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| PLANT IDENT | 0, 1, 4 |
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PRODUCT SPECIFICATION

| REV LTR | REVISION ISSUE DATE | APPROVED BY | REVISIONS |
|------------|------------------------|-------------------|--------------------------------------|
| A | 5/21/81 | <i>AM 5/21/81</i> | Original Issue -- Mark 11.0 Release. |

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GENERAL DESCRIPTION

This document contains information pertaining to the maintenance of model 206 and 207 disk drives. The material presented is a cross reference between the Disk Drive Electronic Controller (DDEC) maintenance test procedures and the Disk Subsystem Controller (DSC) standalone diagnostic program.

This cross reference guide when used in conjunction with the 206 or 207 Maintenance Test Routine (MTR) manuals permits an engineer to use the DSC standalone diagnostic program to provide stimulus to a model 206 or 207 disk drive.

Step numbers listed in this document correspond to step numbers listed in the model 206 and 207 disk drive MTRs. The Disk MTR column describes the DDEC maintenance panel commands required for a step. The DSC Diagnostic column describes the commands to be entered on the ODT for the DSC Diagnostic to perform the same step.

RELATED SPECIFICATIONS

| SPEC. NO. ----- | NAME ----- |
|--------------------|--|
| 2734 1378 | MAINTENANCE TEST ROUTINES (206 Drives) |
| 2786 2887 | MAINTENANCE TEST ROUTINES (207 Drives) |

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| STEP | DISK MTR | DSC DIAGNOSTIC |
|--------|--|---|
| 000000 | | BEFORE ERRORS IN A MODEL 206 DISK UNIT CAN BE DETECTED USING THIS PROCEDURE, THE DSC-2 DIAGNOSTIC PROGRAM, CT 2228 3915, SHOULD BE LOADED INTO THE GEM PROCESSOR AND EXECUTED. THE FOLLOWING COMMANDS SHOULD THEN BE ENTERED ON THE ODT: UNIT <UNIT NUMBER> AVAILABLE ON UNLOCK BEGIN 0, END 362674 ODT OFF |
| 100071 | PERFORM A SEEK TO CYL 511 (1,2,4,8,16,32,64,128,256) (HEX 037843) OBSERVE THE CAR BITS ON THE STATUS MONITOR. | FILE 2378432 LEN 180 READ |
| 100073 | SEEK TO CYL 814 (2,4,8,32 256,512) (HEX 0586F6). OBSERVE THE CAR BITS COME ON AT THE STATUS MONITOR | FILE 2586F62 LEN 180 READ |
| 100075 | SEEK TO CYL 000. OBSERVE THE CAR BITS GO OFF. | FILE 0, LEN 180, READ |
| 100090 | IF THE DRIVE IS CONTROLLED BY AN EXERCISER, GO TO 100150. IF THE DRIVE IS CONTROLLED BY A DPEC OR DDEC, CONTINUE WITH STEP 100091 | GO TO STEP 100091 |

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| STEP | DISK MTR | DSC DIAGNOSTIC |
|--------|--|---|
| 100091 | LOAD A GOOD SCRATCH PACK. SEQUENCE UP THE UNIT. INITIALISE THE WHOLE PACK WITH HEX PATTERN 6363. OBSERVE THAT THE TD BIT DID NOT COME ON AT THE MAINTENANCE PANEL. | BEGIN 0, END 362674 DATA 2632, SECTION F |
| 100093 | PERFORM A FULL PACK READ WITH HALT ON ERROR ON. NO ADDRESS LOAD. MAKE NOTE OF THE TOTAL NUMBER OF ERRORS AND THE ADDRESSES ON THE MAINT. PANEL. REPEAT. IF THE ERRORS RECCUR A THE SAME ADDRESSES, THEN THESE ARE PROBABLY MEDIA (PACK) FAULTS. | HALT ERROR, CLEAR SECTION D |
| 100450 | LOOP READ ON HEAD 0 CYL.0. MEASURE 150MVPPAT TPS AND TP7 ON READ/WRITE MATRIX. REPEAT FOR ALL HEADS. | LEN 16200, FILE 0 READ * FOREVER CLEAR, FILE 90 READ * FOREVER CLEAR, FILE 180 READ * FOREVER CLEAR, FILE 270 READ * FOREVER CLEAR, FILE 360 READ * FOREVER CLEAR |
| 100451 | LOOP READ ON HEAD 0 CYL.0. MEASURE 2.5VPP AT TP4 AND TP6 ON READ/WRITE BOARD. | FILE 0, LEN 16200 READ * FOREVER |

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| STEP | DISK MTR | DSC DIAGNOSTIC |
|--------|--|---|
| 400600 | DE-SNAKE CIRCUIT TEST TEST EQPT: DVM AND O-SCOPE AC OFF, EXTEND READ/WRITE BOARD. INSTALL SCRATCH PACK. AC ON. PWR UP DRIVE. INITIALIZE FIRST FEW CYLINDERS WITH AN ALL ZEROS PATTERN, SEND A READ COMMAND. (LOOP ON HEAD 0 CYLINDER 0) | BEGIN 0, END 5000 DATA 2002 SECTION F FILE 0, LEN 16200 READ * FOREVER |
| 400620 | READ DATA INHIBIT CIRCUIT TEST TEST EQPT: DVM AND O-SCOPE AC OFF, EXTEND READ/WRITE BOARD. INSTALL SCRATCH PACK. AC ON. PWR UP DRIVE. INITIALIZE FIRST FEW CYLINDERS WITH AN ALL ZEROS PATTERN, SEND A READ COMMAND. (LOOP HEAD 0 CYL 0) | BEGIN 0, END 5000 DATA 2002 SECTION F FILE 0, LEN 16200 READ * FOREVER |
| 400990 | READ/WRITE ADDRESS MARK CIRCUIT TEST TEST EQPT: DVM AND O-SCOPE AC OFF, EXTEND DATA SEPARATOR CARD 4. AC ON. PWR UP DRIVE. INITIALIZE CYL 0 HD 0. (LOOP HEAD AND LOOP OP SWITCHES UP) | BEGIN 0, END 89 SECTION F * FOREVER |
| 401188 | REMOVE ALL JUMPERS, INITIALIZE THE PACK. DRIVE APPEARS TO INITIALIZE CORRECTLY. | SECTION F |

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| STEP | DISK MTR | DSC DIAGNOSTIC |
|--------|---|--|
| 402421 | LOAD MAINTENANCE MEMORY WITH ALL ZEROS. SET LOOP OP, SGL SECT. PRESS MSTR CLR, CLEAR AND START. | LENGTH 180, FILE 0 (READ, FILE +1) * 362674 |
| 402626 | LOAD MAINTENANCE MEMORY WITH ALL ZEROS. SET LOOP OP, LOOP HEAD, AND SGL SECT. | NO ACTION REQUIRED |
| 402627 | SEQUENCE UP THE DRIVE AND LET THE HEADS LOAD. PRESS MSTR CLR, CLR AND START. | NO ACTION REQUIRED |
| 402702 | SET UP THE CONTROLLER TO DO ALTERNATE SEEKS AND READS BETWEEN ANY TWO CYLINDERS, USING HEAD 0. OBSERVE LOGIC HIGHS AT 8D-1 AND 8D-2. | LENGTH 180 (FILE 0, READ, FILE 222500, READ) * FORVER |
| 402733 | REMOVE JUMPER. REMOVE JUMPERS FOR 9A. SET THE CONTROLLER TO INITIALIZE TWO DIFFERENT TRACKS USING TWO DIFFERENT HEADS. PRESS MSTR CLR, CLR AND START. | BEGIN 360, END 534 SECTION F * FOREVER |
| 402746 | STOP CONTROLLER. CONNECT 4A-3 TO +5V. CONNECT 4A-4 AND 4A-5 TO +5V AND OBSERVE LOGIC LOW AT 4A-6. GROUND INDIVIDUALLY AND IN TURN, 4A-4 AND 4A-5 AND OBSERVE LOGIC HIGHS AT 4A-6 WHILE THE PINS ARE GROUNDED. | CLEAR |

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| STEP | DISK MTR | DSC DIAGNOSTIC |
|--------|--|--|
| 403070 | SEND A READ COMMAND TO THE DRIVE. (LOOP OP ACTIVE) IGNORE TO. OBSERVE TRANSITIONS AT 03A10(SR08) | READ * FOREVER |
| 403086 | SEND A READ COMMAND TO THE DRIVE. (LOOP OP ACTIVE) OBSERVE TRANSITIONS AT 1E PINS 11,12,13,14. | READ * FOREVER |
| 403310 | SET UP THE CONTROLLER TO DO REPETITIVE ALTERNATE SEEKS BY SETTING ALT OP, LOOP OP AND SGL SECT. GROUND 1C-11. | LENGTH 180, (FILE 0, READ, FILE 222500, READ) * FORVER |
| 403318 | STOP CONTROLLER. RESET LOOP OP. SEND A CM TO "SEEK" TO CYLINDER 0. OBSERVE LOGIC LOWS AT 2B-15, 2B-14, 2B-13, 2B-12 | CLEAR, FILE 0, READ |
| 403324 | RESET ALT OP. SET LOOP OP. SET UP CYLINDER ADDRESS 255 IN MAINTENACE MEMORY. THE PROPER HEX CODE IS 1B843. 1 IS THE MSB, 3 IS THE LSB. PRESS MSTR CLR, CLR AND START TO CONTINUALLY SEND SEEK CM'S OBSERVE PULSES AT 2B-4. | FILE 01B8430 READ * FOREVER |
| 403332 | STOP CONTROLLER. RESET LOOP OP. SEEK TO CYLINDER 0. SEEK TO CYLINDER 255 (1B843) | CLEAR, FILE 0, READ FILE 01B8430, READ |

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| STEP | DISK MTR | DSC DIAGNOSTIC |
|--------|---|--|
| 403345 | SEEK TO CYLINDER 0. OBSERVE LOGIC HIGH AT 3E-6 | FILE 0, READ |
| 403346 | SEEK TO CYLINDER 753 (53700). OBSERVE LOGIC HIGH AT 3E-5. | FILE 341760, READ |
| 403350 | SET ALT OP AND LOOP OP. DO REPETITIVE ALTERNATE SEEKS BETWEEN CYLINDER 0 AND CYLINDER 255 (13B43). START CONTROLLER. OBSERVE PULSES AT 3C-2. | LENGTH 180 (FILE 0, READ, FILE 113475, READ) * FOREVER |
| 403354 | STOP CONTROLLER. DO ALTERNATE SEEKS BETWEEN CYLINDER 255 AND CYLINDER 254 (1B986). OBSERVE PULSES AT 2A-8. | CLEAR (FILE 113475, READ, FILE 113030, READ) * FOREVER |
| 403355 | DO ALTERNATE SEEKS BETWEEN CYLINDER 255 (18B43) AND CYLINDER 253 (1B7C5). OBSERVE PULSES AT 2A-8. | (FILE 113475, READ, FILE 112585, READ) * FOREVER |
| 403356 | DO ALTERNATE SEEKS BETWEEN CYLINDER 255 (13B43) AND CYLINDER 251 (1B44F). OBSERVE PULSES AT 2A-8. | (FILE 113475, READ, FILE 111695, READ) * FOREVER |
| 403357 | DO ALTERNATE SEEKS BETWEEN CYLINDER 255 (18B43) AND CYLINDER 247 (1AD58). OBSERVE PULSES AT 2A-8. | (FILE 113475, READ, FILE 109915, READ) * FOREVER |
| 403358 | DO ALTERNATE SEEKS BETWEEN CYLINDER 254 (1B986) AND CYLINDER 238 (19DB6). OBSERVE PULSES AT 1A-8. | (FILE 113030, READ, FILE 105910, READ) * FOREVER |

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|--------|---|---|
| 403359 | DO ALTERNATE SEEKS BETWEEN CYLINDER 32 (037A0) AND CYLINDER 47 (051B3). OBSERVE PULSES AT 1A-8. | (FILE 14240, READ, FILE 20915, READ) * FOREVER |
| 403361 | DO ALTERNATE SEEKS BETWEEN CYLINDER 16 (01BD0) AND CYLINDER 48 (05370). OBSERVE PULSES AT 1A-11. | (FILE 7120, READ, FILE 21360, READ) * FOREVER |
| 403363 | DO ALTERNATE SEEKS BETWEEN CYLINDER 0 AND CYLINDER 128 (0DE80). OBSERVE PULSES AT 1C-6. | (FILE 0, READ, FILE 56960, READ) * FOREVER |
| 403364 | DO ALTERNATE SEEKS BETWEEN CYLINDER 0 AND CYLINDER 64 (06F40). OBSERVE PULSES AT 1C-6. | (FILE 0, READ, FILE 28480, READ) * FOREVER |
| 403366 | STOP THE CONTROLLER. RESET ALT OP AND LOOP OP. SEEK TO CYLINDER 0. CONNECT 1C-8 TO +5V. SEEK TO CYLINDER 256 (13D00). OBSERVE LOGIC HIGH AT 1C-8 | CLEAR, FILE 0, READ FILE 21BD002, READ |
| 403367 | SEEK TO CYLINDER 512 (37A00). OBSERVE LOGIC HIGH AT 1C-8. | FILE 237A002, READ |
| 403369 | SEEK TO CYLINDER 768 (53700). OBSERVE LOGIC LOW AT 1C-8. | FILE 2537002, READ |
| 403374 | SEEK TO CYLINDER 0. SET ALT OP AND LOOP OP. DO ALTERNATE SEEKS BETWEEN CYLINDER 0 AND CYLINDER 1 (001BD). OBSERVE PULSES AT 3B-5. | LENGTH 180 (FILE 0, READ, FILE 21BD2, READ) * FOREVER |

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| STEP | DISK MTR | DSC DIAGNOSTIC |
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| 403395 | STOP THE CONTROLLER. RESET ALT. OP AND LOOP OP. MOMENTARILY GROUND 10C-13. GROUND 4E-11. SEEK TO CYLINDER 0. SEEK TO CYLINDER 0 AGAIN. OBSERVE LOGIC HIGH AT 6B-3. | CLEAR FILE 0, READ READ |
| 403405 | SEEK TO CYLINDER 511 (37843). OBSERVE LOGIC LCW AT 6B-3. | FILE 2378432, READ |
| 403415 | SEEK TO CYLINDER 511 AGAIN. OBSERVE LOGIC HIGH 6B-3. | FILE 2378432, READ |
| 403425 | SEEK TO CYLINDER 0. OBSERVE LOGIC LOW AT 6B-3. | FILE 0, READ |
| 403435 | CONNECT 1B-10 TO +5V. SEEK TO CYLINDER 511 (37843), OBSERVE LOGIC HIGH AT 6B-3 | FILE 2378432, READ |
| 403445 | REMOVE JUMPER FROM 4E-11. SEEK TO CYLINDER 0. SEEK TO CYLINDER 512 (37A00) AND OBSERVE A PULSE AT 4E-11. | FILE 0, READ FILE 237A002, READ |
| 500001 | MONITOR 35B47(WRT) AND 05A58(NW DATADET) AND OBSERVE THAT 05B47 GOES HIGH WHEN A WRITE COMMAND IS SENT AND THAT 05A58 IS HIGH DURING THIS TRANSITION. | FILE 2586F62, WRITE |

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| STEP | DISK MTR | DSC DIAGNOSTIC |
|--------|----------|---|
| 000000 | | I THE MODEL 207 DISK I MAINTENANCE TEST ROUTINE I (MARK 2 AND MARK 3 MTR I MANUAL 2796 2887, REV. A) I DOES NOT MAKE ANY I REFERENCE TO THE DDEC. I THEREFORE, A CROSS I REFERENCE LIST IS NOT I REQUIRED. I I HOWEVER, LISTED BELOW ARE I THE ITEM NUMBERS WHERE I STIMULUS TO THE DISK MAY I BE PROVIDED BY THE DSC I DIAGNOSTIC. IN SEVERAL I INSTANCES THE STIMULUS I CLOSELY APPROXIMATES, BUT I IS NOT IDENTICAL TO THAT I DESCRIBED IN THE MTR. I I BEFORE ERRORS IN A MODEL I 207 DISK UNIT CAN BE I DETECTED USING THIS I PROCEDURE, THE DSC-2 I DIAGNOSTIC PROGRAM, I CT 2228 3915, SHOULD BE I LOADED INTO THE GEM I PROCESSOR AND EXECUTED. I THE FOLLOWING COMMANDS I SHOULD THEN BE ENTERED I ON THE ODT: I I UNIT <UNIT NUMBER> I AVAILABLE ON I UNLOCK I BEGIN 0, END 1118259 I ODT OFF |

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| 433230 | SEND A CYLINDER CM WITH ADDRESS 1564 GROUND C4-15 MOMENTARILY GND D3-10 OBSERVE HIGH AT J1-15. | FILE 1117545 READ |
| 443720 | OBSERVE A LOW PULSE AT G1-12 WHEN A READ CM IS SENT. | READ |
| 443730 | OBSERVE A HIGH OR A HIGH PULSE AT A2-6 (RDREQ) WHEN A READ CM IS SENT. | READ |
| 443740 | OBSERVE A HIGH AT H2-5 (READGT) WHEN A READ CM IS SENT. IT MAY BE NECESSARY TO SEND SEVERAL READ CM'S. | READ * 1000 |
| 444180 | REMOVE JUMPERS PUSH WRITE ENABLE INSTRUCT DRIVE TO WRITE ON CYLINDER 1563 OBSERVE A HIGH OR HIGH PULSES AT B3-9 (WREQ) | FILE 1117545, LEN 180 WRITE |
| 444370 | SEND A WRITE CM AND OBSERVE A POSITIVE GOING PULSE AT D1-8. | WRITE |
| 465450 | PWR UP DRIVE SEND "TESTOP" CM, CONTINUOUSLY OBSERVE TRANSITIONS AT A0-9, A0-10, A0-11 | TEST |
| 465480 | STOP SENDING CONTINUOUS "TESTOP" CMS JUMPER DC11 INTERFACE TO +5VDC SEND ONE "TESTOP" CM OBSERVE 4 NEG TRANSITIONS AT C0-6 | TEST |

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| STEP | DISK MTR | DSC DIAGNOSTIC |
|--------|--|--|
| 465490 | REMOVE PROBE FROM A0-6, PUT IT ON C0-6 SEND ONE "TESTOP" CM OBSERVE 1 NEG TRANSITION AT C0-6 REMOVE JUMPERS | TEST |
| 465500 | MOVE PROBE FROM C0-6 TO B0-6 GRND B0-2,B0-3,B0-12,B0-13 B0-14 SEND ONE "TESTOP" CM OBSERVE NO TRANSITIONS AT B0-6 REMOVE JUMPERS | TEST |
| 465510 | APPLY +5V TO B0-2,B0-3, B0-12,B0-13,B0-14 SEND ONE "TESTOP" CM OBSERVE 4 NEG TRANSITIONS AT B0-6 REMOVE JUMPERS EXCEPT THE ONE AT DC11 INTERFACE | TEST |
| 465520 | SEND ONE "TESTOP" CM OBSERVE NO TRANSITIONS AT D0-6 REMOVE JUMPERS | TEST |
| 470770 | WRITE ALL "A'S" PATTERN (1,0,1..) ON CYL 1563 HD 0 OBSERVE NEGATIVE GOING PULSES AT F2-2. | LEN 16200, DATA 2AA2 * 180 FILE 1117545, WRITE |

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