The Common Specification of SubEquipment Automation for Innolux FAB4

This specification is not the final version and can be modified if necessary. The final equipment specification should be discussed and re-confirmed based on each equipment characteristic.

Notice:

1. If any indistinctness or undefined on the specification that vendor provided for INX, that have to follow INX common specification.
2. **CIM Pre-shipping test will be held at Innolux Site before the equipment move into INX. The equipment vendor must prepare the CIM PC application and related hardware, ex: PLC or Touch panel**.
3. CIM Pre-shipping test result is not accepted by INX engineer and it will impact the equipment CIM release schedule, the INX will ask vendor site test or suggest not to FOB. Vendor site test all traffic fee and allowances for a business trip should be responsibility of vendor.
4. CIM FAB site testing, in INX clean room, only permits the maximum number of testing to all CIM functionality. When exceeding 5 actual testing, then every testing will have punishment fee 200,000 NT$.
5. After the acceptance test, the vendors have to provide one-year warranty service.
6. This specification is not the final version and can be modified if necessary. The final equipment specification should be discussed and re-confirmed based on each equipment characteristic
7. The online function of equipment is a part of Equipment Final Acceptance item. Hence, the online function fail, the Equipment Final Acceptance will be failure.
8. The PC, communication with INX's host, must be installed and performed on English or Traditional Chinese operation system that can provide the interface like Microsoft Windows.
9. The PC, communication with INX's host, should use dedicated network card to connect with INX intranet. In another word, the PC should not use the Hub to connect with INX intranet.
10. For Microsoft Windows Operation System PC, communication with INX's host must be installed on Windows 2000 Operation System or above.
11. INX has right to install Anti-Virus (Symantec AntiVirus Cooperation Edition) software on the PC, which communicates with INX's host. This installation of Anti-Virus will be done by INX. Anti-Virus cannot affect the equipment application operation. On the other word, the vendor must ensure the Operation system, application and communication work well under Anti-Virus software. If it doesn't work well, the whole online function of equipment will be failure.
12. For docking type and In-line type equipment, the integrator vendor must provide all cable and wiring for docking/Inline equipment communication.
13. The alarm level (serious or light) should be configurable and determined by INX equipment engineer. Alarm level should be configured at equipment operation console or INI file.
14. For data collection function (S6F103), the DVNAME, DVTYPE and ULFLAG of S6F103 should be configurable at equipment operation console or INI file. When equipment move in, the default state is ULFLAG=Y for all data. After equipment reboot, equipment will base on the previous ULFLAG setting by equipment engineer.

Revised History

Version	Date	Page	The description of modification
1.00	2018/02/07		Initial
1.01	2018/04/30		1. add S2F25, S2F26 2. DVTYPE Length change to 4 byte
1.02	2018/05/03		1. modify S6F3 format
1.03	2018.05.08		1. Remove S2F41/S2F42 2. Modify S6F3 to S6F103, S6F4 to S6F104 3. Remove S6F11 4. Modify S7F61 to S7F161, S7F62, to S7F162 5. Remove S10F3
1.04	2018/07/05		1. Recover Add S6F11

The equipment vendor should deliver bug-free software to Innolux before it is tested at Innolux site or vendor site. If there is any bug found during the testing stage, whether it is specification discrepancy or software bug, Innolux reserves the final right to perform the specification change without any charge by vendor.

1. Scope

This specification is used for Innolux's CIM project as equipment automation common specification. It applies only to the equipment that uses the SECS as the communication protocol at Array shop.

Basically, this specification only includes the common parts based on SEMI standard. For the items this specification does not include or the items that cannot be applied, caused by the special characteristics of hardware, a separated discussion is necessary and the final specification should use the discussing results as standards.

2. Definitions

This section defines the important terminology that will be used in this document. The terms that are defined in this section should be applied to the entire document except that extra descriptions are included at the individual sections.

2.1 ID Definitions

The following table defines the data ID of some common items that could be asked to input by operator console, bar code reader (CODE39) or SECS message. The word should be left alignment.
For example: Recipe ID (16 ASCII): '01 '.

Name	Data Type	Description
Lot ID	12 ASCII	Lot number
Cassette ID	8 ASCII	Cassette number
Recipe ID	16 ASCII	Process program name
Reticle ID	16 ASCII	Reticle number used at exposure equipment (Nikon or Canon).
Port ID	2 ASCII	Port Number. Please use '01','02','10','11','12'…etc.

Slot ID	3 ASCII	Slot Number. Please use ‘001’,’002’,’010’,’011’,’020’…etc.
Glass ID	12 ASCII	Glass ID
Chamber ID / Unit ID	2 ASCII	For multi-chamber equipment.
Panel ID	12 ASCII	Panel ID.
Equipment ID	8 ASCII	Equipment ID (6 bytes for main equipment, 2 bytes for sub entity)
Operator ID	6 ASCII	Operator ID
Operation ID	4 ASCII	Operation number (This number will be used for the measurement equipment to store data at the correct path of file server)
Product ID	16 ASCII	Product number (This number will be used for the measurement equipment to store data at the correct path of file server)
Owner ID	4 ASCII	Lot owner.
Material ID	30 ASCII	Material ID management(This number will be get from BCR when material mount / unmount / (In Use)Run / /Down)
MES Link Key	4 ASCII	MES link key (This number will be used for the measurement equipment to save data at the correct path of file server)

The length of ID is flexible before the final spec is determined.

2.2 Equipment Processing State Definitions

The equipment processing state is used to record the equipment performance. The equipment should generate event reports as well as status variables for each processing state transition.

State	Description
IDLE	After the completion of system initialization when equipment power on, go into IDLE state. When there is no lot in processing.
RUN	When equipment starts processing or sends a “PROCESS START” event report to host, go into PROCESSING state.
DOWN	When equipment stops abnormally or urgently.

2.3 Port Status Definitions

Port status is important for system to decide send lots to equipment or not.

State	Description	Report Timing
USEM	Useable and empty	After changing from Un-useable to Usable command
USNE	Useable and not empty	After changing from Un-useable to Usable command
UNUS	Un-useable	After changing only from LDRQ, UDRQ to Un-usable command
LDRQ	Load Request	Port is empty
LDCM	Load Complete	When cassette put on port, Load/Unloader finishes slot mapping and cassette ID passing to Main equipment.
UDRQ	Unload Request	After the cassette was unclamp by Load/Unloader.
UDCM	Unload Complete	After the cassette was token by stock's crane and Load/Unloader senses the cassette is not present.

3 Equipment Models

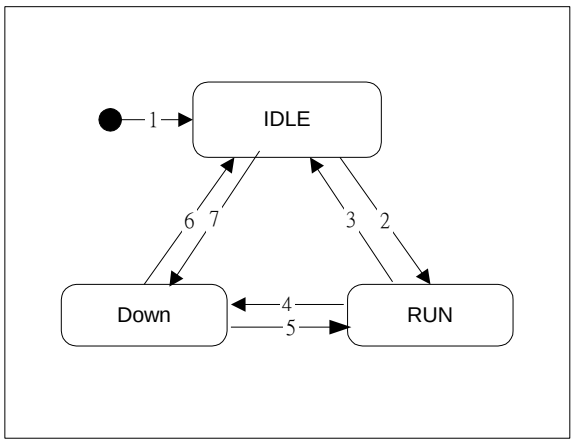
According to the common operation of TFT equipment, the following equipment models should be implemented.

The state transition diagrams in the following sections are depicted by the notation of Harel's. The round rectangles represent states. The arrows between the states are called transitions. Each transition is described in the table with the name of an event and a set of actions that are performed when the event occurs. The rectangle surrounding the other states is called a super-state and the states nested within it are called substrates. Transitions from super states to other states are shared by all substrates within that super-state.

3.1 Equipment Processing State

3.1.1 State Transition Diagram

The following diagram describes the change of equipment processing. After equipment beginning, equipment will be ready to process if no error is detected in equipment.



3.1.2 Description

The following table will describe the above diagram on the change of processing state include original and final state.

1	After equipment power-on and equipment is ready to process, the state will be Idle.
2	When equipment starts to process the lot and the original state is Idle, the new state of equipment will be changed to Run.
3	When equipment finishes the last glass and no lot is left to process on the port. After that, the new state of equipment will be Idle.
4	When equipment is processing and some error is happened in the equipment, it causes equipment to stop processing. The new state of equipment will be Down.
5	When equipment is in Down state and engineer/operator has solved the errors. The equipment can continue to process so the equipment state can change to be Run.
6	When equipment is in Down state and engineer must reset the equipment in order to solve the

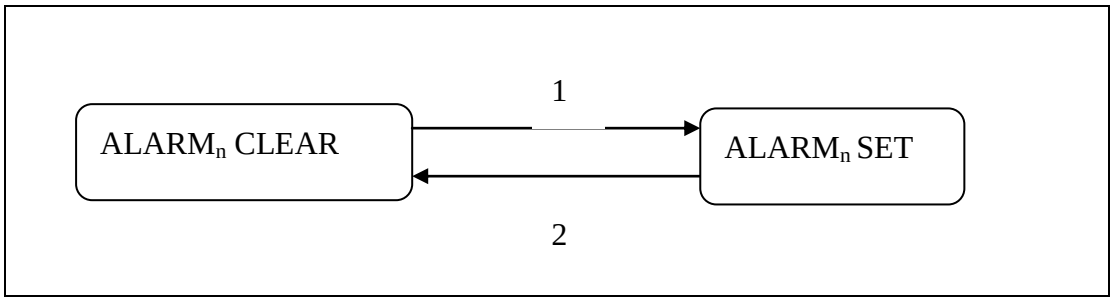
	error. It will cause equipment to be Idle state.
7	When equipment is in IDLE state, but some error happens. That causes equipment to be unable to process the lot. Equipment new state is Down.

The equipment state will be affected by alarm occurrence. The alarm affects the equipment state that will be defined by INX engineer. The equipment has to provide the alarm list after P/O one month.

3.2 Alarm State Diagram

3.2.1 State Transition Diagram

The following diagram describes the status changes of Alarm.



3.2.2 Description

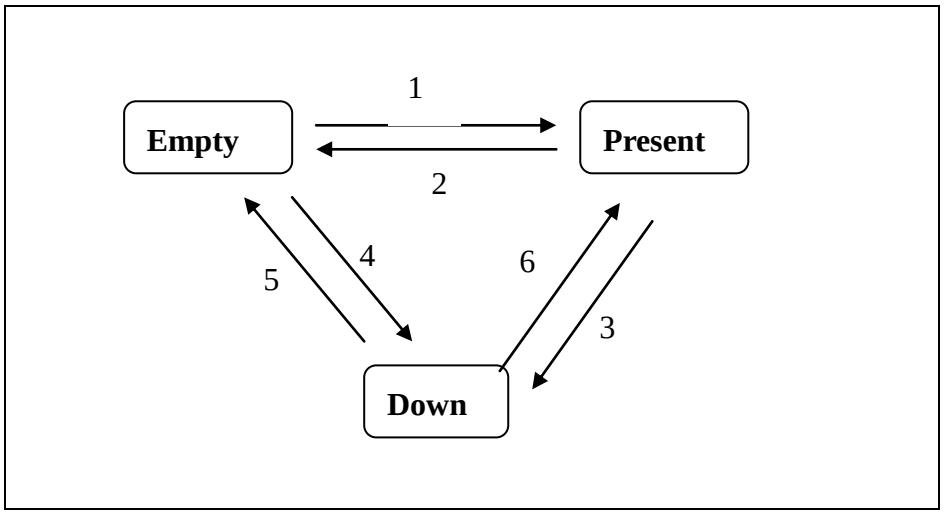
1	Alarm ID (N) is detected on the equipment.
2	Alarm ID (N) is no longer detected on the equipment.

- The alarm item name (alarm code) and level can be configured at equipment operation console.
- If the alarm level and upload flag cannot be changed on equipment operation console, then the level (Serious/Light) of each alarm can be changed by INX request with vendor's support during warranty period with free charge.

3.3 Port State Diagram

3.3.1 State Transition Diagram

The following diagram describes the status changes of equipment port. After equipment startup, the port status should be Empty.



3.3.2 Description

The following table will describe the about diagram on the changes of port status include original and final state.

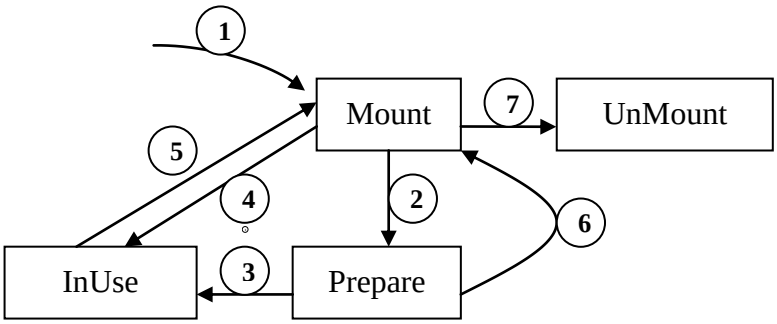
1	When the cassette arrives on the port, the port status will be changed to Present status. This means that there is a lot on the port.
2	When the cassette is moved out from this port by AGV/MGV, the port status will be empty.
3	There is a cassette on the port, but some trouble happens in this port at the same time. This case causes equipment to be unable to service this port, so this port status will be changed to down.
4	There is no cassette on the port and some trouble happens in this port at the same time. The trouble causes equipment to be unable to service this port, the port status will be Down.

5	When the trouble has been fixed and there is no cassette on the port , the status will be empty status.
6.	When the trouble has been fixed and there is one cassette on the port, the status will be not empty status

3.4 Material State

3.4.1 State Transition Diagram

The following diagram describes the state changes of resist/mask.



3.4.2 Description

The following table will describe the above diagram on the change of processing state.

1	Mask completely put into the mask slot. Mask is mounted by operator.
2	Mask is prepared on turn stage. (For DSK)
3	Mask is in process from the prepare state. (For DSK)
4	Mask is in process from the mount state. (For NSK)
5	Mask completely put into the mask slot. Mask is transferred from process stage to mask slot.
6	Mask completely put into the mask slot. Mask is transferred from the prepare state to mask slot. (For DSK)
7	Mask is taken off by operator.

4 Equipment Online Functions

4.1 Equipment Online Functions List

Communication line check function
Equipment status change report function
Recipe ID directory report function
Recipe modified date/time and body upload function
Process data report function (By glass/lot)
Equipment daily check data inquiry
Alarm report/alarm clear report function
SECS II/HSMS System error report function

4.2 Detailed Description Of Online Function

4.2.1 Switch to Online/Offline function

- When HSMS state is “SELECTED” and the equipment will report and reply needed stream function.
- When Equipment changes the HSMS status from DISCONNECTED to SELECTED, the equipment needs to follow SELECTED scenario.

4.2.2 Communication line check function

The objective of this function is to check the reliability of communication between equipment and host. When equipment receives loop-back diagnostic request from host, it should reply back to the host with the same string. Also, host can perform the same action to equipment when operating in online and offline mode (any time).

4.2.3 Equipment status change report function

1. When equipment start to process lot, then equipment send the Processing status to host.
2. When equipment normal process end and no any glass in processing, then equipment should send the Idle

status to host.

3. If equipment faces any problems, which causes the equipment unable to continue the process, then the equipment should send serious alarm and this Down status to host. The down event should be included the glasses ID that affected by the alarm.
4. The other status should be discussed with equipment engineer.

4.2.4 Recipe ID directory report function

1. Host can query the recipe id information, that available on the equipment, at any time in online mode.
2. Equipment only reports available recipe list to host.
3. If the equipment supports manufacture state recipe function, the equipment needs to report individual recipe into specified manufacture category.
4. If the equipment does not support manufacture state recipe function, the equipment always reports recipe into “Production” category.

4.2.5 Recipe modified date/time and body upload function

If host query this recipe at any time in online mode, then equipment should be able to upload latest recipe data (some equipment need included key parameter) to host. For multi chamber or docking type equipment, equipment side should provide the sub-recipe modified date/time and body.

4.2.6 Process data report function (By glass/lot)

1 After each glass (panel) process finishes, equipment send process data report to host by glass (panel).

2 After all glass process finish, equipment sent process data report to host by lot.

4.2.7 Equipment daily check data inquiry

There are some materials like gas, water and chemical will be supplied to equipment. Equipment should collect these data for host query. The detail data item should be defined by INX equipment engineer and vendor.

4.2.8 Alarm report/alarm clear report function

1 When equipment has any alarm happened, equipment sent alarm report to host (No matter offline/online when

the HSMS communication is connected) and enable buzzer on, signal tower flash red light. If HSMS system error, S9 of SECS II message (ex: T3 time out, illegal data, …), happened during alarm report at offline control state, the equipment does not send the HSMS system error message to host.

2 If HSMS T3 time out occurred at online mode, the equipment should send S9F9 message and active a light alarm and report to host. For successive SECS II message:
   - If host reply, then automatically clear this alarm and send alarm clear report to host.
   - If host still no reply, then equipment must continue without affect equipment processing.
   - The S5F1 for T3 time out purpose, the equipment should ignore this message T3 time out.

3 The alarm report including alarm code, id, level, text and the glass id that affected by the alarm.

4 When alarm already is cleared, equipment sent alarm clear report to host.

5 Equipment vendor should provide alarm list for INX equipment engineer to review and separate to light and serious alarm. When light alarm occurs, equipment just sends alarm. If the serious alarm happen, equipment should report alarm and equipment status change report (Down) to host.

6 Equipment alarm should provide the alarm acknowledgement message window and clear alarm list.

7 When equipment occur an alarm, the equipment should popup the alarm acknowledgement message window and adds this alarm into alarm list. This acknowledgement window can be only one on the equipment operation console and it always displays the latest alarm message. Operator only can close this message window, not by alarm clear situation.

8 When the equipment finds the alarm clear, the equipment should automatically clear the alarm and sends alarm clear report to host.

9 When the operator finds the alarm clear, the operator can clear the alarm on the alarm list.

10 The alarm list should record the Occurred/Cleared time on the alarm list.

4.2.9 SECS II/HSMS System error report function

Equipment sent system error report to host, when the block message cannot be handled or timeout error cause transaction failure. (S9Fx)

5 Data Collection

5.1 Reporting Base

The DVNAME, DVTYPE and ULFLAG of S6F103 for data collection should be configurable at equipment operation console or INI file.

5.1.1 By Lot

When equipment is end of lot processing, it must report lot processing data to host. The lot data item need follow our processing requirement. The SECSII format and value of the lot data report depend on your equipment specification.

5.1.2 By Glass

When equipment is end of glass processing, it must report glass processing data to host. The glass data item need follow our processing requirement. The SECSII format and value of the glass data report depend on your equipment.

5.1.3 Both Glass and Lot EDC

When equipment is end of glass processing, it must report glass processing data to host. After all glass is end of processing, it also must report lot processing data to host. The glass and lot data item need follow our processing requirement. The SECSII format and value of the glass and lot data report depend on your equipment specification.

For measurement or inspection equipment, the processing data, including auto and manual measurement data, must be calculated and report to host.

6 Alarm

INX will request equipment vendor to separate alarm to 2 kinds, light and serious. The alarm category should be configurable and determined by INX equipment engineer. If there are several chambers or units in equipment, alarm code should be different for different chamber or unit. And the alarm item name and level can be configured at equipment operation console.

If the alarm level cannot be changed on equipment operation console, then the level (Serious/Light) of each alarm can be changed by INX request with vendor's support during warranty period with free charge.

6.1 Light Alarm (Warning)

When the light alarm is happened during the processing time, the lot processing can continue to be processed and equipment will send alarm report to host at any mode (offline/online).

6.2 Serious Alarm

When the serious alarm happens, the equipment will be halted and the processing will not be continued until the equipment problem is solved. That is, all alarms that require engineer to solve immediately are regarded as serious ones. The alarm messages will be sent to host at offline or online mode. There are two cases in these serious alarm situations. One, the problem is solved and then the lot processing can be continued. The other, the equipment will be reset to initial state so that the process will not be continued. If a serious alarm occurs, equipment should report equipment status change report for "Down". After alarm cleared equipment should report alarm clear report and equipment status change report for "idle" or "run".

7 Scenario

****: This sign means that host send/skip this stream function. That is, this stream function is optional for host.**

7.1 SELECTED Scenario (Disconnected → SELECTED)

Equipment		Host
	Operator switch to Online Control/ Monitor form offline on equipment console.	
Equipment Request on line	S1F1----------→	
	←---------- S1F2	Host Reply OK
Equipment Request Date/time	S2F17----------→	
	←---------- S2F18	Host Reply date/time

7.2 Alarm (For Serious or light Alarm)

Equipment		Host
Serious or light Alarm occurrence	S5F1 ----------→	
	←----------S5F2	

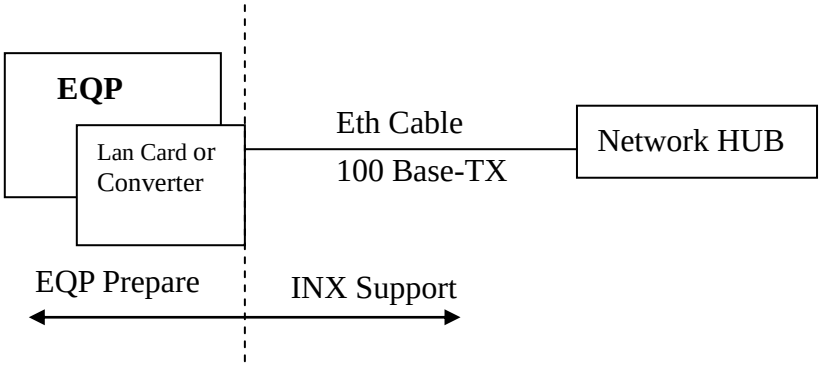
Equipment		Host
Equipment send alarm clear event to host when operator clear alarm at equipment console		
Alarm clear	S5F1 ----------→	
	←----------S5F2	

Chapter A. Appendix

A.1 HSMS-SS Communication Specification

Equipment vendor need to provide HSMS protocol to communicate with Host. About HSMS protocol, please follow SEMI standard (SEMI E37-0298).

HSMS Connection to Network



A.1.1 Basic Specification

A.1.1.1 Communication Protocol Base

TCP/IP.

A.1.1.2 Physical Layer

Ethernet (IEEE 802.3), RJ-45

A.1.1.3 Communication Speed

Typically 100 M bits /second.

A.1.1.4 Connections

One physical network cable can support many HSMS Connections. Typically, an equipment will accept only one HOST Connection.

A.1.1.5 Message Format

Message Text is SECS-II Data Items. Transmits a SECS-II message as a TCP/IP byte stream. The message has a four-byte Message Length, a ten-byte Message Header, and text. It will be described later.

A.1.1.6 Header

The Header is one ten-byte for the entire message. Header bytes 4-5 contain P Type and S Type. Header bytes 2-3 are W-Bit, Stream and Function when S type=0 (Data Message). It will be

described later.

A.1.1.7 Maximum Message Size

Message size limited by 4-byte message length (approximately 4Gbytes).

A.1.1.8 Protocol Parameters

T3 ➔ Reply Timeout Session ID

T5 ➔ Connect Separation Timeout

T6 ➔ Control Transaction Timeout

T7 ➔ NOT Selected Timeout

T8 ➔ Network Inter-character Timeout

IP Address and Port of Passive Entity

The detailed definition will be described later.

A.1.2 Communication Parameter

A.1.2.1 Communication Parameter description

T3: Reply timeout in the HSMS protocol

The T3 reply timeout is a limit on the length of the time that the HSMS message protocol is willing to wait for a Reply Message. After sending a Primary Message with W-bit 1 (Reply Expected), the sender must begin a reply timer, initialized to T3 value. If the sender does not receive the Reply Message before the reply timer expires, then a T3 Timeout Error has occurred. The sender should close the transaction and no longer expect the Reply Message.

T5: Connection Separation Timeout

It in the HSMS protocol used to prevent excessive TCP/IP connect activity by providing a minimum time between the breaking, by an entity, of a TCP/IP connection or a failed attempt to establish one, and the attempt, by that same entity, to initiate a new TCP/IP connection.

T6: Control Transaction Timeout

It defines the maximum time an HSMS control transaction can remain open before a communications failure is considered to have occurred. A transaction is considered open from the time the initiator sends the required request message until the response message is received.

T7: NOT SELECTED Timeout

It defines the maximum amount of time that may transpire between the formation of a TCP/IP connection and the use of that connection for HSMS communications before a communications failure is considered to have occurred.

T8: Network Inter-character Timeout

It defines the maximum amount of time that may transpire between the receipt of any two

successive bytes of a complete HSMS message before a communications failure is considered to have occurred.

T9: Conversation Timeout

Detect an interruption between conversations. It usually used in ONLINE sequence.

Connect Mode:

It specifies the logic this local entity will use during HSMS connection establishment.

Local Entity IP Address and Port number:

Required for any entity operating in PASSIVE mode. Determines the address on which the local entity will listen for incoming connection requests.

Remote Entity IP Address and Port number:

Required for any entity operating in ACTIVE mode. Determines the address of the remote entity to which the local entity will attempt to connect.

A.1.2.2 Default Parameter Value

Name	Value Range	Resolution	Typical Value
T3 Reply Timeout	1-120 sec	1 second	**45** seconds
T5 Connect Separation Timeout	1-240 sec	1 second	**10** seconds
T6 Control Transaction Timeout	1-240 sec	1 second	**10** seconds
T7 NOT SELECTED Timeout	1-240 sec	1 second	**10** seconds
T8 Network Inter-character Timeout	1-120 sec	1 second	**10** seconds
T9 Conversation Timeout	1-240 sec	1 second	**45** seconds
Connect Mode	PASSIVE ACTIVE	—	—
Local Entity IP Address and Port Number	Determined by TCP/IP conventions	—	IP: XXX.XXX.XXX.XXX Port: 5000
Remote Entity IP Address and Port Number	Determined by TCP/IP conventions	—	IP: XXX.XXX.XXX.XXX Port: 5000

A.1.3 HSMS Message Format And Exchange Procedure

A.1.3.1 General Message Format

An HSMS Message is transmitted as a single contiguous stream of bytes in the following order:

Number of Bytes	Description
4 Bytes	Message Length. MSB First. Specifies the number of bytes in the Message Header plus the Message Text.
10 Bytes	Message Header.
0-n Bytes	Message Text.

A.1.3.2 Message Length

It is a four-byte unsigned integer value that specifies the length in bytes of the Message Header plus the Message Text. Message Length is transmitted most significant byte (MSB) first and least significant bye

(LSB) last. The minimum possible Message Length is 10 (Header only). The maximum possible Message Length is implementation-specific.

A.1.3.3 Header Format

The Message Header is a ten-byte filed. The bytes in the header are numbered from byte 0 (first byte transmitted) to byte 9 (last byte transmitted). The format of the Message Header is as follows:

Bytes	Description
0-1	Session ID (Device ID)
2	Header Byte 2
3	Header Byte 3
4	P Type
5	S Type
6-9	System Bytes

A.1.3.3.1 Session ID

Session ID is a 16-bit unsigned integer value, which occupies bytes 0 and 1 of the header (byte 0 is MSB, 1 is LSB). Its purpose is to provide an association by reference between control messages (particularly Select and Deselect) and subsequent data messages. It is the role of HSMS subsidiary standards to specify this association further.

A.1.3.3.2 Header Byte 2

This header byte is used in different ways for different HSMS messages. For Control Message (see S Type, below) it contains zero or a status code. For a Data Message whose P Type =0, it contains the W-Bit and SECS Stream. The Header Byte 2 is formatted as shown below.

7	6 ... 0
W-Bit	Stream

The most significant bit (bit 7) of Header Byte 2 is the W-Bit. In a Primary Message, the W-Bit indicates whether the Primary Message expects a Reply message. A Primary Message which expects a Reply should set the W-Bit to 1. A Primary Message which does not expect a Reply Message which does not expect a Reply should set the W-Bit to 0. A Reply Message should always set the W-Bit to 0. The low-order 7 bits (bits 6-0) of Header Byte 2 contain the SECS Stream for the message.

A.1.3.3.3 Header Byte 3

This header byte is used in different ways for different HSMS messages. For Control Messages, it contains zero or a status code. For a Data Message whose P Type=0, it contains the SECS Function.

A.1.3.3.4 P Type (Presentation Type)

P Type is an 8-bit unsigned integer value that occupies byte 4 of the header. P Type is intended as an enumerated type defining the presentation layer message type: how the Message Header and

Message Text are encoded. Only P Type=0 is defined HSMS to mean SECS-II message encoding. The data list of P Type as below:

Value	Description
0	SECS-II Encoding
1-127	Reserved for subsidiary standards
128-255	Reserved, not used

A.1.3.3.5 S Type (Session Type)

S Type is an one-byte unsigned integer value that occupies header byte 5. S Type is an enumerated type identifying whether this message is an HSMS Data Message (Value=0) or one of the HSMS Control Message (other). The data list of S Type as below:

Value	Description
0	Data Message
1	Select.req
2	Select.rsp
3	Deslect.req
4	Deselect.rsp
5	Linktest.req
6	Linktest.rsp
7	Reject.req
8	(Not used)
9	Separate.req
10	(Not used)
11-127	Reserved for subsidiary standards
128-255	Reserved, not used

A.1.3.3.6 System Bytes

System Bytes is a four-byte field occupying header bytes 6-9. System Bytes is used to identify a transaction uniquely among the set of open transactions.

A.1.3.4 HSMS Message Format By Type

	Message Header						
Message Type	Bytes 0-1	Byte 2	Byte 3	Byte 4 P Type	Byte 5 S type	Byte 6-9 System Bytes	Message Text
Data Message	*	W-bit and SECS Stream	SECS Function	0	0	Primary: Unique Reply: Same as primary	Text

An HSMS message with SType=0 is used by the HSMS Data procedure to send a Data message,

either Primary or Reply.

A.1.3.5 HSMS Message Exchange Procedure

The HSMS message connection is established through an exchange of Control Message (see above SType list).

A.1.3.5.1 Communication Establishment Procedure

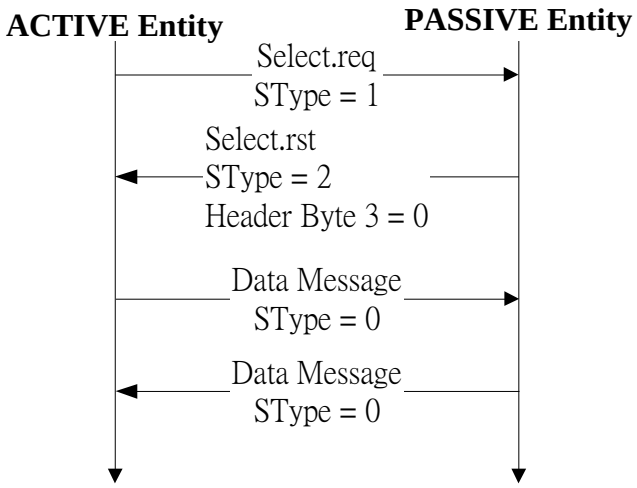
A HSMS message with SType 1 is a “Select Request” Control Message, which is used by initiator of the procedure for establishing HSMS communications. The message of format is as follows:

Message Length	Header Byte 2	Header Byte 3	P Type	S type
10 (Header Only)	0	0	0	1

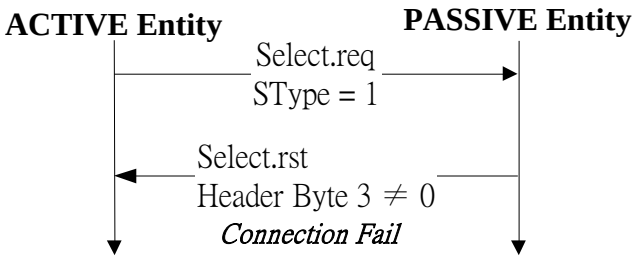
A HSMS message with S Type 2 is a “Select Response” Control Message, used as the response to a Select.req Control Message in the procedure for establishing HSMS communications. The message is as follows:

Message Length	Header Byte 2	Header Byte 3	PType	Stype
10 (Header Only)	0	0 ➔ Success others ➔ Failure	0	2

For Header byte 3 (Select Status), A code of zero indicates success of Select operation. A non-zero code indicates failure. The scenario of normal communication establishment as follows:



If the Header byte 3 (Select Status) is a non-zero code, the communication would be fail as follows:


ACTIVE Entity
PASSIVE Entity
Select.req
SType = 1
Select.rst
Header Byte 3 ≠ 0
Connection Fail

A.2 SECS II Function List

About SECS II function, The following is our SECS function.

Message	Description	Direction
S1F1	Are You There Request	H↔E
S1F2	Online Data	H↔E
S1F5	Formatted Equipment Status Request	H→E
S1F6	Formatted Equipment Status Data	H←E
S2F17	Date and Time Request	H←E
S2F18	Date and Time Data	H→E
S2F25	Loopback Diagnostic Request	H↔E
S2F26	Loopback Diagnostic Data	H↔E
S5F1	Alarm Report Send	H←E
S5F2	Alarm Report Acknowledge	H→E
S6F11	Event Report Send	H←E
S6F12	Event Report Acknowledge	H→E
S6F103	Discrete Variable Data Send	H←E
S6F104	Discrete Variable Data Acknowledge	H→E
S7F19	Current EPPD Request	H→E
S7F20	Current EPPD Data	H←E
S7F25	Formatted Process Program Request	H→E
S7F26	Formatted Process Program Data	H←E
S7F161	Cassette Information Download	H→E
S7F162	Cassette Information Download Acknowledge	H←E
S9F1	Unrecognized Device ID	H←E
S9F3	Unrecognized Stream Type	H←E
S9F5	Unrecognized Function Type	H←E
S9F7	Illegal Data	H←E
S9F9	Transaction Timer Timeout	H←E
S9F11	Data Too Long	H←E

A.3 Message Format

Stream	Function	Function Name	Wait Bit	Direction
1	1	Are You There Request	1	H←→E

Description:

Establishes the communication between host and equipment if the equipment is staying at Offline mode. Once the function 2 reply from host is received, the equipment will continue the Online scenario. After the communication has been established, host can initial this function to equipment to serve a heartbeat function in order to test the equipment communication. A function 0 response to this message means the communication is inoperative or offline. Also from equipment's view point, a function 0 is equivalent to a timeout on the receive timer after issuing S1F1 to the host.

Definition:

None

Structure:

Header only

Stream	Function	Function Name	Wait Bit	Direction
1	2	On Line Data	0	H←→E

Description:

Data signifying that the equipment is alive.

Definition:

The host sends a zero-length list to the equipment.

Structure:

L, 0

Stream	Function	Function Name	Wait Bit	Direction
1	5	Formatted Status Request	1	H→E

Description:

A request for the equipment to report the status according to a pre-defined fixed format. The Host may send this message to the Equipment at any time.

Definition:

<INLINEID> [ASCII 8 byte] Inline ID
<SFCD> [ASCII 1 byte] Status form code
0 = Equipment status inquiry
1 = Daily check data inquiry

Structure:

L,2
1. <A [8] INLINEID>
2. <A [1] SFCD>

Stream	Function	Function Name	Wait Bit	Direction
1	6	Formatted Status Data	0	H←E

Description:

The equipment reports the value of status variables according to the SFCD.

Definition:

<SFCD> [ASCII 1 byte] Status from code
0 = Equipment status reply
1 = Daily check data reply
<INLINEID> [ASCII 8 byte] Inline ID
<EQST> [ASCII 4 byte] Equipment status
IDLE
RUN
DOWN
<PORTID> [ASCII 2 bytes] Port ID
<PORTTYPE> [ASCII 1 bytes] Port Type
B = Loader/Unloader
L = Loader
U = Unloader
F = Buffer
<PORTST> [ASCII 4 byte] Port status
LDRQ = Load Request
LDCM = Load Complete
UDRQ = UnLoad Request
UDCM = Unload Complete
USEM = Useable and empty (After Un-useable and recovery)
USNE = Useable and not empty (After Un-useable and recovery)
UNUS = Unuseable
<CSTID> [ASCII 8 bytes] Cassette ID
<LOTID> [ASCII 12 bytes] Lot ID
<SLOTPPID> [ASCII 16 bytes] Slot ID. Glass have to process, the SLOTPPID will be actually used recipe. If glass do no need process, report space
<LOTST> [ASCII 4 byte] Lot status /* If lot id not exist, LOTST is space. */
WAST = Wait for Recipe/Start (Before start command download or push)
WAIT = Wait for Processing
PROC = Processing
PREN = Process End
ABOT = Abort End
ABND = Abnormal End
CAEN = Cancel End
<RETICLESL> [ASCII 2 bytes] Reticle slot number
<RETICLEID> [ASCII 16 bytes] Reticle ID /* If reticle slot is empty, reticle id is space. */
<RETICLEST> [ASCII 1 bytes] Reticle Status /* If reticle slot is empty, reticle status is space. */
R = In Use
P = Prepare.
M = Mask is transferred back into reticle cassette. It could be by operator or by equipment other's reticle stage.
U = Mask is taken off reticle cassette by operator.
<CHAMBERID> [ASCII 2 bytes] Chamber ID.
<CHAMBERST> [ASCII 4 byte] Chamber status
IDLE
RUN
DOWN
<DCNAME> [ASCII 16 bytes] Daily check parameter name. The name can not contain'%', '/', '\', ':', '"', '', '$', '!', '*', '~', '(', ')' , '#' character.
<DVTYPE> [ASCII 4 bytes] Data Collection Item Type, the naming of item type will be defined by INX engineer, which decide to use what kind of type for each data item.
The name of item type will include "**MAX ", "MIN ", "AVG ", "RNG ", "SDV ", "SDV3", "U1 ","U2 ", "X ","0001","0002",…"9999","EDC "** .
<DCVALUE> [ASCII 16 bytes] Daily check parameter value. The value can not contain'%', '/', '\', ':', '"', '', '$', '!', '*', '~', '(', ')' , '#' character.

The field of item data should be arranged from left to right side.

1. Numeric Type
   Format: [sign] [digits] [.digits] [{ **E** }[sign]digits]
   For example: "-1234.78E+01", "23.5E-02 ", "0.23 ".
2. String Type
   For example: "OK ".
   If there is no value of item, which should be presented by "999999999999.999".

<CURDT> [ASCII 14] Current Date Time, <YYYYMMDDHHMMSS>
<SLOT INFO>

LOTST	SLOTINFO	PPID/SLOTPPID
WAST	1. Before host download S7F65, copy from S1F73 Slot Info. 2. After host download S7F65, copy from S7F65 WORKINFO.	The recipe will be used on this lot
WAIT	Copy from S7F65 WORKINFO (Control mode) or operator setting (Monitor mode).	The recipe will be used on this lot
PROC	Copy from S7F65 WORKINFO (Control mode) or operator setting (Monitor mode).	The recipe will be using on this lot
PREN	Actual status. Processed or not.	The recipe had be used on this lot
ABOT	Actual status. Processed or not.	The recipe had be used on this lot
ABND	Actual status. Processed or not.	The recipe had be used on this lot
CAEN	1. Before host download S7F65, copy from S1F73 Slot Info. 2. After host download S7F65, copy from S7F65 WORKINFO (Control mode) or operator setting after "Start" command (Monitor mode).	The recipe had be used on this lot

<EQUIPMENTID> [ASCII 8 bytes] Equipment ID
<EQMODE> [ASCII 1 byte] Equipment mode
0 = Local mode
1 = Remote mode
<PID> [ASCII 16 bytes] Recipe ID
<PORT_PURPOSE> [ASCII 1 byte] Port Purpose, fix to space

Structure:

[SFCD =0] Equipment status reply

L, 3
1. <A [1] SFCD>
2. <A [8] INLINEID>
3. L, n /n: Each equipment on inline n :max 32
   1. L, 7
      1. <A [8] EQUIPMENTID_1>
      2. <A [4] EQST>
      3. <A [1] EQMODE>
      4. <A [1] MODE>
      5. <A [16] PID>
      6. <A [16] RECIPEID>
      7. L, m :m: max 99
         1. L, 2
            1. <A [8] UNITID_1>
            2. <A [4] UNITST_1>

         …

         m. L, 2
            1. <A [8] UNITID_m>
            2. <A [4] UNITST_m>

   …

   n. L, 7
      1. <A [8] EQUIPMENTID_n>
      2. <A [4] EQST>
      3. <A [1] EQMODE>
      4. <A [1] MODE>
      5.. <A [16] PID>
      6. <A [16] RECIPEID>
      7. L, m :m: max 99

1. L, 2
    1. <A [8] UNITID_1>
    2. <A [4] UNITST_1>

…

m. L, 2
    1. <A [8] UNITID_m>
    2. <A [4] UNITST_m>

[SFCD=1] Daily check data reply

L, 4
1. <A [1] SFCD>
2. <A [8] INLINEID>
3. <A [14] CURDT>
4. L, m /m : max 32
    1. L, 4
        1. <A [8] EQUIPMENTID_1>
        2. <A [4] EQST>
        3. L, k (k is number of daily check parameter item of main EQP. If equipment does not support this function, k = 0)
            1. L, 3
                1. <A [16] DCNAME_1>
                2. < A [4] DVTYPE_1>
                3. <A [16] DCVALUE_1>

            …….

            k. L, 3
                1. <A [16] DCNAME_k>
                2. <A [4] DVTYPE_k>
                3. <A [16] DCVALUE_k>
        4. L, n (n is fixed number of chamber) /* If no chamber, reports L,0 */
            1. L, 3
                1. <A [8] CHAMBERID_1>
                2. <A [4] CHAMBERST_1>
                3. L, m1 (m1 is number of daily check parameter items of chamber 1)
                    1. L,3
                        1. <A [16] DCNAME_1>
                        2. <A [4] DVTYPE_1>
                        3. <A [16] DCVALUE_1>

                    …….

                    m1. L3
                        1. <A [16] DCNAME_m1>
                        2. <A [4] DVTYPE_m1>
                        3. <A [16] DCVALUE_m1>

            …….

            n. L, 3
                1. <A [8] CHAMBERID_n>
                2. <A [4] CHAMBERST_n>
                3. L, mn (mn is number of daily check parameter items of chamber n)
                    1. L,3
                        1. <A [16] DCNAME_1>
                        2. <A [4] DVTYPE_1>
                        3. <A [16] DCVALUE_1>

                    …….

                    mn. L3
                        1. <A [16] DCNAME_mn>
                        2. <A [4] DVTYPE_mn>
                        3. <A [16] DCVALUE_mn>
    ….

m. L, 4
1. <A [8] EQUIPMENTID_m>
2. <A [4] EQST>
3. L, k (k is number of daily check parameter item of main EQP. If equipment does not support this function, k = 0)
1. L, 3
1. <A [16] DCNAME_1>
2. < A [4] DVTYPE_1>
3. <A [16] DCVALUE_1>
…….
k. L, 3
1. <A [16] DCNAME_k>
2. <A [4] DVTYPE_k>
3. <A [16] DCVALUE_k>
4. L, n (n is fixed number of chamber) /* If no chamber, reports L,0 */
1. L, 3
1. <A [8] CHAMBERID_1>
2. <A [4] CHAMBERST_1>
3. L, m1 (m1 is number of daily check parameter items of chamber 1)
1. L,3
1. <A [16] DCNAME_1>
2. <A [4] DVTYPE_1>
3. <A [16] DCVALUE_1>
…….
m1. L3
1. <A [16] DCNAME_m1>
2. <A [4] DVTYPE_m1>
3. <A [16] DCVALUE_m1>
…….
n. L, 3
1. <A [8] CHAMBERID_n>
2. <A [4] CHAMBERST_n>
3. L, mn (mn is number of daily check parameter items of chamber n)
1. L,3
1. <A [16] DCNAME_1>
2. <A [4] DVTYPE_1>
3. <A [16] DCVALUE_1>
…….
mn. L3
1. <A [16] DCNAME_mn>
2. <A [4] DVTYPE_mn>
3. <A [16] DCVALUE_mn>

Stream	Function	Function Name	Wait Bit	Direction
2	17	Date and Time Request	1	H←E

Description:
Useful to check equipment time base or for equipment to synchronize with the host time base.
Host may send this message at any time to determine the date and time.

Definition:

<INLINEID> [ASCII 8 byte] Inline ID

Structure:
L,1
1. <A [8] INLINEID>

Stream	Function	Function Name	Wait Bit	Direction

2	18	Date and Time Data	0	H→E

Description:
Actual time data.
Definition:
<INLINEID> [ASCII 8 byte] Inline ID
<TIME> [ASCII 14 bytes] YYYYMMDDhhmmss

Structure:
L,2
1. <A [8] INLINEID>
2. <A [14] TIME>

Stream	Function	Function Name	Wait Bit	Direction
2	25	Loopback Diagnostic Request	1	H←→E

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

Definition:

<ABS> [ASCII 10 byte] Any ASCII String

Structure:
<A [10] ABS>

Stream	Function	Function Name	Wait Bit	Direction
2	26	Loopback Diagnostic Data	0	H←→E

Description:
The echoed ASCII string
Definition:
<ABS> [ASCII 10 byte] Any ASCII string (Copy from S2F25's ABS)

Structure:
<A [10] ABS>

Stream	Function	Function Name	Wait Bit	Direction
5	1	Alarm Report Send	1	H←E

Description:
This message reports a change or presence of an alarm condition under Offline or Online mode. One message will be issued when the alarm is set and one message will be issued when the alarm is cleared. Irrecoverable errors and attention flags may not have a corresponding clear message.

Definition:

<INLINEID> [ASCII 8 bytes] INLINE ID
<EQUIPMENTID> [ASCII 8 bytes] EQUIPMENT ID
<UNITID> [ASCII 8 bytes] Unit of EQUIPMENT ID
<ALCD> [ASCII 2 bytes] Alarm category
00 = not used
01 = Personal safety
02 = Equipment safety
03 = Parameter control warning
04 = Parameter control error
05 = Irrecoverable error
06 = Equipment status warning
07 = Attention flags
08 = Data integrity
>08 = other categories
09-63 reserved
<EVENTFLAG> [ASCII 1 bytes] ALARM /WARNING event
O = occur
S = solved

<ALARMTYPE> [ASCII 1 bytes] ALARM /WARNING Type
A = ALARM
W = WARNING
<ALARMCODE> [ASCII 4 bytes] ALARM /WARNING code
<ALARMTEXT> [ASCII 80 bytes] ALARM /WARNING Text
<GLASSID> [ASCII 12 bytes] GLASS ID. The glass is affected by this alarm.
One or more glasses is affected by this alarm.
No glass is affected by this alarm: space.

Structure:

L, 9

1. <A [8] INLINEID>
2. <A [8] EQUIPMENTID>
3. <A [8] UNITID>
4. <A [2] ALCD>
5. <A [1] EVENTFLAG>
6. <A [1] ALARMTYPE>
7. <A [4] ALARMCODE>
8. <A [80] ALARMTEXT>
9. L, n

/* n is dynamic, means that there are n glasses in this chamber when chamber status change to DOWN. */
/* For RUN and IDLE, it will be L,0 */

1. <A [12] GLASSID_1>
2. <A [12] GLASSID_2>

:
:

n. <A[12] GLASSID_n>

Stream	Function	Function Name	Wait Bit	Direction
5	2	Alarm Report acknowledge	0	E←H

Description:

Reply, Alarm Report acknowledge

Definition:

<ACKC> [ASCII 1 byte] Acknowledge code
0 = accepted
Other = error, not accepted
<ACKCTXT> [ASCII 80byte] Acknowledge TEXT

Structure:

L, 2

1. <A [1] ACKC>
2. <A [80] ACKCTXT>

Stream	Function	Function Name	Wait Bit	Direction
6	11	Event Report send	1	H←E

Description:

This function shall send information to the Host according to the enabled event on the configuration screen. Anytime if equipment happens control mode and transfer mode change, equipment must report this message.

Definition:

<CEID> [unsigned integer 1 byte] Collect ID
1 = Control state change /* Used for online →offline and monitor←→control*/
2 = Equipment status change
<CTRSTMD> [ASCII 1 byte] Control state mode
0 = Offline
1 = Online Monitor
2 = Online Control
<EQST> [ASCII 4 byte] Equipment status

IDLE
RUN
DOWN

<VCRST> [ASCII 1 byte] Veri code status
G = O.K
D = Down

<REASON> [ASCII 1 byte] Equipment Status Down Reason.
Space: RUN and IDLE, it will be space.
1 = Equipment self problem.
2 = L/UL causes the equipment to DOWN. Ex: can not take glass.
3 = CIM requests. Ex: All ports are occupied by cassette.
4 = Other.

<ALID> [ASCII 8 bytes] Alarm ID

<ALTX> [ASCII 80 bytes] Equipment Down Alarm Text. When RUN and IDLE, it will be space, only reports at DOWN.

<GLASSID> [ASCII 12 bytes] GLASS ID

<INLINEID> [ASCII 8 byte] Inline ID

<EQUIPMENTID>[ASCII 8 bytes] Equipment ID

Structure:

[CEID=1] **/* CEID =1,** Control state change */

L, 2
1. <A [1] CEID>
2. L, 3
    1. <A [8] INLINEID>
    2. <A [1] CTRSTMD>
    3. <A [4] EQST>

[CEID=2] **/* CEID = 2,** Equipment status change */

L, 2
1. <A [1] CEID>
2. L, 8
    1. <A [8] INLINEID>
    2. <A [8] EQUIPMENTID>
    3. <A [4] EQST>
    4. <A [1] VCRST> /* VCRST is always space, if there is no veri-code reader on the equipment.*/
    5. <A [1] REASON> /* Space: For RUN or IDLE, it will be space */
    6. <A [8] ALID> /* Space: it will be space except Down */
    7. <A [80] ALTX> /* Space: it will be space except Down */
    8. L,n /* n is dynamic, means that there are n glasses in this equipment when equipment status change to Down */
        /* For RUN and IDLE, it will be L,0 */
        1. <A [12] GLASSID_1>
        2. <A [12] GLASSID_2>
        ….
        n. <A [12] GLASSID_n>

Stream	Function	Function Name	Wait Bit	Direction
6	12	Event Report Acknowledge	0	H→E

Description :

Acknowledge or error.

Definition :

<ACKC> [ASCII 1 byte] Acknowledge code
0 = accepted
Other = error, not accepted

<ACKCTXT> [ASCII 80byte] Acknowledge TEXT

Structure :

L, 3

1. <A [1] CEID>
2. <A [1] ACKC>
3. <A [80] ACKCTXT>

Stream	Function	Function Name	Wait Bit	Direction
6	103	Discrete Variable Data Send	1	H←E

Description: Any data report which is initiated by an event, such as the completion of a measurement, rather than passage of time is called a discrete variable. Reports requiring only one block of data may report directly to the host with this message.

Definition:

<CEID> [Unsigned integer 1 byte] Collect ID
1= Process data report by glass
<SUBCD> [Unsigned integer 1 byte] Sub Code
0 = Basic data
1 = First step process data
2 = Second step process data
……
99 = Final step process data
<LOTID> [ASCII 12 bytes] LOT ID
<CASET ID> [ASCII 8 bytes] Cassette ID
<GLASSID> [ASCII 12 bytes] GLASS ID
<SLOTID> [ASCII 3 bytes] Slot ID
<PORTID> [ASCII 2 bytes] Port ID
<CHAMBERID> [ASCII 2 bytes] Chamber ID
<LOT START TIME > [ASCII 14 bytes] The initial timer when this lot is processed ;<yyyymmddhhmmss>
<LOT END TIME> [ASCII 14 bytes] The timer when this lot was finished ;<yyyymmddhhmmss>. Lot end time means the last glass return to cassette, not process end time.
<LOT PROCESS TIME> [ASCII 6 byes] How long was this lot processed ;<hhmmss>
<LOTPROCST> [ASCII 1 bytes] Lot process status
1 = Normal end
2 = Abort End
3 = Abnormal End
<GLASS_RECIPEID> [ASCII 16 bytes] This glass is processed by this Recipe ID
<GPRSTARTTIME> [ASCII 14 bytes] Glass process start time. The time means the glass leave cassette time.
<GPRENTIME> [ASCII 14 bytes] Glass process end time. The time means the glass return to cassette time.
<DVNAME> [ASCII 16 bytes] Data Collection Item Name. The name can not contain'%', '/', '\', ':', '"', '"', '$', '!', '*', '~', '(', ')' , '#' character.
<DVTYPE> [ASCII 4 bytes] Data Collection Item Type, the naming of item type will be defined by INX engineer, which decide to use what kind of type for each data item.
The name of item type will include "**MAX ", "MIN ", "AVG ", "RNG ", "SDV ", "SDV3", "U1 ","U2 ", "X ","0001","0002",…"9999","EDC "** .
<DVVAL> [ASCII 16 bytes] Data Collection Item Value. The value can not contain'%', '/', '\', ':', '"', '"', '$', '!', '*', '~', '(', ')' , '#' character.
The field of item data should be arranged from left to right side.
1. Numeric Type
Format: [sign] [digits] [.digits] [{ **E** }[sign]digits]
For example: "-1234.78E+01", "23.5E-02 ", "0.23 ".
2. String Type
For example: "OK ".
If there is no value of item, which should be presented by "999999999999.999".

<MES_LINK_KEY> [ASCII 4 bytes] MES link key copy from S7F65. If blank in S7F65, report as "****".
<ULFLAG> [ASCII 1 byte] Upload flag
This item will included "Y" or "N". User can define this flag for each item from equipment console or INI file.
<LOTCATEGORY> [ASCII 1 bytes] Lot category. Copy from S7F65.
P = Product lot.
E = Engineer Lot.
<PRODCATEGORY> [ASCII 4 bytes] Product category.
<REWORK_COUNT> [ASCII 4 bytes] Rework count.
The information for measurement equipment writes to file server
<EQID> [ASCII 8 byte] EQ ID

1) Process data report by glass with Basic data : CEID=1, SUBCD=0

2) Process data report by glass with First step process data : CEID=1, SUBCD=1
3) Process data report by glass with Second step process data : CEID=1, SUBCD=2
4) Process data report by glass with n step process data : CEID=1, SUBCD=n
5) Process data report by glass with Final step process data : CEID=1, SUBCD=99

6) Process data report by lot with Basic data : CEID=2, SUBCD=0
7) Process data report by lot with First step process data : CEID=2, SUBCD=1
8) Process data report by lot with Second step process data : CEID=2, SUBCD=2
9) Process data report by lot with n step process data : CEID=2, SUBCD=n
10) Process data report by lot with Final step process data : CEID=2, SUBCD=99
PS: If equipment has only less than 200 items process data by lot or glass, it should report s6f103 (ceid=1 subcd=99)

<INLINEID> [ASCII 8 bytes] INLINE ID
<EQUIPMENTID>[ASCII 8 bytes] EQUIPMENT ID
<UNITID> [ASCII 8 bytes] Unit of EQUIPMENT ID
<PRODUCTID> [ASCII 16 bytes] PRODUCT ID
<RECIPEID> [ASCII 16 bytes] EQ current Recipe ID
<ROUTEID> [ASCII 8 bytes] Route ID
<OWNERID> [ASCII 8 bytes] Owner ID
<OPERATIONID> [ASCII 4 bytes] Operation ID
<CASSETTEID> [ASCII 8 bytes] Cassette ID
<OPERATOR> [ASCII 16 bytes] Cassette ID
<CLMDATE> [ASCII 10 bytes] Report Date yyyy/mm/dd, example: “2017/01/01”
<CLMTIME> [ASCII 8 bytes] Report Date Hh:Mm:Ss, example: “13:02:03”
<PROCESS_TIME> [ASCII 8 byes] How long was this lot processed ;<hh:mm:ss>
<SPEC_FLAG> [ASCII 1 byes]
Y = EDC ITEM need report to SPC
N = EDC ITEM doesn’t need report to SPC

Structure:

1) Process data report by glass with First step process data : CEID=1, SUBCD=1

L, 5
1. <A [1] CEID>
2. <A [2] SUBCD>
3. <A [8] INLINEID>
4. <A [8] EQUIPMENTID>
5. L, 20
    1. L, 2
        <A [6] UNITID> //DVNAME
        <A [8] UNITID> //DVVAL
    2. L, 2
        <A [7] GLASSID> //DVNAME
        <A [12] GLASSID> // DVVAL
    3. L, 2
        <A [5] LOTID> //DVNAME
        <A [12] LOTID> //DVVAL
    4. L, 2
        <A [9] PRODUCTID> //DVNAME
        <A [16] PRODUCTID > //DVVAL
    5. L, 2
        <A [8] RECIPEID> //DVNAME
        <A [16] RECIPEID> //DVVAL
    6. L, 2
        <A [7] ROUTEID> //DVNAME
        <A [8] ROUTEID> //DVVAL
    7. L, 2
        <A [7] OWNERID> //DVNAME
        <A [8] OWNER> //DVVAL
    8. L, 2

<A [11] OPERATIONID> //DVNAME
<A [4] OPERATIONID > //DVVAL
9. L, 2
<A [10] CASSETTEID> //DVNAME
<A [8] CASSETTEID > //DVVAL
10. L, 2
<A [8] OPERATOR> //DVNAME
<A [16] OPERATOR > //DVVAL
11. L, 2
<A [7] CLMDATE> //DVNAME
<A [10] CLMDATE > //DVVAL
12. L, 2
<A [7] CLMTIME> //DVNAME
<A [8] CLMTIME > //DVVAL
13. L, 2
<A [8] RESERVE1>
<A [30] RESERVE1>
14. L, 2
<A [8] RESERVE2>
<A [30] RESERVE2>
15. L, 2
<A [8] RESERVE3>
<A [30] RESERVE3>
16. L, 2
<A [8] RESERVE4>
<A [30] RESERVE4>
17. L, 2
<A [8] RESERVE5>
<A [30] RESERVE5>
18. L, 2
<A [8] RESERVE6>
<A [30] RESERVE6>
19. L, 2
<A [8] RESERVE7>
<A [30] RESERVE7>
20. L, n (n = data count of First step process. max : 600)
1. L, 4
<A [16] DVNAME 1> //DVNAME
<A [4] DVTYPE 1> //DVTYPE /* This value of item will be defined by INX engineer.
<A [12] DVVAL 1> //DVVAL
<A [1] SPC_FLAG 1> //Report To SPC Flag
2. L, 4
<A [16] DVNAME 2> //DVNAME
<A [4] DVTYPE 2> //DVTYPE /* This value of item will be defined by INX engineer.
<A [12] DVVAL 2> //DVVAL
<A [1] SPC_FLAG2> //Report To SPC Flag
……
n. L, 4
<A [16] DVNAME n> //DVNAME
<A [4] DVTYPE n> //DVTYPE /* This value of item will be defined by INX engineer.
<A [12] DVVAL n> //DVVAL
<A [1] SPC_FLAGn> //Report To SPC Flag

2) Process data report by glass with Second step process data : CEID=1, SUBCD=2

L, 5
1. <A [1] CEID>
2. <A [2] SUBCD>

3. <A [8] INLINEID>
4. <A [8] EQUIPMENTID>
5. L, 20
    1. L, 2
        <A [6] UNITID> //DVNAME
        <A [8] UNITID> //DVVAL
    2. L, 2
        <A [7] GLASSID> //DVNAME
        <A [12] GLASSID> // DVVAL
    3. L, 2
        <A [5] LOTID> //DVNAME
        <A [12] LOTID> //DVVAL
    4. L, 2
        <A [9] PRODUCTID> //DVNAME
        <A [16] PRODUCTID > //DVVAL
    5. L, 2
        <A [8] RECIPEID> //DVNAME
        <A [16] RECIPEID> //DVVAL
    6. L, 2
        <A [7] ROUTEID> //DVNAME
        <A [8] ROUTEID> //DVVAL
    7. L, 2
        <A [7] OWNERID> //DVNAME
        <A [8] OWNER> //DVVAL
    8. L, 2
        <A [11] OPERATIONID> //DVNAME
        <A [4] OPERATIONID > //DVVAL
    9. L, 2
        <A [10] CASSETTEID> //DVNAME
        <A [8] CASSETTEID > //DVVAL
    10. L, 2
        <A [8] OPERATOR> //DVNAME
        <A [16] OPERATOR > //DVVAL
    11. L, 2
        <A [7] CLMDATE> //DVNAME
        <A [10] CLMDATE > //DVVAL
    12. L, 2
        <A [7] CLMTIME> //DVNAME
        <A [8] CLMTIME > //DVVAL
    13. L, 2
        <A [8] RESERVE1>
        <A [30] RESERVE1>
    14. L, 2
        <A [8] RESERVE2>
        <A [30] RESERVE2>
    15. L, 2
        <A [8] RESERVE3>
        <A [30] RESERVE3>
    16. L, 2
        <A [8] RESERVE4>
        <A [30] RESERVE4>
    17. L, 2
        <A [8] RESERVE5>
        <A [30] RESERVE5>
    18. L, 2
        <A [8] RESERVE6>
        <A [30] RESERVE6>

19. L, 2
    <A [8] RESERVE7>
    <A [30] RESERVE7>
20. L, n (n = data count of First step process. max : 600)
    L, 4
        <A [16] DVNAME 1> //DVNAME
        <A [4] DVTYPE 1> //DVTYPE /* This value of item will be defined by INX engineer.
        <A [12] DVVAL 1> //DVVAL
        <A [1] SPC_FLAG 1> //Report To SPC Flag
    L, 4
        <A [16] DVNAME 2> //DVNAME
        <A [4] DVTYPE 2> //DVTYPE /* This value of item will be defined by INX engineer.
        <A [12] DVVAL 2> //DVVAL
        <A [1] SPC_FLAG2> //Report To SPC Flag
        ……
    L, 4
        <A [16] DVNAME n> //DVNAME
        <A [4] DVTYPE n> //DVTYPE /* This value of item will be defined by INX engineer.
        <A [12] DVVAL n> //DVVAL
        <A [1] SPC_FLAGn> //Report To SPC Flag

3) Process data report by glass with n step process data : CEID=1, SUBCD=n

L, 5
1. <A [1] CEID>
2. <A [2] SUBCD>
3. <A [8] INLINEID>
4. <A [8] EQUIPMENTID>
5. L, 20
    1. L, 2
        <A [6] UNITID> //DVNAME
        <A [8] UNITID> //DVVAL
    2. L, 2
        <A [7] GLASSID> //DVNAME
        <A [12] GLASSID> // DVVAL
    3. L, 2
        <A [5] LOTID> //DVNAME
        <A [12] LOTID> //DVVAL
    4. L, 2
        <A [9] PRODUCTID> //DVNAME
        <A [16] PRODUCTID > //DVVAL
    5. L, 2
        <A [8] RECIPEID> //DVNAME
        <A [16] RECIPEID> //DVVAL
    6. L, 2
        <A [7] ROUTEID> //DVNAME
        <A [8] ROUTEID> //DVVAL
    7. L, 2
        <A [7] OWNERID> //DVNAME
        <A [8] OWNER> //DVVAL
    8. L, 2
        <A [11] OPERATIONID> //DVNAME
        <A [4] OPERATIONID > //DVVAL
    9. L, 2
        <A [10] CASSETTEID> //DVNAME
        <A [8] CASSETTEID > //DVVAL
    10. L, 2
        <A [8] OPERATOR> //DVNAME

<A [16] OPERATOR > //DVVAL
11. L, 2
<A [7] CLMDATE> //DVNAME
<A [10] CLMDATE > //DVVAL
12. L, 2
<A [7] CLMTIME> //DVNAME
<A [8] CLMTIME > //DVVAL
13. L, 2
<A [8] RESERVE1>
<A [30] RESERVE1>
14. L, 2
<A [8] RESERVE2>
<A [30] RESERVE2>
15. L, 2
<A [8] RESERVE3>
<A [30] RESERVE3>
16. L, 2
<A [8] RESERVE4>
<A [30] RESERVE4>
17. L, 2
<A [8] RESERVE5>
<A [30] RESERVE5>
18. L, 2
<A [8] RESERVE6>
<A [30] RESERVE6>
19. L, 2
<A [8] RESERVE7>
<A [30] RESERVE7>
20. L, n (n = data count of First step process. max : 600)
L, 4
<A [16] DVNAME 1> //DVNAME
<A [4] DVTYPE 1> //DVTYPE /* This value of item will be defined by INX engineer.
<A [12] DVVAL 1> //DVVAL
<A [1] SPC_FLAG 1> //Report To SPC Flag
L, 4
<A [16] DVNAME 2> //DVNAME
<A [4] DVTYPE 2> //DVTYPE /* This value of item will be defined by INX engineer.
<A [12] DVVAL 2> //DVVAL
<A [1] SPC_FLAG2> //Report To SPC Flag
……
L, 4
<A [16] DVNAME n> //DVNAME
<A [4] DVTYPE n> //DVTYPE /* This value of item will be defined by INX engineer.
<A [12] DVVAL n> //DVVAL
<A [1] SPC_FLAGn> //Report To SPC Flag

4) Process data report by glass with Final step process data : CEID=1, SUBCD=99

L, 5
1. <A [1] CEID>
2. <A [2] SUBCD>
3. <A [8] INLINEID>
4. <A [8] EQUIPMENTID>
5. L, 20
1. L, 2
<A [6] UNITID> //DVNAME
<A [8] UNITID> //DVVAL
2. L, 2

<A [7] GLASSID> //DVNAME
<A [12] GLASSID> // DVVAL
3. L, 2
<A [5] LOTID> //DVNAME
<A [12] LOTID> //DVVAL
4. L, 2
<A [9] PRODUCTID> //DVNAME
<A [16] PRODUCTID > //DVVAL
5. L, 2
<A [8] RECIPEID> //DVNAME
<A [16] RECIPEID> //DVVAL
6. L, 2
<A [7] ROUTEID> //DVNAME
<A [8] ROUTEID> //DVVAL
7. L, 2
<A [7] OWNERID> //DVNAME
<A [8] OWNER> //DVVAL
8. L, 2
<A [11] OPERATIONID> //DVNAME
<A [4] OPERATIONID > //DVVAL
9. L, 2
<A [10] CASSETTEID> //DVNAME
<A [8] CASSETTEID > //DVVAL
10. L, 2
<A [8] OPERATOR> //DVNAME
<A [16] OPERATOR > //DVVAL
11. L, 2
<A [7] CLMDATE> //DVNAME
<A [10] CLMDATE > //DVVAL
12. L, 2
<A [7] CLMTIME> //DVNAME
<A [8] CLMTIME > //DVVAL
13. L, 2
<A [8] RESERVE1>
<A [30] RESERVE1>
14. L, 2
<A [8] RESERVE2>
<A [30] RESERVE2>
15. L, 2
<A [8] RESERVE3>
<A [30] RESERVE3>
16. L, 2
<A [8] RESERVE4>
<A [30] RESERVE4>
17. L, 2
<A [8] RESERVE5>
<A [30] RESERVE5>
18. L, 2
<A [8] RESERVE6>
<A [30] RESERVE6>
19. L, 2
<A [8] RESERVE7>
<A [30] RESERVE7>
20. L, n (n = data count of First step process. max : 600)
L, 4
<A [16] DVNAME 1> //DVNAME
<A [4] DVTYPE 1> //DVTYPE /* This value of item will be defined by INX engineer.

<A [12] DVVAL 1> //DVVAL
<A [1] SPC_FLAG 1> //Report To SPC Flag

L, 4

<A [16] DVNAME 2> //DVNAME
<A [4] DVTYPE 2> //DVTYPE /* This value of item will be defined by INX engineer.
<A [12] DVVAL 2> //DVVAL
<A [1] SPC_FLAG2> //Report To SPC Flag
……

L, 4

<A [16] DVNAME n> //DVNAME
<A [4] DVTYPE n> //DVTYPE /* This value of item will be defined by INX engineer.
<A [12] DVVAL n> //DVVAL
<A [1] SPC_FLAGn> //Report To SPC Flag

Stream	Function	Function Name	Wait Bit	Direction
6	104	Discrete Variable Data Acknowledge	0	H→E

Description:
Acknowledge or error.

Definition:

<ACKC> [ASCII 1 byte] Acknowledge code
"0" = accepted
Other = error, not accepted
<ACKCTXT> [ASCII 80byte] Acknowledge TEXT

Structure:

L, 3

1. <A [1] CEID>
2. <A [1] ACKC>
3. <A [80] ACKCTXT>

Stream	Function	Function Name	Wait Bit	Direction
7	19	Current EPPD Request	1	H→E

Description:
This message is used by the Host at online mode anytime to request Equipment Process Program Directory from equipment storage.

Definition:
None

Structure:
Header only

Stream	Function	Function Name	Wait Bit	Direction
7	20	Current EPPD Data	0	H←E

Description:

This message is used to transmit the current <PPID>

Definition:

<MPPID> [ASCII 16 Bytes] Recipe ID

Structure:

L, 1

1. L,m (m is number of defined process programs in the Production directory)
<A[16] MPPID_1>

:
<A[16] MPPID_m>

Stream	Function	Function Name	Wait Bit	Direction
7	25	Formatted Process Program Request	1	H→E

Description:

This message allows movement of formatted process programs between a piece of equipment and its host system. Also, the recipe timestamp (creation/modification) should be included.

Definition:

<INLINEID> [ASCII 8 byte] Inline ID
<MPPID> [ASCII 16 bytes] Recipe ID

Structure:

L, 2
1. <A [8] INLINEID>
2. <A [16] MPPID>

Stream	Function	Function Name	Wait Bit	Direction
7	26	Formatted Process Program Data	0	H←E

Description:
This message transfers a process program in response to a request for the PPID transaction.

Definition:
<CEID> [ASCII 1 byte] CEID
N = Normal type equipment
M = Multi-chamber equipment
<INLINEID> [ASCII 8 byte] Inline ID
<EQUIPMENTID> [ASCII 8 bytes] Equipment ID
<MPPID> [ASCII 16 bytes] Recipe ID
<MMTIME> [ASCII14 bytes] Recipe modified data and time
<PARAMNAME> [ASCII12 bytes] To represent the recipe parameter names that are useful for host verification. For example, the equipment chamber processing flow sequence information (if applicable), critical parameter details, etc.
<PARAMVALUE> [ASCII12 bytes] To represent the recipe parameter value that are useful for host verification. For example, the equipment chamber processing flow sequence information (if applicable), critical parameter details, etc.
<SubPPID> [ASCII 16 bytes] Sub recipe id for chamber id or sub entity of docking type equipment
<SUBRecipeNo> [ASCII 4 bytes] Recipe id of equipment
<SubMTIME> [ASCII 14 bytes] Sub recipe modified date/time

Structure: For Normal type equipment
[CEID = N]:

L, 3
1. <A [1] CEID>
2. <A [8] INLINEID>
3. L, 3
    1. <A [16] MPPID>
    2. <A [14] MMTIME>
    3. L, n (n = Number of Equipment in inline) max 99
        1. L, 4 (Equipment 1)
            1. <A [8] EQUIPMENTID>
            2. <A [4] SUBRecipeNo>
            3. <A [14] SubMTIME>
            4. L, s (s = number of sub-recipe parameter) s: max 1000
                1. L, 2
                    1. <A [12] PARAMNAME_M1>
                    2. <A [12] PARAMVALUE_M1>
                2. L, 2

1. <A [12] PARAMNAME_M2>
2. <A [12] PARAMVALUE_M2>

……

s. L, 2

1. <A [12] PARAMNAME_Mn>
2. <A [12] PARAMVALUE_Mn>

2. L, 4 (Equipment 2)

1. <A [8] EQUIPMENTID>
2. <A [4] SUBRecipeNo>
3. <A [14] SubMTIME>
4. L, s (s = number of sub-recipe parameter) s: max 1000

1. L, 2

1. <A [12] PARAMNAME_M1>
2. <A [12] PARAMVALUE_M1>

2. L, 2

1. <A [12] PARAMNAME_M2>
2. <A [12] PARAMVALUE_M2>

……

s. L, 2

1. <A [12] PARAMNAME_Mn>
2. <A [12] PARAMVALUE_Mn>

……

n. L, 4 (Equipment n)

1. <A [8] EQUIPMENTID>
2. <A [4] SUBRecipeNo>
3. <A [14] SubMTIME>
4. L, s (s = number of sub-recipe parameter) s: max 1000

1. L, 2

1. <A [12] PARAMNAME_M1>
2. <A [12] PARAMVALUE_M1>

2. L, 2

1. <A [12] PARAMNAME_M2>
2. <A [12] PARAMVALUE_M2>

……

s. L, 2

1. <A [12] PARAMNAME_Mn>
2. <A [12] PARAMVALUE_Mn>

Exception: A zero length list indicates the request was denied (the recipe is not existed or not support this function)
L, 0

Stream	Function	Function Name	Wait Bit	Direction
7	161	Cassette Information Download	1	H→E

Description: This message send all the glass information to equipment
.

Definition:

<LOTID> [ASCII 12 bytes] LOT ID
<CASET ID> [ASCII 8 bytes] Cassette ID
<GLASSID> [ASCII 12 bytes] GLASS ID
<SLOTID> [ASCII 3 bytes] Slot ID
<PORTID> [ASCII 2 bytes] Port ID
<SLOTPPID> [ASCII 16 bytes] Slot PPID
<GLASS_RECIPEID> [ASCII 16 bytes] This glass is processed by this Recipe ID
<MES_LINK_KEY> [ASCII 4 bytes] MES link key copy from S7F65. If blank in S7F65, report as "****".
<LOTCATEGORY> [ASCII 1 bytes] Lot category. Copy from S7F65.
P : Product lot.
E : Engineer Lot.

<PRODCATEGORY> [ASCII 4 bytes] Product category.
<REWORK_COUNT> [ASCII 4 bytes] Rework count. The information for measurement equipment writes to file server
<COMMAND> [ASCII 1 bytes] Command for equipment action
1 = Start to collect data
2 = Stop to collect data
3 = Reply now

Structure

L, 4
1. <A [8] INLINEID>
2. <A [8] EQUIPMENTID>
3. <A [1] COMMAND>
4. L, 19
    1. L, 2
        <A [6] UNITID> //DVNAME
        <A [8] UNITID> //DVVAL
    2. L, 2
        <A [7] GLASSID> //DVNAME
        <A [12] GLASSID> // DVVAL
    3. L, 2
        <A [5] LOTID> //DVNAME
        <A [12] LOTID> //DVVAL
    4. L, 2
        <A [9] PRODUCTID> //DVNAME
        <A [16] PRODUCTID > //DVVAL
    5. L, 2
        <A [8] RECIPEID> //DVNAME
        <A [16] RECIPEID> //DVVAL
    6. L, 2
        <A [7] ROUTEID> //DVNAME
        <A [8] ROUTEID> //DVVAL
    7. L, 2
        <A [7] OWNERID> //DVNAME
        <A [8] OWNER> //DVVAL
    8. L, 2
        <A [11] OPERATIONID> //DVNAME
        <A [4] OPERATIONID > //DVVAL
    9. L, 2
        <A [10] CASSETTEID> //DVNAME
        <A [8] CASSETTEID > //DVVAL
    10. L, 2
        <A [8] OPERATOR> //DVNAME
        <A [16] OPERATOR > //DVVAL
    11. L, 2
        <A [7] CLMDATE> //DVNAME
        <A [10] CLMDATE > //DVVAL
    12. L, 2
        <A [7] CLMTIME> //DVNAME
        <A [8] CLMTIME > //DVVAL
    13. L, 2
        1. <A [8] RESERVE1>
        2. <A [30] RESERVE1>
    14. L, 2
        1. <A [8] RESERVE2>
        2. <A [30] RESERVE2>
    15. L, 2
        1. <A [8] RESERVE3>
        2. <A [30] RESERVE3>

16. L, 2
    1. <A [8] RESERVE4>
    2. <A [30] RESERVE4>
17. L, 2
    1. <A [8] RESERVE5>
    2. <A [30] RESERVE5>
18. L, 2
    1. <A [8] RESERVE6>
    2. <A [30] RESERVE6>
19. L, 2
    1. <A [8] RESERVE7>
    2. <A [30] RESERVE7>

Stream	Function	Function Name	Wait Bit	Direction
7	162	Cassette Information Download Acknowledge	0	H←E

Description:
Acknowledge or error.

Definition:
<ACKC> [ASCII 1 byte] Acknowledge code
0 = accepted
Other = error, not accepted
<ACKCTXT> [ASCII 80byte] Acknowledge TEXT

Structure :

L, 2
1. <A [1] ACKC>
2. <A [80] ACKCTXT>

Stream	Function	Function Name	Wait Bit	Direction
9	1	Unrecognized Device ID	0	H←E

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

Definition:
<MHEAD> [ASCII 10 bytes] SECS message block header associated with message block in error

Structure:
1. <A [10] MHEAD>

Stream	Function	Function Name	Wait Bit	Direction
9	3	Unrecognized Stream Type	0	H←E

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

Definition:
<MHEAD> [ASCII 10 bytes] SECS message block header associated with message block in error

Structure:
1. <A [10] MHEAD>

Stream	Function	Function Name	Wait Bit	Direction

9	5	Unrecognized Function Type	0	H←E

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

Definition:
<MHEAD> [ASCII 10 bytes] SECS message block header associated with message block in error

Structure:
1. <A [10] MHEAD>

Stream	Function	Function Name	Wait Bit	Direction
9	7	Illegal Data	0	H←E

Description:
This message indicates that the stream and function was recognized but the associated data format could not be interpreted.

Definition:
<MHEAD> [ASCII 10 bytes] SECS message block header associated with message block in error

Structure:
1. <A [10] MHEAD>

Stream	Function	Function Name	Wait Bit	Direction
9	9	Transaction Timer Timeout	0	H←E

Description:
Detect Time-Out When Transaction Transmission. If transaction time-out, indicate the transaction has terminated.

Definition:
<SHEAD> [ASCII 10 bytes] Stored header related to the transaction timer

Structure:
1. <A [10] SHEAD>

Stream	Function	Function Name	Wait Bit	Direction
9	11	Data Too Long	0	H←E

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

Definition:
<MHEAD> [ASCII 10 bytes] SECS message block header associated with message block in error

Structure:
1. <A [10] MHEAD>