5.4.3.7. 8411/8414/8424/8425 Disc Subsystems

Command	Bit Positions							
	0	1	2	3	4	5	6	7
SEEK								
Seek	0	0	0	0	0	1	1	1
Seek-head	0	0	0	1	1	0	1	1
Seek-cylinder	0	0	0	0	1	0	1	1
WRITE								
Write-home-address	0	0	0	1	1	0	0	1
Write-TD-record	0	0	0	1	0	1	0	1
Write-count-key-and-data	0	0	0	1	1	1	0	1
Write-special-count-key-and-data	0	0	0	0	0	0	0	1
Write-data	0	0	0	0	0	1	0	1
Write-key-and-data	0	0	0	0	1	1	0	1

8411/8414/8424/8425 Disk Subsystems (cont)

Command	Bit Positions							
	0	1	2	3	4	5	6	7
READ								
Read-home-address	M	0	0	1	1	0	1	0
Read-TD-record	M	0	0	1	0	1	1	0
Read-count	M	0	0	1	0	0	1	0
Read-data	M	0	0	0	0	1	1	0
Read-key-and-data	M	0	0	0	1	1	1	0
Read-count-key-and-data	M	0	0	1	1	1	1	0
Initial-program-load	M	0	0	0	0	0	1	0

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SEARCH								
Search-home-address-equal	M	0	1	1	1	0	0	1
Search-ID-equal	M	0	1	1	0	0	0	1
Search-ID-high	M	1	0	1	0	0	0	1
Search-ID-equal-or-high	M	1	1	1	0	0	0	1
Search-key-equal	M	0	1	0	1	0	0	1
Search-key-high	M	1	0	0	1	0	0	1
Search-key-equal-or-high	M	1	1	0	1	0	0	1
Search-key-and-data-equal	M	0	1	0	1	1	0	1
Search-key-and-data-high	M	1	0	0	1	1	0	1
Search-key-and-data-equal-or-high	M	1	1	0	1	1	0	1
Continue-scan-equal	M	0	1	0	0	1	0	1
Continue-scan-high	M	1	0	0	0	1	0	1
Continue-scan-equal-or-high	M	1	1	0	0	1	0	1
Continue-scan-no-compare	M	1	0	1	0	1	0	1
Continue-scan-set-compare	M	1	1	1	0	1	0	1
Continue-scan-set-compare	M	0	1	1	0	1	0	1

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

8411/8414/8424/8425 Disk Subsystems (cont)

Command	Bit Positions							
	0	1	2	3	4	5	6	7
SENSE								
Sense-I/O	0	0	0	0	0	1	0	0
Sense-reserve	1	1	1	1	0	1	0	0
Sense-release	1	1	0	1	0	1	0	0
MISCELLANEOUS								
Set-file-mask	0	0	0	1	1	1	1	1
Recalibrate	0	0	0	1	0	0	1	1
No-operation	0	0	0	0	0	0	1	1
Space-count	0	0	0	0	1	1	1	1
Erase	0	0	0	1	0	0	0	1
Test-I/O	0	0	0	0	0	0	0	0

LEGEND:

Bit positions in a byte, position 7 being the least significant bit position.

The M bit, when 0, establishes normal operation mode. The M bit, when 1, establishes multiple-track mode. This bit is ignored by the control unit on an initial-program-load command. When the M bit is set to 1 in the command, the disk unit upon encountering the index mark, increments the head register to switch to the next head. This M bit when set to 1 in a search-truncated command, and the track descriptor record (TDR) is used as a data record, enables the program to cascade down the cylinder switching to the next head after reaching the index mark. If the track descriptor record is not used as a data record, and the data length is 0 along with external interrupt status containing unit exception, disk transfer terminates. If the TDR does not have a data length of 0, the data within the TDR will then be presented, and the read/write, search-truncated, jump, and chain continue.

5.4.3.12. UNISERVO VI-C Magnetic Tape Subsystem

Command	Bit Positions							
	0	1	2	3	4	5	6	7
Test	X	X	0	0	0	0	0	0
				or				
	X	X	1	1	0	0	0	0
Set inhibit status	X	X	0	1	0	0	0	0
Reset inhibit status	X	X	1	0	0	0	0	0
Sense	0	0	0	0	0	1	0	0
Write	0	0	0	0	0	0	0	1
Read	0	0	0	X	0	0	1	0
Read backward	0	0	0	X	1	1	0	0
Control	0	0	C	C	C	1	1	1

Command	Bit Positions							
	0	1	2	3	4	5	6	7
Mode set	D	D	M	M	M	0	1	1

LEGEND:

Bit position 7 is the least significant bit position.

X may be a 1 or 0 bit and is ignored.

CCC (control code):

000	=	rewind
001	=	rewind-with-interlock
010	=	erase
011	=	write tape mark
100	=	backspace block
101	=	backspace file
110	=	forward space block
111	=	forward space file

MMM (mode modifier):

000	=	no operation
001	=	reserved for failure-finding mode (maintenance personnel only)
010	=	odd parity recording, data converter ON, density per DD
011	=	low gain (applies only to read or space operation immediately following mode set command; gain is reset to normal gain at end of operation). DD must be 01.
100	=	even parity recording, data converter OFF, density per DD
101	=	invalid
110	=	odd parity recording, data converter OFF, density per DD
111	=	invalid

DD (density set), applicable to 7-track operation only:

00	=	200 bpi
01	=	556 bpi
10	=	800 bpi
11	=	not used (invalid command)

Nine-track operation forces 800 bpi and odd vertical parity recording.
Nine-track operation overrides but does not reset 7-track mode setting.

5.9.3.7. 8411/8414/8424/8425 Disk Subsystems

SENSE DATA BYTE / BIT	0	1	2	3	4	5	6	7
0	COMMAND REJECT	INTERVENTION REQUIRED	BUS OUT CHECK	EQUIPMENT CHECK	DATA CHECK	OVERRUN	TRACK CONDITION CHECK	SEEK CHECK
1	COUNT AREA CHECK	TRACK OVERRUN	CYLINDER END	INVALID SEQUENCE	NO RECORD FOUND	FILE PROTECTED	MISSING ADDRESS MARKER	OVERFLOW INCOMPLETE
2	UNSAFE	NOT USED (ALWAYS 0)	NOT USED (ALWAYS 0)	NOT USED (ALWAYS 0)	NOT USED (ALWAYS 0)	UNSELECTED STATUS	NOT USED (ALWAYS 0)	NOT USED (ALWAYS 0)
3	READY	ONLINE	UNSAFE	NOT USED (ALWAYS 0)	NOT USED (ALWAYS 1)	END OF CYLINDER	NOT USED (ALWAYS 0)	SEEK INCOMPLETE
4	ALWAYS 0							
5	THIS BYTE IS ALL 0's EXCEPT WHEN BIT 7 OF BYTE 1 IS SET (OVERFLOW INCOMPLETE).							

Bit Position	Bit Designation	Definition
		Sense Data Byte 0
0	Command reject	This bit is set: ■ when an invalid command, an invalid sequence of commands, or a command for a feature not installed is received; ■ when the command received is one restricted by set-file-mask; ■ when two set-file-mask commands are sent in the same command chain; ■ when a second disk drive unit is addressed during a command chain.
1	Intervention required	This bit is set when a nonexistent (either physically or electrically) disk drive unit is addressed.
2	Bus out check	This bit is set: ■ when a command or data arrives on the bus out lines with even (incorrect) parity; ■ when even parity is detected in the Q3 register during data and command transfers; ■ when even parity is detected in the shift register during a write data transfer, or on the input bus lines for a read transfer.
3	Equipment check	This bit is set to indicate an equipment fault within the subsystem and is set with bit 0 of sense data byte 2.
4	Data check	This bit is set when an error is detected in the information transferred from a disk drive to the control unit.

8411/8414/8424/8425 Disk Subsystems (cont)

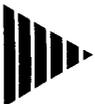| Bit Position	Bit Designation	Definition
Sense Data Byte 0 (cont)		
5	Overrun	This bit is set: ■ when the control unit does not receive data bytes within the prescribed time; ■ when data is received too late to be properly written and the remaining record area is filled with 0's; ■ when a subsequent command in a chain is received too late to be properly executed.
6	Track condition check	This bit is set when a read, write, or search command is attempted on a defective track (bit 6 of the flag byte on the record is set if the track is defective). These commands are inhibited for all data records but are permitted for home address and track descriptor records.
7	Seek check	This bit is set when an invalid address is sent for a seek command or if less than six address bytes are sent.
Sense Data Byte 1		
0	Count area check	This bit is set as the result of an error in the count area transferred from a disk drive to the control unit.

| 1	Track overrun	This bit is set when the writing on a track is not completed by the time the index marker is reached.
2	Cylinder end	This bit is set when a command chain is not completed by the time the end of a cylinder is reached.
3	Invalid sequence	This bit is set when two set-file-mask commands are sent in the same command chain. This bit, which is set along with bit 0 (command reject) of sense data byte 0, is also set for an invalid sequence of commands.
4	No record found	This bit can be set only when the M bit of read and search commands is 0 and one of the following conditions exists: Two index markers are detected, and there are no intervening read or write commands during the execution of a chain of search commands. ■ A read or search command has been issued for a blank track. ■ A home address and address marker are missing from a record R_0 track.
5	File protected	This bit is set when a seek or write command which has been prohibited by a set-file-mask command is issued.
6	Missing address marker	This bit is set along with bit 4 (data check) of sense data byte 0 when one of the following conditions exists: ■ Two index markers are passed without detecting any address markers.

8411/8414/8424/8425 Disk Subsystems (cont)

Bit Position	Bit Designation	Definition
Sense Data Byte 1 (cont)		
6	Missing address marker (cont)	■ Two successive records are read in which the bit 0's of the flag bytes are equal (indicating that both records are odd or even), and there was no intervening index marker; thus an address marker was missed. An exception is when the command issued is a search-ID, and the error indication would be no record found.
7	Overflow incomplete	This bit is set when an overflow record is not completed because overflow came either from a defective track or from an alternate track. Bit 6 (defective track check) of sense data byte 0 also is set for these conditions.
Sense Data Byte 2		
0	Unsafe	This bit is set when a disk file malfunction is detected.
1	N/A	This bit is not used and is always 0.
2	N/A	This bit is not used and is always 0.
3	N/A	This bit is not used and is always 0.
4	N/A	This bit is not used and is always 0.
5	Unselected status	This bit is set when a file status line is active with no device selected.

Bit Position	Bit Designation	Definition
6, 7	N/A	These bits are not used and are always 0.
Sense Data Byte 3		
0	Ready	This bit is set when the disk file is ready for operation.
1	Online	This bit is set when the disk file is online.
2	Unsafe	This bit is set when a disk file malfunction is detected.
3	N/A	This bit is not used and is always 0.
4	N/A	This bit is not used and is always 1.
5	End of cylinder	This bit is set along with bit 7 of sense data byte 1 when a seek command is not successfully completed.
6	N/A	This bit is not used and is always 0.
7	Seek incomplete	This bit is set when the end of a cylinder is detected.
Sense Data Byte 4		
0—8		The bits of sense data byte 4 are always 0.

8411/8414/8424/8425 Disk Subsystems (cont)

Bit Position	Bit Designation	Definition
		Sense Data Byte 5

This byte contains all 0's at all times except when the overflow incomplete bit is set (byte 1, bit 7). The codes in byte 5 indicate the type of command being executed when an overflow incomplete occurs. The codes and their meanings are:

Code In Hexadecimal	Meaning
06	A read command is in progress.
05	A write command is in progress.
25	A search-key-and-data-equal command is in progress, and the comparison is equal to this point.
45	A search-key-and-data-high command is in progress, and the comparison is equal to this point.
65	A search-key-and-data-equal-or-high command is in progress, and the comparison is equal up to this point.
55	Any search-key-and-data operation is in progress, and the comparison is low; or a search-key-and-data-equal is in progress, and the comparison is high.
75	A search-key-and-data-high command or a search-key-and-data-equal-or-high command is in progress, and the comparison is high.
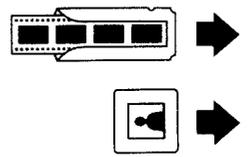
5.9.3.12. UNISERVO VI-C Magnetic Tape Subsystem

SENSE DATA BYTE	BIT 0	1	2	3	4	5	6	7
0	INVALID FUNCTION	INTERVENTION REQUIRED	BUS OUT CHECK	EQUIPMENT CHECK	DATA CHECK	DATA LATE	WORD COUNT ZERO	DATA CONVERTER CHECK
1	NOISE	TAPE UNIT STATUS A*	TAPE UNIT STATUS B*	7-TRACK*	LOAD POINT*	END-OF-TAPE*	FILE PROTECT*	NOT USED; ALWAYS ZERO
2	NOT USED							
	ALWAYS 0 BITS						ALWAYS 1 BITS	
3	READ VP ERROR	LP ERROR	SKEW	CRC READ ERROR	WRITE VP ERROR	NOT USED; ALWAYS 0	BACKWARD*	NOT USED; ALWAYS ZERO
			ALWAYS 0 BITS					ALWAYS 0 BITS
4	RUNAWAY CHECK	TAPE MOTION FAULT	RESERVED FOR FAILURE-FINDING MODE			STALL	TAPE FAULT	RESERVED FOR FAILURE-FINDING MODE

*Indicates bit that is conditioned by current status of tape unit.

Bit Position	Bit Designation	Definition
		Sense Data Byte 0
0	Invalid function	This bit is set if a write, write-tape-mark or erase operation was attempted on a file protected tape unit or if an invalid function was received by the control unit (in the second case, the bit will not be set if the bus out check bit is set).
1	Intervention required	Indicates that a nonexistent or nonready tape unit was addressed by a function other than a sense function. If this bit is set, the tape unit status A bit is not set (sense data byte 1).
2	Bus out check	Indicates that a function or data arrived with even parity on the bus out lines. If this condition is set on a data transfer during a write operation, the operation is terminated and the faulty byte is not written. If the parity error is detected on a first data transfer, the word count zero bit is also set. If the bus out check bit is set, the invalid function bit will not be set for a function transfer.
3	Equipment check	This bit indicates an equipment fault and is set whenever bit 0, 1, or 5 of sense data byte 4 is set.
4	Data check	This bit indicates a fault in data and is set whenever bit 0 of sense data byte 1 is set, or bit 0, 1, 2, 3, or 4 of sense data byte 3 is set.

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UNISERVO VI-C Magnetic Tape Subsystem (cont)

Bit Position	Bit Designation	Definition
		Sense Data Byte 0 (cont)
5	Data late	This bit is set if service is requested on the interface lines but data cannot be transferred because of a late SERVICE OUT signal from the multiplexer channel. This bit is not set for the sense function.
6	Word count zero	This bit is set if during a write operation a data transfer is prevented when the first data byte is requested. No tape motion occurs when this condition is detected.
7	Data converter check	This bit, together with the unit check bit, (of the status bytes) indicates the number of bytes read during data conversion (where the data conversion feature is present) was incorrect.
		Sense Data Byte 1
0	Noise	For a write or write-tape-mark operation, an unsuccessful write occurred. because data (or electrical noise) was detected in the area allotted to the interblock gap. For a write or tape mark operation a tape fault occurred. In this case, the noise bit will be accompanied by the tape fault bit in sense data byte 4.
		For a read, read-backward, forward-space-block, or backspace-block operation, this bit indicates that data was detected in the interblock gap. Data after the longitudinal parity character turns on the noise bit and maintains tape motion but is not transferred. This condition may also be caused by a "dropout" of data in the block, causing false detection of longitudinal parity character. Such a dropout can be caused by bad tape (for example, wrinkled tape). This indication can usually be ignored on a space operation. If noise is detected after a true longitudinal parity character, successful completion of the operation is indicated; however, in most cases, the longitudinal parity error bit (sense data byte 3) will be set. Note that the dropout of two identical frames cannot be detected by the longitudinal parity character.
1	Tape unit status A	This bit indicates that the tape unit is selected and ready. If this bit is not set, the settings of bits 3—6 in sense data byte 1 are unreliable.
2	Tape unit status B	This bit indicates that the tape unit is rewinding, not ready, or under control of the other control unit.
3	7-Track	This bit indicates that the selected tape unit is a 7-track unit.
4	Load point	This bit indicates that the selected unit is positioned at load point. NOTE: 　Reading backward over the first block on a tape will not put the tape at load point.
5	End-of-tape	This bit indicates that the selected unit is positioned in the end-of-tape area.
6	File protect	This bit indicates that the tape on the selected unit does not have a write enable ring installed.

UNISERVO VI-C Magnetic Tape Subsystem (cont)

Bit Position	Bit Designation	Definition
		Sense Data Byte 1 (cont)
7	Tape handler busy	This bit is not used and is always a 0 bit.
		Sense Data Byte 2
		Sense data byte 2 is not used. Positions 0—5 always contain 0 bits; positions 6 and 7 always contain 1 bits.
		Sense Data Byte 3
0	READ VP error	A vertical parity (VP) error is detected on a cyclic redundancy check character (9-track only) or on a data character during a read or read-backward operation. The data late bit in sense data byte 0 (if set) will inhibit setting of this bit for the parity error condition. Data was not detected at the read head within 10 milliseconds after data recording commenced for a write or write-tape-mark operation.
1	Read LP error	This bit indicates that a longitudinal parity error was detected during a read or read backward operation, or during the automatic readback for a write or write-tape-mark operation.

2	Skew	This bit indicates that excessive skew was detected during the automatic readback for a write or write-tape-mark operation.
3	CRC read error	9-track only. This bit indicates that the cyclic redundancy character (CRC) calculated during a read operation is not the same as the stored CRC.
4	Write VP error	This bit indicates detection of a vertical parity (VP) error in a data frame or the CRC in the automatic readback during a write or write-tape-mark operation.
5		This bit is not used and is always a 0 bit.
6	Backward	Bit 6. Backward. This bit indicates that the selected unit is in a backward condition.
7		Bit 7. This bit is not used and is always a 0 bit.
		Sense Data Byte 4
0	Runaway check	During a write or write-tape-mark operation, no data was detected under the read head in the automatic readback within 10 milliseconds after writing commenced. During any read operation, no data was detected within 20 seconds.
1	Tape motion fault	The tape unit failed to respond to a START command. Tape motion may or may not have occurred. Tape motion stopped independently of the control unit during an operation requiring movement. The equipment check bit (sense data byte 0) will also be set. (This condition will occur if a backward operation extends motion into load point.)

Bit Position	Bit Designation	Definition
		Sense Data Byte 4 (cont)
2, 3, 4		Always zero and reserved for the failure finding mode using by maintenance personnel.
5	Stall	This bit indicates that the control unit is "hung-up" for more than 20 seconds. The unit check bit is set and the channel terminates the operation by initiating a status request.
6	Tape fault	This bit indicates that during a write or write-tape-mark operation an interblock gap was detected sooner than expected. This false end-of-block may be due to a loss of data for more than 800 microseconds (if this is the case, a backspace may not reposition the tape to the beginning of the written block).
7		Always zero and reserved for the failure finding mode used by maintenance personnel.