

IBM

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**3380-DE
Maintenance
Reference**

SX 26-1670-0

Preface

The 3380-DE Maintenance Reference was designed to aid the CE to quickly determine the type of problems indicated for a particular symptom code and to be able to plan maintenance calls more effectively.

Other information is given to assist the CE when the 3380-DE maintenance package is not available. This booklet is designed to supplement, not to take the place of, the 3380-DE maintenance package.

First Edition (June 1985)

This reference summary may be updated from time to time; however, the basic documentation is the authoritative source and will be first to reflect changes. Information herein is extracted from the 3380-DE maintenance Library Manuals and maintenance device programs.

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1302



CARD GKNR

P/N 2315246



16DB → ERRORS ?

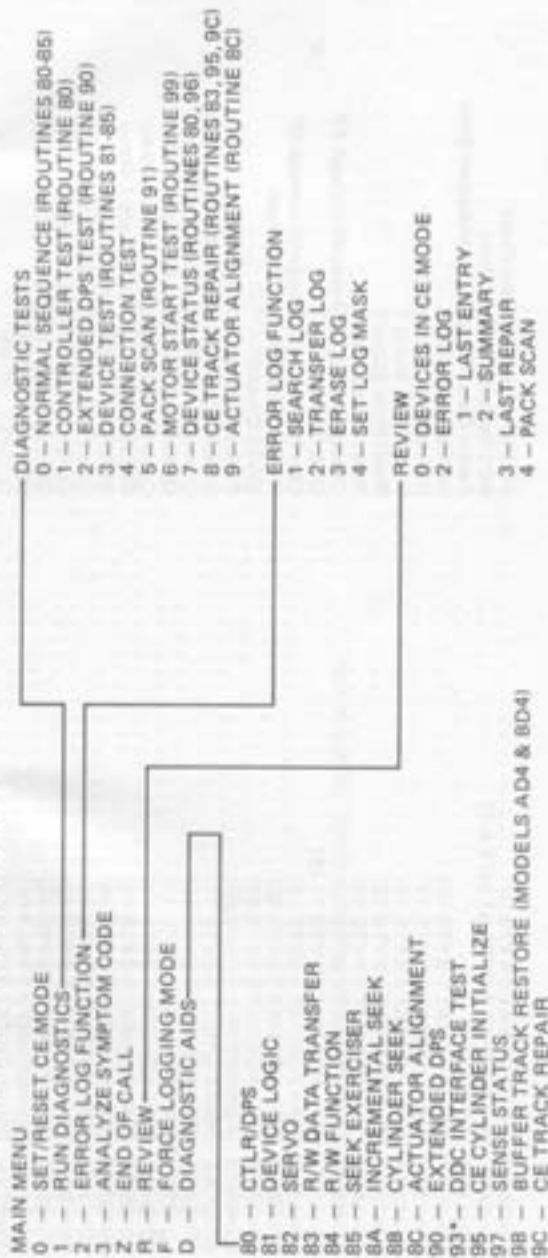
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MD MENU (See PSG Start-1, Entry C)



*Routine 93 should be run from the storage director to check the DDC interface.

Symptom Code Summary

SC-49 XX	(XX= FORMAT 4 BYTE 07)	ECC Uncorrectable Data Check
SC-5X5X	(X= FORMAT 5 BYTE 07 BITS 4-7)	ECC Correctable Data Check
SC-AXXX	(FORMAT 1)	Device Check-2 and Servomechanism Error
SC-A0XX	(XX= FORMAT 1 BYTE 10)	Device Power Status
SC-A1XX	(XX= FORMAT 1 BYTE 11)	Device Check-2 Status 1
SC-A2XX	(XX= FORMAT 1 BYTE 12)	Read/Write Status 1
SC-A3XX	(XX= FORMAT 1 BYTE 13)	Read/Write Status 2
SC-A4XX	(XX= FORMAT 1 BYTE 14)	Read/Write Status 3
SC-A5XX	(XX= FORMAT 1 BYTE 15)	Checkpoint Log - Checks 80 through FF
SC-ACXX	(XX= FORMAT 1 BYTE 11-15)	DDC Hot Bits
SC-ADXX	(XX= FORMAT 1 BYTE 15)	Checkpoint Log - Checks 00 through 5F
SC-AEXX	(XX= FORMAT 1 BYTE 07)	Program Recoverable Data Check
SC-AFXX	(XX= FORMAT 1 BYTE 07)	Device Checks
SC-8XXX	(FORMAT 7)	Controller Check-1 Errors
SC-81XX	(XX= FORMAT 7 BYTE 11)	Connection Check Alert and Power Status
SC-82XX	(XX= FORMAT 7 BYTE 12)	Controller addressed as 0 Check 1 Status
SC-83XX	(XX= FORMAT 7 BYTE 13)	Controller addressed as 0 Check 1 Status
SC-84XX	(XX= FORMAT 7 BYTE 14)	Controller addressed as 1 Check 1 Status
SC-85XX	(XX= FORMAT 7 BYTE 15)	Controller addressed as 1 Check 1 Status
SC-86XX	(XX= FORMAT 7 BYTE 16)	Controller addressed as 0 Register 1F
SC-87XX	(XX= FORMAT 7 BYTE 17)	Controller addressed as 0 Register 1F
SC-88XX	(XX= FORMAT 7 BYTE 18)	Controller addressed as 0 Register 1F
SC-89XX	(XX= FORMAT 7 BYTE 19)	Controller addressed as 1 Register 1F
SC-8E2X	(X= FORMAT 7 BYTE 11)	Controller addressed as 1 Register 1F
SC-8FXY	(X= FORMAT 7 BYTE 10)	CCA and Power Status
BITS 0-3, Y=	FORMAT 7 BITS 4-7)	DTI/XES Register and Format 7 Messages

SC-CXXX	(FORMAT 8)	Controller Check-2 & Device Check-1 Errors
SC-C0XX	(XX= FORMAT 8 BYTE 10)	DTI/XES Register
SC-C1XX	(XX= FORMAT 8 BYTE 11)	Controller Fault Log A
SC-C2XX	(XX= FORMAT 8 BYTE 12)	Controller Fault Log B
SC-C3XX	(XX= FORMAT 8 BYTE 13)	Controller Fault Log C
SC-C5XX	(XX= FORMAT 8 BYTE 15)	Controller Fault Log E
SC-C6XX	(XX= FORMAT 8 BYTE 16)	Register 1D Error
SC-C8XX	(XX= FORMAT 8 BYTE 18)	Controller Fault Log F
SC-C80X	(XX= FORMAT 8 BYTE 13)	Controller Fault Log
BITS 4&5, BYTE	14 BITS 6&7)	
SC-CCXX	(XX= FORMAT 8 BYTES 11	
	12, 13, and 18)	
SC-CDXX	(XX= FORMAT 8 BYTE 09)	DDC Hot bits
SC-CEXX	(XX= FORMAT 8 BYTE 14)	DDC Bus In
SC-CFXX	(XX= FORMAT 8 BYTE 07)	Controller Fault Log D
		Controller Check 2

Note: For further information see ECM manual, SENSE section.

Format 1: Device Check 2's (See ECM Sense)

Bit	Byte 00	Byte 01	Byte 02	Byte 03
Unit Check Description				Cntl Phy ID
0	Command rej	Perm error	Correctable 1st err logged Env data pr	
1	Intervn req	Invl trk fmt		
2	Bus out P-chk	End of cyl	Write op	
3	Equipmnt chk	MSG to oper		
4	Data check	No rod found		
5	Overrun	File protect		
6		Write inhibit		
7				

Bit	Byte 08	Byte 09	Byte 10	Byte 11
DDC Bus Out		DDC Bus In	Power Status	Check-2 Reg
0				
1	Valid only	Valid only	Mtr/DCA ther	Dev seq chk
2	for messages	for messages	No air flow	Svo ctl chk
3	1,4,5,6,8,D,	1,4,5,6,7,D,	Drv seq cplt	RPS check
4	and F.	and F.	Mtr run latch	Chkpt check
5		End op code	Spindle ctl 0	Seq wr bus p
6		for msg 0.	Mtr brk litch	R/W check
7			Spindle ctl 1	Power check
				Funnel pchk

Bit	Byte 16	Byte 17	Note ^{1,3} Byte 18	Byte 19
Cyl/Status		Cyl & Head	R/W Status 4	Dev Status 1
0	Cyl 0-255	Valid cyl	Fru bit 0	Pad in prog
1	Read for msg	and head	Fru bit 1	3380 model E
2	7, A, E,	Addr for msg	Multifunction	Sk inc/Srvo 1
3	expected	7, A, and E.	No function	CK2/SS incomp
4	Status 1 for		AE select	Online
5	Message 1.		Wr mode verify	HDA atten
6			AE status 2	Device busy
7			AE status 1	Locate inrpt

Bit	Byte 04	Byte 05	Byte 06	Byte 07
Device ID		Seek Address		FMT/MSG
0	DPS model	Cyl 128	Cyl 1024	Format 8
1	3380-DE	Cyl 64		Format 4
2	Path fenced	Cyl 32	Cyl 512	Format 2
3		Cyl 16	Cyl 256	Format 1
4	Devaddr 8	Cyl 8	Head 8	Message 8
5	Devaddr 4	Cyl 4	Head 4	Message 4
6	Devaddr 2	Cyl 2	Head 2	Message 2
7	Devaddr 1	Cyl 1	Head 1	Message 1

Bit	Note ¹ Byte 12	Byte 13	Note ² Byte 14	Byte 15
R/W Status 1		R/W Status 2	R/W Status 3	Chkpoint Log
0	Fru bit 0	RW chnl chk	Chk inh chk	See chkpoint log summary
1	Fru bit 1	Pad check	RW chnl pchk	
2	Redundant ck	Sequence chk	RXMT/SEALT	
3	No RW recovry	RW card chk	RW ctl cbl ck	
4	Inh/rst activ	Srvo cbl chk	R/W mode 0	
5	Rd and wr chk	Wrt overrun	R/W mode 1	
6	Head/arm pty	R/W servo		
7	Data Det chk	Har parity		

Bit	Byte 20	Byte 21	Byte 22	Byte 23
Dev Status 2		Stg Dir ID	Symptom Code	
0	Dev log dis			
1	Surge cmlpt			
2	Offset active			
3	Dev mtr off			
4	Logic exchg			
5	Dev Switch dis			
6	Act selected			
7	Seek inc			

Byte 7 Messages for Format 1

- 0 No Message (Byte 9 has End Op Response. See End-Op Code Summary)
- 1 Device Status 1 Not as expected
- 2 Successful Subsystem Recovery of One Type of Correctable Data Check
- 3 Missing Index
- 4 Unresettable Interrupt
- 5 Device Not Responding to Selection
- 6 Device Check 2 or Set Sector Incomplete
- 7 Head Address Mismatch
- 8 Invalid Device Status 1
- 9 Device Not Ready to do Customer Work
- A Physical Address Mismatch while Oriented
- B Missing Device Address Bit at Device Selection Time
- C Drive Motor Switch Off
- D Seek Incomplete
- E Cylinder Address Mismatch
- F Unresettable offset active

Format 1 Notes

- NOTE 1 R/W FRU BITS**
 00 = No Error
 01 = R/W Channel Error
 10 = B-Logic Error
 11 = R/W Data Cable (Read Mode)
- NOTE 2 R/W MODE BITS**
 00 = No R/W Operation on this Device
 01 = Read/Xmit this Device
 10 = Write Gate this Device
 11 = Read Xmit this Device and Write Gate Other Device via Alternate Path
- NOTE 3 AE STATUS BIT DEFINITIONS**
 NOTE: AE status bit 2 & 1 should be active when write mode verify is active.
 IF AE STATUS BIT 2 IS "OFF", THE FOLLOWING COULD EXIST:
 a) Open head select lines
 b) Open write data lines
 c) Defective polecat card
 IF AE STATUS BIT 1 IS "OFF", THE FOLLOWING COULD EXIST:
 a) Open head
 b) Shorted head to gnd
 c) Write transition error
 d) Write current error
 e) Defective polecat card

Checkpoint Log Value Meanings (See ECM Sense)

'XX'² Indicates an alternate meaning depending on the operation.

'XX'-D For diagnostic use only.

'XX'-E Indicates an error condition, all other checkpoints are status conditions. (See error descriptions on ECM pages.)

'XX'-E² Indicates an error condition with an alternate meaning depending on the operation.

'00' Hardware Reset of the Checkpoint
 '01' Reset Complete
 '02' Power Off Complete
 '03' Sequence Test Good
 '04' External Timer Test Good
 '05' Port, Motor, AGC Test Good
 '06' Course Track, Servo Inhibit Test Good
 '07' Not Busy or Not Padding In Progress
 '08' Motor Off With Motor Switch Off
 '09' Check Reset Command Accepted
 '0A' Back to Functional Mode
 '0B' Disabled to CE Mode
 '0C' Composite Command Accepted
 '0D' Diagnostic, Command 70 Accepted
 '0E' Diagnostic, Command 71 Accepted
 '0F' Diagnostic-Write Not Write Inhibit
 '10'-E AGC Recovered at Park Prior To A Seek
 '12'-E AGC Recovered Prior To A Seek, Park Failed
 '14'-E Write Inhibit Failed Prior To A Seek
 '15'-E Write Inhibit Failed During Settle
 '16'-E Track Following Failed At End Of Settle
 '17' Write Inhibit Active, Not Track Followed
 '18'-E AGC Active During Rezero
 '20' Power Up Command Accepted
 '21' Pick Brake At End Of Compress
 '22' Pick Soft Start And Motor Control Relays
 '23' Drop Soft Start Relay, Motor Is On
 '24' Decompress Has Been Set
 '25' Diagnostic, Cylinder -3 Found
 '27' Checking for Command Line Stuck Active
 '28' Diagnostic, AGC Test Good
 '29' Start Sweep Routine
 '2A' Diagnostic, Checkpoint Log Test
 '2B' In 3-Minute Sweep Routine
 '2C' Offset Active In 3-Minute Sweep Routine
 '2D' Check Reset Command Received During Power Up
 '2E' Diagnostic, Seek -2 Command Accepted
 '30' Power Off Sequence Started
 '32' Motor Off 'OK' During Power Off Sequence
 '33' Brake Applied During Power Off Sequence
 '34' Power Off Command 4F Accepted
 '39' Diagnostic, Forward Motion Not Started
 '40' Rezero Command Accepted
 '41' AGC Active During Rezero
 '42' Second GBID Found During Rezero
 '43' Reverse Motion Is OK During Rezero
 '44' Track -3 Found In GBOD During Rezero
 '45' Second GBOD Found During Rezero
 '46' Cylinder 0 Track Found During Rezero
 '47' PES Integrate Signal Set At End Of Rezero
 '48'-E No GBID Found During Rezero
 '49'-E Guard Band Safe Latch Failed During Rezero
 '4A'-E No Reverse Motion Or GBID Stuck Active During Rezero
 '4A'² Received A '4A' Command
 '4B'-E No Type 1 Track Transition Or GBOD Found During Rezero
 '4C'-E Type 1 Track Not Found In GBOD During Rezero

'4D'-E Cylinder 0 Not Found During Rezero
 '4E'-E Guard Band Detected At Cylinder 0 During Rezero
 '4F'-E Overshoot Error During Rezero
 '50' Seek Cylinder Command Accepted
 '51' AGC Active Prior To Starting Seek Operation
 '52' Track Following Good Prior To Seek Operation
 '53' Targeted Cylinder Found During Seek
 '54' PES Integrate Signal Set At End Of Seek Operation
 '55' Started First Dynamic Setting Delay After Seek
 '55'² Diagnostic, Checkpoint Log Test
 '56' Started Second Dynamic Setting Delay After Seek
 '57' Started Third Dynamic Setting Delay After Seek
 '58'-E Started Fourth Dynamic Setting Delay After Seek
 '58'² Check For Command Line Stuck Active
 '59'-E Not Track Following Before A Seek
 '5A'-E Guard Band Found During Seek
 '5B'-E Targeted Cylinder Not Found Within 40 msec
 '5C'-E Overshoot Error During Seek Or Offset Setting
 '5D'-E Guard Band Found During The Seek Settle
 '5E'-E Tried To Seek With Offset Active
 '60' Offset Command Accepted
 '61' AGC Active During Offset
 '62' Targeted Cylinder Found During Offset
 '70' Sector Search Command Accepted
 '71' Sector Search In Progress
 '72' Sector Found
 '73' Go Again, Sector Search Continuing
 '74' Terminate Sector Search Command Accepted
 '7A' This is loaded at the completion of a diagnostic Gate Device Drivers On command.
 '7F' Diagnostic-Write Inhibit Active
 '80'-E Illegal Command Code Received For This Model
 '82'-E Sense or Invalid Command Received During Power Up or Down
 '83'-E Illegal Command Received When Device Is Busy
 '84'-E External Timer Test Failed
 '85'-E External Timer From Other Device Not Running
 '86'-E Lost Track Following During Idle
 '87'-E Busy In Idle Loop Without Padding in Progress
 '88'-E Rejected Valid Command While Busy
 '89'-E AGC Active While Drive Motor Switch Off
 '8A'-E Device Sequencer Check, Clock Check or CDP Hung
 '8C'-E, D '7B' Command, Cylinder Pulse Stuck Active
 '8D'-E Valid Command Rejected During Power Up/Down
 '8E'-E Command Line Active After a Power Off Command
 '8F'-E Opposite AGC OK, This AGC and GBOD Not Active During Idle
 '91'-E AGC Not Active at Park Position Prior To A Seek
 '92'-E Command Line Stuck Active
 '93'-E AGC Not Active Prior To A Seek or Offset
 '94'-E, D '4E' Command, Failed to Detect GBID
 '95'-E, D '4E' Command, Failed to Detect Overshoot
 '96'-E, D '4E' Command, Failed to Re-acquire AGC
 '97'-E, D '4E' Command, Failed to Detect Servo Test Pattern
 '98'-E, D '4E' Command, GBOD Active When Not Expected
 '99'-E, D Diagnostic '4E' Command, AGC Active When Not Expected
 '9F'-E, D Diagnostic '7B' Command, CE Cylinder Not Found
 'A0'-E Port Fenced Active Before Power Up Routine
 'A1'-E Port Fenced Active During Power Up Routine
 'A2'-E Motor Control Not Active During Power Up Routine
 'A3'-E Both AGCs Not Active During 3 Minute Warm Up
 'A4'-E Motor Control Switch Off After Being On
 'A5'-E Motor Control Switch Off When Power On Command Received
 'A6'-E AGC Not Active During Power Up Routine
 'A7'-E Compress Current Stuck Active During Power Up
 'A8'-E AGC Not Active After Drive Motor Start
 'A9'-E AGC Not Active After 18 Sec.

Checkpoint Log Value Meanings (continued)

'AA'-E	No Cylinder Pulse Transition During Sweep	'DB'-D	Guard Band Detected During A Settle No Guard Band Routine
'AB'	Diagnostic Command '4E' Executed OK	'DC'-E ³ ,D	'7B' Command, Failed To Acquire CE Cylinder
'AC'-E	Pick Signal To The Drive Motor Relay Missing During Power Up Routine	'DE'-E,D	Guard Band Not Detected During A Settle in Guard Band Routine
'AD'-E	Servo Inhibit During 3 Minute Warm Up Routine	'DF'-E,D	Guard Band Not Detected During A Seek From Guard Band Command
'AE'-E	Pick Signal To DCA Relay Not Active At End Of Drive Motor Start Routine	'E0'-E,D	Routine 99, DCA Relay Active At Start Of Test
'AF'-E	Compress Current Missing During Drive Motor Start Routine	'E1'-E,D	Routine 99, Motor Relay Active At Start Of Test
'B0'-E	Port Fenced Active, AGC Off During Idle Routine	'E1'-E ³ ,D	'76' or '78' Command, Guard Band Not Safe
'B1'-E	Park Failed During Power Off or Rzero	'E2'-E,D	Routine 99, Motor and DCA Relays Active At Start Of Test
'B2'-E	Motor Control Relay Pick Signal Active At End Of Power Down Routine	'E2'-E ³ ,D	'76' or '78' Command, GBID Up After 40 msec of Reverse
'B3'-E	Port Fenced and AGC Active During Idle Routine	'E3'-E,D	Routine 99, Motor Switch On At Start Of Test
'B4'-E	Pick Signal To Motor Active, Motor Switch Off During Idle Routine	'E3'-E ³ ,D	'76' or '78' Command, Type 1 Track or GBOD Not Found
'B5'-E	Pick Signal To Motor Not Active, AGC Active During Idle Routine	'E4'-E,D	Routine 99, DCA Relay Not Active During Test
'B6'-E	Pick Signals To Motor And DCA Relays Active When Not Expected	'E4'-E ³ ,D	'76' or '78' Command, Track -3 Not Found
'B7'-E	No Motion During Warm Up Or Diagnostics	'E5'-E,D	Routine 99, DCA Relay Active After Drop
'B8'-E	Brake Applied, Pick Signal To Motor Relay Active During Power Up Routine	'E5'-E ³ ,D	'76' or '78' Command, Cylinder 0 Not Found
'B9'-E	Write Inhibit Active At Park During Power Up	'E6'-E,D	Routine 99, Motor Relay Active After Picking Brake
'BA'-E	No Compress Current Before Motor Start During Power Up Routine	'E6'-E ³ ,D	'76' or '78' Command, Write Inhibit Failed During Settle
'BB'-E	Fail To Find the -4 Track In Sweep	'E7'-E,D	Routine 99, Motor Relay Not Active During Test
'BC'-E	Lost Course Track During The Sweep	'E7'-E ³ ,D	'76' or '78' Command, Guard Band Active At Cylinder 0 During Settle
'BD'-E	DCA Relay Pick Signal Not Active When Expected	'E8'-E,D	Routine 99, Motor Relay Active After Drop During Brake Test
'BE'-E	DCA Pick Signal Active When Not Expected	'E8'-E ³ ,D	'76' or '78' Command, Overshoot Active During Settle
'BF'-E	About To Apply Brake, Motor Turning During POR	'E9'-E,D	Routine 99, Motor Relay Active With Brake Dropped
'C0'-E	Servo Inhibit, Reject '68' Command	'E9'-E ³ ,D	'76' or '78' Command, No Track Following At End Of Settle
'C1'-E	GBID Active During A Hex '59' or '69' Command	'EA'-E,D	Routine 99, Motor Relay Active After Drop
'C2'-D	This Device is a 3380 Model E.	'EB'-E,D	Routine 99, DCA Signal Active After Motor Test
'C3'-E	Device Deselected During Command	'EC'-E,D	Routine 99, Motor Relay Active At End Of Test
'C4'-E	Sector Compare Stuck Active	'ED'-E,D	Routine 99, Motor And DCA Relays Active At End Of Test
'C5'-E	Sector Compare Not Found	'EE'-E,D	Routine 99, Motor Switch On At End Of Test
'C6'-E	No Controller Cmd Before Timeout	'EF'-E,D	Lost Fine Track After Index
'C7'-E	This Device is a 3380 Model D.	'F0'-E	Motor Relay Stuck Active On Power Off
'C8'-E	Cylinder 0 Not Detected During '59' or '69' Cmd	'F1'-E	AGC Active, Opposite AGC Not Active During Power Down Routine
'C9'-E	Track 1781 Not Found During '59' or '69' Cmd	'F2'-E	Motor Slow Down In Sweep
'CA'-E	GBOD Detected Before Executing '59' or '69' Cmd	'F3'-E	AGC On, Motor Slowing Down
'CB'-E	GBOD Not Found At Track 1781 in '59' or '69' Cmd	'F5'-E	Motor Slow Down During Idle Routine
'CC'-E	Cylinder Pulse or Coarse Track Failed in '69' Cmd	'F7'-E	Servo Write Inhibit Stayed At The End Of Settle
'CD'-E	Cylinder Pulse Failed During '68' Command	'F8'-E	Sector Compare Failed During Search
'CF'-E	Move MOW Failed to Reset During POR	'F9'-E	Motor Relay Pick Signal Missing During Sector Search
'D0'-E,D	'76' Command, AGC Inactive At Beginning Of Test	'FA'-E	Port Fenced Active During Sector Search
'D1'-E,D	'76' Command, Both AGC Signals Inactive At Beginning Of Test	'FB'-E	Motor Switch Off During Sector Search
'D2'-E,D	'76' Command, GBOD Not Found When Parked	'FC'-E	Disable Switch Active During Sector Search
'D3'-E,D	'76' Command, Servo Write Inhibit Active When Parked	'FE'-E,D	'4B' Command, Test Failed
'D4'-E,D	'76' Command, Lost AGC After A Compress	'FF'-E	AGC Not Active At Beginning Of Sector Search
'D5'-E,D	'76' Command, Servo Write Inhibit Active At End Of Test		
'D6'-E,D	'76' Command, Servo Write Inhibit At End Of Test		
'D8'-E,D	'78' Command, GBID Not Active		

Format 4 – Uncorrectable Data Checks

Bit	Byte 00	Byte 01	Byte 02	Byte 03
Unit Check Description				Unused
0	Command rej	Perm error	Correctable 1 log mode Env data pr	
1	Intervn req	Invl trk fmt		
2	Bus out P-chk	End of cyl		
3	Equipmnt chk	MSG to oper		
4	Data check	No rcd found		
5	Overrun	File protect		
6		Write inhibit		
7		Write op		

Note ¹ Byte 08	Note ¹ Byte 09	Note ¹ Byte 10	Note ¹ Byte 11
CCHHR Record From Count			
0	Unused	Cyl 128	Unused
1	Unused	Cyl 64	Unused
2	Unused	Cyl 32	Unused
3	Unused	Cyl 16	Unused
4	Unused	Cyl 8	Unused
5	Cyl 1024	Cyl 4	Head 8
6	Cyl 512	Cyl 2	Head 4
7	Cyl 256	Cyl 1	Head 2

Byte 16	Byte 17	Byte 18	Byte 19
Unused	Unused	Unused	Unused
0			
1			
2			
3			
4			
5			
6			
7			

Byte 7 Messages For Format 4

- 0 HA Area; ECC Uncorrectable
- 1 Count Area; Ecc Uncorrectable
- 2 Key Area; ECC Uncorrectable
- 3 Data Area; ECC Uncorrectable
- 4 HA Area; No Sync Byte Found
- 5 Count Area; No Sync Byte Found
- 6 Key Area; No Sync Byte Found
- 7 Data Area; No Sync Byte Found
- 8 HA Area; ECC Uncorrectable with Offset Active
- 9 Count Area; ECC Uncorrectable with Offset Active
- A Key Area; ECC Uncorrectable with Offset Active
- B Data Area; ECC Uncorrectable with Offset Active
- C HA Area; No Sync Byte Found with Offset Active
- D Count Area; No Sync Byte Found with Offset Active
- E Key Area; No Sync Byte Found with Offset Active
- F Data Area; No Sync Byte Found with Offset Active

Bit	Byte 04	Byte 05	Byte 06	Byte 07
Device ID		Seek Address		FMT/MSG
0	DPS model	Cyl 128		Format 8
1	3380-DE	Cyl 64	Cyl.1024	Format 4
2	Path fenced	Cyl 32	Cyl 512	Format 2
3		Cyl 16	Cyl 256	Format 1
4	Devaddr 8	Cyl 8	Head 8	Message 8
5	Devaddr 4	Cyl 4	Head 4	Message 4
6	Devaddr 2	Cyl 2	Head 2	Message 2
7	Devaddr 1	Cyl 1	Head 1	Message 1

Notes ¹ & ² Byte 12	Note ¹ Byte 13	Byte 13	Byte 15
	Sector Number	CTLR ID	Offset Level
0	Record 128		320/184
1	Record 64		160/92
2	Record 32		80/46
3	Record 16		40/23
4	Record 8		Loss Fine Tr
5	Record 4		Unused
6	Record 2		Unused
7	Record 1		Forward

Byte 20	Byte 21	Note ¹ Byte 22	Note ¹ Byte 23
Unused	Stg Dir ID	Symptom Code	
0			
1			
2			
3			
4			
5			
6			
7			

Format 4 Notes

- NOTE 1** BYTES 8 thru 13 are unpredictable if message equals 0, 1, 4, 5, 8, 9, D, or E.
- NOTE 2** BYTE 12 set to 0 if HA is unreadable. This byte is unreliable after space count command.
- NOTE 3** BYTES 22 and 23 equal 494X where X equals bits 4 thru 7 of Byte 7, the message number.

Format 5 – Correctable Data Checks

Bit	Byte 00	Byte 01	Byte 02	Byte 03
Unit Check Description				Controller ID
0	Command rej	Perm error	Correctable 1 log mode Env data pr	
1	Intervn req	Invl trk fmt		
2	Bus out P-chk	End of cyl		
3	Equipmnt chk	MSG to oper		
4	Data check	No rod found		
5	Overrun	File protect		
6		Write inhibit	Write op	
7				

Byte 08	Byte 09	Byte 10	Byte 11
CCHRR Record From Count			
0	Unused	Cyl 128	Unused
1	Unused	Cyl 64	Unused
2	Unused	Cyl 32	Unused
3	Unused	Cyl 16	Unused
4	Unused	Cyl 8	Unused
5	Cyl 1024	Cyl 4	Head 8
6	Cyl 512	Cyl 2	Head 4
7	Cyl 256	Cyl 1	Head 2

Note ¹ Byte 16	Note ¹ Byte 17	Byte 18	Byte 19
Restart Displacement		Error Displacement	
0	Restart Displacement		
1	Restart Displacement		
2	or		
3	Storage Director ID		
4	Unused		
5			
6			
7			

Byte 7 Messages For Format 5

- 0 HA Area; Correctable Data Check
- 1 Count Area; Correctable Data Check
- 2 Key Area; Correctable Data Check
- 3 Data Area; Correctable Data Check
- 4 Unused
- 5 Unused
- 6 Unused
- 7 Unused
- 8 HA Area; Correctable Data Check with Offset Active
- 9 Count Area; Correctable Data Check with Offset Active
- A Key Area; Correctable Data Check with Offset Active
- B Data Area; Correctable Data Check with Offset Active
- C Unused
- D Unused
- E Unused
- F Unused

Bit	Byte 04	Byte 05	Byte 06	Byte 07
Device ID		Seek Address		FMT/MSG
0	DPS model	Cyl 128		Format 8
1	3380-DE	Cyl 64	Cyl 1024	Format 4
2	Path fenced	Cyl 32	Cyl 512	Format 2
3		Cyl 16	Cyl 256	Format 1
4	Devaddr 8	Cyl 8	Head 8	Message 8
5	Devaddr 4	Cyl 4	Head 4	Message 4
6	Devaddr 2	Cyl 2	Head 2	Message 2
7	Devaddr 1	Cyl 1	Head 1	Message 1

Note ¹ Byte 12	Byte 13	Byte 14	Note ¹ Byte 15
	Sector Number	CTLR ID	Restart Displacement
0	Record 128		Restart Displacement or Storage Director ID
1	Record 64		
2	Record 32		
3	Record 16		
4	Record 8		
5	Record 4		
6	Record 2		
7	Record 1		

Byte 20	Byte 21	Note ⁴ Byte 22	Note ¹ Byte 23
Error Pattern			
0			
1			
2			
3			
4			
5			
6			
7			

Format 5 Notes

- NOTE 1** When Environmental Data Present (Byte 2 Bit 3 = '1' then:
 Byte 15 = Offset Level (See Format 4 byte 15 for bit assignments)
 Byte 16 = Storage Director Physical ID
 Byte 17 = Unused
- When Environmental Data is NOT Present (Byte 2 Bit 3 = '0' then:
 Bytes 15 thru 17 = Restart Displacement
- NOTE 2** BYTES 22 and 23 Do NOT contain a Fault Symptom Code unreliable after space count command.
- NOTE 3** BYTE 12 is unpredictable after a Space Count Command. The byte is set to zero if the HA is unreadable.

Format 7 – Controller Check Ones

Bit	Byte 00	Byte 01	Byte 02	Byte 03
Unit Check Description				Cntl Phy ID
0	Command rej	Perm error	Correctable 1 log mode Env data pr	
1	Intervn req	Invl trk fmt		
2	Bus out P-chk	End of cyl		
3	Equipmnt chk	MSG to oper		
4	Data check	No rcd found		
5	Overrun	File protect		
6		Write inhibit		
7			Write op	

Byte 08	Byte 09	Note ³ Byte 10	Byte 11
DDC Bus Out	DDC Bus In	SD DTI Reg	CCA and PWR
0	Selection Response for message 5.	CCA	CTL 0 CCA
1		Tag in check	CTL 1 CCA
2		Sync in chk	DPS UCRV 0
3		DDC bus in p	DPS UCRV 1
4		Null disc	CTL 0 pwr on
5		Val/sync-in	CTL 1 pwr on
6		Sel null	
7	End op		

Byte 16	Byte 17	Byte 18	Byte 19
Ref 1F	RCC Ctr 0	Ref 1F	RCC Ctr 1
0	Sequencer	Sequencer	Reg bus pchk
1	detected	detected	Always 1
2	chk-1 for	chk-1 for	Always 1
3	cntl 0, see	cntl 1, see	Always 1
4	reg 1F	reg 1F	Pwr seq cplt
5	definitions	definitions	Ck 2 active
6			Socssfl xfer
7			Always 0

Byte 7 Messages For Format 7

- 0 RCC initiated by a CAA
- 1 RCC1 sequence not successful
- 2 RCC1 and RCC2 sequences not successful
- 3 Invalid Tag In during the selection sequence
- 4 Extra RCC Required
- 5 No Response to Subsequent Selection or Invalid Selection Response
- 6 Missing End Op, Device Transfer Complete
- 7 Missing End Op, Device Transfer Incomplete
- 8 Invalid Tag In for an Immediate Command Sequence
- 9 Invalid Tag In for an Extended Command Sequence
- A Timed Out on Deselection
- B Subsequent to Poll Interrupt, No Response to Selection
- C Permanent Path Error
- D Controller Not Available on Disconnected Command Chain
- E Unused
- F Unused

Bit	Byte 04	Byte 05	Byte 06	Byte 07
Device ID		Seek Address		FMT/MSG
0	DPS	Cyl 128	Cyl 1024 Cyl 512 Cyl 256 Head 8 Head 4 Head 2 Head 1	Format 8
1	3380-DE	Cyl 64		Format 4
2	Path fenced	Cyl 32		Format 2
3		Cyl 16		Format 1
4	Devaddr 8	Cyl 8		Message 8
5	Devaddr 4	Cyl 4		Message 4
6	Devaddr 2	Cyl 2		Message 2
7	Devaddr 1	Cyl 1	Message 1	

Note ³ Byte 12	Byte 13	Note ³ Byte 14	Byte 15
Controller 0 Check One		Controller 1 Check One	
0	IOCC1 ISO 0	IOCC1 ISO 0	DDC tag seq
1	IOCC1 ISO 1	IOCC1 ISO 1	Ext tag seq
2	IOCC1 ISO 2	IOCC1 ISO 2	Seq det ck 1
3	DDC bus out	DDC float	DDC float
4	Clock check	RCC seq chk	RCC seq chk
5	Sequencer ck	Unused	Sequencer ck
6	DDC bus in ck	Unused	DDC bus in
7	IOCC2 chk 1	Unused	IOCC2 chk 1

Note ³ Byte 20	Byte 21	Byte 22	Byte 23
See note 2	Seg Dir ID	Symptom Code	
0	Format 8		
1	Format 4		
2	Format 2		
3	Format 1		
4	Message 8		
5	Message 4		
6	Message 2		
7	Message 1		

Format Notes

- NOTE 1** Byte 10 is the contents of the SD DTI and XES Registers.
- NOTE 2** Byte 20 – Contains original contents of Byte 7 when MSG is changed to '4', 'C' or 'D' during Sense Assembly; Not always valid during first reporting of '7D'. Subsequent '7D's should have valid sense in Byte 20.
- NOTE 3** IOCC1 Chk Bit Definitions (Byte 12 & 14 Bits 0-2)
- | BIT | 0 | 1 | 2 | Description of Error |
|-----|---|---|---|-----------------------------|
| 0 | 0 | 0 | 0 | No Check |
| 0 | 0 | 0 | 1 | Control Check |
| 0 | 1 | 0 | 0 | Multiplexer Parity Check |
| 0 | 1 | 1 | 0 | Multiplexer Selection Check |
| 0 | 1 | 1 | 1 | Reg 0 Parity Check |
| 1 | 0 | 0 | 0 | Reg 1 Parity Check |
| 1 | 1 | 0 | 0 | Reg 5 Parity Check |
| 1 | 1 | 1 | 1 | Controller Selection Check |

Register-1F Definitions

- 00 Reset at initial power up. This is not a failure.
- 02 Controller Sequencer Internal Register Failed.
- 04 Controller Sequencer Counter Failed.
- 08 Set at successful run of diagnostic routine 80.
- 0A Not An Error, normal operation.
- 0C Set at the RCC/Hang Reset sequence has completed.
- 0E Controller power up complete prior to powering up the drives. This is not a failure.
- 10 During an Unoriented Command, the Controller Command latch failed.
- 12 After a Hang Reset sequence, the DDC/CDP Control Circuits failed.
- 14 Diagnostic Routine 80 failed.
- 18 Selected Wait Loop. "Allow Selection" or "Device Selected" signals failed.
- 1A Selected Wait Loop. DDC Tag-Out signal not in an expected state.
- 20 Selected Wait Loop. "Controller Command" signal active without DDC Tag-Out being at a Command Gate state.
- 22 "DPS Command" signal is in the wrong state.
- 36 Selected Wait Loop. DDC Tag-Out not at a Valid state.
- 70, 74, 76, 78 Invalid DDC Tag-Out sequences.

End-Op Codes

The following End Operation code will appear in sense byte 9 of sense format 1 and 8. These End Op are only valid for format 1 message 0 and format 8 messages 0, 3, 4, 5 if format 8 byte 10 bit 1, 2, 3 are equal to '0'. Bit 7 is equal to '1'.

- Bit 0 = Index
- Bit 1 = No sync and no data

The hex codes below (bits 2 through 7) are ORed with the bits above and result in the final contents of the End Op byte. See ECD pages for more information.

- 00 Operation successfully completed
- 01 DDC command overrun
- 02 Sync byte missing
- 03 Data check
- 06 Invalid command code
- 07 DDC data overrun
- 08 HAR modifier overrun on set HAR oriented
- 09 No selection response from device
- 10 Check-2-detected in controller
- 11 Device check 1 on selection
- 12 Controller Sequencer Detected Error
- 13 CDP hung due late of missing device response
- 14 Precompensation failure, set or reset
- 15 Write-A, R, P decode failure
- 16 Data check on start read/write
- 17 Any check but controller collected no status
- 18 Sync Out/In Tag counts not equal
- 19 Device dropped to null
- 1B Index found during defect skip in MA
- 20 Device check active. The storage director upon recognizing this End Op code collects Format 1 sense data.

Register-1D

- 01 Index Not Active when Expected
- 02 Index Active when not Expected
- 03 Segment Boundary Not Active when Expected
- 04 Segment Boundary Active when not Expected
- 05 Clocks Started, Segment Boundary Not Active
- 06 Address Mark or Index Not Active when Expected
- 10 First Byte Ready Active when not Expected
- 12 Stop/DHPLO Delta Frequency Check Not Active when not Expected
- 13 Stop/DHPLO Delta Frequency Check Not Active when Expected
- 14 Address Mark Active when not Expected
- 15 Lock PLO to Servo Not Active when Expected
- 16 Write ASRP Not Active when Expected
- 17 Write ASRP Active when not Expected
- 20 CDP Tag In at Valid when not Expected
- 51, 52, 53, 54, 55 Expected Drive Checkpoint Log Value did not Occur
- 56 Pad In Progress when not Expected
- 57, 58 Expected Drive Checkpoint Log Value did not Occur
- 80 Diagnostic, CDP Timeout Not Active when Expected
- 81 Diagnostic, Controller Command Not Active when Expected
- 82 Diagnostic, DPS Command Active when not Expected
- 83 Diagnostic, Allow Selection Active when not Expected
- 84 Diagnostic, Device Selected Active when not Expected
- 85 Diagnostic, CDP Timeout Active when not Expected
- 86 Diagnostic, Controller Command Active when not Expected
- 87 Diagnostic, Counter Error
- 90 Diagnostic, CDP Tag In Active when not Expected Port 0
- 94 Diagnostic, CDP Tag In Active when not Expected Port 1
- 98 Diagnostic, CDP Tag In Active when not Expected Port 2
- 9C Diagnostic, CDP Tag In Active when not Expected Port 3

Format 8 – Controller Check Two's and Device Check One's

Bit	Byte 00	Byte 01	Byte 02	Byte 03	Bit	Byte 04	Byte 05	Byte 06	Byte 07
Unit Check Description				Cntl Phy ID	Device ID	Seek Address		FMT/MSG	
0	Command rej	Perm error			0	DPS model	Cyl 128		Format 8
1	Intervn req	Invl trk fmt	Correctable		1	3380-DE	Cyl 64	Cyl 1024	Format 4
2	Bus out P-chk	End of cyl	1st err logged		2	Path fenced	Cyl 32	Cyl 512	Format 2
3	Equipmnt chk	MSG to oper	Env data pr		3		Cyl 16	Cyl 256	Format 1
4	Data check	No rod found			4	Devaddr 8	Cyl 8	Head 8	Message 8
5	Overrun	File protect			5	Devaddr 4	Cyl 4	Head 4	Message 4
6		Write inh	Write op		6	Devaddr 2	Cyl 2	Head 2	Message 2
7					7	Devaddr 1	Cyl 1	Head 1	Message 1

Byte 08	Note ¹ Byte 09	Note ² Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15
Bus Out 0	Bus In 1	SD DTI Reg	Fault Log A	Fault Log B	Fault Log C	Fault Log D	Fault Log E
0	DDC cmd	Valid	CCA	S/D Ctl chk	ECC Logic 1	Dev XX00 ck1	Array check
1	valid for	contents for	Tag-In chk	1 Ser data chk	S/D MPX pchk	Dev XX01 ck1	Int ctl chk
2	messages	messages	Sync-in chk	2 Fail to lock ck	S/D MPX selck	Dev XX10 ck1	Compare chk
3	0, 3, 4, 5	0, 3, 4, 5	DDC bus in p	3 R/W cbl chk	ECC Logic 2	Dev XX11 ck1	CCC chk
4			Null disc	4 CDP Reg3 chk	Str config 0	See Note 3	Sar check
5			Val/Sync-in	5 IOCC2 chk2	Str config 1	See Note 3	Int reg chk
6			Sel null	6 Precomp chk	CDP/DPS pck	Portsel-0 XX	Alternate ck
7			End op	7 Sel dev chk	CDP actv drv	Portsel-1 XX	Gap 3 check

Byte 16	Byte 17	Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23
Reg ID	Unused	Fault Log F	Dev Status 1	Dev Status 2	Stg Dir ID	Symptom Code	
0	Sequencer	DXB bus out	Pad in prgs	0 Dev log dis			
1	detected	DXB bus in ck	3380 Model E	1 Surge complt			
2	Chk-2's	DXB ctl chk	SK inc/arvo i	2 Offset active			
3	See Reg ID	DDC float ck	Ck2/ta inc	3 Dev mtr off			
4	Definitions	Delta freq ck	Online	4 Logic exchg			
5		Unused	HDA attn	5 Dev Switch dis			
6		Unused	Device busy	6 Act selected			
7		Unused	Locate irpt	7 Seek inc			

Byte 7 Messages For Format 8

- 0 No Message
- 1 ECC Hardware Fault
- 2 Unused
- 3 Unexpected End Op Response Code
- 4 End Op received with Transfer Count not equal to Zero
- 5 End Op received with Transfer Count equal to Zero
- 6 Controller Aborts DPS Cleanup after Channel System Reset
- 7 DPS Array Not Initialized
- 8 Short Busy Timeout During Selection
- 9 Controller Failed to either Set or Reset Long Busy Latch

Format 8 Notes

- NOTE 1** Byte 9 End Op is valid if Byte 10 Bit 7 is equal to '1' or Byte 7 message is 0, 3, 4, 5 and byte 10 bit 1, 2, 3 are equal to '0'. See End of Code Summary.
- NOTE 2** Byte 10 is the contents of the Storage Director BTI and XES registers.
- NOTE 3** Sense Byte 14 bits 4-5 are a two bit encoded field which identify the source of the Device Check 1:
 00 = DPS Failed to Tie break (Simultaneous selection attempted by both SD's)
 01 = Clock Check
 10 = Port Card Check
 11 = CDP Interface Check

A-Board (Controller) Layout & Failure Affected

A Board Cards

Ctr. Logic Card Name	Failure Affected
DDC/DTB	Controller
I/O Control 1	Controller
I/O Control 2	Controller
CDP	Controller
DPS	String
Ctr sequencer	Controller
Clk/SERDES/ECC	Controller
DHPLO	Controller
MD adapter	Controller

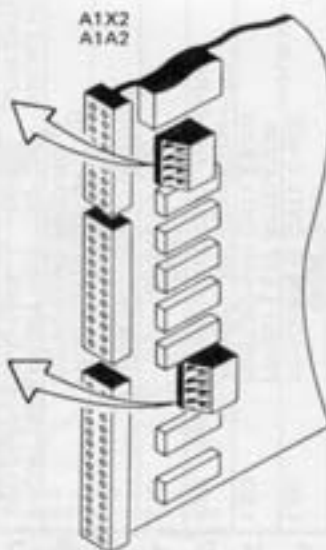
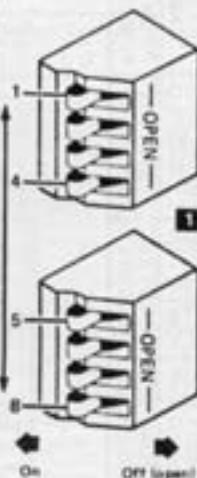
⊗ Replace For S353 First
OR IN 3880 SD X2 CARDS

A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X
MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO	MM LSO
A2	A2	A2	A2	A2	A2	A2	A2	A2	A2	A2	A2	A2	A2	A1	A1	A1	A1	A1	A1	A1	A1
XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX	XXX
DDC/DTB CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD	I/O CONTROL 2 CARD	I/O CONTROL 1 CARD
NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED
NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED	NOT USED

* - Replace For FSC S353,
11/13/15/18

DDC/DTB Card Switch Settings
(Cards A1X2, A1A2)

Switch Position	String 0	String 1
1	On	Off
2	Off	Off
3	Off	Off
4	Off	Off
5	On	Off
6	Off	On
7	On	Off
8	Off	On

I/O Control 2 Card Switch Settings
Cards A1C2, A1V2

Physical Identifier (Example)	Binary Code	Switch Settings	Binary Value	Switch Position		
0	1	0	0	1	1	0
On	On	On	On	On	On	Off
8	4	2	1	9	4	2
1	2	3	4	5	6	7

String Configuration	Switches	
	9	10
A UNIT ONLY	ON	ON
A UNIT AND ONE B UNIT	ON	OFF
A UNIT AND TWO B UNITS	OFF	ON
A UNIT AND THREE B UNITS	OFF	OFF

Some String
Physical Identifier
(Example)

10-Position
Switch



3380-D TRACK LAYOUT (See PSG Intro)

Outer Diameter (OD)	Physical Data Track Decimal	Logical Data Track Decimal	Logical Data Track Hex	
				Head Landing Zone
	-11			
	-10			
				Reserved
	-4			HA Map
	-3	-3	FFF0	
	-2			Reserved
	-1			
	0	0	0	Customer Data
				Data
	884	884	374	
	885	885	375	Alternate
	886*			
	887*			Buffer
	888*			
	889	886	376	CE
	890	887	377**	
	891	888	378**	Diagnostic
	892	889	379**	
	893	890	37A**	
	894			
	895			Required for servo
	896			
				Inner Diameter (ID)

* 3380-D has 3 buffer cylinders between the alternate cylinder and the CE cylinder. These cylinders are not accessible from the system.

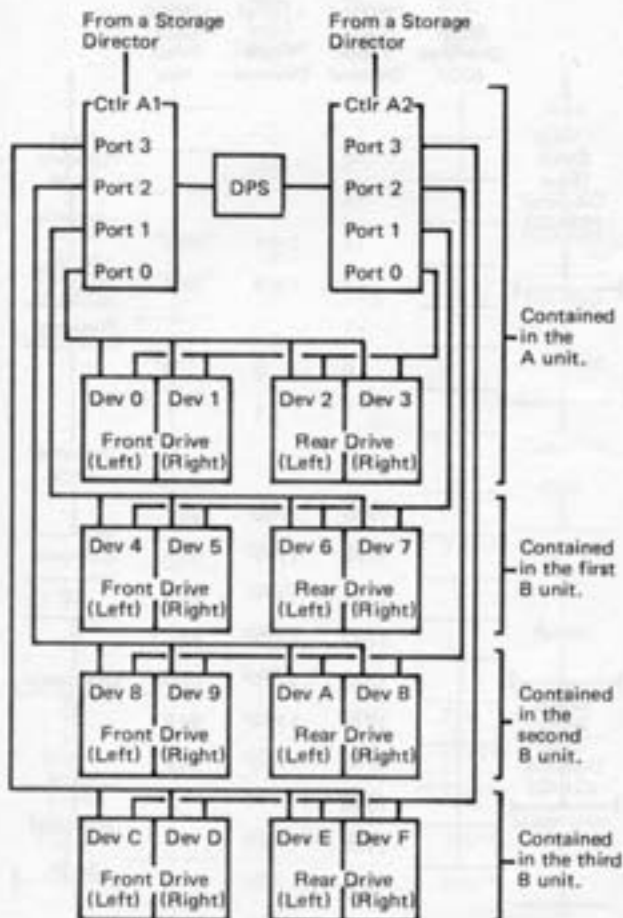
** Diagnostic cylinders are accessible only by the diagnostics. They cannot be accessed from the system.

3380-E TRACK LAYOUT (See PSG Intro)

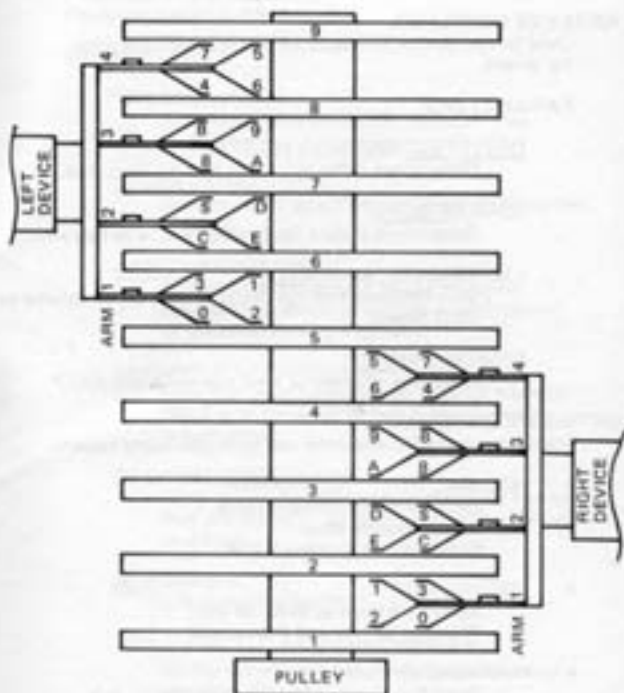
Outer Diameter (OD)	Physical Data Track Decimal	Logical Data Track Decimal	Logical Data Track Hex	
				Head Landing Zone
		-5		
		-4		
		-3	1781	6F5
		-2	1780	6F4
		-1		Reserved
		0	0	0
		1	1	1
				Customer Data
				Data
		1769	1769	6E9
		1770	1770	6EA
		1771	1771	6EB
		1772	1772*	6EC*
		1773	1773*	6ED*
		1774	1774*	6EE*
		1775	1775*	6EE*
		1776		
		1777		
		1778		
				Inner Diameter (ID)

* Diagnostic cylinders are accessible only by the diagnostics. They cannot be accessed from the system.

STRING CONFIGURATION:



HDA Assembly (See MSM Oper)



Hexadecimal and Decimal Conversion

HEXADecimal COLUMNS					
6	5	4	3	2	1
HEX - DEC	HEX - DEC	HEX - DEC	HEX - DEC	HEX - DEC	HEX - DEC
0	0	0	0	0	0
1	1,048,576	1	65,536	1	4,096
2	2,097,152	2	131,072	2	8,192
3	3,145,728	3	196,608	3	12,288
4	4,194,304	4	262,144	4	16,384
5	5,242,880	5	327,680	5	20,480
6	6,291,456	6	393,216	6	24,576
7	7,340,032	7	458,752	7	28,672
8	8,388,608	8	524,288	8	32,768
9	9,437,184	9	589,824	9	36,864
A	10,485,760	A	655,360	A	40,960
B	11,534,336	B	720,896	B	45,056
C	12,582,912	C	786,432	C	49,152
D	13,631,488	D	851,968	D	53,248
E	14,680,064	E	917,504	E	57,344
F	15,728,640	F	983,040	F	61,440
0 1 2 3	4 5 6 7	0 1 2 3	4 5 6 7	0 1 2 3	4 5 6 7
BYTE		BYTE		BYTE	

DEVICE SUPPORT FACILITIES

ANALYZE COMMAND:

Used to test device hardware and/or scan volume data for errors.

PARAMETERS:

DRIVETEST/NODRIVETEST

Determines if the drive test is to be executed.

SCAN/NOSCAN

Determines if data verification test is to be run.

LIMITS(scanlo, scanhi)/ALL

Scan between two cyl limits or scan all of volume on CKD device.

SPEED/NOSPEED

Read one cylinder or read one track per EXCP.

INITIALIZE COMMAND:

Prepares volume for customer use with operating system.

- **MINIMAL INIT:**
Writes IPL bootstrap records.
Writes volume label.
Reserves and formats VTOC.
- **MEDIAL INIT:**
Same functions as Minimal Init.
Rewrites all HA and RO records.
- **MAXIMAL INIT:**
Same functions as Minimal and Medial Init.
Surface checks tracks.
Generates skip displacements.
Reclaims defective tracks or blocks.

PARAMETERS:

CHECK(n)/NOCHECK

Check forces Maximal Init and causes surface checking (n) times.

MAP/NOMAP

Lists defective tracks.

RECLAIM/NORECLAIM

Used to reclaim defective primary or alternate tracks that are found to be error free during surface checking.

VALIDATE/NOVALIDATE

Validate forces Medial Init if Check is not specified.

VERIFY (serial[, owner])/NOVERIFY

Verify the volume serial number and owner identification.

INSPECT COMMAND:

Inspects specified tracks for defects.
Generates skip displacements.
Assigns alternate tracks.
Reclaims tracks or blocks.

PARAMETERS:

TRACKS(cyl, trk)

Specifies which tracks on volume are to be checked.

CHECK(n)/NOCHECK

Determines if specified tracks are to be surface checked.

ASSIGN/NOASSIGN

Determines if alternate tracks are to be assigned as a result of surface errors (check) or unconditionally (nocheck).

PRESERVE/NOPRESERVE

Specifies whether customer data on track or block is to be saved before surface checking is performed.

RECLAIM/NORECLAIM

Used to reclaim defective or alternate tracks that are found to be error free during surface checking.

MAP/NOMAP

List defective tracks.

VERIFY (serial[, owner])/NOVERIFY

Verify the volume serial number and owner identification.

CONTROL COMMAND:

Clears a path that has been Write Inhibited.

PARAMETER:

ALLOWRITE

Required parameter.

ONLINE TESTS (OLTS)

There are three 3380 online tests:

T3380PSA – Check HA and R0 Readability

- Routine 1 (device/T3380PSA,1/options/)
Scans home addresses (HAs) and record zeros (R0s) on all usable tracks, except CE tracks, for readability and correctness. Alternate track assignments are verified.
- Routine 2 (device/T3380PSA,2/options/)
Provides the same function as routine 1 on specified tracks.

T3380PSB – HDA Burst Test (Pack Scan)

HA, R0, and data are scanned for readability on all or specified tracks. A statistical summary is generated for output. There are five routines provided:

- Routine 1 (device/T3380PSB,1/options/)
All records on all tracks are scanned one track at a time.
- Routine 2 (device/T3380PSB,2/options/)
All records on specified tracks are scanned, one record at a time.
- Routine 3 (device/T3380PSB,3/options/)
A scope loop is set up on a specific track.
- Routine 4 (device/T3380PSB,4/options/)
All records on all tracks are scanned, one cylinder at a time.
- Routine 5 (device/T3380PSB,5/options/)
All records on specific tracks are scanned, one track at a time.

T3380PSC – HA and R0 Restoration

T3380PSC restores HA and R0 on a specific (bad) track or all tracks.

T3380PSC provides five modes of operation:

- MODE M1 – Single Track Restore (device/T3380PSC/EXT=M1,options/)
HA and R0 are written on the specified track. Skip displacement information is obtained from the factory directory.

- MODE M2 – Quick Restore (device/T3380PSC/EXT=M2,options/)

All HAs and R0s on the volume are scanned. If a data check or no record found error occurs, the HA and R0 for that track are rewritten and a statistical summary is printed. Skip displacement information is obtained from the factory directory.

- MODE M3 – Full Restore (device/T3380PSC/EXT=M3,options/)

All HAs and R0s are rewritten. Skip displacement information is obtained from the factory directory.

- MODE M6 – Track Restore (device/T3380PSC/EXT=M6,options/)

HA and R0 are rewritten on the specified track. You are prompted for skip displacement information.

- MODE MP – Quick Restore and MAP (device/T3380PSC/EXT=MP,options/)

All functions of MODE M2 plus a MAP of all HAs with field assigned skip displacements is generated for output. Skip displacement information is obtained from the factory directory.

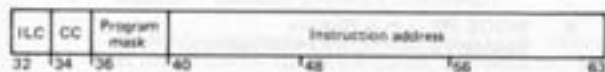
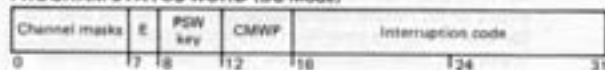
Option	Mnemonic	Default
Control print	CP	X
No control print	NCP	
Error loop	EL	
Error loop (I-indefinite)	EL (I)	
Error loop n	ELn*	
No error loop	NEL	X
Error print	EP	X
No error print	NEP	
First error communication	FE	
No first error communication	NFE	X
Manual intervention	MI	
No manual intervention	NMI	X
Parallel print n	PPn*	
No parallel print	NPP	X
Print	PR	X
No print	NP	
Spurious interrupt	SI	X
No spurious interrupt	NSI	
Test loop n	TLn*	
No test loop	NTL	X
Trace	TR	
No trace	NTR	X

Notes:

*Options followed by the letter n run as often as specified by n.

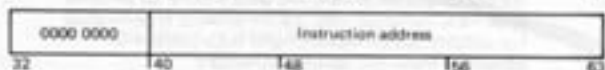
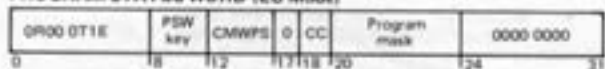
System Commands, PSW, CCW, and CSW

PROGRAM STATUS WORD (BC Mode)



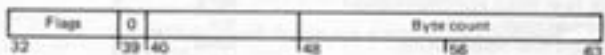
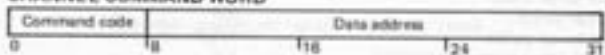
- 0-5 Channel 0 to 5 masks
 6 Mask for channel 6 and up
 7 (E) External mask
 12 IC = 0) Basic control mode
 13 (M) Machine-check mask
 14 (W = 1) Wait state
 15 (P = 1) Problem state
- 32-33 (ILC) Instruction length code
 34-35 (CC) Condition code
 36 Fixed-point overflow mask
 37 Decimal overflow mask
 38 Exponent underflow mask
 39 Significance mask

PROGRAM STATUS WORD (EC Mode)



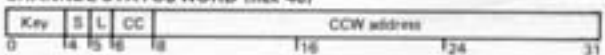
- 1 (R) Program event recording mask
 5 (T = 1) Translation mode
 6 (I) Input/output mask
 7 (E) External mask
 12 IC = 1) Extended control mode
 13 (M) Machine-check mask
 14 (W = 1) Wait state
- 15 (P = 1) Problem state
 16 (S = 1) Secondary space mode
 18-19 (CC) Condition code
 20 Fixed-point overflow mask
 21 Decimal overflow mask
 22 Exponent underflow mask
 23 Significance mask

CHANNEL COMMAND WORD



- CD—bit 32 (80) causes use of address portion of next CCW.
 CC—bit 33 (40) causes use of command code and data address of next CCW.
 SLI—bit 34 (20) causes suppression of possible incorrect length indication.
 Skip—bit 35 (10) suppresses transfer of information to main storage.
 PCI—bit 36 (08) causes a channel program controlled interruption.
 IDA—bit 37 (04) causes bits 8-31 of CCW to specify location of first IDAW.
 Suspend—bit 38 (02) causes suspension before interruption of this CCW.

CHANNEL STATUS WORD (hex 40)



- 4 Suspended (only in CCW stored by PCI)
 5 Layout pending
 6-7 Deferred condition code
 32 (80) Attention
 33 (40) Status modifier
 34 (20) Control unit end
 35 (10) Busy
 36 (08) Channel end
 37 (04) Device end
 38 (02) Unit check
- 39 (01) Unit exception
 40 (80) Program-controlled interruption
 41 (40) Incorrect length
 42 (20) Program check
 43 (10) Protection check
 44 (08) Channel data check
 45 (04) Channel control check
 46 (02) Interface control check
 47 (01) Channel check
 48-63 Residual byte count for the last CCW used

Summary of Count, Key, Data Command Set

Command	MT Off	MT On*	Count
Control			
No Operation (No-Op)	'03'		Numbers
Recalibrate	'13'		6
Seek	'07'		6
Seek Cylinder	'08'		6
Seek Head	'18'		6
Space Count	'0F'		3
Set File Mask	'1F'		1
Set Sector	'23'		1
Restore	'17'		Numbers
Suspend Multipath Reconnection	'58'		Numbers
Set Path Group ID	'AF'		12
Define Extent	'63'		16
Locate Record	'47'		16
Search			
Home Address Equal	'39'	'89'	4
Identifier (ID) Equal	'31'	'81'	5
Identifier (ID) High	'51'	'D1'	5
Identifier (ID) Equal or High	'71'	'F1'	5
Key Equal	'29'	'A9'	KL
Key High	'49'	'C9'	KL
Key Equal or High	'69'	'E9'	KL
Read			
Home Address	'1A'	'9A'	5
Special Home Address	'0A'		28
Count	'12'	'92'	8
Record Zero (RD)	'16'	'96'	Number of bytes to be transferred
Data	'06'	'86'	> Max track length
Key and Data	'0E'	'8E'	= Bytes to be fld
Count, Key, and Data (CKD)	'1E'	'9E'	1
Multiple Count, Key and Data	'5E'		
Initial Program Load (IPL)	'02'		
Sector	'22'		
Sense			
Sense Identification	'64'		7
Sense Path Group ID	'34'		12
Sense	'04'		24
Read and Reset Buffered Log	'A4'		24
Device Reserve	'84'		24
Unconditional Reserve	'14'		24
Device Release	'94'		24
Read Device Characteristics	'64'		24
Write			
Home Address	'19'		5, 7 or 11
Special Home Address	'09'		28
Record Zero (RD)	'15'		8 + KL + DL or RD
Erase	'11'		8 + KL + DL
Count, Key, and Data (CKD)	'1D'		8 + KL + DL
Special Count, Key, and Data	'01'		8 + KL + DL
Data	'05'		DL
Key and Data	'0D'		KL + DL
Update Data	'85'		DL
Update Key and Data	'8D'		KL + DL
CKD Next Track	'9D'		2
Diagnostic			
Diagnostic Sense	'44'		16 or 512
Diagnostic Load	'63'		1
Diagnostic Write	'73'		8
Diagnostic Control	'F3'		4 + *bytes to be fld
Diagnostic Sense/Read	'C4'		4092 max

*CODE SAME AS MT OFF EXCEPT AS LISTED

POWER OFF/ON PROCEDURES

WARNING:

Follow these procedures correctly or machine damage may result.

String

- POWER OFF
1. Set both controller power switches on the operator panel to OFF.
 2. Wait until all drives in the string stop.
 3. Set CB200 to OFF.

- POWER ON
1. Set CB200 to ON.
 2. Set both controller power switches to ON.

Unit

- POWER OFF
1. Set both motor switches (SW691 & SW692) to OFF.
 2. Wait until both drives stop.
 3. Set CP405 to OFF.
 4. Set CB201 to OFF.

- POWER ON
1. Set CB201 to ON.
 2. Set CP405 to ON.
 3. Wait five seconds.
 4. Set motor switch SW691 to ON.
 5. Wait 25 seconds.
 6. Set motor switch SW692 to ON.

Controller

- POWER OFF
1. Set controller A1 or A2 power switch on the operator panel to OFF.

- POWER ON
1. Set controller A1 or A2 power switch to ON.

Drive

- POWER OFF
1. Set the front (SW691) or rear (SW692) motor switch to OFF.
 2. Wait until the drive stops.
 3. Set the front (CP602) or rear (CP622) +5V common CP to OFF.
 4. Set the two LOGIC switches for the front or rear drive to DISABLE.
 5. Set the actuator CPs (left to right) to OFF.
 6. Set the front (CP407) or rear (CP408) motor switch CP to OFF.

- POWER ON
1. Set the front (CP407) or rear (CP408) motor CP to ON.
 2. Set the actuator CPs (right to left) to ON.
 3. Set the two LOGIC switches to ENABLE.
 4. Set the front (CP602) or rear (CP622) +5V common CP to ON.
 5. Wait five seconds.
 6. Set the front (SW691) or rear (SW692) motor switch to ON.

Device

- POWER OFF
1. Set the actuator LOGIC switch for the device to DISABLE.
 2. Set the actuator CPs to OFF (left to right)

- POWER ON
1. Set the actuator CPs to ON (right to left).
 2. Set the actuator LOGIC switch to ENABLE.

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