



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F24 Port Group Action Acknowledge	S,H<-E
<i>Description</i>	
This message acknowledges the port group action.	
<i>Structure</i>	
L , 2 <ul style="list-style-type: none"> 1. <CAACK> 2. L , n <ul style="list-style-type: none"> 1. L , 2 <ul style="list-style-type: none"> 1. <ERRCODE₁> 2. <ERRTEXT₁> . . n. L , 2 <ul style="list-style-type: none"> 1. <ERRCODE_n> 2. <ERRTEXT_n> 	
<i>Exception</i>	
If n = 0, no errors exist.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F25 Port Action Request	S,H->E, reply
<i>Description</i>	
This message requests an action be performed for a port	
<i>Structure</i>	
L , 3 <ul style="list-style-type: none"> 1. <PORTACTION> 2. <PTN> 3. L , m <ul style="list-style-type: none"> 1. L , 2 <ul style="list-style-type: none"> 1. <PARAMNAME₁> 2. <PARAMVAL₁> . . m. L , 2 <ul style="list-style-type: none"> 1. <PARAMNAME_m> 2. <PARAMVAL_m> 	
<i>Exception</i>	
If m = 0, then no parameters are provided.	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F26 Port Action Acknowledge	S,H<-E
<i>Description</i>	
This message acknowledges the port action request.	
<i>Structure</i>	
L , 2	
1. <CAACK>	
2. L , n	
1. L , 2	
3. <ERRCODE ₁ >	
4. <ERRTEXT ₁ >	
.	
.	
n. L , 2	
5. <ERRCODE _n >	
6. <ERRTEXT _n >	
<i>Exception</i>	
If n = 0, no errors exist.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F27 Change Access	S,H->E, reply
<i>Description</i>	
The Host requests the Equipment to change the Access Mode for the specified Load Ports. ACCESSMODE specifies the desired Access Mode. PTN specifies a desired Load Port Number.	
<i>Structure</i>	
L , 2	
1. <ACCESSMODE>	
2. L , n	
1. <PTN ₁ >	
.	
.	
n. <PTN _n >	
<i>Exception</i>	
If n = 0, then the command applies to all Load Ports on the equipment. If any specified port is already in the specified Access Mode, then the Equipment shall accept the command, and toggle all loadports to specified mode. If the Equipment is unable to change one or more of specified Port(s) to the specified Access Mode, then the Equipment shall accept the command (with appropriate response acknowledgement), and shall change only the Access Mode of those Port(s) allowed by the equipment, supplying the host with an indication that not all ports were successfully changed.	



Stream, Function Name (Mnemonic)	Direction
S3,F28 Change Access Acknowledge	S,H<-E
<i>Description</i>	
<i>Structure</i>	
L, 2 1. <CAACK> 2. L, n 1. L, 3 1. <PTN ₁ > 2. <ERRCODE ₁ > 3. <ERRTEXT ₁ > . . n. L, 3 1. <PTN _n > 2. <ERRCODE _n > 3. <ERRTEXT _n >	
<i>Exception</i>	
If the command is successful, CAACK = 0, and n = 0. If the command was successful for some ports, CAACK = 6, and n > 0.	

Stream, Function Name (Mnemonic)	Direction
S3,F29 Carrier Tag Read Request	S,H->E, reply
<i>Description</i>	
The host requests the equipment to read data from the carrier tag of a carrier. The carrier must be identified either by its location identifier or its carrier identifier, or both. DATASEG may be used to indicate a specific section of data to be read. DATALENGTH is used to limit the amount of data for that section.	
<i>Structure</i>	
L, 4 1. <LOCID> 2. <CARRIERSPEC> 3. <DATASEG> 4. <DATALENGTH>	
<i>Exception</i>	
Either LOCID and CARRIERSPEC can omitted (zero length item), but not both. If DATASEG and DATALENGTH are both omitted (are zero length items) then all data is requested. If DATALENGTH only is omitted, then all data within the indicated section is requested.	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F30 Carrier Tag Read Data (CTRD)	S,H<-E
<i>Description</i>	
This message is used to return requested information from the carrier tag of the carrier indicated in the request and to acknowledge the results of the request.	
<i>Structure</i>	
<pre>L,2 1. <DATA> 2. <L,2> 1. <CAACK> 2. L,s 1. L,2 1. <ERRCODE₁> 2. <ERRTEXT₁> . . s. L,2 1. <ERRCODE_s> 2. <ERRTEXT_s></pre>	
<i>Exception</i>	
If the carrier identifier or the carrier location originally specified is unknown, then DATA is zero length. If CAACK is non-zero, then DATA is zero length.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F31 Carrier Tag Write Data Request (CTWDR)	S,H->E, reply
<i>Description</i>	
The host requests the equipment to write data to a carrier tag. The carrier must be indicated either by its location identifier or its carrier identifier, or both. DATASEG may be used to indicate a specific section of data to be written or overwritten. DATALENGTH may be used to indicate the length of the data to be written.	
<i>Structure</i>	
<pre>L,5 1. <LOCID> 2. <CARRIERSPEC> 3. <DATASEG> 4. <DATALENGTH> 5. <DATA></pre>	
<i>Exception</i>	
Either LOCID and CARRIERSPEC can be omitted (zero length item), but not both. If DATASEG and DATALENGTH are both omitted (are zero length items) then all data is to be overwritten. If only DATALENGTH is omitted, then all data within the indicated section is to be written.	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F32 Carrier Tag Write Data Acknowledge (CTWDA)	S,H<-E
<i>Description</i>	
This message acknowledges the success or failure of writing data to the carrier tag requested.	
<i>Structure</i>	
L, 2	
1. <CAACK>	
2. L,s	
1. L,2	
1. <ERRORCODE ₁ >	
2. <ERRORTEXT ₁ >	
.	
.	
s. L,2	
1. <ERRORCODE _s >	
2. <ERRORTEXT _s >	
<i>Exception</i>	
s = 0 if and only if there are no errors.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3, F33 Cancel All Pod Out Request	
<i>Description</i>	
This message is used to cancel all pending pod out requests.	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F34 Cancel All Pod Out Acknowledge	
<i>Description</i>	
This message acknowledges the Cancel Pod Out request.	
<i>Structure</i>	
L, 2	
1. <CAACK>	
2. L,n	
1. L,2	
1. <ERRORCODE ₁ >	
2. <ERRORTEXT ₁ >	
.	
.	
n. L,2	
1. <ERRORCODE _n >	
2. <ERRORTEXT _n >	
<i>Exception</i>	
If n = 0, no errors exist.	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F35 Reticle Transfer Job Request	
<i>Description</i>	
This message requests a reticle transfer job be performed (or cancelled) for a particular pod.	
<i>Structure</i>	
<pre> L,6 1. <JOBACTION> 2. <PODID> 3. <INPTN> 4. <OUTPTN> 5. L,n n = number of attributes 1. L,2 1. <ATTRID₁> 2. <ATTRDATA₁> . . . n. L,2 1. <ATTRID_n> 2. <ATTRDATA_n> 5. L,m m = capacity 1. L,3 1. <RETICLEID₁> 2. <RETRMOVEINSTR₁> 3. L,r r = number of attributes 1. L,2 1. <ATTRID_{1..1}> 2. <ATTRDATA_{1..1}> . . r. L,2 1. <ATTRID_{1..r}> 2. <ATTRDATA_{1..r}> . . m. L,3 1. <RETICLEID_m> 2. <RETRMOVEINSTR_m> 3. L,r r = number of attributes 1. L,2 1. <ATTRID_{m..1}> 2. <ATTRDATA_{m..1}> . . r. L,2 1. <ATTRID_{m..r}> 2. <ATTRDATA_{m..r}> 6. L,m m = capacity 1. L,2 1. <RETICLEID₁> 2. <RETPPLACEINSTR₁> . . m. L,2 1. <RETICLEID_m> 2. <RETPPLACEINSTR_m></pre>	
<i>Exception</i>	
If JOBACTION = CancelReticleTransferJob, m and n may = 0	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S3,F36 Reticle Transfer Job Request Acknowledgement	
<i>Description</i>	
This message acknowledges the ReticleTransferJobRequest.	
<i>Structure</i>	
<pre>L,2 1. <RPMACK> 2. L,n 1. L,2 1. <ERRCODE₁> 2. <ERRTEXT₁> . . n. L,2 1. <ERRCODE_n> 2. <ERRTEXT_n></pre>	
<i>Exception</i>	
None	

10.8 *Stream 4 Material Control* — The material control stream contains the original material control protocol and the newer protocol which supports SEMI E32.

10.8.1 *Original Material Control Protocol* — The functions in the material control stream are used to effect the automatic transfer of material between equipment. A simple handshake is achieved which provides for a variety of error conditions which gracefully terminate the handshake. Separate messages advise the host of errors and completed material transfers.

10.8.1.1 Since the handshake and host messages are separate, the handshake may be achieved transparently through the host or by direct connection between equipment. The host completes the handshake by relaying messages between the equipment. Only a single port is required on the equipment, and the equipment has a simple message handling requirement. When a direct connection is desired, at least three ports are required, the receiving equipment must look like the host with respect to the sending equipment, and message handling in the equipment is significantly more complicated than in the host-only connection. Nevertheless, the direct connection may still be chosen in an attempt to provide operation without a host. Since the host is reasonably transparent in the material handshake, a simple explanation of the handshake may be achieved by just considering the exchange of messages between the sender, the equipment wanting to get rid of material, and the receiver (the equipment able to accept the material).

10.8.1.2 Figure 4 shows six possible handshake situations between the sender and the receiver. There are two normal handshakes. Figure 4(a) shows the normal three-message exchange when material is passed between equipment. The host is informed of a complete transfer of material. Figure 4(b) shows an alternative message exchange where the sender changes its mind and decides not to send the material. Figures 4(c) and (d) show two situations where the material gets stuck during the transfer. In each situation an error message is issued to the host from the equipment where the material is stuck. The other equipment terminates normally. When material is stuck, manual intervention is required to move the material towards the equipment which indicates the stuck condition. The manual intervention has two possible outcomes. One, the material can be moved to a position where the handshake can resume or, two, the material is broken or lost from the transfer. Lost material causes a lost material error message to be sent to the host prior to resuming the operation. The specific details of recovering front stuck material are equipment-dependent. The stuck material condition is determined by the amount of time the material transfer mechanism is turned on. The sender claims stuck material if the material is not clear of its sensor before a time t1. The receiver claims stuck material if the material is not received before time t2. Figures 4(e) and (f) show the possible error conditions in the unlikely event that for some reason a handshake message is lost. Figure 4(e) shows that time t3 is the longest that the sender will wait for material received message. Times t2 and t3 set an upper limit on the amount of time either material transport mechanism will operate.

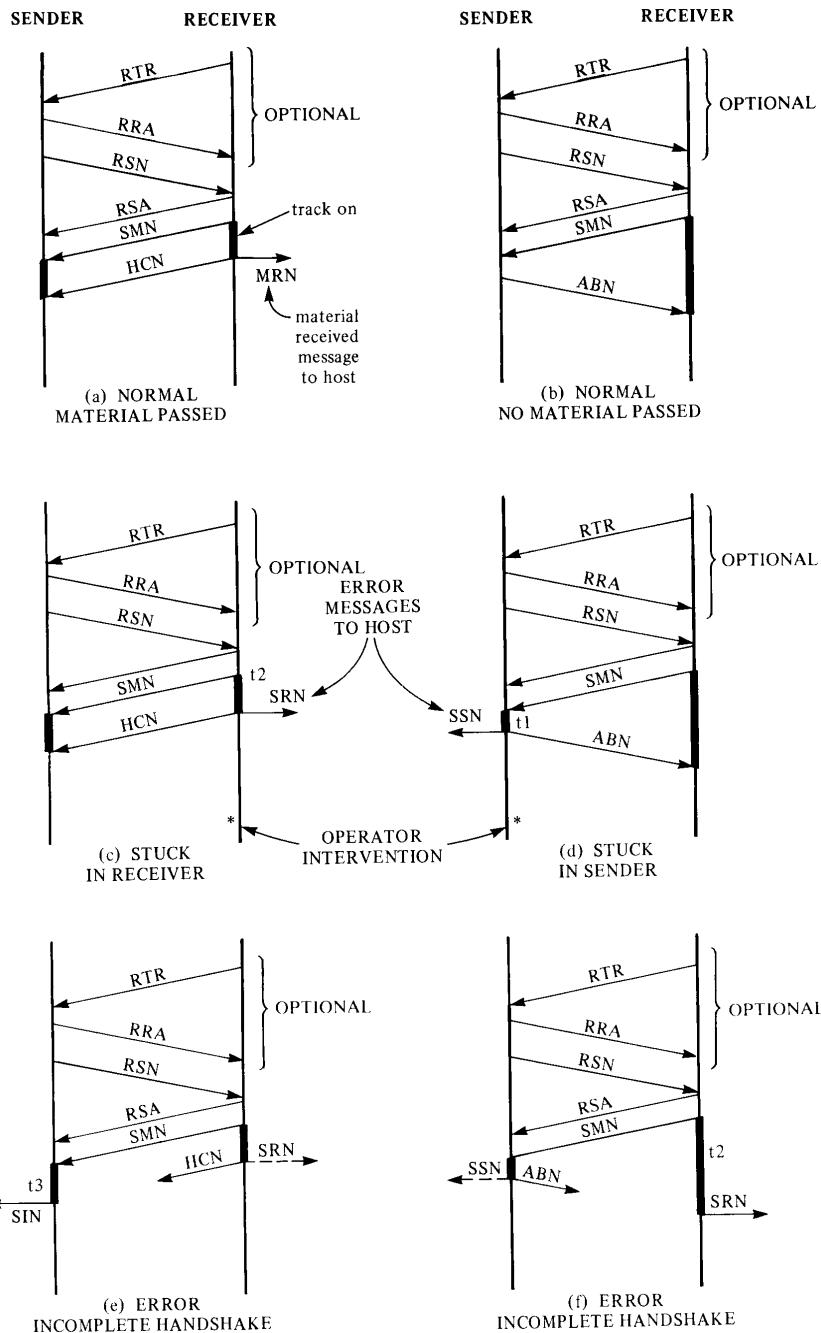


Figure 4
The Six Possible Handshakes

10.8.1.3 Figure 5 summarizes the interaction of the timers, handshake messages, and the error messages in the form of a flow chart. It also identifies specific states for the sender and the receiver. These states are referred to in the messages.

The ranges of timer values are as follows:

t_1 — time to leave sender

$t_1 + 10 \leq t_2 \leq 60$ sec. — time to receive

$t_2 + 10 \leq t_3 \leq 70$ sec. — time to complete send

Default values, $t_1 = 10$ sec., $t_2 = 60$ sec., $t_3 = 70$ sec.

NOTE 6: t_1, t_2, t_3 defined for Stream 4 are not to be confused with timeouts T_1, T_2, T_3 , and T_4 defined in SEMI E4 (SECS-I).

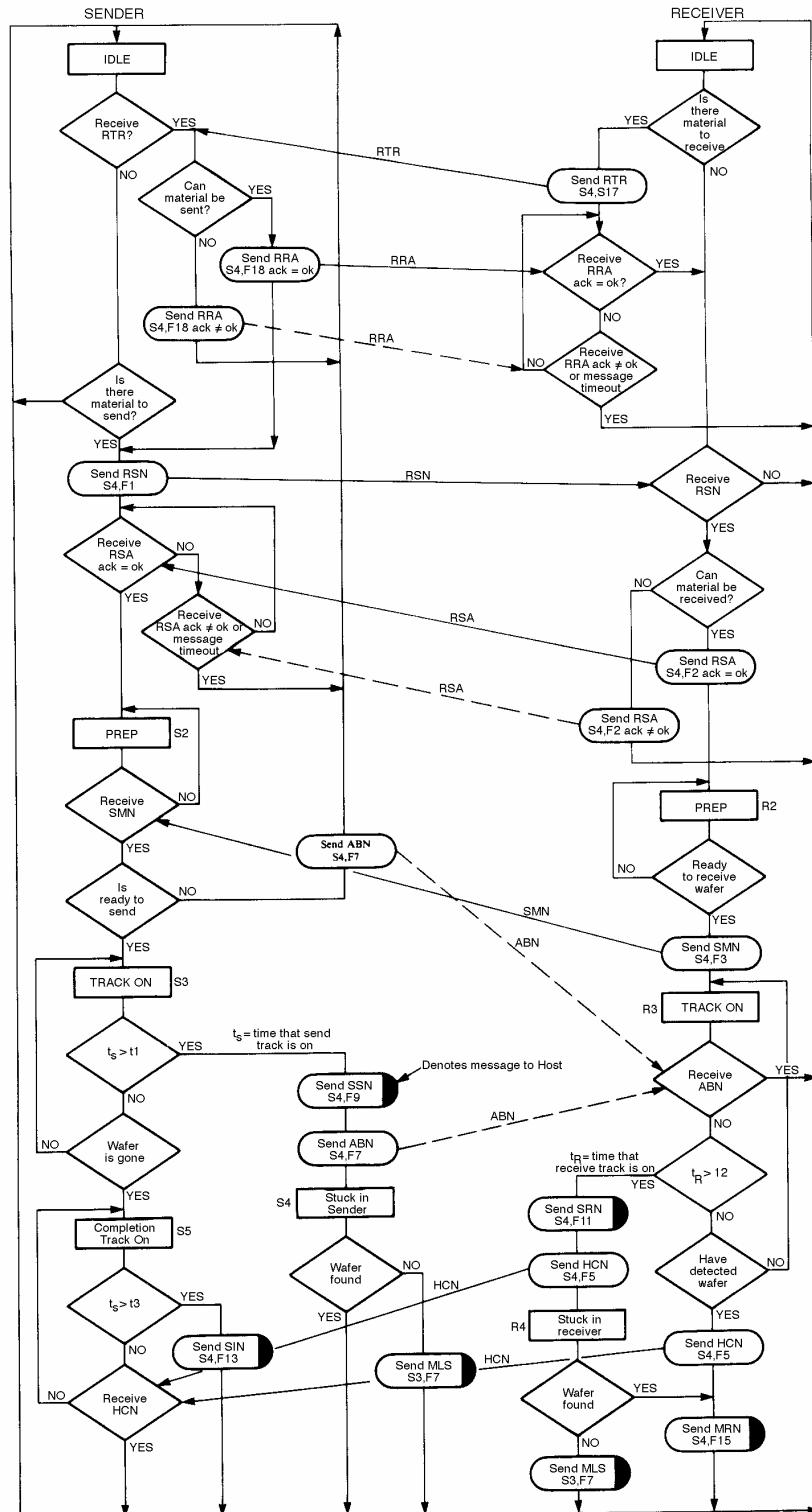


Figure 5
Material Control-Handshake Flowchart



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F0 Abort Transaction (S4F0)	S,H->E
<i>Description</i>	
Same form as S1,F0.	
<i>Structure</i>	
<i>Exception</i>	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F1 Ready to Send Materials (RSN)	S,H<->E,reply
<i>Description</i>	
The sender advises the receiver that some material is awaiting transfer.	
<i>Structure</i>	
L , 2 1 . <PTN> 2 . <MID>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F2 Ready to Send Acknowledge (RSA)	S,H<->E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<RSACK>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F3 Send Material (SMN)	S,H<->E
<i>Description</i>	
The receiver advises the sender that it is ready to receive material and that its transfer mechanism is running.	
<i>Structure</i>	
L , 2 1 . <PTN> 2 . <MID>	
<i>Exception</i>	
None	

S4,F4 Not Used



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F5 Handshake Complete (HCN)	S,H<->E
<i>Description</i>	
Receiver advises sender that the handshake is complete. The sender may now stop its transfer mechanism.	
<i>Structure</i>	
L , 2 1. <PTN> 2. <MID>	
<i>Exception</i>	
None	

S4,F6 Not Used

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F7 Not Ready to Send (ABN)	S,H<->E
<i>Description</i>	
Sender advises receiver that no material is being sent. The receiver may now stop its transfer mechanism.	
<i>Structure</i>	
L , 2 1. <PTN> 2. <MID>	
<i>Exception</i>	
None	

S4,F8 Not Used

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F9 Stuck in Sender (SSN)	S,H<-E
<i>Description</i>	
An error from the sender to the host. The time between the receipt of Material (SMN) and the material leaving the sender's sensor exceeds the sender's t1 timeout. The sender goes to a hold state until the disposition of the stuck material is determined.	
<i>Structure</i>	
L , 2 1. <PTN> 2. <MID>	
<i>Exception</i>	
None	

S4,F10 Not Used



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F11 Stuck in Receiver (SRN)	S,H<-E
<i>Description</i>	
An error from the receiver to the host. The time between Send Material (SMN) and detection of the material at the receiver exceeds the receiver's t2 timeout. The receiver goes to a hold state until the disposition of material is determined.	
<i>Structure</i>	
L , 2 1. <PTN> 2. <MID>	
<i>Exception</i>	
None	

S4,F12 Not Used

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F13 Send Incomplete Timeout (SIN)	S,H<-E
<i>Description</i>	
An error from the sender to the host. The time between the receipt of the Send Material (SMN) and the receipt of Handshake-Complete (HCN) exceeds the sender's t3 timeout. There has been an error in the handshake and the transfer mechanism is turned off.	
<i>Structure</i>	
L , 2 1. <PTN> 2. <MID>	
<i>Exception</i>	
None	

S4,F14 Not Used

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F15 Material Received (MRN)	S,H<-E
<i>Description</i>	
A message from the receiver to the host. Material has been transferred to the receiver.	
<i>Structure</i>	
L , 2 1. <PTN> 2. <MID>	
<i>Exception</i>	
None	

S4,F16 Not Used



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F17 Request to Receive (RTR)	S,H<->E,reply
<i>Description</i>	
Receiver requests the sender initiate a conversation to send the specified material to the specified port.	
<i>Structure</i>	
L , 2 1. <PTN> 2. <MID>	
<i>Exception</i>	
A zero-length MID means equipment doesn't know MID.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F18 Request to Receive Acknowledge (RRA)	S,H<->E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<RRACK>	
<i>Exception</i>	
None	

10.8.2 *Support for Material Movement Management Services* — The following messages were defined to support SEMI E32.

10.8.2.1 *Macro Level Messages* — The following messages support the host supervised macro level of material movement as defined in SEMI E32. Stream 1 Macro Level Messages can be found in Section 10.5: S1F19, Get Attribute (GA); S1F20, Attribute Data (AD).



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F19 Transfer Job Create (TJ)	M,H->E,reply
<i>Description</i>	
The host requests that the equipment undertake one or more discrete (or atomic) transfers to achieve a host defined objective. The host provides the transfer specifications for each atomic transfer. Atomic transfers on separate ports on the equipment are allowed to execute in parallel. Atomic transfers for a port must be executed sequentially or in some cases concurrently. Both equipment transfer partners for each atomic transfer must receive appropriate Transfer Job Request messages in order to execute a transfer. If S4,F20 is multi-block, it must be preceded by the S4,F25/S4,F26 Inquire/Grant transaction.	
<i>Structure</i>	
L,2	
1. <DATAID>	
2. L,2	
1. <TRJOBNAME>	
2. L,n	[n = #atomic xfrs defined for this job]
1. L,12	[Specification for first atomic xfr]
1. <TRLINK>	[Atomic transfer identifier]
2. <TRPORT>	[Port to be used for transfer]
3. <TROBJNAME>	[Transfer object identifier]
4. <TROBJTYPE>	[Object type-what form is the material in]
5. <TRROLE>	[Role in transfer-primary/secondary]
6. <TRRCP>	[Transfer recipe identifier]
7. <TRPTNR>	[Identifier of transfer partner]
8. <TRPTPORT>	[Partner's Port to be Used]
9. <TRDIR>	[Transfer direction-send or receive]
10. <TRTYPE>	[Active or Passive]
11. <TRLOCATION>	[Location to send/receive mtl]
12. <TRAUTOSTART>	[Does eqp await host start command after setup?]
.	
.	
n. L,12	[Specification for nth atomic xfr]
1. <TRLINK>	
↓	
12. <TRAUTOSTART>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4.F20 Transfer Job Acknowledge (TJA)	S,H<-E
<i>Description</i>	
The equipment informs the host of its acceptance or rejection of the Transfer Job Request.	
<i>Structure</i>	
L,3	
1. <TRJOBID>	
2. L,m	[m = number of atomic transfers in the transfer job.]
1. <TRATOMICID ₁ >	
.	
m. <TRATOMICID _m >	
3. L,2	
1. <TRACK>	[Accepted or rejected]
2. L,n	[n = # errors reported]
1. L,2	
1. <ERRCODE ₁ >	
2. <ERRTEXT ₁ >	
.	
.	
n. L,2	
1. <ERRCODE _n >	
2. <ERRTEXT _n >	
<i>Exception</i>	
A zero-length list (m = 0) is sent if the transfer job is rejected. A zero-length list (n = 0) is sent if the transfer job is accepted.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4.F21 Transfer Job Command (TC)	S,H->E,reply
<i>Description</i>	
This message is used by the host to modify a current transfer job on an equipment.	
<i>Structure</i>	
L,3	
1. <TRJOBID>	
2. <TRCMDNAME>	[identifier of the transfer command]
3. L,n	[n = number of parameters = 0 if none]
1. L,2	
1. <CPNAME ₁ >	[transfer parameter name]
2. <CPVAL ₁ >	[transfer parameter value]
.	
.	
n. L,2	
1. <CPNAME _n >	
2. <CPVAL _n >	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F22 Transfer Command Acknowledge (TCA)	S,H<-E
<i>Description</i>	
Equipment accepts or rejects the transfer command.	
<i>Structure</i>	
L,2 1. <TRACK> [Accepted or rejected] 2. L,n [n = # errors reported] 1. L,2 1.1. <ERRCODE ₁ > 1.2. <ERRTEXT ₁ > . . n. L,2 1.1. <ERRCODE _n > 1.2. <ERRTEXT _n >	
<i>Exception</i>	
If the command is accepted, n = 0.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F23 Transfer Job Alert (TJA)	S,H<-E,[reply]
<i>Description</i>	
Equipment informs the host that a transfer job milestone has been reached (e.g., job started or job complete). If complete, all equipment resources originally reserved for the transfer have been released.	
<i>Structure</i>	
L,4 1. <TRJOBID> 2. <TRJOBNAME> 3. <TRJOBMS> 4. L,2 1.1. <TRACK> [success or failure] 1.2. L,n [n = # errors reported] 1.1.1. L,2 1.1.1.1. <ERRCODE ₁ > 1.1.1.2. <ERRTEXT ₁ > . . n. L,2 1.1.1. <ERRCODE _n > 1.1.2. <ERRTEXT _n >	
<i>Exception</i>	
If the transfer job is completed successfully, n = 0.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F24 Transfer Alert Acknowledge (TLA)	S,H->E
<i>Description</i>	
Acknowledge receipt of the S4,F23 message.	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F25 Multi-block Inquire (MB14)	S,H->E,reply
<i>Description</i>	
If a Stream 4 host-initiated message is more than a single block in length, this transaction must precede the message.	
<i>Structure</i>	
L , 2 1. <DATAID> 2. <DATALENGTH>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F26 Multi-block Grant (MBG4)	S,H<-E
<i>Description</i>	
Grant (or deny) permission to send multi-block message.	
<i>Structure</i>	
<GRANT>	
<i>Exception</i>	
None	

10.8.2.2 *Micro Level Messages* — The following messages support the equipment-to-equipment micro level handoff of material as defined in SEMI E32.

10.8.2.2.1 The messages which support the micro level are passed directly between the equipment. For the purpose of the communication link, one of the equipment must be designated the host and the other the equipment. The choice is up to the implementer. Equipment which are configurable to act as either host or equipment are suggested for ease of installation.

10.8.2.2.2 The two equipment involved in a micro level transfer assume different roles. One equipment is designated the “Primary Transfer Partner,” and the other is the “Secondary Transfer Partner” (see SEMI E32 for more definition). While some consistency of roles is expected, this designation is fluid and may change from one transfer to the next. The Primary Transfer Partner has more responsibility and thus initiates messages which the Secondary does not.

10.8.2.2.3 The selection of “Host” and “Equipment” for the communication link is not related to the fluid relationship of Primary and Secondary Transfer Partner. However, it is the designation of Primary or Secondary which determines the originator of certain messages. It is for this reason that the designation P = Primary and S = Secondary Transfer Partner.



10.8.2.2.4 Micro Level Messages

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F27 Handoff Ready (HR)	S,P<->S
<i>Description</i>	
Each transfer partner informs the other when they are ready to perform a specified atomic transfer. The TRLINK values from the two partners must match. The values contained in the atomic transfer specification pertain to the sender of the message (except where specified).	
<i>Structure</i>	
L, 2	
1. <EQNAME>	
2. L,11	[Specification for atomic xfr]
1. <TRLINK>	[Atomic transfer identifier]
2. <TRPORT>	[Port to be used for transfer]
3. <TROBJNAME>	[Transfer object identifier]
4. <TROBJTYPE>	[Object type-what form the material is in]
5. <TRROLE>	[Role in transfer-primary/secondary]
6. <TRPTNR>	[Identifier of transfer partner]
7. <TRPTPORT>	[Partner's Port to be Used]
8. <TRDIR>	[Transfer direction-send or receive]
9. <TRTYPE>	[Active or Passive]
10. <TRLOCATION>	[Location to send/receive mtl]
<i>Exception</i>	
None	

S4,F28 Not Used

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F29 Handoff Command (HC)	S,P->S
<i>Description</i>	
Command issued by the primary to the secondary transfer partner to achieve some physical action.	
<i>Structure</i>	
L, 4	
1. <TRLINK>	[Atomic Transfer identifier]
2. <MCINDEX>	[Identified this specific Micro Cmd request]
3. <HOCMDNAME>	[Requested Micro Cmd]
4. L,n	[n = number of parameters]
1. L,2	
1. <CPNAME ₁ >	[Micro Cmd parameter name]
2. <CPVAL ₁ >	[Micro Cmd parameter value]
.	
.	
n. L,2	
1. <CPNAME _n >	
2. <CPVAL _n >	
<i>Exception</i>	
N = 0 if no parameters are used.	

S4,F30 Not Used



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F31 Handoff Command Complete (HCC)	S,P<-S
<i>Description</i>	
Completion status of the micro command. This is sent from the secondary to the primary transfer partner when the command is completed or terminated.	
<i>Structure</i>	
L,3	
1. <TRLINK>	[Atomic Transfer identifier]
2. <MCINDEX>	[Links to specific micro command (S4,F31)]
3. L,2	
1. <HOACK>	[success or failure]
2. L,n	[n = # errors reported]
1. L,2	
1. <ERRCODE ₁ >	
2. <ERRTEXT ₁ >	
.	
.	
n. L,2	
1. <ERRCODE _n >	
2. <ERRTEXT _n >	
<i>Exception</i>	
None	

S4,F32 Not Used

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F33 Handoff Verified (HV)	P<->S
<i>Description</i>	
Sent by the primary transfer partner to inform the secondary that no more micro commands will be issued for this atomic transfer and to request a verification that the transfer is complete and successful. Also sent by the secondary partner following the receipt of this message to verify that the transfer is complete and successful (or to report problems).	
<i>Structure</i>	
L,2	
1. <TRLINK>	
2. L,2	
1. <HOACK>	[success or failure]
2. L,n	[n = # errors reported]
1. L,2	
1. <ERRCODE ₁ >	
2. <ERRTEXT ₁ >	
.	
.	
n. L,2	
1. <ERRCODE _n >	
2. <ERRTEXT _n >	
<i>Exception</i>	
None	

S4,F34 Not Used



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F35 Handoff Cancel Ready (HCR)	P<->S
<i>Description</i>	
Sent by either transfer partner to cancel a previous Handoff Ready message. This message is valid only before the handoff has begun.	
<i>Structure</i>	
<TRLINK>	
<i>Exception</i>	
None	

S4,F36 Not Used

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F37 Handoff Cancel Ready Acknowledge (HCA)	P<->S
<i>Description</i>	
Sent by the receiver of the Handoff Cancel Ready message to accept or deny the cancel. The cancel request is denied if the handoff process has begun.	
<i>Structure</i>	
L , 2 1 . <TRLINK> 2 . <HOCANCELACK>	
<i>Exception</i>	
None	

S4,F38 Not Used

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S4,F39 Handoff Halt (HH)	P<->S
<i>Description</i>	
Sent by either transfer partner to cause all transfer related activity of the other to cease immediately. It is used when the equipment or material is at risk of damage.	
<i>Structure</i>	
<TRLINK>	
<i>Exception</i>	
None	

S4,F40 Not Used



Stream, Function Name (Mnemonic)	Direction
S4,F41 Handoff Halt Acknowledge (HHA)	P<->S
<i>Description</i>	
Sent to equipment's transfer partner following completion of halt activities resulting from a previously received S4,F39.	
<i>Structure</i>	
L , 2 1 . <TRLINK> 2 . <HOHALTACK>	
<i>Exception</i>	
None	

S4,F42 Not Used

10.9 *Stream 5 Exception Handling* — This stream contains messages regarding binary and analog equipment exceptions. Exceptions are classified into two categories: errors and alarms. Messages S5,F1 through S5,F8 of this section provide basic alarm messages. The messages S5,F9 through S5,F18 provide extended capabilities for Exception Handling. When using messages F1–F8, alarms may be 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.

10.9.1 For messages F1 through F8, it will be the equipment's responsibility to categorize the alarm. Some alarm conditions may cause more than one type of alarm to be issued. For example, a parameter control error on over temperature may also trip a protective device that makes the alarm irrecoverable without some intervention.

Stream, Function Name (Mnemonic)	Direction
S5,F0 Abort Transaction (S5F0)	S,H<->E
<i>Description</i>	
Same form as S1,F0.	
<i>Structure</i>	
<i>Exception</i>	



Stream, Function Name (Mnemonic)	Direction
S5,F1 Alarm Report Send (ARS)	S,H<-E,[reply]
<i>Description</i>	
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. Irrecoverable errors and attention flags may not have a corresponding clear message.	
<i>Structure</i>	
L, 3 1. <ALCD> 2. <ALID> 3. <ALTX>	
<i>Exception</i>	
None	

Stream, Function Name (Mnemonic)	Direction
S5,F2 Alarm Report Acknowledge (ARA)	S,H->E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC5>	
<i>Exception</i>	
None	

Stream, Function Name (Mnemonic)	Direction
S5,F3 Enable/Disable Alarm Send (EAS)	S,H->E,[reply]
<i>Description</i>	
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.	
<i>Structure</i>	
L, 2 1. <ALED> 2. <ALID>	
<i>Exception</i>	
A zero-length item for ALID means all alarms.	

Stream, Function Name (Mnemonic)	Direction
S5,F4 Enable/Disable Alarm Acknowledge (EAA)	S,H<-E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC5>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F5 List Alarms Request (LAR)	S,H->E,reply
<i>Description</i>	
This message requests the equipment to send binary and analog alarm information to the host.	
<i>Structure</i>	
<ALID ₁ , . . . , ALID _n >	
<i>Exception</i>	
A zero-length item means send all possible alarms regardless of the state of ALED.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F6 List Alarm Data (LAD)	M,H<-E
<i>Description</i>	
This message contains the alarm data known to the equipment. There are "m" alarms in the list.	
<i>Structure</i>	
L, m 1. L, 3 1. <ALCD ₁ > 2. <ALID ₁ > 3. <ALTX ₁ > 2. L, 3 . . m. L, 3 1. <ALCD _m > 2. <ALID _m > 3. <ALTX _m >	
<i>Exception</i>	
If m = 0, no response can be made. A zero-length item returned for ALCD _i or ALTX _i means that value does not exist.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F7 List Enabled Alarm Request (LEAR)	S,H->E,reply
<i>Description</i>	
List alarms which are enabled.	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F8 List Enabled Alarm Data (LEAD)	M,H<-E
<i>Description</i>	
This message is similar to S5,F6 except that it lists only alarms which are enabled.	
<i>Structure</i>	
Same as S5,F6	
<i>Exception</i>	
None	



Stream, Function Name (Mnemonic)	Direction
S5,F9 Exception Post Notify (EXPN)	S,H<-E,[reply]
<i>Description</i>	
This message provides the means to inform a host system that an exception condition is ‘set’. Optionally, recovery actions for the exception may be sent.	
<i>Structure</i>	
L, 5 1. <TIMESTAMP> 2. <EXID> 3. <EXTYPE> 4. <EXMESSAGE> 5. L,n 1. <EXRECVRA ₁ > . . . n. <EXRECVRA _n >	
<i>Exception</i>	
A zero-length list (n = 0) shall be sent when there are no possible recovery actions.	
This is a single block message. The text in each of the EXRECVRA data items may need to be restricted in length to meet the single block requirement.	

Stream, Function Name (Mnemonic)	Direction
S5,F10 Exception Post Confirm (EXPC)	S,H->E
<i>Description</i>	
Host confirms receipt of S5,F9 message from the equipment.	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	

Stream, Function Name (Mnemonic)	Direction
S5,F11 Exception Clear Notify (EXCN)	S,H<-E,[reply]
<i>Description</i>	
This message provides the means to inform a host system that an exception/alarm condition is no longer active (set).	
<i>Structure</i>	
L, 4 1. <TIMESTAMP> 2. <EXID> 3. <EXTYPE> 4. <EXMESSAGE>	
<i>Exception</i>	
EXMESSAGE can be used to provide the reason that the exception cleared.	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F12 Exception Clear Confirm (EXCC)	S,H->E
<i>Description</i>	
Host confirms receipt of S5,F11 message from the equipment.	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F13 Exception Recover Request (EXRR)	S,H->E,reply
<i>Description</i>	
Request that the entity which is experiencing an error execute a recovery action.	
<i>Structure</i>	
L , 2 1 . <EXID> 2 . <EXRECVRA>	
<i>Exception</i>	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F15 Exception Recovery Complete Notify (EXRCN)	S,H<-E,[reply]
<i>Description</i>	
Allows the service provider to inform the controller/host that the recovery operation completed on a specific exception and an error code if the recovery terminated abnormally.	
<i>Structure</i>	
L,3	
1. <TIMESTAMP>	
2. <EXID>	
3. L,2	
1. <ACKA>	
2. L,m	(m = {0,2})
1. <ERRCODE>	
2. <ERRTEXT>	
<i>Exception</i>	
This list m can be of zero length if the recovery was successful.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F16 Exception Recovery Complete Confirm (EXRCC)	S,H->E
<i>Description</i>	
Host confirms receipt of S5,F15 message from the equipment.	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F17 Exception Recovery Abort Request (EXRAR)	S,H->E,reply
<i>Description</i>	
Stop the recovery procedure on a specific exception.	
<i>Structure</i>	
1. <EXID>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S5,F18 Exception Recovery Abort Acknowledge (EXRAA)	S,H<-E
<i>Description</i>	
Indicate the success of the request for Recovery Abort.	
<i>Structure</i>	
<pre>L , 2 1. <EXID> 2. L , 2 1. <ACKA> 2. L , m (m = { 0 , 2 }) 1. <ERRCODE> 2. <ERRTEXT></pre>	
<i>Exception</i>	
The list m can be of zero length if the abort was successful.	



10.10 *Stream 6 Data Collection* — This stream is intended to cover the needs of in-process measurements and equipment monitoring.

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F0 Abort Transaction (S6F0)	S,H<->E
<i>Description</i>	
Same form as S1,F0.	
<i>Structure</i>	
<i>Exception</i>	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F1 Trace Data Send (TDS)	M,H<-E,[reply]
<i>Description</i>	
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.	
Even if S6,F1 is multi-block, it is not preceded by an Inquire/Grant transaction, because the Host S2,F23 is an implicit grant. Some equipment may support only single-block S6,F1, and may refuse an S2,F23 (Trace Initiate Send) message which would cause a multi-block S6,F1.	
<i>Structure</i>	
L , 4 1. <TRID> 2. <SMPLN> 3. <STIME> 4. L , n 1. <SV ₁ > 2. <SV ₂ > . . n. <SV _n >	
<i>Exception</i>	
A zero-length STIME means no value is given and that the time is to be derived from SMPLN along with knowledge of the request.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F2 Trace Data Acknowledge (TDA)	S,H->E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC6>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F3 Discrete Variable Data Send (DVS)	M,H<-E,[reply]
<i>Description</i>	
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. Some equipment may have several possible events on which to send the data. S2,F15 is used to select the desired reporting events. Reports requiring only one block of data may report directly to the host with this message. If S6,F3 is multi-block, it must be preceded by the S6,F5/S6,F6 Inquire/Grant transaction.	
<i>Structure</i>	
L,3 1. <DATAID> 2. <CEID> 3. L,n 1. L,2 1. <DSID ₁ > 2. L,m 1. L,2 1. <DVNAME ₁ > 2. <DVVAL ₁ > 2. L,2 . . m. L,2 1. <DVNAME _m > 2. <DVVAL _m > 2. L,2 . . n. L,2 1. <DSID _n > 2. etc.	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F4 Discrete Variable Data Acknowledge (DVA)	S,H->E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC6>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F5 Multi-block Data Send Inquire (MBI)	S,H<-E,reply
<i>Description</i>	
If the discrete data report S6F3, F9, F11, F13 can involve more than one block, this transaction must precede the transmission.	
<i>Structure</i>	
L,2 1. <DATAID> 2. <DATALENGTH>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F6 Multi-block Grant (MBG)	S,H->E
<i>Description</i>	
Grant permission to send	
<i>Structure</i>	
<GRANT6>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F7 Data Transfer Request (DDR)	S,H->E,reply
<i>Description</i>	
The host may initiate a data transfer of specified data stored in the equipment with this function.	
<i>Structure</i>	
<DATAID>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F8 Data Transfer Data (DDD)	M,H<-E
<i>Description</i>	
Equipment sends data to the host.	
<i>Structure</i>	
Similar to the structure of S6,F3	
<i>Exception</i>	
A zero-length item returned means the requested data cannot be sent.	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F9 Formatted Variable Send (FVS)	M,H<-E,[reply]
<i>Description</i>	
The same function as S6,F3 except that the DVNAMEs are supplied from a predefined form that is known to the host. Thus, the data are more compact. If S6,F9 is multi-block, it must be preceded by the S6,F5/S6,F6 Inquire/Grant transaction.	
<i>Structure</i>	
L, 4	
1. <PFCD>	
2. <DATAID>	
3. <CEID>	
4. L,n	
1. L,2	
1. <DSID ₁ >	
2. L,m	
1. <DVVAL ₁ >	
.	
.	
m. <DVVAL _m >	
2. L,2	
.	
.	
n. L,2	
1. <DSID _n >	
2. etc.	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F10 Formatted Variable Acknowledge (FVA)	S,H->E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC6>	
<i>Exception</i>	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F11 Event Report Send (ERS)	M,H<-E, reply
<i>Description</i>	
The purpose of this message is for the equipment to send a defined, linked, and enabled group of reports to the host upon the occurrence of an event (CEID).	
If S6,F11 is Multi-block, it must be preceded by the S6,F5/S6,F6 Inquire/Grant transaction.	
<i>Structure</i>	
<pre>L,3 1. <DATAID> 2. <CEID> 3. L,a 1. L,2 1. <RPTID₁> 2. L,b 1. <V₁> . . b. <V_b> . . a. L,2 report a 1. <RPTIDA> 2. L,c #Vs this report 1. <V₁> . . c. <V_c></pre>	
<i>Exception</i>	
If there are no reports linked to the event a ‘null’ report is assumed. A zero-length list for # of reports means there are no reports linked to the given CEID.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F12 Event Report Acknowledge (ERA)	S,H->E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC6>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F13 Annotated Event Report Send (AERS)	M,H<-E,reply
<i>Description</i>	
This message is the same as S6F11 with the exception that VID's are sent with data. If S6,F13 is Multi-block, it must be preceded by the S6,F5/S6,F6 Inquire/Grant transaction.	
<i>Structure</i>	
<pre> L,3 1. <DATAID> 2. <CEID> 3. L,a 1. L,2 1. <RPTID₁> 2. L,b 1. L,2 1. <VID₁> . . b. L,2 1. <VID_b> b. <V_b> . . a. L,2 1. <RPTID_a> 2. L,c 1. L,2 1. <VID₁> 2. <V₁> . . c. L,2 1. <VID_c> 2. <V_c> </pre>	
<i>Exception</i>	
If there are no reports linked to the event a 'null' report is assumed. A zero-length list for # of reports means there are no reports linked to the given CEID.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F14 Annotated Event Report Acknowledge (AERA)	S,H->E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC6>	
<i>Exception</i>	
None	



Stream, Function Name (Mnemonic)	Direction
S6,F15 Event Report Request (ERR)	S,H->E, reply
<i>Description</i>	
The purpose of this message is for the host to demand a given report group from the equipment.	
<i>Structure</i>	
<CEID>	
<i>Exception</i>	
None	

Stream, Function Name (Mnemonic)	Direction
S6,F16 Event Report Data (ERD)	M,H<-E
<i>Description</i>	
Equipment sends reports linked to given CEID to host.	
<i>Structure</i>	
Identical to structure of S6,F11.	
<i>Exception</i>	
A zero-length item means there are no reports linked to the given CEID.	

Stream, Function Name (Mnemonic)	Direction
S6,F17 Annotated Event Report Request (AERR)	S,H->E, reply
<i>Description</i>	
Same as S6,F15, but requests annotated reports.	
<i>Structure</i>	
<CEID>	
<i>Exception</i>	
None	

Stream, Function Name (Mnemonic)	Direction
S6,F18 Annotated Event Report Data (AERD)	M,H<-E
<i>Description</i>	
Equipment sends annotated reports linked to given CEID.	
<i>Structure</i>	
Same as S6,F13.	
<i>Exception</i>	
A zero-length item means there are no reports linked to the given CEID.	

Stream, Function Name (Mnemonic)	Direction
S6,F19 Individual Report Request (IRR)	S,H->E, reply
<i>Description</i>	
The purpose of this message is for the host to request a defined report from the equipment.	
<i>Structure</i>	
<RPTID>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F20 Individual Report Data (IRD)	M,H<-E
<i>Description</i>	
Equipment sends variable data defined for the given RPTID to the host.	
<i>Structure</i>	
L,n 1. <V ₁ > . . n. <V _n >	# of variable data items
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F21 Annotated Individual Report Request (AIRR)	S,H->E,reply
<i>Description</i>	
The purpose of this message is for the host to request an annotated defined report from the equipment.	
<i>Structure</i>	
<RPTID>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F22 Annotated Individual Report Data (AIRD)	M,H<-E
<i>Description</i>	
Equipment sends annotated variable data defined for the given RPTID to the host.	
<i>Structure</i>	
L,n 1. L,2 1. <VID ₁ > 2. <V ₁ > . . n. L,2 1. <VID _n > 2. <V _n >	# of variable data items
<i>Exception</i>	
A zero-length list for # of variable data items means RPTID is not defined.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F23 Request Spooled Data (RSD)	S,H->E,reply
<i>Description</i>	
The purpose of this message is for the host to request transmission or deletion of the messages currently spooled by the equipment.	
<i>Structure</i>	
<RSDC>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F24 Request Spooled Data Acknowledgement Send (RSDAS)	S,H<-E
<i>Description</i>	
The purpose of this message is to acknowledge the receipt of the Request Spooled Data (S6,F23) and to respond with an appropriate acknowledge code.	
<i>Structure</i>	
<RSDA>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F25 Notification Report Send	M,H<->E,[reply]
<i>Description</i>	
This message is used for change notifications or confirmation reports. A change notification is a report of an internal action and is not associated with a prior action requested by the host.	
A confirmation report is always associated with an earlier request for action. A confirmation report is sent to the initial requestor of a delayed action at the time the action is completed. A delayed action is an action that is any action not performed before the response to the initial request is sent. OPID contains the value of OPID in the initial request. LINKID is set to a non-zero value if and only if additional completion reports with the same OPID will be sent. If S6,F25 is multiblock, it must be preceded by the S6,F5/S6,F6 Inquire Grant transaction.	
<i>Structure</i>	
L, 7 1. <DATAID> 2. <OPID> 3. <LINKID> 4. <RCPSPEC> 5. <RMCHGSTAT> 6. L,m 1. L,2 1. <RCPATTRID ₁ > 2. <RCPATTRDATA ₁ > . . m. L,2 1. <RCPATTRID _m > 2. <RCPATTRDATA _m > 7. L,2 1. <RMACK> 2. L,p 1. L,2 1. <ERRCODE ₁ > 2. <ERRTEXT ₁ > . . p. L,2 1. <ERRCODE _p > 2. <ERRTEXT _p >	
<i>Exception</i>	
OPID and LINKID are zero-length items when and only when S6,F25 is sent as a change notification rather than as a confirmation report. p = 0 if and only if RMACK indicates no errors.	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6,F26 Notification Report Send Acknowledge	S,H<->E
<i>Description</i>	
This message is used to acknowledge the confirmation report. It is defined for completeness and as an aid to the user in identifying problems.	
<i>Structure</i>	
<ACKC6>	
<i>Exception</i>	
None	



Stream, Function Name (Mnemonic)	Direction
S6,F27 Trace Report Send (TRS)	M,H<-E,[reply]
Description	The equipment sends a completed Trace Report to the host.
Structure	<pre> L,3 1. <DATAID> 2. <TRID> 3. L,n 1. L,p 1. L,2 1. <RPTID₁> 2. L,m (n cannot exceed group size specified by S2F53) 1. <V₁> . . m. <V_m> . p. L,2 1. <RPTID_p> 2. L,m 1. <V₁> . . m. <V_m> . n. L,p (p is the number of reports for each trace sample) 1. L,2 1. <RPTID₁> 2. L,m (number of items in this data report) 1. <V₁> . . m. <V_m> . p. L,2 1. <RPTID_p> 2. L,m 1. <V₁> . . m. <V_m> . . </pre>



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F28 Trace Report Send Acknowledge	S,H->E
<i>Description</i>	
The host Acknowledges receipt of the Trace Report.	
<i>Structure</i>	
<TRID>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F29 Trace Report Request (TRR)	S,H->E
<i>Description</i>	
Request that the data reports assigned to the trace report be sampled and returned to the host.	
<i>Structure</i>	
<TRID>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S6.F30 Trace Report Data (TRD)	M,H<-E
<i>Description</i>	
Message containing the requested data reports associated with the TRID of trace data report definition.	
<i>Structure</i>	
L, 3 1. <TRID> 2. L, n 1. L, 2 1. <RPTID ₁ > 2. L, m 1. <V ₁ > . . m. <V _m > . n. L, 2 1. <RPTID _n > 2. L, m 1. <V ₁ > . . m. <V _m > 3. <ERRCODE>	
<i>Exception</i>	
If TRID is unknown, a zero-length list (n = 0) shall be sent. Item 3 (ERRCODE) shall be set to zero length when there is no error.	

10.11 *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.



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F0 Abort Transaction (S7F0)	S,H<->E
<i>Description</i>	
Same form as S1,F0	
<i>Structure</i>	
<i>Exception</i>	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F1 Process Program Load Inquire (PPI)	S,H<->E,reply
<i>Description</i>	
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 (S7,F3/S7,F4) or a formatted process program (S7,F23/S7,F24),(S7,F31/S7,F32).	
<i>Structure</i>	
L , 2 1. <PPID> 2. <LENGTH>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F2 Process Program Load Grant (PPG)	S,H<->E
<i>Description</i>	
This message gives permission for the process program to be loaded.	
<i>Structure</i>	
<PPGNT>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F3 Process Program Send (PPS)	M,H<->E,reply
<i>Description</i>	
The program is sent. If S7,F3 is multi-block, it must be preceded by the S7,F1/S7,F2 Inquire/Grant transaction.	
<i>Structure</i>	
L , 2 1. <PPID> 2. <PPBODY>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F4 Process Program Acknowledge (PPA)	S,H<->E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC7>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F5 Process Program Request (PPR)	S,H<->E,reply
<i>Description</i>	
This message is used to request the transfer of a process program.	
<i>Structure</i>	
<PPID>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F6 Process Program Data (PPD)	M,H<->E
<i>Description</i>	
This message is used to transfer a process program.	
<i>Structure</i>	
L , 2 1. <PPID> 2. <PPBODY>	
<i>Exception</i>	
A zero-length list means request denied.	

NOTE 7: 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.

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F7 Process Program ID Request (PIR)	S,H<->E,reply
<i>Description</i>	
This message is used to request the PPID for use on the material identified.	
<i>Structure</i>	
<MID>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F8 Process Program ID Data (PID)	S,H->E
<i>Description</i>	
This message is used to transmit a single matrix entry in response to S7,F7.	
<i>Structure</i>	
L , 2 1. <PPID> 2. <MID>	
<i>Exception</i>	
A zero-length list returned means no such MID or other error.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F9 M/P M Request (MMR)	S,H<->E,reply
<i>Description</i>	
This message is used to request the transmission of the material/process matrix. If the message is from the host, the response will be the current matrix in the equipment. If the message is from the equipment, the response will be a new matrix to initialize the equipment.	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	

NOTE 8: 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.



Stream, Function Name (Mnemonic)	Direction
S7,F10 M/P M Data (MMD)	M,H<->E
<i>Description</i>	
In the response to S7,F9, the equipment will transmit the current matrix it contains. The matrix will be the sum of all matrix updates transmitted since initialization less the completed material whose linkages have been deleted. Programs with no pending material will be deleted from the matrix but not from the equipment program directory.	
<i>Structure</i>	
L,n	number of process programs
1. L,2	
1. <PPID ₁ >	
2. L,a	(number of MID for this PPID)
1. <MID ₁ >	
.	
.	
a. <MID _a >	
2. L,2	
.	
.	
n. L,2	
1. <PPID _n >	
2. L,b	
1. <MID ₁ >	
.	
.	
b. <MID _b >	
Function 10	Example 2 process programs (1 and 3 MID, respectively)
L,2	
L,2	
1. <PPID ₁ >	
2. L,1	
1. <MID _a >	
L,2	
1. <PPID ₂ >	
2. L,3	
1. <MID _b >	
2. <MID _c >	
3. <MID _d >	
<i>Exception</i>	
a = 0 indicates that this PPID will be used for all material processed. The last default transmitted will be the one used; all other entries will be deleted from the active matrix. A zero-length list returned means no such matrix.	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F11 M/P M Update Send (UMS)	S,H->E,[reply]
<i>Description</i>	
This message is used by the host to add to the M/PM in the equipment.	
<i>Structure</i>	
<pre> L,n (number of process programs) 1. L,2 1. <PPID₁> 2. L,a (number of MID's using PPID1) 1. <MID₁> . . a. <MID_a> 2. L,2 . . n. L,2 1. <PPID_n> 2. L,b 1. <MID₁> . . b. <MID_b></pre>	
<i>Exception</i>	
If a = 0, then the preceding PPID is to be used for all material processed. All other entries will be deleted from the active matrix.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F12 M/P M Update Acknowledge (UMA)	S,H<-E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC7>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F13 Delete M/P M Entry Send (DES)	S,H->E,[reply]
<i>Description</i>	
This message is used to delete program to material linkages in the M/PM of the equipment.	
<i>Structure</i>	
<pre> L,n (number of process programs) 1. L,2 1. <PPID₁> L,a (number of MID's using PPID) 1. <MID₁> . . a. <MID_a> 2. L,2 . . n. L,2 1. <PPID_n> 2. L,b 1. <MID₁> . . b. <MID_b></pre>	
<i>Exception</i>	
A delete consisting of a zero-length means delete all entries and generate a S7,F9 request to initialize matrix.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F14 Delete M/P M Entry Acknowledge (DEA)	S,H<-E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC7>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F15 Matrix Mode Select Send (MMS)	S,H->E,reply
<i>Description</i>	
This message is used by the host to change the method of process program selection in the equipment which might not support all modes.	
<i>Structure</i>	
<MMODE>	
<i>Exception</i>	
None	



Stream, Function Name (Mnemonic)	Direction
S7,F16 Matrix Mode Select Acknowledge (MMA)	S,H<-E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC7>	
<i>Exception</i>	
None	

NOTE 9: The matrix structure allows the program linkages to be established 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.

Stream, Function Name (Mnemonic)	Direction
S7,F17 Delete Process Program Send (DPS)	S,H->E,reply
<i>Description</i>	
This message is used by the host to request the equipment to delete process programs from equipment storage.	
<i>Structure</i>	
L, n 1. <PPID ₁ > . . . n. <PPID _n >	(Number of process programs to be deleted)
<i>Exception</i>	
If n = 0, then delete all.	

Stream, Function Name (Mnemonic)	Direction
S7,F18 Delete Process Program Acknowledge (DPA)	S,H<-E
<i>Description</i>	
Acknowledge or error	
<i>Structure</i>	
<ACKC7>	
<i>Exception</i>	
None	

Stream, Function Name (Mnemonic)	Direction
S7,F19 Current EPPD Request (RER)	S,H->E,reply
<i>Description</i>	
This message is used to request the transmission of the current equipment process program directory (EPPD). This is a list of all the PPIDs of the process programs stored in the equipment.	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F20 Current EPPD Data (RED)	M,H<-E
<i>Description</i>	
This message is used to transmit the current EPPD.	
<i>Structure</i>	
L,n 1. <PPID ₁ > . . n. <PPID _n >	(number of process programs in the directory)
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F21 Equipment Process Capabilities Request (PCR)	S,H->E,reply
<i>Description</i>	
This message is used to request the Equipment Process Capabilities Data (PCD).	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>	
S7,F22 Equipment Process Capabilities Data (PCD)	M,H<-E	
<i>Description</i>		
This equipment message provides the information necessary for the host to create and partially verify the contents of a new process program or display the object of a process program previously generated by a host or equipment. The PCD defines the process program content acceptable to the originating equipment.		
<i>Structure</i>		
L,5		
1. <MDLN>		
2. <SOFTREV>		
3. <CMDMAX>		
4. <BYTMAX>		
5. L,c	(c = Number of Possible Commands)	
1. L,11		
1. <CCODE>		
2. <CNAME>		
3. <RQCMD>		
4. <BLKDEF>		
5. <BCDS>		
6. <IBCDS>		
7. <NBCDS>		
8. <ACDS>		
9. <IACDS>		
10. <NACDS>		
11. L,p	(p = Number of Parameters)	
1.	(parameter specification) (see below)	
.		
.		
p.	(parameter specification)	
2. L,11		
.		
.		
c. L,11		
Parameter specifications depend on the data type of each parameter. The structure of each of the possible three groups is as follows:		
Numeric Data	String Data	Boolean Data
L,9	L,5	L,4
1. <PNAME>	1. <PNAME>	1. <PNAME>
2. <RQPAR>	2. <RQPAR>	2. <RQPAR>
3. <PDFLT>	3. <PDFLT>	3. <PDFLT>
4. <PMAX>	4. <PMAX>	4. <PMAX>
5. <LLIM>	5. L,s	
6. <ULIM>	1. <STEMP ₁ >	
7. <UNITS>	.	
8. <RESC>	.	
9. <RESV>	s. <STEMP _s >	
<i>Exception</i>		
None		



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F23 Formatted Process Program Send (FPS)	M,H<->E.reply
<i>Description</i>	
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 S7,F23 is multi-block, it must be preceded by the S7,F1/F2 Inquire/Grant transaction.	
<i>Structure</i>	
L,4	
1. <PPID>	
2. <MDLN>	
3. <SOFTREV>	
4. L,c	(c = Number of Process Commands)
1. L,2	
1. <CCODE>	
2. L,p	(p = Number of Parameters)
1. <PPARM ₁ >	
.	
.	
p. <PPARM _p >	
2. L,2	
.	
.	
c. L,2	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F24 Formatted Process Program Acknowledge (FPA)	S,H<->E
<i>Description</i>	
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 (S7,F27/S7,F28).	
<i>Structure</i>	
<ACKC7>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F25 Formatted Process Program Request (FPR)	S,H<->E.reply
<i>Description</i>	
This message is used by either equipment or host to request a particular process program from the other.	
<i>Structure</i>	
<PPID>	
<i>Exception</i>	
None	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F26 Formatted Process Program Data (FPD)	M,H<->E
<i>Description</i>	
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.	
<i>Structure</i>	
<pre>L , 4 1. <PPID> 2. <MDLN> 3. <SOFTREV> 4. L,c (c = Number of Process Commands) 1. L,2 1. <CCODE> 2. L,p (p = Number of Parameters) 1. <PPARM₁> . . p. <PPARM_p> 2. L,2 . . c. L,2</pre>	
<i>Exception</i>	
A zero length list indicates the request was denied.	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F27 Process Program Verification Send (PVS)	S,H<-E,reply
<i>Description</i>	
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 (S7,F23; S7,F26; S7,F31) or a large process program that was transferred via Stream 13 Data set Transfer Protocol (S7,F37; S7,F39; S7,F41; S7,F43). The verification of large unformatted process programs checks that the received process program is intact and was not corrupted by the Stream 13 transfer (e.g. by trying to load it). If S7,F27 is multi-block, it must be preceded by the S7,F29/S7,F30 Inquire/Grant Transaction.	
<i>Structure</i>	
<pre>L , 2 1. <PPID> 2. L,n (n = number of errors being reported) 1. L,3 1. <ACKC7A> 2. <SEQNUM> 3. <ERRW7> 2. L,3 . . n. L,3</pre>	
<i>Exception</i>	



<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F28 Process Program Verification Acknowledge (PVA)	S,H->E
<i>Description</i>	
Reply by host to equipment acknowledging reception of Process Program Verification Send (PVS).	
<i>Structure</i>	
Header only	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F29 Process Program Verification Inquire (PVI)	S,H<-E,reply
<i>Description</i>	
This message allows a piece of equipment to ask a host for permission to send a multi-block PVS.	
<i>Structure</i>	
<LENGTH>	
<i>Exception</i>	
None	

<i>Stream, Function Name (Mnemonic)</i>	<i>Direction</i>
S7,F30 Process Program Verification Grant (PPGNT)	S,H->E
<i>Description</i>	
Reply by host to equipment providing response to Process Program Verification Inquire (PVI).	
<i>Structure</i>	
<PPGNT>	
<i>Exception</i>	
None	