8. SCSI Interface Specifications

8-1. SCSI characteristics

8-1-1. Standards

This device conforms to the SCSI-2 standard, functioning as "Scanner device." Compliance with the standard is not however total, as the device is unable to support the full range of functions possible under SCSI-2. The device also makes use of a non-standard connector.

Reference Standard

ANSI SCSI-2 X3T9.2/86-109 Revision 10g

8-1-2. Supported functions

The functions supported by this device are given below. The device functions only as a target.

1. Parity checking

   Under the following conditions, however, the device will assume that the initiator to which it is connected does not conform to the SCSI-2 standard and will not perform parity checking:

   (a) the device is selected with the target SCSI ID only
   (b) the device is selected without an arbitration phase
   (c) the device is selected without the ATN signal having been set to TRUE

   In order to be able to determine whether or not to perform parity checking, the device saves the above information for each initiator.

The following functions are not supported:

1. DISCONNECT function
2. Target routine
3. Synchronous event notification
4. Synchronous data transfer
5. Wide data transmission
6. Command linking
7. Command queue
8. ECA condition

8-1-3. Logical unit

This device is logical unit 0; logical units 1–7 are not supported. Below, "logical unit number" is sometimes abbreviated as "LUN."

8-1-4. Window coordinates and image data

The device performs compression and save operations on the image in the portion of the window specified by the SET WINDOWS command. The values to be specified are shown in Figure 8-1-4. The offset from both the X and Y axes is always zero and the dimensions of the window always 640 dots along the X axis and 480 dots on the Y axis.

8-1-5. Determining volume of data present

If the initiator issues a CHECK command to check the data recorded in the device, this will be interpreted as a READ CHECK command, which returns information on the amount and type of data present. The reason for this is that the amount of data in audio recordings or memos is not fixed, while in the case of photographs the image data are JPEG-compressed, with the result that the amount of data varies from image to image even when the images contain the same number of pixels. By means of this operation, the initiator is able to determine accurately the amount of data to be read.

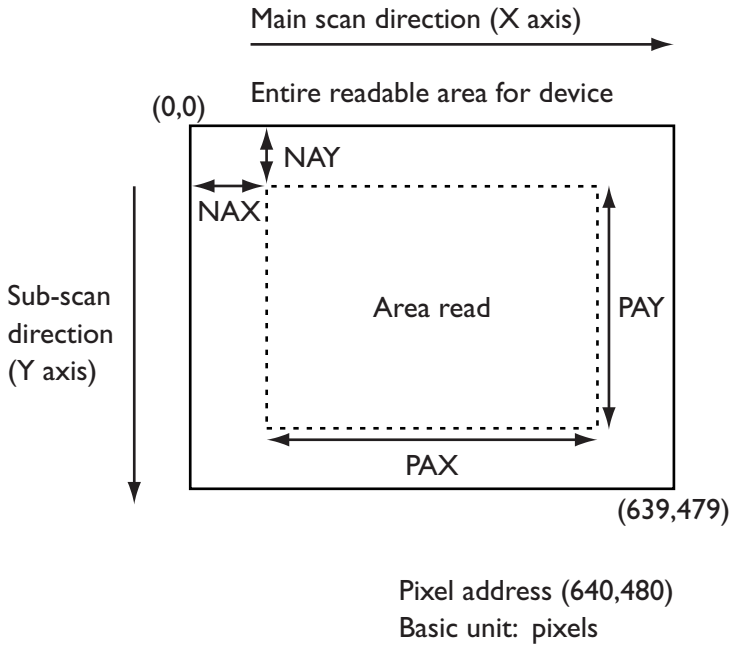

Figure 8-1-4: Device window

8-1-6. Reserving the device

In addition to supporting multiple initiators, the device also permits simultaneous use of the other interfaces with which it is equipped. Consequently, there is a possibility that other initiators, or hosts connected to another interface, may change device settings or carry out other operations while the device is in operation[1]. It is recommended that any initiator attempting to operate the device issue a RESERVE UNIT command to reserve the device from the beginning to end of the operation.

1 I.e., while a host or initiator is issuing a set sequence of commands to change settings or to perform an operation such as reading or writing a photograph or audio recording.

8-1-7. Making photographs

When passed a SCAN command, the device will initiate the process for taking a photograph. The picture-taking process is composed of a sequence of operations in which image data are transferred to frame memory, compressed, and saved.

This sequence of operations can be halted by issuing an ABORT command. If an ABORT command is received before the sequence of operations which ends in the data being saved to memory is complete, the operation currently being performed is halted and the device returned to the state it was in prior to receiving the SCAN command. As a result, no photograph will be taken. To take a photograph after an ABORT command has been issued, the initiator must issue another SCAN command.

8-1-8. Recording audio data

Recording operations may be controlled by sending the device a RECORD command to begin or end recording. The recording process is composed of a sequence of operations in which audio data are recorded, compressed, and saved to memory. There being a number of different recording modes, settings for the recording operation are specified using the SET WINDOW command. If the device has been set to simultaneous recording mode through the SET WINDOW command, a recording operation will not be carried out when a RECORD command is issued but only take place when a SCAN command has been received, in which instance the audio recording will be made at the same time a photograph is being recorded.

8-1-9. Playback

The device will perform a playback operation when a PLAY command is issued. The length of the playback is specified in the PLAY command. Playback may be halted by issuing an ABORT command. The images, memos, and recordings to be played back are specified using a SEND command; these settings remain in effect until a CLEAR SET PLAY command has been issued.

8-1-10. Reading recorded data

The host computer can read image, memo, audio and thumbnail data from the device using a READ or READ2 command. The host computer must issue a READ CHECK command to confirm the volume of data to be read after first having issued a CHECK command to check what data are recorded.

The READ command results in the most recently recorded image, memo, audio recording, or thumbnail being sent, the READ2 command in the transfer of a selected item.

8-1-11. Saving data

By issuing a SEND command, the host computer can write image, memo, audio and thumbnail data currently in playback back to the device's memory from whence they can then be saved. Similarly, the host computer can overwrite the file names in the device's memory.

8-1-12. Deleting data

Image, memo, audio and thumbnail data can be erased from the device's memory by issuing an ERASE command.

8-1-13. Examples of recommended command sequences

8-1-13-1. Taking photographs

The following gives the recommended command sequence for taking photographs.

1. Issue an INQUIRY command to confirm that the device is connected.
2. Check the mode parameter using a MODE SENSE command.
3. Reserve the unit with a RESERVE UNIT command.
4. Confirm that the device is ready to take a picture by issuing a TEST UNIT READY command.
5. Specify the desired camera settings using the SET WINDOW command.
6. Issue a GET WINDOW command to check camera settings.
7. Check the number of exposures remaining using a CHECK command.
8. Execute a SCAN command.
9. Issue a TEST UNIT READY command to confirm that the device has finished making a photograph.
10. Issue a SET WINDOW command to return camera settings to their default values (not necessary if the read area has not been changed).
11. Use the GET WINDOW command to confirm that settings have been returned to their default values (not necessary if the read area has not been changed).
12. Free the device using a RELEASE UNIT command.

8-1-13-2. Simultaneous recording of photograph and audio data

The following gives the recommended command sequence for taking photographs and making audio recordings.

1. Issue an INQUIRY command to confirm that the device is connected.
2. Check the mode parameter using a MODE SENSE command (as the mode parameter for the device will be fixed, this check is not essential).
3. Reserve the unit with a RESERVE UNIT command.
4. Confirm that the device is ready to take a picture by issuing a TEST UNIT READY command.
5. Set user-specified settings (simultaneous recording mode, length of audio recording) with the SET WINDOW command.
6. Issue a GET WINDOW command to check camera settings (recording mode, length of recording).
7. Check the number of exposures remaining using a CHECK command.
8. Execute a SCAN command.
9. Issue a TEST UNIT READY command to confirm that the device has finished making a photograph.
10. Issue a SET WINDOW command to return the read area to its default size (not necessary if the read area has not been changed).
11. Use the GET WINDOW command to confirm that the read area has been returned to its default size (not necessary if the read area has not been changed).
12. Free the device using a RELEASE UNIT command.

8-1-13-3. Audio recording (not simultaneous)

The following gives the recommended command sequence for recording audio data.

1. Issue an INQUIRY command to confirm that the device is connected.
2. Reserve the unit with a RESERVE UNIT command.
3. Issue a TEST UNIT READY command to confirm that the device is ready to make an audio recording.
4. Set the recording mode to a non-synchronous mode using the SET WINDOW command.
5. Issue a GET WINDOW command to confirm recording mode (this check is not required).
6. Using a CHECK command, check the amount of memory remaining (measured in seconds of recording time).
7. Execute a RECORD command (start of recording).
8. Execute a RECORD command (end of recording).
9. Free the device using a RELEASE UNIT command.

8-1-13-4. Reading data from memory

The following gives the recommended command sequence for reading data from the device's memory.

1. Issue an INQUIRY command to confirm that the device is connected.
2. Reserve the unit with a RESERVE UNIT command.
3. Issue a TEST UNIT READY command to confirm that the data can be read from the device.
4. Get the highest frame number with a CHECK command.
5. Issue READ CHECK commands to check the kind of data (image, memo, audio) associated with each frame number.
6. Issue a READ CHECK command to check whether any data are present and their volume.
7. Read image data using a READ2 command (a sub-portion of the image may be read by dividing the image with a READ2 command, although the read must continue through to the last byte in the image).
8. Read memo data using a READ2 command (a sub-portion of the memo may be read by dividing the image with a READ2 command, although the read must continue through to the last byte in the image).
9. Read audio data using a READ2 command (a sub-portion of the data may be read by dividing the recording with a READ2 command, although the read must continue through to the last byte in the image).
10. Free the device using a RELEASE UNIT command.

8-1-13-5. Writing data for playback

The following gives the recommended command sequence for writing data to the device's memory for playback.

1. Issue an INQUIRY command to confirm that the device is connected.
2. Reserve the unit with a RESERVE UNIT command.
3. Issue a TEST UNIT READY command to confirm whether data can be written to the device.
4. Using a CHECK command, check the number of exposures/seconds of recording time remaining.
5. Using a READ or READ2 command, read the link information for the data in memory to determine what frame numbers are not currently in use (use a CHECK command to determine the next unused frame number).
6. Using a SEND command, specify a frame number and transfer the data to be recorded.
7. Free the device using a RELEASE UNIT command.

8-1-13-6. Playing back data on the device (1)

The following gives one recommended command sequence for playing back data on the device.

1. Issue an INQUIRY command to confirm that the device is connected.
2. Reserve the unit with a RESERVE UNIT command.
3. Issue a TEST UNIT READY command to confirm whether data can be played back.
4. Using a CHECK command, get the highest frame number.
5. Issue READ CHECK commands to check the kind of data (image, memo, audio) associated with each frame number.
6. By means of a READ or READ2 command, read the data currently set for playback on the device and save this as the default setting.
7. Using a SEND command, specify the data to be played back.
8. Begin playback with a PLAY command. Play each item back for the specified length of time.
9. Issue a TEST UNIT READY command to check whether playback has ended.
10. Using a SEND command, return the default playback data to the device.
11. Free the device using a RELEASE UNIT command.

8-1-13-7. Playing back data on the device (2)

The following gives a recommended command sequence for playing back data on the device.

1. Issue an INQUIRY command to confirm that the device is connected.
2. Reserve the unit with a RESERVE UNIT command.
3. Issue a TEST UNIT READY command to confirm whether data can be played back.
4. Using a CHECK command, get the highest frame number.
5. Issue READ CHECK commands to check the kind of data (image, memo, audio) associated with each frame number.
6. By means of a READ or READ2 command, read the data currently set for playback on the device and save this as the default setting.
7. Using a SEND command, specify the data to be played back.
8. Begin playback with a PLAY command. Play each item back for the specified length of time.
9. Issue a PLAY2 command to select new data for playback (by means of this command it is possible to suspend playback of the current image, memo, or audio recording and begin playback of the next item).
10. Issue a TEST UNIT READY command to check whether playback has ended.
11. Using a SEND command, return the default playback data to the device.
12. Free the device using a RELEASE UNIT command.

8.2. General SCSI considerations

8-2-1. SCSI bus phase

8-2-1-1. Bus free phase

Under the following conditions, the device releases a BSY signal and moves to the bus free phase:

1. Immediately after the device has been powered on or reset.
2. After an ABORT message has been received successfully.
3. After a BUS DEVICE RESET message has been received successfully.
4. After a COMMAND COMPLETE message has been sent successfully.

The device may also release a BSY signal and move to the bus free phase to inform the initiator of an error condition (Standard 5.1.1, unexpected disconnect). The device will set sense data should a LUN be specified by the initiator.

8-2-1-2. Arbitration phase

The device will respond to selection by initiators which do not conduct arbitration.

8-2-1-3. Selection phase

The device will not respond to selection when a parity error is detected, or when three or more SCSI ID bits are present in the data bus.

8-2-1-4. Reselection phase

This device does not support a reselection phase and will not respond to reselection from other devices.

8-2-1-5. Command phase

If a parity error is detected in the command byte, the device will move to the message-in phase and send a RESTORE POINTERS message. If the message is transmitted normally, the device will assert a REQ signal to request that the command be resent. If after a maximum of four re-sends the command has still not been received correctly, the device will move to the bus free phase after setting the sense key to ABORTED COMMAND and the additional sense code to SCSI PARITY ERROR.

8-2-1-6. Data phase

1. Data-out phase
   When a parity error is detected in the data byte received, the device moves to the message-in phase and sends a RESTORE POINTERS message. If the message is transmitted normally, the device will assert a REQ signal to request that the data be resent. If after a maximum of four re-sends the data have still not been received correctly, the device will move to the bus free phase after setting the sense key to ABORTED COMMAND and the additional sense code to SCSI PARITY ERROR.
2. Data-in phase
   Data are sent from the target to the initiator. If a RESTORE POINTERS message is received, data will be resent.

8-2-1-7. Message phase

1. Message-out phase
   If, after the entire message has been transmitted, one or more parity errors are detected in the message bytes received, the device will assert a REQ signal to request re-transmission of the message. In the case of the E-300, retransmission will be attempted a maximum of four times. If the data have still not been received correctly, the device will move to the bus free phase after setting the sense key to ABORTED COMMAND and the additional sense code to SCSI PARITY ERROR.

In the event that the error was detected in the first message received, the message will be executed to the point at which the parity error was detected. When the message is retransmitted, the portion preceding the point at which error occurred will be ignored and the message executed from the point of occurrence to the point where another parity error is detected.

2. Message-in phase
   A message is sent from the target to the initiator. If a RESTORE POINTERS message is received, data will be resent.

8-2-2. SCSI bus conditions

8-2-2-1. Attention condition

The operations to be performed when an attention condition is detected depends on the current phase.

1. Attention condition detected in command phase
   The device enters the message-out phase after the entire command description block has been transmitted.
2. Attention condition detected in data phase
   The device enters the message-out phase once the contents of the buffer have been transmitted.
3. Attention condition detected in status phase
   The device enters the message-out phase after the initiator has received the status signal.
4. Attention condition detected in message-in phase
   The device enters the message-out phase before another message is sent.
5. Attention condition detected in selection phase
   The device immediately enters the message-out phase.

If a parity error is identified during a phase in which an attention condition is detected, the attention condition operation will be performed before error handling.

8-2-2-2. Reset condition

The device is not reset with the assertion of a RST signal. Instead, the device implements a hard reset. When a reset condition is detected, the device:

1. clears all I/O processes;
2. releases all SCSI device reservations;
3. initializes the operating modes for all SCSI devices by returning the mode select parameter and window settings to their default values; and
4. clears all stored sense data and sets the unit attention condition.

8-2-3. Messages

8-2-3-1. Supported messages

The SCSI messages supported by the device are defined in table 8-2-3-1.

Table 8-2-3-1: Message Codes

Code Value	Message		Direction
06h	ABORT		Out
0Ch	BUS DEVICE RESET		Out
00h	COMMAND COMPLETE	In	
80h+	IDENTIFY	In	
80h+	IDENTIFY		Out
05h	INITIATOR DETECTED ERROR		Out
09h	MESSAGE PARITY ERROR		Out
07h	MESSAGE REJECT	In	Out
08h	NO OPERATION		Out
03h	RESTORE POINTERS	In	

Key: In.....From device to initiator
Out.....From initiator to device
80h+.....Range from 80h to FFh, used for IDENTIFY message

If the device receives a message that it does not support, it returns a MESSAGE REJECT message to the initiator.

8-2-3-2. Description of messages

1. ABORT message

   Sent from initiator to device.

   On successful receipt of an ABORT message, the device enters the bus free phase.

2. BUS DEVICE RESET message

   Sent from initiator to device.

   On receipt of a BUS DEVICE RESET message, the device enters the reset state and moves into the bus free phase.

3. COMMAND COMPLETE message

   COMMAND COMPLETE messages are sent to the initiator after a command has been carried out and a status indicator received. Once the device has detected that the message has been sent normally, it enters the bus free phase.

4. IDENTIFY message

Sent from initiator to device. If an IDENTIFY message is received after the selection phase, the device will enter the command phase so long as the initiator does not send it another message. Otherwise the device will return to the previous phase. If in the interval between the selection phase and the bus free phase the device receives an IDENTIFY message containing a target routine or LUN that does not match that already received, the device will enter the bus free phase after setting the sense key to ILLEGAL REQUEST and the additional sense code to INVALID BITS IN IDENTIFY MESSAGE.

Table 8-2-3-2: Format of IDENTIFY message

Bit							
7	6	5	4	3	2	1	0
Identify	DiscPriv	LUNTAR	Reserved	Reserved	LUNTRN		

a. Identify bit

When this bit is set to one, the device will treat the message as an IDENTIFY message.

b. DiscPriv (disconnect privilege) bit

When an IDENTIFY message is sent from an initiator to the device, a zero indicates that the device must not disconnect, a 1 that the device has disconnect privileges. This bit is always set to zero in IDENTIFY messages sent from the device to the initiator.

c. LUNTAR (logical unit target) bit

The device does not support target routines; hence if any value other than zero is received for this bit, the device will enter the bus free phase. This bit is always set to zero in IDENTIFY messages sent from the device to the initiator.

d. LUNTRN (logical unit number/target routine number) field

For information on the operations performed when the device receives an IDENTIFY message containing a non-zero value for this field, refer to 8-2-6-1, "*Invalid logical unit selection.*" In IDENTIFY messages sent from device to initiator, this field sets the device's logical unit number.

e. Reserved bits

If the device receives a IDENTIFY message from the initiator containing a value other than zero for either of these bits, it will enter the bus free phase after setting the sense key to ILLEGAL REQUEST and the additional sense code to INVALID BITS IN IDENTIFY MESSAGE. In IDENTIFY messages sent from device to initiator, this bit is always set to zero.

5. INITIATOR DETECTED ERROR message

Sent from initiator to device. If such a message is received while the device is in the process of sending a status indicator to the initiator, the device will transmit a RESTORE POINTERS message and return to the previous phase. The device will then retransmit the status indicator. This process will be repeated up to a maximum of four times. If the INITIATOR DETECTED ERROR message is received again after four attempts, or if the device is making a transmission when this message is received, the device will enter the bus free phase after setting the sense key to ABORTED COMMAND and the additional sense code to INITIATOR DETECTED ERROR MESSAGE RECEIVED.

If an INITIATOR DETECTED ERROR message is received in conditions other than those described above, the device will enter the bus free phase after setting the sense key to ABORTED command and the additional sense code to INVALID MESSAGE.

6. MESSAGE PARITY ERROR message

Sent from initiator to device. When the device is in receipt of a MESSAGE PARITY ERROR message, it returns to the message phase and retransmits the message that produced the parity error. If after a maximum of four retries the device receives a further MESSAGE PARITY ERROR message from the initiator, it will enter the bus free phase after setting the sense key to ABORTED COMMAND and the additional sense code to SCSI PARITY ERROR.

If this message is received in a phase other than the message phase, the device will enter the bus free phase after setting the sense key to ABORTED COMMAND and the additional sense code to INVALID MESSAGE.

7. MESSAGE REJECT message

MESSAGE REJECT messages are sent from initiator to device and from device to initiator, in the latter case to signal that the most recently received message or message byte is inappropriate.

The operations performed by the device when a MESSAGE REJECT message has been transmitted depend on the content of the message rejected.

a. Message sent from initiator to device to reject one of the following messages received from the device:
   - COMMAND COMPLETE, IDENTIFY, MESSAGE REJECT
     The device returns to the bus free phase after setting the sense key to ABORTED COMMAND and the additional sense code to MESSAGE ERROR.
   - RESTORE POINTERS
     The device aborts retransmission of the command data status indicator, which it had been attempting as the result of a parity error. It then sets the sense key to ABORTED COMMAND and the additional sense code to MESSAGE ERROR before entering the bus free phase. If the device is unable to identify the message received, it enters the bus free phase after setting the sense key to ABORTED COMMAND and the additional sense code to INVALID MESSAGE.

b. Message sent from device to initiator to reject a message from the initiator
   - Message not supported by device
     The device ignores the messages received from the initiator and returns to the previous phase. If an ATN signal is still asserted, the device will return to the message-out phase.

8. NO OPERATION message

Sent from initiator to device. On receipt of this message, the device returns to the previous phase.

9. RESTORE POINTERS message

Should a parity error occur during command data status transmission, the device will send a RESTORE POINTERS message to the initiator before attempting retransmission. Once the device has determined that the RESTORE POINTERS message has been successfully transmitted, it will return to the phase in which the parity error occurred and re-send the command data status.

10. COMMAND COMPLETE message

The device sends a COMMAND COMPLETE message to the initiator after the device has carried out a command and transmitted a status indicator. Once the device has determined that the COMMAND COMPLETE message has been successfully transmitted, it will enter the bus free phase.

8-2-4. General commands

8-2-4-1. Device commands

The commands that can be carried out by the device are listed in Table 8-2-4-1.

Table 8-2-4-1: Device Commands

Command	Operation code	Type	Phase sequence
TEST UNIT READY	00h	M	A—C—S—Min
REQUEST SENSE	03h	M	A—C—Din—S—Min
INQUIRY	12h	M	A—C—Din—S—Min
MODE SELECT (6)	15h	O	A—C—Dout—S—Min
RESERVE UNIT	16h	M	A—C—S—Min
RELEASE UNIT	17h	M	A—C—S—Min
MODE SENSE (6)	1Ah	O	A—C—Din—S—Min
SCAN	1Bh	O	A—C—S—Min
SEND DIAGNOSTIC	1Dh	M	A—C—Dout—S—Min
SET WINDOW	24h	M	A—C—Dout—S—Min
GET WINDOW	25h	O	A—C—Din—S—Min
READ	28h	M	A—C—Din—S—Min
ABORT	C0h	V	A—C—S—Min
RECORD	C1h	V	A—C—S—Min
CHECK	C2h	V	A—C—Din—S—Min
READ CHECK	C3h	V	A—C—Din—S—Min
READ2	E0h	V	A—C—Din—S—Min
ERASE	C5h	V	A—C—S—Min
SEND	E1h	V	A—C—Dout—S—Min
CLEAR SET PLAY	C9h	V	A—C—S—Min
PLAY	CAh	V	A—C—S—Min
PLAY 2	CBh	V	A—C—S—Min

Notes

M Required under SCSI-2
O Optional under SCSI-2
V Specific to this device

Phases

A Arbitration/selection phase
C Command phase
Din Data-in phase
Dout Data-out phase
S Status phase
Min Message-in phase

Note: *Data phases are omitted if transfer length is zero.*

8-2-4-2. Reserved areas

On receipt of a non-zero reserved bit, field, or byte, the device terminates the current command with a CHECK CONDITION status and sets the sense key to ILLEGAL REQUEST and the additional sense code to INVALID FIELD IN CDB.

8-2-4-3. Command description block (CDB)

1. Operation code (byte zero of command description block)
   If the device receives an operation code it does not implement, it will terminate the current command with a CHECK CONDITION status, set the sense key to ILLEGAL REQUEST and set the additional sense code to INVALID COMMAND OPERATION.
2. Logical unit number (first three bits of byte 1 of command description block)
   As the LUN is defined using an IDENTIFY message, this field is usually ignored. In the event that no IDENTIFY message has been received from the initiator, however, the device will check this field first. For details on the operations performed when a non-zero value is received, refer to "*Invalid logical unit selection*" (section 8-2-6-1).
3. Bits, fields, and bytes defined for each command
   On receipt of an invalid value for any command, the device terminated the command with a CHECK CONDITION status, sets the sense key to ILLEGAL REQUEST and sets the additional sense code to INVALID FIELD IN CDB.

8-2-5. Statuses

8-2-5-1. Device-transmitted statuses

The status indicators sent from device to initiator are given in Table 8-2-5-1. Unless the command is aborted as a result of one of the conditions listed immediately below, the device will send a status indicator to the initiator with the completion of each command.

1. An ABORT message is received from the initiator
2. A BUS DEVICE RESET message is received
3. The device undergoes a hard reset
4. The device has entered the bus free phase after detecting an error and releasing the BSY signal

Table 8-2-5-1: Status Byte Codes

Status byte bit number								
7	**6**	**5**	**4**	**3**	**2**	**1**	**0**	**Status**
R	R	0	0	0	0	0	R	GOOD
R	R	0	0	0	0	1	R	CHECK CONDITION
R	R	0	0	1	0	0	R	BUSY
R	R	0	1	1	0	0	R	RESERVATION CONFLICT
Key: R = Reserved bit (set to zero)								

GOOD — Sent when command is completed successfully

CHECK CONDITION — Sent when device has set sense data as a result of unexpected command termination

BUSY — Not implemented in this device

RESERVATION CONFLICT — Sent when an initiator attempts to access a logical unit that has already been reserved by another initiator

8-2-6. Command processing and exception conditions

The following describes a number of exception conditions, as well as errors associated with command processing and command sequences.

8-2-6-1. Invalid logical unit selection

The response of the device to invalid unit selection from the initiator depends on the command received by the device.

1. The IDENTIFY message sent by the initiator specifies a non-zero logical unit
   a. INQUIRY command
      The device will execute the command.
   b. REQUEST SENSE command
      The device will send sense data after setting the sense key to ILLEGAL REQUEST and the additional sense code to LOGICAL UNIT NOT SUPPORTED.
   c. Other commands
      The device will terminate the command with a CHECK CONDITION status but without setting sense data.
2. The initiator has not sent an IDENTIFY message and the LUN field in the command description block contains a non-zero value
   a. INQUIRY command
      The device will execute the command.
   b. REQUEST SENSE command
      The device will return the current sense data.
   c. Other commands
      The device will terminate the command with a CHECK CONDITION status but without setting sense data.
3. The device cannot operate as logical unit zero
   a. INQUIRY command
      The device will execute the command.
   b. REQUEST SENSE command
      The device will return the current sense data.
   c. Other commands
      The device will terminate the command with a CHECK CONDITION status after setting the sense key and additional sense code to values that reflect the current condition of the logical unit.

8-2-6-2. CA condition

The device saves sense data for each of the SCSI devices to which it is connected. Any one of the following conditions must be satisfied before sense data can be cleared:

1. A RST signal has been asserted and the device reset
2. The device has been powered on
3. The device receives an ABORT command from an initiator which has reported a CA condition
4. A BUS DEVICE RESET message has been received from any of the initiators
5. Immediately after the logical unit having been established, the device receives a command from an initiator which has reported a CA condition

8-2-6-3. Use of the REQUEST SENSE command

In the event of a CA condition (a CA condition is caused by the device returning a CHECK CONDITION status, as described in Standard 6.6), any initiator which detects the CA condition (i.e., which has received a CHECK CONDITION status from the device) should execute a REQUEST SENSE command. Should the initiator execute any other command, the current sense data will be lost.

8-2-6-4. Queued I/O processes

This device does not support queued I/O processes.

8-2-6-5. Unit attention condition

Unit attention conditions will be produced with respect to each initiator when:

1. the device has been reset by means of a RST signal,
2. the device has just been turned on, or
3. the device has received a BUS DEVICE RESET message.

The device records the most recent unit attention condition. When a unit attention condition is in memory, the device will carry out the following operations:

1. If the first command received after detection of a unit attention condition is an INQUIRY command, the device will execute the command but will leave the unit attention condition unchanged
2. If the first command received after detection of a unit attention condition is a REQUEST SENSE command, the unit will respond with the current sense data but will leave the unit attention condition unchanged
3. If the first command received after detection of a unit attention condition is neither an INQUIRY command nor a REQUEST SENSE command, the device will terminate the command with a CHECK UNIT CONDITION status in order to communicate the unit attention condition to the initiator.

Having recorded a unit attention condition and informed the initiator of this fact by means of a CHECK CONDITION status, the device will then carry out the following operations:

1. If the first command received after transmission of the CHECK CONDITION status is an INQUIRY command, the device will execute the command and clear all unit attention conditions from memory.
2. If the first command received after transmission of the CHECK CONDITION status is a REQUEST SENSE command, the device will first report the currently saved unit attention condition and then clear it from memory.
3. If the first command received after transmission of the CHECK CONDITION status is neither an INQUIRY command nor a REQUEST SENSE command, the device will clear the unit attention condition from memory and execute the command.

8-3. Commands

Commands are described below.

Error responses common to many of the commands described below are as follows:

Common Error 1:

The device returns a CHECK CONDITION status after setting the sense key to ILLEGAL REQUEST and the additional sense code to INVALID FIELD IN CDB

Common Error 2:

The device returns a CHECK CONDITION status after setting the sense key to ILLEGAL REQUEST and the additional sense code to INVALID FIELD IN PARAMETER

Other error responses are described below.

Figures in square brackets in the following tables indicate permitted or recommended values for command description blocks or parameters, as well as values returned as response data.

8-3-1. The TEST UNIT READY command

Table 8-3-1-1: TEST UNIT READY Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [00h]							
1	LUN [0]			Reserved [0]				
2–4	Reserved [0]							
5	Control byte [0]							

The TEST UNIT READY command provides a means of determining whether the logical unit is operable.

8-3-2. The REQUEST SENSE command

Table 8-3-2-1: REQUEST SENSE Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [03h]							
1	LUN [0]			Reserved [0]				
2–3	Reserved [0]							
4	Allocation length [recommended value: 18]							
5	Control byte [0]							

1. By means of the REQUEST SENSE command, the device can be requested to send sense data to an initiator. If the device has no valid sense data to transmit, it will return NO SENSE in the sense key and NO ADDITIONAL SENSE INFORMATION in the additional sense code.
2. The device will return a CHECK CONDITION status in response to a REQUEST SENSE command only in order to report a exception condition with respect to the command. Examples of exception conditions include the following:
   a. The device has received a command description block containing non-zero reserved bits
   b. A non-recoverable parity error has occurred
   c. The device is unable to return sense data because of a malfunction
3. If the device has returned a CHECK CONDITION status in response to a REQUEST SENSE command, the sense data may no longer be valid.
4. If the device is selected with a logical unit number greater than or equal to 1, it will terminate the command with a GOOD status after setting the sense key to ILLEGAL REQUEST and the additional sense code to LOGICAL UNIT NOT SUPPORTED.
5. The device is able to return eighteen bytes of data in response to a REQUEST SENSE command.

Table 8-3-2-2: Sense Data Format for Error Code 70h

Bit / Byte	7	6	5	4	3	2	1	0
0	Valid	Error Code [70h]						
1	Segment Number [0]							
2	FILEMARK [0]	EOM [0]	Invalid Length	Reserved [0]	Sense Key			
3–6	Information							
7	Additional Sense Code Length (n–7) [10d]							
8–11	Command-specific information [0]							
12	Additional Sense Code (ASC)							
13	Additional Sense Code Qualifier (ASCQ)							
14	Field-Replaceable Unit Code (FRUC)							
15	SKSV [0]	Information specific to sense key [0]						
–17								

1. If the Valid bit is zero, the Information field will be ignored. A value of 1 for the Valid bit indicates that the Information field contains valid information.
2. The format for sense data is defined in Table 8-3-2-2.
3. The FILEMARK bit returns zero.
4. The End-of-Medium (EOM) bit returns zero.
5. The device sets the Invalid Length Indicator (ILI) to indicate that the data sent in response to a READ command is shorter than the device's transfer length. In such a case, the Information field is set to a value equal to the difference in length between the transfer length and the length of the data actually sent, measured in blocks.
6. The Sense Key field contains general information about errors or exception conditions. The sense keys are defined in Table 8-3-2-3.
7. The Additional Sense Code Length field returns 10d.
8. The command-specific information field returns zero.
9. The Additional Sense Code contains relatively detailed information on the error or exception condition reported in the Sense Key field. A list of additional sense codes is given in Table 8-3-2-4. If the device does not have sufficient information concerning a given error or exception code, the additional sense code will be set to NO ADDITIONAL SENSE INFORMATION.
10. The Additional Sense Code Qualifier (ASCQ) contains detailed information on the additional sense code. The values returned when an error or exception condition is reported are given in Table 8-3-2-4. If the device does not have sufficient information pertaining to a given error or exception code, the Additional Sense Code Qualifier will be set to zero.
11. A non-zero value for the Field Replaceable Unit Code field indicates a defective unit. A value of zero indicates either that a particular unit has not been identified as defective or that the data are not valid.
12. The Sense Key Specific Value (SKSV) bit returns zero, as does the field for sense-key specific information.

Table 8-3-2-3: Explanation of Sense Keys (0h-Bh)

Sense Key	Explanation
0h	NO SENSE The specified logical unit has no particular sense information to report. This value is used when a command has been completed successfully or when the device is in receipt of a command with an ILI bit set to 1 and which results in a CHECK CONDITION status.
2h	NOT READY Indicates that the specified logical unit cannot be accessed.
4h	HARDWARE ERROR The device has detected an unrecoverable hardware error while processing a command or while performing self-diagnosis
5h	ILLEGAL REQUEST Indicates that an inappropriate parameter has been identified in a command description block or in additional parameters given as part of the data (for example, mode select) for some commands. This sense key is also used when the device has received an invalid IDENTIFY message.
6h	UNIT ATTENTION Indicates that the device has been reset.
Bh	ABORTED COMMAND The device has aborted a command. It is possible for the initiator to recover from this condition by resending the command.

Table 8-3-2-4: ASC and ASCQ

Sense Key	ASC	ASCQ	Description
0h	00h	00h	NO ADDITIONAL SENSE INFORMATION
1h	2Ah	00h	PARAMETERS CHANGED
2h	04h	80h	Recording standby
	04h	81h	Recording audio data (non-simultaneous recording)
	04h	82h	Preparing to record image
	04h	84h	Preparing to record image, recording audio data (simultaneous recording)
	04h	85h	Recording image
	04h	8Ah	Playing back data or recording audio (simultaneous recording) data after recording image
	04h	8Eh	Playing back recorded data
	04h	90h	Deleting recorded data
	04h	A0h	Memory full
	04h	A1h	Battery error
	04h	F0h	Unable to receive I/F command
4h	40h	F0h	Main CPU/SRAM verify error
	40h	F1h	Flash memory write error
	40h	F2h	Not enough internal memory remaining
	40h	F3h	File read error
	40h	F4h	SRAM buffer allocation error
5h	1Ah	00h	PARAMETER LIST LENGTH ERROR
	20h	00h	INVALID COMMAND OPERATION CODE
	24h	00h	INVALID FIELD IN CDB
	25h	00h	LOGICAL UNIT NOT SUPPORTED
	26h	00h	INVALID FIELD IN PARAMETER LIST
	2Ch	00h	COMMAND SEQUENCE ERROR
	3Dh	00h	INVALID BITS IN IDENTIFY MESSAGE
	39h	00h	SAVING PARAMETERS NOT SUPPORTED
6h	29h	00h	POWER ON, RESET, OR BUS DEVICE RESET OCCURRED
Bh	43h	00h	MESSAGE ERROR
	47h	00h	SCSI PARITY ERROR
	48h	00h	INITIATOR DETECTED ERROR MESSAGE RECEIVED
	49h	00h	INVALID MESSAGE ERROR

8-3-3. The INQUIRY command

Table 8-3-3-1: INQUIRY Command

Byte \ Bit	7	6	5	4	3	2	1	0
0	Operation code [12h]							
1	LUN [0]			Reserved [0]				EVPD [0]
2	Page code [0]							
3	Reserved [0]							
4	Allocation length [recommended value: 36d]							
5	Control byte [0]							

1. The INQUIRY command provides the initiator with information on the parameters for the device and any logical units to which it may be connected.
2. The EVPD (Enable Vital Product Data) bit must be zero. If the bit is set to 1 the device will respond with Common Error 1.
3. The page code field must be zero. If the field has a non-zero value, the device will respond with Common Error 1.
4. The device will return a CHECK CONDITION status in response to an INQUIRY command only if it is unable to return the requested INQUIRY data.
5. If the device receives an INQUIRY command from the initiator while there is a unprocessed unit attention condition in memory (i.e., before the device has been able to report a CHECK CONDITION status), it will execute the command without clearing the unit attention condition (see Standard 6.9).

8-3-3-1. Device INQUIRY data

As is may be seen from Table 8-3-3-2, the INQUIRY data for this device is limited to the required thirty-six bytes.

Table 8-3-3-2: Format for Device INQUIRY Data

Byte \ Bit	7	6	5	4	3	2	1	0
0	Peripheral Qualifier [00b] or [011b]			Peripheral Device Type [6h = 00110b] or [1Eh = 11111b]				
1	RMB [0]	Device-Type Modifier [0]						
2	ISO Version [0]		ECMA Version [0]			ANSI-Approved Version [2 = 0010b]		
3	AENC [0]	TrmIOP [0]	Reserved [0]			Response Data Format [2 = 0010b]		
4	Additional Length (n-4) [1Fh (31d)]							
5–6	Reserved [0]							
7	RelAdr [0]	WBus32 [0]	WBus16 [0]	Sync [0]	Linked [0]	Reserved [0]	CmdQue [0]	SftRe [0]
8–15	Vender Identification [Nikon……]							
16–31	Product Identification [COOLPIX·300]							
32–35	Product Revision Level e.g.: [1.00]							

1. The Peripheral Qualifier field returns 000b when the LUN in the first byte of this command is zero. Otherwise this field returns 011b.
2. The Removable Medium Bit (RMB) returns zero.
3. The Device-Type Modifier field returns zero.
4. The ISO Version and ECMA Version fields return zero.
5. The ANSI-Approved Version field returns 2, indicating that the device is compatible with the SCSI-2 standard.
6. The Asynchronous Event Notification Capability (AENC) bit returns zero.
7. The Terminate I/O Process (TrmIOP) field returns zero, indicating that the device does not support TERMINATE I/O PROCESS messages.
8. The Response Data Format field returns 2, indicating that the INQUIRY data format for the device complies with the SCSI-2 standard.
9. The Additional Length field returns 1Fh (31d).
10. The Relative Addressing (RelAdr) bit returns zero, indicating that the device does not support relative addressing.

11. The Wide Bus 32 (WBus32) and Wide Bus 16 bits return zero, indicating that the device supports a data transfer width of eight bits only.
12. The Synchronous Transfer (Sync) bit returns zero, indicating that the device does not support synchronous data transfer.
13. The Linked Command (Linked) bit returns zero, indicating that the device does not support linked commands.
14. The Command Queuing (CmdQue) bit returns zero, indicating that the device does not support tagged commands forming a command queue.
15. The Soft Reset (SftRe) bit returns zero, indicating that the device will respond to a reset condition with a Hard RESET Alternative.
16. The Vendor Identification field returns eight bytes of vendor-defined ASCII data identifying the vendor. Data are left-aligned within the field and unused bytes padded with spaces (code value 20h).
17. The Product Identification field returns sixteen bytes of vendor-defined ASCII data. Data are left-aligned within the field and unused bytes padded with spaces (code value 20h).
18. The Product Revision Level field returns four bytes of vendor-defined ASCII data. Data are left-aligned within the field and unused bytes padded with spaces (code value 20h).

8-3-4. The MODE SELECT (6) command

Table 8-3-4-1: MODE SELECT (6) command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [15h]							
1	LUN [0]			PF [1]	Reserved [0]			SP[0]
2–3	Reserved [0]							
4	Parameter list length							
5	Control byte [0]							

The MODE SELECT (6) command provides initiators a means of setting the device parameters for this device. Should an initiator issue a MODE SELECT command that changes parameters which affect other initiators, the device will produce a unit attention condition which applies to all initiators other than that which issued the MODE SELECT command (see Standard 6.9). The device will also set the additional sense code to MODE PARAMETERS CHANGED.

1. The Page Format (PF) bit must be 1. This value indicates that the mode select parameters following the block descriptor and header conform to the SCSI-2 standard and are structured as pages of related parameters.
2. The Save Pages (SP) bit must be zero, indicating that the device does not have a page save function. If this bit is set to 1, the device responds with Common Error 1.
3. The parameter-list length field gives the length, in bytes, of the parameter list sent from the initiator to the device in the DATA OUT phase. A value of zero indicates that no data will be sent, but this is not treated as an error. If a value is given which would result in loss of the descriptor, header, or page parameters, the device terminates the command with a CHECK CONDITION status after setting the sense key to ILLEGAL REQUEST and the additional sense code to PARAMETER LIST LENGTH ERROR.

In the circumstances described below, no parameters will be changed; instead the device will terminate the MODE SELECT command with a CHECK CONDITION status after setting the sense key to ILLEGAL REQUEST and the additional sense code to INVALID FIELD IN PARAMETER LIST.

1. The initiator attempts to change a field that the device has reported to be invariant
2. The initiator sends a mode select header, block descriptor, or page header which would set a reserved field to a value not supported by the device
3. The initiator sends a page of a length which differs from the parameter length for that page as reported to the device in the MODE SENSE command
4. The initiator sends a parameter which exceeds the range of values supported by the device
5. The initiator specifies a non-zero value for a reserved field in a mode parameter

8-3-4-1. Device mode parameters

Table 8-3-4-2: Mode Parameter Header

Bit / Byte	7	6	5	4	3	2	1	0
0	Mode data length							
1	Media type [0]							
2	Device-specific parameters [0]							
3	Block descriptor length							

Where the MODE SENSE command is used, the mode data length field gives the length, in bytes, of all transmissible data following the field. The value for mode data length does not include the length of the mode data length field. If the MODE SENSE command is used, the mode data length field is reserved.

1. The value for media type is always zero.
2. The value for device-specific parameters is always zero.
3. The value for block descriptor length is the length, in bytes, of the entire block descriptor. In the case of the E-300 this field may have a value of either zero or 8. A value of zero indicates that no block descriptor is included in the mode parameter list, but this is not treated as an error.

The definition of the mode parameter block descriptor is given in Table 8-3-4-3.

1. The density code field is always zero.
2. The block count field is always zero.
3. The block length is always 1.

This device supports only the units page, which specifies the units used for calculating window position and page layout. The units employed are not related to the horizontal and vertical scan densities.

1. The Parameter Save (PS) bit can only be used in combination with the MODE SENSE command; it is reserved in the case of the MODE SELECT command. This bit is set to zero both for MODE SENSE and MODE SELECT (in the latter case the standard defines it as reserved), meaning that the device does not support the parameter save function. If the bit is set to 1 for the MODE SELECT command, the device will respond with Common Error 2.
2. The basic measurement unit field has a value of 02h, indicating that only points are used as a basic unit of measurement. If in the case of MODE SELECT this field has a value of zero or 1, the device will respond with Common Error 2.
3. The measurement unit divisor is the value needed to keep measurements consistent with the basic measurement unit. Given that this device uses only points as the basic measurement unit, however, the value of this field is irrelevant.

Table 8-3-4-3: Mode Parameter Block Descriptor

Byte \ Bit	7	6	5	4	3	2	1	0
0	Density code [0]							
1	(MSB)							
2				Block count [0]				
3								(LSB)
4	Reserved [0]							
5	(MSB)							
6				Block length [1]				
7								(LSB)

Table 8-3-4-4: Units Page

Byte \ Bit	7	6	5	4	3	2	1	0
0	PS [0]	Reserved [0]	Operation code [03h]					
1	Parameter length [06h]							
2	Basic units [02h]							
3	Reserved [0]							
4	(MSB)			Measurement unit divisor [1200]				
5								(LSB)
6–7	Reserved [0]							

8-3-5. The RESERVE UNIT command

Table 8-3-5-1: RESERVE UNIT command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [16h]							
1	LUN [0]			Third party	Third party device ID			Reserved [0]
2–4	Reserved [0]							
5	Control byte [0]							

The RESERVE UNIT provides a means of reserving a logical unit for an initiator's exclusive use and, when functioning as a command for making third party reservations, can also be used to reserve a logical unit for another SCSI device, specified in the command.

The RESERVE UNIT command requests reservation of an entire logical unit for the exclusive use of the initiator making the reservation. The unit will be reserved until the command is overridden by another valid RESERVE UNIT command from the initiator which made the original reservation or until the unit is released by a RELEASE UNIT command from the initiator making the reservation, by a BUS DEVICE RESET message from any initiator, by a hard reset, or by a power-on cycle. Although the initiator which made the original reservation may reserve the unit again, while reserved the logical unit must not accept further reservations from other initiators.

If the unit is reserved by another initiator or by a device on another interface, it will return a RESERVATION CONFLICT status. Once a logical unit has been reserved, any commands other than INQUIRY, REQUEST SENSE, and RELEASE UNIT given the unit by another initiator will be refused with a RESERVATION CONFLICT status.

8-3-5-1. Third-party reservation function

Using this function, an initiator can reserve a logical unit for another SCSI device. If the third-party (3rdPty) bit is zero, the third-party reservation function is not used. When the bit is set to 1, the device reserves a logical unit for the SCSI device specified in the third-party device ID field. The E-300 will keep the unit reserved until the current reservation is overridden by another valid RESERVE UNIT command from the initiator which made the original reservation, or until the unit is released by this same initiator, by a BUS DEVICE RESET message from any initiator, or by a hard reset. The device will ignore requests to release the unit from any initiator other than that which made the original reservation.

8-3-5-2. Override function

An initiator which has reserved a logical unit may, by issuing a further RESERVE UNIT command to the same unit, renew its current reservation. If the E-300 authorizes the request for a reservation override, the unit will be released from the current reservation. If a reservation override is not authorized, the current reservation remains in effect. If, due to a conflict with the current reservation, a reservation is refused, the E-300 will return a RESERVATION CONFLICT status.

After the device has received a RESERVE UNIT command, apart from the main on-off switch and the TFT-panel on-off switch all external input will be masked. If the TFT-panel switch is turned off after this command has been received, the TFT-panel will be turned off but device will not automatically enter recording stand-by mode.

8-3-6. The RELEASE UNIT command

Table 8-3-6-1: RELEASE UNIT Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [17h]							
1	LUN [0]			Third party	Third party device ID			Reserved [0]
2–4	Reserved [0]							
5	Control byte [0]							

The RELEASE UNIT command allows the initiator issuing the command to release a logical it had earlier reserved. When functioning as a command for releasing third party reservations, this command can be used to end a reservation held by another SCSI device, specified in the command. If there is currently a valid reservation, the E-300 will release it and return a GOOD status. Only the initiator which made the original reservation can release it. A RELEASE UNIT command which attempts to release a reservation which is not currently in effect or which was made by another initiator is not treated as an error; instead, the E-300 will leave existing reservations unchanged and return a GOOD status.

8-3-6-1. Third-party release function

Using this function, an initiator can release a unit that it had earlier reserved through the third-party reservation function. When the third-party (3rdPty) bit is zero, the third-party release function is not used. When an initiator which has used the third-party reservation function to reserve a SCSI device specified in the third-party device ID field requests termination of the reservation for the same SCSI device, that device will be released by the E-300.

When this command is received, external input (other than the main on/off switch and TFT panel on/off switch, which had not been masked in the first place) will be unmasked. Turning the TFT panel off will once again return the E-300 to recording stand-by mode.

8-3-7. The MODE SENSE (6) command

Table 8-3-7-1: MODE SENSE Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [1Ah]							
1	LUN [0]			PF [1]	DBD [0] or [1]	Reserved [0]		
2	PC		Page code					
3	Reserved [0]							
4	Allocation length							
5	Control byte							

The MODE SENSE (6) command provides a means for the device to report parameters to the initiator.

1. A value of zero for the DISABLE BLOCK DESCRIPTORS (DBD) bit indicates that the device will return block descriptors in the mode sense data; if the value is 1 the device will not return block mode descriptors in the mode sense data.
2. The Page Control (PC) field defines the type of page mode parameter value returned. The values for page mode parameter type are defined in Table 8-3-7-2. A value of 3h (which under the SCSI-2 standard is the value for "saved") will cause the device to terminate the command with a CHECK CONDITION status after setting the sense key to ILLEGAL REQUEST and the additional sense code to SAVING PARAMETERS NOT SUPPORTED.
   a. Current values
      A value of 0h for the PC field requests the device to return the current parameter values for the specified page code of the logical unit. The current parameters returned are either:
      i. the parameters specified in the most recent successful MODE SELECT command, or,
      ii. if the last BUS DEVICE RESET message, power on, or hard reset has not been followed by a MODE SELECT command, the default values.
   b. Variable values
      A value of 1h for the PC field returns the variable parameter mask values for the page code that has been passed to the device. The data returned indicate what parameters of the requested page are variable. Bits which correspond to variable parameters are set to 1. Depending on the initiator, bits which correspond to invariant parameters may be set to zero. In the case of the E-300, as both the basic unit and measurement unit divisor are invariant, these fields return zero.
   c. Default values
      A value of 2h for the PC field returns the default values for the page code passed to the device. The device sets the values for unsupported parameters to zero.

3. The page code field gives the page to be returned. Usage is shown in Table 8-3-7-3. Initiators can request from the device any or all of the pages it supports. Should an initiator issue a MODE SENSE command containing reference to a page code not implemented by the device, the device will respond with Common Error 1.
   a. A value of 3Fh for the page code field causes the device to return all implemented pages (the E-300 however only supports the basic units page) to the initiator.
   b. On receipt of a MODE SENSE command containing zero values for both the PC and page code fields, the device returns only the mode parameter header and block descriptor.

Table 8-3-7-2: Page Control Field

Code	Parameter type
00b	Current values
01b	Variable values
10b	Default values

Table 8-3-7-3: Page Code Usage for All Devices

Page code	Usage
03h	Units page returned
3Fh	All pages returned

8-3-8. The SCAN command

Table 8-3-8-1: SCAN command

Byte \ Bit	7	6	5	4	3	2	1	0
0	Operation code [1Bh]							
1	LUN [0]			Reserved [0]				
2–3	Reserved [0]							
4	Transfer length [0] or [1]							
5	Control byte [0]							

The SCAN command is a request to the device to perform the operations involved in taking a photograph. When in receipt of this command, the device reads the image data and saves them to memory. If the recording mode has been set to "simultaneous recording," the device will also record audio data of the specified length.

From receipt of this command until all image data have been transferred to memory (or, in simultaneous recording mode, from receipt of this command until all image and audio data have been transferred to memory), all external input except for that from the main on/off switch will be masked.

1. The transfer length byte gives the length, in bytes, of the window identifier list sent during the data-out phase. If this byte has a length of zero, no data will be sent, but this is not treated as an error. In the case of the E-300, these data have no meaning even if they are sent.
2. The window identifier list is a collection of window identifiers defining the window to be scanned. As the device has only one window, however, it will scan the window identified by window identifier 0 regardless of whether it has received a window identifier list or not.

8-3-9. The SEND DIAGNOSTIC command

Table 8-3-9-1: SEND DIAGNOSTIC Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [1Dh]							
1	LUN [0]			PF [0]	Reserved [0]	Self-test [1]	Dev Ofl [0]	Unit Ofl [0]
2	Reserved [0]							
3–4	Parameter list length [0]							
5	Control byte [0]							

The SEND DIAGNOSTIC command requests the device to perform a self-diagnosis. If the device is on and the results of the test are satisfactory, the device terminates the command with a GOOD status. If the test detects some abnormality, the device terminates the command with a CHECK CONDITION status after setting the sense key to HARDWARE ERROR (the device does not in fact perform a self-diagnosis on receipt of this command; rather, it reports the results of the initial check performed after power on).

8-3-10. The SET WINDOW command

Table 8-3-10-1: SET WINDOW Command

Byte \ Bit	7	6	5	4	3	2	1	0
0	Operation code [24h]							
1	LUN [0]			Reserved [0]				
2–5	Reserved [0]							
6	(MSB)							
7	Transfer length [recommended value: 58d]							
8								(LSB)
9	Control byte [0]							

The SET WINDOW command provides initiators with a means of defining a window within the device's scanning range.

1. The transfer length gives the size, in bytes, of the data to be transferred in the data-out phase. A value of zero indicates that no window parameter data will be sent. This is not an error. If the transfer length is shorter than that required to send all the device's window parameters, the parameters that could not be sent remain unchanged.

   The recommended transfer length is fifty-eight bytes, but including parameters used during product development the total length is 166.

2. The window parameters consist of a header (see Table 8-3-10-2) followed by a window descriptor. The window descriptor sets the window position, size, and scan method. See Table 8-3-11-3 for a definition of the window descriptor.

3. The window descriptor length gives the size of a window descriptor in bytes. The first forty-eight bytes are those defined in the standard, while the remainder are specific to this device.

Table 8-3-10-2: Set Window Data Header

Byte \ Bit	7	6	5	4	3	2	1	0
0–5	Reserved							
6	(MSB)							
7	Window descriptor length [50d]							(LSB)

The final window descriptor length is fifty bytes, but if parameters used during development are included the total length is 158 bytes.

The format of the window descriptor following the header is given in Table 8-3-11-3 as part of the description of the GET WINDOW command.

8-3-11. The GET WINDOW command

Table 8-3-11-1: GET WINDOW Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [25h]							
1	LUN [0]			Reserved [0]				Single [1]
2–4	Reserved [0]							
5	Window identifier [0]							
6	(MSB)							
7	Transfer length [recommended value: 58d]							
8								(LSB)
9	Control byte [0]							

The GET WINDOW provides a means by which an initiator can get information about a previously defined window.

1. The Single bit must be 1.
2. The only value which can be used for the window identifier is zero.
3. The data obtained with the GET WINDOW command consist of a header (see Table 8-3-11-2) followed by a window descriptor (see Table 8-3-11-3). The window descriptor gives the window position, size, and scan method.
4. The transfer length is the size, in bytes, of the data to be transferred during the data-in phase. A value of zero indicates that no window parameter data will be sent. This is not an error. If the transfer length is longer than that required to send all the device's window parameters (i.e., longer than 167 bytes), the portion over 167 bytes will be padded with zeros.

   The final recommended transfer length is fifty-eight bytes, but including parameters used during development the total length is 167 bytes.

Table 8-3-11-2: Get Window Data Header

Bit / Byte	7	6	5	4	3	2	1	0
0–1	Window data length [56d]							
2–5	Reserved							
6	(MSB)							
7	Window descriptor length [50d]							(LSB)

1. The window data length is the length, in bytes, of the data following the window data length field. The length of the window data length field itself is not included in this figure. Even if the length allocated in this field is not sufficient to return all the Get Window data, the window data length will not be adjusted to allow the remainder to be sent.
2. The window descriptor length is the length, in bytes, of the window descriptor for a single window. The first forty-eight bytes are those defined in the standard, while the remainder are specific to this device.

Table 8-3-11-3: Window Descriptor Bytes

Byte \ Bit	7	6	5	4	3	2	1	0
0	Window identifier [0]							
1	Reserved [0]							Auto
2–3	X-axis resolution [0]							
4–5	Y-axis resolution [0]							
6–9	X-axis upper left offset [0]							
10–13	Y-axis upper left offset [0]							
14–17	Window width [640]							
18–21	Window height [480]							
22	Brightness [0]							
23	Threshold value [0]							
24	Contrast [0]							
25	Image mode [05h]							
26	Pixel composition [8]							
27–28	Neutral pitch pattern [0]							
29	Image inversion [1]	Reserved [0]						Padding type [0]
30–31	Bit array [0]							
32	Compression type [80h]							
33	Compression argument [0]							
34–39	Reserved [0]							

Note: *Parameters consisting of more than one byte are treated as beginning from the upper byte.*

Table 8-3-11-3 (Continued): Window Descriptor Bytes

Byte \ Bit	7	6	5	4	3	2	1	0
40	Image read settings 1: Single frame 2: Consecutive (fixed at 1)		Number of consecutive frames (fixed at 1)					
41	Red-eye 0: ON 1: OFF	Flash settings 1: AUTO 2: OFF 3: ON		Reserved [0]				
42	Recording mode 1: Synchronous mode 2: Non-synchronous mode 1 3: Non-synchronous mode 2		Switch 1: ON 2: OFF	Reserved [0]	(MSB) Length of recording (seconds)			
43	Length of recording (seconds)							(LSB)
44	Time and date Re-write 0: Allowed 1: Not allowed	Year (last two digits) [0–99]						
45	Time and date Re-write 0: Allowed 1: Not allowed	Month [1–12]						
46	Time and date Re-write 0: Allowed 1: Not allowed	Day [1–31]						
47	Time and date Re-write 0: Allowed 1: Not allowed	Hour [0–23]						
48	Time and date Re-write 0: Allowed 1: Not allowed	Minute [0–59]						
49	Time and date Re-write 0: Allowed 1: Not allowed	Second [0–59]						

Note: *Parameters consisting of more than one byte are treated as beginning from the upper byte.*

Table 8-3-11-3 (Continued): Window Descriptor Bytes

Byte \ Bit	7	6	5	4	3	2	1	0
50–51	DSP FRONT [0h–FFFFh]							
52–53	DSP FILTER SEL [0h–FFFFh]							
54–55	DSP HVED H base grip [0h–7FFFh]							
56–57	DSP HVED H high clip [0h–7FFFh]							
58–59	DSP HVED V base grip [0h–7FFFh]							
60–61	DSP FRONT DEKNEE [0h–07FFh]							
62–63	DSP YGAMMA γ gain data [0h–03FFh]							
64–65	DSP YGAMMA γ gain data [0h–007Fh]							
66–67	DSP RGBGAIN R offset data [0h–0FFFh]							
68–69	DSP RGBGAIN G offset data [0h–0FFFh]							
70–71	DSP RGBGAIN B offset data [0h–0FFFh]							
72–73	DSP RGBGAIN R gain data [0h–07FFh]							
74–75	DSP RGBGAIN G gain data [0h–07FFh]							
76–77	DSP RGBGAIN B gain data [0h–07FFh]							
78–79	DSP RGBGAIN R set-up data [0h–0FFFh]							
80–81	DSP RGBGAIN G set-up data [0h–0FFFh]							
82–83	DSP RGBGAIN B set-up data [0h–0FFFh]							
84–85	DSP RGBOUT R-CH data [0h–FFFFh]							
86–87	DSP RGBOUT G-CH data [0h–FFFFh]							
88–89	DSP RGBOUT B-CH data [0h–FFFFh]							
90–91	DSP YHMAT [0h–FFFFh]							
92–93	DSP YHMAT [0h–00FFh]							

Table 8-3-11-3 (Continued): Window Descriptor Bytes

Byte \ Bit	7	6	5	4	3	2	1	0
94-95	DSP Y PRO Y offset data [0h-–0FFFh]							
96–97	DSP Y PRO Y gain data Y high clip [0h-–FFFFh]							
98–99	DSP Y PRO Y set-up data [0h-–03FFh]							
100–101	DSP RBYMAT [0h–3FFFh]							
102–103	DSP RBYMAT [0h–007Fh]							
104–105	DSP RBYGAIN C-Y clip data [0h–000Fh]							
106–107	DSP RBYGAIN R-Y/B-Y gain data [0h–FFFFh]							
108–109	DSP RBYGAIN R-Y/B-Y phase data [0h–FFFFh]							
110–111	DSP Y OUT Y pedestal Y-BLK data [0h–0FFFh]							
112–113	DSP Y OUT Y high clip [0h–7FFFh]							
114–115	DSP C MOD R-Y/B-Y burst level [0h–FFFFh]							
116–117	DSP MOD DATA A, B [0h–FFFFh]							
118–119	DSP MOD DATA C, D [0h–FFFFh]							
120–121	DSP MOD DATA E, F [0h–FFFFh]							
122–123	DSP Y OUT, C OUT, C MOD [0h–FFFFh]							
124–125	DSP IRIS AREA-SEL, IN-LEVEL [0h–3FFFh]							
126–127	DSP SD-SEL [0h–000Fh]							
128–129	DTG7 operating mode setting [0h–FFFFh]							
130–131	DTG7 rapid pulse phase setting, etc. [0h–1FFFh]							
132–133	DTG7 electronic shutter V timing [0h–03FFh]							
134–135	DTG7 electronic shutter H timing [0h–01FFh]							
136–137	SSG HCLR timing [0h–00FFh]							
138–139	SSG HD first transition, CBLK first transition timing [0h–FFFh]							
140–141	SSG HSYNC first transition, first transition timing [0h–1FFFh]							
142–143	SSG VSER first transition, EQ first transition timing [0h–FFFFh]							
144–145	SSG BF first transition, first transition timing [0h–FFFFh]							
146–147	SSG TGHD first transition timing, etc. [0h–FFFFh]							
148–149	SSG HBLK first transition timing [0h–03FFh]							
150–151	other SSG HBLK [0h–01FFh]							
152–153	SSG AREA start timing [0h–00FFh]							
154–157	DSP WB-DATA shift [0h–FFFFh]							
158–159	DSP WB-DATA shift [0h–FFFFh]							

Note: *Parameters consisting of more than one byte are treated as beginning from the upper byte.*

The fields in the window descriptor are described below. Where numeric values are specified, these represent absolute values with respect to the reference values, not changes relative to the current values.

1. Byte 0

   The window identifier identifies the window defined by the window descriptor. The E-300 has only the window identified by window identifier zero.

2. **Byte 1**
   The Auto bit is zero.

3. **Bytes 2–3**
   The X-axis resolution field gives the resolution for the direction in which the pixels are ordered in the pixel array, measured in pixels per inch. A value of zero is used to indicate that the default resolution will be used. In the case of the E-300, this field is fixed at zero.

4. **Bytes 3–4**
   The Y-axis resolution field contains the value for resolution in the scan direction, measured in pixels per inch. A value of zero is used to indicate that the default resolution will be used. In the case of the E-300, this field is fixed at zero.

5. **Bytes 6–9**
   The X-axis upper-left offset field gives the X coordinate of the top left corner of the window. This coordinate represents the distance (number of pixels) from the left edge of the page. In the case of the E-300, this field is fixed at zero.

6. **Bytes 10–13**
   The Y-axis upper-left offset field gives the Y coordinate of the top left corner of the window. This coordinate represents the distance (number of pixels) from the top edge of the page. In the case of the E-300, this field is fixed at zero.

7. **Bytes 14–17**
   The window width field gives the size of the window in the direction of the X- (long) axis, expressed in pixels. In the case of the E-300, this field is fixed at a value of 640.

8. **Bytes 18–21**
   The window width field gives the size of the window in the direction of the Y- (short) axis, expressed in pixels. In the case of the E-300, this field is fixed at a value of 480.

9. **Bytes 22–24**
   The brightness, threshold value, and contrast fields are, in the case of the E-300, irrelevant, and are ignored no matter what their value. In the case of the GET WINDOW command these fields return zero.

10. **Byte 25**
    The image mode field specifies the image type. The E-300 handles image data using a YCbCr 4:2:2 format, but there being no equivalent code in the SCSI-2 standard this field is fixed at a value of 05h (multi-value RGB colour).

11. **Byte 26**
    The pixel composition field gives the number of bits per pixel for the reproduction of shading. In the case of the E-300 the value for this field is fixed at 8.

12. **Bytes 27–28**
    This field has a value of zero.

13. **Byte 29**
    The image inversion (RIF) field has no effect in the case of the E-300. The GET WINDOW command returns a value of 1 for this field. The padding type field has a value of zero.

14. **Bytes 30–31**
    The bit array field has a value of zero.

15. **Byte 32**
    The compression type field is set to 80h. The E-300 JPEG-compresses all image data.

16. **Byte 33**
    The compression argument field gives the image compression mode. The E-300 supports two compression modes, offering a choice of 0 (NORMAL) and 40h (FINE).

17. **Bytes 34–39**
    These fields are set to zero.

18. **Byte 40**
    The image read setting field specifies the shooting mode. The E-300 supports two shooting modes, offering a choice between 1h (single-frame) and 2h (consecutive). The number of frames is the number of exposures that will be made in consecutive mode and can be set to any value less than or equal to the number of exposures that will fit in the memory that remains.

    Note: *The image read setting field is fixed at 1 and the number of frames at 1h, making it impossible to use the consecutive shooting mode while the camera is controlled by a computer.*

19. **Byte 41**
    Bit 7: 1=red-eye reduction on; 0=red-eye reduction off
    Bit 6–5: 1=automatic; 2=flash off; 3= flash on

    Note: *The flash cannot be used when the E-300 is powered by the AC adaptor. Consequently, any attempt to set the flash to "auto" or "on" when the device in these circumstances will result in the flash automatically being set to "off."*

20. **Bytes 42–43**
    These fields are used to set the sound mode to one of the three modes supported by the E-300. When an audio recording is to be made, the switch bit is set to 1 and a recording mode selected from among 1h (simultaneous), 2h (non-simultaneous mode 1), and 3h (non-simultaneous mode 2). When the sound mode is setting is made through an initiator, however, the device behaves the same whether the setting is 2h (non-simultaneous mode 1) or 3h (non-simultaneous mode 2).

    The length of recording field gives the length of the audio recording that will be made if, when the Switch bit is on and the recording mode set to "simultaneous," a photograph is made as a result of a SCAN command. The maximum value for this field depends upon the amount of memory remaining.

21. **Byte 44**
    This byte is used to set the year (represented by the last two digits of the year A.D.) for the device's internal clock-calendar. If the specified value is to be used to change the device's internal settings, the re-write field must be set to zero.

22. **Byte 45**
    This byte is used to set the month for the device's internal clock-calendar. If the specified value is to be used to change the device's internal settings, the re-write field must be set to zero.

23. **Byte 46**
    This byte is used to set the day for the device's internal clock-calendar. If the specified value is to be used to change the device's internal settings, the re-write field must be set to zero.

24. **Byte 47**
    This byte is used to set the hour for the device's internal clock-calendar. If the specified value is to be used to change the device's internal settings, the re-write field must be set to zero.

25. **Byte 48**
    This byte is used to set the minute for the device's internal clock-calendar. If the specified value is to be used to change the device's internal settings, the re-write field must be set to zero.

26. **Byte 49**
    This byte is used to set the second for the device's internal clock-calendar. If the specified value is to be used to change the device's internal settings, the re-write field must be set to zero.

Bytes 50–157 correspond to internal registers 0–55 of the "IC for digital signal processing in VGA-CCD cameras." These settings are for use by developers and are not used in the case of the commercial product.

27. **Bytes 50–51**
    This field corresponds to Register 0 of the IC for digital signal processing in VGA-CCD cameras.

28. **Bytes 52–53**
    This field corresponds to Register 1 of the IC for digital signal processing in VGA-CCD cameras.

29. **Bytes 54–55**
    This field corresponds to Register 2 of the IC for digital signal processing in VGA-CCD cameras.

30. **Bytes 56–57**
    This field corresponds to Register 3 of the IC for digital signal processing in VGA-CCD cameras.

31. **Bytes 58–59**
    This field corresponds to Register 4 of the IC for digital signal processing in VGA-CCD cameras.

32. **Bytes 60–61**
    This field corresponds to Register 5 of the IC for digital signal processing in VGA-CCD cameras.

33. **Bytes 62–63**
    This field corresponds to Register 6 of the IC for digital signal processing in VGA-CCD cameras.

34. **Bytes 64–65**
    This field corresponds to Register 7 of the IC for digital signal processing in VGA-CCD cameras.

35. **Bytes 66–67**
    This field corresponds to Register 8 of the IC for digital signal processing in VGA-CCD cameras.

36. Bytes 68–69
This field corresponds to Register 9 of the IC for digital signal processing in VGA-CCD cameras.

37. Bytes 70–71
This field corresponds to Register 10 of the IC for digital signal processing in VGA-CCD cameras.

38. Bytes 72–73
This field corresponds to Register 11 of the IC for digital signal processing in VGA-CCD cameras.

39. Bytes 74–75
This field corresponds to Register 12 of the IC for digital signal processing in VGA-CCD cameras.

40. Bytes 76–77
This field corresponds to Register 13 of the IC for digital signal processing in VGA-CCD cameras.

41. Bytes 78–79
This field corresponds to Register 14 of the IC for digital signal processing in VGA-CCD cameras.

42. Bytes 80–81
This field corresponds to Register 15 of the IC for digital signal processing in VGA-CCD cameras.

43. Bytes 82–83
This field corresponds to Register 16 of the IC for digital signal processing in VGA-CCD cameras.

44. Bytes 84–85
This field corresponds to Register 18 of the IC for digital signal processing in VGA-CCD cameras.

45. Bytes 86–87
This field corresponds to Register 19 of the IC for digital signal processing in VGA-CCD cameras.

46. Bytes 88–89
This field corresponds to Register 20 of the IC for digital signal processing in VGA-CCD cameras.

47. Bytes 90–91
This field corresponds to Register 21 of the IC for digital signal processing in VGA-CCD cameras.

48. Bytes 92–93
This field corresponds to Register 22 of the IC for digital signal processing in VGA-CCD cameras.

49. Bytes 94–95
This field corresponds to Register 23 of the IC for digital signal processing in VGA-CCD cameras.

50. Bytes 96–97
This field corresponds to Register 24 of the IC for digital signal processing in VGA-CCD cameras.

51. Bytes 98–99
This field corresponds to Register 25 of the IC for digital signal processing in VGA-CCD cameras.

52. Bytes 100–101
This field corresponds to Register 26 of the IC for digital signal processing in VGA-CCD cameras.

53. Bytes 102–103
This field corresponds to Register 27 of the IC for digital signal processing in VGA-CCD cameras.

54. Bytes 104–105
This field corresponds to Register 28 of the IC for digital signal processing in VGA-CCD cameras.

55. Bytes 106–107
This field corresponds to Register 29 of the IC for digital signal processing in VGA-CCD cameras.

56. Bytes 108–109
This field corresponds to Register 30 of the IC for digital signal processing in VGA-CCD cameras.

47. Bytes 110–111
This field corresponds to Register 31 of the IC for digital signal processing in VGA-CCD cameras.

58. Bytes 112–113
This field corresponds to Register 32 of the IC for digital signal processing in VGA-CCD cameras.

59. Bytes 114–115
This field corresponds to Register 33 of the IC for digital signal processing in VGA-CCD cameras.

60. Bytes 116–117
This field corresponds to Register 34 of the IC for digital signal processing in VGA-CCD cameras.

61. Bytes 118–119
This field corresponds to Register 35 of the IC for digital signal processing in VGA-CCD cameras.

62. Bytes 120–121
This field corresponds to Register 36 of the IC for digital signal processing in VGA-CCD cameras.

63. Bytes 122–123
This field corresponds to Register 37 of the IC for digital signal processing in VGA-CCD cameras.

64. Bytes 124–125
This field corresponds to Register 38 of the IC for digital signal processing in VGA-CCD cameras.

65. Bytes 126–127
This field corresponds to Register 39 of the IC for digital signal processing in VGA-CCD cameras.

66. Bytes 128–129
This field corresponds to Register 40 of the IC for digital signal processing in VGA-CCD cameras.

67. Bytes 130–131
This field corresponds to Register 41 of the IC for digital signal processing in VGA-CCD cameras.

68. Bytes 132–133
This field corresponds to Register 42 of the IC for digital signal processing in VGA-CCD cameras.

69. Bytes 134–135
This field corresponds to Register 43 of the IC for digital signal processing in VGA-CCD cameras.

70. Bytes 136–137
This field corresponds to Register 44 of the IC for digital signal processing in VGA-CCD cameras.

71. Bytes 138–139
This field corresponds to Register 45 of the IC for digital signal processing in VGA-CCD cameras.

72. Bytes 140–141
This field corresponds to Register 46 of the IC for digital signal processing in VGA-CCD cameras.

73. Bytes 142–143
This field corresponds to Register 47 of the IC for digital signal processing in VGA-CCD cameras.

74. Bytes 144–145
    This field corresponds to Register 48 of the IC for digital signal processing in VGA-CCD cameras.

75. Bytes 146–147
    This field corresponds to Register 49 of the IC for digital signal processing in VGA-CCD cameras.

76. Bytes 148–149
    This field corresponds to Register 50 of the IC for digital signal processing in VGA-CCD cameras.

77. Bytes 150–151
    This field corresponds to Register 51 of the IC for digital signal processing in VGA-CCD cameras.

78. Bytes 152–153
    This field corresponds to Register 52 of the IC for digital signal processing in VGA-CCD cameras.

79. Bytes 154–155
    This field corresponds to Register 54 of the IC for digital signal processing in VGA-CCD cameras.

80. Bytes 156–157
    This field corresponds to Register 55 of the IC for digital signal processing in VGA-CCD cameras.

8-3-12. The READ command

Table 8-3-12-1: READ command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [28h]							
1	LUN [0]			Reserved [0]				
2	Data-type code [0]							
3	Reserved [0]							
4	Data-type modifier (upper byte) [0]							
5	Data-type modifier (lower byte) [0]							
6	(MSB)			Transfer length				
7								
8								(LSB)
9	Control byte [0]							

The function of the READ command is to read the most recently recorded data and file information for each data type (image, memo, or audio recording).

1. The data type field makes it possible to identify the type of data transferred between the device and the initiator. The data type codes are listed below.
   - 00h: image data
   - 80h audio data
   - C0h: memo data
   - 21h: configuration information file
   - 22h: link information file
   - 23h: playback settings file
2. The recommended value for transfer length is equal to the size of the data structure in bytes multiplied by the data count (as the E-300 supports single-byte data structures only, the recommended transfer length is the same as the data count).
3. The data-type modifier is used to distinguish non-image data transfers using the same data-type code. In the case of the E-300 this field has no effect and is consequently set to zero.
4. The data transfer length gives the number of blocks that the device will send to the initiator in the data-in phase. The size of each block is the block size currently given in the mode parameter block descriptor (in the case of the E-300 block size is fixed at one byte per block). A value of zero for data transfer length does not indicate an error but rather that there are no data to be sent. The maximum transfer length for the E-300 is one file (length varies depending on the file in question). If a value which would exceed the size of an image file is specified, the device will return a CHECK CONDITION status. In such a case, the sense data to be returned in response to a REQUEST SENSE command will be set as follows: the ILI bit will be set to 1, the Valid bit to 1, and the Information byte to the number of blocks (bytes of data) in the file that was to be read.

5. When a single file's worth of data are divided into a number of portions and read with multiple READ commands, the device will not permit a READ command which requests more blocks (bytes of data) than remain to be sent. The device will return a CHECK CONDITION status in response to any READ command which would violate this constraint. The sense data to be returned in response to a REQUEST SENSE command will be set as follows: the ILI bit will be set to 1, the Valid bit to 1, and the Information byte to the number of blocks (bytes of data) remaining in the file that is being read. Configuration information, link information, and play-back settings files can not be read using multiple READ commands (i.e., an amount equal to the transfer length is read starting from the lead byte).

   Note: Limitation on reading image, memo, and audio data using multiple READ commands
   The number of bytes transferred must be n × ***512, where*** n ***is an integer and 0*** ≤ n ≤ ***152. This does not apply when attempting to read all the data remaining in a file containing less than 77,824 bytes of unread data.***

6. The READ command is normally used in combination with a SCAN or RECORD command. When used to read the image data produced with a SCAN command, the most recently recorded data are selected. If there are no data of the indicated type in the data most recently recorded, the device will return a CHECK CONDITION status.

7. If there is a conflict of reserved access and there are no data to be transferred, this command will terminate with a RESERVATION CONFLICT status.

Note: *The formats for image, memo, audio, configuration information, and link information files are described elsewhere.*

8-3-13. The ABORT command

Table 8-3-13: ABORT Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [C0h]							
1	LUN [0]			Reserved [0]				
2–4	Reserved [0]							
5	Control byte [0]							

1. The ABORT command terminates recording of a photograph or audio data begun with the SCAN or RECORD command. On receipt of this command, the device terminates the operation and returns to stand-by mode. After an ABORT issued, photographs or audio data will not be recorded until another SCAN or RECORD command is received. If the device was not in the process of recording data when the ABORT command was received, it will return a GOOD status.

2. This command can also be used to terminate playback after the device has received a PLAY command. If the device was not in the process of playing back data when the ABORT was received, it will return a GOOD status.

8-3-14. The RECORD command

Table 8-3-14-1: RECORD command

Byte \ Bit	7	6	5	4	3	2	1	0
0	Operation code [C1h]							
1	LUN [0]			Reserved [0]		Record function		
2–4	Reserved [0]							
5	Control byte [0]							

This command is designed to provide a means of controlling the device's audio recording function. It can be used when the recording mode has been set to 2h (non-simultaneous mode 1) or 3h (non-simultaneous mode 2) by means of the SET WINDOW command (note that this command results in the same operations being performed irrespective of whether the recording mode is non-simultaneous mode 1 or non-simultaneous mode 2).

1. The value for the record function specifies what action is to take place on receipt of this command, as defined in the following table:
   000b Start recording
   001b Stop recording
   010b Reserved
   –111b
2. If this command is issued with a "start recording" function when the recording mode has been set to "simultaneous," the device will return a CHECK CONDITION status after setting the sense data to COMMAND SEQUENCE ERROR.
3. If after receipt of this command a second RECORD command is issued with a "start recording" function while audio data are still being recorded, the device will return a CHECK CONDITION status after setting the sense data to RECORDING AUDIO DATA.
4. If a RECORD command is issued to stop recording when the device is not currently recording audio data, the device will return a GOOD status.
5. If memory runs out while recording is in progress, the device will terminate recording, set the sense data to MEMORY FULL, and return a CHECK CONDITION status in response to the next command received.
6. With the exception of the main power switch, all external input are masked while the device is making a recording as a result of having received a RECORD command.

8-3-15. The CHECK command

Table 8-3-15-1: CHECK Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [C2h]							
1	LUN [0]			Reserved [0]				
2–3	Reserved [0]							
4	Transfer length [10d]							
5	Control byte [0]							

This command is intended to provide information on memory used, remaining memory, and battery level.

1. The transfer length gives the number of bytes of data that will be transferred in the data-in phase.
2. The format of the CHECK data sent by the device is shown in Table 8-3-15-2.

Table 8-3-15-2: CHECK data format

Bit / Byte	7	6	5	4	3	2	1	0
0	ACA	Battery level [0–100%]						
1	Remaining memory [0–100%]							
2–3	(MSB)	Highest frame number						(LSB)
4–5	(MSB)	Number of exposures remaining [frame count]						(LSB)
6–7	(MSB)	Remaining recording time [seconds]						(LSB)
8–9	(MSB)	Next usable frame number						(LSB)
10–11	(MSB)	Maximum recording time in simultaneous recording mode						(LSB)
12	Reserved [0]							MCR

Note: *Parameters consisting of more than one byte are treated as beginning from the upper byte.*

1. Byte 0

   If the AC adaptor is in use the ACA bit will be 1; if the adaptor is not in use, the bit will be zero.

   If the device is being operated on battery power, the battery level field will indicate the remaining charge as a percentage.

2. Byte 1

   This field gives the amount of memory remaining, expressed as a percentage of total memory.

3. Bytes 2–3

   This field gives the highest frame number. If no data are currently in memory, this field has a value of zero.

4. **Bytes 4–5**

   This field gives the number of exposures (expressed as number of frames) that can be recorded in the current mode. When the recording mode is set to "simultaneous," this field gives the number of frames that can be recorded together with the specified length of audio data. When the recording mode is "non-simultaneous mode 1" or "non-simultaneous mode 2," the figure gives the number of frames that could be recorded were all the memory remaining to be used to store images.

   The following parameters used in calculating a value for this field are obtained through the SET WINDOW command:

   Compression (image quality) mode ..... NORMAL, FINE
   Image read settings ..... Single frame, consecutive
   Recording mode ..... Simultaneous, non-simultaneous mode 1, non-simultaneous mode 2
   Recording time in simultaneous mode ... Specified value

5. **Bytes 6–7**

   When the device is set to make audio recordings (i.e., when the Switch bit is set to 1) and the recording mode is set to non-simultaneous recording mode 1 or 2, this field gives the maximum length of recording that could be made were all remaining memory to be used to record audio data. When the Switch bit is zero or the device is in simultaneous recording mode, this field has no effect and is set to zero. The following parameter used in calculating a value for this field is obtained through the SET WINDOW command:

   Recording mode ..... Simultaneous, non-simultaneous mode 1, non-simultaneous mode 2

6. **Bytes 8–9**

   This field gives the frame number that will be assigned to the next image, memo, or audio recording., returning a value of FFFFh if all frame numbers are already in use.

7. **Bytes 10–11**

   When the device is set to make audio recordings (i.e., when the Switch bit is set to 1) and the selected recording mode is "simultaneous," this field gives the maximum length of recording that can be made simultaneously with a single photograph at current image quality settings. When the Switch bit is zero or the device is in non-simultaneous recording mode 1 or 2, this field has no effect and is set to zero. The following parameters used in calculating a value for this field are obtained through the SET WINDOW command:

   Compression (image quality) mode ..... NORMAL, FINE
   Recording mode ..... Simultaneous, non-simultaneous mode 1, non-simultaneous mode 2

8. **Byte 12**

   The MCR bit has a value of 1 when the device is in macro-zoom mode, zero when in normal mode.

8-3-16. The READ CHECK command

Table 8-3-16-1: READ CHECK Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [C3h]							
1	LUN [0]			Reserved [0]				
2	(MSB) Frame number							
3								(LSB)
4	Transfer length [61d]							
5	Control byte [0]							

The READ CHECK command is provided as a means of obtaining information on the type and amount of data stored under each frame number.

1. If the requested frame does not exist, the device will return a CHECK CONDITION status after setting the sense data to INVALID FIELD IN CDB.
2. The transfer length corresponds to the number of bytes of data to be sent in the data-in phase.
3. The frame number specifies which of the frames in memory is the one about which information is to be provided. A value of 0h requests information about the most recently recorded data (i.e., about the data stored under what is currently the highest frame number in memory).
4. The format for the READ CHECK data sent by the device is shown in Table 8-3-16-2.

Table 8-3-16-2: READ CHECK data format

Bit / Byte	7	6	5	4	3	2	1	0
0	Reserved [0]			I [00]		M[0]	V [0]	SI [0]
1–3	(MSB) Number of bytes compressed image data (LSB)							
4–6	(MSB) Number of bytes memo data (LSB)							
7–9	(MSB) Number of bytes audio data (LSB)							
10–12	(MSB) Number of bytes thumbnail image data (LSB)							
13	Recording time: Year (last two digits) [0–99]							
14	Recording time: Month [1–12]							
15	Recording time: Day [1–31]							
16	Recording time: Hour [0–23]							
17	Recording time: Minute [0–59]							
18	Recording time: Second [0–59]							
19–20	Compressed image DIR No. [2–479]							
21–22	Memo data DIR No. [2–479]							
23–24	Audio data DIR No. [2–479]							
25–36	Filename of compressed image [Mxxxxxxx.JPG]							
37–48	Memo filename [Mxxxxxxx.PIC]							
49–61	Audio data filename [Mxxxxxxx.DSC]							

Note: *Parameters consisting of more than one byte are treated as beginning from the upper byte.*

Note: *The string "xxxxxxx" in the filenames represents numeric characters.*

1. **Byte 0**

   These fields indicate the type of data stored in the location indicated by the specified frame number. Several bits may be active depending on whether or not audio or memo data have been recorded with an image.

   I bit ..... 01h if image data are present
   00h if no image data are present

   M bit ..... 01h if memo data are present
   00h if no memo data are present

   V bit ..... 01h if audio data are present
   00h if no audio data are present

   SI bit ..... 01h if thumbnail image data are present
   00h if no thumbnail image data are present
   This bit is set to 1 through a MAKE IMAGE command. It will be set to zero when the image is deleted by means of an ERASE command or through direct operation of the camera, or when a MAKE IMAGE command is issued with respect to another frame number.

2. **Bytes 1–3**

   When compressed image data are present at the specified frame number, this field gives the number of bytes in the data.

3. **Bytes 4–6**

   When memo data are present at the specified frame number, this field gives the number of bytes in the data.

4. **Bytes 7–9**

   When audio data are present at the specified frame number, this field gives the number of bytes in the data.

5. **Bytes 10–12**

   When thumbnail image data are present at the specified frame number, this field gives the number of bytes in the data.

6. **Bytes 13–18**

   These fields give the time and date of recording (expressed as year, month, day, hour, minute, second) for the data at the specified frame number. Of the three recordings (compressed image, memo, or audio) that may be associated with a given frame number, the time and date for the item recorded first is returned (the time and date of creation for a thumbnail generated by the MAKE IMAGE command will not be returned).

7. **Bytes 19–20**

   This field gives the DIR number for the compressed image data at the specified frame number, if any are present.

8. **Bytes 21–22**

   This field gives the DIR number for the memo data at the specified frame number, if any are present.

9. **Bytes 23–24**
   This field gives the DIR number for the audio data at the specified frame number, if any are present.

10. **Bytes 25–36**
    If compressed image data are present at the specified frame number, this field will give the name of the file containing the data. The filename is stored as an ASCII character string.

11. **Bytes 37–48**
    If memo data are present at the specified frame number, this field will give the name of the file containing the data. The filename is stored as an ASCII character string.

12. **Bytes 49–61**
    If audio data are present at the specified frame number, this field will give the name of the file containing the data. The filename is stored as an ASCII character string.

8-3-17. The READ2 command

Table 8-3-17-1: READ2 Command

Byte \ Bit	7	6	5	4	3	2	1	0
0	Operation code [E0h]							
1	LUN [0]			Reserved [0]				
2	Data-type code [0]							
3	Reserved [0]							
4	(MSB)			Frame number				
5								(LSB)
6	(MSB)			Transfer length				
7								
8								(LSB)
9	Control byte [0]							

The READ2 requests the device to send data to the initiator.

1. The data type field makes it possible to identify the type of data transferred between the device and the initiator. The data type codes are listed below.
   - 00h: image data
   - 80h audio data
   - C0h: memo data
   - 21h: configuration information file
   - 22h: link information file
   - 23h: playback settings file
2. The recommended value for transfer length is equal to the size of the data structure in bytes multiplied by the data count (as the E-300 supports single-byte data structures only, the recommended transfer length is the same as the data count).
3. The frame number field specifies the frame number of the data to be sent. If the specified frame number does not exist, the device will return a CHECK CONDITION status after setting the sense data to INVALID FIELD IN CDB. Specifying a frame number of zero selects the most recently recorded frame for transfer. If the specified data type is a configuration information file or link information file, the field is not relevant.
4. The data transfer length gives the number of blocks that the device will send to the initiator in the data-in phase. The size of each block is the block size currently given in the mode parameter block descriptor (in the case of the E-300 block size is fixed at one byte per block). A value of zero for data transfer length does not indicate an error but rather that there are no data to be sent. The maximum transfer length for the E-300 is one file (length varies depending on the file in question). If a value which would exceed the size of an image file is specified, the device will return a CHECK CONDITION status. In such a case, the sense data to be returned in response to a REQUEST SENSE command will be set as follows: the ILI bit will be set to 1, the Valid bit to 1, and the Information byte to the number of blocks (bytes of data) in the file that was to be read.

5. When a single file's worth of data are divided into a number of portions and read with multiple READ2 commands, the device will not permit a READ2 command which requests more blocks (bytes of data) than remain to be sent. The device will return a CHECK CONDITION status in response to any READ2 command which would violate this constraint. The sense data to be returned in response to a REQUEST SENSE command will be set as follows: the ILI bit will be set to 1, the Valid bit to 1, and the Information byte to the number of blocks (bytes of data) remaining in the file that is being read. Configuration information, link information, and playback settings files can not be read using multiple READ2 commands (i.e., an amount equal to the transfer length is read starting from the lead byte).

   Note: Limitation on reading image, memo, and audio data using multiple READ2 commands
   The number of bytes transferred must be n × *512, where* n *is an integer and* $0 \leq n \leq 152$. *This does not apply when attempting to read all the data remaining in a file containing less than 77,824 bytes of unread data.*

6. The READ2 command is normally used in combination with a SCAN or RECORD command. When used to read the image data produced with a SCAN command, the most recently recorded data are selected. If there are no data of the indicated type in the data most recently recorded, the device will return a CHECK CONDITION status.

7. If there is a conflict of reserved access and there are no data to be transferred, this command will terminate with a RESERVATION CONFLICT status.

8. An initiator will not be permitted to read data from another recording until all bytes of a given recording have been read. Should such an attempt be made, the device will return a CHECK CONDITION status after setting the sense data to INVALID FIELD IN CDB.

Note: *The formats for image, memo, audio, configuration information, and link information files are described elsewhere.*

8-3-18. The ERASE command

Table 8-3-18-1: ERASE Command

Bit / Byte	7	6	5	4	3	2	1	0
0	Operation code [C5h]							
1	LUN [0]			Reserved [0]				ERA [0]
2	(MSB) Frame number							
3								(LSB)
4	Data-type code [0]							
5	Control byte [0]							

This command is provided to allow erasure of recorded data.

1. The data-type code serves to identify the type of data to be deleted, chosen from among the three types of data which can be recorded by the device. These are image data (0h), audio data (80h), and memo data (C0h). A value of FFh erases data of all three types associated with the specified frame number.
2. In the event that the specified frame number or data type does not exist, the device will return a GOOD status. A value of zero for the frame number field results in the requested deletion being performed on the data at the most recently recorded frame number.
3. If the ERA (ERase All) bit is set to 1 when the specified frame number is zero, all data remaining in memory will be erased.
4. If there are no data to be erased in a case of conflicting access reservations, the device will terminate the command with a RESERVATION CONFLICT status.

8-3-19. The SEND command

Table 8-3-19-1: SEND Command

Byte \ Bit	7	6	5	4	3	2	1	0
0	Operation code [E1h]							
1	LUN [0]			Reserved [0]				
2	Reserved [0]							
3	(MSB)			Frame number				
4								(LSB)
5	Data-type code [0]							
6	(MSB)			Transfer length				
7								
8								(LSB)
9	Control byte [0]							

This command is provided to allow data to be transferred from the initiator to the device.

1. The frame number is that use by the device in managing data. If in the device's memory there are already data of the specified type at the specified frame number, the device will return a CHECK CONDITION status after setting the sense key to INVALID FIELD IN CDB.

   If an existing frame number is specified but the data are of a type not currently present at that frame number, the data will be recorded at the specified number. If the data are sent to a new frame number, it will be necessary to search for an unused number. When a frame number of zero is specified, a number will be allocated automatically from among the unused numbers (the frame number that will be automatically assigned by the device can be determined in advance by means of the CHECK command).

2. The data type field makes it possible to identify the type of data transferred between the device and the initiator. The data type codes are listed below.
   - 00h: image data
   - 80h audio data
   - C0h: memo data
   - 21h: configuration information file
   - 22h: link information file
   - 23h: playback settings file

3. The transfer length gives the number of bytes in the data that will be sent from the initiator in the data-out phase. A value of zero is not treated as an error but rather indicates that there are no data to be transferred.

4. If there is a conflict of reserved access and there are no data to be transferred, the device will terminate the command with a RESERVATION CONFLICT status.

8-3-20. The CLEAR SET PLAY command

Table 8-3-20-1: CLEAR SET PLAY command

Byte \ Bit	7	6	5	4	3	2	1	0
0	Operation code [C9h]							
1	LUN [0]			Reserved [0]				
2	(MSB) Recording number							
3								(LSB)
4	Reserved [0]				AC [0]	I [0]	M [0]	V [0]
5	Control byte [0]							

Using the CLEAR SET PLAY command, frame numbers that have been selected for playback using the SET PLAY command can be removed from the playback list.

1. The frame number is that used by the device in managing data. If the specified frame number does not exist, the device will return a CHECK CONDITION status after setting the sense key to INVALID FIELD IN CDB. If the specified frame number has not been selected for playback, the device will return a GOOD status. A value of zero will result in the frame most recently selected for playback being removed from the playback list.

2. Byte 4 specifies the type of data at the specified frame that is to be removed from the playback list. More than one of bits 0–3 can be active at a time. If data of the specified type have not been selected for playback, the device will return a GOOD status.
   - I bit ..... has a value of 1 if image data are to be removed from the playback list
     has a value of 0 if image data are not to be removed from the playback list
   - M bit ..... has a value of 1 if memo data are to be removed from the playback list
     has a value of 0 if memo data are not to be removed from the playback list
   - V bit ..... has a value of 1 if audio data are to be removed from the playback list
     has a value of 0 if audio data are not to be removed from the playback list
   - AC bit .... If this bit has a value of 1 and zero is given as the frame number, the current playback settings will be cleared (in this case, the remaining bits I, M, and V will be ignored)

3. If audio data are selected for playback at the same time as image or memo data and the length of playback specified for the memo or image is longer than that given for the audio data, issuing this command to remove the image or memo, but not the audio data, from the playback list will cause the playback time given for the image or memo to be ignored.

8-3-21. The PLAY command

Table 8-3-21-1: PLAY Command

Byte \ Bit	7	6	5	4	3	2	1	0
0	Operation code [CAh]							
1	LUN [0]			Reserved [0]				
2	Reserved [0]							VOL [00–11b]
3	E [0]	(MSB)	Number of playback cycles [1–999]					
4								(LSB)
5	Reserved [0]							

The PLAY command plays back data as specified in the playback settings saved in the device's memory.

1. The VOL field sets the volume at which audio data will be played back. A value of 00b sets the playback volume to zero, 01b to low, 10b to normal, and 11b to loud. No audio data will be played back if the volume is set to zero; instead, the next item in the playback list will be displayed after a pause equal in length to the length of the recording or the time specified for playback of the audio data.
2. A value of 1 for the E bit specifies that playback is to be repeated *ad infinitum*. If this bit is set to zero playback will be repeated for the number of times given in the "number of playback cycles" field.

   The "number of playback cycles" field specifies the number of times playback is to be repeated. The maximum value for this field is that given for the number of cycles in the device's slide-show settings. If a value greater than the maximum is specified playback will be repeated the maximum number of times. No data will be played back if the value of this field is zero.
3. While data are being played back as a result of this command, all external input, with the exception of the main power switch, will be masked.
4. If this command is issued when no playback settings are present in the device's memory, the device will return a CHECK CONDITION status after setting the ASC and ASCQ to COMMAND SEQUENCE ERROR.

8-3-22. The PLAY2 command

Table 8-3-22-1: PLAY2 Command

Byte \ Bit	7	6	5	4	3	2	1	0
0	Operation code [CBh]							
1	LUN [0]			Reserved [0]				
2	Reserved [0]							DIR
3	Reserved [0]							
4	Reserved [0]							
5	Reserved [0]							

The PLAY2 command is issued after a PLAY command to end playback of the item currently being displayed and start playback of the next item.

1. If this command is received while recorded data are being played back, playback will be terminated and the next item displayed even if the current data have not been displayed for the specified length of time (this includes data that are to be displayed for an unlimited length of time).
2. If the DIR bit is zero, playback will proceed in a forward direction through the playback list; if 1, playback will proceed in a reverse direction through the list.

8-4. Addendum

8-4-1. Data link information file format

The following defines the format for the link information file used in this device to manage joint information on stored recorded data. The link information file is written using a SEND command with a data-type code of 22h and read using either a READ or READ2 command with a data-type code of 22h.

Table 8-4-1-1: Link Information File Format

Byte \ Bit	7	6	5	4	3	2	1	0
0–11	Header [LINK FILE]							
12–13	Storage area for first frame number							
14–15	Storage area for last frame number							
16–31	Reserved area for frame number 0							
32–33	Number of frame linked following frame number 1							
34–35	Number of frame linked preceding frame number 1							
36–41	Date of recording for frame number 1 [Year Month Day Hour Minute Second]							
42–43	Frame number 1: Image data DIR No.							
44–45	Frame number 1: Memo data DIR No.							
46–47	Frame number 1: Audio data DIR No.							
…	…							
7648–7649	Number of frame linked following frame number 477							
7650–7651	Number of frame linked preceding frame number 477							
7652–7657	Date of recording for frame number 477 [Year Month Day Hour Minute Second]							
7658–7659	Frame number 477: Image data DIR No.							
7660–7661	Frame number 477: Memo data DIR No.							
7662–7663	Frame number 477: Audio data DIR No.							

The device is capable of saving up to 477 items of data (where a single image, memo, or audio recording is counted as one item of data) internally. Thus the maximum number of frames when each frame contains only one item of recorded data is 477. Sixteen bytes of link information are saved for each frame number.

1. Header
   The header contains the ASCII character string "LINK FILE ".
2. Storage area for first frame number
   The number of the oldest frame is entered in this field.
3. Storage area for last frame number
   The number of the most recent frame is entered in this field.
4. Reserved area for frame number 0
   Area of memory reserved for frame number 0

From byte 32 on, the link information for each frame number is stored using an area of sixteen bytes for each frame number. Bytes 32 to 47 are used to store information on frame number one, bytes 48 to 63 information on frame number 2, and so on, with the frame number increasing by 1 every sixteen bytes. The highest possible frame number for the E-300 is 477.

The value for the number of the frame following the last frame is FEFEh.

5. **Number of frame linked following frame number *n***
   This field contains the number of the frame linked immediately following the current frame in ascending order by time of recording. The value for this field in the case of the last frame is FEFEh.

6. **Number of frame linked preceding frame number *n***
   This field contains the number of the frame linked immediately preceding the current frame in ascending order by time of recording. The value for this field in the case of the first frame is FEFEh. When a new frame is recorded, the number of what had hitherto been the most recently recorded frame is entered here.

7. **Date of recording for frame number *n***
   This field gives the year, month, day, hour, minute, and second of recording for the current frame.

8. **Frame number *n*: image data DIR number**
   Gives the DIR number for image data present at this frame number, if any. The DIR number remains constant so long as the associated image data are not deleted. If no image data are associated with the frame number, this field has a value of E5E5h.

9. **Frame number *n*: memo data DIR number**
   Gives the DIR number for memo data present at this frame number, if any. The DIR number remains constant so long as the associated memo data are not deleted. If no memo data are associated with the frame number, this field has a value of E5E5h.

10. **Frame number *n*: audio data DIR number**
    Gives the DIR number for audio data present at this frame number, if any. The DIR number remains constant so long as the associated audio data are not deleted. If no audio data are associated with the frame number, this field has a value of E5E5h.

8-4-2. Format of playback settings file

The following describes the file format for the playback settings file saved by this device. The playback settings file is written using a SEND command with a data-type code of 22h and read using either a READ or READ2 command with a data-type code of 22h.

Table 8-4-2-1: Playback Settings File Format

Byte \ Bit	7	6	5	4	3	2	1	0
0–7	Header [SLID - F]							
8–9	Reserved [0000h]							
10–11	Maximum number of frames in playback list [480d]							
12–13	Number of frames to be played back [1–480d]							
14–15	Number of repeats [0–999d]							
16	(MSB) Frame number							
17	Frame number (LSB)							
18	T	I	M	V	L	(MSB)	Length of playback	
19	Length of playback [0–999 sec.] (LSB)							
…	…							
1932	(MSB) Frame number							
1933	Frame number (LSB)							
1934	T	I	M	V	L	(MSB)	Length of playback	
1935	Length of playback [0–999 sec.] (LSB)							
1936 –1937	End marker [0000h]							

1. Header

   The header contains the ASCII character string "SLID - F".

2. Reserved area

   The value 0000h is stored in the reserved area. There are no conventions governing writing to or reading from this area.

3. Maximum number of frames in playback list

   This field is fixed at a value of 480d, written to this area when the settings file is saved.

4. Number of frames to be played back

   A value of between 1 and 480d is written to this field when the settings file is saved. This field can be changed.

5. Number of repeats

   This field contains a numeric value corresponding to the number of times playback is to be repeated as specified in the PLAY command. It is only used for read operations, and hence there are no conventions for writing to this field.

Bytes 16 on list the playback settings for each frame, each assigned an area of four bytes. As there are a maximum of 480 frames in the playback list, this area ranges in size from four to 1,920 bytes. The end of the settings list is indicated by an end marker.

6. **Frame number**
   This field contains the number of the frame to be played back.

7. When the T bit has a value of 1, the information in the L bit and length of playback field will be used. When data are played back using the default settings this field has a value of zero.

   A value of 1 for the I bit indicates that any image data associated with the frame number will be played back. Similarly, a value of 1 for the M bit indicates that any memos associated with that frame will be played back, and a value of 1 for the V bit that any audio data at that frame will be played back.

   The L bit is only meaningful when the T bit has a value of 1. In this case, a value of 1 for the L bit indicates that there are no specified limits on the length of time the frame will be played back. This field has a value of zero when data are played back using the default settings . If the T bit is 1 and the L bit is zero, the frame will be played back for the number of seconds given in the length of playback field. This last-named field can be set to any value between zero and 999; any attempt to set the field to a value greater than 999 results in its being set to 999.

8. **End marker**
   The end marker contains a value of 0000h.

9. **Miscellaneous**
   The same frame can appear multiple times in the playback settings list.