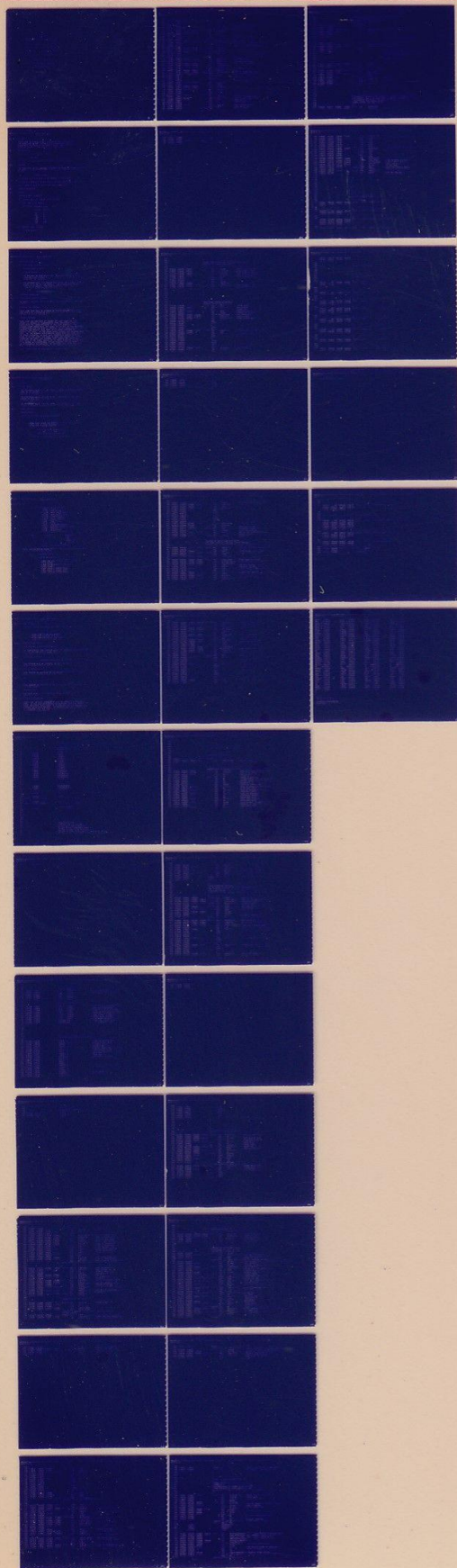


RF11

MULTI DISK
MD-11-DZRFC-B

EP-DZRFC-B-DL
COPYRIGHT © 1973
FICHE 1 OF 1

JUN 1978
digital
MADE IN USA



IDENTIFICATION

PRODUCT CODE: MAINDEC-11 DZRECH-B-D
REPLACES: MAINDEC-11-05AA
PRODUCT NAME: PF11 MULTI DISK
DATE OF EDITION: 1 NOVEMBER 1970
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: E. HAIGHT/C. CASAFIL

COPYRIGHT 1973

DIGITAL EQUIPMENT CORPORATION

MAYFARL, MASS.

1. ABSTRACT

MULTI DISK IS A HIGH SPEED CONFIDENCE TEST THAT ASSURES THE USER THAT HE CAN TRANSFER DATA CORRECTLY, WITHOUT DESTROYING THE DATA ON THE DISK. MULTI DISK USES ALL EXISTING MEMORY ON THE SYSTEM AS BUFFER AREAS.

2. REQUIREMENTS

A. PDP-11 4K TO 28K OF MEMORY

TELETYPE

B. RF11 AND RS11 PLUS UP TO SEVEN ADDITIONAL RS11'S

2.2 STORAGE

THE MAIN BODY OF THE PROGRAM OCCUPIES THE FIRST 5K OCTAL (BYTES) OF MEMORY. THREE DATA BUFFERS OCCUPY THE REST OF EXISTING MEMORY.

BUFFER ORDER

OUT BUFFER = RANDOM DATA TO BE WRITTEN ON THE DISK.

IN BUFFER = AREA FOR RANDOM DATA WHEN READ FROM THE DISK.

SAVE BUFFER = AREA TO SAVE DISK WHEN EXERCISING.

3. LOADING PROCEDURE

3.1 METHOD

PROGRAM FORMAT ABSOLUTE

A. VERIFY THE BOOT LOADER IS IN MEMORY.

B. LOAD TAPE INTO READER.

C. SET SWITCH REGISTER EQUAL TO 0750

MEMORY SIZE *

4K	17
8K	37
12K	57
16K	77
20K	117
24K	137
28K	157

D. DEPRESS LOAD ADDRESS.

E. DEPRESS START.

4. STARTING PROCEDURE

- A. SET SWITCH REGISTER EQUAL TO 200.
- B. DEPRESS LOAD ADDRESS.
- C. DEPRESS START.
- D. THE PROGRAM AT THIS POINT WILL DETERMINE THE AMOUNT OF EXISTING CORE MEMORY, AND SET UP THE WORD COUNT AND BUFFER AREAS FOR THE PROGRAM.
- E. THE PROGRAM WILL NEXT REPORT THE NUMBER OF EXISTING DISK(S) WHICH WHICH ARE ON THE SYSTEM. THE NUMBER WILL RANGE FROM 1 - 10 OCTAL. THE DISK SELECTION LINES MUST BE IN SEQUENTIAL ORDER RANGING FROM 0 TO 7.

06 EXISTENT DISK(S)

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

THE SWITCH REGISTER HAS NO CONTROL OVER THE OPERATION OF THIS PROGRAM.

5.2 STOPPING THE PROGRAM

MULTI DISK MUST ONLY BE STOPPED BY TYPING CONTROL C. IF THE USER STOPS THE PROGRAM BY DEPRESSING CONSOLE HALT, THE DISK SURFACE MAY NOT BE RESTORED.

5.3 PROGRAM ABSTRACT

MULTI DISK WAS DESIGNED TO INSURE THE USER THAT THE DISK SYSTEM IS CAPABLE OF TRANSFERRING DATA CORRECTLY WHILE NOT DESTROYING THE USERS PROGRAMS ON THE DISK SURFACE. THE PROGRAM FIRST READS FROM THE DISK, THE LENGTH OF THE TRANSFER IS DETERMINED BY THE SIZE OF MEMORY. IF AN ERROR OCCURS WHILE READING, THE PROGRAM WILL MAKE UP TO THREE ATTEMPTS AT READING THE DATA. IF THE ERROR STILL EXISTS, THE PROGRAM WILL THEN HALT. IF THE PROGRAM SUCCESSFULLY READS FROM THE DISK WITHIN THE THREE ATTEMPTS, IT WILL THEN GENERATE A RANDOM BUFFER, WRITE IT ON THE DISK, AND READ IT BACK AND VERIFY IT. AFTER COMPARING THE DATA, THE PROGRAM THEN WRITES THE ORIGINAL DATA BACK ON THE DISK, MAKING UP TO THREE ATTEMPTS TO TRANSFER IF AN ERROR IS ENCOUNTERED, BEFORE HALTING. IF THE DATA WAS SUCCESSFULLY TRANSFERRED, THE PROGRAM WILL GO TO THE NEXT DISK BUFFER UNTIL THE COMPLETE DISK SYSTEM IS EXERCISED.

NOTE: EACH WRITE IS FOLLOWED BY A WRITE CHECK.

6. ERRORS

6.1 ERROR HALTS

THE PROCESSOR HALTED AT LOC. 1462. CAUSE OF HALT NO SELECTED DISK ON THE SYSTEM, OR DISKS NOT SELECTED IN SEQUENTIAL ORDER STARTING WITH DISK A.

THE PROCESSOR HALTED AT LOC. 2004. THE CAUSE OF THE HALT, UNABLE TO READ FROM THE DISK FOR THE SAME BUFFER. THREE ATTEMPTS WERE MADE.

THE PROCESSOR HALTED AT LOC. 2256. THE CAUSE OF THE HALT, UNABLE TO RESTORE THE DISK SURFACE. THREE ATTEMPTS WERE MADE.

6.2 ERROR REPORTS

STATUS ERROR

STATUS ERROR XXDAF XXXXXDAF XXXXXDCS

A B C

A=THE DISK NUMBER AND EXTENDED DISK ADDRESS BITS.

B=THE DISK ADDRESS REGISTER

C=THE DISK CONTROL REGISTER

LAYOUT OF DISK ADDRESS BITS

DAF DAF

XXX XXX XXX XXX XXX XXX XXX

DISK NO. TRACK ADDRESS WORD ADDRESS

(6.2 CONT'D)

HIT LAYOUT OF DCS REGISTER

HIT15= ERROR
 BIT14= DISK FREEZE
 HIT13= WRITE CHECK ERROR
 BIT12= DATA PARITY ERROR
 HIT11= NON-EXISTENT DISK
 HIT10= WRITE LOCKOUT
 HIT9= MISSED TRANSFER
 BIT8= DISK CLEAR
 HIT7= READY
 HIT6= INTERRUPT ENABLE
 HIT5= EXTENDED MEMORY 1 (XM1)
 HIT4= EXTENDED MEMORY 0 (XM0)
 BIT3= MAINTENANCE
 HIT2-1= FUNCTION REGISTER

BIT 2	BIT 1	OPERATION
0	0	NOOP
1	0	READ
0	1	WRITE
1	1	WRITE CHECK

HIT= GO (WRITE ONLY HIT)

NOTE: WHEN A FREEZE ERROR OCCURS AN ADDITIONAL ERROR MESSAGE WILL BE REPORTED, AS FOLLOWS.

XXX HARD ERROR

LAYOUT OF BITS 0 - 7

HIT0= CMA INH. (NOT AN ERROR CONDITION)
 BIT1= UNUSED
 BIT2= NON-EXISTENT MEMORY ERROR
 BIT3= UNUSED
 HIT4= TRACK C TIMING ERROR
 HIT5= TRACK B TIMING ERROR
 HIT6= TRACK A TIMING ERROR
 BIT7= ADDRESS PARITY ERROR

6.3 DATA ERRORS

DATA ERROR XADAF XXXXXXDAP XXXXXXGOOD DATA XXXXXHAFI DATA

A P C D

A=THE DISK NUMBER AND EXTENDED DISK ADDRESS BITS
B=THE DISK ADDRESS REGISTER
C=THE DATA WRITTEN ON THE DISK
D=THE DATA READ FROM THE DISK

6.4 DISK ADDRESS ERROR

DISK ADDRESS ERROR XADAEXXXXXXDAH

THE TERMINATING DISK ADDRESS AFTER THE TRANSFER WAS NOT CORRECT
THE DAF AND DAP SHOULD EQUAL WHAT WAS REPORTED. CHECK THE
MF11 PANEL FOR THE ERROR ADDRESS.

6.5 PROCESSOR TIME OUT

PROCESSOR BACKGROUND TIMED OUT.

THIS MESSAGE WILL BE REPORTED IF THE DISK FAILS TO RAISE A RR
REQUEST AFTER EXTENDED PERIOD OF TIME.

6.6 MEMORY PARITY ERROR

THIS MESSAGE IS REPORTED IF THE PROGRAM DETECTS A MEMORY
PARITY ERROR DURING PROGRAM EXECUTION.

6.7 END

END

THIS MESSAGE IS REPORTED AT THE END OF ONE COMPLETE PASS OF
THE DISK SYSTEM.

7. RESTRICTIONS

THE DISKS MUST BE IN SEQUENTIAL ORDER RANGING FROM DISK
SELECT A - 7.

8. PROGRAM DESCRIPTION

MULTI DISK IS NOT A DIAGNOSTIC - IT IS MERELY A CONFIDENCE
TEST. IF THE USER ENCOUNTERS ANY PROBLEMS WITH THE SYSTEM
WHILE OPERATING MULTI DISK, HE SHOULD NOT TRY TO DIAGNOSE THE
PROBLEM USING THIS PROGRAM. IF PROBLEMS ARE ENCOUNTERED, IT
IS SUGGESTED THAT THE USER REVERTS TO DISK DATA AS A MEANS
OF DIAGNOSING HIS PROBLEM.

```

1
2      .TITLE MAINDEC-11-DZMPCA-A MF11 MULTI LISK REPLACES DSA
3
4      ;COPYRIGHT 1973 DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
5      ;PROGRAM BY E. HAIGHT/C. CASWELL
6      .FNAML  ARS
7
8      .F1T001
9      .F1T102
10     .F1T204
11     .F1T310
12     .F1T420
13     .F1T540
14     .F1T6100
15     .F1T7200
16     .F1T8400
17     .F1T91000
18     .F1T102000
19     .F1T114000
20     .F1T1210000
21     .F1T1320000
22     .F1T1440000
23     .F1T15100000
24
25     .F1T16100000
26
27     ;
28     ;
29     ;
30     .WHITE=TRAP+3
31     .PCHECK=TRAP+7
32     .PEAL=TRAP+5
33
34     .=0      ;TRAP CATCHER A=176
35
36     .=704
37
38     .=200
39
40     ;STATIC ROUTINES
41     .=300
42
43     ;
44     ;
45     ;
46     ;
47     ;
48     ;
49     ;
50     ;
51     ;
52     ;
53     ;
54     ;
55     ;
56     ;
57     ;MF11 MULTI LISK
58     ;VECTORS USED IN PROGRAM
59     ;01 LOC 204 DISK INTERRUPT
60     ;02 LOC 30 FMT (TELETYPE OUTPUT)
61     ;03 LOC 34 TRAP (DISK HANDLERS)
62     ;04 LOC 14 TRACE TRAP (USED IN BACKGROUND TEST)
63     ;05 LOC 20 IOT TRAP (USED IN CALLING BACKGROUND TEST)
64

```

MAINDEC-11-DZFECA-A RE11 MULTI DISK REPLACES D5AA
DZFECH.PIC

PAC111 27(657) 4-DPC-75 15113 PAGE 1-1

65

001000

.81000

67			.EVEN	
68			:	
69			; I/O ADDRESS POINTERS	
70	001000	177570	SWP:	177570 ; SWITCH REGISTER
71	001002	177776	FS:	177776 ; PROCESSOR STATUS REGISTER
72	001004	177566	TPP:	177566 ; TELETYPE REGISTERS
73	001006	177562	TKP:	177562
74	001010	177564	TPS:	177564
75	001012	177560	TKS:	177560
76			:	
77			; DISK I/O REGISTERS	
78			:	
79	001014	177460	DCS:	177460 ; DISK CONTROL REGISTER
80	001016	177462	AC:	177462 ; ACCT COUNT REGISTER
81	001020	177464	CMA:	177464 ; CURRENT ADDRESS REGISTER
82	001022	177466	DAR:	177466 ; LOWER 16 BITS OF DISK ADDRESS
83	001024	177470	DAF:	177470 ; EXTENSION ADDRESS REGISTER
84	001026	177472	DRP:	177472 ; DATA BUFFER REGISTER
85	001030	177474	MA:	177474 ; MAINTENANCE REGISTER
86	001032	177476	APS:	177476 ; LOOK AHEAD REGISTER
87	001034	000200	VECTOR:	204 ; INTERRUPT VECTOR ADDRESS
88	001036	000206	STATUS:	206 ; DISK INTERRUPT STATUS
89	001040	000200	PRIORITY:	017 ; DISK PRIORITY LEVEL
90			:	
91			:	
92			:	
93			:	
94			:	
95			:	
96			:	
97			; REPLICATE REGISTERS (MEMORY)	
98			:	
99	001042	000000	FLAG:	0 ; INTERNAL PROGRAM FLAG
100	001044	146723	RANDN:	146723 ; RANDOM NUMBER PRIME
101	001046	000000	WDCT:	0 ; WORKING WORD COUNT
102	001050	000000	TRCK:	0 ; WORKING DAP
103	001052	000000	DMA:	0 ; WORKING DATA BUFFER (OUT-IN)
104	001054	000000	PATN:	0 ; DATA PATTERN INDEX
105	001056	000000	BIFF:	0 ; WORKING DATA BUFFER (OUT-IN)
106	001060	000000	TRPDCT:	0 ; TEMP WORD COUNT
107	001062	000000	TDMA:	0 ; TEMP DAP
108	001064	000000	SRPDCT:	0 ; STANDARD WORD COUNT
109	001066	000000	ERCOUNT:	0 ; ERROR COUNT FOR MESSAGES.
110	001070	000000	SAVF:	0
111	001072	000000	SAV1:	0
112	001074	000000	PASS:	0
113	001076	000000	DSKTOP:	0
114	001100	000000	ORDER:	0 ; POINTER FOR HAND EPOCH
115	001102	000000	HIGH:	0
116	001104	000000	LIMIT:	0
117	001106	000000	TRACK:	0 ; TEMP TRACK NO.
118	001110	000000	TDKNO:	0 ; TEMP DISK NO.
119	001112	005360	OUTBUF:	BUFFER
120	001114	000000	INBUF:	0

MAINDEC-11-DZRFCA-A RE11 MULTI DISK REPIACES D53A
DZRFCA.PIC

MACY11 27(657) 4-14C-75 15:33 PAGE 2-1

121 001116 000000
122
123
124
125 001120 000000
126 001122 000000
127 001124 000000

SAVR01: 0
:
JHE11 WORK REGISTERS
(CAN BE CHANGED IN ANY ROUTING)
WORK1: 0
WORK2: 0

```

128
129 001126 000005          START: RESET          ;CLEAR THE JUMP
130 001132 012706 001000    MOV      01000,06    ;SET UP STACK
131 001134 012767 000006    MOV      06,4
132 001142 005067 176642    CLP      6
133 001146 012777 002374 177660  MOV      00AINT,0VECTOR    ;SET UP DISK POINTER
134 001154 012777 000340 177654  MOV      0340,0STATUS    ;LOCK UP INTERRUPTS
135 001162 012767 003760 176640  MOV      0FMTMP,30    ;SET UP TTY POINTER
136 001170 012767 000340 176634  MOV      0340,32    ;LOCK UP INTERRUPTS
137 001176 012767 002322 176630  MOV      0DISK,34    ;SET UP DISK HANDLER POINTER
138 001204 012767 000340 176624  MOV      0340,36    ;LOCK UP INTERRUPTS
139 001212 012777 000340 177562  MOV      0340,0PS    ;LOCK UP INTERRUPT LEVELS
140 001220 005067 177616  CLP      FLAG    ;CLEAR PROGRAM FLAG
141 001224 005067 177620  CLP      TRACK    ;CLEAR TRACK REGISTERS
142 001230 005067 177616  CLP      DMA    ;CLEAR DMA REGISTERS
143 001234 005067 177614  CLP      PATN    ;CLEAR PATTERN COUNT
144 001240 012767 003572 176552  MOV      0XWAIT,20
145 001246 005067 176550  CLP      22
146 001252 012767 004454 176544  MOV      0DOAN,24    ;SET UP FOR POWER FAIL
147 001260 012767 000340 176640  MOV      0340,126    ;LOCK UP INTERRUPTS
148 001266 004767 003000  JSP      07,0AMP    ;SET UP PARITY SWITCHES
149
150
151
152 001272 012777 000340 177502  ;THIS ROUTINE DETERMINES HOW MUCH MEMORY IS ON THE SYSTEM
153 001300 013767 000042 177562  ;
154 001306 001410
155 001310 100432
156 001312 162767 000020 177550  ;EXTMEM: MOV      0340,0PS    ;LOCK UP PRIORITY LEVELS
157 001320 022767 005360 177542  MOV      0042,SAVE    ;GET MONITOR ADD
158 001326 100444 BEQ      18    ;SKIP IF ZERO
159 001330 012767 001406 176446  BNE      LGMEM    ;GREATER THAN 16K
160 001336 012767 000340 176442  SUB      020,SAVE    ;DEC IT
161 001344 012767 017446 177516  CMP      0BUFFER,SAVE ;IS IT ACT 11?
162 001352 005777 177512  BNE      GOTMEM    ;NO-SKIP
163 001356 022767 177446 177504  18: MOV      0MAXREF,4    ;SET UP PROCESSOR TRAP
164 001364 001410  MOV      0340,6
165 001366 062767 020000 177474  MOV      017446,SAVE    ;SET UP REFERENCE TO 4K
166 001374 000766  TST      0SAVE    ;REFERENCE MEMORY
167 001376 162767 000020 177464  CMP      0177446,SAVE    ;TEST FOR GREATER THAN 20K
168 001404 000415  BFC      MAXREF    ;SET UP FOR NEXT REFERENCE
169  BNE      EXREF    ;REFERENCE NEXT BANK
170  LGMEM: SUB      020,SAVE    ;DEC. IT
171  BR      GOTMEM
172
173
174
175
176
177
178
179 001406 012706 001000  ;TRAPS HERE IF MEM TIMES OUT
180 001412 012767 000006 176364  ;
181 001420 005067 176362
182 001424 162767 020000 177436  MAXREF: MOV      01000,06    ;RESET STACK
183 001432 032767 002000 177402  MOV      06,4    ;RESET VECTOR
184  CLP      6
185  SUB      020,00,SAVE    ;
186  BIT      0BIT1,FLAG
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000

```

MAINDEC-11-DZRECA-A NF11 MULTI DISK REPLACES DSAA
DZRECA.BIC

MACY11 27(657) 9-DEC-75 15113 PAGE 3-1

182 001460 001010
183 001462 062767 000004 177430
184 001470 022767 000040 177422
185 001476 001471
186 001500 000761

NSF
ANI
CMP
WFG
RN
NFIST
04,400K
040,000K
004
INLSK

BRANCH IF NOT EXISTENT DISK SET
SET UP THAT DISK NO.
CHECK FOR N DISKS
BRANCH IF N DISKS

187							
188	001522	006067	177412		RFUST:	ROP	0000
189	001506	006067	177406			ROP	0000
190	001512	032767	000017	177400		RIT	017,0000
191	001520	001002				RNF	000
192	001522	000000				HALT	
193	001524	000777				RF	0
194	001526	004567	002400			JSR	00,0000
195	001532	001120				WORK	
196	001534	005213				WFS11	
197	001536	000002				2	
198	001540	104000				RYT	00
199	001542	005031				HEDSA	
200	001544	005213				WFS11	
201	001546	177777				-1	
202	001550	005367	177344			DFC	WORK
203	001554	006167	177340			ROL	WORK
204	001560	006167	177334			ROL	WORK
205	001564	016767	177330	177304		MOV	WORK,CSKNOP
206							
207							
208							
209	001572	166767	177314	177270		SUB	OUTHUP,SAVE
210	001600	005067	177314			CLP	WORK
211	001604	162767	000003	177256	STTHUF:	SUB	03,SAVE
212	001612	022767	000003	177250		CMP	03,SAVE
213	001620	101003				RHI	OVERFLO
214	001622	005267	177272			INC	WORK
215	001626	000766				RR	SETRUF
216	001630	042767	000001	177262	OVERFLO:	BIC	0010,WORK
217	001636	016767	177250	177250		MOV	OUTHUP,INHUF
218	001644	066767	177250	177242		ADD	WORK,INHUF
219	001652	016767	177236	177236		MOV	INHUF,SAVHUF
220	001660	066767	177234	177230		ADD	WORK,SAVBHUF
221	001666	016767	177226	177170		MOV	WORK,SWPDCT
222	001674	000241				CLC	
223	001676	006067	177162			ROK	SWPDCT
224	001702	012767	003724	176150		MOV	00HTLC,00
225	001710	012767	000340	176144		MOV	0340,02
226	001716	052777	000100	177066		RIS	0010,0000
227							
228	001724	016767	177134	177114		MOV	SWPDCT,WDCT
229	001732	012767	001724	177140		MOV	WDATAT,WDEN
230	001740	005067	177106			CLP	000
231	001744	005067	177100			CLP	TRACH
232	001750	012777	000340	177024	WDNAV:	MOV	0340,000
233	001756	016767	177134	177072		MOV	SAVBHUF,HUF
234	001764	042767	000003	177050		BIC	03,FLAG

235										
236	001777	042767	001000	177042	LIAT:	NIC	001777,FLAG			
237	002000	005267	177036			INC	FLAG			
238	002004	104505				WPAV	0100			
239	002006	000004				LOT				WAIT FOR FLAG IN BACKGROUND TEST
240	002010	032767	001000	177024		HIT	001777,FLAG			CHECK FOR ERROR
241	002016	001414				WPAV	WPAV			WRITE BACKUP DATA
242	002020	016767	177016	177072		MOV	FLAG,WORK			TRY TO READ 3 TIMES
243	002026	042767	177774	177064		NIC	0177774,WORK			
244	002034	022767	000003	177056		CMP	03,WORK			
245	002042	001353				WPAV	LOAD			
246	002044	000000				HALT				UNABLE TO READ FROM
247	002046	000777				WPAV				DISK
248	002050	012767	002170	177022	WPAV:	MOV	000000,WORK			SET UP FOR HARD ERROR
249	002056	016767	177030	176772		MOV	000000,WORK			SET UP HARD BUFFER
250	002064	104503				WRITE	0100			
251	002066	000004				LOT				WAIT FOR FLAG IN BACKGROUND
252	002070	042767	000003	176744		NIC	03,FLAG			
253	002076	016767	177012	176752		MOV	000000,WORK			SET UP CURRENT ADDR
254	002104	042767	001000	176730	WPAV:	NIC	001777,FLAG			
255	002112	005267	176724			INC	FLAG			
256	002116	104505				WPAV	0100			
257	002120	000004				LOT				WAIT FOR FLAG IN BACKGROUND
258	002122	004567	001216			JSH	05,COMPARE			COMPARE DATA
259	002126	032767	001000	176706		HIT	001777,FLAG			CHECK FOR ERROR
260	002134	001415				WPAV	WPAV			RESTORE DISK BUFFER
261	002136	016767	176700	176754		MOV	FLAG,WORK			CHECK FOR 3 RE-READS
262	002144	042767	177774	176746		NIC	0177774,WORK			
263	002152	022767	000003	176740		CMP	03,WORK			
264	002160	001351				WPAV	WPAV			GO RE-READ DATA
265	002162	042767	000003	176652		NIC	03,FLAG			
266	002170	042767	001000	176644	WPAV:	NIC	001777,FLAG			CLEAR PROGRAM FROM FLAG
267	002176	016767	176714	176652		MOV	SAVEBUF,WORK			SET UP CURRENT ADDRESS
268	002204	104503				WRITE	0100			
269	002206	000004				LOT				WAIT IN BACKGROUND TEST
270	002210	104507				WRCHECK	0100			
271	002212	000004				LOT				WAIT FOR FLAG
272	002214	032767	001000	176620		HIT	001777,FLAG			CHECK FOR ERROR
273	002222	001413				WPAV	STOPBU			
274	002224	016767	176612	176666		MOV	FLAG,WORK			
275	002232	042767	177774	176660		NIC	0177774,WORK			
276	002240	022767	000003	176652		CMP	03,WORK			
277	002246	001350				BNE	WPAV			
278	002250	000000				HALT				
279	002252	005767	176564		STOPBU:	TST	FLAG			RESTORE DISK AND EXIT
280	002256	100417				WPAV	WPAV			SET UP NEXT DISK BUFFER
281	002260	004767	000362			JSP	07,DISKBU			READ NEXT BUFFER
282	002264	000107	177460			JMP	WPAV			REPORT END.
283	002270	100001				ENT	01			
284	002272	005352				END				
285	002274	013700	000042			MOV	0042,00			GET MONITOR ADDRESS
286	002300	001404				BFO	LXIT			SKIP IF NO WORK
287	002302	004710			LOGICAL:	JSP	7,(0)			GO TO MONITOR
288	002304	000204				NOP				

MAINDEC-11-DZHFCA-A RFI1 MULTI DISK REPIACES 15AA
DZHFCA.RIC

MACY11 27(657) 9-DEC-75 15:33 PAGE 5-1

289 002306 000240
290 002310 000240
291 002312 000167 177406
292 002316 000000
293 002320 000777

NOP
NOP
EXIT: JMF
RESTORE:
NR

DATAT
HAIT
.

RECYCLE TEST
DO NOT RESTORE RFW

```

294
295
296
297
298
299
300 002322 016705 176500
301 002326 016745 176516
302 002332 016745 176514
303 002336 016745 176514
304 002342 016745 176500
305 002346 005115
306 002350 005215
307 002352 011604
308 002354 014467 176540
309 002360 042767 177600 176532
310 002366 016745 176526
311 002372 000002
312
313
314
315
316
317
318
319
320
321 002374 005046
322 002376 012746 002404
323 002402 000002
324 002404 005777 176404
325 002410 100113
326 002412 052767 001000 176422
327 002420 017767 176400 176472
328 002426 042767 177700 176464
329 002434 004567 001560
330 002440 001120
331 002442 005047
332 002444 000002
333 002446 104001
334 002450 004737
335 002452 017767 176344 176440
336 002460 005367 176434
337 002464 004567 001530
338 002470 001120
339 002472 005033
340 002474 000006
341 002476 104000
342 002500 005047
343 002502 005033
344 002504 177777
345 002506 017767 176302 176404
346 002514 004567 001500
347 002520 001120

;
; ENTER DISK HANDLER BY THE TRAP INSTRUCTION
; ARGUMENT TO TRAP INSTRUCTION IS TWO ORDER
; BYTE OF THE CONTROL REGISTER.
;
DISK:  MOV     DEB,05          ;SET UP TO LOAD DISK REG
      MOV     TRACK,-(5)      ;LOAD TRACK NUMBER
      MOV     DMA,-(5)        ;LOAD WORD ADDRESS
      MOV     RUF,-(5)        ;SET UP CURRENT ADDRESS
      MOV     ARCT,-(5)       ;LOAD WORD COUNT
      COM     (5)             ;SET UP TWO'S COMPLEMENT
      INC     (5)
      MOV     (6),04
      MOV     -(4),WORK
      PIC     0177600,WORK    ;MASK FUNCTION HITS
      MOV     WORK,-(5)       ;LOAD FUNCTION REG.
      RTI                    ;RETURN FROM TRAP

;
;
;
;
;
;
; RE11 DISK INTERRUPT HANDLER
; ROUTINE CONTINUES ON ERRORS
DKINT: CLR     -(6)          ;CLEAR STACK
      MOV     #18,-(6)       ;SET RETURN
      RTI                    ;CLEAR TBIT
      TST     00CS           ;TEST FOR ERROR
      BPL     INTEXT         ;BRANCH IF NO ERROR
      MIB     0019,FLAG      ;SET ERROR BIT
      MOV     00AF,WORK      ;REPORT ERROR
      PIC     0177700,WORK    ;MASK ADDRESS EXT. HITS.
      JSP     05,CONV        ;CONVERT TO ASCII
      WORK
      MFS1A
      2
      FMT+1
      HED2
      MOV     00AF,WORK      ;SET UP LOWER 16 BITS OF ADDR.
      DEC     WORK
      JSH     05,CONV        ;CONVERT TO ASCII
      WORK
      MES1
      6
      FMT+0
      MES1A
      MES1
      -1
      MOV     00CS,WORK      ;SET UP STATUS
      JSP     05,CONV
      WORK

```

MAINDFC-11-DZRFCA-A RE11 MULTI DISK REPLACES DSAA
DZRFCA.AIC

ACY11 27(657) 9-DEC-75 15:33 PAGE 6-1

348	002522	005057		MF52	
349	002524	000006		6	
350	002526	104001		EXT+1	
351	002532	005057		MF52	
352	002532	032777	040000 176254	HIT	0HIT14,ADCS

```

353
354 002540 001430      REQ      SOFTER      ;GO AND CONTINUE SOFT FROM
355 002542 017767 176256 176352      MOV      00AF,00PK      ;FETCH FROM EXT. BITS
356 002550 000367 176344      SWAB      00PK
357 002554 042767 177400 176336      RLC      017740,00PK
358 002562 004567 001432      JSH      05,CONV      ;CONVERT TO ASCII
359 002566 001120      WOPR
360 002570 005073      MFS2A
361 002572 000003      J
362 002574 104000      FMT+P
363 002576 005031      MFS2A
364 002600 005073      MFS2A
365 002602 177777      -1
366 002604 052777 000400 176202      HIS      0010,00CS      ;CLEAR THE DISK
367 002612 012706 001000      MOV      0100,06
368 002616 000177 176256      JMP      000000
369 002622 005777 176170      SOFTER: TST      00C
370 002626 001404      BEQ      INTEXT      ;EXIT FROM ROUTINE
371 002630 052777 000001 176156      HIS      0010,00CS      ;SET GO AND CONTINUE
372 002636 000002      RTI
373 002640 012706 000774      INTEXT: MOV      0774,06      ;RETURN TO WAIT INSTM.
374 002644 000002      RTI      ;RESET STACK
375      ;EXIT
376      ;
377      ;ROUTINE TO SETUP DISK BUFFERS
378      ;ADD WORD COUNT TO STARTING DISK ADDRESSES
379      ;COMPARE CALCULATED ADDRESS TO TERMINATING ADDRESS
380      ;
381 002646 066767 176174 176176      DISBUF: ADD      0000,00A      ;ADD WORD COUNT TO LOWER 16 BITS
382 002654 103002      HCC
383 002656 005267 176166      INC      TRACK
384 002662 026777 176164 176132      COMPAR: CMF      00A,00AP      ;OVERFLOW ADD ONE TO TRACK
385 002670 001403      RFQ      CM0AE
386 002672 052767 000100 176142      BIS      0010,FLAG      ;COMPARE LOWER 16 BITS
387 002700 017767 176120 176214      CM0AE: MOV      00AF,00PK1      ;FETCH EXT. ADDR BITS
388 002706 042767 177740 176206      RLC      017740,00PK1      ;MASK TRACK AND DISK ADDR
389 002714 042767 177740 176126      RLC      017740,TRACK
390 002722 026767 176122 176172      CMP      TRACK,00PK1      ;ARE THEY EQUAL
391 002730 001100      BNE
392 002732 105767 176104      TST      FLAG      ;ERROR IN DATA REG
393 002736 100015      RPL      EXTCMP      ;CHECK FOR LAST DISK BUFFER
394 002740 005067 176106      CLW      00A      ;CLEAR LOWER 16 BITS
395 002744 005067 176100      CLW      TRACK      ;CLEAR EXT. ADDR. BITS.
396 002750 042767 000200 176064      RLC      0200,FLAG
397 002756 062716 000004      ADD      04,(6)      ;INC STACK POINTER
398 002762 016767 176076 176056      MOV      SW00CT,000CT
399 002770 000457      HW      EXIDH      ;EXIT

```

320											
321	002772	042767	177774	176122	EXTCMP:	RIC	0177774,WORK1				
322	003000	022767	000003	176114		CMP	03,WORK1				
323	003006	001033				MOV	AKH				
324	003010	017767	176010	176102		MOV	00AF,WORK				
325	003016	042767	177743	176074		RIC	0177743,WORK				
326	003024	026767	176070	176044		CMP	WORK,DSKNOH				
327	003032	001021				BNF	AKH				
328	003034	017767	175762	176056		MOV	00AH,WORK				
329	003042	066767	176000	176050		AND	WORK,WORK				
330	003050	103012				RCC	AKH				
331	003052	052767	000200	175762		RIS	0200,FLAG				
332	003060	017767	175736	175760		MOV	00AH,WORK				
333	003066	005167	175754			COM	WORK				
334	003072	005267	175750			INC	WORK				
335	003076	017767	175722	175744	AKH:	MOV	00AE,THACH				
336	003104	042767	177740	175736		RIC	0177740,THACH				
337	003112	017767	175704	175732		MOV	00AH,DMA				
338	003120	032767	000100	175714		RIT	0010,FLAG				
339	003126	001001				BNF	004				
340	003130	000207			EXTDR:	RIS	07				
341	003132	004567	001062		FRADR:	JSP	05,CONV				
342	003136	001052				DMA					
343	003140	005033				MFS1					
344	003142	000006				6					
345	003144	004567	001050			JSP	05,CONV				
346	003150	001050				TPACH					
347	003152	005047				MFS1A					
348	003154	000002				2					
349	003156	104000				FMT	00				
350	003160	005004				HED4					
351	003162	005047				MFS1A					
352	003164	005033				MFS1					
353	003166	177777				-1					
354	003170	005067	175656			CLH	DMA				
355	003174	005067	175650			CLP	TPACH				
356	003200	000000				HALT					

```

437
438
439
440
441 ;ROUTINE TO FILL BUFFERS WITH RANDOM DATA
442
443
444
445 ;ENTER FROM JSR B7,PANEX
446
447 PANEX:
448     MOV     WORDT,WORDF      ;SET UP WORDF
449     MOV     BOUTHUP,B5      ;LOC. OF BOUTHUP
450
451
452
453 ;RANDOM DATA GENERATOR SUBROUTINE
454 DAYGEN: MOV     LONUM,B0      ;SET UP B0 WITH 5 DIGITS LOW
455         MOV     HINUM,B1      ;SET UP B1 WITH 5 DIGITS HIGH
456         MOV     B7,B3        ;SET UP SHIFT COUNT
457         CLR     B2           ;CLEAR B2
458 SHIFT:  ASL     B0           ;SHIFT B0 LEFT AND
459         ROL     B1           ;ROTATE CARRY INTO LSH OF B1 INTO
460         ROL     B2           ;ROTATE CARRY OUT OF B1 INTO B2
461         DEC     B3           ;DECREMENT B3
462         BNE     SHIFT        ;CONTINUE SHIFT LOOP
463         ADD     LONUM,B0      ;ADDN IN NUMBER TO MAKE X 129
464         ADC     B1           ;PROPOGATE CARRY
465         ADD     HINUM,B1      ;ADDN IN NUMBER TO MAKE X 129
466         ADC     B2           ;PROPOGATE CARRY
467         ADD     B1,B57,B0     ;ADDN LOW CONSTANT
468         ADC     B1           ;PROPOGATE CARRIES
469         ADC     B2           ;PROPOGATE AGAIN
470         ADD     B47401,B1     ;ADDN HIGH CONSTANT
471         ADC     B2           ;PROPOGATE CARRY
472         ADD     B6,B2        ;ADDN HIGHEST CONSTANT
473         ADD     B2,B0        ;REFINE B0 WITH HIGH DIGIT
474         ADC     B1           ;PROPOGATE CARRY
475         MOV     B0,LONUM      ;PUT B0 BACK IN LONUM

```

```

476
477 003312 010025      MOV      00,(5)+      ;HOLD CARRY FOR PROGRAM
478 003314 005367 175600      DEC      WORK
479 003320 001406      BFC      EXGEN
480 003322 010167 000014      MOV      01,MINUM      ;PUT PI BACK IN MINUM
481 003326 010125      MOV      01,(5)+      ;HOLD MINUM FOR PROGRAM
482 003330 005367 175604      DEC      WORK
483 003334 001327      MVE      DAYGE1
484 003336 000207      EXGEN: RTS      07      ;RETURN TO PROGRAM
485 003340 000000      LONGUM: 0
486 003342 000000      MINUM: 0
487
488
489      ;DATA COMPARISON ROUTINE
490      ;IF AN ERROR OCCURS BETWEEN THE OUT-BUFFER AND
491      ;THE IN-BUFFER AN ERROR WILL BE REPORTED IN THE
492      ;FOLLOWING MANNER
493      ;DATA ERROR XX DAF XXXXXX DAF XXXXXX GOOD DATA XXXXXX BAD DATA
494
495      ;
496 003344 005067 175554      COMPARE:CLP      00002      ;WORD COUNT
497 003350 016767 175536 175512      MOV      OUTBUF,SAVE      ;SET UP OUTBUFFER POINTER
498 003356 016767 175532 175506      MOV      INBUF,SAVE      ;SET UP IN BUFFER POINTER
499 003364 027777 175500 175500      WRDCMP: CMP      0SAVE,0SAV1      ;COMPARE BUFFERS
500 003372 001016      BNE      0DEFF      ;WORD IN ERROR
501 003374 005267 175524      WRDINC: INC      0WORK2      ;+1 WORD COUNT
502 003400 026767 175442 175516      CMP      0RDC1,00002      ;IS COMPLETE BUFFER CHECKED
503 003406 001407      BFC      ADAM      ;EXIT ROUTINE
504 003410 062767 000002 175452      ADD      02,SAVE
505 003416 062767 000002 175446      ADD      02,SAV1
506 003424 000757      BR      0RDCMP
507 003426 000205      ADAM: RTS      05      ;COMPARE NEXT WORD
508      ;EXIT THIS ROUTINE
509
510 003430 052767 001000 175404      0DEFF: BIS      0BIT9,FLAG      ;SET ERROR BIT
511 003436 016767 175410 175454      MOV      10A,000K      ;FETCH STARTING DISK ADDR
512 003444 016767 175400 175450      MOV      TRACK,000K1
513 003452 066767 175446 175440      ADD      000K2,000K
514 003460 103002      RCC      000
515 003462 005267 175434      INC      000K1
516 003466 024567 000526      JSP      05,CONV      ;CONVERT WORD ADDR TO ASCII
517 003472 001120      WORK1
518 003474 005033      MFS1
519 003476 000006      6
520 003500 004567 000514      JSP      05,CONV      ;CONVERT TRACK ADDR TO ASCII
521 003504 001122      WORK1
522 003506 005047      MFS1A
523 003510 000002      2
524 003512 017767 175352 175400      MOV      0SAVE,000K
525 003520 004567 000474      JSP      05,CONV      ;FETCH GOOD DATA
526 003524 001120      000K
527 003526 005156      MFS5
528 003530 000006      6
529 003532 017767 175334 175360      MOV      0SAV1,000K      ;FETCH BAD DATA
530 003540 004567 000454      JSP      05,CONV      ;CONVERT TO ASCII

```

MAINDEC-11-DZPFC-A RE11 MULTI DISK REPLACES CSAA
DZPFC.RIC

MACY11 27(657) 9-DEC-75 15133 PAGE 17-1

532 003544 001123
531 003546 005172
532 003552 000006

WOPF
VFSH
6

```

533
534 003552 104000          FMT      00          ;PRINT MESSAGE
535 003554 004722          MFD1
536 003556 005047          MFS1A
537 003560 005033          MFS1
538 003562 005156          MFS5
539 003564 005172          MFS6
540 003566 177777          -1
541 003570 000701          BP      000INC      ;GO COMPARE NEXT WORD
542
543
544
545
546
547
548
549
550 003572 012767 003722 174214 XWAIT: MOV      00TIX,14      ;SET UP INACT TRAP
551 003600 005067 174212          CLP      16
552 003604 012737 003626 000010      MOV      018,0010      ;SET ILLEGAL INST
553 003612 006727 000000          SXT      00      ;TEST FOR 11/45
554 003616 012767 000006 000076      MOV      06,PTIX      ;MAKE IT AN HTT
555 003624 000401          BP      28      ;SKIP JUNK
556 003626 022626          18:      CMP      (6)+,(6)+      ;CLEAR STACK
557 003630 012737 000012 000010      28:      MOV      012,0010      ;RESET I/O
558 003636 005067 175232          CLP      PASS      ;SET UP TIME MASK
559 003642 052777 000020 175132      BIS      0BIT4,0PS      ;SET TRACE HIT
560 003650 005027 000000          CLP      00
561 003654 005267 177772          XINCW: INC      XINCw-2
562 003660 105767 177766          TSTB     XINCw-2
563 003664 100373          BPL      XINCw
564 003666 005267 175202          INC      PASS
565 003672 001401          BEQ      0+4
566 003674 000765          BR      XINCw-4
567
568 003676 042777 000020 175076 ;REPORT BACKGROUND TEST TIMED OUT
569 003704 005046          BIC      0BIT4,0PS      ;CLEAR TRACE HIT
570 003706 012746 003714          CLP      -(6)      ;CLEAR PS ON STACK
571 003712 000002          MOV      018,-(6)      ;SET RETURN
572 003714 104001          RTI          ;CLEAR TRACE HIT
573 003716 005243          18:      FMT+1
574 003720 000000          TIMO
575 003722 000002          HALT
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999

```

```

577
578
579
580
581
582 003724 017767 175056 175166
583 003732 042767 000200 175160
584 003740 022767 000003 175152
585 003746 001003
586 003750 052767 100000 175064
587 003756 000002
588
589
590
591
592
593 003760 011600
594 003762 022740 104001
595 003766 001077
596 003770 000400
597
598 003772 011600
599 003774 062716 000002
600 004000 011000
601 004002 112067 000154
602 004006 122767 000100 000140
603 004010 001005
604 004016 005067 000140
605 004022 004767 000030
606 004026 000002
607 004030 122767 000045 000124
608 004036 001436
609 004040 122767 000042 000114
610 004046 001437
611 004050 004767 000002
612 004054 000752
613 004056 116777 000100 174720
614 004064 105777 174720
615 004070 100375
616 004072 122767 000015 000062
617 004100 001003
618 004102 012767 000011 000054
619 004110 005767 000050
620 004114 001406
621 004116 005367 000042
622 004122 112767 000000 000032
623 004130 000752
624 004132 000207
625 004134 112767 000015 000020
626 004142 004767 177710
627 004146 112767 000012 000006
628 004154 004767 177676
629 004160 000710
630 004162 000000

;
;TEST FOR CONTROL "C"
;UPON RECEIPT OF CNTLC SET FLAG HIT
;
CNTLC:  MOV     BTRH, AOPR      ;FETCH KEYBOARD BUFFER
        RLC     BRT7, AOPR     ;MASK FOR 33
        CMP     B3, AOPR       ;TEST FOR CNTLC
        RNE     ,+10           ;NOT CNTLC EXIT
        MHS     BRT15, FLAG    ;SET FLAG HIT
        RTI                    ;EXIT ROUTINE

;
;ROUTINE TO DECODE FMT CALLS
;FMT+1=TYPE ONE LINE OF TEXT
;FMT+0=TYPE A SERIES OF LINES
EMTRP:  MOV     (A), B0
        CMP     BEMT+1, -(A)    ;WAS THE CALL EMT+1
        RNE     TYPES          ;NOT TYPE A SERIES
        RR      TYPE           ;TYPE ONE LINE

;SUBROUTINE TO OUTPUT ASCII MESSAGE ON TELETYPE PRINTER.
TYPE:   MOV     B00, B0
        ADD     B2, B00        ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
        MOV     B00, B0
        TYPEA:  MOVH    (0)+, TYPDAT ;GET CHARACTER
        CMHR    B100, TYPDAT    ;CHECK FOR "0" CHARACTER
        RNE     TYPEC          ;BRANCH IF NOT "0".
        CLH     TYPDAT         ;OUTPUT NULL TO
        JSH     B7, TYPD       ;CLEAR BUFFER
        RTI                    ;TERMINATOR CHAR. DONE. EXIT.
        TYPEC:  CMHR    B45, TYPDAT ;CHECK FOR "8".
        BFG     TYPEF          ;BRANCH IF "8".
        CMHR    B42, TYPDAT    ;NOT "8". CHECK FOR "0".
        BFG     TYPEG          ;BRANCH IF "0".
        JSH     B7, TYPD       ;TYPE CHAR IN TYPDAT
        RR      TYPEA
        TYPED:  MOVH    TYPDAT, BTPB ;OUTPUT CHARACTER TO PRINTER
        TSTR    BTPB          ;WAIT FOR DONE FLAG.
        RPL     ,+4
        CMHR    B15, TYPDAT    ;CHECK FOR CR
        RNE     IS            ;NO SKIP
        MOV     B00, NULL      ;SET NULL COUNTER
        IS:     TST     NULL    ;TEST COUNTER
        BFG     TYEXIT        ;ZERO-EXIT
        OFC     NULL          ;DECREMENT
        MOVH    B0, TYPDAT    ;ZERO OUTPUT
        RR      TYPD         ;OUTPUT NULL.
        TYEXIT: RTS     B7     ;EXIT
        TYPEF:  MOVH    B15, TYPDAT ;MOVE CARRIAGE RETURN CODE TO TYPDAT
        JSH     B7, TYPD       ;GO TYPE CHAR.
        TYPEG:  MOVH    B12, TYPDAT ;MOVE LF CODE TO TYPDAT.
        JSH     B7, TYPD       ;GO TYPE CHAR.
        RR      TYPEA
        TYPDAT: 0

```

631	004164	000000	NULL:	0	
632			;SUBROUTINE TO OUTPUT A SERIES OF ASCII MESSAGES ON TELETYPE PRINTER		
633	004166	011600	TYP5:	MOV	006,07
634	004170	062716		ADD	02,006
635	004174	011067		MOV	006,TYPSH
636	004200	022767		CMP	0-1,TYPSH
637	004206	001001		BNE	TYPSA
638	004210	000002		BTI	

;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
 ;UPDATE TO NEXT MESSAGE ADDRESS
 ;ADDRESS OF MESSAGE TO TYPSH
 ;CHECK FOR TERMINATOR
 ;BRANCH IF NOT TERMINATOR.
 ;TERMINATOR, EXIT

```

639
640 004212 104001      TYP5A:  FMT      +1      ;CALL 05 TYP SUB TO TYP MESSAGE
641 004214 000000      TYP5H:  0              ;ADDRESS OF MESSAGE GOES HERE
642 004216 000763      HP      TYP5      ;GO PROCESS NEXT MESSAGE
643
644
645
646
647 ;OCTAL TO ASCII CONVERT ROUTINE
648
649 ;ENTER ROUTINE AS FOLLOWS
650 ;JSP05,CONV
651 ;ADDR0=ADDRESS OF NUMBER TO BE CONVERTED
652 ;ADDR BYTE=LSB OF WHERE ASCII IS GOING
653 ;ASCII0=THE NUMBER OF ASCII CHAR. TO BE CONVERTED
654
655
656 004220 013567 000306 CONV:  MOV      0(5)+,ACNVX      ;VALUE OF 0 TO BE CONVERTED
657 004224 012501      MOV      (5)+,01      ;ASCII ADDR
658 004226 012502      MOV      (5)+,02      ;0 OF ASCII CHAR
659 004230 000201      ADD      02,01
660 004232 016703 000274 ACV0:  MOV      ACNVX,03
661 004236 042703 177770 BIC      017770,03      ;ISOLATE LEAST SIGNIFICANT OCTAL0
662 004242 062703 000060 ADD      060,03      ;SET UP ASCII0
663 004246 110341      MOV0    03,-(1)      ;STORE ASCII CHAR
664 004250 042767 000007 000254 HIC      07,ACNVX
665 004256 006067 000250 ROP      ACNVX      ;ROTATE OCTAL0
666 004262 006067 000744 ROP      ACNVX
667 004266 006067 000240 ROP      ACNVX
668 004272 005302      DEC      02      ;-1 FROM ASCII CHAR COUNT
669 004274 001356      BNE      ACV0
670 004276 000205      RTS      05      ;EXIT 0 CONVERTED
671
672 ;ROUTINE TO SET ACTION ENABLE ON MA/MF PARITY MEMORIES
673 ;CALL JSP P, MAMP
674 172100 PARCSH=172100
675 000114 PARVEC=114
676 000004 EPPVEC=4
677 000006 SP=06
678 004300 012737 004372 000114 MAMP:  MOV      0PARSHV,00PARVEC      ;SET PARITY INTERRUPT VECTOR
679 004306 012737 000340 000116 MOV      0300,00PARVEC+2 ;AND PRIORITY LEVEL 1 ON INTERRUPT
680 004314 013746 000004 MOV      00EPPVEC,-(SP) ;SAVE CURRENT ERROR VECTOR
681 004320 013746 000006 MOV      00EPPVEC+2,-(SP) ;AND PRIORITY LEVEL
682 004324 012737 000006 000004 MOV      0EPPVEC+2,00EPPVEC
683 004332 012737 000002 000006 MOV      0011,001PRVFC+2
684 004340 012700 172100 MOV      0PARCSH,00      ;GET FIRST CSH ADDRESS
685 004344 012702 000001 MOV      01,02
686 004350 012720 000001 IS:    MOV      01,(A)+      ;SET ACTION ENABLE IF AVAILABLE
687 004354 006302      ASL      02      ;SHIFT AVAILABILITY INDICATOR
688 004356 103374      HCC      10
689 004360 012637 000006 MOV      (SP)+,00EPPVEC+2 ;RESTORE ERROR VECTOR
690 004364 012637 000004 MOV      (SP)+,00EPPVEC ;PRIORITY LEVEL AND INTERRUPT VECTOR
691 004370 000207      RTS      07
692 ;PARITY ERROR SERVICE ROUTINE

```

```

693      WHEN A PARITY ERROR IS DETECTED THE ROUTINE SCANS
694      MEMORY FOR THE PARITY ERROR. WHEN THE ERROR
695      IS DETECTED THE PROGRAM HALTS WITH THE ADDRESS
696      CAUSING THE ERROR IN R2
697      TO CONTINUE PRESS CONTINUE
698      PARSE: ENT+1
699      PAREP:
700      MOV      028,00PARVPC      ;DEPOSITION PARITY ERROR INT
701      MOV      048,00ERRVPC      ;SET TIME OUT TRAP
702      CIL      00ERRVPC+2
703      TEST     (,)+
704      IF       10
705      HALT
706
707      ;PARITY ERROR = ADDRESS
708      ;CAUSING ERROR IS IN REGISTER 1
709
710      38:      RESET
711      MOV      0PARSHV,00PARVPC ;RESTORE PARITY VECTOR
712      MOV      0ERRVPC+2,00ERRVPC ;RESTORE TIME OUT HALT
713      JSH      07,4AMF
714
715      48:      RTI
716      HALT
717      IF       38
718
719      ;ERROR = PARITY ERROR NOT DETECTED ON SCAN
720      ;1 (SF) CONTAINS PC WHERE
721      ;PARITY ERROR WAS ORIGINALLY DETECTED
722      ;
723      ;POWER DOWN ROUTINE
724      ;POWER DISK AND HALT
725
726      72:      004454 052777 000400 174332 DOWN:  HIS      00ITH,DCS      ;POWER DISK
727      004462 012767 004472 173334      MOV      00P,24
728      004470 000000      HALT
729
730      73:      004472 012767 004454 173324      UP:      MOV      00UPH,24
731      004500 012766 001000      MOV      01000,06
732      004504 012767 177324 174406      MOV      0-300,0000
733      004512 000005      TIMEOUT: RESET
734      004514 005267 174406      INC      00H
735      004520 001374      ARE      TIMEOUT
736      004522 104001      ENT+1
737      004524 005334      PAREP
738      004526 000167 174374      JMF      START
739      004532 000000      ACIOX: 0
740
741      ;
742      ;
743      ;
744      ;
745      ;THIS ROUTINE ENABLES THE OPERATOR TO SELECT A TRACK STATICLY
746      ;THE ROUTINE DOES A ONE WORD READ TO SELECT THE TRACK
747      ;THE OPERATOR MAY CHANGE THE SWITCH REGISTER AT ANY TIME
748      ;SWR6-0 EQUALS THE TRACK NUMBER
749      ;SWR9-7 EQUALS THE DISK NUMBER
750      ;
751      74:      004534 052777 000400 174252 STAMP:  HIS      00ITH,DCS
752      004542 017767 174232 174352      MOV      0SWP,00001      ;FETCH SWR

```

747	004550	016767	174346	174347	MOV	WORK1,WORK	
748	004556	042767	176200	174334	BIC	0170000,WORK	;MASK DISK ADDR TRACE NO.
749	004564	006067	174330		ROF	WORK	
750	004570	006067	174324		ROP	WORK	
751	004574	006067	174320		ROP	WORK	
752	004600	006067	174314		ROH	WORK	
753	004604	006067	174310		ROH	WORK	
754	004610	016777	174304	174206	MOV	WORK,0DAE	;DISK EXT. ADDR. REG. LOADED
755	004616	017767	174156	174274	MOV	0500,WORK	
756	004624	000367	174270		SWAH	WORK	
757	004630	006167	174264		ROL	WORK	
758	004634	006167	174260		ROL	WORK	
759	004640	006167	174254		ROL	WORK	
760	004644	042767	003777	174246	BIC	03777,WORK	
761	004652	016777	174242	174142	MOV	WORK,0DAR	;DISK ADDRESS REG LOADED
762	004660	012777	001114	174132	MOV	010000,0CMA	;LOAD CURRENT ADDRESS
763	004666	012777	177777	174122	MOV	0177777,0WC	;LOAD WORD COUNT
764	004674	052777	000005	174112	BIS	05,0DCS	;GO AND HEAD
765	004702	105777	174106		CTBUSY:	0DCS	;TEST FOR CONTROL READY
766	004706	100375			BPL	CTBUSY	;WAIT FOR CONTROL READY
767	004710	026777	174206	174062	SRCHG:	CMP	WORK1,050R
768	004716	001306			BNF	STAMP	;050R HAS CHANGED
769	004720	000773			BR	SRCHG	;050R HAS NOT CHANGED
770							
771							
772							
773							
774							
775							
776							
777							
778							
779							
780							
781							
782							
783							
784							
785	004722	042045	052101	020101	HED1:	.EVEN	
	004730	051105	047522	020122		.ASCII	/0DATA FROM #/
	004736	100					
786							
787							
788	004737	045	052123	052101	HED2:	.ASCII	/0STATUS FROM #/
	004744	051525	042440	051122			
	004752	051117	040040				
789							
790							
791	004756	047445	042526	043122	HED3:	.ASCII	/0OVERFLOW X-FRM ERROR #/
	004764	047514	054040	043055			
	004772	051105	042440	051122			
	005000	051117	040040				
792							
793	005004	042045	051511	020113	HED4:	.ASCII	/0DISK ADDRESS FROM #/

	005012	042101	051104	051505	
	005020	020123	051105	047522	
	005026	020127	100		
794					;
795					;
796	005031	045	100		HED5A: .ASCII /00/
797					;
798					;
799					;
800					;
801					;
802					;
803					;
804					;
805	005033	040	020040	020040	MFS1: .ASCII / DAN 0/
	005040	020040	040504	020122	
	005046	100			
806					;
807					;
808					;
809	005047	040	020040	040504	MFS1A: .ASCII / DAE 0/
	005054	020105	100		
810					;
811					;
812					;
813	005057	040	020040	020040	MFS2: .ASCII / DCB 0/
	005064	020040	041504	020123	
	005072	100			
814					;
815	005073	040	020040	020040	MFS2A: .ASCII / HARD ERROR0/
	005100	020040	040510	042122	
	005106	042440	051122	051117	
	005114	100			
816					;
817					;
818	005115	040	020040	020040	MFS3: .ASCII / WORD COUNT0/
	005122	047527	042122	041440	
	005130	052517	052116	100	
819					;
820					;
821					;
822	005135	040	020040	020040	MFS4: .ASCII / WORD ADP.0/
	005142	020040	047527	042122	
	005150	040440	051104	040056	
823					;
824					;
825					;
826	005156	043411	047517	020104	MES5: .ASCII / GOOD DATA 0/
	005164	040504	040524	040040	
827					;
828					;
829					;
830	005172	020040	020040	020040	MES6: .ASCII / BAD DATA 0/
	005200	041040	042101	042040	

MAINDEC-11-DZHFCA-A RE11 MULTI DISK REPLACES DSAA
DZHFCA.RIC

MACY11 27(657) 4-DEC-75 15133 PAGE 13-4

005206 052101 020101 100

```

R31
R32
R33
R34 005213      040 020040 054105 MFS11: .ASCII / EXISTENT DISK(S).# /
      005220 051511 042524 052116
      005226 042040 051511 024113
      005234 024523 040056

R35
R36
R37 005240 020040      100 MFS12: .ASCII / 0 /
R38
R39
R40 005243      045 051120 041517 TIMO: .ASCII /0PROCESSOR BACKGROUND TIMED OUT#/
      005250 051505 047523 020122
      005256 040502 045503 051107
      005264 052517 042116 052040
      005272 046511 042105 047440
      005300 052125      100

R41
R42 005303      045 042515 047515 PARERR: .ASCII /0MEMORY PARITY ERROR#/
      005310 054522 050040 051101
      005316 052111 020131 051105
      005324 047522 040122

R43
R44 005330 050045 053517 051105 PPNF: .ASCII /0POWER HAS FAILED#/
      005336 044040 051501 043040
      005344 044501 042514 040104

R45
R46 005352 042445 042116      100 END: .ASCII /0END#/
R47      005360
R48 005360 000000 BUFFER: 0
R49      000001 .END

```

ACNVK	004532	ACVN	004232	ADAV	003326	ANS	001032
AFH	003076	BITV	000001	BIT1	000002	BIT10	002000
BIT11	004000	BIT12	010000	BIT13	020000	BIT14	040000
BIT15	100000	BIT2	000004	BIT4	000010	BIT6	000020
BIT5	000040	BIT6	000100	BIT7	000200	BIT8	000400
BIT9	001000	BUF	001056	BUFFER	005362	CNA	001020
CMDAE	002700	CNTLC	003724	COMDAP	002662	COMPAR	003344
CONV	004220	CTBUSY	004702	DAE	001024	DAP	001022
DATAT	001724	DAYGEN	003214	DBR	001026	DCB	001014
DFLMS	002452	DISBUF	002646	DISK	002322	DKINT	002374
DWA	001052	DOWN	004454	DSKNOV	001076	EMTPP	003760
END	005352	ERAPR	003132	ERCOUN	001066	EMVLCB	000004
EXGEN	003336	EXRFF	001352	EXTCME	002772	EXTOP	003130
EXTMEM	001272	FLAG	001042	GOTMEM	001440	HEU1	004722
HFD2	004737	HED3	004756	HFD4	005004	HED5A	003031
HIGH	001102	HINUM	003342	HORDER	001100	INDUF	001114
INDSK	001444	INTEXT	002640	LDAT	001772	LGMEN	001376
LIMIT	001104	LOGICA	002302	LONGUP	003340	LXIT	002312
MA	001030	MAMP	004300	MAXRFF	001400	MFS1	003033
MES1A	005047	MES11	005213	MES12	005240	MES2	003057
MES2A	005073	MES3	005115	MES4	005135	MES5	005156
MES6	005172	NEDST	001502	NULL	004164	OUTHUF	001112
OVERFL	001630	PARCSR	172100	PAPERH	005303	PANARY	000372
PARVECB	000114	PASS	001074	PATRU	001054	PC	00000007
PRIORI	001040	PHWF	005330	PS	001002	PANEX	003202
RANNU	001044	RANRD	002104	PCSAV	001750	READ	004405
RESTOP	002316	RTIX	003722	RN	00000000	R1	00000001
R7	00000002	P3	00000003	R4	00000004	R5	00000005
SAVBUF	001116	SAVE	001070	SAV1	001072	SEIHUF	001004
SHIFT	003232	SOFTER	002622	SP	00000006	SPCHG	000710
STAMP	004514	STAPT	001126	STATUS	001036	STOPBU	002252
SWP	001000	SWRDCT	001064	TOMA	001062	TDSNO	001110
TIMFOU	004512	TIMO	005243	TRB	001006	TRB	001012
TPH	001004	TPS	001010	TRACK	001050	TTNACV	001106
TWRDCT	001060	TYEXIT	004132	TYP	003772	TYPA	004002
TYPC	004030	TYPD	004056	TYPDAT	004162	TYVF	004134
TPG	004146	TYP5	004166	TYPSA	004212	TYPSB	004214
UP	004472	VECTOR	001034	WC	001016	WDEMR	003030
WORK	001120	WORK1	001122	WORK2	001124	WCHLCS	104407
WRDAT	002050	WRDCHP	003364	WRDCT	001046	WHLINC	003374
WRITE	004403	WPSAV	002170	XINC	003654	XALIT	003572
.	005362						

ERRORS DETECTED: 0

0, DZRFCA/N=DZRFCA.RIC
RUN-TIME: 3 6 0 SECONDS
CORE USED: 4K