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83-010 HOW TO USE DISK ERROR INFORMATION

There are no error log MAPs for the 62EH disk. However, MAP 8301 is the error log MAP for the 62PC disk. Use the following error log descriptions to isolate disk failures.

Four sets of disk MAPs (two for 62EH and two for 62PC) have been supplied to aid in diagnosing solid and intermittent hardware failures. MAP 0101 (system entry) is the entry point for solid failures; MAP 0967 (62EH) and MAP 1058 (62PC) are the entry points for intermittent failures. MAP 0901 (62EH) and MAP 1001 (62PC) are device exercisers that test all parts of the disk. These tests are performed only once and may not be effective for diagnosing intermittent failures.

MAP 0967 (62EH) and MAP 1058 (62PC) give a set of exercisers that are repeated until a failure occurs. The status from the failure indicates the failing unit. These MAPs are used to diagnose intermittent disk failures.

The error recording analysis procedure information can also be used to diagnose failures. Paragraphs 83-311 to 83-387 (62EH) and paragraphs 83-811 to 83-881 (62PC) of this manual describe what each status bit in the disk error recording means and which circuit parts could cause the problem. The *Theory-Diagrams Manual* also contains a detailed description of the check circuits that generate the status bits. See the *Theory-Diagrams Manual* to identify all parts of the circuits in the failing area.

Because the error recording information is stored on the disk, only the intermittent errors are stored. Solid errors will cause the system not to CSIPL or cause a processor check when a program is run. In the case of a processor check, Appendix G of the *Data Area and Diagnostic Aids Manual* describes the procedure for displaying and decoding the error information stored in the work registers.

For systems that have two 62EH drives, if both drives fail in a similar way, the problem is not in either disk enclosure. An exception is when one drive has a brake failure. Then AC power is removed from both drives.

For systems that have more than one 62PC drive, if all drives fail in a similar way, the problem is not in any of the disk enclosures. An exception is when one drive has a brake failure. If either drive A or B has a brake failure, then AC power is removed from both drives A and B (but not drives C and D). If either drive C or D has a brake failure, then AC power is removed from both drives C and D (but not drives A and B).

Note: On 62EH systems, both disk drives and attachments are the same and all parts can be swapped (see paragraph 09-150). On 62PC systems, all disk drives are the same and all parts can be swapped but there is only one attachment.

CAUTION

If the disk drives are swapped, customer data can be destroyed.

Electrical noise problems may come from inside the System/34 or from external sources. Noise usually causes various types of checks. See paragraph 80-200 for checks and adjustments to aid in preventing ESD (electrostatic discharge).

**83-050 I/O COUNTER TABLE
FOR 62EH**

I/O COUNTER TABLE FOR DISK DRIVE A (OR B)

DATE LAST RESET	78/02/12
VERIFIES	115654
WRITES	114740
READS OR SCAN READS	1051585
NONZERO SEEKS	533972

83-100 ERROR COUNTER TABLE FOR 62EH

The error counter table logs all temporary and permanent errors. A temporary error is described in paragraph 83-110, and a permanent error is described in paragraph 83-120.

ERROR COUNTER TABLE FOR DISK DRIVE A (OR B)	DATE LAST RESET 08/30/77		DESCRIPTION MAP	
	TEMPORARY	PERMANENT		
DISK NOT READY CHECKS	0	0	83-311	0922
SECTOR SYNC CHECKS	0	0	83-315	0950
OFF-TRACK CHECKS	10	0	83-317	0955
CYCLIC REDUNDANCY CHECKS	0	0	83-319	0950
DBO PARITY CHECKS	0	0	83-321	0904
WRITE DATA ECHO CHECKS	0	0	83-323	0950
CYCLE STEAL OVERRUNS	0	0	83-325	0950
DATA UNSAFE CHECKS	0	0	83-329	0940
NOT VALID SEEK ADDRESS CHECKS ..	0	0	83-331	0955
ATTACHMENT EQUIPMENT CHECKS	12	0	83-333	0936
NO RECORDS FOUND	4	0	83-335	NONE
SEEK CHECKS	2	0	83-341	0928
SERDES CHECKS	0	0	83-343	0950
WRITE CHECKS	0	0	83-345	0940
CHANNEL TRANSFER CHECKS	0	0	83-347	0905
PLO OUT OF SYNC CHECKS	0	0	83-349	0922
INTERRUPT TIMEOUT CHECKS	2	0	83-351	0939
SECTOR CHECKS	0	0	83-357	0938
SELECT UNSAFE CHECKS	0	0	83-361	0940
WRITE UNSAFE CHECKS	0	0	83-363	0940
BRAKE FAILURE CHECKS	0	0	83-365	0910
SERVO UNSAFE CHECKS	0	0	83-367	0940
NOT VALID I/O BUFFER ADDRESS ...	0	0	83-375	0905

83-110 Temporary Error for 62EH

When an error occurs on an operation, the disk microcode clears the error and starts the operation again. The operation can be started up to 16 times and if the operation completes without error in less than 16 attempts, a temporary error is written in the log.

83-120 Permanent Error for 62EH

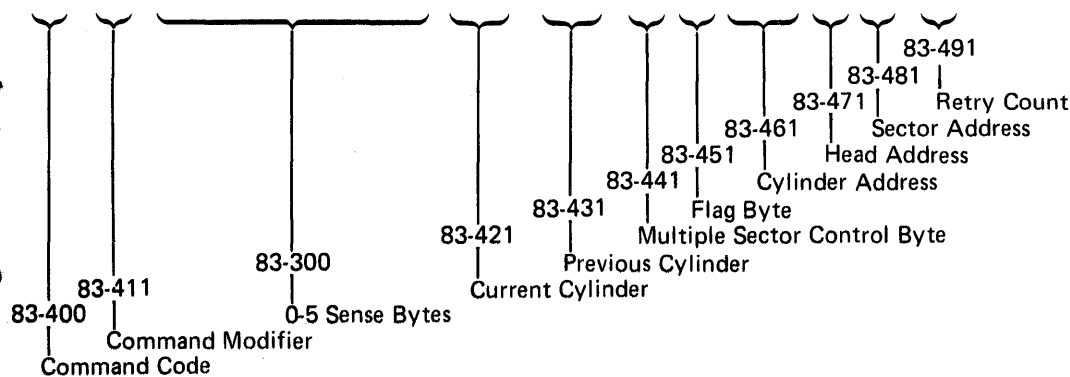
When an error occurs on an operation, the disk microcode clears the error and starts the operation again. The operation can be started up to 16 times but if the operation does not complete without error in less than 16 attempts, a permanent error is written in the log.

Most 62EH permanent errors cause an operator message to be displayed and/or an end of the job that started the operation, or the permanent errors cause a system check halt. However, a permanent CRC check or a no record found check on a write data operation will not cause either of these conditions. Instead, an alternative sector is assigned, and the error is written in ERAP.

83-200 ERROR HISTORY INFORMATION FOR 62EH

ERROR HISTORY TABLE FOR DISK DRIVE A(OR B)

COMMAND CODE	MDR	SENSE BYTES	CUR CYL	PREV CYL	CONTROL FIELD	RETRY COUNT	DATE	TIME					
0	1	2	3	4	5	N	F	C	C	H	S	YY/MM/DD	HH:MM:SS
A2	04	10 16 02 81 01 00	012C	0000	3F 00 01 2C 02 37	10	76/11/16	00 01 18					
A2	04	10 16 02 81 01 00	012C	0000	3F 00 01 2C 02 37	10	76/11/16	00 01 18					
A2	04	10 16 02 81 01 00	012C	0000	3F 00 01 2C 02 37	10	76/11/15	00 00 43					
A2	04	10 16 02 81 01 00	012C	0000	3F 00 01 2C 02 37	10	76/11/15	00 00 43					



83-300 DISK SENSE BYTES FOR 62EH

Byte	Bit	Description	Section
0	0	Disk not ready check	83-311
	1	Alternative sector processing	83-313
	2	Sector sync check	83-315
	3	Off track check	83-317
	4	Cyclic redundancy check	83-319
	5	DBO parity check	83-321
	6	Write data echo check	83-323
	7	Cycle steal overruns	83-325
1	0	No operation	83-327
	1	Data unsafe check	83-329
	2	Not valid seek address	83-331
	3	Attachment equipment check	83-333
	4	No records found	83-335
	5	Scan equal hit	83-337
	6	Scan not hit	83-339
	7	Seek check	83-341
2	0	SERDES check	83-343
	1	Write check	83-345
	2	Channel transfer check	83-347
	3	Phase lock oscillator (PLO) out of sync check	83-349
	4	Interrupt time-out check	83-351
	5	Behind home	83-353
	6	ID orientation correct	83-355
	7	Sector check	83-357
3	0	Second drive installed	83-359
	1	Select unsafe check	83-361
	2	Write unsafe check	83-363
	3	Brake failure check	83-365
	4	Servo unsafe check	83-367
	5	Not used	
	6	Not used	
	7	Disk storage size indicator	83-373
4	0	Not valid I/O buffer address check	83-375
	1-5	Not used	
	6, 7	Head select sense bits	83-387
5		Not used	

83-311 Disk Not Ready Checks (DNRDY)

Disk not ready checks indicate the drive is either:

- Not up to speed (speed not ok)
- Failed to recalibrate after the first power up
- Unsafe
- Has a motor or brake failure

Disk not ready checks are reset when the problem is cleared.

Disk not ready checks are part of unit check condition and can occur during any operation. When disk not ready occurs, check the following items:

- When two speed pulses from the speed transducer are over 35 milliseconds apart, disk not ready is indicated. Parts in this circuit are the speed transducer, the D-W1A1 cable to the gate and the A2C4 and A2D2 attachments cards.
- Any unsafe condition causes disk not ready. Repair the indicated unsafe condition to solve this problem.
- The card interlock causes an unsafe condition which will cause disk not ready. An intermittent problem or noise on this line will be set as not ready but *not* set as unsafe.
- Brake failures cause disk not ready. Loose connections in the brake circuit can cause intermittent brake failures which will be set as disk not ready but not as brake failures. However, overcurrent in the brake circuit is set as a brake failure. Parts in this circuit are the DC cable from the power supply to the gate, the DC voltage connectors on the gate, the D-W1A1 cable to the gate, connections to the brake on the file, brake, C4, and D2 attachment cards.
- Several types of intermittent problems in the disk enclosure and servo circuits can cause not ready to be indicated after power up. Check the access speed adjustment (paragraph 09-140) and reseat cards and cables. Use MAP 0967 to diagnose this type of problem.

83-313 Alternative Sector Processing (ALSP)

This sense bit is turned on when the error occurred during the processing of an alternative sector.

83-315 Sector Sync Check (SSCK)

This check indicates that the sync byte was not written correctly or that the attachment did not synchronize to the data. If the sector sync check occurs without cyclic redundancy checks, either the sync byte was not written correctly and the disk should be initialized, or attachment card F2 is failing. After you exchange the F2 card, it may be necessary to initialize the disk.

When both sector sync checks and cyclic redundancy checks occur together, the problem is usually that the hardware is not in sync with the data. See paragraph 83-319 for repair action.

When sector sync checks and sector checks occur together, the problem is usually that the disk needs to be initialized or that a read or scan command was sent to a sector that has an ID written in the wrong position. The only way to determine if an ID is written in the wrong position is to use an oscilloscope to observe the standardized read data.

83-317 Off Track Check (OTCK)

This check indicates that the access arm moved off track during a read, write, or scan operation. Parts in this circuit are the disk enclosure, D-W1A1 cable to the gate, D-W1B1 cable to the gate, B2, B4, C4, D2, and G2 attachment cards.

The most common cause of off track checks are the B2 card or electrical noise.

83-319 Cyclic Redundancy Check (CRC)

The cyclic redundancy check is used to ensure that the data was read correctly from the disk. Many problems that occur while writing or reading the data will cause cyclic redundancy checks.

Cyclic redundancy checks occur when the hardware does not synchronize to the data correctly, when a data bit is wrong, or when reading data that was not written correctly. (Data not written correctly will always cause a check on the same sector.)

The most common causes of cyclic redundancy checks are electrical noise or a failing C2 or F2 attachment card. Other parts in the circuit are the disk enclosure, D-W1B3 card, D-W1A5 card, and D-W1B6 cable.

After repairing the system it may be necessary to initialize the disk.

83-321 DBO Parity Check (PPCK)

This check indicates that bad parity was sensed on the data bus out during cycle steal operations. Reseat the channel crossover cables, reseat the F2 attachment card, or exchange the card and cables.

83-323 Write Data Echo Check

During write operations, this check verifies the operation of the data separator by comparing the write data to read data generated by the data separator. The F2 and C2 cards and the D-W1B6 cable are in this circuit.

83-325 Cycle Steal Overrun (OVRN)

This check ensures the correct number of bytes are sent during cycle steal operations. If both files in a two-drive machine are getting overrun checks, the problem is in the control processor. If only one drive is getting checks, the problem may be loose cards, loose crossover cables, or bad parts. Attachment card F2 or control processor cards can cause this check.

Problems in the disk data channel can also cause intermittent overruns.

83-327 No Operation (NO-OP)

This status bit is set on by microcode if a command is sent when the file is not ready.

83-329 Data Unsafe Check (DUNSF)

Data unsafe is an OR of select unsafe, write unsafe, servo unsafe, or card interlock open. Correct the indicated unsafe condition or, if no other unsafe conditions are indicated, correct the card interlock problem by reseating the cards and cables. See FSL page GV230 for point-to-point wiring in the interlock circuit.

83-331 Not Valid Seek Address Check (INVSK)

This check is set by hardware. The attachment counts the on track pulses to check the position of the access arm. When a seek is made to a track beyond the installed storage size, the check is set. The most probable cause of this check is extra on track pulses. These can be caused by noise, access speed adjustment, or hardware problems.

To repair, perform the access speed adjustment described in paragraph 09-140. Any part in the attachment or the disk drive can cause intermittent checks.

83-333 Attachment Equipment Check

This check is an OR of several other checks. In most cases another check will be indicated with attachment equipment check. The other checks indicate the type of failure occurring.

When only attachment equipment check is on, one of the two following conditions was sensed by the microcode:

- The number of cycle steals was not correct during a read data or write data command (the F2 attachment card is indicated).
- During a read identifier, write identifier, or read data diagnostic command, an extra index pulse occurred (the E2 attachment card is indicated by this condition).

83-335 No Record Found (NRF)

This is a microcode check flag and has no associated hardware.

No record found is normally set to indicate that some hardware check occurred and prevented the read ID of a sector.

No record found set with no other checks indicates the following errors:

- A read data operation could not find a good primary sector during three consecutive index pulses. This could have been caused by a hardware failure when reading the sector ID.
- Alternative sector processing (\$ALT) is started and a Read ID is made of the sector to see if it is a bad primary. If the sector does not read as a bad primary, then no record found condition is set and the operation is terminated. Any other error flags are reset and the only indicator is no record found.
- If a bad primary sector was found by alternative sector processing, the alternative sector must be searched for on the alternative sector track. If the alternative sector is not found during one revolution of the disk, then no record found will be set. Any other error indicators will be reset. No record found and alternative sector processing will be the only indicators. This could be caused by an earlier operation that failed to correctly assign an alternative sector.

In any of the preceding examples, use of the disk analyze program will describe the problem.

83-337 Scan Equal Hit (SEHT)

This is a status bit which is normally on. It is used during scan read operations to describe the type of scan hit.

83-339 Scan Not Hit

This is a status bit which is normally on. It is used during scan read operations to indicate scan hit conditions.

83-341 Seek Check

This check bit is set by microcode when a check occurs during a seek operation. The other indicated checks should be used to diagnose the failure.

83-343 Serializer-Deserializer (SERDES) Check

The SERDES (serializer-deserializer) check circuit is used to verify the operation of the F2 card. This check is set when the F2 card is bad or when bad parity is received on the data bus out during cycle steals.

Data bus out parity problems may be corrected by reseating the channel crossover cables.

83-345 Write Check

This check is set when write current is sensed and it should not be on, or when there is no write current when it should be on. Write unsafe should be set concurrently. If write unsafe is not set, exchange the F2 card. Other cards in the circuit are D-W1B3, cable from D-W1B5 to the gate, C2 and D2 cards.

83-347 Channel Transfer Check

This check indicates a data bus in parity check occurred on a cycle steal operation. Parts in the circuit are the F2 card, the channel, and the control processor.

83-349 Phase Lock Oscillator (PLO) Out of Sync Check

This check indicates a problem occurred in the servo system. Noise is the usual cause of intermittent phase lock oscillator out of sync checks. Usually off track checks and sector checks will occur intermittently with the phase lock oscillator out of sync check. Parts in this circuit are the B2, D2, B4, and C4 attachment cards, the D-W1A1 and D-W1B1 cables, and the disk enclosure.

83-351 Interrupt Time-out (ITO) Check

This check occurs when there is no response to an enabled interrupt. The four interrupts that can cause interrupt time-out checks are:

- Data operation end
- Sector pulse
- Index pulse
- Seek operation end

Interrupt time-out check is generated on the E2 card. Other parts include all cards and cables in the servo channel and read channel. Change the D2 and G2 cards first. Also, extra pulses on the 1-second clock line will cause this check.

83-353 Behind Home

This is a status bit that indicates the access arm is in the landing zone. When the access arm is in the landing zone the system must be powered down to recover.

This problem can be caused by seek problems or noise. Use MAP 0928 to diagnose seek problems.

83-355 ID Orientation Correct

This status bit is useful to determine if the recorded check occurred during the ID field or data field during any read, write, or scan operation. If this bit is on, the check occurred during the data field. If the bit is off, the check occurred during the ID field.

83-357 Sector Check

This check can be caused by either of two error conditions:

- Any two sector or index pulses were not 300 bytes apart.
- During a read, write, or scan operation the hardware did not cycle through the complete sector correctly before sensing a sector or index pulse.

The usual cause of this check is extra sector or index pulses caused by noise. However, if the disk is not initialized correctly, a sector check will always occur on the same sector.

Other causes may be a failure on the servo track, B2, D2, E2, and F2 attachment cards.

83-359 Second Drive Installed

This status bit is turned on or off by a feature wire on the F2J12 attachment card pin. Jumper on = bit off = 1 disk drive installed. Jumper off = bit on = 2 disk drives installed.

83-361 Select Unsafe Check

Select unsafe causes data unsafe and disk not ready. It is caused by more than one head being selected during a write operation. Parts of this circuit include the D-W1B3 card, D-W1B5 cable, G2, and D2 attachment cards.

83-363 Write Unsafe Check

This check causes data unsafe and disk not ready. It has two causes:

1. On a write operation, no current is sensed from the write driver.
2. Write current is sensed when write is not selected.

Parts of this circuit are the D-W1B5 cable, D-W1B3 card, G2, and D2 attachment cards. Failure 1 is usually caused by no heads being selected because of a loose cable. Failure 2 is usually caused by a damaged W1B3 card.

83-365 Brake Failure Check

This check occurs when an overcurrent or undercurrent is sensed in the brake circuit. This check causes AC power to drop to both drives.

The overcurrent condition causes a latch to set giving a permanent error. To recover, the system must be powered down. The undercurrent condition is not set.

The most common cause is loose cable D-W1A1 to A-A2A4 on the gate or loose voltage connections from the power supply to the input/output board. Also, card C4 of the I/O boards may be failing.

83-367 Servo Unsafe Check

This check causes data unsafe and disk not ready. Servo unsafe is set when either the phase lock oscillator is out of sync or the off track check is set and a write operation is performing. See paragraph 83-349 *Phase Lock Oscillator Out of Sync* or paragraph 83-317 *Off Track Check*.

83-373 Disk Storage Size Indicator

This status bit is turned on or off by a feature wire on the F2P07 attachment card pin. Jumper on = bit off = 9 megabyte. Jumper off = bit on = 13 or 27 megabyte.

83-375 Not Valid I/O Buffer Address Check

This check is a latch on the E2 attachment card that is controlled by microcode. It is set on when the microcode sends an address that is not valid for the data buffer area in storage.

83-387 Head Select Sense Bits

These two bits indicate which head is in use.

Bit 6	Bit 7	Head in Use
0	0	2 ¹
0	1	2
1	0	1
1	1	0

¹This combination is not valid but does select head 2.

83-390 Byte 5

Sense byte 5 is not used.

6-7 Modifier bits. Describes disk start input/output command functions.

83-400 COMMAND CODE FOR 62EH

Bits 0 through 3 are always 1010 (hex A) indicating a disk operation. The other bits describe the operation as follows:

		Bits			
		4	5	6	7
Control	Seek	0	0	0	0
Commands	Recalibrate	0	0	0	0
Read	Data	0	0	0	1
Commands	ID	0	0	0	1
	Diagnostic	0	0	0	1
	Verify	0	0	0	1
Write	Data	0	0	1	0
Commands	ID	0	0	1	0
Scan Read	Equal	0	0	1	1
Commands	Low or Equal	0	0	1	1
	High or Equal	0	0	1	1

		Bits	
		6	7
Control	Seek	0	0
Commands	Recalibrate	0	1
Read	Data	0	0
Commands	ID	0	1
	Diagnostic	1	0
	Verify	1	1
Write	Data	0	0
Commands	ID	0	1
Scan Read	Equal	0	0
Commands	Low or Equal	0	1
	High or Equal	1	0

83-411 COMMAND MODIFIER (MDR) FOR 62EH

The bits of the command modifier mean:

Bit	Description
0	Data field repeat control. Causes the disk data field address to be returned to the first value after each sector is operated on; for example, operate for N+1 sectors on the same disk data field address.
1-3	Not assigned
4	Fast sync extend control. Must be used with disk start input/output read ID and write ID commands to read or write a skewed ID field.
5	Control storage address select. Causes the disk data field address to point to control storage.

83-421 CURRENT CYLINDER ADDRESS (CUR CYL) FOR 62EH

The CUR CYL (current cylinder address) is the hexadecimal address of the cylinder the error written in the log occurred on.

83-431 PREVIOUS CYLINDER ADDRESS (PREV CYL) FOR 62EH

The PREV CYL (previous cylinder address) is the hexadecimal address of the cylinder that was used before the current cylinder.

83-441 MULTIPLE SECTOR CONTROL BYTE (N) FOR 62EH

This byte controls the number of sectors operated on by the command. For any read, write, scan, or verify, the number of sectors operated on is one more than the multiple sector control byte. If all sectors have been completed, this byte will be hexadecimal FF. If an error occurs, this byte is the number of sectors left to be completed.

83-451 FLAG BYTE (F) FOR 62EH

Used to identify or flag a given sector status. All flag bits are needed for F-byte orientations.

Bits	Description
1-4	Not assigned
5	Data field may contain bad data flag bit used by the alternative sector assignment routine to flag data that could not be recovered error free.
6-7	Sector condition bits, assigned meaning: 00-good primary sector 10-failing primary sector 01-good alternative sector 11-failing alternative sector

83-461 CYLINDER ADDRESS (CC) FOR 62EH

The CC (cylinder address) is a two-byte hexadecimal address. Valid cylinder addresses are:

Storage Size (Megabytes)	Valid Cylinder Addresses
8.6	000 - 202 or hex 00 to C9
13.2	000 - 302 or hex 00 to 12E

83-471 HEAD ADDRESS (H) FOR 62EH

The H (head address) is a single byte hexadecimal address needed by all start input/output commands to address the desired head. An attempt to execute a data operation with a head address that is not valid sets no record found status. Valid heads are 0, 1, and 2.

83-481 SECTOR ADDRESS (S) FOR 62EH

The S (sector address) is a single byte hexadecimal address used to address one of sixty sectors per track.

Logical sector address arrangement starts at index (X) and is skewed by 2 sectors for each head.

Head 0	X,00,30,01,31.....,58,29,59
Head 1	X,29,59,00,30.....,57,28,58
Head 2	X,28,58,29,59.....,56,27,57

No record found check is set if a logical sector address cannot be found.

83-491 RETRY COUNT FOR 62EH

This field records the number of times this entry was attempted.

83-550 I/O COUNTER TABLE FOR 62PC

I/O COUNTER TABLE FOR DISK DRIVE A (B, C, OR D)

```

DATE LAST RESET      00/00/00

VERIFIES .....      296878
WRITES .....         296887
READS OR SCAN READS  296075
NONZERO SEEKS .....  592962
    
```

83-600 ERROR COUNTER TABLE FOR 62PC

The error counter table logs all temporary and permanent errors. A temporary error is described in paragraph 83-610, and a permanent error is described in paragraph 83-620.

ERROR COUNTER TABLE FOR DISK DRIVE A (B, C, OR D)	DATE LAST RESET		DESCRIPTION
	TEMPORARY	PERMANENT	
ADAPTER CHECKS	0	0	83-811
CHANNEL OVERRUN CHECKS	0	0	83-813
TAG PARITY CHECKS	0	0	83-817
CA DATA BUS PARITY CHECKS	0	0	83-819
FORCED END OPERATIONS	0	0	83-835
BRAKE APPLIED CHECKS	0	0	83-843
TRACK UNAVAILABLE CHECKS	0	0	83-845
COMMAND CHECKS	0	0	83-847
DATA UNSAFE CHECKS	0	0	83-849
SEEK INCOMPLETE CHECKS	0	0	83-851
DISK NOT READY CHECKS	0	0	83-855
CYCLIC REDUNDANCY CHECKS	0	1	83-857
COMMON ADAPTER PARITY CHECKS ...	0	0	83-859
CHANNEL INTERFACE PARITY CHECKS.	0	0	83-861
WRITE GATE RETURN CHECKS	0	0	83-863
NO RECORDS FOUND	0	0	83-865
NOT VALID COMMAND PARAMETER CHKS	0	0	83-867
MISSING SECTOR PULSE CHECKS	0	0	83-869
TIMEDOUT CHECKS	0	0	83-871
DISK NOT ATTACHED CHECKS	0	0	83-873
NOT VALID I/O BUFFER ADDRESS CHK	0	0	83-875
62PC INTERFACE ERRORS	0	0	83-881

83-610 Temporary Error for 62PC

When an error occurs on an operation, the disk microcode clears the error and starts the operation again. The operation can be started up to 16 times; if the operation completes without error in less than 16 attempts, a temporary error is written in the log.

83-620 Permanent Error for 62PC

When an error occurs on an operation, the disk microcode clears the error and starts the operation again. The operation can be started up to 16 times; however, if the operation does not complete without error in less than 16 attempts, a permanent error is written in the log.

Most 62PC permanent errors cause an operator message to be displayed and/or an end of the job that started the operation, or the permanent errors cause a system check halt. However, a permanent CRC check or a no record found check on a write data operation will not cause either of these conditions. Instead, an alternative sector is assigned, and the error is written in ERAP. In addition, the data is written on the alternative sector, and the operation continues.

The following occurs when a permanent CRC check occurs on a read data operation:

- An alternative sector is always assigned after the first 16 attempts to read, and a permanent error is always written in ERAP.
- An additional 256 attempts are made to read the data.
- If the data is read without error in less than the 256 attempts, no operator message is posted; the data is moved to the alternative sector, and the operation continues.
- If the data is not read without error in less than the 256 attempts, the operation ends, and an operator message is posted.

83-700 ERROR HISTORY INFORMATION FOR 62PC

ERROR HISTORY TABLE FOR DISK DRIVE A (B, C, OR D)

COMMAND	SENSE BYTES					DISK	CUR	PREV	CONTROL FIELD					RETRY	DATE	TIME			
CODE	MDR	0	1	2	3	4	5	STATUS	CYL	CYL	N	F	C	C	H	S	COUNT	DATE	TIME
..... HEX																	YYMMDD	HMMSS	
A1	00	00	85	03	01	00	01	000000	FFFF	0000	00	00	01	63	00	00	10	780725	000003

Diagram showing error codes mapped to fields:

- 83-900 points to COMMAND
- 83-911 points to MDR
- 83-800 spans SENSE BYTES 0-5
- 83-912 points to STATUS
- 83-921 points to CUR CYL
- 83-931 points to PREV CYL
- 83-941 points to CONTROL FIELD N
- 83-951 points to CONTROL FIELD F
- 83-961 points to CONTROL FIELD C
- 83-971 points to CONTROL FIELD C
- 83-981 points to CONTROL FIELD H
- 83-991 points to CONTROL FIELD S

83-800 DISK SENSE BYTES FOR 62PC

Byte	Bit	Description	Paragraph
0	0	Adapter check	83-811
	1	Channel overrun check	83-813
	2	Parallel DBO parity check	83-815
0	3	Tag parity check	83-817
	4	CA data bus parity check	83-819
	5	Inbound interface error	83-821
	6-7	Not used	
	0	End of operation	83-823
	1	End of track	83-825
	2	Data operation ready	83-827
1	3	Not used	
	4	Scan argument transfer complete	83-829
	5	Any error	83-831
	6-7	File select bits 2 and 1	83-833
	0	Not used	
	1	Forced end operation	83-835
2	2	Read/write/scan busy	83-837
	3	Alternative sector processing	83-839
	4	Not used	
	5-7	File configuration	83-841
	0	Not used but always 1	
	1	Brake applied	83-843
	2	Track unavailable	83-845
3	3	Command error	83-847
	4	Data unsafe	83-849
	5	Seek incomplete	83-851
	6	Home	83-853
	7	Disk not ready	83-855

Byte	Bit	Description	Paragraph
	0	Cyclic redundancy check (CRC)	83-857
	1	Common adapter parity check	83-859
	2	Channel interface parity check	83-861
4	3	Write gate return check	83-863
	4	No record found	83-865
	5	Not valid command parameter	83-867
	6	Missing sector pulse check	83-869
	7	Time-out check	83-871
	0	Disk not attached	83-873
	1	Not valid I/O buffer address	83-875
5	2-4	Not used	
	5	Scan equal hit	83-877
	6	Scan not hit	83-879
	7	62PC interface error	83-881

83-811 Adapter Check

This check is the OR of several other checks. The other checks indicate the type of failure. The conditions that set adapter check are:

- Channel overrun check
- Parallel DBO parity check
- Tag parity check
- CA data bus parity check
- Inbound interface error

83-813 Channel Overrun Check

This check indicates that the data rate was not maintained during a cycle steal operation. Adapter check is set concurrently. Parts in the circuit are the A-A2C2, A-A2D2, and A-A2E2 cards, the channel, and the control processor.

83-815 Parallel DBO Parity Check

This check indicates that bad parity was sensed on the data bus during an I/O instruction. This check concurrently sets the DBO processor check and should not appear in the error history table. Reseat the channel crossover cables, reseat the A-A2E2 card, or exchange the card and cables.

83-817 Tag Parity Check

This check indicates that bad parity was sensed by the channel adapter on the common adapter tag bus. Reseat the A-A2C2, A-A2D2, and A-A2E2 cards or exchange the A-A2D2 and A-A2E2 cards.

83-819 CA Data Bus Parity Check

This check indicates that bad parity was sensed by the channel adapter on the CA data bus. Reseat the A-A2C2, A-A2D2, and A-A2E2 cards or exchange the cards.

83-821 Inbound Interface Error

This check indicates that bad parity was sensed by the common adapter either on the tag bus or the CA data bus. Reseat the A-A2D2 and A-A2E2 cards or exchange the cards.

83-823 End of Operation

This is a status bit that is normally on. It indicates that the disk attachment has terminated an operation with or without an error.

83-825 End of Track

This is a status bit that is normally off at operation end time. It indicates that the disk hardware has reached the end of track for a read or write operation. This bit is for microcode use only.

83-827 Data Operation Ready

This is a status bit that is normally off at operation end time. It indicates that the disk hardware has completed the seek part of a read/write/scan operation and is ready to start the data transfer. This bit is for microcode use only.

83-829 Scan Argument Transfer Complete

This is a status bit that is normally off at operation end time. It indicates that the disk hardware has received the 256-byte data field into its buffer for a scan operation. This bit is for microcode use only.

83-831 Any Error

This bit indicates that the common adapter has sensed an error during an operation. The conditions that set this error are:

- CRC check
- Write gate return check
- Common adapter parity check
- Channel interface parity check

- No record found
- Missing sector pulse check
- Timeout error
- Not valid command parameters
- Data unsafe
- Disk not ready
- Disk not attached
- Track unavailable
- Command error
- Seek incomplete
- 62PC interface error

These check conditions indicate the type of failure occurring.

83-833 File Select Bits 2 and 1

At operation end time, these status bits indicate the file selected.

	Bit 2	Bit 1
File A	0	0
File B	0	1
File C	1	0
File D	1	1

83-835 Forced End Operation

This bit indicates that the microcode terminated an operation in a way that was not normal because of an error. Some other check condition is set concurrently and indicates the type of failure occurring.

83-837 Read/Write/Scan Busy

This is a status bit that is normally off at operation end time. It indicates the disk hardware is busy executing a read/write/scan operation.

83-839 Alternative Sector Processing

This bit indicates that an alternative sector was used during the operation.

83-841 File Configuration

These are status bits that are normally on at operation end time. They indicate the size of the disk.

- 011 – 65-megabyte file attached
- 100 – Disk not attached

If the status bits indicate that the disk is not attached, it is probably a hardware failure. Check the configuration jumpers on the A-A2D2 card as instructed in paragraph 10-210. Then reseal the A-A2C2, A-A2D2, and A-A2E2 cards or exchange the cards.

83-843 Brake Applied

This bit is set if the brake coil is no longer active. It supplies sense information that the 'brake applied' line was activated. The system must immediately remove AC power from the disk drive motor when the line becomes active.

This line is activated by the PLO going out of synchronization, caused by loss of disk speed because of brake failure, a broken belt, or failure of the servo circuits. Reseat the D2, E2, and F2 cards in the disk card gate or exchange these cards.

83-845 Track Unavailable

This bit indicates that an attempt was made to seek beyond cylinder 359. This check may indicate an error in loading the common adapter or in moving the seek address to the disk. Reseat the A-A2C2 and A-A2D2 cards and the C2 card in the disk card gate.

83-847 Command Error

This check condition is set when the 62PC senses a parity error on either the control bus or the disk tag lines. This problem is generally caused by a loose bus cable. Reseat the A-A2A5 and E-A1A3 cables. Also reseat the following cables (if present) for systems with more than one drive: E-A1A4, E-B1A3, E-B1A4, E-C1A3, E-C1A4, and E-D1A3. The check can also be caused by loose or bad cards. Reseat or exchange the A-A2D2 card and the C2 card in all disk card gates.

83-849 Data Unsafe

Some conditions may occur during read/write operations that may damage customer data. Data unsafe is set by the following conditions:

- Write or read and multiple module selection error
- Write and data servo unsafe
- Write and no write transitions
- Not write and write current detected
- Write and read
- Write and head short circuit to ground indicated
- Write and head selected during a sector pulse or index pulse
- Write and not ready

The parts in the circuit are the A-A2C2 card and the disk enclosure, B2, E2, and F2 cards in the disk card gate.

83-851 Seek Incomplete

This check is set by the disk to indicate that an access attempt failed. It is also set by the common adapter when no interrupt follows an access command. Possible causes of this problem are the actuator card, the disk enclosure, or the D2, E2, and F2 cards in the disk card gate.

83-853 Home

This bit indicates that the read/write heads are in the home position (cylinder 0, head 1 selected). This bit is active only after a recalibrate operation.

83-855 Disk Not Ready

The disk not ready check is set when one of the following conditions occurs:

- The 'brake applied' line is active.
- The 'illegal move' line is active.
- The PLO is out of synchronization.

Use a recalibrate to reset the disk not ready condition except when the 'brake applied' line, which needs a power on cycle, is active.

If a brake applied check occurred with the disk not ready check, see the brake applied check.

If a seek incomplete check occurred with the disk not ready check, see the seek incomplete check.

If the disk not ready check is the only check indicated, reseal or exchange the B2, C2, and D2 cards in the disk card gate.

83-857 Cyclic Redundancy Check (CRC)

The cyclic redundancy check is used to ensure that the data was read correctly from the disk. Many problems that occur while writing or reading the data will cause cyclic redundancy checks.

Cyclic redundancy checks occur when the hardware does not synchronize to the data correctly, when a data bit is wrong, or when reading data that was not written correctly. (Data not written correctly will always cause a permanent check on the same sector.)

The most common cause of a cyclic redundancy check is electrical noise. Parts in the circuit are the disk enclosure, the A-A2C2 card, and the B2 card in the disk card gate.

After repairing the system, it may be necessary to initialize the disk.

83-859 Common Adapter Parity Check

This check indicates that the common adapter sensed wrong parity in its hardware. Reseat the A-A2C2 and A-A2D2 card or exchange the cards.

83-861 Channel Interface Parity Check

This check indicates that wrong parity was sensed on the data bus or tag bus between the common adapter and the channel adapter cards. Reseat the A-A2E2, A-A2D2, and A-A2C2 cards or exchange the A-A2E2 and A-A2D2 cards.

83-863 Write Gate Return Check

This check is set if write current to the disk is not sensed when write gate is on. Reseat the dedicated cable (A-A2A4 for drive A, A-A2Z1 for drive B, A-A2B4 for drive C, or A-A2B5 for drive D). Reseat the A-A2C2 card or the B2 card in the disk card gate.

83-865 No Record Found (NRF)

This check is set when the specified sector could not be found within two index pulses or one full revolution.

No record found is normally set to indicate that some hardware check occurred and prevented an ID hit for a sector. (A permanent NRF usually indicates that an ID was not correctly assigned to a new sector or has been destroyed.)

For temporary NRFs, reseat or exchange the A-A2C2 card and the B2 card in the disk card gate. For permanent NRFs, run disk analyze to locate any bad sectors.

83-867 Not Valid Command Parameters

This check indicates that the common adapter sensed either a not valid command or not valid command parameters. This check generally indicates that the command was not set up correctly. Check the control field in the error history table for not valid command parameters.

83-869 Missing Sector Pulse Check

This check indicates that an index pulse or a sector pulse was not received when expected. The check is set only during a read ID operation, write ID operation, or read diagnostic operation. Failure of the disk D2 or F2 card or a failure on the servo track can cause this check.

83-871 Time-out Check

This error is set by the common adapter if there is no response from the disk in 200 milliseconds or less on a seek operation or in 5 seconds or less on a recalibrate operation. A time-out error is also set if the sequence counter in the common adapter does not advance during a read or write operation, or it is set if the common adapter controller attempts to execute read only storage locations that are not used.

If the error is caused by a time-out of a disk seek or recalibrate operation, the seek incomplete error should be indicated. However, if the seek incomplete error is not indicated, the cause of the problem is probably the A-A2C2 or A-A2D2 card or the disk B2 card.

83-873 Disk Not Attached

This check indicates that the operation sent to the common adapter was for a disk that is not attached, as indicated by the common adapter configuration jumpers. See paragraph 83-841.

83-875 Not Valid I/O Buffer Address

This check indicates that the I/O buffer address was not in the user's area of main storage or that the address did not start on a 8-byte boundary. This check is set by the disk microcode.

83-877 Scan Equal Hit

This is a status bit that is used at operation end time for scan commands. It is used to describe the type of scan hit condition.

83-879 Scan Not Hit

This is a status bit that is used at operation end time for scan commands. It is used to indicate a scan not hit condition.

83-881 62PC Interface Error

This check indicates than an error was sensed by the common adapter on the 62PC interface or a cable continuity check was sensed. It is caused by one of the following errors:

- Bad cable continuity
- Control sample received not set
- Disk interrupt not reset
- Control bus parity check

Reseat the disk cables (A-A2A5, A-A2A4, and A-A2Z1, A-A2B4, and A-A2B5 if present. Also A3, A4, and A5 in the disk card gate), the terminator card (A4 in the disk card gate), the A-A2D2 card, the A-A2C2 card, and C2 in the disk card gate.

83-900 COMMAND CODE FOR 62PC

Bits 0 through 3 are always 1010 (hex A), indicating a disk operation. The other bits describe the operation as follows:

		Bits 4567
Command	Seek	0000
Commands	Recalibrate	0000
Read Commands	Data	0001
	ID	0001
	Diagnostic Verify	0001 0001
Write Commands	Data	0010
	ID	0010
Scan Read Commands	Equal	0011
	Low or Equal	0011
	High or Equal	0011

83-911 COMMAND MODIFIER FOR 62PC

The bits of the command modifier mean:

Bit	Description
0	Data repeat control. Causes a single 256-byte field to be used for the requested operation (valid only for read and write data).
1	Suppress read verify—Inhibits the read verify after a write operation (valid only for write data and write ID).
2	Displaced sector—Indicates that the sector to be operated on is moved one sector from its normal location (valid only for read ID, write ID, or read diagnostic).
3	Not used.
4	Fast sync extend control—Must be used with disk start input/output read ID and write ID command to read or write a skewed ID field.
5	Control storage address select—Causes the disk data field address to point to control storage.
6-7	Modifier bits—Describes disk start input/output command function.

		Bits 6 7	
Control Commands	Seek Recalibrate	0 0 0 1	
Read Commands	Data ID Diagnostic Verify	0 0 0 1 1 0 1 1	
	Write Commands	Data ID	0 0 0 1
	Scan Read Commands	Equal Low or Equal High or Equal	0 0 0 1 1 0

83-912 DISK STATUS FOR 62PC

These status bits are used by the disk MDI MAPs to isolate disk problems.

83-921 CURRENT CYLINDER ADDRESS (CUR CYL) FOR 62PC

The CUR CYL (current cylinder address) is the hexadecimal address of the cylinder that the error written in the log occurred on.

83-931 PREVIOUS CYLINDERS ADDRESS (PREV CYL) FOR 62PC

The PREV CYL (previous cylinder address) is the hexadecimal address of the cylinder that was used before the current cylinder.

83-941 MULTIPLE SECTOR CONTROL BYTE (N) FOR 62PC

This byte controls the number of sectors operated on by the command. For any read, write, scan or verify, the number of sectors operated on is one more than the multiple sector control byte. If all sectors have been completed, this byte will be hexadecimal FF. If an error occurs, this byte is the number of sectors left to be completed.

83-951 FLAG BYTE (F) FOR 62PC

Used to identify or flag sector status.

Bit	Description
0	Alternative record 1 may contain bad data. The bit is used by the alternative sector assignment routine to flag data in data field 1 of the sector that could not be recovered error free.
1	Alternative record 2 may contain bad data. The bit is used by the alternative sector assignment routine to flag data in data field 2 of the sector that could not be recovered error free.
2	User assigned defective sector. This bit is used to flag sectors that have been assigned to a new sector by the alternative sector assignment routine. It will be on in the defective primary sector only.
3	Not used.
4	Displaced sector. This bit is used to flag that a sector is moved by one from its normal location.
5	Sector reassigned to the alternative cylinder. This bit indicates that the sector has been assigned to a new sector. (This bit should be on in both the defective primary sector and the assigned alternative sector.)
6	Manufacturing assigned defective sector. This bit is used to flag sectors that were found defective at the factory.
7	Assigned alternative. This bit is used to flag sectors on the alternative cylinder that have been assigned a new sector number.

83-961 CYLINDER ADDRESS (CC) FOR 62PC

The CC (cylinder address) is a 2-byte hexadecimal address. Valid cylinder addresses are:

000 - 359 or hex 00 to hex 167

83-971 HEAD ADDRESS (H) FOR 62PC

The H (head address) is a single byte hexadecimal address needed by all start input/output commands to address the desired head. An attempt to execute a data operation with a head address that is not valid sets no record found status. Valid heads are hexadecimal 0 through A.

83-981 SECTOR ADDRESS (S) FOR 62PC

The S (sector address) is a single byte hexadecimal address used to address one of the 64 records per track.

Logical record address arrangement starts sequentially at index (X) and is skewed by 16 records for each head.

- Head 0 X,00,01,02,03,.....61,62,63
- Head 1 X,48,49,50,51,.....45,46,47
- Head 2 X,32,33,34,35,.....29,30,31
- Head 3 X,16,17,18,19,.....13,14,15
- Head 4 X,00,01,02,03,.....61,62,63
- Head 5 X,48,49,50,51,.....45,46,47
- Head 6 X,32,33,34,35,.....29,30,31
- Head 7 X,16,17,18,19,.....13,14,15
- Head 8 X,00,01,02,03,.....61,62,63
- Head 9 X,48,49,50,51,.....45,46,47
- Head A X,16,17,18,19,.....13,14,15

No record found check is set if a logical record address cannot be found.

83-991 RETRY COUNT FOR 62PC

This field records the number of times the entry was attempted.