data than it can handle.

Structure:

```
[1]  <MHEAD>
```

S9F12 Not Used

S9F13 Conversation Timeout (CTN) S,H<-E

Description:

Data were expected but none were received within a reasonable length of time. Resources have been cleared.

Structure:

```
[1]       <L,2
[1][1]        <MEXP>
[1][2]        <EDID>
          >
```

S9F14 Not Used

Stream 10 Terminal Services

The functions of this stream is to pass textual messages between operator terminals attached to processing and/or testing equipment and the host. The equipment makes no attempt to interpret the text of the message, but merely passes it from terminal keyboard to the host or from the host to the display of the terminal. Management of human response times to information displayed on terminals is the responsibility of the host.

S10F0 Abort Transaction S,H<->E

Description:

Same form as S1F0.

S10F1 Terminal Request (TRN) S,H<-E,[reply]

Description:

A terminal text message to the host.

Structure:

```
[1]       <L,2
[1][1]        <TID>
[1][2]        <TEXT>
          >
```

S10F2 Terminal Request Acknowledge S,H->E

Description:

Acknowledge or error

Structure:

```
[1] <ACKC10>
```

S10F3 Terminal Display, Single (VTN) S,H->E, [reply]

Description:

Data to be displayed.

Structure:

```
[1]                 <L,2
[1][1]        <TID>
[1][2]        <TEXT>
          >
```

S10F4 Terminal Display, Single Acknowledge (VTA) S,H<-E

Description:

Acknowledge or error

Structure:

```
[1]  <ACKC10>
```

S10F5 Terminal Display, Multi-Block (VTN) M,H->E,[reply]

Description:

Data to be displayed on the equipment's terminal.

Structure:

```
[1]           <L,2
[1][1]            <TID>
[1][2]            <L,n
[1][2][1]             <TEXT1>
        .              .
       .              .
[1][2][n]              <TEXTn>
                  >
         >
```

S10F6 Terminal Display, Multi-block Acknowledge (VMA) S,H<-E

Description:

Acknowledge or error

Structure:

```
[1]  <ACKC10>
```

S10F7 Multi-block Not Allowed (MNN) S,H<-E

Description:

An error message from a terminal that cannot handle a multi-block message from S10F5.

Structure:

```
[1] <TID>
```

S10F8 Not Used

Stream 11 Deleted

Stream 11 has been deleted and will not appear again in this publication.

It is the consensus of the Communications Committee that Stream 11 is obsolete. Its use is discouraged, and it has been removed from the 1989 edition of the standard. The reasons for removal are three-fold:

1.The purpose of this stream, as it was originally envisioned, is perceived to be of little use and can best be accomplished by other means beyond the scope of this standard;

2.The functions in this stream have many technical problems that severely limit their use

There is a noticeable lack of implementations of this standard that utilize Stream11 in its originally intended form.

Note: Applications that need to transfer unformatted data between the host and equipment should use the facilities of Stream 13 .

Stream 12 Wafer Mapping

Messages which deal with coordinate positions and data associated with those positions. This includes functions such as wafer mapping with coordinates of die on a wafer and the associated binning information.

S12F0 Abort Transaction — S,H<->E

Description:

Same form as S1F0.

Stream 13 Unformatted Data Set Transfers

This stream provides a protocol to transfer data sets between systems. It is not intended to provide a general file access mechanism.

S13F0 Abort Transaction (S13,F0) — S,H<->E

Description:

Same form as S1F0

Stream 14 Object Services

The functions in this stream are used for generic functions concerning objects, including obtaining information about objects and setting values for an object

S14F0 Abort Transaction (S14F0) — S,H<->E

Description:

Same form as S1F0.

4.0 Message Scenarios

4.0 Message Scenarios

The following scenarios demonstrate a possible sequence of messages when the Equipment is in a specific operational state. They are not the only sequence. A number of undeterministic conditions effect the sequences.

Note: The left margin has been extented to the furthest point to allow use of the entire page for the following scenarios.

Host Attempts to Establish Communications

The Equipment has completed initialization and is idle. The default communications states are ENABLED, OFF-LINE, and LOCAL.

COMMENT	HOST	EQUIPMENT
Communications state is Enabled (any substate)		
Establish Communications Request	S1,F13-->	
Reply COMMACK = Accept and Communications state = COMMUNICATING		<--S1,F14

Equipment Attempts to Establish Communications after Power-On

The Communication state is ENABLED. The Control State is ON-LINE/REMOTE. These setting were set as default.

COMMENT	HOST	EQUIPMENT
[LOOP]		
[LOOP] -- SEND		
Establish Communications Request		<--S1,F13
Reply COMMACK = Accept and Communications state = COMMUNICATING	S1,F14-->	
[IF] S1,F14 received without timeouts		
[THEN] exit_loop -- SEND		
[ELSE] Delay for interval in Establish Communications Timeout		
[END_IF]		
[END_LOOP] -- SEND		
[IF] COMMACK = Accept		
[THEN] Communication State = Communicating exit_loop--		
[ELSE] Reset timer for delay, and delay for interval specified in Establish Communication Timeout		
[END_IF]		
[END_LOOP]		
ARE YOU THERE?		<--S1,F1
Acknowledge	S1,F2-->	
[IF ENABLED]		<--S6,F11
CEID = 68		
CONTROL STATE IS REMOTE		
Acknowledge	S6,F12-->	
OPERATOR LOG ON SCREEN APPEARS		
EQUIPMENT WAITS FOR OPERATOR LOG-ON		
OPERATOR LOGS-ON		
[IF ENABLED]		<--S6,F11
CEID = 82		
OPERATOR LOG ON EVENT		
Acknowledge	S6,F12-->	
[IF] PRIVILEGE IS CORRECT HOST CONTROL HOST CONTROL SCREEN		

[ELSE] LESSER PRIVILEGE			
MODE MENU SCREEN			
[IF ENABLED] AND LOADLOCK EMPTY			
CEID = 84		<--S6,F11	
READY TO RECEIVE MATERIAL			
Acknowledge	S6,F12-->		

Operator Attempts to Establish Communications

Operator switches to the Host Interface screen.

The Communications State is DISABLED. The Control state is ON-LINE. NOT COMMUNICATING is displayed in the status area of the Host Mode block. Operator touches button icon labeled DISABLE. The label changes from DISABLE to ENABLE.

COMMENT	HOST	EQUIPMENT	COMMENT
			[LOOP]
			[LOOP] -- SEND
		<--S1,F13	Establish Communications Request
Reply COMMACK = Accept and Communications state = COMMUNICATING	S1,F14-->		
			[IF] S1,F14 received without timeouts
			[THEN] exit_loop -- SEND
			[ELSE] Delay for interval in Establish Communications Timeout
			[END_IF]
			[END_LOOP] -- SEND
			[IF] COMMACK = Accept
			[THEN] Communication State = Communicating exit_loop--
			[ELSE] Reset timer for delay, and delay for interval specified in Establish Communication Timeout
			[END_IF]
			[END_LOOP]

Status area in the Host Mode Block of the Host Interface Screen displays COMMUNICATING

		<--S1,F1	ARE YOU THERE?
Acknowledge	S1,F2-->		
		<--S6,F11	[IF ENABLED]
			CEID= 67/68
			COMMUNICATIONS STATE IS REMOTE or LOCAL
Acknowledge	S6,F12-->		
			[IF ENABLED] AND LOADLOCK EMPTY
			CEID= 84
		<--S6,F11	READY TO RECEIVE MATERIAL
Acknowledge	S6,F12-->		

Host Attempts to Establish Communications, Equipment Disabled

Equipment is powered on and the communication state is DISABLE.

COMMENT	HOST	EQUIPMENT	COMMENT
Establish Communications Request	S1,F13-->		
HOST TIMEOUT			

Remote Process Control Scenario (Unformatted Process Program)

Equipment's Communications state is ENABLED and COMMUNICATING. The Control state is ON-LINE and REMOTE. The exchanges shown below may take place in a different sequence because of undeterministic timing between the various devices of the E220.

SCREEN 2

HOST CONTROL SCREEN

Operator switches to Host Control screen.

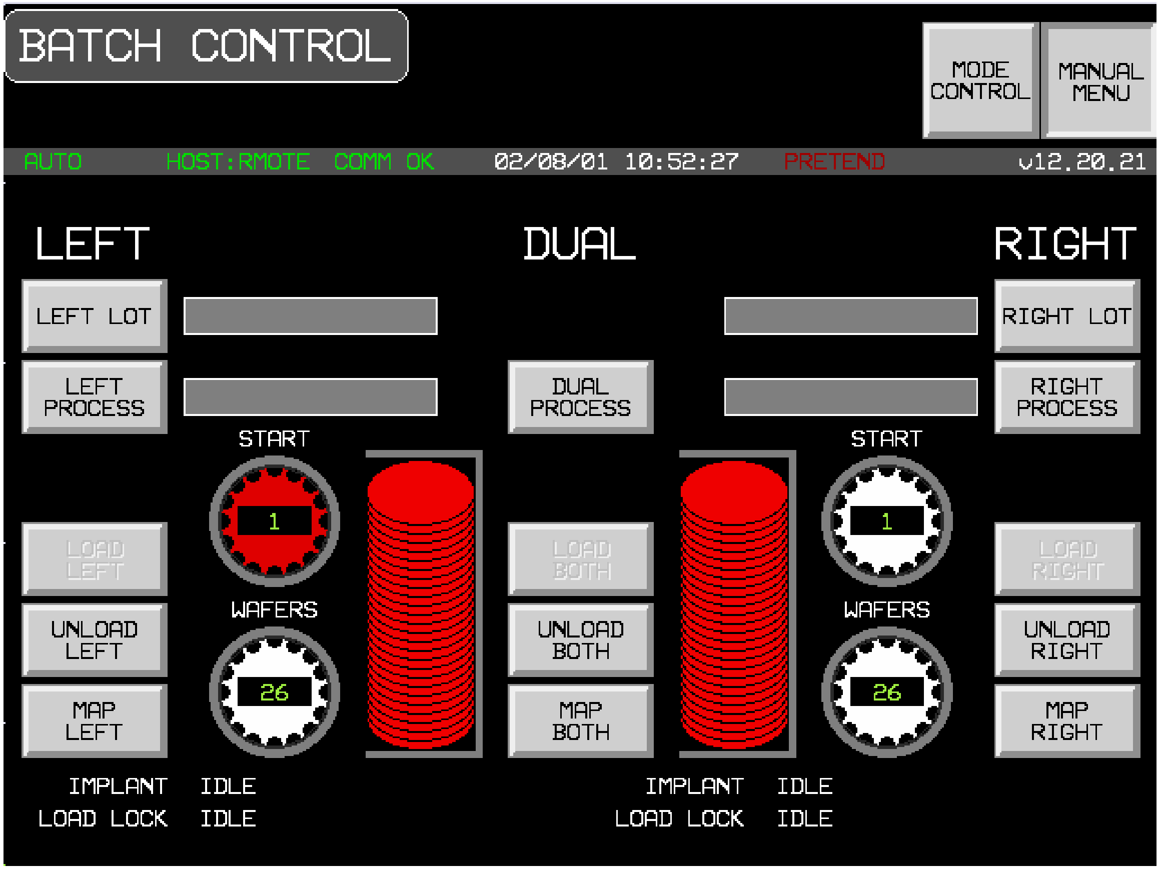
COMMENT	HOST	EQUIPMENT	COMMENT
			Idle State - Waiting for command from operator or Host
			[IF]Operator gives batch ID to Host,
			[THEN] Process Program request from HOST initiated
[IF] Process Program not present in EPPD			
[THEN]			
Process Program Load Inquiry	S7,F1-->		
		<--S7,F2	Process Program Load Grant
Process Program Send	S7,F3-->		
		<--S7,F4	Process Program Acknowledge
[ENDIF]			
			[ELSE] Operator selects process from recipe index on E220.
			[ENDIF]
			Return to Idle State
REMOTE COMMAND with PPSELECT	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			Event Process Program Selected
			[IF] Acknowledge Negative
			[THEN] Return to Idle State
			[ELSE]Equipment displays PPID on Host Control screen.
			Operator verifies PPID
			Operator places wafers into loadlocks
			[IF ENABLED]
		<--S6,F11	CEID = 85
			Material sensed at port

Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF] Operator touches GO icon on Host Control Screen [THEN] [IF ENABLED] CEID = 73 Operator Command Issued
Event Report Acknowledge	S6,F12-->		
			[ELSE] Wait for command from Host
REMOTE COMMAND START	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			[IF] Acknowledge Negative [THEN] Return to Idle State
		<--S6,F11	[IF ENABLED] CEID = 86 Host command issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	Equipment begins setup for implanting wafer [IF ENABLED] CEID =75 Process state change
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 27 Elevator pump started
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 25 Door close started
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 26 Door close completed
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 38 Wafer mapping started
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 39 Wafer mapping completed
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 28 Elevator pump completed

Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID =75
		<--S6,F11	Process state change
Event Report Acknowledge	S6,F12-->		[IF ENABLED]
			CEID = 5
		<--S6,F11	Source setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 6
		<--S6,F11	Source setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 7
		<--S6,F11	Beamline setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 8
		<--S6,F11	Beamline setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 9
		<--S6,F11	Beamscan setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 10
		<--S6,F11	Beamscan setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 75
		<--S6,F11	Process state change
Event Report Acknowledge	S6,F12-->		
			Equipment is idle waiting for Start Command
Host Command START Sent (RCMD = 4)	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			HCACK = 0 (assumes command can be performed).
			[IF ENABLED]
			CEID = 86
		<--S6,F11	Host command issued
Event Report Acknowledge	S6,F12-->		
			[IF] 1st Wafer
			[THEN]
			[IF ENABLED]
		<--S6,F11	CEID = 11
			Batch started
Event Report Acknowledge	S6,F12-->		[ENDIF]
			[LOOP]
		<--S6,F11	CEID = 13
			Wafer started
Event Report Acknowledge	S6,F12-->		
			[IF] PAUSE RECEIVED FROM HOST OR

			OPERATOR
			[THEN] EVENT PAUSE STATE
			[WAIT]
			[IF] HOST SEND S2,F41 OR OPERATOR PRESSES CONTINUE
			[THEN]
			EVENT EXECUTING
		<--S6,F11	CEID = 14
			Wafer complete
			[IF] PROCESS PROGRAM COMMAND IS SET TO PERIODICALLY CHECK THE BEAM AND TIMEOUT OCCURS
			[THEN] BEAMCHECK IS DONE
			[IF] FAILS
			[THEN] BEAM SCAN IS DONE
			[IF] Last wafer
			[THEN] Exit loop [END_LOOP]
			[ENDIF]
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	CEID = 12
			Batch complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 21
		<--S6,F11	Elevator vent started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 23
		<--S6,F11	Door open started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 24
		<--S6,F11	Door open completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 22
		<--S6,F11	Elevator vent completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID =65
			Pivot extend complete
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED]
			CEID= 75
			Process state change
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID =41
			Cassette(s) remved
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID =46
			Cassette sense status change
Event Report Acknowledge	S6, F12 -->		
			[IF ENABLED]
		<--S6,F11	CEID = 84

COMMENT	HOST	EQUIPMENT	COMMENT
			Ready to receive material
Event Report Acknowledge	S6,F12-->		
			Waiting for command from operator or Host
			SCREEN CHANGES TO HOST CONTROL



Version Introduced: 12.20

Remote Process Control Scenario (Formatted Process Program)

Equipment's Communications state is ENABLED and COMMUNICATING. The Control state is ON-LINE and REMOTE. The exchanges shown below may take place in a different sequence because of undeterministic timing between the various devices of the E220.

Operator switches to Host Control screen.

COMMENT	HOST	EQUIPMENT	COMMENT
			Idle State - Waiting for command from operator or Host
			[IF]Operator gives batch ID to Host,
			[THEN] Process Program request from HOST initiated
[IF] Process Program not present in EPPD			
[THEN]			
[IF] Process Program is multi-block			
[THEN]			
Process Program Load Inquire	S7,F1-->		
		<--S7,F2	Process Program Load Grant
[END_IF]			
Formatted Process Program Send	S7,F23-->		

		<--S7,F24	Formatted Process Program Acknowledge
			Verify Process Program
			[IF]S7,F27 is multi-block
			[THEN]
		<--S7,F29	Process Program Verification Inquire
Process Program Verification Grant	S7,F30-->		
			[END_IF]
		<--S7,F27	Process Program Verification Send
Process Program Verification Acknowledge	S7,F28-->		
			[ELSE] Operator selects process from recipe index on E220.
			[ENDIF]
			Return to Idle State
REMOTE COMMAND with PPSELECT	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			Event Process Program Selected
			[IF] Acknowledge Negative
			[THEN] Return to Idle State
			Operator places wafers into loadlocks
		<--S6,F11	[IF ENABLED]
			CEID = 85
			Material Sensed at Port
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF] Operator touches GO icon on Host Control Screen
			[THEN]
			[IF ENABLED]
			CEID = 73
			Operator Command Issued
Event Report Acknowledge	S6,F12-->		
			[ELSE] Wait for command from Host
REMOTE COMMAND START	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			[IF] Acknowledge Negative
			[THEN] Return to Idle State
			[IF ENABLED]
		<--S6,F11	CEID = 86
			HOST COMMAND STARTED
Event Report Acknowledge	S6,F12-->		
			Equipment begins setup for implanting wafer
			[IF ENABLED]
		<--S6, F11	CEID = 75
			Process state change
Event Report Acknowledge	S6, F12-->		
			[IF ENABLED]
		<--S6,F11	CEID = 27
			Elevator pump started
Event Report Acknowledge	S6,F12-->		

			[IF ENABLED]
			CEID = 25
		<--S6,F11	Door close started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 26
		<--S6,F11	Door close completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 38
		<--S6,F11	Wafer mapping started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 39
		<--S6,F11	Wafer mapping completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 28
		<--S6,F11	Elevator pump completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID = 75
Event Report Acknowledge	S6, F12-->		Process state change
			[IF ENABLED]
			CEID = 5
		<--S6,F11	Source setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 6
		<--S6,F11	Source setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 7
		<--S6,F11	Beamline setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 8
		<--S6,F11	Beamline setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 9
		<--S6,F11	Beamscan setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 10
		<--S6,F11	Beamscan setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID =75
			Process State Change
Event Report Acknowledge	S6,F12-->		
			Equipment is idle waiting for Start Command

Host Command START Sent (RCMD = 4)	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			HCACK = 0 (assumes command can be performed).
			[IF ENABLED]
		<--S6,F11	CEID = 86
			Host command issued
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID = 75
			Process state change
Event Report Acknowledge	S6,F12-->		
			[IF] 1st Wafer
			[THEN]
			[IF ENABLED]
		<--S6,F11	CEID = 11
			Batch started
Event Report Acknowledge	S6,F12-->		[ENDIF]
			[LOOP]
		<--S6,F11	CEID = 13
			Wafer started
Event Report Acknowledge	S6,F12-->		
			[IF] PAUSE RECEIVED FROM HOST OR OPERATOR
			[THEN] EVENT PAUSE STATE
			[WAIT]
			[IF] HOST SEND S2,F41 OR OPERATOR PRESSES CONTINUE
			[THEN]
			EVENT EXECUTING
		<--S6,F11	CEID = 14
			Wafer complete
			[IF] PROCESS PROGRAM COMMAND IS SET TO PERIODICALLY CHECK THE BEAM AND TIMEOUT OCCURS
			[THEN] BEAMCHECK IS DONE
			[IF] FAILS
			[THEN] BEAM SCAN IS DONE
			[IF] Last wafer
			[THEN] Exit loop [END_LOOP]
			[ENDIF]
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	CEID = 12
			Batch complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 21
		<--S6,F11	Elevator vent started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 23
		<--S6,F11	Door open started
Event Report Acknowledge	S6,F12-->		

			[IF ENABLED]
			CEID = 24
		<--S6,F11	Door open completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 22
		<--S6,F11	Elevator vent completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID = 65
Event Report Acknowledge	S6,F12-->		Pivot extend complete
			[IF ENABLED]
		<--S6,F11	CEID = 75
			Process state change
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID = 41
			Cassette removed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID = 84
			Ready to receive material
Event Report Acknowledge	S6,F12-->		
			Waiting for command from operator or Host

Local Process Control Scenario

Equipment's Communications state is ENABLE and COMMUNICATING. The Equipment's Control state is ON-LINE and LOCAL. The Host shall be prohibited from the use of remote commands that cause physical movement or initiate processing by operator switching to LOCAL mode. Also, the Host shall not modify Equipment constants that could affect a process in progress. The exchanges shown below may not take place in the order shown because of timing considerations between the various devices which are part of the E220.

Operator switches to Batch Status screen.

COMMENT	HOST	EQUIPMENT	COMMENT
			Idle State - Waiting for command from operator
			Operator selects PPID from the Recipe Index screen. Operator switches to Batch status screen.
			Operator presses Go button
			[IF ENABLED]
		<--S6,F11	CEID = 73
			Operator Command Issued
Event Report Acknowledge	S6,F12-->		Equipment begins setup for implanting wafer
			[IF ENABLED]
		<--S6,F11	CEID = 75
			Process state change
Event Report Acknowledge	S6,F12-->		
			Equipment begins setup for implanting wafer
			[IF ENABLED]
			CEID = 27
		<--S6,F11	Elevator pump started
Event Report Acknowledge	S6,F12-->		

			[IF ENABLED]
			CEID = 25
		<--S6,F11	Door close started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 26
		<--S6,F11	Door close completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 38
		<--S6,F11	Wafer mapping started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 39
		<--S6,F11	Wafer mapping completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 28
		<--S6,F11	Elevator pump completed
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED]
			CEID = 75
Event Report Acknowledge	S6, F12-->		Process state change
			[IF ENABLED]
			CEID = 5
		<--S6,F11	Source setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 6
		<--S6,F11	Source setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 7
		<--S6,F11	Beamline setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 8
		<--S6,F11	Beamline setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 9
		<--S6,F11	Beamscan setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 10
		<--S6,F11	Beamscan setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 75
			Process state change

		<--S6,F11	
Event Report Acknowledge	S6,F12-->		
			Operator presses Go button
			[IF ENABLED]
			CEID = 73
			Operator command issued
			[IF ENABLED]
		<--S6,F11	CEID = 75
			Process state change
Event Report Acknowledge	S6,F12-->		
			[IF] 1st Wafer
			[THEN]
			[IF ENABLED]
		<--S6,F11	CEID = 11
			Batch started
Event Report Acknowledge	S6,F12-->		[ENDIF]
			[LOOP]
		<--S6,F11	CEID = 13
			Wafer started
Event Report Acknowledge	S6,F12-->		
			[IF] PAUSE RECEIVED FROM HOST OR OPERATOR
			[THEN] EVENT PAUSE STATE
			[WAIT]
			[IF] HOST SEND S2,F41 OR OPERATOR PRESSES CONTINUE
			[THEN]
			EVENT EXECUTING
		<--S6,F11	CEID = 14
			Wafer complete
			[IF] PROCESS PROGRAM COMMAND IS SET TO PERIODICALLY CHECK THE BEAM AND TIMEOUT OCCURS
			[THEN] BEAMCHECK IS DONE
			[IF] FAILS
			[THEN] BEAM SCAN IS DONE
			[IF] Last wafer
			[THEN] Exit loop [END_LOOP]
			[ENDIF]
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	CEID = 12
			Batch complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6, F11	CEID = 75
			Process state change
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 21
		<--S6,F11	Elevator vent started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 23
		<--S6,F11	Door open started

Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 24
		<--S6,F11	Door open completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 22
		<--S6,F11	Elevator vent completed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED}
		<--S6, F11	CEID = 65
Event Report Acknowledge	S6, F12		Pivot extend complete
			[IF ENABLED]
		<--S6,F11	CEID = 75
			Process state change
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID =41
			Cassette removed
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	Event report, CEID = 84
			Ready to receive material
Event Report Acknowledge	S6,F12-->		
			Idle State - Waiting for operator command

Off-Line Process Control Scenario

Equipment’s Communications state is DISABLED

COMMENT	HOST	EQUIPMENT	COMMENT
			Idle State - Waiting for operator command
			Operator enters batch ID
			Selects Process Program from Recipe index screen
			Process Program load
			Operator presses Go button
			Equipment begins setup for implanting wafer
			Elevator pump started
			Pivot retract started
			Pivot retract completed
			Door close started
			Door close completed
			Wafer mapping started
			Wafer mapping completed
			Elevator pump completed
			Source setup complete
			Beamline setup started
			Beamline setup complete
			Beamscan setup started
			Beamscan setup complete
			[IF] 1st Wafer
			[THEN] Batch started

			[ENDIF]
			[LOOP]
			Wafer started
			Wafer complete
			[IF] Last wafer
			[THEN] Exit loop
			[END_LOOP]
			Elevator vent started
			Door open started
			Door open completed
			Elevator vent completed
			[IF] Last cassette
			[THEN] Exit loop
			[ELSE IF] 2nd cassette loaded
			[THEN] Continue processing
			[ELSE] Load 2nd cassette, continue processing
			[ENDIF]
			Batch complete
			Idle State - Waiting for operator to enter new batch ID

Host Requests Event Report

The Equipment’s Communication state is ENABLE and COMMUNICATING. The Equipment’s Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host requests an event report	S6,F15-->		
		<--S6,F16	Equipment sends Event Report

Host initiated On-line Identification

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE. This does not change the label of the LOCAL button or switch modes.

COMMENT	HOST	EQUIPMENT	COMMENT
Are you there?	S1,F1-->		
		<--S1,F2	Equipment replies with MDLN and SOFTREV.

Message Fault due to Unrecognized Device ID

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host sends a message	Sx,Fx-->		
			Equipment detects an unrecognized device ID within message from the host.
		<--S9,F1	Equipment reports to the host that an "unrecognized device ID" was detected in the received message

Message Fault due to Unrecognized Stream Type

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host sends a message	Sx,Fx-->		
			Equipment detects an unrecognized stream type within message from the host.
		<--S9,F3	Equipment reports to the host that an "unrecognized stream type" was detected in the receive message

Message Fault due to Unrecognized Function type

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host sends a message	Sx,Fy-->		
			Equipment detects an unrecognized function type within message from the host.
		<--S9,F5	Equipment reports to the host that an "unrecognized function type" was detected in the receive message

Message Fault due to Illegal data format

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host sends a message	Sx,Fy-->		
			Equipment detects an illegal data format within message from the host.
		<--S9,F7	Equipment reports to the host that an "illegal data format" was detected in the receive message

Message Fault due to Transaction Timer Timeout

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE..

COMMENT	HOST	EQUIPMENT	COMMENT
		<--Sx,Fy	Equipment sends a message that requires a reply from the host.
			Equipment does not receive an expected reply message from the host and a transaction timeout occurs.
		<--S9,F9	Equipment reports to the host that a transaction timer timeout occurred.

Message Fault due to data too long

The Equipment has established communication and is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host sends a message	Sx,Fy-->		
			Equipment detects that the message from the host contains more data than it can handle.
		<--S9,F11	Equipment reports to the host that "data too long" was detected in the receive message.

Host Accepts ON-LINE

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is OFF-LINE.
Operator switches to Host Interface screen. Operator touches switch labeled OFF-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S1,F1	Equipment requests ON-LINE
Host grants ON-LINE	S1,F2-->		
		<--S6,F11	"Control State LOCAL (or REMOTE)" event, CEID= 67/68
Acknowledge	S6,F12-->		

Button’s label changes to ON-LINE.

Host denies ON-LINE

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is OFF-LINE.
Operator switches to Host Interface screen. Operator touches switch labeled OFF-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S1,F1	Equipment requests ON-LINE
Host denies ON-LINE	S1,F0-->		
			Equipment displays message to operator "HOST DENIES ON-LINE"

Operator Sets OFF-LINE

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.
Operator switches to Host Interface screen. Operator touches switch labeled OFF-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S6,F11	Equipment sends Control state change event, CEID = 66
Acknowledge	S6,F12-->		An invalid response doesn’t prevent the Equipment from changing state.

Button’s label changes to OFF-LINE

Operator Sets REMOTE

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE (LOCAL).
Operator switches to Host Interface screen. Operator touches switch labeled REMOTE.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S6,F11	Equipment sends Control state change event, CEID = 68
Acknowledge	S6,F12-->		

Button’s label changes to REMOTE.

Operator Sets LOCAL

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE (REMOTE).
Operator switches to Host Interface screen. Operator touches switch labeled REMOTE.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S6,F11	Equipment sends Control state change event, CEID = 67
Acknowledge	S6,F12-->		An invalid response doesn’t prevent the Equipment from changing state.

Button’s label changes to LOCAL

Host Requests Report

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host requests data variables contained in report RPTID	S6,F19-->		
		<--S6,20	Equipment responds with a list if variable data for the given RPTID

Host Initiates Trace Report

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Trace Data Initialization requested	S2,F23-->		
		<--S2,F24	Acknowledge, trace initiated
			[DO] TOTSMP REPGSZ times
			[DO] REPSGZ many times:
			collect SVID1....SVIDn data,
			delay time by DSPER.
			[END_DO]
		<--S6,F1	Send SV1....SVn
Acknowledge receipt	S6,F2-->		
			[END_DO]
OPTIONAL:			
Request trace termination prior to completion (TOTSMP = 0)	S2,F23-->		
		<--S2,F24	Acknowledge premature termination

Zone Transition Event occurs in Equipment

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S6,F5	[IF] Event Report is Multi-block
			[THEN] send Multi-block inquire
Multi-block Grant	S6,F6-->		
			[ENDIF]
			[IF ENABLED]
		<--S6,F11	Equipment sends Event Report
Host Acknowledges Event Report	S6,F12-->		

Host defines Limit Attributes

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
[IF] S2,F45 is Multi-block	S2,F39-->		
[THEN] Send Multi-block inquire			
		<--S2,F40	Multi-block Grant
[ENDIF]			
Host defines variable limit attributes.	S2,F45-->		
		<--S2,F46	Equipment acknowledges host request.

Host queries Equipment for current limit

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host queries Equipment for current variable limit attribute definitions.	S2,F47-->		

		<--S2,F48	Equipment returns report containing requested variable limit attribute values/

Request Equipment Status Report

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host requests report of selected status variable values	S1,F3-->		
		<--S1,F4	Equipment responds with the requested status variable data.

Request Equipment Status Variable Namelist

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host requests Equipment to identify selected status variables	S1,F11-->		
		<--S1,F12	Equipment responds with the requested status variable descriptions.

Enable/Disable Alarms

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Enable/disable Alarm	S5,F3-->		

Upload Alarm Information

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Request alarm data/text	S5,F5-->		
		<--S5,F6	Send alarm data/text

Send Alarm Report

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.
Alarm occurrence is detected by the Equipment

COMMENT	HOST	EQUIPMENT	COMMENT
			[IF ENABLED]
		<--S5,F1	Send alarm report
Acknowledge	S5,F2-->		
			[IF ENABLED]
		<--S6,F11	Send event report.
Acknowledge	S6,F12-->		

Host sends Remote Command

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host Command Send	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			HCACK = 0 (assumes command can be performed).
			[IF ENABLED]

		<--S6,F11	Event Report - state change or other collection event occurrence
Event Report Acknowledge	S6,F12-->		

Host Sends Equipment Constants

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE. Note: In order for E220 to accept the change, E220 is in the idle state and touch screen is not in GEM interface.

COMMENT	HOST	EQUIPMENT	COMMENT
Host sends Equipment constants	S2,F15-->		

Host Equipment Constants Request

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host constant request	S2,F13-->		
		<--S2,F14	Equipment constants data

Host Equipment Constant Namelist Request

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host constant namelist request	S2,F29-->		
		<--S2,F30	Equipment constant namelist

Operator Changes Equipment Constant

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
			Operator changes Equipment constant at Equipment's operator console
			[IF ENABLED]
		<--S6,F11	Equipment reports Equipment constant change, CEID = 76
Host acknowledges event	S6,F12-->		

Process Program Created, Edited, or Deleted by Operator

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
			New process program created, edited, or deleted by operator at Equipment.
			PPChangeName = PPID
			PPChangeStatus = 1 (Created)
			= 2 (Edited)
			= 3 (Deleted)
			[IF] CEID for Process Program Change Event enabled
			[THEN]
			[IF ENABLED]
		<--S6,F11	Event report, CEID = 79
			Process program change
Event Report Acknowledge	S6,F12-->		[END_IF]

Process Program Deletion by Host

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Delete Process Program Send	S7,F17-->		
		<--S7,F18	Delete Process Program Acknowledge. The process program is removed from non-volatile storage.

Process Program Directory Request

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Current EPPD Request	S7,F19-->		
		<--S7,F20	Current EPPD Data

Host-Initiated Process Program Upload - Formatted

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Formatted Process Program Request	S7,F25-->		
		<--S7,F26	Formatted Process Program Data

Host-Initiated Process Program Upload - Unformatted

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE. The Equipment is NOT PROCESSING.

COMMENT	HOST	EQUIPMENT	COMMENT
Process Program Request	S7,F5-->		
		<--S7,F6	Process Program Data (if process program does not exist zero-length list is sent).

Operator Initiated Process Program Upload - Formatted

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE. The Equipment is idle.

The operator switches to the Recipe Index screen, selects a process program, and presses the button labeled UPLOAD to HOST.

COMMENT	HOST	EQUIPMENT	COMMENT
			[IF] Process program is multi-block
			[THEN]
		<--S7,F1	Process Program Load Inquire
Process Program Load Grant	S7,F2-->		[END_IF]
		<--S7,F23	Formatted Process Program Send
Formatted Process Program Acknowledge	S7,F24-->		

Operator Initiated Process Program Upload - Unformatted

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

The operator switches to the Recipe Index screen(see screen 2), selects a process program, and presses the button labeled UPLOAD to HOST.

COMMENT	HOST	EQUIPMENT	COMMENT
			[IF] Process program is multi-block
			[THEN]
		<--S7,F1	Process Program Load Inquire
Process Program Load Grant	S7,F2-->		[END_IF]
		<--S7,F3	Process Program Send
Process Program Acknowledge	S7,F4-->		

Host-Initiated Process Program Download - Formatted

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
[IF] Process Program is multi-block			
[THEN]			
Process Program Load Inquire	S7,F1-->		
		<--S7,F2	Process Program Load Grant
[END_IF]			
Formatted Process Program Send	S7,F23-->		
		<--S7,F24	Formatted Process Program Acknowledge
			Verify Process Program
			[IF] S7,F27 is multi-block
			[THEN]
		<--S7,F29	Process Program Verification Inquire
Process Program Verification Grant	S7,F30-->		
			[END_IF]
		<--S7,F27	Process Program Verification Send
Process Program Verification Acknowledge	S7,F28-->		

Host initiated Process Program Download - Unformatted

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
[IF] Process program is multi-block			
[THEN]			
Process Program Load Inquire	S7,F1-->		
[END_IF]		<--S7,F2	Process Program Load Grant
Process Program Send	S7,F3-->		
		<--S7,F4	Process Program Acknowledge

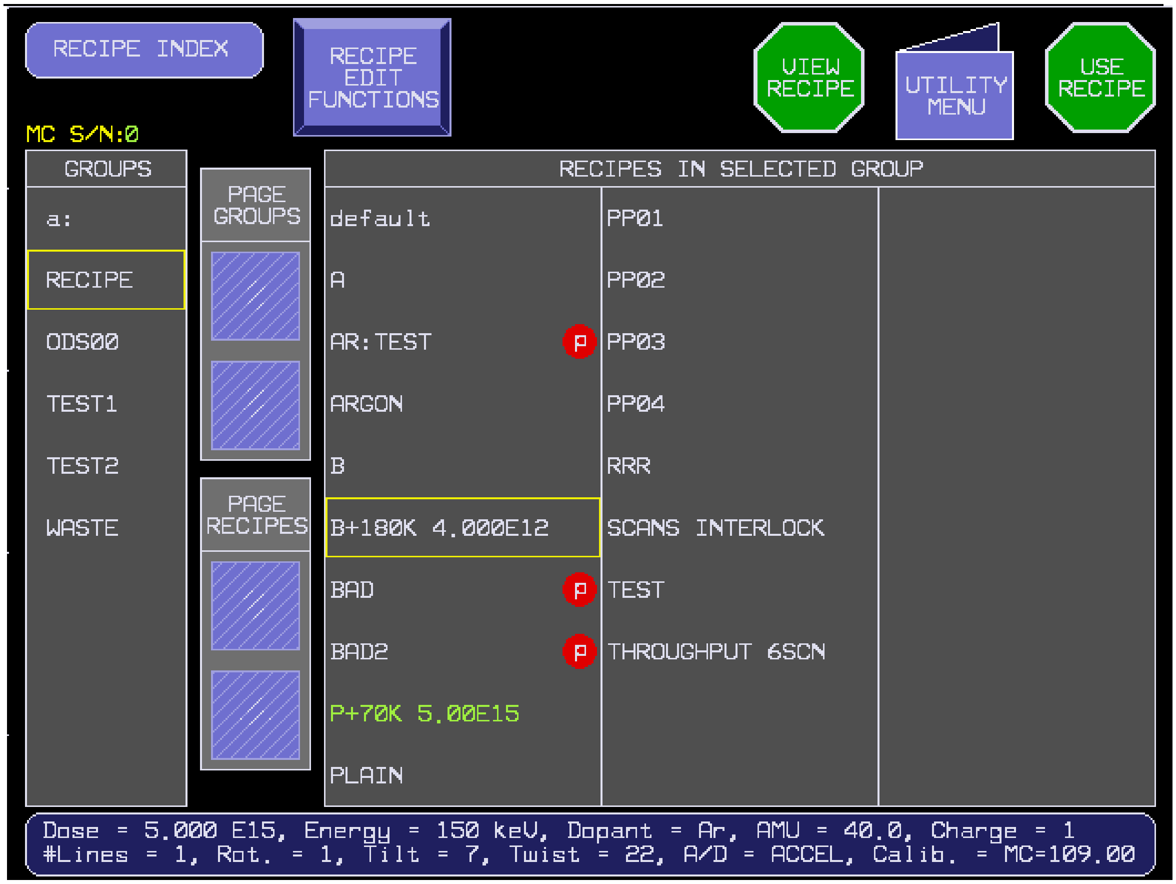
Operator Initiated Process Program Download - Formatted

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

The operator switches to the Recipe Edit screen, selects a process program, and presses the button labeled DOWNLOAD from Host.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S7,F25	Formatted Process Program Request
Formatted Process Program Data	S7,F26-->		
			[IF] S7,F27 is multi-block
			[THEN]

		<--S7,F29	Process Program Verification Inquire
Process Program Verification Grant	S7,F30-->		
			[END_IF]
		<--S7,F27	Process Program Verification Send
Process Program Verification Acknowledge	S7,F28-->		



Operator Initiated Process Program Download - Unformatted

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

The operator switches to the Recipe IEdit screen (see screen 3), enters a process program, and pressesthe button labeled DOWN from HOST.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S7,F5	Process Program Request
Process Program Send	S7,F6-->		

Material arrival/departs Equipment

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
			Material is sent or received at an Equipment Loadlock.
			[IF ENABLED]
		<--S6,F11	CEID = 85
			Material sensed at port

Host acknowledges	S6,F12-->		

Host sends information to an Equipment's display device

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host sends textual information to Equipment for display to the operator on terminal x.	S10,F3-->		
		<--S10,F4	Equipment acknowledges request to display text. (Equipment sets unrecognized message indicator.)
			Operator indicates message recognition. (Equipment clears unrecognized message indicator.)
			[IF ENABLED]
		<--S6,F11	Event report, CEID = 81
			Message recognition event.
Host acknowledges	S6,F12-->		
Optional:			
		<--S10,F1	Operator responds with text via terminal x.
Host acknowledges receipt of operator text.	S10, F2		

Host sends information to an Equipment's display device and then overwrites the information before operator recognizes message

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host sends textual information to Equipment for display to the operator on terminal x.	S10,F3-->		
		<--S10,F4	Equipment acknowledges request to display text. (Equipment sets unrecognized message indicator.)
Host sends textual information to Equipment for display to the operator on terminal x. This message overwrites the first one sent by the host since it is still unrecognized.	S10,F3-->		
		<--S10,F4	Equipment acknowledges request to display text. (Equipment sets unrecognized message indicator.)
			Operator indicates message recognition. (Equipment clears unrecognized message indicator.)
			[IF ENABLED]
		<--S6,F11	Event report, CEID=81
			Message recognition event.
Host acknowledges	S6,F12		

Operator sends information to the host

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S10,F1	Operator sends textual information via Equipment terminal x.
Host acknowledges receipt of operator initiated message.	S10,F2-->		
Optional:	S10,F3-->		
Host responds with information for display to the operator on terminal x.			
		<--S10,F4	Equipment acknowledges receipt of request to display text. (Equipment sets unrecognized message indicator.)
			Operator indicates message recognition.
			[IF ENABLED]
			Event report, CEID =81
		<--S6,F11	Message recognition event.
Host acknowledges	S6,F12		

Host sends a multi-block display message

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Send information	S10,F5-->		
		<--S10,F6	Accepted or denied.
			[IF]
			Message from host is multi-block and multi-block is not supported by the Equipment,
			[THEN]
		<--S10,F7	Send Multi-block Not Allowed.
			[END_IF]

Equipment Requests TIME

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
		<--S2,F17	Equipment requests a time value from the host
Host responds with a time value	S2,F18-->		
			Equipment sets its internal time reference to the value of TIME received from the host.

Host Instructs Equipment to Set Time

The Equipment's Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host instructs Equipment to set its time	S2,F31-->		
		<--S2F32	Equipment sets its internal time reference to the value of TIME received from the host and acknowledges completion.

Host Requests Equipment's Current Time Value

The Equipment’s Communications state is ENABLE and COMMUNICATING; the Control state is ON-LINE.

COMMENT	HOST	EQUIPMENT	COMMENT
Host requests Equipment time.	S2,F17-->		
		<--S2,F18	Equipment returns its internal time reference value to the host.

VILL Remote Process Control Scenario (Formatted Process Program)

Vacuum Independent Loadlocks (ECO 90) is selected.

Equipment’s Communications State is ENABLED and COMMUNICATING.

The Control State is ON-LINE and REMOTE.

Note: Because left and right processes are interleaved, completion event sequence will differ. Completion events in the following scenario are grouped by the side on which they occurred.

Operator switches to Host Control screen.

COMMENT	HOST	EQUIPMENT	COMMENT
			Idle State - Waiting for command from operator or Host
			[IF]Operator gives batch ID to Host,
			[THEN] Process Program request from HOST initiated
Download Left Process Program if it does not exist on the equipment.			
[IF] Process Program not present in EPPD			
[THEN]			
Process Program Load Inquiry	S7,F1-->		
		<--S7,F2	Process Program Load Grant
Process Program Send	S7,F3-->		
		<--S7,F4	Process Program Acknowledge
[ENDIF]			
			[ELSE] Operator selects process from recipe index on E220.
			[ENDIF]
			Return to Idle State
REMOTE COMMAND with PPSELECT	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			Event Process Program Selected
			[IF] Acknowledge Negative
			[THEN] Return to Idle State
			[ELSE]Equipment displays PPID on Host Control screen.
		<--S6,F11	[IF ENABLED]
			CEID = 80
			Process Program Selected
			SVID 151 = 1
			SVID 228 = LEFT-PPID
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED]
			CEID = 42
			Ready to process
			SVID 151 (PORT-ID) =1
			Svid 227 (left-ppid) = left PPID

Event Report Acknowledge	S6,F12-->		
			Operator verifies PPID
			At this point, another PPSELECT REMOTE COMMAND with a different PPID on the right side MAY be issued.
			After the PPSELECT, if the Right Go button is pressed or a START-RIGHT REMOTE COMMAND is issued, the process will be queued if another process on the left side has already been started. The queued process will start after the left side is done.
			If a PPSELECT remote command with the PPID same as that of the left side is issued, processing may either be started on the right side only (by pressing the Right Go button or issuing a START-RIGHT remote command) or on both sides (by pressing the Go button or issuing a START remote command).
			In this scenario, PPSELECT on the right side will be initiated after the left process is started.
			Operator places wafers into left loadlock
			[IF ENABLED]
		<--S6,F11	CEID = 85
			Material sensed at port
			SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
			[IF] Operator touches GO icon on Host Control Screen
			[THEN]
			[IF ENABLED]
		<--S6,F11	CEID = 73
			Operator Command Issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED]
			CEID = 64
			Go button pressed or Host
			START command received
Event Report Acknowledge	S6,F12-->		
			[ELSE] Wait for command from Host
REMOTE COMMAND START-LEFT	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			[IF] Acknowledge Negative
			[THEN] Return to Idle State
			[IF ENABLED]
		<--S6,F11	CEID = 86
			Host command issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED]
			CEID = 64
			Host START command issued

Event Report Acknowledge	S6,F12-->		
		<--S6,F11	Equipment begins setup for implanting wafer [IF ENABLED] CEID =75 Process state change
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 27 Elevator pump started SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 25 Door close started SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 26 Door close completed SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 38 Wafer mapping started SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 39 Wafer mapping completed SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 28 Elevator pump completed SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
While the left side is setting up, the right process may be initiated and queued.			
PPSELECT REMOTE COMMAND on the right side with Process Program that may be different from left side	S2,F41-->		
		<--S2,F42	Host Command Acknowledge [IF] Acknowledge is negative [THEN] Right side returns to Idle state. [ELSE] Equipment displays right PPID on HOST Control screen.
		<--S6,F11	[IF ENABLED] CEID = 80 Process Program Selected SVID 151 = 2 SVID 228 = RIGHT-PPID
Event Report Acknowledge	S6,F12-->		

		<--S6,F11	[IF ENABLED] CEID = 42 Ready to process SVID 151 = 2
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	Operator places wafers into right loadlock [IF ENABLED] CEID = 85 Material sensed at port SVID 151 = 2
	S6,F12-->		
		<--S6,F11	[IF] Operator touches RIGHT GO icon on Host Control Screen [THEN] [IF ENABLED] CEID = 73 Operator Command Issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 64 Go button pressed
Event Report Acknowledge	S6,F12-->		
			[ELSE] Wait for command from Host while continuing to process left side.
REMOTE COMMAND START or START-RIGHT	S2,F41-->		
		<--S2,F42	Host Command Acknowledge [IF] Acknowledge is negative [THEN] Right side returns to Idle State
		<--S6,F11	[IF ENABLED] CEID = 86 Host command issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 64 Host START command issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 27 Elevator pump started SVID 151 = 2
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 25 Door close started SVID 151 = 2
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 26 Door close completed SVID 151 = 2
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 38 Wafer mapping started SVID 151 = 2
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED]

			CEID = 39 Wafer mapping completed SVID 151 = 2
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 28 Elevator pump completed SVID 151 = 2
Event Report Acknowledge	S6,F12-->		
Setup for left process continues while the right process waits in the queue.			
			[IF ENABLED] CEID =75 Process state change
		<--S6,F11	
Event Report Acknowledge	S6,F12-->		[IF ENABLED] CEID = 5
		<--S6,F11	Source setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED] CEID = 6
		<--S6,F11	Source setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED] CEID = 7
		<--S6,F11	Beamline setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED] CEID = 8
		<--S6,F11	Beamline setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED] CEID = 9
		<--S6,F11	Beamscan setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED] CEID = 10
		<--S6,F11	Beamscan setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED] CEID = 75
		<--S6,F11	Process state change
Event Report Acknowledge	S6,F12-->		
			[IF ECID 257 (MODES) bit S is not set (non-auto start after beamscan)] [THEN] Equipment is idle waiting for Start Command
[IF ECID 257 (MODES) bit S is not set] [THEN] Host Command START-IMPLANT (RCMD = 30) or	S2,F41-->		

START (RCMD = 4) sent			
		<--S2,F42	Host Command Acknowledge
			HCACK = 0 (assumes command can be performed).
			[IF ENABLED]
			CEID = 86
		<--S6,F11	Host command issued
Event Report Acknowledge	S6,F12-->		
[ENDIF ECID 257 bit S is not set]			
			[ENDIF ECID 257 bit S is not set]
			[IF] 1st Wafer
			[THEN]
			[IF ENABLED]
		<--S6,F11	CEID = 11
			Batch started
Event Report Acknowledge	S6,F12-->		[ENDIF]
			[LOOP]
		<--S6,F11	CEID = 13
			Wafer started
Event Report Acknowledge	S6,F12-->		
			[IF] PAUSE RECEIVED FROM HOST OR OPERATOR
			[THEN] EVENT PAUSE STATE
			[WAIT]
			[IF] HOST SEND START OR OPERATOR PRESSES CONTINUE
			[THEN]
			EVENT EXECUTING
		<--S6,F11	CEID = 14
			Wafer complete
			[IF] PROCESS PROGRAM COMMAND IS SET TO PERIODICALLY CHECK THE BEAM AND TIMEOUT OCCURS
			[THEN] BEAMCHECK IS DONE
			[IF] FAILS
			[THEN] BEAM SCAN IS DONE
			[IF] Last wafer
			[THEN] Exit loop [END_LOOP]
			[ENDIF]
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	CEID = 12
			Batch complete
Event Report Acknowledge	S6,F12-->		
			SCREEN CHANGES TO HOST CONTROL
			At this point, while the left side starts its vent sequence, the right side starts setting up.
			Messages from the left and right sides will be interleaved.
			Note: Right side setup, implant and vent sequences will not be shown here.
			IF ECID 257 bit V is set, unloading is

			initiated automatically, else, an explicit LEFT-VENT-OPEN remote command or an UNLOAD must be issued to start unloading.
			[IF ECID 257 bit V is not set]
		<--S6,F11	[IF] Operator touches LEFT UNLOAD button on the Host Control Screen [THEN] [IF ENABLED] CEID = 73 Operator Command Issued
Event Report Acknowledge	S6,F12-->		
			[ELSE] Wait for command from Host while continuing to process right side.
REMOTE COMMAND LEFT-VENT-OPEN	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			[IF] Acknowledge is negative [THEN] Return to Idle State
		<--S6,F11	[IF ENABLED] CEID = 86 Host command issued
Event Report Acknowledge	S6,F12-->		
			[ENDIF ECID 257 bit V is not set]
		<--S6,F11	[IF ENABLED] CEID = 21 Elevator vent started SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 23 Door open started SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 24 Door open completed SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 22 Elevator vent completed SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID =65 Pivot extend complete SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID= 75

			Process state change
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
		<--S6,F11	CEID =41
			Cassette(s) removed
			SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID =46
			Cassette sense status change
Event Report Acknowledge	S6, F12 -->		SVID 151 = 1
			[IF ENABLED]
		<--S6,F11	CEID = 84
			Ready to receive material
			SVID 151 = 1
Event Report Acknowledge	S6,F12-->		

As the left side vents, the right side continues to setup, implant and eventually vent.

Note: Right side setup, implant and vent sequences are the same as that of the left side and will not be shown here.

.
.
.

Right side sets up, implants and vents

.
.
.

Equipment goes back to idle.
Waiting for command from operator or Host

Effective Throughput Queue Process Control Scenario

This scenario is applicable to software versions that do not support Process Job Queue host interface. If the software version supports it, see "Process Job Queue Process Control Scenario" instead.

Host scenario with and without SMIF
VILL Remote Process with Process Job Queue Control Scenario (Formatted Process Program)
Process Job Queue (ECO 104) is selected.

Vacuum Independent Loadlocks (ECO 90) is selected.
Clear PPID after Implant (ECO 39) is deselected.
Equipment's Communications State is ENABLED and COMMUNICATING.
The Control State is ON-LINE and REMOTE.

Note: Because left and right processes are interleaved, completion event sequence will differ.
Operator switches to Host Control screen.

COMMENT	HOST	EQUIPMENT	COMMENT
			Idle State - Waiting for command from operator or Host
			[IF]Operator gives batch ID to Host,
			[THEN] Process Program request from HOST initiated
Download Left Process Program if it does not exist on the equipment.			
[IF] Process Program not present in EPPD			

[THEN]			
Process Program Load Inquiry	S7,F1-->		
		<--S7,F2	Process Program Load Grant
Process Program Send	S7,F3-->		
		<--S7,F4	Process Program Acknowledge
[ENDIF]			
			[ELSE] Operator selects process from recipe index on E220.
			[ENDIF]
			Return to Idle State
REMOTE COMMAND with PPSELECT	S2,F41-->		
dual batch will be used in this scenario, but may be single batch.			
		<--S2,F42	Host Command Acknowledge
			Event Process Program Selected
			[IF] Acknowledge Negative
			[THEN] Return to Idle State
			[ELSE]Equipment displays PPID on Host Control screen.
		<--S6,F11	[IF ENABLED]
			CEID = 80
			Process Program Selected
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED]
			CEID = 42
			Ready to process
Event Report Acknowledge	S6,F12-->		
			Operator verifies PPID
			Operator places wafers into left loadlock
			[IF ENABLED]
		<--S6,F11	CEID = 85
			Material sensed at port
			SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
			Operator places wafers into right loadlock
			[IF ENABLED]
		<--S6,F11	CEID = 85
			Material sensed at port
			SVID 151 = 2
Event Report Acknowledge	S6,F12-->		

START Remote Command Trigger

If the Equipment has SMIFs the host can use events such as ‘SMIF LOADING COMPLETE’ as trigger in sending the START remote command.

If the Equipment is loaded by an operator, the host can use CEID = 85 as trigger in sending the START remote command.

If the host sent a PPSELECT with LOC = 3 (dual-sided), it should wait for the trigger events for both loadlocks. For single-sided PPSELECT, the host should wait for the trigger event on the processing side.

(see S6,F11 with CEID = 85 above)

REMOTE COMMAND START	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			[IF] Acknowledge Negative [THEN] Return to Idle State [IF ENABLED]
		<--S6,F11	CEID = 86 Host command issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 64 Host START command issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	Equipment begins setup for implanting wafer [IF ENABLED] CEID =75 Process state change
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 27 Elevator pump started *two events for both sides*
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 25 Door close started *two events for both sides*
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 38 Wafer mapping started *two events for both sides*
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 39 Wafer mapping completed *two events for both sides*
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 28 Elevator pump completed *two events for both sides*
Event Report Acknowledge	S6,F12-->		

While this batch is setting up, the next recipe may be queued.

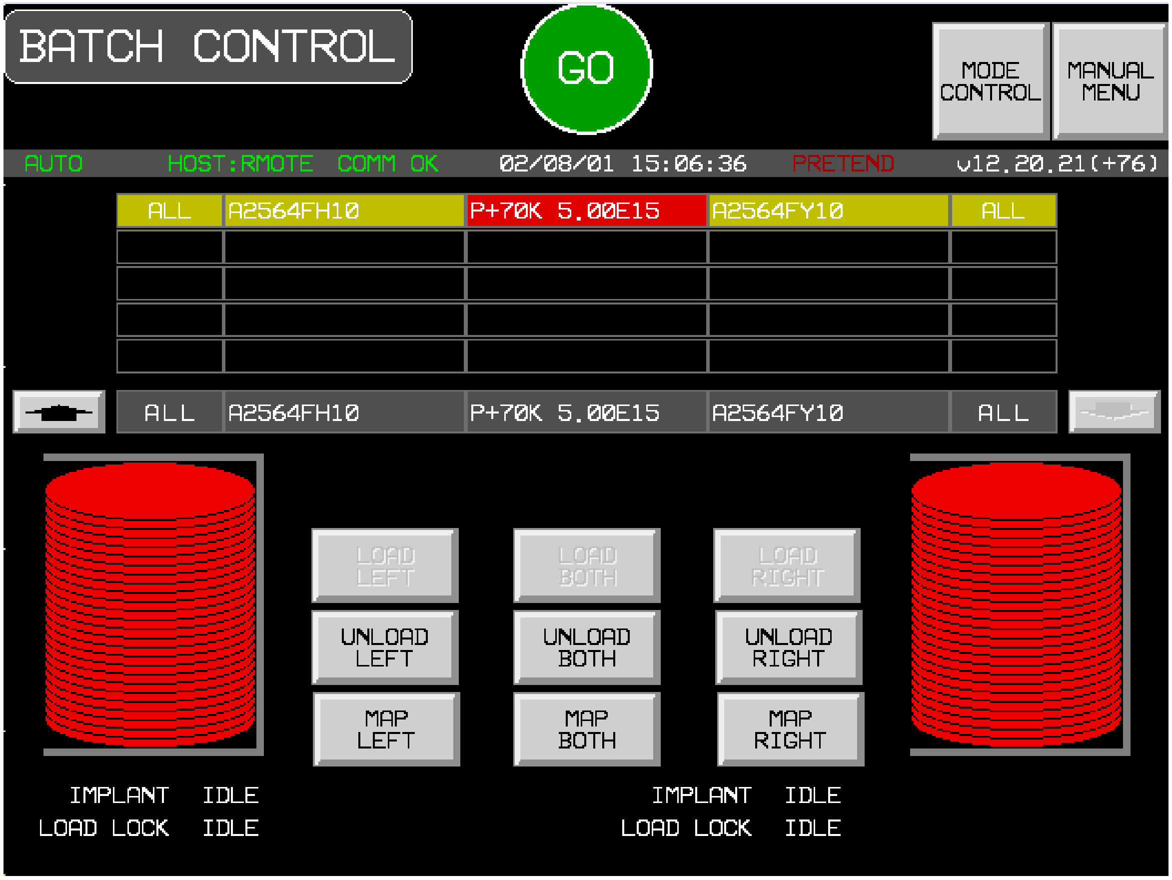
REMOTE COMMAND with	S2,F41-->		

PPSELECT			
		<--S2,F42	Host Command Acknowledge
			[IF] Acknowledge Negative
			[THEN] Lineup queue might already be full. SVID 171 may be checked to verify this.
			[ELSE] Equipment accepts the recipe in the lineup queue and displays PPID if HOST Control screen is active.
		<--S6,F11	[IF ENABLED]
			CEID = 80
			Process Program Selected
Event Report Acknowledge	S6,F12-->		
Setup for the first process continues while the next recipe waits in the lineup queue.			
			[IF ENABLED]
			CEID =75
			Process state change
		<--S6,F11	
Event Report Acknowledge	S6,F12-->		[IF ENABLED]
			CEID = 5
		<--S6,F11	Source setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 6
		<--S6,F11	Source setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 7
		<--S6,F11	Beamline setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 8
		<--S6,F11	Beamline setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 9
		<--S6,F11	Beamscan setup started
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 10
		<--S6,F11	Beamscan setup complete
Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID = 75
		<--S6,F11	Process state change
Event Report Acknowledge	S6,F12-->		
			[IF ECID 257 (MODES) bit S is not set (non-auto start after beamscan)]
			[THEN]
			Equipment is idle waiting for Start Command
[IF ECID 257 (MODES) bit S is not set] [THEN] Host Command START-IMPLANT (RCMD = 30) or START (RCMD = 4) sent	S2,F41-->		
		<--S2,F42	Host Command Acknowledge

			HCACK = 0 (assumes command can be performed).
			[IF ENABLED]
			CEID = 86
		<--S6,F11	Host command issued
Event Report Acknowledge	S6,F12-->		
[ENDIF ECID 257 bit S is not set]			
			[ENDIF ECID 257 bit S is not set]
			[IF] 1st Wafer
			[THEN]
			[IF ENABLED]
		<--S6,F11	CEID = 11
			Batch started
Event Report Acknowledge	S6,F12-->		[ENDIF]
			[LOOP]
		<--S6,F11	CEID = 13
			Wafer started
Event Report Acknowledge	S6,F12-->		
			[IF] PAUSE RECEIVED FROM HOST OR OPERATOR
			[THEN] EVENT PAUSE STATE
			[WAIT]
			[IF] HOST SEND START OR OPERATOR PRESSES CONTINUE
			[THEN]
			EVENT EXECUTING
		<--S6,F11	CEID = 14
			Wafer complete
			[IF] PROCESS PROGRAM COMMAND IS SET TO PERIODICALLY CHECK THE BEAM AND TIMEOUT OCCURS
			[THEN] BEAMCHECK IS DONE
			[IF] FAILS
			[THEN] BEAM SCAN
			IS DONE
			[IF] Last wafer
			[THEN] Exit loop [END_LOOP]
			[ENDIF]
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	CEID = 12
			Batch complete
Event Report Acknowledge	S6,F12-->		
			Equipment switches to HOST CONTROL screen.
			At this point, while the previous batch starts its vent sequence, the next recipe in the lineup queue starts setting up.
			[IF ENABLED]
			CEID =75
			Process state change
		<--S6,F11	
Event Report Acknowledge	S6,F12-->		[IF ENABLED]
			CEID = 5
		<--S6,F11	Source setup started
Event Report Acknowledge	S6,F12-->		
			Source, Beamline and Beamscan Setup continues…
			Setup events are the same as that of the previous batch and will not be shown here.

			Previous batch starts unloading. IF ECID 257 bit V is set, unloading is initiated automatically, else, an explicit LEFT-VENT-OPEN remote command or an UNLOAD must be issued to start unloading.
			[IF ECID 257 bit V is not set]
			[IF ECID
			[ELSE] Wait for command from Host while continuing to process right side.
REMOTE COMMAND LEFT-VENT-OPEN	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			[IF] Acknowledge is negative [THEN] Return to Idle State
		<--S6,F11	[IF ENABLED] CEID = 86 Host command issued
Event Report Acknowledge	S6,F12-->		
			[ENDIF ECID 257 bit V is not set]
		<--S6,F11	[IF ENABLED] CEID = 21 Elevator vent started *two events for both sides*
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 23 Door open started *two events for both sides*
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 24 Door open completed *two events for both sides*
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID = 22 Elevator vent completed *two events for both sides*
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID =65 Pivot extend complete *two events for both sides*
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID= 75 Process state change
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED] CEID =41 Cassette(s) removed *two events for both sides*

Event Report Acknowledge	S6,F12-->		
			[IF ENABLED]
			CEID =46
			Cassette sense status change
Event Report Acknowledge	S6, F12 -->		t*wo events for both sides*
			[IF ENABLED]
		<--S6,F11	CEID = 84
			Ready to receive material
			t*wo events for both sides*
Event Report Acknowledge	S6,F12-->		
			Operator places wafers into left loadlock
			[IF ENABLED]
		<--S6,F11	CEID = 85
			Material sensed at port
			SVID 151 = 1
Event Report Acknowledge	S6,F12-->		
			Operator places wafers into right loadlock
			[IF ENABLED]
		<--S6,F11	CEID = 85
			Material sensed at port
			SVID 151 = 2
Event Report Acknowledge	S6,F12-->		
The Host waits for cassette loading completion as discussed in 'START Remote Command Trigger'.			
REMOTE COMMAND START	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			[IF] Acknowledge Negative
			[THEN] Return to Idle State
			[IF ENABLED]
		<--S6,F11	CEID = 86
			Host command issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	[IF ENABLED]
			CEID = 64
			Host START command issued
Event Report Acknowledge	S6,F12-->		
		<--S6,F11	Equipment begins setup for implanting wafer
			[IF ENABLED]
			CEID =75
			Process state change
			After the current batch performs source, beamline and beamscan setup.
			The current batch implants and vents.
			Equipment goes back to idle.
			Waiting for command from operator or Host



Process Job Queue Process Control Scenario

This scenario is applicable to software versions that support Process Job Queue host interface. If the software version does not support it, see "Effective Throughput Queue Process Control Scenario" instead.

Process Job Queue (ECO 104) is selected.
Equipment's Communications State is ENABLED and COMMUNICATING.
The Control State is ON-LINE and REMOTE.
Job Queue is Empty.

Notes:
1. S6F12 replies have been omitted for brevity.
2. Only single-sided jobs are shown, but dual-sided jobs may also be created.

Operator switches to Host Control screen.

COMMENT	HOST	EQUIPMENT	COMMENT
REMOTE COMMAND with PPSELECT for JOBID1	S2,F41-->		
		<--S2,F42	Host Command Acknowledge Event Process Program Selected
			Equipment displays Job 1 on Batch Control

			screen.
		<--S6,F11	CEID = 88 Job Created SVID 195 = JOBID1
		<--S6,F11	CEID = 80 Process Program Selected SVID 195 = JOBID1
		<--S6,F11	CEID = 42 Ready to process SVID 195 = JOBID1
			This event is generated if material for JOBID1 has arrived.
START-PROCESS REMOTE COMMAND	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			Equipment starts loading the cassette into the loadlocks if not already loaded.
		<--S6,F11	CEID = 92 Job Processing Started SVID 195 = JOBID1
		<--S6,F11	. . . *Beam sets up and implants wafers.*
		<--S6,F11	CEID = 11 Batch Started
REMOTE COMMAND with PPSELECT for JOBID2	S2,F41-->		*Although this scenario shows that a new job is queued after the first job has started processing, the host may queue additional jobs at any time.*
		<--S2,F42	*Equipment adds Job 2 on Batch Control screen.*
		<--S6,F11	CEID = 88 Job Created SVID 195 = JOBID2
		<--S6,F11	CEID = 93 Job Processing Completed SVID 195 = JOBID1
		<--S6,F11	CEID = 12 Batch Complete
			Material for JOBID1 starts unloading
		<--S6,F11	CEID = 80 Process Program Selected SVID 195 = JOBID2
		<--S6,F11	CEID = 42 Ready to process SVID 195 = JOBID2
			This event is generated if material for JOBID2 has arrived.
START-PROCESS REMOTE COMMAND	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			Equipment starts loading the cassette for JOBID2 into the loadlocks if not already loaded.
		<--S6,F11	CEID = 92 Job Processing Started SVID 195 = JOBID2

<--S6,F11	CEID = 41 Cassette is removed For JOB1
<--S6,F11	CEID = 90 Job Completed SVID 195 = JOBID1
<--S6,F11	. . .
	Beam sets up JOBID2 recipe and equipment goes into implant.
<--S6,F11	CEID = 11 Batch Started
<--S6,F11	CEID = 93 Job Processing Completed SVID 195 = JOBID2
<--S6,F11	CEID = 12 Batch Complete
	Material for JOBID2 starts unloading
<--S6,F11	CEID = 41 Cassette is removed For JOBID2
<--S6,F11	CEID = 90 Job Completed SVID 195 = JOBID2

Chaining with Job Queue Process Control Scenario

Process Job Queue (ECO 104) is selected.
Equipment's Communications State is ENABLED and COMMUNICATING.
The Control State is ON-LINE and REMOTE.
Job Queue is Empty.

Notes:
1. S6F12 replies have been omitted for brevity.
2. In this example, there are 2 recipes in the PPID-LIST.

Operator switches to Host Control screen.

COMMENT	HOST	EQUIPMENT	COMMENT
REMOTE COMMAND with PPSELECT and PPID-LIST parameter for JOBID1	S2,F49-->		
		<--S2,F42	Host Command Acknowledge Event Process Program Selected
		<--S6,F11	CEID = 88 Job Created SVID 195 = JOBID1
			Equipment displays the first recipe step of Job 1 on Batch Control screen.
		<--S6,F11	CEID = 80 Process Program Selected SVID 195 = JOBID1
		<--S6,F11	CEID = 94 Job Chain Modified SVID 195 = JOBID1

			Equipment displays the second recipe step of Job 1 on Batch Control screen.
		<--S6,F11	CEID = 42 Ready to process SVID 195 = JOBID1
			This event is generated if material for JOBID1 has arrived.
START-PROCESS REMOTE COMMAND	S2,F41-->		
		<--S2,F42	Host Command Acknowledge
			Equipment starts loading the cassette into the loadlocks if not already loaded.
		<--S6,F11	CEID = 92 Job Processing Started SVID 195 = JOBID1
		<--S6,F11	. . . *Beam sets up and implants wafers.*
		<--S6,F11	CEID = 11 Batch Started
		<--S6,F11	CEID = 12 Batch Complete
			End of first chained job step
		<--S6,F11	CEID = 94 Job Chain Modified SVID 195 = JOBID1
			Equipment removes the first chained job step of Job 1 on Batch Control screen.
		<--S6,F11	CEID = 80 Process Program Selected
			Equipment selects the second chained job step of Job 1 on Batch Control screen.
		<--S6,F11	. . . *Beam sets up and implants wafers.*
		<--S6,F11	CEID = 11 Batch Started
		<--S6,F11	CEID = 93 Job Processing Completed SVID 195 = JOBID1
		<--S6,F11	CEID = 12 Batch Complete
			End of second chained job step
		<--S6,F11	CEID = 41 Cassette is removed For JOBID1
		<--S6,F11	CEID = 90 Job Completed SVID 195 = JOBID1

Appendix A - GEM State Diagrams

Purpose

These state models describe the behavior of equipment from a host perspective in a graphical format. In compliance to the GEM standard the following diagrams document the operational behavior of the E220. The documentation includes:

- A state diagram - using Harel notation
- A transition table - listing each transition
- A definition of each state - specifying system behavior when the state is active.

Communication state

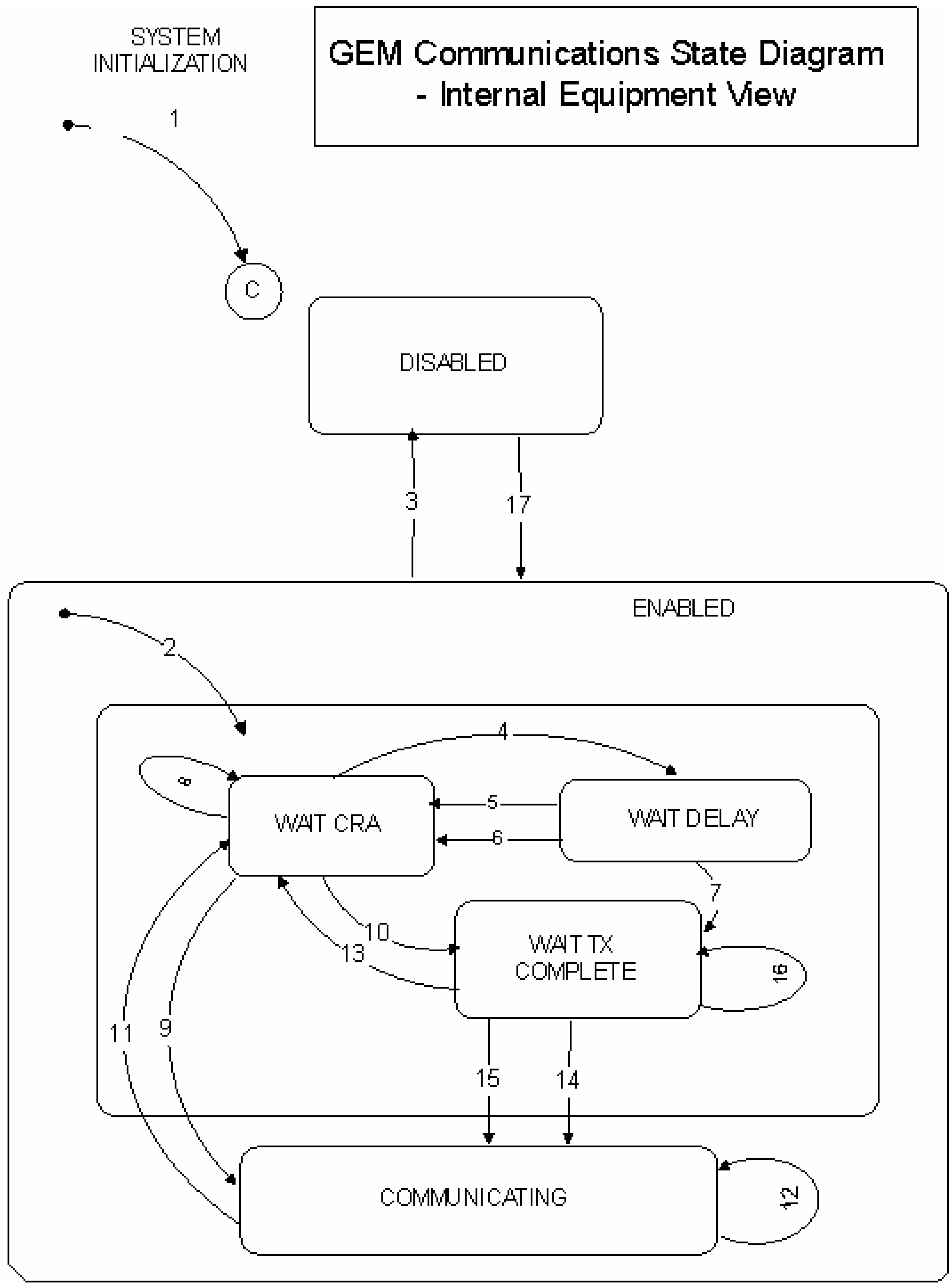


Table 1. Communication State Transitions

Current State	Trigger	New State	Action	Comment
(Entry to Communication)	System Initialization.	System Default	None	
(Entry to Enabled	Any entry to ENABLED state.	WAIT CRA	Initialize communications Set CommDelay timer "expired" Send S1,F13.	May enter from system initialization to ENABLED or through operator touching switch
DISABLED	Operator switches	WAIT CRA	Initialize	

	from Disabled to ENABLED.		communications Set CommDelay timer "expired." Send S1,F13.	
WAIT CRA	Connection transaction failure.	WAIT DELAY	Initialize CommDelay timer	Wait for timer to expire.
WAIT DELAY	CommDelay timer expired	WAIT CRA	Send S1,F13	Wait for S1,F14. May receive S1,F13 from Host
WAIT DELAY	Received a message other than S1,F13.	WAIT CRA	Discard message. No reply. Set CommDelay timer "expired" Send S1,F13.	Indicates opportunity to establish communications
WAIT DELAY	Received S1,F13	WAIT TX COMPLETE	Send S1,F14 with COMMACH = 0.	Equipment received S1,F13 and has no open S1,F13 transaction.
WAIT CRA	Received a message other than an S1,F13 or an expected S1,F14.	WAIT CRA	Discard message no reply.	Continue to wait for S1,F14.
WAIT CRA	Received expected S1,F14 with COMMACK = 0.	COMMUNICATING	None.	Communications established. Normal Path.
WAIT CRA	Received S1,F13.	WAIT TX COMPLETE	Send S1,F14 with COMMACK = 0.	Equipment sent S1,F13 and Host sends S1,F13 (connect collision)
COMMUNICATING	Communications failure.	WAIT CRA	Set CommDelay timer "expired" Send S1,F13 (connect collision)	Discard all messages queued to send.
COMMUNICATING	Receive any message.	COMMUNICATING	If S1,F13 received. send S1,F14	Normal Conditions
WAIT TX COMPLETE	Communications failure.	WAIT CRA	Discard all messages queued to send. Set timer "expired." Send S1,F13.	Equipment attempt to send S1,F14 failed.
WAIT TX COMPLETE	S1,F14 transmission completed successfully.	COMMUNICATING	Status of Host Interface screen displays "COMMUNICATING."	Normal path to completion. Communications established.
WAIT TX COMPLETE	Received expected S1,F14 with COMMACK = 0.	COMMUNICATING	Status of Host Interface screen displays "COMMUNICATING."	
WAIT TX COMPLETE	Receive message other than S1,F14	WAIT TX COMPLETE	Discard message. No reply.	

Control state

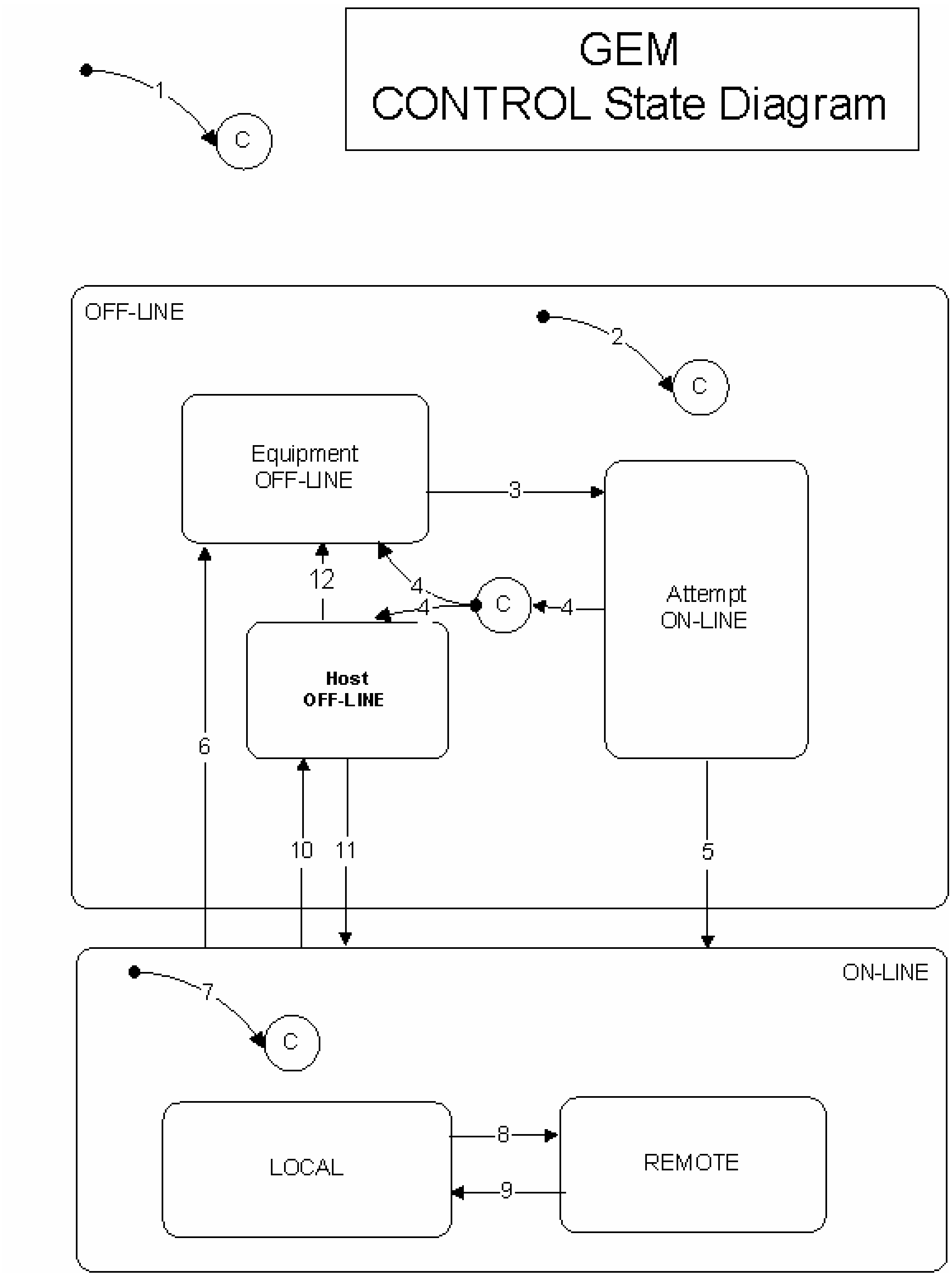


Table 2. Control State Transitions

Current State	Trigger	New State	Action	Comment
Undefined - System Initialization	Entry into CONTROL state (System Initialization)	CONTROL (Substate conditional on configuration)	Display of Host Interface screen Highlights default states	Equipment Constant used at initialization

Undefined	Entry into OFF-LINE state	OFF-LINE (Substate conditional on configuration: OFF-LINE DISABLED = EQUIPMENT OFF-LINE ON-LINE DISABLED = HOST OFF-LINE)	Display of Host Interface screen Highlights OFF-LINE	Equipment Constants used at initialization
EQUIPMENT OFF-LINE	Operator ENABLES communication and ON-LINE	ATTEMPT ON-LINE	Host interface screen highlights active states. S1,F1 sent to Host.	Default Control state = OFF-LINE Default Communication state = DISABLE
ATTEMPT ON-LINE	S1,F2 Not received or Receipt of S1,F0	EQUIPMENT OFF-LINE or HOST OFF-LINE	Host interface screen highlights active states	None
ATTEMPT ON-LINE	Equipment receives expected S1,F2 from the Host.	ON-LINE	Host interface screen highlights active states	Host is notified of transition to ON-LINE at transition 7.
ON-LINE	Operator touches OFF-LINE switch	EQUIPMENT OFF-LINE	Host interface screen highlights active states	Equipment OFF-LINE event is sent to Host.
Undefined	Entry to ON-LINE state	ON-LINE (Substate conditional on REMOTE/LOCAL equipment constant	Host interface screen highlights active states	Control state LOCAL or Control state REMOTE event is to Host.
LOCAL	Operator touches REMOTE switch	REMOTE	Host interface screen highlights active states	Control state REMOTE event is to Host
REMOTE	Operator touches LOCAL switch	LOCAL	Host interface screen highlights active states	Control state LOCAL event is to Host
ON-LINE	Equipment accepts OFF-LINE message from Host	HOST OFF-LINE	Host interface screen highlights active states	Equipment OFF-LINE event occurs
HOST OFF-LINE	Equipment accepts host request to go ON-LINE	ON-LINE	None	Host is notified of transition to ON-LINE at transition 7.
HOST OFF-LINE	Operator acuates OFF-LINE switch	EQUIPMENT OFF-LINE	None	Equipment OFF_LINE event occurs

Alarm state Model

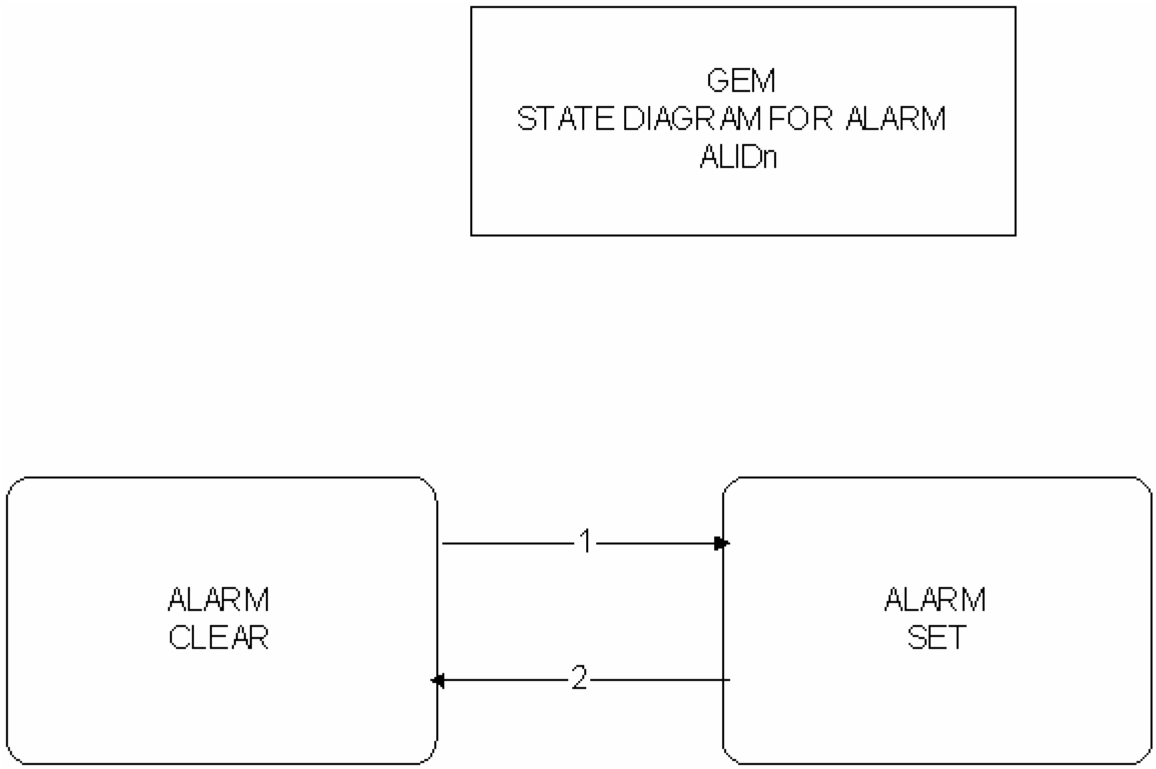


Table 10. Alarm State Transitions

#	Current State	Trigger	New State	Actions	Comments
1	ALARMn CLEAR	Alarmn is detected on the equipment.	ALARMn SET	Initiate local actions (if any) to ensure safety. Update AlarmsSet and SLCDn values. Generate and issue alarm message if enabled.	Inhibited activities require operator or Host intervention prior to resuming.
2	ALARMn SET	Alarmn is no longer detected on the equipment	ALARMn CLEAR	Update AlarmsSet and ALCDn values. Generate and issue alarm message if enabled.	Inhibited activities require operator or Host intervention prior ro resuming.

Limit state Model

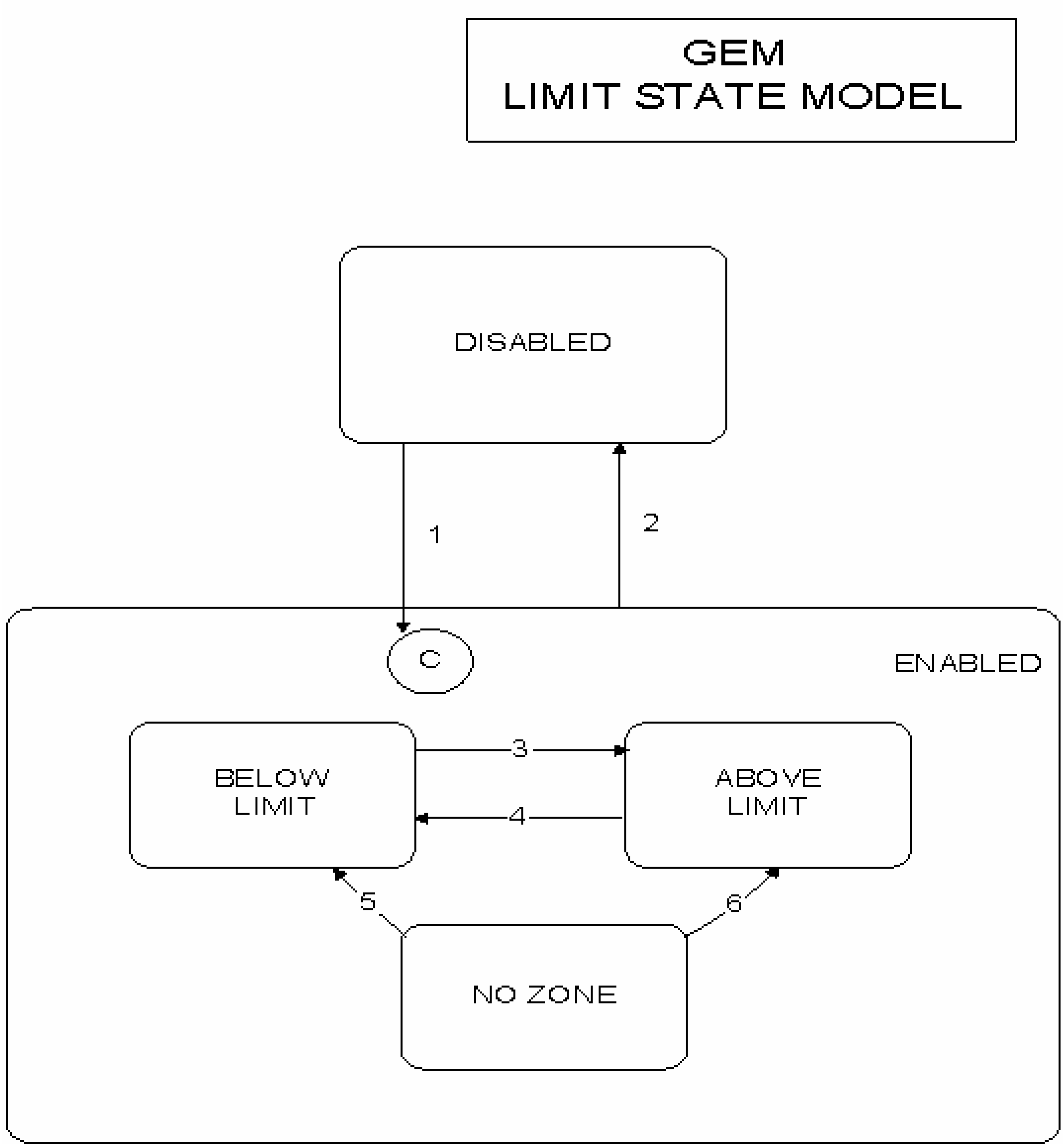


Table 9. Limit State Transitions

#	Current State	Trigger	New State	Actions	Comments
	DISABLED	Limit attributes defined x/S2,F45.	ENABLED	None	The substate is determined by the current value of the monitored variable.
	ENABLED	Limit attributes set undefined w/S2,F45.	DISABLED	None	None
	BELOW LIMIT	Variable Increases to $\geq$ UPPERDB.	ABOVE LIMIT	None	Zone Transition.
	ABOVE LIMIT	Variable Decreases to $\leq$ LOWERDB	BELOW LIMIT	None	Zone Transition
	NO ZONE	Variable Decreases to $\leq$ LOWERDB	BELOW LIMIT	None	Zone Transition
	NO ZONE	Variable Increases to $\geq$ UPPERDB.	ABOVE LIMIT	None	Zone Transition.

VILL Port State Model

This section describes the Port State Model of the equipment. LPORT refers to the Left Loadlock, which is also called Port 1. RPORT refers to the Right Loadlock, which is also called Port 2.

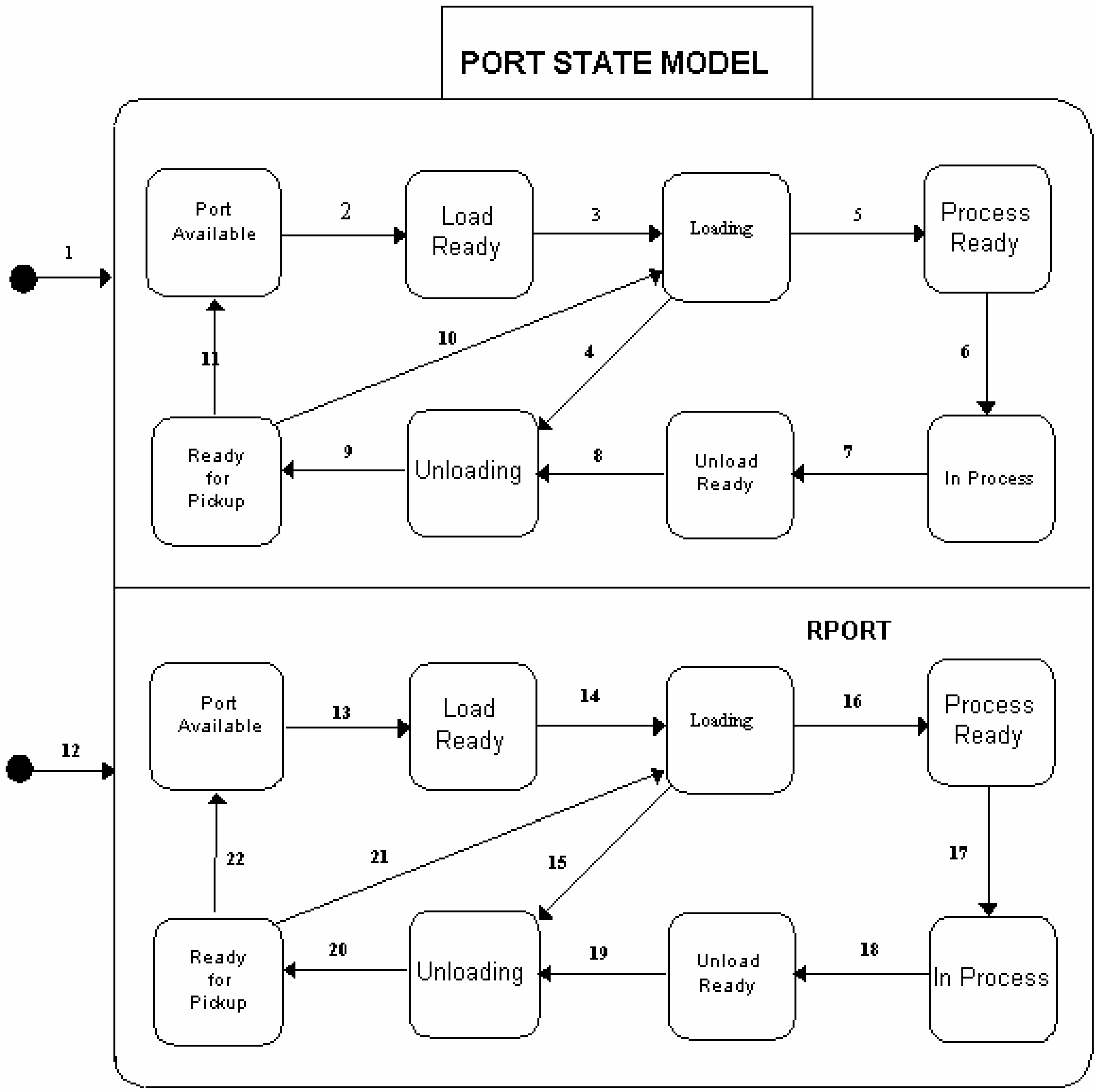


Table 3. VILL Port State Definition

State	**Definition**
PORT AVAILABLE (LPORT)	The door of the Left Loadlock is open and there is no material in the Left Loadlock.
LOAD READY (LPORT)	The Left Loadlock door is open and material is present in the Left Loadlock.
LOADING (LPORT)	The equipment performs the following:
	The Left Loadlock door is closed.
	The Left Loadlock is roughed.
	The wafers in the Left Loadlock cassette are mapped.
	The Left Loadlock is pumped to hi-vac.
PROCESS READY (LPORT)	The Left Loadlock has been pumped to hi-vac, but implanting of the batch has not yet started.
IN PROCESS (LPORT)	The wafers in the Left Loadlock are being implanted.
UNLOAD READY (LPORT)	The wafers in the Left Loadlock have been implanted, and they are waiting for the left elevator venting to be started.
UNLOADING (LPORT)	The Left Loadlock elevator venting has begun.
READY FOR PICKUP (LPORT)	The pivot extend has been completed. The Left Loadlock door is open and the cassette is ready to be removed.
PORT AVAILABLE (RPORT)	The door of the Right Loadlock is open and there is no material in the Right

	Loadlock.
LOAD READY (RPORT)	The Right Loadlock door is open and material is present in the Right Loadlock.
LOADING (RPORT)	The equipment performs the following: The Right Loadlock door is closed. The Right Loadlock is roughed. The wafers in the Right Loadlock cassette are mapped. The Right Loadlock is pumped to hi-vac.
PROCESS READY (RPORT)	The Right Loadlock has been pumped to hi-vac, but implanting of the batch has not yet started.
IN PROCESS (RPORT)	The wafers in the Right Loadlock are being implanted.
UNLOAD READY (RPORT)	The wafers in the Right Loadlock have been implanted, and they are waiting for the right elevator venting to be started.
UNLOADING (RPORT)	The Right Loadlock elevator venting has begun.
READY FOR PICKUP (RPORT)	The pivot extend has been completed. The Right Loadlock door is open and the cassette is ready to be removed.

Table 4. VILL Port State Transitions

#	Current State	Trigger	New State	Action	Comment
1.	Undefined	The machine has been started up.	LPORT State Model	The Left Loadlock may be loaded with a cassette.	"Ready to Receive Material, Port-ID 1" (CEID 84)
2.	LPORT/Port Available	Cassette sensed at LPORT.	LPORT/Load Ready	Operator, AGV, or SMIF places cassette in LPORT.	"Material Sensed at Port, Port-ID 1" (CEID 85)
3.	LPORT/Load Ready	The left LOAD or GO button is touched, or an appropriate RCMD is received from the host..	LPORT/Loading	Close LPORT door, rough LPORT, map wafers in LPORT cassette, and hi-vac LPORT.	"Door Close Started, Port-ID 1" (CEID 25) "Door Close Complete, Port-ID 1" (CEID 26) "Elevator Pump Started, Port-ID 1" (CEID27) "Wafer Mapping Started, Port-ID 1" (CEID 38) "Wafer Mapping Complete, Port-ID 1" (CEID 39)
4.	LPORT/Loading	The load has failed.	LPORT/Unloading		"Elevator Vent Started, Port-ID 1" (CEID 21) "Elevator Vent Complete, Port-ID 1 (CEID 22) "Door Open Started, Port-ID 1" (CEID 23) "Door Open Complete, Port ID 1" (CEID 24)
5.	LPORT/Loading	The Left Loadlock has been pumped to hi-vac.	LPORT/Process Ready		"Elevator Pump Complete, Port-ID 1" (CEID 28)
6.	LPORT/Process Ready	The GO button has been touched or a START command has been received from the host.	LPORT/In Process		"Batch Started, Port-ID 1" (CEID 11) "Wafer Started, Port-ID 1" (CEID 13) "Wafer Complete, Port ID 1" (CEID 14)
7.	LPORT/In Process	All LPORT wafers have been implanted.	LPORT/Unload Ready	All wafers have been implanted.	"Batch Complete, Port-ID 1" (CEID 12)
8.	LPORT/Unload Ready	Venting of the left elevator has started.	LPORT/Unloading	The left elevator is vented, the door is opened, and the pivot starts to extend.	"Elevator Vent Started, Port-ID 1" (CEID 21) "Elevator Vent Complete, Port-ID 1 (CEID 22) "Door Open Started, Port-ID 1" (CEID 23) "Door Open Complete, Port ID 1" (CEID 24)
9.	LPORT/Unloading	The left pivot is	LPORT/Ready for		"Pivot Extend Complete, Port-ID 1"

		extended.	Pickup		(CEID 65)
10.	LPORT/Ready for Pickup	The LOAD or GO button has been touched or an RCMD has been received from the host.	LPORT/Loading	A new implant has been requested.	
11.	LPORT/Ready for Pickup	The cassette is not sensed at the Left Loadlock.	LPORT/Port Available	The left cassette has been removed by the operator, AGV, or SMIF.	"Cassette Removed, Port-ID 1" (CEID 41)
12.	Undefined	The machine has been started up.	RPORT State Model	The Right Loadlock may be loaded with a cassette.	"Ready to Receive Material, Port-ID 2" (CEID 84)
13.	RPORT/Port Available	Cassette sensed at RPORT.	RPORT/Load Ready	Operator, AGV, or SMIF places cassette in RPORT.	"Material Sensed at Port, Port-ID 2" (CEID 85)
14.	RPORT/Load Ready	The right LOAD or GO button is touched, or an appropriate RCMD is received from the host.	RPORT/Loading	Close RPORT door, rough RPORT, map wafers in RPORT cassette, and hi-vac RPORT.	"Door Close Started, Port-ID 2" (CEID 25) "Door Close Complete, Port-ID 2" (CEID 26) "Elevator Pump Started, Port-ID 2" (CEID27) "Wafer Mapping Started, Port-ID 2" (CEID 38) "Wafer Mapping Complete, Port-ID 2" (CEID 39)
15.	RPORT/Loading	The load has failed.	RPORT/Unloading		"Elevator Vent Started, Port-ID 2" (CEID 21) "Elevator Vent Complete, Port-ID 2" (CEID 22) "Door Open Started, Port-ID 2" (CEID 23) "Door Open Complete, Port ID 2" (CEID 24)
16	RPORT/Loading	The Right Loadlock has been pumped to hi-vac.	RPORT/Process Ready		"Elevator Pump Complete, Port-ID 2" (CEID 28)
17.	RPORT/Process Ready	The GO button has been touched or a START command has been received from the host.	RPORT/In Process		"Batch Started, Port-ID 2" (CEID 11) "Wafer Started, Port-ID 2" (CEID 13) "Wafer Complete, Port ID 2" (CEID 14)
18.	RPORT/In Process	All RPORT wafers have been implanted.	RPORT/Unload Ready	All wafers have been implanted.	"Batch Complete, Port-ID 2" (CEID 12)
19.	RPORT/Unload Ready	Venting of the right elevator has started.	RPORT/Unloading	The right elevator is vented, the door is opened, and the pivot starts to extend.	"Elevator Vent Started, Port-ID 2" (CEID 21) "Elevator Vent Complete, Port-ID 2" (CEID 22) "Door Open Started, Port-ID 2" (CEID 23) "Door Open Complete, Port ID 2" (CEID 24)
20.	RPORT/Unloading	The right pivot is extended.	RPORT/Ready for Pickup		"Pivot Extend Complete, Port-ID 2" (CEID 65)
21.	RPORT/Ready for Pickup	The LOAD or GO button has been touched or an RCMD has been received from the	RPORT/Loading	A new implant has been requested.	

		host.			
22.	RPORT/Ready for Pickup	The cassette is not sensed at the Right Loadlock.	RPORT/Port Available	The right cassette has been removed by the operator, AGV, or SMIF.	"Cassette Removed, Port-ID 2" (CEID 41)

VILL Processing State

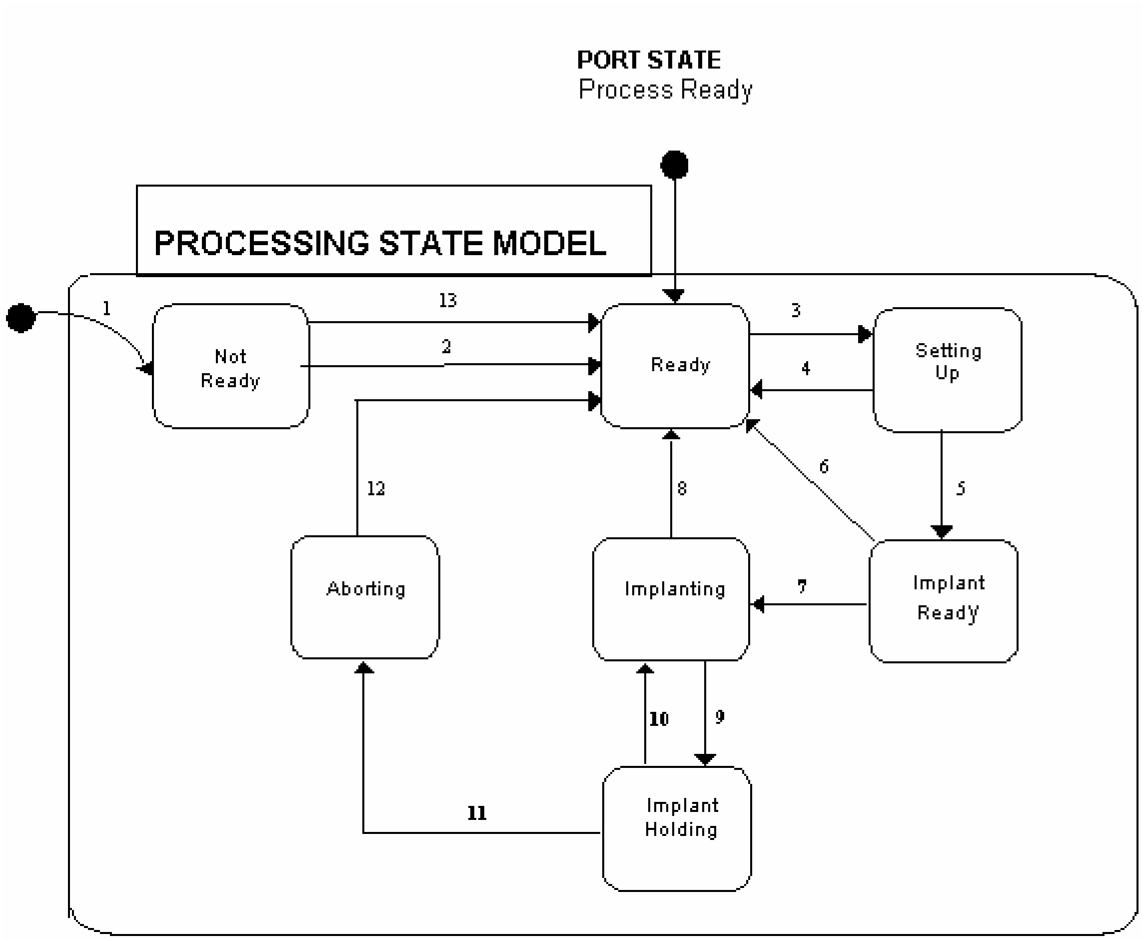


Table 5. VILL Processing State Definition

State	Definition
NOT READY	The machine has been initialized and Start Up has not completed, or Shut Down has started.
READY	Processing is ready to begin. Start Up has completed, a batch has been completed, or an Abort has been completed.
SETTING UP	Source, Beamline, or Beamscan setup is under way, and material is being readied.
IMPLANT READY	Recipe has been set up and material is present. The GO is displayed and awaiting action.
IMPLANTING	Implanting is under way.
IMPLANT HOLDING	The Implant has been held.
ABORTING	An Abort procedure has been started, but has not yet completed.

Table 6. VILL Processing State Transitions

#	Current State	Trigger	New State	Actions	Comments
1.	Undefined	The machine is initialized.	Not Ready	Machine performs software initialization.	

2	Not Ready	Operator touches System Startup button.	Ready	The Start Up procedure has been completed successfully.	"Start Up Started" (CEID 1) "Start Up Complete" (CEID 2)
3.	Ready	Operator touches GO on Host Control screen or RCMD received from host.	Setting Up	Source, Beamline, or Beamscsn setup is executed.	"Source Setup Started" (CEID 5) "Beamline Setup Started" (CEID 7) "Beamscan Setup or Check Started" (CEID 9) "Implant Started" (CEID 40)
4.	Setting Up	Setup fails.	Ready		
5.	Setting Up	Completion of Beamscan Setup or Check.	Implant Ready		"Source Setup Complete" (CEID 6) "Beamline Setup Complete" (CEID 8) "Beamscan Setup or Check Complete" (CEID 10) "GO Displayed' (CEID 63)
6.	Implant Ready	STOP command from operator or host RCMD.	Ready		
7.	Implant Ready	The GO button on Implant Monitor is touched or RCMD from host is received.	Implanting	Implanting of the wafers is started.	"Batch Started" (CEID 11) "Wafer Started" (CEID 13) "Wafer Complete (CEID 14)
8.	Implanting	The implant for the batch has been completed.	Ready		"Batch Complete" (CEID 12)
9.	Implanting	Operator touches HOLD button on Implant Monitor screen.	Implant Holding	Implanting of the wafer is held.	"Implant Held" (CEID 17)
10.	Implant Holding	Operator touches the CONTINUE button on the Implant Monitor screen.	Implanting	The held implant has been resumed.	"Implant Continued" (CEID 18)
11.	Implant Holding	Operator touches STOP button on the Implant Monitor screen and then chooses Abort at the prompt, or host sends Abort RCMD.	Aborting	An Abort of the implant is started.	"Abort Started" (CEID 19)
12.	Aborting	An Abort process has been completed.	Ready		"Abort Complete" (CEID 20)
13.	Ready	Operator touches System Shut Down button.	Not Ready	A Shutdown from the Ready is carried out.	"Shut Down Started" (CEID 3) "Shut Down Complete" (CEID 4)

VILL Material State Model

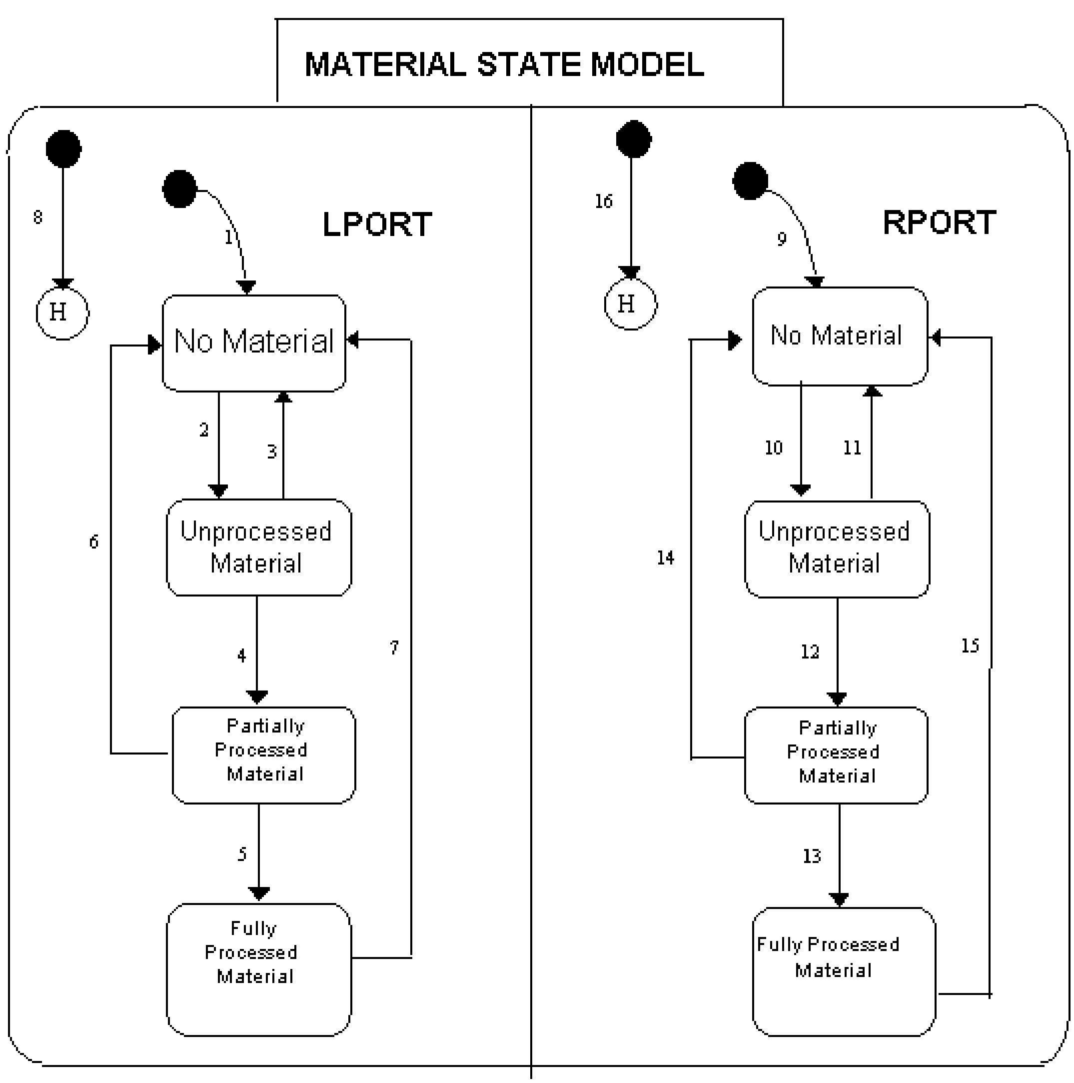


Table 7. VILL Material State Definition

State	Definition
LPORT	Material State for the Left Loadlock.
LPORT/No Material	There is no cassette in the Left Loadlock.
LPORT/Unprocessed Material	None of the wafers in the Left Loadlock cassette have been processed.
LPORT/Partially Processed Material	At least one wafer in the Left Loadlock cassette has been processed.
LPORT/Fully Processed Material	All wafers in the Left Loadlock cassette have been processed.
RPORT	Material State for the Right Loadlock.
RPORT/No Material	There is no cassette in the Right Loadlock.
RPORT/Unprocessed Material	None of the wafers in the Right Loadlock cassette have been processed.
RPORT/Partially Processed Material	At least one wafer in the Right Loadlock cassette has been processed.
RPORT/Fully Processed Material	All wafers in the Right Loadlock cassette have been processed.

Table 8. VILL Material State Transitions

#	Current State	Trigger	New State	Action	Comment
1.	Undefined	Software initialized.	No Material		"Ready to Receive Material, Port-ID 1" (CEID 84)

2.	LPORT/No Material	Cassette placed into Left Loadlock by Operator, AGV, or SMIF.	Unprocessed Material	"Material Sensed at Port, Port-ID 1" (CEID 85)
3.	LPORT/ Unprocessed Material	Cassette removed from Left Loadlock by Operator, AGV, or SMIF before any wafer was processed.	No Material	"Cassette Removed, Port-ID 1" (CEID 41) "Ready to Receive Material, Port-ID 1" (CEID 84)
4.	LPORT/ Unprocessed Material	Implant started by Operator or Host, and at least one wafer implanted.	Partially Processed Material	"Wafer Started, Port-ID 1" (CEID 13) "Batch Started, Port-ID 1" (CEID 11)
5.	LPORT/Partially Processed Material	Implant completed.	Fully Processed Material	"Batch Complete, Port-ID 1" (CEID 12)
6.	LPORT/Partially Processed Material	Cassette removed from Left Loadlock by Operator, AGV, or SMIF after implant is aborted.	No Material	"Cassette Removed, Port-ID 1" (CEID 41) "Ready to Receive Material, Port-ID 1" (CEID 84)
7.	LPORT/Fully Processed Material	Cassette removed from Left Loadlock by Operator, AGV, or SMIF after implant is completed.	No Material	"Cassette Removed, Port-ID 1" (CEID 41) "Ready to Receive Material, Port-ID 1" (CEID 84)
8	LPORT/Undefined	One of the following situations: Reset or power failure.	Previous LPORT state.	
9.	Undefined	Software initialized.	No Material	"Ready to Receive Material, Port-ID 2" (CEID 84)
10.	RPORT/No Material	Cassette placed into Right Loadlock by Operator, AGV, or SMIF.	Unprocessed Material	"Material Sensed at Port, Port-ID 2" (CEID 85)
11.	RPORT/ Unprocessed Material	Cassette removed from Right Loadlock by Operator, AGV, or SMIF before any wafer was processed.	No Material	"Cassette Removed, Port-ID 2" (CEID 41) "Ready to Receive Material, Port-ID 2" (CEID 84)
12.	RPORT/ Unprocessed Material	Implant started by Operator or Host, and at least one wafer implanted.	Partially Processed Material	"Wafer Started, Port-ID 2" (CEID 13) "Batch Started, Port-ID 2" (CEID 11)
13.	RPORT/Partially Processed Material	Implant completed.	Fully Processed Material	"Batch Complete, Port-ID 2" (CEID 12)
14.	RPORT/Partially Processed Material	Cassette removed from Right Loadlock by Operator, AGV, or SMIF after implant is aborted.	No Material	"Cassette Removed, Port-ID 2" (CEID 41) "Ready to Receive Material, Port-ID 2" (CEID 84)
15.	RPORT/Fully Processed Material	Cassette removed from Right Loadlock by Operator, AGV, or SMIF after implant is completed.	No Material	"Cassette Removed, Port-ID 2" (CEID 41) "Ready to Receive Material, Port-ID 2" (CEID 84)

16	RPORT/Undefined	One of the following situations: Reset or power failure.	Previous RPORT state.

Appendix B - E220 GEM Alarms

Purpose

The following tables contain the alarm Ids, codes, and text sent within stream 5 messages. Only alarms considered irrecoverable are sent to the host.

A convention in the text is $ denotes a value filled in before the message is sent.

A ‘|’ character denotes a new line.

Asyst and Ergospeed2 Smif Errors

154302 154303	77001	505	The right smif arm has timed-out during the Ready (T2) timing wait period. Please check the smif for any problems.
154304 154305	77002	505	The left smif arm has timed-out during the Ready (T2) timing wait period. Please check the smif for any problems.
154306 154307	77003	505	The right smif arm has timed-out during the Load Complete (T4) timing wait period. Please check the smif for any problems.
154308 154309	77004	505	The left smif arm has timed-out during the Load Complete (T4) timing wait period. Please check the smif for any problems.
154310 154311	77005	505	The right smif arm has completed the transfer, but sensors indicate that the transfer was not successful. Please check for any problems before continuing.
154312 154313	77006	505	The left smif arm has completed the transfer, but sensors indicate that the transfer was not successful. Please check for any problems before continuing.
154330 154331	77015	515	Unable to set Smif Mode to FULL AUTO because pods were detected on the smif. Please remove pods and try again.
154500 154501	77100	5	Left LPT1 Load Error. Please get experienced help. $
154502 154503	77101	5	Left LPT1 Unload Error. Please get experienced help. $
154504 154505	77102	5	Left LPT1 Home Error. Please get experienced help. $
154506 154507	77103	5	Left LPT1 Error. Please get experienced help. $
154700 154701	77200	5	Right LPT2 Load Error. Please get experienced help. $
154702 154703	77201	5	Right LPT2 Unload Error. Please get experienced help. $
154704 154705	77202	5	Right LPT2 Home Error. Please get experienced help. $
124302 124303	62001	505	Right smif arm operation timed-out. Please check the smif for any problems.
124304 124305	62002	505	Left smif arm operation timed-out. Please check the smif for any problems.
124314 124315	62007	505	The LOAD CASSETTE command for the right smif arm can not be executed because either the smif arm or the implanter is not in a ready state.
124316 124317	62008	505	The LOAD CASSETTE command for the left smif arm can not be executed because either the smif arm or the implanter is not in a ready state.
124318 124319	62009	505	The UNLOAD CASSETTE command for the right smif arm can not be executed because either the smif arm or the implanter is not in a ready state.
124320 124321	62010	505	The UNLOAD CASSETTE command for the left smif arm can not be executed because either the smif arm or the implanter is not in a ready state.
124322 124323	62011	505	The INITX2 command for the right smif arm can not be executed because either the smif arm or the implanter is not in a ready state.
124324 124325	62012	505	The INITX2 command for the left smif arm can not be executed because either the smif arm or the implanter is not in a ready state.
124326 124327	62013	505	The INITX3 command for the right smif arm can not be executed because either the smif arm or the implanter is not in a ready state.
124328 124329	62014	505	The INITX3 command for the left smif arm can not be executed because either the smif arm or the implanter is not in a ready state.
124330 124331	62015	505	Right SMIF Completion Error: $ | Please check the smif for any problems.

124332 124333	62016	505	Left SMIF Completion Error: $	Please check the smif for any problems.

Most likely Asyst smif errors substituted for messages with $ (77100 to 77202) above:

"Aborted by user, Estop."
"Action time-out."
"Auto correct of error failed."
"Cassette already at tool."
"Collision."
"Gripper close aborted, time-out."
"Gripper finger over-travel."
"Gripper open aborted, time-out."
"Homing calibration aborted, time-out."
"Port action communication failed."
"Port action status indicates failure."
"Port alarm reports fatal error."
"Rotate following error."
"Rotate negative over-travel"
"Rotate positive over-travel"
"Tilt following error."
"Tilt negative over-travel."
"Tilt positive over-travel."
"Vertical following error."
"Vertical negative over-travel."
"Vertical positive over-travel."

Below is a partial list of Asyst smif errors containing messages less likely generated for $ above:

"Aborted by user, Soft-stop."
"ACOMLIBS resources init error."
"LPT action rejected, at Estop."
"LPT action rejected, busy with stop."
"LPT action rejected, busy."
"Axis is busy."
"Brake released."
"Brake set."
"Condition motion abort, time-out."
"Error during io task status init."
"Error of unknown code."
"Estop is reset."
"Estop is clear."
"Estop or soft-stop action time-out."
"Estop requested before completion."
"Face squat is clear."
"Face squat"
"Full squat achieved."
"Gripper finger closed."
"Gripper finger opened."
"Homing calibration completed."
"Invalid/unsupported arm action."
"Invalid/unsupported port action."
"Motion completed."

"Motion time-out."
"Partial squat achieved"
"Port action rejected, at Estop."
"Port action rejected, busy with stop."
"Port action rejected, busy."
"Required cassette condition failed."
"Reserved axis following error."
"Reserved axis negative over-travel."
"Reserved axis positive over-travel."
"Reverse vertical squat."
"Servo disabled."
"Servo enabled."
"Soft stop canceled by Estop."
"Soft-stop requested before completion."
"Unhandled stop request."
"Unrecognized arm event code."
"Y axis position not attainable."

Auto Scan Errors

12302 12303	6001	505	VOLTAGE CALIBRATION FAILED.
12304 12305	6002	505	CAUTION: MIN-SLOPE = 0 | optic link between uniformity controller and scanner carrying SLOPE and SPOT-MODE may be damaged or disconnected.
12306 12307	6003	505	CAUTION: MIN-SLOPE ($) < 512 | wire inside scanner connecting PROBE signal to capacitance sense board may be broken.
12308 12309	6004	505	CAUTION: MIN-SLOPE ($) > 2048 | Scanner has inadequate dynamic range to perform dose correction properly.
12310 12311	6005	505	CAUTION: negative zero offset on dose integrator. | This will result in dose errors during implant!! Check the dose integrator and preamplifier.
12312 12313	6006	505	CAUTION: input signal to dose integrator exceeded full scale. | This will cause dose errors during implant!! Check the dose integrator and the preamplifier.
12314 12315	6007	505	CAUTION: DOSE = 0 | optic link carrying INTEGRATE and DOSE between uniformity controller and dose integrator may be damaged.
12316 12317	6008	505	CAUTION: DOSE = 0 | single optic link carrying SCAN-STATUS from scanner to uniformity controller may be disconnected or exchanged with ACCEL-OK link.
12318 12319	6009	505	CAUTION: scan ratio ($) > 20 | Scanner performance inadequate for implants. Tubes or linear optic link may be weak.
12320 12321	6010	505	CAUTION: uniformity poor when scanning at full speed | If there is only a single peak on the orange plot, set the MIRROR supply to 28 kV, otherwise check the scanner.
12324 12325	6012	507	The center to side ratio is inconsistent.| Press PROCEED to enter the Beamscan screen.
12328 12329	6014	505	FAST SCAN FAILURE| Beam setup was > $.$ times XSIGMA for fast scan test.
12340 12341	6020	505	SCANNER SETUP FAILED| The beam stability may not be adequate.
12344 12345	6022	507	SETUP CALLS FOR TOO MANY SCANS| The computed number of scans is $, which exceeds the allowed maximum of 16383. It is not possible to implant.
12346 12347	6023	507	COMPUTED NUMBER OF SCANS IS LESS THAN THE NUMBER OF SCANS ASKED FOR IN THE RECIPE.| DO YOU WISH TO IMPLANT THE WAFERS WITH| $ SCANS ?| Recipe calls for a mimimum of $ scans.
12400 12401	6050	507	The bearing is not initialized properly. Go to the end station initialization screen to correct this problem.
12402 12403	6051	507	The head is not initialized properly. Go to the end station initialization screen to correct this problem.
12404 12405	6052	507	The traveling faraday is not initialized properly. Go to the end station initialization screen to correct this problem.

12406 12407	6053	507	The traveling faraday cup stopped in the wrong position. Go to the end station initialization screen to correct this problem.
12408 12409	6054	507	Beam purity check failed.
12414 12415	6057	515	The Dose Integrator must pass a self test before a beamscan SETUP or CHECK can be run. Run the System Startup sequence, or the Self Test from the Beamscan screen, until all ranges Pass.
12420 12421	6060	507	The required number of scans ($) differs more than 40% from the recipe value ($).|| Hit 'YES' to continue, 'NO' to abort.
12424 12425	6062	507	The arc current is outside of legal limits.|| (1) Auto setup has to be run to use ECO 26.| (2) ECO 26 must be turned off to run manually.
12452 12453	6076	507	The 10% scans interlock (ECO 26) is selected and the calculated number of scans falls outside this range. Options: | 1. Adjust arc and try SETUP again. | 2. Press GO on the batch screen. | 3. Deselect ECO 26.
12454 12455	6077	505	Dose Integrator Failure!| The Self Test results have indicated a failure that needs to be corrected prior to running an Implant. Run the Dose Integrator Self Test from the Beamscan screen to resolve the error.
12462 12463	6081	505	Batch completed, scanner recheck FAILED. | Process Information: | (%) XSIGMA * $ = $$.$$| Measured (%) XSIGMA = $$.$$| (%) PEAK TO PEAK * $ = $$.$$| Measured (%) PEAK TO PEAK = $$.$$| Recipe Name: $| Left Lot Number: $| Right Lot Number:
12466 12467	6083	505	Scanner recheck FAILED. | Process check indicates not all wafers in this batch have been implanted. Please check Implant Log.| Process Information: | (%) XSIGMA * $ = $$.$$| Measured (%) XSIGMA = $$.$$| (%) PEAK TO PEAK * $ = $$.$$| Measured (%) PEAK TO PEAK = $$.$$| Recipe Name: $| Left Lot Number: $| Right Lot Number: $|
12470 12471	6085	505	Batch Pre-Implant scanner check FAILED. | Process Information: | (%) XSIGMA * $ = $$.$$| Measured (%) XSIGMA = $$.$$| (%) PEAK TO PEAK * $ = $$.$$| Measured (%) PEAK TO PEAK = $$.$$| Recipe Name: $| Left Lot Number: $| Right Lot Number:
12472 12473	6086	505	The Platen is not at the safe position.| Move the Platen to the safe position | before moving or using the Target Faraday.
12476 12477	6088	505	TARGET FARADAY CUP BIAS VOLTAGE ERROR. READBACK VOLTAGE IS TOO LOW OR DOES NOT MATCH THE PROGRAM VOLTAGE. CHECK BIAS FEED CONNECTIONS.
12478 12479	6089	505	Integrated beam found unstable. | The Center to Side measurement exceeds $%.
12480 12481	6090	505	Integrator offset check error! The offset | measurement difference has shown greater than | 1% between the side and center Faraday positions. | Possible causes are : | 1. Failure on the current integrator | 2. Excessive noise on the target Faraday | 3. Excessive impurity, neutral beam or energy | contamination.
12488 12489	6094	505	Dose per Scan Limit Error!| The minimum Dose per Scan $ is greater than the average Dose per Scan $.| Implant will not be allowed.| Please retry beamscan setup.
12490 12491	6095	505	Dose per Scan Limit Error!| The maximum Dose per Scan $ is less than the average Dose per Scan plus tolerance $.| Implant will not be allowed.| Please retry beamscan setup.

Auto-Setup Errors

18300 18301	9000	505	Remote $ does not respond.
18308 18309	9004	505	The extraction supply has been turned off because of overloading.|| Suggestion:| This failure may be caused by an arc in the source. Turn off the filament power for a few seconds. Then light the arc again and try to turn on the extraction manually.
18312 18313	9006	505	The source gas control failed to settle.|| Suggestion:| If the gas readback is fluctuating, the gas control feedback circuit needs to be adjusted or replaced.|| If the gas readback does not change and is much lower than the setpoint, either the gas control feedback circuit needs to be adjusted, or the valve is stuck shut.
18314 18315	9007	505	The source magnet power supply failed to settle.|| Suggestion:| Gain access to the source magnet power supply and check the front panel readings.
18316 18317	9008	505	The Z-axis motor failed to settle.

18318 18319	9009	505	The source extraction power supply failed to settle.
18320 18321	9010	505	The AMU magnet power supply failed to settle.|| Suggestion:| Gain access to the AMU magnet power supply and check the front panel readings.
18342 18343	9021	505	The arc is glitching too much for automatic source setup to proceed.
18344 18345	9022	505	The source extractor is sparking too much for automatic source setup to proceed.|| Additional possibilities:|| 1.__UNSTABLE SUPPLY:| the extraction power supply may be unstable.|| 2.__CORONA:| there is corona discharge between part of the source or source cabinet and other parts of the terminal.
18346 18347	9023	505	The source arc has gone out.|| Suggestion:| Press the SETUP button to try lighting the source automatically, or set up the source manually.
18348 18349	9024	505	The extraction power supply has lost voltage. The most common cause of this condition is an arc between a dirty source and the extraction suppressor plate.|| Suggestion:| Turn off the filament and extractor for a few seconds to extinquish the arc. Move the Z-axis farther out, re-light the source, and turn on the extractor again. Press "SETUP" to continue setting up automatically, or set up manually.|| If the extraction supply loses voltage again, you may need to clean the ion source. Also scrape off any deposits on the side of the extraction suppressor plate that faces the source.
18354 18355	9027	505	Unable to continue automatic source setup because the mirror supply is shorted.
18364 18365	9032	505	The source cabinet does not respond, even though the door interlocks are made and the high voltage supplies are armed.|| Suggestion: Open the enclosure and terminal doors, and check whether the supplies have power.
18400 18401	9050	505	Unable to continue automatic source setup because of unstable beam. Check the arc, filament, and extraction power supplies.
18402 18403	9051	505	The source arc can't reach the setpoint.|| Suggestion:| This condition may be caused by a filament voltage limit set too low, an extremely old filament, or inadequate gas flow or vapor production.
18500 18501	9100	505	The automatic source setup program can't get a low enough beam to achieve the minimum number of scans specified.|| Do you want to continue anyway?
18502 18503	9101	505	The automatic source setup program can't get a low enough beam to achieve the minimum number of scans specified in the recipe. Automatic setup halted.
18504 18505	9102	505	Unable to continue automatic source setup because of excessive suppression current.
18506 18507	9103	505	Unable to continue automatic source setup because of excessive suppression current when tuning Z axis.
18520 18521	9110	505	The mirror supply must be turned on to run multiply-charged ions.
18522 18523	9111	505	The 100-degree magnet current is set outside the calculated AMU window for the designated species. Implant is not allowed under these conditions.|| Suggestion:| If the peak is correct, use the SERVICE screen to add an AMU magnet calibration point in the vicinity.
18524 18525	9112	505	The specified extraction voltage of $ V is not achieved. Please check the extraction power supply.
18526 18527	9113	505	The target faraday cup is in the wrong position; the head cannot be moved. Go to the manual BEAMSCAN screen to move it out of the way.
18528 18529	9114	505	The faraday cup suppression supply is too low for accurate beam current measurement. Check it on the manual BEAMSCAN screen.
18530 18531	9115	505	The requested beam energy of $ keV cannot be achieved with an ion charge of $.
18532 18533	9116	505	The specified beam energy of $ keV is not achieved.|| Suggestion:| Check the extraction and accel supplies.
18534 18535	9117	505	The Filament Current indicates that the Filament is worn to the point of breakage. It may burn through during the implant of a wafer, do you wish to continue ?
18536 18537	9118	505	Dipole lens magnet does not match correct setting for desired amu.
18538 18539	9119	505	The flood gun secondary emission current is more than $% different from the value specified in the recipe.
18540 18541	9120	505	Accel power supply is turned off.
18542 18543	9121	505	Decel power supply is turned off.
18544 18545	9122	505	The Mirror readback does not match the value selected in the RECIPE. |Please adjust

			the recipe value to match the readback value.
18546 18547	9123	505	The selected gas bottle label does not match the recipe.| Please select the proper gas.
18548 18549	9124	505	The selected vaporizer label does not match the recipe.| Please select the proper crucible.
18584 18585	9142	505	PRESSURE OF SDS BOTTLE SELECTED IS BELOW THE EMPTY BOTTLE DETECTOR SETTING. THE GAS BOX HAS BEEN SHUTDOWN. TO CONTINUE, REPLACE BOTTLE, TURN OFF EMPTY BOTTLE DETECTOR, OR RESET THE DETECTOR SETTING.
18960 18961	9330	505	Remove target faraday cup from beam path.
18962 18963	9331	505	Unable to find an initial beam in the focus cup of at least 0.5% of the beam in the setup cup. Automatic beam setup cannot proceed.
18964 18965	9332	505	The $ power supply is shorted out (either internally or externally.)
18966 18967	9333	505	The $ power supply is at $, and can't reach its setpoint of $.
18968 18969	9334	505	Less than 10 nanoamps of beam in the setup cup: setup cannot continue.
18970 18971	9335	505	The requested energy of $ KeV cannot be achieved on the E-220 with an ion charge of $.
18988 18989	9344	505	The accel voltage is shorted out.|| Possible causes:| 1. The drop bars are down.| 2. The terminal grounding hook is on.
18990 18991	9345	505	The offset between the deflector programmed voltage and readback exceeds 5%. Automatic setup cannot continue.
19002 19003	9351	515	Switched over to DECEL mode, but| DECEL static continuity test has failed! Check auto decel hardware.
19004 19005	9352	515	Switched over to ACCEL mode, but| ACCEL static continuity test has failed! Check auto decel hardware.
19006 19007	9353	505	BEAM ENERGY PROBE FAILURE,| Check power to energy probe.
19008 19009	9354	505	BEAM ENERGY PROBE FAILURE,| The beam energy varies by more than $.$%. The beam energy probe reads back $$$.$ KV.
19010 19011	9355	505	BEAM CURRENT TOO HIGH,| This will cause too much power in end station resulting in focus cup over heating.| Please reduce arc current.
19012 19013	9356	505	The requested energy of $ KeV cannot be achieved on the E-500 with an ion charge of $.
19014 19015	9357	505	The requested energy of $ KeV with an ion charge of $ cannot be achieved using the automatic source setup because it is too low.
19016 19017	9358	505	Automatic source setup cannot be achieved using the requested extraction voltage of $ kV because it exceeds $ kV which is the maximum allowable extraction based on calculations that use the kamu magnetic constants table.
19018 19019	9359	515	Continuity check on auto accel/decel switching cannot be done because enclosure doors are open and high voltage cannot be turned on.
19020 19021	9360	515	Continuity check on auto accel/decel switching cannot be done because the high voltage is not enabled.
19022 19023	9361	515	Enclosure doors are open. Do you still want to switch?| IF YES, ENSURE THAT ALL PERSONS ARE CLEAR OF AUTO-DECEL BAR BEFORE PROCEEDING.
19026 19027	9363	515	Continuity check on auto accel/decel switching cannot be done because the source or beamline is vented.
19028 19029	9364	505	BEAM CURRENT TOO HIGH FOR MIRROR SUPPLY OPERATION.| Cannot allow mirror to be turned on for single charged, accel mode as requested in the recipe.| Either set the MIRROR parameter in the recipe to 0 kV, or use a lower beam current specification.

Auto Vacuum Errors

4304 4305	2002	507	To pump down the elevators | - The elevator cryos' temperatures must be | __less than $ degrees K, and the| __elevator cryos are not being regenerated.
4312 4313	2006	507	To pump down the beamline | - The chamber cryo temperature must be| __less than 20

			degrees K, and the| __chamber cryo is not being regenerated.
4338 4339	2019	507	System startup cannot perform pump down. Cryopump temperatures indicate that the cryos are too warm. Please check them.
4342 4343	2021	507	System pump down has been aborted.| Check the following:| - Cryo temperatures must be less than| __20 degrees K.| - Handlers must be at the safe position.| - Traveling faraday cup must be at the| __home position.
4344 4345	2022	507	System startup cannot perform pump down. Traveling faraday status indicates that the faraday is not initialized. Please check it.
4346 4347	2023	507	System startup cannot perform pump down. Handler status indicates that one or both of the handlers are not initialized Please check them.
4348 4349	2024	507	System startup has failed to attain high| vacuum. Check the following:| - Source and beamline turbo speeds must be| __greater than 80%| - Source isolation, left isolation, and | __right isolation valves must be open.
4350 4351	2025	507	System Start Up has failed to achieve high| vacuum before a 60 second timeout.
4532 4533	2116	515	The elevator isolation valve(s) did not close within the allocated time (20seconds).
4536 4537	2118	515	The beamline chamber cannot be pumped down to hi vacuum. The stage pumps and the beamline pumps have been shut off and the beamline foreline valve has been closed. Please check the chamber for any leaks.
4540 4541	2120	515	The auto elevator cryo regen procedure has been aborted and the cryo purge valves have been closed.| The reason is because:| -- both cryo cold heads did not warm up to $ or greater within the allotted time of $ mins as per the current Regen parameters.
4542 4543	2121	515	The auto elevator Aisin cryo regen procedure has been aborted and the cryo purge valves have been closed. The reason is because,| -- both cryo cold heads did not warm up to 280K or greater within 90 mins.
4550 4551	2125	505	The Source turbopump(s) failed to spin up.| The stage pumps and the beamline pumps have been shut off and the vent valve has been opened.| Please check for pump failures or vacuum leaks.
4620 4621	2160	515	CRYO PUMP REGENERATION FAILURE.| The rate of rise test has exceeded the $ micron rise in one minute criteria even after trying to rough the elevator cryos $ times according to the current parameters.
4624 4625	2162	515	FAILURE TO PUMP DOWN THE ELEVATOR CRYO CHAMBERS TO $ MICRONS IN THE ALLOTED TIME OF $ MINUTES. ||Please check the following: |-- The elevator doors. Ensure that they are properly closed. | -- The pop-off valve on the cryo pump is sealing properly.
4628 4629	2164	515	FAILURE TO CHILL DOWN THE ELEVATOR CRYO COLD HEADS TO $ KELVIN IN THE ALLOTTED TIME OF $ MINUTES. |Please check the compressor and the cryo cold heads for proper operation.
4632 4633	2166	515	FAILURE TO PUMP DOWN BELOW $ MICRONS AFTER PASSING RATE OF RISE TEST.
4634 4635	2167	515	FAILURE TO WARM UP CHAMBER CRYO COLD HEAD TO 280 KELVIN WITHIN ALLOTTED TIME OF $.
4636 4637	2168	515	FAILURE TO PUMP DOWN THE CRYO CHAMBER AFTER TWO PURGE AND PUMP DOWN RETRIES.
4638 4639	2169	515	CHAMBER CRYO REGENERATION FAILURE.| The rate of rise test has exceeded the $ micron rise in one minute criteria even after trying to rough the main cryo $ times according to the current parameters.
4642 4643	2171	515	FAILURE TO PUMP DOWN THE CHAMBER CRYO CHAMBER BELOW 50 MICRONS AFTER PASSING THE RATE OF RISE TEST.
4644 4645	2172	515	FAILURE TO CHILL DOWN THE CHAMBER CRYO COLD HEAD TO $ KELVIN IN THE ALLOTTED TIME OF $ MINUTES. |Please check the compressor and the cryo cold head for proper operation.
4646 4647	2173	505	RIGHT ELEVATOR MOVE TO 1CLEAR FAILURE!| One or more of the following errors have been detected, preventing the safe move of the elevator:|| 1) Servo is not initialized. 2) The handler is not in a safe position. 3) The wafer walkout sensor is tripped.
4648 4649	2174	505	LEFT ELEVATOR MOVE TO 1CLEAR FAILURE!| One or more of the following errors have been detected, preventing the safe move of the elevator:|| 1) Servo is not initialized. 2) The handler is not in a safe position. 3) The wafer walkout sensor is tripped.

4650 4651	2175	505	AUTO PUMPDOWN/VENT FAILURE!| The SMIF state is not at the "READY", the SMIF must be in this state prior to any door and/or Cassette Tilter motions can be made.

Batch Status Errors

26320 26321	13010	515	WARNING: Lot $ has been previously implanted.| | Press YES to permit this implant.| Press NO to cancel.
26322 26323	13011	515	ERROR: Lot $ has been previously implanted.
26324 26325	13012	515	Recipe loading problem.| Please verify recipe by going to the process editor screen.
26326 26327	13013	515	The currently active recipe is not the selected recipe for this process. Processing cancelled.
26348 26349	13024	505	The Dose Integrator must pass a Self-Test without any range errors prior to running a batch of wafers. Run the SYSTEM-STARTUP sequence or Self Test from BEAMSCAN to correct this interlock.
26360 26361	13030	515	LEFT SIDE WAFER MAPPER PROBLEM|| Specified first wafer ($) is not there.
26362 26363	13031	515	RIGHT SIDE WAFER MAPPER PROBLEM|| Specified first wafer ($) is not there.
26364 26365	13032	515	LEFT SIDE WAFER MAPPER PROBLEM|| Wafers specified before start: $ | Wafers found after start:_____$
26366 26367	13033	515	RIGHT SIDE WAFER MAPPER PROBLEM|| Wafers specified before start: $ | Wafers found after start:_____$
26368 26369	13034	515	LEFT SIDE WAFER MAPPER PROBLEM|| No wafers found.
26370 26371	13035	515	RIGHT SIDE WAFER MAPPER PROBLEM|| No wafers found.
26372 26373	13036	515	Unload cassette for shuffle mode contains wafers in destination slots.
26374 26375	13037	515	Loading operation did not start.
26376 26377	13038	515	WAFER MAPPER PROBLEM|| Knob(s) set to "MAP" but mapping ECO disabled.
26386 26387	13043	515	LEFT SIDE WAFER MAPPER PROBLEM|| No wafers found in the range starting from slot $ to ending slot $.
26388 26389	13044	515	RIGHT SIDE WAFER MAPPER PROBLEM|| No wafers found in the range starting from slot $ to ending slot $.
26390 26391	13045	515	WAFERS ALREADY IMPLANTED:| Some or all of the wafers in the specified slot range on the $ side have already been processed.| Press YES if you wish to allow processing.| Press NO to cancel processing.| WARNING! Possible process risk!| Pressing YES could result in a double implant.

Elevator Errors

36420 36421	18060	505	Left Wafer $ is detected out of safe area| for the Handler.
36422 36423	18061	505	Right Wafer $ is detected out of safe area| for the Handler.
36424 36425	18062	505	Mapping shows irregular wafer presence patterns| Check the parameters in Travel Calibration or| the receiver alignment.
36426 36427	18063	505	Left Mapping Light is too dim | for proper mapping.
36428 36429	18064	505	Right Mapping Light is too dim | for proper mapping.
36430 36431	18065	505	Left Wafer $ doesn't have the minimum clearance| for the Handler.
36432 36433	18066	505	Right Wafer $ doesn't have the minimum clearance| for the Handler.
36436 36437	18068	505	RIGHT CASSETTE INSERTED INCORRECTLY Alert!| The cassette is not inserted correctly, and wafers are present indicating incorrect insertion.
36438 36439	18069	505	LEFT CASSETTE INSERTED INCORRECTLY Alert!| The cassette is not inserted correctly, and wafers are present indicating incorrect insertion.

36440 36441	18070	505	LEFT ELEVATOR MOVE TO PIVOT FAILURE!| One or more of the following errors have been detected, preventing the safe move of the elevator:|| 1) Servo is not initialized. 2) The handler is not in a safe position. 3) The wafer walkout sensor is tripped.
36442 36443	18071	505	RIGHT ELEVATOR MOVE TO PIVOT FAILURE!| One or more of the following errors have been detected, preventing the safe move of the elevator:|| 1) Servo is not initialized. 2) The handler is not in a safe position. 3) The wafer walkout sensor is tripped.
36460 36461	18080	505	WAFER MISSING ALERT!| Wafers from the LEFT cassette slots listed below appear to have been lost:| $$$$$$$$$$$$$$$$$$$$$$$$$$$$
36462 36463	18081	505	WAFER MISSING ALERT!| Wafers from the RIGHT cassette slots listed below appear to have been lost:| $$$$$$$$$$$$$$$$$$$$$$$$$$$$
36464 36465	18082	505	WAFER FOUND ALERT!| Wafers that were not seen before in the LEFT cassette have appeared in the slots listed below:| $$$$$$$$$$$$$$$$$$$$$$$$$$$$
36466 36467	18083	505	WAFER FOUND ALERT!| Wafers that were not seen before in the RIGHT cassette have appeared in the slots listed below:| $$$$$$$$$$$$$$$$$$$$$$$$$$$$

End Station Initialization Errors

16716 16717	8208	505	There is a Wafer Walkout Detected.| The RIGHT SIDE cassette has a walkout. The wafer may be extending into the iso-valve, the Beamline and Elevator may have to be vented manually. Visually inspect the iso-valve to determine if is safe to close. Vent the system as necessary to correct the condition using the ES-MANUAL functions.
16718 16719	8209	505	There is a Wafer Walkout Detected.| The LEFT SIDE cassette has a walkout. The wafer may be extending into the iso-valve, the Beamline and Elevator may have to be vented manually. Visually inspect the iso-valve to determine if is safe to close. Vent the system as necessary to correct the condition using the ES-MANUAL functions.
16720 16721	8210	505	The RIGHT HANDLER did not return to the HOME position!| The Handler did not reach the home position as commanded. Insure the position of the handler, or insure the correct function of the position sensor.
16722 16723	8211	505	The LEFT HANDLER did not return to the HOME position!| The Handler did not reach the home position as commanded. Insure the position of the handler, or insure the correct function of the position sensor.
16724 16725	8212	505	The RIGHT ELEVATOR CAN'T BE INITIALIZED!| The Right Handler has not been initialized. It is unsafe to move the elevator with the Handler in an unknown location.
16726 16727	8213	505	The LEFT ELEVATOR CAN'T BE INITIALIZED!| The Left Handler has not been initialized. It is unsafe to move the elevator with the Handler in an unknown location.
16728 16729	8214	505	The RIGHT ELEVATOR CAN'T BE INITIALIZED!| The Right Handler is extended into the cassette. It is unsafe to move the elevator with the Handler extended.
16730 16731	8215	505	The LEFT ELEVATOR CAN'T BE INITIALIZED!| The Left Handler is extended into the cassette. It is unsafe to move the elevator with the Handler extended.
16732 16733	8216	505	The RIGHT ELEVATOR CAN'T BE INITIALIZED!| When using SMIF the Ready state must be set for elevator initialization to proceed. During Init the door and tilter is closed and retracted.
16734 16735	8217	505	The LEFT ELEVATOR CAN'T BE INITIALIZED!| When using SMIF the Ready state must be set for elevator initialization to proceed. During Init the door and tilter is closed and retracted.

Facilities and UCC Errors

2302 2303	1001	510	Do you want to try downloading UCC program again?|| Press YES to retry| Press NO to quit to the manual menu.
2304 2305	1002	505	UCC ERROR:| Uniformity Controller powered down or disconnected from link.| Do you want to bypass downloading the UCC program?| Press YES to bypass.| Press NO and you will be given the choice to quit or retry.

2306 2307	1003	505	UCC ERROR:| Uniformity Controller data error.| Do you want to bypass downloading the UCC program?| Press YES to bypass.| Press NO and you will be given the choice to quit or retry.
2308 2309	1004	505	UCC ERROR:| Uniformity Controller communication timeout.| Do you want to bypass downloading the UCC program?| Press YES to bypass.| Press NO and you will be given the choice to quit or retry.
2310 2311	1005	505	Facilities are not ok.| Correct the conditions in red or yellow.| Press YES to ignore errors and continue with system startup.| Press NO to recheck facilities.
2402 2403	1051	507	Low City Water flow.
2404 2405	1052	507	Low Cryo coolant flow.
2406 2407	1053	507	Low Platen coolant flow.
2408 2409	1054	507	Low Focus Cup coolant flow.
2410 2411	1055	507	Low EFlood coolant flow.
2412 2413	1056	507	Low End Station Pump coolant flow.
2414 2415	1057	507	Low Stage Pump coolant flow.
2416 2417	1058	507	Doors open.
2418 2419	1059	507	Low DI water tank level.
2420 2421	1060	507	Low Valve air pressure.
2422 2423	1061	507	Low Bearing air pressure.
2424 2425	1062	507	Ground facil Error: Motor Generator.
2426 2427	1063	507	City water too hot.
2428 2429	1064	507	Ground water too hot.
2430 2431	1065	507	Bad ground remotes communications.
2450 2451	1075	507	Low Source coolant flow.
2452 2453	1076	507	Low Source magnet coolant flow.
2454 2455	1077	507	Low Vacuum pump coolant flow.
2456 2457	1078	507	Low Analyzer magnet coolant flow.
2458 2459	1079	507	Low Quad magnet coolant flow.
2460 2461	1080	507	Low Lens magnet coolant flow.
2462 2463	1081	507	Analyzer magnet too hot.
2464 2465	1082	507	Quad1 magnet too hot.
2466 2467	1083	507	Quad2 magnet too hot.
2468 2469	1084	507	Lost Purge N2.
2470 2471	1085	507	Lens Magnet too hot.
2472 2473	1086	507	Lost Exhaust air flow.
2474 2475	1087	507	Terminal DI water tank level low.
2476 2477	1088	507	High Voltage not armed.
2478 2479	1089	507	Terminal water too hot.
2480 2481	1090	507	Terminal water resistivity too low.
2482 2483	1091	507	Bad Terminal remote communications.

Factory Automation (ACH) Errors

80302 80303	40001	505	ACH MODE CHANGE ERROR
80304 80305	40002	505	Equipment received out of range data
80320 80321	40010	505	ACH does not respond--Retries exhausted

80322 80323	40011	505	Equipment detects a receive comm. error
80324 80325	40012	505	Equipment detects a send comm. error
80326 80327	40013	505	Equipment detects a comm. interleave
80328 80329	40014	505	Equipment received illegal commands| from ACH
80340 80341	40020	505	Equipment finds no cassette on| the designated ACH port
80342 80343	40021	505	Equipment finds no cassette in| the designated loadlock
80344 80345	40022	505	Recipe and Lot fit not found
80346 80347	40023	505	Cassette not found in equipment| cassette table
80360 80361	40030	505	Equipment Constant FACTAUTO interlock
80498 80499	40099	505	ACH Error Detected.| This message will be automatically cleared| after ACH error recovery. If the ACH is| unable to recover, press PROCEED and check| ACH states afterwards.
80380 80381	40040	505	Recipe $ is not valid.
80382 80383	40041	505	Recipe $ is missing.
81702 81703	40701	505	ACH does not accept Link command
81710 81711	40705	505	ACH does not accept AGV Enable command
81712 81713	40706	505	ACH does not return cassette status data
81720 81721	40710	505	ACH returns illegal movement status
81730 81731	40715	505	ACH does not return sensor status data
81742 81743	40721	505	ACH does not accept Lamp or Port Use command:| ACH is not linked
81744 81745	40722	505	ACH does not accept Lamp or Port Use command:| Cassette port is not used
81762 81763	40731	505	ACH does not accept Move command:| ACH is not linked
81764 81765	40732	505	ACH does not accept Move command:| ACH is transferring a cassette
81766 81767	40733	505	ACH does not accept Move command:| Cassette is not found at the transfer| origination
81768 81769	40734	505	ACH does not accept Move command:| Cassette is found at the transfer destination
81770 81771	40735	505	AGV is accessing ACH
81772 81773	40736	505	Discrepancy is found in lot information
81774 81775	40737	505	Command is illegal
81776 81777	40738	505	Access to equipment is denied
81778 81779	40739	505	End Station sensor interlock prevents| cassette transfer
81782 81783	40741	505	ACH is not linked
81784 81785	40742	505	ACH is not transferring a cassette
81786 81787	40743	505	ACH is in an error condition

GasBox 3 Errors

74564 74565	37132	515	*** WARNING: CRITICAL ERROR **** | The gas bottle valve is still open or has failed. Please get immediate and experienced help.

GasBox 4 Errors

76564 76565	38132	515	*** WARNING: CRITICAL ERROR **** | The gas bottle valve V10 is still open or has failed. Please get immediate and experienced help.

GasBox 5 Errors

138564 138565	69132	515	*** WARNING: CRITICAL ERROR **** | The gas bottle valve is still open or has failed. Please get immediate and experienced help.

GasBox 7 Errors

136564 136565	68132	515	*** WARNING: CRITICAL ERROR **** | The gas bottle is still open or has failed. Please get immediate and experienced help.

GasBox 8 Errors

132564 132565	66132	515	*** WARNING: CRITICAL ERROR **** | The gas bottle is still open or has failed. Please get immediate and experienced help.

GasBox 9 Errors

140564 140565	70132	515	*** WARNING: CRITICAL ERROR **** | The gas bottle valve is still open or has failed. Please get immediate and experienced help.

GasBox HP Errors

54564 54565	27132	515	*** WARNING: CRITICAL ERROR **** | The gas bottle valve is still open or has failed. Please get immediate and experienced help.

Gases Errors

6564 6565	3132	515	*** WARNING: CRITICAL ERROR **** | The gas bottle valve is still open or has failed. Please get immediate and experienced help.

GEM / SECSII Errors

146302 146303	73001	515	Cannot change equipment constants.
146542 146543	73121	515	Insertion of an unrelated job lot into a job chain is prohibited.
146544 146545	73122	515	POTENTIAL CHAINED IMPLANT PROPOSED:| Please verify duplicate processing of same lot is desired.
146564 146565	73132	505	Left Cassette ID Mismatch.| Expected: $| Actual : $| Please select YES to continue processing| or NO to abort.
146566 146567	73133	505	Right Cassette ID Mismatch.| Expected: $| Actual : $| Please select YES to continue processing| or NO to abort.
146568 146569	73134	505	Left Missing Waf:|$\|$| Press PROCEED to discard job.

146570 146571	73135	505	Right Missing Waf:|$\|$| Press PROCEED to discard job.
146572 146573	73136	505	Left Extra Waf:|$\|$| Press PROCEED to discard job.
146574 146575	73137	505	Right Extra Waf:|$\|$| Press PROCEED to discard job.
146576 146577	73138	505	Left Cross Slot:|$\|$| Please check wafers in the cassette.
146578 146579	73139	505	Right Cross Slot:|$\|$| Please check wafers in the cassette.
146584 146585	73142	505	Left Cassette ID Mismatch.| Expected: $| Actual : $| Press PROCEED to discard job.
146586 146587	73143	505	Right Cassette ID Mismatch.| Expected: $| Actual : $| Press PROCEED to discard job.
146600 146601	73150	505	Left SMART Tag Status Read Error.| To retry, remove and place the pod.
146602 146603	73151	505	Right SMART Tag Status Read Error.| To retry, remove and place the pod.
146604 146605	73152	505	Left SMART Tag Lotid Write Error.| Please check SMART Tag.
146606 146607	73153	505	Right SMART Tag Lotid Write Error.| Please check SMART Tag.
146608 146609	73154	505	Left SMART Tag Lotid Read Error.| Please check SMART Tag.
146610 146611	73155	505	Right SMART Tag Lotid Read Error.| Please check SMART Tag.

Hardware Errors

90660 90661	45180	505	POST IMPLANT Mapping WAFER MISSING Alert!| The Wafer in slot $ was not returned to the cassette.

Hazards Errors

114302 114303	57001	507	Cryo temperatures: Chamber = $ Left = $ Right = $.
114304 114305	57002	507	Touch screen communications have been restored.
114360 114361	57030	507	Touch screen failure: initialization not completed.
114362 114363	57031	507	Touch screen failure: no response message.
114364 114365	57032	507	Touch screen failure: response message incomplete.
114366 114367	57033	507	Touch screen failure: expected response not received.
114368 114369	57034	507	Touch screen failure: unexpected response message.
114370 114371	57035	507	Touch screen failure: error in response message.
114502 114503	57101	507	Software has detected that the outer enclosure doors are open and high| voltage is on. The high voltage power supplies have been shut down.
114504 114505	57102	507	Software has detected that the extraction power supply is on without| sufficient suppression. The extraction power supply has been shut down.| Extraction suppression must be at least 900 volts to prevent exposure| to X-Ray radiation.
114506 114507	57103	507	Software has detected that the accel power supply is on without| sufficient suppression. The accel power supply has been shut down.| Accel suppression must meet the following requirements to prevent exposure to X-Ray radiation:| Accel > 100 volts (.1kV): Supp = 2.0kV + (Accel * 0.015)| Accel < or = 100 volts (.1kV): Supp = 0.5kV + (Accel * 0.015)
114508 114509	57104	507	Software has detected that source power is on without the source being| in vacuum. Source and extraction power have been shut down, the source| vacuum chamber has been isolated.
114510 114511	57105	507	Software has detected that the mirror power supply is on without the| beamline being in vacuum. The mirror power supply has been shut down.
114512 114513	57106	507	Software has detected that the deflector power supply is on without the| beamline being in vacuum. The deflector power supply has been shut down.
114514 114515	57107	507	Software has detected that the accel power supply is on without the| beamline being in vacuum. The accel and accel suppression power| supplies have been shut down.
114516 114517	57108	507	Software has detected that the decel power supply is on with either| the source or beamline not in vacuum. The decel power supply has been| shut down.

114518 114519	57109	507	Software has detected that there is too much beam power with the| reducer extended. Beam power is defined as Extraction Voltage times| Extraction Current. The reducer has been retracted. Either reduce| the beam power or increase the Max Beam Reducer Power on the| Miscellaneous Interlocks Edit screen.
114520 114521	57110	507	Software has detected that beam is possibly in the focus cup with no| cooling flow to the focus cup. The extraction and extraction suppression| power supplies have been shut down, the setup cup has been extended.
114522 114523	57111	507	Software has detected that beam is possibly on the platen with no| cooling flow to the platen. The extraction and extraction suppression| power supplies have been shut down, the setup cup has been extended.
114524 114525	57112	507	Software has detected that high voltage is up, the service cart is| active, and the Isolated Service Cart (Option 26) is not selected.| High voltage has been shut down.
114526 114527	57113	507	Software has detected that the inlet cooling water is too hot. It is| also possible that the sensor is disconnected. The following items| have been shutdown:| All high voltage supplies.| All magnets.| All ion source power supplies.| All vacuum pumps.| The next logged message will detail the exact nature of the failure.
114528 114529	57114	507	Software has detected that the inlet cooling water is not flowing.| The following items have been shutdown:| All high voltage supplies.| All magnets.| All ion source power supplies.| All vacuum pumps.
114530 114531	57115	507	Software has detected that the ground cooling water is too hot. It is| also possible that the sensor is disconnected. The following items| have been shutdown:| All high voltage supplies.| All vacuum pumps (if End Station pumps are water cooled).| All cryo pumps (if cooled by ground water).| The next logged message will detail the exact nature of the failure.
114532 114533	57116	507	Software has detected that the ground cooling water pump is running| with all the valves shut. The ground water pump has been shutdown.
114534 114535	57117	507	Software has detected that the ground cooling water pump is running| with the water tank empty. The ground water pump has been shutdown.
114536 114537	57118	507	Software has detected that the machine.con file is possibly corrupted.| Enter the Magnet Constants screen and verify that all values are| correct. Contact Product Support for details.
114538 114539	57119	507	Software has detected that the terminal cooling water is too hot. It| is also possible that the sensor is disconnected. The following items| have been shutdown:| All high voltage supplies.| All magnets.| All ion source power supplies.| All vacuum pumps, except for the end station roughing pump.| The next logged message will detail the exact nature of the failure.
114540 114541	57120	507	Software has detected that the terminal cooling water pump is running| with all the valves shut. The terminal water pump has been shutdown.
114542 114543	57121	507	Software has detected that the terminal cooling water pump is running| with the water tank empty. The terminal water pump has been shutdown.
114544 114545	57122	507	Software has detected that the terminal cooling water resistivity is| too low with high voltage on. All high voltage supplies have been shut| down. Low resistivity is defined as less than 1.99 Megohms per cubic| centimeter.
114546 114547	57123	507	Software has detected that the Electron Flood Gun filament supply is on| with no water flow. The filament supply has been shut down.
114548 114549	57124	507	Software has detected that the source exhaust tube is excessively| coated and high voltage is up. The high voltage supplies have been shut| down. In order to restore operation:| The source exhaust tube must be cleaned or replaced.| The exhaust current leakage monitor must be cleared.
114550 114551	57125	507	Software has detected that the beamline exhaust tube is excessively| coated and high voltage is up. The high voltage supplies have been shut| down. In order to restore operation:| The beamline exhaust tube must be cleaned or replaced.| The exhaust current leakage monitor must be cleared.
114552 114553	57126	507	Software has detected a loss of exhaust air flow with source power on.| The source has been shut down. If ECO 30 is not selected (Exhaust Inter-| locks Gas Box Only), the beamline has also been shut down.
114554 114555	57127	507	Software has detected that the terminal pump exhaust overheated.| The terminal vacuum system has been shut down.
114556 114557	57128	507	Software has detected that the source turbo speed dropped by more than| 10%. This indicates a vacuum failure. The source vacuum system has been| shut down.
114558 114559	57129	507	Software has detected that the source turbo has been on for 16 minutes| and has not reached 95% of full speed. This indicates a vacuum failure.| The source vacuum system has been shut down.
114560 114561	57130	507	Software has detected that the beamline turbo speed dropped by more than| 10%. This

			indicates a vacuum failure. The beamline vacuum system has| been shut down.
114562 114563	57131	507	Software has detected that the beamline turbo has been on for 16 minutes| and has not reached 95% of full speed. This indicates a vacuum failure.| The beamline vacuum system has been shut down.
114564 114565	57132	507	Software has detected that the analyzer turbo speed dropped by more than| 10% or the pump status returned false. This indicates a vacuum failure.| The beamline vacuum system has been shut down.
114566 114567	57133	507	Software has detected that the analyzer turbo has been on for 16 minutes| and has not reached 95% of full speed. This indicates a vacuum failure.| The beamline vacuum system has been shut down.
114568 114569	57134	507	Software has detected that the terminal turbo pump cooling water is not| flowing and the pumps are on. The terminal vacuum system has been shut| down.
114570 114571	57135	507	Software has detected that the source turbo purge nitrogen is lost| with the gas box manifold shut off valve open. The gas box has been| shut down. Purge nitrogen is needed to prevent corrosion of the turbo| bearings.
114572 114573	57136	507	Software has detected that the terminal dry pumps are too hot and the| pumps are on. The terminal vacuum system has been shut down.
114574 114575	57137	507	Software has detected that the end station dry pump is too hot and the| pump is on. The end station pump has been shut down.
114576 114577	57138	507	Software has detected that the end station dry pump has no coolant flow| and the pump is on. The end station pump has been shut down.
114578 114579	57139	507	Software has detected that the stage dry pumps are too hot and the| pumps are on. The beamline vacuum system has been shut down.
114580 114581	57140	507	Software has detected that the stage dry pumps have no coolant flow| and the pumps are on. The beamline vacuum system has been shut down.
114582 114583	57141	507	Software has detected that the cryo compressor has no coolant flow| and the compressor is on. The cryo pumps have been shut down.
114584 114585	57142	507	Software has detected that the chamber cryo temperature has exceeded the| setpoint. An automatic cryo regen has been initiated.
114586 114587	57143	507	Software has detected that the left load lock cryo temperature has| exceeded the setpoint. An automatic cryo regen has been initiated.
114588 114589	57144	507	Software has detected that the right load lock cryo temperature has| exceeded the setpoint. An automatic cryo regen has been initiated.
114590 114591	57145	507	Software has detected that there is no coolant flow to the ion source.| The source has been shut down.
114592 114593	57146	507	Software has detected that the filament and extraction power supplies| are on and the source isolation valve is closed. There is a possibility| the beam is striking the isolation valve. The extraction power supply| has been shut down.
114594 114595	57147	507	Software has detected that source pressure rose above 2.0E-4 with the| manifold shutoff valve open. The manifold shutoff valve has been closed.
114596 114597	57148	507	Software has detected that beamline pressure rose above 4.0E-5 with the| manifold shutoff valve open. The manifold shutoff valve has been closed.
114598 114599	57149	507	Software has detected a loss of communications with the vaporizer. The| source has been shut down.
114600 114601	57150	507	Software has detected a vaporizer runaway. The vaporizer current| readback exceeds the program by over 10%. The source has been shut down.
114602 114603	57151	507	Software has detected a vaporizer runaway. The vaporizer heater| temperature readback exceeds the program by over 25 degrees and the| current readback is greater than 12% of full scale. The source has been| shut down.
114604 114605	57152	507	Software has detected a broken vaporizer thermocouple. The vaporizer| temperature readback exceeds 200 degrees and the heater temperature is| less than 50 degrees. The source has been shut down.
114606 114607	57153	507	Software has detected a loss of touch screen communication. The next| logged message will detail the exact nature of the failure.
114608 114609	57154	507	Software has detected a particle monitor diagnostics fault on left side.| Please check the particle monitor.
114610 114611	57155	507	Software has detected that the particle threshold has been exceeded on| the left side.
114612 114613	57156	507	Software has detected a particle monitor diagnostics fault on right| side. Please check the particle monitor.
114614 114615	57157	507	Software has detected that the particle threshold has been exceeded on| the right side.
114616 114617	57158	507	Software has detected that the source magnet has no coolant flow and the| magnet is on. The ion source and the source magnet have been shut down.
114618 114619	57159	507	Software has detected that the analyzer magnet has no coolant flow and| the magnet or

			extraction is on. The analyzer magnet and extraction| power supply have been shut down.
114620 114621	57160	507	Software has detected that the analyzer magnet is too hot and the| magnet is on. The analyzer magnet and extraction power supply have| been shut down.
114622 114623	57161	507	Software has detected that the quad magnets have no coolant flow and| the magnets are on. The quad magnets and extraction power supply have| been shut down.
114624 114625	57162	507	Software has detected that the quad 1 magnet is too hot and the| magnet is on. The quad 1 magnet and extraction power supply have| been shut down.
114626 114627	57163	507	Software has detected that the quad 2 magnet is too hot and the| magnet is on. The quad 2 magnet and extraction power supply have| been shut down.
114628 114629	57164	507	Software has detected that the lens magnet has no coolant flow and| the magnet is on. The lens magnet and extraction power supply have| been shut down.
114630 114631	57165	507	Software has detected that the lens magnet is too hot and the| magnet is on. The lens magnet and extraction power supply have| been shut down.
114632 114633	57166	507	Software has detected that the target bias has deviated by more| than 5%. The target bias supply has been shutdown.
114634 114635	57167	507	Software has detected that the end station dry pump has no coolant flow| and the pump is on. The end station pump has been shut down.
114636 114637	57168	507	Software has detected that the stage dry pumps have no coolant flow| and the pumps are on. The beamline vacuum system has been shut down.
114638 114639	57169	507	Software has detected that the linear motor has no coolant flow and it is scanning. The implant has been placed on hold.
114640 114641	57170	507	Software has detected that there is toxic leak.| The high voltage supplies have been shut down.

IBM Gases Errors

44564 44565	22132	515	*** WARNING: CRITICAL ERROR **** | The gas bottle valve is still open or has failed. Please get immediate and experienced help.

Implant Errors

134320 134321	67010	505	Filament power supply is turned off.
134322 134323	67011	505	Arc power supply is turned off.
134324 134325	67012	505	Source magnet power supply is turned off.
134326 134327	67013	505	Cup suppressor power supply is turned off.
134328 134329	67014	505	Quad 1 power supply is turned off.
134330 134331	67015	505	Quad 2 power supply is turned off.
134332 134333	67016	505	Amu magnet power supply is turned off.
134334 134335	67017	505	Lens magnet power supply is turned off.
134336 134337	67018	505	Extraction power supply is turned off.
134338 134339	67019	505	Suppression power supply is turned off.
134340 134341	67020	505	Source CCIG or HCIG Power is turned off.
134342 134343	67021	505	Scanner CCIG or HCIG Power is turned off.
134344 134345	67022	505	Chamber CCIG or HCIG Power is turned off.
134346 134347	67023	505	Analyzer CCIG or HCIG Power is turned off.
134348 134349	67024	505	The Dose Integrator must pass a Self-Test without any range errors prior to running a batch of wafers. Run the SYSTEM-STARTUP sequence or Self Test from BEAMSCAN to correct this interlock.
134350 134351	67025	505	Manifold shutoff valve is closed or the vaporizer power supply is turned off.
134360 134361	67030	505	Arc current doesn't match setpoint, | the readback value deviates more than $% from the programmed value

134362 134363	67031	505	Arc voltage doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134364 134365	67032	505	Gas pressure doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134366 134367	67033	505	Source magnet current doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134368 134369	67034	505	Extraction voltage doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134370 134371	67035	505	Extraction current doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134372 134373	67036	505	Suppression voltage doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134374 134375	67037	505	Suppression current doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134376 134377	67038	505	Mirror voltage doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134378 134379	67039	505	Target bias voltage doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134380 134381	67040	505	Quad 1 magnet current doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134382 134383	67041	505	Quad 2 magnet current doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134384 134385	67042	505	Amu magnet current doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134386 134387	67043	505	Lens magnet current doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134388 134389	67044	505	Accel voltage doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134390 134391	67045	505	Accel current doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134392 134393	67046	505	Accel suppression voltage doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134394 134395	67047	505	Accel suppression current doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134396 134397	67048	505	Target cup position doesn't match setpoint, | the readback value deviates more than $% from the programmed value
134398 134399	67049	505	Vaporizer temperature doesn't match setpoint; | the readback value deviates more than $% from the programmed value.
134400 134401	67050	505	Decel voltage doesn't match setpoint; | the readback value deviates more than $% from the programmed value.
134402 134403	67051	505	Faraday cup suppression with flood gun option | doesn't match setpoint; | the readback value deviates more than $% from the programmed value.
134404 134405	67052	505	Electron Flood Gun secondary electron emission current is more than $% different from the value specified in the recipe.
134406 134407	67053	505	Decel suppression voltage doesn't match setpoint; | the readback value deviates more than $% from the programmed value.
134408 134409	67054	505	Left Elevator Turbo Pump failure.
134410 134411	67055	505	Communications failure with Right Elevator Turbo Pump.
134412 134413	67056	505	Right Elevator Turbo Pump failure.
134414 134415	67057	505	A communications failure has occurred with the On-Board Network Terminal. Cryopump status is unknown and all cryo valves have been closed. Check RS-232 connection.
134416 134417	67058	505	Platen Movement Failure!| Expected Sensor Value = $| __Actual Sensor Value = $| Although the roplat motor encoder reported arriving at the correct position, the secondary sensor did not detect proper movement. A problem likely exists with

			the roplat motor encoder or the secondary movement sensor.
134418 134419	67059	505	Communications failure with Left Elevator Turbo Pump.
134440 134441	67070	505	Arc current unstable, | changed more than $% since last reading
134442 134443	67071	505	Arc voltage unstable, | changed more than $% since last reading
134444 134445	67072	505	Gas pressure unstable, | changed more than $% since last reading
134446 134447	67073	505	Source magnet current unstable, | changed more than $% since last reading
134448 134449	67074	505	Extraction voltage unstable, | changed more than $% since last reading
134450 134451	67075	505	Extraction current unstable, | changed more than $% since last reading
134452 134453	67076	505	Suppression voltage unstable, | changed more than $% since last reading
134454 134455	67077	505	Suppression current unstable, | changed more than $% since last reading
134456 134457	67078	505	Mirror voltage unstable, | changed more than $% since last reading
134458 134459	67079	505	Target bias voltage unstable, | changed more than $% since last reading
134460 134461	67080	505	Quad 1 magnet current unstable, | changed more than $% since last reading
134462 134463	67081	505	Quad 2 magnet current unstable, | changed more than $% since last reading
134464 134465	67082	505	Amu magnet current unstable, | changed more than $% since last reading
134466 134467	67083	505	Lens magnet current unstable, | changed more than $% since last reading
134468 134469	67084	505	Accel voltage unstable, | changed more than $% since last reading
134470 134471	67085	505	Accel current unstable, | changed more than $% since last reading
134472 134473	67086	505	Accel suppression voltage unstable, | changed more than $% since last reading
134474 134475	67087	505	Accel suppression current unstable, | changed more than $% since last reading
134476 134477	67088	505	Target cup position unstable, | changed more than $% since last reading
134478 134479	67089	505	Vaporizer temperature unstable, | changed more than $% since last reading
134480 134481	67090	505	Decel voltage unstable, | changed more than $% since last reading
134482 134483	67091	505	Faraday cup suppression with flood gun option unstable, | changed more than $% since last reading
134484 134485	67092	505	Electron Flood Gun secondary electron emission current has changed since the last reading. It is now more than $% different from the value specified in the recipe.
134486 134487	67093	505	Decel suppression voltage unstable, | changed more than $% since last reading
134520 134521	67110	505	Source pressure exceeds ~2.0E-5 2.6E-3~ ~Torr Pa~ or the turbo speed is less than 90%
134522 134523	67111	505	Chamber pressure exceeds recipe setpoint. The turbo speed is less than 90% or the CCIG may be disconnected.
134524 134525	67112	505	TOTAL BEAM ENERGY MISMATCH WITH RECIPE. |Desired Energy (keV) = $ |Calculated Energy = $ |Probe Readback = $
134540 134541	67120	505	LEFT STEP #$ TIMED OUT!! || This step took more than 10 seconds to complete. Normally, all steps finish within 1 second. Most likely something is wrong with a motion controller readback signal. Go to the end station initialization scr
134542 134543	67121	505	RIGHT STEP #$ TIMED OUT!! || This step took more than 10 seconds to complete. Normally, all steps finish within 1 second. Most likely something is wrong with a motion controller readback signal. Go to the end station initialization screen to check the end station.
134544 134545	67122	505	Bearing stopped in wrong position. | The readback position of the Bearing is more than 10 mils away from where it should be. AP= $
134546 134547	67123	505	LEFT STEP #$ TIMED OUT.| The multi-line energy specified in line $ of the recipe was not achieved in $ seconds.
134548 134549	67124	505	RIGHT STEP #$ TIMED OUT.| The multi-line energy specified in line $ of the recipe was not achieved in $ seconds.
134550 134551	67125	505	Bearing stopped in wrong position. | The readback position of the Bearing is more than 10 mils away from where it should be. AP= $ ENCODER= $
134552 134553	67126	505	Handler did not extend. | The handler did not reach the extended position.
134560 134561	67130	505	Unknown error code. | Communication error with uniformity controller.
134562 134563	67131	505	Uniformity controller error code #1 || No scans made after the dose was cleared. | The wafer

			on the platen is not implanted.
134564 134565	67132	505	Uniformity controller error code #2 || Implant held by operator command.
134566 134567	67133	505	Uniformity controller error code #3 || Implant held due to beam current drift.
134568 134569	67134	505	Uniformity controller error code #4 || Implant held due to beam dropout.
134570 134571	67135	505	Uniformity controller error code #5 || Air bearing position error has been detected or linear motor air pressure is too low. If air pressure is correct then air bearing problem is likely. Initialize end station, if error reoccurs possible causes are:|1. Linear motor problem.|2. End of scan sensor must be repositioned or has failed.|3. UCC problem.
134572 134573	67136	505	Uniformity controller error code #6 || Implant held due to accel voltage drift.
134574 134575	67137	505	Uniformity controller error code #7 || --- Reserved for future error ---
134576 134577	67138	505	Uniformity controller error code #8 || --- Reserved for future error ---
134578 134579	67139	505	Uniformity controller error code #9 || --- Reserved for future error ---
134580 134581	67140	505	Uniformity controller error code #10 || --- Reserved for future error ---
134582 134583	67141	505	Uniformity controller error code #11 || --- Reserved for future error ---
134584 134585	67142	505	Uniformity controller error code #12 || --- Reserved for future error ---
134586 134587	67143	505	Uniformity controller error code #13 || --- Reserved for future error ---
134588 134589	67144	505	Uniformity controller error code #14 || --- Reserved for future error ---
134590 134591	67145	505	Uniformity controller error code #5 || Bearing in lower limit switch.
134592 134593	67146	505	Uniformity controller error code #5 || Bearing in upper limit switch.
134594 134595	67147	505	Uniformity controller error code #5 | Air pressure at the return side of the bearing is low.
134640 134641	67170	505	Target suppression voltage is too low.
134642 134643	67171	505	Beamscan setup failed. Increase X-SIGMA.
134644 134645	67172	505	Beam parameters are incorrect.
134650 134651	67175	505	Aborting implant(s). | Running implant with illegal function code (FC=0).
134660 134661	67180	505	Left side lost a wafer.| Check this side visually for the presence of a wafer. || Do you want to continue with this batch?
134662 134663	67181	505	Right side lost a wafer.| Check this side visually for the presence of a wafer. || Do you want to continue with this batch?
134668 134669	67184	505	Left side has the wrong wafer type.| The wafer might be so far off center that the wafer type can not be verified in one orient try. Orienter Failure Error Code:$| Do you want to orient again?
134670 134671	67185	505	Right side has the wrong wafer type.| The wafer might be so far off center that the wafer type can not be verified in one orient try. Orienter Failure Error Code:$| Do you want to orient again?
134674 134675	67187	505	Orienter light source is fading.
134676 134677	67188	505	Orienter light source is broken.
134680 134681	67190	505	Orienter sensor error.| Not enough data points were acquired from the orienter light sensor to orient the wafer. This indicates a problem with the A to D conversion hardware or software because data storage point $ is out of range. | Contact customer service and include this error number.
134682 134683	67191	505	Software mismatch within multiline parameters. | Contact customer service and include this error number.
134690 134691	67195	505	Hazardous condition encountered.|| A red screen condition is detected. Before bringing up the red screen, the implant will be put on hold in a controlled fashion.
134710 134711	67205	505	The gas cooling pressure behind the wafer is too low.
134712 134713	67206	505	The gas cooling pressure behind the wafer is too high.
134714 134715	67207	505	The gas cooling pressure behind the wafer did not reach it's desired setpoint of $ ~mTorr mPa~.
134716 134717	67208	505	Cooling option not selected, although recipe specifies cooling.
134718 134719	67209	505	The one or both load lock isolation valves are not open.
134720 134721	67210	505	Tilt angle is greater than 13 degrees with the electron flood gun selected.

134722 134723	67211	505	The handlers are in danger of colliding with each other during the exchange of the wafers on the platen. The handler that was retracting the wafer that was just implanted did not retract fast enough. Check the encoder of that handler to see if there is a problem.
134724 134725	67212	505	The traveling faraday cup is left in the scan path of the air bearing. It is not safe to start the implant.
134726 134727	67213	505	The head is not in the implant position that is specified by the current tilt angle. The wafer can not be implanted correctly.
134728 134729	67214	505	There is no water flow to the platen. It is not safe to start an implant.
134730 134731	67215	505	Orienter light level indicates that a wafer from the left side did not get transferred to the platen. | Check that platen pins are functioning correctly.
134732 134733	67216	505	The flag on the bearing is not made. This indicates a bearing breakaway condition. The handler can not be rotary extended to pick up the wafer that was just implanted.
134734 134735	67217	505	Orienter light level indicates that a wafer from the right side did not get transferred to the platen. | Check that elevator is functioning correctly.
134740 134741	67220	505	The Uniformity Controller is not responding.
134742 134743	67221	505	The number of vertical scans done on the current wafer = $.| This is more than 10% different from the computed number of scans.
134744 134745	67222	505	The amount of dose (% of total) for the current wafer was more than +/- .5% of the allowable variation.
134746 134747	67223	505	ELECTROSTATIC CLAMP FAIL, POSSIBLE LOST WAFER:| It is unsafe to continue because the electrostatic clamp current readback indicates that the wafer on the platen is unclamped, or the wafer has been lost.
134748 134749	67224	505	ELECTROSTATIC CLAMP WILL NOT TURN OFF:| It is unsafe to continue because the electrostatic clamp current readback indicates that the wafer on the platen is clamped.
134750 134751	67225	505	ELECTROSTATIC CLAMP FAULT:| The bearing is not allowed to be moved to the load position because the electrostatic clamp is on.
134752 134753	67226	505	Electro static clamp failed at step# $. ECLAMP-I = $ DAC units.
134756 134757	67228	505	ELECTROSTATIC CLAMP FAILURE:| The $ % window for the electrostatic clamp readback current was exceeded. To prevent wafer loss, the bearing has been moved to a safe position and the implant has been held.| The initial value of the eclamp readback current at the start of the implant was $ DAC units.
134764 134765	67232	505	ANALYZER PRESSURE FAILURE IN PRE-IMPLANT CHECK:| The analyzer pressure is greater than ~4.0E-5 5.3E-3~ ~Torr Pa~ CCIG, (or ~8.0E-5 1.0E-2~ ~Torr Pa~ HCIG). Please check the Manual Vacuum Screen.
134766 134767	67233	505	ROPINS UP FAILURE:| After commanding the ropins up, the ropins motor home position sensor indicates that the ropins are at the home (down) position.
134768 134769	67234	505	ROPINS DOWN FAILURE:| After commanding the ropins down, the ropins motor home position sensor indicates that the ropins are not at the home (down) position.
134770 134771	67235	505	Cassette is not sensed.
134772 134773	67236	505	PLATEN FLOW FAILURE:| No coolant flow to the platen, implant on HOLD.
134776 134777	67238	505	HANDLER ROTARY EXTEND INTERLOCK VIOLATION:| While attempting to transfer a wafer from the handler to the platen, wafer clamped sensors indicate that there is already a wafer on the platen.
134778 134779	67239	505	HANDLER ROTARY EXTEND INTERLOCK VIOLATION:| While attempting to transfer a wafer from the handler to the platen, wafer tracking indicates that there is already a wafer on the platen.
134780 134781	67240	505	HANDLER ROTARY EXTEND INTERLOCK VIOLATION:| While attempting to transfer a wafer from the platen to the handler, wafer tracking indicates that there is already a wafer on the handler. Extending the handler will cause the wafer to collide with the pins.
134782 134783	67241	505	Centering Clamp sensors are not in Wafer-Receive condition| YES to continue, NO to cancel. | Sensor1: $, Sensor2: $, Sensor3: $ | (Normal : 0)
134784 134785	67242	505	Wafer is not sensed by Centering Clamp sensors. Sensor1: $ | Sensor2: $ | Sensor3: $ (Normal : -1)
134786 134787	67243	505	The chamber cryo door is closed:| It is not safe to start an implant.
134788 134789	67244	505	CHAMBER CRYO DOOR CLOSED:| Target Chamber cryo door closed, implant on HOLD.

134800 134801	67250	505	CRITICAL INTERLOCK ENCOUNTERED ON PRE-IMPLANT CHECK.| $ has exceeded its recipe limits.| Min Limit = $, Actual = $, Max Limit = $| The implant will not be not be allowed to start until this parameter is within its recipe limits.
134802 134803	67251	505	CRITICAL INTERLOCK ENCOUNTERED DURING IMPLANT.| $ has exceeded its recipe limits.| Min Limit = $, Actual = $, Max Limit = $| The implant will not be not be allowed to continue until this parameter is within its recipe limits.
134804 134805	67252	505	WARNING INTERLOCK ENCOUNTERED ON PRE-IMPLANT CHECK.| $ has exceeded its recipe limits.| Min Limit = $, Actual = $, Max Limit = $| Hold On Warning ECO (72) selected; the implant will not be not be allowed to start until this parameter is within its recipe limits.
134806 134807	67253	505	WARNING INTERLOCK ENCOUNTERED ON PRE-IMPLANT CHECK.| $ has exceeded its recipe limits.| Min Limit = $, Actual = $, Max Limit = $| Select YES to continue the implant and ignore this parameter for the remainder of the implant, or NO to remain in the HOLD state.| Hold On Warning ECO (72) deselected; the implant will be allowed to start only if the operator chooses to ignore this parameter for the remainder of the implant.
134808 134809	67254	505	WARNING INTERLOCK ENCOUNTERED DURING IMPLANT.| $ has exceeded its recipe limits.| Min Limit = $, Actual = $, Max Limit = $| Hold On Warning ECO (72) selected; the implant will not be not be allowed to continue until this parameter is within its recipe limits. The wafer presently on the platen has received its full dose.
134810 134811	67255	505	WARNING INTERLOCK PRESENT AT COMPLETION OF THE BATCH.| One or more parameter has been found to exceed its recipe limits after the last wafer was implanted.| Refer to the chrono log for information on the parameter(s).
134812 134813	67256	505	CRITICAL SCANS INTERLOCK.| The actual scans for the wafer in slot $ exceeded the limits specified in the recipe.| Min Limit = $, Actual = $, Max Limit = $.
134814 134815	67257	505	SCANS INTERLOCK WARNING, HOLD ON WARNING SELECTED.| BATCH PUT ON HOLD. | The actual scans for the wafer in slot $ exceeded the limits specified in the recipe.| Min Limit = $, Actual = $, Max Limit = $|
134816 134817	67258	505	SCANS INTERLOCK WARNING, HOLD ON WARNING NOT SELECTED.| REPORTED AT END OF BATCH.| The actual scans of a wafer in this batch had exceeded the limits specified in the recipe.| Refer to the chrono log for information on the wafer(s) in question.
134818 134819	67259	505	The RIGHT LOWER HANDLER did not return to the HOME position!| The Handler did not reach the home position as commanded. Insure the position of the handler, or insure the correct function of the position sensor.
134820 134821	67260	505	The LEFT LOWER HANDLER did not return to the HOME position!| The Handler did not reach the home position as commanded. Insure the position of the handler, or insure the correct function of the position sensor.
134822 134823	67261	505	There is a WAFER WALKOUT DETECTION!| There is a wafer extending out of the RIGHT cassette nest. It may be extending into the Iso-valve. The Beamline & Elevator may have to be vented manually. Visually inspect the Iso-valve opening to determine if it is safe to close. Vent the necessary systems and correct the condition using the ES-MANUAL functions.
134824 134825	67262	505	There is a WAFER WALKOUT DETECTION!| There is a wafer extending out of the LEFT cassette nest. It may be extending into the Iso-valve. The Beamline & Elevator may have to be vented manually. Visually inspect the Iso-valve opening to determine if it is safe to close. Vent the necessary systems and correct the condition using the ES-MANUAL functions.
134826 134827	67263	505	LEFT HANDLER not empty!| After implanting, the handler attempted to return the wafer to the cassette. When the handler was retracted awaiting the Elevator move to the next clear position the Handler is tested for a wafer. The orienter light level indicates a wafer on the handler. Visually inspect and correct the condition using the ES-MANUAL functions.
134828 134829	67264	505	RIGHT HANDLER not empty!| After implanting, the handler attempted to return the wafer to the cassette. When the handler was retracted awaiting the Elevator move to the next clear position the Handler is tested for a wafer. The orienter light level indicates a wafer on the handler. Visually inspect and correct the condition using the ES-MANUAL functions.
134834 134835	67267	505	The switch to LINEAR has failed!| The Brake actuator sensors for linear mode and rotary mode NOT, indicate the mode switch did not achieve linear state on the second try.
134836 134837	67268	505	The switch to ROTARY has failed!| The Brake actuator sensors for rotary mode and linear mode NOT, indicate the mode switch did not achieve rotary state on the second try.
134840 134841	67270	505	Upper Handler Sequencer Left Step #$ Timed OUT!! || This step took more than 10 seconds to complete. Normally, all steps finish within 1 second. Most likely something is wrong with a motion controller readback signal. Go to the end station initialization screen to check the end station. || Remember the step# and retry the implant. See if the implant stops at the same step again.

134842 134843	67271	505	Upper Handler Sequencer Right Step #$ Timed OUT!! || This step took more than 10 seconds to complete. Normally, all steps finish within 1 second. Most likely something is wrong with a motion controller readback signal. Go to the end station initialization screen to check the end station. || Remember the step# and retry the implant. See if the implant stops at the same step again.
134844 134845	67272	505	Lower Handler Sequencer Left Step #$ Timed OUT!! || This step took more than 10 seconds to complete. Normally, all steps finish within 1 second. Most likely something is wrong with a motion controller readback signal. Go to the end station initialization screen to check the end station. || Remember the step# and retry the implant. See if the implant stops at the same step again.
134846 134847	67273	505	Lower Handler Sequencer Right Step #$ Timed OUT!! || This step took more than 10 seconds to complete. Normally, all steps finish within 1 second. Most likely something is wrong with a motion controller readback signal. Go to the end station initialization screen to check the end station. || Remember the step# and retry the implant. See if the implant stops at the same step again.
134848 134849	67274	505	Implant Sequencer Left Step #$ Timed OUT!! || This step took more than 10 seconds to complete. Normally, all steps finish within 1 second. Most likely something is wrong with a motion controller readback signal. Go to the end station initialization screen to check the end station. || Remember the step# and retry the implant. See if the implant stops at the same step again.
134850 134851	67275	505	Implant Sequencer Right Step #$ Timed OUT!! || This step took more than 10 seconds to complete. Normally, all steps finish within 1 second. Most likely something is wrong with a motion controller readback signal. Go to the end station initialization screen to check the end station. || Remember the step# and retry the implant. See if the implant stops at the same step again.
134860 134861	67280	505	A previous motor failure has left a motor uninitialized. It is not possible to continue processing this batch. It is recommended that the implant be aborted from an end station manual screen, and all motors successfully initialized before the wafers are recovered.|| The current wafer has completed all of its implant steps.

Logging Errors

48506 48507	24103	515	hard disk full | please archive/delete some logs
48706 48707	24203	515	Hard disk full. Please archive/delete some logs. If you want to continue without logging, press [YES], Or press [NO] to cancel this process.

Manual Beam Setup Errors

10360 10361	5030	505	Remove target faraday cup from beam path.
10362 10363	5031	505	Unable to find an initial beam in the focus cup of at least 0.5% of the beam in the setup cup. Automatic beam setup cannot proceed.
10364 10365	5032	505	The $ power supply is shorted out (either internally or externally.)
10366 10367	5033	505	The $ power supply is at $, and can't reach its setpoint of $.
10368 10369	5034	505	Less than 10 nanoamps of beam in the setup cup: setup cannot continue.
10370 10371	5035	505	The requested energy of $ KeV cannot be achieved on the E-220 with an ion charge of $.
10388 10389	5044	505	The accel voltage is shorted out.|| Possible causes:| 1. The drop bars are down.| 2. The terminal grounding hook is on.
10390 10391	5045	505	The offset between the deflector programmed voltage and readback exceeds 5%. Automatic setup cannot continue.
10402 10403	5051	515	Switched over to DECEL mode, but| DECEL static continuity test has failed! Check auto decel hardware.

10404 10405	5052	515	Switched over to ACCEL mode, but| ACCEL static continuity test has failed! Check auto decel hardware.
10408 10409	5054	505	BEAM ENERGY PROBE FAILURE,| The beam energy varies by more than $.$%. The beam energy probe reads back $$$.$ KV.
10412 10413	5056	505	The requested energy of $ KeV cannot be achieved on the E-500 with an ion charge of $.
10414 10415	5057	505	The requested energy of $ KeV with an ion charge of $ cannot be achieved using the automatic source setup because it is too low.
10416 10417	5058	505	Automatic source setup cannot be achieved using the requested extraction voltage of $ kV because it exceeds $ kV which is the maximum allowable extraction based on calculations that use the kamu magnetic constants table.
10418 10419	5059	515	Continuity check on auto accel/decel switching cannot be done because enclosure doors are open and high voltage cannot be turned on.
10420 10421	5060	515	Continuity check on auto accel/decel switching cannot be done because the high voltage is not enabled.
10422 10423	5061	515	Enclosure doors are open. Do you still want to switch?| IF YES, ENSURE THAT ALL PERSONS ARE CLEAR OF AUTO-DECEL BAR BEFORE PROCEEDING.
10426 10427	5063	515	Continuity check on auto accel/decel switching cannot be done because the source or beamline is vented.
10428 10429	5064	505	BEAM CURRENT TOO HIGH FOR MIRROR SUPPLY OPERATION.| Cannot allow mirror to be turned on for single charged, accel mode as requested in the recipe.| Either set the MIRROR parameter in the recipe to 0 kV, or use a lower beam current specification.
64414 64415	32057	515	The Dose Integrator must pass a self test before a beamscan SETUP or CHECK can be run. Run the System Startup sequence, or the Self Test from the Beamscan screen, until all ranges Pass.

Networking Errors

20302 20303	10001	507	The licensing for the TSX operating system on this computer does not include network utilities, so the FTP server will not run.| | Please contact customer support to obtain revised licensing from the vendor.

Parametric Beam Setup Errors

110482 110483	55091	505	Unable to detect Setup Cup current. Verify that desired species is peaked and restart; otherwise check Setup Cup readback connections.
110502 110503	55101	505	AUTO SETUP: SETUP CUP BEAM CURRENT ERROR ! |RECIPE = $uA + $% AND $% |ACTUAL = $uA
110510 110511	55105	505	AUTO SETUP: UNABLE TO OPEN SOURCE ISOLATION VALVE DUE TO INADEQUATE SCANNER TURBO SPEED !
110512 110513	55106	505	AUTO SETUP: INTEGRATED BEAM CURRENT ERROR ! |RECIPE = $uA + $% AND $% |ACTUAL = $uA
110516 110517	55108	505	Arc Current has extinguished !
110524 110525	55112	505	AUTO SETUP: UNABLE TO MEASURE BEAM CURRENT. CHECK FARADAY CUP FOR FAULTY OPTIC LINK OR BROKEN PICKUP LEAD !
110526 110527	55113	505	Suppression current readback is not responding during tune. Check for open, or disconnected suppression cable.
110528 110529	55114	505	AUTO SETUP: CANNOT COMMUNICATE WITH GAS BOX, CHECK HIGH VOLTAGE DISABLE KEYSWITCH !
110532 110533	55116	505	AUTO SETUP: UNABLE TO GENERATE ARC CURRENT. MANUALLY VERIFY THAT

			SOURCE CAN GENERATE AND MAINTAIN STABLE ARC !
110540 110541	55120	505	AUTO SETUP: Beam Energy Probe Readback is| Greater than +/- 5 keV of Calculated Energy.
110542 110543	55121	505	AUTO SETUP: ARC CURRENT LOW LIMIT (3 mA) HAS BEEN REACHED, UNABLE TO ACHIEVE DESIRED BEAM CURRENT !
110546 110547	55123	505	AUTO SETUP: DESIRED DOPANT GAS IS UNAVAILABLE AT THIS TIME, CHECK BOTTLE STATUS AND BOTTLE PRESSURE !
110584 110585	55142	505	The pressure of the SDS bottle selected is below the empty bottle detector setting. The gas box has been shutdown. To continue, replace the bottle, turn off empty bottle detector, or reset the detector setting.
110614 110615	55157	505	Arc Current has exceeded power supply limit!
110634 110635	55167	505	AUTO SETUP: UNABLE TO MEASURE INTEGRATED BEAM !
110642 110643	55171	505	SCANNER SETUP FAILURE |RECIPE XSIGMA _= $ |MEASURED XSIGMA = $
110644 110645	55172	505	10 PCT SCAN INTERLOCK ERROR! |RECIPE SCANS _= $ +/- $ SCANS |MEASURED SCANS = $
110646 110647	55173	505	SIX SCAN MIN INTERLOCK ERROR! |RECIPE SCANS _= $ |MEASURED SCANS = $
110648 110649	55174	505	MINIMUM SCAN INTERLOCK ERROR! |RECIPE SCANS _= $ |MEASURED SCANS = $
110652 110653	55176	505	AUTO SETUP CHECK: SUPPRESSION VOLTS DEVIATES MORE THEN 5% FROM THE LEARNED VALUE.
110654 110655	55177	505	Extraction Current Limit of $ uA has been exceeded !
110658 110659	55179	505	UNABLE TO STRIKE ARC, MKS VALVE IS NOT REGULATING. GAS READBACK DOES NOT MATCH GAS PROGRAM WITHIN +/- 20 PERCENT !
110660 110661	55180	505	AUTO SETUP CHECK: VAPORIZER OPTION HAS NOT BEEN SELECTED !
110664 110665	55182	505	AUTO SETUP CHECK: VAPORIZER CONTENTS UNKNOWN! CANNOT SETUP !
110666 110667	55183	505	AUTO SETUP CHECK: VAPORIZER CONTENTS DO NOT MATCH DESIRED RECIPE DOPANT MATERIAL !
110668 110669	55184	505	HOST COMPUTER HALTED AUTOMATIC SETUP. PRESS 'CANCEL' TO ABORT, OR AWAIT HOST COMMAND TO CONTINUE OR ABORT PROCESSING.
110670 110671	55185	505	DECEL POWER SUPPLY MALFUNCTION DETECTED. POWER SUPPLY READBACK VOLTAGE DOES NOT EQUAL PROGRAM VOLTAGE !!
110672 110673	55186	505	ACCEL POWER SUPPLY MALFUNCTION DETECTED. POWER SUPPLY READBACK VOLTAGE DOES NOT EQUAL PROGRAM VOLTAGE !!
110674 110675	55187	505	SCANNER SETUP FAILURE.| Scan curve didn't pass beam saturation test.
110694 110695	55197	505	Manipulator Stalled!| The X manipulator axis has failed to reach its programmed position of $. The readback was $ after $ seconds and the tolerance is $.| Please check the manipulator.
110696 110697	55198	505	Manipulator Stalled!| The Y manipulator axis has failed to reach its programmed position of $. The readback was $ after $ seconds and the tolerance is $.| Please check the manipulator.
110698 110699	55199	505	Manipulator Stalled!| The Z manipulator axis has failed to reach its programmed position of $. The readback was $ after $ seconds and the tolerance is $.| Please check the manipulator.
110700 110701	55200	505	SCANNER POWER SUPPLY MALFUNCTION DETECTED. POWER SUPPLY READBACK VOLTAGE DOES NOT EQUAL PROGRAM VOLTAGE !!
110704 110705	55202	505	UNABLE TO SWITCH TO DECEL MODE. DECEL LEAKAGE TEST HAS FAILED. VERIFY THAT AUTO DECEL HARDARE IS INSTALLED AND FUNCTIONAL !
110706 110707	55203	505	UNABLE TO SWITCH TO ACCEL MODE. MIRROR LEAKAGE TEST HAS FAILED. VERIFY THAT AUTO DECEL HARDARE IS INSTALLED AND FUNCTIONAL !
110718 110719	55209	505	B11 VERSUS B10 ISOTOPE CHECK FAILED.| BEAM IS NOT TUNED TO THE BORON 11 PEAK.
110722 110723	55211	515	Error: EHP option (99) is enabled and recipe is not an EHP parametric recipe.
110724 110725	55212	515	Error: EHP option (99) is disabled and recipe is an EHP parametric recipe.
110740 110741	55220	505	Machine configurable operating temperatures for the dual vaporizer are uninitialized.|1. Enter a valid reset temperature for each crucible via the Interlocks Edit Screen. |2. Set the operating temperature by reconfiguring both crucibles. Saving the crucible configuration will prompt the user to reset the operating temperature for each crucible.

110742 110743	55221	505	Setup Error: Unable to verify +++P31 species selection. Hit proceed to manually verify desired species selection.
110744 110745	55222	505	Hall Probe Failure Detected. | PLEASE ARM THE MACHINE AND TRY AGAIN.
110746 110747	55223	505	THE HIGH-VOLTAGE IS NOT ARMED! | PLEASE ARM THE MACHINE AND TRY AGAIN.
110756 110757	55228	505	SCANNER SETUP PEAK-TO-PEAK FAILURE! |RECIPE XSIGMA * 5 _= $ |MEASURED PEAK-TO-PEAK = $
111116 111117	55408	505	During arc current ramping the suppression | current exceeded the allowable limit $.$ mA.| Therefore, the suppression power supply has| been turned off, and the setup aborted.

Vacuum Errors

34340 34341	17020	515	The Source Vent Safety Check has failed. Possible hazardous gas in the gasbox manifold. Source region maintenance may release this gas. Are you sure you want to take this action?
34342 34343	17021	515	The Source Vent Safety Check has failed. Possible hazardous gas in the| gasbox manifold. A warning message was displayed, the user chose to| vent the source.
35200 35201	17450	515	Door open command unsuccessful.| - because the elevator is under vacuum; i.e., door motor stalled.
35202 35203	17451	507	A timeout occurred while the door was opening;| - i.e., the door motor never stalled.
35204 35205	17452	507	A timeout occurred while the door was closing;| -i.e., the door motor never stalled.
35206 35207	17453	507	A timeout occurred while the tilter was extending;| - i.e., the tilter motor never stalled.
35208 35209	17454	507	A timeout occurred while the tilter was retracting; | -i.e., the tilter motor never stalled.
35210 35211	17455	507	A timeout occurred while the tilter was initializing, -i.e., the tilter motor never stalled.
35212 35213	17456	507	A timeout occurred while the door was initializing;| i.e., the door motor never stalled.
35310 35311	17505	15	To start an auto vent of the elevator - The rough valve or hi-vac valve must be first closed.
35314 35315	17507	15	The requested operation cannot be performed while an elevator pumpdown is in progress.
35320 35321	17510	15	An auto pumpdown of the elevator cannot be performed, because the door or pivot is in an unknown state. To correct the problem, initialize the elevator from the End-Station Init screen.
35340 35341	17520	507	One of the elevator isolation valves initialized into an error state, because the iso closed and iso open flags both were false. The valve has malfunctioned or is partially open. To clear the error, open or close the valve from the manual vacuum screen.
35342 35343	17521	507	One of the elevator isolation valves initialized into an error state, because the iso closed and iso open flags both were true. The valve may have malfunctioned. To clear the error, try opening or closing the valve from the manual vacuum screen.
35344 35345	17522	507	A timeout error occurred while the isolation valve was opening, and the valve is now in an unknown state. The valve may have malfunctioned. To clear the error, try opening or closing the valve.
35346 35347	17523	507	A timeout error occurred while the isolation valve was closing, and the valve is now in an unknown state. The valve may have malfunctioned. To clear the error, try opening or closing the valve.
35348 35349	17524	507	A pumpdown sequence has been aborted, because the tilter timed out while it was retracting.
35350 35351	17525	507	A pumpdown sequence has been aborted, because the tilter failed while it was retracting.
35352 35353	17526	507	A pumpdown sequence has been aborted, because the wafer handler was extended at the time the tilter was to be retracted.
35354 35355	17527	507	A pumpdown sequence has been aborted, because the door/tilter state was unknown at the time the tilter was to be retracted. To proceed, initialize the elevator from the End-Station Init screen.
35356 35357	17528	507	A pumpdown sequence has been aborted, because a door/tilter interlock was tripped during the time the tilter was to be retracted. Check door and tilter status.
35358 35359	17529	507	A pumpdown sequence has been aborted, because the door timed out while it was closing.
35360 35361	17530	507	A pumpdown sequence has been aborted, because the door failed to close.

35362 35363	17531	507	A pumpdown sequence has been aborted, because a door/tilter interlock was tripped while the door was closing. Check door and tilter status.
35364 35365	17532	507	A pumpdown sequence has been aborted, because the end-station rough pump was off at the time roughing was to begin.
35366 35367	17533	507	A pumpdown sequence has been aborted, because the elevator did not reach rough pressure in the alloted time (300 sec).
35368 35369	17534	507	A pumpdown sequence has been aborted, because the elevator pressure rose beyond ~2000 266.6~ ~microns Pa~ between the closing of the rough valve and the opening of the hi-vac valve. The elevator may have a vacuum leak.
35370 35371	17535	507	A pumpdown sequence has been aborted, because the elevator hi-vac pump was not ready. Check the hi-vac pump status.
35372 35373	17536	507	A pumpdown sequence has been aborted, because the beamline turbopump was off or not up to speed at the time the isolation valve was to open.
35374 35375	17537	507	A pumpdown sequence has been aborted, because the isolation valve timed out while it was opening. The isolation valve is now in an unknown state. To clear the error, the valve must be opened or closed from the Manual Vacuum screen.
35376 35377	17538	507	A vent sequence has been aborted, because the isolation valve timed out while it was closing. The isolation valve is now in an unknown state. To clear the error, the valve must be opened or closed from the Manual Vacuum screen.
35378 35379	17539	507	A vent sequence has been aborted, because an door/tilter interlock was tripped while the door was opening. Check door and tilter status.
35380 35381	17540	507	A vent sequence has been aborted, because the door timed out while it was opening.
35382 35383	17541	507	A vent sequence has been aborted, because a door/tilter error occurred while the door was opening.
35384 35385	17542	507	A vent sequence has been aborted, because the wafer handler was extended at the time the tilter was to be extended.
35386 35387	17543	507	A vent sequence has been aborted, because the door/tilter state was unknown at the time the tilter was to be extended. To proceed, initialize the elevator from the End-Station Init screen.
35388 35389	17544	507	A vent sequence has been aborted, because a door/tilter interlock was tripped during the time the tilter was to be extended. Check door and tilter status.
35390 35391	17545	507	A vent sequence has been aborted, because the tilter timed out while it was extending.
35392 35393	17546	507	A vent sequence has been aborted, because the tilter failed while it was extending.
35394 35395	17547	507	A pump sequence has been aborted, because the roughing manifold valve did not close.
35396 35397	17548	507	A pump sequence has been aborted, the elevator pressure is above ~100 13.3~ ~microns Pa~ at the time the isolation valve was to open.
35700 35701	17700	507	The chamber cryopump regeneration was aborted, because the cryopump did not warm up to 290 K within $ minutes.
35702 35703	17701	507	The chamber cryopump regeneration was aborted, because the left elevator rough valve could not be closed. The elevator may be busy in a vacuum sequence operation.
35704 35705	17702	507	The chamber cryopump regeneration was aborted, because the right elevator rough valve could not be close. The elevator may be busy in a vacuum sequence operation.
35706 35707	17703	507	The chamber cryopump regeneration was aborted, because the roughing manifold valve could not be opened. The end-station rough pump may be off or in use.
35708 35709	17704	507	The chamber cryopump regeneration was aborted, because the cryopump failed to rough to $ ~microns Pa~ after $ repurges.
35710 35711	17705	507	The chamber cryopump regeneration was aborted, because the cryopump failed the rate-of-rise test after $ attempts.
35712 35713	17706	507	The chamber cryopump regeneration was aborted, because the cryopump failed to cooldown to 20 K within $ minutes.
35714 35715	17707	507	A communications failure has occurred with the CTI On-Board system and all cryo valves have been closed. Check the RS-232 connection to the On-Board Network Terminal.
35720 35721	17710	507	The elevator cryopump regeneration was aborted, because the left cryovalve could not be closed. The elevator may be busy in a vacuum sequence.
35722 35723	17711	507	The elevator cryopump regeneration was aborted, because the right cryovalve could not be

			closed. The elevator may be busy in a vacuum sequence.
35724 35725	17712	507	The elevator cryopump regeneration was aborted, because the left cryopump did not warm up to 290 K within $ minutes.
35726 35727	17713	507	The elevator cryopump regeneration was aborted, because the right cryopump did not warm up to 290 K within $ minutes.
35728 35729	17714	507	The elevator cryopump regeneration was aborted, because the left elevator rough valve could not be closed. The elevator may be busy in a vacuum sequence operation.
35730 35731	17715	507	The elevator cryopump regeneration was aborted, because the right elevator rough valve could not be closed. The elevator may be busy in a vacuum sequence operation.
35732 35733	17716	507	The elevator cryopump regeneration was aborted, because the roughing manifold valve could not be opened. The end-station rough pump may be off or in use.
35734 35735	17717	507	The elevator cryopump regeneration was aborted, because the left cryopump failed to rough to $ ~microns Pa~ after $ repurges.
35736 35737	17718	507	The elevator cryopump regeneration was aborted, because the right cryopump failed to rough to $ ~microns Pa~ after $ repurges.
35738 35739	17719	507	The elevator cryopump regeneration was aborted, because the left cryopump failed the rate-of-rise test after $ attempts.
35740 35741	17720	507	The elevator cryopump regeneration was aborted, because the right cryopump failed the rate-of-rise test after $ attempts.
35742 35743	17721	507	The elevator cryopump regeneration was aborted, because the left cryopump failed to cooldown to $ K within $ minutes.
35744 35745	17722	507	The elevator cryopump regeneration was aborted, because the right cryopump failed to cooldown to $ K within $ minutes.
35820 35821	17760	507	The turbopump sequence could not open the opposite foreline valve. The turbo on sequence has been aborted.
35822 35823	17761	507	A failure has occurred on the right elevator turbopump. A hard reset of the controller may be required.
35824 35825	17762	507	A communications failure has occurred with the left elevator turbopump and the hi-vac valve has been closed. Check the RS-232 connection to the pump controller.
35826 35827	17763	507	A communications failure has occurred with the right elevator turbopump and the hi-vac valve has been closed. Check the RS-232 connection to the pump controller.
35828 35829	17764	507	The left elevator turbopump failed to reach operating speed in the alloted time. Possible problems are:| - Foreline pressure is too high.| - Turbopump is in a failure condition.
35830 35831	17765	507	The right elevator turbopump failed to reach operating speed in the alloted time. Possible problems are:| - Foreline pressure is too high.| - Turbopump is in a failure condition.
35832 35833	17766	507	The left elevator turbopump has failed to turn off in the alloted time. If the turbopump controller is in a failure mode, reset the turbopump controller.
35834 35835	17767	507	The right elevator turbopump has failed to turn off in the alloted time. If the turbopump controller is in a failure mode, reset the turbopump controller.
35836 35837	17768	515	The requested operation cannot be completed, because the left elevator turbopump did not acknowledge a request. Check the turbopump controller for an error condition; the controller may need to be reset.
35838 35839	17769	515	The requested operation cannot be completed, because the right elevator turbopump did not acknowledge a request. Check the turbopump controller for an error condition; the controller may need to be reset.
35840 35841	17770	507	The timer that monitors the opposite rough valve being closed, during the automatic turbo pump on sequence, has expired. The sequence has been aborted.
35842 35843	17771	507	The elevator turbo pump has failed to reach 95% operating speed in the alloted time. The turbo pump command has been set to off.
35844 35845	17772	507	The turbopump on sequence could not close the opposite foreline valve. The turbo on sequence has been aborted.
35846 35847	17773	507	The auto turbo on sequence could not open the manifold valve. The turbo on sequence has been aborted.
35848 35849	17774	507	A hardware failure of the left elevator turbopump has occurred. The turbopump controller may need to be reset from its front panel.

35850 35851	17775	507	A hardware failure of the right elevator turbopump has occurred. The turbopump controller may need to be reset from its front panel.
35852 35853	17776	507	The left elevator turbopump, which was off, has been detected as on. The turbopump state machine has been reinitialized to correct for this unexpected event.
35854 35855	17777	507	The right elevator turbopump, which was off, has been detected as on. The turbopump state machine has been reinitialized to correct for this unexpected event.
35856 35857	17778	507	The left elevator turbopump, which was on, has been detected as off. The turbopump state machine has been reinitialized to correct for this unexpected event.
35858 35859	17779	507	The right elevator turbopump, which was on, has been detected as off. The turbopump state machine has been reinitialized to correct for this unexpected event.
36060 36061	17880	507	The target chamber cryopump, which was off, has been detected as on. The cryopump state machine has been reinitialized to correct for this unexpected event.
36062 36063	17881	507	The target chamber cryopump, which was on, has been detected as off. The cryopump state machine has been reinitialized to correct for this unexpected event.
36064 36065	17882	507	The target chamber cryopump purge valve, which was closed, has been detected as open. The cryopump state machine has been reinitialized to correct for this unexpected event.
36066 36067	17883	507	The target chamber cryopump purge valve, which was open, has been detected as closed. The cryopump state machine has been reinitialized to correct for this unexpected event.
36068 36069	17884	507	The target chamber cryopump rough valve, which was closed, has been detected as open. The cryopump state machine has been reinitialized to correct for this unexpected event.
36070 36071	17885	507	The target chamber cryopump rough valve, which was open, has been detected as closed. The cryopump state machine has been reinitialized to correct for this unexpected event.
36072 36073	17886	507	The left elevator cryopump, which was off, has been detected as on. The cryopump state machine has been reinitialized to correct for this unexpected event.
36074 36075	17887	507	The left elevator cryopump, which was on, has been detected as off. The cryopump state machine has been reinitialized to correct for this unexpected event.
36076 36077	17888	507	The left elevator cryopump purge valve, which was closed, has been detected as open. The cryopump state machine has been reinitialized to correct for this unexpected event.
36078 36079	17889	507	The left elevator cryopump purge valve, which was open, has been detected as closed. The cryopump state machine has been reinitialized to correct for this unexpected event.
36080 36081	17890	507	The left elevator cryopump rough valve, which was closed, has been detected as open. The cryopump state machine has been reinitialized to correct for this unexpected event.
36082 36083	17891	507	The left elevator cryopump rough valve, which was open, has been detected as closed. The cryopump state machine has been reinitialized to correct for this unexpected event.
36084 36085	17892	507	The right elevator cryopump, which was off, has been detected as on. The cryopump state machine has been reinitialized to correct for this unexpected event.
36086 36087	17893	507	The right elevator cryopump, which was on, has been detected as off. The cryopump state machine has been reinitialized to correct for this unexpected event.
36088 36089	17894	507	The right elevator cryopump purge valve, which was closed, has been detected as open. The cryopump state machine has been reinitialized to correct for this unexpected event.
36090 36091	17895	507	The right elevator cryopump purge valve, which was open, has been detected as closed. The cryopump state machine has been reinitialized to correct for this unexpected event.
36092 36093	17896	507	The right elevator cryopump rough valve, which was closed, has been detected as open. The cryopump state machine has been reinitialized to correct for this unexpected event.
36094 36095	17897	507	The right elevator cryopump rough valve, which was open, has been detected as closed. The cryopump state machine has been reinitialized to correct for this unexpected event.

DVID Variable Dictionary

#MULTIPLE **Format: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
#MULTIPLE	DV	219		<A “XX”>	2

If a recipe is a multi-line recipe, #MULTIPLE indicates the number of implant iterations. Significant only if it is 2 or larger.

#WAFER

Format: **20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
#WAFER	DV	121	# wafers	<A “XX”>	2

Number of wafers on the side being reported at the start or end of a batch implant.

<TILT

Format: **20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
<TILT	DV	209	degree	<A “XX”>	2

Tilt angle of the wafer relative to the ion beam in degrees.

<TWIST

Format: **20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
<TWIST	DV	210	degree	<A “XXXX”>	4

Angle of rotation of the wafer flat or notch relative to the axis about which it is tilted in degrees.

A(LLOT)

Format: **20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
A(LLOT)	DV	100	none	<A “X…X”>	16

The MID of the left cassette, or the expected MID.

A(RLOT)

Format: **20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
A(RLOT)	DV	101	none	<A “X…X”>	16

The MID of the right cassette, or the expected MID.

a1OnBoardPumpStatus[0]

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardPumpStatus[0]	DV	605	none	<A “XXXX”>	4

The on board target chamber pump status.

a1ESTurboCommStatus[0] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1ESTurboCommStatus[0]	DV	600	none	<A “XXXX”>	4

The left end station turbo communication status.

a1ESTurboState[0] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1ESTurboState[0]	DV	601	none	<A “XXXX”>	4

The left end station turbo state.

a1ESTurboCommStatus[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1ESTurboCommStatus[1]	DV	602	none	<A “XXXX”>	4

The right end station turbo communication status.

a1ESTurboState[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1ESTurboState[1]	DV	603	none	<A “XXXX”>	4

The right end station turbo state.

1OnBoardCommStatus Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
1OnBoardCommStatus	DV	604	none	<A “XXXX”>	4

The on board communications status.

a1OnBoardDelayRestart[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardDelayRestart[0]	DV	610	minutes	<A “XXXX”>	4

The on board target chamber pump delay restart in minutes.

a1OnBoardDelayStart[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardDelayStart[0]	DV	609	minutes	<A “XXXX”>	4

The on board target chamber pump delay start in minutes.

a1OnBoardExtendedPurge[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardExtendedPurge[0]	DV	612	minutes	<A “XXXX”>	4

The on board target chamber pump extended purge in minutes.

a1OnBoardFastRoughTest[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardFastRoughTest[0]	DV	611	seconds	<A “XXXX”>	4

The on board target chamber pump fast rough test in seconds.

a1OnBoardFirstStageTempSetpoint[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardFirstStageTempSetpoint[0]	DV	618	oK	<A “XXXX”>	4

The on board target chamber pump first stage temperature setpoint in Kelvin.

a1OnBoardPowerFailRecoveryTemp[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardPowerFailRecoveryTemp[0]	DV	617	oK	<A “XXXX”>	4

The on board target chamber pump power fail recovery temperature in Kelvin.

a1OnBoardPurgeValveStatus[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardPurgeValveStatus[0]	DV	607	none	<A “XXXX”>	4

The on board target chamber pump purge valve status.

a1OnBoardRegenStatus[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRegenStatus[0]	DV	606	none	<A “XXXX”>	4

The on board target chamber pump regen status.

a1OnBoardRepurgeCycles[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRepurgeCycles[0]	DV	614	none	<A “XXXX”>	4

The on board target chamber pump repurge cycles.

a1OnBoardRepurgeTime[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRepurgeTime[0]	DV	613	minutes	<A “XXXX”>	4

The on board target chamber pump repurge time in minutes.

a1OnBoardRORCycles[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRORCycles[0]	DV	616	none	<A “XXXX”>	4

The on board target chamber pump ROR cycles.

a1OnBoardRORLimit[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRORLimit[0]	DV	615	microns	<A “XXXX”>	4

The on board target chamber pump ROR limit in microns.

a1OnBoardRoughValveStatus[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRoughValveStatus[0]	DV	608	none	<A “XXXX”>	4

The on board target chamber pump rough valve status.

a1OnBoardSecondStageTempSetpoint[0]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardSecondStageTempSetpoint[0]	DV	619	oK	<A “XXXX”>	4

The on board target chamber pump second stage temperature setpoint in Kelvin.

a1OnBoardPumpStatus[1]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardPumpStatus[1]	DV	620	none	<A “XXXX”>	4

The on board left elevator pump status.

a1OnBoardRegenStatus[1]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRegenStatus[1]	DV	621	none	<A “XXXX”>	4

The on board left elevator pump regen status.

a1OnBoardPurgeValveStatus[1]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardPurgeValveStatus[1]	DV	622	none	<A “XXXX”>	4

The on board left elevator pump purge valve status.

a1OnBoardRoughValveStatus[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRoughValveStatus[1]	DV	623	none	<A “XXXX”>	4

The on board left elevator pump rough valve status.

a1OnBoardDelayStart[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardDelayStart[1]	DV	624	minutes	<A “XXXX”>	4

The on board left elevator pump delay start in minutes.

a1OnBoardDelayRestart[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardDelayRestart[1]	DV	625	minutes	<A “XXXX”>	4

The on board left elevator pump delay restart in minutes.

a1OnBoardFastRoughTest[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardFastRoughTest[1]	DV	626	seconds	<A “XXXX”>	4

The on board left elevator pump fast rough test in seconds.

a1OnBoardExtendedPurge[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardExtendedPurge[1]	DV	627	minutes	<A “XXXX”>	4

The on board left elevator pump extended purge in minutes.

a1OnBoardRepurgeTime[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRepurgeTime[1]	DV	628	minutes	<A “XXXX”>	4

The on board left elevator pump repurge time in minutes.

a1OnBoardRepurgeCycles[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRepurgeCycles[1]	DV	629	none	<A "XXXX">	4

The on board left elevator pump repurge cycles.

a1OnBoardRORLimit[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRORLimit[1]	DV	630	microns	<A "XXXX">	4

The on board left elevator pump ROR limit in microns.

a1OnBoardRORCycles[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRORCycles[1]	DV	631	none	<A "XXXX">	4

The on board left elevator pump ROR cycles.

a1OnBoardPowerFailRecoveryTemp[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardPow erFailRecoveryTemp[1]	DV	632	oK	<A "XXXX">	4

The on board left elevator pump power fail recovery temperature in Kelvin.

a1OnBoardFirstStageTempSetpoint[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardFirstStageTempSetpoint[1]	DV	633	oK	<A "XXXX">	4

The on board left elevator pump first stage temperature setpoint in Kelvin.

a1OnBoardSecondStageTempSetpoint[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardSecondStageTempSetpoint[1]	DV	634	oK	<A “XXXX”>	4

The on board left elevator pump second stage temperature setpoint in Kelvin.

a1OnBoardPumpStatus[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardPumpStatus[2]	DV	635	none	<A “XXXX”>	4

The on board right elevator pump status.

a1OnBoardRegenStatus[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRegenStatus[2]	DV	636	none	<A “XXXX”>	4

The on board right elevator pump regen status.

a1OnBoardPurgeValveStatus[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardPurgeValveStatus[2]	DV	637	none	<A “XXXX”>	4

The on board right elevator pump purge valve status.

a1OnBoardRoughValveStatus[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRoughValveStatus[2]	DV	638	none	<A “XXXX”>	4

The on board right elevator pump rough valve status.

a1OnBoardDelayStart[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardDelayStart[2]	DV	639	minutes	<A “XXXX”>	4

The on board right elevator pump delay start in minutes.

a1OnBoardDelayRestart[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardDelayRestart[2]	DV	640	minutes	<A "XXXX">	4

The on board right elevator pump delay restart in minutes.

a1OnBoardFastRoughTest[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardFastRoughTest[2]	DV	641	seconds	<A "XXXX">	4

The on board right elevator pump fast rough test in seconds.

a1OnBoardExtendedPurge[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardExtendedPurge[2]	DV	642	minutes	<A "XXXX">	4

The on board right elevator pump extended purge in minutes.

a1OnBoardRepurgeTime[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRepurgeTime[2]	DV	643	minutes	<A "XXXX">	4

The on board right elevator pump repurge time in minutes.

a1OnBoardRepurgeCycles[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRepurgeCycles[2]	DV	644	none	<A "XXXX">	4

The on board right elevator pump repurge cycles.

a1OnBoardRORLimit[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRORLimit[2]	DV	645	microns	<A "XXXX">	4

The on board right elevator pump ROR limit in microns.

a1OnBoardRORCycles[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardRORCycles[2]	DV	646	none	<A “XXXX”>	4

The on board right elevator pump ROR cycles.

a1OnBoardPowerFailRecoveryTemp[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardPowerFailRecoveryTemp[2]	DV	647	oK	<A “XXXX”>	4

The on board right elevator pump power fail recovery temperature in Kelvin.

a1OnBoardFirstStageTempSetpoint[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardFirstStageTempSetpoint[2]]	DV	648	oK	<A “XXXX”>	4

The on board right elevator pump first stage temperature setpoint in Kelvin.

a1OnBoardSecondStageTempSetpoint[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
a1OnBoardSecondStageTempSetpoint[2]	DV	649	oK	<A “XXXX”>	4

The on board right elevator pump second stage temperature setpoint in Kelvin.

ACCEL/DECEL

Format: 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ACCEL/DECEL	DV	222	none	<A “X”>	1

Energy mode; Accel if 0, Decel if 1.

ACH-STATUS

Format: 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ACH-STATUS	DV	127	none	<A “X…X”>	5

Complete cassette status of automatic cassette handler(2 bytes)

stg1		stg2		stg3		stg4		stg5		stg6		stg7		stg8	
1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2

1st byte	cassette status	2nd byte	equipment status
0	stage available	0	stage available
1	agv to stage transition	1	left port
2	load cassette at stage	2	right port
3	stage to eq transition		
4	load cassette at eq		
5	eq to stage transition		
6	unload cassette at stage		
7	stage to agv		
8	not in use		

Note: 2nd byte data of 2 (middle port) is not applicable to E220/E500. The stages, stg5 to stg8, are not applicable to E220/E500.

ACTUAL-MID(LLOT) Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ACTUAL-MID(LLOT)	DV	160	None	<A “X...X”>	16

The actual cassette id read on the left side. In MID module terminology, this is the left EMID.

ACTUAL-MID(RLOT) Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ACTUAL-MID(RLOT)	DV	161	None	<A “X...X”>	16

The actual cassette id read on the right side. In MID module terminology, this is the right EMID.

aDOSE Format:20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
aDOSE	DV	113	%	<A “XXXXXX”>	6

Dose on the last wafer as a percentage of the recipe dose. .

AlarmID Format:3( ), 5( )

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
AlarmID	DV	502	None	None	None

This variable is valid only upon the setting or clearing of an alarm condition and contains the current alarm identification (ALID), regardless of whether that alarm is enabled for reporting.

AlarmsEnabled

Format: **00**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
AlarmsEnabled	DV	307	None	<L,n <ALID1>…<ALIDn> >	

List of enabled alarms.
Contains the list of alarms (ALIDs) enabled for reporting (via Stream 5).

AlarmsSet

Format: **00**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
AlarmsSet	DV	308	None	<L,n <ALID1>…<ALIDn> >	

List of alarms set.

Contents of this variable is a list of alarms (ALIDs) currently in the UNSAFE (alarm set) state, regardless whether the alarms are enabled for reporting.

allqdpCommunicationsStatus[0]

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpCommunicationsStatus[0]	DV	652	none	<A “XXXX”>	4

allqdpPumpStatus[0]

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpStatus[0]	DV	653	none	<A “XXXX”>	4

allqdpPumpTemperature[0]

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpTemperature[0]	DV	654	oC	<A “XXXX”>	4

allqdpPumpPower[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpPower[0]	DV	655	kW	<A “XXXX”>	4

allqdpPumpCurrent[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpCurrent[0]	DV	656	A	<A “XXXX”>	4

allqdpExhaustPressure[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpExhaustPressure[0]	DV	657	Psi	<A “XXXX”>	4

allqdpWaterFlow[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpWaterFlow [0]	DV	658	none	<A “XXXX”>	4

allqdpRunningTime[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpRunningTime[0]	DV	659	hours	<A “XXXX”>	4

allqdpOilLevel[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpOilLevel[0]	DV	660	none	<A “XXXX”>	4

allqdpBlowerStatus[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerStatus[0]	DV	661	none	<A “XXXX”>	4

allqdpBlowerOilLevel[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerOilLevel[0]	DV	662	none	<A “XXXX”>	4

allqdpBlowerMotorTemperature[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerMotorTemperature[0]	DV	663	oC	<A “XXXX”>	4

allqdpBlowerPower[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerPower[0]	DV	664	kW	<A “XXXX”>	4

allqdpBlowerPhaseCurrent[0] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerPhaseCurrent[0]	DV	665	A	<A “XXXX”>	4

allqdpCommunicationsStatus[1] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpCommunicationsStatus[1]	DV	666	none	<A “XXXX”>	4

allqdpPumpStatus[1] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpStatus[1]	DV	667	none	<A “XXXX”>	4

allqdpPumpTemperature[1] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpTemperature[1]	DV	668	oC	<A “XXXX”>	4

allqdpPumpPower[1] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpPower[1]	DV	669	kW	<A “XXXX”>	4

allqdpPumpCurrent[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpCurrent[1]	DV	670	A	<A “XXXX”>	4

allqdpExhaustPressure[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpExhaustPressure[1]	DV	671	Psi	<A “XXXX”>	4

allqdpWaterFlow[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpWaterFlow [1]	DV	672	none	<A “XXXX”>	4

allqdpRunningTime[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpRunningTime[1]	DV	673	hours	<A “XXXX”>	4

allqdpOilLevel[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpOilLevel[1]	DV	674	none	<A “XXXX”>	4

allqdpBlowerStatus[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerStatus[1]	DV	675	none	<A “XXXX”>	4

allqdpBlowerOilLevel[1] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerOilLevel[1]	DV	676	none	<A “XXXX”>	4

allqdpBlowerMotorTemperature[1] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerMotorTemperature[1]	DV	677	oC	<A “XXXX”>	4

allqdpBlowerPower[1] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerPower[1]	DV	678	kW	<A “XXXX”>	4

allqdpBlowerPhaseCurrent[1] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerPhaseCurrent[1]	DV	679	A	<A “XXXX”>	4

allqdpCommunicationsStatus[2] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpCommunicationsStatus[2]	DV	680	none	<A “XXXX”>	4

allqdpPumpStatus[2] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpStatus[2]	DV	681	none	<A “XXXX”>	4

allqdpPumpTemperature[2] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpTemperature[2]	DV	682	oC	<A “XXXX”>	4

allqdpPumpPower[2] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpPower[2]	DV	683	kW	<A “XXXX”>	4

allqdpPumpCurrent[2] Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpPumpCurrent[2]	DV	684	A	<A “XXXX”>	4

allqdpExhaustPressure[2] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpExhaustPressure[2]	DV	685	Psi	<A “XXXX”>	4

allqdpWaterFlow[2] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpWaterFlow [2]	DV	686	none	<A “XXXX”>	4

allqdpRunningTime[2] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpRunningTime[2]	DV	687	hours	<A “XXXX”>	4

allqdpOilLevel[2] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpOilLevel[2]	DV	688	none	<A “XXXX”>	4

allqdpBlowerStatus[2] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerStatus[2]	DV	689	none	<A “XXXX”>	4

allqdpBlowerOilLevel[2] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerOilLevel[2]	DV	690	none	<A “XXXX”>	4

allqdpBlowerMotorTemperature[2] Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerMotorTemperature[2]	DV	691	oC	<A “XXXX”>	4

allqdpBlowerPower[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerPower[2]	DV	692	kW	<A “XXXX”>	4

allqdpBlowerPhaseCurrent[2]

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
allqdpBlowerPhaseCurrent[2]	DV	693	A	<A “XXXX”>	4

aSCANS

Format:20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
aSCANS	DV	114	# scans	<A “XXXXX”>	5

Number of mechanical scans used to implant the wafer. .

aXSIGMA

Format:20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
aXSIGMA	DV	111	%	<A “XX.XX”>	5

The variation in dose across the wafer as measured by the traveling Faraday during beamscan setup.

aYSIGMA

Format:20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
aYSIGMA	DV	115	%	<A “XX.XX”>	5

The uniformity controller keeps a record of the dose at each scan line position in Y. The line spacing is 0.1 in in normal mode and 0.05 in in X compressed mode. At the end of an implant or when on hold it calculates the sigma of the array of doses.

BATCH-END-TIME

Format:20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
BATCH-END-TIME	DV	110	None	<A “X…X”>	12

Implant end time for one batch in the format yymmddhhmmss.

BATCH-HOLDS

Format:**20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
BATCH-HOLDS	DV	119	# holds	<A “XXX”>	3

Total number of normal hold conditions (retry conditions) during implant of the current batch. The units are the # of normal holds.

BATCH-START-TIME

Format:**20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
BATCH-START-TIME	DV	109		<A “X…X”>	12

Implant start time for one batch in the format yymmddhhmmss.

BATCH_WAFERS_IMPLANTED

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
BATCH_WAFERS_IMPLANTED	DV	174	# wafers	<A “XX”>	3

Version Introduced 11.05.08

The number of wafers for the last batch that were completely or partially implanted with the specified recipe. When a wafer that is partially implanted is on hold, this SVID will not be incremented. However, as soon as the implant is aborted, these variables will be incremented to reflect the partially implanted wafer.

BEAM-WIDTH

Format:**20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
BEAM-WIDTH	DV	124	mm	<A “XXX”>	3

The width of the beam in the end station in units of millimeters.

BPTN

Format:**20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
BPTN	DV	128		<A “X”>	1

ACH stage number; ACH stage (port) is designated 1 to 4, left to right facing the equipment. Port information is no longer supported for DVID 128 with V12 and greater. DVID 151 should be used to send port information instead of DVID 128. BPTN is no longer supported in V12 since this is actually the port-id for an automatic cassette handler.

CHK-INT

Format:**20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
CHK-INT	DV	215	minute	<A “XX”>	2

Checking interval. The E220 will recheck the uniformity across the wafer periodically to ensure against beam drift when running long implants. CHK-INT is the time in minutes between checks. If the value is set to zero, checking will be performed only between batches of wafers.

CLOCK

Format**: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
CLOCK	DV	305	cs	<A “X…X”>	16

The value of the equipment's internal clock. This is a format requirement only and does not imply a precision or accuracy.

Format: YYYYMMDDhhmmsscc

YYYY=Year 0000 to 9999

MM=Month 01 to 12

DD=Day 01 to 31

hh=Hour 00 to 23

mm=Minute 00 to 59

ss=Second 00 to 59

cc=Centisecond 00 to 99

ControlState

Format**: 51**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ControlState	SV	309	None	<U1 >	

This status variable contains the code which identifies the current control state of the equipment. When reported related to a control state transition, its value should represent the state current after the transition.

1 = OFF-LINE/EQUIPMENT OFF-LINE

2 = OFF-LINE/ATTEMPT ON-LINE

3 = OFF-LINE/HOST OFF-LINE

4 = ON-LINE/LOCAL

5 = ON-LINE/REMOTE

6-63 Reserved

COOLING

Format:**20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
COOLING	DV	207		<A “XXX”>	3

Logical value = true if wafer cooling is to be used.

CSTATUS

Format**: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
CSTATUS	DV	129		<A “X”>	1

Cassette status at ACH stage; identical to the first byte of ACH-STATUS.

DATAID

Format : 54

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
DATAID	DV	503	None	<U4 >	

The data ID for the most recent event report.

DI-WATER-FLOW

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
DI-WATER-FLOW	DV	175	None	<A “X”>	1

Version Introduced 12.14

Terminal DI water flow.
Possible values are:
0 - insufficient flow
1 - sufficient flow

DOSE-CALIBRATION-FACTOR

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
DOSE-CALIBRATION-FACTOR	DV	188	%	<A “XXX.XX”>	5

The number is used to adjust the DOSE measurement system so that two ion implants with the same recipe (DOSE) will result in the same DOSE on the wafer when measured by Prometrix or Thermawave.

DOSE-EXPONENT

Format: 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
DOSE-EXPONENT	DV	204		<A “XX”>	2

Exponent of the desired dose.

DOSE-MANTISSA

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
DOSE-EXPONENT	DV	203	None	<A “XX”>	2

Mantissa of the desired dose.

ECO_SETTINGS

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ECO_SETTINGS	SV	821		<Bool0…Bool511>	

Array of ECO Settings. The first byte corresponds to ECO 0 which is unused. The equipment screen may only show a portion of the ECO settings, but there are actually 512 ECO settings slots allocated for future use. Available in V13.20

ENERGY

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ENERGY	DV	205	KeV	<A “XXX”>	3

The total ion energy in units of Kev. In the case of doubly charged ions (P ++, etc) this is twice the total voltage used.

ErgoSMIF Cassette in Gripper

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Cassette in Gripper	DV	8309	None	<U1 >	
Right ErgoSMIF Cassette in Gripper	DV	8409	None	<U1 >	

Version Available : 11.07.06

Gripper Cassette Sensor
0 - no cassette in gripper
1 - cassette in gripper

ErgoSMIF Elevator State

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Elevator State	DV	8303	None	<U1 >	
Right ErgoSMIF Elevator State	DV	8403	None	<U1 >	

Version Available : 11.07.06

ErgoSpeed Elevator State
0 - not at home position
1 - at home position

ErgoSMIF FFU State

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF FFU State	DV	8313	None	<U1 >	
Right ErgoSMIF FFU State	DV	8413	None	<U1 >	

Version Available : 11.07.06

Fan Filter Unit State (FFU)
0 - FFU not available
1 - FFU available

ErgoSMIF Gripper State

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Gripper State	DV	8308	None	<U1 >	
Right ErgoSMIF Gripper State	DV	8408	None	<U1 >	

Version Available : 11.07.06

Gripper
0 - undefined
1 - closed
2 - open

ErgoSMIF Home State

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Home State	DV	8306	None	<U1 >	
Right ErgoSMIF Home State	DV	8406	None	<U1 >	

Version Available : 11.07.06

Pneumatic Arm Position
0 - undefined
1 - at home
2 - at equipment position

ErgoSMIF Last Function

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Last Function	DV	8301	None	<U1 >	
Right ErgoSMIF Last Function	DV	8401	None	<U1 >	

Version Available : 11.07.06

Last Function Completed. Refer to Infab ErgoSpeed SECS II Interface Specification for possible values.

ErgoSMIF Lock State

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Lock State	DV	8305	None	<U1 >	
Right ErgoSMIF Lock State	DV	8405	None	<U1 >	

Version Available : 11.07.06

Pod Lock State
0 - undefined
1 - locked
2 - unlocked

ErgoSMIF Low Load

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Low Load	DV	8310	None	<U1 >	
Right ErgoSMIF Low Load	DV	8410	None	<U1 >	

Version Available : 11.07.06

LowLoad Position
0 - not at load level
1 - at load level

ErgoSMIF Pneumatic Stroke State

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Pneumatic Stroke State	DV	8307	None	<U1 >	
Right ErgoSMIF Pneumatic Stroke State	DV	8407	None	<U1 >	

Version Available : 11.07.06

Pneumatic Stroke
0 - undefined
1 - raised
2 - lowered

ErgoSMIF Pod Placed

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Pod Placed	DV	8304	None	<U1 >	
Right ErgoSMIF Pod Placed	DV	8404	None	<U1 >	

Version Available : 11.07.06

Pod Presence
0 - not placed
1 - placed

ErgoSMIF Port Door State

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Port Door State	DV	8311	None	<U1 >	
Right ErgoSMIF Port Door State	DV	8411	None	<U1 >	

Version Available : 11.07.06

Port Door State

1 - locked
2 - unlocked

ErgoSMIF Pressure State

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF Pressure State	DV	8312	None	<U1 >	
Right ErgoSMIF Pressure State	DV	8412	None	<U1 >	

Version Available : 11.07.06

Pressure State
0 - low pressure
1 - sufficient pressure

ErgoSMIF RCMD Compl State

Format : 52

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Left ErgoSMIF RCMD Compl State	DV	8302	None	<U2 >	
Right ErgoSMIF RCMD Compl State	DV	8402	None	<U2 >	

Version Available : 11.07.06

Return code of last remote command
1 - Success
>1 - Error (return code)

cSCANS

Format:20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
cSCANS	DV	112	# scans	<A “XXXXX”>	5

The number of mechanical scans that the beam scan setup program expects will be required to implant the wafer. .

ECLAMP-I

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ECLAMP-I	DV	194	mA	<A “XXXX”>	4

Eclamp current in mA.

EST-VAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ENERGY	DV	212	Torr	<A "XXXX">	4

Maximum end station vacuum allowed during an implant as a multiple of 1E-7 Torr. For example, 500 would correspond to 5E-5 Torr.

EventsEnabled

Format: **00**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
EventsEnabled	DV	306	None	<L,n <CEID1…CEIDn> >	

Contains the list of events (CEIDs) enabled for reporting (via Stream 6).

EventLimit

Format **: U1**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
EventLimit	DV	311	none	<A "X">	1

Used with the Limits Monitoring capability, it contains the LIMITID of the limit reached or crossed by LimitVariable. Since multiple zone transitions for a variable may occur simultaneously (e.g., due to identical limit definitions or a slow data sampling rate), EventLimit has been defined to allow for a list of LIMITIDs.

EXPECTED-SLOT-MAP(LLOT)

Format **: 10**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
EXPECTED-SLOT-MAP(LLOT)	DV	156		<B [0,25,26] b..b>	26

The MID Module expected slot map for the left side. The first Boolean b is for slot 1, the second for slot 2 … etc. When there is no expected map, the variable is *<B [0]>*. For each *b,*0 = absent, 1 = present.

EXPECTED-SLOT-MAP(RLOT)

Format **: 10**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
EXPECTED-SLOT-MAP(RLOT)	DV	157		<B [0,25,26] b..b>	26

The MID Module expected slot map for the right side. The first Boolean b is for slot 1, the second for slot 2 … etc. When there is no expected map, the variable is *<B [0]>*. For each *b,*0 = absent, 1 = present.

EXPECTED-WID(LLOT)

Format **: 00**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
EXPECTED-WID(LLOT)	DV	158		<L [0,25,26] <A[0-48]"WafID 1"> … <A[0-48]"WafID n"> >	

The MID Module expected wafer ids for the left side as specified in the WaferIDn parameter of the PPSELECT remote command.

EXPECTED-WID(RLOT)

Format **: 00**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
EXPECTED-WID(RLOT)	DV	159		<L [0,25,26] <A[0-48]"WafID 1"> … <A[0-48]"WafID n"> >	

The MID Module expected wafer ids for the right side as specified in the WaferIDn parameter of the PPSELECT remote command.

CURRENT-WAFER-ID

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
CURRENT-WAFER-ID	DV	166		<A "X…X">	48

Wafer id of the wafer that is currently being implanted as specified in the MID module’s WaferIDn parameter of the PPSELECT remote command.

EXTR-HV-TIME

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
EXTR-HV-TIME	SV	819	hours	<A “XXXXXX.XX">	9

Accumulated number of hours the extraction power supply is on. The timer can be reset from the maintenance screen. Available in V13.10

EXTRACTION

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
EXTRACTION	DV	221	.1 KeV	<A “XX.X”>	4

Extraction voltage; unit is 0.1 keV.

F-LEARNED

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
F-LEARNED	DV	218	.1 KeV	<A “X”>	1

Parametric recipe marker. If a recipe is marked as learned in the implanter recipe directory, this field returns 1, otherwise 0.

FAUTO

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
FAUTO	DV	126	none	<A “X”>	1

Factory automation status variable:

VALUE	DESCRIPTION
0	factory automation off or not installed, Host is off-line.
1	factory automation in manual mode Host is on-line ACH is not linked to E220/500, AGV is not used. LPORT and RPORT are directly accessed by hand carried cassette or by ACH in Local Manual Mode. Cassette Load Complete buttons show n in HOST CONTROL screen. Button activation (pressing) w ill cause E220 to send S4F69.
2	Reserved
3	factory automation in semi auto mode : Host is on-line ACH is linked to E220/500, but AGV and parallel i/o are off. The operator places a cassette on ACH or removes it from ACH.
4	full auto mode :Host is on-line both ACH and AGV are linked AGV performs material handling.

FLOOD

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
FLOOD	DV	208	degree	<A “XXX”>	3

Logical value = true if the electron flood gun is to be used for the implant.

FLOOD-CURRENT

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
FLOOD-CURRENT	DV	225	0.1 mA	<A “XX.X”>	4

Electron flood current; unit is 0.1 mA.

GAS/VAPOR

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS/VAPOR	DV	220	none	<A “X”>	1

Ion source is gas if 0, vaporizer if 1.

GAS1_4_PM Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS1_4_PM	DV	150	none	<A “XXXXXX.XX”>	9

Sum of the total use times of Gasses 1-4 since the last periodic maintenance, expressed in hours and hundredths of hours.

GAS1_4_TOTAL Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS1_4_TOTAL	DV	145	none	<A “XXXXXX.XX”>	9

Sum of the total use times of Gasses 1-4 expressed in hours and hudredths of hours.

GAS1_PM Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS1_PM	DV	146	none	<A “XXXXXX.XX”>	9

Total use time of Gas 1 since the last periodic maintenance, expressed in hours and hundredths of hours.

GAS1_TOTAL Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS1_TOTAL	DV	141	none	<A “XXXXXX.XX”>	9

Total use time of Gas 1 expressed in hours and hundredths of hours.

GAS2_TOTAL Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS2_TOTAL	DV	142	none	<A “XXXXXX.XX”>	9

Total use time of Gas 2 expressed in hours and hundredths of hours.

GAS2_PM

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS2_PM	DV	147	none	<A “XXXXXX.XX”>	9

Total use time of Gas 2 since the last periodic maintenance, expressed in hours and hundredths of hours.

GAS3_PM

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS3_PM	DV	148	none	<A “XXXXXX.XX”>	9

Total use time of Gas 3 since the last periodic maintenance, expressed in hours and hundredths of hours.

GAS3_TOTAL

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS3_TOTAL	DV	143	none	<A “XXXXXX.XX”>	9

Total use time of Gas 3 expressed in hours and hundredths of hours.

GAS4_PM

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS4_PM	DV	149	none	<A “XXXXXX.XX”>	9

Total use time of Gas 4 since the last periodic maintenance, expressed in hours and hundredths of hours.

GAS4_TOTAL

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GAS4_TOTAL	DV	144	none	<A “XXXXXX.XX”>	9

Total use time of Gas 4 expressed in hours and hundredths of hours.

GemSpoolFull

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GemSpoolFull	DV	514	None	<U1 >	

If active, the entire spool file has been filled with messages.

GemSpoolLoadSubstate

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GemSpoolLoadSubstate	DV	515	None	<U1 >	

Writes new equipment initiated promary messages to the spool file. The current state is kept in GemSpoolLoad Substate and is one of the following:

6 – Spool Not Full – In this state, there is space in the spool file for writing new messages.

7 – Spool Full – In this state, the entire spool file has been filled with messages, and GWGEM is taking the appropriate action.

GemSpoolState

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GemSpoolState	DV	513	None	<U1 >	

Status variable GemSpoolState contains the current state of the spool finite state machine

1 – Spool Inactive

2 – Spool Active

GemSpoolUnloadSubstate

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
GemSpoolUnloadSubstate	DV	516	None	<U1 >	

Removes previously spooled equipment-initiated primary messages from the spool file and sends them to the host. The current state is kept in GemSpoolUnloadSubstate and is one of the following:

5 – No Spool Output – In this state, no messages are being removed from the spool file.

4 – Transmit Spool – In this state, messages are being removed from the spool file and transmitted to the host.

3 – Purge Spool – In this state, the equipment is erasing its spool file and not transmitting the messages to the host.

HOST-CONTROL

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
HOST-CONTROL	DV	125		<A “X”>	1

VALUE	DESCRIPTION
1	Ignore
2	Monitor
3	Control
4	Control w ith Implant

ID-VALIDATION(LLOT)

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ID-VALIDATION(LLOT)	DV	167		<U1 [33] u…u>	33

MID module validation statuses on the left side are reported in the following format:
<U1[33]
Expected MID
Expected PPID
Expected Slot Map
Expected Wafer ID
EMID(Actual CID)
EquipActualSlotMap
SMIFActualSlotMap
ActualWaferID1 … ActualWaferID26
>

Each status variable validation will have one of the following values:
0 = empty
1 = exist
2 = validation failed
3 = validation pass

ID-VALIDATION(RLOT) Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ID-VALIDATION(RLOT)	DV	168		<U1 [33] u…u>	33

MID module validation statuses on the right side. Same as ID-VALIDATION(LLOT).

IMPLANT-STEP-PROCESS-TIME Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
IMPLANT-STEP-PROCESS-TIME	DV	814	seconds	<A “XXXXXXXXXX”>	10

The time in seconds it took the latest implant step to complete. The last value is preserved and is only reset on software reset. It reflects beam-on-wafer time and does not count implant-on-hold time.

ION-AMU Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ION-AMU	DV	202	AMU	<A “XXX”>	3

The atomic weight of the ion or molecule used for the implant.

ION-CHARGE

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ION-CHARGE	DV	211	none	<A “X”>	1

The charge state of the ion: 1 for singly charged, 2 for doubly charged implants. The E220 will set up for doubly charged implants if the ENERGY exceeds the 200 KV rating of the implanter regardless of the value in ION-CHARGE.

ION-NAME

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
FLOOD-CURRENT	DV	201	none	<A “XX”>	2

The 2 character name of the ion to be used: Ar, B, As, etc. This name is used to search through the gas bottles and vaporizer for the one with the correct species.

JOB_ID

Format : 20

JOB_ID	DV	195	none	<A "XXXXX">	5

A job identifier automatically assigned by the equipment, but can also be assigned by the host. It identifies which job a job-related event occurred on.

JOB_ID_LIST

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
JOB_ID_LIST	DV	193	none	<L, n <inactive_job1… inactive_job5> >	5

A list of up to 5 jobs in the job queue that are not yet active. This is applicable if ECO 104 (Lineup job queue) is selected.

LEFT_WAFERS_IMPLANTED

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LEFT_WAFERS_IMPLANTED	DV	172	# wafers	<A “XX”>	3

Version Introduced 11.05.08

The number of wafers in the left loadlock that were completely or partially implanted with the specified recipe in the last batch. When a wafer that is partially implanted is on hold, this SVID will not be incremented. However, as soon as the implant is aborted, these variables will be incremented to reflect the partially implanted wafer.

LimitVariable

Format : 54

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LimitVariable	DV	312	none	<U4 >	

This variable contains the VID for the variable whose value changed monitoring zones.

LMATERIAL-STATUS

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LPORT-STATUS	DV	154	none	<A "XXX">	3

Side-specific material status for left side. Normal progression 0-1-2-3-0…

VALUE	DESCRIPTION
0	No material
1	Unprocessed material
2	Partially processed material
3	Fully processed material
255	Unknown material status (lost records)

LOT

Format: 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LOT	DV	120	lot #	<A "X…X">	16

Lot number of side being reported on start or end batch or wafer reports.

LEFT-PPID

Format : U1

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LEFT-PPID	DV	227	KeV	<A "X…X">	16

The 16 character name of the last recipe run on the left side.

llqdpEnabled

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
llqdpEnabled	DV	651	none	<A "XXXX">	4

llqdpEndTask

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
llqdpEndTask	DV	650	none	<A “XXXX”>	4

LEFT-ELEV-SERVO-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LEFT-ELEV-SERVO-DAC	DV	801	encoder cnts	<A “XXXXXXXX">	8

Left elevator position in raw encoder counts.

LEFT-HANDLER-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LEFT-HANDLER-DAC	DV	805	encoder cnts	<A “XXXXXXXX">	8

Left handler position in raw encoder counts.

ECO_SETTINGS

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ECO_SETTINGS	DV	821		<Boolean ECO-0…ECO-511>	512

Array of ECO Settings. The first byte corresponds to ECO 0 which is unused. The equipment screen may only show a portion of the ECO settings, but there are actually 512 ECO settings slots allocated for future use. Available in V13.20

LEFT-ORIENTER-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LEFT-ORIENTER-DAC	DV	803	encoder cnts	<A “XXXXXXXX">	8

Left orienter position in raw encoder counts.

LEFT-UPPER-ARM

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LEFT-UPPER-ARM	DV	816	encoder cnts	<A “XXXXXXXX">	8

Left upper arm position in raw encoder counts. Applicable only to Productivity Plus equipment and V12.50 and later.

LINE#

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LINE#	DV	813	none	<A “XX">	2

The current recipe line number being executed.   This variable is reset to 1 on the next wafer.

LPORT

Format   **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LPORT	DV	130	none	<A “X”>	1

Left side port status
0 - cassette not present
1 - cassette present
2 - not in use
Note: When FAUTO is either 1 or 0, 0 indicates the port is ready for load cassette, 1 not ready.
LPORT is valid with the cassette sense option.

LPORT-STATUS

Format   **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LPORT-STATUS	DV	152	none	<A “XXX”>	3

Side-specific port status for left side: Normal progression 0-1-2-3-4-5-6-7-0

VALUE	DESCRIPTION
0	Port available
1	Load ready
2	Loading
3	Process ready
4	In process
5	Unload ready
6	Unloading
7	Ready for pickup
255	Unknow n port status

LTAG-BATSTAT

Format   **: 51**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LTAG-BATSTAT	DV	198	None	<U1 >	

Version Introduced 12.14

Battery Status of the left Tag.
0 = Battery check pass
255 = Battery check fail
Data is valid only when linked with CEID 162

LWAF#

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LWAF#	DV	102	# wafers	<A “XX”>	2

The number of wafers on the left side.

MIR-V

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
MIR-V	DV	224	0.1 keV	<A “XX.X”>	4

Mirror voltage; unit is 0.1 keV.

NUMBER_OF_SCANS

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
NUMBER_OF_SCANS	DV	140	none	<A “XXXXXX”>	6

Total number of wafer scans.

OP-NAME

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
OP-NAME	DV	104	none	<A “XXXXXX”>	6

The name of the operator running the implanter.

OPERATOR-ID

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
OPERATOR-ID	DV	105	none	<A “XXXXXX”>	6

The ID code of the operator.

OPTION_SETTINGS

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
OPTION_SETTINGS	SV	822		<Bool0…Bool511>	

Array of OPTION Settings. The first byte corresponds to OPTION 0 which is unused. The equipment screen may only show a portion of the OPTION settings, but there are actually 512 OPTION settings slots allocated for future use. Available in V13.20

PLATEN-TILT-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PLATEN-TILT-DAC	DV	807	encoder cnts	<A “XXXXXXXX">	8

Platen tilter position in raw encoder counts.

PLATEN-ROTATION-SENSOR-COUNT

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PLATEN-ROTATION-SENSOR-COUNT	DV	818	encoder cnts	<A “XXXXXXXX">	8

Accumulated rotation sensor counts for every rotation on the wafer ONLY while implanting. This means that no rotation counts is accumulated for rotating platen movements done manually in INITIALIZATION or ES-MANUAL screens. .Applicable only if OPTION 83 (Platen Movement Sensor) is selected. Available in V13.10

PORT-ID

Format: 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PORT-ID	DV	151	none	<A “X”>	1

Event identification by port number (side). This DVID should be used with V12 and greater for sending port information.

VALUE	DESCRIPTION
0	Event is not side-related
1	Event occurred for left side
2	Event occurred for right side
3	Event occurred for both sides

PORT-STATUS

Format: 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PORT-STATUS	DV	132	none	<A “XXXXX”>	5

PORT-STATUS is in a 2-byte format. Feedback from port sensors. If a sensor is "made" the associated bit in PORT-STATUS =1. If a sensor is not installed, the associated bit always = 0.

Right Load Lock							
Pivot Extended	Pivot Retracted	Door Opened	Door Closed	Not Used	Cassette Present	Not Used	Not Used
7	6	5	4	3	2	1	0

Left Load Lock							
Pivot Extended	Pivot Retracted	Door Opened	Door Closed	Not Used	Cassette Present	Not Used	Not Used
15	14	13	12	11	10	9	8

PPChangeName Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PPChangeName	DV	301	none	<A “X...X”>	16

The PPID which was affected upon the event of the creation, editing, or deletion of a Process Program local to the equipment.

PPChangeStatus Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PPChangeStatus	DV	300	none	<U1 >	

The action taken on the Process Program named in PPChangeName. This variable is valid upon the event of the creation, editing, or deletion of a Process Program local to the equipment.

1 - Created
2 - Edited
3 - Deleted
4 - Learned
5-63 - Reserved

PPID Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PPID	DV	200	none	<A “X...X”>	16

The 16 character name of the last recipe run on the machine.

PPExecName Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PPExecName	DV	304	none	<A “X…X”>	16

The PPID(s) of the Process Program that is currently set up. Start of the beam setup updates this variable.

PREVIOUSCEID Format : 54

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PREVIOUSCEID	DV	504	None	<U4 >	

PREVIOUSCEID is the most recent event report.

PreviousControlState

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PreviousControlState	DV	310	none	<U1 >	

1=Off-Line
5=On-Line (Remote)
4=On-Line (Local)

PreviousProcessState

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PreviousProcessState	DV	303	none	<U1 >	

The previous processing state of the equipment, before the most recent process state change. Values are the same as in ProcessState.

ProcessState

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ProcessState	DV	302	none	<U1 >	

The current processing state of the equipment.

0=Not ready
1=Ready
2=Unused
3=Setting up
4=Implant ready
5=Implanting
6=Implant hold
7=Aborting
255=Unknown state

PURITY

Format: 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
PURITY	DV	223	0.01	<A “X.XX”>	4

For E500 only; unit is 0.01.

Q-SOURCE

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
Q-SOURCE	DV	216	none	<A "X">	1

Obsolete.

QUEUE_FREE_SLOTS

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
QUEUE_FREE_SLOTS	DV	196	None	<A "XX">	2

Version Introduced 12.20

Status variable #196 returns the number of job entries allowed from the host. As the lineup queue currently contains a maximum of 5 entries, a value of 0 to 5 will be returned dependent upon the number of jobs currently contained in the queue. A check of this ASCII SVID will allow the host to determine the number of jobs that can be sent to the tool.

QUEUE-FULL

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
QUEUE-FULL	DV	171	None	<A "X">	1

Version Introduced 12.10.21

Status variable #171 returns a value of 1 if the lineup queue is full.

REMOTE-CONTROL

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
REMOTE-CONTROL	DV	122	none	<A "XXX">	3

True if the E220 is in Host Control and will accept remote commands.

RIGHT-ELEV-SERVO-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RIGHT-ELEV-SERVO-DAC	DV	802	encoder cnts	<A "XXXXXXXX">	8

Right elevator position in raw encoder counts.

RIGHT-HANDLER-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RIGHT-HANDLER-DAC	DV	806	encoder cnts	<A "XXXXXXXX">	8

Right handler position in raw encoder counts.

RIGHT-ORIENTER-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RIGHT-ORIENTER-DAC	DV	804	encoder cnts	<A “XXXXXXXX">	8

Right orienter position in raw encoder counts.

RIGHT-ORIENTER-LIFTER-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RIGHT-ORIENTER-LIFTER-DAC	DV	809	encoder cnts	<A “XXXXXXXX">	8

Right orienter lifter position in raw encoder counts.

RIGHT-PPID

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RIGHT-PPID	DV	228	none	<A “X…X”>	16

The name of the recipe selected on the right side.

RIGHT-UPPER-ARM

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RIGHT-UPPER-ARM	DV	817	encoder cnts	<A “XXXXXXXX">	8

Left upper arm position in raw encoder counts. Applicable only to Productivity Plus equipment and V12.50 and later.

RIGHT_WAFERS_IMPLANTED

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RIGHT_WAFERS_IMPLANTED	DV	173	# wafers	<A “XX”>	2

Version Introduced 11.05.08

The number of wafers in the right loadlock that were completely or partially implanted with the specified recipe in the last batch. When a wafer that is partially implanted is on hold, this SVID will not be incremented. However, as soon as the implant is aborted, these variables will be incremented to reflect the partially implanted wafer.

RMATERIAL-STATUS

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RMATERIAL-STATUS	DV	155	none	<A “XXX”>	3

Side-specific material status for right side. Normal progression 0-1-2-3-0… See LMATERIAL-STATUS for values.

ROPINS-MOTOR-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ROPINS-MOTOR-DAC	DV	811	encoder cnts	<A “XXXXXXXX">	8

Ropins position in raw encoder counts.

ROTATING-PLATEN-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ROTATING-PLATEN-DAC	DV	810	encoder cnts	<A “XXXXXXXX">	8

Rotating platen position in raw encoder counts.

ROTATION#

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ROTATION#	DV	812	none	<A “XX">	2

The current rotation number being executed. This variable is reset to 1 on the next line of a multi-line recipe or the next wafer.

RTAG-BATSTAT

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RTAG-BATSTAT	DV	199	None	<U1 >	

Version Introduced 12.14

Battery Status of the right Tag.
0 = Battery check pass
255 = Battery check fail
Data is valid only when linked with CEID 162

ROTATE

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
ROTATE	DV	226	# rotations	<A “XX”>	2

For rotating platen option only, this DVID displays the number of rotations.

RPORT Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RPORT	DV	131	none	<A "X">	1

Right side port status
0 - cassette not present
1 - cassette present
2 - not in use
Note: When FAUTO is either 1 or 0, 0 indicates the port is ready for load cassette, 1 is not ready. RPORT is valid with the cassette sense option.

RPORT-STATUS Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RPORT-STATUS	DV	153	none	<A "XXX">	3

Side-specific port status for right side: Normal progression 0-1-2-3-4-5-6-7-0… See LPORT-STATUS for values.

RWAF# Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
RWAF#	DV	103	# wafers	<A "XX">	2

The number of wafers on the right side.

SCANS Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
SCANS	DV	206	# scans	<A "XXXX">	4

The minimum number of mechanical scans to be used for the implant.

SHUFFLE-MODE Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
SHUFFLE-MODE	SV	815	none	<A "X">	1

Indicates the SHUFFLE-MODE the equipment is in.
0 – no shuffling
1 – left to right shuffle
2 – right to left shuffle

SOURCE-TIME

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
SOURCE-TIME	SV	820	hours	<A “XXXXXX.XX">	9

Accumulated number of hours the filament power is on. The timer can be reset from the maintenance screen. Available in V13.10

SPOOLCOUNT ACTUAL

Format **: 54**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
SPOOLCOUNTACTUAL	DV	511	None	<U4 >	None

Used to keep a count of the messages actually contained in the equipment's spool area. Multi-block inquire/grant messages are not spooled and not included in this count. Required for GEM compliance.

SPOOLCOUNTTOTAL

Format **: 54**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
SPOOLCOUNTTOTAL	DV	512	None	<U4 >	None

Used to keep a count of the total number of primary messages directed to the spool, regardless of whether placed or retained in the spool. Multi-block inquire/grant messages are not spooled and not included in this count.

SPOOLFULLTIME

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
SPOOLFULLTIME	DV	510	None	None	None

Contains the timestamp from the time the spool last became full. If the spool was not filled during the last spooling period, this will contain a time value prior to the current SpoolStartTime.

Format: YYYYMMDDHHMMSSCC

YYYY=Year 0000 to 9999
MM=Month 01 to 12
DD=Day 01 to 31
HH=Hour 00 to 23
MM=Minute 00 to 59
SS=Second 00 to 59
CC=Centisecond 00 to 99

SPOOLSTARTTIME

Format**: 0, 10, 11, 20, 21, 3(), 4(), 5()**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
SPOOLSTARTTIME	DV	509	None	None	None

Contains the timestamp from the time spooling last became active.

Format: YYYYMMDDHHMMSSCC

YYYY=Year	0000 to 9999
MM=Month	01 to 12
DD=Day	01 to 31
HH=Hour	00 to 23
MM=Minute	00 to 59
SS=Second	00 to 59
CC=Centisecond	00 to 99

STATUS

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
STATUS	DV	117	none	<A “XX”>	2

VALUE	DESCRIPTION
1	standby
2	loading(pumping or ventng cassette)
3	ready(w aiting for cassette)
4	beam setup
5	implanting
6	on hold

TAG-FILEDATA

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
TAG-FILEDATA	DV	197	None	<A “X…X”>	32757

Version Introduced 12.14

This variable should be linked with CEID 161 to get the file data from the Tag on the side where the event occurred on.

TARGET-FARADAY-DAC

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
TARGET-FARADAY-DAC	DV	800	encoder cnts	<A “XXXXXXXX">	8

Target faraday position in raw encoder counts.

TARGET-I

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
TARGET-I	DV	123	amp	<A “X.XXXE-X”>	8

The integrated beam current in the end station.

TransitionType

Format : 51

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
TransactionType	DV	313	none	<U1 >	

Used with the Limits Monitoring capability, it defines the direction of the zone transition which has occurred.

0 - Transition from lower to upper zone.
1 - Transition from upper to lower zone.

W-TYPE

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
W-TYPE	DV	217	none	<A “X”>	1

Specifies the flat configuration on the wafer to allow the implanter to confirm that the right kind of wafers are being run. In addition, wafer type 5 is used for semitransparent wafers such as silicon on sapphire or LCD display on glass.

WAFER-END-TIME

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WAFER-END-TIME	DV	108	none	<A “X…X”>	12

Implant end time for wafer in the format yymmddhhmmss.

WAFER-HOLDS

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WAFER-HOLDS	DV	118	# holds	<A “XX”>	2

Total number of normal hold conditions (retry conditions) during implant of the current wafer.

WAFER-NUMBER

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WAFER-NUMBER	DV	106	# holds	<A “XXX”>	3

Current wafer being implanted. For 25-wafer cassettes, wafer numbers 1 to 25 are on the left loadlock and 26 to 50 are on the right. For 26-wafer cassettes, 1 to 26 are on the left and 27 to 52 are on the right.

If ECID 256 (FORMAT) bit 9 (counting from 0) is set, wafer numbers are sequential from 1 to 25 (or 26) on both sides.

WAFER-START-TIME

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WAFER-START-TIME	DV	107	none	<A “X…X”>	12

Implant start time for wafer in the format yymmddhhmmss.

WAFERS_IMPLANTED

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WAFERS_IMPLANTED	DV	139	none	<A “XXXXXX”>	6

Total number of wafers implanted. This count is not reset every batch. This counter may be reset in the wafer/gas metering screen.

WFR_CYC_PM_L/R

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WFR_CYCL_PM_L/R	DV	138	none	<A “XXXXXX”>	6

Wafer cycles on the left and right sides since the last periodic maintenance.

WFR_CYC_PM_LEFT

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WFR_CYCL_PM_LEFT	DV	136	none	<A “XXXXXX”>	6

Wafer cycles on the left side since the last periodic maintenance.

WFR_CYC_PM_RIGHT

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WFR_CYCL_PM_RIGHT	DV	137	none	<A “XXXXXX”>	6

Wafer cycles on the right side since the last periodic maintenance.

WFR_CYC_TOT_L/R

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WFR_CYCL_TOT_L/R	DV	135	none	<A “XXXXXX”>	6

Wafer cycles total for the left and right sides.

WFR_CYC_TOT_LEFT

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WFR_CYCL_TOT_LEFT	DV	133	none	<A “XXXXXX”>	6

Wafer cycles total for the left side.

WFR_CYC_TOT_RIGHT

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WFR_CYCL_TOT_RIGHT	DV	134	none	<A “XXXXXX”>	6

Wafer cycles total for the right side.

WHEREIS(LLOT)

Format : 34

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WHEREIS(LLOT)	DV	176	none	<I4 [26] i4…i4>	

Current location of each wafer on the left loadlock as tracked by the MID module. Values are as follows:

0 = unknown
1 = located in automation ready for locking
2 = located in automation ready to load to tool
3 = automation loading to tool loadlock
4 = located in the tool loadlock ready for readying
5 = located in the tool loadlock ready for processing
6 = tool processing
7 = tool finished processing
8 = located in the tool loadlock ready for returning
9 = located in the tool loadlock ready for unloading
10 = automation unloading from tool loadlock
11 = located in automation ready for unlocking
12 = located in automation ready for removal

WHEREIS(RLOT)

Format : 34

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
WHEREIS(RLOT)	DV	177	none	<I4 [26] i4…i4>	

Current location of each wafer on the right loadlock as tracked by the MID module. Values are the same as in WHEREIS(LLOT).

X-SIGMA

Format : 20

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
X-SIGMA	DV	213	0.01%	<A “XX.XX”>	5

Maximum non-uniformity allowed across the wafer as measured during the scanner setup. Units are 0.1%.

ECID Variable Dictionary

Accel-mode

Format: **51**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
Accel-mode	ECV	259	0	1	0

CEID's 258, 259 and 260 are used for recipe conversion and should be treated as a set. They are only used when PPBODY1 recipes are used on version 9 software. These conversion numbers are ignored when using PPBODY2.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

ACHPORT_ENABLE

Format:**54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
ACHPORT_ENABLE	ECV	279	None	None	None

							LSB
7	6	5	4	3	2	1	0
				Port 4	Port 3	Port 2	Port 1
15	14	13	12	11	10	9	8
23	22	21	20	19	18	17	16
MSB							
31	30	29	28	27	26	25	24

0: Disabled

1: Enabled

Baud-Rate

Format: **54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
Baud-Rate	ECV	267	150	19200	9600

Default Baud rate of the communications port in bps.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

BCR MODE

Format: **: 54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
BCR MODE	ECV	299			

Set to flag if the BCR is enabled on each side (left and/or right). Aside from being host configurable, the operator shall be able to configure it in the Barcode Reader screen.

BCR Mode bits shall also be configurable using the GUI and its value shall be stored in permanent storage.

							LSB
					BCRTR	RBCR	LBCR
SYM	SYM	SYM	SYM	MODEL	MODEL	MODEL	MODEL
MSB							

Field	Description	Value - Description
LBCR	Left Barcode Reader	0 – Left BCR disabled 1 – Left BCR enabled
RBCR	Right Barcode Reader	0 – Right BCR disabled 1 – Right BCR enabled
BCRTR	Barcode Reader Trigger Specifies how Bar code reading is triggered by the operator. Note: in this document, barcode reading for the E500 always refers to retracting the cassette and reading the barcode.	0 - BCR read after operator touches LOAD (BCR Read) button. (default) 1 - BCR automatically read after cassette is sensed. (Note: setting 1 will be implemented in a future software release.)
MODEL	Barcode Reader Model	The following Barcode hardware are supported: 0 - Sickoptic CLA430A (default)
SYM	Barcode Reader Symbology	0 – Code 39 (default)

Circuit Assurance

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
Circuit Assurance	ECV	351	1	240	15

This specifies the frequency (in seconds) at which the equipment will initiate the HSMS Linktest control transaction to verify that the link is still functional. A smaller value means more frequent control messages. The equipment sends Linktest transactions only during idle periods, when there is no normal Data Message traffic which indicates that the connection remains functional. If you specify the value 0, the equipment initiates no Linktest transactions, and does not verify that the link remains active.

CONFIGALARMS

Format:54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
CONFIGALARMS	ECV	271	0	2	0

Determines what alarm report is sent.

0: S5F1 (default)

1: S5F71

2: S5F73

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

CONFIGCONNECT

Format:**54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
CONFIGCONNECT	ECV	272	0	2	2

Determines what message will be used to establish communications.

0: S1F1

1: S1F65

2: S1F13 (default).

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

CONFIGEVENTS

Format:**54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
CONFIGEVENTS	ECV	273	0	1	1

Controls whether event reports are sent in S6F11/S6F13 GEM format or S6F3/S6F9 SECS format.

0: S6F3/S6F9 (SECS Format)

1: S6F11 /S6F13 (GEM Format)

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

CONNECT MODE

Format**:** **: 54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
CONNECT MODE	ECV	292			

Controls whether the equipment is the HSMS Active or Passive Entity .

0: HSMS Passive Entity

non-zero: HSMS Active Entity

CONNECTION ESTABLISHMENT

Format**:** **: 54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
CONNECTION ESTABLISHMENT	ECV	350	1	240	10

For a Port configured as ACTIVE, this parameter specifies the maximum time in seconds the equipment will wait after issuing a TCP/IP connect command without receiving success or failure status from TCP/IP, before the equipment gives up and assumes the connect attempt has failed. For certain complex networks with many routers, this can be long.

DEVICENAME

Format: 20

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
DEVICENAME	ECV	269	asc_lo	asc_hi	E220

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

EC TIMEFORMAT

Format : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
EC TIMEFORMAT	ECV	289	None	None	None

This EC controls the date/time format for all applicable SECS II messages. See also TIME data item. Y2K feature.
0 - date/time format = YYMMDDHHMMSS
1 - date/time format = YYYYMMDDHHMMSSCC (Y2K compliant)

EQPORT_ENABLE

Format : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
EQPORT_ENABLE	ECV	278	None	None	None

1: Right Side Enabled
2: Left Side Enabled
3: Both Sides Enabled

Equipment-ID

Format: 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
Equipment-ID	ECV	268	0	32000	0

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

EQUIPMENT IP ADR

Format: : A

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
EQUIPMENT IP ADR	ECV	291			

The passive IP address which is always set to the equipment internet IP address. This is a requirement for the passive (server) Connect Mode.

Establish-Comm-Timeout

Format : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
Establish-Comm-Timeout	ECV	262	1	36000	10

Establish communications timeout. The length of time in seconds of the interval between attempts to send S1F13 when establishing communications.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

Extraction-volts

Format: : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
Extraction-volts	ECV	260	0	71	0

CEID's 258, 259 and 260 are used for recipe conversion and should be treated as a set. They are only used when PPBODY1 recipes are used on version 9 software. These conversion numbers are ignored when using PPBODY2.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

FACTAUTO

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
FACTAUTO	ECV	263	0	4	1

This equipment constant determines the factory automation configuration as follows:

0: Factory Automation is not installed

1: Host Communication is enabled, but no Cassette Handler or Automatic Guided Vehicle

2: Host Communication and Cassette Handler is enabled, no Automatic Guided Vehicle

3: All components of Factory Automation are enable, Host Commuication, Cassette Handler, and Automatic Guided Vehicle.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

FORMAT

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
FORMAT	ECV	256	0	32	128

Report data format

MSB										LSB
10										0
bit 10	bit 9	I	H	X	F	E	D	C	B	X

H : Set to one if a separate end of batch report is to be sent for each cassette in a batch when two cassettes are implanted at the same time.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

I : When set, ESPressure recipe parameter is in lo/target/hi/interlock format when used in formatted recipe upload/download. When clear, ESPressure only has a target value.

Bit 9: When set, VID 106 (WAFER-NUMBER) shall be reported as 1 to 25 (26 for 26-wafer cassette) for both sides. The right side shall NOT be reported as 25 (26) to 50 (52).

Bit 10: When set, the following variables shall report "NONE" when the value is blank:

VID 100 A(LLOT)

VID 101 A(RLOT)

VID 120 LOT

VID 200 PPID

VID 227 LEFT-PPID

VID 228 RIGHT-PPID

VID 304 PPExecName

GemConfigSpool

Format : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
GemConfigSpool	ECV	280	0	1	None

1: Spooling Enabled

0: Spooling Disabled

GemInitCommState

Format: : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
GemInitCommState	ECV	265	0	1	0

Specifies the Equipment's default communications state after power on.

0 – DISABLED

1 - ENABLED

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

GemInitControlState

Format : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
GemInitControlState	ECV	266	0	2	0

EQUIPMENT DEFAULT CONTROL STATE. Specifies the Equipment's default control state after a power on.

0 - OFFLINE

1 - LOCAL

2 - REMOTE

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

GemMaxSpoolFileSize

Format : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
GemMaxSpoolFileSize	ECV	281	None	None	None

Maximum size of the spool file, default is 10000 units. Units depend upon the operating system call to create the file.

GemMaxSpoolTransmit

Format: 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
GemMaxSpoolTransmit	ECV	282	None	None	None

The maximum number of messages which the equipment will transmit from the spool in response to an S6F23 "Transmit Spooled Messages" request. If MaxSpoolTransmit is set to zero, no limit is placed on the messages sent from the spool. Multi-block inquire/grant messages are not counted in this total.

GemMsgInterLv

Format : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
GemMsgInterLv	ECV	285	0	1	None

This EC enables/disables the message interleaving capability.

0: Disabled (default)

1: Enabled

Where Used: S2F15

GemOverWriteSpool

Format: : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
GemOverWriteSpool	ECV	283	0	1	None

This Equipment Constant is used to indicate to the equipment either to overwrite data in the spool area or to stop spooling whenever the spool area limits are exceeded.

TRUE- to overwrite spooled data

FALSE - to stop spooling when limits exceeded

GemSpoolFileName

Format: : 20

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
GemSpoolFileName	ECV	284	asc_lo	asc_hi	SPOOL LOG

This EC specifies which file to be used to hold the spooled data.

HEARTBEAT

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
HEARTBEAT	ECV	277	None	None	20

Length of delay in the range of 0 - 99 seconds, between the S1F1 being sent to the Host. Setting to 0 disables heartbeat.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

GEMTASK LOG SIZE

Format : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
GEMTAKSK LOG SIZE	ECV	288	None	None	None

Version Introduced: 11.05.05

Logging files such as gemtask.log and forth.log continue to increase in size as the tool is run. The possibility exists that logging files can increase until virtually all hard disk space is utilized. 11.05.05 will now automatically zip all logs including *machine.con.* In order prevent filling the hard disk, only the last eight zipped logs files will be kept. The user is able to determine the file size at which the zipping process begins through the specification of new equipment constant 288. Setting EC288 to 4000000 limits gemtask.log and gemtask.old to 400K before compression. Compressed logs will be kept in the c:\data directory under the file names logs1.zip – logs8.zip. In addition to automatic zipping of all log files, gemtask.log now contains a time stamp as well as converting the SDR hex bytes to SML. To obtain current zip logs, the following procedure must be used:

[If running, hit any key, type BYE to shutdown to TSX]
cd \tsxutil
copy gemtest.cmd gemtask.cmd
E220
[run a test that highlights the failure]
[hit any key]
BYE
[IF you go into TSX]
sy
[IF gemtask is running, note its {job-id} say 12]
DBSTOP {job-id}
[ENDIF]
ZIPLOGS
[ELSE]
[wait five minutes for the log caches to flush reboot by pushing reset button in back of the computer (e220.cmd will automatically zip all logs)]
[ENDIF]
cd \tsxutil
copy gemrel.cmd gemtask.cmd
cd \data
[put a blank disk in drive a:]
copy LOGS1.ZIP
[email the factory LOGS1.ZIP]

Note: This ECID was changed from MAX-WAFERS in 11.05.05.

MemoryStall

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
MemoryStall	ECV	353	1	240	10

This limits how long (in seconds) the equipment will tolerate a situation where all equipment buffers are full and the other end of the link attempts to send more data. If the MEMORY STALL timeout expires, the equipment will terminate the connection, to avoid clogging the TCP/IP network.

MID-MODE

Format**: : 54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
MID-MODE	ECV	286	0	0x1FFFF	0

							LSB
7	6	5	4	3	2	1	0
CWID	CEM	CSM	AWI	AW	ACI	AC	ESM
15	14	13	12	11	10	9	8
ICEM	ICWID	ICCID	WIZ	STRT	WCC	POD	CCID
23	22	21	20	19	18	17	16
						CCIDJ	ICSM
MSB							
31	30	29	28	27	26	25	24

FIELD	DESCRIPTION	VALUE
ESM	Enable SMIF Map	1 - Enable SMIF slot map reader (User can also independently enable reader using the GUI). 0 – Disable
AC	Allow Operator EMID Input	1 - Allow operator EMID (actual cassette identification) input when reader Fails. 0 - Do not allow operator (EMID) actual cassette input when reader fails.
ACI	Allow Operator EMID Ignore	1 - Allow operator to ignore EMID (actual cassette ID) reader failures. 0 - Do not allow Operator to ignore EMID (actual cassette ID) reader failures.
AW*	Allow Operator Wafer ID Input	1 - Allow Operator wafer ID input when reader fails. 0 - Do not allow operator wafer ID input when reader fails.
AWI*	Allow Operator Wafer ID Ignore	1 - Allow operator to ignore wafer ID reader failures. 0 - Do not allow Operator to ignore wafer ID reader failures.
CSM	Validate SMIF Slot Map	1 - Validate SMIF actual slot map against host expected slot map. 0 - Do not compare actual SMIF Slot Map.
CEM*	Validate Equip Slot Map	1 - Validate equipment actual slot map against host expected slot map. 0 - Do not validate equipment actual slot map.
CWID*	Validate Wafer ID	1 - Validate the equipment actual wafer ID against the host expected wafer ID. 0 - Do not validate equipment actual wafer ID.
CCID	Check Material ID	1 - Validate the EMID (actual cassette id) against the MID (expected cassette id). 0 - Do not validate EMID (actual cassette ID) against the MID (expected cassette ID).
POD*		1 - The host sends the PPSELECT or SetWaferParameters message with the MID after the cassette arrives at the equipment. Validate the EMID (actual cassette ID) against the MID (expected cassette ID) as soon as the MID (expected cassette ID) is received. 0 - The host sends the PPSELECT or SetWaferParameters before the cassette arrives at the equipment. Validate the EMID (actual cassette ID) against the MID (expected cassette ID) as soon as the EMID is received.
WCC	Validate Host Expected Wafer Parameters	1 - Validate expected slot map against expected wafer. 0 - Both a Wafer ID and Slot Map are invalid if both are received at the same time.
STRT	Auto-Start	1 Send a START command as soon as all the EMID(actual cassette id) are validated. 0 Do not Auto Start. Note: If STRT is set, ECID 257 bit Y (smif autoload/unload) should be cleared and vice versa.
WIZ*		1 - Provide helpful Popups that tell the operator which buttons to touch. 0 - Do not provide helpful Popups.
ICCID	Operator Ignore CID Comparision	1 - Allow the operator to ignore the EMID (actual cassette id) validation failure. 0 - Do not allow operator to ignore EMID validation failures.
ICWID*	Operator Ignore WID Comparison	1 - Allow the operator to ignore the actual wafer id validation failure. 0 - Do not allow operator to ignore actual wafer id validation failures.
ICSM*	Operator Ignore Smif Slot Map Comparison	1 - Allow the operator to ignore the SMIF slot map validation failure. 0 - Do not allow operator to ignore SMIF slot map validation failures.
ICEM*	Operator Ignore Equipment Slot Map Comparison	1 - Allow the operator to ignore the equipment slot map validation failure. 0 - Do not allow operator to ignore equipment slot map validation failures.
CCIDJ	ID Mismatch Job Action	On MID/EMID mismatch: 1 - Discard job on MID/EMID mismatch and let the host issue another PPSELECT. 0 - Retain job on MID/EMID mismatch so operator can place the

* These fields are reserved. They presently have no effect.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

Mirror-mode

Format: : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
Mirror-mode	ECV	258	0	3	0

CEID's 258, 259 and 260 are used for recipe conversion and should be treated as a set. They are only used when PPBODY1 recipes are used on version 9 software. These conversion numbers are ignored when using PPBODY2.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

MODES

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
MODES	ECV	257	0	BIT 20	1

							LSB
7	6	5	4	3	2	1	0
C	N	A	E	R	P	S	V
15	14	13	12	11	10	9	8
Z	Y	G	D	I	F	B	X
23	22	21	20	19	18	17	16
			Bit 20	Bit 19	Bit 18	Bit 17	Bit 16
MSB							
31	30	29	28	27	26	25	24

Modes control bits

BIT Character	BIT Number	DESCRIPTION
V	0	Set to one to vent automatically at the end of the implant.
S	1	Set to one to automatically start implanting after beamscan.
P	2	Set to one to skip cassette removal message at the end of the batch processing.
R	3	Set to one to indicate no operator access to Recipe and Lot fields.
E	4	Set to one to indicate ALID is a 4 byte integer.
A	5	Set to one to indicate Equipment Scheduling. Cleared to indicate Host Scheduling. Not used in GEM.
N	6	Set to one to indicate automatic start after S2F27 in Host Scheduling Mode. Not used in GEM.
C	7	Set to one to indicate Event Reports for enabled events 51, 52, 55, and 56 are sent to the Host.
X	8	Reserved.
B	9	Set to one to indicate two additional recipe fields, Beam Slit and Dose Calibration Factor, in PPBODY2 MSB.
F	10	Set to one to set orienter to notch. Cleared to set orienter to flat.
I	11	Set to one to allow a message with TID > 0 to show on main screenSet for support of S10F5. Not used in GEM.
D	12	Set to one to suppress the Double Implant warning message.
G	13	Set to one to indicate Chained Implant. If this bit is set, the equipment will not vent automatically even if bit V is set.
Y	14	Automatically unload to SMIF LPT after an implant and the door opens; ignore if there is no SMIF LPT. Note: When MID module is in use, if bit Y is set, ECID 286 (MIDMode) bit STRT should be cleared and vice versa.
Z	15	If clear, PPSELECT and START remote commands will be executed only if the E500 is in the HOST-CONTROL screen. If set, these commands will be executed in HOST-CONTROL, FULL AUTOMATED or manual BATCH screens. (Applicable only to V11; not in V12 and newer software)
Bit 16	16	Set to one if S1F1 and S2F17 are sent only the first time eqpt is switched to CONTROL mode and not everytime the HOST-CONTROL button is touched in the MODE MENU screen.
Bit 17	17	Set to one to force both sides to report "mapping done" event (ECID 39) simultaneously.
Bit 18	18	Set to one if the S2F71 and S2F72 transaction is verified to be successful before queueing the process. Version Introduced: 12.11
Bit 19	19	Set to one to switch control modes with the remote commands G0-LOCAL and GO-REMOTE. Version Introduced: 12.14
Bit 20	20	If ECID=257 (MODES) bit 20 is set, then a new PPSELECT shall be rejected and the E500 shall NOT overwrite the LOTID and PPID of a previous PPSELECT when the previous one has not started processing. If the host has to overwrite the previous PPSELECT, it shall have to send a PPCLEAR-LEFT and/or PPCLEAR-RIGHT first before sending the new PPSELECT. ECID=257 (MODES) bit 20 shall have no effect if ECO 104 (Job Queue) is enabled. Version introduced: 12.15

In GEM, the A, N, I bits are ignored (bits 5, 6, and 11).

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

PASSIVE IP ADDRESS Format**: : A**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
PASSIVE IP ADDRESS	ECV	293	N/A	N/A	N/A

Specifies the IP Address at which the PASSIVE ENTITY waits for connection on this HSMS link. A typical TCP Port Number is 5000.

PASSIVE TCP PORT

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
PASSIVE TCP PORT	ECV	294	N/A	N/A	N/A

Specifies the TCP Port Number at which the PASSIVE ENTITY waits for connection on this HSMS link. A typical TCP Port Number is 5000. TCP Port 5001 is reserved for the Remote Recipe Editor, a separate option.

PPTF

Format: : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
PPTF	ECV	264	0	1	0

Process Program Transfer Format. Determines the type of process program transfer from the Equipment to the Host. Both types are available from the Host to the Equipment.

0 - Unformatted

1 - Formatted.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

Router

Format: : A

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
Router	ECV	356	N/A	N/A	N/A

Used to define a route to access a host that is not directly connected to the equipment. This specifies the internet address of the computer to which messages addressed to the host or to another intermediate computer on the path are to be routed.

RPTYPE

Format: : 51

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
RPTYPE	ECV	270	None	None	0

Controls whether Normal (S6F11) or Annotated (S6F13) event reports are used.

1: Annotated

0: Normal

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

RTY

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
RTY	ECV	253	0	31	3

SECS retry count

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

SMIF-MODE

Format : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
SMIF-MODE	ECV	287	0	0xFFFF	0

							LSB
7	6	5	4	3	2	1	0
					DMode2	DMode1	AutoLock
15	14	13	12	11	10	9	8
23	22	21	20	19	18	17	16
MSB							
31	30	29	28	27	26	25	24

AutoLock: 1 - Lock Pod as soon as placed on Asyst/ErgospeedII SMIF
0 - Do not Lock Pod when placed on Asyst/ErgospeedII SMIF

On bootup, the Asyst/ErgospeedII SMIFs are configured based on Dmode1 and Dmode2 settings as follows:

Dmode2	Dmode1
0	0
0	1
1	0
1	1

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes. DMode1 and DMode2 bits can be set in the Asyst or ErgospeedII smif screens.

Submask

Format: : A

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
Submask	ECV	355	N/A	N/A	N/A

Used to define a route to access a host that is not directly connected to the equipment. The value is used to determine whether a message goes to a computer that is on the same subnet as the computer that sent the message. The standard netmask for a class C network is 255.255.255.0 - basically the last octet, .0, says 'look here for the machine number, the rest (255) is network number'.

T1 Format : **54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
T1	ECV	250	1	100	5

SECS T1 timer timeout in .1 seconds.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

T2 Format: : **54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
T2	ECV	251	2	250	100

SECS T2 timer timeout in .1 seconds.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

T3 Format : **54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
T3	ECV	252	1	120	45

SECS transaction timer timeout in seconds

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

T4 Format : **54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
T4	ECV	254	1	120	45

SECS II conversation timeout in seconds.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

T5 Format: : **54**

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
T5	ECV	295	1	240	10

Connect Separation Timeout

Specifies the amount of time in seconds between successive attempts to connect to a given remote entry.

T6

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
T6	ECV	296	1	240	90

Control Transaction Timeout

Specifies the time which a control transaction may remain open before it is considered a communications failure.

T7

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
T7	ECV	297	1	240	10

NOT SELECTED Timeout

Time which a TCP/IP connection can remain in NOT SELECTED state (i.e., no HSMS activity) before it is considered a communication failure.

T8

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
T8	ECV	298	1	120	5

Network Intercharacter Timeout

Maximum time between successive bytes of a single HSMS message which may expire before it is considered a communications failure.

TimeoutGrace

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
TimeoutGrace	ECV	352	1	240	10

While the equipment is attempting to establish a connection, this specifies the 'grace period' (in seconds) during which the equipment will accept message send operations and will cause messages to be buffered during connection establishment. The TimeoutGrace interval ends with a timeout or successful connection establishment. If the connection is successfully established within the TimeoutGrace interval, the messages will be sent. If a TimeoutGrace timeout occurs, the buffered message will each be failed.

TYPE-RCP

Format : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
TYPE-RCP	ECV	261	1	4	1

Determines the type of the PPBODY to be one of the following:

1: PPBODY1 (48 bytes)

2: PPBODY2 short (66 bytes)

3: PPBODY2 long (242 bytes)

4:PPBODY3 (1518 bytes) The PPBODY returned with S7F6 will have the length specified by TYPE-RCP. If the PPID requested in S7F5 was PPBODY inappropriate with TYPE-RCP, the zero length list is returned.

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

WBITS5

Format : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
WBITS5	ECV	274	0	1	1

Controls whether the alarm report is sent with a W-Bit of "0" or "1".

0 : No ACK

1 : ACK

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

WBITS6

Format : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
WBITS6	ECV	275	0	1	1

Controls whether the event report is sent with a W-Bit of "0" or "1".

0 : No ACK

1 : ACK

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

WBITS10

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
WBITS10	ECV	276	0	1	1

Determines whether the W-Bit is set for the S10F1 message from the E220.

0 : No ACK

1 : ACK

Note: Default value is set when performing a HOST_COMM_FACTORY_INIT as described in the software revision release notes.

WriteStall

Format: : 54

ECNAME	CLASS	VID/ECID	Min. Value	Max. Value	Default Value
WriteStall	ECV	354	1	240	10

This limits how long (in seconds) the equipment will wait for TCP/IP to accept data the equipment is passing to TCP/IP.

If a WRITE STALL timeout occurs, TCP/IP has a problem and the equipment terminates the connection.

SVID Variable Dictionary

3.0 Variable Item Dictionary

This section defines variable items available to the Host for data collection.

Name: A unique mnemonic name for this variable data item. This name is provided for reference only.

Class: The variable data (V) type classification (SV , ECV , or DVVAL) of the item. Status values (SV's) always contain valid information, while data values (DVVAL's) may only be valid upon the occurrence of a particular event. All equipment constants (ECV's) are settable by the Host.

Format: The allowable item format codes which can be used for this variable data item.

IDThe variable data identification, VID.

Description: A description of the variable data item, with the meanings of specific values. Also, specify validity for item of class DVVAL.

3.1 Min, Max, Average Data Variables and non-ASCII formatting

Status variables are organized according to the operator control "screen" on which they are displayed. The ASCII name matches the name of the program variable from which the value is derived whenever possible.

Status variable ID's from 1 to 99 are reserved for analog readback which the E220 monitors several times a second. The maximum, minimum and average value of each status variable from 1 to 99 is calculated and stored for each wafer and batch. The ID's of these discrete variables is the status variable numeric ID plus a multiple of 1000. The name is the same as the discrete variable name preceded by two characters. The first character indicates lowest/highest/average and the second one indicates per-wafer/per-batch.

1000	lw	low est SV value on last w afer
2000	hw	highest SV value on last w afer
3000	aw	average SV value on last w afer
4000	lb	low est SV value on last batch
5000	hb	highest SV value on last batch
6000	ab	average SV value on last batch

For example:

ID	ASCII ID	Description
28	EXT-VOLTS	Current Extraction Voltage
1028	lw EXT-VOLTS	Low est Extraction Voltage on last w afer implant
2028	hw EXT-VOLTS	Highest Extraction Voltage on last w afer implant
3028	aw EXT-VOLTS	Average Extraction Voltage on last w afer implant
4028	lbEXT-VOLTS	Low est Extraction Voltage on last batch implant
5028	hbEXT-VOLTS	Highest Extraction Voltage on last batch implant
6028	abEXT-VOLTS	Average Extraction Voltage on last batch implant

The same offset value and two character prefix is used for all of the first 99 status variables. The calculated values should be included in the end of wafer or end of batch event report. Otherwise they will be overwritten as soon as the next wafer or batch starts. The variable item dictionary lists all the status variables that are available on the E200 by SVID number and ASCII value.

Support for non-ASCII formatting is available for releases 11.05.05 and greater. These versions have added non ASCII formatting for all traceable analog readback values.

70XX	Non-ASCII format of Analog readback values

For example:

SVID	ASCII ID	Description
28	EXT-VOLTS	SVID ASCII formatting
7028	EXT-VOLTS	SVID non-ASCII formatting

The same offset value and two character prefix (70) is used for all of the first 99 status variables. The variable item dictionary lists all the status variables that are available on the E200 by SVID number and ASCII value.

a1ESTurboSpeed[0] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboSpeed[0]	SV	400	KRPM	<A "XXXX">	4

The left end station turbo speed in KRPM.

a1ESTurboNormalizedSpeed[0] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboNormalizedSpeed[0]	SV	401	%	<A "XX">	2

The left end station turbo normalized speed.

a1ESTurboCurrent[0] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboCurrent[0]	SV	402	mA	<A "XX.X">	4

The left end station turbo current in mA.

a1ESTurboVoltage[0] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboVoltage[0]	SV	403	V	<A "XXX">	3

The left end station turbo voltage.

a1ESTurboTempC[0] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboTempC[0]	SV	404	Cº	<A "XXX">	3

The left end station turbo temperature in degrees C.

a1ESTurboLifeHR[0] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboLifeHR[0]	SV	405	hours	<A "XXXX">	4

The left end station turbo life in hours.

a1ESTurboCycles[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboCycles[0]	SV	406	none	<A "XXXX">	4

The left end station turbo cycles.

a1ESTurboCycleTimeMIN[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboCycleTimeMIN[0]	SV	407	Minutes	<A "XXXX">	4

The left end station turbo cycle time in minutes.

a1ESTurboSpeed[1]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboSpeed[1]	SV	408	KRPM	<A "XXXX">	4

The right end station turbo speed in KRPM.

a1ESTurboNormalizedSpeed[1]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboNormalizedSpeed[1]	SV	409	%	<A "XX">	2

The right end station turbo normalized speed.

a1ESTurboCurrent[1]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboCurrent[1]	SV	410	mA	<A "XX.X">	4

The right end station turbo current in mA.

a1ESTurboVoltage[1]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboVoltage[1]	SV	411	V	<A "XXX">	3

The right end station turbo voltage.

a1ESTurboTempC[1]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboTempC[1]	SV	412	Cº	<A "XXX">	3

The right end station turbo temperature in degrees C.

a1ESTurboLifeHR[1]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboLifeHR[1]	SV	413	Hours	<A "XXXX">	4

The right end station turbo life in hours.

a1ESTurboCycles[1]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboCycles[1]	SV	414	none	<A "XXXX">	4

The right end station turbo cycles.

a1ESTurboCycleTimeMIN[1]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1ESTurboCycleTimeMIN[1]	SV	415	Minutes	<A "XXXX">	4

The right end station turbo cycle time in minutes.

a1OnBoardRegenStep[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardRegenStep[0]	SV	416	none	<A "XXXX">	4

The on board target chamber pump regen step number.

a1OnBoardFirstStageTemp[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardFirstStageTemp[0]	SV	417	Kº	<A "XXX">	3

The on board target chamber pump first stage temperature in Kelvin.

a1OnBoardSecondStageTemp[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardSecondStageTemp[0]	SV	418	K°	<A "XXX">	3

The on board target chamber pump second stage temperature in Kelvin.

a1OnBoardTcGaugePress[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTcGaugePress[0]	SV	419	microns	<A "XXXX">	4

The on board target chamber pump thermocouple gauge pressure in microns.

a1OnBoardTotalOperatingTime[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTotalOperatingTime[0]	SV	420	hours	<A "XXXX">	4

The on board target chamber pump total operating time in hours.

a1OnBoardTempSinceLastFullRegen[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTempSinceLastFullRegen[0]	SV	421	hours	<A "XXX">	3

The on board target chamber pump time since the last full regen in hours.

a1OnBoardTempSinceLastFastRegen[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTempSinceLastFastRegen[0]	SV	422	hours	<A "XXXX">	4

The on board target chamber pump time in hours.

a1OnBoardBasePressure[0]

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardBasePressure[0]	SV	423	microns	<A "XXXX">	4

The on board target chamber pump base pressure in microns.

a1OnBoardRegenStep[1]   Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardRegenStep[1]	SV	424	none	<A "XXXX">	4

The on board left elevator pump regen step number.

a1OnBoardFirstStageTemp[1]   Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardFirstStageTemp[1]	SV	425	Kº	<A "XXX">	3

The on board left elevator pump first stage temperature in Kelvin.

a1OnBoardSecondStageTemp[1]   Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardSecondStageTemp[1]	SV	426	Kº	<A "XXX">	3

The on board left elevator pump second stage temperature in Kelvin.

a1OnBoardTcGaugePress[1]   Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTcGaugePress[1]	SV	427	microns	<A "XXXX">	4

The on board left elevator pump thermocouple gauge pressure in microns.

a1OnBoardTotalOperatingTime[1]   Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTotalOperatingTime[1]	SV	428	hours	<A "XXXX">	4

The on board left elevator pump total operating time in hours.

a1OnBoardTempSinceLastFullRegen[1]   Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTempSinceLastFullRegen[1]	SV	429	hours	<A "XXXX">	4

The onboard left elevator pump total operating time in hours.

a1OnBoardTempSinceLastFastRegen[1] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTempSinceLastFastRegen[1]	SV	430	hours	<A "XXXX">	4

The on board left elevator pump time since the last fast regen in hours.

a1OnBoardBasePressure[1] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardBasePressure[1]	SV	431	micron	<A "XXXX">	4

The on board left elevator pump base pressure in microns.

a1OnBoardRegenStep[2] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardRegenStep[2]	SV	432	none	<A "XXXX">	4

The on board right elevator pump regen step.

a1OnBoardFirstStageTemp[2] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardFirstStageTemp[2]	SV	433	Kº	<A "XXX">	3

The on board right elevator pump first stage temperature in Kelvin.

a1OnBoardSecondStageTemp[2] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardSecondStageTemp[2]	SV	434	Ko	<A "XXX">	3

The on board right elevator pump second stage temperature in Kelvin.

a1OnBoardTcGaugePress[2] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTcGaugePress[2]	SV	435	micron	<A "XXXX">	4

The on board right elevator pump thermocouple gauge pressure in microns.

a1OnBoardTotalOperatingTime[2] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTotalOperatingTime[2]	SV	436	hours	<A "XXXX">	4

The on board right elevator pump total operating time in hours.

a1OnBoardTempSinceLastFullRegen[2] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTempSinceLastFullRegen[2]	SV	437	hours	<A "XXXX">	4

The on board right elevator pump time since the last full regen in hours.

a1OnBoardTempSinceLastFastRegen[2] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardTempSinceLastFastRegen[2]	SV	438	hours	<A "XXXX">	4

The on board right elevator pump time since the last fast regen in hours.

a1OnBoardBasePressure[2] **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
a1OnBoardBasePressure[2]	SV	439	micron	<A "XXXX">	4

The on board right elevator pump base pressure in microns.

ACCEL-I **Format: 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
ACCEL-I	SV	48	mamp	<A “XX.XX”>	5

SVID	SVNAME	DESCRIPTION
48	ACCEL-I	Current Acceleration power supply current
1048	lwACCEL-I	Lowest Acceleration power supply current on last wafer implant
2048	hwACCEL-I	Highest Acceleration power supply current on last wafer implant
3048	awACCEL-I	Average Acceleration power supply current on last wafer implant
4048	lbACCEL-I	Lowest Acceleration power supply current on last batch implant
5048	hbACCEL-I	Highest Acceleration power supply current on last batch implant
6048	abACCEL-I	Average Acceleration power supply current on last batch implant
7048	ACCEL-I	Non-ASCII formatting available with V 11.05.05 and above

Acceleration power supply current.

ACCEL-VOLTS

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
ACCEL-VOLTS	SV	47	Kvolts	<A “XXX.X”>	5

SVID	SVNAME	DESCRIPTION
47	ACCEL-VOLTS	Current Acceleration power supply voltage
1047	lwACCEL-VOLTS	Lowest Acceleration power supply voltage on last wafer implant
2047	hwACCEL-VOLTS	Highest Acceleration power supply voltage on last wafer implant
3047	awACCEL-VOLTS	Average Acceleration power supply voltage on last wafer implant
4047	lbACCEL-VOLTS	Lowest Acceleration power supply voltage on last batch implant
5047	hbACCEL-VOLTS	Highest Acceleration power supply voltage on last batch implant
6047	abACCEL-VOLTS	Average Acceleration power supply voltage on last batch implant
7047	ACCEL-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Acceleration power supply voltage in kilovolts.

ALARMSTATE

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
ALARMSTATE	SV	517	None	<A "X">	1

ALARMSTATE is the GEM compliant format of reporting the alarm state of the most recent alarm ID. The default value of ALARMSTATE is 0.

AMU

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
AMU	SV	36	none	<A “XXX.X”>	5

SVID	SVNAME	DESCRIPTION
36	AMU	Current AMU
1036	lwAMU	Lowest AMU on last wafer implant
2036	hwAMU	Highest AMU on last wafer implant
3036	awAMU	Average AMU on last wafer implant
4036	lbAMU	Lowest AMU on last batch implant
5036	hbAMU	Highest AMU on last batch implant
6036	abAMU	Average AMU on last batch implant
7036	AMU	Non-ASCII formatting available with V 11.05.05 and above

AMU value calculated from the extraction voltage, analyzer current, ion charge in the recipe and the analyzer magnet constant table.

AMU-I

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
AMU-I	SV	35	amp	<A “XXX.X”>	5

SVID	SVNAME	DESCRIPTION
35	AMU-I	Current AMU-I
1035	lw AMU-I	Lowest AMU-I on last wafer implant
2035	hw AMU-I	Highest AMU-I on last wafer implant
3035	aw AMU-I	Average AMU-I on last wafer implant
4035	lbAMU-I	Lowest AMU-I on last batch implant
5035	hbAMU-I	Highest AMU-I on last batch implant
6035	abAMU-I	Average AMU-I on last batch implant
7035	AMU-I	Non-ASCII formatting available with V 11.05.05 and above

Analyzer magnet current in amperes.

AMU-G

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
AMU-G	SV	75	kGauss	<A “XX.XX”>	5

SVID	SVNAME	DESCRIPTION
75	AMU-G	Current AMU-G
1075	lw AMU-G	Lowest AMU-G on last wafer implant
2075	hw AMU-G	Highest AMU-G on last wafer implant
3075	aw AMU-G	Average AMU-G on last wafer implant
4075	lbAMU-G	Lowest AMU-G on last batch implant
5075	hbAMU-G	Highest AMU-G on last batch implant
6075	abAMU-G	Average AMU-G on last batch implant
7075	AMU-G	Non-ASCII formatting available with V 11.05.05 and above

ANALYZER-PRESSURE

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
ANALYZER-PRESSURE	SV	64	Torr	<A “X.XE-X”>	6

SVID	SVNAME	DESCRIPTION
64	ANALYZER-PRESSURE	Current analyzer pressure
1064	lw ANALYZER-PRESSURE	Lowest analyzer pressure on last wafer implant
2064	hw ANALYZER-PRESSURE	Highest analyzer pressure on last wafer implant
3064	aw ANALYZER-PRESSURE	Average analyzer pressure on last wafer implant
4064	lbANALYZER-PRESSURE	Lowest analyzer pressure on last batch implant
5064	hbANALYZER-PRESSURE	Highest analyzer pressure on last batch implant
6064	abANALYZER-PRESSURE	Average analyzer pressure on last batch implant
7064	ANALYZER-PRESSURE	Non-ASCII formatting available with V 11.05.05 and above

Read back from the CCIG near the resolving aperture.

ANALYZER-TC

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
ANALYZER-TC	SV	80	micron	<A "XXXX">	4

SVID	SVNAME	DESCRIPTION
80	ANALYZER-TC	Current analyzer thermocouple reading
1080	lwANALYZER-TC	Lowest analyzer thermocouple reading on last wafer implant
2080	hwANALYZER-TC	Highest analyzer thermocouple reading on last wafer implant
3080	awANALYZER-TC	Average analyzer thermocouple reading on last wafer implant
4080	lbANALYZER-TC	Lowest analyzer thermocouple reading on last batch implant
5080	hbANALYZER-TC	Highest analyzer thermocouple reading on last batch implant
6080	abANALYZER-TC	Average analyzer thermocouple reading on last batch implant
7080	ANALYZER-TC	Non-ASCII formatting available with V 11.05.05 and above

Analyzer thermocouple reading for the additional thermocouple gauge option.

ARC-I

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
ARC-I	SV	24	A/mA	<A “XXX.X”>	5

SVID	SVNAME	DESCRIPTION
24	ARC-I	Current arc current
1024	lwARC-I	Lowest arc current on last wafer implant
2024	hwARC-I	Highest arc current on last wafer implant
3024	awARC-I	Average arc current on last wafer implant
4024	lbARC-I	Lowest arc current on last batch implant
5024	hbARC-I	Highest arc current on last batch implant
6024	abARC-I	Average arc current on last batch implant
7024	ARC-I	Non-ASCII formatting available with V 11.05.05 and above

Arc current.

ARC-VOLTS

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
ARC-VOLTS	SV	26	volts	<A “XXXX”>	4

SVID	SVNAME	DESCRIPTION
26	ARC-VOLTS	Current arc voltage
1026	lwARC-VOLTS	Lowest arc voltage on last wafer implant
2026	hwARC-VOLTS	Highest arc voltage on last wafer implant
3026	awARC-VOLTS	Average arc voltage on last wafer implant
4026	lbARC-VOLTS	Lowest arc voltage on last batch implant
5026	hbARC-VOLTS	Highest arc voltage on last batch implant
6026	abARC-VOLTS	Average arc voltage on last batch implant
7026	ARC-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Arc voltage in volts.

BEAM

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
BEAM	SV	38	amp	<A “XXX”>	3

SVID	SVNAME	DESCRIPTION
38	BEAM	Current setup faraday cup current
1038	lw BEAM	Lowest setup faraday cup current on last wafer implant
2038	hw BEAM	Highest setup faraday cup current on last wafer implant
3038	aw BEAM	Average setup faraday cup current on last wafer implant
4038	lbBEAM	Lowest setup faraday cup current on last batch implant
5038	hbBEAM	Highest setup faraday cup current on last batch implant
6038	abBEAM	Average setup faraday cup current on last batch implant
7038	BEAM	Non-ASCII formatting available with V 11.05.05 and above

Setup Faraday cup current. See SVID 39 for unit. The Faraday cup is retracted during implant so the reading is only valid at the end of ion source setup and before beamline setup.

BEAM-I-RANGE

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
BEAM-I-RANGE	SV	39	none	<A “XX”>	1

SVID	SVNAME	DESCRIPTION
39	BEAM-I-RANGE	Current beam current unit
1039	lw BEAM-I-RANGE	Lowest beam current unit on last wafer implant
2039	hw BEAM-I-RANGE	Highest beam current unit on last wafer implant
3039	aw BEAM-I-RANGE	Average beam current unit on last wafer implant
4039	lbBEAM-I-RANGE	Lowest beam current unit on last batch implant
5039	hbBEAM-I-RANGE	Highest beam current unit on last batch implant
6039	abBEAM-I-RANGE	Average beam current unit on last batch implant
7039	BEAM-I-RANGE	Non-ASCII formatting available with V 11.05.05 and above

BEAM-I-RANGE	Unit
0	Milliamp
1	Microamp
2	Microamp
3	Microamp
4	Nanoamp
5	Nanoamp

Unit for the BEAM current.

BEAMLINE-TC

BEAMLINE-TC

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
BEAMLINE-TC	SV	81	micron	<A "XXXX">	4

SVID	SVNAME	DESCRIPTION
81	BEAMLINE-TC	Current beamline thermocouple reading
1081	lw BEAMLINE-TC	Lowest beamline thermocouple reading on last wafer implant
2081	hw BEAMLINE-TC	Highest beamline thermocouple reading on last wafer implant
3081	aw BEAMLINE-TC	Average beamline thermocouple reading on last wafer implant
4081	lbBEAMLINE-TC	Lowest beamline thermocouple reading on last batch implant
5081	hbBEAMLINE-TC	Highest beamline thermocouple reading on last batch implant
6081	abBEAMLINE-TC	Average beamline thermocouple reading on last batch implant
7081	BEAMLINE-TC	Non-ASCII formatting available with V 11.05.05 and above

Beamline thermocouple reading for the additional thermocouple gauge option.

BIAS

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
BIAS	SV	37	volts	<A “XXX”>	3

SVID	SVNAME	DESCRIPTION
37	BIAS	Current Faraday setup cup suppression voltage
1037	lw BIAS	Lowest Faraday setup cup suppression voltage on last wafer implant
2037	hw BIAS	Highest Faraday setup cup suppression voltage on last wafer implant
3037	aw BIAS	Average Faraday setup cup suppression voltage on last wafer implant
4037	lbBIAS	Lowest Faraday setup cup suppression voltage on last batch implant
5037	hbBIAS	Highest Faraday setup cup suppression voltage on last batch implant
6037	abBIAS	Average Faraday setup cup suppression voltage on last batch implant
7037	BIAS	Non-ASCII formatting available with V 11.05.05 and above

Setup Faraday cup suppression voltage in volts.

CHAMBER-CRYO-TC

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
CHAMBER-CRYO-TC	SV	15	micron	<A “XXXX”>	4

SVID	SVNAME	DESCRIPTION
15	CHAMBER-CRYO-TC	Current chamber cryo pump temperature
1015	lw CHAMBER-CRYO-TC	Lowest chamber cryo pump temperature on last wafer implant
2015	hw CHAMBER-CRYO-TC	Highest chamber cryo pump temperature on last wafer implant
3015	aw CHAMBER-CRYO-TC	highest chamber cryo pump temperature on last batch implant
4015	lbCHAMBER-CRYO-TC	Lowest chamber cryo pump temperature on last batch implant
5015	hbCHAMBER-CRYO-TC	Highest chamber cryo pump temperature on last batch implant
6015	abCHAMBER-CRYO-TC	Average chamber cryo pump temperature on last batch implant
7015	CHAMBER-CRYO-TC	Non-ASCII formatting available with V 11.05.05 and above

The pressure inside the chamber cryo pump as measured by its thermocouple gauge.

CHAMBER-CRYO-TEMP

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
CHAMBER-CRYO-TEMP	SV	12	K°	<A “XXX”>	3

SVID	SVNAME	DESCRIPTION
12	CHAMBER-CRYO-TEMP	Current ES cryo pump temperature
1012	lw CHAMBER-CRYO-TEMP	Lowest ES cryo pump temperature on last wafer implant
2012	hw CHAMBER-CRYO-TEMP	Highest ES cryo pump temperature on last wafer implant
3012	aw CHAMBER-CRYO-TEMP	Average ES cryo pump temperature on last wafer implant
4012	lbCHAMBER-CRYO-TEMP	Lowest ES cryo pump temperature on last batch implant
5012	hbCHAMBER-CRYO-TEMP	Highest ES cryo pump temperature on last batch implant
6012	abCHAMBER-CRYO-TEMP	Average ES cryo pump temperature on last batch implant
7012	CHAMBER-CRYO-TEMP	Non-ASCII formatting available with V 11.05.05 and above

The temperature of the cryo pump for the main end station chamber.

CHAMBER-PRESSURE

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
CHAMBER-PRESSURE	SV	8	Torr	<A “X.XE-X”>	6

SVID	SVNAME	DESCRIPTION
8	CHAMBER-PRESSURE	Current CCIG pressure
1008	lw CHAMBER-PRESSURE	Lowest CCIG pressure on last wafer implant
2008	hw CHAMBER-PRESSURE	Highest CCIG pressure on last wafer implant
3008	aw CHAMBER-PRESSURE	Average CCIG pressure on last wafer implant
4008	lbCHAMBER-PRESSURE	Lowest CCIG pressure on last batch implant
5008	hbCHAMBER-PRESSURE	Highest CCIG pressure on last batch implant
6008	abCHAMBER-PRESSURE	Average CCIG pressure on last batch implant
7008	CHAMBER-PRESSURE	Non-ASCII formatting available with V 11.05.05 and above

The readback from the CCIG mounted in the end station.

CITY-WATER-TEMP

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
CITY-WATER-TEMP	SV	5	deg. C	<A “XXX”>	3

SVID	SVNAME	DESCRIPTION
5	CITY-WATER-TEMP	Current cooling water temperature
1005	lw CITY-WATER-TEMP	Lowest cooling water temperature on last wafer implant
2005	hw CITY-WATER-TEMP	Highest cooling water temperature on last wafer implant
3005	aw CITY-WATER-TEMP	Average cooling water temperature on last wafer implant
4005	lbCITY-WATER-TEMP	Lowest cooling water temperature on last batch implant
5005	hbCITY-WATER-TEMP	Highest cooling water temperature on last batch implant
6005	abCITY-WATER-TEMP	Average cooling water temperature on last batch implant
7005	CITY-WATER-TEMP	Non-ASCII formatting available with V 11.05.05 and above

The temperature of the cooling water supplied to the implanter from facilities.

COOLING

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
COOLING	SV	54	Torr	<A “X.XX”>	4

SVID	SVNAME	DESCRIPTION
54	COOLING	Current gas pressure readback
1054	lw COOLING	Lowest gas pressure readback on last wafer implant
2054	hw COOLING	Highest gas pressure readback on last wafer implant
3054	aw COOLING	Average gas pressure readback on last wafer implant
4054	lbCOOLING	Lowest gas pressure readback on last batch implant
5054	hbCOOLING	Highest gas pressure readback on last batch implant
6054	abCOOLING	Average gas pressure readback on last batch implant
7054	COOLING	Non-ASCII formatting available with V 11.05.05 and above

Gas pressure regulator readback in Torr.

DECEL-I

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
DECEL-I	SV	74	mamp	<A “XX.XX”>	5

SVID	SVNAME	DESCRIPTION
74	DECEL-I	Current decel current
1074	lw DECEL-I	Lowest decel current on last wafer implant
2074	hw DECEL-I	Highest decel current on last wafer implant
3074	aw DECEL-I	Average decel current on last wafer implant
4074	lbDECEL-I	Lowest decel current on last batch implant
5074	hbDECEL-I	Highest decel current on last batch implant
6074	abDECEL-I	Average decel current on last batch implant
7074	DECEL-I	Non-ASCII formatting available with V 11.05.05 and above

Deceleration power supply current in milliamps.

DECEL-SUPPRESSION-VOLTS

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
DECEL-SUPPRESSION-VOLTS	SV	82	Kvolts	<A “XXX.X”>	5

SVID	SVNAME	DESCRIPTION
82	DECEL-SUPPRESSION-VOLTS	Current decel suppression voltage
1082	lw DECEL-SUPPRESSION-VOLTS	Lowest decel suppression voltage on last wafer implant
2082	hw DECEL-SUPPRESSION-VOLTS	Highest decel suppression voltage on last wafer implant
3082	aw DECEL-SUPPRESSION-VOLTS	Average decel suppression voltage on last wafer implant
4082	lbDECEL-SUPPRESSION-VOLTS	Lowest decel suppression voltage on last batch implant
5082	hbDECEL-SUPPRESSION-VOLTS	Highest decel suppression voltage on last batch implant
6082	abDECEL-SUPPRESSION-VOLTS	Average decel suppression voltage on last batch implant
7082	DECEL-SUPPRESSION-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Deceleration power supply voltage in kilovolts.

DECEL-VOLTS

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
DECEL-VOLTS	SV	73	Kvolts	<A “XXX.X”>	5

SVID	SVNAME	DESCRIPTION
73	DECEL-VOLTS	Current decel voltage
1073	lw DECEL-VOLTS	Lowest decel voltage on last wafer implant
2073	hw DECEL-VOLTS	Highest decel voltage on last wafer implant
3073	aw DECEL-VOLTS	Average decel voltage on last wafer implant
4073	lbDECEL-VOLTS	Lowest decel voltage on last batch implant
5073	hbDECEL-VOLTS	Highest decel voltage on last batch implant
6073	abDECEL-VOLTS	Average decel voltage on last batch implant
7073	DECEL-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Deceleration power supply voltage in kilovolts.

DEC-I

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
DEC-I	SV	50	mamp	<A “XX.XX”>	5

SVID	SVNAME	DESCRIPTION
50	DEC-I	Current suppression supply current
1050	lw DEC-I	Lowest suppression supply current on last wafer implant
2050	hw DEC-I	Highest suppression supply current on last wafer implant
3050	aw DEC-I	Average suppression supply current on last wafer implant
4050	lbDEC-I	Lowest suppression supply current on last batch implant
5050	hbDEC-I	Highest suppression supply current on last batch implant
6050	abDEC-I	Average suppression supply current on last batch implant
7050	DEC-I	Non-ASCII formatting available with V 11.05.05 and above

Accel column electron suppression supply current in milliamps.

DEC-VOLTS

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
DEC-VOLTS	SV	49	kvolts	<A “XX.XX”>	5

SVID	SVNAME	DESCRIPTION
49	DEC-VOLTS	Current suppression supply voltage
1049	lw DEC-VOLTS	Lowest suppression supply voltage on last wafer implant
2049	hw DEC-VOLTS	Highest suppression supply voltage on last wafer implant
3049	aw DEC-VOLTS	Average suppression supply voltage on last wafer implant
4049	lbDEC-VOLTS	Lowest suppression supply voltage on last batch implant
5049	hbDEC-VOLTS	Highest suppression supply voltage on last batch implant
6049	abDEC-VOLTS	Average suppression supply voltage on last batch implant
7049	DEC-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Accel column electron suppression supply voltage in kilovolts.

DEFLECTOR

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
DEFLECTOR	SV	45	kvolts	<A “XX.X”>	4

SVID	SVNAME	DESCRIPTION
45	DEFLECTOR	Current deflector voltage
1045	lw DEFLECTOR	Lowest deflector voltage on last wafer implant
2045	hw DEFLECTOR	Highest deflector voltage on last wafer implant
3045	aw DEFLECTOR	Average deflector voltage on last wafer implant
4045	lbDEFLECTOR	Lowest deflector voltage on last batch implant
5045	hbDEFLECTOR	Highest deflector voltage on last batch implant
6045	abDEFLECTOR	Average deflector voltage on last batch implant
7045	DEFLECTOR	Non-ASCII formatting available with V 11.05.05 and above

The voltage on the deflector electrode in kilovolts.

DI-WATER-DELTA-TEMP

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
DI-WATER-DELTA-TEMP	SV	79	Celsius	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
79	DI-WATER-DELTA-TEMP	Current differential temperature
1079	lw DI-WATER-DELTA-TEMP	Lowest differential temperature on last wafer implant
2079	hw DI-WATER-DELTA-TEMP	Highest differential temperature on last wafer implant
3079	aw DI-WATER-DELTA-TEMP	Average differential temperature on last wafer implant
4079	lbDI-WATER-DELTA-TEMP	Lowest differential temperature on last batch implant
5079	hbDI-WATER-DELTA-TEMP	Highest differential temperature on last batch implant
6079	abDI-WATER-DELTA-TEMP	Average differential temperature on last batch implant
7079	DI-WATER-DELTA-TEMP	Non-ASCII formatting available with V 11.05.05 and above

Differential temperature between the terminal and return DI cooling water supply in degrees Celsius.

DRY-PUMP-TC

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
DRY-PUMP-TC	SV	65	micron	<A “XXXX”>	4

SVID	SVNAME	DESCRIPTION
65	DRY-PUMP-TC	Current foreline thermocouple readback
1065	lw DRY-PUMP-TC	Lowest foreline thermocouple readback on last wafer implant
2065	hw DRY-PUMP-TC	Highest foreline thermocouple readback on last wafer implant
3065	aw DRY-PUMP-TC	Average foreline thermocouple readback on last wafer implant
4065	lbDRY-PUMP-TC	Lowest foreline thermocouple readback on last batch implant
5065	hbDRY-PUMP-TC	Highest foreline thermocouple readback on last batch implant
6065	abDRY-PUMP-TC	Average foreline thermocouple readback on last batch implant
7065	DRY-PUMP-TC	Non-ASCII formatting available with V 11.05.05 and above

Readback from the thermocouple gauge on the foreline of the source dry pump in units of microns.

eBIAS-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eBIAS-I	SV	62	mamp	<A “XX.X”>	4

SVID	SVNAME	DESCRIPTION
62	eBIAS-I	Current bias current
1062	lweBIAS-I	Lowest bias current on last wafer implant
2062	hweBIAS-I	Highest bias current on last wafer implant
3062	aweBIAS-I	Average bias current on last wafer implant
4062	lbeBIAS-I	Lowest bias current on last batch implant
5062	hbeBIAS-I	Highest bias current on last batch implant
6062	abeBIAS-I	Average bias current on last batch implant
7062	eBIAS-I	Non-ASCII formatting available with V 11.05.05 and above

Bias current in milliamps (can be negative).

eBIAS-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eBIAS-VOLTS	SV	61	volt	<A “XX.X”>	4

SVID	SVNAME	DESCRIPTION
61	eBIAS-VOLTS	Current target bias voltage
1061	lweBIAS-VOLTS	Lowest target bias voltage on last wafer implant
2061	hweBIAS-VOLTS	Highest target bias voltage on last wafer implant
3061	aweBIAS-VOLTS	Average target bias voltage on last wafer implant
4061	lbeBIAS-VOLTS	Lowest target bias voltage on last batch implant
5061	hbeBIAS-VOLTS	Highest target bias voltage on last batch implant
6061	abeBIAS-VOLTS	Average target bias voltage on last batch implant
7061	eBIAS-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Target bias voltage in volts.

eEXT-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eEXT-I	SV	59	mamp	<A “XXX.XX”>	6

SVID	SVNAME	DESCRIPTION
59	eEXT-I	Current extraction current
1059	lweEXT-I	Lowest extraction current on last wafer implant
2059	hweEXT-I	Highest extraction current on last wafer implant
3059	aweEXT-I	Average extraction current on last wafer implant
4059	lbeEXT-I	Lowest extraction current on last batch implant
5059	hbeEXT-I	Highest extraction current on last batch implant
6059	abeEXT-I	Average extraction current on last batch implant
7059	eEXT-I	Non-ASCII formatting available with V 11.05.05 and above

Extraction current in amps.

eFIL-I **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eFIL-I	SV	56	amp	<A “XX.X”>	4

SVID	SVNAME	DESCRIPTION
56	eFIL-I	Current filament current
1056	lw eFIL-I	Low est filament current on last w afer implant
2056	hw eFIL-I	Highest filament current on last w afer implant
3056	aw eFIL-I	Average filament current on last w afer implant
4056	lbeFIL-I	Low est filament current on last batch implant
5056	hbeFIL-I	Highest filament current on last batch implant
6056	abeFIL-I	Average filament current on last batch implant
7056	eFIL-I	Non-ASCII formatting available w ith V 11.05.05 and above

Filament current in amps.

eEXT-VOLTS **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eEXT-VOLTS	SV	58	volt	<A “XXX”>	3

SVID	SVNAME	DESCRIPTION
58	eEXT-VOLTS	Current extraction voltage
1058	lw eEXT-VOLTS	Low est extraction voltage on last w afer implant
2058	hw eEXT-VOLTS	Highest extraction voltage on last w afer implant
3058	aw eEXT-VOLTS	Averageextraction voltage on last w afer implant
4058	lbeEXT-VOLTS	Low est extraction voltage on last batch implant
5058	hbeEXT-VOLTS	Highest extraction voltage on last batch implant
6058	abeEXT-VOLTS	Average extraction voltage on last batch implant
7058	eEXT-VOLTS	Non-ASCII formatting available w ith V 11.05.05 and above

Extraction voltage in volts.

eFIL-VOLTS **Format : 20**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eFIL-VOLTS	SV	55	volt	<A “XX.X”>	4

SVID	SVNAME	DESCRIPTION
55	eFIL-VOLTS	Current filament voltage
1055	lw eFIL-VOLTS	Low est filament voltage on last w afer implant
2055	hw eFIL-VOLTS	Highest filament voltage on last w afer implant
3055	aw eFIL-VOLTS	Average filament voltage on last w afer implant
4055	lbeFIL-VOLTS	Low est filament voltage on last batch implant
5055	hbeFIL-VOLTS	Highest filament voltage on last batch implant
6055	abeFIL-VOLTS	Average filament voltage on last batch implant
7055	eFIL-VOLTS	Non-ASCII formatting available w ith V 11.05.05 and above

Filament voltage in volts.

ENERGY-PROBE

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
ENERGY-PROBE	SV	51	none	<A "XXX.X">	5

SVID	SVNAME	DESCRIPTION
51	ENERGY-PROBE	Current accel voltage
1051	lw ENERGY-PROBE	Lowest accel voltage on last wafer implant
2051	hw ENERGY-PROBE	Highest accel voltage on last wafer implant
3051	aw ENERGY-PROBE	Average accel voltage on last wafer implant
4051	lbENERGY-PROBE	Lowest accel voltage on last batch implant
5051	hbENERGY-PROBE	Highest accel voltage on last batch implant
6051	abENERGY-PROBE	Average accel voltage on last batch implant
7051	ENERGY-PROBE	Non-ASCII formatting available with V 11.05.05 and above

The total voltage used to accelerate the ion beam in kilovolts times the ion charge in the recipe. If the high voltage probe option is installed, this value comes from the probe. Otherwise, it is calculated from the extraction and accelerating voltages.

ErgoSMIF MDLN

Format : A6

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left ErgoSMIF MDLN	SV	8314	none	<A "XXXXXX">	6
Right ErgoSMIF MDLN	SV	8414	none	<A "XXXXXX">	6

Version Available : 11.07.06

Equipment Model Type. The default is "ERGO 2"

ErgoSMIF SoftRev

Format : A6

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left ErgoSMIF SoftRev	SV	8315	none	<A "XXXXXX">	6
Right ErgoSMIF SoftRev	SV	8415	none	<A "XXXXXX">	6

Version Available : 11.07.06

SMIF software revision V2.00 or higher. The default is "PID200"

ErgoSMIF Control State

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left ErgoSMIF Control State	SV	8316	none	<A "X">	1
Right ErgoSMIF Control State	SV	8416	none	<A "X">	1

Version Available : 11.07.06

The current control state of the SMIF. The default is "4" (Local).

4 - local

5 - remote

ErgoSMIF Process State

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left ErgoSMIF Process State	SV	8317	none	<A "X">	1
Right ErgoSMIF Process State	SV	8417	none	<A "X">	1

Version Available : 11.07.06

The process state of the SMIF. The default is "0" (Idle).

0 - idle

1 - loading

2 - unloading

3 - initializing

4 - service running

5 - load paused

6 - unload paused

ErgoSMIF PIO State

Format : U2

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left ErgoSMIF PIO State	SV	8318	none	<A "XX">	2
Right ErgoSMIF PIO State	SV	8418	none	<A "XX">	2

Version Available : 11.07.06

The binary PIO State. The default is set as "0".

eRPL-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eRPL-VOLTS	SV	57	volt	<A “XX.X”>	4

SVID	SVNAME	DESCRIPTION
57	eRPL-VOLTS	Current repeller voltage
1057	lweRPL-VOLTS	Lowest repeller voltage on last wafer implant
2057	hweRPL-VOLTS	Highest repeller voltage on last wafer implant
3057	aweRPL-VOLTS	Average repeller voltage on last wafer implant
4057	lbeRPL-VOLTS	Lowest repeller voltage on last batch implant
5057	hbeRPL-VOLTS	Highest repeller voltage on last batch implant
6057	abeRPL-VOLTS	Average repeller voltage on last batch implant
7057	eRPL-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Repeller voltage in volts.

ES-DIFFER-TC

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
ES-DIFFER-TC	SV	78	micron	<A "XXXX">	4

SVID	SVNAME	DESCRIPTION
78	ES-DIFFER-TC	Current ES differential pressure
1078	lw ES-DIFFER-TC	Low est ES differential pressure on last w afer implant
2078	hw ES-DIFFER-TC	Highest ES differential pressure on last w afer implant
3078	aw ES-DIFFER-TC	Average ES differential pressure on last w afer implant
4078	lbES-DIFFER-TC	Low est ES differential pressure on last batch implant
5078	hbES-DIFFER-TC	Highest ES differential pressure on last batch implant
6078	abES-DIFFER-TC	Average ES differential pressure on last batch implant
7078	ES-DIFFER-TC	Non-ASCII formatting available w ith V 11.05.05 and above

End station differential pressure.

eSECOND-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eSECOND-I	SV	71	mamp	<A “XX.X”>	4

SVID	SVNAME	DESCRIPTION
71	eSECOND-I	Current secondary current sensor readback
1071	lw eSECOND-I	Low est secondary current sensor readback on last w afer implant
2071	hw eSECOND-I	Highest secondary current sensor readback on last w afer implant
3071	aw eSECOND-I	Average secondary current sensor readback on last w afer implant
4071	lbeSECOND-I	Low est secondary current sensor readback on last batch implant
5071	hbeSECOND-I	Highest secondary current sensor readback on last batch implant
6071	abeSECOND-I	Average secondary current sensor readback on last batch implant
7071	eSECOND-I	Non-ASCII formatting available w ith V 11.05.05 and above

Secondary current sensor readback in milliamps if ECO Option # 44 is selected.

eSUP-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eSUP-VOLTS	SV	63	volt	<A “XXX.XX”>	6

SVID	SVNAME	DESCRIPTION
63	eSUP-VOLTS	Current ES Faraday suppression voltage
1063	lw eSUP-VOLTS	Low est ES Faraday suppression voltage on last w afer implant
2063	hw eSUP-VOLTS	Highest ES Faraday suppression voltage on last w afer implant
3063	aw eSUP-VOLTS	Average ES Faraday suppression voltage on last w afer implant
4063	lbeSUP-VOLTS	Low est ES Faraday suppression voltage on last batch implant
5063	hbeSUP-VOLTS	Highest ES Faraday suppression voltage on last batch implant
6063	abeSUP-VOLTS	Average ES Faraday suppression voltage on last batch implant
7063	eSUP-VOLTS	Non-ASCII formatting available w ith V 11.05.05 and above

End station Faraday cup suppression voltage in volts.

eTARGET-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
eTARGET-I	SV	60	mamp	<A "XXX.XX">	6

SVID	SVNAME	DESCRIPTION
60	eTARGET-I	Current target current
1060	lw eTARGET-I	Low est target current on last w afer implant
2060	hw eTARGET-I	Highest target current on last w afer implant
3060	aw eTARGET-I	Average target current on last w afer implant
4060	lbeTARGET-I	Low est target current on last batch implant
5060	hbeTARGET-I	Highest target current on last batch implant
6060	eTARGET-I	Average target current on last batch implant
7060	eTARGET-I	Non-ASCII formatting available w ith V 11.05.05 and above

Target current in milliamps.

EXT-I

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
EXT-I	SV	29	mamp	<A "XX.X">	4

SVID	SVNAME	DESCRIPTION
29	EXT-I	Current extraction supply current
1029	lw EXT-I	Low estextraction supply current on last w afer implant
2029	hw EXT-I	Highestextraction supply current on last w afer implant
3029	aw EXT-I	Averageextraction supply current on last w afer implant
4029	lbEXT-I	Low est extraction supply current on last batch implant
5029	hbEXT-I	Highest extraction supply current on last batch implant
6029	abEXT-I	Average extraction supply current on last batch implant
7029	EXT-I	Non-ASCII formatting available w ith V 11.05.05 and above

Extraction supply current in milliamps.

EXT-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
EXT-VOLTS	SV	28	kvolts	<A "XX.XX">	5

SVID	SVNAME	DESCRIPTION
28	EXT-VOLTS	Current extraction supply voltage
1028	lw EXT-VOLTS	Low est extraction supply voltage on last w afer implant
2028	hw EXT-VOLTS	Highest extraction supply voltage on last w afer implant
3028	aw EXT-VOLTS	Average extraction supply voltage on last w afer implant
4028	lbEXT-VOLTS	Low est extraction supply voltage on last batch implant
5028	hbEXT-VOLTS	Highest extraction supply voltage on last batch implant
6028	abEXT-VOLTS	Averageextraction supply voltage on last batch implant
7028	EXT-VOLTS	Non-ASCII formatting available w ith V 11.05.05 and above

Extraction supply voltage in kilovolts.

FIL-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
FIL-I	SV	22	amp	<A "XXX.X">	5

SVID	SVNAME	DESCRIPTION
22	FIL-I	Current filament current
1022	lw FIL-I	Low est filament current on last w afer implant
2022	hw FIL-I	Highest filament current on last w afer implant
3022	aw FIL-I	Average filament current on last w afer implant
4022	lbFIL-I	Low est filament current on last batch implant
5022	hbFIL-I	Highest filament current on last batch implant
6022	abFIL-I	Average filament current on last batch implant
7022	FIL-I	Non-ASCII formatting available w ith V 11.05.05 and above

Filament current in amperes.

FIL-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
FIL-VOLTS	SV	23	Volts	<A "XX.XX">	5

SVID	SVNAME	DESCRIPTION
23	FIL-VOLTS	Current filament voltage
1022	lw FIL-VOLTS	Low est filament voltage on last w afer implant
2023	hw FIL-VOLTS	Highest filament voltage on last w afer implant
3023	aw FIL-VOLTS	Average filament voltage on last w afer implant
4023	lbFIL-VOLTS	Low est filament voltage on last batch implant
5023	hbFIL-VOLTS	Highest filament voltage on last batch implant
6023	abFIL-VOLTS	Average filament voltage on last batch implant
7023	FIL-VOLTS	Non-ASCII formatting available w ith V 11.05.05 and above

Filament voltage in volts.

G1-PRES

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
G1-PRES	SV	18	psi	<A "XXXX.X">	6

SVID	SVNAME	DESCRIPTION
18	G1-PRES	Current pressure in gas bottle 1
1018	lw G1-PRES	Low est pressure in gas bottle 1 on last w afer implant
2018	hw G1-PRES	Highest pressure in gas bottle 1 on last w afer implant
3018	aw G1-PRES	Averagepressure in gas bottle 1 on last w afer implant
4018	lbG1-PRES	Low est pressure in gas bottle 1 on last batch implant
5018	hbG1-PRES	Highest pressure in gas bottle 1 on last batch implant
6018	abG1-PRES	Average pressure in gas bottle 1 on last batch implant
7018	G1-PRES	Non-ASCII formatting available w ith V 11.05.05 and above

Pressure in gas bottle 1. Units are pounds per square inch with a full scale of 3000 psi. The gauge readings should not be used to determine when a bottle is empty since the pressure in most toxic gas bottles is only 300 psi when full and the gauges have significant zero offsets.

G2-PRES

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
G2-PRES	SV	19	psi	<A "XXXX.X">	6

SVID	SVNAME	DESCRIPTION
19	G2-PRES	Current pressure in gas bottle 2
1019	lw G2-PRES	Lowest pressure in gas bottle 2 on last wafer implant
2019	hw G2-PRES	Highest pressure in gas bottle 2 on last wafer implant
3019	aw G2-PRES	Average pressure in gas bottle 2 on last wafer implant
4019	lbG2-PRES	Lowest pressure in gas bottle 2 on last batch implant
5019	hbG2-PRES	Highest pressure in gas bottle 2 on last batch implant
6019	abG2-PRES	Average pressure in gas bottle 2 on last batch implant
7019	G2-PRES	Non-ASCII formatting available with V 11.05.05 and above

Pressure in gas bottle 2.

G3-PRES

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
G3-PRES	SV	20	psi	<A "XXXX.X">	6

SVID	SVNAME	DESCRIPTION
20	G3-PRES	Current pressure in gas bottle 3
1020	lw G3-PRES	Lowest pressure in gas bottle 3 on last wafer implant
2020	hw G3-PRES	Highest pressure in gas bottle 3 on last wafer implant
3020	aw G3-PRES	Average pressure in gas bottle 3 on last wafer implant
4020	lbG3-PRES	Lowest pressure in gas bottle 3 on last batch implant
5020	hbG3-PRES	Highest pressure in gas bottle 3 on last batch implant
6020	abG3-PRES	Average pressure in gas bottle 3 on last batch implant
7020	G3-PRES	Non-ASCII formatting available with V 11.05.05 and above

Pressure in gas bottle 3.

G4-PRES

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
G4-PRES	SV	21	psi	<A "XXXX.X">	6

SVID	SVNAME	DESCRIPTION
21	G4-PRES	Current pressure in gas bottle 4
1021	lw G4-PRES	Low est pressure in gas bottle 4 on last w afer implant
2021	hw G4-PRES	Highestpressure in gas bottle 4 on last w afer implant
3021	aw G4-PRES	Averagepressure in gas bottle 4 on last w afer implant
4021	lbG4-PRES	Low est pressure in gas bottle 4 on last batch implant
5021	hbG4-PRES	Highest pressure in gas bottle 4 on last batch implant
6021	abG4-PRES	Average pressure in gas bottle 4 on last batch implant
7021	G4-PRES	Non-ASCII formatting available w ith V 11.05.05 and above

Pressure in gas bottle 4.

Note: Many special gas box configurations exist and the "bottle pressure" readings cited above may not apply to some custom configurations.

GAS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
GAS	SV	17	Torr	<A "XX.XX">	5

SVID	SVNAME	DESCRIPTION
17	GAS	Current readback from manometer
1017	lw GAS	Low est readback from manometer on last w afer implant
2017	hw GAS	Highest readback from manometer on last w afer implant
3017	aw GAS	Average readback from manometer on last w afer implant
4017	lbGAS	Low est readback from manometer on last batch implant
5017	hbGAS	Highest readback from manometer on last batch implant
6017	abGAS	Average readback from manometer on last batch implant
7017	GAS	Non-ASCII formatting available w ith V 11.05.05 and above

The readback from the capacitance manometer pressure gauge that is used to control the gas flow to the ion source.

GROUND-MEGOHMS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
GROUND-MEGOHMS	SV	2	Mohm/cm	<A "XX.XX">	5

SVID	SVNAME	DESCRIPTION
2	GROUND-MEGOHMS	Current resistivity of the cooling w ater
1002	lw GROUND-MEGOHMS	Low est resistivity of the cooling w ater on last w afer implant
2002	hw GROUND-MEGOHMS	Highest resistivity of the cooling w ater on last w afer implant
3002	aw GROUND-MEGOHMS	Average resistivity of the cooling w ater on last w afer implant
4002	lbGROUND-MEGOHMS	Low est resistivity of the cooling w ater on last batch implant
5002	hbGROUND-MEGOHMS	Highest resistivity of the cooling w ater on last batch implant
6002	abGROUND-MEGOHMS	Average resistivity of the cooling w ater on last batch implant
7002	GROUND-MEGOHMS	Non-ASCII formatting available w ith V 11.05.05 and above

The resistivity of the cooling water at ground. The production machines do not use deionized cooling water at ground but this may change to support electrostatic clamping of the water so the variable is provided for future use.

GROUND-WATER-TEMP

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
GROUND-WATER-TEMP	SV	4	C^o	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
4	GROUND-WATER-TEMP	Current temperature of the cooling water
1004	lw GROUND-WATER-TEMP	Lowest temperature of the cooling water on last wafer implant
2004	hw GROUND-WATER-TEMP	Highest temperature of the cooling water on last wafer implant
3004	aw GROUND-WATER-TEMP	Average temperature of the cooling water on last wafer implant
4004	lbGROUND-WATER-TEMP	Lowest temperature of the cooling water on last batch implant
5004	hbGROUND-WATER-TEMP	Highest temperature of the cooling water on last batch implant
6004	abGROUND-WATER-TEMP	Average temperature of the cooling water on last batch implant
7004	GROUND-WATER-TEMP	Non-ASCII formatting available with V 11.05.05 and above

The temperature of the cooling water used to cool the end station.

HELIUM-PRESSURE

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
HELIUM-PRESSURE	SV	76	Psi	<A "XXX.X">	5

SVID	SVNAME	DESCRIPTION
76	HELIUM-PRESSURE	Current Helium pressure
1076	lw HELIUM-PRESSURE	Lowest Helium pressure on last wafer implant
2076	hw HELIUM-PRESSURE	Highest Helium pressure on last wafer implant
3076	aw HELIUM-PRESSURE	Average Helium pressure on last wafer implant
4076	lbHELIUM-PRESSURE	Lowest Helium pressure on last batch implant
5076	hbHELIUM-PRESSURE	Highest Helium pressure on last batch implant
6076	abHELIUM-PRESSURE	Average Helium pressure on last batch implant
7076	HELIUM-PRESSURE	Non-ASCII formatting available with V 11.05.05 and above

Cryo compressor helium pressure.

HTR-TEMP

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
HTR-TEMP	SV	72	C^o	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
72	HTR-TEMP	Current heater temperature
1072	lw HTR-TEMP	Lowestheater temperature on last wafer implant
2072	hw HTR-TEMP	Highest heater temperature on last wafer implant
3072	aw HTR-TEMP	Average heater temperature on last wafer implant
4072	lbHTR-TEMP	Lowest heater temperature on last batch implant
5072	hbHTR-TEMP	Highest heater temperature on last batch implant
6072	abHTR-TEMP	Average heater temperature on last batch implant
7072	HTR-TEMP	Non-ASCII formatting available with V 11.05.05 and above

Temperature for the standard heater in degrees centigrade.

LEFT-CYRO-TEMP

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
LEFT-CYRO-TEMP	SV	11	K^o	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
11	LEFT-CYRO-TEMP	Current temperature of left cryo
1011	lw LEFT-CYRO-TEMP	Lowest temperature of left cryo on last wafer implant
2011	hw LEFT-CYRO-TEMP	Highest temperature of left cryo on last wafer implant
3011	aw LEFT-CYRO-TEMP	Average temperature of left cryo on last wafer implant
4011	lbLEFT-CYRO-TEMP	Lowest temperature of left cryo on last batch implant
5011	hbLEFT-CYRO-TEMP	Highest temperature of left cryo on last batch implant
6011	abLEFT-CYRO-TEMP	Averagetemperature of left cryo on last batch implant
7011	LEFT-CYRO-TEMP	Non-ASCII formatting available with V 11.05.05 and above

The temperature of the left elevator cryo pump in degrees Kelvin. Generally the pump must be colder than 20 degrees Kelvin to pump effectively.

LEFT-ELEVATOR-TC

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
LEFT-ELEVATOR-TC	SV	14	micron	<A "XXXX">	4

SVID	SVNAME	DESCRIPTION
14	LEFT-ELEVATOR-TC	Current left elevator pressure
1014	lw LEFT-ELEVATOR-TC	Lowest left elevator pressure on last wafer implant
2014	hw LEFT-ELEVATOR-TC	Highest left elevator pressure on last wafer implant
3014	aw LEFT-ELEVATOR-TC	Average left elevator pressure on last wafer implant
4014	lbLEFT-ELEVATOR-TC	Lowest left elevator pressure on last batch implant
5014	hbLEFT-ELEVATOR-TC	Highest left elevator pressure on last batch implant
6014	abLEFT-ELEVATOR-TC	Average left elevator pressure on last batch implant
7014	LEFT-ELEVATOR-TC	Non-ASCII formatting available with V 11.05.05 and above

The left elevator pressure as measured by its thermocouple pressure gauge. Units are microns. Reading above 2000 microns should be considered unreliable because the gauge cannot reliably measure pressures between 2000 microns and atmosphere.

LEFT-ORIENTER-LIFTER-DAC

Format **: 20**

DVNAME	Class	VID/DVID	UNITS	Structure	Max Characters
LEFT-ORIENTER-LIFTER-DAC	DV	808	encoder cnts	<A “XXXXXXXX">	8

Left orienter lifter position in raw encoder counts.

LENS-I

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
LENS-I	SV	46	amp	<A "XXX.X">	5

SVID	SVNAME	DESCRIPTION
46	LENS-I	Current lens magnet current
1046	lw LENS-I	Low est lens magnet current on last w afer implant
2046	hw LENS-I	Highest lens magnet current on last w afer implant
3046	aw LENS-I	Average lens magnet current on last w afer implant
4046	lbLENS-I	Low est lens magnet current on last batch implant
5046	hbLENS-I	Highest lens magnet current on last batch implant
6046	abLENS-I	Averagelens magnet current on last batch implant
7046	LENS-I	Non-ASCII formatting available w ith V 11.05.05 and above

Current in the lens magnet in amps.

LENS-VOLTS

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
LENS-VOLTS	SV	70	Kvolts	<A "XXX.X">	5

SVID	SVNAME	DESCRIPTION
70	LENS-VOLTS	Current lens magnet voltage
1070	lw LENS-VOLTS	Low est lens magnet voltage on last w afer implant
2070	hw LENS-VOLTS	Highest lens magnet voltage on last w afer implant
3070	aw LENS-VOLTS	Average lens magnet voltage on last w afer implant
4070	lbLENS-VOLTS	Low est lens magnet voltage on last batch implant
5070	hbLENS-VOLTS	Highest lens magnet voltage on last batch implant
6070	abLENS-VOLTS	Average lens magnet voltage on last batch implant
7070	LENS-VOLTS	Non-ASCII formatting available w ith V 11.05.05 and above

Lens magnet voltage in kilovolts.

LPT SMIF Ctl Status

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 Ctl Status	SV	8101	none	<A "X...X">	20
Right SMIF 2 Ctl Status	SV	8201	none	<A "X...X">	20

<U1[20]
MODE 8x17,
PIP 8x24,
HOMEST 8x12,
FUNC 8x10,
COLST 8x04,
LFUNC 8x13,
GPST 8x11,
PRTST 8x27,
ELUP 8x09,
PLDN 8x25,
MARMUP 8x16,
MARMDN 8x14,
TILUP 8x32,
ELDN 8x07,
PLUP 8x39,
SWPOS 8x29,
DIPSW 8x06,
ARMTYP 8x02,

ECV 8x40,
ALED 8x41
>
<L[0] > : Not available

LPT SMIF Ctl ARMTYPE

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 Ctl ARMTYPE	SV	8102	none	<A "X">	1
Right SMIF 2 Ctl ARMTYPE	SV	8202	none	<A "X">	1

Value	Arm Type
0	Arm 1000 V
1	Arm 1000 H Bar Towards
2	Arm 1000 H Bar Away
3	2000 Outside Move
4	2000 Inside Move
5	Arm 3000 V
6	Arm 3000 H Bar Towards
7	Arm 3000 H Bar Away
8	ALU 2000
9	Other Configuration
10	ALU 2200
11	Arm 2200 Outside V Move
12	Arm 2200 Inside V Move
13	Arm 2200 Outside H Move
14	Arm 2200 Inside H Move

LPT SMIF ARM SW

Format : A

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 ARM SW	SV	8103	none	<A "X...X">	20
Right SMIF 2 ARM SW	SV	8203	none	<A "X...X">	20

LPT Arm software part number in 20 byte format.

LPT SMIF COLST

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 COLST	SV	8104	none	<A "X">	1
Right SMIF 2 COLST	SV	8204	none	<A "X">	1

Value	Collision Status
1	No Collision
2	Collision
3	Improper squat in cassette pickup during load
4	Improper squat in cassette place during load

5 Improper squat in cassette pickup during unload
6 Improper squat in cassette place during unload
7 Improper wafer seating

LPT SMIF COUNT

Format : U2

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 COUNT	SV	8105	counts	<A "X">	1
Right SMIF 2 COUNT	SV	8205	counts	<A "X">	1

(RESERVED, NOT USED)
The LPT SMIF count for Move Distance (n).

LPT SMIF DIPSW

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 DIPSW	SV	8106	none	<A "X">	1
Right SMIF 2 DIPSW	SV	8206	none	<A "X">	1

Dip switch setting on the arm controller board.

LPT SMIF ELDN

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 ELDN	SV	8107	none	<A "X">	1
Right SMIF 2 ELDN	SV	8207	none	<A "X">	1

Elevator platform flag
0 - Elevator not at down limit
1 - Elevator at down limit
<L[0] > - Not available

LPT SMIF ELPOS

Format : U2

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 ELPOS	SV	8108	none	<A "X">	1
Right SMIF 2 ELPOS	SV	8208	none	<A "X">	1

Elevator position
0 - Elevator at home position
xx - steps away from the home position
<L[0] > - Not available

LPT SMIF ELUP **Format : U1**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 ELUP	SV	8109	none	<A "X">	1
Right SMIF 2 ELUP	SV	8209	none	<A "X">	1

Elevator UP flag
0 - Elevator not at UP limit
1 - Elevator at UP limit
<L[0] > - Not available

LPT SMIF FUNC **Format : U1**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 FUNC	SV	8110	none	<A "X">	1
Right SMIF 2 FUNC	SV	8210	none	<A "X">	1

Function being done by the arm
0 - Idle
1 - Load/Open in progress
2 - Unload/Close in progress
3 - Auto Home in progress
<L[0] > - Not available

LPT SMIF Full Status **Format : 0**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 Full Status	SV	8100	none	<A "X">	1
Right SMIF 2 Full Status	SV	8200	none	<A "X">	1

<L [5]
<U1[20]
MODE 8x17,
PIP 8x24,
HOMEST 8x12,
FUNC 8x10,
COLST 8x04,
LFUNC 8x13,
GPST 8x11,
PRTST 8x27,
ELUP 8x09,
PLDN 8x25,
MARMUP 8x16,
MARMDN 8x14,
TILUP 8x32,
ELDN 8x07,
PLUP 8x39,
SWPOS 8x29,

DIPSW 8x06,
ARMTYP 8x02,
ECV 08x40,
ALED 08x41
>
<U2[4] XPOS 8x33, YPOS 8x34, ELPOS 8x08, TLTPOS 8x31 >
<U1 RDYS 8x28 >
<A [20] ARM_SW 8x03 >
<U1[4] PIO_LU 8x22, PIO_LRDY 8x21, PIO_URDY 8x23, PIO_LOCK 8x20>
>
<L[0] > - Not available

LPT SMIF GPST

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 GPST	SV	8111	none	<A "X">	1
Right SMIF 2 GPST	SV	8211	none	<A "X">	1

Gripper Status
0 - Gripper Open
1 - Gripper Closed with Cassette
2 - Gripper Closed without Cassette
3 - None of the above
<L[0] > - Not available

LPT SMIF HOMEST

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 HOMEST	SV	8112	none	<A "X">	1
Right SMIF 2 HOMEST	SV	8212	none	<A "X">	1

Arm Home Status
0 - Arm not at home
1 - Arm at Home
<L[0] > - Not available

LPT SMIF LFUNC

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 LFUNC	SV	8113	none	<A "X">	1
Right SMIF 2 LFUNC	SV	8213	none	<A "X">	1

Last Function done
0 - Switched to manual/power up with manual
1 - Switched to auto/power up with auto mode
11 - Load/Open
12 - Unload/Close
13 - Auto Home
<L[0] > - Not available

LPT SMIF MARMDN

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 MARMDN	SV	8114	none	<A "X">	1
Right SMIF 2 MARMDN	SV	8214	none	<A "X">	1

Moving arm down flag
0 - Moving arm not at down limit
1 - Moving arm at down limit
<L[0] > - Not available

LPT SMIF MARMPOS

Format : U2

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 MARMPOS	SV	8115	count	<A "X">	1
Right SMIF 2 MARMPOS	SV	8215	count	<A "X">	1

(RESERVED, NOT USED)
Moving arm position
0 - Arm at home position
xx - Steps away from home position
<L[0] > - Not available

LPT SMIF MARMUP

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 MARMUP	SV	8116	none	<A "X">	1
Right SMIF 2 MARMUP	SV	8216	none	<A "X">	1

Moving arm up flag
0 - Moving arm not at UP limit
1 - Moving arm at UP limit
<L[0] > - Not available

LPT SMIF SWITCH MODE

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 SWITCH MODE	SV	8117	none	<A "X">	1
Right SMIF 2 SWITCH MODE	SV	8217	none	<A "X">	1

Switch Position on maintenance control panel
1- Auto mode
2 - Manual mode
<L[0] > - Not available

LPT SMIF MOT

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 MOT	SV	8118	none	<A "X">	1
Right SMIF 2 MOT	SV	8218	none	<A "X">	1

(RESERVED, NOT USED)
Motor id code
1 - Elevator motor
<L[0] > - Not available

LPT SMIF MVSTAT

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 MVSTAT	SV	8119	none	<A "X">	1
Right SMIF 2 MVSTAT	SV	8219	none	<A "X">	1

(RESERVED, NOT USED)
Motor move status
1 - Move motor
2 - Stop motor
<L[0] > - Not available

LPT SMIF PIO LOCK

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PIO LOCK	SV	8120	none	<A "X">	1
Right SMIF 2 PIO LOCK	SV	8220	none	<A "X">	1

Parallel Interface Pod lock switch position
0 - Inactive
1 – Active
<L[0] > - Not available

LPT SMIF PIO LRDY

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PIO LRDY	SV	8121	none	<A "X">	1
Right SMIF 2 PIO LRDY	SV	8221	none	<A "X">	1

Parallel Interface Host Ready to Load Line
0 - Inactive
1 – Active
<L[0] > - Not available

LPT SMIF PIO LU

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PIO LU	SV	8122	none	<A "X">	1
Right SMIF 2 PIO LU	SV	8222	none	<A "X">	1

Parallel Interface Load / Unload Line
0 - Inactive
1 – Active
<L[0] > - Not available

LPT SMIF PIO URDY

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PIO URDY	SV	8123	none	<A "X">	1
Right SMIF 2 PIO URDY	SV	8223	none	<A "X">	1

Parallel Interface Host Ready to Unload Line
0 - Inactive
1 – Active
<L[0] > - Not available

LPT SMIF PIP

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PIP	SV	8124	none	<A "X">	1
Right SMIF 2 PIP	SV	8224	none	<A "X">	1

Pod in place state
0 - No pod present
1 - Pod present
<L[0] > - Not available

LPT SMIF PLDN

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PLDN	SV	8125	none	<A "X">	1
Right SMIF 2 PLDN	SV	8225	none	<A "X">	1

Arm platform down flag
0 - Platform not at down limit
1 - Platform at down limit
<L[0] > - Not available

LPT SMIF PLPOS

Format : U2

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PLPOS	SV	8126	none	<A "X">	1
Right SMIF 2 PLPOS	SV	8226	none	<A "X">	1

Arm platform position
0 - Arm platform at home position
xx - steps away from home position
<L[0] > - Not available

LPT SMIF PRTST

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PRTST	SV	8127	none	<A "X">	1
Right SMIF 2 PRTST	SV	8227	none	<A "X">	1

SMIF Port Status
0 - port unlock
1 - port locked
2 - none of the above
<L[0] > - Not available

LPT SMIF RDYST

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 RDYST	SV	8128	none	<A "X">	1
Right SMIF 2 RDYST	SV	8228	none	<A "X">	1

Arm Ready status
0 - Arm not ready
1 - Arm ready to load/open
2 - Arm ready to unload/close
3 - Arm ready to load / unload
4 - Arm ready to auto home
<L[0] > - Not available

LPT SMIF SWPOS

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 SWPOS	SV	8129	none	<A "X">	1
Right SMIF 2 SWPOS	SV	8229	none	<A "X">	1

Load /unload switch position
0 - All positions
n - Position n
<L[0] > - Not available

LPT SMIF TLTDN **Format : U1**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 TLTDN	SV	8130	none	<A "X">	1
Right SMIF 2 TLTDN	SV	8230	none	<A "X">	1

(RESERVED, NOT USED)
Gripper tilt down flag
0 - Gripper tilt not at down limit
1 - Gripper tilt at down limit
<L[0] > - Not available

LPT SMIF TLTPOS **Format : U2**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 TLTPOS	SV	8131	count	<A "X">	1
Right SMIF 2 TLTPOS	SV	8231	count	<A "X">	1

Gripper tilt position
0 - Tilt at home position
xx - steps away from the home position
<L[0] > - Not available

LPT SMIF TLTUP **Format : U1**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 TLTUP	SV	8132	none	<A "X">	1
Right SMIF 2 TLTUP	SV	8232	none	<A "X">	1

Gripper tilt UP flag
0 - Gripper tilt not at UP limit
1 - Gripper tilt at UP limit
<L[0] > - Not available

LPT SMIF XPOS **Format : U2**

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 XPOS	SV	8133	none	<A "X">	1
Right SMIF 2 XPOS	SV	8233	none	<A "X">	1

X Coordinate of gripper
0 - Horizontal position of gripper is at home
nn - gripper is nn mils (1/1000 of in.) away from home
<L[0] > - Not available

LPT SMIF YPOS

Format : U2

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 YPOS	SV	8134	none	<A "X">	1
Right SMIF 2 YPOS	SV	8234	none	<A "X">	1

Y Coordinate of gripper
0 - Horizontal position of gripper is at home
nn - gripper is nn mils(1/1000 of in.) away from home
<L[0] > - Not available

LPT SMIF Position

Format : U2

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 Position	SV	8135	none	<A "XXXX">	4
Right SMIF 2 Position	SV	8235	none	<A "XXXX">	4

<U2 [4] XPOS 8x33 , YPOS 8x34, ELPOS 8x08, TLTPOS 8x31>
<L[0] > - Not available

LPT SMIF PIO Status

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PIO Status	SV	8136	none	<A "XXXX">	4
Right SMIF 2 PIO Status	SV	8236	none	<A "XXXX">	4

<U1[4] PIO_LU 8x22, PIO_LRDY 8x21, PIO_URDY 8x23, PIO_LOCK 8x20>
<L[0] > - Not available

LPT SMIF Wafer Map

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 Wafer Map	SV	8137	none	<A "X…X">	25
Right SMIF 2 Wafer Map	SV	8237	none	<A "X…X">	25

<U1 slot1_status ... slot25_status >
<L[0] > - Not available

The slotx_status value may be returned as one of the following values:
0x00 – No wafer detected
0x01 – Wafer detected
0x02 – Cross slot detected

LPT SMIF Wafer Count

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 Wafer Count	SV	8138	none	<A "X">	1
Right SMIF 2 Wafer Count	SV	8238	none	<A "X">	1

n - Wafer Count in Cassette handled by the SMIF LPT.
<L[0] > - Not available

LPT SMIF PLUP

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 PLUP	SV	8139	none	<A "X">	1
Right SMIF 2 PLUP	SV	8239	none	<A "X">	1

Vertical LPT positive over-travel status
0 - Vertical arm not at positive over-travel
1 - Vertical arm at positive over-travel
<L[0] > - Not available

LPT SMIF ECV

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 ECV	SV	8140	none	<A "X">	1
Right SMIF 2 ECV	SV	8240	none	<A "X">	1

ECV EQUIPMENT CONSTANT VALUE

0 - Do not report
1 - Report
<L[0] > - Not available

LPT SMIF ALED

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Left SMIF1 ALED	SV	8141	none	<A "X">	1
Right SMIF 2 ALED	SV	8241	none	<A "X">	1

Where used: S1F3, F11, F12, S2F23
ALED Alarm Enable/Disable Code
Bit 8 = 1: Enable Alarm
Bit 8 = 0: Disable Alarm
<L[0] > - Not available

MAG-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
MAG-I	SV	27	amp	<A "XX.XX">	5

SVID	SVNAME	DESCRIPTION
27	MAG-I	Current source magent current
1027	lw MAG-I	Low est source magent current on last w afer implant
2027	hw MAG-I	Highest source magent current on last w afer implant
3027	aw MAG-I	Average source magent current on last w afer implant
4027	lbMAG-I	Low est source magent current on last batch implant
5027	hbMAG-I	Highest source magent current on last batch implant
6027	abMAG-I	Average source magent current on last batch implant
7027	MAG-I	Non-ASCII formatting available w ith V 11.05.05 and above

Source magnet current in amperes.

MAG-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
MAG-VOLTS	SV	67	Kvolts	<A "XX.X">	4

SVID	SVNAME	DESCRIPTION
67	MAG-VOLTS	Current source magent voltage
1067	lw MAG-VOLTS	Low est source magent voltage on last w afer implant
2067	hw MAG-VOLTS	Highest source magent voltage on last w afer implant
3067	aw MAG-VOLTS	Average source magent voltage on last w afer implant
4067	lbMAG-VOLTS	Low est source magent voltage on last batch implant
5067	hbMAG-VOLTS	Highest source magent voltage on last batch implant
6067	abMAG-VOLTS	Average source magent voltage on last batch implant
7067	MAG-VOLTS	Non-ASCII formatting available w ith V 11.05.05 and above

Source magnet voltage in kilovolts.

MDLN

Format : A

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
MDLN	SV	507	None	<A "XXXX">	4

GEM compliant equipment constant for the machine. This value is ‘E220’ by default.

MIR-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
MIR-I	SV	41	mamp	<A "XX.XX">	5

SVID	SVNAME	DESCRIPTION
41	MIR-I	Current mirror current
1041	lw MIR-I	Lowest mirror current on last wafer implant
2041	hw MIR-I	Highest mirror current on last wafer implant
3041	aw MIR-I	Average mirror current on last wafer implant
4041	lbMIR-I	Lowest mirror current on last batch implant
5041	hbMIR-I	Highest mirror current on last batch implant
6041	abMIR-I	Average mirror current on last batch implant
7041	MIR-I	Non-ASCII formatting available with V 11.05.05 and above

The current output of the mirror supply in milliamps.

MIR-SHUNT-I

Format: 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
MIR-SHUNT-I	SV	42	mamp	<A "XX.XX">	5

SVID	SVNAME	DESCRIPTION
42	MIR-SHUNT-I	Current mirror shunt current
1042	lw MIR-SHUNT-I	Lowest mirror shunt current on last wafer implant
2042	hw MIR-SHUNT-I	Highest mirror shunt current on last wafer implant
3042	aw MIR-SHUNT-I	Average mirror shunt current on last wafer implant
4042	lbMIR-SHUNT-I	Lowest mirror shunt current on last batch implant
5042	hbMIR-SHUNT-I	Highest mirror shunt current on last batch implant
6042	abMIR-SHUNT-I	Average mirror shunt current on last batch implant
7042	MIR-SHUNT-I	Non-ASCII formatting available with V 11.05.05 and above

The current flowing into the shunt regulator in the mirror supply in milliamps. The net current in the supply is (MIR-I) minus (MIR-SHUNT-I) and can be negative when running decel mode.

MIR-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
MIR-VOLTS	SV	40	volts	<A "XX.X">	4

SVID	SVNAME	DESCRIPTION
40	MIR-VOLTS	Current mirror voltage
1040	lw MIR-VOLTS	Lowest mirror voltage on last wafer implant
2040	hw MIR-VOLTS	Highest mirror voltage on last wafer implant
3040	aw MIR-VOLTS	Average mirror voltage on last wafer implant
4040	lbMIR-VOLTS	Lowest mirror voltage on last batch implant
5040	hbMIR-VOLTS	Highest mirror voltage on last batch implant
6040	abMIR-VOLTS	Average mirror voltage on last batch implant
7040	MIR-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

The voltage on the beam filter electrode(mirror) when running double charged ions. The same supply is connected to the accel column and used to decelerate the ion beam when running in decel mode.

Q1-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Q1-I	SV	43	amp	<A "XX.X">	4

SVID	SVNAME	DESCRIPTION
43	Q1-I	Current first quadrupole magnet current
1043	lw Q1-I	Lowest first quadrupole magnet current on last wafer implant
2043	hw Q1-I	Highest first quadrupole magnet current on last wafer implant
3043	aw Q1-I	Average first quadrupole magnet current on last wafer implant
4043	lbQ1-I	Lowest first quadrupole magnet current on last batch implant
5043	hbQ1-I	Highest first quadrupole magnet current on last batch implant
6043	abQ1-I	Average first quadrupole magnet current on last batch implant
7043	Q1-I	Non-ASCII formatting available with V 11.05.05 and above

The current in the first quadrupole magnet in amps.

Q1-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Q1-VOLTS	SV	68	Kvolts	<A "XX.X">	4

SVID	SVNAME	DESCRIPTION
68	Q1-VOLTS	Current first quadrupole magnet voltage
1068	lw Q1-VOLTS	Lowest first quadrupole magnet voltage on last wafer implant
2068	hw Q1-VOLTS	Highest first quadrupole magnet voltage on last wafer implant
3068	aw Q1-VOLTS	Average first quadrupole magnet voltage on last wafer implant
4068	lbQ1-VOLTS	Lowest first quadrupole magnet voltage on last batch implant
5068	hbQ1-VOLTS	Highest first quadrupole magnet voltage on last batch implant
6068	abQ1-VOLTS	Average first quadrupole magnet voltage on last batch implant
7068	Q1-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Quadrupole 1 magnet voltage in kilovolts.

Q2-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Q2-I	SV	44	amp	<A "XX.X">	4

SVID	SVNAME	DESCRIPTION
44	Q2-I	Current second quadrupole magnet current
1044	lw Q2-I	Lowest second quadrupole magnet current on last wafer implant
2044	hw Q2-I	Highest second quadrupole magnet current on last wafer implant
3044	aw Q2-I	Average second quadrupole magnet current on last wafer implant
4044	lbQ2-I	Lowest second quadrupole magnet current on last batch implant
5044	hbQ2-I	Highest second quadrupole magnet current on last batch implant
6044	abQ2-I	Average second quadrupole magnet current on last batch implant
7044	Q2-I	Non-ASCII formatting available with V 11.05.05 and above

The current in the second quadrupole magnet in amps.

Q2-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Q2-VOLTS	SV	69	Kvolts	<A "XX.X">	4

SVID	SVNAME	DESCRIPTION
69	Q2-VOLTS	Current second quadrupole magnet voltage
1069	lwQ2-VOLTS	Lowest second quadrupole magnet voltage on last wafer implant
2069	hwQ2-VOLTS	Highest second quadrupole magnet voltage on last wafer implant
3069	awQ2-VOLTS	Average second quadrupole magnet voltage on last wafer implant
4069	lbQ2-VOLTS	Lowest second quadrupole magnet voltage on last batch implant
5069	hbQ2-VOLTS	Highest second quadrupole magnet voltage on last batch implant
6069	abQ2-VOLTS	Average second quadrupole magnet voltage on last batch implant
7069	Q2-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Quadrupole 2 magnet voltage in kilovolts.

RANGE-ARC

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
RANGE-ARC	SV	25	none	<A "X">	1

SVID	SVNAME	DESCRIPTION
25	RANGE-ARC	Current arc range
1025	lwRANGE-ARC	Lowest arc range on last wafer implant
2025	hwRANGE-ARC	Highest arc range on last wafer implant
3025	awRANGE-ARC	Average arc range on last wafer implant
4025	lbRANGE-ARC	Lowest arc range on last batch implant
5025	hbRANGE-ARC	Highest arc range on last batch implant
6025	abRANGE-ARC	Average arc range on last batch implant
7025	RANGE-ARC	Non-ASCII formatting available with V 11.05.05 and above

Arc current unit.

RANGE-ARC	Unit
0	Amperes
1	Milliamps
2	Milliamps
3	Milliamps
4	Microamps

RIGHT-CRYO-TEMP

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
RIGHT-CRYO-TEMP	SV	13	Ko	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
13	RIGHT-CRYO-TEMP	Current right cryo temperature
1013	lw RIGHT-CRYO-TEMP	Lowest right cryo temperature on last wafer implant
2013	hw RIGHT-CRYO-TEMP	Highest right cryo temperature on last wafer implant
3013	aw RIGHT-CRYO-TEMP	Average right cryo temperature on last wafer implant
4013	lbRIGHT-CRYO-TEMP	Lowest right cryo temperature on last batch implant
5013	hbRIGHT-CRYO-TEMP	Highest right cryo temperature on last batch implant
6013	abRIGHT-CRYO-TEMP	Average right cryo temperature on last batch implant
7013	RIGHT-CRYO-TEMP	Non-ASCII formatting available with V 11.05.05 and above

The temperature of the right elevator cryo pump.

RIGHT-ELEVATOR-TC

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
RIGHT-ELEVATOR-TC	SV	16	micron	<A "XXXX">	4

SVID	SVNAME	DESCRIPTION
16	RIGHT-ELEVATOR-TC	Current pressure inside right elevator
1016	lw RIGHT-ELEVATOR-TC	Lowest pressure inside right elevator on last wafer implant
2016	hw RIGHT-ELEVATOR-TC	Highest pressure inside right elevator on last wafer implant
3016	aw RIGHT-ELEVATOR-TC	Average pressure inside right elevator on last wafer implant
4016	lbRIGHT-ELEVATOR-TC	Lowest pressure inside right elevator on last batch implant
5016	hbRIGHT-ELEVATOR-TC	Highest pressure inside right elevator on last batch implant
6016	abRIGHT-ELEVATOR-TC	Average pressure inside right elevator on last batch implant
7016	RIGHT-ELEVATOR-TC	Non-ASCII formatting available with V 11.05.05 and above

The pressure inside the right elevator.

SCANNER-PRESSURE

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SCANNER-PRESSURE	SV	7	Torr	<A "X.XE-X">	6

SVID	SVNAME	DESCRIPTION
7	SCANNER-PRESSURE	Current scanner CCIG reading
1007	lw SCANNER-PRESSURE	Lowest scanner CCIG reading on last wafer implant
2007	hw SCANNER-PRESSURE	Highest scanner CCIG reading on last wafer implant
3007	aw SCANNER-PRESSURE	Average scanner CCIG reading on last wafer implant
4007	lbSCANNER-PRESSURE	Lowest scanner CCIG reading on last batch implant
5007	hbSCANNER-PRESSURE	Highest scanner CCIG reading on last batch implant
6007	abSCANNER-PRESSURE	Average scanner CCIG reading on last batch implant
7007	SCANNER-PRESSURE	Non-ASCII formatting available with V 11.05.05 and above

The readback from the CCIG mounted in the beamline just past the scan plates.

SCANNER-TURBO-SPEED

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SCANNER-TURBO-SPEED	SV	10	%	<A "XX">	2

SVID	SVNAME	DESCRIPTION
10	SCANNER-TURBO-SPEED	Current scanner turbo speed
1010	lw SCANNER-TURBO-SPEED	Low est scanner turbo speed on last w afer implant
2010	hw SCANNER-TURBO-SPEED	Highest scanner turbo speed on last w afer implant
3010	aw SCANNER-TURBO-SPEED	Average scanner turbo speed on last w afer implant
4010	lbSCANNER-TURBO-SPEED	Low est scanner turbo speed on last batch implant
5010	hbSCANNER-TURBO-SPEED	Highest scanner turbo speed on last batch implant
6010	abSCANNER-TURBO-SPEED	Average scanner turbo speed on last batch implant
7010	SCANNER-TURBO-SPEED	Non-ASCII formatting available w ith V 11.05.05 and above

The speed of the scanner turbo pump.

SMIF1 Controls

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SMIF1 Controls	SV	8001	none	<A "X">	1

The control mode for LPT units.

1 Manual
2 SEMI-Auto
3 FULL AUTO

SMIF Port ID

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SMIF Port ID	SV	8000	none	<A "X">	1

Defines the SMIF unit port ID. This variable may be linked to SMIF-related CEID event reports to determine which side the event was generated on.

1 – Left SMIF
2 – Right SMIF

This is also used for the material identification bar code reader. This SVID reports the side where the event occurs.

1 - left
2 - right

SMIF Tool

Format : U1

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SMIF Tool	SV	8002	none	<A "X">	1

The SMIF tool in use. Use these status variables in reports generated by a SMIF CEID to determine which tool originated the report.

1 tool 1
2 tool 2

SOFTREV

Format : A

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SPFTREV	SV	508	None	<A "XXXXXX">	6

SOFTREV is the GEM compliant software version number. This will display the current software revision installed on the implanter.

SOURCE-PRESSURE

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SOURCE-PRESSURE	SV	6	Torr	<A "X.XE-X">	6

SVID	SVNAME	DESCRIPTION
0	SOURCE-PRESSURE	Current source CCIG reading
1006	lw SOURCE-PRESSURE	Low est source CCIG reading on last w afer implant
2006	hw SOURCE-PRESSURE	Highest source CCIG reading on last w afer implant
3006	aw SOURCE-PRESSURE	Average source CCIG reading on last w afer implant
4006	lbSOURCE-PRESSURE	Low est source CCIG reading on last batch implant
5006	hbSOURCE-PRESSURE	Highest source CCIG reading on last batch implant
6006	abSOURCE-PRESSURE	Average source CCIG reading on last batch implant
7006	SOURCE-PRESSURE	Non-ASCII formatting available w ith V 11.05.05 and above

The readback from the source cold cathode ion gauge in units of Torr. The format: is either "X.XE- X" or "OFF" if the ion gauge is not operating.

SOURCE-TURBO-SPEED

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SOURCE-TURBO-SPEED	SV	9	%	<A "XX">	2

SVID	SVNAME	DESCRIPTION
9	SOURCE-TURBO-SPEED	Current source turbo speed
1009	lw SOURCE-TURBO-SPEED	Low est source turbo speed on last w afer implant
2009	hw SOURCE-TURBO-SPEED	Highest source turbo speed on last w afer implant
3009	aw SOURCE-TURBO-SPEED	Average source turbo speed on last w afer implant
4009	lbSOURCE-TURBO-SPEED	Low est source turbo speed on last batch implant
5009	hbSOURCE-TURBO-SPEED	Highest source turbo speed on last batch implant
6009	abSOURCE-TURBO-SPEED	Average source turbo speed on last batch implant
7009	SOURCE-TURBO-SPEED	Non-ASCII formatting available w ith V 11.05.05 and above

The speed of the source turbo pump as a percentage of full speed. The turbo speeds are used as an indicator of the roughing pressure and determine when the CCIG's will be turned on.

SUP-VOLTS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SUP-VOLTS	SV	30	kvolts	<A "XX.XX">	5

SVID	SVNAME	DESCRIPTION
30	SUP-VOLTS	Current extraction supply voltage
1030	lw SUP-VOLTS	Lowest extraction supply voltage on last wafer implant
2030	hw SUP-VOLTS	Highest extraction supply voltage on last wafer implant
3030	aw SUP-VOLTS	Average extraction supply voltage on last wafer implant
4030	lbSUP-VOLTS	Lowest extraction supply voltage on last batch implant
5030	hbSUP-VOLTS	Highest extraction supply voltage on last batch implant
6030	abSUP-VOLTS	Average extraction supply voltage on last batch implant
7030	SUP-VOLTS	Non-ASCII formatting available with V 11.05.05 and above

Extraction electron suppression supply voltage in kilovolts.

SUP-I

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
SUP-I	SV	31	mamp	<A "XX.X">	4

SVID	SVNAME	DESCRIPTION
31	SUP-I	Current extraction suppression current
1031	lw SUP-I	Lowest extraction suppression current on last wafer implant
2031	hw SUP-I	Highest extraction suppression current on last wafer implant
3031	aw SUP-I	Average extraction suppression current on last wafer implant
4031	lbSUP-I	Lowest extraction suppression current on last batch implant
5031	hbSUP-I	Highest extraction suppression current on last batch implant
6031	abSUP-I	Average extraction suppression current on last batch implant
7031	SUP-I	Non-ASCII formatting available with V 11.05.05 and above

Extraction electron suppression supply current in milliamps.

TARGET-BIAS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
TARGET-BIAS	SV	52	volt	<A "XXX.X">	5

SVID	SVNAME	DESCRIPTION
52	TARGET-BIAS	Current ES faraday electron suppression
1052	lw TARGET-BIAS	Lowest ES faraday electron suppression on last wafer implant
2052	hw TARGET-BIAS	Highest ES faraday electron suppression on last wafer implant
3052	aw TARGET-BIAS	Average ES faraday electron suppression on last wafer implant
4052	lbTARGET-BIAS	Lowest ES faraday electron suppression on last batch implant
5052	hbTARGET-BIAS	Highest ES faraday electron suppression on last batch implant
6052	abTARGET-BIAS	Average ES faraday electron suppression on last batch implant
7052	TARGET-BIAS	Non-ASCII formatting available with V 11.05.05 and above

End station Faraday cup electron suppression voltage in volts. (only on machines without an electron flood gun!)

Note: The current readouts from the Faraday cups in the end station are hard to interpret because they are smaller than the beam and the beam would not ordinarily be pointed at them most of the time so they are not provided as a status variable.

TERM-DI-RETURN-TEMP

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
TERM-DI-RETURN-TEMP	SV	77	Celsius	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
77	TERM-DI-RETURN-TEMP	Current DI return temperature
1077	lw TERM-DI-RETURN-TEMP	Low est DI return temperature on last w afer implant
2077	hw TERM-DI-RETURN-TEMP	Highest DI return temperature on last w afer implant
3077	aw TERM-DI-RETURN-TEMP	Average DI return temperature on last w afer implant
4077	lbTERM-DI-RETURN-TEMP	Low est DI return temperature on last batch implant
5077	hbTERM-DI-RETURN-TEMP	Highest DI return temperature on last batch implant
6077	abTERM-DI-RETURN-TEMP	Average DI return temperature on last batch implant
7077	TERM-DI-RETURN-TEMP	Non-ASCII formatting available w ith V 11.05.05 and above

Terminal DI Water Return Temperature.

TERMINAL-MEGOHMS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
TERMINAL-MEGOHMS	SV	1	Mohm/cm	<A "XX.XX">	5

SVID	SVNAME	DESCRIPTION
1	TERMINAL-MEGOHMS	Current terminal resistivity
1001	lw TERMINAL-MEGOHMS	Low est terminal resistivity on last w afer implant
2001	hw TERMINAL-MEGOHMS	Highest terminal resistivity on last w afer implant
3001	aw TERMINAL-MEGOHMS	Average terminal resistivity on last w afer implant
4001	lbTERMINAL-MEGOHMS	Low est terminal resistivity on last batch implant
5001	hbTERMINAL-MEGOHMS	Highest terminal resistivity on last batch implant
6001	abTERMINAL-MEGOHMS	Average terminal resistivity on last batch implant
7001	TERMINAL-MEGOHMS	Non-ASCII formatting available w ith V 11.05.05 and above

The resistivity of the cooling water used to cool the terminal in Mohm-cm. Generally the value must exceed 2.00 Mohm-cm. The water flows across the 180 KV gap to the terminal so high resistance is necessary to avoid drawing excessive current from the high voltage supplies. Full scale: 9.99.

TERMINAL-WATER-TEMP

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
TERMINAL-WATER-TEMP	SV	3	Co	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
3	TERMINAL-WATER-TEMP	Current cooling w ater temperature
1003	lw TERMINAL-WATER-TEMP	Low est cooling w ater temperature on last w afer implant
2003	hw TERMINAL-WATER-TEMP	Highest cooling w ater temperature on last w afer implant
3003	aw TERMINAL-WATER-TEMP	Average cooling w ater temperature on last w afer implant
4003	lbTERMINAL-WATER-TEMP	Low est cooling w ater temperature on last batch implant
5003	hbTERMINAL-WATER-TEMP	Highest cooling w ater temperature on last batch implant
6003	abTERMINAL-WATER-TEMP	Average cooling w ater temperature on last batch implant
7003	TERMINAL-WATER-TEMP	Non-ASCII formatting available w ith V 11.05.05 and above

The temperature of the cooling water for the terminal in degrees centigrade. The control computer will shut down the implanter if this or any other water circuit becomes too hot.

TIME

Format : A

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
TIME	SV	506	None	<A "X...X">	16

GEM compliant time format. Time will be displayed in the format YYYYMMDDHHMMSSCC.

VAP-TEMP

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
VAP-TEMP	SV	53	Co	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
53	VAP-TEMP	Current vaporizer temperature
1053	lw VAP-TEMP	Lowest vaporizer temperature on last wafer implant
2053	hw VAP-TEMP	Highest vaporizer temperature on last wafer implant
3053	aw VAP-TEMP	Average vaporizer temperature on last wafer implant
4053	lbVAP-TEMP	Lowest vaporizer temperature on last batch implant
5053	hbVAP-TEMP	Highest vaporizer temperature on last batch implant
6053	abVAP-TEMP	Average vaporizer temperature on last batch implant
7053	VAP-TEMP	Non-ASCII formatting available with V 11.05.05 and above

For the vaporizer option. Vaporizer temperature is in degrees centigrade.

X-AXIS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
X-AXIS	SV	32	arb	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
32	X-AXIS	Current extraction electrode x axis position
1032	lw X-AXIS	Lowest extraction electrode x axis position on last wafer implant
2032	hw X-AXIS	Highest extraction electrode x axis position on last wafer implant
3032	aw X-AXIS	Average extraction electrode x axis position on last wafer implant
4032	lbX-AXIS	Lowest extraction electrode x axis position on last batch implant
5032	hbX-AXIS	Highest extraction electrode x axis position on last batch implant
6032	abX-AXIS	Average extraction electrode x axis position on last batch implant
7032	X-AXIS	Non-ASCII formatting available with V 11.05.05 and above

Extraction electrode x axis position. The units are arbitrary and the values run from 0 to 999. The value 500 is the approximate mechanical center.

Y-AXIS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Y-AXIS	SV	33	arb	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
33	Y-AXIS	Current extraction electrode y axis position
1033	lw Y-AXIS	Low est extraction electrode y axis position on last w afer implant
2033	hw Y-AXIS	Highest extraction electrode y axis position on last w afer implant
3033	aw Y-AXIS	Average extraction electrode y axis position on last w afer implant
4033	lbY-AXIS	Low est extraction electrode y axis position on last batch implant
5033	hbY-AXIS	Highest extraction electrode y axis position on last batch implant
6033	abY-AXIS	Average extraction electrode y axis position on last batch implant
7033	Y-AXIS	Non-ASCII formatting available w ith V 11.05.05 and above

Extraction electrode y axis position. The units are arbitrary and the values run from 0 to 999. The value 500 is the approximate mechanical center.

Y-SIGMA

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Y-SIGMA	DV	214	0.01%	<A "XX.XX">	5

Obsolete.

Z-AXIS

Format : 20

SVNAME	Class	VID/SVID	UNITS	Structure	Max Characters
Z-AXIS	SV	34	arb	<A "XXX">	3

SVID	SVNAME	DESCRIPTION
34	Z-AXIS	Current extraction electrode z axis position
1034	lw Z-AXIS	Low est extraction electrode z axis position on last w afer implant
2034	hw Z-AXIS	Highest extraction electrode z axis position on last w afer implant
3034	aw Z-AXIS	Average extraction electrode z axis position on last w afer implant
4034	lbZ-AXIS	Low est extraction electrode z axis position on last batch implant
5034	hbZ-AXIS	Highest extraction electrode z axis position on last batch implant
6034	abZ-AXIS	Average extraction electrode z axis position on last batch implant
7034	Z-AXIS	Non-ASCII formatting available w ith V 11.05.05 and above

Extraction electrode z axis position. The units are arbitrary.