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# APPENDICES

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# APPENDIX A

SEMI EQUIPMENT COMMUNICATIONS STANDARD 2 MESSAGES

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## (SECS-II)

**Stream 0 and Function 0****Stream 1 Equipment Status**

S1,F0	Abort Transaction (S1F0)
S1,F1	Are You There Request ( R )
S1,F2	On Line Data (D)
S1,F3	Selected Equipment Status Request (SSR)
S1,F4	Selected Equipment Status Data (SSD)
S1,F5	Formatted Status Request (FSR)
S1,F6	Formatted Status Data (FSD)
S1,F7	Fixed Form Request (FFR)
S1,F8	Fixed Form Data (FFD)
S1,F9	Material Transfer Status Request (TSR)
S1,F10	Material Transfer Status Data (TSD)
S1,F11	Status Variable NameList Request (SVNR)
S1,F12	Status Variable NameList Reply (SVNRR)
S1,F13	Establish Communications Request (CR)
S1,F14	Establish Communications Request Acknowledge (CRA)
S1,F15	Request OFF-LINE (ROFL)
S1,F16	OFF-LINE Acknowledge (OFLA)
S1,F17	Request ON-LINE (RONL)
S1,F18	ON-LINE Acknowledge (ONLA)
S1,F19	Get Attribute (GA)
S1,F20	Attribute Data (AD)

**Stream 2 Equipment Control and Diagnostics**

S2,F0	Abort Transaction (S2F0)
S2,F1	Service Program Load Inquire (SPI)
S2,F2	Service Program Load Grant (SPG)
S2,F3	Service Program Send (SPS)
S2,F4	Service Program Send Acknowledge (SPA)
S2,F5	Service Program Load Request (SPR)
S2,F6	Service Program Load Data (SPD)
S2,F7	Service Program Run Send (CSS)
S2,F8	Service Program Run Acknowledge (CSA)

S2,F9	Service Program Results Request (SRR)
S2,F10	Service Program Results Data (SRD)
S2,F11	Service Program Directory Request (SDR)
S2,F12	Service Program Directory Data (SDD)
S2,F13	Equipment Constant Request (ECR)
S2,F14	Equipment Constant Data (ECD)
S2,F15	New Equipment Constant Send (ECS)
S2,F16	New Equipment Constant Acknowledge (ECA)
S2,F17	Date and Time Request (DTR)
S2,F18	Date and Time Data (DTD)
S2,F19	Reset/Initialize Send (RIS)
S2,F20	Reset Acknowledge (RIA)
S2,F21	Remote Command Send (RCS)
S2,F22	Remote Command Acknowledge (RCA)
S2,F23	Trace Initialize Send (TIS)
S2,F24	Trace Initialize Acknowledge (RCA)
S2,F25	Loopback Diagnostic Request (LDR)
S2,F26	Loopback Diagnostic Data (LDD)
S2,F27	Initiate Processing Request (IPR)
S2,F28	Initiate Processing Acknowledge (IPA)
S2,F29	Equipment Constant Namelist Request (ECNR)
S2,F30	Equipment Constant Namelist (ECN)
S2,F31	Date and Time Set Request (DTS)
S2,F32	Date and Time Set Acknowledge (DTA)
S2,F33	Define Report (DR)
S2,F34	Define Report Acknowledge (DRA)
S2,F35	Link Report/Event (LER)
S2,F36	Link Report/Event Acknowledge (LERA)
S2,F37	Enable/Disable Event-Report (EDER)
S2,F38	Enable2Disable Event Report Acknowledge (EERA)
S2,F39	Multi-block Inquire (MBI)
S2,F40	Multi-block Grant (MBG)
S2,F41	Host Command Send (HCS)
S2,F42	Host Command Acknowledge (HCA)
S2,F43	Reset Spooling Streams and Functions (RSSF)

S2,F44	Reset Spooling Acknowledge (RSA)
S2,F45	Define Variable Limit Attribute Acknowledge (DVLA)
S2,F46	Variable Limit Attribute Acknowledge (VLAA)
S2,F47	Variable Limit Attribute Request (VLAR)
S2,F48	Variable Limit Attribute Send (VLAS)
S2,F49	Enhanced Remote Command
S2,F50	Enhanced Remote Command Acknowledge

### Stream 3 Material Status

S3,F0	Abort Transaction (S3F0)
S3,F1	Material Status Request (MSR)
S3,F2	Material Status Data (MSD)
S3,F3	Time to Completion Request (TCR)
S3,F4	Time to Completion Data (TCD)
S3,F5	Material Found Send (MFS)
S3,F6	Material Found Acknowledge (MFA)
S3,F7	Material Lost Send (MLS)
S3,F8	Material Lost Acknowledge (MLA)
S3,F9	Material ID Equate Send (IES)
S3,F10	Material ID Equate Acknowledge (IEA)
S3,F11	Material ID Request (MIDR)
S3,F12	Material ID Request Acknowledge (MIRA)
S3,F13	Material ID Send
S3,F14	Material ID Acknowledge

### Stream 4 Material Control

S4,F0	Abort Transaction (S4F0)
S4,F1	Ready to Send Material (RSN)
S4,F2	Ready to Send Acknowledge (RSA)
S4,F3	Send Material (SMN)
S4,F4	Not Used
S4,F5	Handshake Complete (HCN)
S4,F6	Not Used
S4,F7	Not Ready to Send (ABN)
S4,F8	Not Used
S4,F9	Stuck in Sender (SSN)

S4,F10	Not Used
S4,F11	Stuck in Receiver (SRN)
S4,F12	Not Used
S4,F13	Send Incomplete Timeout (SIN)
S4,F14	Not Used
S4,F15	Material Received (MRN)
S4,F16	Not Used
S4,F17	Request to Receive (RTR)
S4,F18	Request to Receive Acknowledge (RRA)

#### Macro Level Messages

S4,F19	Transfer Job Create (TJ)
S4,F20	Transfer Job Acknowledge (TJA)
S4,F21	Transfer Job Command (TJC)
S4,F22	Transfer Command Acknowledge (TCA)
S4,F23	Transfer Job Alert (TJA)
S4,F24	Transfer Alert Acknowledge (TLA)
S4,F25	Multi-Block Inquire (MB14)
S4,F26	Multi-Block Grant (MBG4)

#### Micro Level Messages

S4,F27	Handoff Ready (HR)
S4,F28	Not Used
S4,F29	Handoff Command (HC)
S4,F30	Not Used
S4,F31	Handoff Command Complete (HCC)
S4,F32	Not Used
S4,F33	Handoff Verify (HV)
S4,F34	Not Used
S4,F35	Handoff Cancel Ready (HCR)
S4,F36	Not Used
S4,F37	Handoff Cancel Ready Acknowledge (HCA)
S4,F38	Not Used
S4,F39	Handoff Halt (HH)
S4,F40	Not Used
S4,F41	Handoff Halt Acknowledge (HHA)
S4,F42	Not Used



**Stream 5 Exception Handling**

S5,F0	Abort Transaction (S5F0)
S5,F1	Alarm Report Send (ARS)
S5,F2	Alarm Report Acknowledge (ARA)
S5,F3	Enable/Disable Alarm Send (EAS)
S5,F4	Enable/Disable Alarm Acknowledge (EAA)
S5,F5	List Alarms Request (LAR)
S5,F6	List Alarm Data (LAD)
S5,F7	List Enabled Alarm Request
S5,F8	List Enabled Alarm Data
S5,F9	Exception Post Notify (EXPN)
S5,F10	Exception Post Confirm (EXPC)
S5,F11	Exception Clear Notify (EXCN)
S5,F12	Exception Clear Confirm (EXCC)
S5,F13	Exception Recover Request (EXRR)
S5,F14	Exception Recover Acknowledge (EXRA)
S5,F15	Exception Recovery Complete Notify (EXRCN)
S5,F16	Exception Recovery Complete Confirm (EXRCC)
S5,F17	Exception Recovery Abort Request (EXRAR)
S5,F18	Exception Recovery Abort Acknowledge (EXRAA)

**Stream 6 Data Collection**

S6,F0	Abort Transaction (S6F0)
S6,F1	Trace Data Send (TDS)
S6,F2	Trace Data Acknowledge (TDA)
S6,F3	Discrete Variable Data Send (DVS)
S6,F4	Discrete Variable Data Acknowledge (DVA)
S6,F5	Multi-block Data Send Inquire (MBI)
S6,F6	Multi-block Grant (MBG)
S6,F7	Data Transfer Request (DDR)
S6,F8	Data Transfer Data (DDD)
S6,F9	Formatted Variable Send (FVS)
S6,F10	Formatted Variable Acknowledge (FVA)
S6,F11	Event Report Send (ERS)
S6,F12	Event Report Acknowledge (ERA)
S6,F13	Annotated Event Report Send (AERS)

S6,F14	Annotated Event Report Acknowledge (AERA)
S6,F15	Event Report Request (ERR)
S6,F16	Event Report Data (ERD)
S6,F17	Annotated Event Report Request (AERR)
S6,F18	Annotated Event Report Data (AERD)
S6,F19	Individual Report Request (IRR)
S6,F20	Individual Report Data (IRD)
S6,F21	Annotate Individual Report (AIR)
S6,F22	Annotated Individual Report Data (AIRD)
S6,F23	Request Spooled Data (RSD)
S6,F24	Request Spooled Data Acknowledgement Send (RSDAS)
S6,F25	Notification Report Send
S6,F26	Notification Report Send Acknowledge
S6,F27	Trace Report Send (TRS)
S6,F28	Trace Report Send Acknowledge (TRSA)
S6,F29	Trace Report Request (TRR)
S6,F30	Trace Report Data (TRD)

#### Stream 7 Process Program Management

S7,F0	Abort Transaction (S7F0)
S7,F1	Process Program Load Inquire (PPI)
S7,F2	Process Program Load Grant (PPG)
S7,F3	Process Program Send (PPS)
S7,F4	Process Program Acknowledge (PPA)
S7,F5	Process Program Request (PPR)
S7,F6	Process Program Data (PPD)
S7,F7	Process Program ID Request (PPR)
S7,F8	Process Program ID Data (PID)
S7,F9	M/P M Request (MMR)
S7,F10	M/P M Data (MMD)
S7,F11	M/P M Update Send (UMS)
S7,F12	M/P M Update acknowledge (UMA)
S7,F13	Delete M/P M Entry Send (DES)
S7,F14	Delete M/P M Entry Acknowledge (DEA)
S7,F15	Matrix Mode Select Send (MMS)
S7,F16	Matrix Mode Select Acknowledge (MMA)

S7,F17	Delete Process Program Send (DPS)
S7,F18	Delete Process Program Acknowledge (DPA)
S7,F19	Current EPPD Request (RER)
S7,F20	Current EPPD Data (RED)
S7,F21	Equipment Process Capabilities Request (PCR)
S7,F22	Equipment Process Capabilities Data (PCD)
S7,F23	Formatted Process Program Send (FPS)
S7,F24	Formatted Process Program Acknowledge (FPA)
S7,F25	Formatted Process Program Request (FPR)
S7,F26	Formatted Process Program Data (FPD)
S7,F27	Process Program Verification Send (PVS)
S7,F28	Process Program Verification Acknowledge (PVA)
S7,F29	Process Program Verification Inquire (PVI)
S7,F30	Process Program Verification Grant (PVG)
S7,F31	Verification Request Send (VRS)
S7,F32	Verification Request Acknowledge (VRA)
S7,F33	Process Program Available Request (PAR)
S7,F34	Process Program Available Data (PAD)
S7,F35	Process Program for MID Request (PPMR)
S7,F36	Process Program for MID Data (PPMD)

#### Stream 8 Control Program Transfer

S8,F0	Abort Transaction (S8F0)
S8,F1	Boot Program Request (BPR)
S8,F2	Boot Program Data (BPD)
S8,F3	Executive Program Request (EPR)
S8,F4	Executive Program Data (EPD)

#### Stream 9 System Errors

S9,F0	Abort Transaction (S9)
S9,F1	Unrecognized Device ID (UDN)
S9,F2	Not Used
S9,F3	Unrecognized Stream Type (USN)
S9,F4	Not Used
S9,F5	Unrecognized Function Type (UFN)
S9,F6	Not Used

S9,F7	Illegal Data (IDN)
S9,F8	Not Used
S9,F9	Transaction Timer Timeout (TTN)
S9,F10	Not Used
S9,F11	Data Too Long (DLN)
S9,F12	Not Used
S9,F13	Conversation Timeout (CTN)
S9,F14	Not Used

#### Stream 10 Terminal Services

S10,F0	Abort Transaction (S10F0)
S10,F1	Terminal Request (TRN)
S10,F2	Terminal Request Acknowledge (TRA)
S10,F3	Terminal Display, Single (VTN)
S10,F4	Terminal Display, Single Acknowledge (VTA)
S10,F5	Terminal Display, Multi-block (VTN)
S10,F6	Terminal Display, Multi-block Acknowledge (BCA)
S10,F7	Multi-block Not Allowed (MNN)
S10,F8	Not Used
S10,F9	Broadcast (BCN)
S10,F10	Broadcast Acknowledge (BCA)

#### Stream 11 Host File Services (Deleted)

#### Stream 12 Wafer Mapping

S12,F0	Abort Transaction (S12F0)
S12,F1	Map Set-Up Data Send (MSDS)
S12,F2	Map Set-Up Data Acknowledge (MSDA)
S12,F3	Map Set-Up Data Request (MSDR)
S12,F4	Map Set-Up Data (MSD)
S12,F5	Map Transmit Inquire (MAPTI)
S12,F6	Map Transmit Grant (MAPTG)
S12,F7	Map Data Send Type 1 (MDS1)
S12,F8	Map Data Acknowledge Type 1 (MDA1)
S12,F9	Map Data Send Type 2 (MDS2)
S12,F10	Map Data Acknowledge Type 2 (MDA2)
S12,F11	Map Data Send Type 3 (MDS3)

S12,F12	Map Data Acknowledge 3 (MDA3)
S12,F13	Map Data Request Type 1 (MDR1)
S12,F14	Map Data Type 1 (MD1)
S12,F15	Map Data Request Type2 (MDR2)
S12,F16	Map Data Type 2 (MD2)
S12,F17	Map Data Request Type 3 (MDR3)
S12,F18	Map Data Type 3 (MD3)
S12,F19	Map Error Report Send (MERS)
S12,F20	Not Used



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# APPENDIX B

DATA ITEMS DICTIONARY

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## Data Items Dictionary

The following data items are used by the SECS-II messages. The standard definition in E591 is used except where additional restrictions apply:

**ABS**

Format: 10

Any binary sting.

Note: - The ESEC Die Bonder 2007 limits this string to 16 characters.

Where Used: S2F25, S2F26

**ACKC6**

Format: 10

Acknowledge code, 1 byte.

0 = Accepted and done.

>0 = Error, not done

1-63 = Reserved.

Where Used: S6F12

**ACKC7**

Format: 10

Acknowledge code, 1 byte.

0 = Accepted.

1 = Permission not granted.

2 = Length error.

3 = Matrix overflow

4 = PPID not found.

5 = Mode unsupported.

>5 = Other errors.

6-63 = Reserved.

64 = Access failure (hard disk problem on equipment).

65 = Transfer failure (hard disk problem on equipment).

66 = No more place on equipment.

Where Used: S7F4, S7F18

**ARRIX**

Format: 52

Index in the wafer map data array of the picked chip.

Where Used: S12F83

**BCEQU**

Format: 20

Bin code equivalents.

- Array of all codes that are to be processed. Must be the same format as BINLT and NULBC.
- Zero-length indicates all codes be sent.

Note: - If the equipment sends a zero-length item. The host may select the bin codes to process  
Process using the message S12,F4. This allows to implement inkless binning. Up to 255  
bin-codes can be selected.

- The equipment can also back the same BCEQU. In this case, the host should echo back the  
same ECEQU. This is used to select the bins to process at the equipment.

Where Used: S12F3, S12F4

**BIN**

Format: 20

Null bincode which has been defined in the wafer map data for the picked chip.

Where Used: S12F83

**BINLT**

Format: 20

The Bin List.

- Array of all bin values.

Where Used: S12F9, S12F16

**CEID**

Format: 54

Collected Event Identifier.

Where Used: S6F11

**COLCT**

Format: 52

Column count in die increments.

Where Used: S12F1, S12F4



**COMMACK**

Format: 10

Establish Communications Acknowledge Code, 1byte.

- 0 = Accepted.
- 1 = Denied, try again.
- 2-63 = Reserved.

Where Used: S1F14

**CPACK**

Format: 10

Command Parameter Acknowledge Code, 1 byte.

- 0 = Not used.
- 1 = Parameter name (CPNAME) does not exist.
- 2 = Illegal value specified for CPVAL.
- 3 = Illegal format specified for CPVAL.
- >3 = Other equipment specific errors.
- 4-63 = Reserved.

Where Used: S2F42

**CPNAME**

Format: 20

Command parameter name.

- Note:
- See Section 4.4 Remote Control for a full definition of this data item.
  - The ESEC Die Bonder 2007 accepts only the parameter names defined in the section 4.4 CPNAME's must be sent from the host as they are defined, that is case sensitive and without any supplementary blank space.

Where Used: S2F41, S2F42

**CPVAL**

Format: 10,20,52,5

Command parameter value.

CPNAME	CPVAL SEMI Type	CPVAL Type
ProcessDef	52	Unsigned 2-bytes integer
ProcessCount	54	Unsigned 4-bytes integer
PPID	20	ASCII (max. 8 characters)
Magazined	20	ASCII (max. 16 characters)
AssistDef	52	Unsigned 2-bytes integer
PPExecName	20	ASCII (max. 8 characters)
LotID	20	ASCII (max. 7 characters)

- Note:
- See Section 4.4 Remote Control for a full definition of this data item.

Where Used: S2F41

**DATAID**

Format: 54

Data Identifier.

A unique name used to link multi-block messages for a single event report.

Where Used: S6F5, S6F11

**DATALENGTH**

Format: 20

Die Units of Measure.

Note: - The ESEC Die Bonder 2007 does not use this parameter because it is not possible for a host to compute the expansion. The equipment learns its index during TEACH.

Where Used: S12F1, S12F4

**DIVAL**

Format: 10,11,20,21,3(),4(),5()

Data Value.

Where Used: S6,F11

**EAC**

Format: 10

Equipment Acknowledge Code, 1 byte.

- 0 = Acknowledge.
- 1 = Denied, at least one constant does not exists
- 2 = Denied, busy.
- 3 = Denied, at least one constant out of range.
- >3 = Other equipment specific errors.
- 4-63 = Reserved.
- 64 = Reserved.
- 65 = Denied, Illegal format.
- 66 = Denied, Equipment not in remote control state.
- 67 = Denied, Equipment no in ready processing state.
- 68 = Denied, Several ECV specified.
- 69 = Denied, ECV item format not compatible.
- 70 = Denied, ECV only settable via remote command.
- 71 = Denied, zero length ECV received.
- 72 = Denied, ECV data too long.
- 73 = Denied, ECV not configured.
- 74 = Denied, ECV not activated.

Where Used: S2F16

ECID

Format: 54

Equipment Constant Identifier.

Where Used: S2F13,F15,F29,F30

ECMAX

Format: 10,11,20,21,3(),4(),5()

Equipment constant maximum value.

Where Used: S2F30

ECMIN

Format: 10,11,20,21,3(),4(),5()

Equipment constant minimum value.

Where Used: S2F30

ECNAME

Format: 20

Equipment constant name.

Where Used: S2F30

ECV

Format: 10,11,20,21,3(),4(),5()

Equipment Constant Value.

Where Used: S2F15

EDID

Format: 10,20,3(),5()

Expected Data Identification.

Three possible responses

MEXP	EDID	EDID
S2F3	<SPID>	A[6]
S3F13	<PTN>	B[1]
S7F3	<PPID>	A[16], B[16]

Where used: S9F13

FFROT

Format: 52

Film Frame Rotation.

- In degrees from the bottom CW (Bottom equals zero degrees).
- Zero-length item indicates not used.

Note: - The ESEC Die Bonder 2007 does not use this parameter since contained in FNLOC. It sends a Zero-length item.

Where Used: S12F1, S12F3

## FNLOC

Format: 52

Flat/Notch Location.

- In degrees from the bottom CW (Bottom equals zero degrees).
- Zero-length item indicates not used.

Note: - The ESEC Die Bonder 2007 define FNLOC as the sum of frame and wafer rotation.

This item is mandatory. The equipment awaits from the host in message S12F4 the same value it previously sent to the host in message S12F3.

Where Used: S12F1, S12F3, S12F4

## GRANT6

Format: 10

Permission to send, 1 byte.

- |      |   |                     |
|------|---|---------------------|
| 0    | = | Permission granted. |
| 1    | = | Busy, try again.    |
| 2    | = | Not interested.     |
| >2   | = | Other errors.       |
| 3-63 | = | Reserved.           |

Note: - Code 1 "Busy, try again" is not supported.

Where Used: S6F6

## GRNT1

Format: 10

Grand code, 1 byte.

- |      |   |  |            |
|------|---|--|------------|
| 0    | = | Positive response, transfer ok.        |            |
| 1    | = | Busy, try again.                       |            |
| 3    | = | No space.                              |            |
| 4    | = | Duplicate ID.                          |            |
| 5    | = | Material ID not found.                 |            |
| 6    | = | Unknown map format.                    |            |
| >6   | = | Other errors.                          |            |
| 7-63 | = | Reserved.                              |            |
| 64   | = | Denied, Wafer mapping capability busy. | (internal) |
| 65   | = | Denied, Send error.                    | (internal) |
| 66   | = | Denied, Host aborted with S12F0        | (internal) |
| 67   | = | Denied, S12F5 Reply timeout            | (internal) |
| 68   | = | Denied, Host communication error       | (internal) |

Note: - Code 1 "Busy, try again" is not supported.

Where Used: S12F6

**HCACK**

Format: 10

Host command Parameter Acknowledge code, 1 byte.

- 0 = Acknowledge, command has been performed.
- 1 = Command does not exist.
- 2 = Cannot perform now.
- 3 = At least one parameter is invalid.
- 4 = Acknowledge, command will be performed with completion signalled later by an event
- 5 = Rejected, Already in Requested State
- >5 = Other equipment specific error.
- 6-63 = Reserved.

Where Used: S2F42

**IDTYP**

Format: 10

Identifier Type.

- 0 = Wafer ID.
- 1 = Wafer Cassette ID.
- 2 = Film Frame ID.
- >2 = Error.
- 3-63 = Reserved.

Note: - The ESEC Die Bonder 2007 sends to the host in both messages S12F3 / F15 a value of 2 (Film Frame ID). The equipment accepts a zero-length item in both messages S12F4/F16 or an echoed value of 2.

Where Used: S12F1, S12F3, S12F4, S12F9, S12F15, S12F16

**LENGTH**

Format: 54

Length of the process program in bytes.

Where Used: S7F1

**MAPFT**

Format: 10

Map data format type.

- 0 = Row format.
- 1 = Array format.
- 2 = Coordinate format.
- >2 = Error
- 3-63 = Reserved.

Note: - The ESEC Die Bonder 2007 use Array format (MAPFT=1)

Where Used: S12F3, S12F5

**MDACK**

Format: 10

Map data acknowledge.

- 0 = Map received.
- 1 = Format error.
- 2 = No ID match
- 3 = Abort / discard map.
- >3 = Other errors.
- 4-63 = Reserve.
- 99 = Undefined error.

Where Used: S12F10

**MDLN**

Format: 20

Equipment Model Type, 6 byte.

Where Used: S1F2, S1F13, S1F14

**MEXP**

Format: 20

Message expected in the form SxxFyy where xx is stream and y is function.

Where Used: S9F13

**MHEAD**

Format: 10

SECS message block header associated with message block in error.

Where Used: S9F1, S9F3, S9F5, S9F7, S9F11

**MID**

Format: 20

Material identifier, up to 16 bytes.

Where Used: S12F1, S12F3, S12F4, S12F5, S12F9, S12F15, S12F16

**MLACK**

Format: 10

## Map data reLoad acknowledge code

- 0 = Positive response, ok for transfer.
- >0 = Other errors.
- 1-63 = Reserved.
- 64 = Denied, Wafer mapping already reloading map to host.
- 65 = Denied, Busy, Wafer mapping loading a new map.
- 66 = Denied, Wafer mapping busy.
- 67 = Denied, Map reload function is disabled
- 68 = Denied, No map to reload.
- 99 = Defined, Error.

Where Used: S12F66

**MLCL**

Format: 52

## Message length.

- Defined by message size in bytes.

Note: - The ESEC Die Bonder 2007 does not use this parameter. A zero-length item or a dummy value  
Are accepted. On wafer map upload the equipment defines MLCL as the product of the  
ROWCT and COLCT values plus the offset due to the header and item formats and lengths.

Where Used: S12F4, S12F5

**MRACK**

Format: 10

## Map Restart acknowledge code

- 0 = Ok successful.
- >0 = Other errors.
- 1-63 = Reserved.
- 64 = Already restarted, No saved map.
- 65 = Error, No such material ID.
- 66 = Error, Wafer mapping busy, Try again.
- 67 = Error, Wafer mapping busy (internal)
- 68 = Error, Send Error. (internal)
- 69 = Error, Host aborted with S12F0 (internal)
- 70 = Error, S12F67 reply timeout. (internal)
- 71 = Error, Communication error. (internal)
- 72 = Error, Restart general error. (internal)
- 99 = Error, Undefined. (internal)

Where Used: S12F66

## NULBC

Format: 20

Null bin code value.

- This value is the bin code value that is used for no die at location.
- Zero-length indicates not used.

Note: The ESEC Die Bonder 2007 accepts following NULBC values from the host:

- zero-length item: equipment uses value defined on the equipment itself,
- Character: binary code of each produced die is replaced by NULBC value,
- string: each binary code of BCEQU is replaced by the corresponding one of NULBC; if NULBC is smaller than BCEQU NULBC is extended to the Right.

Where Used: S12F1, S12F3, S12F4

## ORLOC

Format: 10

Origin location

- Implicit value of (0,0).
- 0 = Center die of wafer. Determined by  $((ROWCT+1)/2, (COLCT+1)/2)$
- 1 = Upper right.
- 2 = Upper left.
- 3 = Lower left.
- 4 = Lower right.
- >4 = Error.
- 5-63 = Reserved.
- Zero-length indicates not used.

Note: - The ESEC Die Bonder 2007 assume the origin in the center of the wafer. So 0 is sent and also Expected. According to the standard, a transformation of the origin is done by the host.

Where Used: S12F1, S12F3, S12F4

## PPBODY

Format: 10

Process program body.

Where Used: S7F3, S7F6



**PPGNT**

Format: 10

Process program grant status, 1 byte.

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

Where Used: S7F2, S7F30

**PPID**

Format: 20

Process program identifier, 8 bytes.

The characters allowed for PPID are the same then for DSNAME, i.e.:

- a-z
- A-Z
- 0-9
- \$, £, &, %, @, \_

The case of alphabetic characters is not significant when comparing any two PPID's.

Where Used: S2F41, S7F1, S7F3, S7F5, S7F6, S7F17, S7F20

**PRAXI**

Format: 10

Process axis.

- 0 = Rows (X-axis), top, increasing.
- 1 = Rows (X-axis), top, decreasing.
- 2 = Rows (X-axis), bottom, increasing.
- 3 = Rows (X-axis), bottom, decreasing.
- 4 = Columns (Y-axis), left, increasing.
- 5 = Columns (Y-axis), left, decreasing.
- 6 = Columns (Y-axis), right, increasing.
- 7 = Columns (Y-axis), right, decreasing.
- >7 = Error.
- 8-63 = Reserved.

Note: - The ESEC Die Bonder 2007 set PRAXI=0. It except the map in x-direction, top line first, Increasing. The equipment will compute its processing strategy locally.

Where Used: S12F1, S12F4

PRDCT

Format: 52

Process Die Count.

- Number of die to be processed or number of die which have been processed.
- Zero-length indicated not used.

Note: - The ESEC Die Bonder 2007 does not use these parameters. A zero-length item or a dummy value are accepted.

Where Used: S12F1, S12F4

PTN

Format: 10

Material Port Number, 1 byte.

Where Used: S4F71, S4F81

RCMD

Format: 20

Remote Command Code or string.

- Note:
- See Section 4.4 Remote Control for a full definition of this data item.
  - The ESEC Die Bonder 2007 accepts only the remote commands defined in the Section 4.4 RCMD's must be sent from the host as they are defined, that is case sensitive and without any supplementary blank space.

Where Used: S2F41

REFP

Format: 32

Reference Point.

Where Used: S12F1, S12F4

ROWCT

Format: 52

Row count die increments.

Where Used: S12F1, S12F4

RPSEL

Format: 51

- Note: - The ESEC Die Bonder 2007 accepts up to 50 reference points. It can however handle only up to the number of reference points learned on the equipment.
- When 2 points are used, the reference chips may not be inked, because the reference chip Detection would be disturbed. The two points define the expansion, which is assumed to be the same in x and y direction, and the rotation.
  - During TEACH of the machine, the operator can select the parameters for the automatic Reference point search algorithm.

Where Used: S12F1, S12F4

### RPTID

Format: 54

Report Identifier.

Where Used: S6F11

### SDACK

Format: 10

Map set-up data acknowledge code

0	= Received data.	
>0	= Error.	
1-63	= Reserved.	
64	= Error, Wafer mapping busy.	(internal)
65	= Error, Send error.	(internal)
66	= Error, Host abort.	(internal)
67	= Error, Host reply timeout.	(internal)
68	= Error, Communication failure.	(internal)
99	= Error, Undefined.	(internal)

### SHEAD

Format: 10

Stored message header related to the transaction timer.

Where Used: S9F9

### SOFTREV

Format: 20

Software Revision code, 6 bytes.

Where Used: S1F12, S1F13, S1F14

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**SSPA**

Format: 10

Start / Stop Pick Logging Acknowledge code

- 0 = Start / Stop Pick Logging ok.
- >0 = Error.
- 1-63 = Reserved.
- 64 = Error, Wafer mapping not activated.
- 65 = Error, Wager handler not activated.
- 99 = Error, Undefined.

Where Used: S12F82

**SSPR**

Format: 10

Start / Stop Pick Logging code

- 0 = Stop Pick Logging.
- 1 = Start Pick Logging after next map upload.
- 2 = Start Pick Logging immediately.

Where Used: S12F81

**STRP**

Format: 32

Starting position in die coordinate position. Must be in (X, Y) order.

Note: - The ESEC Die Bonder 2007 does not used this parameter.

Where Used: S12F9, S12F16

**SV**

Format: 10,11,20,21,3(),4(),5()

Status Variable value.

Where Used: S1F4

**SVID**

Format: 54

Status Variable Data Identifier.

Where Used: S1F3

**SVNAME**

Format: 20

Status Variable Name

Where Used; S1F12

**TIACK**

Format: 10

Time Acknowledge code, 1 byte.

- 0 = OK.
- 1 = Error, not done.
- >2 = Equipment specific errors.
- 2-63 = Reserved.

Where Used: S2F32

**TIME**

Format: 20

Time of day, 12 bytes, yymmddhhmmss.

Where Used: S2F18, S2F31

**TRCD**

Format: 10

Transfer code, 1 byte.

- 0 = Transferred.
- 1 = Not transferred.

Where Used: S4F71, S4F81

**UNITS**

Format: 20

Units Identifier. As allowed by E5 section 9.

Where Used: S1F12, S2F30

**V**

Format: 0,10,11,20,21,3(),4(),5()

Variable Data Value (includes SVs, ECVs, DWVALs).

Where Used: S6F11

**XDIES**

Format: 52

X-axis die size (index).

Note: - The ESEC Die Bonder 2007 does not use this parameter because it is not possible for a host to compute the expansion. The equipment learns its index during TEACH. A zero-length item or a dummy value are accepted.

Where Used: S12F1, S12F4

YDIES

Format: 52

Y-axis die size (index).

Note: - The ESEC Die Bonder 2007 does not use this parameter because it is not possible for a host to compute the expansion. The equipment learns its index during TEACH. A zero-length item or a dummy value are accepted.

Where Used: S12F1, S12F4



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# APPENDIX C

COLLECTION EVENTS

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## Collection Events

### Collection Event Designation, CEID, RPTID

Collection Event Designation	CEID	Report Designation	RPTID	Reference / Comment	Valid DWAL
<b>Control Related Events</b>			<b>Section 3.3</b>		
Equipment OFF-LINE	0	Control State Changed	1	ON-LINE -> OFF-LINE, Corresponds to the Control State Model transition number #8.	Clock
Control State LOCAL	1	Control State Changed	1	REMOTE -> LOCAL or OFF-LINE -> LOCAL. Corresponds to the Control State Model transitions number #5,7,8.	Clock
Control State REMOTE	2	Control State Changed	1	LOCAL -> REMOTE or OFF-LINE -> REMOTE, Corresponds to the Control State Model transition number #5,7,8.	Clock
Operator Command	3	OperatorCommand	9	Operator issued a command as the equipment is in the REMOTE equipment control state. There is no state transition related to this event.	Operator Command
Operator Parameter	4	OperatorParameter	10	Operator issued a command as the equipment is in the REMOTE equipment control state. There is no state transition related to this event.	Operator Parameter
<b>Equipment Processing State Related Events</b>			<b>Section 3.4</b>		
NotReady State Entered	10	Processing State Changed	2	This event corresponds to the transition number #1,3,6 of the Processing State Model	Clock
Ready State Entered	11	Processing State Changed	2	This event corresponds to the transition number #2,5 of the Processing State Model	Clock
Executing State Entered	12	Processing State Changed	2	This event corresponds to the transition number #4 of the Processing State Model	Clock
SelfPreparing State Entered	13	Processing State Changed	2	This event is not currently implemented in the Processing State Model	Clock
<b>Exception Related Events</b>			<b>Section 4.3</b>		
Material Warning	20	Exception Occurred	3	Material warning: A piece of equipment is going to run out of material, but operation continues for a while. There is no state transition related to this event.	Clock ExceptionId ExceptionText



Equipment Warning	21	Exception Occurred	3	Equipment warning: An abnormal situation was detected, but operation continues, There is no state transition related to this event.	Clock ExceptionId ExceptionText
Material Stop Error	22	Exception Occurred	3	Material stop error: A piece of equipment detected the end of material. This situation will cause a stop of processing. Corresponds to Processing State Model transition numbers #5,6.	Clock ExceptionId ExceptionText
Equipment Stop Error	23	Exception Occurred	3	Equipment stop error: An abnormal situation was detected which requires operator intervention. This situation causes a stop of processing. Corresponds to Processing State Model transition numbers #5,6.	Clock ExceptionId ExceptionText
Software System Error	24	Exception Occurred	3	Software System Error: A fatal error was detected in the software. No recovery is possible, the piece of equipment has to be shut down. Corresponds to Processing State Model transition numbers #5,6.	Clock ExceptionId ExceptionText
Hardware System Error	25	Exception Occurred	3	Hardware System Error: A Fatal error was detected on the hardware.No recovery is possible, the piece of equipment has to be shut down. Corresponds to Processing State Model transition numbers #5,6.	Clock ExceptionId ExceptionText
Parameter Control Warning	26	Exception Occurred	3	Parameter control warning: A parameter is outside its normal limits and could damage material on the equipment, operation continues. Corresponds to Processing State Model transition numbers #5,6.	Clock ExceptionId ExceptionText
Parameter Control Error	27	Exception Occurred	3	Parameter control error: A parameter is outside reasonable limits. This situation causes a stop of processing. Corresponds to Processing State Model transition numbers #5,6.	Clock ExceptionId ExceptionText
Material Transfer Related Events				Section 4.7	
PostProcInBuf -> Output CPP	30	Magazine Transfer	4	The leadframe handler transferred a magazine from the post-processing input buffer to the output carrier processing position. There is no state transition related to this event.	Buffer State TransferDirection EventCount MagazineID

Output CPP -> PostProcOutBuf	31	Magazine Transfer Mag. Material Qualification	4, 8	The leadframe handler transferred a magazine from the output carrier processing position to the post-processing output buffer. There is no state transition related to this event.	Buffer State TransferDirection EventCount MagazineID
PreProcInBuf -> Input CPP	32	Magazine Transfer	4	The leadframe handler transferred a magazine from the preprocessing input buffer to the input carrier processing position. There is no state transition related to this event.	Buffer State TransferDirection EventCount MagazineID
Input CPP -> PreProcOutBuf	33	Magazine Transfer	4	The leadframe handler transferred a magazine from the input carrier processing position to the pre-processing output buffer. There is no state transition related to this event.	Buffer State TransferDirection EventCount MagazineID
Process Program Management Related Events			Section 4.8		
Process Program Change	40	Process Program Change	5	A process program has been created, edited, or deleted by the operator. There is no state transition related to this event.	PPChangeName PPChangeStatus
Process Program Select	41	Process Program Select	6	A process program has been selected by the operator. There is no state transition related to this event.	PPExecName
Equipment Constant Related Events			Section 4.5		
Operator Equipment Constant Change	50	Equipment Constant	7	An equipment constant has been changed by the operator or through the operation of the equipment. There is no state transition related to this event.	ECIDChang

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# APPENDIX D

VARIABLE ITEM DICTIONARY

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## Variable Item Dictionary

This section gives a list of all variable data items required by GEM or any of the additional capabilities. The ESEC Die Bonder 2007 has much more variable data items than these. A printout utility on the equipment generates for the current configuration the list of all available variable data items.

Designation	Description / Codes	Format	Class	Validity (CEID)	VID
<u>AlarmsEnabled</u>	<p>Contains the list of alarms (ALIDs) enabled for reporting via Stream 5.</p> <p>Structure: L.O (empty list).</p> <p>Note: The ESEC Die Bonder do not use this variable data item as no alarm management capability is implemented. This item is defined for compatibility purposes with the SEMI GEM Standard.</p>	0	SV		<u>110801</u>
<u>AlarmID</u>	<p>This variable is valid upon the setting or clearing of an alarm condition and contains the current alarm identification (ALID), regardless of whether that alarm is enabled for reporting.</p> <p>Note: The ESEC Die Bonder do not use this variable data item as no alarm management capability is implemented. This item is defined for compatibility purposes with the SEMI GEM Standard.</p>	54	DWVAL		<u>310800</u>
<u>AlarmsSet</u>	<p>Contents of this variable is a list of alarms (ALIDs) currently in the UNSAFE (alarm set) state, regardless whether the alarms are enabled for reporting.</p> <p>Structure: L.O (empty list).</p> <p>Note: The ESEC Die Bonder do not use this variable data item as no alarm management capability is implemented. This item is defined for compatibility purposes with the SEMI GEM Standard.</p>	0	SV		<u>110802</u>

AssistDet	<p>Programmable definition of assist function to be performed.</p> <ul style="list-style-type: none"> <li>1 = move to next leadframe</li> <li>2 = move to next leadframe, mark for new magazine</li> <li>3 = transfer input handler magazine</li> <li>4 = transfer output handler magazine</li> <li>5 = unload input handler magazine</li> <li>6 = unload output handler magazine</li> <li>7 = skip 1 device</li> <li>8 = remove leadframes from workholder</li> <li><u>9 = load input handler magazine</u></li> <li><u>10 = load output handler magazine</u></li> <li>21 = unload wafer</li> <li>22 = load wafer</li> <li>23 = move wafer cassette to next slot</li> <li>24 = move wafer cassette to bottom slot</li> <li>25 = restart wafer</li> </ul> <p><u>Note:</u> This value is settable only via an ASSIST command parameter and not as an equipment constant.</p>	52	ECV		11644
BufferState	<p>Buffer state.</p> <p>bit 0, port sensor state:</p> <ul style="list-style-type: none"> <li>0 = uncovered</li> <li>1 = covered</li> </ul> <p>bit 1, lift sensor state:</p> <ul style="list-style-type: none"> <li>0 = uncovered</li> <li>1 = covered</li> </ul> <p>bit 2, transferring state:</p> <ul style="list-style-type: none"> <li>0 = idle</li> <li>1 = transferring</li> </ul>	10	DWVAL	30,31,32,33	441400
CfgEventReport Off-line	<p>Enables / disables event reporting for event CEID 0, "Equipment OFF-LINE".</p> <ul style="list-style-type: none"> <li>1 = disabled</li> <li>2 = enabled</li> </ul>	52	ECV		11700

CfgEventReport Local	Enables / disables event reporting for event CEID 1, "Control state LOCAL". 1 = disabled 2 = enabled	52	ECV		11701
CfgEventReport Remote	Enables / disables event reporting for event CEID 2, "Control state REMOTE". 1 = disabled 2 = enabled	52	ECV		11702
CfgEventReport OperatorCommand	Enables / disables event reporting for event CEID 3, "OperatorCommand". 1 = disabled 2 = enabled	52	ECV		11703
CfgEventReport OperatorParamotor	Enables / disables event reporting for event CEID 4, "OperatorParameter". 1 = disabled 2 = enabled	52	ECV		11704
CfgEventReport NotReady	Enables / disables event reporting for event CEID 10, "Not read state entered". 1 = disabled 2 = enabled	52	ECV		11710
CfgEventReport Ready	Enables / disables event reporting for event CEID 11, "Ready state entered". 1 = disabled 2 = enabled	52	ECV		11711
CfgEventReport Executing	Enables / disables event reporting for event CEID 12, "Executing state entered". 1 = disabled 2 = enabled	52	ECV		11712
CfgEventReport SelfPreparing	Enables / disables event reporting for event CEID 13, "Self preparing state entered". 1 = disabled 2 = enabled	52	ECV		11713
CfgEventReport MatWarning	Enables / disables event reporting for event CEID 20, "Material warning exception occurred". 1 = disabled 2 = enabled	52	ECV		11720
CfgEventReport EquWarning	Enables / disables event reporting for event CEID 21, "Equipment warning exception occurred". 1 = disabled 2 = enabled	52	ECV		11721

CfgEventReport MatError	Enables / disables event reporting for event CEID 22, "Material stop error exception occurred". 1 = disabled 2 = enabled	52	ECV		11722
CfgEventReport EquError	Enables / disables event reporting for event CEID 23, "Equipment stop error exception occurred". 1 = disabled 2 = enabled	52	ECV		11723
CfgEventReport SoftError	Enables / disables event reporting for event CEID 24, "Software system error exception occurred". 1 = disabled 2 = enabled	52	ECV		11724
CfgEventReport HardError	Enables / disables event reporting for event CEID 25, "Hardware system error exception occurred". 1 = disabled 2 = enabled	52	ECV		11725
CfgEventReport ParamWarning	Enables / disables event reporting for event CEID 26, "Parameter control warning exception occurred". 1 = disabled 2 = enabled	52	ECV		11726
CfgEventReport ParamError	Enables / disables event reporting for event CEID 27, "Parameter control error exception occurred". 1 = disabled 2 = enabled	52	ECV		11727
CfgEventReport PostTrinToOutCPP	Enables / disables event reporting for event CEID 30, "PostProcinButt--> Output CPP" (magazine loaded from leadframe handler output handler input buffer): 1 = disabled 2 = rpt.4, CI 1.05 3 = rpt.4, CI 1.05.1 4 = rpt.4, CI 1.06	52	ECV		11730



CfgEventReport OutCPPToPostPrOut	Enables / disables event reporting for event CEID 31, "Output CPP --> PostProcOutBuff" (magazine unloaded to leadframe handler output handler output buffer): 1 = disabled 2 = rpt.4, CI 1.05 3 = rpt.4, CI 1.05.1 4 = rpt.4, CI 1.06 5 = rpt.4+8, CI 1.06	52	ECV		11731
CfgEventReport PrePrinToInCPP	Enables / disables event reporting for event CEID 32, "PreProcinBuff --> Input CPP" (magazine loaded from leadframe handler input handler input buffer): 1 = disabled 2 = rpt.4, CI 1.05 3 = rpt.4, CI 1.05.1 4 = rpt.4, CI 1.06	52	ECV		11732
CfgEventReport InCppToPrePrOut	Enables / disables event reporting for event CEID 33, "Input CPP--> PreProcOutBuff " (magazine unloaded to leadframe handler input handler output buffer): 1 = disabled 2 = rpt.4, CI 1.05 enabled 3 = rpt.4, CI 1.05.1 4 = rpt.4, CI 1.06	52	ECV		11733
CfgEventReport PPChange	Enables / disables event reporting for event CEID 40, "Process program change": 1 = disabled 2 = enabled	52	ECV		11740
CfgEventReport PPSelect	Enables / disables event reporting for event CEID 41, "Process program select": 1 = disabled 2 = enabled	52	ECV		11741
CfgEventReport ECVChange	Enables / disables event reporting for event CEID 50, "Equipment constant change": 1 = disabled 2 = enabled	52	ECV		11750
CfgRemoteOpAcc Define	Defines operator access to the "Define" menus in remote control state: 1 = not allowed 2 = operator access	52	ECV		11161



CfgRemoteOpAcc Activate	Defines operator access to the "Activate" menus in remote control state: 1 = not allowed 2 = operator access	52	ECV		11162
CfgRemoteOpAcc Calibrate	Defines operator access to the "Calibrate" menus in remote control state: 1 = not allowed 2 = operator access	52	ECV		11163
CfgRemoteOpAcc Debug	Defines operator access to the "Debug" menus in remote control state: 1 = not allowed 2 = operator access	52	ECV		11164
CfgRemoteOpAcc Teach	Defines operator access to the "Teach + Convert" menus in remote control state: 1 = not allowed 2 = operator access	52	ECV		11165
CfgRemoteOpAcc Assist	Defines operator access to the "Assist" menus in remote control state: 1 = not allowed 2 = operator access	52	ECV		11166
CfgRemoteOpAcc Production	Defines operator access to the production commands in remote control state: 1 = not allowed 2 = operator access	52	ECV		11167
CfgSignalStateSelection	Process or error state selection for signal configuration. First select with this ECV the desired state to configure, then set the desired signal settings using the other CfgSignalxxx constants: 1 = not ready 2 = ready 3 = self preparing 4 = executing 5 = material warning 6 = parameter control warning 7 = equipment warning 8 = material stop error 9 = parameter control error 10 = equipment stop error 11 = hardware system error 12 = Software system error	52	ECV		11310

CfgSignalGreenLamp	Green lamp setting for the state selected by CfgSignalStateSelection: 1 = no change 2 = off 3 = on 4 = flashing	52	ECV		11311
CfgSignalYellowLamp	Yellow lamp setting for the state selected by CfgSignalStateSelection: 1 = no change 2 = off 3 = on 4 = flashing	52	ECV		11312
CfgSignalRedLamp	Red lamp setting for the state selected by CfgSignalStateSelection: 1 = no change 2 = off 3 = on 4 = flashing	52	ECV		11313
CfgSignalAudiableAlarm	Audiable alarm setting for the state selected by CfgSignalStateSelection: 1 = no change 2 = off 3 = continuous 4 = intermittent	52	ECV		11314
CfgSignalAuxiliaryOutput	Auxiliary output setting for the state selected by CfgSignalStateSelection: 1 = no change 2 = off 3 = on	52	ECV		11315
CfgSignalPriority	Signal state priority setting for the state selected by CfgSignalStateSelection: 0 .. 255 Note: This item is a SV and not an ECV, because the signal priority can not be configured on the 2007.	34	SV		111316
ChipCounterMode	Chip counter production 1 = off (bond while material) 2 = on (bond while material or Number OfDieToBond done)	52	SV		10312

Clock	The value of the equipment's internal clock; accurate to centisecond. Format: YYYYMMDDhhmmsscc YYYY = Year 0000 to 9999 MM = Month 01 to 12 DD = Day 01 to 31 hh = Hour 00 to 23 mm = Minute 00 to 59 ss = Second 00 to 59 cc = Centisecond 00 to 99	20, 16 char	SV		211648
CommunicationsState	Current communications state. 1 = disabled 2 = enabled / not communicating 3 = enabled / communicating	52	SV		111620
ControlState	Equipment Control State 1 = equipment off-line 2 = attempt on-line 3 = host off-line 4 = on-line / local 5 = on-line / remote	10	SV		111630
CurLotStartTime	Current lot start time, 16 bytes, YY:MM:DDHH:MM:SS	20	SV		110411
CurLotEndTime	Current lot end time, 16 bytes, YY:MM:DDHH:MM:SS	20	SV		110412
CurLotChipsBonded	Current lot number of bonded chips	34	SV		110413
CurLotWafersProcessed	Current lot number of processed wafers	34	SV		110414
CurLotNonPicked	Current lot number of unsuccessful pickup	34	SV		110415
CurLotActiveTime	Current lot production time (hours)	44	SV		110416
CurLotIdleTime	Current lot idle time (hours)	44	SV		110417
CurLotGrossUph	Current lot gross uph (chips per hour)	34	SV		110418
CurLotNetUph	Current lot net uph (chips per hour)	34	SV		110419
CurLotBondedOfWafer	Current lot number of bonded chips for currently loaded wafer	34	SV		110420

CurLotOwner	Current lot owner (generator) 1 = operator 2 = host 3 = automatic (generated after each wafer chane)	52	SV		110421
CurRecipeName	Current selected recipe name.	20, 8 char	SV		117101
CurRecipeMuVersion	Actual Master Unit version by last save of current selected recipe	20	SV		117110
CurRecipeWHVersion	Actual Wafer Handler version by last save of current selected recipe.	20	SV		117111
CurRecipePPVersion	Actual Pick & Place version by last save of current selected recipe.	20	SV		117112
CurRecipeINVersion	Actual Master Unit version by last save of current selected recipe	20	SV		117113
CurRecipeVersionNber	Current selected recipe version number.	34	SV		117114
CurRecipeRevisionNber	Current selected recipe version number.	34	SV		117115
ECIDChange	ECID of change equipment constant	54	DWVAL	50	311649
Equipment mode	Equipment global operation mode 1 = Waiting for DATA 2 = Waiting for CONFIG 3 = Waiting for INIT 4 = Waiting for CALIBDATA 5 = Waiting for TEACH 6 = Status request 7 = INIT 8 = Ready 9 = Reserved 10 = CONFIG 11 = DEBUG 12 = CALIBRATION 13 = ITEACH 14 = ASSIST 15 = Processing 16 = Reserved	52	SV		110711
Establish Communications Timeout	The length of time, in seconds, of the interval between attempts to send S1,F13 when establishing communications.	52	ECV		11612

Event Count	Event occurrence counter.	54	DVVAL	30,31,32,33	441407
Event30Count	Event 30 occurrence counter (same data as PostProcInEvCount).	54	SV		140405
Event31Count	Event 31 occurrence counter (same data as PostProcOutEvCount).	54	SV		140406
Event32Count	Event 32 occurrence counter (same data as PreProcInEvCount).	54	SV		140407
Event33Count	Event 33 occurrence counter (same data as PreProcOutEvCount).	54	SV		140408
EventLimit	Used with the Limits Monitorin capability, it contains the LIMITID of the limit reached or crossed by Limit Variable. Since multiple zone transitions for a variable may occur simulatenously (e.g. due to identical limit definitions of a slow data sampling rate). Even Limit has been defined to allow for a list of LIMITIDs. Note: The ESEC Die Bonder do not use this variable data item as no Limits Monitoring capability is implemented. This item is defined for compatibility purposes with the SEMI GEM Standard.	54	DVVAL		310806
EventsEnabled	Contains the list of events (CEIDs) enabled for reporting via Stream 6. Structure: L,n n = number of alarm set 1. <ALID <sub>1</sub> > ... n. <ALID <sub>n</sub> >	0	SV		110805
ExceptionId	Exception identifier. The ExceptionId is unique for all classes of exceptions.	54	DVVAL	20,21,22,23,24	411644
ExceptionState	Current exception state. 1 = no alarm set 2 = warning is set 3 = error is set	0	SV		110805
ExceptionText	Exception text.	20, max 80 char, unformatted	<sup>1</sup> DVVAL	20,21,22,23,24	411649
Host interface version	Host communications interface version	20, max 16 char.	SV		110705
Inkdot mode	Inkdot mode 1 = off 2 = on 3 = inverse 4 = pattern 5 = inverse pattern	52	ECV		24310

IqcResult	IQC Control flag -1 = no chip on pad 0 = all pads with good chip 1 = pad with fault 1 chip 2 = pad with fault 2 chip	31	DVVAL	31	441408
Leadframe handler intern	Leadframe handler internal function mode 1 = Off 2 = On	52	SV		111217
Leadframe handler mode	Leadframe handler operating mode 1 = Waiting for DATA 2 = Waiting for CONFIG 3 = Waiting for INIT 4 = Waiting for CALIB 5 = Waiting for TEACH 6 = Status request 7 = INIT 8 = Ready 9 = Reserved 10 = CONFIG 11 = DEBUG 12 = CALIBRATION 13 = TEACH 14 = ASSIST 15 = Processing 16 = Reserved	52	SV		110714
Leadframe handler version	Leadframe handler unit software version	20, max 16 char.	SV		110704
Limit Variable	This variable contains the VID for the variable whose value changed monitoring zones. Note: The ESEC Die Bonder do not use this variable data item as no Limits Monitoring capability is implemented. This item is defined for compalibility purposes with the SEMI GEM Standard.	54	DVVAL		310807



LocationID	Location identifier 4 = input carrier processing position 14 = output carrier processing position Note: This value is settable only via an EJECT-MAGAZINE command parameter and not as an equipment constant.	10	ECV		40401
LotID	Statistical lot identifier Allowed characters are all characters accepted in MS-DOS file names. Note: This value is settable only via an RESET-STATISTIC command parameter and not as an equipment constant.	20 max 7 char	ECV		10410
MagazineID	Magazine identifier (barcode, ...):	20, max 16 char.	DVVAL	31	441409
MagInputID	Magazine identifier (barcode, ...) for the magazine in input handler gripper: - *NO.MAG* value when no magazine in gripper. - empty string when magazine in gripper but no barcode reader installed.	20, max 16 char.	SV		144660
MagLastID	Magazine identifier (barcode, ...) for the magazine unloaded onto the output handler output buffer. - empty string when magazine in gripper but no barcode reader installed.	20, max 16 char.	SV		154065
MagLastqccResult	IQC Control flag for last magazine unloaded onto the output handler output buffer -1 = no chip on pad 0 = all pads with good chip 1 = pad with fault 1 chip 2 = pad with fault 2 chip	31	SV		154066
MagLastOperatorResult	Operator control flag for last mag. Unloaded onto the output handler output buffer.	31	SV		154067
MagOutputID	Magazine identifier (barcode, ...) for the magazine in output handler gripper: - *NO.MAG* value when no magazine in gripper. - empty string when magazine in gripper but no barcode reader installed.	20, max 16 char.	SV		154060
MagOutputqccResult	IQC Control flag for the magazine in the output handler gripper -1 = no chip on pad 0 = all pads with good chip 1 = pad with fault 1 chip 2 = pad with fault 2 chip	31	SV		154061
MagOutputOperatorResult	Operator control flag for the magazine in the output handler gripper.	31	SV		154062

Master unit version	Master unit software version	20, max 16 char.	SV		110701
NumberOfDieToBond	The number of die to be bonded before execution is automatically stopped by the equipment.				
	Note: This equipment constant is used only with local command "Run" and remote command "Run while material"	54	ECV		10311
OperatorCommand	This data variable is valid in the event the operator issues a command to the equipment. Note: Thesec Die Bonder 2007 set the OperatorCommand event only when the equipment is in the remote equipment control state.	54	DVVAL	9	310803
OperatorParameter	This data variable is valid in the event the operator changes a parameter on the equipment. Note: Thesec Die Bonder 2007 set the OperatorParameter event only when the equipment is in the remote equipment control state.	54	DWAL	9	310804
OperatorResult	Operator control flag	31	DVVAL	31	441410
OptProcPpWhMode	Optimizing process wafer handler (WH) and pick & place (PP) internal mode 1 = Off (WH and PP are off-line during production) 2 =On (actual WH and PP activation is used)	52	ECV		10201
Pick & place intern	Pick & place internal functional mode 1 = Off 2 =On	52	ECV		111216
Pick & place mode	Pick & place operation mode 1 = Waiting for DATA 2 = Waiting for CONFIG 3 = Waiting for INIT 4 = Waiting for CALIB 5 = Waiting for TEACH 6 = Status request 7 = INIT 8 = Ready 9 = Reserved 10 = CONFIG 11 = DEBUG	52	SV		110713



	12 = CALIBRATION 13 = TEACH 14 = ASSIST 15 = Processing 16 = Reserved				
Pick & place version	Pick & place unit software version	20, max 16 char.	SV		110703
PostProcInBufState	Post-process input buffer stae. bit 0, port sensor state: 0 = uncovered 1 = covered bit 1, lift sensor state: 0 = uncovered 1 = covered bit 2, transferring state: 0 = idle 1 = transferring	10	SV		241402
PostProcInEvCount	Post-peocess input buffer event count. This constant is incremented by the equipment each time a magazine is taken from the post-process input buffer.	54	SV		140405
PostProcOutBufState	Post-process output buffer stae. bit 0, port sensor state: 0 = uncovered 1 = covered bit 1, lift sensor state: 0 = uncovered 1 = covered bit 2, transferring state: 0 = idle 1 = transferring	10	SV		241403
PostProcOutEvCount	Post-peocess output buffer event count. This constant is incremented by the equipment each time a magazine is unloaded to the post-process output buffer.	54	SV		140406
PPChangeName	The PPID which was affected upon the event of the creation, editing, or deletion of a Process Program local to the equipment.	20 8 char	DWAL	40	311606

PPChangeStatus	The action taken on the Process Program named in PPChangeName. This variable is valid upon the event of the creation, editing, or deletion of a Process Program local to the equipment. 1 = Created 2 = Edited 3 = Deleted 4-63 = Reserved	51	DVVAL	40	311607
PPChipExecName	The PPID of the currently selected Chip Process Program. The selection of a new Chip Process Program or of a Process Program updates this variable.	20 8 char	SV		111646
PPExecName	The PPID of the currently selected Process Program(s). The selection of a new Process Program updates this variable. If multiple Process Programs are selected, then this variable is a list of PPIDs	20 8 char	SV		111645
PPLFExecName	The PPID of the currently selected Leadframe Process Program. The selection of a new Leadframe Process Program or of Process Program updates this variable.	20 8 char	SV		111647
PreProcInBufState	Pre-process input buffer state. bit 0, port sensor state: 0 = uncovered 1 = covered bit 1, lift sensor state: 0 = uncovered 1 = covered bit 2, transferring state: 0 = idle 1 = transferring	10	SV		241405
PreProcInEvCount	Pre-process input buffer event count. This constant is incremented by the equipment each time a magazine is taken from the post-process input buffer.	54	SV		140407
PreProcOutBufState	Pre-process output buffer state. bit 0, port sensor state: 0 = uncovered 1 = covered bit 1, lift sensor state: 0 = uncovered 1 = covered	10	SV		241406

	bit 2, transferring state: 0 = idle 1 = transferring				
PreProcOutEvCount	Pre-process output buffer event count. This constant is incremented by the equipment each time a magazine is unloaded to the pre-process output buffer.	54	SV		140408
PrevLotStartTime	Previouslot start time, 16 bytes, YY:MM:DDHH:MM:SS	20	SV		110451
PrevLotEndTime	Previouslot end time, 16 bytes, YY:MM:DDHH:MM:SS	20	SV		110452
PrevLotChipsBonded	Previous lot number of bonded chips	34	SV		110453
PrevLotWafersProcessed	Previous lot number of processed wafers	34	SV		110454
PrevLotNonPicked	Previous lot number of unsuccessful pickup	34	SV		110455
PrevLotActiveTime	Previous lot production time (hours)	44	SV		110456
PrevLotIdleTime	Previous lot idle time (hours)	44	SV		110457
PrevLotGrossUph	previous lot gross uph (chips per hour )	34	SV		110458
PrevLotNetUph	Previous lot net uph (chips per hour)	34	SV		110459
PrevLotOwner	Previous lot owner (generator) 1 = operator 2 = host 3 = automatic (generated after each wafer chane)	52	SV		110461
PreviousProcessState	Previous Equipment Processing State. 1 = Init 2 = Not Ready 3 = Ready 4 = Executing	51	SV		111639
ProcessCount	programmable definition of number of things to process as defined by ProcessDef. Note: This value is settable only via a START command parameter and not as an equipment constant.	54	ECV		11642
ProcessDef	Programmable definition of the process to be performed. 0 = Continuous (while material available) 1 = Material in pipeline 2 = ProcessCount number of magazines 3 = ProcessCount number of leadframes	52	ECV		11643

	<p>4 = ProcessCount number of devices (may include multiple die)  5 = ProcessCount number of die  6 = reserved for ProcessCount number of wires  21 = ProcessCount number of wafers</p> <p>Note: This value is settable only via a START command parameter and not as an equipment constant.</p>				
ProcessingState	<p>Equipment Processing State.</p> <p>1 = Init  2 = Not Ready  3 = Ready  4 = Executing</p>	51	SV		111634
RemoteAlarmMasking	<p>Alarm masking in remote equipment control state.</p> <p>This constant is used to activate / deactivate the masking (not setting) on the equipment of material alarms which can be automatically handled by an Autoline robot for example. Masked alarms are not set on the equipment but transmitted to the host application. This allows the host to fix the problem and restart the production without operator having to go to the equipment.</p> <p>1 = disabled  2 = enabled</p>	52	ECV		11770
TotChipsBonded	Equipment total number of bonded chips	34	SV		110473
TotActiveTime	Equipment total production time (hours)	44	SV		110476
TotIdleTime	Equipment total idle time (hours)	44	SV		110477
TotGrossUph	Equipment total gross uph (chip per hour)	34	SV		110478
TotNetUph	Equipment total net uph (chips per hour)	34	SV		110479
TransferDirection	<p>Transfer direction of magazine</p> <p>True = normal, normal production flow  False = reverse, assist only</p>	11	DVVAL	30,31,32,33	441404
Wafer handler intern	<p>Wafer handler internal functional mode</p> <p>1 = Off  2 = On</p>	52	SV		111215

Wafer handler mode	Wafer handler operating mode 1 = Waiting for DATA 2 = Waiting for CONFIG 3 = Waiting for INIT 4 = Waiting for CALIBDATA 5 = Waiting for TEACH 6 = Status request 7 = INIT 8 = Ready 9 = Reserved 10 = CONFIG 11 = DEBUG 12 = CALIBRATION 13 = ITEACH 14 = ASSIST 15 = Processing 16 = Reserved	52	SV		110712
Wafer handler version	Wafer handler unit software version	20 max 16 char.	SV		110702
WMPBinaryEquivalent	Wafer mapping binary equivalents (BCEQU).	20 max 16 char.	ECV		24406
WMPBincodeSelection	Wafer mapping binary equivalents source selection: 1 = from host (equipment uses BCEQU sent from the host) 2 = local (equipment uses bin codes defined locally)	52	ECV		24405
WMPNulBincodeValue	Bin code used for no die at location with wafer mapping (NULBC). When no NULBC value is defined by the host.	20 max 16 char.	ECV		24441
WMPReferenceSelection	Wafer mapping reference data selections: 1 = from host (equipment uses RPSEL,REFP sent from the host) 2 = local (equipment uses references taught locally)	52	ECV		21014



# APPENDIX E

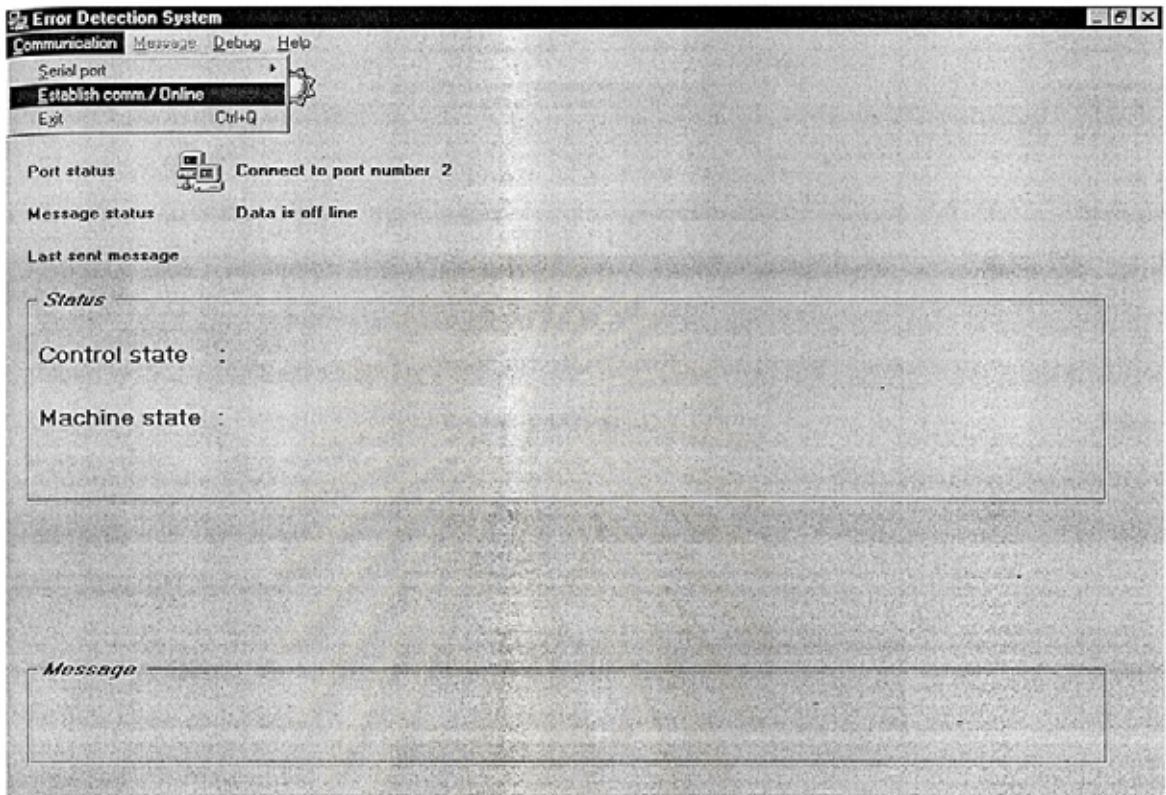
SOURCE CODE OF THE DIE ATTACH MACHINE ERROR DETECTION  
SYSTEM

สถาบันวิทยบริการ  
จุฬาลงกรณ์มหาวิทยาลัย



## SOURCE CODE

## Frame EDS (FrmEDS)



## 'General function

```

Const Freq_Ch = 2000           ' Check the message every 2 second
Const Listen_Sh = 5000000     'Wait for completed receiving
Const Listen_Lg = 12000000
Public Version As String
Public Sh_ver As Byte
Public Byte_7, Byte_8, Byte_9, Byte_10 As Byte
Public Device As Byte
Dim System() As Byte
Dim Previous As String
Dim Previous_time As Date
Dim Pre As Date
Dim Previous_date As Date
Dim Error_count As Byte
Dim Error As String

```

```

Dim Act_time1, Act_time2, Act_time3, Act_time4, Act_time5, Act_time6, Act_time7, Act_time8 As Date
Dim Act_date1, Act_date2, Act_date3, Act_date4, Act_date5, Act_date6, Act_date7, Act_date8 As Date
Dim Action1, Action2, Action3, Action4, Action5, Action6, Action7, Action8 As String
Dim Error1, Error2, Error3, Error4, Error5, Error6, Error7, Error8 As String
Dim Prog As String

```

### Private Sub Form\_Load()

```

    Previous = "Start"
    Previous_time = Format(Now, "hh:mm:ss")
    Previous_date = Format(Now, "yyy/mm/dd")
    Open "C:\EDS\Data\Machine.txt" For Append As #1
    Open "C:\EDS\Data\Backup.txt" For Output As #2
    Close #1, #2
    Clock.Interval = 1000
    tmrCopy.Interval = 60000           'Backup file every 1 minute

```

End Sub

### Private Sub Clock\_Timer()

```

' Display time and image
Dim Day As Date
Dim Night As Date

lblDate.Caption = Format(Now, "yyy/mm/dd")
lblTime.Caption = Format(Now, "hh:mm:ss")
Day = "8:00:00 am": Night = "6:00:00 pm"
If Time > Day And Time < Night Then
    Sun.Visible = True
    Moon.Visible = False
Else
    Sun.Visible = False
    Moon.Visible = True
End If

```

End Sub



**Private Sub tmrCopy\_Timer()**

```
' Backup file frequently.  
Dim strCopy As String  
Open "C:\EDS\Data\Machine.txt" For Input As #1  
Open "C:\EDS\Data\Backup.txt" For Output As #2  
Do While Not EOF(1)  
    Line Input #1, strCopy  
    Print #2, strCopy  
Loop  
Close #1, #2
```

**End Sub****Private Sub EOT()**

```
' Send EOT to the equipment.  
Dim EOT(0) As Byte  
EOT(0) = 4  
MSComm1.Output = EOT
```

**End Sub****Private Sub ACK()**

```
' Send ACK to the equipment.  
Dim ACK(0) As Byte  
ACK(0) = 6  
MSComm1.Output = ACK
```

**End Sub****Private Sub NAK()**

```
' Send NAK to the equipment.  
Dim NAK(0) As Byte  
NAK(0) = 21  
MSComm1.Output = NAK
```

**End Sub**

### Public Sub Sys()

- ' The system byte is prepared for message that
- ' will be sent to the equipment as a PRIMARY MESSAGE.

ReDim Preserve System(1 To 4) As Byte

System(1) = System(1) + 1

If System(1) >= 255 Then

    System(2) = System(2) + 1

    System(1) = 0

End If

If System(2) >= 255 Then

    System(3) = System(3) + 1

    System(2) = 0

End If

If System(3) >= 255 Then

    System(4) = System(4) + 1

    System(3) = 0

End If

If System(4) >= 255 Then

    System(1) = 0

    System(2) = 0

    System(3) = 0

    System(4) = 0

End If

    Byte\_7 = System(4)

    Byte\_8 = System(3)

    Byte\_9 = System(2)

    Byte\_10 = System(1)

End Sub

### Private Sub mnuConnect\_Click()

- ' To connect serial port.

*frmPort.Show*



FrmPort

End Sub

### Private Sub mnuDisconnect\_Click()

' To disconnect serial port.

Dim Port As Byte

Dim bytError As Byte

Dim Current As String

Dim Current\_time As Date

Dim Current\_date As Date

Port = frmPort.byPort

If Port <> 0 Then

    bytError = MsgBox("Do you want to disconnect port number " & Port & " ?", vbYesNo + vbQuestion, "Serial port")

    If bytError = 7 Then: Exit Sub

Else

    bytError = MsgBox("Please select the port number", vbOKOnly + vbInformation, "Error")

    If bytError = 1 Then Exit Sub

End If

If MSComm1.PortOpen = True Then

    MSComm1.PortOpen = False

    lblStat1.Caption = "Disconnect"

    lblShow.Caption = "Data is off line"

    mnuConnect.Enabled = True

    mnuDisconnect.Enabled = False

    mnuEstablish.Enabled = False

    mnuDetect.Enabled = False

End If

Current = lblStat1.Caption

Current\_time = Format(Now, "hh:mm:ss")

Current\_date = Format(Now, "yyyy/mm/dd")

Call Ch\_state(Current, Current\_time, Current\_date)

Connect.Visible = False

Disconnect1.Visible = True

Disconnect2.Visible = True

End Sub

```
Private Sub mnuExit_Click()
```

```
' To exit the program.
```

```
Dim Spend As Date
```

```
Dim bytExit As Byte
```

```
bytExit = MsgBox("Do you want to quit the program ?", vbYesNo + vbQuestion, "Error Detection System")
```

```
Select Case bytExit
```

```
Case Is = 6:
```

```
    Spend = Now - Previous_time
```

```
    Open "C:\EDS\Data\Machine.txt" For Append As #1
```

```
    Print #1, Format(Previous_date, "yyyy/mm/dd"), Format(Previous_time, "hh:mm:ss"), _  
        Format(Spend, "hh:mm:ss"), Previous
```

```
    Print #1, Format(Now, "yyyy/mm/dd"), Format(Now, "hh:mm:ss"), "Exit"
```

```
    Close #1
```

```
End
```

```
Case Is = 7: Exit Sub
```

```
End Select
```

```
End Sub
```

```
Private Sub mnuMsg_Click()
```

```
' To detect the handshake code frequently.
```

```
Timer1.Interval = Freq_Ch
```

```
Timer1.Enabled = True
```

```
End Sub
```

```
Private Sub mnuSV_Click()
```

```
    frmSV.Show
```



```
End Sub
```

```
Private Sub mnuEnaDis_Click()
```

```
    frmEnablePass.Show
```

```
End Sub
```

```
Private Sub mnuShowMsg_Click()
```

```
    frmShowPass.Show
```

```
End Sub
```

**Private Sub mnuHideMsg\_Click()**

' To hide the message that display in the message block.

```
Text1.Visible = False
Text2.Visible = False
Text3.Visible = False
Text4.Visible = False
Text5.Visible = False
Text6.Visible = False
Text7.Visible = False
Text8.Visible = False
txtStat.Visible = False
txtTime.Visible = False
mnuShowMsg.Enabled = True
mnuHideMsg.Enabled = False
```

**End Sub**

**Private Sub mnuPassword\_Click()**

' To change password.

```
frmPassword.Show
```

**End Sub**

**Private Sub mnuVersion\_Click()**

' To check the interface version of the equipment.

```
Dim ENQ(0) As Byte
Dim Receive As Byte
Dim out() As Byte
Dim Send(0) As Byte
Dim bytError As Byte
Dim Data_index As Integer
Dim Length As Byte
Dim LengthSend As Integer
Dim S_sum As Long
Dim Byte_C1 As Byte
Dim Byte_C2 As Byte
Dim Checkind As Integer
Dim Datacount As Integer
```



```
out(17) = 176
```

```
out(18) = 113
```

```
' Calculate checksum
```

```
S_sum = out(1)
```

```
For Checkind = 2 To Length
```

```
    S_sum = S_sum + out(Checkind)
```

```
Next Checkind
```

```
Byte_C1 = S_sum \ 256
```

```
Byte_C2 = S_sum Mod 256
```

```
out(Length + 1) = Byte_C1 'Checksum #1
```

```
out(Length + 2) = Byte_C2 'Checksum #2
```

```
' Send all data to the port
```

```
For Data_index = 1 To LengthSend
```

```
    Send(0) = out(Datacount)
```

```
    MScComm1.Output = Send
```

```
    Datacount = Datacount + 1
```

```
Next Data_index
```

```
' Check for ACK code
```

```
Do While MScComm1.InBufferCount = 0
```

```
Loop
```

```
Receive = Asc(MScComm1.Input)
```

```
Select Case Receive
```

```
    Case Is = 6: lblLast.Caption = "S1F3": lblShow.Caption = "S1F3 is sent": Call Timer1_Timer
```

```
    Case Is = 21: lblShow.Caption = "S1F3 is not accepted": Call Timer1_Timer: Exit Sub
```

```
End Select
```

```
Else
```

```
    bytError = MsgBox("No response from Eq., please check the system ", vbOKOnly + vbCritical + 4096, "ERROR")
```

```
    If bytError = 1 Then: Exit Sub
```

```
End If
```

```
End Sub
```

Private Sub mnuAbout\_Click()

frmAbout.Visible = True

End Sub

Public Sub Ch\_state(Current As String, Current\_time As Date, Current\_date As Date)

Dim Time\_count As Long

Dim HH As Integer

Dim MM As Integer

Dim SS As Integer

Dim Pre\_MM As Long

Dim Hour, Minute, Second As String

Dim Duration As String

Count time spending for each state

Pre = Previous\_time

Do Until Format(Current\_time, "hh:mm:ss") = Format(Pre, "hh:mm:ss")

Pre = Pre + "00:00:01"

Time\_count = Time\_count + 1

Loop

Convert time\_count to be hh:mm:ss

If Time\_count >= 3600 Then

HH = (Time\_count \ 3600)

If HH < 10 Then

Hour = "0" & HH

Else: Hour = HH: End If

Pre\_MM = ((Time\_count / 3600) - HH) \* 3600

MM = (Pre\_MM \ 60)

If MM < 10 Then

Minute = "0" & MM

Else: Minute = MM: End If

SS = ((Pre\_MM / 60) - MM) \* 60

If SS < 10 Then

Second = "0" & SS

Else: Second = SS: End If

Elseif Time\_count < 3600 And Time\_count >= 60 Then



```

Hour = "00"
MM = (Time_count \ 60)
If MM < 10 Then
    Minute = "0" & MM
Else: Minute = MM: End If
SS = ((Time_count / 60) - MM) * 60
If SS < 10 Then
    Second = "0" & SS
Else: Second = SS: End If
Elseif Time_count < 60 Then
    Hour = "00": Minute = "00": SS = Time_count
    If SS < 10 Then
        Second = "0" & SS
    Else: Second = SS: End If
End If
Duration = Hour & ":" & Minute & ":" & Second
Open "C:\EDS\Data\Machine.txt" For Append As #1
Print #1, Format(Previous_date, "yyyy/mm/dd"), Format(Previous_time, "hh:mm:ss"), _
    Duration, Previous
Close #1
Previous = Current
Previous_time = Current_time
Previous_date = Current_date
txtStat.Text = Previous
txtTime.Text = Format(Previous_time, "hh:mm:ss")
End Sub

Private Sub mnuRU_Click()
' Send S1F1 message to ask for the online status.
Dim ENQ(0) As Byte
Dim out() As Byte
Dim Send(0) As Byte
Dim Receive As Byte
Dim bytError As Byte
Dim Data_index As Integer
Dim Length As Byte

```

Dim LengthSend As Integer

Dim S\_sum As Long

Dim Byte\_C1 As Byte

Dim Byte\_C2 As Byte

Dim Checkind As Integer

Dim Datacount As Integer

' Send ENQ and wait for EOT

ENQ(0) = 5

MSComm1.Output = ENQ

Do While MSComm1.InBufferCount = 0

Loop

Receive = Asc(MSComm1.Input)

If Receive = 4 Then

' The header data

Length = 10

LengthSend = Length + 3 'Length byte + Data + Checksum

ReDim out(LengthSend) As Byte

out(0) = Length

out(1) = 0 'Host to Equip.

out(2) = Device 'Device

out(3) = 129 'S1, Reply

out(4) = 1 'F1

out(5) = 128 'Last block

out(6) = 1 'Block 1

' System bytes

Call Sys

out(7) = Byte\_7

out(8) = Byte\_8

out(9) = Byte\_9

out(10) = Byte\_10

' Calculate checksum

S\_sum = out(1)

```

For Checkind = 2 To Length
    S_sum = S_sum + out(Checkind)
Next Checkind
Byte_C1 = S_sum \ 256
Byte_C2 = S_sum Mod 256
out(Length + 1) = Byte_C1 'Checksum #1
out(Length + 2) = Byte_C2 'Checksum #2

' Send all data to the port
For Data_index = 1 To LengthSend
    Send(0) = out(Datacount)
    MSComm1.Output = Send
    Datacount = Datacount + 1
Next Data_index

' Check for ACK code
Do While MSComm1.InBufferCount = 0
Loop
Receive = Asc(MSComm1.Input)
Select Case Receive
    Case Is = 6: lblLast.Caption = "S1F1": lblShow.Caption = "S1F1 is sent": Call Timer1_Timer
    Case Is = 21: lblShow.Caption = "S1F1 is not accepted": Call Timer1_Timer: Exit Sub
End Select
Else
    bytError = MsgBox("No response from Eq., please check the system ", vbOKOnly + vbCritical + 4096, "ERROR")
    If bytError = 1 Then: Exit Sub
End If
End Sub

Private Sub Clear(Prog As String)
' To clear the input buffer in case of more than 1 data are received.
MSComm1.InBufferCount = 0
If Prog = "Establish" Then
    Call mnuEstablish_Click
End If
End Sub

```

### Private Sub mnuEstablish\_Click()

- ' This is the procedure to establish the communications
- ' between host and the equipment.

Dim First(0) As Byte

Dim Second As String

Dim Length As Byte

Dim Data() As Byte

Dim ENQ(0) As Byte

Dim Receive As Byte

Dim Index As Integer

Dim bytError As Byte

Dim Wait As Long

Dim R\_sum As Long

Dim CH\_Rindex As Integer

Dim Byte\_CR1 As Byte

Dim Byte\_CR2 As Byte

Dim Checksum1 As Integer

Dim Checksum2 As Integer

Dim conv As Integer

Dim Tot\_length As Integer

Dim Equip As Byte

Dim Stream As Byte

Dim Func As Byte

Dim Sys1 As Byte

Dim Sys2 As Byte

Dim Sys3 As Byte

Dim Sys4 As Byte

- ' Waiting for ENQ from equipment.

Do Until MSComm1.InBufferCount > 0

Loop

If MSComm1.InBufferCount = 1 Then

    First(0) = Asc(MSComm1.Input)

    If First(0) = 5 Then

        Call EOT

    Else: bytError = MsgBox("ENQ is not sent from Eq. Retry?", vbOKOnly + vbQuestion, "Error")

```

    If bytError = 1 Then: Exit Sub
    End If

Else: Prog = "Establish": Call Clear(Prog)
End If

' Receive message from the equipment
Do While MSComm1.InBufferCount = 0
Loop
For Wait = 1 To Listen_Sh
Next Wait
Second = MSComm1.Input
Length = Asc(Mid(Second, 1, 1))
Tot_length = Length + 2
ReDim Data(Tot_length) As Byte

' Keep data in array
For Index = 1 To Tot_length
    conv = Index + 1
    Data(Index) = Asc(Mid(Second, conv, 1))
Next Index

' Checksum
R_sum = Data(1)
For CH_Rindex = 2 To Length
    R_sum = R_sum + Data(CH_Rindex)
Next CH_Rindex
Byte_CR1 = R_sum \ 256          ' Checksum #1
Byte_CR2 = R_sum Mod 256      ' Checksum #2
Checksum1 = Length + 1
Checksum2 = Length + 2
If Data(Checksum1) = Byte_CR1 And Data(Checksum2) = Byte_CR2 Then
    Call ACK
Else: Call NAK: Exit Sub
End If

```

```

' Verify received message
Equip = Data(1)           ' message direction
Device = Data(2)         ' Device
If Data(3) > 128 Then
    Stream = Data(3) - 128
Else: Stream = Data(3)   ' Stream
End If

Func = Data(4)           ' Function
Sys1 = Data(7)           ' System #1
Sys2 = Data(8)           ' System #2
Sys3 = Data(9)           ' System #3
Sys4 = Data(10)          ' System #4

' Check for S1F13
If Equip >= 128 Then
    If Stream = 1 And Func = 13 Then

        ' Send ENQ and wait for EOT
        ENQ(0) = 5
        MSComm1.Output = ENQ
        Do While MSComm1.InBufferCount = 0
            Loop
            Receive = Asc(MSComm1.Input)
            If Receive = 4 Then
                Call Send_S1F14(Device, Sys1, Sys2, Sys3, Sys4)
            Else
                bytError = MsgBox("No response from Eq., please check the system ", vbOKOnly + vbCritical, "ERROR")
                If bytError = 1 Then: Exit Sub
            End If
        Else: lblShow.Caption = "No Establish communication message"
        End If
    End If
End Sub

```

### Private Sub Send\_S1F14(Device, Sys1, Sys2, Sys3, Sys4 As Byte)

' This procedure is used to send S1F14 message to the equipment.

' after receive S1F13 message.

Dim out() As Byte

Dim Send(0) As Byte

Dim Data\_index As Integer

Dim Length As Byte

Dim LengthSend As Integer

Dim S\_sum As Long

Dim Byte\_C1 As Byte

Dim Byte\_C2 As Byte

Dim Checkind As Integer

Dim Datacount As Integer

Dim Receive As Byte

' The header data

Length = 32

LengthSend = Length + 3 'Length byte + Data + Checksum

ReDim out(LengthSend) As Byte

out(0) = Length

out(1) = 0 'Host to Equip.

out(2) = Device 'Device

out(3) = 1 'S1

out(4) = 14 'F14

out(5) = 128 'Last block

out(6) = 1 'Block 1

' System bytes

out(7) = Sys1

out(8) = Sys2

out(9) = Sys3

out(10) = Sys4

' The body data

out(11) = 1 'List

out(12) = 2 '2 items

out(13) = 33 '1st, Binary

```

out(14) = 1           '1 byte
out(15) = 0           'COMMACK=0, Acceptance
out(16) = 1           'List
out(17) = 2           '2 items
out(18) = 65          '1st, ASCII
out(19) = 6           '6 bytes
out(20) = 68          'D
out(21) = 66          'B
out(22) = 50          '2
out(23) = 48          '0
out(24) = 48          '0
out(25) = 55          '7
out(26) = 65          '2nd, ASCII
out(27) = 5           '5 bytes
out(28) = 67          'C
out(29) = 73          'I
out(30) = 49          '1
out(31) = 48          '0
out(32) = 57          '9

```

```
' Calculate checksum
```

```
S_sum = out(1)
```

```
For Checkind = 2 To Length
```

```
    S_sum = S_sum + out(Checkind)
```

```
Next Checkind
```

```
Byte_C1 = S_sum \ 256
```

```
Byte_C2 = S_sum Mod 256
```

```
out(Length + 1) = Byte_C1           'Checksum #1
```

```
out(Length + 2) = Byte_C2           'Checksum #2
```

```
' Send all data to the port
```

```
For Data_index = 1 To LengthSend
```

```
    Send(0) = out(Datacount)
```

```
    MScComm1.Output = Send
```

```
    Datacount = Datacount + 1
```

```
Next Data_index
```



```
Do While MSComm1.InBufferCount = 0
```

```
Loop
```

```
Receive = Asc(MSComm1.Input)
```

```
' Check for ACK
```

```
Select Case Receive
```

```
Case Is = 6 'ACK
```

```
    mnuDetect.Enabled = True: lblSh_err.Visible = False: lblControl.Caption = ""
```

```
    lblShow.Caption = "Establish Communication Request Acknowledge"
```

```
    lblMachine.Caption = "": lblError.Caption = ""
```

```
    Timer1.Enabled = True: Call Timer1_Timer
```

```
Case Is = 21: lblShow.Caption = "No establishment": Call Timer1_Timer: Exit Sub
```

```
End Select
```

```
End Sub
```

```
Private Sub Send_S1F2(Device, Sys1, Sys2, Sys3, Sys4 As Byte)
```

```
' Send S1F2 message after receive online message (S1F1)
```

```
' for establish communication (Empty list is sent).
```

```
Dim out() As Byte
```

```
Dim Send(0) As Byte
```

```
Dim Data_index As Integer
```

```
Dim Length As Byte
```

```
Dim LengthSend As Integer
```

```
Dim S_sum As Long
```

```
Dim Byte_C1 As Byte
```

```
Dim Byte_C2 As Byte
```

```
Dim Checkind As Integer
```

```
Dim Datacount As Integer
```

```
Dim Receive As Byte
```

```
Dim Shake As String
```

```
' The header data
```

```
Length = 12
```

```
LengthSend = Length + 3
```

```
'Length byte + Data + Checksum
```

```
ReDim out(LengthSend) As Byte
```

```
out(0) = Length
```

```

out(1) = 0           'Host to Equip.
out(2) = Device     'Device
out(3) = 1          'S1, No reply
out(4) = 2          'F2
out(5) = 128        'Last block
out(6) = 1          'Block 1

```

```
' System bytes
```

```

out(7) = Sys1
out(8) = Sys2
out(9) = Sys3
out(10) = Sys4

```

```
' The body data
```

```

out(11) = 1         'List
out(12) = 0         'Empty list

```

```
' Calculate checksum
```

```

S_sum = out(1)
For Checkind = 2 To Length
    S_sum = S_sum + out(Checkind)
Next Checkind

```

```
Byte_C1 = S_sum \ 256
```

```
Byte_C2 = S_sum Mod 256
```

```
out(Length + 1) = Byte_C1           'Checksum #1
```

```
out(Length + 2) = Byte_C2           'Checksum #2
```

```
' Send all data to the port
```

```
For Data_index = 1 To LengthSend
```

```
    Send(0) = out(Datacount)
```

```
    MSComm1.Output = Send
```

```
    Datacount = Datacount + 1
```

```
Next Data_index
```

```
Do While MSComm1.InBufferCount = 0
```

```
Loop
```

```
Receive = Asc(MSComm1.Input)
```

```

' Check for ACK
Select Case Receive
  Case Is = 6 'ACK
    Do Until MSComm1.InBufferCount > 0
      Loop
      Shake = MSComm1.Input
      Call Check(Shake)
      mnuEstablish.Enabled = False
    Case Is = 21: lblShow.Caption = "Can not on line": Call Timer1_Timer: Exit Sub
  End Select
End Sub

```

```

Private Sub Send_S6F12(Device, Sys1, Sys2, Sys3, Sys4 As Byte)

```

```

' Send S6F12 message after receive event report message (S6F11).

```

```

Dim out() As Byte
Dim Send(0) As Byte
Dim Data_index As Integer
Dim Length As Byte
Dim LengthSend As Integer
Dim S_sum As Long
Dim Byte_C1 As Byte
Dim Byte_C2 As Byte
Dim Checkind As Integer
Dim Datacount As Integer
Dim Receive As Byte

```

```

' The header data

```

```

Length = 13
LengthSend = Length + 3           'Length byte + Data + Checksum
ReDim out(LengthSend) As Byte
out(0) = Length
out(1) = 0                       'Host to Equip.
out(2) = Device                   'Device
out(3) = 6                        'S6
out(4) = 12                       'F12

```

```

out(5) = 128                                'Last block
out(6) = 1                                  'Block 1

' System bytes
out(7) = Sys1
out(8) = Sys2
out(9) = Sys3
out(10) = Sys4

' The body data
out(11) = 33                               'Binary
out(12) = 1                               '1 byte
out(13) = 0                               'Accepted and done.

' Calculate checksum
S_sum = out(1)
For Checkind = 2 To Length
    S_sum = S_sum + out(Checkind)
Next Checkind

Byte_C1 = S_sum \ 256
Byte_C2 = S_sum Mod 256
out(Length + 1) = Byte_C1                 'Checksum #1
out(Length + 2) = Byte_C2                 'Checksum #2

' Send all data to the port
For Data_index = 1 To LengthSend
    Send(0) = out(Datacount)
    MSComm1.Output = Send
    Datacount = Datacount + 1
Next Data_index
Do While MSComm1.InBufferCount = 0
Loop
Receive = Asc(MSComm1.Input)

```

```

' Check for ACK
Select Case Receive
    Case Is = 6: lblShow.Caption = "Event Report Acknowledge"
    Case Is = 21: lblShow.Caption = "Message is not accepted": Call Timer1_Timer: Exit Sub
End Select
End Sub

```

### Public Sub Timer1\_Timer()

```

' This is the timer for message checking.
Dim Shake As String

Timer1.Interval = Freq_Ch
If MSComm1.InBufferCount > 1 Then
    MSComm1.InBufferCount = 0
Elseif MSComm1.InBufferCount = 1 Then
    Shake = MSComm1.Input
    Timer1.Enabled = False
    Call Check(Shake)
Else: Timer1.Enabled = True
End If
End Sub

```

### Private Sub Check(Shake As String)

```

' To check the message from equipment frequently.
Dim First(0) As Byte
Dim Wait As Long
Dim Receive As String
Dim Length As Byte
Dim Tot_length As Integer
Dim Data() As Byte
Dim Index As Integer
Dim conv As Integer
Dim R_sum As Long
Dim CH_Rindex As Byte
Dim Checksum1 As Integer
Dim Checksum2 As Integer

```

```

Dim Last As Byte
Dim Equip As Byte
Dim Stream As Byte
Dim Func As Byte
Dim Sys1 As Byte
Dim Sys2 As Byte
Dim Sys3 As Byte
Dim Sys4 As Byte
Dim CEID4 As Integer
Dim RPTID4 As Integer
Dim St() As String
Dim SV As String

```

```
' Check for ENQ and send EOT
```

```
First(0) = Asc(Shake)
```

```
If First(0) = 5 Then
```

```
    Call EOT
```

```
Else: Exit Sub
```

```
End If
```

```
' Receive data from the equipment.
```

```
Do While MSComm1.InBufferCount = 0
```

```
Loop
```

```
For Wait = 1 To Listen_Lg
```

```
Next Wait
```

```
Receive = MSComm1.Input
```

```
Length = Asc(Mid(Receive, 1, 1))
```

```
Tot_length = Length + 2
```

```
ReDim Data(Tot_length) As Byte
```

```
' Keep data into array
```

```
For Index = 1 To Tot_length
```

```
    conv = Index + 1
```

```
    Data(Index) = Asc(Mid(Receive, conv, 1))
```

```
Next Index
```

' Checksum

R\_sum = Data(1)

For CH\_Rindex = 2 To Length

    R\_sum = R\_sum + Data(CH\_Rindex)

Next CH\_Rindex

Byte\_CR1 = R\_sum \ 256

' Checksum #1

Byte\_CR2 = R\_sum Mod 256

' Checksum #2

Checksum1 = Length + 1

Checksum2 = Length + 2

If Data(Checksum1) = Byte\_CR1 And Data(Checksum2) = Byte\_CR2 Then

    Call ACK

Else: Call NAK

End If

' Verify the message

Equip = Data(1)

' Message direction

Device = Data(2)

' Device

If Data(3) > 128 Then

' Stream

    Stream = Data(3) - 128

Else: Stream = Data(3)

End If

Func = Data(4)

' Function

Sys1 = Data(7)

' System bytes

Sys2 = Data(8)

Sys3 = Data(9)

Sys4 = Data(10)

' Display the important information on message block.

Text1.Text = Stream

Text2.Text = Func

Text3.Text = Sys1

Text4.Text = Sys2

Text5.Text = Sys3

Text6.Text = Sys4

If Equip >= 128 Then

' Receive Are You There Request (R).

If Stream = 1 And Func = 1 Then

Call S1F1(Device, Sys1, Sys2, Sys3, Sys4)

' Receive On Line Data (D).

Elseif Stream = 1 And Func = 2 Then: lblControl.Caption = "Data is on-line": Call Timer1\_Timer

' Receive Selected Equipment Status Data (SSD).

Elseif Stream = 1 And Func = 4 Then: lblShow.Caption = "Selected Equipment Status Data"

If Sh\_ver = 1 Then

Version = Mid(Receive, 16, 5)

frmSV.Option1.Value = False: frmSV.Option2.Value = False

frmSV.Option3.Value = False: Call *frmVersion.Show*

FrmVersion

Elseif frmSV.Option1.Value = True Then

Select Case Data(16)

Case Is = 1: SV = "Disabled"

Case Is = 2: SV = "Enabled / not communicating"

Case Is = 3: SV = "Enabled / communicating"

End Select

Elseif frmSV.Option2.Value = True Then

Select Case Data(15)

Case Is = 1: SV = "Equipment off-line"

Case Is = 2: SV = "Attempt on-line"

Case Is = 3: SV = "Host off-line"

Case Is = 4: SV = "On-line / local"

Case Is = 5: SV = "On-line / remote"

End Select

lblControl.Caption = SV

Elseif frmSV.Option3.Value = True Then

SV = CStr((CLng(Data(17)) \* 256) + Data(18))

End If

Call ShowSv(SV): Call Timer1\_Timer



• **Receive Establish Communication Request (CR).**

Elseif Stream = 1 And Func = 13 Then: Call S1F13(Device, Sys1, Sys2, Sys3, Sys4)

• **Receive Event Report Send (ERS).**

Elseif Stream = 6 And Func = 11 Then

  If Length >= 62 Then

    IblSh\_err.Visible = True: IblError.Visible = True

    Last = Length - 62

    IblError.Caption = CStr(Mid(Receive, 64, Last))

    Error = IblError.Caption

  Else: Error = ""

  End If

  DATAID1 = Data(15): DATAID2 = Data(16): DATAID3 = Data(17): DATAID4 = Data(18)

  CEID1 = Data(21): CEID2 = Data(22): CEID3 = Data(23): CEID4 = Data(24)

  RPTID1 = Data(31): RPTID2 = Data(32): RPTID3 = Data(33): RPTID4 = Data(34)

  Call S6F11(Device, Sys1, Sys2, Sys3, Sys4, CEID4, RPTID4, Error)

  Text7.Text = Data(24) 'CEID

  Text8.Text = Data(34) 'RPTID

• **Receive abort transaction messages.**

Elseif Func = 0 Then

  IblMachine.Caption = "Abort transaction message": Timer1.Enabled = True: Call Timer1\_Timer

• **Receive Error messages.**

Elseif Stream = 9 Then Call S9(Func)

Else: IblMachine.Caption = "Host do not know this message": Timer1.Enabled = True: Call

Timer1\_Timer

  End If

End If

End Sub

**Private Sub S1F1(Device, Sys1, Sys2, Sys3, Sys4 As Byte)**

  Dim ENQ(0) As Byte

  Dim Receive As Byte

  Dim bytError As Byte

  IblLast.Caption = "S1F2"

```

' Send ENQ and wait for EOT
ENQ(0) = 5
MSComm1.Output = ENQ
Do While MSComm1.InBufferCount = 0
Loop
Receive = Asc(MSComm1.Input)
If Receive = 4 Then
    Call Send_S1F2(Device, Sys1, Sys2, Sys3, Sys4)
Else
    bytError = MsgBox("No response from Eq., please check the system ", vbOKOnly + vbCritical, "ERROR")
    If bytError = 1 Then: Exit Sub
End If
Timer1.Enabled = True: Call Timer1_Timer
End Sub

```

```

Private Sub S1F13(Device, Sys1, Sys2, Sys3, Sys4 As Byte)

```

```

    Dim ENQ(0) As Byte
    Dim Receive As Byte
    Dim bytError As Byte
    lblLast.Caption = "S1F14"
' Send ENQ and wait for EOT
ENQ(0) = 5
MSComm1.Output = ENQ
Do While MSComm1.InBufferCount = 0
Loop
Receive = Asc(MSComm1.Input)
If Receive = 4 Then
    Call Send_S1F14(Device, Sys1, Sys2, Sys3, Sys4)
Else
    bytError = MsgBox("No response from Eq., please check the system ", vbOKOnly + vbCritical, "ERROR")
    If bytError = 1 Then: Exit Sub
End If
Timer1.Enabled = True: Call Timer1_Timer
End Sub

```

Private Sub S6F11(Device, Sys1, Sys2, Sys3, Sys4 As Byte, CEID4, RPTID4 As Integer, Error As String)

Dim ENQ(0) As Byte  
 Dim Receive As Byte  
 Dim bytError As Byte

lblLast.Caption = "S6F12"

' Send ENQ and wait for EOT

Call Record(CEID4, RPTID4, Error)

ENQ(0) = 5

MSComm1.Output = ENQ

Do While MSComm1.InBufferCount = 0

Loop

Receive = Asc(MSComm1.Input)

If Receive = 4 Then

Call Send\_S6F12(Device, Sys1, Sys2, Sys3, Sys4)

Else

bytError = MsgBox("No response from Eq., please check the system ", vbOKOnly + vbCritical, "ERROR")

If bytError = 1 Then: Exit Sub

End If

Timer1.Enabled = True: Call Timer1\_Timer

End Sub

Private Sub Record(CEID4, RPTID4 As Integer, Error As String)

' Control related events.

If CEID4 = 0 And RPTID4 = 1 Then

Call Off\_line

Elseif CEID4 = 1 And RPTID4 = 1 Then Call Online\_local

Elseif CEID4 = 2 And RPTID4 = 1 Then Call Online\_remote

' Equipment processing state related events.

Elseif CEID4 = 10 And RPTID4 = 2 Then Call Down

Elseif CEID4 = 11 And RPTID4 = 2 Then Call Idle

Elseif CEID4 = 12 And RPTID4 = 2 Then Call Utilised

' **Exception related events**

```

Elseif CEID4 = 20 And RPTID4 = 3 Then Call Mat_warn
Elseif CEID4 = 21 And RPTID4 = 3 Then Call Equip_warn
Elseif CEID4 = 22 And RPTID4 = 3 Then Call Mat_error
Elseif CEID4 = 23 And RPTID4 = 3 Then Call Equip_error
Elseif CEID4 = 24 And RPTID4 = 3 Then Call Soft_error
Elseif CEID4 = 25 And RPTID4 = 3 Then Call Hard_error
Elseif CEID4 = 26 And RPTID4 = 3 Then Call Para_warn
Elseif CEID4 = 27 And RPTID4 = 3 Then Call Para_error

```

' **Equipment constant related events.**

```
Elseif CEID4 = 50 And RPTID4 = 7 Then Call Const_ch
```

' **Material transfer related events.**

```

Elseif RPTID4 = 4 Then Call Mat_transfer(CEID4)
Else: Call No_mean(Error, CEID4, RPTID4)
End If

```

**End Sub**

**Private Sub S9(Func As Byte)**

```

If Func = 1 Then
    lblShow.Caption = "Unrecognised Device ID"
Elseif Func = 3 Then: lblShow.Caption = "Unrecognised Stream Type"
Elseif Func = 5 Then: lblShow.Caption = "Unrecognised Function Type"
Elseif Func = 7 Then: lblShow.Caption = "Illegal Data"
Elseif Func = 9 Then: lblShow.Caption = "Transaction Timer Timeout"
Elseif Func = 11 Then: lblShow.Caption = "Data Too Long"
Elseif Func = 13 Then: lblShow.Caption = "Conversation Timeout"
End If
Timer1.Enabled = True: Call Timer1_Timer

```

**End Sub**

**Private Sub Off\_line()**

```

Dim Current As String
Dim Current_time As Date
Dim Current_date As Date

```

```
lblControl.Caption = "Equip. Off-Line"  
Current = lblControl.Caption  
Current_time = Format(Now, "hh:mm:ss")  
Current_date = Format(Now, "yyy/mm/dd")  
Call File_rec(Current, Current_time, Current_date)
```

End Sub

**Private Sub Online\_local()**

```
Dim Current As String  
Dim Current_time As Date  
Dim Current_date As Date
```

```
lblControl.Caption = "On-Line/Local to equipment No. " & Device  
lblMachine.Caption = ""  
lblSh_err.Visible = False  
lblError.Caption = ""  
Current = lblControl.Caption  
Current_time = Format(Now, "hh:mm:ss")  
Current_date = Format(Now, "yyy/mm/dd")  
Call File_rec(Current, Current_time, Current_date)
```

End Sub

**Private Sub Online\_remote()**

```
Dim Current As String  
Dim Current_time As Date  
Dim Current_date As Date
```

```
lblControl.Caption = "On-Line/Remote"  
Current = lblControl.Caption  
Current_time = Format(Now, "hh:mm:ss")  
Current_date = Format(Now, "yyy/mm/dd")  
Call File_rec(Current, Current_time, Current_date)
```

End Sub

**Private Sub Down()**

Dim Current As String

Dim Current\_time As Date

Dim Current\_date As Date

IblMachine.Caption = "Down"

Current = IblMachine.Caption

Current\_time = Format(Now, "hh:mm:ss")

Current\_date = Format(Now, "yyyy/mm/dd")

Call File\_rec(Current, Current\_time, Current\_date)

**End Sub**

**Private Sub Idle()**

Dim Current As String

Dim Current\_time As Date

Dim Current\_date As Date

IblMachine.Caption = "Idle"

Current = IblMachine.Caption

Current\_time = Format(Now, "hh:mm:ss")

Current\_date = Format(Now, "yyyy/mm/dd")

Call File\_rec(Current, Current\_time, Current\_date)

**End Sub**

**Private Sub Utilised()**

Dim Current As String

Dim Current\_time As Date

Dim Current\_date As Date

IblMachine.Caption = "Utilised"

IblSh\_err.Visible = False: IblError.Visible = False

Current = IblMachine.Caption

Current\_time = Format(Now, "hh:mm:ss")

Current\_date = Format(Now, "yyyy/mm/dd")

Call File\_rec(Current, Current\_time, Current\_date)

**End Sub**

Private Sub File\_rec(Current As String, Current\_time As Date, Current\_date As Date)

Dim Time\_count As Long

Dim HH As Integer

Dim MM As Integer

Dim SS As Integer

Dim Pre\_MM As Long

Dim Hour, Minute, Second As String

Dim Duration As String

' Count time spending for each state

Pre = Previous\_time

Do Until Format(Current\_time, "hh:mm:ss") = Format(Pre, "hh:mm:ss")

Pre = Pre + "00:00:01"

Time\_count = Time\_count + 1

Loop

' Convert time\_count to be hh:mm:ss

If Time\_count >= 3600 Then

HH = (Time\_count \ 3600)

If HH < 10 Then

Hour = "0" & HH

Else: Hour = HH: End If

Pre\_MM = ((Time\_count / 3600) - HH) \* 3600

MM = (Pre\_MM \ 60)

If MM < 10 Then

Minute = "0" & MM

Else: Minute = MM: End If

SS = ((Pre\_MM / 60) - MM) \* 60

If SS < 10 Then

Second = "0" & SS

Else: Second = SS: End If

Elseif Time\_count < 3600 And Time\_count >= 60 Then

Hour = "00"

MM = (Time\_count \ 60)

If MM < 10 Then

Minute = "0" & MM

```

Else: Minute = MM: End If
SS = ((Time_count / 60) - MM) * 60
If SS < 10 Then
    Second = "0" & SS
Else: Second = SS: End If
Elseif Time_count < 60 Then
    Hour = "00": Minute = "00": SS = Time_count
    If SS < 10 Then
        Second = "0" & SS
    Else: Second = SS: End If
End If
Duration = Hour & ":" & Minute & ":" & Second

' Record file
Open "C:\EDS\Data\Machine.txt" For Append As #1
Print #1, Format(Previous_date, "yyyy/mm/dd"), Format(Previous_time, "hh:mm:ss"), _
    Duration, Previous
Close #1
Open "C:\EDS\Data\Current.txt" For Output As #3
Print #3, Current_date, Current_time, Current
Close #3
Previous = Current
Previous_time = Current_time
Previous_date = Current_date
txtStat.Text = Previous
txtTime.Text = Format(Previous_time, "hh:mm:ss")

If Error_count > 0 Then
    Open "C:\EDS\Data\Machine.txt" For Append As #1
    Select Case Error_count
        Case Is = 1:
            Print #1, Format(Act_date1, "yyyy/mm/dd"), Format(Act_time1, "hh:mm:ss"), "00:00:00", Action1, Error1
        Case Is = 2:
            Print #1, Format(Act_date1, "yyyy/mm/dd"), Format(Act_time1, "hh:mm:ss"), "00:00:00", Action1, Error1
            Print #1, Format(Act_date2, "yyyy/mm/dd"), Format(Act_time2, "hh:mm:ss"), "00:00:00", Action2, Error2
        Case Is = 3:

```





```
End Select
Close #1
Error_count = 0
End If
End Sub
```

#### Private Sub Mat\_warn()

```
Dim Act_time As Date
Dim Act_date As Date
Dim Action As String

IblMachine.Caption = "Material warning"
Act_time = Format(Now, "hh:mm:ss")
Act_date = Format(Now, "yyyy/mm/dd")
Action = IblMachine.Caption
Call Error_show(Act_time, Act_date, Action)
End Sub
```

#### Private Sub Equip\_warn()

```
Dim Act_time As Date
Dim Act_date As Date
Dim Action As String

IblMachine.Caption = "Equipment warning"
Act_time = Format(Now, "hh:mm:ss")
Act_date = Format(Now, "yyyy/mm/dd")
Action = IblMachine.Caption
Call Error_show(Act_time, Act_date, Action)
End Sub
```

#### Private Sub Mat\_error()

```
Dim Act_time As Date
Dim Act_date As Date
Dim Action As String
```

```
IblMachine.Caption = "Material stop error"  
Act_time = Format(Now, "hh:mm:ss")  
Act_date = Format(Now, "yyyy/mm/dd")  
Action = IblMachine.Caption  
Call Error_show(Act_time, Act_date, Action)
```

**End Sub**

**Private Sub Equip\_error()**

```
Dim Act_time As Date  
Dim Act_date As Date  
Dim Action As String  
  
IblMachine.Caption = "Equipment stop error"  
Act_time = Format(Now, "hh:mm:ss")  
Act_date = Format(Now, "yyyy/mm/dd")  
Action = IblMachine.Caption  
Call Error_show(Act_time, Act_date, Action)
```

**End Sub**

**Private Sub Soft\_error()**

```
Dim Act_time As Date  
Dim Act_date As Date  
Dim Action As String  
  
IblMachine.Caption = "Software error"  
Act_time = Format(Now, "hh:mm:ss")  
Act_date = Format(Now, "yyyy/mm/dd")  
Action = IblMachine.Caption  
Call Error_show(Act_time, Act_date, Action)
```

**End Sub**

**Private Sub Hard\_error()**

```
Dim Act_time As Date  
Dim Act_date As Date  
Dim Action As String
```

```
lblMachine.Caption = "Hardware error"  
Act_time = Format(Now, "hh:mm:ss")  
Act_date = Format(Now, "yyyy/mm/dd")  
Action = lblMachine.Caption  
Call Error_show(Act_time, Act_date, Action)
```

**End Sub**

**Private Sub Para\_warn()**

```
Dim Act_time As Date  
Dim Act_date As Date  
Dim Action As String  
  
lblMachine.Caption = "Parameter warning"  
Act_time = Format(Now, "hh:mm:ss")  
Act_date = Format(Now, "yyyy/mm/dd")  
Action = lblMachine.Caption  
Call Error_show(Act_time, Act_date, Action)
```

**End Sub**

**Private Sub Para\_error()**

```
Dim Act_time As Date  
Dim Act_date As Date  
Dim Action As String  
  
lblMachine.Caption = "Parameter error"  
Act_time = Format(Now, "hh:mm:ss")  
Act_date = Format(Now, "yyyy/mm/dd")  
Action = lblMachine.Caption  
Call Error_show(Act_time, Act_date, Action)
```

**End Sub**

**Private Sub Const\_ch()**

```
Dim Act_time As Date  
Dim Act_date As Date  
Dim Action As String
```

```

IblMachine.Caption = "Equipment constant change"
Act_time = Format(Now, "hh:mm:ss")
Act_date = Format(Now, "yyyy/mm/dd")
Action = IblMachine.Caption
Call Error_show(Act_time, Act_date, Action)

```

**End Sub**

**Private Sub Mat\_transfer(CEID4)**

```

Dim Act_time As Date
Dim Act_date As Date
Dim Action As String
Dim Magazine As String

```

Select Case CEID4

```

Case Is = 30: Magazine = "Post-input buffer --> Output carrier"
Case Is = 31: Magazine = "Output carrier --> Post-output buffer "
Case Is = 32: Magazine = "Pre-input buffer --> Input carrier"
Case Is = 33: Magazine = "Input carrier --> Pre-output buffer"

```

End Select

```

IblMachine.Caption = Magazine
Act_time = Format(Now, "hh:mm:ss")
Act_date = Format(Now, "yyyy/mm/dd")
Action = IblMachine.Caption
Call Error_show(Act_time, Act_date, Action)

```

**End Sub**

**Private Sub Error\_show(Act\_time, Act\_date As Date, Action As String)**

```

Error_count = Error_count + 1

```

Select Case Error\_count

```

Case Is = 1: Act_date1 = Act_date: Act_time1 = Act_time: Action1 = Action: Error1 = Error
Case Is = 2: Act_date2 = Act_date: Act_time2 = Act_time: Action2 = Action: Error2 = Error
Case Is = 3: Act_date3 = Act_date: Act_time3 = Act_time: Action3 = Action: Error3 = Error
Case Is = 4: Act_date4 = Act_date: Act_time4 = Act_time: Action4 = Action: Error4 = Error
Case Is = 5: Act_date5 = Act_date: Act_time5 = Act_time: Action5 = Action: Error5 = Error
Case Is = 6: Act_date6 = Act_date: Act_time6 = Act_time: Action6 = Action: Error6 = Error
Case Is = 7: Act_date7 = Act_date: Act_time7 = Act_time: Action7 = Action: Error7 = Error

```

```
Case Is = 8: Act_date8 = Act_date: Act_time8 = Act_time: Action8 = Action: Error8 = Error
```

```
End Select
```

```
End Sub
```

```
Private Sub No_mean(Error As String, CEID4, RPTID4 As Integer)
```

```
    lblMachine.Caption = "Can not identify"
```

```
    Open "C:\EDS\Data\Machine.txt" For Append As #1
```

```
    Print #1, Format(Now, "yyyy/mm/dd"), Format(Now, "hh:mm:ss"), lblMachine.Caption, CEID4, RPTID4
```

```
    Close #1
```

```
End Sub
```

```
Private Sub ShowSv(SV As String)
```

```
    ' Display the status variable.
```

```
    Dim bytSv As Byte
```

```
    If frmSV.Option1.Value = True Then
```

```
        bytSv = MsgBox("Communication state is " & SV, vbOKOnly + vbInformation, "SV")
```

```
    ElseIf frmSV.Option2.Value = True Then
```

```
        bytSv = MsgBox("Control state is " & SV, vbOKOnly + vbInformation, "SV")
```

```
    ElseIf frmSV.Option3.Value = True Then
```

```
        bytSv = MsgBox("Net UPH is " & SV & " Units Per Hour", vbOKOnly + vbInformation, "SV")
```

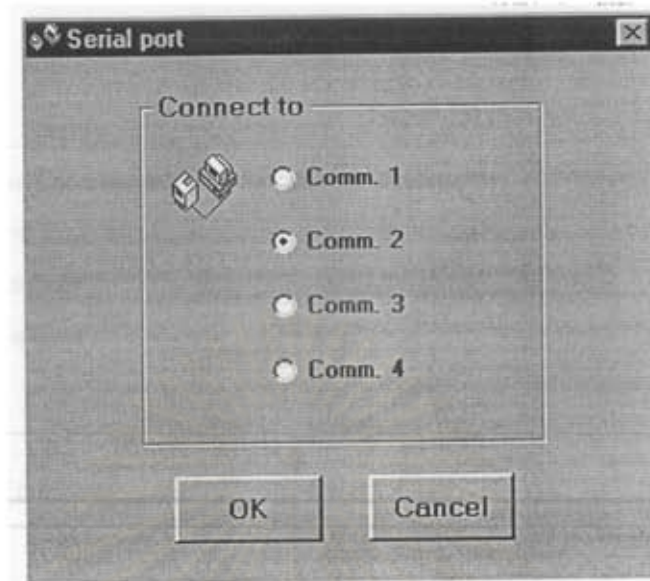
```
    End If
```

```
    If bytSv = 1 Then: Exit Sub
```

```
End Sub
```

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## Frame port (FrmPort)



Public bytPort As Byte

Private Sub Form\_Load()

frmEDS.MSComm1.CommPort = 1

If frmEDS.MSComm1.PortOpen = True Then

Comm1.Enabled = False

End If

frmEDS.MSComm1.CommPort = 2

If frmEDS.MSComm1.PortOpen = True Then

Comm2.Enabled = False

End If

frmEDS.MSComm1.CommPort = 3

If frmEDS.MSComm1.PortOpen = True Then

Comm3.Enabled = False

End If

frmEDS.MSComm1.CommPort = 4

If frmEDS.MSComm1.PortOpen = True Then

Comm4.Enabled = False

End If

End Sub



```
Private Sub cmdCancel_Click()
```

```
    Me.Hide
```

```
End Sub
```

```
Public Sub cmdOK_Click()
```

```
    ' Define comm port and connect the port for communications.
```

```
    Dim Current As String
```

```
    Dim Current_time As Date
```

```
    Dim Current_date As Date
```

```
    cmdOK.SetFocus
```

```
    If Comm1.Value = True Then
```

```
        bytPort = 1
```

```
    ElseIf Comm2.Value = True Then bytPort = 2
```

```
    ElseIf Comm3.Value = True Then bytPort = 3
```

```
    ElseIf Comm4.Value = True Then bytPort = 4
```

```
    End If
```

```
    frmEDS.MSComm1.CommPort = bytPort
```

```
    frmEDS.MSComm1.Settings = "9600,N,8,1"
```

```
    frmEDS.MSComm1.InputMode = comInputModeText
```

```
    frmEDS.MSComm1.InputLen = 0
```

```
    If frmEDS.MSComm1.PortOpen = True Then
```

```
        MsgBox ("Port is already open")
```

```
    Else
```

```
        frmEDS.MSComm1.PortOpen = True
```

```
        frmEDS.lblStat1.Caption = "Connect to port number " & bytPort
```

```
        frmEDS.mnuConnect.Enabled = False
```

```
        frmEDS.mnuDisconnect.Enabled = True
```

```
        frmEDS.mnuEstablish.Enabled = True
```

```
    End If
```

```
    Current = frmEDS.lblStat1.Caption
```

```
    Current_time = Format(Now, "hh:mm:ss")
```

```
    Current_date = Format(Now, "yyy/mm/dd")
```

```
    Call frmEDS.Ch_state(Current, Current_time, Current_date)
```

```
    frmEDS.Connect.Visible = True
```



frmEDS.Disconnect1.Visible = False

frmEDS.Disconnect2.Visible = False

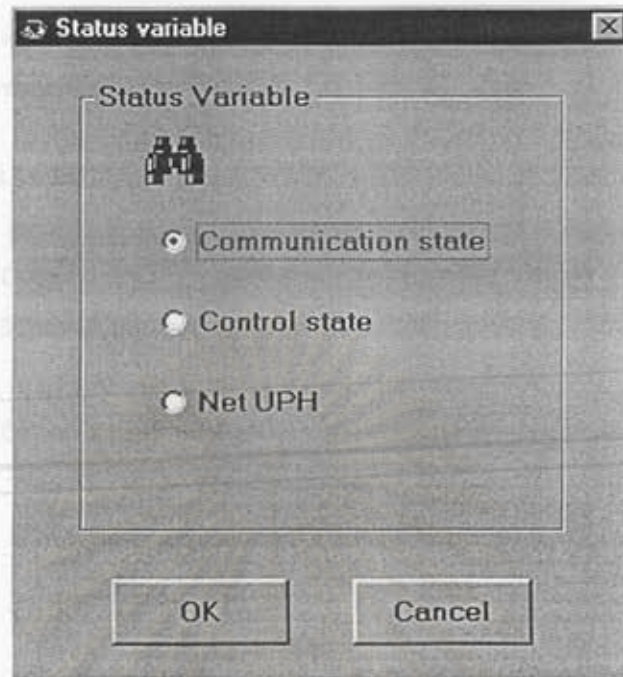
Me.Hide

End Sub



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## Frame status variable (FrmSV)



Dim out() As Byte

Private Sub cmdCancel\_Click()

Me.Hide

End Sub

Private Sub cmdOK\_Click()

Me.Hide

Call SV

End Sub

Public Sub SV()

' To send S1F3 to the equipment to ask for status variable value.

Dim ENQ(0) As Byte

Dim Receive As Byte

Dim Send(0) As Byte

Dim bytError As Byte

Dim Data\_index As Integer

Dim Length As Byte

Dim LengthSend As Integer

Dim S\_sum As Long

Dim Byte\_C1 As Byte

Dim Byte\_C2 As Byte

Dim Checkind As Integer

Dim Datacount As Integer

' Send ENQ and wait for EOT

ENQ(0) = 5

frmEDS.MSComm1.Output = ENQ

Do While frmEDS.MSComm1.InBufferCount = 0

Loop

Receive = Asc(frmEDS.MSComm1.Input)

If Receive = 4 Then

' The header data

Length = 18

LengthSend = Length + 3 'Length byte + Data + Checksum

ReDim out(LengthSend) As Byte

out(0) = Length

out(1) = 0 'Host to Equip.

out(2) = frmEDS.Device 'Device

out(3) = 129 'S1, Reply

out(4) = 3 'F3

out(5) = 128 'Last block

out(6) = 1 'Block 1

' System bytes

Call frmEDS.Sys

out(7) = frmEDS.Byte\_7

out(8) = frmEDS.Byte\_8

out(9) = frmEDS.Byte\_9

out(10) = frmEDS.Byte\_10

' The body data

out(11) = 1 'List, 1 length byte

out(12) = 1 '1 item

out(13) = 177 '1st, 4 bytes integer

out(14) = 4 '4 bytes

```

' Define SVID.
  If Option1.Value = True Then
    out(15) = 0: out(16) = 1: out(17) = 180: out(18) = 4 'SVID=111620
  ElseIf Option2.Value = True Then: out(15) = 0: out(16) = 1: out(17) = 180: out(18) = 14 'SVID=111630
  ElseIf Option3.Value = True Then: out(15) = 0: out(16) = 1: out(17) = 175: out(18) = 83 'SVID=110419
  End If

' Calculate checksum
  S_sum = out(1)
  For Checkind = 2 To Length
    S_sum = S_sum + out(Checkind)
  Next Checkind
  Byte_C1 = S_sum \ 256
  Byte_C2 = S_sum Mod 256
  out(Length + 1) = Byte_C1           'Checksum #1
  out(Length + 2) = Byte_C2         'Checksum #2

' Send all data to the port
  For Data_index = 1 To LengthSend
    Send(0) = out(Datacount)
    frmEDS.MSComm1.Output = Send
    Datacount = Datacount + 1
  Next Data_index
  Do While frmEDS.MSComm1.InBufferCount = 0
  Loop
  Receive = Asc(frmEDS.MSComm1.Input)

' Check for ACK
  Select Case Receive
    Case Is = 6: frmEDS.lblLast.Caption = "S1F3": frmEDS.lblShow.Caption = "S1F3 is sent"
      Call frmEDS.Timer1_Timer
    Case Is = 21: frmEDS.lblShow.Caption = "S1F3 is not accepted": Exit Sub
  End Select

Else
  bytError = MsgBox("No response from Eq., please check the system ", vbOKOnly + vbCritical + 4096, "ERROR")
  If bytError = 1 Then: Exit Sub

End If

End Sub

```

### Frame version (FrmVersion)



```
Private Sub Form_Load()
```

```
    ' Display the software version
```

```
    lblVersion.Caption = " Host interface version " & frmEDS.Version
```

```
    Call frmEDS.Timer1_Timer
```

```
End Sub
```

```
Private Sub cmdOK_Click()
```

```
    Me.Hide
```

```
    frmEDS.Sh_ver = 0
```

```
    Call frmEDS.Timer1_Timer
```

```
End Sub
```

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# APPENDIX F

DATA OF FILE ON THE ERROR DETECTION SYSTEM

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## The die attach error detection system

Date	Time	Duration	Status	Error
24/9/99	14:43:21	0:00:05	Start	
24/9/99	14:43:26	0:00:14	Connect to port number 2	
24/9/99	14:43:40	0:00:30	On-Line/Local to equipment No. 13	
24/9/99	14:44:10	0:01:30	Utilised	
24/9/99	14:45:40	0:00:11	Idle	
24/9/99	14:45:51	0:01:52	Utilised	
24/9/99	14:47:43	0:03:00	Idle	
24/9/99	14:50:43	0:02:35	Utilised	
24/9/99	14:53:18	0:00:03	Idle	
24/9/99	14:53:21	0:00:10	Down	
24/9/99	14:53:31	0:00:02	Idle	
24/9/99	14:53:33	0:05:36	Utilised	
24/9/99	14:59:09	0:00:03	Idle	
24/9/99	14:59:12	0:00:30	Down	
24/9/99	14:59:21	0:00:00	Output carrier --> Post-output buffer	
24/9/99	14:59:37	0:00:00	Post-input buffer --> Output carrier	
24/9/99	14:59:42	0:00:02	Idle	
24/9/99	14:59:44	0:03:20	Utilised	
24/9/99	15:03:04	0:00:02	Idle	
24/9/99	15:03:06	0:00:09	Down	
24/9/99	15:03:15	0:00:02	Idle	
24/9/99	15:03:17	0:07:44	Utilised	
24/9/99	15:11:01	0:00:03	Idle	
24/9/99	15:11:04	0:00:04	Down	
24/9/99	15:11:08	0:00:03	Idle	
24/9/99	15:11:11	0:08:47	Utilised	
24/9/99	15:19:58	0:02:27	Idle	
24/9/99	15:22:25	0:00:09	Down	
24/9/99	15:22:34	0:00:23	Idle	
24/9/99	15:22:57	0:01:15	Down	
24/9/99	15:24:12	0:00:15	Idle	
24/9/99	15:24:27	0:02:20	Down	
24/9/99	15:26:47	0:00:23	Idle	
24/9/99	15:27:10	0:00:12	Down	
24/9/99	15:27:22	0:00:29	Idle	
24/9/99	15:27:51	0:00:04	Down	
24/9/99	15:27:55	0:00:48	Idle	
24/9/99	15:28:43	0:00:30	Down	
24/9/99	15:29:13	0:00:03	Idle	
24/9/99	15:29:16	0:00:37	Utilised	
24/9/99	15:29:53	0:00:02	Idle	
24/9/99	15:29:55	0:00:15	Down	

24/9/99	15:30:10	0:00:04	Idle	
24/9/99	15:30:14	0:00:25	Utilised	
24/9/99	15:30:39	0:00:03	Idle	
24/9/99	15:30:42	0:00:25	Down	
24/9/99	15:31:02	0:00:00	Equipment constant change	
24/9/99	15:31:05	0:00:00	Equipment constant change	
24/9/99	15:31:07	0:00:02	Idle	
24/9/99	15:31:09	0:00:35	Utilised	
24/9/99	15:31:44	0:00:03	Idle	
24/9/99	15:31:47	0:00:35	Down	
24/9/99	15:32:22	0:00:02	Idle	
24/9/99	15:32:24	0:00:08	Utilised	
24/9/99	15:32:32	0:00:05	Idle	
24/9/99	15:32:37	0:01:11	Utilised	
24/9/99	15:33:48	0:00:03	Idle	
24/9/99	15:33:51	0:00:29	Down	
24/9/99	15:34:20	0:00:02	Idle	
24/9/99	15:34:22	0:01:17	Utilised	
24/9/99	15:35:39	0:00:02	Idle	
24/9/99	15:35:41	0:00:13	Down	
24/9/99	15:35:54	0:00:02	Idle	
24/9/99	15:35:56	0:00:52	Utilised	
24/9/99	15:36:48	0:00:02	Idle	
24/9/99	15:36:50	0:00:17	Utilised	
24/9/99	15:37:07	0:00:02	Idle	
24/9/99	15:37:09	0:00:15	Down	
24/9/99	15:37:24	0:00:06	Idle	
24/9/99	15:37:30	0:02:15	Utilised	
24/9/99	15:39:45	0:00:06	Idle	
24/9/99	15:39:51	0:00:17	Utilised	
24/9/99	15:40:08	0:01:13	Idle	
24/9/99	15:41:21	0:00:13	Down	
24/9/99	15:41:34	0:00:15	Idle	
24/9/99	15:41:49	0:00:10	Down	
24/9/99	15:41:59	0:00:04	Idle	
24/9/99	15:42:03	0:00:48	Utilised	
24/9/99	15:42:51	0:00:02	Idle	
24/9/99	15:42:53	0:00:11	Down	
24/9/99	15:43:04	0:00:02	Idle	
24/9/99	15:43:06	0:00:03	Utilised	
24/9/99	15:43:09	0:00:08	Idle	
24/9/99	15:43:17	0:11:40	Utilised	
24/9/99	15:54:57	0:00:07	Idle	
24/9/99	15:55:04	0:12:33	Utilised	
24/9/99	16:07:35	0:00:00	Material stop error	Wafer can not be loaded



24/9/99	16:07:37	0:00:10	Down	
24/9/99	16:07:47	0:00:02	Idle	
24/9/99	16:07:49	0:00:15	Down	
24/9/99	16:08:04	0:00:08	Idle	
24/9/99	16:08:12	0:14:28	Utilised	
24/9/99	16:10:29	0:00:00	Output carrier --> Post-output buffer	
24/9/99	16:10:37	0:00:00	Post-input buffer --> Output carrier	
24/9/99	16:22:40	0:00:05	Idle	
24/9/99	16:22:45	0:11:26	Utilised	
24/9/99	16:34:11	0:00:30	Idle	
24/9/99	16:34:41	0:01:32	Utilised	
24/9/99	16:36:13	0:00:37	Idle	
24/9/99	16:36:50	0:02:15	Utilised	
24/9/99	16:39:05	0:00:16	idle	
24/9/99	16:39:21	1:06:47	Utilised	
24/9/99	17:17:12	0:00:00	Output carrier --> Post-output buffer	
24/9/99	17:17:18	0:00:00	Post-input buffer --> Output carrier	
24/9/99	17:46:06	0:00:00	Equipment stop error	First chip search unsuccessful
24/9/99	17:46:08	0:00:09	Down	
24/9/99	17:46:17	0:00:18	Idle	
24/9/99	17:46:35	0:00:05	Utilised	
24/9/99	17:46:40	0:00:02	Idle	
24/9/99	17:46:42	0:00:11	Down	
24/9/99	17:46:53	0:00:10	Idle	
24/9/99	17:47:03	0:00:56	Utilised	
24/9/99	17:47:59	0:00:20	Idle	
24/9/99	17:48:19	0:04:37	Utilised	
24/9/99	17:52:56	0:00:23	Idle	
24/9/99	17:53:19	0:00:37	Utilised	
24/9/99	17:53:56	0:00:03	Idle	
24/9/99	17:53:59	0:00:08	Utilised	
24/9/99	17:54:07	0:00:03	Idle	
24/9/99	17:54:10	0:00:04	Utilised	
24/9/99	17:54:14	0:00:02	Idle	
24/9/99	17:54:16	0:01:06	Utilised	
24/9/99	17:55:22	1:23:44	Idle	
24/9/99	19:19:06	0:00:13	Utilised	
24/9/99	19:19:11	0:00:00	Material warning	Dispenser empty
24/9/99	19:19:19	0:00:03	Idle	
24/9/99	19:19:22	0:02:21	Utilised	
24/9/99	19:19:24	0:00:00	Material warning	Dispenser empty
24/9/99	19:21:43	0:00:02	Idle	
24/9/99	19:21:45	0:00:11	Utilised	
24/9/99	19:21:48	0:00:00	Material warning	Dispenser empty
24/9/99	19:21:56	0:00:03	Idle	

24/9/99	19:21:59	0:00:04	Down	
24/9/99	19:22:03	0:00:02	Idle	
24/9/99	19:22:05	0:01:43	Utilised	
24/9/99	19:23:48	0:00:04	Idle	
24/9/99	19:23:52	0:07:12	Down	
24/9/99	19:24:01	0:00:00	Output carrier --> Post-output buffer	
24/9/99	19:24:09	0:00:00	Post-input buffer --> Output carrier	
24/9/99	19:31:04	0:00:03	Idle	
24/9/99	19:31:07	0:00:23	Down	
24/9/99	19:31:30	0:00:02	Idle	
24/9/99	19:31:32	0:00:53	Utilised	
24/9/99	19:32:25	0:00:03	Idle	
24/9/99	19:32:28	0:00:02	Down	
24/9/99	19:32:30	0:00:03	Idle	
24/9/99	19:32:33	0:12:30	Utilised	
24/9/99	19:45:01	0:00:00	Material stop error	Wafer can not be loaded
24/9/99	19:45:03	0:00:15	Down	
24/9/99	19:45:18	0:00:07	Idle	
24/9/99	19:45:25	0:00:39	Down	
24/9/99	19:45:33	0:00:00	Material stop error	Wafer can not be loaded
24/9/99	19:46:04	0:00:07	Idle	
24/9/99	19:46:11	0:02:45	Utilised	
24/9/99	19:48:56	0:00:10	Idle	
24/9/99	19:49:06	0:00:19	Down	
24/9/99	19:49:25	0:00:02	Idle	
24/9/99	19:49:27	1:15:05	Utilised	
24/9/99	20:17:16	0:00:00	Output carrier --> Post-output buffer	
24/9/99	20:17:23	0:00:00	Post-input buffer --> Output carrier	
24/9/99	21:04:32	0:00:07	Idle	
24/9/99	21:04:39	0:00:53	Down	
24/9/99	21:05:32	0:00:02	Idle	
24/9/99	21:05:34	0:13:32	Utilised	
24/9/99	21:19:06	0:00:04	Idle	
24/9/99	21:19:10	0:01:21	Utilised	
24/9/99	21:20:29	0:00:00	Equipment stop error	Pushin leadframe failed
24/9/99	21:20:31	0:00:05	Down	
24/9/99	21:20:36	0:00:02	Idle	
24/9/99	21:20:38	0:01:33	Utilised	
24/9/99	21:22:02	0:00:00	Output carrier --> Post-output buffer	
24/9/99	21:22:08	0:00:00	Post-input buffer --> Output carrier	
24/9/99	21:22:11	0:00:23	Idle	
24/9/99	21:22:34	0:12:11	Down	
24/9/99	21:34:45	0:10:45	Idle	
24/9/99	21:45:30	0:20:21	Down	
24/9/99	22:02:51	0:00:00	Equipment stop error	First chip search unsuccessful

24/9/99	22:04:33	0:00:00	Equipment constant change	
24/9/99	22:04:58	0:00:00	Equipment constant change	
24/9/99	22:05:51	0:00:04	Idle	
24/9/99	22:05:55	0:00:45	Utilised	
24/9/99	22:06:40	0:00:12	Idle	
24/9/99	22:06:52	0:00:49	Down	
24/9/99	22:07:15	0:00:00	Equipment constant change	
24/9/99	22:07:18	0:00:00	Equipment constant change	
24/9/99	22:07:26	0:00:00	Equipment constant change	
24/9/99	22:07:28	0:00:00	Equipment constant change	
24/9/99	22:07:41	0:00:02	Idle	
24/9/99	22:07:43	0:00:21	Utilised	
24/9/99	22:08:04	0:00:02	Idle	
24/9/99	22:08:06	0:00:23	Down	
24/9/99	22:08:29	0:00:07	Idle	
24/9/99	22:08:36	0:00:08	Down	
24/9/99	22:08:44	0:00:03	Idle	
24/9/99	22:08:47	0:00:43	Utilised	
24/9/99	22:09:30	0:00:02	Idle	
24/9/99	22:09:32	0:00:07	Down	
24/9/99	22:09:39	0:00:06	Idle	
24/9/99	22:09:45	0:02:23	Utilised	
24/9/99	22:12:08	0:00:02	Idle	
24/9/99	22:12:10	0:00:58	Utilised	
24/9/99	22:13:08	0:00:10	Idle	
24/9/99	22:13:18	0:00:05	Down	
24/9/99	22:13:23	0:02:40	Idle	
24/9/99	22:16:03	0:00:13	Down	
24/9/99	22:16:16	0:00:03	Idle	
24/9/99	22:16:19	0:00:53	Down	
24/9/99	22:17:12	0:00:02	Idle	
24/9/99	22:17:14	0:00:14	Down	
24/9/99	22:17:17	0:00:00	Equipment constant change	
24/9/99	22:17:19	0:00:00	Equipment stop error	First chip search unsuccessful
24/9/99	22:17:28	0:00:02	Idle	
24/9/99	22:17:30	0:00:14	Utilised	
24/9/99	22:17:44	0:00:03	Idle	
24/9/99	22:17:47	0:00:05	Down	
24/9/99	22:17:49	0:00:00	Equipment constant change	
24/9/99	22:17:52	0:00:02	Idle	
24/9/99	22:17:54	0:11:56	Utilised	
24/9/99	22:29:50	0:00:50	Idle	
24/9/99	22:30:40	0:00:28	Utilised	
24/9/99	22:31:08	0:00:05	Idle	
24/9/99	22:31:13	0:00:49	Utilised	

24/9/99	22:32:02	0:13:01	Idle
24/9/99	22:45:03	0:00:51	Down
24/9/99	22:45:54	0:00:02	Idle
24/9/99	22:45:56	0:00:33	Utilised
24/9/99	22:46:29	0:00:03	Idle
24/9/99	22:46:32	0:02:12	Utilised
24/9/99	22:48:44	0:00:21	Idle
24/9/99	22:49:05	0:00:27	Utilised
24/9/99	22:49:32	0:01:01	Idle
24/9/99	22:50:33	0:00:35	Down
24/9/99	22:51:08	0:00:03	Idle
24/9/99	22:51:11	0:00:06	Utilised
24/9/99	22:51:17	0:00:03	Idle
24/9/99	22:51:20	0:00:43	Utilised
24/9/99	22:52:03	0:00:14	Idle
24/9/99	22:52:17	0:01:14	Down
24/9/99	22:53:31	0:00:02	Idle
24/9/99	22:53:33	0:01:24	Down
24/9/99	22:54:57	0:00:02	Idle
24/9/99	22:54:59	0:00:43	Utilised
24/9/99	22:55:42	0:00:03	Idle
24/9/99	22:55:45	0:00:08	Down
24/9/99	22:55:53	0:00:03	Idle
24/9/99	22:55:56	0:00:51	Utilised
24/9/99	22:56:47	0:00:02	Idle
24/9/99	22:56:49	0:00:05	Utilised
24/9/99	22:56:54	0:07:37	Idle
24/9/99	23:04:31	0:02:06	Utilised
24/9/99	23:06:37	0:00:03	Idle
24/9/99	23:06:40	0:00:04	Utilised
24/9/99	23:06:44	0:00:11	Idle
24/9/99	23:06:55	0:01:42	Utilised
24/9/99	23:08:37	0:00:02	Idle
24/9/99	23:08:39	0:00:11	Down
24/9/99	23:08:50	0:00:02	Idle
24/9/99	23:08:52	0:03:22	Utilised
24/9/99	23:12:14	0:00:03	Idle
24/9/99	23:12:17	0:00:04	Down
24/9/99	23:12:19	0:00:00	Equipment constant change
24/9/99	23:12:21	0:00:03	Idle
24/9/99	23:12:24	0:00:06	Utilised
24/9/99	23:12:30	0:00:19	Idle
24/9/99	23:12:49	0:00:16	Utilised
24/9/99	23:13:05	0:00:13	Idle
24/9/99	23:13:18	0:00:51	Utilised

24/9/99	23:14:09	0:00:02	Idle
24/9/99	23:14:11	0:00:07	Down
24/9/99	23:14:14	0:00:00	Equipment constant change
24/9/99	23:14:18	0:00:35	Idle
24/9/99	23:14:53	0:00:53	Down
24/9/99	23:15:46	0:00:03	Idle
24/9/99	23:15:49	0:01:34	Utilised
24/9/99	23:17:23	0:00:02	Idle
24/9/99	23:17:25	0:01:34	Utilised
24/9/99	23:18:59	0:00:05	Idle
24/9/99	23:19:04	0:28:49	Utilised
24/9/99	23:47:53	0:00:04	Idle
24/9/99	23:47:57	0:00:14	Down
24/9/99	23:48:11	0:00:03	Idle
24/9/99	23:48:14	0:00:20	Utilised
24/9/99	23:48:34	0:00:03	Idle
24/9/99	23:48:37	0:00:16	Utilised
24/9/99	23:48:53	0:00:03	Idle
24/9/99	23:48:56	0:00:18	Down
24/9/99	23:49:14	0:00:03	Idle
24/9/99	23:49:17	0:06:35	Utilised
24/9/99	23:49:52	0:00:00	Output carrier --> Post-output buffer
24/9/99	23:50:00	0:00:00	Post-input buffer --> Output carrier
24/9/99	23:55:52	0:00:05	Idle
24/9/99	23:55:57	0:00:13	Down
24/9/99	23:56:10	0:00:02	Idle
24/9/99	23:56:12	0:30:18	Utilised
25/9/99	0:26:30	0:00:09	Idle
25/9/99	0:26:39	0:00:16	Down
25/9/99	0:26:55	0:00:03	Idle
25/9/99	0:26:58	0:11:26	Utilised
25/9/99	0:38:24	0:00:45	Idle
25/9/99	0:39:09	0:00:37	Utilised
25/9/99	0:39:46	0:02:02	Idle
25/9/99	0:41:48	0:00:47	Down
25/9/99	0:42:35	0:00:02	Idle
25/9/99	0:42:37	0:00:11	Utilised
25/9/99	0:42:48	0:00:04	Idle
25/9/99	0:42:52	0:00:11	Utilised
25/9/99	0:43:03	0:00:20	Idle
25/9/99	0:43:23	0:00:15	Utilised
25/9/99	0:43:38	0:00:11	Idle
25/9/99	0:43:49	0:00:10	Down
25/9/99	0:43:59	0:00:02	Idle
25/9/99	0:44:01	0:00:19	Utilised

25/9/99	0:44:20	0:00:03	Idle
25/9/99	0:44:23	0:00:26	Down
25/9/99	0:44:49	0:00:05	Idle
25/9/99	0:44:54	0:00:18	Down
25/9/99	0:45:12	0:00:03	Idle
25/9/99	0:45:15	0:02:55	Down
25/9/99	0:48:10	0:00:03	Idle
25/9/99	0:48:13	0:00:56	Down
25/9/99	0:48:40	0:00:00	Output carrier --> Post-output buffer
25/9/99	0:48:48	0:00:00	Post-input buffer --> Output carrier
25/9/99	0:49:09	0:00:02	Idle
25/9/99	0:49:11	0:00:58	Utilised
25/9/99	0:50:09	0:00:04	Idle
25/9/99	0:50:13	0:00:04	Down
25/9/99	0:50:17	0:00:03	Idle
25/9/99	0:50:20	0:04:51	Utilised
25/9/99	0:55:11	0:00:03	Idle
25/9/99	0:55:14	0:00:18	Utilised
25/9/99	0:55:32	0:00:03	Idle
25/9/99	0:55:35	0:00:16	Down
25/9/99	0:55:51	0:00:03	Idle
25/9/99	0:55:54	0:00:43	Utilised
25/9/99	0:56:37	0:00:02	Idle
25/9/99	0:56:39	0:00:04	Down
25/9/99	0:56:43	0:00:03	Idle
25/9/99	0:56:46	0:00:37	Utilised
25/9/99	0:57:23	0:00:02	Idle
25/9/99	0:57:25	0:00:31	Utilised
25/9/99	0:57:56	0:00:02	Idle
25/9/99	0:57:58	0:00:05	Down
25/9/99	0:58:03	0:00:02	Idle
25/9/99	0:58:05	0:00:31	Utilised
25/9/99	0:58:36	0:00:02	Idle
25/9/99	0:58:38	0:00:09	Down
25/9/99	0:58:47	0:00:02	Idle
25/9/99	0:58:49	0:01:14	Utilised
25/9/99	1:00:03	0:00:51	Idle
25/9/99	1:00:54	0:00:59	Utilised
25/9/99	1:01:53	0:00:02	Idle
25/9/99	1:01:55	0:00:13	Down
25/9/99	1:02:08	0:00:02	Idle
25/9/99	1:02:10	0:55:38	Utilised
25/9/99	1:56:16	0:00:00	Output carrier --> Post-output buffer
25/9/99	1:56:25	0:00:00	Post-input buffer --> Output carrier
25/9/99	1:57:48	0:00:18	Idle

25/9/99	1:58:06	0:00:09	Down	
25/9/99	1:58:15	0:00:02	Idle	
25/9/99	1:58:17	0:47:29	Utilised	
25/9/99	2:42:03	0:00:00	Material warning	Dispenser empty
25/9/99	2:45:46	0:00:05	Idle	
25/9/99	2:45:51	0:00:05	Down	
25/9/99	2:45:56	0:00:02	Idle	
25/9/99	2:45:58	0:00:04	Down	
25/9/99	2:46:02	0:00:03	Idle	
25/9/99	2:46:05	0:06:23	Utilised	
25/9/99	2:52:01	0:00:00	Output carrier --> Post-output buffer	
25/9/99	2:52:08	0:00:00	Post-input buffer --> Output carrier	
25/9/99	2:52:28	0:00:03	Idle	
25/9/99	2:52:31	0:00:11	Down	
25/9/99	2:52:42	0:00:02	Idle	
25/9/99	2:52:44	1:29:27	Utilised	
25/9/99	3:43:48	0:00:00	Output carrier --> Post-output buffer	
25/9/99	3:43:56	0:00:00	Post-input buffer --> Output carrier	
25/9/99	4:22:11	0:00:12	Idle	
25/9/99	4:22:23	0:00:16	Down	
25/9/99	4:22:39	0:00:03	Idle	
25/9/99	4:22:42	0:29:45	Down	
25/9/99	4:22:50	0:00:00	Output carrier --> Post-output buffer	
25/9/99	4:52:27	0:00:04	Idle	
25/9/99	4:52:31	0:01:13	Utilised	
25/9/99	4:52:37	0:00:00	Post-input buffer --> Output carrier	
25/9/99	4:53:44	0:00:46	Idle	
25/9/99	4:54:30	0:00:10	Utilised	
25/9/99	4:54:40	0:07:13	Idle	
25/9/99	5:01:53	0:00:06	Utilised	
25/9/99	5:01:59	0:00:23	Idle	
25/9/99	5:02:22	0:01:46	Down	
25/9/99	5:04:08	0:00:03	Idle	
25/9/99	5:04:11	0:00:06	Utilised	
25/9/99	5:04:17	0:00:03	Idle	
25/9/99	5:04:20	0:06:00	Down	
25/9/99	5:10:20	0:09:55	Idle	
25/9/99	5:20:15	0:02:33	Utilised	
25/9/99	5:22:48	0:00:13	Idle	
25/9/99	5:23:01	0:00:43	Utilised	
25/9/99	5:23:42	0:00:00	Material stop error	No leadframe magazines on input
25/9/99	5:23:44	0:00:31	Down	
25/9/99	5:24:15	0:00:02	Idle	
25/9/99	5:24:17	0:00:28	Utilised	
25/9/99	5:24:42	0:00:00	Equipment stop error	Pushin leadframe failed



25/9/99	5:24:45	0:00:03	Down
25/9/99	5:24:48	0:00:02	Idle
25/9/99	5:24:50	1:09:16	Utilised
25/9/99	6:18:25	0:00:00	Output carrier --> Post-output buffer
25/9/99	6:18:34	0:00:00	Post-input buffer --> Output carrier
25/9/99	6:34:06	0:00:07	Idle
25/9/99	6:34:13	0:00:04	Down
25/9/99	6:34:15	0:00:00	Equipment constant change
25/9/99	6:34:17	0:00:25	Idle
25/9/99	6:34:42	0:00:42	Utilised
25/9/99	6:35:24	0:00:02	Idle
25/9/99	6:35:26	0:00:49	Down
25/9/99	6:36:15	0:00:03	Idle
25/9/99	6:36:18	0:01:05	Utilised
25/9/99	6:37:23	0:00:03	Idle
25/9/99	6:37:26	0:00:04	Down
25/9/99	6:37:28	0:00:00	Equipment constant change
25/9/99	6:37:30	0:00:03	Idle
25/9/99	6:37:33	0:00:03	Down
25/9/99	6:37:36	0:00:03	Idle
25/9/99	6:37:39	0:00:57	Down
25/9/99	6:38:36	0:00:19	Idle
25/9/99	6:38:55	0:14:09	Utilised
25/9/99	6:53:04	0:00:03	Idle
25/9/99	6:53:07	0:00:26	Utilised
25/9/99	6:53:33	0:00:03	Idle
25/9/99	6:53:36	0:00:02	Down
25/9/99	6:53:38	0:00:03	Idle
25/9/99	6:53:41	0:09:46	Utilised
25/9/99	7:03:27	0:16:36	Idle
25/9/99	7:20:03	0:08:36	Utilised
25/9/99	7:28:39	0:00:03	Idle
25/9/99	7:28:42	0:00:45	Utilised
25/9/99	7:29:27	0:00:05	Idle
25/9/99	7:29:32	0:00:59	Utilised
25/9/99	7:30:31	0:00:13	Idle
25/9/99	7:30:44	0:01:03	Down
25/9/99	7:31:47	0:00:05	Idle
25/9/99	7:31:52	0:00:08	Utilised
25/9/99	7:32:00	0:00:15	Idle
25/9/99	7:32:15	0:01:11	Down
25/9/99	7:33:26	0:00:02	Idle
25/9/99	7:33:28	0:00:13	Utilised
25/9/99	7:33:41	0:00:06	Idle
25/9/99	7:33:47	0:00:11	Utilised



25/9/99	7:33:58	0:00:02	Idle	
25/9/99	7:34:00	0:07:44	Utilised	
25/9/99	7:41:44	0:00:03	Idle	
25/9/99	7:41:47	0:00:25	Down	
25/9/99	7:41:55	0:00:00	Output carrier -->	Post-output buffer
25/9/99	7:42:10	0:00:00	Post-input buffer -->	Output carrier
25/9/99	7:42:12	0:00:03	Idle	
25/9/99	7:42:15	1:41:03	Utilised	
25/9/99	8:45:43	0:00:00	Output carrier -->	Post-output buffer
25/9/99	8:45:52	0:00:00	Post-input buffer -->	Output carrier
25/9/99	9:23:18	0:00:28	Idle	
25/9/99	9:23:46	0:11:23	Utilised	
25/9/99	9:31:43	0:00:00	Material warning	Dispenser empty
25/9/99	9:35:09	0:00:15	Idle	
25/9/99	9:35:24	0:00:07	Down	
25/9/99	9:35:31	0:00:02	Idle	
25/9/99	9:35:33	1:24:21	Utilised	
25/9/99	9:47:52	0:00:00	Output carrier -->	Post-output buffer
25/9/99	9:48:01	0:00:00	Post-input buffer -->	Output carrier
25/9/99	10:47:28	0:00:00	Output carrier -->	Post-output buffer
25/9/99	10:47:36	0:00:00	Post-input buffer -->	Output carrier
25/9/99	10:59:54	0:24:30	Idle	
25/9/99	11:24:24	0:04:12	Utilised	
25/9/99	11:28:36	0:00:03	Idle	
25/9/99	11:28:39	0:00:55	Down	
25/9/99	11:29:34	0:00:03	Idle	
25/9/99	11:29:37	0:06:33	Down	
25/9/99	11:30:22	0:00:00	Output carrier -->	Post-output buffer
25/9/99	11:36:10	0:00:03	Idle	
25/9/99	11:36:13	0:04:53	Down	
25/9/99	11:39:53	0:00:00	Equipment constant change	
25/9/99	11:41:06	0:01:28	Idle	
25/9/99	11:42:34	0:00:13	Down	
25/9/99	11:42:47	0:00:15	Idle	
25/9/99	11:43:02	0:00:06	Down	
25/9/99	11:43:06	0:00:00	Equipment constant change	
25/9/99	11:43:08	0:00:45	Idle	
25/9/99	11:43:53	0:00:11	Utilised	
25/9/99	11:44:02	0:00:00	Post-input buffer -->	Output carrier
25/9/99	11:44:04	0:00:05	Idle	
25/9/99	11:44:09	0:01:25	Utilised	
25/9/99	11:45:34	0:00:07	Idle	
25/9/99	11:45:41	0:00:12	Down	
25/9/99	11:45:53	0:00:03	Idle	
25/9/99	11:45:56	0:00:06	Down	

25/9/99	11:46:00	0:00:00	Equipment constant change
25/9/99	11:46:02	0:00:05	Idle
25/9/99	11:46:07	0:00:10	Utilised
25/9/99	11:46:17	0:00:03	Idle
25/9/99	11:46:20	0:00:08	Down
25/9/99	11:46:28	0:00:05	Idle
25/9/99	11:46:33	0:00:59	Utilised
25/9/99	11:47:32	0:00:02	Idle
25/9/99	11:47:34	0:00:13	Down
25/9/99	11:47:47	0:00:04	Idle
25/9/99	11:47:51	0:00:27	Down
25/9/99	11:48:18	0:00:03	Idle
25/9/99	11:48:21	0:02:43	Utilised
25/9/99	11:51:04	0:00:04	Idle
25/9/99	11:51:08	0:00:21	Down
25/9/99	11:51:29	0:00:02	Idle
25/9/99	11:51:31	0:05:21	Utilised
25/9/99	11:56:52	0:00:03	Idle
25/9/99	11:56:55	0:00:05	Down
25/9/99	11:56:57	0:00:00	Equipment constant change
25/9/99	11:57:00	0:00:02	Idle
25/9/99	11:57:02	0:00:19	Utilised
25/9/99	11:57:21	0:01:19	Idle
25/9/99	11:58:40	0:00:13	Down
25/9/99	11:58:43	0:00:00	Equipment constant change
25/9/99	11:58:53	0:02:11	Idle
25/9/99	12:01:04	0:00:18	Down
25/9/99	12:02:11	0:00:27	Idle
25/9/99	12:02:38	0:00:29	Down
25/9/99	12:03:07	0:00:02	Idle
25/9/99	12:03:09	0:00:04	Utilised
25/9/99	12:03:13	0:00:03	Idle
25/9/99	12:03:16	0:00:06	Down
25/9/99	12:03:22	0:00:03	Idle
25/9/99	12:03:25	0:00:02	Utilised
25/9/99	12:03:27	0:00:02	Idle
25/9/99	12:03:29	0:02:01	Utilised
25/9/99	12:05:30	0:00:02	Idle
25/9/99	12:05:32	0:00:53	Utilised
25/9/99	12:06:25	0:03:12	Idle
25/9/99	12:09:37	0:00:03	Down
25/9/99	12:09:40	0:00:02	Idle
25/9/99	12:09:42	0:00:04	Down
25/9/99	12:09:46	0:00:13	Idle
25/9/99	12:09:59	0:00:06	Down

25/9/99	12:10:05	0:00:03	Idle
25/9/99	12:10:08	0:01:42	Utilised
25/9/99	12:11:50	0:00:33	Idle
25/9/99	12:12:23	0:00:10	Down
25/9/99	12:12:33	0:00:02	Idle
25/9/99	12:12:35	0:00:09	Down
25/9/99	12:12:44	0:00:02	Idle
25/9/99	12:12:46	0:00:39	Utilised
25/9/99	12:13:25	0:00:07	Idle
25/9/99	12:13:32	0:01:01	Utilised
25/9/99	12:14:33	0:00:03	Idle
25/9/99	12:14:36	0:00:22	Down
25/9/99	12:14:58	0:00:03	Idle
25/9/99	12:15:01	0:00:16	Utilised
25/9/99	12:15:17	0:01:02	Idle
25/9/99	12:16:19	0:00:06	Down
25/9/99	12:16:25	0:00:02	Idle
25/9/99	12:16:27	0:00:15	Down
25/9/99	12:16:42	0:00:02	Idle
25/9/99	12:16:44	0:00:19	Down
25/9/99	12:16:51	0:00:00	Equipment constant change
25/9/99	12:17:03	0:00:03	Idle
25/9/99	12:17:06	0:00:16	Utilised
25/9/99	12:17:22	0:00:03	Idle
25/9/99	12:17:25	0:00:08	Down
25/9/99	12:17:33	0:00:03	Idle
25/9/99	12:17:36	0:00:18	Utilised
25/9/99	12:17:54	0:00:39	Idle
25/9/99	12:18:33	0:00:49	Utilised
25/9/99	12:19:22	0:00:07	Idle
25/9/99	12:19:29	0:00:12	Utilised
25/9/99	12:19:41	0:00:09	Idle
25/9/99	12:19:50	0:01:03	Down
25/9/99	12:20:33	0:00:00	Equipment constant change
25/9/99	12:20:53	0:00:03	Idle
25/9/99	12:20:56	0:00:06	Down
25/9/99	12:21:02	0:00:35	Idle
25/9/99	12:21:37	0:01:48	Utilised
25/9/99	12:23:25	0:00:39	Idle
25/9/99	12:24:04	0:00:19	Down
25/9/99	12:24:23	0:00:03	Idle
25/9/99	12:24:26	0:00:04	Down
25/9/99	12:24:30	0:00:02	Idle
25/9/99	12:24:32	0:00:07	Down
25/9/99	12:24:39	0:00:02	Idle

25/9/99	12:24:41	0:00:05	Utilised
25/9/99	12:24:46	0:00:02	Idle
25/9/99	12:24:48	0:00:07	Down
25/9/99	12:24:52	0:00:00	Equipment constant change
25/9/99	12:24:55	0:00:02	Idle
25/9/99	12:24:57	0:00:49	Utilised
25/9/99	12:25:46	0:00:03	Idle
25/9/99	12:25:49	0:00:18	Down
25/9/99	12:26:07	0:00:03	Idle
25/9/99	12:26:10	0:01:38	Utilised
25/9/99	12:27:48	0:00:02	Idle
25/9/99	12:27:50	0:00:07	Down
25/9/99	12:27:57	0:00:02	Idle
25/9/99	12:27:59	0:00:04	Utilised
25/9/99	12:28:03	0:00:03	Idle
25/9/99	12:28:06	0:09:04	Utilised
25/9/99	12:37:10	0:01:38	Idle
25/9/99	12:38:48	0:09:00	Utilised
25/9/99	12:47:48	0:00:03	Idle
25/9/99	12:47:51	0:06:57	Utilised
25/9/99	12:54:48	0:00:05	Idle
25/9/99	12:54:53	0:01:05	Down
25/9/99	12:55:58	0:00:03	Idle
25/9/99	12:56:01	0:34:10	Utilised
25/9/99	13:30:11	0:00:05	Idle
25/9/99	13:30:16	0:00:47	Utilised
25/9/99	13:31:03	0:03:45	Idle
25/9/99	13:34:48	0:03:02	Down
25/9/99	13:37:50	0:00:09	Idle
25/9/99	13:37:59	0:00:21	Down
25/9/99	13:38:20	0:00:02	Idle
25/9/99	13:38:22	0:00:49	Down
25/9/99	13:39:11	0:00:03	Idle
25/9/99	13:39:14	0:00:29	Down
25/9/99	13:39:43	0:00:02	Idle
25/9/99	13:39:45	0:00:43	Down
25/9/99	13:40:28	0:00:03	Idle
25/9/99	13:40:31	0:00:06	Down
25/9/99	13:40:33	0:00:00	Equipment constant change
25/9/99	13:40:37	0:00:39	Idle
25/9/99	13:41:16	0:00:17	Utilised
25/9/99	13:41:33	0:00:12	Idle
25/9/99	13:41:45	0:00:25	Utilised
25/9/99	13:42:10	0:00:03	Idle
25/9/99	13:42:13	0:00:16	Down

25/9/99	13:42:29	0:00:03	Idle
25/9/99	13:42:32	0:00:41	Down
25/9/99	13:42:38	0:00:00	Output carrier --> Post-output buffer
25/9/99	13:42:47	0:00:00	Post-input buffer --> Output carrier
25/9/99	13:43:13	0:00:03	Idle
25/9/99	13:43:16	0:00:07	Down
25/9/99	13:43:20	0:00:00	Equipment constant change
25/9/99	13:43:23	0:00:16	Idle
25/9/99	13:43:39	0:00:03	Down
25/9/99	13:43:42	0:00:02	Idle
25/9/99	13:43:44	0:00:37	Utilised
25/9/99	13:44:21	0:00:02	Idle
25/9/99	13:44:23	0:00:03	Down
25/9/99	13:44:26	0:00:02	Idle
25/9/99	13:44:28	0:00:47	Utilised
25/9/99	13:45:15	0:00:02	Idle
25/9/99	13:45:17	0:00:07	Down
25/9/99	13:45:24	0:00:02	Idle
25/9/99	13:45:26	0:00:11	Down
25/9/99	13:45:37	0:00:25	Idle
25/9/99	13:46:02	0:00:18	Utilised
25/9/99	13:46:20	0:00:03	Idle
25/9/99	13:46:23	0:00:12	Down
25/9/99	13:46:35	0:00:02	Idle
25/9/99	13:46:37	0:01:22	Utilised
25/9/99	13:47:59	0:00:03	Idle
25/9/99	13:48:02	0:00:16	Down
25/9/99	13:48:18	0:00:02	Idle
25/9/99	13:48:20	0:00:11	Utilised
25/9/99	13:48:31	0:00:02	Idle
25/9/99	13:48:33	0:00:13	Down
25/9/99	13:48:46	0:00:02	Idle
25/9/99	13:48:48	0:00:13	Utilised
25/9/99	13:49:01	0:00:02	Idle
25/9/99	13:49:03	0:01:20	Down
25/9/99	13:50:23	0:00:02	Idle
25/9/99	13:50:25	0:35:27	Utilised
25/9/99	14:25:52	0:00:14	Idle
25/9/99	14:26:06	0:00:13	Utilised
25/9/99	14:26:19	0:00:10	Idle
25/9/99	14:26:29	0:09:27	Utilised
25/9/99	14:35:56	0:00:02	Idle
25/9/99	14:35:58	0:00:13	Utilised
25/9/99	14:36:11	0:00:57	Idle
25/9/99	14:37:08	0:00:07	Down

25/9/99	14:37:13	0:00:00	Equipment constant change
25/9/99	14:37:15	0:00:02	Idle
25/9/99	14:37:17	0:04:56	Utilised
25/9/99	14:42:13	0:00:33	Idle
25/9/99	14:42:46	0:01:25	Utilised
25/9/99	14:44:11	0:00:03	Idle
25/9/99	14:44:14	0:00:05	Down
25/9/99	14:44:16	0:00:00	Equipment constant change
25/9/99	14:44:19	0:00:02	Idle
25/9/99	14:44:21	0:00:45	Down
25/9/99	14:45:06	0:00:23	Idle
25/9/99	14:45:29	0:03:50	Utilised
25/9/99	14:49:19	0:00:03	Idle
25/9/99	14:49:22	0:00:06	Down
25/9/99	14:49:28	0:00:07	Idle
25/9/99	14:49:35	0:16:28	Utilised
25/9/99	15:02:47	0:00:00	Output carrier --> Post-output buffer
25/9/99	15:02:55	0:00:00	Post-input buffer --> Output carrier
25/9/99	15:06:03	0:00:44	Idle
25/9/99	15:06:47	0:00:04	Down
25/9/99	15:06:51	0:00:03	Idle
25/9/99	15:06:54	0:41:57	Utilised
25/9/99	15:48:51	0:00:05	Idle
25/9/99	15:48:56	0:00:27	Down
25/9/99	15:49:23	0:00:04	Idle
25/9/99	15:49:27	0:09:03	Utilised
25/9/99	15:58:30	0:00:05	Idle
25/9/99	15:58:35	0:00:20	Down
25/9/99	15:58:55	0:00:07	Idle
25/9/99	15:59:02	0:00:10	Utilised
25/9/99	15:59:12	0:00:03	Idle
25/9/99	15:59:15	0:00:31	Down
25/9/99	15:59:40	0:00:00	Equipment constant change
25/9/99	15:59:46	0:00:02	Idle
25/9/99	15:59:48	0:03:49	Utilised
25/9/99	16:03:37	0:00:06	Idle
25/9/99	16:03:43	0:58:26	Utilised
25/9/99	16:11:09	0:00:00	Output carrier --> Post-output buffer
25/9/99	16:11:16	0:00:00	Post-input buffer --> Output carrier
25/9/99	17:02:09	0:00:06	Idle
25/9/99	17:02:15	0:02:25	Down
25/9/99	17:04:40	0:00:02	Idle
25/9/99	17:04:42	0:11:39	Utilised
25/9/99	17:15:44	0:00:00	Output carrier --> Post-output buffer
25/9/99	17:15:52	0:00:00	Post-input buffer --> Output carrier

25/9/99	17:16:21	0:00:03	Idle
25/9/99	17:16:24	0:03:26	Utilised
25/9/99	17:19:50	0:00:05	Idle
25/9/99	17:19:55	0:02:14	Utilised
25/9/99	17:22:09	0:01:31	Idle
25/9/99	17:23:40	0:02:24	Utilised
25/9/99	17:26:04	0:00:03	Idle
25/9/99	17:26:07	0:00:04	Utilised
25/9/99	17:26:11	0:00:03	Idle
25/9/99	17:26:14	0:01:21	Down
25/9/99	17:27:35	0:00:03	Idle
25/9/99	17:27:38	0:21:03	Down
25/9/99	17:27:48	0:00:00	Output carrier --> Post-output buffer
25/9/99	17:48:41	0:00:04	Idle
25/9/99	17:48:45	0:05:04	Down
25/9/99	17:53:20	0:00:00	Equipment constant change
25/9/99	17:53:34	0:00:00	Equipment constant change
25/9/99	17:53:41	0:00:00	Equipment constant change
25/9/99	17:53:49	0:00:54	Idle
25/9/99	17:54:43	0:06:12	Down
25/9/99	17:59:46	0:00:00	Post-input buffer --> Output carrier
25/9/99	18:00:55	0:00:03	Idle
25/9/99	18:00:58	0:00:23	Down
25/9/99	18:01:21	0:00:02	Idle
25/9/99	18:01:23	0:00:59	Down
25/9/99	18:02:22	0:00:03	Idle
25/9/99	18:02:25	0:00:02	Down
25/9/99	18:02:27	0:00:11	Idle
25/9/99	18:02:38	0:00:12	Down
25/9/99	18:02:50	0:00:03	Idle
25/9/99	18:02:53	0:00:53	Utilised
25/9/99	18:03:46	0:00:12	Idle
25/9/99	18:03:58	0:00:07	Down
25/9/99	18:04:05	0:00:02	Idle
25/9/99	18:04:07	0:00:11	Down
25/9/99	18:04:18	0:00:02	Idle
25/9/99	18:04:20	0:00:59	Down
25/9/99	18:05:19	0:00:03	Idle
25/9/99	18:05:22	0:01:28	Utilised
25/9/99	18:06:50	0:00:02	Idle
25/9/99	18:06:52	0:00:11	Down
25/9/99	18:07:03	0:00:02	Idle
25/9/99	18:07:05	0:00:49	Utilised
25/9/99	18:07:54	0:00:03	Idle
25/9/99	18:07:57	0:00:47	Down



25/9/99	18:08:44	0:00:02	Idle
25/9/99	18:08:46	0:00:55	Down
25/9/99	18:09:41	0:00:03	Idle
25/9/99	18:09:44	0:00:47	Utilised
25/9/99	18:10:31	0:00:02	Idle
25/9/99	18:10:33	0:07:14	Down
25/9/99	18:17:47	0:00:03	Idle
25/9/99	18:17:50	0:00:04	Down
25/9/99	18:17:54	0:00:04	Idle
25/9/99	18:17:58	0:00:03	Down
25/9/99	18:18:01	0:00:03	Idle
25/9/99	18:18:04	0:00:04	Down
25/9/99	18:18:06	0:00:00	Equipment constant change
25/9/99	18:18:08	0:00:03	Idle
25/9/99	18:18:11	0:01:03	Utilised
25/9/99	18:19:14	0:00:04	Idle
25/9/99	18:19:18	0:00:07	Down
25/9/99	18:19:25	0:00:04	Idle
25/9/99	18:19:29	0:00:09	Down
25/9/99	18:19:38	0:00:02	Idle
25/9/99	18:19:40	0:31:15	Utilised
25/9/99	18:50:55	0:00:04	Idle
25/9/99	18:50:59	0:03:20	Utilised
25/9/99	18:54:19	0:22:48	Idle
25/9/99	19:17:07	0:22:41	Utilised
25/9/99	19:39:48	0:00:20	Idle
25/9/99	19:40:08	0:00:32	Utilised
25/9/99	19:40:40	0:00:09	Idle
25/9/99	19:40:49	0:00:25	Utilised
25/9/99	19:41:14	0:00:04	Idle
25/9/99	19:41:18	0:49:44	Utilised
25/9/99	19:49:41	0:00:00	Output carrier --> Post-output buffer
25/9/99	19:49:49	0:00:00	Post-input buffer --> Output carrier
25/9/99	20:31:02	0:00:05	Idle
25/9/99	20:31:07	0:04:13	Utilised
25/9/99	20:35:20	0:00:02	Idle
25/9/99	20:35:22	0:00:22	Down
25/9/99	20:35:33	0:00:00	Output carrier --> Post-output buffer
25/9/99	20:35:41	0:00:00	Post-input buffer --> Output carrier
25/9/99	20:35:44	0:00:02	Idle
25/9/99	20:35:46	0:01:02	Down
25/9/99	20:36:48	0:00:02	Idle
25/9/99	20:36:50	0:46:51	Utilised
25/9/99	21:23:41	0:01:47	Idle
25/9/99	21:25:28	0:01:50	Down



25/9/99	21:27:18	0:00:21	Idle
25/9/99	21:27:39	0:00:13	Utilised
25/9/99	21:27:52	0:00:04	Idle
25/9/99	21:27:56	0:00:53	Utilised
25/9/99	21:28:49	0:00:15	Idle
25/9/99	21:29:04	0:00:15	Utilised
25/9/99	21:29:19	0:00:10	Idle
25/9/99	21:29:29	0:00:23	Utilised
25/9/99	21:29:52	0:00:16	Idle
25/9/99	21:30:08	0:00:05	Utilised
25/9/99	21:30:13	0:00:04	Idle
25/9/99	21:30:17	0:00:07	Utilised
25/9/99	21:30:24	0:00:16	Idle
25/9/99	21:30:40	0:00:05	Utilised
25/9/99	21:30:45	0:00:14	Idle
25/9/99	21:30:59	0:00:05	Utilised
25/9/99	21:31:04	0:00:08	Idle
25/9/99	21:31:12	0:00:05	Utilised
25/9/99	21:31:17	0:00:08	Idle
25/9/99	21:31:25	0:00:04	Utilised
25/9/99	21:31:29	0:00:09	Idle
25/9/99	21:31:38	0:00:08	Utilised
25/9/99	21:31:46	0:00:05	Idle
25/9/99	21:31:51	0:00:06	Utilised
25/9/99	21:31:57	0:00:07	Idle
25/9/99	21:32:04	0:00:06	Utilised
25/9/99	21:32:10	0:00:10	Idle
25/9/99	21:32:20	0:00:05	Utilised
25/9/99	21:32:25	0:00:08	Idle
25/9/99	21:32:33	0:00:05	Utilised
25/9/99	21:32:38	0:00:10	Idle
25/9/99	21:32:48	0:00:05	Utilised
25/9/99	21:32:53	0:00:08	Idle
25/9/99	21:33:01	0:00:04	Utilised
25/9/99	21:33:05	0:00:05	Idle
25/9/99	21:33:10	0:00:04	Utilised
25/9/99	21:33:14	0:00:11	Idle
25/9/99	21:33:25	0:00:04	Utilised
25/9/99	21:33:29	0:00:11	Idle
25/9/99	21:33:40	0:00:04	Utilised
25/9/99	21:33:44	0:00:09	Idle
25/9/99	21:33:53	0:00:06	Utilised
25/9/99	21:33:59	0:00:04	Idle
25/9/99	21:34:03	0:00:05	Utilised
25/9/99	21:34:08	0:00:14	Idle

25/9/99	21:34:22	0:01:46	Utilised
25/9/99	21:36:08	0:00:03	Idle
25/9/99	21:36:11	0:00:04	Utilised
25/9/99	21:36:15	0:00:03	Idle
25/9/99	21:36:18	0:00:57	Down
25/9/99	21:36:24	0:00:00	Output carrier --> Post-output buffer
25/9/99	21:37:15	0:00:07	Idle
25/9/99	21:37:22	0:03:52	Utilised
25/9/99	21:37:30	0:00:00	Post-input buffer --> Output carrier
25/9/99	21:41:14	0:00:15	Idle
25/9/99	21:41:29	0:00:21	Utilised
25/9/99	21:41:50	0:00:49	Idle
25/9/99	21:42:39	0:00:14	Down
25/9/99	21:42:53	0:00:11	Idle
25/9/99	21:43:04	0:13:36	Utilised
25/9/99	21:56:40	0:00:05	Idle
25/9/99	21:56:45	0:00:11	Utilised
25/9/99	21:56:56	0:00:04	Idle
25/9/99	21:57:00	0:00:37	Utilised
25/9/99	21:57:37	0:00:35	Idle
25/9/99	21:58:12	0:01:38	Utilised
25/9/99	21:59:50	0:00:17	Idle
25/9/99	22:00:07	0:00:06	Utilised
25/9/99	22:00:13	0:00:27	Idle
25/9/99	22:00:40	0:02:10	Utilised
25/9/99	22:02:50	0:07:45	Idle
25/9/99	22:10:35	0:02:11	Utilised
25/9/99	22:12:46	0:00:12	Idle
25/9/99	22:12:58	0:02:45	Utilised
25/9/99	22:15:43	0:00:03	Idle
25/9/99	22:15:46	0:05:10	Utilised
25/9/99	22:20:56	0:08:35	Idle
25/9/99	22:29:31	0:00:15	Down
25/9/99	22:29:44	0:00:00	Equipment constant change
25/9/99	22:29:46	0:00:03	Idle
25/9/99	22:29:49	0:06:19	Utilised
25/9/99	22:36:08	0:00:02	Idle
25/9/99	22:36:10	0:01:19	Down
25/9/99	22:37:29	0:00:02	Idle
25/9/99	22:37:31	0:05:08	Utilised
25/9/99	22:42:39	0:00:23	Idle
25/9/99	22:43:02	0:01:48	Utilised
25/9/99	22:44:50	0:00:02	Idle
25/9/99	22:44:52	0:00:07	Down
25/9/99	22:44:57	0:00:00	Equipment constant change

25/9/99	22:44:59	0:00:02	Idle
25/9/99	22:45:01	0:00:58	Down
25/9/99	22:45:59	0:00:33	Idle
25/9/99	22:46:32	0:08:29	Utilised
25/9/99	22:55:01	0:00:05	Idle
25/9/99	22:55:06	0:12:38	Utilised
25/9/99	23:07:44	0:00:03	Idle
25/9/99	23:07:47	0:01:11	Utilised
25/9/99	23:08:58	0:02:45	Idle
25/9/99	23:11:43	0:02:44	Down
25/9/99	23:14:27	0:00:02	Idle
25/9/99	23:14:29	0:01:08	Utilised
25/9/99	23:15:37	0:00:02	Idle
25/9/99	23:15:39	0:00:07	Down
25/9/99	23:15:46	0:00:02	Idle
25/9/99	23:15:48	0:14:15	Utilised
25/9/99	23:29:53	0:00:00	Output carrier --> Post-output buffer
25/9/99	23:29:59	0:00:00	Post-input buffer --> Output carrier
25/9/99	23:30:03	0:00:03	Idle
25/9/99	23:30:06	0:00:03	Down
25/9/99	23:30:09	0:00:02	Idle
25/9/99	23:30:11	0:00:59	Utilised
25/9/99	23:31:10	0:00:03	Idle
25/9/99	23:31:13	0:03:46	Utilised
25/9/99	23:34:59	0:00:03	Idle
25/9/99	23:35:02	0:00:06	Down
25/9/99	23:35:08	0:00:03	Idle
25/9/99	23:35:11	0:43:04	Utilised
26/9/99	0:18:15	0:00:11	Idle
26/9/99	0:18:26	0:05:36	Utilised
26/9/99	0:24:02	0:00:21	Idle
26/9/99	0:24:23	0:00:43	Down
26/9/99	0:25:06	0:00:02	Idle
26/9/99	0:25:08	0:43:53	Down
26/9/99	0:25:17	0:00:00	Output carrier --> Post-output buffer
26/9/99	1:09:01	0:00:32	Idle
26/9/99	1:09:33	0:03:53	Down
26/9/99	1:10:57	0:00:00	Equipment constant change
26/9/99	1:13:21	0:00:00	Equipment constant change
26/9/99	1:13:24	0:00:00	Equipment constant change
26/9/99	1:13:26	0:00:03	Idle
26/9/99	1:13:29	0:00:49	Down
26/9/99	1:13:37	0:00:00	Post-input buffer --> Output carrier
26/9/99	1:14:18	0:00:03	Idle
26/9/99	1:14:21	0:00:45	Down

26/9/99	1:15:06	0:00:06	Idle
26/9/99	1:15:12	0:03:26	Down
26/9/99	1:18:38	0:00:03	Idle
26/9/99	1:18:41	0:00:07	Down
26/9/99	1:18:48	0:00:02	Idle
26/9/99	1:18:50	0:00:25	Utilised
26/9/99	1:19:15	0:00:03	Idle
26/9/99	1:19:18	0:00:04	Utilised
26/9/99	1:19:22	0:00:02	Idle
26/9/99	1:19:24	0:01:06	Down
26/9/99	1:20:30	0:00:12	Idle
26/9/99	1:20:42	0:00:15	Utilised
26/9/99	1:20:57	0:00:04	Idle
26/9/99	1:21:01	0:01:18	Utilised
26/9/99	1:22:19	0:00:05	Idle
26/9/99	1:22:24	0:00:12	Utilised
26/9/99	1:22:36	0:00:02	Idle
26/9/99	1:22:38	0:00:56	Down
26/9/99	1:23:34	0:00:02	Idle
26/9/99	1:23:36	0:00:06	Utilised
26/9/99	1:23:42	0:00:09	Idle
26/9/99	1:23:51	0:02:55	Down
26/9/99	1:26:46	0:00:03	Idle
26/9/99	1:26:49	0:02:16	Utilised
26/9/99	1:29:05	0:00:21	Idle
26/9/99	1:29:26	0:00:15	Utilised
26/9/99	1:29:41	0:00:02	Idle
26/9/99	1:29:43	0:00:17	Down
26/9/99	1:30:00	0:00:02	Idle
26/9/99	1:30:02	0:00:11	Down
26/9/99	1:30:13	0:00:02	Idle
26/9/99	1:30:15	0:01:38	Down
26/9/99	1:31:53	0:00:03	Idle
26/9/99	1:31:56	0:00:53	Down
26/9/99	1:32:49	0:00:02	Idle
26/9/99	1:32:51	0:00:13	Down
26/9/99	1:33:02	0:00:00	Equipment constant change
26/9/99	1:33:04	0:00:02	Idle
26/9/99	1:33:06	0:00:03	Down
26/9/99	1:33:09	0:00:02	Idle
26/9/99	1:33:11	0:01:22	Utilised
26/9/99	1:34:33	0:00:02	Idle
26/9/99	1:34:35	0:00:09	Down
26/9/99	1:34:44	0:00:02	Idle
26/9/99	1:34:46	0:00:29	Utilised

26/9/99	1:35:15	0:00:23	Idle	
26/9/99	1:35:38	0:00:10	Down	
26/9/99	1:35:48	0:00:03	Idle	
26/9/99	1:35:51	0:00:08	Down	
26/9/99	1:35:59	0:00:02	Idle	
26/9/99	1:36:01	0:00:07	Down	
26/9/99	1:36:08	0:00:02	Idle	
26/9/99	1:36:10	0:00:15	Utilised	
26/9/99	1:36:25	0:00:02	Idle	
26/9/99	1:36:27	0:05:48	Utilised	
26/9/99	1:42:15	0:00:03	Idle	
26/9/99	1:42:18	0:00:14	Down	
26/9/99	1:42:32	0:00:03	Idle	
26/9/99	1:42:35	1:09:50	Utilised	
26/9/99	2:39:35	0:00:00	Output carrier --> Post-output buffer	
26/9/99	2:39:44	0:00:00	Post-input buffer --> Output carrier	
26/9/99	2:52:25	0:00:19	Idle	
26/9/99	2:52:44	0:01:05	Utilised	
26/9/99	2:53:49	0:01:26	Idle	
26/9/99	2:55:15	0:05:29	Utilised	
26/9/99	3:00:44	0:00:02	Idle	
26/9/99	3:00:46	0:00:23	Utilised	
26/9/99	3:01:09	0:17:33	Idle	
26/9/99	3:18:42	0:02:55	Down	
26/9/99	3:21:37	0:00:03	Idle	
26/9/99	3:21:40	0:00:49	Utilised	
26/9/99	3:22:29	0:00:02	Idle	
26/9/99	3:22:31	0:00:07	Down	
26/9/99	3:22:38	0:00:02	Idle	
26/9/99	3:22:40	0:00:33	Utilised	
26/9/99	3:23:13	0:00:02	Idle	
26/9/99	3:23:15	0:00:03	Down	
26/9/99	3:23:18	0:00:02	Idle	
26/9/99	3:23:20	0:04:56	Utilised	
26/9/99	3:28:16	0:00:02	Idle	
26/9/99	3:28:18	0:00:27	Down	
26/9/99	3:28:45	0:00:13	Idle	
26/9/99	3:28:58	0:11:27	Utilised	
26/9/99	3:40:25	0:00:28	Idle	
26/9/99	3:40:53	0:17:14	Utilised	
26/9/99	3:58:07	0:00:07	Idle	
26/9/99	3:58:14	0:06:38	Utilised	
26/9/99	4:04:52	0:00:02	Idle	
26/9/99	4:04:54	0:01:41	Down	
26/9/99	4:05:07	0:00:00	Material stop error	Wafer can't be on the rolls

26/9/99	4:06:35	0:00:04	Idle	
26/9/99	4:06:39	0:01:57	Down	
26/9/99	4:06:48	0:00:00	Output carrier --> Post-output buffer	
26/9/99	4:07:47	0:00:00	Post-input buffer --> Output carrier	
26/9/99	4:08:36	0:00:11	Idle	
26/9/99	4:08:47	0:11:46	Utilised	
26/9/99	4:20:33	0:00:05	Idle	
26/9/99	4:20:38	0:00:02	Down	
26/9/99	4:20:40	0:00:03	Idle	
26/9/99	4:20:43	0:00:22	Down	
26/9/99	4:21:05	0:00:15	Idle	
26/9/99	4:21:20	0:01:16	Down	
26/9/99	4:21:28	0:00:00	Output carrier --> Post-output buffer	
26/9/99	4:22:36	0:01:26	Idle	
26/9/99	4:24:02	0:01:53	Down	
26/9/99	4:24:21	0:00:00	Equipment stop error	Too many leadframe pick failures
26/9/99	4:25:55	0:00:02	Idle	
26/9/99	4:25:57	0:00:03	Down	
26/9/99	4:26:00	0:00:15	Utilised	
26/9/99	4:26:08	0:00:00	Post-input buffer --> Output carrier	
26/9/99	4:26:15	0:00:53	Idle	
26/9/99	4:27:08	0:00:10	Utilised	
26/9/99	4:27:18	0:00:23	Idle	
26/9/99	4:27:41	0:00:02	Utilised	
26/9/99	4:27:43	0:02:07	Idle	
26/9/99	4:29:50	0:00:02	Utilised	
26/9/99	4:29:52	0:00:10	Idle	
26/9/99	4:30:02		Exit	

## BIOGRAPHY

Mr.Juckrit Prakopkhan was born on January 10,1974 in Chachoengsao province, Thailand. He got a Bachelor degree in Applied Physics from Faculty of science, King Mongkut's Institute of Technology Ladkrabang (KMITL) in 1995. He has worked for NS Electronics Bangkok (1993) Co., Ltd. since 1995 while registered as a part-time student in Engineering management program of the Regional centre for manufacturing systems engineering, Chulalongkorn university.



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จุฬาลงกรณ์มหาวิทยาลัย