

.REM 3

IDENTIFICATION

PRODUCT CODE: AC-E679M-MC
PRODUCT NAME: CXRPAM0 RP11 MODULE
PRODUCT DATE: SEPTEMBER 1978
MAINTAINER: DEC/X11 SUPPORT GROUP

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1. ABSTRACT:

RPA IS A IOMODX THAT EXERCISES THE RP11 HIGH AND LOW DENSITY DISK DRIVES.

2. REQUIRMENTS:

HARDWARE: A PDP11 INTERFACED WITH A RP11.

STORAGE:: RPA REQUIRES:

1. DECIMAL WORDS: 1237
2. OCTAL WORDS: 02325
3. OCTAL BYTES: 4652

3. PASS DFFINITION:

AN END OF PASS OCCURS WHEN 788,000 WORDS HAVE BEEN TRANSFERED. FIRST A WRITE OF 1024 WORDS IS EXECUTED, FOLLOWED BY A WRITE CHECK OF 1024 WORDS, THEN READING 256 WORDS FOLLOWED BY AN IN-CORE COMPARE. THIS IS DONE ON ALL DRIVES THEN ALL TRACKS.

4. EXECUTION TIME:

AN END OF PASS TAKES APPROXIMATELY ONE MINUTE.

5. CONFIGURATION REQUIRMENTS:

DEFAULT PARAMETERS ARE AS FOLLOWS;

DVA=176710
VCT=254
RR1=5

6. DEVICE/OPTION SETUP:

MAKE SURE THE DRIVE IS POWERED UP WITH WRITE ENABLED AND THAT THE DRIVE IS READY. ALSO BE SURE THAT THE PACK HAS BEEN FORMATTED PROPERLY.

7. MODULE OPERATION:

EXECUTES A WRITE, WRITE CHECK, AND A READ ON ALL TRACKS, ALL SECTORS, AND ALL CYLINDERS.
A RETRY IS DONE 3 TIMES BEFORE A MODULE IS DROPPED OR CONTINUES TO A NEW BLOCK DEPENDING ON THE SRI OPTION BITS.
LOCATION "RTLMT" CAN BE CHANGED TO ALTER THE NUMBER OF ATTEMPTED RETRYS.

8. OPERATING OPTIONS:

SRI BIT0=0->IF LOW DENSITY
SRI BIT0=1->IF HIGH DENSITY
SRI BIT1=0->DROPS MODULE AFTER 3 UNRECOVERABLE ERRORS
SRI BIT1=1->GOES ON TO NEXT BLOCK AFTER AN UNRECOVERABLE ERROR
SRI BIT2=0->WILL TYPEOUT DATA LATE ERRORS AND COUNTS THEM IN LOCATION DLTCNT
SRI BIT2=1->WILL NOT TYPEOUT DATA LATE ERRORS AND KEEPS COUNT OF THEM IN DLTCNT
THERE IS A TABLE AT LOCATION "BADLOC" IN WHICH UP TO 20 CYLINDER-TRACK COMBINATIONS MAY BE ENTERED. FOR ANY CYL-TRK LISTED THERE NO ERRORS WILL BE REGISTERED. THIS IS INTENDED FOR USE WITH PACKS WITH KNOWN BAD SPOTS. REFER TO THE LISTING AT LOCATION BADLOC FOR DIRECTIONS ON HOW TO ENTER DISC ADDRESSES INTO THE TABLE.
NOTE: ANY ADDRESS ENTERED IN THIS TABLE WILL APPLY TO ALL DISKS UNDER TEST.

9. NON-STANDARD PRINTOUTS:

ALL PRINTOUTS ARE STANDARD ACCORDING TO DEC/X11 DOCUMENTS.
FREDP PRINTOUTS OTHER THAN DATA ERRORS AND NOT READY ERRORS DUMP THE REGISTERS IN THE FOLLOWING ORDER:

DEVICE STATUS
ERROR
CONTROL STATUS
WORD COUNT
BUS ADDRESS
CYLINDER ADDRESS
DISK ADDRESS
SELECTED UNIT CYLINDER ADDRESS

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*
;XRP11 EXERCISER
000000- IOMODY <RPAM >176710,254,5,0,0,750,6,INRD,256,1024.
000000- MODULE 150000,RPAM,176710,254,5,0,6,750,6,INRD,256,1024.
; .TITLE RPAM DEC/X11 SYSTEM EXERCISER MODULE
; DDRCOM VERSION 6 23-MAY-78
*****LIST*****
000000- BEGIN:
000000- 050122 046501 040 MODNAM: .ASCII /RPAM / ;MODULE NAME
000000- 000000- 000000- ADDR: 176710+0 ;USED TO KEEP TRACK OF WBUFV USAGE
000000- 000010- 000254 VECTOR: 254+0 ;1ST DEVICE ADDR
000000- 000013- 240 BR1: .BYTE PRTV5+0 ;1ST DEVICE VECTOR.
000000- 000014- 000 BR2: .BYTE PRTV5+0 ;1ST BR LEVEL.
000000- 000016- 000000 DVID1: .BYTE PRTV5+0 ;2ND BR LEVEL.
000000- 000020- 000000 SR1: OPEN ;SWITCH REGISTER 1.
000000- 000021- 000000 SR2: OPEN ;SWITCH REGISTER 2.
000000- 000022- 000000 SR3: OPEN ;SWITCH REGISTER 3.
000000- 000024- 000000 SR4: OPEN ;SWITCH REGISTER 4.
*****LIST*****
000025- 150000 STAT: 150000 ;STATUS WORD.
000030- 000254- START: START ;MODULE START ADDR.
000033- 000254- SPOINT: MODDSP ;MODULE STACK POINTER.
000034- 000000- PASCNT: 0 ;PASS COUNTER.
000036- 001356 ICONF: 750. ;# OF ITERATIONS PER PASS=750.
000042- 000000- SOFCNT: 0 ;LOC TO COUNT ITERATIONS
000044- 000000- HRDCNT: 0 ;LOC TO SAVE TOTAL HARD ERRORS
000045- 000000- SOPPAS: 0 ;LOC TO SAVE SOFT ERRORS PER PASS
000046- 000000- HRDPAS: 0 ;LOC TO SAVE HARD ERRORS PER PASS
000052- 000000- SYSCNT: 0 ;# OF SVS ERRORS ACCUMULATED
000054- 000000- RANNUM: 0 ;HOLDS RANDOM # WHEN RAND MACRO IS CALLED
000056- 000000- CONFIG: 0 ;RESERVED FOR MONITOR USE
000060- 000000- RES2: 0 ;RESERVED FOR MONITOR USE
000062- 000000- SVR0: OPEN ;LOC TO SAVE R0
000064- 000000- SVR1: OPEN ;LOC TO SAVE R1.
000066- 000000- SVR2: OPEN ;LOC TO SAVE R2.
000070- 000000- SVR3: OPEN ;LOC TO SAVE R3.
000072- 000000- SVR4: OPEN ;LOC TO SAVE R4.
000074- 000000- SVR5: OPEN ;LOC TO SAVE R5.
000076- 000000- SVR6: OPEN ;LOC TO SAVE R6.
00100- 000000- CSRA: OPEN ;ADDR OF CURRENT CSR.
00102- SBADR: OPEN ;ADDR OF GOOD DATA, OR
00104- ACSR: OPEN ;CONTENTS OF CSR.
00106- WSADR: OPEN ;ADDR OF BAD DATA, OR
00108- ASADR: OPEN ;STATUS REG CONTENTS.
00110- ERRTP: OPEN ;TYPE OF ERROR
00112- ASR: OPEN ;EXPECTED DATA.
00114- AMAS: OPEN ;ACTUAL DATA.
00116- WDFR: OPEN ;START ADDRESS AFTER END OF PASS
;WORDS TO MEMORY PER ITERATION
;WORDS FROM MEMORY PER ITERATION

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000120- 000000 INTR: OPEN ;# OF INTERRUPTS PER ITERATION
000122- 000006 IDNUM: 6 ;MODULE IDENTIFICATION NUMBER=6
000124- 003620- RBUFVA: INRD ;READ BUFFER VIRTUAL ADDRESS
000126- 000000- RBUFPA: OPEN ;READ BUFFER PHYSICAL ADDRESS
000130- 000000- RBUFEA: OPEN ;READ BUFFER EA BITS
000132- 000400- WBUFVA: OPEN ;WRITE BUFFER VIRTUAL ADDRESS
000134- 000000- WBUFEA: OPEN ;WRITE BUFFER EA BITS
000136- 000000- WBUFSG: 1024. ;WRITE BUFFER SIZE REQUESTED
000138- 000000- WBUFSZ: OPEN ;WRITE BUFFER SIZE AVAILABLE
000142- 000000- CDRECT: OPEN ;CDATA/DATCK ERROR COUNT
000146- 000000- CMDCT: OPEN ;CDATA/DATCK WORD COUNT
000150- 000040- FREE: OPEN ;RESERVED FOR FUTURE USE
;MODULE STACK STARTS HERE.
;LIST
;ENDR
000252- MODSP: *****LIST*****
199 000252- 012767 000400 177634 START: MOV #256, WDFR ;256 WORDS TO MEM FROM RP
200 000260- 016767 002000 177630 MOV 1024, WDFR ;1024 WORDS FROM MEM TO RP
201 000266- 012767 000003 177624 MOV #3, INTR ;3 INTERRUPTS PER ITERATION
202 000272- 016767 177514 004316 MOV DVID1, DVCT ;GET NUMBER OF DEVICES
203 000278- 016767 004312 004316 MOV DVCT, RFDV ;SAVE NUMBER
204 000310- 012767 000001 003252 START1: MOV #1, DROP ;SET MODULE DROP POINTER
205 000316- 005067 003216 CLR DLACTN ;CLEAR DATA LATE ERROR COUNTER
206 000322- 005067 003256 CLR TPVS ;
207 000328- 005067 004310 CLR SWLT ;
208 000334- 005987 004282 CLR SWLT ;
209 000336- 001002 BNE STR ;ANY SELECTED?
210 000340- 104410 000000- ENDS, BEGIN ;YES
;
211 000344- 004567 001226 STR: JSP R5, SRC ;SET UP REGISTER ADDRESS
212 000350- 005067 003234 CLR MDCNT ;CLEAR OUT COUNTERS
213 000356- 005067 003232 CLR TPCK ;
214 000362- 005067 003230 CLR BLK1 ;
215 000366- 005067 003230 CLR BLK2 ;
216 000364- 122737 000003 000041 CNPB #3, #41 ;TEST FOR LOAD MEDIUM
217 000372- 001020 BNE RFDNO ;BRANCH IF NOT
218 000374- 113700 000040 MOVB #40, R0 ;LOAD DEVICE NUMBER
219 000400- 012767 000001 MOV R0, R1 ;DEVICE MASK
220 000404- 012767 000001 TSTR R0, R1 ;HAVE LOAD DEVICE?
221 000406- 001403 BEQ 2S ;YES, DROP IT
222 000410- 006301 ASL R1 ;NO, SHIFT TO NEXT DEVICE
223 000412- 105300 DECB R0 ;
224 000414- 000723 BE 1S ;CHECK AGAIN
225 000416- 040167 004176 2S: BIC R1, DVCT ;CLEAR LOAD DEVICE
226 000422- 040167 004200 BIC R1, RFDV ;GO CALCULATE IT ALL
227 000424- 001800 BNE RFDNO ;
228 000430- 104410 000000- ENDS, BEGIN ;
;
229
230 000434- 000000- RPDNO:
231 000440- 104414 000000- GETPAS, BEGIN ;GET WRITE BUFFER INFORMATION
232 000442- 104415 000000- MOV RBUFVA, RBUFVA ;GET PHYSICAL ADDRESS FROM 16-BIT RBUFVA
233 000444- 016767 177460 003142 MOV RBUFSZ, RDCT ;
234 000454- 005467 003136 NFG RDCT ;

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235 000460 016767 177456 004134 MOV WRUFSZ,WRDCT
236 000468 005467 004130 NEG WRDCT
237 000472 004567 004130 JSR R5,CLEAR ;CLEAR TRY COUNTERS
238 000476 004567 004130 JSR R5,RSEL ;GO DETERMINE A DRIVE
239 000502 016777 003102 003036 MOV WDCNT,RCSR ;SET DEVICE NO.
240 000510 105777 003032 2S: TSTR RCSR ;DEVICE READY?
241 000514 104400 001606 BMI R5,HOME HEAD ;IF READY HOME HEAD
242 000516 004567 JSR R5,WAIT
243
244 ;HOME HEADS ROUTINE
245 -----
246
247
248 000522 032767 000010 004112 HMHD: BIT #10,SWIT ;HAVE HEADS BEEN HOMED?
249 000530 016785 BNE EXER ;YES
250 000533 016785 177252 MOV VECTOR,R0 ;SET VECTOR
251 000536 012720 001115 MOV #HHSRV,(R0)+
252 000542 116740 177244 MOVBR BR1,(R0) ;SET BR LEVEL
253 000546 052777 000115 BIS #115,RCSR ;HOME HEADS
254 000554 104400 000000 EXITS,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
255
256
257
258 000560 005767 004034 RTRN: TST DVCT ;ANY MORE DRIVES?
259 000564 001403 BEQ IS INCR
260 000566 105267 003017 BR RPDND
261 000572 007720 000010 004040 1S: RPDND ;SET HEADS HOMED FLAG
262 000576 007720 004020 004010 MOV RPD, DVCT ;RESTORE DEVICE COUNTER
263 000600 016785 004020 002774 CLR WDCNT
264 000610 005067 000001 002746 MOV #1,DROP ;GO DO STUFF
265 000622 007084 BR RPDND
266
267 ;START DATA TRANSFER
268 -----
269
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272
273 000624 005777 002712 EXER: TST R0DVS ;TEST FOR UNIT READY
274 000630 108702 BIT R5,WAIT1 ;GO
275 000632 004567 JSR R5,WAIT1
276
277
278 000636 004567 001076 1S: JSR R5,BLKNO ;GO DETERMINE BLOCK NO.
279 000642 004567 001122 JSR R5,TRKNO ;GO DETERMINE TRACK NO.
280 000646 004567 001144 JSR R5,CALC ;CALCULATE BLOCK CONVERSION
281 000652 005067 003772 CLR DATCK ;CLEAR KNOWN BAD SPOT FLAG
282
283
284 000656 004567 000024 GOA: JSR R5,WRT ;DO A WRITE
285 000662 000533 BR RETRY1 ;TRY AGAIN
286
287 000664 004567 000056 GOB: JSR R5,WCK ;DO A WRITE CHECK
288 000670 000556 BR RETRY2 ;TRY AGAIN
289
290 000672 004567 000110 GOC: JSR R5,RDCMD ;DO A READ
291 000676 000167 JMP RETRY3 ;TRY AGAIN

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291 000702 000167 000500 JMP ALDN ;ALL DONE
292
293
294 000706 116777 003770 002632 WRT: MOVW WRUFSZ,RCSR ;SET WRITE COMMAND
295 000714 042777 000460 002624 BIT #60,RCSR ;CLEAR EA BITS
296 000722 056777 177210 002616 BIS WRUFEA,RCSR
297 000730 016777 003666 002612 MOV WRDCT,WDC ;SET WORD COUNT
298 000736 016777 177172 002608 MOV WBUFFA,RBAD ;SET BUFFER ADDRESS
299 000744 006437 BR G01
300
301 000746 116777 003664 002572 WCK: MOVW WRUFSZ,RCSR ;SET WRITE CHECK
302 000754 042777 000460 002564 BIT #60,RCSR ;CLEAR EA BITS
303 000762 056777 177150 002556 BIS WRUFEA,RCSR
304 000770 016777 003826 002552 MOV WRDCT,WDC ;SET WORD COUNT
305 000776 016777 177132 002546 MOV WBUFFA,RBAD
306 001004 000417 BR G01
307
308
309 001006 116777 003622 002532 RDCMD: MOVW READ,RCSR ;SET READ COMMAND
310 001014 042777 000460 002524 BIT #60,RCSR ;CLEAR EA BITS
311 001022 056777 177102 002516 BIS WRUFEA,RCSR
312 001030 016777 177072 002514 MOV WBUFFA,RBAD
313 001036 016777 002554 002504 MOV WRDCT,WDC
314
315 001044 016700 176740 002470 G01: MOV VECTOR,R0 ;SET VECTOR
316 001050 012720 001132 MOV #RPSUB,(R0)+
317 001054 116710 176732 MOVBR BR1,(R0) ;SET BR LEVEL
318 001060 016777 004326 MOV TPL,RDSAD ;SET TRACK ADDRESS
319 001066 016777 004326 MOV CVL,RDAD ;SET CYLINDER ADDRESS
320 001074 105067 003844 CLRB HDEFF ;CLEAR HARD ERROR FLAG
321 001100 052777 000101 002440 BIS #101,RCSR ;SET GO + INTERRUPT ENABLE
322 001106 104400 000000 EXITS,BEGIN ;EXIT TO MONITOR. MODULE WAIT FOR INTERRUPT.
323
324 ;HOMED HEAD INTERRUPT SERVICE ROUTINE
325 -----
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329
330 001112 HHSRV:
331 001112 000004 000000 001120 ;RIPQS,BEGIN,1S ; QUEUE UP TO CONTINUE AT 1S AND RTI
332
333 001120 042777 000115 002420 1S: BIS #115,RCSR ;CLEAR HOME HEADS BITS
334 001126 000167 177426 JMP RTRN ;RETURN
335
336 ;DATA TRANSFER SERVICE ROUTINE
337 -----
338
339
340
341 001132 RPSUB:
342 001132 000004 000000 001140 ;RIPQS,BEGIN,1S ; QUEUE UP TO CONTINUE AT 1S AND RTI
343
344 001140 004567 000740 1S: JSR R5,ERCK ;GO CHECK FOR ERRORS
345
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347 001144 000205 RTS R5 ;ERRORS
348 001146 005725 TST (R5)+ ;NO ERRORS
349 001150 000205 RTS R5
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001152 105767 003466 RETRV1: TSTB HDERF ;WAS IT A HARD ERROR?
001156 014913 000000 BNE 15 ;SKIP MSG IF YES
001160 004767 001510 JSR PC,NOW ;PUT INTO MSG CURRENT POSITION
001164 104403 000000 MSGNS,BEGIN,MG1 ;ASCII MESSAGE CALL WITH COMMON HEADER
001172 012767 000001 MOV #1,ERRTP ;DATA ERROR
*****
SOFERS,BEGIN,NULL ;WRITE ERROR
*****
001200 104406 000000 000000
001206 026767 002374 002360 1S: CMP RTLM,T,TRV1 ;LIMIT MET?
001214 005267 002352 BEQ COM ;YES
001222 000167 177430 INC TRV1 ;RETRY 3 TIMES
JMP GOA
001226 105767 003412 RETRV2: TSTB HDERF ;WAS IT A HARD ERR?
001232 001013 000000 BNE 15 ;SKIP MSG IF YES
001234 004767 001434 JSR PC,NOW ;PUT INTO MSG CURRENT POSITION
001238 104403 000000 MSGNS,BEGIN,MG2 ;ASCII MESSAGE CALL WITH COMMON HEADER
001246 012767 000001 MOV #1,ERRTP ;DATA ERROR
*****
SOFERS,BEGIN,NULL ;WRITE CHECK ERROR
*****
001262 104406 000000 000000
001262 026767 002320 002306 1S: CMP RTLM,T,TRV2 ;LIMIT MET?
001270 001432 BEQ COM ;YES
001272 005267 002300 INC TRV2 ;RETRY 3 TIMES
001276 000167 177362 JMP GOB
001302 105767 003336 RETRV3: TSTB HDERF ;WAS IT A HARD ERR?
001306 001013 000000 BNE 15 ;SKIP MSG IF YES
001310 004767 001360 JSR PC,NOW ;PUT INTO MSG CURRENT POSITION
001314 104403 000000 MSGNS,BEGIN,MG3 ;ASCII MESSAGE CALL WITH COMMON HEADER
001322 012767 000001 MOV #1,ERRTP ;DATA ERROR
*****
SOFERS,BEGIN,NULL ;WRITE CHECK ERROR
*****
001330 104406 000000 000000
001336 026767 002244 002234 1S: CMP RTLM,T,TRV3 ;LIMIT MET?
001344 001432 BEQ COM ;YES
001346 005267 002226 INC TRV3 ;RETRY 3 TIMES
001352 000167 177314 JMP GOC
COM:
*****
HDRERS,BEGIN,NULL ;TOO MANY RETRIES
*****
MSGNS,BEGIN,MG8 ;ASCII MESSAGE CALL WITH COMMON HEADER
BIT #2,SRL ;IS DROP SWITCH ON?
BNE REATP

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403 001402 004567 001224 JSR R5,OFFEND ;GO DROP
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001406 005767 003236 ALDN: TST DATCK ;IS THIS A KNOWN BAD TRACK?
001414 104412 000000 CDATA,BEGIN,RBUPFA ;IF TRUE CHECK DATA IF YES
001422 001424 000000 .+2 ;REQUEST FOR MONITOR TO CHECK DATA
001424 104413 000000 1S: ENDTIS,BEGIN ;IF ERROR, CONTINUE
001430 000400 BR RESTR ;SIGNAL END OF ITERATION.
;MONITOR SHALL TEST END OF PASS
;CONTINUE AFTER TRANSFERING 4 BLOCKS OF DATA
-----
424 001432 005767 003162 RESTR: TST DVCT ;TEST FOR MORE DRIVES
425 001436 001406 BEQ TRCT
426 001440 105267 002145 INCB NDCNT+1 ;INCREMENT DRIVE COUNT
427 001444 002367 002120 DROP ;MOVE DROP POINTER
428 001450 000167 176760 JMP RPDNO ;GO DO ANOTHER DRIVE
429
430 001454 016767 003136 TRCT: MOV RPDV,DVCT ;RESTORE COUNT
431 001462 005067 000001 CLR NDCNT ;CLEAR MODULE COUNT
432 001466 012767 002074 MOV #1,DROP ;RESTORE DROP POINTER
433 001474 122767 000023 CMPB #23,TRK1+1 ;ALL TRACK TESTED?
434 001502 001405 BEQ #1 ;YES
435 001504 005767 000040 RTS #40,SWIT ;NO
436 001512 000167 176716 JMP RPDNO
437
438 001516 005067 002070 BLCT: CLR TRK1 ;CLEAR TRACK COUNTER
439 001522 032767 000061 176266 BIT #1,SRL ;TEST FOR HIGH OR LOW DENSITY
440 001530 001405 BEQ IS
441
442
443
444
445 001532 022767 007726 002054 CMP #4054,BLK1 ;BLOCK LIMIT MET?
446 001540 000404 BLE RESTR ;RESTART
447 ;NO
448
449
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456
457
458
001544 022767 003750 002042 1S: CMP #2024,BLK1 ;LOW DENSITY LIMIT MET?
001552 001405 BEQ RESTR ;YES
001554 052767 000020 003060 2S: RTS #20,SWIT ;NO
001562 000167 176646 JMP RPDNO
001566 005067 003050 RESTR: CLR SWIT
001572 000167 176546 JMP STP

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465 001576* 016700 176204 SRG: MOV ADDR,R0 ;MOVE ADDRESS TO R0 AND
466 ;START TO SET UP RECS.
467 001602* 010067 001734 MOV R0,DVS ;DEVICE STATUS REG.
468 001608* 005020 CLR (R0)+
469 001610* 010067 001730 MOV R0,ERG ;SET ERROR REG
470 001614* 005020 CLR (R0)+
471 001616* 010067 001724 MOV R0,CSR ;CONTROL STATUS REG
472 001622* 005020 CLR (R0)+ ;INCREMENT ADDRESS
473 001624* 010067 001720 MOV R0,WDC ;WORD COUNT REG.
474 001630* 005020 CLR (R0)+
475 001632* 010067 001714 MOV R0,BAD ;BUS ADDRESS REG.
476 001636* 005020 CLR (R0)+
477 001640* 010067 001710 MOV R0,CYAD ;CYLINDER ADDRESS REG.
478 001644* 005020 CLR (R0)+
479 001646* 010067 001704 MOV R0,DSAD ;DISK ADDRESS REG.
480 001652* 005020 CLR (R0)+
481 001654* 022026 CMP (R0)+,(R0)+
482 001656* 005720 TST (R0)+,(R0)+
483 001660* 010067 001576 MOV R0,SUCA
484 001664* 016767 001658 MOV CSR,CSRA ;SAVE CSR ADDRESS
485 001672* 000205 RTS R5
486
487
488 ;DEVICE SELECT SUBROUTINE
489 -----
490
491
492 001674* 006267 002720 RPSEL: ASR DVCT ;LOOK FOR ACTIVE DEVICE
493 001700* 019065 R5 1
494 001702* 005267 001703 INCR MDCNT+1
495 001706* 006367 001656 ASL DPOP
496 001712* 000770 RR RPSEL
497 001714* 000205 RTS R5
498
499 ;RESET THE RP
500 -----
501
502
503 001716* 112777 000001 001622 REST: MOVB #1,CSR ;SET IDLE COMMAND
504 001720* 116777 001660 001614 MOV WDCNT,CSR ;RESET DRIVE # AFTER IDLE
505 001732* 004567 000466 JSR R5,WAIT1 ;GO WAIT FOR UNIT READY
506 001736* 000205 RTS R5
507
508
509 ;SET BLOCK NUMBER
510 -----
511
512
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515 001740* 332767 000020 002674 BLKNO: BIT #20,SWIT ;NEW BLOCK FLAG SET?
516 001746* 001001 BNE 1 ;YES
517 001750* 000205 RTS R5 ;NO
518 001752* 042767 000020 002662 1$: BIT #20,SWIT ;CLEAR FLAG
519 001754* 062767 000004 001626 ADD #4,BLK1 ;INCREMENT BLOCK COUNT
520 001766* 000205 RTS R5
521
522 ;SET TRACK NUMBER
523 -----
524
525
526 001770* 032767 000040 002644 TRKNO: BIT #40,SWIT ;DO NEW TRACK FLAG SET?
527 001778* 001001 BNE 1 ;YES
528 001782* 000205 RTS R5 ;NO
529 002000* 000205 000040 002632 1$: BIT #40,SWIT ;CLEAR FLAG
530 002002* 042767 000040 001577 INCR TRK1+1 ;INCREMENT TRACK.
531 002014* 000205 RTS R5
532
533 ;CALCULATE CYLINDER AND SECTOR
534 -----
535
536
537
538 002016* 005067 002606 CALC: CLR CYLCNT ;CLEAR CYLINDER COUNT
539 002018* 013901 MOV #1,C1 ;SET DIVIDE
540 002026* 016702 001562 MOV BLK1,R2 ;SET BLOCK NO.
541 002032* 022702 000011 1$: CMP #0,R2 ;START CALCULATION.
542 002036* 062064 BFC D1 ;GO DIVIDE
543 002040* 060102 ADD R1,R2 ;SUBTRACT FOR DIVIDE
544 002042* 005267 002562 INC CYLCNT ;KEEP COUNT.
545 002046* 000774 BR 1
546 002050* 110267 001536 DIV: MOVB #1,TRK1 ;SET SECTOR ADDRESS
547 002054* 000205 RTS R5
548
549
550 ;CLEAR ROUTINE
551 -----
552
553
554
555 002056* 005067 001510 CLEAR: CLR TRV1
556 002062* 005067 001506 CLR TRV2
557 002068* 005067 001504 CLR TRV3
558 002072* 005067 001502 CLR TRV4
559 002076* 005067 001500 CLR TRV5
560 002102* 000205 RTS R5
561
562
563 ;ERROR CHECK ROUTINE
564 -----
565
566
567
568
569
570

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571 002104* 065777 001436 ERCK: TST RCSR ;TEST FOR ERROR BIT
572 002110* 104404 ;BR IF ERROR
573 002112* 065725 1S: TST (R5)+ ;NO ERROR
574 002114* 000295 ;
575 002116* 037777 000020 001420 2S: RTS R5 ;TIMING ERROR?
576 002124* 001411 BEO R5 ;NO
577 002126* 005267 001406 ;COUNT ERROR
578 002132* 177767 000002 175746 ;DATA LATE
579 ;*****
580 002140* 104406 000000 000000 ;DATA LATE
581 ;*****
582 002146* 000426 ;CONT
583 002150* 017767 001400 3S: MOV R1-(R6) ;SAVE R1
584 002156* 105001 ;GET TRACK INFO
585 002160* 006301 CLR R1 ;LEAVE ONLY TRACK BITS
586 002162* 057767 ASL R1 ;MOVE TRACK BITS OVER 1 PLACE
587 002164* 017767 MOV R1,R1 ;OR IN THE CMT BITS
588 002172* 012701 003054* MOV R1,R1 ;OR IN THIS CURRENT ADDR OF DISK
589 002174* 021127 177777 4S: MOV R1,R1 ;GET START OF TABLE OF KNOWN BAD SPOTS
590 002176* 021127 ;END OF TABLE?
591 002178* 014404 002436 5S: CMP R1,R1 ;BRANCH IF YES, MUST BE REAL ERROR
592 002180* 026721 ;IS THIS ADDR A KNOWN BAD SPOT?
593 002210* 001372 BNE R5 ;IF NO, TRY NEXT TABLE ENTRY
594 002212* 012601 MOV R1,R1 ;RESTORE R1
595 002214* 012601 INC DATCK ;SET THE KNOWN BAD SPOT FLAG FOR ALDM
596 002220* 007734 ;RETURN AND DO NOT REPORT THE ERROR
597 002222* 012601 MOV R1-(R6)+,R1 ;RESTORE R1
598 002224* 017767 001316 175646 6S: MOV CSR,CSR ;SET UP FOR ERROR CALLS
599 002240* 017767 001276 175636 MOV R5,R5 ;DITTO
600 002242* 032777 040000 001272 MOV R5,ASTAT ;DITTO
601 002244* 032777 040000 BIT #40000,ACSR ;HARD ERROR?
602 002246* 014416 BEO R5 ;
603 002248* 014416 JSF R5,NOW ;PUT INTO MSG CURRENT POSITION
604 002250* 104403 000000 003164* MSGNS,BEGIN,MSG ;ASCII MESSAGE CALL WITH COMMON HEADER
605 002270* 005067 175612 CLP ERRTP ;UNKNOWN ERROR
606 ;*****
607 002274* 104405 000000 003542* HDRS,BEGIN,SAVE ;*****
608 ;*****
609 002302* 105267 002336 INCR HDERF ;SET HARD ERR FLAG TO GATE LATER MSG
610 002306* 004567 177404 7S: JSP R5,REST ;RESET AND TRY AGAIN
611 002312* 032777 000002 001224 ;CHECK FOR OVERFLOW SET
612 002314* 032777 BEO R5 ;
613 002322* 004567 000172 8S: JSP R5,OVFLO
614 002326* 000205 RTS R5 ;
615 ;
616 ;WAIT FOR CONTROLLER READY
617 ;-----
618 ;
619 ;
620 ;
621 002330* 005067 002270 WAIT: CLR TMCNT
622 002334* 104407 000000 1S: BREAKS,BEGIN ;TEMPORARY RETURN TO MONITOR....
623 002336* 104407 000000 ;THEN CONTINUE AT NEXT INSTRUCTION.
624 002344* 105777 000000 RSTB RCSR ;CONTROLLER READY?
625 002350* 100424 001176 BMI ZS ;YES

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627 002352* 005267 002246 INC TMCNT ;NO
628 002354* 017767 001162 175514 BNE ZS ;TIME OUT
629 002360* 017767 001150 175510 MOV R5,ACSR ;
630 002366* 017767 001150 175510 MOV R5,ASTAT ;
631 002374* 104403 000000 003154* MSGNS,BEGIN,MSG ;ASCII MESSAGE CALL WITH COMMON HEADER
632 002402* 012767 000003 175476 MOV R5,ERRTP ;CONTROLLER NOT READY
633 ;*****
634 002410* 104405 000000 000000 HDRS,BEGIN,NULL ;CONTROLLER NOT READY
635 ;*****
636 002416* 004567 000210 JSR R5,OFFEND ;
637 ;
638 002422* 000205 2S: RTS R5 ;
639 ;
640 ;
641 ;
642 ;WAIT FOR UNIT READY
643 ;-----
644 ;
645 ;
646 002424* 005067 002174 WAIT1: CLR TMCNT
647 002430* 104407 000000 1S: BREAKS,BEGIN ;TEMPORARY RETURN TO MONITOR....
648 002434* 104407 000000 ;THEN CONTINUE AT NEXT INSTRUCTION.
649 002440* 095777 001076 TST R5 ;UNIT READY?
650 002444* 100424 002152 BMI ZS ;YES
651 002446* 005267 001066 175420 INC TMCNT ;NO
652 002450* 017767 001054 175414 MOV R5,ACSR ;TIME OUT
653 002454* 017767 001054 175414 MOV R5,ASTAT ;
654 002462* 017767 000000 003154* MSGNS,BEGIN,MSG ;ASCII MESSAGE CALL WITH COMMON HEADER
655 002470* 012767 000006 175402 MOV R5,ERRTP ;DEVICE NOT READY
656 ;*****
657 002504* 104405 000000 000000 HDRS,BEGIN,NULL ;UNIT NOT READY
658 ;*****
659 002512* 004567 000114 JSR R5,OFFEND ;
660 ;
661 002516* 000205 2S: RTS R5 ;
662 ;
663 ;
664 ;
665 ;
666 ;
667 ;
668 ;
669 ;
670 ;
671 002520* 017703 001036 OVFLO: MOV #SUCA,R3 ;HIGH OR LOW DENSITY?
672 002524* 037767 000001 175264 BEO R1 ;BR IF LOW
673 002530* 014404 ;
674 002534* 012704 000625 MOV R3,R4 ;
675 002540* 166304 SOB R3,R4 ;
676 002542* 000463 RR DE ;
677 002544* 012704 000312 1S: MOV R2,R4 ;
678 002550* 166304 SUB R3,R4 ;
679 002552* 100417 DET: BMI TEL ;ARE WE PAST 405?
680 002554* 017767 BEO R4 ;
681 002556* 017767 MOV R4,QNT ;SET COUNTER
682 002562* 005067 001000 CLR TET ;

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683 002566 062767 005000 000772 1S: ADD #2560.,TET ;FIND SPACE LEFT
684 002800 005367 000784 BNE INT
685 002800 005367 000784 BNE INT
686 002602 026767 175334 000756 CMP WBUPSZ,TET ;COMPARE SPACE LEFT
687 002610 011407 TEL: BLOS RET ;RESTORE STACK
688 002614 065726 TST (R6)+,(R6)+
689 002516 042767 000010 002016 BIC (R6)+,SWIT
690 002624 000167 175514 RET: JMP STR
691 002630 000205 RTS R5
692
693
694
695
696
697
698 ;DROP ROUTINE
699
700 002632 046767 000732 001766 OFFEND: BIC DRDP,RPDV ;CLEAR OFFENDING DRIVE
701 002640 005767 001762 TST RPDV ;ANY MORE DRIVES?
702 002644 001002 BNE 3S
703 002646 164410 000000 ENDS,REGIN ;
704
705 002652 104403 000000 003160 3S: MSGNS,BEGIN,MG6 ;ASCII MESSAGE CALL WITH COMMON HEADER
706 002660 016767 001742 001732 MOV RPDV,DVCT ;RESTORE COUNT
707 002666 005726 TST (R6)+ ;RESTORE STACK
708 002670 000167 175450 JMP STR
709
710 ;NOW ROUTINE INSTALLS CURRENT ADDRESS INTO MSG
711
712
713 002674 010146 NOW: MOV R1,-(R6) ;SAVE CURRENT R1
714 002676 017701 000644 MOV @CSR,R1 ;GET DEVICE #
715 002702 000301 SWAB R1 ;GET GOOD BITS ON RIGHT SIDE
716 002704 042700 177770 BIC #177770,R1 ;LEAVE ONLY CORRECT BITS
717 002710 010167 000132 MOV R1,NUMB1 ;STORE IT
718 ;*****
719 ;CONVERT NUMB1 TO ASCII AND
720 ;STORE AT DNUM
721 002714 104420 000000 003046 OTOAS,BEGIN,NUMB1,DNUM
722 002722 003040 ;*****
723 ;PUT IN MSG
724 002724 116767 000115 000537 MOVB DNUM+5,NW+4 ;PUT IN MSG
725 002732 017767 000616 000110 MOV @VAD,NUMB2 ;PUT CYL# IN NUMB2 FOR MACRO
726 ;*****
727 ;CONVERT NUMB2 TO ASCII AND
728 ;STORE AT DNUM
729 002746 104420 000000 003050 OTOAS,BEGIN,NUMB2,DNUM
730 002746 003040 ;*****
731 ;PUT CYC# DIGITS
732 002750 116767 000067 000516 MOVB DNUM+3,NW+7 ;PUT CYC# DIGITS
733 002756 116767 000062 000511 MOVB DNUM+4,NW+8 ;INTO
734 002764 116767 000055 000504 MOVB DNUM+5,NW+9 ;MSG
735 002772 017761 000560 MOV @SAD,R1 ;PUT TRACK# ON STACK
736 002776 000301 SWAB R1 ;GET GOOD BITS ON RIGHT SIDE
737 002776 000301 BIC #177740,R1 ;LEAVE ONLY TRAVK BITS
738 003004 010167 000042 MOV R1,NUMB3 ;SAVE

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739 ;*****
740 ;CONVERT NUMB3 TO ASCII AND
741 ;STORE AT DNUM
742 003010 104420 000000 003052 OTOAS,REGIN,NUMB3,DNUM
743 003016 003040 ;*****
744 ;PUT TRACK# DIGITS
745 003020 116767 000020 000453 MOVB DNUM+4,NW+12 ;PUT TRACK# DIGITS
746 003026 116767 000013 000446 MOVB DNUM+5,NW+13 ;INTO MSG
747 003034 012601 000000 MOV (R6)+,R1 ;RESTORE R1
748 003036 000207 RTS PC ;GO BACK
749
750
751
752
753
754
755 003040 000003 DNUM: .BLKW 3 ;RESERVE SIX BYTES FOR BTOD MACRO
756 003046 000000 NUMB1: .WORD 0
757 003050 000000 NUMB2: .WORD 0
758 003052 060000 NUMB3: .WORD 0
759
760
761
762
763
764 003054 177777 BADLOC: 177777 ;TABLE FOR ENTRY OF KNOWN BAD
765 003056 177777 177777 ;TRACK-CYLINDER LOCATIONS
766 003062 177777 177777 ;FOR ANY TRACK-CYLINDER COMBINATIONS
767 003064 177777 177777 ;LISTED IN THIS TABLE, NO ERRORS WILL
768 003066 177777 177777 ;BE REGISTERED OR PRINTED.
769 003068 177777 177777 ;THE FIRST OCCURANCE OF A MINUS ONE,
770 003070 177777 177777 ;177777 MARKS THE END OF THE TABLE
771 003072 177777 177777 ;AND ANY ENTRIES PAST IT WILL BE IGNORED.
772 003074 177777 177777
773 003076 177777 177777
774 003100 177777 177777
775 003102 177777 177777
776 003104 177777 177777
777 003106 177777 177777
778 003110 177777 177777 ;DATA MUST BE IN THE FOLLOWING
779 003112 177777 177777 ;PATTERN:
780 003114 177777 177777 ;20 011 TIT CCC CCC CCC
781 003116 177777 177777 ;WHERE 0 IS UNUSED, T IS TRACK
782 003120 177777 177777 ;C IS CYCLINDER, I IS THEREFORE
783 003122 177777 177777 ;JUST, IN OCTAL, 0 IS THE LAST
784 003124 177777 177777 ;ENTRY IN THE TABLE MUST BE 177777
785 ;OF THE PROGRAM WILL BLOW UP
786 ;THIS MEANS THERE IS ROOM FOR 20 ENTRIES
787
788 ;GOOD THINGS TO SAVE.
789 003126 003176 MG1: HE1
790 003132 177777 NW
791
792
793 003134 003222 MG2: HE2
794 003136 003468 NW

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795	003140	177777							177777
796									
797	003142	003254				MG3:		HE3	
798	003144	003465						NW	
799	003146	177777						177777	
800									
801	003150	003277				MG4:		DMR	
802	003152	177777						177777	
803									
804	003154	003324				MG5:		UNR	
805	003156	177777						177777	
806									
807									
808	003160	003347				MG6:		DRD	
809	003162	177777						177777	
810									
811									
812	003164	003404				MG7:		HRD	
813	003166	003465						NW	
814	003170	177777						177777	
815									
816									
817	003172	003435				MG8:		SOE	
818	003174	177777						177777	
819									
820									
821	003176	020045	047523	052106		HE1:	.ASCIZ	"% SOFT WRITE ERROR "	
822	003204	053440	044522	042524					
823	003226	000040	051122	051117					
824									
825									
826	003222	020045	047523	052106		HE2:	.ASCIZ	"% SOFT WRITE CHECK ERROR "	
827	003230	053440	042510	045563					
828	003236	000040	042510	045563					
829	003244	042440	051122	051117					
830	003252	000040							
831									
832	003254	020045	047523	052106		HE3:	.ASCIZ	"% SOFT READ ERROR "	
833	003262	051040	040505	020104					
834	003270	051105	047522	020122					
835	003276	000							
836									
837	003277	045	042040	053105		DNR:	.ASCIZ	"% DEVICE NOT READY %"	
838	003304	041511	020105	047516					
839	003320	020124	042523	042101					
840	003326	020131	000045						
841									
842	003324	020045	047125	052111		UNR:	.ASCIZ	"% UNIT NOT READY %"	
843	003330	047040	052117	051040					
844	003336	040505	054504	022440					
845	003346	000							
846									
847									
848	003347	045	042040	047522		DRD:	.ASCIZ	"% DROPPED OFFENDING DRIVE %"	
849	003354	050120	042105	047440					
850	003362	043106	047105	044504					

851	003370	043516	042040	044522					
852	003376	042526	020040	000045					
853									
854	003404	020045	040510	042122		HRD:	.ASCIZ	"% HARD ERROR BIT 14 SET "	
855	003412	042440	051122	051117					
856	003420	041040	052111	030440					
857	003426	020044	042523	020124					
858	003434	000							
859									
860									
861	003435	045	052440	051116		SOE:	.ASCIZ	"% UNRECOVERABLE ERROR %"	
862	003445	041505	053117	051105					
863	003450	041101	042514	042440					
864	003456	051122	051117	022440					
865	003464	000							
866	003472	041440	042504	020126		NW:	.ASCIZ	" DEV C T IN OCTAL "	
867	003492	041440	020040	020040					
868	003500	020124	020040	044440					
869	003506	020114	041517	040524					
870	003514	060114							
871	003516	042045	052101	020101		MES10:	.ASCIZ	"%DATA LATE ERROR%"	
872	003524	040514	042524	042440					
873	003532	051122	051117	000045					
874									
875									
876									
877									
878									
879	003540	000000				DLTCNT:	0		
880	003542	000000				SAVRC:	0		
881	003544	000000				DVS:	0		
882	003546	000000				ERC:	0		
883	003546	000000				CSR:	0		
884	003550	000000				WDC:	0		
885	003552	000000				BAD:	0		
886	003554	000000				CYAD:	0		
887	003556	000000				DSAD:	0		
888	003560	177777						177777	
889									
890									
891	003562	000000				SUCA:	0		
892	003564	000000				QNT:	0		
893	003566	000000				TEP:	0		
894	003568	000000				DRDP:	0		
895	003572	000000				TRV:	0		
896	003574	000000				TRV1:	0		
897	003576	000000				TRV2:	0		
898	003600	000000				TRV3:	0		
899	003602	000000				TRV4:	0		
900	003604	000000				TRV5:	0		
901	003606	000002				RTLMT:	2		
902	003610	000000				WDCHT:	0		
903	003612	000000				TRK1:	0		
904	003614	000000				BLK1:	0		
905	003616	000000				RDC1:	0		
906	003620	000400				INRD:	.BLKW 256.		

;DEVICE STATUS REG
 ;ERROR REG
 ;CONTROL STATUS REG
 ;WORD COUNT REG
 ;BUS ADDRESS REG.
 ;CYLINDER ADDRESS REG.
 ;DISK ADDRESS REG.

;SELECTED UNIT CYLINDER ADDRESS

;RETRY LIMIT *****CAN BE CHANGED

;TRACK NO.

;READ WORD COUNT
 ;READ BUFFER

SOE	003435R	817	861#																	
SOP	000042R	152#																		
SOPERS=	104406	199#	362	376	390	580														
SOPPAS	000046R	154#																		
SPDINT	000037R	148#																		
SPSIZ =	000046	192																		
SRG	001576R	212																		
SRI	000016R	143#	401	439	672															
SR4	000025R	144#																		
SR4	000024R	144#																		
START	000217R	174#	199#																	
START1	000310R	204#																		
STR	000344R	209	212#	458	691	708														
SUCA	003562R	483#	671	891#																
SVRO	000062R	161#																		
SVR1	000064R	162#																		
SVR2	000066R	163#																		
SVR3	000070R	164#																		
SVR4	000072R	165#																		
SVR5	000074R	166#																		
SVR6	000076R	167#																		
SWIT	004642R	207#	248	262*	435*	455*	457*	515	518*	527	530*	690*	916#							
SYSCNT	000052R	158#																		
TEA	002612R	176#																		
TEA	003566R	682*	680	688#																
TECNT	004624R	621*	627*	686*	893#	909#														
TRC*	001454R	425	430	646*	652*															
TRKNO	001770R	279	527#																	
TRK1	003612R	214*	318	433	438*	531*	547*	903#												
TRDPD=	000027	199#																		
TRY	000052R	158#																		
TRY1	003574R	364	895#																	
TRY2	003576R	378	366*	559*	896#															
TRY3	003600R	392	380*	560*	897#															
TRY4	003602R	392*	394*	561*	898#															
TRY5	003604R	392*	899#																	
UNR	003324R	804	900#																	
VECTOR	000010R	137#	804	842#																
WALL	002139R	242	250	315																
WASADR	000104R	171#	621#	646#																
WBUFEA	000136R	186#	296	303																
WBUPPA	000138R	186#	298	305																
WBUPRO	000140R	187#																		
WBUPSZ	000142R	188#																		
WCK	000746R	286	235	686																
WDC	003550R	297*	301#																	
WDFR	000148R	177#	304*	313*	473*	884#														
WDT0	000114R	177#	199*																	
WRDCT	004622R	235*	236*	297	304	908#														
WRITE	004632R	294	912#																	
WRT	001706R	283	292																	
WRTCK	004636R	301	914#																	
XPLAG	000005R	135#																		

. = 004652R 412 755# 906#

. ABS. 000000 000
 004652 001

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0
 XRPAMO,XRPAMO/SOL/CRF:SYM=DDXCOM,XRPAMO
 RUN-TIME: 1 2.4 SECONDS
 RUN-TIME RATIO: 2574=5 1
 CORE USED: 7K (13 PAGES)