

# RP11C

DISK PACK FORMATTER  
MD-11-DZRPD-B

EP-DZRPD-B-DL-A  
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FICHE 1 OF 1

NOV 1976  
**digital**  
MADE IN USA

This microfiche card contains a grid of frames. The frames are arranged in approximately 10 rows and 4 columns. Each frame contains a small, dense grid of characters, likely representing a table of data or a list of entries. The characters are small and difficult to read, but they appear to be organized in a structured format. The frames are separated by thin white lines, and the overall layout is consistent with a standard microfiche card.

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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZRPD-A-D  
PRODUCT NAME: RP11C DISK PACK FORMATTER  
DATE CREATED: NOVEMBER 15, 1972  
MAINTAINER: DIAGNOSTIC GROUP  
AUTHOR: JOE STUBBLEBINE

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DIGITAL EQUIPMENT CORPORATION  
MAYNARD, MASS.

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1.0 ABSTRACT

THE RP11C FORMATTER CONSISTS OF THREE PARTS. PART 1 FORMATS AN RPO3 DISK IN THE NORMAL MANNER AND CHECKS ALL ADDRESSES FOR VALIDITY. PART 2 ALLOWS THE OPERATOR TO REWRITE THE HEADER OF ANY DESIRED SECTOR. PART 3 FORMATS AND VERIFIES THE DISK WITH THE SEQUENCE OF SECTOR ADDRESSES SPECIFIED BY THE OPERATOR.

2.0 REQUIREMENTS

2.1 EQUIPMENT

STANDARD PDP-11 CONFIGURATION  
RP11C DISK CONTROLLER  
ONE OR MORE RPO3 DISK DRIVES

2.2 STORAGE

PROGRAM REQUIRES 4K OF STORAGE

2.3 PRELIMINARY PROGRAMS

DZSPA DISKLESS DIAGNOSTIC  
DZRPB RP11C RELIABILITY DIAGNOSTIC

3.0 LOADING PROCEDURE

USE STANDARD PROCEDURE FOR ABS TYPES.

4.0 STARTING PROCEDURE

4.1 CONTROL SWITCH SETTING

SEE SECTION 5.1.1

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#### 4.2 STARTING ADDRESS

THE PROGRAM MAY BE STARTED AT ONE OF FOUR LOCATIONS

1. STARTING ADDRESS 200 WILL FORMAT THE ENTIRE PACK AND THEN VERIFY THAT THE HEADERS HAVE BEEN WRITTEN CORRECTLY.
2. STARTING ADDRESS 250 WILL ALLOW THE OPERATOR TO SPECIFY A PARTICULAR HEADER TO BE REWRITTEN AND VERIFIED
3. STARTING ADDRESS 300 WILL FORMAT THE ENTIRE PACK USING THE SECTOR ADDRESS SEQUENCE PROVIDED BY THE OPERATOR. AFTER FORMATTING THE PACK IS VERIFIED.
4. STARTING ADDRESS 350 ALLOWS THE OPERATOR TO VERIFY ALL THE HEADERS ON THE PACK.

#### 4.3 PROGRAM AND/OR OPERATOR ACTION

1. LOAD THE PROGRAM INTO MEMORY USING THE ABS LOADER.
2. LOAD DESIRED STARTING ADDRESS
3. SET SWITCHES (SEE SEC 5.1.1)
4. PRESS START
5. WHEN THE PROGRAM IS COMPLETE, IT TYPES OUT "TEST COMPLETE" AND HALTS.

#### 5.0 OPERATING PROCEDURE

#### 5.1 OPERATIONAL SWITCH SETTINGS

AFTER LOADING STARTING ADDRESS SELECT THE DESIRED SWITCHES.

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5.1.1 SWITCH SETTINGS ARE:

SW<15>=1.....HALT ON ERROR  
SW<14> .....NOT USED  
SW<13>=1.....INHIBIT PRINTOUT  
SW<12> .....NOT USED  
SW<11> .....NOT USED  
SW<10>=1.....BELL ON ERROR

5.2 SUBROUTINE ABSTRACTS

5.2.1 TRAPCATCHER

A ".+2" - "HALT" SEQUENCE IS REPEATED FROM 0-776 TO CATCH ANY UNEXPECTED TRAPS. THUS ANY UNEXPECTED TRAPS OR INTERRUPTS WILL HALT AT THE VECTOR +2.

5.2.2 ERROR HANDLER

THIS ROUTINE IS ENTERED UPON DETECTION OF AN ERROR. THE ERROR ADDRESS, PDP-11 STATUS, AND RELEVANT ERROR INFORMATION IS TYPED OUT. RING THE BELL, INHIBIT TYPEOUTS, AND HALT ON ERROR SWITCHES ARE TESTED.

6.0 ERRORS

6.1 ERROR PRINTOUTS

#1 ERROR MESSAGE FORMAT:

ERROR AT ADDRESS XXXX PS= PROCESSOR STATUS  
CALLED FROM SUBROUTINE AT YYY  
RPCS = CONTENTS OF RPCS  
RPCS = CONTENTS OF RPCS  
RPER = CONTENTS OF RPER  
RPDS = CONTENTS OF RPDS

XXXX = THE ADDRESS WHERE THE ERROR WAS  
ENCOUNTERED.

YYY = IF THE ERROR WAS ENCOUNTERED IN A  
SUBROUTINE, THIS ADDRESS REFERS BACK TO THE

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MAINLINE CODE WHICH CALLED THE SUBROUTINE.

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#2 ERROR AT ADDRESS XXXX PS= PROCESSOR STATUS  
CALLED FROM SUBROUTINE AT YYY

		CYLINDER	TRACK	SECTOR
GOOD =	=	-	-	-
BAD =	=	-	-	-

THIS MESSAGE IS GIVEN IF AN ERROR OCCURS WHILE  
VERIFYING A HEADER. GOOD EQUALS THE EXPECTED  
CONTENTS OF THE HEADER AND BAD EQUALS WHAT WAS  
ACTUALLY FOUND IN THE HEADER.

7.0 RESTRICTIONS

NONE

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

AFTER PERFORMING THE SELECTED TASK, THE PROGRAM WILL  
TYPE TEST COMPLETE AND HALT.

8.2 STACK POINTER

THE STACK IS INITIALLY SET TO 600.

9.0 PROGRAM DISCRIPTION

9.1 STANDARD FORMATTER

ONCE STARTED THE PROGRAM TYPES:

UNIT

AND WAITS FOR INPUT. RESPOND WITH THE RELEVANT  
OCTAL NUMBER (0-7) AND TERMINATE WITH A CARRIAGE  
RETURN.



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DZRPD.P11

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**I01**

293

THE TTY THEN PRINTS:

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SET THE FORMAT ENABLE SWITCH.  
SET THE RP11C WRITE ENABLE SWITCH.  
SET THE SELECTED UNIT WRITE ENABLE SWITCH.  
STRIKE ANY TELETYPE KEY WHEN READY.

STRIKING ANY KEY CAUSES THE FORMATTING OPERATION TO BEGIN. WHEN THE DISK HAS BEEN FORMATTED, THE TTY PRINTS:

RESET THE FORMAT ENABLE SWITCH TO NORMAL.  
STRIKE ANY TELETYPE KEY WHEN READY.

STRIKING ANY KEY CAUSE THE PROGRAM TO ENTER A READ/COMPARE HEADER SEQUENCE. WHEN COMPLETE THE PROGRAM TYPES TEST COMPLETE.

### 9.2 SINGLE HEADER FORMATTER

ONCE STARTED, THE PROGRAM QUERIES FOR THE UNIT NUMBER AS IN 9.1. THE PROGRAM THEN PRINTS:

CYLINDER TRACK SECTOR  
OLD:

AND WAITS FOR INPUT.  
TYPE THE PHYSICAL CYLINDER, TRACK, AND SECTOR OF THE DESIRED ADDRESS; TERMINATE THE FIRST TWO WITH A SPACE AND THE LAST WITH A CARRIAGE RETURN.  
THE PROGRAM THEN TYPES:

NEW

AND WAITS FOR INPUT. THE THE DESIRED ADDRESS IN THE SAME SEQUENCE AS ABOVE. THE PROGRAM WILL FIRST REWRITE AND THEN READ THE DESIRED HEADER TO DETERMINE VALIDITY. WHEN FINISHED THE PROGRAM TYPES TEST COMPLETE AND HALTS.

### 9.3 SPECIAL FORMATTER

ONCE STARTED, THE PROGRAM QUERIES FOR THE UNIT NUMBER AS IN 9.1. THE PROGRAM THEN PRINTS:

INPUT THE SECTOR NUMBERS (0-9) IN THE DESIRED ORDER.

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K01

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RESPOND WITH THE FIRST DESIRED SECTOR NUMBER. THE  
OTHER NINE NUMBERS ARE REQUESTED AND SPECIFIED IN

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LIKE MANNER. ONCE A SECTOR NUMBER HAS BEEN USED IT CANNOT BE SPECIFIED AGAIN.

AFTER THE LAST PARAMETER HAS BEEN PROCESSED, THE PROGRAM WRITE THE PACK TO THE DESIRED FORMAT AND THEN ENTERS A READ/COMPARE HEADER SEQUENCE TO ENSURE THE VALIDITY OF ALL ADDRESSES. WHEN THE PROGRAM IS FINISHED IT TYPES TEST COMPLETE AND HALTS.

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000002  
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000007  
000007  
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000340  
000001  
000002  
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000100  
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000400  
001000  
002000  
004000  
010000  
020000  
040000  
100000  
104000  
104400

%  
:RP11 DISK FORMATTER  
:ROBERT J. COLLINS  
:JANUARY 29, 1971  
  
SR=177570 :SWITCH REGISTER  
CC=177776 :CONDITION CODES  
TKS=177560  
TKB=177562  
TPS=177564  
TPB=177566  
TKV=60  
TPV=64  
  
CR=15  
LF=12 :STACK PCINTER  
SP=%6  
R0=%0  
R1=%1  
R2=%2  
R3=%3  
R4=%4  
R5=%5  
R6=%6  
R7=%7  
PC=%7  
XX=HALT  
PS=CC  
NOP=240  
P0=0  
P1=40  
P2=100  
P3=140  
P4=200  
P5=240  
P6=300  
P7=340  
B0=1  
B1=2  
B2=4  
B3=10  
B4=20  
B5=40  
B6=100  
B7=200  
B8=400  
B9=1000  
B10=2000  
B11=4000  
B12=10000  
B13=20000  
B14=40000  
B15=100000  
ERR=EMT  
ERM=TRAP

421	000001	GB=80		
422	000002	DD=81		
423	000004	DS=82		
424	000010	ER=83		
425	000020	CS=84		
426	000040	DA=85		
427	000100	HD=86		
428	005726	POP=5726		
429	022626	POPPOP=22626		
430				
431		.MACR	ANDI	A,B
432		BIC	#-A-1,B	;MASK A APPLIED TO B
433		.ENDM		
434				
435				
436		.MACR	PNTM A	
437		MOV	#A,RO	;PRINT MESSAGE
438		JSR	PC,TYPOUT	;POINTED TO BY A
439		.ENDM		
440				
441		.MACR	PNTOL A	
442		MOV	A,RO	;PRINT 6 OCTAL
443		JSR	PC,PNTOCT	;NUMBERS IN A
444		.ENDM		
445				
446				
447				
448				
449	000000	.=0		
450		.REPT	140	
451		.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
452		HALT		
453		.ENDR		
454	000000	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
455	000002	HALT		
456	000004	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
457	000006	HALT		
458	000010	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
459	000012	HALT		
460	000014	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
461	000016	HALT		
462	000020	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
463	000022	HALT		
464	000024	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
465	000026	HALT		
466	000030	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
467	000032	HALT		
468	000034	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
469	000036	HALT		
470	000040	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
471	000042	HALT		
472	000044	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
473	000046	HALT		
474	000050	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
475	000052	HALT		
476	000054	.+2		;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS

477	000056	000000	HALT	
478	000060	000062	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
479	000062	000000	HALT	
480	000064	000066	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
481	000066	000000	HALT	
482	000070	000072	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
483	000072	000000	HALT	
484	000074	000076	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
485	000076	000000	HALT	
486	000100	000102	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
487	000102	000000	HALT	
488	000104	000106	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
489	000106	000000	HALT	
490	000110	000112	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
491	000112	000000	HALT	
492	000114	000116	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
493	000116	000000	HALT	
494	000120	000122	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
495	000122	000000	HALT	
496	000124	000126	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
497	000126	000000	HALT	
498	000130	000132	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
499	000132	000000	HALT	
500	000134	000136	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
501	000136	000000	HALT	
502	000140	000142	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
503	000142	000000	HALT	
504	000144	000146	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
505	000146	000000	HALT	
506	000150	000152	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
507	000152	000000	HALT	
508	000154	000156	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
509	000156	000000	HALT	
510	000160	000162	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
511	000162	000000	HALT	
512	000164	000166	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
513	000166	000000	HALT	
514	000170	000172	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
515	000172	000000	HALT	
516	000174	000176	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
517	000176	000000	HALT	
518	000200	000202	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
519	000202	000000	HALT	
520	000204	000206	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
521	000206	000000	HALT	
522	000210	000212	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
523	000212	000000	HALT	
524	000214	000216	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
525	000216	000000	HALT	
526	000220	000222	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
527	000222	000000	HALT	
528	000224	000226	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
529	000226	000000	HALT	
530	000230	000232	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
531	000232	000000	HALT	
532	000234	000236	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS

533	000236	000000	HALT	
534	000240	000242	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
535	000242	000000	HALT	
536	000244	000246	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
537	000246	000000	HALT	
538	000250	000252	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
539	000252	000000	HALT	
540	000254	000256	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
541	000256	000000	HALT	
542	000260	000262	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
543	000262	000000	HALT	
544	000264	000266	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
545	000266	000000	HALT	
546	000270	000272	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
547	000272	000000	HALT	
548	000274	000276	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
549	000276	000000	HALT	
550	000300	000302	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
551	000302	000000	HALT	
552	000304	000306	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
553	000306	000000	HALT	
554	000310	000312	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
555	000312	000000	HALT	
556	000314	000316	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
557	000316	000000	HALT	
558	000320	000322	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
559	000322	000000	HALT	
560	000324	000326	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
561	000326	000000	HALT	
562	000330	000332	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
563	000332	000000	HALT	
564	000334	000336	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
565	000336	000000	HALT	
566	000340	000342	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
567	000342	000000	HALT	
568	000344	000346	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
569	000346	000000	HALT	
570	000350	000352	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
571	000352	000000	HALT	
572	000354	000356	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
573	000356	000000	HALT	
574	000360	000362	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
575	000362	000000	HALT	
576	000364	000366	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
577	000366	000000	HALT	
578	000370	000372	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
579	000372	000000	HALT	
580	000374	000376	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
581	000376	000000	HALT	
582	000400	000402	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
583	000402	000000	HALT	
584	000404	000406	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
585	000406	000000	HALT	
586	000410	000412	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
587	000412	000000	HALT	
588	000414	000416	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS



589	000416	000000	HALT	
590	000420	000422	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
591	000422	000000	HALT	
592	000424	000426	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
593	000426	000000	HALT	
594	000430	000432	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
595	000432	000000	HALT	
596	000434	000436	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
597	000436	000000	HALT	
598	000440	000442	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
599	000442	000000	HALT	
600	000444	000446	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
601	000446	000000	HALT	
602	000450	000452	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
603	000452	000000	HALT	
604	000454	000456	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
605	000456	000000	HALT	
606	000460	000462	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
607	000462	000000	HALT	
608	000464	000466	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
609	000466	000000	HALT	
610	000470	000472	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
611	000472	000000	HALT	
612	000474	000476	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
613	000476	000000	HALT	
614	000500	000502	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
615	000502	000000	HALT	
616	000504	000506	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
617	000506	000000	HALT	
618	000510	000512	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
619	000512	000000	HALT	
620	000514	000516	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
621	000516	000000	HALT	
622	000520	000522	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
623	000522	000000	HALT	
624	000524	000526	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
625	000526	000000	HALT	
626	000530	000532	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
627	000532	000000	HALT	
628	000534	000536	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
629	000536	000000	HALT	
630	000540	000542	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
631	000542	000000	HALT	
632	000544	000546	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
633	000546	000000	HALT	
634	000550	000552	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
635	000552	000000	HALT	
636	000554	000556	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
637	000556	000000	HALT	
638	000560	000562	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
639	000562	000000	HALT	
640	000564	000566	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
641	000566	000000	HALT	
642	000570	000572	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
643	000572	000000	HALT	
644	000574	000576	.+2	; TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS

645	000576	000000		HALT	
646					
647		000030		.=30	
648	000030	004660		.WORD	ERROR
649	000032	000340		.WORD	340
650	000034	004660		.WORD	ERROR
651	000036	000340		.WORD	340
652					
653					
654					
655		000200		.=200	
656	000200	012707	000600	MOV	#START1,PC
657		000250		.=250	
658	000250	012707	001342	MOV	#START2,PC
659		000300		.=300	
660	000300	012707	002076	MOV	#START3,PC
661		000350		.=350	
662	000350	012707	001010	MOV	#START4,PC
663		000600		.=600	
664					

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665          .TITLE  RP11C DISK PACK FORMATTER
666          .SBTTL  ** STANDARD FORMATTER **
667
668          ;THIS ROUTINE WILL FORMAT THE ENTIRE PACK AND THEN VERIFY
669          ;THE HEADERS WITHIN EACH SECTOR.  STARTING ADDRESS IS 200.
670
671 000600 012706 000600          START1: MOV      #START1,SP      ;INITIALIZE STACK POINTER
672 000604 012767 000340 177164  MOV      #P7,CC      ;LOCKOUT OTHER DEVICES
673 000612 000005                RESET                ;CLEAR THE WORLD
674 000614 004767 002310  IL1:   JSR      PC,UNIQ      ;GET UNIT#
675 000620                URDY1: PNTM      SWMES
676 000620 012700 004175                MOV      #SWMES,RO      ;PRINT MESSAGE
677 000624 004767 006000                JSR      PC,TYPOUT      ;POINTED TO BY SWMES
678 000630 004767 003134                JSR      PC,RIN        ;WAIT FOR KEYBOARD RESPONSE
679
680
681 000634 004767 002470          NS2:   JSR      PC,HOME      ;HOME SEEK
682 000640 012777 000732 006172  MOV      #RPI,ARPIV    ;RP11 PI VECTO
683 000646 012777 000340 006166  MOV      #P7,ARPSV    ;RP11 PI STATUS
684 000654 012777 000001 006112  MOV      #1,ARPMC     ;ALLOW DSH BREAKS
685 000662 062777 014103 006100  ADD      #14103,ARPCS ;WRITE 10/15 HEADER (FORMAT) WITH PI ON
686 000670 112767 000200 177100  MOVB     #P4,PS      ;LOWER CPU PRIORITY
687 000676 017704 006102          IL2:   MOV      ARPDA,R4    ;SAVE ADDRESS
688 000702 012767 177770 005770  MOV      #177770,TOG1 ;SETUP TIMEOUT
689 000710 020477 006070          IL3:   CMP      R4,ARPDA    ;HAS ADDRESS CHANGED?
690 000714 001370                BNE      IL2          ;YES - RECYCLE
691 000716 005367 005756                DEC      TOG1        ;NO - HAS 100 MSEC. TIMED OUT?
692 000722 001372                BNE      IL3          ;NO - KEEP CHECKING
693 000724 104074                ERR+DS+CS+ER+DA    ;DISK ADDRESS NOT CHANGING IN TIME
694 000726 000167 177702          JMP      NS2          ;TRY AGAIN
695 000732 004567 005470          RPI:   JSR      R5,SAVOS  ;RP11 PI HANDLER - SAVE RO-5
696 000736 032777 100000 006024  BIT      #B15,ARPCS  ;ERROR?
697 000744 001406                BEQ      P1OK1       ;NO
698 000746 104034                ERR+ER+CS+DS      ;ERROR DURING FORMAT GENERATION
699 000750 004567 005466          RPIX:  JSR      R5,RESTOS ;RESTORE RO-5
700 000754                POP                ;POP OLD PC
701          .IRP      B,<>
702                MOV      (SP)+,B      ;;POP STACK INTO B
703          .ENDM
704 000754 012746 000634          MOV      #NS2,-(SP)  ;PUSH A NEW PC
705 000760 000002                RTI                ;EXIT
706 000762 032777 000200 006000  P1OK1: BIT      #B7,ARPCS ;DONE?
707 000770 001002                BNE      .+6        ;YES
708 000772 104050                ERR+CS+ER+CS      ;EXTRANEIOUS PI DURING FORMAT PASS
709 000774 000765                BR       RPIX       ;TRY AGAIN
710 000776 004567 005440          JSR      R5,RESTOS  ;RESTORE RO-5
711 001002                POP                ;POP OLD PC
712          .IRP      B,<>
713                MOV      (SP)+,B      ;;POP STACK INTO B
714          .ENDM
715 001002 012746 001030          MOV      #STR4,-(SP) ;PUSH A NEW PC
716 001006 000002                RTI                ;EXIT TO PASS 2
717
718
719 001010 012706 000600          START4: MOV     #START1,SP
720 001014 012767 000340 176754  MOV     #P7,CC

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721	001022	000005				RESET		
722	001024	004767	002100			JSR	PC, UNIQ	
723	001030	012767	000340	176740	STR4:	MOV	#P7, PS	; LOCKOUT PI'S
724	001036					PNTM	NSWMES	
725	001036	012700	004417			MOV	#NSWMES, RO	; PRINT MESSAGE
726	001042	004767	005562			JSR	PC, TYP0UT	; POINTED TO BY NSWMES
727	001046	004767	002716			JSR	PC, RIN	; WAIT FOR OPERATOR
728	001052	012777	000001	005710	P2L1:	MOV	#1, JRPCS	; RESET RP11
729	001060	116777	005634	005704		MOV B	UNIT, JRPCS1	; LOAD UNIT #
730	001066	004767	002236			JSR	PC, HOME	; HOME SEEK
731	001072	005067	005626			CLR	CYL	; CYL=0
732	001076	016777	005622	005674	P2L2:	MOV	CYL, JRPCA	; START AT
733	001104	005077	005674			CLR	JRPCA	; SAR & TAR = 0
734	001110	112777	000011	005652		MOV B	#11, JRPCS	; SEEK
735	001116	036777	005600	005634		BIT	ATNB, JRPDS	; WAIT FOR
736	001124	001774				BEQ	.-6	; ATTN.
737	001126	112777	000377	005624		MOV B	#377, JRPDS	; CLEAR ATTN
738	001134	032777	004000	005616		BIT	#B11, JRPDS	; DONE?
739	001142	001402				BEQ	.-6	; YES
740	001144	104074				ERR+ER+CS+DS+DA		; NO- SEEK INCOMPLETE ON PASS2 SEEK
741	001146	000741				BR	P2L1	; TRY AGAIN
742	001150	012777	176650	005616		MOV	#-600., JRPWC	; READ ONE CYLINDER OF HEADERS INTO
743	001156	012777	007244	005612		MOV	#INBUF, JRPBA	; BUFFER
744	001164	052777	014000	005576		BIS	#14000, JRPCS	; 10/15 HEADER MODE
745	001172	112777	000005	005570		MOV B	#5, JRPCS	; READ HEADERS
746	001200	032777	100200	005562		BIT	#B15+B7, JRPCS	; ERROR OR DONE
747	001206	001774				BEQ	.-6	; NOT YET
748	001210	100002				BPL	P2N1	; DONE
749	001212	104074				ERR+ER+DS+CS+DA		; ERROR ON READ HEADER OP.
750	001214	000730				BR	P2L2	; RECYCLE
751								
752								
753								
754	001216	005067	005504		P2N1:	CLR	HED	; START ADDRESS CHECKING
755	001222	005067	005502			CLR	SEC	; INITIALIZE GOOD DATA
756	001226	012704	007244			MOV	#INBUF, R4	; POINTER TO DATA READ
757	001232	004767	002222		P2L3:	JSR	PC, CHKAD	; CHECK DATA
758	001236	000240				NOP		; NO LOOPING
759	001240	005267	005464			INC	SEC	; ADVANCE SEC#
760	001244	026727	005460	000011		CMP	SEC, #9.	; OVFL0?
761	001252	101002				BHI	.-6	; YES
762	001254	000167	177752			JMP	P2L3	; NO- CHECK NEXT ADDRESS
763	001260	005067	005444			CLR	SEC	
764	001264	005267	005436			INC	HED	; ADVANCE HEAD#
765	001270	026727	005432	000023		CMP	HED, #19.	; OVFL0?
766	001276	101002				BHI	.-6	; YES
767	001300	000167	177726			JMP	P2L3	; NO- CHECK NEXT ADDRESS
768	001304	005067	005416			CLR	HED	
769	001310	005267	005410			INC	CYL	; ADVANCE CYL#
770	001314	026727	005404	000625		CMP	CYL, #405.	; DONE ALL?
771	001322	101002				BHI	1\$	; YES
772	001324	000167	177546			JMP	P2L2	; NO- READ ANOTHER BLOCK
773	001330				1\$:	PNTM	ENDM1	
774	001330	012700	006405			MOV	#ENDM1, RO	; PRINT MESSAGE
775	001334	004767	005270			JSR	PC, TYP0UT	; POINTED TO BY ENDM1
776	001340	000000				HALT		

H02

RP11C DISK PACK FORMATTER      MACY11 27(732) 04-NOV-76 14:24 PAGE 21  
DZRPD.P11      \*\* STANDARD FORMATTER \*\*

777  
778  
779

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780 .SBTTL ** SINGLE HEADER FORMATTER **
781
782 ;THIS ROUTINE ALLOWS THE OPERATOR TO SPECIFY A PARTICULAR
783 ;HEADER TO BE FORMATTED AND THEN VERIFIED. THE STARTING ADDR
784 ;IS 250.
785
786 001342 012706 000600 START2: MOV #START1,SP ;SET STACK POINTER
787 001346 012767 000340 176422 MOV #P7,CC ;LOCKOUT PI
788 001354 000005 RESET ;CLEAR THE WORLD
789 001356 004767 001546 JSR PC,UNIQ ;GET UNIT
790 001362 PNTM HDMS
791 001362 012700 006116 MOV #HDMS,RO ;PRINT MESSAGE
792 001366 004767 005236 JSR PC,TYP0UT ;POINTED TO BY HDMS
793 001372 PNTM OLDMS
794 001372 012700 006207 MOV #OLDMS,RO ;PRINT MESSAGE
795 001376 004767 005226 JSR PC,TYP0UT ;POINTED TO BY OLDMS
796 001402 012705 000625 MOV #405,R5 ;HIGHEST CYLINDER
797 001406 004767 001644 JSR PC,PARIN ;FETCH PARAMETER
798 001412 000767 BR HL1 ;ERROR RECYCLE
799 001414 016767 005272 005316 MOV WORK1,CYLA ;SAVE VALUE
800 001422 012705 000023 MOV #19,R5 ;HIGHEST TRACK
801 001426 004767 001624 JSR PC,PARIN ;FETCH PARAMETER
802 001432 000757 BR HL1 ;ERROR RECYCLE
803 001434 016767 005252 005300 MOV WORK1,HEDA ;SAVE VALUE
804 001442 004767 002202 JSR PC,TTIO ;FETCH PARAMETER
805 001446 000751 BR HL1 ;ERROR RECYCLE
806 001450 020027 000011 CMP RO,#9. ;HIGHEST SECTOR
807 001454 101346 BHI HL1 ;TOO BIG
808 001456 010067 005262 MOV RO,SECA ;SAVE VALUE
809 001462 PNTM NEWS
810 001462 012700 006222 MOV #NEWS,RO ;PRINT MESSAGE
811 001466 004767 005136 JSR PC,TYP0UT ;POINTED TO BY NEWS
812 001472 012705 000625 MOV #405,R5 ;HIGHEST CYLINDER
813 001476 004767 001554 JSR PC,PARIN ;FETCH PARAMETER
814 001502 000767 BR HL2 ;ERROR RECYCLE
815 001504 016767 005202 005212 MOV WORK1,CYL ;SAVE VALUE
816 001512 012705 000023 MOV #19,R5 ;HIGHEST TRACK
817 001516 004767 001534 JSR PC,PARIN ;FETCH PARAMETER
818 001522 000757 BR HL2 ;ERROR RECYCLE
819 001524 016767 005162 005174 MOV WORK1,HED ;SAVE VALUE
820 001532 004767 002112 JSR PC,TTIO ;FETCH PARAMETER
821 001536 000751 BR HL2 ;ERROR RECYCLE
822 001540 020027 000011 CMP RO,#9. ;HIGHEST SECTOR
823 001544 101346 BHI HL2 ;TOO BIG
824 001546 010067 005156 MOV RO,SEC ;SAVE VALUE
825
826
827
828 001552 005067 005466 HGO: CLR INBUF ;HWRD1=0
829 001556 016767 005146 005464 MOV SEC,INBUF+4 ;HWRD3=SECTOR
830 001564 016767 005134 005454 MOV CYL,INBUF+2
831 001572 006167 005450 ROL INBUF+2
832 001576 006167 005444 ROL INBUF+2
833 001602 006167 005440 ROL INBUF+2
834 001606 006167 005434 ROL INBUF+2
835 001612 006167 005430 ROL INBUF+2
  
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836	001616	006167	005424		RUL	INBUF+2	
837	001622	006167	005100		ROL	HED	
838	001626	056767	005074	005412	BIS	HED, INBUF+2	
839	001634	006067	005066		ROR	HED	
840	001640	042767	100001	005400	BIC	#100001, INBUF+2	
841	001646	004767	001456		HGL1: JSR	PC, HOME	;HOME SEEK
842	001652	012777	177775	005114	MOV	#-3, ARPWC	;WORD COUNT
843	001660	012777	007244	005110	MOV	#INBUF, ARPBA	;BUFFER ADDRESS
844	001666	052777	014000	005074	BIS	#14000, ARPCS	;10/15 MODE HEADER OP
845	001674	016777	005040	005076	MOV	CYLA, ARPCA	;LOAD CYLINDER
846	001702	116777	005034	005076	MOVB	HEDA, ARPDA1	;TRACK
847	001710	116777	005030	005066	MOVB	SECA, ARPDA	;AND SECTOR TO BE CHANGED
848	001716	112777	000003	005044	MOVB	#3, ARPCS	;REWRITE IT
849	001724	032777	100200	005036	BIT	#B15+B7, ARPCS	;ERROR OR DONE?
850	001732	001774			BEQ	.-6	;NOT YET
851	001734	100002			BPL	HG01	;DONE
852	001736	104074			ERR+ER+DS+CS+DA		;ERROR ON WRITE HEADER OP
853	001740	000742			BR	HGL1	;TRY AGAIN
854	001742	005067	005276		HG01: CLR	INBUF	;DESTROY
855	001746	005067	005274		CLR	INBUF+2	;OLD
856	001752	005067	005272		CLR	INBUF+4	;DATA
857	001756	004767	001346		HGL2: JSR	PC, HOME	;HOME SEEK
858	001762	012777	177775	005004	MOV	#-3, ARPWC	;WORD COUNT
859	001770	012777	007244	005000	MOV	#INBUF, ARPBA	;BUFFER
860	001776	016777	004736	004774	MOV	CYLA, ARPCA	;DISK
861	002004	116777	004732	004774	MOVB	HEDA, ARPDA1	;ADDRESS
862	002012	116777	004726	004764	MOVB	SECA, ARPDA	;TO BE FOUND
863	002020	052777	014000	004742	BIS	#14000, ARPCS	;10/15 MODE HEADER OP
864	002026	112777	000005	004734	MOVB	#5, ARPCS	;READ
865	002034	032777	100200	004726	BIT	#B15+B7, ARPCS	;ERROR OR DONE?
866	002042	001774			BEQ	.-6	;NOT YET
867	002044	100002			BPL	HG02	;DONE
868	002046	104074			ERR+ER+DS+CS+DA		;ERROR ON READING NEW HEADER
869	002050	000742			BR	HGL2	;TRY AGAIN
870	002052	012704	007244		HG02: MOV	#INBUF, R4	;R4=DATA POINTER
871	002056	004767	001376		JSR	PC, CHKAD	;CHECK REWRITTEN HEADER
872	002062	000735			BR	HGL2	;ERROR - TRY AGAIN
873	002064				PNTM	ENDM1	
874	002064	012700	006405		MOV	#ENDM1, RO	;PRINT MESSAGE
875	002070	004767	004534		JSR	PC, TYP0UT	;POINTED TO BY ENDM1
876	002074	000000			HALT		
877							
878							
879							
880							
881							

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882          .SBTTL ** SPECIAL FORMATTER **
883
884          ; THIS ROUTINE WILL FORMAT THE ENTIRE PACK USING THE SECTOR
885          ; ADDRESS SEQUENCE SPECIFIED BY THE OPERATOR. THE STARTING
886          ; ADDRESS IS 300.
887
888 002076 012706 000600          START3: MOV      #START1, SP          ; SET STACK
889 002102 012767 000340 175666  MOV      #P7, CC          ; LOCKOUT PI
890 002110 000005          RESET          ; CLEAR
891 002112 004767 001012          JSR      PC, UNIQ          ; GET UNIT#
892 002116          SFSL1: PNTM      SECME$          ;
893 002116 012700 004025          MOV      #SECME$ , RO          ; PRINT MESSAGE
894 002122 004767 004502          JSR      PC, TYP0UT          ; POINTED TO BY SECME$
895 002126 004767 000452          JSR      PC, CLRS          ; CLEAR FLAG STRING
896 002132 012767 177766 004540  MOV      #-10, TOG1          ; DO BELOW 10 TIMES
897 002140 012705 003046          MOV      #NSTR, R5          ; POINTER TO MESSAGE POINTERS
898 002144 012704 003072          MOV      #SCSLT, R4          ;
899 002150 012500          SFSL2: MOV      (R5)+, RO          ; FETCH POINTER
900 002152 004767 004452          JSR      PC, TYP0UT          ; FOR MESSAGE
901 002156 004767 000442          JSR      PC, SIN          ; GET PARAMETER
902 002162 000755          BR       SFSL1          ; ERROR
903 002164 005267 004510          INC      TOG1          ; DONE?
904 002170 001367          BNE     SFSL2          ; NOT YET
905 002172 004767 000476 004566  SFSL3: JSR      PC, MKBUF          ; GENERATE A TABLE OF ADDRESSES
906 002176 116777 004516          MOVVB   UNIT, ARPCS1          ; RESET
907 002204 004767 001120          JSR      PC, HOME          ; SELECTED UNIT
908 002210 005067 004510          CLR     CYL          ; START AT CYL=0
909 002214 016777 004504 004556  SFSL4: MOV      CYL, ARPCA          ; LOAD
910 002222 005077 004556          CLR     ARPDA          ; DISK ADDRESS
911 002226 004767 000540          JSR      PC, SEKE          ; SEEK
912 002232 000757          BR       SFSL3          ; ERROR RETURN
913 002234 012777 176650 004532  MOV      #-500, ARPWC          ; GOOD RETURN
914 002242 012777 011544 004526  MOV      #OUTBUF, ARPBA          ; WC&CA
915 002250 052777 014000 004512  BIS     #14000, ARPCS          ; 10/15 HEADER MODE
916 002256 112777 000003 004504  MOVVB   #3, ARPCS          ; WRITE
917 002264 032777 100200 004476  BIT     #B15+B7, ARPCS          ; ERROR OR DONE
918 002272 001774          BEQ     -5          ; WAIT
919 002274 100002          BPL     SFSN1          ; DONE
920 002276 104074          ERR+ER+DS+CS+DA          ; ERROR ON WRITE HEADER OP
921 002300 000745          BR       SFSL4          ; REPEAT
922 002302 012767 177470 004370  SFSN1: MOV      #-200, TOG1          ;
923 002310 012705 011546          MOV      #OUTBUF+2, R5          ;
924 002314 062715 000100          SFSL5: ADD     #100, (R5)          ; ADVANCE CYLINDER ADDRESS
925 002320 062705 000006          ADD     #6, R5          ; INDEX
926 002324 005267 004350          INC     TOG1          ; DONE?
927 002330 001371          BNE     SFSL5          ; NO
928 002332 005267 004366          INC     CYL          ; ADVANCE CYLINDER
929 002336 026727 004362 000625  CMP     CYL, #405          ; DONE?
930 002344 101001          JHI     SFCBK          ; YES
931 002346 000722          BR       SFSL4          ; NO
932 002350 012767 000340 175420  SFCBK: MOV      #P7, PS          ; LOCKOUT PI
933 002356 116777 004336 004406  MOVVB   UNIT, ARPCS1          ; SET UNIT
934 002364 004767 000740          JSR      PC, HOME          ; HOME SEEK
935 002370 005067 004330          CLR     CYL          ; CYL=0
936 002374 016777 004324 004376  SFCL1: MOV      CYL, ARPCA          ; TAR=0
937 002402 005077 004376          CLR     ARPDA          ; SAR=0

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938	002406	004767	000360			JSR	PC, SEKE	:SEEK
939	002412	000756				BR	SFCHK	:ERROR RETURN
940	002414	012777	176650	004352		MOV	#-600., ARPWC	:WC
941	002422	012777	0J7244	004346		MOV	#INBUF, ARPBA	:CA
942								
943	002430	052777	014000	004332		BIS	#14000, ARPCC	:10/15 HEADER OP
944	002436	112777	000005	004324		MOVB	#5, ARPCC	:READ
945	002444	032777	100200	004316		BIT	#B15+B7, ARPCC	:ERROR OR DONE?
946	002452	001774				BEQ	.-6	:NOT YET
947	002454	10CJ02				BPL	SFCN1	:JUMP IF DONE
948	002456	1C4074				ERR+ER+DS+CS+DA		:READ HEADER ERROR
949	002460	CJ0745				BR	SFCL1	:LOOP
950	002462	012705	003072		SFCN1:	MOV	#SCSLT, R5	:SETUP SECTOR LIST AND
951	002466	012767	177766	004204		MOV	#-10., TOG1	:COUNTER
952	002474	005067	004226			CLR	HED	:SETUP GOOD DATA
953	002500	012704	007244			MOV	#INBUF, R4	:SETUP BUFFER POINTER
954	002504	012567	004220		SFCL2:	MOV	(R5)+, SEC	:FETCH A SECTOR
955	002510	004767	000744			JSR	PC, CHKAD	:CHECK ADDRESS
956	002514	000240				NOP		:NO LOOPING
957	002516	005267	004156			INC	TOG1	:DONE ONE SURFACE?
958	002522	001370				BNE	SFCL2	:NO
959	002524	012705	003072			MOV	#SCSLT, R5	:YES - RESET
960	002530	012767	177766	004142		MOV	#-10., TOG1	:SECTOR PARAMETERS
961	002536	005267	004164			INC	HED	:ADVANCE TRACK
962	002542	026727	004160	000023		CMP	HED, #19.	:DONE?
963	002550	101755				BLOS	SFCL2	:NO
964	002552	005067	004150			CLR	HED	:YES - RESET HEAD
965	002556	005267	004142			INC	CYL	:ADVANCE CYLINDER
966	002562	026727	004136	000625		CMP	CYL, #405.	:DONE?
967	002570	101701				BLOS	SFCL1	:NOT YET
968	002572					PNTM	ENDM1	
969	002572	012700	006405			MOV	#ENDM1, RO	:PRINT MESSAGE
970	002576	004767	004026			JSR	PC, TYP0UT	:POINTED TO BY ENDM1
971	002602	000000				HALT		
972	002604	012705	177742		CLRS:	MOV	#-30., R5	:CLEAR
973	002610	012704	003072			MOV	#SCSLT, R4	:THE SECTOR
974	002614	105024			CLRS1:	CLRB	(R4)+	:SLOTS AND
975	002616	005205				INC	R5	:FLAG POINTERS
976	002620	001375				BNE	CLRS1	:EXIT
977	002622	000207				RTS	PC	:WHEN DONE
978	002624	004767	001140		SIN:	JSR	PC, RIN	:ASSEMBLE
979	002630	004767	003662			JSR	PC, TTO	:ECHO
980	002634	162700	000260			SUB	#260, RO	:A LIST OF
981	002640	020027	000011			CMP	RO, #9.	:LOGICAL SECTOR
982	002644	101012				BHI	SIN1	:NUMBERS
983	002646	005700				TST	RO	:TOO SMALL?
984	002650	100410				BMI	SIN1	:0-9 ARE LEGAL
985	002652	105760	003116			TSTB	SCFLG(RO)	:HAS THIS NUMBER BEEN USED?
986	002656	001005				BNE	SIN1	:ERROR - THIS NUMBER ALREADY USED
987	002660	105160	003116			COMB	SCFLG(RO)	:SET FLAG
988	002664	010024				MOV	RO, (R4)+	:STORE SEC#
989	002666	062716	000002			ADD	#2, (SP)	:ADVANCE RETURN
990	002672	000207			SIN1:	RTS	PC	:AND EXIT
991	002674	012767	177754	003776	MKBUF:	MOV	#-20., TOG1	:TOG1=COUNTER
992	002702	012705	011544			MOV	#OUTBUF, R5	:R5=POINTER TO BUFFER
993	002706	012704	003072			MOV	#SCSLT, R4	:R4=POINTER TO SECTOR LIST

994	002712	012767	177766	003762		MOV	#-10., TOG2	; TOG2=SECTOR COUNT
995	002720	005067	003764			CLR	WORK	
996	002724	005025			MKBL1:	CLR	(R5)+	; WORD1=0
997	002726	016725	003756			MOV	WORK, (R5)+	; WORK2=CYL+HEAD
998	002732	012425				MOV	(R4)+, (R5)+	; WORD3=SECTOR
999	002734	005267	003742			INC	TOG2	; DONE 10?
1000	002740	001371				BNE	MKBL1	; NO
1001								
1002	002742	012704	003072			MOV	#SCSLT, R4	; YES - UPDATE POINTER,
1003	002746	012767	177766	003726		MOV	#-10., TOG2	; COUNTER,
1004	002754	062767	000002	003726		ADD	#2, WORK	; AND TRACK
1005	002762	005267	003712			INC	TOG1	; FINISHED?
1006	002766	001356				BNE	MKBL1	; NO
1007	002770	000207				RTS	PC	; EXIT
1008	002772	112777	000377	003760	SEKE:	MOVB	#377, ARPDS	; CLEAR ATTN
1009	003000	112777	000011	003762		MOVB	#11, ARPDS	; SEEK
1010	003006	036777	003710	003744		BIT	ATNB, ARPDS	; WAIT FOR
1011	003014	001774				BEQ	-6	; ATTN
1012	003016	112777	000377	003734		MOVB	#377, ARPDS	; CLEAR ATTN
1013	003024	032777	004000	003726		BIT	#B11, ARPDS	; DONE?
1014	003032	001402				BEQ	+6	
1015	003034	104474				ERM+ER+CS+DS+DA		; SEEK INCOMPLETE
1016	003036	000207				RTS	PC	; ERROR EXIT
1017	003040	062716	000002			ADD	#2, (SP)	; GOOD
1018	003044	000207				RTS	PC	; EXIT
1019	003046	004113			NSTR:	NO		
1020	003050	004120				N1		
1021	003052	004125				N2		
1022	003054	004132				N3		
1023	003056	004137				N4		
1024	003060	004144				N5		
1025	003062	004151				N6		
1026	003064	004156				N7		
1027	003066	004163				N8		
1028	003070	004170				N9		
1029	003072				SCSLT:	.REPT	12	
1030						.WORD	0	
1031						.ENDR		
1032	003072	000000				.WORD	0	
1033	003074	000000				.WORD	0	
1034	003076	000000				.WORD	0	
1035	003100	000000				.WORD	0	
1036	003102	000000				.WORD	0	
1037	003104	000000				.WORD	0	
1038	003106	000000				.WORD	0	
1039	003110	000000				.WORD	0	
1040	003112	000000				.WORD	0	
1041	003114	000000				.WORD	0	
1042								
1043	003116				SCFLG:	.REPT	12	
1044						.BYTE	0	
1045						.ENDR		
1046	003116	000				.BYTE	0	
1047	003117	000				.BYTE	0	
1048	003120	000				.BYTE	0	
1049	003121	000				.BYTE	0	

1050	003122	000			.BYTE	0	
1051	003123	000			.BYTE	0	
1052	003124	000			.BYTE	0	
1053	003125	000			.BYTE	0	
1054	003126	000			.BYTE	0	
1055	003127	000			.BYTE	0	
1056							
1057							
1058							
1059	003130				UNIQ:	PNTM	UMES
1060	003130	012700	004014			MOV	#UMES,RO
1061	003134	004767	003470			JSR	PC, TYP0UT
1062	003140	004767	000504			JSR	PC, TTIO
1063	003144	000771				BR	UNIQ
1064	003146	020027	000007			CMP	RO, #7
1065	003152	101366				BHI	UNIQ
1066	003154	010067	003540			MOV	RO, UNIT
1067	003160	012700	000001			MOV	#1, RO
1068	003164	005767	003530			TST	UNIT
1069	003170	001406				BEQ	UNSI
1070	003172	016767	003522	000004		MOV	UNIT, DS1
1071	003200	004767	001426			JSR	PC, RTL
1072	003204	000001			DS1:	.WORD	1
1073	003206	010067	003510		UNSI:	MOV	RO, ATNB
1074	003212	116777	003502	003552		MOVB	UNIT, DRPCS1
1075	003220	032777	100000	003532		BIT	#B15, DRPDS
1076	003226	001401				BEQ	+4
1077	003230	000207				RTS	PC
1078	003232	104434				ERM+DS+ER+CS	
1079	003234	000766				BR	UNSI+4
1080	003236				SPACE:	PNTM	S1
1081	003236	012700	006154			MOV	#S1, RO
1082	003242	004767	003362			JSR	PC, TYP0UT
1083	003246	005367	003474			DEC	TTG
1084	003252	001371				BNE	SPACE
1085	003254	000207				RTS	PC
1086	003256	004767	000366		PARIN:	JSR	PC, TTIO
1087	003262	000401				BR	+4
1088	003264	000207				RTS	PC
1089	003266	020027	000240			CMP	RO, #240
1090	003272	001015				BNE	PRX
1091	003274	026705	003412			CMP	WORK1, R5
1092	003300	101012				BHI	PRX
1093	003302	005267	003440			INC	TTG
1094	003306	026727	003434	000005		CMP	TTG, #5
1095	003314	101004				BHI	PRX
1096	003316	004767	177714			JSR	PC, SPACE
1097	003322	062716	000002			ADD	#2, (SP)
1098	003326	000207			PRX:	RTS	PC
1099							
1100	003330	112777	000377	003422	HOME:	MOVB	#377, DRPDS
1101	003336	112777	000015	003424		MOVB	#15, DRPCS
1102	003344	012767	000005	003666		MOV	#5, DEBUG+174
1103	003352	005367	003662		WWW:	DEC	DEBUG+174
1104	003356	001375				BNE	WWW
1105	003360	032777	002000	003372		BIT	#B10, DRPDS

```

;PRINT MESSAGE
;POINTED TO BY UMES
;READ UNIT #
;ERROR RECYCLE
;TOO BIG
;YES
;SAVE IT
;DETERMINE ATTENTION BIT
;NO ROTATION
;IF 0
;NUMBER OF ROTATES
;TO DETERMINE ATTENTION BIT
;IS PUT HERE
;SAVE BIT
;SELECT UNIT
;IS IT READY?
;NO
;YES - EXIT
;SELECTED UNIT READY NOT UP
;LOOP UNTIL FIXED

;PRINT MESSAGE
;POINTED TO BY S1
;PRINT NUMBER OF SPACES
;IN TTG. THEN
;EXIT
;READ SOME NUMBERS
;THIS IS NOW THE GOOD RETURN
;CR IS ILLEGAL FOR THIS SEQUENCE
;IS IT A SPACE?
;NO - EXIT
;TOO BIG?
;YES - EXIT
;TTG=# OF SPACES
;TOO MANY
;YES
;JUSTIFY NEXT ENTRY
;SKIP FOR GOOD RETURN
;EXIT

;CLEAR ATTN BITS
;HOME SEEK
;WAIT FOR
;SEEK TO
;START
;IS SEEK UNDERWAY?
  
```

1106	003366	001002			BNE	+6		:YES
1107	003370	104434			ERM+ER+DS+CS			:SEEK NOT UNDERWAY
1108	003372	000756			BR	HOME		:FIX IT
1109	003374	036777	003322	003356	BIT	ATNB,ARPDS		:WAIT FOR
1110	003402	001774			BEQ	-6		:ATTENTION TO SET
1111	003404	032777	004000	003346	BIT	#B11,ARPDS		:SEEK INCOMPLETE?
1112	003412	001402			BEQ	+6		:NO
1113	003414	104434			ERM+ER+DS+CS			:DEVICE STATUS ERROR
1114	003416	000744			BR	HOME		:LOOP
1115	003420	132777	000023	003334	BITB	#23,ARPDS1		:ANY ERRORS?
1116	003426	001402			BEQ	+6		:NO
1117	003430	104434			ERM+ER+CS+DS			:DEVICE STATUS ERROR
1118	003432	000736			BR	HOME		:LOOP
1119	003434	112777	000001	003326	MOVB	#1,ARPCS		:RESET THE RP11
1120	003442	112777	000377	003310	MOVB	#377,ARPDS		:CLEAR ATTN BITS
1121	003450	116777	003244	003314	MOVB	UNIT,ARPCS1		:RELOAD UNIT#
1122	003456	000207			RTS	PC		:EXIT
1123	003460	062704	000002		ADD	#2,R4	CHKAD:	:SKIP 1ST WORD
1124	003464	012467	003244		MOV	(R4)+,HEDR		:FETCH HEAD AND
1125	003470	016767	003240	003234	MOV	HEDR,CYLR		:CYLINDER READ
1126	003476	006067	003232		ROR	HEDR		:JUSTIFY HEAD
1127	003502	006067	003224		ROR	CYLR		
1128	003506	006067	003220		ROR	CYLR		
1129	003512	006067	003214		ROR	CYLR		
1130	003516	006067	003210		ROR	CYLR		
1131	003522	006067	003204		ROR	CYLR		
1132	003526	006067	003200		ROR	CYLR		
1133	003532	012467	003200		MOV	(R4)+,SECR		:FETCH SECTOR READ
1134	003536				ANDI	17,SECR		
1135	003536	042767	177760	003172	BIC	#-17-1,SECR		:MASK 17 APPLIED TO SECR
1136	003544				ANDI	37,HEDR		
1137	003544	042767	177740	003162	BIC	#-37-1,HEDR		:MASK 37 APPLIED TO HEDR
1138	003552				ANDI	777,CYLR		
1139	003552	042767	177000	003152	BIC	#-777-1,CYLR		:MASK 777 APPLIED TO CYLR
1140	003560	026767	003140	003144	CMP	CYL,CYLR		:IS CYL# OK?
1141	003566	001013			BNE	CMER		:NO
1142	003570	026767	003132	003136	CMP	HED,HEDR		:IS TRACK# OK
1143	003576	001007			BNE	CMER		:NO
1144	003600	026767	003124	003130	CMP	SEC,SECR		:IS SECTOR# OK?
1145	003606	001003			BNE	CMER		:NO
1146	003610	062716	000002		ADD	#2,(SP)		:ALL ADDRESSES
1147	003614	000207			RTS	PC		:OK - EXIT
1148	003616	104500			ERM+HD		CMER:	:HEADER COMPARE ERROR
1149	003620	000207			RTS	PC		:ERROR EXIT
1150	003622				SUBER:	PNTM		
1151	003622	012700	006235		MOV	#SUBRMS,RO		:PRINT MESSAGE
1152	003626	004767	002776		JSR	PC,TYP0UT		:POINTED TO BY SUBRMS
1153	003632	016600	000022		MOV	22(SP),RO		:FETCH PC OF SUBROUTINE CALL
1154	003636	162700	000004		SUB	#4,RO		:PC-4=ADDRESS OF SUBROUTINE CALL
1155	003642	004767	002620		JSR	PC,OCTPNT		:PRINT ADDRESS
1156	003646	000207			RTS	PC		:EXIT
1157								
1158	003650	012767	000005	003070	TTIO:	MOV	#5,TTG	:INPUT UP TO 5 OCTAL DIGITS
1159	003656	005067	003030		CLR	WORK1		:CLEAR WORK REGISTER
1160	003662	004767	000102		TTIL:	JSR	PC,RIN	:READ TTY CHARACTER INTO RO
1161	003666	020027	000215		CMP	RO,#215		:IS IT CR?

1162	003672	001427		BEO	TTIX	:YES
1163	003674	004767	002616	JSR	PC, TTO	:ECHO
1164	003700	020027	000267	CMP	RO, #267	:TOO BIG?
1165	003704	101030		BHI	TTRX	:YES
1166	003706	020027	000257	CMP	RO, #257	:TOO SMALL?
1167	003712	101425		BLOS	TTRX	:YES
1168	003714	005367	003026	DEC	TTG	:COUNT DIGIT
1169	003720	100422		BMI	TTRX	:TOO MANY?
1170	003722			ANDI	7, RO	:NO - MASK IT
1171	003722	042700	177770	BIC	#-7-1, RO	:MASK 7 APPLIED TO RO
1172	003726	000241		CLC		:AND
1173	003730	006167	002756	ROL	WORK1	:SHIFT
1174	003734	006167	002752	ROL	WORK1	:WORK REGISTER
1175	003740	006167	002746	ROL	WORK1	:3 PLACES
1176	003744	060067	002742	ADD	RO, WORK1	:ADD NEW NUMBER
1177	003750	000744		BR	TTIL	:GET NEXT ONE
1178	003752	004767	002540	JSR	PC, TTO	
1179	003756	062716	000002	ADD	#2, (SP)	:SKIP RETURN
1180	003762	016700	002724	MOV	WORK1, RO	
1181	003766	000207		RTS	PC	
1182	003770	005267	173564	INC	TKS	:FETCH A CHARACTER
1183	003774	105767	173560	TSTB	TKS	:WAIT
1184	004000	100375		BPL	-4	:FOR IT
1185	004002	116700	173554	MOVB	TKB, RO	:READ IT INTO RO
1186	004006			ANDI	377, RO	
1187	004006	042700	177400	BIC	#-377-1, RO	:MASK 377 APPLIED TO RO
1188	004012	000207		RTS	PC	:AND EXIT

1192	004014	023046	047125	052111	UMES:	.ASCII	/&&UNIT: 2/
1193	004022	020072	100				
1194	004025	046	044446	050116	SECMES:	.ASCII	/&&INPUT THE SECTOR NUMBERS(0-9) IN THE ORDER DESIRED.2/
1195	004032	052125	052040	042510			
1196	004040	051440	041505	047524			
1197	004046	020122	052516	041115			
1198	004054	051105	024123	026460			
1199	004062	024471	044440	020116			
1200	004070	044124	020105	051117			
1201	004076	042504	020122	042504			
1202	004104	044523	042522	027104			
1203	004112	100					
1204	004113	046	035060	040040	N0:	.ASCII	/&0: 2/
1205	004120	030446	020072	100	N1:	.ASCII	/&1: 2/
1206	004125	046	035062	040040	N2:	.ASCII	/&2: 2/
1207	004132	031446	020072	100	N3:	.ASCII	/&3: 2/
1208	004137	046	035064	040040	N4:	.ASCII	/&4: 2/
1209	004144	032446	020072	100	N5:	.ASCII	/&5: 2/
1210	004151	046	035066	040040	N6:	.ASCII	/&6: 2/
1211	004156	033446	020072	100	N7:	.ASCII	/&7: 2/
1212	004163	046	035070	040040	N8:	.ASCII	/&8: 2/
1213	004170	034446	020072	100	N9:	.ASCII	/&9: 2/
1214							
1215	004175	046	051446	052105	SWMES:	.ASCII	/&&SET THE FORMAT ENABLE SWITCH./
1216	004202	052040	042510	043040			
1217	004210	051117	040515	020124			

1218	004216	047105	041101	042514				
1219	004224	051440	044527	041524				
1220	004232	027110						
1221	004234	051446	052105	052040			.ASCII	/8SET THE RP11 WRITE ENABLE SWITCH./
1222	004242	042510	051040	030520				
1223	004250	020061	051127	052111				
1224	004256	020105	047105	041101				
1225	004264	042514	051440	044527				
1226	004272	041524	027110					
1227	004276	051446	052105	052040			.ASCII	/8SET THE SELECTED UNIT WRITE ENABLE SWITCH./
1228	004304	042510	051440	046105				
1229	004312	041505	042524	020104				
1230	004320	047125	052111	053440				
1231	004326	044522	042524	042440				
1232	004334	040516	046102	020105				
1233	004342	053523	052111	044103				
1234	004350	056						
1235	004351	046	052123	044522			.ASCII	/8STRIKE ANY TELETYPE KEY WHEN READY.80/
1236	004356	042513	040440	054516				
1237	004364	052040	046105	052105				
1238	004372	050131	020105	042513				
1239	004400	020131	044127	047105				
1240	004406	051040	040505	054504				
1241	004414	023056	100					
1242								
1243	004417	046	051046	051505	NSWMES:		.ASCII	/88RESET THE FORMAT ENABLE SWITCH TO NORMAL./
1244	004424	052105	052040	042510				
1245	004432	043040	051117	040515				
1246	004440	020124	047105	041101				
1247	004446	042514	051440	044527				
1248	004454	041524	020110	047524				
1249	004462	047040	051117	040515				
1250	004470	027114						
1251	004472	051446	051124	045511			.ASCII	/8STRIKE ANY TELETYPE KEY WHEN READY.80/
1252	004500	020105	047101	020131				
1253	004506	042524	042514	054524				
1254	004514	042520	045440	054505				
1255	004522	053440	042510	020116				
1256	004530	042522	042101	027131				
1257	004536	040046						
1258								
1259							.EVEN	
1260								
1261	004540	032777	040000	002222	HRDR:	BIT	#B14,8RPCS	:TEST HARD ERROR BIT
1262	004546	001001				BNE	HRN1	:OK IF SET
1263	004550	104020				ERR+CS		:HARD ERROR NOT SET. C(SP) POINTS TO CAUSE
1264	004552	032777	100000	002210	HRN1:	BIT	#B15,8RPCS	:TEST ERROR BIT IN RPCS
1265	004560	001401				BEQ	+4	:OK IF SET
1266	004562	000207				RTS	PC	:OK- EXIT
1267	004564	104020				ERR+CS		:RPCS ERROR NOT SET. C(SP) POINTS TO CAUSE
1268	004566	000207				RTS	PC	:EXIT
1269	004570	032777	040000	002172	SFTER:	BIT	#B14,8RPCS	:TEST HARD ERROR BIT
1270	004576	001765				BEQ	HRN1	:OK IF CLEAR
1271	004600	104020				ERR+CS		:SOFT ERROR SET HARD ERROR BIT
1272	004602	000763				BR	HRN1	:TEST INCLUSIVE ERROR
1273	004604	017667	000000	002142	RTR:	MOV	8(SP),ROTOG	:FETCH SHIFT COUNT

1274	004612	062716	000002			ADD	#2, (SP)	:STEP RETURN VECTOR
1275	004616	000241			RRLUP:	CLC		:CLEAR THE LINK
1276	004620	006000				ROR	RO	:SHIFT RO RIGHT ONCE
1277	004622	005367	002126			DEC	ROTOG	:FINISHED?
1278	004626	001373				BNE	RRLUP	:NO
1279	004630	000207				RTS	PC	:YES- EXIT
1280	004632	017667	000000	002114	RTL:	MOV	2(SP), ROTOG	:FETCH SHIFT COUNT
1281	004640	062716	000002			ADD	#2, (SP)	:STEP RETURN VECTOR
1282	004644	000241			RLLUP:	CLC		:CLEAR LINK
1283	004646	006100				ROL	RO	:SHIFT RO LEFT ONCE
1284	004650	005367	002100			DEC	ROTOG	:FINISHED?
1285	004654	001373				BNE	RLLUP	:NO
1286	004656	000207				RTS	PC	:YES- EXIT
1287								
1288								
1289	004660	032767	002000	172702	ERROR:	BIT	#B10, SR	:RING THE BELL?
1290	004666	001404				BEQ	15	:BRANCH IF NO
1291	004670					PNTM	BELL	
1292	004670	012700	006424			MOV	#BELL, RO	:PRINT MESSAGE
1293	004674	004767	001730			JSR	PC, TYP0UT	:POINTED TO BY BELL
1294	004700	032767	020000	172662	15:	BIT	#B13, SR	:TEST T10 DELETE SWITCH
1295	004706	001103				BNE	ERXIT1	:EXIT NOW IF T10 DELETE SWITCH IS UP
1296	004710	004567	001512			JSR	R5, SAV05	:SAVE ACO-5
1297	004714	012700	006163			MOV	#ERMS1, RO	:MESSAGE POINTER TO KO
1298	004720	004767	001704			JSR	PC, TYP0UT	:PRINT MESSAGE
1299	004724	016600	000014			MOV	14(SP), RO	:FETCH SAVED PC
1300	004730	162700	000002			SUB	#2, RO	:FIND ADDRESS OF ERROR CALL
1301	004734	010005				MOV	RO, R5	:PUT POINTER IN R5
1302	004736	004767	001524			JSR	PC, OCTPNT	:PRINT PC
1303	004742	012700	006366			MOV	#STMS, RO	:MESSAGE POINTER
1304	004746	004767	001656			JSR	PC, TYP0UT	:PRINT "PS="
1305	004752	016600	000016			MOV	16(SP), RO	:FETCH SAVED STATUS
1306	004756	004767	001504			JSR	PC, OCTPNT	:AND PRINT IT
1307	004762	032715	000400			BIT	#B8, (R5)	:TRAP?
1308	004766	001402				BEQ	GOGO	:NO
1309	004770	004767	176626			JSR	PC, SUBER	:SUBROUTINE ERROR
1310	004774	032715	000020		GOGO:	BIT	#B4, (R5)	:RPCS?
1311	005000	001402				BEQ	+6	:NO
1312	005002	004767	000230			JSR	PC, CSTYPE	:YES
1313	005006	032715	000010			BIT	#B3, (R5)	:RPER?
1314	005012	001402				BEQ	+6	:NO
1315	005014	004767	000262			JSR	PC, ERTYPE	:YES
1316	005020	032715	000004			BIT	#B2, (R5)	:RPDS?
1317	005024	001402				BEQ	+6	:NO
1318	005026	004767	000272			JSR	PC, DSTYPE	:YES
1319	005032	032715	000040			BIT	#B5, (R5)	:RPDA & RPCA?
1320	005036	001402				BEQ	+6	:NO
1321	005040	004767	000302			JSR	PC, ADTYPE	:YES
1322	005044	032715	000100			BIT	#HD, (R5)	:HEADER MESSAGE?
1323	005050	001402				BEQ	+6	:NO
1324	005052	004767	000616			JSR	PC, HDTYPE	:YES
1325	005056	032715	000001			BIT	#B0, (R5)	:B0(1) FOR GOOD/BAD
1326	005062	001402				BEQ	+6	:SKIP IF=0
1327	005064	004767	000104			JSR	PC, GBTYPE	:GOOD/BAD
1328	005070	032715	000002			BIT	#B1, (R5)	:B1(1) FOR DATA
1329	005074	001402				BEQ	+6	:SKIP IF=0

1330	005076	004767	000156			JSR	PC, DATYPE	: DATA
1331	005102	004567	001334		ERXIT:	JSR	RS, RESTOS	: RESTORE ACC-5
1332	005106	012700	000015			MOV	#CR, RO	: PRINT
1333	005112	004767	001400			JSR	PC, TIO	: CR & LF
1334	005116	105777	001646		ERXIT1:	TSTB	DRPCS	: WAIT FOR DONE
1335	005122	100375				BPL	ERXIT1	
1336	005124	032767	100000	172436		BIT	#B15, SR	: HALT ON ERROR?
1337	005132	001401				BEQ	IS	
1338	005134	000000				XX		: ERROR HALT. CONTINUE
1339	005136	000002			IS:	RTI		: EXIT ERROR ROUTINE
1340								
1341								
1342								
1343	005140	032767	020000	172422	LERCHK:	BIT	#B13, SR	: SR13(1)=LOOP ON ERROR
1344	005146	001002				BNE	.+6	: EXIT IF 1
1345	005150	062716	000004			ADD	#4, (SP)	: ADVANCE RETURN VECTOR OVER LOOP JUMP
1346	005154	000207			LERXT:	RTS	PC	: EXIT
1347								
1348	005156	032767	010000	172404	LUPCHK:	BIT	#B12, SR	: SR12(1)=LOOP ALWAYS
1349	005164	001002				BNE	.+6	: EXIT IF 1
1350	005166	062716	000004			ADD	#4, (SP)	: ADVANCE RETURN VECTOR OVER LOOP JUMP
1351	005172	000207				RTS	PC	: EXIT
1352								
1353	005174	012700	006350		GBTYPE:	MOV	#GDMS, RO	: POINTER TO "GOOD"
1354	005200	004767	001424			JSR	PC, TYPOUT	: PRINT MESSAGE
1355	005204	016700	001460			MOV	GOOD, RO	: FETCH C(GOOD)
1356	005210	004767	000354			JSR	PC, PNT OCT	: PRINT OCTAL NUMBER
1357	005214	012700	006360			MOV	#BDMS, RO	: POINTER TO "BAD"
1358	005220	004767	001404			JSR	PC, TYPOUT	: PRINT MESSAGE
1359	005224	016700	001442			MOV	BAD, RO	: FETCH C(BAD)
1360	005230	004767	000334			JSR	PC, PNT OCT	: PRINT OCTAL NUMBER
1361	005234	000207				RTS	PC	: EXIT
1362								
1363	005236	012700	006271		CSTYPE:	MOV	#CSMS, RO	: POINTER TO "STATUS"
1364	005242	004767	001362			JSR	PC, TYPOUT	: PRINT TEXT
1365	005246	017700	001516			MOV	DRPCS, RO	: FETCH C(RPCS)
1366	005252	004767	000312			JSR	PC, PNT OCT	: PRINT OCTAL NUMBER
1367	005256	000207				RTS	PC	: EXIT
1368	005260	012700	006375		DATYPE:	MOV	#DAMS, RO	: POINTER TO "DATA"
1369	005264	004767	001340			JSR	PC, TYPOUT	: PRINT TEST
1370	005270	016700	001400			MOV	DATA, RO	: FETCH C(DATA)
1371	005274	004767	000270			JSR	PC, PNT OCT	: PRINT OCTAL NUMBER
1372	005300	000207				RTS	PC	: EXIT
1373	005302	012700	006301		ERTYPE:	MOV	#ERMS, RO	: PRINT
1374	005306	004767	001316			JSR	PC, TYPOUT	: "RPER="
1375	005312	017700	001446			MOV	DRPER, RO	: PRINT
1376	005316	004767	000246			JSR	PC, PNT OCT	: RPER
1377	005322	000207				RTS	PC	: EXIT
1378	005324	012700	006311		DSTYPE:	MOV	#DSMS, RO	: PRINT
1379	005330	004767	001274			JSR	PC, TYPOUT	: "RPDS="
1380	005334	017700	001420			MOV	DRPDS, RO	: PRINT
1381	005340	004767	000224			JSR	PC, PNT OCT	: RPDS
1382	005344	000207				RTS	PC	: EXIT
1383	005346	032777	000001	001410	ADTYPE:	BIT	#B0, DRPER	: ADDRESS ERROR?
1384	005354	001407				BEQ	IS	: BRANCH IF NO
1385	005356	017767	001416	001332		MOV	DRPCA, WORK3	: GET THE CLYINDER ADDREEE



1386	005364	017767	001414	001322		MOV	JRPDA,WORK2		;GET HEAD AND SECTOR ADDRESS
1387	005372	000437				BR	ADT1		
1388	005374	017767	001400	001314	1S:	MOV	JRPCA,WORK3		
1389	005402	017767	001376	001304		MOV	JRPDA,WORK2		
1390	005410	042767	160360	001276		BIC	#160360,WORK2		
1391	005416	032767	000017	001270		BIT	#17,WORK2		
1392	005424	001403				BEQ	DECTK		
1393	005426	005367	001262			DEC	WORK2		
1394	005432	000417				BR	ADT1		
1395	005434	132767	000037	001253	DECTK:	BITB	#37,WORK2+1		
1396	005442	001406				BEQ	DECCY		
1397	005444	105367	001245			DECB	WORK2+1		
1398	005450	052767	000011	001236		BIS	#11,WORK2		
1399	005456	000405				BR	ADT1		
1400	005460	012767	011411	001226	DECCY:	MOV	#11411,WORK2		
1401	005466	005367	001224			DEC	WORK3		
1402	005472	012700	006321		ADT1:	MOV	#CYMS,RO		;PRINT
1403	005476	004767	001126			JSR	PC,TYP0UT		; "CAR="
1404	005502	016700	001210			MOV	WORK3,RO		;PRINT
1405	005506					ANDI	777,RO		
1406	005506	042700	177000			BIC	#-777-1,RO		;MASK 777 APPLIED TO RO
1407	005512	004767	000750			JSR	PC,OCTPNT		;CAR
1408	005516	012700	006330			MOV	#TAMS,RO		;PRINT
1409	005522	004767	001102			JSR	PC,TYP0UT		; "TAR="
1410	005526	116700	001163			MOV#	WORK2+1,RO		;PRINT
1411	005532					ANDI	37,RO		
1412	005532	042700	177740			BIC	#-37-1,RO		;MASK 37 APPLIED TO RO
1413	005536	004767	000724			JSR	PC,OCTPNT		;TAR
1414	005542	012700	006340			MOV	#SEMS,RO		;PRINT
1415	005546	004767	001056			JSR	PC,TYP0UT		; "SAR="
1416	005552	116700	001136			MOV#	WORK2,RO		;PRINT
1417	005556					ANDI	17,RO		
1418	005556	042700	177760			BIC	#-17-1,RO		;MASK 17 APPLIED TO RO
1419	005562	004767	000700			JSR	PC,OCTPNT		;SAR
1420	005566	000207				RTS	PC		;EXIT
1421	005570	012767	000006	001110	PNT0CT:	MOV	#6,TOG4		
1422	005576	010067	001106		OLUP:	MOV	RO,WORK		
1423	005602					ANDI	7,WORK		
1424	005602	042767	177770	001100		BIC	#-7-1,WORK		;MASK 7 APPLIED TO WORK
1425	005610	062767	000060	001072		ADD	#60,WORK		
1426	005616	016746	001066			MOV	WORK,-(SP)		
1427	005622	006000				ROR	RO		
1428	005624	006000				ROR	RO		
1429	005626	006000				ROR	RO		
1430	005630	005367	001052			DEC	TOG4		
1431	005634	003360				BGT	OLUP		
1432	005636	012767	000005	001042		MOV	#5,TOG4		
1433	005644	012600				MOV	(SP)+,RO		
1434	005646					ANDI	61,RO		
1435	005646	042700	177716			BIC	#-61-1,RO		;MASK 61 APPLIED TO RO
1436	005652	004767	000640			JSR	PC,TT0		
1437	005656	012600			TOLUPO:	MOV	(SP)+,RO		
1438	005660	004767	000632			JSR	PC,TT0		
1439	005664	005367	001016			DEC	TOG4		
1440	005670	003372				BGT	TOLUPO		
1441	005672	000207				RTS	PC		

1442							
1443	005674			HDTYPE: PNTM	HDMS		
1444	005674	012700	006116	MOV	#HDMS,RO		;PRINT MESSAGE
1445	005700	004767	000724	JSR	PC, TYP0UT		;POINTED TO BY HDMS
1446	005704			PNTM	GDMS		
1447	005704	012700	006350	MOV	#GDMS,RO		;PRINT MESSAGE
1448	005710	004767	000714	JSR	PC, TYP0UT		;POINTED TO BY GDMS
1449	005714			PNTM	S2		
1450	005714	012700	006156	MOV	#S2,RO		;PRINT MESSAGE
1451	005720	004767	000704	JSR	PC, TYP0UT		;POINTED TO BY S2
1452	005724			PNTOL	CYL		
1453	005724	016700	000774	MOV	CYL,RO		;PRINT 6 OCTAL
1454	005730	004767	177634	JSR	PC, PNT0CT		;NUMBERS IN CYL
1455	005734			PNTM	S1		
1456	005734	012700	006154	MOV	#S1,RO		;PRINT MESSAGE
1457	005740	004767	000664	JSR	PC, TYP0UT		;POINTED TO BY S1
1458	005744			PNTOL	HED		
1459	005744	016700	000756	MOV	HED,RO		;PRINT 6 OCTAL
1460	005750	004767	177614	JSR	PC, PNT0CT		;NUMBERS IN HED
1461	005754			PNTM	S1		
1462	005754	012700	006154	MOV	#S1,RO		;PRINT MESSAGE
1463	005760	004767	000644	JSR	PC, TYP0UT		;POINTED TO BY S1
1464	005764			PNTOL	SEC		
1465	005764	016700	000740	MOV	SEC,RO		;PRINT 6 OCTAL
1466	005770	004767	177574	JSR	PC, PNT0CT		;NUMBERS IN SEC
1467	005774			PNTM	CARET		
1468	005774	012700	006161	MOV	#CARET,RO		;PRINT MESSAGE
1469	006000	004767	000624	JSR	PC, TYP0UT		;POINTED TO BY CARET
1470	006004			PNTM	S1		
1471	006004	012700	006154	MOV	#S1,RO		;PRINT MESSAGE
1472	006010	004767	000614	JSR	PC, TYP0UT		;POINTED TO BY S1
1473	006014			PNTM	BDMS		
1474	006014	012700	006360	MOV	#BDMS,RO		;PRINT MESSAGE
1475	006020	004767	000604	JSR	PC, TYP0UT		;POINTED TO BY BDMS
1476	006024			PNTM	S2		
1477	006024	012700	006156	MOV	#S2,RO		;PRINT MESSAGE
1478	006030	004767	000574	JSR	PC, TYP0UT		;POINTED TO BY S2
1479	006034			PNTOL	CYLR		
1480	006034	016700	000672	MOV	CYLR,RO		;PRINT 6 OCTAL
1481	006040	004767	177524	JSR	PC, PNT0CT		;NUMBERS IN CYLR
1482	006044			PNTM	S1		
1483	006044	012700	006154	MOV	#S1,RO		;PRINT MESSAGE
1484	006050	004767	000554	JSR	PC, TYP0UT		;POINTED TO BY S1
1485	006054			PNTOL	HEDR		
1486	006054	016700	000654	MOV	HEDR,RO		;PRINT 6 OCTAL
1487	006060	004767	177504	JSR	PC, PNT0CT		;NUMBERS IN HEDR
1488	006064			PNTM	S1		
1489	006064	012700	006154	MOV	#S1,RO		;PRINT MESSAGE
1490	006070	004767	000534	JSR	PC, TYP0UT		;POINTED TO BY S1
1491	006074			PNTOL	SECR		
1492	006074	016700	000636	MOV	SECR,RO		;PRINT 6 OCTAL
1493	006100	004767	177464	JSR	PC, PNT0CT		;NUMBERS IN SECR
1494	006104			PNTM	CARET		
1495	006104	012700	006161	MOV	#CARET,RO		;PRINT MESSAGE
1496	006110	004767	000514	JSR	PC, TYP0UT		;POINTED TO BY CARET
1497	006114	000207		RTS	PC		



1554	006375	046	040504	040524	DAMS:	.ASCII	/&DATA= 2/	
1555	006402	020075	100					
1556								
1557	006405	046	042524	052123	ENDM1:	.ASCII	/&TEST COMPLETED/	
1558	006412	041440	046517	046120				
1559	006420	052105	040105					
1560								
1561	006424	040007			BELL:	.ASCII	<7>/2/	
1562								
1563						.EVEN		
1564								
1565	006426	010446			SAV05:	MOV	R4,-(SP)	;SAVE R0-R5 ON THE STACK
1566	006430	010346				MOV	R3,-(SP)	;R5 WAS STACKED BY THE JSR
1567	006432	010246				MOV	R2,-(SP)	;R4-R3 ARE STACKED ABOVE IT
1568	006434	010146				MOV	R1,-(SP)	;WITH R0 ON TOP
1569	006436	010046				MOV	R0,-(SP)	;R5 HOLDS THE RETURN PC, BUT AN
1570	006440	000115				JMP	(R5)	;RTS WOULD POP THE STACK-SO JUMP OUT
1571								
1572	006442	005726			REST05:	TST	(SP)+	;MOVE SP OVER WORD SAVED BY JSR
1573	006444	012600				MOV	(SP)+,R0	;R0-4
1574	006446	012601				MOV	(SP)+,R1	;ARE POPPED
1575	006450	012602				MOV	(SP)+,R2	;IN LIFO
1576	006452	012603				MOV	(SP)+,R3	;SEQUENCE
1577	006454	012604				MOV	(SP)+,R4	;R5 IS POPPED BY THE RTS AND
1578	006456	000205				RTS	R5	;THE PC IS TAKEN FROM R5
1579								
1580	006460	012702	000012		DECPNT:	MOV	#10,R2	;DIVISOR OF 10 FOR DECIMAL PRINT
1581	006464	000402				BR	DECREM	;PROCESS AND PRINT NUMBER
1582	006466	012702	000010		OCTPNT:	MOV	#8,R2	;DIVISOR OF 8 FOR OCTAL PRINT
1583	006472	004767	000060		DECREM:	JSR	PC, IDIVR	;DIVIDE (R0) BY (R2) WITH REMAINDER IN R1
1584	006476	010146				MOV	R1,-(SP)	;STACK REMAINDER
1585	006500	005700				TST	R0	;HAS NUMBER DEFLATED BELOW RADIX?
1586	006502	001402				BEQ	POPTT	;YES - POP AND PRINT
1587	006504	004767	177762			JSR	PC, DECREM	;NO - DIVIDE NUMBER BY RADIX
1588	006510	012600			POPTT:	MOV	(SP)+,R0	;POP NUMBER FROM STACK
1589	006512	062700	000060			ADD	#60,R0	;MAKE ASCII
1590	006516	032767	040000	171044	TTO:	BIT	#B14,SR	;IF SR14=1,DELETE TYPEOUT
1591	006524	001010				BNE	TTOLF-2	;EXIT
1592	006526	010067	171034			MOV	R0,TPB	;PRINT CONTENTS OF R0
1593	006532	105767	171026		TTOLP:	TSTB	TPS	;DONE YET?
1594	006536	100375				BPL	TTOLP	;NO - KEEP LOOPING
1595	006540	022700	000015			CMP	#CR,R0	;WAS CHARACTER A CR!
1596	006544	001401				BEQ	TTOLF	;YES - PRINT LINE FEED
1597	006546	000207				RTS	PC	;RETURN TO POPTT OR MAIN PROGRAM
1598	006550	012700	000012		TTOLF:	MOV	#LF,R0	;PRINT LF
1599	006554	000760				BR	TTO	;EXECUTE PRINT
1600								
1601	006556	010067	000114		IDIVR:	MOV	R0,DIVID	;SAVE DIVIDEND
1602	006562	005000				CLR	R0	;CLEAR QUOTIENT AREA
1603	006564	005001				CLR	R1	;CLEAR ACCUM.
1604	006566	060201			DIVLP:	ADD	R2,R1	;ADD DIVISOR TO ACCUM.
1605	006570	020167	000102			CMP	R1,DIVID	;COMPARE TO DIVIDEND
1606	006574	100002				BPL	DVEND	;WHEN ACCUM PASSES DIVIDEND - EXIT
1607	006576	005200				INC	R0	;INCREMENT QUOTIENT THEN
1608	006600	000772				BR	DIVLP	;ADD AGAIN
1609	006602	001003			DVEND:	BNE	DIVN1	;JUMP TO GET REMAINDER

1610	006604	005200		INC	RO	:NO REMAINDER - INCREMENT QUOTIENT
1611	006606	005001		CLR	R1	:REMAINDER OF 0
1612	006610	000207		RTS	PC	:EXIT
1613	006612	160167	000060	DIVN1: SUB	R1, DIVID	:FANCY FINAGLING TO
1614	006616	060267	000054	ADD	R2, DIVID	:DETERMINE THE REMAINDER
1615	006622	016701	000050	MOV	DIVID, R1	:REMAINDER TO R1
1616	006626	000207		RTS	PC	:EXIT WITH QUOTIENT IN RO
1617						
1618	006630	010046		TYP0UT: MOV	RO, -(SP)	:STACK ADDRESS POINTER FOR MESSAGE
1619	006632	117600	000000	TPOFCH: MOV	B(SP), RO	:FETCH ASCII BYTE
1620	006636	022700	000100	CMP	#100, RO	:IS IT B(TERMINATOR)?
1621	006642	001411		BEG	TPOUTX	:YES - EXIT
1622	006644	022700	000046	CMP	#46, RO	:IS IT CRLF FLAG?
1623	006650	001002		BNE	+.6	:NO
1624	006652	012700	000015	MOV	#CR, RO	:YES- CHANGE DATA TO CRLF
1625	006656	004767	177634	JSR	PC, TTO	: PRINT
1626	006662	005216		INC	(SP)	:MOVE POINTER TO NEXT BYTE
1627	006664	000762		BR	TPOFCH	:FETCH NEXT CHARACTER
1628	006666			TPOUTX: POP		:POP STACK TO REACH RETURN VECTOR
1629				.IRP	B, <>	
1630				MOV	(SP)+, B	::POP STACK INTO B
1631				.ENDM		
1632	006666	000207		RTS	PC	:EXIT
1633						
1634	006670	000000		GOOD:	XX	
1635	006672	000000		BAD:	XX	
1636	006674	000000		DATA:	XX	
1637	006676	000000		DIVID:	XX	
1638	006700	000000		TOG1:	XX	
1639	006702	000000		TOG2:	XX	
1640	006704	000000		TOG3:	XX	
1641	006706	000000		TOG4:	XX	
1642	006710	000000		WORK:	XX	
1643	006712	000000		WORK1:	XX	
1644	006714	000000		WORK2:	XX	
1645	006716	000000		WORK3:	XX	
1646	006720	000000		UNIT:	XX	
1647	006722	000000		ATNB:	XX	
1648	006724	000000		CYL:	XX	
1649	006726	000000		HED:	XX	
1650	006730	000000		SEC:	XX	
1651	006732	000000		CYLR:	XX	
1652	006734	000000		HEDR:	XX	
1653	006736	000000		SECR:	XX	
1654	006740	000000		CYLA:	XX	
1655	006742	000000		HEDA:	XX	
1656	006744	000000		SECA:	XX	
1657	006746	000000		TTG:	XX	
1658	006750	000000		TEMP1:	XX	
1659	006752	000000		MASK:	XX	
1660	006754	000000		ROTOG:	XX	
1661	006756	000000		LERR:	XX	
1662	006760	176710		RPDS:	176710	
1663	006762	176711		RPDS1:	176711	
1664	006764	176712		RPER:	176712	
1665	006766	176713		RPER1:	176713	

1666	006770	176714	RPCS:	176714
1667	006772	176715	RPCS1:	176715
1668	006774	176716	RPWC:	176716
1669	006776	176720	RPBA:	176720
1670	007000	176722	RPCA:	176722
1671	007002	176723	RPSQ1:	176723
1672	007004	176724	RPDA:	176724
1673	007006	176725	RPDA1:	176725
1674	007010	176726	RPM1:	176726
1675	007012	176727	RPM11:	176727
1676	007014	176730	RPM2:	176730
1677	007016	176731	RPM21:	176731
1678	007020	176732	RPM3:	176732
1679	007022	176733	RPM31:	176733
1680	007024	176734	RPB1:	176734
1681	007026	176735	RPB11:	176735
1682	007030	176736	RPB2:	176736
1683	007032	176737	RPB21:	176737
1684	007034	176740	RP33:	176740
1685	007036	176741	RPB31:	176741
1686	007040	000254	RPIV:	.WORD 254
1687	007042	000256	RPSV:	.WORD 256
1688	007044	000000	DEBUG:	XX
1689		007244	INBUF=	DEBUG+200
1690		011544	OUTBUF=	INBUF+2300
1691				
1692				
1693	000001		.END	;THAT'S ALL FOLKS!

















.SSB20	18
.SSB20	18
.SSCOP	18
.SSIZE	18
.SSUPR	18
.STRAP	18
.STYPB	18
.STYPD	18
.STYPE	18
.STYPO	18
.S4OCA	18
.1170	18

ADD	685	924	925	989	1004	1017	1097	1123	1146	1176	1179	1274	1281	1345	1350
	1425	1589	1604	1614											
BEQ	697	736	739	747	850	866	918	946	1011	1014	1069	1076	1110	1112	1116
	1162	1265	1270	1290	1308	1311	1314	1317	1320	1323	1326	1329	1337	1384	1392
	1396	1586	1596	1621											
BGT	1431	1440													
BHI	761	766	771	807	823	930	982	1065	1092	1095	1165				
BIC	840	1135	1137	1139	1171	1187	1390	1406	1412	1418	1424	1435			
BIS	744	838	844	863	915	943	1398								
BIT	696	706	735	738	746	849	865	917	945	1010	1013	1075	1105	1109	1111
	1261	1264	1269	1289	1294	1307	1310	1313	1316	1319	1322	1325	1328	1336	1343
	1348	1383	1391	1590											
BITB	1115	1395													
BLOS	963	967	1167												
BMI	984	1169													
BNE	690	692	707	904	927	958	976	986	1000	1006	1084	1090	1104	1106	1141
	1143	1145	1262	1278	1285	1295	1344	1349	1591	1609	1623				
BPL	748	851	867	919	947	1184	1335	1594	1606						
BR	709	741	750	798	802	805	814	818	821	853	869	872	902	912	921
	931	939	949	1063	1079	1087	1108	1114	1118	1177	1272	1387	1394	1399	1581
	1599	1608	1627												
CLC	1172	1275	1282												
CLR	731	733	754	755	763	768	828	854	855	856	908	910	935	937	952
	964	995	996	1159	1602	1603	1611								
CLRB	974														
CMP	689	760	765	770	806	822	929	962	966	981	1064	1089	1091	1094	1140
	1142	1144	1161	1164	1166	1595	1605	1620	1622						
COMB	987														
DEC	691	1083	1103	1168	1277	1284	1393	1401	1430	1439					
DECB	1397														
EMT	419														
HALT	392	455	457	459	461	463	465	467	469	471	473	475	477	479	481
	483	485	487	489	491	493	495	497	499	501	503	505	507	509	511
	513	515	517	519	521	523	525	527	529	531	533	535	537	539	541
	543	545	547	549	551	553	555	557	559	561	563	565	567	569	571
	573	575	577	579	581	583	585	587	589	591	593	595	597	599	601
	603	605	607	609	611	613	615	617	619	621	623	625	627	629	631
	633	635	637	639	641	643	645	776	876	971					
INC	759	764	769	903	926	928	957	961	965	975	999	1005	1093	1182	1607
	1610	1626													
JMP	694	762	767	772	1570										
JSR	674	677	678	681	695	699	710	722	726	727	730	757	775	789	792
	795	797	801	804	811	813	817	820	841	857	871	875	891	894	895
	900	901	905	907	911	934	938	955	970	978	979	1061	1062	1071	1082
	1086	1096	1152	1155	1160	1163	1178	1293	1296	1298	1302	1304	1306	1309	1312
	1315	1318	1321	1324	1327	1330	1331	1333	1354	1356	1358	1360	1364	1366	1369
	1371	1374	1376	1379	1381	1403	1407	1409	1413	1415	1419	1436	1438	1445	1448
	1451	1454	1457	1460	1463	1466	1469	1472	1475	1478	1481	1484	1487	1490	1493
	1496	1583	1587	1625											
MOV	656	658	660	662	671	672	676	682	683	684	687	688	704	715	719
	720	723	725	728	732	742	743	756	774	786	787	791	794	796	799
	800	803	808	810	812	815	816	819	824	829	830	842	843	845	858
	859	860	870	874	888	889	893	896	897	898	899	909	913	914	922
	923	932	936	940	941	950	951	953	954	959	960	969	972	973	988
	991	992	993	994	997	998	1002	1003	1060	1066	1067	1070	1073	1081	1102
	1124	1125	1133	1151	1153	1158	1180	1273	1280	1292	1297	1299	1301	1303	1305

	1332	1353	1355	1357	1359	1363	1365	1368	1370	1373	1375	1378	1380	1385	1386
	1388	1389	1400	1402	1404	1408	1414	1421	1422	1426	1432	1433	1437	1444	1447
	1450	1453	1456	1459	1462	1465	1468	1471	1474	1477	1480	1483	1486	1489	1492
	1495	1565	1566	1567	1568	1569	1573	1574	1575	1576	1577	1580	1582	1584	1588
	1592	1598	1601	1615	1618	1624									
MOV8	686	729	734	737	745	846	847	848	861	862	864	906	916	933	944
	1008	1009	1012	1074	1100	1101	1119	1120	1121	1185	1410	1416	1619		
NOP	758	956													
RESET	673	721	788	890											
ROL	831	832	833	834	835	836	837	1173	1174	1175	1283				
ROR	839	1126	1127	1128	1129	1130	1131	1132	1276	1427	1428	1429			
RTI	705	716	1339												
RTS	977	990	1007	1016	1018	1077	1085	1088	1098	1122	1147	1149	1156	1181	1188
	1266	1268	1279	1286	1346	1351	1361	1367	1372	1377	1382	1420	1441	1497	1578
	1597	1612	1616	1632											
SUB	980	1154	1300	1613											
TRAP	420														
TST	983	1068	1572	1585											
TSTB	985	1183	1334	1593											
.ASCII	1192	1194	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1215	1221	1227
	1235	1243	1251	1500	1506	1508	1510	1513	1519	1521	1523	1528	1531	1534	1537
	1540	1543	1546	1549	1551	1554	1557	1561							
.BYTE	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055					
.ENABL	1	370													
.END	1693														
.EVEN	1259	1563													
.IRP	701	712	1629												
.LIST	1	370													
.MACR	431	436	441												
.MACRO	1														
.NLIST	1	370													
.PAGE	665	780	882												
.REM	1														
.REPT	450	1029	1043												
.SBTTL	666	780	882												
.TITLE	665														
.WORD	648	649	650	651	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1072
	1686	1687													

ERRORS DETECTED: 0  
 DEFAULT GLOBALS GENERATED: 0

\* DZRPD.SEG/SOL/CRF/PAGNUM/NL:TOC=SYSMAC.CO,DZRPD.P11  
 RUN-TIME: 25 31 3 SECONDS  
 RUN-TIME RATIO: 130/59=2.1  
 CORE USED: 33K (65 PAGES)



