

# RP11E

MULTI-DRIVE EXERCISER  
MD-11-DZRP1-B

EP-DZRP1-B-DL-A  
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This image displays a grid of 132 small plots arranged in 12 rows and 11 columns. Each plot contains a different visualization, likely representing data from a multi-drive exerciser. The visualizations include:

- Waveforms and signal traces.
- Tables of data with multiple columns and rows.
- Bar charts and histograms.
- Scatter plots.
- Diagrams and flowcharts.

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MAINDEC-11-DZRP1-B-D  
RP11E MULTI-DRIVE EXERCISER PROGRAM  
MAY 21, 1976  
DIAGNOSTIC GROUP  
C. HESS

I D E N T I F I C A T I O N

PRODUCT CODE: MAINDEC-11-DZRP1-B-D  
PRODUCT NAME: RP11E MULTI-DRIVE EXERCISER PROGRAM  
DATE CREATED: MAY 21, 1976  
MAINTAINER: DIAGNOSTIC GROUP  
AUTHOR: C. HESS

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1. ABSTRACT

THE RPIIE MULTI-DRIVE EXERCISER PROGRAM EXERCISES 1 TO 8 RPO2, RPRO2, OR RPO3 DISK DRIVES ATTACHED TO THE SAME RPIIE. IF 2 OR MORE DISK DRIVES ARE BEING EXERCISED, OPERATIONS ON THE DRIVES ARE OVERLAPPED (OTHER DRIVES ARE PERFORMING SEEK OPERATIONS WHILE ONE DRIVE IS PERFORMING A DATA TRANSFER OR WRITE CHECK OPERATION). OPERATIONS AMONG THE DRIVES ARE OPTIMIZED SO THAT A HIGH SUBSYSTEM DATA TRANSFER RATE OR A HIGH DRIVE POSITIONING RATE CAN BE MAINTAINED.

THE PERFORMANCE OF EACH DISK DRIVE IS MONITORED BY THE PROGRAM. IF A DRIVE EXCEEDS A PRESET NUMBER OF ERRORS, THE DRIVE IS AUTOMATICALLY DEASSIGNED. (THE OPERATOR HAS THE OPTION OF OVERRIDING THE AUTOMATIC DEASSIGNMENT FEATURE.) THE PROGRAM REPORTS PERFORMANCE DATA FOR EACH DRIVE BEING EXERCISED ON REQUEST FROM THE OPERATOR OR AUTOMATICALLY AT AN INTERVAL DETERMINED BY THE OPERATOR AT PROGRAM STARTUP.

ALL DATA TRANSFER COMMANDS ARE USED (I.E., READ & WRITES WITH AND WITHOUT IMPLIED SEEKS) AS WELL AS WRITE CHECK COMMANDS.

THE DATA TRANSFER COMMANDS ARE SELECTED RANDOMLY EXCEPT FOR THE WRITE CHECK COMMAND. THE WRITE CHECK COMMAND IS USED TO VERIFY A PREVIOUS WRITE OPERATION.

PROGRAM/OPERATOR COMMUNICATIONS ARE THROUGH THE TELETYPE; PROGRAM OPTIONS ARE SELECTED BY SWITCH REGISTER SETTINGS.

ALL COMMANDS, DATA PATTERNING, AND DATA BUFFER SIZES ARE SELECTED RANDOMLY BY THE PROGRAM. ADDITIONALLY THE ADDRESSES (EG, CYLINDER, TRACK, AND SECTOR) FOR EACH OPERATION ARE SELECTED RANDOMLY.

2. REQUIREMENTS

2.1 EQUIPMENT

REQUIRED

POP-11 PROCESSOR (WITH OR WITHOUT HARDWARE SWITCH REGISTER)  
8K MEMORY  
TELETYPE  
PROGRAM LOADING DEVICE  
KH11-L OR KH11-P CLOCK  
RPIIE WITH 1 RPO2-RPRO2 OR 1 RPO3

OPTIONAL

4K TO 20K ADDITIONAL MEMORY  
1 TO 7 ADDITIONAL RPO2'S-RPRO2'S OR RPO3'S ON THE SAME RPIIE

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2.2 MEDIA

THE RPIIE MULTI-DRIVE EXERCISER PROGRAM REQUIRES FORMATTED DISK PACKS WHICH CONTAIN RANDOM OR PATTERNED DATA RECOGNIZED BY THE EXERCISER. DISK PACKS USED BY THE PROGRAM MAY BE GENERATED BY THE RPIIE FORMATTER PROGRAM (MAINDEC-11-DZRP2) OR BY THE 'W' COMMAND OF THE RPIIE MULTI-DRIVE EXERCISER (SEE SECTION 4.4).

2.3 PRELIMINARY PROGRAMS

MAINDEC-11-DZPPW - RPIIE DISKLESS CONTROLLER TEST  
MAINDEC-11-DZRPY - RPIIE FUNCTIONAL LOGIC AND READ/WRITE TEST  
MAINDEC-11-DZRPZ - RPIIE DRIVE POSITIONING TEST  
MAINDEC-11-DZRP2 - RPIIE DRIVE FORMATTER PROGRAM

3. OPERATING THE PROGRAM

3.1 \*\*\* BEFORE STARTING REFER TO SECTION 4.2 \*\*\*  
THE PROGRAM MAY BE LOADED WITH THE ABSOLUTE PAPER TAPE LOADER OR IT MAY BE LOADED FROM THE APPROPRIATE MEDIA USING THE ASSOCIATED 'XXDP' LOADER. IF THE PROGRAM IS BEING RUN ON A PROCESSOR WITH 8K OF MEMORY, THE PROGRAM WILL NOT PRESERVE THE 'XXDP' LOADER; THE 'ABS' LOADER (OR THE 'ABS' LOADER SECTION OF THE 'XXDP' LOADER) WILL BE PRESERVED, HOWEVER.

THE 'XXDP' LOADER IS NOT PRESERVED IN AN 8K PROCESSOR BECAUSE OF THE MEMORY REQUIREMENTS OF THE 'XXDP' LOADER; THE PROGRAM USES THE 'XXDP' LOADER SPACE FOR BUFFER SPACE ON THE 8K PROCESSOR.

THE PROGRAM MAY BE INCLUDED IN AN 'XXDP' CHAIN IF THE PROCESSOR TO RUN THE CHAIN IS 12K OR GREATER.

3.2 THE NORMAL STARTING LOCATION FOR THE PROGRAM IS 200(8). PARAMETERS MAY BE CHANGED BY STARTING THE PROGRAM AT LOCATION 204(8).

3.3 THE PROGRAM MAY BE RESTARTED FROM EITHER LOCATION 200(8) OR OR LOCATION 204 (8).

3.4 SET THE 'FORMAT' AND 'MAINTENANCE' SWITCHES ON THE RPIIE TO 'NORMAL'; SET THE CONTROLLER WRITE LOCKOUT AND DRIVE WRITE ENABLE SWITCHES AS REQUIRED.

ONCE THE PROGRAM IS LOADED AND STARTED, OPERATIONS ARE INITIATED AND CONTROLLED BY KEYBOARD COMMANDS AND SWITCH REGISTER SWITCH SETTINGS.

IF THE PROGRAM IS BEING RUN AS PART OF AN 'XXDP' CHAIN, THE 'T' COMMAND IS NOT REQUIRED TO START THE TEST; THE PROGRAM WILL AUTOMATICALLY INITIATE A 'TA' COMMAND. IF THE 'XXDP' CHAIN IS BEING LOADED FROM AN RPO2, RPRO2, OR RPO3, DRIVE 0 WILL BE BYPASSED WHEN THE 'TA' COMMAND IS ISSUED. NOTE THAT OPERATOR INTERVENTION IS NOT REQUIRED.

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3.5 PASS/TEST TERMINATION

3.5.1 PASS TERMINATION

END OF PASS MAY BE DETERMINED BY EITHER OF THE FOLLOWING CONDITIONS.  
THE END OF PASS CONDITION USED IS DETERMINED BY PARAMETER 'SEKMOD'.

- A. IF PARAMETER 'SEKMOD' IS 0, END OF PASS OCCURS WHEN THE DRIVE HAS REPTD  $6.25 \times 10^8$  WORDS; ( $1 \times 10^{10}$  BITS).
- B. IF PARAMETER 'SEKMOD' IS 1, END OF PASS OCCURS WHEN THE DRIVE HAS PERFORMED  $1 \times 10^6$  SEEKS.

3.5.2 TEST TERMINATION

THE TEST FOR A DRIVE IS TERMINATED (SW<04> = 0) WHEN:

- A. THE DRIVE HAS COMPLETED THE NUMBER OF PASSES SPECIFIED IN PARAMETER 'PASCNT'.
- B. THE TOTAL ERRORS ACCUMULATED EXCEED 100.
- C. A FATAL ERROR OCCURS.

3.6 RUN TIME

THE EXERCISER PROGRAM MAY BE RUN IN TWO MODES. THE MODE IS DETERMINED BY THE VALUE IN PARAMETER 'BUFRSZ'. IF 'BUFRSZ' IS '1' SECTOR, THE PROGRAM RUNS IN A SEEK HEAVY MODE; IF 'BUFRSZ' APPROACHES ONE TRACK IN SIZE (5000 OCTAL) THE PROGRAM RUNS IN A DATA TRANSFER HEAVY MODE. THE PROGRAM RUN TIME VARIES GREATLY DEPENDING ON THE OPERATION MODE SELECTED, THE MEMORY AVAILABLE OVER BK, THE READ/WRITE RATIO PARAMETER - 'RATIO', AND BY SWITCHES 0 & 1.

3.6.1 RUN TIME IN 'DATA TRANSFER MODE'

14 HOURS FOR 1 DRIVE.

(ADD 4 HOURS FOR EACH ADDITIONAL DRIVE TESTED.)

NOTE: IF SW<01> = 1 (NO SOFTWARE DATA COMPARISONS), THE RUN TIMES ARE THE FOLLOWING VALUES, APPROXIMATELY:

12 HOURS FOR 1 DRIVE

(ADD 3 HOURS FOR EACH ADDITIONAL DRIVE TESTED.)

3.6.2 RUN TIME IN 'SEEK VERIFICATION MODE'

ASSUME THE FOLLOWING PARAMETERS VALUES:

- PARAMETER 'BUFRSZ' = 1 SECTOR (400(8) WORDS)
- PARAMETER 'LT' = 'FT'
- PARAMETER 'LS' = 'FS'
- SW<00> = 1 (READ ONLY MODE)

17 HOURS FOR 1 DRIVE

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(ADD 8 HOURS FOR EACH ADDITIONAL DRIVE TESTED.)

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3.7 UNIBUS & VECTOR ADDRESSES

THE PROGRAM ASSUMES THE FOLLOWING UNIBUS AND VECTOR ADDRESSES. (REFER TO SECTION 4.2.2 FOR THE LOCATIONS AT WHICH TO CHANGE THESE ADDRESSES.)

<u>UNIT</u>	<u>UNIBUS ADDRESS</u>	<u>VECTOR ADDRESS</u>
RP11E	175710	254
TTY PRINTER	177564	NOT USED
TTY KEYBOARD	177560	60
KW11-L	177546	100
KW11-P	172542	104

3.8 SUBSYSTEMS WITH BOTH RPO2-RPRO2 AND RPO3 DRIVES

RP11E SUBSYSTEMS WITH RPO2-RPRO2 AND RPO3 DISK DRIVES ARE NOT SUPPORTED BY THE MULTI-DRIVE EXERCISER. IF THE PROGRAM IS RUN ON A SYSTEM WITH BOTH DRIVE TYPES, EITHER THE RPO2-RPRO2 DRIVES OR THE RPO3 DRIVES MUST BE POWERED OFF.

4. CONTROLLING THE PROGRAM

4.1 PARAMETERS

WHEN THE PROGRAM IS STARTED FROM LOCATION 200, PRELOADED PARAMETERS WILL BE ASSUMED. IF THE PROGRAM IS STARTED FROM LOCATION 204, THE FOLLOWING MESSAGE WILL BE TYPED.

ENTER PARAMETERS:

THE PROGRAM WILL THEN IDENTIFY THE PARAMETER BY THE NAME GIVEN BELOW, DISPLAY THE CURRENT VALUE OF THE PARAMETER (IN OCTAL) AND THE AND WAIT FOR THE ENTRY.  
IF ONLY A CARRIAGE RETURN IS ENTERED, THE PROGRAM WILL USE THE PRESENT VALUE OF THE PARAMETER. THE RUBOUT KEY WILL ALLOW THE OPERATOR TO DELETE AN INCORRECT ENTRY; 'CONTROL U' WILL ALLOW AN ENTIRE ENTRY TO BE DELETED AND REENTERED. THE PROGRAM WILL TYPE A '?' IF AN ALPHABETIC OR INCORRECT NUMBER (FOR THE BASE OF THE PARAMETER) IS ENTERED. IF 'CONTROL C' IS ENTERED, THE PROGRAM WILL RETURN TO THE BEGINNING OF THE PARAMETER LIST. IF A PERIOD IS ENTERED (FOLLOWED BY A CARRIAGE RETURN) EITHER TO TERMINATE AN ENTRY OR IN PLACE OF A PARAMETER CHANGE ENTRY, THE PROGRAM WILL USE THE PRESENT VALUES OF THE REMAINING PARAMETERS AS DEFAULT VALUES.

(NOTE: A PARAMETER ENTRY MUST BE TERMINATED BY A 'CARRIAGE RETURN' OR A 'PERIOD' - 'CARRIAGE RETURN'.)

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4.1.1 KEYBOARD ENTRY PARAMETERS

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NAME	DEFAULT VALUE	VALUE RANGE	FUNCTION
BUFRSZ	(SEE NOTE)		CONTROLS THE MAXIMUM BUFFER SIZE USED FOR DATA TRANSFERS
PASCNT	1	1 - 1747	NUMBER OF PASSES TO END OF TEST.
INTRVL	5	0 - 377	DETERMINES THE INTERVAL (IN MINUTES) BETWEEN AUTOMATIC PERFORMANCE SUMMARY TYPEOUTS
CMPMT	4	0 - 'BUFRSZ'	THE NUMBER OF DATA COMPARISON ERRORS PRINTED OUT IF SW(02)=0
LC	(SEE NOTE)		THE MAXIMUM CYLINDER ADDRESS
FC	(SEE NOTE)		THE MINIMUM CYLINDER ADDRESS. VALUE MUST NOT BE GREATER THAN VALUE IN 'LC'
LT	23	0 - 23	THE MAXIMUM TRACK ADDRESS
FT	0	0 - 23	THE MINIMUM TRACK ADDRESS
LS	11	0 - 11	THE MAXIMUM SECTOR ADDRESS
FS	0	0 - 11	THE MINIMUM SECTOR ADDRESS
SEKMOD	1	0 OR 1	IF EQ 0, END OF PASS DETERMINED BY THE 'WORDS READ' COUNT. IF EQ 1, END OF PASS IS DETERMINED BY THE NUMBER OF SEEKS.
RPADR	176710	N/A	THE RPIIE UNIBUS ADDRESS
RPVEC	254	N/A	THE RPIIE VECTOR ADDRESS
RATIO	3	0 - 7	CONTROLS THE APPROXIMATE RATIO OF READ TO WRITE ORDERS.
			VALUE R/W RATIO
			0 15/1
			1 7/1
			2 6/2
			3 5/3
			4 4/4
			5 3/5
			6 2/6
			7 1/7
AUTOCK	1	0 OR 1	IF EQ 1, THE PROGRAM PERFORM WRITE CHECKS AFTER EACH WRITE COMMAND.

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IF EQ 0, THE PROGRAM  
WILL PERFORM WRITE CHECKS  
RANDOMLY.

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NOTE: THE PROGRAM WILL SELECT A MAXIMUM BUFFER SIZE WHICH IS DETERMINED BY THE MEMORY AVAILABLE. THE MAXIMUM BUFFER SIZE ASSIGNED BY THE PROGRAM IS 5400 (8) WORDS. THE OPERATOR MAY SPECIFY ANY OTHER MAXIMUM SIZE AS LONG AS THE VALUE SPECIFIED IS AT LEAST 4 WORDS BUT NO LARGER THAN THE INITIAL VALUE OF 'BUFRSZ' DETERMINED BY THE PROGRAM.

THE MAXIMUM VALUES FOR 'FC' AND 'LC' ARE THE DETERMINED BY THE DRIVE TYPE BEING TESTED: 202 (10) FOR RP02'S; 405 (10) FOR RP03'S; AND 405 (10) FOR SYSTEMS WITH BOTH RP02'S AND RP03'S.

4.1.2 PERIPHERAL ADDRESSES AND OTHER LOCATIONS OF INTEREST

TO ALTER THESE LOCATIONS, THE OPERATOR MUST MAKE MANUAL ENTRIES BEFORE THE PROGRAM IS STARTED. THE KEYBOARD ENTRY ROUTINE DOES NOT PROVIDE ACCESS TO THESE LOCATIONS.

LOC	TAG	CONTENTS	FUNCTION
---	---	-----	-----
1216	SLKCSR	172540	ADDRESS OF KW11-P STATUS REGISTER
1220	SLKCSB	172542	ADDRESS OF KW11-P COUNTER BUFFER
1222	SLPVEC	104	KW11-P VECTOR ADDRESS
1224	SLKS	177546	ADDRESS OF KW11-L STATUS REGISTER
1226	SLLVEC	100	KW11-L VECTOR ADDRESS
1232	HZ	74	74 (60 DECIMAL) IF SYSTEM IS 60 HZ; 62 (50 DECIMAL) IF SYSTEM IS 50 HZ.

4.2 SWITCH REGISTER SETTINGS

IF THE DIAGNOSTIC IS RUN ON A CPU WITHOUT A SWITCH REGISTER THEN A SOFTWARE SWITCH REGISTER IS USED WHICH ALLOWS THE USER THE SAME SWITCH OPTIONS AS THE HARDWARE SWITCH REGISTER. IF THE HARDWARE SWITCH REGISTER DOES NOT EXIST OR IF ONE DOES AND IT CONTAINS ALL ONES (177777) THEN THE SOFTWARE SWITCH REGISTER (LOC. 176) IS USED.

CONTROL:

THIS PROGRAM ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER (LOC. 176) FROM THE TTY. THIS CAN BE ACCOMPLISHED BY DOING THE FOLLOWING:

- 1) TYPE CONTROL G (<G>); THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.
- 2) THE MACHINE WILL THEN TYPE: SWR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)
- 3) AFTER THE ''NEW=''' HAS BEEN TYPED THEN THE OPERATOR CAN DO ONE OF THE FOLLOWING AT THE TTY:
  - A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A (<CR>). (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS

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WILL BE ALLOWED)  
IF A (CR) IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH  
REGISTER CONTENTS WILL NOT BE CHANGED.

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B) IF A CONTROL U (<U>) IS DEPRESSED THEN THE PROGRAM WILL SEND YOU  
BACK TO STEP 2.

SW (15) = 1 HALT ON ERROR  
SW (13) = 1 INHIBIT ERROR TYPEOUT  
SW (10) = 1 RING THE TELETYPE BELL IF ERROR  
SW (6) = 1 DON'T SYSTEM STATUS WHEN PROGRAM STARTED  
INHIBIT PERFORMANCE SUMMARY TYPEOUTS  
SW (5) = 1 LOOP ON PRESENT OPERATION(S)  
SW (4) = 1 INHIBIT MAXIMUM ERROR COUNT CHECK; DO NOT DEASSIGN  
DRIVES WHEN NORMAL END OF TEST REACHED.  
SW (3) = 1 DISPLAY SECTOR WHICH GAVE 'HARD' ERROR  
IF DATA COMPARE ERRORS & SW(2) SET, DISPLAY REST  
OF BUFFER  
SW (2) = 1 DISPLAY ALL DATA COMPARISON ERRORS  
SW (1) = 1 INHIBIT DATA COMPARISON AFTER READ ORDERS  
SW (0) = 1 READ ONLY MODE

#### 4.3 KEYBOARD COMMANDS

THE KEYBOARD COMMANDS CONTROL THE ASSIGNMENT/DEASSIGNMENT OF DRIVES,  
ALLOW THE OPERATOR TO REQUEST DRIVE PERFORMANCE SUMMARIES, AND ALLOW  
DATA PACKS TO BE WRITTEN

WHEN THE PROGRAM IS STARTED (OR RESTARTED), KEYBOARD COMMANDS ARE  
NOT RECOGNIZED UNTIL THE PROGRAM HAS INITIALIZED ITSELF. THE OPERATOR  
MUST WAIT UNTIL THE 'PROGRAM INITIALIZE COMPLETE' MESSAGE IS TYPED  
BEFORE ATTEMPTING TO USE THE COMMANDS. AFTER INITIALIZATION HAS BEEN  
COMPLETED, THESE COMMANDS MAY BE USED.

IF THE PROGRAM IS BEING RUN AS PART OF AN 'XXDP' PROGRAM CHAIN, OPERATIONS  
ARE AUTOMATICALLY STARTED. THE PROGRAM ITSELF SIMULATES THE ISSUING  
OF A 'TA' COMMAND.

##### 4.3.1 'T' COMMAND

USED TO ASSIGN A DRIVE(S) FOR TEST

FORMAT: TN<CR>

N = DRIVE NUMBER, MAY BE 0 TO 7 OR 'A'. ENTRY MUST BE  
TERMINATED BY A CARRIAGE RETURN <CR>.

EXAMPLE: T0<CR> - ASSIGN DRIVE 0 FOR TEST  
TA<CR> - ASSIGN ALL AVAILABLE DRIVES FOR TEST

NOTE: DRIVE OPERATION BEGINS IMMEDIATELY  
AFTER COMMAND IS ENTERED.

##### 4.3.2 'D' COMMAND

USED TO DEASSIGN A DRIVE(S) BEING EXERCISED.

FORMAT: DN<CR>

D02

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N = DRIVE NUMBER. MAY BE 0 TO 7 OR 'A'. ENTRY MUST BE  
TERMINATED BY A CARRIAGE RETURN (CR).

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EXAMPLE: DO<CR> - DEASSIGN DRIVE 0  
DA<CR> - DEASSIGN ALL DRIVES BEING TESTED.

- NOTES: 1. IF THE 'D' COMMAND REFERENCES A DRIVE NOT ASSIGNED, THE PROGRAM WILL TYPEOUT 'DRIVE NOT ASSIGNED'.  
2. THE DRIVES WILL BE DEASSIGNED AS THEIR OPERATION COMPLETE.  
3. IF THE 'DA' COMMAND IS USED, ONLY DRIVES BEING TESTED WILL BE DEASSIGNED - THE ERROR MESSAGE IN (1) ABOVE WILL NOT BE DISPLAYED.

#### 4.3.3 'S' COMMAND

USED TO REQUEST A PERFORMANCE SUMMARY TYPEOUT FOR THE REFERENCED DRIVE(S).

FORMAT: SN<CR>

N = DRIVE NUMBER. MAY BE 0 TO 7 OR 'A'. ENTRY MUST BE TERMINATED BY A CARRIAGE RETURN <CR>.

EXAMPLE: SO<CR> - TYPEOUT PERFORMANCE SUMMARY FOR DRIVE 0  
SA<CR> - TYPEOUT PERFORMANCE SUMMARY FOR ALL DRIVES BEING TESTED.

- NOTES: 1. IF 'SA' IS USED ONLY DRIVES BEING TESTED WILL BE DISPLAYED.  
2. IF PARAMETER 'INTRVL' IS NOT ZERO, THE PROGRAM WILL AUTOMATICALLY DISPLAY A PERFORMANCE SUMMARY FOR EACH DRIVE BEING TESTED AT A RATE DETERMINED BY 'INTRVL'.  
3. IF THE 'SA' COMMAND IS USED, THE PROGRAM WILL TYPEOUT THE OPERATOR ENTERED DATE, OPERATOR I.D., AND THE DRIVE I.D. FOR EACH DRIVE BEING TESTED. THE DATE AND OPERATOR I.D. WILL NOT BE TYPED OUT IF NO DRIVES ARE BEING TESTED.

#### 4.3.4 'W' COMMAND

USED TO WRITE A DATA PACK WITH DATA ACCEPTABLE TO THE RPO2 MULTI-DRIVE EXERCISER PROGRAM.

FORMAT: WN<CR>

N = DRIVE NUMBER. MAY BE 0 TO 7 OR 'A'. ENTRY MUST BE TERMINATED BY A CARRIAGE RETURN <CR>.

EXAMPLE: WA<CR> - WRITE DATA PACKS ON ALL AVAILABLE DRIVES.  
WD<CR> - GENERATE A DATA PACK ON DRIVE 0.

- NOTES: 1. THE 'W' COMMAND SHOULD NOT BE USED UNLESS 'BUFRSZ' PARAMETER IS APPROXIMATELY 1 TRACK IN SIZE - 5000 (10).

F02

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IF THE BUFFER SIZE IS MUCH LESS THAN 1 TRACK, THE  
TIME REQUIRED TO WRITE A DATA PACK IS TOO GREAT TO  
BE PRACTICAL.

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2. THE 'W' COMMAND PERFORMS A SEQUENTIAL WRITE OF THE PACK USING A 'WRITE WITH IMPLIED SEEKS' COMMAND. THE DATA PATTERN USED FOR EACH WRITE IS SELECTED RANDOMLY. THE PACK IS WRITTEN SEQUENTIALLY, BEGINNING AT 'FC', 'FT' AND CONTINUING TO 'LC', 'LT'.
3. THE 'W' COMMAND DOES NOT WRITE HEADERS AND ASSUMES THAT THE FORMAT OF THE PACK IS GOOD.
4. THE 'W' COMMAND CANNOT BE STARTED IF SWITCH 0 (READ ONLY MODE) IS SET. IF SWITCH 0 SET DURING THE OPERATION OF THE 'W' COMMAND, THE DRIVE PERFORMING THE 'W' COMMAND WILL IGNORE THE SWITCH.
5. THE DATA WRITTEN IS VERIFIED BY A 'WRITE CHECK COMMAND' (IF THE PARAMETER 'AUTOCK' IS '1').

4.3.5 'R' COMMAND

USED TO PERFORM A SEQUENTIAL READ OF THE PACK.

FORMAT: RN<CR>

N = DRIVE NUMBER. MAY BE 0 TO 7 OR 'A'. ENTRY MUST BE TERMINATED BY A CARRIAGE RETURN <CR>.

EXAMPLE: RA<CR> - READ THE PACKS ON ALL OF THE ONLINE DRIVES.  
RD<CR> - READ THE PACK ON DRIVE 0.

- NOTES:
1. THE PROGRAM WILL PERFORM A NORMAL CHECK OF ALL DATA READ. HOWEVER, ALL OPERATIONS WILL BE SEQUENTIAL.
  2. THE PROGRAM WILL READ THE PACK STARTING AT THE ADDRESS SPECIFIED BY 'FC', 'FT' TO THE ADDRESS SPECIFIED BY 'LC', 'LT'. THE READ WILL BE SEQUENTIAL.

4.3.6 GENERAL COMMAND INFORMATION

- A. WHEN A COMMAND IS ENTERED, THE PROGRAM WILL TYPE OUT THE TIME
- B. IF THE COMMAND ENTERED IS NOT VALID, THE PROGRAM WILL TYPE 'INVALID COMMAND'.
- C. DRIVES ASSIGNED (WITH THE 'T' COMMAND) OR DEASSIGNED (WITH THE 'D' COMMAND) MAY BE ENTERED IN ANY SEQUENCE.
- D. THE ERROR RESPONSES FROM THE PROGRAM ARE AS FOLLOWS

RESPONSE -----	COMMAND(S) -----
?DRIVE N OFFLINE	T, W, R
?DRIVE N NOT ASSIGNED	D, S
?DRIVE N ALREADY ASSIGNED	T, W, R

H02

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?DRIVE N UNSAFE

T, W, R

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6865. PERFORMANCE SUMMARY TYPEOUT  
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5.1 THE PROGRAM WILL DISPLAY A PERFORMANCE SUMMARY FOR THE DRIVES BEING EXERCISED. THIS SUMMARY WILL BE DISPLAYED AUTOMATICALLY IF THE PARAMETER 'INTRVL' IS NOT ZERO OR CAN BE DISPLAYED ON REQUEST BY THE OPERATOR THROUGH THE USE OF THE 'S' COMMAND. THE PERFORMANCE SUMMARY TYPEOUT CONTAINS THE FOLLOWING FIELDS:

'DRV'	THE DRIVE NUMBER
'PASS'	THE PRESENT PASS COUNT FOR THE DRIVE
'ORDERS'	THE NUMBER OF ORDERS PERFORMED BY THE DRIVE
'SEEKS'	THE NUMBER OF SEEK OPERATIONS THE DRIVE PERFORMED
'SOFT'	THE NUMBER OF SOFT DATA ERRORS
'HARD'	THE NUMBER OF HARD DATA ERRORS
'SUSI'	THE NUMBER OF 'SUSI' ERRORS
'MISP'	THE NUMBER OF POSITIONING ERRORS
'OTHER'	THE TOTAL ERRORS OF OTHER TYPES

## 5.2 SOFT/HARD ERROR DEFINITIONS

## 5.2.1 HARD ERRORS

'CSME', 'MPE', AND 'LPE' ERRORS WHICH ARE NOT RECOVERABLE AFTER 10 RETRY ATTEMPTS FOLLOWED BY A HOME SEEK AND A RE-SEEK TO THE ERROR CYLINDER AND 10 ADDITIONAL RETRY ATTEMPTS.

## 5.2.2 SOFT ERRORS

'CSME', 'MPE', OR 'LPE' ERRORS WHICH ARE RECOVERABLE DURING THE 10 RETRY, HOME SEEK, RE-SEEK, 10 RETRY SEQUENCE DESCRIBED ABOVE.

6. DATA CHECKING & ERROR RECOVERY  
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## 6.1 DATA COMPARISON

DATA COMPARISON OCCURS AFTER EACH READ ORDER UNDER THE THE FOLLOWING CONDITIONS:

- A. THE ORDER TERMINATED WITH NO ERROR.
- B. THE OPERATION TERMINATED WITH A DATA ERROR BUT READ CORRECTLY CORRECTLY AFTER RETRY ATTEMPTS.

## 6.2 VERIFICATION OF DATA WRITTEN

AFTER EACH WRITE OPERATION, THE DATA WRITTEN IS CHECKED WITH A WRITE CHECK COMMAND - IF PARAMETER 'AUTOCK' IS '1'.  
(IF 'AUTOCK' IS '0', WRITE CHECKS WILL BE PERFORMED RANDOMLY.)

J02

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7. ERROR MESSAGES

DRIVE ERRORS ARE REPORTED ON THE TELETYPE OR (IF AVAILABLE) A LINE PRINTER. ALL ERROR CONDITIONS ARE REPORTED IN ERROR MESSAGES; THE PROGRAM CONTAINS NO CODED ERROR HALTS. IF THE PROGRAM HALTS (ASSUMING, OF COURSE, THAT SW(15) IS NOT SET), AN UNRECOVERABLE PROGRAM CONDITION HAS OCCURED OR A CENTRAL PROCESSOR FAILURE HAS OCCURED.

ERROR MESSAGES ARE MADE UP OF SEVERAL LINES. EACH TYPE OF ERROR HAS SEVERAL OPTIONAL LINES WHICH MAY APPEAR WITH IT. ALL OF THE POSSIBLE ERROR MESSAGE LINES WHICH MAY APPEAR ARE GIVEN IN THE SECTION DESCRIBING THE PARTICULAR ERROR HEADER.

7.1 ERROR DESCRIPTION LINES

(THE MESSAGE TAGS ARE GIVEN FOR REFERENCE.)

MESSAGE  
TAG  
---

TEXT  
----

EM1 RP11 DIDN'T RESPOND TO ADDRESSING

WHEN THE PROGRAM ADDRESSED THE RP11, A BUS TIMEOUT OCCURED.

EM2 'INVALID RP11 COMMAND'

THE PROGRAM ATTEMPTED TO ISSUE AN INVALID RP11 COMMAND. THIS ERROR WILL INDICATE EITHER A PROGRAMMING ERROR OR A CENTRAL PROCESSOR FAILURE.

EM3 'UNDEFINED INTERRUPT FROM THE RP11'

AN INTERRUPT FROM THE RP11 OCCURED AND NO ATTENTION BITS WERE SET AND NO TRANSFER WAS UNDERWAY.

EM10 'CAN'T MATCH DATA READ WITH A PATTERN'

THE DATA COMPARSION ROUTINE CANNOT IDENTIFY THE DATA PATTERN READ.

EM12 'DATA COMPARSION ERROR'

THE COMPARSION ROUTINE WAS ABLE TO IDENTIFY THE DATA PATTERN; HOWEVER, A COMPARSION ERROR OCCURED.

EM15 ''ERR' NOT SET BUT 'RPER' CONTENTS NOT ZERO'

THE ERROR BIT IN 'RPCS' WAS NOT SET BUT ONE OR MORE ERROR BITS WAS SET IN THE ERROR REGISTER.

EM16 'WORD COUNT NOT ZERO OR BUFFER ADDRESS WRONG'

L02

MD-11-DZRP1-8, RPI1E MULTI-DRIVE EXERCISER PROGRAM  
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AFTER AN ERROR FREE DATA TRANSFER, THE WORD COUNT REGISTER  
DID NOT GO TO ZERO OR THE BUFFER ADDRESS REGISTER CONTENTS  
WERE INCORRECT.

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747	EM17	'SOFTWARE TIMEOUT DURING POSITIONING'
748		A SEEK OR HOME SEEK COMMAND DID NOT COMPLETE WITHIN 1 SECOND.
749		
750	EM20	'SOFTWARE TIMEOUT DURING I/O'
751		A DATA TRANSFER OR WRITE CHECK COMMAND DID NOT COMPLETE WITHIN
752		1 SECOND.
753		
754	EM21	'DRIVE OFFLINE'
755		THE INDICATED DRIVE HAS GONE OFFLINE.
756		
757	EM22	'DRIVE UNSAFE'
758		THE INDICATED DRIVE HAS BECOME UNSAFE.
759		
760	EM23	'SEEK INCOMPLETE'
761		A SEEK INCOMPLETE ERROR HAS OCCURED ON THE INDICATED
762		DRIVE.
763		
764	EM24	'UNIBUS TRANSFER ERROR'
765		A UNIBUS TIMING ERROR OR NON-EXISTENT MEMORY ERROR HAS
766		OCCURED.
767		
768	EM25	'CONTROLLER ERROR'
769		A 'MODE' ERROR OR A 'PROGRAM' ERROR HAS OCCURED.
770		
771	EM26	'NON-EXISTENT DISK ADDRESS'
772		A NON-EXISTENT SECTOR, TRACK, OR CYLINDER ERROR HAS
773		OCCURED.
774		
775	EM27	'DATA ERROR'
776		ANY OR ALL OF THE FOLLOWING ERRORS OCCURED: 'CHECKSUM'
777		ERROR, 'WORD PARITY ERROR', OR 'LONGITUDINAL PARITY' ERROR.
778		
779	EM32	'WRITE CHECK ERROR (NO DATA ERROR)'
780		A WRITE CHECK ERROR OCCURED. 'CHECKSUM', 'WORD PARITY
781		ERROR', OR 'LONGITUDINAL PARITY' ERROR BITS WERE NOT SET.
782		
783	EM33	'WRITE CHECK ERROR (DATA ERROR BITS SET)'
784		A WRITE CHECK ERROR OCCURED. 'CHECKSUM', 'WORD PARITY', OR
785		'LONGITUDINAL PARITY' ERROR BITS WERE SET.
786		
787	EM34	'HEADER NOT FOUND'
788		A 'HEADER NOT FOUND' ERROR OCCURED. THE PROGRAM VERIFIED
789		THAT THE DISK WAS ON THE CORRECT CYLINDER.
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EM35 'FORMAT ERROR WHILE SEARCHING FOR INITIAL SECTOR'  
A 'FORMAT ERROR' WAS DETECTED WHILE THE CONTROLLER WAS SEARCHING FOR THE FIRST SECTOR OF THE DATA TO BE TRANSFERED.

EM36 'HEADER NOT FOUND, CYLINDER IN HEADER DOES NOT COMPARE'  
A HEADER NOT FOUND ERROR OCCURED. THE PROGRAM READ THE HEADER OF THE SECTOR BEING SEARCHED FOR (USING A HEADER READ) AND THE CYLINDER ADDRESS FIELD IN THE HEADER DID NOT COMPARE WITH THE CYLINDER THE DISK WAS EXPECTED TO BE AT. THE PROGRAM ISSUES A HOME SEEK TO THE DRIVE AFTER REPORTING THIS ERROR.

EM37 'DIFFERENT ERROR DURING RETRY'  
DURING ERROR RECOVERY OR RETRY A DIFFERENT ERROR TYPE OCCURED.

EM43 ''ERR' SET BUT NO ERROR BITS SET'  
'ERR' IN 'RPCS' WAS SET, BUT NO ERROR BITS IN 'RPER' WERE SET.

EM44 'WRITE PROTECTION VIOLATION'  
THE PROGRAM ATTEMPTED TO WRITE ON A WRITE PROTECTED DRIVE.

EM45 'FORMAT ERROR DURING I/O'  
A 'FORMAT ERROR' WAS DETECTED WHILE THE CONTROLLER WAS SEARCHING FOR THE SECOND OR SUBSEQUENT SECTOR TO BE TRANSFERED.

8. PROGRAM DESCRIPTION

8.1 PROGRAM OPERATION

WHEN THE PROGRAM IS STARTED FROM LOCATION 200(8), ALL TABLES AND PARAMETERS ARE CLEARED OR INITIALIZED. THE PARAMETERS WHICH ARE UNDER OPERATOR TTY ENTRY CONTROL ARE CHECKED FOR VALIDITY AND CONSISTENCY. TTY KEYBOARD INTERRUPT ENABLE IS SET, AND THE KW11-L OR KW11-P CLOCK IS STARTED. WHEN THESE ACTIONS HAVE BEEN COMPLETED, THE PROGRAM TYPES OUT 'PROGRAM INITIALIZE COMPLETE'. COMMAND ENTRIES WILL NOW BE ACCEPTED BY THE PROGRAM

THE PROGRAM SCANS ITS INTERNAL ASSIGNMENT TABLES, LOOKING FOR:

- 1) DRIVES TO ASSIGN/DEASSIGN
- 2) PERFORMANCE SUMMARY TYPEOUT REQUESTS
- 3) DRIVES REQUIRING COMMAND INITIATION, BUFFER ASSIGNMENT, OR PARAMETER SELECTION.
- 4) DRIVES COMPLETING CURRENT OPERATIONS.

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THE PROGRAM CONTINUES SCANNING ITS TABLES UNTIL AN ENTRY IS FOUND. IN THE CASE OF THE PROGRAM AT INITIAL START, THE FIRST ENTRY WILL BE MADE BY THE OPERATOR WHEN A DRIVE IS ASSIGNED ('T' COMMAND).

WHEN A DRIVE IS ASSIGNED, THE KEYBOARD ENTRY ROUTINE VERIFIES THAT THE DRIVE IS PRESENT AND IS ONLINE. THE ASSIGNMENT ROUTINE THEN ISSUES A HOME SEEK INSTRUCTION.

PARAMETERS FOR THE OPERATION ARE SELECTED AND A BUFFER IS ASSIGNED. IF THE OPERATION IS A WRITE OR WRITE CHECK ORDER, THE ASSIGNED BUFFER WILL BE FILLED WITH THE SELECTED PATTERN. (WRITE CHECK ORDERS ARE ISSUED AFTER EACH WRITE ORDER. THE WRITE CHECK ORDER USES THE PARAMETERS SELECTED FOR THE PRECEDING WRITE ORDER.) CONTROL (COMMAND INITIATION DESCRIPTION)

WHEN THE DATA TRANSFER OPERATION IS COMPLETE, THE DRIVE REGISTERS ARE STORED AND A DATA TRANSFER IS INITIATED FOR A WAITING DRIVE.

IF THE OPERATION HAS BEEN COMPLETED NORMALLY, THE SAVED DRIVE REGISTERS ARE CHECKED TO VERIFY THAT NO ERROR BITS ARE SET; THE RPIIE BUS ADDRESS AND WORD COUNT ADDRESS REGISTERS ARE CHECKED TO VERIFY THAT THE CORRECT NUMBER OF WORDS HAVE BEEN TRANSFERRED AND THAT THE TWO REGISTERS ARE CONSISTENT WITH EACH OTHER; AND IF THE ORDER WAS A READ ORDER, THE DATA BUFFER IS COMPARED. WHEN THIS SEQUENCE IS COMPLETED, THE DRIVE IS RETURNED TO THE ASSIGNED, INACTIVE LIST. THE PROGRAM THEN INITIATES A DATA TRANSFER ON A WAITING DRIVE AND RESELECTS AND REINITIATES ANOTHER OPERATION ON THE RELEASED DRIVE.

ERRORS WHICH OCCUR ARE PROCESSED IN THE FOLLOWING ORDER. MULTIPLE ERRORS WILL BE REPORTED AS THE FIRST ERROR TYPE CHECKED.

A. ERRORS REPORTED FOR OPERATIONS WHICH HAVE NOT COMPLETED NORMALLY.

SOFTWARE TIMEOUT DURING POSITIONING - EM17  
SOFTWARE TIMEOUT DURING I/O - EM20  
DRIVE OFFLINE - EM21  
DRIVE UNSAFE - EM22

B. ERRORS REPORTED FOR OPERATIONS WHICH COMPLETE NORMALLY.

SEEK INCOMPLETE - EM23  
UNIBUS TRANSFER ERROR - EM24  
CONTROLLER ERROR - EM25  
NON-EXISTENT DISK ADDRESS - EM26  
DATA ERROR - EM27  
WRITE CHECK ERROR (NO DATA ERROR) - EM32  
WRITE CHECK ERROR (DATA ERROR BITS SET) - EM33  
HEADER NOT FOUND - EM34  
FORMAT ERROR WHILE SEARCHING FOR INITIAL SECTOR - EM35  
POSITIONING ERROR - EM36  
DIFFERENT ERROR DURING RETRY - EM37  
WRITE PROTECTION VIOLATION - EM44  
FORMAT ERROR DURING I/O - EM45

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C. ERRORS NOT FLAGGED BY THE HARDWARE ERROR DETECTION LOGIC.

RP11 DIDN'T RESPOND TO ADDRESSING - EM1  
INVALID RP11 COMMAND - EM2  
UNDEFINED INTERRUPT FROM THE RP11 - EM3  
CAN'T MATCH DATA READ WITH A PATTERN - EM10  
DATA COMPARE ERRORS - EM12  
'ERR' NOT SET BUT 'RPER' CONTENTS NOT ZERO - EM15  
WORD COUNT NOT ZERO OR BUFFER ADDRESS WRONG - EM16  
'ERR' SET BUT NOT ERROR BITS IN 'RPER' SET - EM13

B.2 SELECTION OF OPERATION VARIABLES

- A. SECTOR ADDRESS SELECTION IS RANDOM BETWEEN THE VALUES IN 'FS' AND 'LS'. TRACK ADDRESS SELECTION IS RANDOM BETWEEN THE VALUES IN 'FT' AND 'LT'. CYLINDER ADDRESS SELECTION IS RANDOM BETWEEN 'FC' AND 'LC'.
- B. THE BUFFER SIZE IS RANDOM SELECTED BETWEEN 4 (10) - AND THE VALUE IN 'P.FRSZ'. THE SIZE SELECTED IS WEIGHTED TO ENSURE THAT AT LEAST 4 WORDS ARE WRITTEN IN THE DATA AREA OF THE LAST SECTOR. THIS IS NECESSARY AS THE PROGRAM REQUIRES 4 LOCATIONS IN THE DATA PORTION OF THE SECTOR TO BE ABLE TO MATCH THE DATA TO A PATTERN FOR DATA COMPARISON PURPOSES.
- C. THE DATA WRITTEN IS RANDOMLY SELECTED AMONG THE 20 (8) STANDARD PATTERNS.
- D. THE ORDERS ARE SELECTED RANDOMLY. WRITE CHECK ORDERS ARE PERFORMED ONLY IF THE PREVIOUS ORDER WAS A WRITE COMMAND.
- E. THE FIRST ORDER PERFORMED AFTER A UNIT IS ASSIGNED WITH A 'T' COMMAND IS NOT RANDOMLY SELECTED. THE PARAMETERS FOR THE FIRST OPERATION ARE THE MINIMUM OR STARTING VALUES OF THE VARIABLES.

8.3 DATA PATTERNS

THE PROGRAM SELECTS ONE OF THE FOLLOWING DATA PATTERNS TO WRITE WHEN A WRITE ORDER IS SELECTED. THE ENTIRE BUFFER IS FILLED WITH THE SELECTED PATTERN. WHEN DATA IS READ FROM THE DISK, THE PROGRAM COMPARES DATA ON A SECTOR BASIS: FROM THE FIRST 4 DATA WORDS OF EACH SECTOR, THE PROGRAM MATCHES THE DATA TO ONE OF THE FOLLOWING PATTERNS.

PATTERN '8' IS DEFINED AS THE 'WORST CASE' PATTERN.

PAT 0	PAT 1	PAT 2	PAT 3	PAT 4	PAT 5	PAT 6	PAT 7
000000	000001	177776	000000	000000	052525	007417	026455
000000	000003	177774	000000	010421	052525	007417	026455
000000	000007	177770	000000	021042	052525	007417	026455
000000	000017	177760	177777	031463	125252	170360	151322
000000	000037	177740	177777	042104	125252	170360	151322
000000	000077	177700	177777	052525	125252	170360	151322
000000	000177	177600	000000	063146	052525	007417	026455
000000	000377	177400	000000	073567	052525	007417	026455
000000	000777	177000	177777	104210	125252	170360	151322
000000	001777	176000	177777	114631	125252	170360	151322
000000	003777	174000	000000	125252	052525	007417	026455
000000	007777	170000	177777	135673	125252	170360	151322
000000	017777	160000	000000	146314	052525	007417	026455
000000	037777	140000	177777	156735	125252	170360	151322
000000	077777	100000	000000	167356	052525	007417	026455
000000	177777	000000	177777	177777	125252	170360	151322
PAT 8	PAT 9	PAT 10	PAT 11	PAT 12	PAT 13	PAT 14	PAT 15
077577	000001	177776	172666	077777	153333	000000	177777
077577	000002	177775	155555	137777	066667	177777	000000
077577	000004	177773	172666	157777	153333	177777	000000
077577	000010	177767	155555	167777	066667	177777	000000
077577	000020	177757	172666	173777	153333	177777	000000
077577	000040	177737	155555	175777	066667	177777	000000
077577	000100	177677	172666	176777	153333	177777	000000
077577	000200	177577	155555	177377	066667	177777	000000
077577	000400	177377	172666	177577	153333	177777	000000
077577	001000	176777	155555	177677	066667	177777	000000
077577	002000	175777	172666	177737	153333	177777	000000
077577	004000	173777	155555	177757	066667	177777	000000
077577	010000	167777	172666	177767	153333	177777	000000
077577	020000	157777	155555	177773	066667	177777	000000
077577	040000	137777	172666	177775	153333	177777	000000
077577	100000	077777	155555	177776	066667	177777	000000

9. PROGRAM LISTING

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.TITLE MD-11-DZRP1-B, RPI1E MULTI-DRIVE EXERCISER PROGRAM
*COPYRIGHT (C) 1975, 1976
*DIGITAL EQUIPMENT CORP.
*MAYNARD, MASS. 01754
*
*PROGRAM BY C. HESS/F. ROEMER
*
*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
*PACKAGE (MAINDEC-11-DZQAC-C1), MAR 24, 1976.
*
.SBTTL OPERATIONAL SWITCH SETTINGS
*
*      SWITCH      USE
*-----
*      15      HALT ON ERROR
*      13      INHIBIT ERROR TYPEOUTS
*      10      BELL ON ERROR
*      7       DON'T TYPE SYSTEM STATUS.
*      6       INHIBIT PERFORMANCE SUMMARY TYPEOUTS
*      5       DON'T CHANGE PARAMETERS (LOOP ON PRESENT VALUES)
*      4       DO NOT CHECK FOR MAXIMUM ERROR COUNT OR DEASSIGN
*              DRIVE WHEN NORMAL END OF TEST REACHED
*      3       DISPLAY SECTOR WHICH GAVE 'HARD' ERROR
*              IF DATA COMPARE ERROR & SMZ SET, DISPLAY
*              REMAINDER OF BUFFER
*      2       DISPLAY ALL DATA COMPARE ERRORS
*      1       INHIBIT DATA COMPASION AFTER READ ORDERS
*      0       READ ONLY MODE
*
.SBTTL BASIC DEFINITIONS
*#INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
STACK= 1100
.EQUIV EMT,ERROR          ;;BASIC DEFINITION OF ERROR CALL
.EQUIV IOT,SCOPE         ;;BASIC DEFINITION OF SCOPE CALL
*#MISCELLANEOUS DEFINITIONS
MT= 11                    ;;CODE FOR HORIZONTAL TAB
LF= 12                    ;;CODE FOR LINE FEED
CR= 15                    ;;CODE FOR CARRIAGE RETURN
CRLF= 200                 ;;CODE FOR CARRIAGE RETURN-LINE FEED
PS= 177776                ;;PROCESSOR STATUS WORD
.EQUIV PS,PSW
STKLMT= 177774            ;;STACK LIMIT REGISTER
PIRQ= 177772              ;;PROGRAM INTERRUPT REQUEST REGISTER
DSMR= 177570              ;;HARDWARE SWITCH REGISTER
DOISP= 177570             ;;HARDWARE DISPLAY REGISTER
*#GENERAL PURPOSE REGISTER DEFINITIONS
R0= X0                    ;;GENERAL REGISTER
R1= X1                    ;;GENERAL REGISTER
R2= X2                    ;;GENERAL REGISTER
R3= X3                    ;;GENERAL REGISTER
R4= X4                    ;;GENERAL REGISTER
R5= X5                    ;;GENERAL REGISTER

```

001100

000011  
000012  
000015  
000200  
177776  
177774  
177772  
177570  
177570

000000  
000001  
000002  
000003  
000004  
000005

```

1059      000006      R6=      X6      :: GENERAL REGISTER
1060      000007      R7=      X7      :: GENERAL REGISTER
1061      .EQUIV      R6,SP      :: STACK POINTER
1062      .EQUIV      R7,PC      :: PROGRAM COUNTER
1063
1064      :#PRIORITY LEVEL DEFINITIONS
1065      000000      PR0=      0      :: PRIORITY LEVEL 0
1066      000040      PR1=      40     :: PRIORITY LEVEL 1
1067      000100      PR2=      100    :: PRIORITY LEVEL 2
1068      000140      PR3=      140    :: PRIORITY LEVEL 3
1069      000200      PR4=      200    :: PRIORITY LEVEL 4
1070      000240      PR5=      240    :: PRIORITY LEVEL 5
1071      000300      PR6=      300    :: PRIORITY LEVEL 6
1072      000340      PR7=      340    :: PRIORITY LEVEL 7
1073
1074      :#"SWITCH REGISTER" SWITCH DEFINITIONS
1075      100000      SW15=     100000
1076      040000      SW14=     40000
1077      020000      SW13=     20000
1078      010000      SW12=     10000
1079      004000      SW11=     4000
1080      002000      SW10=     2000
1081      001000      SW09=     1000
1082      000400      SW08=     400
1083      000200      SW07=     200
1084      000100      SW06=     100
1085      000040      SW05=     40
1086      000020      SW04=     20
1087      000010      SW03=     10
1088      000004      SW02=     4
1089      000002      SW01=     2
1090      000001      SW00=     1
1091      .EQUIV      SW09,SW9
1092      .EQUIV      SW08,SW8
1093      .EQUIV      SW07,SW7
1094      .EQUIV      SW06,SW6
1095      .EQUIV      SW05,SW5
1096      .EQUIV      SW04,SW4
1097      .EQUIV      SW03,SW3
1098      .EQUIV      SW02,SW2
1099      .EQUIV      SW01,SW1
1100      .EQUIV      SW00,SW0
1101
1102      :#DATA BIT DEFINITIONS (BIT0 TO BIT15)
1103      100000      BIT15=    100000
1104      040000      BIT14=    40000
1105      020000      BIT13=    20000
1106      010000      BIT12=    10000
1107      004000      BIT11=    4000
1108      002000      BIT10=    2000
1109      001000      BIT09=    1000
1110      000400      BIT08=    400
1111      000200      BIT07=    200
1112      000100      BIT06=    100
1113      000040      BIT05=    40
1114      000020      BIT04=    20

```

```

1115      000010      BIT03= 10
1116      000004      BIT02= 4
1117      000002      BIT01= 2
1118      000001      BIT00= 1
1119      .EQUIV      BIT09, BIT9
1120      .EQUIV      BIT08, BIT8
1121      .EQUIV      BIT07, BIT7
1122      .EQUIV      BIT06, BIT6
1123      .EQUIV      BIT05, BIT5
1124      .EQUIV      BIT04, BIT4
1125      .EQUIV      BIT03, BIT3
1126      .EQUIV      BIT02, BIT2
1127      .EQUIV      BIT01, BIT1
1128      .EQUIV      BIT00, BIT0

1130      ;#BASIC "CPU" TRAP VECTOR ADDRESSES
1131      000004      ERRVEC= 4          ;: TIME OUT AND OTHER ERRORS
1132      000010      RESVEC= 10       ;: RESERVED AND ILLEGAL INSTRUCTIONS
1133      000014      TBITVEC=14       ;: "T" BIT
1134      000014      TRTVEC= 14       ;: TRACE TRAP
1135      000014      BPTVEC= 14       ;: BREAKPOINT TRAP (BPT)
1136      000020      IOTVEC= 20       ;: INPUT/OUTPUT TRAP (IOT) **SCOPE**
1137      000024      PWRVEC= 24       ;: POWER FAIL
1138      000030      EMTVEC= 30       ;: EMULATOR TRAP (EMT) **ERROR**
1139      000034      TRAPVEC=34       ;: "TRAP" TRAP
1140      000060      TKVEC= 60        ;: TTY KEYBOARD VECTOR
1141      000064      TPVEC= 64        ;: TTY PRINTER VECTOR
1142      000240      PIRQVEC=240      ;: PROGRAM INTERRUPT REQUEST VECTOR

1143      ;RPI1 REGISTER INDEX VALUES
1144
1145
1146      000000      RPCS=00          ;: DRIVE STATUS REGISTER
1147      000002      RPER=02          ;: ERROR REGISTER
1148      000004      RPCS=04          ;: CONTROL REGISTER
1149      000006      RPWC=06          ;: WORD COUNT REGISTER
1150      000010      RFBAR=10         ;: BUFFER ADDRESS REGISTER
1151      000012      RPCA=12          ;: CYLINDER ADDRESS REGISTER
1152      000014      RPOA=14          ;: SECTOR/TRACK ADDRESS REGISTER
1153      000016      RPM1=16          ;: MAINTENANCE REGISTER #1
1154      000020      RPM2=20          ;: MAINTENANCE REGISTER #2
1155      000022      RPM3=22          ;: MAINTENANCE REGISTER #3
1156      000024      SUCA=24         ;: SELECTED UNIT CYLINDER ADDRESS REGISTER
1157      000026      SILO=26         ;: SILO REGISTER

1158
1159      ;RPI1 OP CODE DEFINITIONS
1160
1161      000001      CLEAR=1           ;: CLEAR THE CONTROLLER
1162      000003      WRTSEK=3         ;: WRITE WITH IMPLIED SEEK AND HEAD SELECTION
1163      000005      RDSEK=5          ;: READ WITH IMPLIED SEEK AND HEAD SELECT
1164      000007      WRTCHK=7         ;: WRITE CHECK WITH IMPLIED SEEK AND HEAD SELECT
1165      000011      SEEK=11          ;: SEEK
1166      000013      WRITE=13         ;: WRITE (NO IMPLIED SEEK OR HEAD SELECT)
1167      000015      HOMSEK=15        ;: HOME SEEK
1168      000017      READ=17         ;: READ (NO IMPLIED SEEK OR HEAD SELECT)

1169
1170      ;RPI1 REGISTER EQUATES

```

```

1171
1172           ;RPOS (DRIVE STATUS REGISTER)
1173
1174           ;ATTENTION BITS ARE REFERENCED BY BIT NUMBER (BIT00 - BIT07)
1175           000400      SUMP=400           ;SELECTED UNIT WRITE PROTECTED
1176           001000      SUFJ=1000        ;SELECTED UNIT FILE UNSAFE
1177           002000      SUSU=2000        ;SELECTED UNIT SEEK UNDERWAY
1178           004000      SUSI=4000        ;SELECTED UNIT SEEK INCOMPLETE
1179           010000      HNF=10000       ;HEADER NOT FOUND
1180           020000      SURP03=20000     ;SELECTED UNIT IS AN RPO3
1181           040000      SUOL=40000      ;SELECTED UNIT IS ONLINE
1182           100000      SURDY=100000    ;SELECTED UNIT IS READY
1183
1184           ;RPER (ERROR REGISTER)
1185
1186           000001      DSKERR=1         ;DISK ERROR
1187           000002      EOP=2           ;END OF PACK
1188           000004      NXME=4          ;NON-EXISTENT MEMORY
1189           000010      WCE=10         ;WRITE CHECK ERROR
1190           000020      TIMEE=20       ;TIMING ERROR
1191           000040      CSME=40        ;CHECKSUM ERROR
1192           000100      WPE=100        ;WORD PARITY ERROR
1193           000200      LPE=200       ;LONGITUDINAL PARITY ERROR
1194           000400      MODERR=400     ;MODE ERROR
1195           001000      FMTERR=1000    ;FORMAT ERROR
1196           002000      PROG=2000     ;PROGRAM ERROR
1197           004000      NXS=4000      ;NON-EXISTENT SECTOR
1198           010000      NXT=10000     ;NON-EXISTENT TRACK
1199           020000      NXC=20000     ;NON-EXISTENT CYLINDER
1200           040000      FLV=40000    ;FILE UNSAFE VIOLATION
1201           100000      MPV=100000   ;WRITE PROTECT VIOLATION
1202
1203           ;RPCS (CONTROL REGISTER)
1204
1205           ;'GO' BIT AND FUNCTION BITS ARE LOADED TOGETHER AND ARE DEFINED ELSEWHERE.
1206           ;EXTENDED MEMORY ADDRESS BITS ARE REFERED TO BY BIT NUMBER
1207           000100      IDE=100        ;INTERRUPT ON DONE
1208           000200      RDY=200       ;RPI1 READY
1209           ;DRIVE SELECT BITS ARE REFERED TO BY BIT NUMBER
1210           004000      HDR=4000      ;HEADER
1211           010000      MODE=10000    ;MODE
1212           020000      AIE=20000    ;ATTENTION INTERRUPT ENABE
1213           040000      HE=40000     ;HARD ERROR
1214           100000      ERR=100000   ;ERROR
1215
1216           .SBTTL TRAP CATCHER
1217
1218           .=0
1219           ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
1220           ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
1221           ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
1222           .=174
1223           000174      000000      DISPREG: .WORD 0           ;SOFTWARE DISPLAY REGISTER
1224           000176      000000      SWREG: .WORD 0            ;SOFTWARE SWITCH REGISTER
1225
1226           .SBTTL ACT11 HOOKS

```

```

1227
1228
1229
1230          000200
1231          000046
1232 000046  003634
1233          000052
1234 000052  040000
1235          000200
1236
1237          .SBTTL  STARTING ADDRESSES
1238
1239          000200
1240
1241 000200  000137  002016      JMP      START
1242 000204  000137  002024      JMP      START1

```

```

;*****
;HOOKS REQUIRED BY ACT11
$SVPC=.          ;SAVE PC
.=46
SENDAD          ;;1)SET LOC.46 TO ADDRESS OF SENDAD IN .SEOP
.=52
.WORD  40000    ;;2)SET LOC.52 TO 40000
.$SVPC          ;; RESTORE PC

```

```

;START PROGRAM WITHOUT CHANGING PARAMETERS
;START PROGRAM AND CHANGE PARAMETERS

```

.SBTTL COMMON TAGS

\*\*\*\*\*  
\*THIS TABLE CONTAINS VARIOUS COMMON STORAGE LOCATIONS  
\*USED IN THE PROGRAM.

1243  
1244  
1245  
1246  
1247  
1248  
1249 001100  
1250 001100  
1251 001100 000000  
1252 001102 000  
1253 001103 000  
1254 001104 000000  
1255 001106 000000  
1256 001110 000000  
1257 001112 000000  
1258 001114 000  
1259 001115 001  
1260 001116 000000  
1261 001120 000000  
1262 001122 000000  
1263 001124 000000  
1264 001126 000000  
1265 001130 000000  
1266 001132 000000  
1267 001134 000  
1268 001135 000  
1269 001136 000000  
1270 001140 177570  
1271 001142 177570  
1272 001144 177560  
1273 001146 177552  
1274 001150 177564  
1275 001152 177566  
1276 001154 000  
1277 001155 002  
1278 001156 012  
1279 001157 000  
1280 001160 000000  
1281  
1282 001162 000000  
1283 001164 000000  
1284 001166 000000  
1285 001170 000000  
1286 001172 000000  
1287 001174 000000  
1288 001176 000000  
1289 001200 000000  
1290 001202 000000  
1291 001204 000000  
1292 001206 177607 000377  
1293 001212 077  
1294 001213 015  
1295 001214 000012  
1296  
1297 001216 176710  
1298 001220 000254

.=1100  
\$CHTAG: .WORD  
\$PASS: .WORD 0  
\$STNUM: .BYTE 00  
\$ERFLG: .BYTE 00  
\$ICNT: .WORD 00  
\$LPAOR: .WORD 00  
\$LPERR: .WORD 00  
\$ERTTL: .WORD 00  
\$ITEMB: .BYTE 00  
\$ERMAX: .BYTE 1  
\$ERRPC: .WORD 00  
\$GDADR: .WORD 00  
\$BADR: .WORD 00  
\$LDOAT: .WORD 00  
\$BDOAT: .WORD 00  
\$AUTOB: .BYTE 00  
\$INTAG: .BYTE 00  
\$SWR: .WORD DSWR  
\$DISPLAY: .WORD 00DISP  
\$TKS: 177560  
\$TKB: 177562  
\$TPS: 177564  
\$TPB: 177566  
\$NULL: .BYTE 0  
\$FILLS: .BYTE 2  
\$FILLC: .BYTE 12  
\$TPFLG: .BYTE 0  
\$REGAD: .WORD 0  
\$REG0: .WORD 0  
\$REG1: .WORD 0  
\$REG2: .WORD 0  
\$REG3: .WORD 0  
\$REG4: .WORD 0  
\$REG5: .WORD 0  
\$REG6: .WORD 0  
\$REG7: .WORD 0  
\$REG10: .WORD 0  
\$REG11: .WORD 0  
\$ELL: .ASCIZ <207><377><377>  
\$QUES: .ASCII /?/  
\$CRLF: .ASCII <15>  
\$LF: .ASCIZ <12>  
\$PADR: .WORD 176710  
\$PVEC: .WORD 254

START OF COMMON TAGS  
CONTAINS PASS COUNT  
CONTAINS THE TEST NUMBER  
CONTAINS ERROR FLAG  
CONTAINS SUBTEST ITERATION COUNT  
CONTAINS SCOPE LOOP ADDRESS  
CONTAINS SCOPE RETURN FOR ERRORS  
CONTAINS TOTAL ERRORS DETECTED  
CONTAINS ITEM CONTROL BYTE  
CONTAINS MAX. ERRORS PER TEST  
CONTAINS PC OF LAST ERROR INSTRUCTION  
CONTAINS ADDRESS OF 'GOOD' DATA  
CONTAINS ADDRESS OF 'BAD' DATA  
CONTAINS 'GOOD' DATA  
CONTAINS 'BAD' DATA  
RESERVED--NOT TO BE USED  
AUTOMATIC MODE INDICATOR  
INTERRUPT MODE INDICATOR  
ADDRESS OF SWITCH REGISTER  
ADDRESS OF DISPLAY REGISTER  
TTY KBD STATUS  
TTY KBD BUFFER  
TTY PRINTER STATUS REG. ADDRESS  
TTY PRINTER BUFFER REG. ADDRESS  
CONTAINS NULL CHARACTER FOR FILLS  
CONTAINS # OF FILLER CHARACTERS REQUIRED  
INSERT FILL CHARS. AFTER A "LINE FEED"  
"TERMINAL AVAILABLE" FLAG (BIT(07)=0=YES)  
CONTAINS THE ADDRESS FROM WHICH (\$REG0) WAS OBTAINED  
CONTAINS ((REGAD)+0)  
CONTAINS ((REGAD)+2)  
CONTAINS ((REGAD)+4)  
CONTAINS ((REGAD)+6)  
CONTAINS ((REGAD)+10)  
CONTAINS ((REGAD)+12)  
CONTAINS ((REGAD)+14)  
CONTAINS ((REGAD)+16)  
CONTAINS ((REGAD)+20)  
CONTAINS ((REGAD)+22)  
CODE FOR BELL  
QUESTION MARK  
CARRIAGE RETURN  
LINE FEED  
\*\*\*\*\*  
FIRST ADDRESS OF RP11  
RP11 VECTOR ADDRESS

1299	001222	000240	RPPRIO: .WORD	5*32.	:RPI1 PRIORITY
1300	001224	172540	\$LKCSR: .WORD	172540	:ADDR OF KW11-P STATUS REGISTER
1301	001226	172542	\$LKCSB: .WORD	172542	:ADDR OF KW11-P COUNTER BUFFER
1302	001230	000104	\$LPVEC: .WORD	104	:ADDR OF KW11-P VECTOR
1303	001232	177546	\$LKS: .WORD	177546	:ADDR OF KW11-L STATUS REGISTER
1304	001234	000100	\$LLVEC: .WORD	100	:ADDR OF KW11-L VECTOR
1305	001236	177777	CLKFLG: .WORD	-1	: '0' IF A CLOCK IS AVAILABLE
1306	001240	000074	HZ: .WORD	74	: 74 (8) IF 60 HZ SYSTEM; 62 (8) IF 50 HZ SYSTEM
1307	001242	000000	CNTRLC: .WORD	0	: VECTOR ADDRESS FOR CONTROL C
1308	001244	000000	LSTAD: .WORD	0	: CONTAINS LAST MEMORY ADDRESS
1309	001246	001100	STACK1: .WORD	STACK	: CONSTANT USED TO CHECK STACK POINTER
1310	001250	000000	STATIN: .WORD	0	: ERROR RATE DATA DISPLAY INDICATOR
1311	001252	000000	PACK: .WORD	0	: 'W' OR 'R' COMMAND INDICATOR
1312	001254	000003	FAIRMS: .WORD	3	: 'FAIRNESS' COUNT FOR BUFFER WAIT
1313	001256	000000	MAXCYL: .WORD	0	: MAXIMUM CYLINDER ADDRESS ALLOWED FOR
1314					: ANY DRIVE TESTED. (FILLED IN DURING STARTUP.)
1315	001260	001750	TIMOUT: .WORD	1000.	: TIME (IN MS) ALLOWED FOR OPERATION
1316	001262	000000	CHNGPM: .WORD	0	: IS NON-ZERO IF PARAMETERS TO BE CHANGED
1317	001264	000000	DRIVE: .WORD	0	: STORE DRIVE NUMBER HERE
1318	001266	000000	CYL.ER: .WORD	0	: STORE CYLINDER ADDRESS HERE
1319	001270	000000	TRK.ER: .WORD	0	: STORE TRACK ADDRESS HERE
1320	001272	000000	SEC.ER: .WORD	0	: STORE SECTOR ADDRESS HERE

;;\*\*\*\*\*

.SBTTL CONTROL PARAMETERS

;;\*\*\*\*\*

1328	001274	137100	ENDCON: .WORD	137100	: 6.25X10 <sup>18</sup> WORDS (10) (1X10 <sup>10</sup> BITS)
1329	001276	022500	ENDSEK: .WORD	22500	: MSW
1330	001300	041100	ENDSEK: .WORD	041100	: 1 X 10 <sup>16</sup> SEEKS (LSW)
1331	001302	000017		17	: MSW
1332	001304	000001	PASCNT: .WORD	1	: NUMBER OF PASSES TO END OF TEST
1333	001306	000000	BUFRSZ: .WORD	0	: MAXIMUM DATA TRANSFER SIZE IN WORDS
1334					: (FILLED BY PROGRAM AT STARTUP OR BY OPERATOR
1335					: DURING PARAMETER ENTRY DIALOG.)
1336	001310	000144	MAXER: .WORD	100.	: MAXIMUM ERRORS - 100(10)
1337	001312	000005	INTRVL: .WORD	5	: LOW BYTE IS PERFORMANCE TYPEOUT INTERVAL
1338					: COUNTER. UPPER BYTE IS VALUE.
1339	001314	000004	CMPLMT: .WORD	4	: NUMBER OF COMPARE ERRORS TYPED OUT
1340	001316	000000	SEKMOD: .WORD	0	: IF EQ 1, END OF PASS DETERMINED BY SEEK COUNT
1341	001320	000003	RATIO: .WORD	3	: READ/WRITE RATIO (RANGE 0 - 7)
1342					: 0 - 15/1 (READ/WRITE)
1343					: 1 - 7/1
1344					: 2 - 6/2
1345					: 3 - 5/3
1346					: 4 - 4/4
1347					: 5 - 3/5
1348					: 6 - 2/6
1349					: 7 - 1/7
1350	001322	000001	AUTOCK: .WORD	1	: IF EQ 1, DO A WRITE CHECK AFTER EACH ORDER
1351					: IF EQ 0, SELECT WRITE CHECK ORDERS RANDOMLY

;;\*\*\*\*\*

1354



```

1383 .SBTTL ERROR POINTER TABLE
1384
1385 ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
1386 ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
1387 ;*LOCATION SITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
1388 ;*NOTE1: IF SITEMB IS 0 THE ONLY PERTINENT DATA IS (SERRPC).
1389 ;*NOTE2: EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
1390
1391 ;* EM ;: POINTS TO THE ERROR MESSAGE
1392 ;* DH ;: POINTS TO THE DATA HEADER
1393 ;* DT ;: POINTS TO THE DATA
1394 ;* DF ;: POINTS TO THE DATA FORMAT
1395
1396
1397 001346 SERRTB:
1398
1399 ;ERROR 1
1400
1401 001346 027030 EM1 ;RP11 DIDN'T RESPOND TO ADDRESSING
1402 001350 030352 DH1
1403 001352 032010 DT1
1404 001354 032264 DF1
1405
1406 ;ERROR 2
1407
1408 001356 027072 EM2 ;INVALID RP11 COMMAND
1409 001360 030360 DH2
1410 001362 032012 DT2
1411 001364 032270 DF2
1412
1413 ;ERROR 3
1414
1415 001366 027117 EM3 ;UNDEFINED INTERRUPT FROM RP11
1416 001370 030375 DH3
1417 001372 032016 DT3
1418 001374 032270 DF2
1419
1420 ;ERROR 4
1421
1422 001376 000000 0 ;UNUSED
1423 001400 000000 0
1424 001402 000000 0
1425 001404 000000 0
1426
1427 ;ERROR 5
1428
1429 001406 000000 0 ;UNUSED
1430 001410 000000 0
1431 001412 000000 0
1432 001414 000000 0
1433
1434 ;ERROR 6
1435
1436 001416 000000 0 ;UNUSED
1437 001420 000000 0
1438 001422 000000 0

```

1439	001424	000000	0	
1440				
1441				;ERROR 7
1442				
1443	001426	000000	0	;UNUSED
1444	001430	000000	0	
1445	001432	000000	0	
1446	001434	000000	0	
1447				
1448				;ERROR 10
1449				
1450	001436	027161	EM10	;CAN'T MATCH DATA READ WITH A PATTTERN
1451	001440	030412	DH10	
1452	001442	032026	DT10	
1453	001444	032274	DF10	
1454				
1455				;ERROR 11
1456				
1457	001446	000000	0	;SECOND LINE OF 'CAN'T MATCH DATA' MESSAGE
1458	001450	000000	0	
1459	001452	032022	DT11	
1460	001454	032270	DF2	
1461				
1462				;ERROR 12
1463				
1464	001456	027226	EM12	;DATA COMPARE ERRORS
1465	001460	030412	DH10	
1466	001462	032026	DT10	
1467	001464	032304	DF12	
1468				
1469				;ERROR 13
1470				
1471	001466	000000	0	;DATA COMPARE DETAIL LINE
1472	001470	000000	0	
1473	001472	032040	DT13	
1474	001474	032314	DF13	
1475				
1476				;ERROR 14
1477				
1478	001476	000000	0	;DATA COMPARE ERROR SUMMARY LINE
1479	001500	030571	DH14	
1480	001502	032046	DT14	
1481	001504	032320	DF14	
1482				
1483				;ERROR 15
1484				
1485	001506	027252	EM15	; 'ERR' NOT SET BUT 'RPER' CONTENTS NOT ZERO
1486	001510	030617	DH15	
1487	001512	032050	DT15	
1488	001514	032324	DF15	
1489				
1490				;ERROR 16
1491				
1492	001516	027325	EM16	;WORD COUNT NOT ZERO OR BUFFER ADDRESS WRONG
1493	001520	030654	DH16	
1494	001522	032060	DT16	

1495	001524	032330	DF16	
1496				
1497				; ERROR 17
1498				
1499	001526	027401	EM17	; SOFTWARE TIMEOUT DURING POSITIONING
1500	001530	030775	DH17	
1501	001532	032076	DT17	
1502	001534	032334	DF17	
1503				
1504				; ERROR 20
1505				
1506	001536	027445	EM20	; SOFTWARE TIMEOUT DURING I/O
1507	001540	030775	DH17	
1508	001542	032076	DT17	
1509	001544	032334	DF17	
1510				
1511				; ERROR 21
1512				
1513	001546	027501	EM21	; DRIVE OFFLINE
1514	001550	030775	DH17	
1515	001552	032076	DT17	
1516	001554	032334	DF17	
1517				
1518				; ERROR 22
1519				
1520	001556	027517	EM22	; DRIVE UNSAFE
1521	001560	030775	DH17	
1522	001562	032076	DT17	
1523	001564	032334	DF17	
1524				
1525				; ERROR 23
1526				
1527	001566	027534	EM23	; SEEK INCOMPLETE
1528	001570	031117	DH23	
1529	001572	032124	DT23	
1530	001574	032344	DF23	
1531				
1532				; ERROR 24
1533				
1534	001576	027554	EM24	; UNIBUS TRANSFER ERROR
1535	001600	031237	DH24	
1536	001602	032144	DT24	
1537	001604	032354	DF24	
1538				
1539				; ERROR 25
1540				
1541	001606	027602	EM25	; CONTROLLER ERROR
1542	001610	031304	DH25	
1543	001612	032156	DT25	
1544	001614	032324	DF15	
1545				
1546				; ERROR 26
1547				
1548	001616	027623	EM26	; NON-EXISTENT DISK ADDRESS
1549	001620	031341	DH26	
1550	001622	032166	DT26	

1551	001624	032360	DF26	
1552				
1553				;ERROR 27
1554				
1555	001626	027655	EM27	;DATA ERROR
1556	001630	031416	DH27	
1557	001632	032202	DT27	
1558	001634	032364	DF27	
1559				
1560				;ERROR 30
1561				
1562	001636	000000	0	;SOFT ERROR REPORT LINE
1563	001640	031570	DH30	
1564	001642	000000	0	
1565	001644	000000	0	
1566				
1567				;ERROR 31
1568				
1569	001646	000000	0	;HARD ERROR REPORT LINE
1570	001650	031603	DH31	
1571	001652	000000	0	
1572	001654	000000	0	
1573				
1574				;ERROR 32
1575				
1576	001656	027670	EM32	;WRITE CHECK ERROR (NO DATA ERROR)
1577	001660	031416	DH27	
1578	001662	032202	DT27	
1579	001664	032364	DF27	
1580				
1581				;ERROR 33
1582				
1583	001666	027732	EM33	;WRITE CHECK ERROR (DATA ERROR BITS SET)
1584	001670	031416	DH27	
1585	001672	032202	DT27	
1586	001674	032364	DF27	
1587				
1588				;ERROR 34
1589				
1590	001676	030002	EM34	;HEADER NOT FOUND
1591	001700	031616	DH34	
1592	001702	032236	DT34	
1593	001704	032374	DF34	
1594				
1595				;ERROR 35
1596				
1597	001706	030023	EM35	;FORMAT ERROR WHILE SEARCHING FOR INITIAL SECTOR
1598	001710	031416	DH27	
1599	001712	032202	DT27	
1600	001714	032364	DF27	
1601				
1602				;ERROR 36
1603				
1604	001716	030103	EM36	;HEADER NOT FOUND, CYLINDER IN HEADER
1605				;DOES NOT COMPARE
1606	001720	031616	DH34	

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1607 001722 032236 DT34
1608 001724 032374 DF34
1609
1610 ;ERROR 37
1611
1612 001726 030171 EM37 ;DIFFERENT ERROR DURING RETRY
1613 001730 030775 DH17
1614 001732 032076 DT17
1615 001734 032334 DF17
1616
1617 ;ERROR 40
1618
1619 001736 000000 0 ;UNUSED
1620 001740 000000 0
1621 001742 000000 0
1622 001744 000000 0
1623
1624 ;ERROR 41
1625
1626 001746 000000 0 ;RETRY SUCCESSFUL
1627 001750 031745 DH41
1628 001752 000000 0
1629 001754 000000 0
1630
1631 ;ERROR 42
1632
1633 001756 000000 0 ;RETRY UNSUCCESSFUL
1634 001760 031765 DH42
1635 001762 000000 0
1636 001764 000000 0
1637
1638 ;ERROR 43
1639
1640 001766 030226 EM43 ;ERROR SIGNALLED BUT NO ERROR BITS SET
1641 001770 030775 DH17
1642 001772 032076 DT17
1643 001774 032334 DF17
1644
1645 ;ERROR 44
1646
1647 001776 030267 EM44 ;WRITE PROTECT VIOLATION
1648 002000 030617 DH15
1649 002002 032050 DT15
1650 002004 032324 DF15
1651
1652 ;ERROR 45
1653
1654 002006 030322 EM45 ;FORMAT ERROR DURING I/O
1655 002010 031416 DH27
1656 002012 032202 DT27
1657 002014 032364 DF27
1658
1659 ; *****
1660 .SBTTL SETUP AND INITIALIZATION ROUTINE
1661
1662

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# E04

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1663      :      START ADDRESS = 200
1664      :      START ADDRESS WITH PARAMETER CHANGES = 204
1665      :
1666      ;;*****
1667      :
1668      002016 005037 001262  START: CLR      CHNGPM      ;CLEAR 'START FROM 204' INDICATOR
1669      002022 000403          BR      BEGIN        ;START THE PROGRAM
1670      002024 012737 177777 001262  START1: MOV     #-1,CHNGPM ;SET 'CHANGE PARAMETER' INDICATOR
1671      002032 000005          BEGIN: RESET       ;CLEAR EVERYTHING
1672      :      .SBTTL INITIALIZE THE COMMON TAGS
1673      :      ;;CLEAR THE COMMON TAGS ($CHTAG) AREA
1674      002034 012706 001100          MOV     #CHTAG,R6      ;FIRST LOCATION TO BE CLEARED
1675      002040 005026          CLR     (R6)+         ;CLEAR MEMORY LOCATION
1676      002042 022706 001140          CMP     #SMR,R6      ;;DONE?
1677      002046 001374          BNE    #-6           ;LOOP BACK IF NO
1678      002050 012706 001100          MOV     #STACK,SP    ;SETUP THE STACK POINTER
1679      :      ;;INITIALIZE A FEW VECTORS
1680      002054 012737 015624 000030          MOV     #ERROR,#EMTVEC ;EMT VECTOR FOR ERROR ROUTINE
1681      002062 012737 000340 000032          MOV     #340,#EMTVEC+2 ;LEVEL 7
1682      002070 012737 021020 000034          MOV     #STRAP,#TRAPVEC ;TRAP VECTOR FOR TRAP CALLS
1683      002076 012737 000340 000036          MOV     #340,#TRAPVEC+2 ;LEVEL 7
1684      002104 012737 176543 020620          MOV     #176543,#MINUM ;PRIME THE RANDOM NUMBER GENERATOR
1685      002112 012737 123456 020622          MOV     #123456,#LONUM ;BOTH HIGH AND LOW WORDS
1686      :      ;;SIZE FOR A HARDWARE SWITCH REGISTER, IF NOT FOUND OR IT IS
1687      :      ;;EQUAL TO A "-1" SETUP FOR A SOFTWARE SWITCH REGISTER.
1688      002120 013746 000004          MOV     #ERRVEC,-(SP) ;SAVE ERROR VECTOR
1689      002124 012737 002160 000004          MOV     #545,#ERRVEC ;SET UP ERROR VECTOR
1690      002132 012737 177570 001140          MOV     #DSWR,SMR    ;SETUP FOR A HARDWARE SWICH REGISTER
1691      002140 012737 177570 001142          MOV     #DDISP,DISPLAY ;AND A HARDWARE DISPLAY REGISTER
1692      002146 022777 177777 176764          CMP     #-1,DSWR    ;TRY TO REFERENCE HARDWARE SMR
1693      002154 001012          BNE    66$         ;BRANCH IF NO TIMEOUT TRAP OCCURRED
1694      :      ;AND THE HARDWARE SMR IS NOT = -1
1695      002156 000403          BR     65$         ;BRANCH IF NO TIMEOUT
1696      002160 012716 002166          64$: MOV     #65$,(SP) ;SET UP FOR TRAP RETURN
1697      002164 000002          RTI
1698      002166 012737 000176 001140          65$: MOV     #DDISP,SMR ;POINT TO SOFTWARE SMR
1699      002174 012737 000174 001142          MOV     #DDISP,DISPLAY
1700      002202 012637 000004          66$: MOV     (SP)+,#ERRVEC ;RESTORE ERROR VECTOR
1701      :
1702      002206 012737 000240 000032          MOV     #240,#EMTVEC+2 ;CHANGE EMT PRIORITY TO 5
1703      002214 012737 000240 000036          MOV     #240,#TRAPVEC+2 ;CHANGE TRAP PRIORITY TO 5
1704      002222 104401 031644          1$: TYPE  TITLE      ;TYPE THE PROGRAM NAME AND MAINDEC NUMBER
1705      002226 012737 001213 002224          MOV     #SCRLF,1$+2 ;CHANGE 'TITLE' TO CR-LF
1706      002234 001337 177776          CLR     PS          ;RESET PROCESSOR PRIORITY
1707      002240 004737 016756          JER     PC,STKINT  ;INITIALIZE THE TTY KEYBOARD
1708      :      .SBTTL GET VALUE FOR SOFTWARE SWITCH REGISTER
1709      002244 005737 000042          TST     #42        ;ARE WE RUNNING UNDER XDP/ACT?
1710      002250 001006          BNE    67$         ;BRANCH IF YES
1711      002252 023727 001140 000176          CMP     SWR,#SMREG  ;SOFTWARE SWITCH REG SELECTED?
1712      002260 001005          BNE    68$         ;BRANCH IF NO
1713      002262 104406          GTSMR          ;GET SOFT-SMR SETTINGS
1714      002264 000403          BR     68$
1715      002266 112737 000001 001134          67$: MOV     #1,$AUTOB  ;;SET AUTO-MODE INDICATOR
1716      002274          68$:
1717      002274 005037 001250          CLR     STATIN     ;CLEAR PERFORMANCE SUMMARY INDICATOR
1718      002300 105037 001157          CLR     $TPFLG    ;SET TTY AVAILABILITY FLAG

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1719 002304 012705 025460          MOV      #ASMLST,RS      ; START OF AREA TO CLEAR
1720 002310 005025          2S:    CLR      (RS)+      ; CLEAR
1721 002312 022705 025736          CMP      #BLKADR,RS    ; LOOK FOR END OF CLEAR AREA
1722 002316 001374          BNE     2S             ; BR IF NOT FINISHED
1723 002320 013737 001240 010144      MOV      #Z,SIXTEE     ; 1/60 TH OR 1/50 TH SECOND COUNTER VALUE
1724 002326 005437 010144          NEG      SIXTEE        ; CONVERT TO 2'S COMP
1725 002332 012737 030060 010130      MOV      #30060,HOUR   ; ASCII '00' TO HOUR COUNTER
1726 002340 012737 030060 010134      MOV      #30060,MINUTE ; ASCII '00' TO MINUTES COUNTER
1727 002346 012737 030060 010140      MOV      #30060,SECOND ; ASCII '00' TO SECONDS COUNTER
1728 002354 105037 001313          CLR     INTRVL+1      ; CLEAR INTERVAL COUNTER
1729 002360 005037 177776          CLR     PSM           ; CLEAR PROCESSOR STATUS
1730 002364 005037 001252          CLR     PACK          ; 'R' OR 'W' COMMAND INDICATOR
1731
1732                               ;ROUTINE TO DETERMINE BUFFER AREA SIZE
1733
1734 002370 005227 177777          SIZMEM: INC     #-1     ; FIRST START ?
1735 002374 001013          BNE     1S           ; BR IF NOT
1736 002376 004737 033742          JSR     PC,$SIZE    ; SEE HOW MUCH MEMORY ON SYSTEM
1737 002402 012737 000137 002370      MOV      #137,SIZMEM ; CLEAR ENTRY TO '$SIZE'
1738 002410 012737 002424 002372      MOV      #18,SIZMEM+2 ; SAME
1739 002416 013737 034036 001244      MOV      $LSTAD,LSTAD ; SAVE THE HIGH MEMORY ADDRESS
1740 002424 012737 000001 025614      1S:    MOV      #1,BUFTBL  ; LOAD NUMBER OF BUFFERS
1741 002432 012737 033644 025616      MOV      #ENOPGM,BUFTBL+2 ; STARTING ADDRESS OF BUFFER
1742 002440 013737 001244 025620      MOV      LSTAD,BUFTBL+4 ; LAST ADDR TO BUFFER ALLOCATION TABLE
1743 002446 162737 033644 025620      SUB     #ENOPGM,BUFTBL+4 ; SUBTRACT PROGRAM SPACE
1744 002454 000241          CLC                    ; CLEAR THE 'C' BIT
1745 002456 006037 025620          ROR     BUFTBL+4      ; CONVERT TO WORD COUNT
1746 002462 022737 037776 001244      CMP     #37776,LSTAD ; ONLY BK ON THE SYSTEM ?
1747 002470 103003          BHS    2S           ; BR IF BK OR LESS
1748 002472 105737 000041          TST    41            ; SEE WHO LOADED THE PROGRAM
1749 002476 001004          BNE     3S           ; BR IF LOADED BY 'XXDP'
1750 002500 162737 000144 025620      2S:    SUB     #100.,BUFTBL+4 ; SUBTRACT 'ABS' LOADER SIZE
1751 002506 000403          BR     4S           ; CONTINUE WITH BUFFER SPACE SETUP
1752 002510 162737 002734 025620      3S:    SUB     #1500.,BUFTBL+4 ; SUBTRACT 'XXDP' LOADER SIZE
1753 002516 005737 001306          4S:    TST     BUFRSZ    ; VALUE IN 'BUFRSZ' ?
1754 002522 001012          BNE     5S           ; BR IF VALUE IS
1755 002524 012737 005400 001306      MOV     #2816.,BUFRSZ ; ASSUME FULL TRACK + 1 SEC MAXIMUM
1756 002532 023737 001306 025620      CMP     BUFRSZ,BUFTBL+4 ; IS THAT TOO LARGE ?
1757 002540 101403          BLOS   5S           ; BR IF NOT
1758 002542 013737 025620 001306      MOV     BUFTBL+4,BUFRSZ ; USE MAX AVAIL MEMORY AS MAX BUFFER SIZE
1759 002550 005737 001262          5S:    TST     CHNGPM    ; CHANGE PARAMETERS ?
1760 002554 001455          BEQ    CKADR        ; BR IF NOT
1761
1762                               ;PARAMETER ENTRY ROUTINE
1763
1764 002556 012737 002662 001242      ENTPAR: MOV     #ENTPR1,CNTRLC ; CONTROL C RETURN ADDRESS
1765 002564 104401 033374          ENTPR:  TYPE    #ASKPAR ; 'ENTER PARAMETERS'
1766 002570 012704 033276          MOV     #PARLST,R4    ; ENTRY PARAMETER LIST TO R4
1767 002574 012437 002612          1S:    MOV     (R4)+,4S    ; ADDRESS OF PARAMETER NAME
1768 002600 001435          BEQ    ENTPR2        ; BR IF AT END OF TABLE
1769 002602 000402          BR     3S           ; GET AROUND THE CR-LF
1770 002604 104401 001213          2S:    TYPE    #SCRLF   ; CR-LF
1771 002610 104401          3S:    TYPE    #        ; TYPE THE PARAMETER NAME
1772 002612 000000          4S:    .WORD 0        ; ADDRESS OF PARAMETER NAME TEXT
1773 002614 011405          MOV     (R4),RS      ; ADDRESS OF PARAMETER LOCATION
1774 002616 011546          MOV     (RS),-(SP)   ; CONTENTS OF PARAMETER LOCATION

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1775	002620	104402				TYP0C		:TYPE THE CURRENT VALUE
1776	002622	104401	032501			TYPE	,SPACE1	:1 SPACE
1777	002624	104411				ROL IN		:READ THE KEYBOARD
1778	002630	012601				MOV	(SP)+,R1	:BUFFER ADDRESS
1779	002632	004037	012020			JSR	RD,CK.NUM	:CHECK THE NUMBER
1780	002636	002604				ZS		:ILLEGAL INPUT
1781	002640	002650				SS		:TERMINATED WITH A SS
1782	002644	002656				7S		:TERMINATED WITH A '7'
1783	002648	002652				6S		:NO ENTRY - TERMINATED WITH A SS
1784	002646	002674				ENTPR2		:NO ENTRY - TERMINATED WITH A '6'
1785	002650	010215			5S:	MOV	R2,(RS)	:MOVE NEW VALUE TO PARAMETER LOCATION
1786	002652	005724			6S:	TST	(R4)+	:INCREMENT THE PARAMETER POINTER
1787	002654	000747				BR	1S	:GET MORE PARAMETERS
1788	002656	010215			7S:	MOV	R2,(RS)	:NEW PARAMETER VALUE
1789	002660	000405				BR	ENTPR2	:CONTINUE
1790	002662	012706	001100		ENTPR1:	MOV	#STACK,SP	:RESET THE STACK POINTER
1791	002666	005037	177776			CLR	PSW	:CLEAR THE STATUS WORD
1792	002672	000734				BR	ENTPR	:START WITH PARAMETER ENTRY AGAIN
1793	002674	005077	176244		ENTPR2:	CLR	#STKS	:CLEAR THE KEYBOARD INTERRUPT
1794	002700	005037	177776			CLR	PSW	:CLEAR PROCESSOR STATUS
1795	002704	012706	001100			MOV	#STACK,SP	:RESTORE STACK POINTER FOR RESTART
1796								
1797								
1798								
1799	002710	012737	002732	000004	CKADR:	MOV	#1S,ERRVEC	:CHANGE TIMEOUT RETURN
1800	002716	005777	176274			TST	ZRPAR	:SEE IF RP11 RESPONDS
1801	002722	012737	000006	000004		MOV	#ERRVEC+2,ERRVEC	:RESET THE TIMEOUT VECTOR
1802	002730	000411				BR	ZS	:CONTINUE WITH CHECKING
1803	002732	012737	000006	000004	1S:	MOV	#ERRVEC+2,ERRVEC	:RESET TIMEOUT VECTOR
1804	002740	104001				ERROR	1	:REPORT RP11 DIDN'T RESPOND
1805	002742	013700	000042			MOV	#42,R0	:CHAIN MODE 'OR' ACT11
1806	002746	001703				BEQ	ENTPAR	:IF NOT - GO TO ENTER PARAMETER ROUTINE
1807	002750	000137	003634			JMP	SEND40	:RETURN TO MONITOR
1808	002754	004737	021314		2S:	JSR	PC,RPINIT	:INITIALIZE THE RP11 HANDLER
1809	002760	012737	177777	021132		MOV	#-1,SAVEFG	:SET THE 'SAVE REGISTER' FLAG
1810	002766	012737	000312	001256		MOV	#202,MAXCYL	:START CYLINDER LIMIT AT RPO2 LIMIT
1811	002774	005737	021122			TST	DRVTP	:SEE WHICH DRIVES (RPO2 OR RPO3) ARE
1812								:ON SYSTEM
1813	003000	001403				BEQ	3S	:BR IF RPO2'S
1814	003002	012737	000625	001256		MOV	#405,MAXCYL	:CYLINDER LIMIT FOR RPO3'S
1815	003010	005737	001324		3S:	TST	LC	:VALUE ENTERED IN 'LC' ?
1816	003014	001003				BNE	4S	:BR IF ONE IS
1817	003016	013737	001256	001324		MOV	MAXCYL,LC	:USE MAXIMUM VALUE
1818	003024	005037	001262		4S:	CLR	CHNGPM	:CLEAR CHANGE PARAMETERS INDICATOR
1819	003030	023737	001306	025620		CMP	BUFRSZ,BUFTBL+4	:REQUESTED TRANSFER SIZE TOO LARGE ?
1820	003036	101004				BHI	5S	:BR IF REQUESTED MAXIMUM TOO LARGE
1821	003040	022737	000004	001306		CMP	#4,BUFRSZ	:SEE IF MAXIMUM TRANSFER SIZE TOO SMALL
1822	003046	101404				BLOS	6S	:BR IF NOT TOO SMALL
1823	003050	012746	033501		5S:	MOV	#PAR1,-(SP)	:ADDR OF PARAMETER NAME
1824	003054	000137	003256			JMP	BADPAR	:REPORT THE PARAMETER ERROR
1825	003060	023737	001306	001344	6S:	CMP	BUFRSZ,BEGSZ	:IS MAX RECORD LENGTH SMALLER THAN 1 SECTOR ?
1826	003066	103003				BHIS	CKPAR	:BR IF NOT
1827	003070	013737	001306	001344		MOV	BUFRSZ,BEGSZ	:USE MAX RECORD SIZE AS STARTING SIZE
1828	003076	023737	001256	001324	CKPAR:	CMP	MAXCYL,LC	:MAXIMUM CYLINDER ADDR TOO LARGE ?
1829	003104	103004				1S		:BR IF NOT
1830	003106	012746	033531			MOV	#PAR4,-(SP)	:ADDR OF PARAMETER NAME

;CHECK THE PARAMETERS FOR VALIDITY

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1831 003112 000137 003256      JMP      BADPAR      ;REPORT PARAMETER ERROR
1832 003116 023737 001324 001326 1S:  CMP      LC,FC      ;MAX CYLINDER LARGER THAN MIN CYLINDER
1833 003124 103004          BHS      2S        ;BR IF IT IS
1834 003126 012746 033535      MOV      #PAR5, -(SP) ;ADDRESS OF PARAMETER NAME
1835 003132 000137 003256      JMP      BADPAR      ;REPORT PARAMETER ERROR
1836 003136 022737 000023 001330 2S:  CMP      #19.,LT    ;MAXIMUM TRACK ADDRESS TOO LARGE ?
1837 003144 103004          BHS      3S        ;BR IF NOT
1838 003146 012746 033541      MOV      #PAR6, -(SP) ;ADDRESS OF PARAMETER NAME
1839 003152 000137 003256      JMP      BADPAR      ;REPORT PARAMETER ERROR
1840 003156 023737 001330 001332 3S:  CMP      LT,FT      ;SEE IF MAX TRACK EQ OR LARGER THAN MIN TRACK
1841 003164 103004          BHS      4S        ;BR IF IT IS
1842 003166 012746 033545      MOV      #PAR7, -(SP) ;ADDRESS OF PARAMETER NAME
1843 003172 000137 003256      JMP      BADPAR      ;REPORT PARAMETER ERROR
1844 003176 022737 000011 001334 4S:  CMP      #9.,LS     ;SEE IF MAX SECTOR TOO LARGE ?
1845 003204 103004          BHS      5S        ;BR IF MAX SECTOR OK
1846 003206 012746 033551      MOV      #PAR8, -(SP) ;ADDRESS OF PARAMETER NAME
1847 003212 000137 003256      JMP      BADPAR      ;REPORT PARAMETER ERROR
1848 003216 023737 001334 001336 5S:  CMP      LS,FS      ;MINIMUM SECTOR ADDRESS TOO LARGE
1849 003224 103004          BHS      6S        ;BR IF NOT
1850 003226 012746 033555      MOV      #PAR9, -(SP) ;ADDRESS OF PARAMETER NAME
1851 003232 000137 003256      JMP      BADPAR      ;REPORT PARAMETER ERROR
1852 003236 022737 000007 001320 6S:  CMP      #7,RATIO   ;SEE IF R/W RATIO TOO LARGE
1853 003244 103016          BHS      SETVEC     ;BR IF NOT
1854 003246 012746 033607      MOV      #PAR14, -(SP) ;ADDRESS OF PARAMETER NAME
1855 003252 000137 003256      JMP      BADPAR      ;REPORT PARAMETER ERROR
1856
1857          ;REPORT THE BAD PARAMETER
1858
1859 003256 012637 003270      BADPAR: MOV      (SP)+, 1S ;MOVE PARAMETER NAME
1860 003262 104401 033421          TYPE      ,NGPAR    ;'BAD PARAMETER'
1861 003266 104401          TYPE
1862 003270 000000          1S:      .WORD      0 ;PARAMETER NAME
1863 003272 104401 033451          TYPE      REPAR    ;'REENTER PARAMETERS
1864 003276 000137 002556          JMP      ENTPAR     ;GO THROUGH PARAMETER ENTRY ROUTINE AGAIN
1865
1866          ;DISPLAY DRIVE STATUS AND SET UP THE OTHER UNITS THE
1867          ;PROGRAM WILL USE
1868
1869 003302 005227 177777      SETVEC: INC      # -1 ;FIRST START ?
1870 003306 001404          BEQ      9S        ;BR IF IT IS
1871 003310 032777 000200 175622      BIT      #SW07, 2SWR ;SWITCH 6 SET ?
1872 003316 001064          BNE      8S        ;BR IF SET
1873 003320 005004          9S:      CLR      R4        ;DRIVE TABLE POINTER
1874 003322 012703 000010          MOV      #8., R3   ;ITERATION COUNTER
1875 003326 104401 001213          TYPE      , $CALF  ;CR-LF
1876 003332 104401 032625          TYPE      ,SYSTAT ;TYPE STATUS HEADING
1877 003336 010446          1S:      MOV      R4, -(SP) ;DRIVE NUMBER FOR TYPEOUT
1878 003340 104403          TYP0S    ;TYPE THE DRIVE NUMBER
1879 003342          001      000      .BYTE      1, 0
1880 003344 104401 032476          TYPE      ,SPACE4 ;SPACES
1881 003350 105764 021112          TSTB     DRVSTA(R4) ;SEE WHAT DRIVE'S STATUS IS
1882 003354 001405          BEQ      2S        ;BR IF OFFLINE OR NOT PRESENT
1883 003356 100413          BMI      3S        ;BR IF UNSAFE
1884 003360 012737 032535 003442          MOV      #UNTON, 6S ;MESSAGE ADDRESS
1885 003366 000412          BR       4S        ;DETERMINE DRIVE TYPE MESSAGE
1886 003370 012737 032524 003442 2S:  MOV      #UNTOFF, 6S ;OFFLINE MESSAGE ADDRESS

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1887 003376 012737 032501 003452      MOV      #SPACE1,7$      ; DUMMY MESSAGE
1888 003404 000415                      BR       5$             ; PRINT IT
1889 003406 012737 032515 003442 3$:   MOV      #NOTSAFE,6$    ; UNIT UNSAFE
1890 003414 012737 032503 003452 4$:   MOV      #RPO2,7$      ; ASSUME RPO2
1891 003422 136437 021304 021122      BITB     ATABIT(R4),DRVTYP ; SEE WHICH DRIVE TYPE
1892 003430 001403                      BEQ      5$             ; BR IF RPO2
1893 003432 012737 032510 003452      MOV      #RPO3,7$      ; 'RPO3'
1894 003440 104401                      TYPE     ; TYPE THE IDENTIFYING MESSAGE
1895 003442 000000                      .WORD   0               ; MESSAGE ADDRESS HERE
1896 003444 104401 032476                      TYPE     ,SPACE4        ; SPACES
1897 003450 104401                      TYPE     ; TYPE THE DRIVE TYPE MESSAGE
1898 003452 000000 7$:   .WORD   0               ; DRIVE TYPE MESSAGE GOES HERE
1899 003454 104401                      TYPE     ,CRLF          ; CR-LF
1900 003460 005303                      DEC      R3             ; DECREMENT THE ITERATION COUNTER
1901 003462 001402                      BEQ      8$             ; BR IF END
1902 003464 005204                      INC      R4             ; INCREMENT TABLE POINTER
1903 003466 000723                      BR       1$             ; CONTINUE
1904 003470 104401 033212 8$:   TYPE     ,INTDON        ; TYPE 'INITIALIZE COMPLETE'
1905 003474 004737 006762                      JSR     PC,CXCLK        ; START CLOCK IF ONE ON SYSTEM
1906 003500 012737 000200 177776      MOV      #PR4,PSW      ; SET PRIORITY TO KEYBOARD LEVEL
1907 003506 004737 016756                      JSR     PC,$TKINT       ; INITIALIZE THE KEYBOARD INTERRUPT HANDLER
1908 003512 012737 006640 001242      MOV      #DORTI,CNTRLC ; ADDRESS IF 'CONTROL C'
1909 003520 012737 010146 000060      MOV      #KSR,TKVEC    ; CHANGE KEYBOARD VECTOR ADDRESS
1910 003526 005037 177776                      CLR     PSW             ; LOWER PRIORITY
1911
1912 ;SET UP IF 'XXDP' OR 'ACT11' OPERATION
1913
1914 003532 005737 000042      MONTR:  TST      42             ; 'XXDP' CHAIN MODE OR 'ACT11' AUTO ACCEPT
1915 003536 001417                      BEQ     2$             ; BR IF NEITHER
1916 003540 012703 000010      MOV      #8.,R3        ; DRIVE COUNTER
1917 003544 005004                      CLR     R4             ; DRIVE POINTER
1918 003546 105737 000041      TSTB    41             ; SEE WHICH - 'XXDP' OR 'ACT11' ?
1919 003552 001407                      BEQ     1$             ; BR IF 'ACT11' CONTROL
1920 003554 122737 000007 000041      CMPB    #7,41          ; IS RPO2 OR RPO3 THE LOADING DEVICE ?
1921 003562 001003                      BNE     1$             ; BR IF NOT
1922 003564 005204                      INC     R4             ; SETUP TO BYPASS DRIVE 0
1923 003566 012703 000007      MOV      #7,R3         ; DRIVES TO TRY TO ASSIGN
1924 003572 004737 010502 1$:   JSR     PC,ASGN2       ; ASSIGN ALL AVAILABLE DRIVES (EXCEPT DRIVE
1925 ; 0 IF LOADED FROM AN RPO2 OR RPO3)
1926 003576 000137 004046 2$:   JMP     MAIN;          ; START THE PROGRAM
1927
1928 ;'XXDP' OR 'ACT11' END OF TEST ROUTINE
1929
1930 003602 013700 000042      $GET42: MOV      42,R0         ; MONITOR ADDRESS
1931 003606 001002                      BNE     1$             ; BR IF MONITOR ADDRESS
1932 003610 000137 004046                      JMP     MAIN;          ; NONE, CONTINUE
1933 003614 022700 003634 1$:   CMP     #SENDAD,R0     ; IS MONITOR 'ACT11'
1934 003620 001005                      BNE     SENDAD         ; NO, BRANCH
1935 003622 022760 177777 000002      CMP     #-1,2(R0)      ; YES, IF THIS LAST PASS
1936 003630 001005                      BNE     SDOAGN         ; NO, MAKE ANOTHER PASS
1937 003632 000005                      RESET                    ; CLEAR EVERYTHING
1938 003634 004710      SENDAD: JSR     PC,(R0)   ; GO TO THE MONITOR
1939 003636 000240                      NOP                    ; SAVE ROOM
1940 003640 000240                      NOP                    ; FOR
1941 003642 000240                      NOP                    ; ACT11
1942 003644 000137 002016      SDOAGN: JMP     START   ; START AGAIN

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1943
1944
1945
1946
1947
1948
1949
1950 003650 005737 001250 MAIN: TST STATIN ;TYPE ERROR RATE STATISTICS ?
1951 003654 001410 BEQ MAIN0 ;BR IF NOT
1952 003656 032777 000100 175254 BIT #SW06,JSWR ;CHECK SWITCH 6
1953 003664 001004 BNE MAIN0 ;BR IF SET
1954 003666 005037 001250 CLR STATIN ;CLEAR THE INDICATOR
1955 003672 004737 007126 JSR PC,STATPR ;TYPE THE STATISTICS
1956
1957 ;LOOK FOR DRIVES TO BE DEASSIGNED
1958
1959 003676 012703 000010 MAIN0: MOV #8,R3 ;UNIT COUNTER
1960 003702 012705 025504 MOV #UNIT,R5 ;ADDRESS OF 'DROP UNIT' TABLE
1961 003706 005715 1$: TST (R5) ;SEE IF ENTRY AT PRESENT POSITION
1962 003710 001011 BNE 3$ ;BR IF THERE IS ONE
1963 003712 062705 000002 2$: ADD #2,R5 ;INCREMENT TO NEXT TABLE POSITION
1964 003716 005303 DEC R3 ;DECREMENT UNIT COUNTER
1965 003720 001372 BNE 1$ ;BR IF MORE TO CHECK
1966 003722 005737 025460 TST ASMLST ;ANY DRIVES STILL RUNNING ?
1967 003726 001047 BNE MAIN1 ;BR IF ANY ARE - CHECK ASSIGN QUEUE
1968 003730 000137 003602 JMP $GET42 ;CHECK FOR MONITOR RETURN
1969 003734 012701 025550 3$: MOV #AVAIL,R1 ;ADDRESS OF 'AVAILABLE' UNITS TABLE
1970 003740 005711 4$: TST (R1) ;SEE IF AT END OF TABLE
1971 003742 001405 BEQ 5$ ;BR IF AT END: GO CHECK 'WAIT' TABLE
1972 003744 021115 CMP (R1),(R5) ;IS UNIT IN 'AVAIL' THE ONE TO BE DROPPED
1973 003746 001414 BEQ 7$ ;BR IF YES
1974 003750 062701 000002 ADD #2,R1 ;INCREMENT 'AVAIL' TABLE ADDRESS
1975 003754 000771 BR 4$ ;CONTINUE LOOKING
1976 003756 012701 025572 5$: MOV #WAIT,R1 ;MOVE THE ADDRESS OF THE BUFFER WAIT TABLE
1977 003762 005711 6$: TST (R1) ;AT THE END OF THE 'WAIT' TABLE ?
1978 003764 001752 BEQ 2$ ;BR IF YES: SEE IF ANY MORE 'DROP' REQUESTS
1979 003766 021115 CMP (R1),(R5) ;UNIT IN THE 'WAIT' TABLE ?
1980 J 003770 001403 BEQ 7$ ;BR IF IT IS
1981 003772 062701 000002 ADD #2,R1 ;INCREMENT 'WAIT' TABLE ADDRESS
1982 003776 000771 BR 6$ ;CONTINUE LOOK THROUGH THE 'WAIT' TABLE
1983 004000 011100 7$: MOV (R1),R0 ;PUT THE UNIT'S BLOCK ADDRESS IN R0
1984 004002 104401 001213 TYPE $CR LF ;CR-LF
1985 004006 004737 007634 JSR PC,$TIME ;TYPE THE TIME
1986 004012 104401 032515 TYPE UNMSG ;'DRIVE'
1987 004016 111046 MOV# (R0),-(SP) ;DRIVE NUMBER
1988 004020 104403 TYPOS ;TYPE IT
1989 004022 001 000 BYTE 1,0
1990 004024 104401 033067 TYPE DEASSG ;'DEASSIGNED'
1991 004030 004737 007240 JSR PC,TYPEST ;TYPE THE DRIVE'S PERFORMANCE SUMMARY
1992 004034 005015 CLR (R5) ;CLEAR THE 'DROP UNIT' TABLE ENTRY
1993 004036 005011 CLR (R1) ;REMOVE THE UNIT FROM THE 'AVAIL' OR 'WAIT' TABLE
1994 004040 004737 006650 JSR PC,CMPRES ;COMPRESS THE RESPECTIVE TABLE
1995 004044 000722 BR 2$ ;SEE IF ANY MORE UNITS
1996
1997 ;LOOK FOR DRIVES TO BE ASSIGNED
1998

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1999 004046 012703 000010 MAIN1: MOV #8,R3 ;UNIT COUNT
2000 004052 005002 CLR R2 ;'AVAIL' INDEX
2001 004054 005004 CLR R4 ;ASSIGN LIST INDEX
2002 004056 005005 CLR R5 ;NEW UNIT INDEX
2003 004060 005765 025526 15: TST NEWUNT(R5) ;NEW UNIT IN THIS POSITION
2004 004064 001006 BNE 35 ;BR IF THERE IS
2005 004066 062705 000002 25: ADD #2,R5 ;INCREMENT R5
2006 004072 005204 INC R4 ;INCREMENT ASSIGN INDEX
2007 004074 005303 DEC R3 ;DECREMENT UNIT COUNT
2008 004076 001370 BNE 15 ;BR IF MORE UNITS
2009 004100 000472 BR MAIN2 ;START OPERATIONS FOR THE AVAILABLE UNITS
2010 004102 104401 001213 35: TYPE $CRLF ;CR-LF
2011 004106 004737 007634 JSR PC,$TIME ;TYPE THE TIME
2012 004112 104401 032515 TYPE UNTMSG ;'DRIVE'
2013 004116 010446 MOV R4,-(SP) ;DRIVE NUMBER
2014 004120 104403 TYPOS ;TYPE IT
2015 004122 001 000 .BYTE 1,0
2016 004124 104401 033131 TYPE $ASCND ;'ASSIGNED'
2017 004130 005762 025550 45: TST AVAIL(R2) ;AT END OF AVAILABLE TABLE
2018 004134 001403 BEQ 55 ;BR IF YES
2019 004136 062702 000002 ADD #2,R2 ;INCREMENT AVAILABLE TABLE INDEX
2020 004142 000772 BR 45 ;CONTINUE LOOKING FOR END OF TABLE
2021 004144 015562 025526 025550 55: MOV NEWUNT(R5),AVAIL(R2) ;MOVE ADDR OF UNIL INTO AVAIL LST
2022 004152 005065 025526 CLR NEWUNT(R5) ;TAKE UNIT OUT OF NEW UNIT TABLE
2023 004156 156437 021304 025460 BISB ATABIT(R4),ASMLST ;SET UNIT ASSIGNED INDICATOR
2024 004164 016200 025550 MOV AVAIL(R2),R0 ;PUT STARTING ADDRESS OF BLOCK IN R0
2025 004170 113760 001336 000012 MOVBS FS,$SEC(R0) ;INITIAL SECTOR VALUE
2026 004176 113760 001332 000013 MOVBS FT,$TRK(R0) ;INITIAL TRACK VALUE
2027 004204 013760 001326 000010 MOV FC,$CYL(R0) ;INITIAL CYLINDER VALUE
2028 004212 113760 001342 000002 MOVBS BEGCOO,$COMND(R0) ;INITIAL COMMAND CODE
2029 004220 113760 001340 000026 MOVBS BEGPAT,$PATT(CR0) ;PATTERN CODE
2030 004226 106360 000026 ASLB $PATT(CR0) ;CONVERT CODE TO A TABLE INDEX
2031 004232 013760 001344 000020 MOV BEGSIZ,$WRDL(R0) ;BEGINNING RECORD SIZE
2032 004240 013760 001344 000004 MOV BEGSIZ,$WRDM(R0) ;VALUE FOR DATA TRANSFER
2033 004246 005460 000004 NEG $WRDM(R0) ;MAKE IT INTO 2'S COMPLEMENT
2034 004252 013760 001254 000064 MOV FAIRNS,$FAIR(R0) ;LOAD FAIRNESS COUNT
2035 004260 062702 000002 ADD #2,R2 ;INCREMENT 'AVAILABLE' TABLE POINTER
2036 004264 000700 BR 25 ;LOOK FOR MORE UNITS
2037
2038 ;GET PARAMETERS, BUFFER SPACE, AND START OPDRS FOR DRIVES IN
2039 ; THE 'AVAILABLE' QUEUE
2040
2041 004266 005737 025572 MAIN2: TST WAIT ;OUTSTANDING BUFFER REQUESTS
2042 004272 001065 BNE MAIN3 ;BR IF THERE ARE
2043 004274 005002 CLR R2 ;CLEAR 'AVAIL' TABLE POINTER
2044 004276 005762 025550 15: TST AVAIL(R2) ;ANY UNITS WAITING FOR PARAMETERS
2045 004302 001513 BEQ IDLE ;BRANCH IF NONE
2046 004304 016200 025550 MOV AVAIL(R2),R0 ;CONTROL BLOCK ADDR IN R0
2047 004310 026037 000064 001254 CMP $FAIR(R0),FAIRNS ;HAS ENTRY BEEN IN THE QUEUE ?
2048 004316 001010 BNE 35 ;BR IF IT HAS
2049 004320 105760 000022 TSTB $PACK(R0) ;'R' OR 'W' COMMAND FOR THE DRIVE ?
2050 004324 001403 BEQ 25 ;BR IF NOT
2051 004326 004737 006332 JSR PC,$WTPK ;GET DATA PACK PARAMETERS
2052 004332 000402 BR 35 ;GET THE BUFFER
2053 004334 004737 005512 25: JSR PC,$GETPAR ;LOAD NEW PARAMETERS
2054 004340 005046 35: CLR -(SP) ;MAKE ROOM ON THE STACK FOR THE BUFFER ADDR

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2055	004342	004737	004720		JSR	PC,GETBUF	;	GET BUFFER
2056	004346	012660	000006		MOV	(SP)+,\$BUF(RO)	;	MOVE BUFFER ADDR TO DPB
2057	004352	001414			BEQ	5\$	;	BR IF '0' ADDR (NO BUFFER)
2058	004354	004737	005304		JSR	PC,FILBUF	;	FILL THE BUFFER
2059	004360	005060	000064		CLR	\$FAIR(RO)	;	CLEAR THE 'FAIRNESS' COUNT
2060	004364	004737	005434		JSR	PC,GODRIV	;	PUT CURRENT DPB IN DRIVER
2061	004370	012705	025462		MOV	#ORDERQ,R5	;	ADDRESS OF ORDER QUEUE IN R5
2062	004374	005725			TST	(R5)+	;	END OF QUEUE ?
2063	004376	001376			BNE	.-2	;	BR IF NOT
2064	004400	010045			MOV	RO,-(R5)	;	PUT BLOCK ADDRESS INTO QUEUE
2065	004402	000413			BR	8\$	;	COMPRESS THE 'AVAIL' LIST
2066	004404	005360	000064	5\$:	DEC	\$FAIR(RO)	;	DECREMENT THE 'FAIRNESS' COUNT
2067	004410	001402			BEQ	6\$	;	ENTRY WAITING FOR BUFFER PAST LIMIT
2068	004412	005722			TST	(R2)+	;	INCREMENT THE 'AVAILABLE TABLE' POINTER
2069	004414	000730			BR	1\$	;	CONTINUE LOOKING
2070	004416	012705	025572	6\$:	MOV	#WAIT,R5	;	TABLE ADDRESS
2071	004422	005725			TST	(R5)+	;	AT END OF TABLE ?
2072	004424	001376			BNE	.-2	;	BR IF NOT
2073	004426	016245	025550	7\$:	MOV	AVAIL(R2),-(R5)	;	MOVE ENTRY FROM AVAILABLE TO WAIT
2074	004432	012701	025550	8\$:	MOV	#AVAIL,R1	;	TABLE TO COMPRESS
2075	004436	060201			ADD	R2,R1	;	FORM TABLE POSITION
2076	004440	004737	006650		JSR	PC,COMPRES	;	COMPRESS THE INDICATED TABLE
2077	004444	000714			BR	1\$	;	CONTINUE PROCESSING
2078								
2079								
2080								
2081	004446	013700	025572	MAIN3:	MOV	WAIT,RO	;	MOVE THE 'WAIT' ENTRY TO RO
2082	004452	005046			CLR	-(SP)	;	MAKE ROOM ON THE STACK FOR THE BUFFER ADDR
2083	004454	004737	004720		JSR	PC,GETBUF	;	TRY TO GET A BUFFER
2084	004460	012660	000006		MOV	(SP)+,\$BUF(RO)	;	MOVE THE BUFFER ADDR TO THE DPB
2085	004464	001002			BNE	1\$	;	BR IF A BUFFER WAS ASSIGNED
2086	004466	000137	004532		JMP	IDLE	;	NO BUFFER AVAILABLE YET
2087	004472	004737	005304	1\$:	JSR	PC,FILBUF	;	FILL THE BUFFER
2088	004476	004737	005434		JSR	PC,GODRIV	;	PUT THE ENTRY IN THE DRIVER
2089	004502	005060	000064		CLR	\$FAIR(RO)	;	CLEAR THE 'FAIRNESS' COUNT
2090	004506	012705	025462		MOV	#ORDERQ,R5	;	ADDRESS OF ORDER QUEUE IN R5
2091	004512	005725			TST	(R5)+	;	AT END OF THE QUEUE
2092	004514	001376			BNE	.-2	;	BR IF NOT
2093	004516	010045			MOV	RO,-(R5)	;	PUT BLOCK ADDRESS IN QUEUE
2094	004520	012701	025572		MOV	#WAIT,R1	;	TABLE ADDRESS
2095	004524	004737	006650		JSR	PC,COMPRES	;	COMPRESS THE WAIT TABLE
2096	004530	000656			BR	MAIN2	;	LOOK FOR MORE ENTRIES
2097								
2098								
2099								
2100	004532	012701	025462	IDLE:	MOV	#ORDERQ,R1	;	ADDRESS OF THE ORDER QUEUE IN R1
2101	004536	012100		1\$:	MOV	(R1)+,RO	;	PUT BLOCK ADDRESS INTO RO
2102	004540	001430			BEQ	3\$	;	BR IF END OF QUEUE
2103	004542	005760	000016		TST	\$STATUS(RO)	;	SEE IF UNIT FINISHED
2104	004546	001773			BEQ	1\$	;	BR IF UNIT NOT FINISHED
2105	004550	162701	000002		SUB	#2,R1	;	CORRECT THE QUEUE POINTER
2106	004554	010146			MOV	R1,-(SP)	;	SAVE THE QUEUE ADDRESS
2107	004556	004737	004626		JSR	PC,STATIS	;	ACCUMULATE STATISTICS FOR UNIT IN RO
2108	004562	004737	012374		JSR	PC,PROCES	;	PROCESS END OF ORDER
2109	004566	004737	005056		JSR	PC,RELAUF	;	RESTORE THE BUFFER
2110	004572	004737	011306		JSR	PC,ABNAML	;	SEE IF ANY UNITS HAVE TOO MANY ERRORS

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2111 004576 004737 011334 JSR PC,NRML ;SEE IF ANY UNIT HAS XFERED 3X10^9 BITS
2112 004602 012601 MOV (SP)+,R1 ;RESTORE THE ORDER TABLE INDEX
2113 004604 012705 025550 MOV #AVAIL,R5 ;FIND THE END OF THE 'AVAILABLE' TABLE
2114 004610 005725 2$: TST (R5)+ ;END OF THE TABLE ?
2115 004612 001376 BNE 2$ ;BR IF NOT AT END OF LIST
2116 004614 011145 MOV (R1), -(R5) ;MOV THE BLOCK ADDRESS INTO THE TABLE
2117 004616 004737 006650 JSR PC,CMPRES ;COMPRESS THE ORDER QUEUE
2118 004622 000137 003650 3$: JMP MAIN ;CONTINUE THE LOOP
2119
2120 ;ROUTINE TO UPDATE THE GENERAL STATISTICS FOR THE DRIVE IN RD
2121
2122 004626 016037 000076 004716 STATIS: MOV $RPBA(RD),FACTOR ;STORE THE FINAL BUFFER ADDRESS
2123 004634 166037 000006 004716 SUB $BUF(RD),FACTOR ;SUBTRACT THE INITIAL ADDRESS
2124 004642 001413 BEQ 1$ ;BR IF NO DATA TRANSFER
2125 004644 006237 004716 ASR FACTOR ;CONVERT TO A WORD COUNT
2126 004650 132760 000004 000002 BITB #BIT02,$COMND(RD) ;READ OR WRITE ORDER ?
2127 004656 001405 BEQ 1$ ;BR IF WRITE
2128 004660 063760 004716 000044 ADD FACTOR,$READ(RD) ;UPDATE THE READ WORD COUNT
2129 004666 005560 000046 ADC $READ+2(RD)
2130 004672 026060 000010 000106 1$: CMP $CYL(RD),$SUCA(RD) ;DID MID-TRANSFER SEEK OCCUR
2131 004700 001405 BEQ 2$ ;BR IF NOT
2132 004702 062760 000001 000040 ADD #1,$POSIT(RD) ;INCREMENT SEEK COUNT
2133 004710 005560 000042 ADC $POSIT+2(RD) ;ADD CARRY TO UPPER WORD
2134 004714 000207 2$: RTS PC
2135
2136 004716 000000 FACTOR: .WORD 0 ;USED FOR WORDS TRANSFERED
2137
2138 ;*****
2139
2140 .SBTTL BUFFER SUPPORT ROUTINES
2141
2142 ;*****
2143
2144 ;ROUTINE TO GET A BUFFER
2145
2146 004720 010146 GETBUF: MOV R1,-(SP) ;SAVE R1
2147 004722 010246 MOV R2,-(SP) ;SAVE R2
2148 004724 010346 MOV R3,-(SP) ;SAVE R3
2149 004726 013702 025614 MOV BUFTBL,R2 ;NUMBER OF SEPARATE BUFFERS
2150 004732 001413 BEQ 5$ ;BR IF NONE AVAILABLE
2151 004734 012701 025616 MOV #BUFTBL+2,R1 ;FIRST ADDRESS OF ALLOCATION TABLE
2152 004740 026061 000020 000002 1$: CMP $WRDL(RD),2(R1) ;SEE IF THERE IS A BLOCK LARGE ENOUGH
2153 004746 101411 BLOS 3$ ;BRANCH IF IT IS
2154 004750 005302 DEC R2 ;DECREMENT TABLE COUNT
2155 004752 001403 BEQ 5$ ;BR IF THROUGH TABLE
2156 004754 062701 000004 ADD #4,R1 ;INCREMENT TABLE POINTER
2157 004760 000767 BR 1$ ;CONTINUE LOOKING
2158 004762 012603 5$: MOV (SP)+,R3 ;RESTORE R3
2159 004764 012602 MOV (SP)+,R2 ;RESTORE R2
2160 004766 012601 MOV (SP)+,R1 ;RESTORE R1
2161 004770 000207 RTS PC ;RETURN
2162 004772 011166 000010 3$: MOV (R1),10(SP) ;BUFFER ADDRESS TO STACK
2163 004776 166061 000020 000002 SUB $WRDL(RD),2(R1) ;ADJUST BUFFER SIZE
2164 005004 001407 BEQ 4$ ;BR IF DIFFERENCE IS ZERO
2165 005006 006360 000020 ASL $WRDL(RD) ;CONVERT # WORDS TO BYTES
2166 005012 066011 000020 ADD $WRDL(RD),(R1) ;MAKE NEW STARTING ADDRESS

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2167 005016 006260 000020      ASR   $WRDL(R0)      ;RETURN # BYTES TO WORDS
2168 005022 000757              BR     $$           ;RETURN
2169 005024 005337 025614      4$:  DEC   BUFTBL      ;DECREMENT ENTRIES COUNT
2170 005030 001754              BEQ   $$           ;BR IF ALLOCATION TABLE EMPTY
2171 005032 005302              DEC   R2           ;DECREMENT TABLE COUNT
2172 005034 001752              BEQ   $$           ;BR IF ITEM WERE LAST ENTRY
2173 005036 010103              MOV   R1,R3       ;MOVE TABLE POINTER
2174 005040 062703 000004      ADD   #4,R3       ;POINT TO NEXT ENTRY
2175 005044 012321 6$:  MOV   (R3)+,(R1)+  ;MOVE ITEMS
2176 005046 012321              MOV   (R3)+,(R1)+
2177 005050 005302              DEC   R2           ;DECREMENT TABLE COUNT
2178 005052 001374              BNE   $$           ;CONTINUE IF NOT AT EN OF TABLE
2179 005054 000742              BR     $$           ;RETURN
2180
2181
2182      ;ROUTINE TO PUT BUFFER BACK IN TABLE
2183
2184 005056 104412      RELBUF: SAVREG      ;SAVE R0-R5
2185 005060 012701 025616      MOV   #BUFTBL+2,R1 ;BEGINNING OF TABLE
2186 005064 013702 025614      MOV   BUFTBL,R2    ;ENTRY COUNT
2187 005070 001424              BEQ   $$           ;BR IF EMPTY TABLE
2188 005072 016003 000020      MOV   $WRDL(R0),R3 ;TRIAL ADDRESS
2189 005076 006303              ASL   R3           ;CHANGE TO BYTE COUNT
2190 005106 066003 000006      ADD   $BUF(R0),R3  ;ADDRESS OF HIGHER ADJACENT BLOCK
2191 005104 021103 1$:  CMP   (R1),R3      ;UPPER ADJACENT BLOCK
2192 005106 001432              BEQ   4$          ;BR IF YES
2193 005110 062701 000004      ADD   #4,R1        ;INCREMENT POINTER
2194 005114 005302              DEC   R2           ;DECREMENT ENTRY COUNT
2195 005116 001372              BNE   1$          ;CONTINUE SEARCHING
2196 005120 016011 000006      MOV   $BUF(R0),(R1) ;PUT THE BUFFER BLOCK INTO THE TABLE
2197 005124 016061 000020 000002      MOV   $WRDL(R0),2(R1) ;BLOCK SIZE
2198 005132 005237 025614      INC   BUFTBL       ;INCREMENT ENTRY COUNT
2199 005136 005202              INC   R2           ;INCREMENT R2 FOR USE LATER
2200 005140 000422              BR     $$           ;SEE IF A LOWER ADJACENT BLOCK IS IN THE TABLE
2201 005142 016021 000006 2$:  MOV   $BUF(R0),(R1)+ ;BLOCK ADDRESS TO TABLE
2202 005146 016021 000020      MOV   $WRDL(R0),(R1)+ ;SIZE TO TABLE
2203 005152 005237 025614      INC   BUFTBL       ;INCREMENT ENTRY COUNT
2204 005156 022737 000002 025614 3$:  CMP   #2,BUFTBL    ;SEE HOW MANY BLOCKS ARE IN TABLE
2205 005164 103001              BHIS  .+4          ;BR IF NOT MORE THAN 2
2206 005166 000240              NOP

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2207 005170 104413          R4,REG          ;RESTORE R0-R5
2208 005172 000207          RTS             ;RETURN
2209 005174 016011 000006 4S:  MOV          $BUF(R0), (R1) ;RELEASED BUFFER IS LOWER ADJACENT
2210 005200 066061 000020 000002  ADD          $WORD(R0), 2(R1) ;INCREMENTED SIZE
2211 005206 010246          5S:  MOV          R2, -(SP) ;SAVE R2
2212 005210 013702 025614  MOV          BUFTBL, R2 ;ENTRY COUNT
2213 005214 012705 025616  MOV          #BUFTBL+2, R5 ;BEGINNING OF TABLE
2214 005220 016504          6S:  MOV          2(R5), R4 ;BLOCK SIZE (IN WORDS)
2215 005224 006304          ASL          R4 ;CHANGE TO BYTE COUNT
2216 005226 061504          ADD          (R5), R4 ;ADD BLOCK BEGINNING ADDRESS
2217 005230 020411          CMP          R4, (R1) ;R1 STILL POINTS TO INSERTED ENTRY
2218 005232 001406          BEQ          B5 ;LOWER ADJACENT IN TABLE
2219 005234 062705 000004  ADD          #4, R5 ;INCREMENT POINTER
2220 005240 005302          DEC          R2 ;DECREMENT ENTRY COUNT
2221 005242 001346          BNE          B5 ;CONTINUE LOOKING
2222 005244 005726          TST          (SP)+ ;RESTORE STACK POINTER
2223 005246 000743          BR          B5 ;END
2224 005250 012602          8S:  MOV          (SP)+, R2 ;RESTORE R2
2225 005252 066165 000002 000002  ADD          2(R1), 2(R5) ;INCREMENT LOWER BLOCK LENGTH
2226 005260 005337 025614  DEC          BUFTBL ;DECREMENT ENTRY COUNT
2227 005264 010105          MOV          R1, R5 ;GET READY TO COMPRESS
2228 005266 062705 000004  ADD          #4, R5 ;INCREMENT TO NEXT ENTRY
2229 005272 012521          9S:  MOV          (R5)+, (R1)+ ;COMPRESS TABLE
2230 005274 012521          MOV          (R5)+, (R1)+ ;MOVE SIZE FIELD DOWN
2231 005276 005302          DEC          R2 ;DECREMENT ENTRY COUNT
2232 005300 001374          BNE          B9 ;BR IF NOT FINISHED
2233 005302 000725          BR          B9 ;FINISHED
2234
2235
2236 ;FILL THE ASSIGNED BUFFER (IF WRITE OR WRITE,CHECK ORDER)
2237
2238 005304 104412          FILBUF: SAVREG ;SAVE R0-R5
2239 005306 132760 000004 000002  BITB          #BIT02, $COMND(R0) ;READ OR WRITE ORDER ?
2240 005314 001404          BEQ          B8 ;BR IF WRITE
2241 005316 122760 000007 000002  CMPB         #WRTCHK, $COMND(R0) ;WRITE CHECK ?
2242 005324 001041          BNE          B8 ;BR IF NOT
2243 005326 026027 000006 033644 1S:  CMP          $BUF(R0), #ENDPGM ;MAKE SURE BUFFER IS ABOVE PROGRAM
2244 005334 103002          BHIS         .+6 ;BR IF IT IS
2245 005336 000000          HALT ;BUFFER ADDRESS WITHIN PROGRAM, ILLEGAL
2246 005340 000776          BR          .-2 ;INTERLOCK THE HALT
2247 005342 023760 001306 000020  CMP          BUFRSZ, $WORD(R0) ;SEE IF WORD LENGTH DOESN'T EXCEED MAXIMUM
2248 005350 103002          BHIS         .+6 ;BR IF IT DOESN'T
2249 005352 000000          HALT ;WORD LENGTH FOR OPERATION GREATER THAN AVAIL MEM
2250 005354 000776          BR          .-2 ;INTERLOCK THE HALT
2251 005356 016001 000006  MOV          $BUF(R0), R1 ;BUFFER ADDRESS
2252 005362 016002 000020  MOV          $WORD(R0), R2 ;POSITIVE WORD COUNT
2253 005366 005004          CLR          R4 ;CLEAR R4
2254 005370 116004 000026  MOVB         $PATT(R0), R4 ;RELATIVE PATTERN ADDRESS
2255 005374 016405 025764  MOV          $NDAT(R4), R5 ;PATTERN ADDRESS
2256 005400 012703 000020  MOV          #16, R3 ;PATTERN COUNT
2257 005404 012521          2S:  MOV          (R5)+, (R1)+ ;MOVE THE PATTERN INTO THE BUFFER
2258 005406 005302          DEC          R2 ;DECREMENT THE WORD COUNT
2259 005410 001407          BEQ          B8 ;BR IF DONE (WORD COUNT = 0)
2260 005412 005303          DEC          R3 ;DECREMENT THE PATTERN COUNT
2261 005414 001373          BNE          B2 ;BR IF MORE PATTERN
2262 005416 012703 000020  MOV          #16, R3 ;RESTORE PATTERN COUNT

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2263 005422 016405 025764          MOV     STNDAT(R4),RS      ;RESTORE THE ADDRESS
2264 005425 000766                BR      2$               ;CONTINUE DISTRIBUTING THE PATTERN
2265 005430 104413          3$:   RESREG              ;RESTORE RD-RS
2266 005432 000207          RTS     PC               ;RETURN

;START THE ORDER FOR THE DPB IN RD

2270 005434 010046          GODRIV: MOV    RD,-(SP)      ;SAVE RD
2271 005436 010037 005446          MOV    RD,1$           ;CURRENT DPB ADDRESS
2272 005442 004037 021566          JSR    RD,RP11         ;DRIVER ENTRANCE
2273 005446 000000          1$:   0                 ;DPB ADDR GOES HERE
2274 005450 000000          HALT                    ;DRIVER REJECTED REQUEST
2275 005452 012500          MOV    (SP)+,RD        ;RESTORE RD
2276 005454 062760 000001 000034          ADD    #1,$OPERC(R1)   ;INCREMENT THE OPERATION COUNT
2277 005462 005560 000036          ADC    $OPERC+2(R0)    ;ADD ANY CARRY
2278 005466 026060 000032 000010          CMP    $PREVA+2(R0),SCYL(R0) ;DID ORDER REQUIRE A CYLINDER CHANGE
2279 005474 001405          BEQ    2$              ;BR IF NOT
2280 005476 062760 000001 000040          ADD    #1,$POSIT(R0)  ;INCREMENT SEEK COUNT
2281 005504 005560 000042          ADC    $POSIT+2(R0)   ;ADD ANY CARRY
2282 005510 000207          2$:   RTS     PC

;*****
.SBTTL  GENERATE VARIABLES FOR THE NEXT OPERATION
;*****

;GENERATE VARIABLES FOR THE OPERATION

2300 005512 010546          GETPAR: MOV    RS,-(SP)  ;SAVE RS
2301 005514 004737 006616          JSR    PC,PREVST      ;SAVE CURRENT SECTOR & TRACK ADDRS
2302 005520 016060 000106 000032          MOV    $SUCA(R0), $PREVA+2(R0) ;SAVE CURRENT CYLINDER
2303 005524 032777 000040 173404          BIT    #SND5,$SMR    ;SWITCH $ SET ?
2304 005528 001414          BEQ    GTPAR1         ;BR IF NOT SET
2305 005532 122760 000007 000002          CMPB  $RTCHK,$COMND(R0) ;PRESENT ORDER A WRITE CHECK ?
2306 005536 001006          BNE    1$            ;BR IF NOT
2307 005540 005737 001322          TST   AUTOCK         ;AUTO WRITE CHECKS ?
2308 005544 001403          BEQ    1$            ;BR IF NOT
2309 005548 116060 000024 000002          MOVB  $PREVO(R0),$COMND(R0) ;RESTORE PREVIOUS OPERATION
2310 005552 000137 006216          1$:   JMP    PARXIT      ;EXIT
2311 005556 116060 000002 000024          GTPAR1: MOVB  $COMND(R0),$PREVO(R0) ;SAVE CURRENT OPERATION CODE
2312 005560 004737 020522          JSR    PC,$RND        ;CYCLE THE RANDOM NUMBER GENERATOR
2313 005564 032777 000001 173332          BIT    #D0,$SMR      ;SEE IF $40 SET
2314 005568 001017          BNE    2$            ;BR IF SET - READ ONLY
2315 005572 012705 000010          1$:   MOV    #10,RS      ;READ/WRITE SELECTION DIVISOR
2316 005576 004737 011600          JSR    PC,GETREM     ;GET SELECTION VALUE
2317 005580 020537 001320          CMP    RS,RATIO      ;DETERMINE IF READ OR WRITE
2318 005584 003010          BGT    2$            ;BR IF READ
2319 005588 004737 006230          JSR    PC,RANWRT    ;SELECT A WRITE ORDER
2320 005592 122760 000007 000002          CMPB  $RTCHK,$COMND(R0) ;WAS WRITE CHECK SELECTED ?
2321 005596 001013          BNE    GETSEC        ;NO, CONTINUE WITH THE SELECTION
2322 005600 000137 006216          JMP    PARXIT        ;BYPASS REST OF VARIABLE SELECTION
2323 005604 013705 020620          2$:   MOV    $HINLY,RS   ;SELECT READ OPERATION CODE
2324 005608 042705 177776          BIC   #1,RS          ;MASK OUT ALL BUT BIT 0
2325 005612 062705 000003          ADD   #3,RS          ;TABLE OFFSET FOR READ CODE
2326 005616 116560 025756 000002 3$:   MOVB  COMTBL(RS),$COMND(R0) ;ORDER SELECTION CODE TO CONTROL BLOCK

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2319
2320 ;GENERATE A RANDOM SECTOR ADDRESS BETWEEN VALUES 'FS' & 'LS'
2321
2322 005670 013705 001334 GETSEC: MOV LS,RS ;GET MAXIMUM SECTOR ADDRESS
2323 005674 163705 001336 SUB FS,RS ;SUBTRACT MINIMUM SECTOR ADDRESS
2324 005700 001403 BEQ 1$ ;BR IF MIN & MAX THE SAME
2325 005702 005205 INC RS ;INCREMENT DIFFERENCE TO USE AS DIVISOR
2326 005704 004737 011600 JSR PC,GETREM ;GET THE RANDOM AUGMENT
2327 005710 063705 001336 1$: ADD FS,RS ;CONVERT TO ADDRESS
2328 005714 110560 000012 MOVB RS,$SFC(RO) ;STORE SECTOR ADDRESS IN DPB
2329
2330 ;GENERATE A RANDOM TRACK ADDRESS BETWEEN VALUES 'FT' & 'LT'
2331
2332 005720 013705 001330 GETTRK: MOV LT,RS ;GET MAXIMUM TRACK ADDRESS
2333 005724 163705 001332 SUB FT,RS ;SUBTRACT MINIMUM TRACK ADDRESS
2334 005730 001403 BEQ 1$ ;BR IF MIN & MAX THE SAME
2335 005732 005205 INC RS ;INCREMENT DIFFERENCE TO USE AS DIVISOR
2336 005734 004737 011600 JSR PC,GETREM ;GET THE RANDOM TRACK AUGMENT
2337 005740 063705 001332 1$: ADD FT,RS ;CONVERT AUGMENT TO AN ADDRESS
2338 005744 110560 000013 MOVB RS,$TRK(RO) ;STORE TRACK ADDRESS IN DPB
2339
2340 ;GENERATE A RANDOM CYLINDER ADDRESS BETWEEN VALUES 'FC' & 'LC'
2341
2342 005750 013705 001324 GETCYL: MOV LC,RS ;GET MAXIMUM CYLINDER ADDRESS
2343 005754 163705 001326 SUB FC,RS ;SUBTRACT MINIMUM CYLINDER ADDRESS
2344 005760 001403 BEQ 1$ ;BR IF MIN & MAX THE SAME
2345 005762 005205 INC RS ;INCREMENT DIFFERENCE TO USE AS DIVISOR
2346 005764 004737 011600 JSR PC,GETREM ;GET THE RANDOM AUGMENT
2347 005770 063705 001326 1$: ADD FC,RS ;CONVERT AUGMENT TO AN ADDRESS
2348 005774 010560 000010 MOV RS,$CYL(RO) ;STORE CYLINDER ADDRESS IN DPB
2349
2350 ;GENERATE A RANDOM BUFFER LENGTH BETWEEN 4 & THE VALUE IN 'BUFRSZ'
2351
2352 006000 013705 001306 GETSIZ: MOV BUFRSZ,RS ;GET BUFFER SIZE
2353 006004 005205 INC RS ;INCREMENT THE MAXIMUM SIZE
2354 006006 004737 011600 JSR PC,GETREM ;DIVIDE BY MAX VALUE
2355 006012 005705 TST RS ;IS THE REMAINDER 0 ?
2356 006014 001413 BEQ 1$ ;ZERO, TRY AGAIN
2357 006016 010546 MOV RS,-(SP) ;NEW WORD LENGTH ON STACK FOR CHECK
2358 006020 005046 CLR -(SP) ;MAKE UPPER DIVIDEND ZERO
2359 006022 012746 000400 MOV #256,-(SP) ;SECTOR SIZE IS THE DIVISOR
2360 006026 004737 020206 JSR PC,SDIV ;DIVIDE BUFFER SIZE BY SECTOR SIZE
2361 006032 021627 000004 CMP (SP),#4 ;SEE IF REMAINDER LESS THAN 4
2362 006036 103005 BHS 2$ ;BR IF NOT
2363 006040 062706 000004 ADD #4,SP ;CORRECT THE STACK POINTER
2364 006044 004737 020522 1$: JSR PC,$RAND ;CYCLE THE RANDOM NUMBER GENERATOR
2365 006050 000753 BR GETSIZ ;TRY AGAIN
2366 006052 132760 000004 2$: BITB #4,$COMND(RO) ;READ OR WRITE ?
2367 006060 001002 BNE 3$ ;BR IF READ
2368 006062 042705 000001 BIC #1,RS ;MOVE THE SIZE EVEN
2369 006066 010550 000020 3$: MOV RS,$.RDL(RO) ;WORD LENGTH TO CONTROL BLOCK
2370 006072 122760 000013 000002 CMPB #WRITE,$COMND(RO) ;WRITE WITHOUT IMPLIED SEEK ?
2371 006100 001404 BEQ 4$ ;BR IF IT IS
2372 006102 122760 000017 000002 CMPB #READ,$COMND(RO) ;READ WITHOUT IMPLIED SEEK ?
2373 006110 001027 BNE 4$ ;BR IF NOT
2374 006112 005016 4$: CLR (SP) ;CLEAR THE STACK

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2375 006114 116016 000012          MOVB    $SEC(RO), (SP)      ; MOVE THE SECTOR ADDRESS
2376 006120 000616 000002          ADD     2(SP), (SP)        ; ADD THE NUMBER OF SECTORS IN THE BUFFER
2377 000024 0000716 000010          CMP     #8., (SP)         ; DO THEY EXCEED THE TRACK
2378 006130 103017          BHS     B$                ; BR IF NOT
2379 006132 132760 000010 000002          BITB   #10, $COMND(RO)    ; SEE IF AN 'IMPLIED SEEK' COMMAND
2380 006140 001413          BEQ     B$                ; BR IF NOT
2381 006142 132760 000004 000002          BITB   #4, $COMND(RO)    ; HEAD WITHOUT IMPLIED SEEK ?
2382 006150 001004          BNE     B$                ; BR IF READ
2383 006152 112760 000003 000002          MOVB   #WRTSEK, $COMND(RO) ; LOAD COMMAND
2384 006160 000403          BR     B$                ; CONTINUE
2385 006162 112760 000005 000002 5$: MOVB   #RDSEK, $COMND(RO) ; LOAD COMMAND
2386 006170 062706 000004 6$: ADD     #4, SP            ; CORRECT THE STACK POINTER
2387 006174 016060 000020 000004          MOV    $WPL(RO), $WRDM(RO) ; SETUP WORD COUNT
2388 006202 005460 000004          NEG    $WRDM(RO)         ; MAKE IT NEGATIVE

;GET THE PATTERN CODE & EXIT FROM PARAMETER SELECTION
2391
2392 006206 004737 006304          PATCOD: JSR    PC, GETPAT   ; GET PATTERN CODE
2393 006212 110560 000026          MOVB   R5, $PATC(RO)     ; MOVE PATTERN CODE TO CONTROL BLOCK
2394 006216 013760 001254 000064  PARXIT: MOV    FAIRNS, $FAIR(RO) ; LOAD 'FAIRNESS' COUNT
2395 006224 012605          MOV    (SP)+, R5        ; RESTORE R5
2396 006226 000207          RTS     PC              ; RETURN

;ROUTINE TO SELECT A WRITE (OR WRITE CHECK) OPERATION
2399
2400 006230 012705 000003  RANWRT: MOV    #3, R5      ; WRITE OPERATION SELECTION DIVISOR
2401 006234 004737 011600          JSR    PC, GETREM      ; GET SELECTION CODE
2402 006240 005737 001322          TST    AUTUCK          ; ARE WRITE CHECK ORDERS TO BE SELECTED
2403          ; RANDOMLY ?
2404          BEQ    1$          ; BR IF THEY ARE
2405 006246 042705 000002          BIC    #2, R5          ; SET CODE TO EXCLUDE WRITE CHECK ORDERS
2406 006252 000410          BR     2$             ; FINISH
2407 006254 020527 000002  1$:  CMP    R5, #2         ; WRITE CHECK SELECTED ?
2408 006260 001005          BNE    2$            ; BR IF NOT
2409 006262 132760 000004 000024          BITB   #BIT02, $PREVO(RO) ; WAS PREVIOUS ORDER A WRITE ?
2410 006270 001401          BEQ    2$            ; BR IF IT WAS
2411 006272 005005          CLR    R5            ; CHANGE WRITE CHECK CODE TO WRITE WITH
2412          ; IMPLIED SEEK
2413 006274 116560 025756 000002  2$:  MOVB   COMTBL(R5), $COMND(RO) ; CODE TO DRIVE BLOCK
2414 006302 000207          RTS     PC            ; RETURN

;ROUTINE TO SELECT A PATTERN
2416
2417
2418 006304 012705 000020  GETPAT: MOV    #16, R5   ; SELECT PATTERN
2419 006310 004737 011600          JSR    PC, GETREM      ; GET CODE
2420 006314 005705          TST    R5             ; WAS PATTERN ZERO SELECTED ?
2421 006316 001003          BNE    1$            ; BR IF NOT ZERO
2422 006320 004737 020522          JSR    PC, $RAND       ; CYCLE THE RANDOM NUMBER GENERATOR
2423 006324 000767          BR     GETPAT         ; TRY AGAIN
2424 006326 006305  1$:  ASL    R5             ; MAKE CODE INTO TABLE INDEX
2425 006330 000207          RTS     PC            ; RETURN

;ROUTINE TO SETUP PARAMETERS FOR A SEQUENTIAL READ OR WRITE OF THE DISK
2427
2428 006332 004737 020522  WRTPK: JSR    PC, $RAND   ; CYCLE THE RANDOM NUMBER GENERATOR
2429 006336 005760 000036          TST    $OPERC+2(RO)    ; SEE IF FIRST OPERATION
    
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006342 001007 BNE WRTPK1 ;BR IF UPPER WORD OF COUNTER NOT ZERO
006344 005760 000034 TST $OPERC(RO) ;LOWER WORD ZERO ?
006350 001004 BNE WRTPK1 ;BR IF NOT 1ST OPERATION
006352 105760 000022 TSTB $PACK(RO) ;SEE WHICH - 'R' OR 'W'
006356 100504 BMI WRTPK3 ;BR IF 'W'
006360 000477 BR WRTPK2 ;'R' OPERATION
006362 032777 000040 172550 WRTPK1: BIT $SW05,$SWR ;LOOP ON LAST ADDRESS ?
006370 001106 BNE WRTPK4 ;BR IF LOOP
006372 032750 000002 000070 BIT $EOP,$RPER(RO) ;DID LAST ORDER OVERFLOW ?
006400 001032 BNE IS ;BR IF IT DID
006402 116060 000002 000024 MOVB $COMND(RO), $PREV0(RO) ;SAVE CURRENT PARAMETERS
006410 004737 JC 616 JSR PC,PREVST ;SAVE CURRENT SECTOR & TRACK
006414 016060 000106 000032 MOV $SUCA(RO), $PREVA+2(RO) ;CURRENT CYLINDER
006422 016060 000102 000012 MOV $RPOA(RO), $SECA(RO) ;NEW SECTOR & TRACK ADDRESS
006430 042760 000360 000012 BIC $360,$SECA(RO) ;CLEAR THE 'SOT' BITS
006436 016060 000100 000010 MOV $RPOA(RO), $CYLA(RO) ;NEW CYLINDER ADDRESS
006444 025037 000010 001324 CMP $CYLA(RO), LC ;SEE IF END CYLINDER
006452 103427 BLO 2S ;BR IF NOT
006454 101004 BHI IS ;BR IF PAST END CYLINDER
006456 126037 000013 001330 CMPB $TRK(RO), LT ;END TRACK ?
006464 101422 BLOS 2S ;BR IF NOT EXCEEDED
006466 113760 001332 000013 IS: MOVB FT, $TRK(RO) ;RESET TRACK ADDRESS
006474 113760 001336 000012 MOVB FS, $SECA(RO) ;RESET SECTOR ADDRESS
006502 013760 001326 000010 MOV FC, $CYLA(RO) ;RESET CYLINDER ADDRESS
006510 004737 011410 JSR PC, NRM12 ;DROP THE UNIT (NORMAL TERMINATION)
006514 032777 000020 172416 BIT $SW04,$SWR ;IS SWITCH 4 SET ?
006522 001003 BNE 2S ;BR IF SET
006524 005726 TST (SP)+ ;INCREMENT THE STACK POINTER
006526 000137 003650 JMP MAIN ;RETURN DIRECTLY TO 'MAIN'
006528 013760 001306 000020 2S: MOV BUFRSZ, $WRDL(RO) ;BUFFER SIZE IS MAXIMUM
006530 013760 001306 000004 MOV BUFRSZ, $WRDM(RO) ;WORD COUNT
006532 005460 000104 NEG $WRDM(RO) ;CHANGE WORD COUNT TO 2'S COMPLEMENT
006534 105760 000022 TSTB $PACK(RO) ;READ OR WRITE ?
006536 100404 BMI WRTPK3 ;BR IF WRITE
006540 112760 000005 000002 WRTPK2: MOVB $ROSEK, $COMND(RO) ;OP CODE
006542 000407 BR WRTPK4 ;EXIT
006544 112760 000003 000002 WRTPK3: MOVB $WRTSEK, $COMND(RO) ;OP CODE
006546 004737 006304 JSR PC, GETPAT ;GET PATTERN CODE
006548 110560 000026 MOVB RS, $PATT(RO) ;PATTERN CODE
006550 013750 001254 000064 WRTPK4: MOV FAIRNS, $AIR(RO) ;LOAD 'FAIRNES' COUNT
006552 000207 RTS ;RETURN

;DECREMENT AND SAVE CURRENT SECTOR & TRACK ADDRESS
PREVST: SUB #4, SP ;MAKE ROOM ON THE STACK
JSR PC, READOR ;DECREMENT SECTOR-TRACK ADDRESS
MOVB (SP)+, $PREVA+1(RO) ;SAVE CURRENT TRACK
MOVB (SP)+, $PREVA(RO) ;SAVE CURRENT SECTOR
RTS PC ;RETURN

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;;\*\*\*\*\*

.SBTTL GENERAL SUPPORT SUBROUTINES

;;\*\*\*\*\*



# H05

NO-11-DZRP1-B, RPI1E MULTI-DRIVE EXERCISER PROGRAM  
DZRP1B.CMB GENERAL SUPPORT SUBROUTINES

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;ROUTINE TO DISPLAY STATISTICS FOR ALL DRIVES ASSIGNED
2543
2544
2545 007126 104412 STATPR: SAVREG ;SAVE R0-R5
2546 007130 005004 CLR R4 ;R4 CONTAINS THE UNIT POINTER
2547 007132 012703 000010 MOV #8, R3 ;R3 CONTAINS THE UNIT COUNTER
2548 007136 012700 024274 MOV #BLK0, R0 ;ADDR OF FIRST COUNTER
2549 007142 136437 021304 025460 18: BITB ATABIT(R4), ASMLST ;SEE IF DRIVE ASSIGNED
2550 007150 001006 BNE 28 ;BR IF IT IS
2551 007152 005204 INC R4 ;INCREMENT THE UNIT POINTER
2552 007154 062700 000112 ADD #SSILO+2, R0 ;INCREMENT THE BLOCK ADDRESS
2553 007160 005303 DEC R3 ;FINISHED?
2554 007162 001357 BNE 18 ;BR IF NOT
2555 007164 000423 BR 68 ;YES, EXIT
2556 007166 044737 007270 28: JSR PC, SHOTYP ;TYPE THE HEADING
2557 007172 136437 021304 025460 38: BITB ATABIT(R4), ASMLST ;IS THE UNIT ASSIGNED
2558 007200 001003 BNE 48 ;BR IF ASSIGNED
2559 007202 062700 000112 ADD #SSILO+2, R0 ;ADD TABLE SIZE TO ADDRESS
2560 007206 000407 BR 58
2561 007210 010002 48: MOV R0, R2 ;PUT BLOCK ADDRESS IN R2
2562 007212 062702 000034 ADD #SOPERC, R2 ;FIRST COUNTER TO DISPLAY
2563 007216 004737 007306 JSR PC, SDETAL ;TYPE THE STATISTICS
2564 007222 062700 000112 ADD #SSILO+2, R0 ;INCREMENT BLOCK ADDRESS
2565 007226 005204 58: INC R4 ;INCREMENT UNIT NUMBER
2566 007230 005303 DEC R3 ;DECREMENT UNIT COUNTER
2567 007232 001357 BNE 38 ;BR IF NOT FINISHED
2568 007234 104413 68: RESREG ;RESTORE R0-R5
2569 007236 000207 RTS PC

;ROUTINE TO TYPE STATISTICS FOR THE DRIVE IN R0
2570
2571
2572
2573 007240 104412 TYPEST: SAVREG ;SAVE R0-R5
2574 007242 004737 007270 JSR PC, SHOTYP ;TYPE THE HEADING
2575 007246 005004 CLR R4 ;CLEAR R4 FOR DRIVE NUMBER
2576 007250 111004 MOVB (R0), R4 ;DRIVE NUMBER
2577 007252 010002 MOV R0, R2 ;PUT BLOCK ADDRESS IN R2
2578 007254 062702 000034 ADD #SOPERC, R2 ;ADDRESS OF 'SOPERC' IN PRESENT CLOCK
2579 007260 004737 007306 JSR PC, SDETAL ;TYPE THE STATISTICS
2580 007264 104413 RESREG ;RESTORE R0-R5
2581 007266 000207 RTS PC ;RETURN

;TYPE THE HEADER FOR THE DRIVE PERFORMANCE SUMMARY TYPEOUT
2582
2583
2584
2585 007270 104401 SHOTYP: TYPE $CRLF ;CR-LF
2586 007274 004737 007634 JSR PC, $TIME ;TYPE THE TIME OF DAY
2587 007300 104401 032646 TYPE $ATHD ;HEADER
2588 007304 000207 RTS PC ;RETURN

;TYPE THE DRIVE PERFORMANCE DATA LINE
2589
2590
2591
2592 007306 010446 SDETAL: MOV R4, -(SP) ;DRIVE NUMBER
2593 007310 104403 TYPOS ;TYPE IT
2594 007312 001 000 .BYTE 1, 0
2595 007314 104401 032477 TYPE $SPACE3 ;SPACES
2596 007320 016046 000062 MOV $PASSC(R0), -(SP) ;PUT THE PASS COUNT ON THE STACK
2597 007324 004737 015574 JSR PC, $S2D ;CONVERT IT
2598 007330 004737 011642 JSR PC, $RPZRS ;TYPE IT

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2599 007334 104401 032500      TYPE      SPACE2      : SPACES
2600 007340 010246      MOV      R2,-(SP)      : PUT $OPERC ON THE STACK
2601 007342 004737 020624      JSR      PC,$D820      : CONVERT IT
2602 007346 004737 011622      JSR      PC,$APZRB      : TYPE $OPERC
2603 007352 104401 032500      TYPE      SPACE2      : SPACES
2604 007356 062702 000004      ADD      #4,R2         : INCREMENT R2
2605 007362 010246      MOV      R2,-(SP)      : PUT $POSIT ON THE STACK
2606 007364 004737 020624      JSR      PC,$D820      : CONVERT IT
2607 007370 004737 011622      JSR      PC,$APZRB      : TYPE $POSIT
2608 007374 104401 032500      TYPE      SPACE2      : SPACES
2609 007400 062702 000004      ADD      #4,R2         : INCREMENT R2
2610 007404 010246      MOV      R2,-(SP)      : PUT $READ ON THE STACK
2611 007406 004737 020624      JSR      PC,$D820      : CONVERT $READ
2612 007412 004737 011652      JSR      PC,$APZRO      : TYPE IT
2613 007416 104401 032501      TYPE      SPACE1      : 1 SPACE
2614 007422 062702 000004      ADD      #4,R2         : INCREMENT R2
2615 007426 010146      1S:     MOV      R1,-(SP)      : SAVE R1
2616 007430 012701 000004      MOV      #4,R1         : USE R1 AS A COUNTER
2617 007434 062702 000002      ADD      #2,R2         : INCREMENT R2 AGAIN
2618 007440 012246      2S:     MOV      (R2)+,-(SP)      : PUT '$SOFT', '$SHARD', '$SKI', OR '$MISPO'
2619                                     : ON THE STACK
2620 007442 004737 015574      JSR      PC,$D820      : CONVERT IT
2621 007446 004737 011632      JSR      PC,$APZR4      : TYPEOUT
2622 007452 104401 032501      TYPE      SPACE1      : 1 SPACE
2623 007456 005301      DEC      R1             : DONE ?
2624 007460 001367      BNE      2S             : BR IF NOT
2625 007462 012601      MOV      (SP)+,R1      : RESTORE R1
2626 007464 016046 000050      MOV      $TOTAL(R0),-(SP) : CALCULATE NUMBER OF OTHER ERRORS
2627 007470 166016 000052      SUB      $SOFT(R0),(SP) : SUBTRACT $SOFT FROM $TOTAL
2628 007474 166016 000054      SUB      $SHARD(R0),(SP) : SUBTRACT $SHARD FROM $TOTAL
2629 007500 166016 000056      SUB      $SKI(R0),(SP)  : SUBTRACT $SKI FROM $TOTAL
2630 007504 166016 000060      SUB      $MISPO(R0),(SP) : SUBTRACT $MISPO FROM $TOTAL
2631 007510 004737 015574      JSR      PC,$D820      : CONVERT 'OTHER' COUNT
2632 007514 004737 011632      JSR      PC,$APZR4      : TYPE IT
2633 007520 104401 001213      TYPE      $CALF
2634 007524 000207      RTS      PC
2635
2636      ;ROUTINE TO INCREMENT $SOFT
2637
2638      ;NOTE: $SOFT WILL NOT BE INCREMENTED BEYOND 9999 (10)
2639
2640 007526 026027 000052 023417 INCSOF: CMP      $SOFT(R0),#9999. : IS $SOFT ALREADY AT MAXIMUM ?
2641 007534 103002      BHS      1S             : BR IF IT IS
2642 007536 005260 000052      INC      $SOFT(R0)      : INCREMENT $SOFT
2643 007542 000207      1S:     RTS      PC       : RETURN
2644
2645      ;ROUTINE TO INCREMENT $SHARD
2646
2647      ;NOTE: $SHARD WILL NOT BE INCREMENTED BEYOND 9999 (10)
2648
2649 007544 026027 000054 023417 INCHRD: CMP      $SHARD(R0),#9999. : IS $SHARD ALREADY AT MAXIMUM ?
2650 007552 103002      BHS      1S             : BR IF IT IS
2651 007554 005260 000054      INC      $SHARD(R0)     : INCREMENT $SHARD
2652 007560 000207      1S:     RTS      PC       : RETURN
2653
2654      ;ROUTINE TO INCREMENT $SKI

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2655
2656
2657
2658 007562 026027 000056 023417 INCSKI: CMP    $SKI(RO),#9999.  ;IS $SKI ALREADY AT MAXIMUM ?
2659 007570 103002          BHS    IS                ;BR IF IT IS
2660 007572 005260 000056          INC    $SKI(RO)          ;INCREMENT $SKI
2661 007576 000207          RTS    PC                ;RETURN
2662
2663 ;ROUTINE TO INCREMENT $MISPO
2664
2665 ;NOTE: $MISPO WILL NOT BE INCREMENTED BEYOND 9999 (10)
2666
2667 007600 026027 000060 023417 INCMIS: CMP    $MISPO(RO),#9999. ;IS $MISPO ALREADY AT MAXIMUM ?
2668 007606 103002          BHS    IS                ;BR IF IT IS
2669 007610 005260 000060          INC    $MISPO(RO)       ;INCREMENT $MISPO
2670 007614 000207          RTS    PC                ;RETURN
2671
2672 ;ROUTINE TO INCREMENT $TOTAL
2673
2674 ;NOTE: $TOTAL WILL NOT BE INCREMENTED BEYOND 9999 (10)
2675
2676 007616 026027 000050 023417 INCTOT: CMP    $TOTAL(RO),#9999. ;IS $TOTAL ALREADY AT MAXIMUM ?
2677 007624 103002          BHS    IS                ;BR IF IT IS
2678 007626 005260 000050          INC    $TOTAL(RO)      ;INCREMENT $TOTAL
2679 007632 000207          RTS    PC                ;RETURN
2680
2681
2682 ;ROUTINE TO TYPE THE TIME
2683
2684 007634 005737 001236 STIME:  TST    CLKFLG          ;CLOCK ON THE SYSTEM ?
2685 007640 001006          BNE    IS                ;BR IF NOT
2686 007642 104401 010130          TYPE  ' HOUR            ;TYPE THE HOURS
2687 007646 104401 010134          TYPE  ' MINUTE          ;TYPE THE MINUTES
2688 007652 104401 010140          TYPE  ' SECOND          ;TYPE THE SECONDS
2689 007656 000207          RTS    PC
2690
2691 ;CLOCK HANDLER ROUTINE
2692
2693 007660 010046 CLOCK:  MOV    RO,-(SP)        ;SAVE RO
2694 007662 005237 010144          INC    SIXTEE           ;INCREMENT THE 1/60 SECOND COUNTER
2695 007666 001076          BNE    IS                ;BR IF A SECOND NOT COUNTED
2696 007670 013737 001240 010144          MOV    #7,SIXTEE       ;RESTORE THE VALUE
2697 007676 005437 010144          NEG    SIXTEE           ;MAKE IT INTO 2'S COMP
2698 007702 105237 010141          INCB  SECOND+1         ;INCREMENT THE SECONDS
2699 007706 122737 000072 010141          CMPB  #72,SECOND+1     ;SEE IF COUNTER AT MAX
2700 007714 001063          BNE    IS                ;BR IF NOT
2701 007716 112737 000060 010141          MOVB  #60,SECOND+1     ;RESTORE VALUE
2702 007724 105237 010140          INCB  SECOND           ;INCREMENT UPPER
2703 007730 122737 000066 010140          CMPB  #66,SECOND       ;UPPER AT MAX
2704 007736 001052          BNE    IS                ;BR IF NOT
2705 007740 112737 000060 010140          MOVB  #60,SECOND       ;RESET UPPER
2706 007746 105237 001313          INCB  INTRVL+1         ;INCREMENT STATISTICS TYPEOUT INTERVAL
2707 007752 105237 010135          INCB  MINUTE+1         ;INCREMENT MINUTE
2708 007756 122737 000072 010135          CMPB  #72,MINUTE+1     ;AT MAX ?
2709 007764 001037          BNE    IS                ;BR IF NOT
2710 007766 112737 000060 010135          MOVB  #60,MINUTE+1     ;RESET LOWER

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# K05

MD-11-DZRP1-B, RPI1E MULTI-DRIVE EXERCISER PROGRAM  
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2711 007774 105237 010134      INCB  MINUTE      ; INCREMENT UPPER HALF
2712 010000 122737 000066 010134  CMPB  #66,MINUTE ; AT MAX ?
2713 010006 001026          BNE   1$        ; BR IF NOT
2714 010010 112737 000060 010134  MOVB  #60,MINUTE ; RESET UPPER
2715 010016 105237 010131      INCB  HOUR+1     ; INCREMENT HOURS
2716 010022 022737 035071 010130  CMP   #35071,HOUR ; AT MAX (99) ?
2717 010030 001412          BEQ   2$        ; BR IF IT IS
2718 010032 122737 000072 010131  CMPB  #72,HOUR+1 ; AT MAX ?
2719 010040 001011          BNE   1$        ; BR IF NOT
2720 010042 112737 000060 010131  MOVB  #60,HOUR+1 ; RESET VALUE
2721 010050 105237 010130      INCB  HOUR       ; INCREMENT UPPER
2722 010054 000403          BR    1$
2723 010056 012737 030060 010130 2$:  MOV   #30060,HOUR ; RESET HOUR FIELD
2724 010064 012746 000021 1$:  MOV   #17,-(SP) ; 17 MS ON THE STACK
2725 010070 004737 023360          JSR   PC,RPTMR  ; DRIVER TIMER ROUTINE
2726 010074 075737 001312          TSTB INTRVL     ; DISPLAY THE PERFORMANCE SUMMARY ?
2727 010100 01411          BEQ   3$        ; BR IF NOT
2728 010102 123737 001312 001313  CMPB  INTRVL,INTRVL+1 ; DISPLAY INTERVAL FINISHED ?
2729 010110 001005          BNE   3$        ; BR IF NOT
2730 010112 105037 001313          CLRB INTRVL+1  ; RESTORE THE INTERVAL
2731 010116 012737 177777 001250  MOV   #-1,STATIN ; SET ERROR RATE DATA DISPLAY FLAG
2732 010124 012600 3$:  MOV   (SP)+,RO  ; RESTORE RO
2733 010126 000002
2734
2735 010130 060 060      HOUR:  .BYTE 60,60 ; HOURS
2736 010132 072 000      .BYTE 72,0 ; ':' & TERMINATOR
2737 010134 060 060      MINUTE: .BYTE 60,60 ; MINUTES
2738 010136 072 000      .BYTE 72,0 ; ':' & TERMINATOR
2739 010140 060 060      SECOND: .BYTE 60,60 ; SECONDS
2740 010142 040 000      .BYTE 40,0 ; SPACE, TERMINATOR
2741
2742
2743 010144 000000      SIXTEE: .WORD 0 ; 1/60TH OR 1/50TH OF A SECOND COUNTER
2744
2745 ;COMMAND DECODE ROUTINE
2746
2747 010146 104412      KSR:  SAVREG ; SAVE RO-RS
2748 010150 012746 000200      MOV   #PR4,-(SP) ; RETURN AT PRIORITY 4
2749 010154 012746 010230      MOV   #KSR1,-(SP) ; DUMMY INTERRUPT RETURN
2750 010160 017746 170762      MOV   #STKB,-(SP) ; GET THE CHARACTER FROM THE KEYBOARD
2751 010164 042716 177600      BIC   #177,(SP) ; CLEAR THE JUNK
2752 010170 021627 000007      CMP   (SP),#7 ; 'CONTROL G' ?
2753 010174 001010          BNE   1$        ; BR IF NOT
2754 010176 022737 000176 001140  CMP   #SWREG,SWR ; SOFTWARE SWITCH REGISTER ?
2755 010204 001004          BNE   1$        ; BR IF NOT ACTIVE
2756 010206 012766 010420 000002  MOV   #KSR2,2(SP) ; CHANGE THE RETURN ADDRESS
2757 010214 000403          BR    2$
2758 010216 012737 017026 000060 1$:  MOV   #STKSRV,TKVEC ; CHANGE KEYBOARD VECTOR ADDRESS
2759 010224 000137 017032 2$:  JMP   $TKSRV+4 ; PROCESS THE CHARACTER JUST ENTERED
2760 010230 104411      KSR1:  RDLIN ; READ THE KEYBOARD
2761 010232 012737 010146 000060      MOV   #KSR,TKVEC ; CHANGE THE KEYBOARD VECTOR
2762 010240 012605      MOV   (SP)+,RS ; BUFFER ADDRESS
2763 010242 005205      INC   RS ; POINT TO DRIVE NUMBER
2764 010244 104401 001213      TYPE  ,SCLF ; CR-LF
2765 010250 122715 000101      CMPB  #'A,(RS) ; EQ TO AN 'A'
2766 010254 001410          BEQ   1$        ; BR IF IT IS

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2767 010256 121527 000067      CMPB      (R5),#67      ;UNIT NUMBER GREATER THAN AN ASCII 7 ?
2768 010262 101054              BHI       6$          ;BF IF IT IS
2769 010264 121527 000060      CMPB      (R5),#60      ;UNIT NUMBER LESS THAN AN ASCII 0 ?
2770 010270 103451              BLO       6$          ;BR IF IT IS
2771 010272 142715 177770      BICB      #1C7,(R5)    ;LEAVE ONLY LOWER 3 BITS IF CHAR NOT 'A'
2772 010276 122765 000124 177777 1$:  CMPB      #'T,-1(R5)    ;EQ TO 'T'
2773 010304 001003              BNE       2$          ;BR IF NOT EQ
2774 010306 004737 010424      JSR       PC,NEWASN    ;ASSIGN UNIT FOR TEST
2775 010312 000442              BR        KSR2        ;EXIT
2776 010314 122765 000104 177777 2$:  CMPB      #'D,-1(R5)    ;EQ TO 'D' ?
2777 010322 001003              BNE       3$          ;BR IF NOT EQ
2778 010324 004737 010664      JSR       PC,DEASGN    ;DEASSIGN UNIT
2779 010330 000433              BR        KSR2        ;EXIT
2780 010332 122765 000123 177777 3$:  CMPB      #'S,-1(R5)    ;EQ TO 'S'
2781 010340 001003              BNE       4$          ;BR IF NOT EQ
2782 010342 004737 010772      JSR       PC,SCMND     ;TYPE STATISTICS
2783 010346 000424              BR        KSR2        ;EXIT
2784 010350 122765 000127 177777 4$:  CMPB      #'W,-1(R5)    ;EQ TO 'W'
2785 010356 001007              BNE       5$          ;BR IF NOT EQ
2786 010360 032777 000001 170552  BIT       #SW0,2SWR    ;IS SWITCH 0 SET ?
2787 010366 001012              BNE       6$          ;BR IF SET, CAN'T DO 'W' COMMAND
2788 010370 004737 011074      JSR       PC,DATAPK    ;WRITE A DATA PACK
2789 010374 000411              BR        KSR2        ;EXIT
2790 010376 122765 000122 177777 5$:  CMPB      #'R,-1(R5)    ;EQ TO 'R' ?
2791 010404 001003              BNE       6$          ;BR IF NOT EQ
2792 010406 004737 011106      JSR       PC,REDAPK    ;READ A DATA PACK
2793 010412 000402              BR        KSR2        ;EXIT
2794 010414 104401 033146      6$:      TYPE     ,INVL D    ;TYPE 'INVALID COMMAND' MESSAGE
2795 010420 104413      KSR2:    RESREG    ;RESTORE R0-R5
2796 010422 000002      RTI       ;RETURN
2797
2798
2799      ;ROUTINE TO ASSIGN A DRIVE ('T' COMMAND)
2800 010424 005037 001252      NEWASN:  CLR       PACK    ;CLEAR 'W' COMMAND INDICATOR
2801 010430 005004      ASGN0:  CLR       R4      ;R4 IS TABLE INDEX
2802 010432 012703 000010      MOV      #8, R3        ;SET INITIAL COUNT TO 8
2803 010436 122715 000101      CMPB      #101,(R5)    ;ASSIGN ALL UNITS?
2804 010442 001417      BEQ      ASGN2        ;BR IF ALL UNITS
2805 010444 111504      ASGN1:  MOV      (R5),R4    ;PUT UNIT # IN R4
2806 010446 012737 032567 011140      MOV      #UNTASN,ASNMSG ;'UNIT ASSIGNED' MESSAGE ADDR
2807 010454 012703 000001      MOV      #1,R3        ;RELOAD R3 FOR 1 UNIT
2808 010460 136437 021304 025460      BITB     ATABIT(R4),ASNLS ;UNIT ALREADY ASSIGNED ?
2809 010466 001002              BNE       1$          ;BR IF IT IS
2810 010470 004737 010524      JSR      PC,ASGN3     ;SEE IF UNIT ON THE SYSTEM
2811 010474 000137 011120      1$:     JMP      ASNERR        ;RETURN HERE IF DRIVE NOT AVAIL
2812 010500 000207              RTS      PC           ;EXIT
2813 010502 004737 010524      ASGN2:  JSR      PC,ASGN3 ;ASSIGN ALL UNASSIGNED, AVAIL UNITS
2814 010506 000137 010514              JMP      1$          ;UNIT NOT ON SYSTEM
2815 010512 000207              RTS      PC           ;EXIT
2816 010514 012746 010506      1$:     MOV      #ASGN2+4,-(SP) ;PUT RETURN ADDRESS ON THE STACK
2817 010520 000137 010626              JMP      ASGN4        ;LOOK FOR MORE UNITS
2818 010524 136437 021304 025460      ASGN3:  BITB     ATABIT(R4),ASNLS ;UNIT ALREADY ASSIGNED ?
2819 010532 001035              BNE      ASGN4        ;BR IF IT IS
2820 010534 005737 021124      1$:     TST      TRANSW     ;DATA TRANSFER UNDER WAY ?
2821 010540 001375              BNE      1$          ;BR IF IT IS
2822 010542 110437 025414      MOV      R4,GENDPB    ;DRIVE NUMBER

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M05

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2823 010546 004737 015354 JSR PC,RECALO ;RECALIBRATE DRIVE
2824 010552 105764 021112 TSTB DRVSTA(R4) ;DRIVE AVAILABLE?
2825 010556 001432 BEQ ASGN6 ;BR IF DRIVE OFFLINE
2826 010560 100435 BMI ASGN7 ;BR DRIVE NOT AVAILABLE
2827 010562 006304 ASL R4 ;MAKE R4 INTO WORD INDEX
2828 010564 016464 025736 025526 MOV BLKADR(R4),NEWUNT(R4) ;DPB ADDRESS
2829 010572 016400 025736 MOV BLKADR(R4),RO ;PUT BLOCK'S ADDR INTO RO
2830 010576 004737 011150 JSR PC,CLRDPB ;CLEAR BLOCK FOR UNIT JUST ASSIGNED
2831 010602 012760 000001 000062 MOV #1,$PASSC(RO) ;PRESET PASS COUNT TO 1
2832 010610 005737 001252 TST PACK ;WRITE DATA PACK ?
2833 010614 001403 BEQ Z$ ;BR IF NOT
2834 010616 113760 001252 000022 MOVB PACK,$PACK(RO) ;SET READ/WRITE DATA PACK INDICATOR
2835 010624 006204 2$: ASR R4 ;RESTORE UNIT ADDRESS
2836 010626 005303 ASGN4: DEC R3 ;DEC UNIT COUNT
2837 010630 001402 BEQ ASGN5 ;BR IF FINISHED
2838 010632 005204 INC R4 ;INCREMENT UNIT NUMBER
2839 010634 000733 BR ASGN3 ;CONTINUE
2840 010636 062716 000004 ASGN5: ADD #4,(SP) ;INCREMENT RETURN
2841 010642 000407 BR ASGN8 ;EXIT
2842 010644 012737 032524 011140 ASGN6: MOV #UNTOFF,ASNMSG ;'OFFLINE' MESSAGE ADDRESS
2843 010652 000403 BR ASGN8 ;EXIT
2844 010654 012737 032615 011140 ASGN7: MOV #NOTSAF,ASNMSG ;ADDR OF 'DRIVE UNSAFE' MESSAGE
2845 010662 000207 ASGN8: RTS PC ;RETURN
2846
2847 ;ROUTINE TO DEASSIGN A UNIT ('D' COMMAND)
2848
2849 010664 005004 DEASGN: CLR R4
2850 010666 122715 000101 CMPB #101,(R5) ;DEASSIGN ALL UNITS ?
2851 010672 001434 BEQ Z$ ;BR IF YES
2852 010674 012703 000001 MOV #1,R3 ;SET R3 FOR ONE UNIT
2853 010700 111504 MOVB (R5),R4 ;GET UNIT NUMBER
2854 010702 136437 021304 025460 1$: BITB ATABIT(R4),ASNLST ;UNIT ASSIGNED ?
2855 010710 001414 BEQ Z$ ;BR IF NOT
2856 010712 146437 021304 025460 BICB ATABIT(R4),ASNLST ;DELETE THE UNIT FROM THE ASSIGNED LIST
2857 010720 006304 ASL R4 ;MAKE ADDR INTO A WORD INDEX
2858 010722 016464 025736 025504 MOV BLKADR(R4),DUNIT(R4) ;PUT ADDRESS IN DEASSIGN LIST
2859 010730 005204 ASR R4
2860 010732 005303 2$: DEC R3 ;ANY MORE UNITS ?
2861 010734 001412 BEQ Z$ ;BR IF NOT
2862 010736 005204 INC R4
2863 010740 000760 BR 1$
2864 010742 122715 000101 3$: CMPB #101,(R5) ;DEASSIGN ALL UNITS ?
2865 010746 001771 BEQ Z$ ;BR IF YES
2866 010750 012737 032545 011140 MOV #UN,NOT,ASNMSG ;ADDR OF 'NOT ASSIGNED' MESSAGE
2867 010756 004737 011120 JSR PC,ASNEAR ;REPORT IT
2868 010762 000207 4$: RTS PC
2869 010764 012703 000010 5$: MOV #8.,R3 ;SET UNIT COUNT TO 8
2870 010770 000744 BR 1$
2871
2872 ;ROUTINE TO TYPE UNIT PERFORMANCE SUMMARY ('S' COMMAND)
2873
2874 010772 005004 SCMD: CLR R4
2875 010774 122715 000101 CMPB #101,(R5) ;ALL STATISTICS ?
2876 011000 001421 BEQ Z$ ;BR IF YES
2877 011002 111504 MOVB (R5),R4 ;GET UNIT #
2878 011004 136437 021304 025460 BITB ATABIT(R4),ASNLST ;SEE IF UNIT ASSIGNED

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2879 011012 001406      BEQ      1$      ;BR IF NOT
2880 011014 006304      ASL      R4      ;MAKE UNIT ADDR INTO WORD INDEX
2881 011016 016400 025736  MOV     BLKADR(R4),R0 ;ADDR OF BLOCK
2882 011022 004737 007240  JSR     PC,TYPEST ;TYPE DRIVE STATISTICS
2883 011026 000421      BR       5$      ;EXIT
2884 011030 012737 032545 011140 1$:  MOV     #UNTNOT,ASNMSG ;ADDR OF 'NOT ASSIGNED' MSG
2885 011036 004737 011120  JSR     PC,ASNERR ;TYPE ERROR MESSAGE
2886 011042 000413      BR       5$      ;EXIT
2887 011044 012703 000010 2$:  MOV     #8,R3 ;UNIT COUNT
2888 011050 105737 025460 3$:  TSTB   ASNLIST ;SEE IF ANY UNIT ASSIGNED
2889 011054 001004      BNE     4$      ;BR IF ANY ARE
2890 011056 005204      INCR    R4      ;INCREMENT UNIT ADDRESS
2891 011060 005303      DEC     R3      ;DECREMENT COUNTER
2892 011062 001372      BNE     3$      ;MORE TO CHECK ?
2893 011064 000402      BR       5$      ;NONE ASSIGNED, RETURN
2894 011066 004737 007126 4$:  JSR     PC,STATPR ;TYPE ALL STATISTICS
2895 011072 000207 5$:  RTS     PC
2896
2897 ;ROUTINE TO WRITE A DATA PACK ('W' COMMAND)
2898
2899 011074 012737 177777 001252 DATAPK: MOV     #-1,PACK ;SET THE 'W' COMMAND INDICATOR
2900 011102 000137 010430  JMP     ASGNO ;ASSIGN REQUESTED UNIT
2901
2902
2903 ;ROUTINE TO READ A DATA PACK ('R' COMMAND)
2904
2905 011106 012737 000001 001252 REDAPK: MOV     #1,PACK ;SET THE 'READ' INDICATOR
2906 011114 000137 010430  JMP     ASGNO ;ASSIGN THE REQUESTED UNIT
2907
2908 ;TYPEOUT ASSIGN/DEASSIGN ERROR MESSAGE
2909
2910 011120 104401 033144  ASNERR: TYPE    ,QUES ;QUESTION MARK
2911 011124 104401 032515  TYPE    ,UNTMMSG ;TYPE 'UNIT'
2912 011130 010446  MOV     R4,-(SP) ;DRIVE NUMBER
2913 011132 104403  TYPOS   ;TYPE IT
2914 011134 001 000 .BYTE 1,0
2915 011136 104401  TYPE    ;TYPE SPECIFIC MESSAGE
2916 011140 000000  ASNMSG: .WORD 0 ;MESSAGE ADDRESS
2917 011142 104401 001213  TYPE    ,$CRLF
2918 011146 000207  RTS     PC
2919
2920 ;ROUTINE TO CLEAR THE DPB FOR THE ASSIGNED UNIT
2921
2922 CLRDPB:
2923 011150  MOV     R3,-(SP) ;PUSH R3 ON STACK
2924 011152 010346  MOV     R4,-(SP) ;PUSH R4 ON STACK
2925 011154 010546  MOV     R5,-(SP) ;PUSH R5 ON STACK
2926 011156 010004  MOV     R0,R4 ;GET THE DPB ADDRESS
2927 011160 062704 000002  ADD     #2,R4 ;ADDRESS OF FIRST LOCN TO BE CLEARED
2928 011164 012703 000005  MOV     #5,R3 ;NUMBER OF LOCNS TO BE CLEARED
2929 011170 005024 1$:  CLR     (R4)+ ;CLEAR THE LOCATION
2930 011172 005303  DEC     R3 ;DECREMENT THE COUNTER
2931 011174 001375  BNE     1$ ;BR IF NOT FINISHED
2932 011176 062704 000002  ADD     #2,R4 ;MOVE THE ADDRESS PAST THE 'REG' ADDR
2933 011202 012703 000074  MOV     #5,LO-SREG,R3 ;NUMBER OF LOCNS TO BE CLEARED
2934 011206 005024 2$:  CLR     (R4)+ ;CLEAR

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2935 011210 162703 000002      SUB      R2,R3      ;DECREMENT THE LOCN COUNTER
2936 011214 001374      BNE      2$        ;BR IF NOT FINISHED
2937 011216 012605      MOV      (SP)+,R5  ;POP STACK INTO R5
2938 011220 012604      MOV      (SP)+,R4  ;POP STACK INTO R4
2939 011222 012603      MOV      (SP)+,R3  ;POP STACK INTO R3
2940 011224 000207      RTS      PC
2941
2942      ;DEASSIGN A DRIVE IF A FATAL ERROR OCCURS
2943
2944 011226 011446      DROP:  MOV      (R4),-(SP)  ;SAVE R4
2945 011230 005004      CLR      R4        ;CLEAR R4 FOR UNIT NUMBER
2946 011232 111004      MOV      (R0),R4   ;MOVE UNIT NUMBER TO R4
2947 011234 146437 021304 025460 BICB     ATAB1:(R4),ASNLST ;REMOVE UNIT FROM ASSIGNED LIST
2948 011242 006304      RSL      R4        ;MAKE UNIT NUMBER INTO A TABLE INDEX
2949 011244 010064 025504      MOV      R0,DUNIT(R4) ;PUT UNIT IN DROP LIST
2950 011250 104401 001213      TYPE     ,SCLRF    ;CR-LF
2951 011254 104401 001213      TYPE     ,SCLRF    ;CR-LF
2952 011260 104401 033001      TYPE     ,DROPNL   ;TYPE 'DROPPING UNIT'
2953 011264 104401 033103      TYPE     ,DRNUM    ;'DRIVE #'
2954 011270 111046      MOV      (R0),-(SP) ;DRIVE NUMBER
2955 011272 104403      TYPOS   ;TYPE IT
2956 011274 001 000      .BYTE   1,0
2957 011276 104401 001213      TYPE     ,SCLRF    ;CR-LF
2958 011302 012604      MOV      (SP)+,R4  ;RESTORE R4
2959 011304 000207      RTS      PC        ;RETURN
2960
2961      ;ROUTINE TO DEASSIGN A UNIT IF ERRORS BECOMES EXCESSIVE
2962
2963 011306 032777 000020 167624 ABNRM1: BIT      #SW04,2SWR  ;SEE IF SWITCH 4 SET
2964 011314 001006      BNE      1$        ;BR IF IT'S SET
2965 011316 023760 001310 000050      CMP      MAXER,$TOTAL(R0) ;CHECK TOTAL ERROR VALUE
2966 011324 101002      BHI      1$        ;BR IF NOT AT MAXIMUM
2967 011326 000137 011226      JMP      DROP      ;DEASSIGN THE DRIVE
2968 011332 000207      1$:  RTS      PC        ;RETURN
2969
2970      ;ROUTINE TO CHECK FOR END OF PASS AND END OF TEST
2971
2972 011334 005737 001316      NRML:  TST      SEKMOO  ;END OF PASS DETERMINED BY SEEKS OR WORDS ?
2973 011340 001012      BNE      NRML1     ;BR IF SET'S
2974 011342 026037 000046 001276      CMP      $READ+2(R0),ENDCON+2 ;CHECK MSW OF WORDS READ COUNT
2975 011350 101017      BHI      NRML2     ;BR IF MSW GREATER THAN LIMIT
2976 011352 103405      BLO      NRML1     ;BR IF MSW LESS THAN LIMIT
2977 011354 026037 000044 001274      CMP      $READ(R0),ENDCON  ;CHECK LSW AGAINST LIMIT
2978 011362 103012      BHIS    NRML2     ;BR IF EQUAL OR GREATER
2979 011364 000504      BR      NRMLX     ;EXIT
2980 011366 026037 000042 001302      NRML1: CMP      $POSIT+3(R0),ENDSEK+2 ;CHECK MSW OF SEEK COUNT
2981 011374 101005      BHI      NRML2     ;BR IF MSW GREATER THAN LIMIT
2982 011376 103477      BLO      NRMLX     ;EXIT IF MSW LESS THAN LIMIT
2983 011400 026037 000040 001300      NRML2: CMP      $POSIT(R0),ENDSEK  ;CHECK LSW OF SEEK COUNT
2984 011406 103473      BLO      NRMLX     ;EXIT IF LSW LESS THAN LIMIT
2985 011410 104401 001213      NRML2: TYPE     ,SCLRF    ;CR-LF
2986 011414 104401 033035      TYPE     ,ENOPAS  ;END OF PASS FOR THE UNIT
2987 011420 016046 000062      MOV      $PASSC(R0),-(SP) ;PUT PASS COUNT ON THE STACK
2988 011424 104405      TYPOS   ;CONVERT PASS COUNT TO DECIMAL AND TYPE IT
2989 011426 032777 000020 167504      BIT      #SW04,2SWR  ;SWITCH 4 SET ?
2990 011434 001016      BNE      1$        ;BR IF SET

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2991 011436 026037 000062 001304      CMP      $PASSC(R0),PASCNT      ;SEE IF AT END OF TEST
2992 011444 103412                    ZLO      IS                    ;BR IF NOT
2993 011446 104401 033051            TYPE    ,ENDTST              ;TYPE 'END OF TEST'
2994 011452 104401 033103            TYPE    DRNUM                ;'DRIVE #'
2995 011456 111046                    MOVVB   (R0),-(SP)           ;DRIVE NUMBER
2996 011460 104403                    OS      ;TYPE IT
2997 011462 001 000                    .BYTE  1,0                  ;
2998 011464 104401 001213            TYPE    $CRLF                ;CR-LF
2999 011470 000430                    BR      3$                  ;DEASSIGN THE DRIVE
3000 011472 104401 033103            TYPE    DRNUM                ;'DRIVE #'
3001 011476 111046                    MOVVB   (R0),-(SP)           ;DRIVE NUMBER
3002 011500 104403                    TYPOS   ;TYPE IT
3003 011502 001 000                    .BYTE  1,0                  ;
3004 011504 104401 001213            TYPE    $CRLF                ;CR-LF
3005 011510 004737 007240            JSR     PC,TYPEST            ;TYPE THE UNIT'S STATISTICS
3006 011514 010346                    MOV     R3,-(SP)            ;SAVE R3
3007 011516 010446                    MOV     R4,-(SP)            ;SAVE R4
3008 011520 010004                    MOV     R0,R4                ;UNIT'S BLOCK ADDRESS
3009 011522 062704 000034            ADD     #SOPERC,R4           ;ADD THE STARTING ADDR OF SECTIONS TO CLEAR
3010 011526 012703 000006            MOV     #6,R3                ;NUMBER OF LOCMs TO BE CLEARED
3011                                     ;(ERROR COUNTERS NOT CLEARED)
3012 011532 005024                    2$:   CLR     (R4)+           ;CLEAR THE LOCM
3013 011534 005303                    DEC     R3                    ;DECREMENT THE LOCATION COUNTER
3014 011536 001375                    BNE     2$                    ;BR IF MORE TO GO
3015 011540 012604                    MOV     (SP)+,R4             ;RESTORE R4
3016 011542 012603                    MOV     (SP)+,R3             ;RESTORE R3
3017 011544 005260 000062            INC     $PASSC(R0)           ;INCREMENT THE PASS COUNT
3018 011550 000412                    BR      NRMLX                 ;EXIT
3019 011552 104401 001213            3$:   TYPE    $CRLF
3020 011556 005004                    CLR     R4                    ;CLEAR R4 FOR DRIVE NUMBER
3021 011560 111004                    MOVVB   (R0),R4              ;MOVE DRIVE NUMBER
3022 011562 146437 021304 025460      BICB   ATABIT(R4),ASMLST     ;DELETE DRIVE FROM ASSIGNED LIST
3023 011570 006304                    RSL     R4                    ;MAKE DRIVE NUMBER INTO TABLE INDEX
3024 011572 010064 025504            MOV     R0,DUNIT(R4)         ;PUT BLOCK ADDRESS INTO DROP LIST
3025 011576 000207                    NRMLX: RTS     PC              ;RETURN
3026                                     ;ROUTINE TO GET THE REMAINDER OF THE RANDOM NUMBER
3027
3028
3029
3030 011600 013746 020620            GETREM: MOV     $HNUM,-(SP)    ;LOWER DIVIDEND
3031 011604 005046                    CLR     -(SP)                ;UPPER DIVIDEND
3032 011606 010546                    MOV     R5,-(SP)            ;PUT DIVISOR ON THE STACK
3033 011610 004737 020206            JSR     PC,$DIV              ;
3034 011614 012605                    MOV     (SP)+,R5            ;PUT THE REMAINDER INTO R5
3035 011616 005726                    TST     (SP)+                ;ADJUST THE STACK POINTER
3036 011620 000207                    RTS     PC
3037                                     ;ROUTINE TO REPLACE LEADING ZEROS IN A NUMERIC STRING WITH SPACES
3038
3039 011622 012737 000004 011742      $RPZR8: MOV     #4,$RPZRC      ;SETUP TO TYPE 8 SIGNIFICANT DIGITS
3040 011630 000412                    BR      $RPZERO              ;TYPE THE VALUE
3041 011632 012737 000006 011742      $RPZR4: MOV     #6,$RPZRC      ;SETUP TO TYPE 4 SIGNIFICANT DIGITS
3042 011640 000406                    BR      $RPZERO              ;TYPE THE VALUE
3043 011642 012737 000007 011742      $RPZR5: MOV     #7,$RPZRC      ;SETUP TO TYPE 3 SIGNIFICANT DIGITS
3044 011650 000402                    BR      $RPZERO              ;TYPE THE VALUE
3045 011652 005037 011742            $RPZR0: CLR     $RPZRC        ;SETUP TO TYPE 10 SIGNIFICANT DIGITS
3046 011656 010046                    $RPZERO: MOV     R0,-(SP)     ;SAVE R0

```

```

3047 011660 016600 000004      MOV      4(SP),R0      ;ADDRESS OF NUMBER TO R0
3048 011664 122710 000060      1S:    CMPB     #'0',(R0)  ;BYTE EQUAL TO ASCII '0' ?
3049 011670 001004      BNE     2S            ;BR IF NOT
3050 011672 112710 000040      MOVB    #'40',(R0)    ;REPLACE THE ZERO WITH A SPACE
3051 011676 005200      INC     R0            ;INCREMENT THE BYTE ADDRESS
3052 011700 000771      BR      1S           ;GO BACK AND LOOK FOR MORE LEADING ZEROS
3053 011702 105710      2S:    TSTB     (R0)      ;SEE IF ZERO BYTE TERMINATOR
3054 011704 001003      BNE     3S           ;BR IF NOT
3055 011706 005300      DEC     R0            ;BACKUP STRING POINTER
3056 011710 112710 000060      MOVB    #'0',(R0)    ;PUT A ZERO BACK IN
3057 011714 016637 000004 011732 3S:    MOV      4(SP),4S     ;PUT ADDRESS IN LOCATION FOR TYPEOUT
3058 011720 063737 011742 011732      ADD     RPZRC,4S     ;BEGINNING OF SIGNIFICANT DIGITS
3059 011730 104401      TYPE   TYPE          ;TYPE THE NUMBER
3060 011732 000000      4S:    .WORD   0           ;ADDRESS OF NUMBER
3061 011734 012600      MOV     (SP)+,R0     ;RESTORE R0
3062 011736 012616      MOV     (SP)+,(SP)  ;MOVE RETURN ADDRESS
3063 011740 000207      RTS     PC           ;RETURN

```

```

011742 000000      RPZRC: .WORD 0      ;OFFSET FOR CONVERTED DIGITS HERE

```

```

;THIS ROUTINE IS USED TO CHECK IF AN ASCII CHARACTER IS A DIGIT
;BETWEEN 0 AND 7.

```

```

.....
MOV     #ADR,R1      ;ADDRESS OF ASCII CHARACTER
JSR     R0,CK.OCT   ;CHECK THE CHARACTER
RETURN1 ;CHARACTER IS IN R2 AS A
.....
RETURN2 ;OCTAL DIGIT
.....
;CHARACTER IS NOT BETWEEN 0-7

```

```

011744 121127 000060      CK.OCT: CMPB     (R1),'0    ;LESS THAN ZERO?
011750 103407      BLO     1S           ;YES -- BRANCH
011752 121127 000067      CMPB     (R1),'7      ;GREATER THAN SEVEN?
011754 101004      BHI     1S           ;YES -- BRANCH
011756 111102      MOVB    (R1),R2     ;GET THE CHARACTER
011762 042702 177770      BIC     #'C7,R2     ;STRIP AWAY THE ASCII
011766 000401      BR      2S           ;BYPASS RETURN ADJUST
011770 005720      1S:    TST     (R0)+    ;ADJUST FOR RETURN
011772 000200      2S:    RTS     R0      ;RETURN

```

```

;THIS ROUTINE WILL CHECK AN ASCII CHARACTER TO
;DETERMINE WHAT IT IS.

```

```

.....
MOV     #ADR,R1      ;ADDRESS OF ASCII CHARACTER
JSR     R0,CK.CHR   ;CHECK CHARACTER
RETURN  ADR1        ;UNKNOWN CHARACTER
RETURN  ADR2        ;CARRIAGE RETURN * (R1)=ADR+1
RETURN  ADR3        ;PERIOD * (R1)=ADR+1

```

```

011774 105711      CK.CHR: TSTB     (R1)    ;"CARRIAGE RETURN"?
011776 001404      BEQ     1S           ;YES -- BRANCH
012007 121127 000056      CMPB     (R1),'.'    ;"PERIOD"?
012009 001003      BNE     2S           ;NO -- BRANCH
012006 005720      TST     (R0)+    ;PERIOD
012010 005720      1S:    TST     (R0)+    ;CARRIAGE RETURN
012012 005201      INC     R1        ;MOVE POINTER TO NEXT CHARACTER
012014 011000      2S:    MOV     (R0),R0  ;UNKNOWN CHARACTER

```

# E06

```

3103 012016 000200          RTS      R0          ;RETURN
3104
3105
3106          ; THIS ROUTINE CHECKS AN ASCIZ STRING FOR LEGAL CHARACTERS
3107          ; AND FORMS AN OCTAL NUMBER IN R2
3108
3109          ;
3110          ;
3111          ;
3112          ;
3113          ;
3114          ;
3115          ;
3116          ;
3117 012020 010346          CK.NUM:  MOV    R3, -(SP)          ;SAVE R3
3118 012022 005003          CLR    R3          ;START NUMBER AT ZERO
3119 012024 004037 011744   JSR    R0, CK.OCT          ;OCTAL DIGIT?
3120 012030 000405          BR    IS          ;YES--BRANCH
3121 012032 004037 011774   JSR    R0, CK.CHR          ;CHECK ONE CHARACTER
3122 012036 012122          6S          ;ILLEGAL CHARACTER
3123 012040 012112          8S          ;CARRIAGE RETURN
3124 012042 012110          7S          ;
3125 012044 005201          IS:    INC    R1          ;MOVE TO NEXT CHARACTER
3126 012046 006303          RSL   R3          ;FOR THE OCTAL NUMBER IN R3
3127 012050 103424          BCS   6S          ;DON'T LET IT GET TO BIG
3128 012052 006303          RSL   R3
3129 012054 103422          BCS   6S
3130 012056 006303          RSL   R3
3131 012058 103420          BCS   6S
3132 012060 060203          R00   R2, R3
3133 012064 004037 011744   JSR    R0, CK.OCT          ; IS THIS AN OCTAL DIGIT?
3134 012070 000765          BR    IS          ; YES--MAKE IT PART OF THE NUMBER
3135 012072 010302          2S:    MOV    R3, R2          ; SAVE THE OCTAL NUMBER
3136 012074 005003          CLR    R3          ; START WITH ZERO INDEX
3137 012076          3S:
3138 012076 004037 011774   JSR    R0, CK.CHR          ; CHECK ONE CHARACTER
3139 012102 012122          6S          ; ILLEGAL CHARACTER
3140 012104 012116          5S          ; CARRIAGE RETURN
3141 012106 012114          4S          ;
3142 012110 005723          7S:    TST   (R3)+          ; 'PERIOD' ONLY
3143 012112 005723          8S:    TST   (R3)+          ; 'CR' ONLY
3144 012114 005723          4S:    TST   (R3)+          ; "PERIOD"
3145 012116 005723          5S:    TST   (R3)+          ; "CR"
3146 012120 060300          R00   R3, R0          ; YES--SAVE THE OCTAL NUMBER
3147 012122 012603          6S:    MOV    (SP)+, R3          ; RESTORE R3
3148 012124 011000          MOV    (R0), R0          ; PICKUP EXIT ADDRESS
3149 012126 000200          RTS      R0          ; RETURN
3150
3151          ; THIS ROUTINE USES THE "ITEM CONTROL BYTE" ($ITEMB) TO DETERMINE
3152          ; WHICH ERROR IS TO BE REPORTED. IT THEN OBTAINS, FROM THE "ERROR
3153          ; TABLE" ($ERRTAB), AND REPORTS THE APPROPRIATE INFORMATION
3154          ; CONCERNING THE ERROR.
3155
3156 012130 104412          TYPERR: SAVREG          ; SAVE R0-R5
3157 012132 032777 020000 167000 BIT    #SW13, $SWR          ; INHIBIT ERROR TYPEOUTS ?
3158 012140 001113          BNE   20S          ; BR IF INHIBIT

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3159	012142	005000		CLR	RO	: CLEAR RO FOR ERROR NUMBER
3160	012144	113700	001114	MOV	\$ITMB,RO	: ERROR NUMBER
3161	012158	005300		DEC	RO	: FORM INDEX FOR ERROR TABLE
3162	012158	006300		ASL	RO	
3163	012158	006300		ASL	RO	
3164	012158	006300		ASL	RO	
3165	012160	062700	001346	15:	ADD	\$SEARTB,RO
3166	012164	012037	012204		MOV	(RO)+,2\$
3167	012170	001406			BEQ	3\$
3168	012172	104401	001213		TYPE	,SCLF
3169	012176	004737	007634		JSR	PC,\$TIME
		104401			TYPE	
		000700		25:	.WORD	0
		012137	012222	35:	MOV	(RO)+,4\$
3173	012212	001404			BEQ	5\$
3174	012214	104401	001213		TYPE	,SCLF
3175	012220	104401			TYPE	
3176	012222	000700		45:	.WORD	0
3177	012224	012001		55:	MOV	(RO)+,R1
3178	012226	001460			BEQ	20\$
3179	012230	005005			CLR	RS
3180	012232	012000			MOV	(RO)+,RO
3181	012234	012002			MOV	(RO)+,R2
3182	012236	001451			BEQ	17\$
3183	012240	005105			COM	RS
3184	012242	104401	001213		TYPE	,SCLF
3185	012246	112003		105:	MOV	(RO)+,R3
3186	012250	112004			MOV	(RO)+,R4
3187	012252	006004		115:	ROR	R4
3188	012254	103403			BCS	12\$
3189	012256	013146			MOV	2(R1)+,-(SP)
3190	012260	104402			TYPOC	
3191	012262	000402			BR	13\$
3192	012264			125:		
3193	012264	013146			MOV	2(R1)+,-(SP)
3194	012266	104405			TYPDS	
3195	012270	005303		135:	DEC	R3
3196	012272	001403			BEQ	14\$
3197	012274	104401	032500		TYPE	,SPACE2
3198	012300	000764			BR	11\$
3199	012302	005302		145:	DEC	R2
3200	012304	003431			BLE	20\$
3201	012306	104401	001213		TYPE	,SCLF
3202	012312	005760	000002		TST	2(RO)
3203	012316	001404			BEQ	15\$
3204	012320	005105			COM	RS
3205	012322	001002			BNE	15\$
3206	012324	104401	032500		TYPE	,SPACE2
3207	012330	012037	012336	155:	MOV	(RO)+,16\$
3208	012334	104401			TYPE	
3209	012336	000000		165:	.WORD	0
3210	012340	005710			TST	(RO)
3211	012342	001003			BNE	21\$
3212	012344	062700	000004		ADD	84,RO
3213	012350	000754			BR	14\$
3214	012352	104401	001213	215:	TYPE	,SCLF

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3215 012356 005705          TST      RS          ; INDENT?
3216 012360 001332          BNE     10$          ; NO--BRANCH
3217 012362 104401 032500 17$: TYPE  SPACE2      ; YES--TYPE SPACES
3218 012356 000727          BR      10$          ; LOOP
3219 012370 104413          RESREG  PC          ; RESTORE RO-RS
3220 012372 000207          RTS     PC          ; RETURN
3221
3222 ;*****
3223 .SBTTL  END OF ORDER PROCESSING
3224 ;*****
3225 ;PROCESS THE ORDER TERMINATION
3226
3227
3228 PROCES: TST      STATUS(RO) ; SEE IF RP11 HANDLER SIGNALLED AN ERROR
3229        BPL     1$          ; BR IF NO ERROR DETECTED
3230 012374 005760 000016      JMP     ERPROC       ; ERROR - PROCESS IT
3231 012400 100002          JSR    PC,CKERR     ; NO ERROR, CHECK ERROR BITS ANYWAY
3232 012402 000137 013462      JSR    PC,CKBUS     ; NO ERROR, CHECK BUS ADDR & WC
3233 012406 004737 012434      BIT    #SM01,2$WR  ; COMPARE THE BUFFER
3234 012412 004737 012466      BNE    2$          ; BR IF NOT
3235 012416 032777 000002 166514 JSR    PC,CMPAR     ; NO ERROR, COMPARE DATA
3236 012424 001002          JSR    PC          ; RETURN
3237 012426 004737 012534      RTS     PC
3238 012432 000207
3239
3240 ;CHECK ERROR BITS IN 'RPER' & 'RPDS'
3241
3242 CKERR: BIT    #HF!SUSI!SUFU,$RPOS(RO) ; SEE IF ERROR BITS IN RPDS
3243 012434 032760 015000 000066 BNE    1$          ; BR IF ANY SET
3244 012442 001003          TST    $RPER(RO)   ; ANY BITS SET IN RPER
3245 012444 005760 000070      BEQ    2$          ; BR IF NONE SET
3246 012450 001405          ERROR  1$          ; ERROR BITS SET, NO ERROR SIGNALLED
3247 012452 104015          JSR    PC,INCTOT   ; INCREMENT TOTAL ERROR COUNT
3248 012454 004737 007616      ADD    #2,$P       ; RETURN TO MAIN ROUTINE
3249 012460 062706 000002      RTS     PC        ; RETURN
3249 012464 000207

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3250
3251 ;CHECK BUS ADDRESS REGISTER & WORD COUNT REGISTER
3252
3253 012466 016046 000020 CKBUS: MOV SWRDL(R0),-(SP) ;WORD LENGTH
3254 012472 066316 ASL (SP) ;CHANGE INTO BYTE COUNT
3255 012474 066016 000006 ADD SBUF(R0),(SP) ;ADD THE STARTING LOCATION
3256 012500 011637 001124 MOV (SP),SGDOAT ;STORE IN CASE OF ERROR
3257 012504 022660 000076 CMP (SP)+,SFPBA(R0) ;BUFFER ADDRESS PROPER ?
3258 012510 071303 BNE IS ;BR IF NOT CORRECT
3259 012512 055760 000074 TST SRPWC(R0) ;CHECK WORD COUNT
3260 012516 001405 BEQ ZS ;BR IF ZERO
3261 012520 104016 IS: ERROR 16 ;WORD COUNT OR BUFFER ADDRESS INCORRECT
3262 012522 004737 007616 JSR PC,INCTOT ;INCREMENT TOTAL ERROR COUNT
3263 012526 062706 000002 R/O #2,SP ;RETURN TO MAIN ROUTINE
3264 012532 000207 ZS: RTS PC ;RETURN
3265
3266 ;COMPARE THE BUFFER
3267
3268 012534 122760 000007 000032 CMPAR: CMPB #WRTCHK,SCOMND(R0) ;WRITE CHECK ?
3269 012542 001404 BEQ IS ;BR IF WRITE CHECK
3270 012544 132760 000004 000002 BITB #BIT02,SCOMND(R0) ;READ ORDER ?
3271 012552 001001 BNE CMPARD ;BR IF READ
3272 012554 000207 IS: RTS PC ;RETURN
3273 012556 016001 000006 CMPARD: MOV SBUF(R0),R1 ;BUFFER ADDRESS
3274 012562 016037 000020 013154 MOV SWRDL(R0),CMCNT ;WORD COUNT TO WORKING LOCATION
3275 012570 066037 000074 013154 ADD SRPWC(R0),CMCNT ;CALCULATE ACTUAL WORDS TRANSFERED
3276 012576 016037 000010 013156 MOV SCYL(R0),CMCYL ;CYLINDER ADDRESS
3277 012584 116037 000013 013162 MOV SBTRK(R0),CMTRK ;TRACK ADDRESS
3278 012612 116037 000012 013160 MOV SBSEC(R0),CMSEC ;SECTOR ADDRESS
3279 012620 013737 001314 013152 CMSTR: MOV CMPLMT,LIMIT ;DISPLAY LIMIT
3280 012626 005237 013152 INC LIMIT ;CONVERT PARAMETER INTO LIMIT VALUE
3281 012632 010137 013164 MOV R1,CMXIF ;STARTING ADDRESS OF SECTOR BUFFER
3282 012636 112737 177777 013142 MOVB #-1,ZROIND ;CLEAR THE 'ZERO'S' INDICATOR
3283 012644 105037 013143 CLRB FRSTER ;CLEAR 'FIRST ERROR' INDICATOR
3284 012650 005037 013150 CLR ERCTR ;CLEAR ERROR COUNTER
3285 012654 005037 013144 CLR SAVER1 ;CLEAR THE R1 SAVE WORD
3286 012660 005037 013146 CLR SAVER5 ;CLEAR THE R5 SAVE WORD
3287 012664 023727 013154 000400 CMP CMCNT,#256. ;IS BUFFER SIZE GREATER THAN ONE SECTOR ?
3288 012672 101003 BHI IS ;BR IF IT IS
3289 012674 013702 013154 MOV CMCNT,R2 ;LESS THAN, USE REMAINING BUFFER
3290 012700 000402 BR ZS
3291 012702 012702 000400 IS: MOV #256.,R2 ;COMPARE SECTOR
3292 012706 160237 013154 ZS: SUB R2,CMCNT ;DECREMENT WORD COUNT
3293 012712 004737 013404 CMDAT: JSR PC,MATCH ;FIND THE PATTERN
3294 012716 000403 BR ZS ;FOUND A PATTERN
3295 012720 004737 015040 JSR PC,NOMTCH ;RETURN HERE IF NO MATCH WITH PATTERN MADE
3296 012724 000456 BR 9S ;BYPASS COMPARE ROUTINE
3297 012726 011405 ZS: MOV (R4),R5 ;ADDRESS OF PATTERN ADDRESS IN R4
3298 012730 012703 000020 MOV #20,R3 ;R3 IS PATTERN POS COUNTER
3299 012734 022125 3S: CMP (R1)+,(R5)+ ;COMPARE BUFFER WITH PATTERN
3300 012736 001016 BNE 5S ;BR IF NOT EQUAL
3301 012740 005737 013150 TST ERCTR ;ERRORS DETECTED ?
3302 012744 001406 BEQ 4S ;BR IF NO ERRORS
3303 012746 032777 000010 166164 BIT #SW3,JSWR ;SWITCH 3 SET ?
3304 012754 001402 BEQ 4S ;BR IF NOT SET
3305 012756 004737 013166 JSR PC,CMPT ;DISPLAY THE WORD

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3306 012762 005302          45: DEC R2          ; DECREMENT SIZE COUNT
3307 012764 001434          BEQ R3          ; BR WHEN AT END
3308 012766 005303          DEC R3          ; DECREMENT PATT POS COUNT
3309 012770 001361          BNE R3          ; BR IF NOT AT END OF PATT
3310 012772 000755          BR R3          ; RESTART THE PATTERN
3311 012774 005761 177776  55: TST -2(R1)      ; IS MISCOMPARED CHARACTER=C
3312 013000 001406          BEQ R3          ; BR IF YES
3313 013002 112737 177777 013142  MOVB #-1,ZROIND ; SET NON-ZERO MISCOMPARED IND
3314 013010 004737 013166  JSR PC,CMPRT   ; REPORT ERROR
3315 013014 000762          BR R3          ; CONTINUE COMPARE
3316 013016 105737 013143  65: TSTB FRSTER   ; FIRST ERROR?
3317 013022 001007          BNE R3          ; BR IF NOT
3318 013024 105037 013142  CLRB ZROIND    ; SET THE ZERO INDICATOR
3319 013030 010137 013144  MOV R1,SAVER1  ; SAVE CURR ENT R1
3320 013034 010537 013146  MOV R5,SAVERS  ; SAVE CURRENT R5
3321 013040 000750          BR R3          ; CONTINUE COMPARE
3322 013042 105737 013142  75: TSTB ZROIND   ; ANY MISCOMPARISONS NOT ZEROS ?
3323 013046 001745          BEQ R3          ; BR IF NONE: ALL ERRORS ARE ZERO
3324 013050 004737 013166  JSR PC,CMPRT   ; REPORT ERROR
3325 013054 000742          BR R3          ; CONTINUE COMPARING
3326 013056 004737 013362  85: JSR PC,ENDCMP ; PRINT LAST LINE (IF ERRORS)
3327 013058 005737 013154  95: TST CMCNT     ; AT END OF BUFFER
3328 013056 003424          BLE CMPRX      ; BR IF AT END
3329 013070 005237 013160  INC CMSEC      ; INCREMENT SECTOR
3330 013074 023727 013160 000012  CMP CMSEC,#10. ; SECTOR GREATER THAN MAX ?
3331 013102 103646          BLO CMSTR      ; BR IF NOT GREATER THAN MAX
3332 013104 005037 013160  CLR CMSEC      ; CLEAR SECTOR ADDRESS
3333 013110 005237 013162  INC CMTRK      ; INCREMENT TRACK
3334 013114 023727 013162 000024  CMP CMTRK,#20. ; TRACK GREATER THAN MAX ?
3335 013122 103636          BLO CMSTR      ; BR IF NOT GREATER
3336 013124 005037 013162  CLR CMTRK      ; RESET TRACK ADDRESS
3337 013130 005237 013156  INC CMCYL      ; INCREMENT CYLINDER ADDRESS
3338 013134 000137 012620  JMP CMSTR      ; CONTINUE WITH COMPARE
3339 013140 000207          CMPRX: RTS PC
3340
3341 013142 377          ZROIND: .BYTE -1 ; ZERO INDICATOR
3342 013143 000          FRSTER: .BYTE 0 ; FIRST ERROR INDICATOR
3343
3344 013144 000000          SAVER1: .WORD 0  ; IF NOT 0, MISCOMPARSION FOUND
3345 013146 000000          SAVERS: .WORD 0  ; SAVE R1 HERE
3346 013150 000000          ERCTR: .WORD 0  ; SAVE R5 HERE
3347 013152 000000          LIMIT: .WORD 0  ; NUMBER OF ERRORS
3348 013154 000000          CMCNT: .WORD 0  ; DISPLAY LIMIT
3349 013156 000000          CMCYL: .WORD 0  ; WORD COUNT
3350 013160 000000          CMSEC: .WORD 0  ; CYLINDER ADDRESS
3351 013162 000000          CMTRK: .WORD 0  ; SECTOR ADDRESS
3352 013164 000000          CMBUF: .WORD 0  ; TRACK ADDRESS
3353
3354          ; TYPE DATA COMPARE ERRORS
3355
3356 013166 105737 013143  CMPRT: TSTB FRSTER ; FIRST ERROR?
3357 013172 001010          BNE R3          ; BR IF NOT
3358 013174 112737 000012 001114  MOVB #12,SITEMB ; ERROR TABLE INDEX
3359 013202 004737 012130  JSR PC,TYPERR  ; DATA COMPARISON ERROR
3360 013206 112737 177777 013143  MOVB #-1,FRSTER ; SET 'FIRST ERROR' INDICATOR
3361 013214 005737 013144  15: TST SAVER1    ; SAVED REGISTERS ?

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3362 013220 001420 BEQ 2$ ;BR IF NONE
3363 013222 010146 MOV R1,-(SP) ;PUSH R1 ON STACK
3364 013224 010546 MOV FS,-(SP) ;PUSH RS ON STACK
3365 013226 013701 013144 MOV SAVER1,R1 ;DISPLAY SAVED R1
3366 013228 013705 013146 MOV SAVER5,RS ;DISPLAY SAVED RS
3367 013230 004737 013274 JSR PC,CMPRT1 ;PRINT SAVED VALUES
3368 013242 005237 013150 INC ERCTR ;INCREMENT THE ERROR COUNTER
3369 013246 005037 013144 CLR SAVER1 ;CLEAR SAVED REGISTER INDICATORS
3370 013252 005037 013146 CLR SAVER5 ;CLEAR THE OTHER ONE
3371 013256 012605 MOV (SP)+,RS ;POP STACK INTO RS
3372 013260 012601 MOV (SP)+,R1 ;POP STACK INTO R1
3373 013262 004737 013274 2$: JSR PC,CMPRT1 ;PRINT REMAINDER OF MESSAGE
3374 013266 005237 013150 INC ERCTR ;INCREMENT THE ERROR COUNTER
3375 013272 000207 RTS PC ;RETURN
3376 013274 005737 013152 CMPRT1: TST LIMIT ;TIMEOUT LIMIT REACHED ?
3377 013300 001403 BEQ 1$ ;BR IF IT HAS
3378 013302 005337 013152 DEC LIMIT ;DECREMENT LIMIT COUNTER
3379 013306 001004 BNE 2$ ;BR IF NOT AT LIMIT
3380 013310 032777 000004 165622 1$: BIT #SW02,#SWR ;PRINT ALL DATA COMPARE ERRORS ?
3381 013316 001420 BEQ 3$ ;BR IF NOT
3382 013320 010137 001122 2$: MOV R1,$B0ADR ;ADDRESS OF BAD WORD
3383 013324 162737 000002 001122 SUB #2,$B0ADR ;ADJUST ADDRESS
3384 013332 016537 177776 001124 MOV -2(RS),$GDDAT ;GOOD DATA
3385 013340 016137 177776 001126 MOV -2(R1),$BDDAT ;BAD DATA
3386 013346 112737 000013 001114 MOVB #13,$ITEMB ;ERROR TABLE INDEX
3387 013354 004737 012130 JSR PC,TYPERR ;DISPLAY WORD THAT DIDN'T COMPARE
3388 013360 000207 3$: RTS PC ;RETURN
3389
3390 ;LAST LINE OF COMPARE ERROR REPORTING
3391
3392 013362 005737 013150 ENDCMP: TST ERCTR ;SEE IF ANY ERRORS
3393 013366 001405 BEQ 1$ ;BR IF NONE
3394 013370 104014 ERROR 14 ;NUMBER OF COMPARE ERRORS
3395 013372 004737 007616 JSR PC,INCTOT ;INCREMENT TOTAL ERROR COUNT
3396 013376 062706 000002 ADD #2,SP ;RETURN TO MAIN ROUTINE
3397 013402 000207 1$: RTS PC ;RETURN
3398
3399 ;FIND THE CORRECT PATTERN - RETURN WITH ADDRESS OF PATTERN IN R4
3400 ; RETURN +2 IF PATTERN CAN'T BE FOUND
3401
3402 013404 010146 MATCH: MOV R1,-(SP) ;SAVE R1 ON THE STACK
3403 013406 012704 000044 MOV #44,R4 ;PATTERN TABLE INDEX
3404 013412 011601 1$: MOV (SP),R1 ;RELOAD R1
3405 013414 162704 000002 SUB #2,R4 ;DECREMENT INDEX
3406 013420 016405 025764 MOV STNDAT(R4),RS ;ADDRESS OF PATTERN ADDRESS
3407 013424 001411 BEQ 3$ ;BR IF ALL PATTERNS CHECKED AND NO MATCH
3408 ; FOUND
3409 013426 012703 000004 2$: MOV #4,R3 ;NUMBER OF LOCATIONS TO CHECK
3410 013432 022125 CMP (R1)+,(RS)+ ;COMPARE THE BUFFER AGAINST THE PATTERN
3411 013434 001366 BNE 1$ ;BR IF NOT EQUAL, TRY NEXT PATTERN
3412 013436 005303 DEC R3 ;FINISHED CHECKING?
3413 013440 001374 BNE 2$ ;BR IF NOT FINISHED
3414 013442 062704 025764 ADD #STNDAT,R4 ;MAKE PATTERN ADDRESS ABSOLUTE
3415 013446 000403 BR 4$ ;EXIT
3416 013450 062766 000002 3$: ADD #2,2(SP) ;INCREMENT RETURN ADDRESS
3417 013456 012601 4$: MOV (SP)+,R1 ;RESTORE R1

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# K06

MD-11-DZRP1-8, RPI1E MULTI-DRIVE EXERCISER PROGRAM  
DZRP18.CMB      END OF ORDER PROCESSING

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013460 000207                    RTS      PC                    ;RETURN
                                 ;ORDER TERMINATED WITH AN ERROR - PROCESS THE ERROR
013462 032760 000200 000016 ERPROC: BIT      #BIT07,STATUS(RO) ;DONE BIT SET ?
013470 001402                    BEQ      ERPRC1       ;BR IF ORDER DIDN'T COMPLETE NORMALLY
013472 000137 013662            JMP      DONE       ;PROCESS ERROR WITH 'DONE' BIT SET
                                 ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE NOT' BITS
013476 032760 000400 000016 ERPRC1: BIT      #BIT08,STATUS(RO) ;WAS A 'RESET' ISSUED ?
013504 001405                    BEQ      IS           ;BR IF NOT
013506 012777 000100 165430      MOV      #BIT06,STKS ;RESTORE TTY KEYBOARD INTERRUPT
013514 004737 006762            JSR      PC,CKCLK   ;START THE CLOCK
013520 032760 040000 000016 IS:    BIT      #BIT14,STATUS(RO) ;UNIT WENT OFFLINE ?
013526 001022                    BNE      OFLIN       ;BR IF IT DID
013530 032760 020000 000016      BIT      #BIT13,STATUS(RO) ;BAD COMMAND CODE USED ?
013536 001023                    BNE      BADOP       ;BR IF SO
013540 032760 010000 000016      BIT      #BIT12,STATUS(RO) ;SEE IF DRIVE WAS UNSAFE
013546 001021                    BNE      UNSAF       ;BR IF IT WENT UNSAFE
013550 032760 001000 000016      BIT      #BIT09,STATUS(RO) ;TIMEOUT DURING POSITIONING ?
013556 001022                    BNE      TIMPOS      ;BR IF YES
013560 032760 000400 000016      BIT      #BIT8,STATUS(RO) ;TIMEOUT DURING I/O
013566 001023                    BNE      TIMIO       ;BR IF YES
013570 104043                    ERROR    43           ;INVALID STATUS CODE
013572 000207                    RTS      PC           ;RETURN
                                 ;DRIVE WENT OFFLINE
013574 104021                    OFLIN:    ERROR    21           ;DRIVE WENT OFFLINE
013576 004737 007616            JSR      PC,INCTOT ;INCREMENT TOTAL ERROR COUNT
013602 000137 011226            JMP      DROP       ;DEASSIGN THE DRIVE
                                 ;PROGRAM TRIED TO GIVE THE DRIVE A BAD COMMAND
013606 104002                    BADOP:    ERROR    2           ;INVALID COMMAND ATTEMPTED
013610 000207                    RTS      PC           ;RETURN
                                 ;DRIVE IS UNSAFE
013612 104022                    UNSAF:    ERROR    22           ;DRIVE UNSAFE
013614 004737 007616            JSR      PC,INCTOT ;INCREMENT TOTAL ERROR COUNT
013620 000137 011226            JMP      DROP       ;DEASSIGN THE DRIVE
                                 ;DRIVE TIMED OUT DURING POSITIONING
013624 104017                    TIMPOS:    ERROR    17           ;DRIVE TIMED OUT DURING POSITIONING
013626 004737 007616            JSR      PC,INCTOT ;INCREMENT THE 'TOTAL' ERROR COUNT
013632 000137 011226            JMP      DROP       ;DEASSIGN THE DRIVE
                                 ;DRIVE TIMED OUT DURING A DATA TRANSFER
013636 104020                    TIMIO:    ERROR    20           ;DRIVE TIMED OUT DURING I/O
013640 004737 007616            JSR      PC,INCTOT ;INCREMENT THE 'TOTAL' ERROR COUNT
013644 012777 000100 165272      MOV      #BIT06,STKS ;RESTORE THE TTY KEYBOARD INTERRUPT ENABLE
013652 004737 006762            JSR      PC,CKCLK   ;RESTART THE CLOCK

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3474 013656 000137 011226          JMP      DROP          ;DEASSIGN THE DRIVE
3475
3476          ;PROCESS ORDER COMPLETION WITH 'ERROR' & 'DONE' BITS SET
3477
3478 013662 022760 000002 000070  DONE:  CMP      #EOP,$RPER(RO) ;END OF PACK ?
3479 013670 001475          BEQ      IS           ;BR IF EOP, OPERATION OVERFLOWED
3480 013672 022760 000010 000070          CMP      #WCE,$RPER(RO) ;WRITE CHECK ERROR ONLY ?
3481 013700 001002          BNE      .+6         ;BR IF NOT
3482 013702 000137 014066          JMP      WCEER        ;REPORT THE WRITE CHECK ERROR
3483 013706 032760 100000 000070          BIT      #WPV,$RPER(RO) ;WRITE PROTECTION VIOLATION ?
3484 013714 001402          BEQ      .+6         ;BR IF NOT
3485 013716 000137 014076          JMP      WPVER        ;REPORT THE WRITE PROTECTION VIOLATION
3486 013722 032760 040000 000070          BIT      #FUV,$RPER(RO) ;FILE UNSAFE ?
3487 013730 001402          BEQ      .+6         ;BR IF NOT
3488 013732 000137 013612          JMP      UNSAF        ;REPORT THE UNSAFE
3489 013736 032760 004000 000066          BIT      #SUSI,$RPDS(RO) ;SEEK INCOMPLETE ?
3490 013744 001402          BEQ      .+6         ;BR IF NOT
3491 013746 000137 014424          JMP      SKIER        ;PROCESS IT
3492 013752 032760 034000 000070          BIT      #NXC!NXT!NXS,$RPER(RO) ;INVALID DISK ADDRESS ?
3493 013760 001402          BEQ      .+6         ;BR IF NOT
3494 013762 000137 014106          JMP      BDAOR        ;REPORT INVALID DISK ADDRESS
3495 013766 032760 012000 000070          BIT      #PROG!MODE,$RPER(RO) ;CONTROLLER ERROR ?
3496 013774 001402          BEQ      .+6         ;BR IF NOT
3497 013776 000137 014116          JMP      CNTRLR       ;REPORT THE CONTROLLER ERROR
3498 014002 032760 000024 000070          BIT      #TIMEE!NXME,$RPER(RO) ;INTERFACE (UNIBUS) ERROR ?
3499 014010 001402          BEQ      .+6         ;BR IF NOT
3500 014012 000137 014126          JMP      INTRFA       ;REPORT THE ERROR
3501 014016 032760 001000 000070          BIT      #FMTE,$RPER(RO) ;FORMAT ERROR ?
3502 014024 001402          BEQ      .+6         ;BR IF NOT
3503 014026 000137 014136          JMP      FMTERR       ;PROCESS THE FORMAT ERROR
3504 014032 032760 010000 000066          BIT      #HNF,$RPDS(RO) ;HEADER NOT FOUND ?
3505 014040 001402          BEQ      .+6         ;BR IF NOT SET
3506 014042 000137 014460          JMP      CKHNF        ;PROCESS THE ERROR
3507 014046 032760 000340 000070          BIT      #LPE!WPE!CSME,$RPER(RO) ;DATA ERROR ?
3508 014054 001402          BEQ      .+6         ;BR IF NOT
3509 014056 000137 014622          JMP      DATER        ;REPORT THE DATA ERROR
3510 014062 104043          ERROR   43          ;ERROR REPORT BUT NO BITS SET
3511 014064 000207          IS:    RTS         PC          ;RETURN
3512
3513          ;REPORT A WRITE CHECK ERROR (DATA CHECK BITS NOT SET)
3514
3515 014066 104032          WCEER: ERROR   32          ;WRITE CHECK (DATA CHECK BITS NOT SET)
3516 014070 004737 007616          JSR      PC,INCTOT    ;INCREMENT 'TOTAL' ERROR COUNT
3517 014074 000207          RTS         PC          ;RETURN
3518
3519          ;REPORT WRITE PROTECTION VIOLATION
3520
3521 014076 104044          WPVER: ERROR   44          ;WRITE PROTECTION VIOLATION
3522 014100 004737 007616          JSR      PC,INCTOT    ;INCREMENT 'TOTAL' ERROR COUNT
3523 014104 000207          RTS         PC          ;RETURN
3524
3525          ;REPORT INVALID DISK ADDRESS ('NXC', 'NXT', 'NXS')
3526
3527 014106 104026          BDAOR: ERROR   26          ;INVALID DISK ADDRESS
3528 014110 004737 007616          JSR      PC,INCTOT    ;INCREMENT 'TOTAL' ERROR COUNT
3529 014114 000207          RTS         PC          ;RETURN

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3530
3531 ;REPORT CONTROLLER ERROR ('PROG' & 'MODE')
3532
3533 014116 104025 CNTRLR: ERROR 25 ;REPORT CONTROLLER ERROR
3534 014120 004737 007616 JSR PC,INCTOT ;INCREMENT 'TOTAL' ERROR COUNT
3535 014124 000207 RTS PC ;RETURN
3536
3537 ;REPORT UNIBUS INTERFACE ERROR ('TIMEE' & 'NXME')
3538
3539 014126 104024 INTRFA: ERROR 24 ;REPORT UNIBUS ERROR
3540 014130 004737 007616 JSR PC,INCTOT ;INCREMENT 'TOTAL' ERROR COUNT
3541 014134 000207 RTS PC ;RETURN
3542
3543 ;REPORT FORMAT ERROR
3544
3545 014136 122760 000007 000002 FMterr: CMPB #WRTCHK,$COMND(RO) ;WRITE CHECK OPERATION ?
3546 014144 001404 BEQ 1$ ;BR IF WRITE CHECK
3547 014146 132760 000004 000002 BITB #BITG2,$COMND(RO) ;WRITE COMMAND ?
3548 014154 001010 BNE 2$ ;BR IF NOT
3549 014156 016046 000076 1$: MOV $RPBA(RO),-(SP) ;PUT PRESENT BUFFER ADDRESS ON THE STACK
3550 014162 166016 000006 SUB $BUF(RO),(SP) ;SUBTRACT STARTING ADDRESS
3551 014166 022726 000200 CMP #128.,(SP)+ ;SILO FILLED OR HAS XFER TO DISK STARTED ?
3552 014172 103074 BHIS 6$ ;BR IF NOT
3553 014174 000404 BR 3$
3554 014176 026060 000006 000076 2$: CMP $BUF(RO),$RPBA(RO) ;READ TRANSFER STARTED ?
3555 014204 001467 BEQ 6$ ;BR IF NOT
3556 014206 104045 3$: ERROR 45 ;FORMAT ERROR DURING I/O
3557 014210 162706 000004 SUB #4,SP ;MAKE ROOM ON THE STACK
3558 014214 004737 006666 JSR PC,READR ;ADJUST SECTOR/TRACK ADDRESSES
3559 014220 112660 000013 MOVB ($SP)+,$TRK(RO) ;MOVE THE TRACK ADDRESS
3560 014224 112660 000012 MOVB ($SP)+,$SEC(RO) ;MOVE THE SECTOR ADDRESS
3561 014230 016060 000106 000010 MOV $SUCA(RO),$CYL(RO) ;USE PRESENT CYLINDER ADDRESS
3562 014236 022760 000400 000020 CMP #256.,$WRDL(RO) ;WAS INITIAL TRANSFER TO BE GREATER
3563 ; THAN 1 SECTOR ?
3564 014244 103015 BHIS 4$ ;BR IF NOT
3565 014246 004737 005056 JSR PC,RELBUF ;RELEASE PRESENT BUFFER
3566 014252 012760 003400 000020 MOV #256.,$WRDL(RO) ;SETUP FOR THE FAILING SECTOR
3567 014260 012760 177400 000004 MOV #-256.,$WRDM(RO) ;WORD COUNT (2'S COMPLEMENT)
3568 014266 005046 CLR -(SP) ;CLEAR THE STACK
3569 014270 004737 004720 JSR PC,GETBUF ;GET NEW BUFFER
3570 014274 012660 000006 MOV ($SP)+,$BUF(RO) ;LOAD BUFFER ADDRESS
3571 014300 012737 001001 015572 4$: MOV #FMTE!DSKERR,MASK ;ERROR MASK FOR RETRY
3572 014306 112737 000012 015571 MOVB #10.,$RETRY+1 ;RETRY LIMIT
3573 014314 004737 007616 JSR PC,INCTOT ;INCREMENT 'TOTAL' ERROR COUNT
3574 014320 004737 015472 JSR PC,RETRY ;RETRY THE OPERATION
3575 014324 000411 BR 5$ ;RETRY GOOD
3576 014326 004737 015350 JSR PC,RECALT ;RECTOR (PART OF STANDARD RECOVERY)
3577 014332 004737 015472 JSR PC,RETRY ;RETRY AGAIN
3578 014336 000404 BR 5$ ;RETRY GOOD
3579 014340 104042 ERROR 42 ;UNSUCCESSFUL RETRY
3580 014342 004737 007544 JSR PC,INCHRD ;INCREMENT 'HARD' ERROR COUNT
3581 014346 000425 BR 8$ ;EXIT
3582 014350 104041 5$: ERROR 41 ;SUCCESSFUL RETRY
3583 014352 004737 007526 JSR PC,INCSOF ;INCREMENT 'SOFT' ERROR COUNT
3584 014356 004737 012534 JSR PC,CMPAR ;COMPARE THE BUFFER
3585 014362 000417 BR 8$ ;EXIT

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3586 014364 104035          6S:  ERROR 35          ;FORMAT ERROR SEARCHING FOR INITIAL SECTOR
3587 014366 004737 007616      JSR    PC,INCTOT      ;INCREMENT 'TOTAL' ERROR COUNT
3588 014372 012737 001001 015572  MOV    #FMTE!DSKERR,MASK ;ERROR MASK FOR RETRY
3589 014400 112737 000001 015571  MOVB  #1,$RETRY+1     ;RETRY COUNT
3590 014406 004737 015472      JSR    PC,RETRY       ;RETRY THE ORDER
3591 014412 000402          BR     7S             ;GOOD RETRY
3592 014414 104042          ERROR 42             ;UNSUCCESSFUL RETRY
3593 014416 000401          BR     8S             ;EXIT
3594 014420 104041          7S:  ERROR 41             ;SUCCESSFUL RETRY
3595 014422 000207          8S:  RTS    PC         ;RETURN
3596
3597          ;REPORT SEEK INCOMPLETE
3598
3599 014424 016037 000032 001124  SKIER: MOV    $PREVA+2(RO), $GDDAT ;PREVIOUS CYLINDER ADDRESS
3600 014432 016037 000010 001126      MOV    $CYL(RO), $BDDAT ;DESTINATION CYLINDER
3601 014440 104023          ERROR 23             ;SEEK INCOMPLETE
3602 014442 004737 007616      JSR    PC,INCTOT      ;INCREMENT 'TOTAL' ERROR COUNT
3603 014446 004737 007562      JSR    PC,INCSKI     ;INCREMENT 'SUSI' ERROR COUNT
3604 014452 004737 015350      JSR    PC,RECALT     ;RESTORE
3605 014456 000207          RTS    PC             ;RETURN
3606
3607          ;REPORT HEADER NOT FOUND ERROR OR POSITIONING ERROR
3608
3609 014460 116046 000102  CKHNF: MOVB  $RPDA(RO), -(SP) ;SECTOR ADDRESS ON THE STACK
3610 014464 042716 000360      BIC    #360, (SP)     ;CLEAR THE 'SOT' BITS
3611 014470 116046 000103      MOVB  $RPDA+1(RO), -(SP) ;TRACK ADDRESS
3612 014474 004737 015402      JSR    PC,READHD     ;READ THE HEADER FROM THE INITIAL SECTOR
3613 014500 032737 100000 025436  BIT    #ERR, GENREG+RPER ;ERROR DURING OPERATION ?
3614 014506 001041          BNE    1S             ;BR IF ERROR
3615 014510 013737 033640 001126  MOV    CYLDER+2, $BDDAT ;CYLINDER FROM HEADER
3616 014516 006237 001126      ASR    $BDDAT         ;SHIFT CYLINDER ADDRESS
3617 014522 006237 001126      ASR    $BDDAT         ;SHIFT CYLINDER ADDRESS
3618 014526 006237 001126      ASR    $BDDAT         ;SHIFT CYLINDER ADDRESS
3619 014532 006237 001126      ASR    $BDDAT         ;SHIFT CYLINDER ADDRESS
3620 014536 006237 001126      ASR    $BDDAT         ;SHIFT CYLINDER ADDRESS
3621 014542 006237 001126      HSR    $BDDAT         ;SHIFT CYLINDER ADDRESS
3622 014546 026037 000106 001126  CMP    $SUCA(RO), $BDDAT ;AT CORRECT CYLINDER ?
3623 014554 001416          BEQ    1S             ;BR IF AT CORRECT CYLINDER
3624 014556 016037 000032 001124  MOV    $PREVA+2(RO), $GDDAT ;PREVIOUS CYLINDER ADDRESS
3625 014564 104036          ERROR 36             ;POSITIONING ERROR
3626 014566 004737 007600      JSR    PC,INCMIS     ;INCREMENT POSITIONING ERROR COUNT
3627 014572 004737 015350      JSR    PC,RECALT     ;RESTORE THE DRIVE
3628 014576 016037 000106 000032  MOV    $SUCA(RO), $PREVA+2 ;SAVE PREVIOUS CYLINDER
3629 014604 005060 000010      CLR    $CYL(RO)      ;RESET CURRENT CYLINDER
3630 014610 000401          BR     2S             ;CLEAN UP, THEN EXIT
3631 014612 104034          1S:  ERROR 34             ;HEADER NOT FOUND ERROR
3632 014614 004737 007616          2S:  JSR    PC,INCTOT      ;INCREMENT 'TOTAL' ERROR COUNT
3633 014620 000207          RTS    PC             ;RETURN
3634
3635          ;REPORT DATA ERROR ('LPE', 'WPE', & 'CSME')
3636
3637 014622 032760 000010 000070  DATER: BIT    #WCE, $APER(RO) ;WRITE CHECK ERROR ALSO ?
3638 014630 001402          BEQ    1S             ;BR IF NOT
3639 014632 104033          ERROR 33             ;REPORT WRITE CHECK WITH DATA CHECK
3640 014634 000403          BR     2S             ;CONTINUE
3641 014636 104027          1S:  ERROR 27             ;DATA ERROR

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3642 014640 004737 015144          JSR    PC,PRTBAD      ;TYPE THE BAD SECTOR
3643 014644 004737 007616      2$:   JSR    PC,INCTOT   ;INCREMENT 'TOTAL' ERROR COUNT
3644 014650 162706 005004          SUB    #4,SP          ;MAKE ROOM ON THE STACK
3645 014654 004737 005566          JSR    PC,READOR     ;ADJUST SECTOR, TRACK ADDRESSES
3646 014660 112660 003013          MOV    (SP)+,$TRK(RO) ;MOVE THE TRACK ADDRESS
3647 014664 112660 000012          MOV    (SP)+,$SEC(RO) ;MOVE THE SECTOR ADDRESS
3648 014670 016060 000106 000010  MOV    $SUCA(RO),$CYL(RO) ;USE PRESENT CYLINDER ADDRESS
3649 014676 022760 000400 000020  CMP    #256.,$WRDL(RO) ;INITIAL TRANSFER SIZE LARGER
3650                                     ;THAN 1 SECTOR ?
3651 014704 103023          BHS    3$           ;BR IF NOT
3652 014706 004737 005056          JSR    PC,RELBUF     ;RELEASE THE PRESENT BUFFER
3653 014712 012760 000400 000020  MOV    #256.,$WRDL(RO) ;SETUP FOR 1 SECTOR
3654 014720 012760 177400 000004  MOV    #-256.,$WRDL(RO) ;WORD COUNT
3655 014726 005046          CLR    -(SP)        ;CLEAR THE STACK
3656 014730 004737 004720          JSR    PC,GETBUF     ;GET NEW BUFFER
3657 014734 012660 000036          MOV    (SP)+,$BUF(RO) ;LOAD BUFFER ADDRESS
3658 014740 022760 000007 000002  CMP    #WATCH,$COMMAND(RO) ;IS THE COMMAND A WRITE CHECK ?
3659 014746 001002          BNE    3$           ;BR IF NOT
3660 014750 004737 005304          JSR    PC,FILBUF     ;REFILL THE BUFFER
3661 014754 012737 000350 015572 3$:   MOV    #MACE!LPE!MPE!CSME,MASK ;RETRY MASK
3662 014762 112737 000012 015571  MOV    #10.,$RETRY+1 ;RETRY LIMIT
3663 014770 004737 015472          JSR    PC,RETRY      ;RETRY THE SECTOR
3664 014774 000413          BR     4$           ;RETRY GOOD
3665 014776 004737 015350          JSR    PC,RECALT     ;RESTORE THE DRIVE
3666 015002 004737 015472          JSR    PC,RETRY      ;RETRY 10 MORE TIMES
3667 015006 000406          BR     4$           ;RETRY GOOD
3668 015010 104031          EPROR 31           ;HARD ERROR
3669 015012 004737 007544          JSR    PC,INCHRD     ;INCREMENT 'HARD' ERROR COUNT
3670 015016 004737 015144          JSR    PC,PRTBAD     ;PRINT BAD SECTOR ?
3671 015022 000405          BR     5$           ;EXIT
3672 015024 104030          4$:   EPROR 30           ;SOFT ERROR
3673 015026 004737 007526          JSR    PC,INCSOF     ;INCREMENT 'SOFT' ERROR COUNT
3674 015032 004737 012534          JSR    PC,CMPAR      ;COMPARE THE BUFFER
3675 015036 000207          5$:   RTS    PC          ;RETURN
3676
3677
3678                                     ;REPORT AN 'UNKNOWN' DATA PATTERN
3679
3680 015040 010346          NONTCH: MOV    R3,-(SP) ;SAVE R3
3681 015042 112737 000010 001114  MOV    #10,$ITEMB ;ERROR TABLE INDEX
3682 015050 004737 012130          JSR    PC,TYPEERR   ;CAN'T MATCH PATTERN WITH DATA READ
3683 015054 012703 000004          MOV    #4,R3        ;WORD COUNTER
3684 015060 010137 001122          1$:   MOV    R1,$BADDR   ;ADDRESS OF WORD
3685 015064 012137 001126          MOV    (R1)+,$BODAT ;WORD
3686 015070 112737 000011 001114  MOV    #11,$ITEMB ;ERROR TABLE INDEX
3687 015076 004737 012130          JSR    PC,TYPEERR   ;DISPLAY THE PATTERN 'SEED'
3688 015102 005303          DEC    R3           ;DECREMENT WORD COUNTER
3689 015104 001365          BNE    1$          ;BR IF NOT DONE
3690 015106 062701 000770          ADD    #770,R1      ;INCREMENT BUFFER POINTER
3691 015112 060237 013150          ADD    R2,ERRCTR    ;ADD SECTOR (OR LESS) COUNT TO THE
3692                                     ;COMPARISON ERROR COUNT
3693 015116 005002          CLR    R2           ;CLEAR 'WORDS TO COMPARE' COUNT IN R2
3694 015120 112737 177777 013143  MOV    #-1,FRSTER   ;SET 'NOT FIRST ERROR' INDICATOR
3695 015126 012603          MOV    (SP)+,R3     ;RESTORE R3
3696 015130 032777 100000 164002  BIT    #SW15,$SWR    ;HALT ON ERROR ?
3697 015136 001401          BEQ    2$          ;BR IF NOT

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3698 015140 000000          HALT          ;ERROR HALT
3699 015142 000207          25:      RTS          PC          ;RETURN
3700
3701          ;ROUTINE TO DISPLAY THE SECTOR WHICH GAVE THE HARD ERROR
3702
3703 015144 032777 000010 163766 PRTBAD: BIT      #SW3,2SWR      ;PRINT THE BAD SECTOR ?
3704 015152 001475          BEQ      7$          ;BR IF NOT
3705 015154 032777 020000 163756 BIT      #SW13,2SWR     ;INHIBIT ERROR TYPEOUTS
3706 015162 001071          BNE      7$          ;BR IF INHIBIT
3707 015164 122760 000007 000002 CMPB    #WRTCHK,$COMND(RO) ;PRESENT COMMAND A WRITE CHECK ?
3708 015172 001465          BEQ      7$          ;BR IF IT IS
3709 015174 032760 000004 000002 BIT      #BIT02,$COMND(RO) ;PRESENT COMMAND A WRITE ?
3710 015202 001461          BEQ      7$          ;BR IF IT IS
3711 015204 016001 000076          MOV     $PPBA(RO),R1    ;PUT THE END ADDRESS INTO R1
3712 015210 016046 000020          MOV     $RUL(RO),-(SP) ;FIND THE BEGINNING OF THE SECTOR
3713 015214 066016 000074          ADD     $RPMC(RO),(SP) ;SUBTRACT THE WORDS NOT TRANSFERRED
3714 015220 005046          CLR     -(SP)         ;MAKE THE UPPER DIVIDEND 0
3715 015222 012746 000400          MOV     #256, -(SP)   ;DIVIDE THE WORDS TRANSFERRED BY THE SECTOR SIZE
3716 015226 004737 020000          JSR     PC,$DIV       ;DIVIDE
3717 015232 005716          TST     (SP)         ;REMAINDER = 0 ?
3718 015234 001403          BEQ     1$          ;BR IF IT IS - COMPLETE SECTOR TRANSFERRED
3719 015236 006316          RSL     (SP)         ;CONVERT THE RESIDUAL SECTOR SIZE INTO BYTE COUNT
3720 015240 161601          SUB     (SP),R1      ;SUBTRACT IT FROM THE END ADDRESS
3721 015242 000402          BR      2$          ;FINISH THE SIZING
3722 015244 162701 001000          15:    SUB     #1000,R1  ;SUBTRACT FULL SECTOR SIZE FROM END ADDR
3723 015250 062706 000004          25:    ADD     #4,SP    ;RESTORE THE STACK POINTER
3724 015254 104401 032404          TYPE   ,LINITH      ;PRINT THE HEADER
3725 015260 032777 000010 163652 35:    BIT      #SW03,2SWR     ;PRINT ANY MORE OF THE SECTOR
3726 015266 001420          BEQ     5$          ;BR IF NOT
3727 015270 012702 000007          MOV     #7,R2       ;R2 CONTAINS THE WORDS/LINE COUNT
3728 015274 010146          MOV     R1,-(SP)    ;PUT THE ADDRESS ON THE STACK
3729 015276 104402          TYPOC          ;PRINT IT
3730 015300 020160 000076          45:    CMP     R1,$RPBA(RO) ;PRINTED ALL THE SECTOR ?
3731 015304 001411          BEQ     5$          ;BR IF ALL PRINTED
3732 015306 104401 032500          TYPE   ,SPACE2      ;SPACES
3733 015312 012146          MOV     (R1)+,-(SP) ;PUT THE DATA ON THE STACK
3734 015314 104402          TYPOC          ;PRINT IT
3735 015316 005302          DEC     R2         ;DECREMENT THE HORIZONTAL COUNT
3736 015320 001367          BNE     4$          ;BR IF NOT AT THE END OF THE LINE
3737 015322 104401 001213          TYPE   ,$CRLF       ;CR-LF
3738 015326 000754          BR      3$          ;RESTORE THE WORDS/LINE COUNT
3739 015330 104401 001213          55:    TYPE   ,$CRLF       ;PRINT WHAT REMAINS IN THE BUFFER
3740 015334 032777 100000 163576 65:    BIT      #SW15,2SWR     ;HALT ON ERROR ?
3741 015342 001401          BEQ     7$          ;BR IF NOT
3742 015344 000000          HALT          ;HALT
3743 015346 000207          75:    RTS          PC          ;RETURN
3744
3745          ;ROUTINE TO DO A HOME SEEK - DRIVE SELECTED IN RO
3746          ;ENTER AT 'RECALO' IF UNIT NUMBER ALREADY LOADED
3747          ;INTO 'GENDPB'
3748
3749 015350 111037 025414          RECALO: MOVB    (RO),GENDPB ;MOVE THE UNIT # TO THE GENERAL DPB
3750 015354 112737 000015 025416 RECALO: MOVB    #HOMSEK,GENDPB+$COMND ;HOME SEEK COMMAND
3751 015362 004037 021566          JSR     RO,RP11     ;DRIVER ENTRANCE
3752 015366 025414          GENDPB          ;DPB ADDRESS FOR ORDER
3753 015370 000000          HALT          ;DRIVER DIDN'T ACCEPT THE ORDER

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3754 015372 005737 025432 15: TST GENDPB+STATUS ;SEE IF FINISHED
3755 015376 001775 ;BEQ 15 ;BR IF NOT FINISHED
3756 015400 000207 ;RTS PC ;RETURN
3757
3758 ;UTILITY READ HEADER ROUTINE
3759 ; ENTER WITH TRACK AND SECTOR ADDRS ON THE STACK
3760
3761 015402 116637 000002 025427 READHD: MOVB 2(SP),GENDPB+STRK ;TRACK ADDRESS
3762 015410 116637 000004 025426 MOVB 4(SP),GENDPB+SSEC ;SECTOR ADDRESS
3763 015416 111037 025414 MOVB (R0),GENDPB ;DRIVE NUMBER
3764 015422 016037 000106 025424 MOV SSUCA(R0),GENDPB+CYL ;CYLINDER ADDRESS
3765 015430 012737 014000 025416 MOV #MODE!HDR,GENDPB+SCOMD ;MODE AND HEADER BITS
3766 015436 112737 000017 025416 MOVB #READ,GENDPB+SCOMD ;READ COMMAND
3767 015444 004037 021566 JSR R0,RP11 ;DRIVER ENTRANCE
3768 015450 025414 GENDPB ;DPB ADDRESS FOR ORDER
3769 015452 000000 HALT ;DRIVER DIDN'T ACCEPT COMMAND
3770 015454 005737 025432 15: TST GENDPB+STATUS ;FINISHED?
3771 015460 001775 ;BEQ 15 ;BR IF NOT
3772 015462 012666 000002 MOV (SP)+,2(SP) ;ADJUST STACK FOR RETURN
3773 015464 005726 TST (SP)+
3774 015470 000207 ;RTS PC ;RETURN
3775
3776 ;RETRY THE PRESENT OPERATION
3777 ; RETURN IF RETRY SUCCESSFUL
3778 ; RETURN+2 IF RETRY UNSUCCESSFUL
3779 ; RETURN TO MAIN PROGRAM IF DIFFERENT ERROR OCCURS
3780
3781 015472 105037 015570 RETRY: CLRB $RETRY ;CLEAR RETRY COUNTER
3782 015476 004737 005434 15: JSR PC,GOORIV ;RE-START ORDER
3783 015502 005760 000016 25: TST $STATUS(R0) ;ORDER FINISHED?
3784 015506 001775 ;BEQ 25 ;BR IF NOT
3785 015510 100403 ;E-I 25 ;BR IF ERROR
3786 015512 105237 015570 INCB $RETRY ;INCREMENT RETRY COUNT
3787 015516 000420 BR 65 ;GO TO EXIT, SUCCESSFUL RETRY
3788 015520 032760 000200 000016 35: BIT #BIT7,$STATUS(R0) ;DID ORDER TERMINATE NORMALLY?
3789 015526 001415 ;BEQ 75 ;BR IF NOT
3790 015530 033760 015572 000070 BIT MASK,$RPER(R0) ;SAME ERROR?
3791 015536 001415 ;BEQ 75 ;BR IF NOT
3792 015540 105237 015570 55: INCB $RETRY ;INCREMENT RETRY COUNT
3793 015544 123737 015570 015571 CMPB $RETRY,$RETRY+1 ;REACHED RETRY LIMIT?
3794 015552 001351 BNE 15 ;BR IF NOT
3795 015554 062716 000002 ADD #2,(SP) ;INCREMENT RETURN, UNSUCCESSFUL RETRY
3796 015560 000207 65: RTS PC ;RETURN
3797 015562 104037 75: ERROR 37 ;DIFFERENT ERROR DURING RETRY
3798 015564 005726 TST (SP)+ ;ADJUST STACK POINTER FOR DIRECT RETURN
3799 015566 000207 ;RTS PC ;RETURN
3800
3801 015570 000 000 $RETRY: .BYTE 0,0 ;RETRY LIMIT & RETRY COUNTER
3802 015572 000000 MASK: .WORD 0 ;ERROR MASK
3803
3804 ;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO
3805 ;AN UNSIGNED DECIMAL ASCII NUMBER.
3806
3807 ;CALL
3808 ; MOV #NUMBER,-(SP) ;PUT THE BINARY NUMBER ON THE STACK
3809 ; JSR PC,$S820 ;CALL
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3811 ;
3812 ;
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3810          RETURN ; ADDRESS OF 1ST CHARACTER IS ON THE STACK
3811          ;
3812          ; NOTE: THIS FORM OF '$SB20' MUST BE USED, THE PROGRAM CANNOT USE THE
3813          ; VERSION OF THIS ROUTINE WHICH IS ON THE SYSMAC LIBRARY, REV C OR LATER.
3814          ;
3815 015574 016637 000002 015620 $SB20: MOV 2(SP), 1$ ; SAVE THE BINARY NUMBER
3816 015602 012746 015620      MOV 1$, -(SP) ; SET POINTER
3817 015606 004737 020624      JSR PC, $SB20 ; CALL DOUBLE LENGTH CONVERT
3818 015612 012666 000002      MOV (SP)+, 2(SP) ; PICKUP THE POINTER
3819 015616 000207      RTS PC ; RETURN
3820 015620 000000 000000 1$: .WORD 0,0
3821          ;
3822          ; *****
3823          .SBTTL MACRO ROUTINES
3824          .SBTTL ERROR HANDLER ROUTINE
3825          ;
3826          ; *****
3827          ; *THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
3828          ; *SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
3829          ; *AND GO TO TYPERR ON ERROR
3830          ; *THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
3831          ; *SW15=1 HALT ON ERROR
3832          ; *SW13=1 INHIBIT ERROR TYPEOUTS
3833          ; *SW10=1 BELL ON ERROR
3834          ; *CALL
3835          ; * ERROR N ;; ERROR=EMT AND N=ERROR ITEM NUMBER
3836          ;
3837          ;
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4000          ;

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3866 015766 001402          BEQ      1S          ;; NO - SKIP
3867 015770 104401 001206    TYPE     $BELL      ;; RING BELL
3868 015774 005237 001112    1S:     $ERTTL      ;; COUNT THE NUMBER OF ERRORS
3869 016000 011637 001116    MOV      (SP), $ERRPC ;; GET ADDRESS OF ERROR INSTRUCTION
3870 016004 162737 000002 001116    SUB      #2, $ERRPC
3871 016012 117737 163100 001114    MOV      @($ERRPC, $ITEMB) ;; STRIP AND SAVE THE ERROR ITEM CODE
3872 016020 032777 020000 163112    BIT      @BIT13, @SWR    ;; SKIP TYPEOUT IF SET
3873 016026 001004          BNE     20S        ;; SKIP TYPEOUTS
3874 016030 004737 012130    JSR     PC, $TYPERR    ;; GO TO USER ERROR ROUTINE
3875 016034 104401 001213    TYPE     , $CRLF
3876 016040          20S:
3877 016040 005777 163074    2S:     TST      @SWR    ;; HALT ON ERROR
3878 016044 101002          BPL     3S        ;; SKIP IF CONTINUE
3879 016046 001000          HALT
3880 016050 101407          CKSWR   ;; HALT ON ERROR!
3881 016052          3S:           ;; TEST FOR CHANGE IN SOFT-SWR
3882 016052 000002          RTI           ;; RETURN
    
```

.SBTTL TYPE ROUTINE

```

*****
; ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
; THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
; NOTE1: $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
; NOTE2: $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
; NOTE3: $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
    
```

```

; CALL:
; 1) USING A TRAP INSTRUCTION
;     TYPE ,MESADR ;; MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
; OR
;     TYPE
;     MESADR
    
```

```

3901 016054 105737 001157    $TYPE: TSTB     $TPFLG  ;; IS THERE A TERMINAL?
3902 016060 100002          BPL     1S        ;; BR IF YES
3903 016062 001000          HALT          ;; HALT HERE IF NO TERMINAL
3904 016064 001007          BR      3S        ;; LEAVE
3905 016066 010046    1S:     MOV      RO, -(SP) ;; SAVE RO
3906 016070 017600 000002    MOV      @2(SP), RO    ;; GET ADDRESS OF ASCIZ STRING
3907 016074 112046    2S:     MOV      (RO)+, -(SP) ;; PUSH CHARACTER TO BE TYPED ONTO STACK
3908 016076 001005          EIE     4S        ;; BR IF IT ISN'T THE TERMINATOR
3909 016100 005726          TST     (SP)+        ;; IF TERMINATOR POP IT OFF THE STACK
3910 016102 012600    60S:   MOV      (SP)+, RO    ;; RESTORE RO
3911 016104 062716 000002    3S:     ADD      #2, (SP)  ;; ADJUST RETURN PC
3912 016110 001002          RTI
3913 016112 122716 000011    4S:     CMPB     @HT, (SP)  ;; BRANCH IF <HT>
3914 016116 001430          BEQ     8S
3915 016120 122716 000200    CMPB     @CRLF, (SP)  ;; BRANCH IF NOT <CRLF>
3916 016124 001006          BNE     5S
3917 016126 005726          TST     (SP)+
3918 016130 104401          TYPE     /R, /LF     ;; POP </R></LF> EQUIV
3919 016132 001213          $CRLF  ;; TYPE /R AND /LF
3920 016134 105037 016270    CLRB     $CHARCNT    ;; CLEAR CHARACTER COUNT
3921 016140 000755          BR      2S        ;; GET NEXT CHARACTER
    
```

```

3922 016142 004737 016224 5S: JSR PC,$TYPEC ;;GO TYPE THIS CHARACTER
3923 016146 123726 001156 6S: CMPB $FILLC,(SP)+ ;;IS IT TIME FOR FILLER CHARS.?
3924 016152 001350 001154 BNE 2S ;;IF NO GO GET NEXT CHAR.
3925 016154 013746 001154 MOV $NULL,-(SP) ;;GET # OF FILLER CHARS. NEEDED
3926 ;;AND THE NULL CHAR.
3927 016160 105366 000001 7S: DECB 1(SP) ;;DOES A NULL NEED TO BE TYPED?
3928 016164 002770 BLT 6S ;;BR IF NO--GO POP THE NULL OFF OF STACK
3929 016166 004737 016224 JSR PC,$TYPEC ;;GO TYPE A NULL
3930 016172 105337 016270 DECB $CHARCNT ;;DO NOT COUNT AS A COUNT
3931 016176 000770 BR 7S ;;LOOP

```

;HORIZONTAL TAB PROCESSOR

```

3932 016200 112716 000040 8S: MOVB #' (SP) ;;REPLACE TAB WITH SPACE
3933 016204 004737 016224 9S: JSR PC,$TYPEC ;;TYPE A SPACE
3934 016210 132737 000007 016270 BITB #',$CHARCNT ;;BRANCH IF NOT AT
3935 016216 001372 BNE 9S ;;TAB STOP
3936 016220 005726 TST (SP)+ ;;POP SPACE OFF STACK
3937 016222 000724 BR 2S ;;GET NEXT CHARACTER
3938 016224 105777 162720 $TYPEC: TSTB $STPS ;;WAIT UNTIL PRINTER IS READY
3939 016230 100375 BPL $TYPEC
3940 016232 116677 000002 162712 MOVB 2(SP),$STPB ;;LOAD CHAR TO BE TYPED INTO DATA REG.
3941 016240 122766 000015 000002 CMPB #CR,2(SP) ;;IS CHARACTER A CARRIAGE RETURN?
3942 016246 001003 BNE 1S ;;BRANCH IF NO
3943 016250 105037 016270 CLAB $CHARCNT ;;YES--CLEAR CHARACTER COUNT
3944 016254 000406 BR $TYPEX ;;EXIT
3945 016256 122766 000012 000002 1S: CMPB #LF,2(SP) ;;IS CHARACTER A LINE FEED?
3946 016264 001402 BEQ $TYPEX ;;BRANCH IF YES
3947 016266 105227 INCB (PC)+ ;;COUNT THE CHARACTER
3948 016270 000000 $CHARCNT: .WORD 0 ;;CHARACTER COUNT STORAGE
3949 016272 000207 $TYPEX: RTS PC

```

.SBTTL BINARY TO OCTAL (ASCII) AND TYPE

```

*****
*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
*OCTAL (ASCII) NUMBER AND TYPE IT.
*STYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
*CALL:
*   MOV   NUM,-(SP)      ;;NUMBER TO BE TYPED
*   TYPOS      ;;CALL FOR TYPEOUT
*   .BYTE  N      ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
*   .BYTE  M      ;;M=1 OR 0
*                               ;;1=TYPE LEADING ZEROS
*                               ;;0=SUPPRESS LEADING ZEROS
*
*STYPON---ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
*STYPOS OR STYPOC
*CALL:
*   MOV   NUM,-(SP)      ;;NUMBER TO BE TYPED
*   TYPON      ;;CALL FOR TYPEOUT
*
*STYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
*CALL:
*   MOV   NUM,-(SP)      ;;NUMBER TO BE TYPED

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3978 ;*          TYP0C          ;;CALL FOR TYPEOUT
3979
3980 016274 017646 000000          STYPOS: MOV      2(SP),-(SP)          ;; PICKUP THE MODE
3981 016300 116637 000001 016517 MOVB    1(SP),%OFILL          ;; LOAD ZERO FILL SWITCH
3982 016306 112637 016521          MOVB    (SP)+,%OMODE+1          ;; NUMBER OF DIGITS TO TYPE
3983 016312 062716 000002          ADD     #2,(SP)                ;; ADJUST RETURN ADDRESS
3984 016316 000406          BR      $TYPON
3985 016320 112737 000001 016517 STYPOC: MOVB    #1,%OFILL          ;; SET THE ZERO FILL SWITCH
3986 016326 112737 000006 016521          MOVB    #6,%OMODE+1          ;; SET FOR SIX(6) DIGITS
3987 016334 112737 000005 016516 STYPON: MOVB    #5,%OCNT          ;; SET THE ITERATION COUNT
3988 016342 010346          MOV     R3,-(SP)              ;; SAVE R3
3989 016344 010446          MOV     R4,-(SP)              ;; SAVE R4
3990 016346 010546          MOV     R5,-(SP)              ;; SAVE R5
3991 016350 113704 016521          MOVB    %OMODE+1,R4          ;; GET THE NUMBER OF DIGITS TO TYPE
3992 016354 005404          NEG     R4
3993 016356 062704 000006          ADD     #6,R4                ;; SUBTRACT IT FOR MAX. ALLOWED
3994 016362 110437 016520          MOVB    R4,%OMODE          ;; SAVE IT FOR USE
3995 016366 113704 016517          MOVB    %OFILL,R4          ;; GET THE ZERO FILL SWITCH
3996 016372 016505 000012          MOV     12(SP),R5          ;; PICKUP THE INPUT NUMBER
3997 016376 005003          CLR     R3                    ;; CLEAR THE OUTPUT WORD
3998 016400 006105          1$:    ROL     R5                ;; ROTATE MSB INTO "C"
3999 016402 000404          BR      3$
4000 016404 006105          2$:    ROL     R5                ;; FORM THIS DIGIT
4001 016406 006105
4002 016410 006105
4003 016412 010503
4004 016414 006103          3$:    ROL     R3                ;; GET LSB OF THIS DIGIT
4005 016416 105337 016520          DECB   %OMODE          ;; TYPE THIS DIGIT?
4006 016422 100016          BPL    7$
4007 016424 042703 177770          BIC    #177770,R3          ;; GET RID OF JUNK
4008 016430 001002          BNE    4$
4009 016432 005704          TST    R4                    ;; TEST FOR 0
4010 016434 001403          BEQ    5$                    ;; SUPPRESS THIS 0?
4011 016436 005204          4$:    INC     R4                ;; ER IF YES
4012 016440 052703 000060          BIS    #'0,R3          ;; DON'T SUPPRESS ANYMORE 0'S
4013 016444 052703 000040          5$:    BIS    #' ',R3          ;; MAKE THIS DIGIT ASCII
4014 016450 110337 016514          MOVB   R3,%S                ;; MAKE ASCII IF NOT ALREADY
4015 016454 104401 016514          TYPE   %S                    ;; SAVE FOR TYPING
4016 016460 105337 016516          7$:    DECB   %OCNT          ;; GO TYPE THIS DIGIT
4017 016464 003347          BGT    2$                    ;; COUNT BY 1
4018 016466 002402          BLT    6$                    ;; BR IF MORE TO DO
4019 016470 005204          INC    R4                    ;; BR IF DONE
4020 016472 000744          BR     2$                    ;; INSURE LAST DIGIT ISN'T A BLANK
4021 016474 012605          6$:    MOV     (SP)+,R5          ;; GO DO THE LAST DIGIT
4022 016476 012604          MOV     (SP)+,R4          ;; RESTORE R5
4023 016500 012603          MOV     (SP)+,R3          ;; RESTORE R4
4024 016502 016666 000002 000004          MOV     2(SP),4(SP)        ;; RESTORE R3
4025 016510 012616          MOV     (SP)+,(SP)          ;; SET THE STACK FOR RETURNING
4026 016512 000002          RTI
4027 016514 000          8$:    .BYTE 0                ;; RETURN
4028 016515 000          .BYTE 0                ;; STORAGE FOR ASCII DIGIT
4029 016516 000          $OCNT: .BYTE 0          ;; TERMINATOR FOR TYPE ROUTINE
4030 016517 000          $OFILL: .BYTE 0         ;; OCTAL DIGIT COUNTER
4031 016520 000000          $OMODE: .WORD 0          ;; ZERO FILL SWITCH
4032
4033          .SBTTL CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

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4045 016522
4046 016522 010046
4047 016524 010146
4048 016526 010246
4049 016530 010346
4050 016532 010546
4051 016534 012746 020200
4052 016540 016605 000020
4053 016544 100004
4054 016546 005405
4055 016550 112766 000055 000001
4056 016556 005000
4057 016560 012703 016736
4058 016564 112723 000040
4059 016570 005002
4060 016572 016001 016726
4061 016576 160105
4062 016600 002402
4063 016602 005202
4064 016604 000774
4065 016606 060105
4066 016610 005702
4067 016612 001002
4068 016614 105716
4069 016616 100407
4070 016620 106316
4071 016622 103003
4072 016624 116663 000001 177777
4073 016632 052702 000060
4074 016636 052702 000040
4075 016642 110223
4076 016644 005720
4077 016646 020027 000010
4078 016652 002746
4079 016654 003002
4080 016656 010502
4081 016660 000764
4082 016662 105726
4083 016664 100003
4084 016666 116663 177777 177776
4085 016674 105013
4086 016676 012605
4087 016700 012603
4088 016702 012602
4089 016704 012601

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*****
*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
*REPLACED WITH SPACES.
*CALL:
*   MOV   NUM,-(SP)           ;;PUT THE BINARY NUMBER ON THE STACK
*   TYPDS                ;;GO TO THE ROUTINE
STYPDS:
MOV   R0,-(SP)           ;;PUSH R0 ON STACK
MOV   R1,-(SP)           ;;PUSH R1 ON STACK
MOV   R2,-(SP)           ;;PUSH R2 ON STACK
MOV   R3,-(SP)           ;;PUSH R3 ON STACK
MOV   R5,-(SP)           ;;PUSH R5 ON STACK
MOV   #20200,-(SP)       ;;SET BLANK SWITCH AND SIGN
MOV   20(SP),R5          ;;GET THE INPUT NUMBER
BPL   1$                 ;;BR IF INPUT IS POS.
NEG   R5                 ;;MAKE THE BINARY NUMBER POS.
MOVB  #'-,1(SP)         ;;MAKE THE ASCII NUMBER NEG.
CLR   R0                 ;;ZERO THE CONSTANTS INDEX
MOV   #50BLK,R3         ;;SETUP THE OUTPUT POINTER
MOVB  #' ,(R3)+         ;;SET THE FIRST CHARACTER TO A BLANK
2$:   CLR   R2           ;;CLEAR THE BCD NUMBER
MOV   $DTBL(R0),R1      ;;GET THE CONSTANT
3$:   SUB   R1,R5        ;;FORM THIS BCD DIGIT
BLT   4$                 ;;BR IF DONE
INC   R2                 ;;INCREASE THE BCD DIGIT BY 1
4$:   ADD   R1,R5        ;;ADD BACK THE CONSTANT
TST   R2                 ;;CHECK IF BCD DIGIT=0
BNE   5$                 ;;FALL THROUGH IF 0
TSTB  (SP)              ;;STILL DOING LEADING 0'S?
BMI   7$                 ;;BR IF YES
5$:   ASLB  (SP)         ;;MSD?
BCC   6$                 ;;BR IF NO
MOVB  1(SP),-1(R3)      ;;YES--SET THE SIGN
6$:   BIS   #'0,R2       ;;MAKE THE BCD DIGIT ASCII
7$:   BIS   #' ,R2       ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
MOVB  R2,(R3)+         ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
TST   (R0)+            ;;JUST INCREMENTING
CMP   R0,#10           ;;CHECK THE TABLE INDEX
BLT   2$                 ;;GO DO THE NEXT DIGIT
BGT   8$                 ;;GO TO EXIT
MOV   R5,R2           ;;GET THE LSD
BR    6$                 ;;GO CHANGE TO ASCII
8$:   TSTB  (SP)+       ;;WAS THE LSD THE FIRST NON-ZERO?
BPL   9$                 ;;BR IF NO
MOVB  -1(SP),-2(R3)    ;;YES--SET THE SIGN FOR TYPING
9$:   CLRB  (R3)         ;;SET THE TERMINATOR
MOV   (SP)+,R5        ;;POP STACK INTO R5
MOV   (SP)+,R3        ;;POP STACK INTO R3
MOV   (SP)+,R2        ;;POP STACK INTO R2
MOV   (SP)+,R1        ;;POP STACK INTO R1

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4090 016706 012600          MOV      (SP)+,RO      ;; POP STACK INTO RO
4091 016710 104401 016736  TYPE      $DBLK      ;; NOW TYPE THE NUMBER
4092 016714 016666 000002 000004  MOV      2(SP),4(SP)  ;; ADJUST THE STACK
4093 016722 012616          MOV      (SP)+,(SP)
4094 016724 000002          RTI                      ;; RETURN TO USER
4095 016726 023420          $DTBL: 10000.
4096 016730 001750          1000.
4097 016732 000144          100.
4098 016734 000012          10.
4099 016736 000004          $DBLK: .BLKW 4
4100
4101 .SBTTL TTY INPUT ROUTINE
4102
4103 ;;*****
4104 .ENABL LSB
4105 016746 000000 $TKCNT: .WORD 0      ;; NUMBER OF ITEMS IN QUEUE
4106 016750 000000 $TKQIN: .WORD 0      ;; INPUT POINTER
4107 016752 000000 $TKQOUT: .WORD 0     ;; OUTPUT POINTER
4108 016754 000001 $TKQSRV: .BLKB 1    ;; TTY KEYBOARD QUEUE
4109          016755 $TKQEND=.
4110          016756 .EVEN
4111
4112 ;;*TK INITIALIZE ROUTINE
4113 ;;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
4114 ;;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
4115
4116 ;;*CALL:
4117 ;;* JSR PC,$TKINT
4118 ;;* RETURN
4119
4120 016756 005037 016746 $TKINT: CLR $TKCNT      ;; CLEAR COUNT OF ITEMS IN QUEUE
4121 016762 012737 016754 016750 MOV $TKQSRV,$TKQIN  ;; MOVE THE STARTING ADDRESS OF THE
4122 016770 013737 016750 016752 MOV $TKQIN,$TKQOUT  ;; QUEUE INTO THE INPUT & OUTPUT POINTERS.
4123 016776 012737 017026 000060 MOV $TKSRV,$TKVEC  ;; INITIALIZE THE KEYBOARD VECTOR
4124 017004 012737 000200 000062 MOV #200,$TKVEC+2  ;; "BA" LEVEL 4
4125 017012 005777 162130 TST $TKB          ;; CLEAR DONE FLAG
4126 017016 012777 000100 162120 MOV #100,$TKS     ;; ENABLE TTY KEYBOARD INTERRUPT
4127 017024 000207          RTS PC              ;; RETURN TO CALLER
4128
4129 ;;*TK SERVICE ROUTINE
4130 ;;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
4131 ;;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
4132 ;;*IT IN THE QUEUE.
4133 ;;*IF THE CHARACTER IS A "CONTROL-C" (1C) $TKINT IS CALLED AND
4134 ;;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (@CNTRLC)
4135
4136 017026 117746 162114 $TKSRV: MOVB $TKB,-(SP)  ;; PICKUP THE CHARACTER
4137 017032 042716 177600 BIC #177,(SP)      ;; STRIP THE JUNK
4138 017036 021627 000003 CMP (SP),#3        ;; IS IT A CONTROL C?
4139 017042 001007 BNE 1$            ;; BRANCH IF NO
4140 017044 104401 020144 TYPE $CNTRLC      ;; TYPE A CONTROL-C (1C)
4141 017050 004737 016756 JSR PC,$TKINT     ;; INIT THE KEYBOARD
4142 017054 005726 TST (SP)+         ;; CLEAN UP STACK
4143 017056 000177 162160 JMP @CNTRLC       ;; CONTROL C RESTART
4144 017062 021627 000007 1$: CMP (SP),#7      ;; IS IT A CONTROL G?
4145 017066 001004 BNE 2$           ;; BRANCH IF NO

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4146 017070 022737 000176 001140      CMP      #SWREG,SWR      ;; IS SOFT-SWR SELECTED?
4147 017076 001500                      BEQ      65             ;; GO TO SWR CHANGE
4148
4149 017100                      25:      CMP      #1,STKCNT      ;; IS THE QUEUE FULL?
4150 017100 022737 000001 016746          BNE      35             ;; BRANCH IF NO
4151 017106 001004                      TYPE     $BELL          ;; RING THE TTY BELL
4152 017110 104401 001206                      TST     (SP)+           ;; CLEAN CHARACTER OFF OF STACK
4153 017114 005726                      BR       55             ;; EXIT
4154 017116 000451                      35:      CMP      (SP),#23       ;; IS IT A CONTROL-S?
4155 017120 021627 000023          BNE      325            ;; BRANCH IF NO
4156 017124 001021                      CLR     %STKS           ;; DISABLE TTY KEYBOARD INTERRUPTS
4157 017126 005077 162012          TST     (SP)+           ;; CLEAN CHAR OFF STACK
4158 017132 005726                      TSTB   %STKS           ;; WAIT FOR A CHAR
4159 017134 105777 162004          315:    BPL     315             ;; LOOP UNTIL ITS THERE
4160 017140 100375                      MOVB   %STKB,-(SP)     ;; GET THE CHARACTER
4161 017142 117746 162000          BIC     #1C177,(SP)    ;; MAKE IT 7-BIT ASCII
4162 017146 042716 177600          CMP     (SP)+,#21      ;; IS IT A CONTROL-Q?
4163 017152 022627 000021          BNE      315            ;; BRANCH IF NO
4164 017156 001366                      MOV     #100,%STKS     ;; REENABLE TTY KEYBOARD INTERRUPTS
4165 017160 012777 000100 161756          RTI
4166 017166 000002                      325:    INC     STKCNT          ;; COUNT THIS CHARACTER
4167 017170 005237 016746          CMP     (SP),#140      ;; IS IT UPPER CASE?
4168 017174 021627 000140          BLT     45              ;; BRANCH IF YES
4169 017200 002405                      CMP     (SP),#175      ;; IS IT A SPECIAL CHAR?
4170 017202 021627 000175          BGT     45              ;; BRANCH IF YES
4171 017206 003002                      BIC     #40,(SP)       ;; MAKE IT UPPER CASE
4172 017210 042716 000040          MOVB   (SP)+,%STKQIN  ;; AND PUT IT IN QUEUE
4173 017214 112677 177530          45:    INC     STKQIN          ;; UPDATE THE POINTER
4174 017220 005237 016750          INC     STKQIN          ;; GO OFF THE END?
4175 017224 023727 016750 016755          CMP     STKQIN,%STKQEND ;; BRANCH IF NO
4176 017232 001003                      BNE      55             ;; RESET THE POINTER
4177 017234 012737 016754 016750          MOV     %STKQRT,STKQIN
4178 017242 000002                      55:    RTI
4179
4180
4181
4182
4183
4184
4185 017244 022737 000176 001140 $CKSWR: CMP      #SWREG,SWR      ;; IS THE SOFT-SWR SELECTED
4186 017252 001124                      BNE      155            ;; EXIT IF NOT
4187 017254 105777 161664          TSTB   %STKS           ;; IS A CHAR WAITING?
4188 017260 100121                      BPL     155            ;; IF NOT, EXIT
4189 017262 117746 161660          MOVB   %STKB,-(SP)     ;; YES
4190 017266 042716 177600          BIC     #1C177,(SP)    ;; MAKE IT 7-BIT ASCII
4191 017272 021627 000007          CMP     (SP),#7        ;; IS IT A CONTROL-G?
4192 017276 001300                      BNE      25             ;; IF NOT, PUT IT IN THE TTY QUEUE
4193
4194
4195
4196
4197
4198
4199 017300 123727 001134 000001 65:    CMPEB  $AOUT08,#1      ;; ARE WE RUNNING IN AUTO-MODE?
4200 017306 001674                      BEQ     25              ;; BRANCH IF YES
4201 017310 005726                      TST     (SP)+           ;; CLEAR CONTROL-G OFF STACK

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\*\*\*\*\*

\*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.  
\*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL  
\*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP  
\*CALL WHEN OPERATING IN TTY INTERRUPT MODE.

```

4185 017244 022737 000176 001140 $CKSWR: CMP      #SWREG,SWR      ;; IS THE SOFT-SWR SELECTED
4186 017252 001124                      BNE      155            ;; EXIT IF NOT
4187 017254 105777 161664          TSTB   %STKS           ;; IS A CHAR WAITING?
4188 017260 100121                      BPL     155            ;; IF NOT, EXIT
4189 017262 117746 161660          MOVB   %STKB,-(SP)     ;; YES
4190 017266 042716 177600          BIC     #1C177,(SP)    ;; MAKE IT 7-BIT ASCII
4191 017272 021627 000007          CMP     (SP),#7        ;; IS IT A CONTROL-G?
4192 017276 001300                      BNE      25             ;; IF NOT, PUT IT IN THE TTY QUEUE
4193
4194
4195
4196
4197
4198
4199 017300 123727 001134 000001 65:    CMPEB  $AOUT08,#1      ;; ARE WE RUNNING IN AUTO-MODE?
4200 017306 001674                      BEQ     25              ;; BRANCH IF YES
4201 017310 005726                      TST     (SP)+           ;; CLEAR CONTROL-G OFF STACK

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\*\*\*\*\*  
\*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE  
\*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A  
\*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.

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4199 017300 123727 001134 000001 65:    CMPEB  $AOUT08,#1      ;; ARE WE RUNNING IN AUTO-MODE?
4200 017306 001674                      BEQ     25              ;; BRANCH IF YES
4201 017310 005726                      TST     (SP)+           ;; CLEAR CONTROL-G OFF STACK

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4202	017312	004737	016756		JSR	PC,\$TKINT	:: FLUSH THE TTY INPUT QUEUE
4203	017316	005077	161622		CLR	\$TKS	:: DISABLE TTY KEYBOARD INTERRUPTS
4204	017322	112737	000001	001135	MOVB	#1,\$INTAG	:: SET INTERRUPT MODE INDICATOR
4205							
4206	017330	104401	020156		TYPE	,\$CNTLG	:: ECHO THE CONTROL-G (↑G)
4207	017334	104401	020163	\$GTSWR:	TYPE	,\$MSWR	:: TYPE CURRENT CONTENTS
4208	017340	013746	000176		MOV	\$WREG,-(SP)	:: SAVE SWREG FOR TYPEOUT
4209	017344	104402			TYPOC		:: GO TYPE--OCTAL ASCII(ALL DIGITS)
4210	017346	104401	020174		TYPE	,\$MNEW	:: PROMPT FOR NEW SWR
4211	017352	005046		19\$:	CLR	-(SP)	:: CLEAR COUNTER
4212	017354	005046			CLR	-(SP)	:: THE NEW SWR
4213	017356	105777	161562	7\$:	TSTB	\$TKS	:: CHAR THERE?
4214	017362	100375			BPL	7\$	:: IF NOT TRY AGAIN
4215							
4216	017364	117746	161556		MOVB	\$TKB,-(SP)	:: PICK UP CHAR
4217	017370	042716	177600		BIC	#↑C177,(SP)	:: MAKE IT 7-BIT ASCII
4218							
4219	017374	021627	000003		CMP	(SP),#3	:: IS IT A CONTROL-C?
4220	017400	001015			BNE	9\$	:: BRANCH IF NOT
4221	017402	104401	020144		TYPE	,\$CNTLC	:: YES, ECHO CONTROL-C (↑C)
4222	017406	062706	000006		ADD	#6,SP	:: CLEAN UP STACK
4223	017412	123727	001135	000001	CMPB	\$INTAG,#1	:: REENABLE TTY KEYBOARD INTERRUPTS?
4224	017420	001003			BNE	8\$	:: BRANCH IF NO
4225	017422	012777	000100	161514	MOV	#100,\$TKS	:: ALLOW TTY KEYBOARD INTERRUPTS
4226	017430	000177	161606	8\$:	JMP	\$CNTRLC	:: CONTROL-C RESTART
4227							
4228							
4229	017434	021627	000025	9\$:	CMP	(SP),#25	:: IS IT A CONTROL-U?
4230	017440	001005			BNE	10\$	:: BRANCH IF NOT
4231	017442	104401	020151		TYPE	,\$CNTLU	:: YES, ECHO CONTROL-U (↑U)
4232	017446	062706	000006	20\$:	ADD	#6,SP	:: IGNORE PREVIOUS INPUT
4233	017452	000737			BR	19\$	:: LET'S TRY IT AGAIN
4234							
4235							
4236	017454	021627	000015	10\$:	CMP	(SP),#15	:: IS IT A <CR>?
4237	017460	001022			BNE	16\$	:: BRANCH IF NO
4238	017462	005766	000004		TST	4(SP)	:: YES, IS IT THE FIRST CHAR?
4239	017466	001403			BEQ	11\$	:: BRANCH IF YES
4240	017470	016677	000002	161442	MOV	2(SP),\$SWR	:: SAVE NEW SWR
4241	017476	062706	000006	11\$:	ADD	#6,SP	:: CLEAN UP STACK
4242	017502	104401	001213	14\$:	TYPE	,\$CRLF	:: ECHO <CR> AND <LF>
4243	017506	123727	001135	000001	CMPB	\$INTAG,#1	:: RE-ENABLE TTY KBD INTERRUPTS?
4244	017514	001003			BNE	15\$	:: BRANCH IF NOT
4245	017516	012777	000100	161420	MOV	#100,\$TKS	:: RE-ENABLE TTY KBD INTERRUPTS
4246	017524	000002		15\$:	RTI		:: RETURN
4247	017526	004737	016224	16\$:	JSR	PC,\$TYPEC	:: ECHO CHAR
4248	017532	021627	000060			(SP),#60	:: CHAR < 0?
4249	017536	002420			BLI	18\$	:: BRANCH IF YES
4250	017540	021627	000067		CMP	(SP),#67	:: CHAR > 7?
4251	017544	003015			BGT	18\$	:: BRANCH IF YES
4252	017546	042726	000060		BIC	#60,(SP)+	:: STRIP-OFF ASCII
4253	017552	005766	000002		TST	2(SP)	:: IS THIS THE FIRST CHAR
4254	017556	001403			BEQ	17\$	:: BRANCH IF YES
4255	017560	006316			ASL	(SP)	:: NO, SHIFT PRESENT
4256	017562	006316			ASL	(SP)	:: CHAR OVER TO MAKE
4257	017564	006316			ASL	(SP)	:: ROOM FOR NEW ONE.

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4258 017566 005266 000002 17$: INC 2(SP) ;;KEEP COUNT OF CHAR
4259 017572 056616 177776 BIS -2(SP),(SP) ;;SET IN NEW CHAR
4260 017576 000667 BR 7$ ;;GET THE NEXT ONE
4261 017600 104401 001212 18$: TYPE $QUES ;;TYPE ?<CR><LF>
4262 017604 000720 BR 20$ ;;SIMULATE CONTROL-U
4263 .DSABL LSB
4264
4265
4266 *****
4267 *THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
4268 *CALL:
4269 * ROCHR ;;GET A CHARACTER FROM THE QUEUE
4270 * RETURN HERE ;;CHARACTER IS ON THE STACK
4271 * ;;WITH PARITY BIT STRIPPED OFF
4272
4273
4274 017606 011646 $ROCHR: MOV (SP),-(SP) ;;PUSH DOWN THE PC AND
4275 017610 016666 000004 000002 MOV 4(SP),2(SP) ;;THE PS
4276 017616 005066 000004 CLR 4(SP) ;;GET READY FOR A CHARACTER
4277 017622 005046 CLR -(SP) ;;PUT NEW PS ON STACK
4278 017624 012746 017632 MOV #64$,-(SP) ;;PUT NEW PC ON STACK
4279 017630 000002 RTI ;;POP NEW PC AND PS
4280 017632
4281 017632 005737 016746 64$: TST $TKCNT ;;WAIT ON A CHARACTER
4282 017636 001775 1$ BEQ 1$
4283 017640 005337 016746 DEC $TKCNT ;;DECREMENT THE COUNTER
4284 017644 117766 177102 000004 MOVB $TKQOUT,4(SP) ;;GET ONE CHARACTER
4285 017652 005237 016752 INC $TKQOUT ;;UPDATE THE POINTER
4286 017656 023727 016752 016755 CMP $TKQOUT,#$TKQEND ;;DID IT GO OFF OF THE END?
4287 017664 001003 BNE 2$ ;;BRANCH IF NO
4288 017666 012737 016754 016752 MOV #$TKQRT,$TKQOUT ;;RESET THE POINTER
4289 017674 000002 2$: RTI ;;RETURN
4290 *****
4291 *THIS ROUTINE WILL INPUT A STRING FROM THE TTY
4292 *CALL:
4293 * RDLIN ;;INPUT A STRING FROM THE TTY
4294 * RETURN HERE ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
4295 * ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
4296
4297 017676 010346 $RDLIN: MOV R3, -(SP) ;;SAVE R3
4298 017700 005046 CLR -(SP) ;;CLEAR THE RUBOUT KEY
4299 017702 012703 020132 1$: MOV #$TTYIN,R3 ;;GET ADDRESS
4300 017706 022703 020144 2$: CMP #$TTYIN+10.,R3 ;;BUFFER FULL?
4301 017712 101456 BLOS 4$ ;;BR IF YES
4302 017714 104410 RDCHR ;;GO READ ONE CHARACTER FROM THE TTY
4303 017716 112613 MOVB (SP)+,(R3) ;;GET CHARACTER
4304 017720 122713 000177 10$: CMPB #177,(R3) ;;IS IT A RUBOUT
4305 017724 001022 BNE 5$ ;;BR IF NO
4306 017726 005716 TST (SP) ;;IS THIS THE FIRST RUBOUT?
4307 017730 001007 BNE 6$ ;;BR IF NO
4308 017732 112737 000134 020130 MOVB #' \,9$ ;;TYPE A BACK SLASH
4309 017740 104401 020130 TYPE 9$
4310 017744 012716 177777 MOV #-1,(SP) ;;SET THE RUBOUT KEY
4311 017750 005303 6$: DEC R3 ;;BACKUP BY ONE
4312 017752 020327 020132 CMP R3,#$TTYIN ;;STACK EMPTY?
4313 017756 103434 BLO 4$ ;;BR IF YES

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4314 017760 111337 020130      MOVB      (R3),9$      ;; SETUP TO TYPEOUT THE DELETED CHAR.
4315 017764 104401 020130      TYPE      9$          ;; GO TYPE
4316 017770 000746                BR        2$          ;; GO READ ANOTHER CHAR.
4317 017772 005716                5$:      TST        (SP)      ;; RUBOUT KEY SET?
4318 017774 001406                BEQ       7$          ;; BR IF NO
4319 017776 112737 000134 020130  MOVB      #' \,9$     ;; TYPE A BACK SLASH
4320 020004 104401 020130      TYPE      9$          ;;
4321 020010 005016                CLR       (SP)        ;; CLEAR THE RUBOUT KEY
4322 020012 122713 000025      7$:      CMPB      #25,(R3)   ;; IS CHARACTER A CTRL U?
4323 020016 001003                BNE      8$          ;; BR IF NO
4324 020020 104401 020151      TYPE      $CNTLU      ;; TYPE A CONTROL "U"
4325 020024 000726                BR        1$          ;; GO START OVER
4326 020026 122713 000022      8$:      CMPB      #22,(R3)   ;; IS CHARACTER A "↑R"?
4327 020032 001011                BNE      3$          ;; BRANCH IF NO
4328 020034 105013                CLRB     (R3)         ;; CLEAR THE CHARACTER
4329 020036 104401 001213      TYPE      ,SCALF      ;; TYPE A "CR" & "LF"
4330 020042 104401 020132      TYPE      ,STTYIN     ;; TYPE THE INPUT STRING
4331 020046 000717                BR        2$          ;; GO PICKUP ANOTHER CHARACTER
4332 020050 104401 001212      4$:      TYPE      $QUES     ;; TYPE A '?'
4333 020054 000712                BR        1$          ;; CLEAR THE BUFFER AND LOOP
4334 020056 111337 020130      3$:      MOVB      (R3),9$     ;; ECHO THE CHARACTER
4335 020062 104401 020130      TYPE      9$          ;;
4336 020066 122723 000015      CMPB     #15,(R3)+    ;; CHECK FOR RETURN
4337 020072 001305                BNE      2$          ;; LOOP IF NOT RETURN
4338 020074 105063 177777      CLRB     -1(R3)      ;; CLEAR RETURN (THE 15)
4339 020100 104401 001214      TYPE      $LF         ;; TYPE A LINE FEED
4340 020104 005726                TST     (SP)+         ;; CLEAN RUBOUT KEY FROM THE STACK
4341 020106 012603                MOV      (SP)+,R3     ;; RESTORE R3
4342 020110 011646                MOV      (SP),-(SP)   ;; ADJUST THE STACK AND PUT ADDRESS OF THE
4343 020112 016666 000004 000002  MOV      4(SP),2(SP)  ;; FIRST ASCII CHARACTER ON IT
4344 020120 012766 020132 000004  MOV      #STTYIN,4(SP)
4345 020126 000002                RTI
4346 020130 000                9$:      .BYTE      0          ;; RETURN
4347 020131 000                .BYTE      0          ;; STORAGE FOR ASCII CHAR. TO TYPE
4348 020132 000012                $TTYIN: .BLKB     10.  ;; TERMINATOR
4349 020144 041536 005015 000      $CNTLC: .ASCIZ  /↑C/<15><12>  ;; RESERVE 10. BYTES FOR TTY INPUT
4350 020151 136 006525 000012  $CNTLU: .ASCIZ  /↑U/<15><12>  ;; CONTROL "C"
4351 020156 043536 005015 000      $CNTLG: .ASCIZ  /↑G/<15><12>  ;; CONTROL "U"
4352 020163 015 051412 051127  $MSWR:  .ASCIZ  <15><12>/SWR = /  ;; CONTROL "G"
4353 020170 036440 000040      $MNEW:  .ASCIZ  / NEW = /
4354 020174 020040 042516 020127
4355 020202 020075 000
4356 020206                .EVEN
4357
4358                .SBTTL  INTEGER DIVIDE ROUTINE
4359
4360                ;*****
4361                ;THIS ROUTINE WILL DIVIDE A 32-BIT TWO'S COMPLEMENT INTEGER
4362                ;DIVIDEND BY A 16-BIT TWO'S COMPLEMENT INTEGER DIVISOR GIVING
4363                ;A 16-BIT TWO'S COMPLEMENT INTEGER QUOTIENT AND A 16-BIT REMAINDER.
4364                ;DIVISION WILL BE PERFORMED SO THAT THE REMAINDER IS OF THE
4365                ;SAVE SIGN AS THE DIVIDEND.
4366                ;CALL:
4367                ;     MOV      LOW DIVIDEND,-(SP) ;; THE HIGH DIVIDEND MUST BE < 1/2
4368                ;     MOV      HIGH DIVIDEND,-(SP); AS LARGE AS THE DIVISOR
4369                ;     MOV      DIVISOR,-(SP)

```

```

4370          *      JSR      PC,SDIV
4371          *      RETURN   ;; QUOTIENT & REMAINDER ARE ON THE STACK
4372          *      "V"=0   IMPLIES NO ERROR
4373          *      "V"=1   IMPLIES ERROR OCCURRED
4374          *      "C"=0   DIVIDE OVERFLOW OCCURRED
4375          *      "C"=1   ATT   TO DIVICE BY ZERO
4376
4377
4378          *      STACK   NO ERROR      OVERFLOW      DIVIDE BY ZERO
4379          *      -----
4380          *      TOP     REMAINDER    ALL ZEROS      ALL ONES
4381          *      +2     QUOTIENT     ALL ZEROS      ALL ONES
4382
4383          *
4384          *      SDIV:
4385          *      TRAP
4386          *      BIC      #17,(SP)   ;; PUSH OLD PSH AND PC ON STACK
4387          *      MOV      R0,-(SP)   ;; STRIP AWAY CONDITION CODES
4388          *      MOV      R1,-(SP)   ;; PUSH R0 ON STACK
4389          *      MOV      R2,-(SP)   ;; PUSH R1 ON STACK
4390          *      MOV      R3,-(SP)   ;; PUSH R2 ON STACK
4391          *      CLR      -(SP)      ;; PUSH R3 ON STACK
4392          *      MOV      #17,-(SP)  ;; SAVE A PLACE FOR SIGNS
4393          *      MOV      24(SP),R1  ;; SETUP THE ITERATION COUNTER
4394          *      MOV      22(SP),R0  ;; PICKUP THE DIVIDEND
4395          *      BPL      1$
4396          *      DECB     3(SP)      ;; CHECK THE SIGN
4397          *      NEG      R0         ;; KEEP TRACK OF THE SIGN
4398          *      NEG      R1         ;; AND NEGATE THE ORIGINAL
4399          *      SBC     R0         ;; NUMBER
4400          *      MOV      20(SP),R2  ;; PICKUP THE DIVISOR
4401          *      BLT     2$
4402          *      BGT     3$
4403          *      BIS     #3,14(SP)  ;; CHECK THE SIGN
4404          *      MOV      #-1,R0    ;; DIVISOR OF 0 IS A NO-NO
4405          *      BR     7$         ;; SET "V" & "C"
4406          *      INC     2(SP)      ;; SET REMAINDER TO ALL ONES
4407          *      BR     4$         ;; EXIT
4408          *      NEG     R2         ;; KEEP TRACK OF DIVISORS SIGN
4409          *      CLC     6$
4410          *      BR     5$
4411          *      ROL     R0         ;; NEGATE THE ORIGINAL NUMBER
4412          *      MOV     R0,R3     ;; CLEAR "C"
4413          *      ADD     R2,R3     ;; START FORMING QUOTIENT
4414          *      BCC     6$        ;; POSITION MSB'S
4415          *      MOV     R3,R0     ;; COPY
4416          *      ROL     R1        ;; COMPARE DIVIDEND & DIVISOR
4417          *      DEC     (SP)      ;; BR IF DIVIDEND > DIVISOR
4418          *      BNE     5$        ;; REMAINDER AFTER THIS LOOP
4419          *      TST     R1        ;; QUOTIENT BIT ENTERS HERE
4420          *      BPL     8$        ;; DONE?
4421          *      BIS     #2,14(SP)  ;; BR IF NO
4422          *      CLR     R0        ;; OVERFLOW?
4423          *      MOV     R0,R1     ;; BR IF NO
4424          *      TST     (SP)+     ;; SET "V" IN RETURN STATUS WORD
4425          *      TST     (SP)      ;; SET REMAINDER TO ALL ZEROS
4426          *      BGE     9$        ;; COPY REMAINDER INTO QUOTIENT
4427          *      MOV     R0,R1     ;; CLEAR COUNTER FROM STACK
4428          *      TST     (SP)      ;; REMAINDER SIGN CORRECTION NEEDED?
4429          *      BGE     9$        ;; BR IF NO

```

```

4426 020362 005400          NEG      RO
4427 020364 105066 000001    CLRB    1(SP)
4428 020370 005316          DEC     (SP)
4429 020372 005726          9S:    TST     (SP)+
4430 020374 001401          BEQ     10S
4431 020376 005401          NEG     R1
4432 020400 010166 000020    10S:   MOV     R1,20(SP)
4433 020404 010066 000016    MOV     RO,16(SP)
4434 020410 012603          MOV     (SP)+,R3
4435 020412 012602          MOV     (SP)+,R2
4436 020414 012601          MOV     (SP)+,R1
4437 020416 012600          MOV     (SP)+,RO
4438 020420 012666 000002    MOV     (SP)+,2(SP)
4439 020424 000002          RTI

```

```

: NEGATE REMAINDER
: CLEAR SIGN
: BUT DON'T FORGET QUOTIENT
: QUOTIENT SIGN CORRECTION NEEDED?
: BR IF NO
: NEGATE QUOTIENT
: RETURN QUOTIENT AND
: REMAINDER TO USER
: POP STACK INTO R3
: POP STACK INTO R2
: POP STACK INTO R1
: POP STACK INTO RO
: SETUP TO RETURN CONDITION CODES
: RETURN

```

.SBTTL SAVE AND RESTORE RO-R5 ROUTINES

```

*****
: #SAVE RO-R5
: #CALL:
: # SAVREG
: #UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
: #
: #TOP---(+16)
: # +2---(+18)
: # +4---R5
: # +6---R4
: # +8---R3
: # +10---R2
: # +12---R1
: # +14---RO

```

\$SAVREG:

```

MOV     RO, -(SP)
MOV     R1, -(SP)
MOV     R2, -(SP)
MOV     R3, -(SP)
MOV     R4, -(SP)
MOV     R5, -(SP)
MOV     22(SP), -(SP)
MOV     22(SP), -(SP)
MOV     22(SP), -(SP)
MOV     22(SP), -(SP)
RTI

```

```

: PUSH RO ON STACK
: PUSH R1 ON STACK
: PUSH R2 ON STACK
: PUSH R3 ON STACK
: PUSH R4 ON STACK
: PUSH R5 ON STACK
: SAVE PS OF MAIN FLOW
: SAVE PC OF MAIN FLOW
: SAVE PS OF CALL
: SAVE PC OF CALL

```

: #RESTORE RO-R5

```

: #CALL:
: # RESREG
: $RESREG:

```

```

MOV     (SP)+, 22(SP)
MOV     (SP)+, 22(SP)
MOV     (SP)+, 22(SP)
MOV     (SP)+, 22(SP)
MOV     (SP)+, R5
MOV     (SP)+, R4
MOV     (SP)+, R3

```

```

: RESTORE PC OF CALL
: RESTORE PS OF CALL
: RESTORE PC OF MAIN FLOW
: RESTORE PS OF MAIN FLOW
: POP STACK INTO R5
: POP STACK INTO R4
: POP STACK INTO R3

```

```

4458 020426 010046          MOV     RO, -(SP)
4459 020428 010146          MOV     R1, -(SP)
4460 020430 010246          MOV     R2, -(SP)
4461 020432 010346          MOV     R3, -(SP)
4462 020434 010446          MOV     R4, -(SP)
4463 020436 010546          MOV     R5, -(SP)
4464 020440 010546          MOV     22(SP), -(SP)
4465 020442 016646 000022    MOV     22(SP), -(SP)
4466 020446 016646 000022    MOV     22(SP), -(SP)
4467 020450 016646 000022    MOV     22(SP), -(SP)
4468 020456 016646 000022    MOV     22(SP), -(SP)
4469 020462 000002          RTI
4470
4471
4472
4473
4474 020464 012666 000022    MOV     (SP)+, 22(SP)
4475 020464 012666 000022    MOV     (SP)+, 22(SP)
4476 020470 012666 000022    MOV     (SP)+, 22(SP)
4477 020474 012666 000022    MOV     (SP)+, 22(SP)
4478 020500 012666 000022    MOV     (SP)+, R5
4479 020504 012605          MOV     (SP)+, R5
4480 020506 012604          MOV     (SP)+, R4
4481 020510 012603          MOV     (SP)+, R3

```

```

4512 020512 012602      MOV      (SP)+,R2      ;; POP STACK INTO R2
4513 020514 012601      MOV      (SP)+,R1      ;; POP STACK INTO R1
4514 020516 012600      MOV      (SP)+,R0      ;; POP STACK INTO R0
4515 020520 000002      RTI

```

.SBTTL RANDOM NUMBER GENERATOR ROUTINE

```

*****
*THIS ROUTINE IS A DOUBLE PRECISION PSEUDO RANDOM NUMBER GENERATOR
*WITH A RANGE OF 0 TO 2(+33)-1.

```

```

*CALL:
*      JSR      PC,SRAND      ;; CALL THE ROUTINE
*      RETURN      ;; RETURN HERE THE RANDOM
*                          ;; NUMBER WILL BE IN
*                          ;; SHINUM,SLONUM

```

```

SRAND:
      MOV      R0,-(SP)      ;; PUSH R0 ON STACK
      MOV      R1,-(SP)      ;; PUSH R1 ON STACK
      MOV      R2,-(SP)      ;; PUSH R2 ON STACK
      MOV      SLONUM,R0     ;; SET R0 WITH LOW
      MOV      SHINUM,R1     ;; SET R1 WITH HIGH
      MOV      #7,R2         ;; SET SHIFT COUNT
IS:   ASL      R0             ;; SHIFT R0 LEFT AND
      ROL      R1             ;; ROTATE CARRY INTO R1 AND
      INC      R2             ;; CHECK FOR DONE
      BNE     IS             ;; CONTINUE SHIFT LOOP
      ADD     SLONUM,R0       ;; ADD NUMBER TO MAKE X 129
      ROR     R1             ;; PROPAGATE CARRY
      ADD     SHINUM,R1       ;; ADD NUMBER TO MAKE X 129
      ADD     #1057,R0        ;; ADD LOW CONSTANT
      ROR     R1             ;; PROPAGATE CARRY
      ADD     #47401,R1       ;; ADD HIGH CONSTANT
      MOV     R0,SLONUM      ;; SAVE R0
      MOV     R1,SHINUM      ;; SAVE R1
      MOV     (SP)+,R2        ;; POP STACK INTO R2
      MOV     (SP)+,R1        ;; POP STACK INTO R1
      MOV     (SP)+,R0        ;; POP STACK INTO R0
      RTS      PC            ;; RETURN
SHINUM: .WORD 176543
SLONUM: .WORD 123456

```

.SBTTL DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

```

*****
*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
*POSITIVE.

```

```

*CALL
*      MOV     #PNTR,-(SP)    ;; POINTER TO LOW WORD OF BINARY NUMBER
*      JSR     PC,#$0B20
*      RETURN      ;; THE FIRST ADDRESS OF ASCII
*                          ;; IS ON THE STACK

```

```

$0B20: SAVREG      ;; SAVE REGISTERS

```

```

4516 020522 010046      020622
4517 020522 010146      020620
4518 020524 010246      177771
4519 020530 013700
4520 020534 013701
4521 020540 012702
4522 020544 006300
4523 020546 006101
4524 020550 005202
4525 020552 001374
4526 020554 063700      020622
4527 020560 005501
4528 020562 063701      020620
4529 020566 062700      001057
4530 020572 005501
4531 020574 062701      047401
4532 020600 010037      020622
4533 020604 010137      020620
4534 020610 012602
4535 020612 012601
4536 020614 012600
4537 020616 000207
4538 020620 176543
4539 020622 123456

```

```

4537 020624 104412

```

```

4538 020626 016602 000002      MOV      2(SP),R2      ;; PICKUP THE DATA POINTER
4539 020632 012700 021004      MOV      @SDECVL,R0   ;; GET ADDRESS OF "SDECVL" STRING
4540 020636 010066 000002      MOV      R0,2(SP)    ;; PUT ADDRESS OF ASCII STRING ON STACK
4541 020642 012201          MOV      (R2)+,R1    ;; PICKUP THE BINARY NUMBER
4542 020644 012202          MOV      (R2)+,R2
4543 020646 012737 000012 020722      MOV      @10.4$      ;; SET UP TO DO 10 CONVERSIONS
4544 020654 012704 020734      MOV      @STNPLR,R4   ;; ADDRESS OF TEN POWER
4545 020660 012705 020736      MOV      @STNPLR+2,R5
4546 020664 005003          CLR      R3          ;; CLEAR PARTIAL
4547 020670 161401          SUB      (R4),R1     ;; SUBTRACT TEN POWER
4548 020676 005602          SBC      R2
4549 020682 161502          SUB      (R5),R2
4550 020688 002402          BLT     3$          ;; BR IF TEN POWER TOO LARGE
4551 020694 005203          INC     R3          ;; ADD 1 TO PARTIAL
4552 020700 000772          BR     2$          ;; LOOP
4553 020706 062401          ADD     (R4)+,R1    ;; RESTORE SUBTRACTED VALUE
4554 020712 005502          ADC     R2
4555 020718 062402          ADD     (R4)+,R2
4556 020724 022402          CMP     (R5)+,(R5)+ ;; MOVE TO NEXT TEN POWER
4557 020730 052703 000060      BIS     @'0,R3       ;; CHANGE PARTIAL TO ASCII
4558 020736 110320          MOV     R3,(R0)+    ;; SAVE IT
4559 020742 005327          DEC     (PC)+       ;; DONE?
4560 020748 000000          .WORD  0
4561 020754 001357          BNE     1$          ;; BR IF NO
4562 020760 105020          CLRB   (R0)+       ;; TERMINATOR
4563 020766 104413          RESREG          ;; RESTORE REGISTERS
4564 020772 000207          RTS     PC         ;; RETURN
4565 020778 145000          STNPLR: 145000     ;; 1.0E09
4566 020784 25632          25632             ;; 1.0E08
4567 020790 160400          160400           ;; 1.0E07
4568 020796 002765          2765             ;; 1.0E06
4569 020802 113200          113200           ;; 1.0E05
4570 020808 230          230              ;; 1.0E04
4571 020814 041100          041100           ;; 1.0E03
4572 020820 000017          17              ;; 1.0E02
4573 020826 103240          103240           ;; 1.0E01
4574 020832 000001          1              ;; 1.0E00
4575 020838 23420          23420            ;; 1.0E00
4576 020844 0          0
4577 020850 001750          1750            ;; 1.0E02
4578 020856 000000          0
4579 020862 000144          144             ;; 1.0E02
4580 020868 000000          0
4581 020874 000012          12             ;; 1.0E01
4582 020880 000000          0
4583 020886 000001          1              ;; 1.0E00
4584 020892 021004          SDECVL: .BLKB 12. ;; RESERVE STORAGE FOR ASCII STRING
4585 020898 .SBTTL TRAP DECODER
4586
4587
4588
4589
4590
4591
4592
4593

```

```

;; *****
;; *THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
;; *AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
;; *OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
;; *GO TO THAT ROUTINE.

```

455  
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492  
493  
494  
495  
496  
497  
498  
499  
500

021020 010046  
021022 016600 000002  
021024 005740  
021030 111000  
021032 006300  
021034 016000 021054  
021040 000200

STRAP: MOV RO, -(SP) ;; SAVE RO  
MOV 2(SP), RO ;; GET TRAP ADDRESS  
TST -(RO) ;; BACKUP BY 2  
MOVB (RO), RO ;; GET RIGHT BYTE OF TRAP  
ASL RO ;; POSITION FOR INDEXING  
MOV STRPAD(RO), RO ;; INDEX TO TABLE  
RTS RO ;; GO TO ROUTINE

;; THIS IS USE TO HANDLE THE "GETPRI" MACRO

021042 011646  
021044 016656 000004 000002  
021052 000002

STRAP2: MOV (SP), -(SP) ;; MOVE THE PC DOWN  
MOV 4(SP), 2(SP) ;; MOVE THE PSW DOWN  
RTI ;; RESTORE THE PSW

.SBTTL TRAP TABLE

;; THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED  
;; BY THE "TRAP" INSTRUCTION.

ROUTINE  
-----  
STRPAD: .WORD STRAP2  
\$TYPE ;; CALL=TYPE TRAP+1(104401) TTY TYPEOUT ROUTINE  
\$TYPC ;; CALL=TYPC TRAP+2(104402) TYPE OCTAL NUMBER (WITH LEADING ZEROS)  
\$TYPOS ;; CALL=TYPOS TRAP+3(104403) TYPE OCTAL NUMBER (NO LEADING ZEROS)  
\$TYPON ;; CALL=TYPON TRAP+4(104404) TYPE OCTAL NUMBER (AS PER LAST CALL)  
\$TYPDS ;; CALL=TYPDS TRAP+5(104405) TYPE DECIMAL NUMBER (WITH SIGN)  
  
SGTSWR ;; CALL=GTSWR TRAP+6(104406) GET SOFT-SWR SETTING  
  
\$CKSWR ;; CALL=CKSWR TRAP+7(104407) TEST FOR CHANGE IN SOFT-SWR  
\$RDCHR ;; CALL=RDCHR TRAP+10(104410) TTY TYPEIN CHARACTER ROUTINE  
\$RDLIN ;; CALL=RDLIN TRAP+11(104411) TTY TYPEIN STRING ROUTINE  
\$SAVREG ;; CALL=SAVREG TRAP+12(104412) SAVE RO-R5 ROUTINE  
\$RESREG ;; CALL=RESREG TRAP+13(104413) RESTORE RO-R5 ROUTINE

;; \*\*\*\*\*

.SBTTL RP11 HANDLER

;; \*\*\*\*\*

;; STORAGE FOR RPDS & RPCS ON AN ILLEGAL INTERRUPT ERROR  
; RPERRS = RPDS  
; RPERRS+2 = RPCS

021104 000000  
021106 000000

RPERRS: .WORD 0  
.WORD 0

;; TABLE OF DRIVE ACTIV. INDICATORS (DRVACT=1 WORD)  
;; THIS IS A ONE WORD QUEUE WHICH WILL CONTAIN A  
;; BIT FOR EACH DRIVE WHICH IS ACTIVE WITH A COMMAND.

021110 000000

DRVACT: .WORD 0

```

4650
4651 ;TABLE OF DRIVE STATUS INDICATORS (DRVSTA=8 BYTES)
4652 ;DRVSTA=0 DRIVE NONEXISTENT OR OFFLINE
4653 ;DRVSTA>0 DRIVE IS ONLINE
4654 ;DRVSTA<0 DRIVE IS UNSAFE OR AN RPO3
4655
4656 021112 000 DRVSTA: .BYTE 0 ;DRIVE 0
4657 021113 000 .BYTE 0 ;DRIVE 1
4658 021114 000 .BYTE 0 ;DRIVE 2
4659 021115 000 .BYTE 0 ;DRIVE 3
4660 021116 000 .BYTE 0 ;DRIVE 4
4661 021117 000 .BYTE 0 ;DRIVE 5
4662 021120 000 .BYTE 0 ;DRIVE 6
4663 021121 000 .BYTE 0 ;DRIVE 7
4664
4665 ;DRIVE TYPE INDICATOR (DRVTP = 1 WORD)
4666 ;THIS IS A ONE WORD INDICATOR. EACH DRIVE IS ASSIGNED ONE BIT
4667 ;STARTING AT BIT00 FOR DRIVE 0. THE DRIVE'S BIT WILL BE SET IF IT
4668 ;IS AN RPO3 AND RESET IF IT IS AN RPO2.
4669
4670 021122 000000 DRVTP: .WORD 0
4671
4672 ;TRANSFER WAIT FLAG (TRANSWT=1 WORD)
4673 ;THIS IS A ONE WORD QUEUE. IT WILL CONTAIN THE ADDRESS OF
4674 ;"CPB" OF THE I/O OPERATION.
4675
4676 021124 000000 TRANSWT: .WORD 0
4677
4678 ;SEEK WAIT KEYS (SEEKWT=1 WORD)
4679 ;THIS IS A ONE WORD QUEUE THAT WILL CONTAIN A KEY FOR EACH OF
4680 ;THE DRIVES THAT ARE PERFORMING A SEARCH COMMAND FOR THE I/O
4681 ;REQUEST THAT IS AT THE TOP OF THEIR REQUEST QUEUE.
4682 ;EACH DRIVE IS ASSIGNED ONE BIT, STARTING AT BIT00 FOR DRIVE 0.
4683
4684 021126 000000 SEEKWT: .WORD 0
4685
4686 ;RPI1 DRIVER ACTIVE FLAG (ACTDRV=1 BYTE)
4687 ;ACTDRV=0 DRIVER IS INACTIVE
4688 ;ACTDRV>0 DRIVER IS ACTIVE
4689
4690 021130 000 ACTDRV: .BYTE 0
4691
4692 ;SOFTWARE TIMER ROUTINE ACTIVE FLAG (ACTSTR=1 BYTE)
4693 ;ACTSTR=0 SOFTWARE TIMER ROUTINE IS INACTIVE
4694 ;ACTSTR>0 SOFTWARE TIMER ROUTINE IS ACTIVE
4695
4696 021131 000 ACTSTR: .BYTE 0
4697
4698 ;SAVE REGISTERS FLAG (SAVEFG =1 WORD)
4699 ;SAVEFG<0 SAVE THE RPI1E REGISTERS WHEN THE
4700 ;OPERATION IS COMPLETED AS PER (DPB+14).
4701 ;SAVEFG=0 SAVE THE RPI1E REGISTERS, AS PER
4702 ;(DPB+14), AFTER AN ERROR.
4703
4704 021132 000000 SAVEFG: .WORD 0
4705

```

# H08

NO-11-DZRP1-8, RP11E MULTI-DRIVE EXERCISER PROGRAM  
DZRP18.CMB RP11 HANDLER

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```
4706 ;ORDER REQUEST QUEUES/LISTS
4707
4708 021134 000000 000000 000000 QREGS: .WORD 0,0,0,0,0,0,0,0,0 ;STORE REGISTERS ORDER QUEUE
4709 021142 000000 000000 000000
4710 021150 000000 000000 000000
4711 021156 000000 000000 000000 QSEEK: .WORD 0,0,0,0,0,0,0,0,0 ;SEEK/HOME SEEK ORDER QUEUE
4712 021164 000000 000000 000000
4713 021172 000000 000000 000000
4714 021200 000000 000000 000000 QTRANS: .WORD 0,0,0,0,0,0,0,0,0 ;TRANSFER ORDER QUEUE
4715 021206 000000 000000 000000
4716 021214 000000 000000 000000
4717 021222 000000 000000 000000 QDONE: .WORD 0,0,0,0,0,0,0,0,0 ;ON CYLINDER TRANSFER QUEUE
4718 021230 000000 000000 000000
4719 021236 000000 000000 000000
4720 021244 000000 000000 000000 QWAIT: .WORD 0,0,0,0,0,0,0,0 ;TRANSFER SEEK DONE LIST
4721 021252 000000 000000 000000
4722 021260 000000 000000 000000
4723
4724
4725 ;TIMEOUT TABLE (TIMER=8 WORDS)
4726 ;THIS TABLE CONTAINS THE TIME ALLOWED FOR AN OPERATION
4727
4728 021264 177777 TIMER: .WORD -1 ;DRIVE 0
4729 021266 177777 .WORD -1 ;DRIVE 1
4730 021270 177777 .WORD -1 ;DRIVE 2
4731 021272 177777 .WORD -1 ;DRIVE 3
4732 021274 177777 .WORD -1 ;DRIVE 4
4733 021276 177777 .WORD -1 ;DRIVE 5
4734 021300 177777 .WORD -1 ;DRIVE 6
4735 021302 177777 .WORD -1 ;DRIVE 7
4736
4737 ;ATTENTION BITS TABLE (ATABIT=8 BYTES)
4738 ;THIS TABLE CONTAINS THE CORRESPONDING BIT TO EACH DRIVES
4739 ;ATTENTION BIT
4740
4741 021304 001 ATABIT: .BYTE 1 ;DRIVE 0
4742 021305 002 .BYTE 2 ;DRIVE 1
4743 021306 004 .BYTE 4 ;DRIVE 2
4744 021307 010 .BYTE 10 ;DRIVE 3
4745 021310 020 .BYTE 20 ;DRIVE 4
4746 021311 040 .BYTE 40 ;DRIVE 5
4747 021312 100 .BYTE 100 ;DRIVE 6
4748 021313 200 .BYTE 200 ;DRIVE 7
4749
4750 ;RP11E DRIVER INITIALIZATION CODE
4751 ;THIS ROUTINE WILL DETERMINE WHICH RPO2 OR RPO3 DRIVES ARE
4752 ;AVAILABLE FOR TESTING AND SET THE 'DRYSTA' INDICATOR
4753 ;TO THE PROPER STATE FOR EACH DRIVE.
4754 ;NOTE: THIS ROUTINE CALLS DRVINT
4755
4756 ;CALL
4757
4758 JSR PC,RPINIT
4759 RETURN
4760
4761 021314 10412 RPINIT: SAVREG ;SAVE R0-R5
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4762 021316 013746 177776      MOV      2#PS, -(SP)      ;SAVE THE PRESENT PROCESSOR STATUS
4763 021322 013737 001222 177776  MOV      RPPR10, 2#PS    ;CHANGE THE PRIORITY
4764 021330 012701 021104      MOV      #RPERAS, R1    ;FIRST ADDRESS TO BE CLEARED
4765 021334 012702 021262      MOV      #TIMER-2, R2   ;LAST ADDRESS TO BE CLEARED
4766 021340 005021          15:  CLR      (R1)+           ;CLEAR
4767 021342 020102          CMP      R1, R2         ;ARE WE DONE?
4768 021344 101775          BLOS    1$             ;BRANCH IF NO
4769 021346 012702 021302      MOV      #ATABIT-2, R2  ;LAST ADDRESS
4770 021352 012721 177777      MOV      #-1, (R1)+     ;INITIALIZE
4771 021356 020102          CMP      R1, R2         ;DONE?
4772 021360 101774          BLOS    2$             ;LOOP IF NO
4773 021372 013703 001220      MOV      RPVEC, R3      ;SETUP THE RPI1 VECTOR
4774 021374 012723 022502      MOV      #ISP, (R3)+    ;
4775 021376 013713 001222      MOV      RPPR10, (R3)   ;
4776 021378 013704 001216      MOV      RPADR, R4      ;RPI1 ADDRESS
4777 021402 005001          CLR      R1             ;START WITH DRIVE 0
4778 021404 004737 021444      JSR     PC, DRVINT      ;INIT THE DRIVE
4779 021410 005201          3$:  INC     R1             ;GO TO NEXT DRIVE
4780 021412 042701 177770      4$:  BIC     #1C7, R1      ;MASK OUT UNUSED BITS
4781 021416 001372          BNE     3$             ;BR IF MORE DRIVES TO GO
4782 021420 012701 000007      MOV      #7, R1        ;START WITH DRIVE 7
4783 021424 005037 177776      CLR      2#PS          ;CLEAR THE PROCLSSOR STATUS
4784 021430 005301          5$:  DEC     R1             ;GO TO THE NEXT DRIVE
4785 021432 100376          BPL     5$             ;CHECK NEXT DRIVE
4786 021434 012637 177776      MOV      (SP)+, 2#PS    ;RESTORE THE PROCESSOR STATUS
4787 021440 104413          RESREG ;RESTORE R0-R5
4788 021442 000207          RTS     PC             ;BYE-BYE
4789
4790
4791 ;DRIVE INITIALIZATION ROUTINE
4792 ;THIS ROUTINE DETERMINES OF A DRIVE IS PRESENT AND IF IT IS
4793 ;AN RPO2 OR RPO3. 'DRVSTA' IS SET TO REFLECT THE DRIVE'S
4794 ;STATUS AND THE DRIVE TYPE INDICATOR BIT IS SET IN 'DRVTYP'.
4795 ;CALL
4796 ;
4797 ;
4798 ;
4799 ;
4800 ;
4801 ;
4802 ;
4803 ;
4804 ;
4805 ;
4806 ;
4807 ;
4808 ;
4809 ;
4810 ;
4811 ;
4812 ;
4813 ;
4814 ;
4815 ;
4816 ;
4817 ;

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# JOB

MD-11-DZRP1-B, RPI1E MULTI-DRIVE EXERCISER PROGRAM  
DZRP1B.CMB RPI1 HANDLER

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4818 021554 156137 02130 1122 4$: BISB ATABIT(R1),DRVTYP ;SET RPO3 INDICATOR
4819 021562 104413 5$: RESREG ;RESTORE RO-R5
4820 021564 000207 RTS PC ;RETURN
4821
4822 ;REQUEST PRE-PROCESSOR-HANDLES SUBSYSTEM REQUEST
4823
4824 ;CALL
4825
4826 JSR RO,2#RPI1 ;CALL THE RPI1E DRIVER
4827 PNTADR ;ADDRESS OF POINTER OF DRIVE'S PARAMETER BLOCK
4828 RETURN1 ;RETURN HERE IF QUEUE IS FULL
4829 RETURN2 ;RETURN HERE IF REQUEST IS IN QUEUE OR THERE
4830 ;IS AN ERROR CONDITION
4831
4832 021566 013746 177776 RPI1: MOV PSW, -(SP) ;SAVE THE CALLING STATUS
4833 021572 013737 001222 177776 MOV RPPRIO, PSW ;DON'T ALLOW ANY RPI1E INTERRUPTS
4834 021600 112737 000001 021130 MOVVB #1, ACTDRV ;SET "ACTIVE DRIVER" FLAG
4835 021606 010246 MOV R2, -(SP) ;SAVE R2
4836 021610 012002 MOV (RO)+, R2 ;PICKUP THE DRIVE PARAMETER BLOCK POINTER
4837 021612 005062 000016 CLR 16(R2) ;CLEAR THE STATUS/ERROR INDICATOR
4838 021616 004037 024060 JSR RO, LODQUE ;PUT THIS REQUEST IN QUEUE
4839 021622 000403 BR 1$ ;QUEUE IS FULL
4840 021624 004737 021646 JSR PC, CI ;INITIATE A COMMAND
4841 021630 005720 TST (RO)+
4842 021632 012602 1$: MOV (SP)+, R2 ;RESTORE R2
4843 021634 105037 021130 CLRB ACTDRV ;CLEAR "ACTIVE DRIVER" FLAG
4844 021640 012637 177776 MOV (SP)+, 2#PS ;RETURN "PS" TO USER LEVEL
4845 021644 000200 RTS RO ;RETURN TO CALLER
4846
4847 ;COMMAND INITIATION ROUTINE
4848
4849 021646 104412 CI: SAVREG ;SAVE RO-R5
4850 021650 013704 MOV RPADR, R4 ;RPI1 ADDRESS
4851 021654 005737 021124 TST TRNSWT ;TRANSFER IN PROGRESS ?
4852 021660 001035 BNE 5$ ;BR IF ONE IS
4853 021662 005737 021134 TST QREGS ;PENDING STORE REGISTERS OP ?
4854 021666 001402 BEQ 1$ ;BR IF NOT
4855 021670 004737 021760 JSR PC, CI1 ;STORE THE REGISTERS
4856 021674 005737 021156 1$: TST QSEEK ;PENDING SEEKS OR HOME SEEKS ?
4857 021700 001402 BEQ 2$ ;BR IF NONE
4858 021702 004737 022024 JSR PC, CI2 ;START PENDING SEEKS
4859 021706 005737 021200 2$: TST QTRANS ;PENDING TRANSFER ORDERS ?
4860 021712 001402 BEQ 3$ ;BR IF NONE
4861 021714 004737 022142 JSR PC, CI3 ;START THE TRANSFER ORDERS
4862 021720 005737 021222 3$: TST QNONE ;ON CYLINDER TRANSFER REQUESTS ?
4863 021724 001405 BEQ 4$ ;BR IF DONE
4864 021726 004737 022264 JSR PC, CI4 ;START ORDER AT HEAD OF QUEUE
4865 021732 005737 021124 TST TRNSWT ;TRANSFER ORDER STARTED ?
4866 021736 001006 BNE 5$ ;BR IF ONE WAS
4867 021740 105737 021110 4$: TSTB DRVACT ;ANY ACTIVE DRIVES ?
4868 021744 001403 BEQ 5$ ;BR IF NONE
4869 021746 112764 000040 000005 MOVVB #40, RPCS+1(R4) ;SET ATTENTION INTERRUPT ENABLE
4870 021754 104413 5$: RESREG ;RESTORE RO-R5
4871 021756 000207 RTS PC ;RETURN
4872
4873 ;STORE THE REGISTERS COMMAND

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# K08

MD-11-DZRP1-B, RPI1E MULTI-DRIVE EXERCISER PROGRAM  
DZRP1B.CMB RPI1 HANDLER

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4874
4875 021760 117764 177150 000005 CI1:  MOVB  @QREGS,RPCS+1(R4) ;SELECT THE DRIVE
4876 021766 013702 021134      MOV  @QREGS,R2      ;DPB ADDRESS
4877 021772 004737 024000      JSR  PC,SVAP11     ;STORE THE REGISTERS
4878 021776 012762 000200 000016      MOV  #BIT07,16(R2) ;SET 'DONE'
4879 022004 012702 021134      MOV  @QREGS,R2     ;QUEUE ADDRESS
4880 022010 004737 024256      JSR  PC,POPQUE     ;'POP' THE QUEUE
4881 022014 005737 021134      TST  @QREGS        ;ANY MORE REQUESTS IN QUEUE ?
4882 022020 001357      BNE  CI1           ;BR IF ANY ARE
4883 022022 000207      RTS               ;RETURN
4884
4885 ;START THE SEEK OR HOME SEEK COMMAND
4886
4887 022024 117764 177126 000005 CI2:  MOVB  @QSEEK,RPCS+1(R4) ;SELECT THE DRIVE
4888 022032 013702 021156      MOV  @QSEEK,R2     ;DPB ADDRESS
4889 022036 005001      CLR  R1            ;CLEAR R1
4890 022040 117701 177112      MOVB  @QSEEK,R1     ;DRIVE ADDRESS
4891 022044 004037 022436      JSR  RO,CIR        ;SEE IF DRIVE IS READY
4892 022050 000424      BR   !S           ;DRIVE NOT READY OR IS UNSAFE
4893 022052 016264 000010 000012      MOV  10(R2),RPCA(R4) ;DESIRED CYLINDER ADDRESS
4894 022060 016264 000012 000014      MOV  12(R2),RPDA(R4) ;SECTOR/TRACK ADDRESS
4895 022066 116264 000002 000004      MOVB  2(R2),RPCS(R4) ;START THE COMMAND
4896 022074 156137 021304 021110      BISB  ATABIT(R1),DRVACT ;SET THE DRIVE'S ACTIVE BIT
4897 022102 006301      ASL  R1            ;ADDRESS WORDS
4898 022104 013761 001260 021264      MOV  TIMEOUT,TIMER(R1) ;START TIMER FOR DRIVE
4899 022112 013761 021156 021244      MOV  @QSEEK,@WAIT(R1) ;PUT DPB ADDRESS IN 'WAIT' QUEUE
4900 022120 006201      ASR  R1            ;RESTORE DRIVE ADDRESS
4901 022122 012701 021156      !S:  MOV  @QSEEK,R1     ;QUEUE ADDRESS
4902 022126 004737 024256      JSR  PC,POPQUE     ;'POP' THE SEEK QUEUE
4903 022132 005737 021156      TST  @QSEEK        ;MORE REQUESTS ?
4904 022136 001332      BNE  CI2           ;BR IF MORE
4905 022140 000207      RTS               ;RETURN
4906
4907 ;DO AN EXPLICIT SEEK IF DRIVE IS NOT ON CYLINDER
4908
4909 022142 117764 177032 000005 CI3:  MOVB  @QTRANS,RPCS+1(R4) ;SELECT THE DRIVE
4910 022150 005001      CLR  R1            ;CLEAR R1
4911 022152 117701 177022      MOVB  @QTRANS,R1     ;DRIVE ADDRESS
4912 022156 013702 021200      MOV  @QTRANS,R2     ;DPB ADDRESS
4913 022162 004037 022436      JSR  RO,CIR        ;SEE IF DRIVE READY
4914 022166 000426      BR   !S           ;DRIVE NOT READY
4915 022170 016264 000010 000012      MOV  10(R2),RPCA(R4) ;DESIRED CYLINDER
4916 022176 016264 000012 000014      MOV  12(R2),RPDA(R4) ;SECTOR/TRACK ADDRESS
4917 022204 112764 000011 000004      MOVB  @SEEK,RPCS(R4) ;SEEK COMMAND
4918 022212 156137 021304 021110      BISB  ATABIT(R1),DRVACT ;SET DRIVE ACTIVE
4919 022220 156137 021304 021126      BISB  ATABIT(R1),SEEKWT ;SET SEEK WAIT BIT
4920 022226 006301      ASL  R1            ;SETUP TO ADDRESS WORDS
4921 022230 013761 001260 021264      MOV  TIMEOUT,TIMER(R1) ;START TIMER FOR DRIVE
4922 022236 013761 021200 021244      MOV  @QTRANS,@WAIT(R1) ;'WAIT' TABLE ENTRY
4923 022244 012701 021200      !S:  MOV  @QTRANS,R1     ;TRANSFER QUEUE ADDRESS
4924 022250 004737 024256      JSR  PC,POPQUE     ;'POP' THE TRANSFER QUEUE
4925 022254 005737 021200      TST  @QTRANS       ;MORE DRIVES IN QUEUE ?
4926 022260 001330      BNE  CI3           ;BR IF MORE DRIVES
4927 022262 000207      RTS               ;RETURN
4928
4929 ;START THE PENDING ON CYLINDER TRANSFER REQUEST

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4930
4931 022264 117764 176732 000005 CI4:  MOVB  QDONE,RPCS+1(R4) ;SELECT THE DRIVE
4932 022272 117701 176724      MOVB  QDCC+5,R1 ;DRIVE ADDRESS
4933 022276 013702 021222      MOV   QDONE,R2 ;DPB ADDRESS
4934 022302 004037 022436      JSR   RD,CIR ;SEE IF DRIVE IS READY
4935 022306 000440      BR    1$ ;DRIVE NOT READY
4936 022310 016264 000004 000006      MOV   4(R2),RPWC(R4) ;WORD COUNT
4937 022316 016264 000006 000010      MOV   6(R2),RPBA(R4) ;BUFFER ADDRESS
4938 022324 016264 000010 0C0012      MOV   10(R2),RPCA(R4) ;CYLINDER ADDRESS
4939 022332 016264 000012 000014      MOV   12(R2),RPDA(R4) ;SECTOR/TRACK ADDRESS
4940 022340 016246 000002      MOV   2(R2),-(SP) ;COMMAND CODE, MODE & HDR BITS
4941 022344 151266 000001      BISB  (R2),1(SP) ;DRIVE ADDRESS
4942 022350 156216 000001      BISB  1(R2),(SP) ;'MEX' BITS
4943 022354 052716 000100      BIS   #IDE,(SP) ;INTERRUPT ON DONE BIT
4944 022360 012664 000004      MOV   (SP)+,RPCS(R4) ;START THE COMMAND
4945 022364 156137 021304 021110      BISB  ATABIT(R1),DRVACT ;DRIVE ACTIVE BIT
4946 022372 006301      ASL   R1 ;ADDRESS WORDS
4947 022374 013761 001260 021264      MOV   TIMEOUT,TIMER(R1) ;START TIMER FOR DRIVE
4948 022402 006201      ASR   R1 ;RESTORE R1
4949 022404 010237 021124      MOV   R2,TRANSWT ;DPB ADDRESS
4950 022410 012701 021222      1$:  MOV   QDONE,R1 ;QUEUE ADDRESS
4951 022414 004737 024256      JSR   PC,POPQUE ;'POP' THE QUEUE
4952 022420 005737 021124      TST   TRANSWT ;TRANSFER ORDER RUNNING ?
4953 022424 001003      BNE   2$ ;BR IF ONE IS
4954 022426 005737 021222      TST   QDONE ;MORE ORDERS WAITING ?
4955 022432 001314      BNE   CI4 ;BR IF MORE
4956 022434 000207      2$:  RTS   PC ;RETURN
4957
4958 ;SEE IF DRIVE IS ONLINE
4959
4960 022436 004737 021444      CIR:  JSR   PC,DRVINT ;CHECK DRIVE'S STATUS
4961 022442 105761 021112      TSTB  DRVSTA(R1) ;SEE WHAT DRIVE'S STATUS IS
4962 022446 003013      BGT   3$ ;BR IF DRIVE ONLINE
4963 022450 002404      BLT   1$ ;BR IF DRIVE IS UNSAFE
4964 022452 012762 140000 000016      MOV   #BIT15:BIT14,16(R2) ;SET OFFLINE INDICATOR
4965 022460 000403      BR    2$ ;GO STORE REGISTERS
4966 022462 012762 110000 000016      1$:  MOV   #BIT15:BIT12,16(R2) ;SET UNSAFE INDICATOR
4967 022470 004737 024000      2$:  JSR   PC,SVRP11 ;STORE THE REGISTERS
4968 022474 000401      BR    4$ ;EXIT
4969 022476 005720      3$:  TST  (R0)+ ;STEP AROUND ERROR RETURN
4970 022500 000200      4$:  RTS   R0 ;RETURN
4971
4972 ;INTERRUPT SERVICE ROUTINE
4973
4974 022502 112737 000001 021130      ISR:  MOVB  #1,ACTDRV ;SET "ACTIVE DRIVER" FLAG
4975 022510 104412      SAVREG ;SAVE R0-R5
4976 022512 013704 001216      MOV   RPADR,R4 ;ADDRESS OF RP11
4977 022516 005737 021124      TST   TRANSWT ;TRANSFER OPERATION IN PROGRESS ?
4978 022522 001403      BEQ   1$ ;BR IF NOT
4979 022524 004737 022552      JSR   PC,TD ;CALL TRANSFER DONE
4980 022530 000402      BR    2$ ;EXIT
4981 022532 004737 023034      1$:  JSR   PC,SC ;CALL SPECIAL CONDITIONS
4982 022536 004737 021646      2$:  JSR   PC,CI ;GO TO THE COMMAND INITIATION ROUTINE
4983 022542 104413      RESREG ;RESTORE R0-R5
4984 022544 105037 021130      CLRB  ACTDRV ;CLEAR "ACTIVE DRIVER" FLAG
4985 022550 000002      RTI ;RETURN

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4996
4997
4998
4999 022552 005001 TD: CLR R1 ;CLEAR DRIVE NUMBER STORAGE
5000 022554 117701 176344 MOVB #TRANSWT,R1 ;GET DRIVE NUMBER
5001 022560 146137 021304 021110 BICB ATABIT(R1),DRVACT ;CLEAR DRIVE ACTIVE BIT
5002 022566 006301 ASL R1
5003 022570 012761 177777 021264 MOV #8-1,TIMER(R1) ;STOP TIMER
5004 022576 006201 ASR R1
5005 022600 013702 021124 MOV TRANSWT,R2 ;GET "DPB" ADDRESS FROM THE
5006 022604 005037 021124 CLR TRANSWT ;TRANSFER WAIT QUEUE--CLEAR QUEUE
5007 022610 012762 000200 000016 MOV #BIT07,16(R2) ;SET DONE
5008 022616 110164 000005 MOVB R1,RPCS+1(R4) ;SELECT THE DRIVE
5009 022622 116164 021304 000000 MOVB ATABIT(R1),RPDS(R4) ;CLEAR DRIVE'S ATTENTION BIT
5010 022630 005764 070004 TST RPCS(R4) ;ERROR SET ?
5011 022634 100413 BMI 2$ ;BR IF YES
5012 022636 005737 021132 TST SAVEFG ;SAVE THE RP11E REGISTERS?
5013 022642 100002 BPL 1$ ;BRANCH IF NO
5014 022644 004737 024000 JSR PC,SVRP11 ;YES--SAVE THE REGISTERS
5015 022650 042764 000100 000004 1$: BIC #IDE,RPCS(R4) ;CLEAR 'INTERRUPT ON DONE' BIT
5016 022656 004737 022742 JSR PC,WC ;SEE IF WRITE CHECK TO BE PUT IN QUEUE
5017 022662 000505 BR SC0 ;SPECIAL CONDITIONS ENTRY
5018 022664 004737 024000 2$: JSR PC,SVRP11 ;SAVE THE REGISTERS
5019 022670 012764 000001 000004 MOV #CLEAR,RPCS(R4) ;CLEAR THE CONTROLLER
5020 022676 004737 021444 JSR PC,DRVINT ;CHECK THE DRIVE'S STATUS
5021 022702 105761 021112 TSTB DRVSTA(R1) ;DRIVE STILL ONLINE ?
5022 022706 003011 BGT 4$ ;BR IF ONLINE
5023 022710 100404 BMI 3$ ;BR IF UNSAFE
5024 022712 012762 140000 000016 MOV #BIT15:BIT:4,16(R2) ;SET DRIVE OFFLINE INDICATOR
5025 022720 000466 BR SC0 ;CHECK FOR OTHER DRIVES
5026 022722 012762 110000 000016 3$: MOV #BIT15:BIT12,16(R2) ;SET DRIVE UNSAFE INDICATOR
5027 022730 000462 BR SC0 ;CHECK FOR OTHER DRIVES
5028 022732 052762 100100 000016 4$: BIS #BIT15:BIT06,16(R2) ;SET DATA ERROR FLAG
5029 022740 000456 BR SC0 ;SPECIAL CONDITIONS ENTRY
5030
5031
5032
5033
5034
5035
5036
5037
5038
5039
5040
5041 023034 105764 000000 SC: TSTB RPDS(R4) ;ATTENTION BITS SET ?

```

;TRANSFER DONE ROUTINE

;FORCED WRITE CHECK ROUTINE

;SPECIAL CONDITION ROUTINE

5042	023040	001016			BNE	5C0		:BR IF SOME SET
5043	023042	016437	000000	021104	MOV	RPOS(R4),RPERRS		:STORE DRIVE STATUS REGISTER
5044	023050	016437	000004	021106	MOV	RPCS(R4),RPERRS+2		:STORE THE CONTROL REGISTER
5045	023056	104003			ERROR	3		:ILLEGAL INTERRUPT
5046	023060	005737	021110		TST	DRVACT		:ANY DRIVES ACTIVE ?
5047	023064	001403			BEQ	15		:BR IF NOT
5048	023066	112764	000040	000005	MOVB	#40,RPCS+1(R4)		:SET 'AIE'
5049	023074	000207			RTS	PC		:RETURN

15:

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5050 023076 005001          SCO:  CLR  R1          ;CLEAR DRIVE NUMBER STORAGE
5051 023100 012793 000001      SC1:  MOV  #1,R3       ;START WITH DRIVE 0'S BIT
5052 023104 030337 021110      SC1:  BIT  R3,DRVACT   ;IS THIS DRIVE ACTIVE ?
5053 023110 001304          SC2:  BNE  SC3         ;BR IF IT IS
5054 023112 095201          SC2:  INC  R1         ;GO TO NEXT DRIVE
5055 023114 106303          SC2:  ASLB R3         ;SHIFT DRIVE'S BIT
5056 023116 001372          SC2:  BNE  SC1         ;BR IF MORE DRIVES TO CHECK
5057 023120 000207          SC2:  RTS  PC         ;RETURN
5058 023122 006301          SC3:  ASL  R1         ;SETUP TO ADDRESS WORDS
5059 023124 016102 021244      SC3:  MOV  #0,R1 ;GET DRIVE'S DPB ADDRESS
5060 023130 006201          SC3:  ASR  R1 ;RESTORE ADDRESS
5061 023132 110164 000005      SC3:  MOV  R1,RPCS+1(R4) ;SELECT DRIVE
5062 023136 032764 002000 000000 SC3:  BIT  #SUU,RPDS(R4) ;DRIVE STILL SEEKING ?
5063 023144 001362          SC3:  BNE  SC2         ;BR IF IT IS
5064 023146 006301          SC3:  ASL  R1         ;ADDRESS WORDS
5065 023150 005061 021244      SC3:  CLR  WAIT(R1)    ;CLEAR THE WAIT QUEUE ENTRY
5066 023154 012761 177777 021264 SC3:  MOV  #-1,TIMER(R1) ;STOP THE TIMER
5067 023162 006201          SC3:  ASR  R1         ;RESTORE DRIVE ADDRESS
5068 023164 146137 021304 021110 SC3:  BICB ATABIT(R1),DRVACT ;CLEAR THE DRIVE'S ACTIVE BIT
5069 023172 116164 021304 000000 SC3:  MOV  ATABIT(R1),RPDS(R4) ;CLEAR DRIVE'S ATTENTION BIT
5070 023200 032764 001000 000000 SC3:  BIT  #SUFU,RPDS(R4) ;DRIVE UNSAFE ?
5071 023206 001027          SC3:  BNE  1$         ;BR IF IT IS
5072 023210 032764 040000 000000 SC3:  BIT  #SUOL,RPDS(R4) ;IS DRIVE STILL ONLINE ?
5073 023216 001432          SC3:  BEQ  2$         ;BR IF NOT
5074 023220 032764 140000 000004 SC3:  BIT  #ERR!HE,RPCS(R4) ;ANY ERRORS SET ?
5075 023226 001034          SC3:  BNE  3$         ;BR IF SET
5076 023230 136137 021304 021126 SC3:  BITB ATABIT(R1),SEEKWT ;TRANSFER SEEK ?
5077 023236 001434          SC3:  BEQ  4$         ;BR IF NOT
5078 023240 010146          SC3:  MOV  R1,-(SP)    ;SAVE R1
5079 023242 12701 021222      SC3:  MOV  #DONE,R1    ;DONE QUEUE ADDRESS
5080 023246 004037 024226      SC3:  JSR  R0,DRVQUE  ;PUT DRIVE'S DPB ADDRESS IN DONE QUEUE
5081 023252 000240          SC3:  NOP             ;RETURN IF QUEUE FULL (SHOULDN'T HAPPEN)
5082 023254 012601          SC3:  MOV  (SP)+,R1    ;RESTORE R1
5083 023256 146137 021304 021126 SC3:  BICB ATABIT(R1),SEEKWT ;CLEAR WAIT BIT
5084 023264 000712          SC3:  BR   SC2         ;GET ANOTHER DRIVE
5085 023266 052762 110000 000016 1$:  BIS  #BIT15!BIT12,16(R2) ;SET DRIVE UNSAFE STATUS
5086 023274 112761 177777 021112 SC3:  MOV  #-1,DRVSTA(R1) ;SET DRIVE UNSAFE
5087 023302 000420          SC3:  BR   5$         ;STORE REGISTERS
5088 023304 052762 140000 000016 2$:  BIS  #BIT15!BIT14,16(R2) ;SET DRIVE OFFLINE STATUS
5089 023312 105061 021112      SC3:  CLRB DRVSTA(R1) ;SET DRIVE OFFLINE
5090 023316 000412          SC3:  BR   5$         ;STORE REGISTERS
5091 023320 052762 100240 000016 3$:  BIS  #BIT15!BIT7!BITS,16(R2) ;SET ERROR DURING SEEK STATUS
5092 023326 000406          SC3:  BR   5$         ;STORE REGISTERS
5093 023330 052762 000200 000016 4$:  BIS  #BIT07,16(R2)    ;NORMAL END OF ORDER STATUS
5094 023336 005737 021132      SC3:  TST  SAVEFG     ;SAVE REGISTERS ?
5095 023342 001663          SC3:  BEQ  SC2         ;BR IF NOT
5096 023344 146137 021304 021126 5$:  BICB ATABIT(R1),SEEKWT ;CLEAR DRIVE'S WAIT BIT
5097 023352 004737 024000      SC3:  JSR  PC,SVRPI1  ;STORE THE RPI1E REGISTERS
5098 023356 000655          SC3:  BR   SC2         ;GET ANOTHER DRIVE
5099
5100 ;TIMER ROUTINE
5101 ;CALL
5102 ;   MOV  #TIME,-(SP) ;ELAPSED TIME IN MILLISECONDS ON THE STACK
5103 ;   JSR  PC,RPTMR    ;CALL RPI1E TIMER ROUTINE
5104
5105 023360 005737 021130      RPTMR: TST  ACTDRV    ;CHECK "ACTDRV & ACTSTR"

```

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5106 023364 001040          BNE      55          ; IF NON-ZERO, EXIT
5107 023366 112737 000001 021131  MOVB    #1,ACTSTR  ; SET "ACTSTR"
5108 023374 104412          SAVREG          ; SAVE R0-R5
5109 023376 005001          CLR      R1          ; START WITH DRIVE 0
5110 023400 005003          CLR      R3
5111 023402 005763 021264 15:   TST     TIMER(R3)  ; IS THE TIMER RUNNING?
5112 023406 002407          BLT     25          ; BRANCH IF NO
5113 023410 166663 000002 021264  SUB     2(SP),TIMER(R3) ; COUNT THE INTERVAL
5114 023416 003003          BGT     25          ; BR IF NO SOFTWARE TIMEOUT
5115 023420 004737 023472  JSR     PC,STO      ; CALL SOFTWARE TIMEOUT ROUTINE
5116 023424 000406          BR      35          ; GO TO THE EXIT
5117 023426 005201          BR      25:        ; MOVE TO NEXT DRIVE
5118 023430 005723          INC     R1
5119 023432 022701 000010  TST     (R3)+
5120 023436 003361          CMP     #8.,R1     ; OUT OF DRIVES?
5121 023440 000407          BGT     15          ; BRANCH IF NO
5122 023442 005737 021124 35:   BR      45          ; BYPASS 'SC' AND 'CI' CHECKS
5123 023446 001004          TST     TRNSWT     ; ACTIVE TRANSFER COMMAND ?
5124 023450 004737 023076  JSR     PC,SCO      ; BR IF YES
5125 023454 004737 021646  JSR     PC,CI       ; LOOK FOR DRIVES FINISHED SEEKING
5126 023460 104413          JSR     RESREG     ; START ANY OUTSTANDING COMMANDS
5127 023462 105037 021131 45:   CLRB   ACTSTR      ; RESTORE R0-R5
5128 023466 012616 55:   MOV     (SP)+,(SP) ; ZERO ACTIVE SOFTWARE TIMEOUT ROUTINE FLAG
5129 023470 000207          RTS     PC         ; ADJUST THE STACK
5130                                ; RETURN
5131                                ; SOFTWARE TIMEOUT ROUTINE
5132                                ; CALL:
5133                                ; STO
5134                                ; MOV     #DRVNUM,R1 ; DRIVE NUMBER
5135                                ; JSR     PC,STO   ; CALL--DRVACT MUST BE NONZERO
5136                                ; RETURN
5137
5138 023472 013704 001216  STO:   MOV     RPADR,R4 ; GET ADDRESS OF RPI1
5139 023476 110164 000005  MOVB    R1,RPCS+1(R4) ; SELECT THE DRIVE
5140 023502 006301          ASL     R1          ; WORD INDEX
5141 023504 012761 177777 021264  MOV     #1,TIMER(R1) ; STOP TIMER
5142 023512 006201          ASR     R1          ; RESTORE R1
5143 023514 005737 021124  TST     TRNSWT     ; DATA TRANSFER IN PROGRESS ?
5144 023520 001446          BEQ     STO1       ; ER IF NOT
5145 023522 120177 175376  CMPB   R1,TRNSWT   ; IN PROGRESS FOR THIS DRIVE ?
5146 023526 001123          BNE     STO5       ; BR IF NOT
5147 023530 105764 000004  TSTB   RPCS(R4)   ; CONTROLLER READY ?
5148 023534 100520          BMI     STO5       ; BR IF READY
5149 023536 146137 021304 021110  BICB   ATABIT(R1),DRVACT ; CLEAR DRIVE ACTIVE BIT
5150 023544 013702 021124  MOV     TRNSWT,R2  ; PUT OPB ADDRESS IN R2
5151 023550 004737 024000  JSR     PC,SVRPI1  ; STORE THE REGISTERS
5152 023554 004737 021444  JSR     PC,DRVINT  ; CHECK ON THE DRIVE'S STATUS
5153 023560 012762 100400 000016  MOV     #BIT15:BIT08,16(R2) ; SET TIMEOUT & 'RESET' INDICATOR
5154 023566 105761 021112  TSTB   DRVSTA(R1) ; SEE IF DRIVE STILL ONLINE
5155 023572 003010          BGT     25          ; BR IF DRIVE STILL ONLINE
5156 023574 002404          BLT     15          ; BR IF DRIVE UNSAFE
5157 023576 052762 040000 000016  BIS    #BIT14,16(R2) ; SET OFFLINE INDICATOR
5158 023604 000403          BR      25          ; GO INIT THE DRIVE
5159 023606 052762 010000 000016 15:   BIS    #BIT12,16(R2) ; SET UNSAFE INDICATOR
5160 023614 112764 000001 000004 25:   MOVB   #CLEAR,RPCS(R4) ; CLEAR THE CONTROLLER
5161 023622 112764 000001 000004  MOVB   #CLEAR,RPCS(R4) ; CLEAR THE CONTROLLER AGAIN

```

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5162 023630 005037 021124 CLR TRANSWT ;CLEAR THE TRANSFER QUEUE
5163 023634 000460 BR ST05 ;EXIT
5164 023636 006301 ASL R1 ;ADDRESS WORDS
5165 023640 016102 MOV QWAIT(R1),R2 ;GET DPB ADDRESS
5166 023644 006201 ASR R1 ;RESTORE R1
5167 023646 032764 BIT #SUFU,RPDS(R4) ;DRIVE UNSAFE ?
5168 023654 001020 BNE ST02 ;BR IF UNSAFE
5169 023656 032764 BIT #SUSI,RPDS(R4) ;SEEK INCOMPLETE ?
5170 023664 001044 BNE ST05 ;BR IF SET
5171 023666 032764 BIT #SUOL,RPDS(R4) ;DRIVE ONLINE ?
5172 023674 001417 BEQ ST03 ;BR IF NOT
5173 023676 032764 BIT #SUDY,RPDS(R4) ;DRIVE READY ?
5174 023704 001034 BNE ST05 ;BR IF READY
5175 023706 012762 MOV #BIT15:BIT09,16(R2) ;SET INDICATOR FOR TIMEOUT DURING SEEK
5176 023714 000414 BR ST04 ;CONTINUE WITH PROCESSING
5177 023716 012762 MOV #BIT15:BIT12,16(R2) ;DRIVE UNSAFE INDICATOR
5178 023724 112761 MOVB #-1,DRVSTA(R1) ;SET DRIVE UNSAFE
5179 023732 000405 BR ST04 ;CONTINUE
5180 023734 012762 MOV #BIT15:BIT14,16(R2) ;DRIVE OFFLINE INDICATOR
5181 023742 105061 CLRB DRVSTA(R1) ;SET DRIVE OFFLINE
5182 023746 006301 ASL R1 ;ADDRESS WORDS
5183 023750 005061 CLR QWAIT(R1) ;CLEAR THE ENTRY
5184 023754 006201 ASR R1 ;RESTORE R1
5185 023756 146137 BICB ATABIT(R1),DRVACT ;CLEAR DRIVE'S ACTIVE BIT
5186 023764 146137 BICB ATABIT(R1),SEEKWT ;CLEAR SEEK WAIT BIT
5187 023772 004737 JSR PC,SVRP11 ;SAVE THE REGISTERS
5188 023776 000207 RTS ;RETURN

```

;ROUTINE TO SAVE THE RP11E REGISTERS AS PER DPB+14

```

5191 ;CALL
5192 ;
5193 ;
5194 ;
5195 ;
5196 ;
5197 024000 104412 SVRP11: SAVREG ;SAVE R0-R5
5198 024002 013704 MOV RPAOR,R4 ;RP11 ADDRESS
5199 024006 111264 MOVB (R2),RPCS+1(R4) ;SELECT DRIVE
5200 024012 016202 MOV 14(R2),R2 ;GET THE ERROR TABLE POINTER
5201 024016 001416 BEQ 4$ ;EXIT IF 0
5202 024020 005003 CLR R3 ;COUNTER & POINTER
5203 024024 012705 MOV #RPM2,R5 ;PROBLEM REGISTER
5204 024026 020005 1$: CMP R3,R5 ;REACHED RPM2 ?
5205 024030 001002 BNE 2$ ;BR IF NO
5206 024032 005723 TST (R3)+ ;INCREMENT THE INDEX
5207 024034 005723 TST (R3)+ ;INCREMENT THE INDEX
5208 024036 010446 2$: MOV R4,-(SP) ;FORM RP11 ADDRESS THAT IS
5209 024040 060316 ADD R3,(SP) ;TO BE READ
5210 024042 013622 MOV 2(SP)+,(R2)+ ;AND READ IT
5211 024044 005723 3$: TST (R3)+ ;MOVE TO NEXT REG INDEX
5212 024046 020327 000026 CMP R3,#SILO ;DONE?
5213 024052 003765 BLE 1$ ;FINCH IF NO
5214 024054 104413 4$: RESREG ;RESTORE R0-R5
5215 024056 000207 RTS ;RETURN TO USER

```

;ROUTINE TO PUT THE REQUEST IN THE PROPER QUEUE

```

:CALL
:      MOV      #DOPBNUM,R2      ; ADDRESS OF PARAMETER BLOCK
:      JSR      RO,LODQUE        ; PUT THE REQUEST IN THE PROPER QUEUE
:      RETURN1
:      RETURN2
:      RETURN HERE IF QUEUE IS FULL
:      RETURN HERE IF REQUEST IS IN QUEUE

LODQUE: MOV      R1,-(SP)        ; SAVE R1
        BIT      #BIT0,2(R2)    ; IS THIS A GET REGISTER REQUEST ?
        BNE     1$             ; BR IF NOT
        MOV      #DREGS,R1      ; LOAD QUEUE ADDRESS
        BR      7$             ; GO ENTER REQUEST
        CMPB    #DSEEK,2(R2)    ; SEEK REQUEST ?
        BEQ     2$             ; BR IF IT IS
        CMPB    #DHOMSEK,2(R2) ; HOME SEEK REQUEST ?
        BNE     3$             ; BR IF NOT
        MOV      #DSEEK,R1      ; QUEUE ADDRESS
        BR      7$             ; ENTER REQUEST
        CMPB    #DRDSEK,2(R2)  ; READ W/IMPLIED SEEK ?
        BEQ     5$             ; BR IF IT IS
        CMPB    #DWRITE,2(R2)  ; WRITE W/IMPLIED SEEK ?
        BEQ     5$             ; BR IF IT IS
        CMPB    #DWRITECHK,2(R2); WRITE CHECK ?
        BEQ     5$             ; BR IF WRITE CHECK
        CMPB    #DREAD,2(R2)   ; READ W/O IMPLIED SEEK ?
        BEQ     5$             ; BR IF IT IS
        CMPB    #DWRITE,2(R2)  ; WRITE W/O IMPLIED SEEK ?
        BEQ     5$             ; BR IF IT IS
        MOV      #BIT15:BIT13,16(R2) ; SET INVALID OPCODE INDICATOR
        BR      8$             ; EXIT WITHOUT MAKING QUEUE ENTRY
        MOV      #DTRANS,R1     ; QUEUE ADDRESS
        JSR      RO,DRVQUE      ; PUT THE REQUEST IN THE QUEUE
        BR      9$             ; QUEUE WAS FULL
        TST     (R0)+          ; INCREMENT RETURN
        MOV     (SP)+,R1        ; RESTORE R1
        RTS      RO            ; RETURN

:ROUTINE TO PUT A REQUEST IN QUEUE
:CALL
:      MOV      #DNAME,R1      ; QUEUE ADDRESS
:      MOV      #DOPB,R2      ; ADDRESS OF PARAMETER BLOCK
:      JSR      RO,DRVQUE      ; GO PUT REQUEST IN QUEUE
:      RETURN1
:      RETURN2
:      RETURN HERE IF QUEUE IS FULL
:      RETURN HERE IF REQUEST IS IN QUEUE

DRVQUE: MOV      #8,-(SP)      ; QUEUE SIZE COUNTER
1$:     TST     (R1)+          ; SEE IF AT END OF ENTRIES
        BEQ     2$             ; BR IF YES
        DEC     (SP)          ; DECREMENT THE COUNTER
        BGT     1$            ; BR IF NOT AT END
        BR      3$            ; AT END
2$:     MOV     R2,-2(R1)      ; PUT REQUEST IN THE QUEUE
        TST     (R0)+          ; INCREMENT RETURN
3$:     TST     (SP)+          ; CORRECT THE STACK POINTER
        RTS      RO            ; RETURN

```

```

024060 010146 000001 000002
024062 032762
024064 001003
024070 012701 021134
024072 000445
024076 122762 000011 000002 1$:
024100 001404
024106 122762 000015 000002
024110 001003
024116 012701 021156 2$:
024120 000432
024124 122762 000005 000002 3$:
024128 001424
024132 122762 000003 000002
024136 001420
024140 122762 000007 000002
024144 001414
024148 122762 000017 000002
024152 001410
024156 122762 000013 000002
024160 001404
024164 012762 120000 000016
024168 000405
024172 012701 021200
024176 004037 024226 5$:
024180 000401 7$:
024184 005720 8$:
024188 012601 9$:
024192 000200 RTS

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024256 016111 000002  
024257 001403  
024258 062701 000002  
024259 000772  
024272 000207

```
;ROUTINE TO "POP" THE REQUEST FROM QUEUE
;CALL
;      MOV      %NAME R1      ;QUEUE ADDRESS TO R1
;      JSR      PC,POPQUE    ;CALL TO REMOVE REQUEST
POPQUE: MOV      2(R1),(R1)   ;SHIFT ENTRY DOWN
        BEQ      IS         ;BR IF AT END
        ADD      #2,R1       ;INCREMENT THE POINTER
        BR      POPQUE      ;CONTINUE
IS:     RTS      PC         ;RETURN
```

;\*\*\*\*\*

.SBTTL DATA, CONTROL, & STATUS BLOCKS

;\*\*\*\*\*

;BLOCK LOCATION EQUATE STATEMENTS

000001	\$MEX	=	1	;EXTENDED MEMORY BITS
000002	\$COMND	=	\$MEX+1	;OPERATION CODE
000003	\$MODE	=	\$COMND+1	;MODE & HDR BITS
000004	\$WRDM	=	\$MODE+1	;WORD COUNT (2'S COMP)
000006	\$BUF	=	\$WRDM+2	;BUFFER ADDR
000010	\$CYL	=	\$BUF+2	;CYLINDER ADDRESS
000012	\$SEC	=	\$CYL+2	;SECTOR ADDRESS
000013	\$TRK	=	\$SEC+1	;TRACK ADDRESS OF LAST REG ADDR
000014	\$REG	=	\$TRK+1	;REGISTER STORAGE ADDRESS
000016	\$STATUS	=	\$REG+2	;STATUS WORD (SET BY DRIVER)
000020	\$WRDL	=	\$STATUS+2	;WORD COUNT (NOT 2'S COMP)
000022	\$PACK	=	\$WRDL+2	;WRITE DATA PACK INDICATOR
000024	\$PREVO	=	\$PACK+2	;PREVIOUS COMMAND SELECTION CODE
000026	\$PATT	=	\$PREVO+2	;PATTERN CODE
000030	\$PREVA	=	\$PATT+2	;PREVIOUS ADDRESS - TRACK, SECTOR, CYLINDER
000034	\$OPERC	=	\$PREVA+4	;OPERATION COUNT
000040	\$POSIT	=	\$OPERC+4	;SEEK COUNT
000044	\$READ	=	\$POSIT+4	;TOTAL BITS READ COUNT
000050	\$TOTAL	=	\$READ+4	;TOTAL ERRORS (ALL TYPES) COUNT
000052	\$SOFT	=	\$TOTAL+2	; 'SOFT' ERROR COUNT
000054	\$HARD	=	\$SOFT+2	; 'HARD' ERROR COUNT
000056	\$SKI	=	\$HARD+2	; 'SUSI' ERROR COUNT
000060	\$MISPO	=	\$SKI+2	; POSITIONING ERROR COUNT
000062	\$PASSC	=	\$MISPO+2	;PASS COUNTER
000064	\$FAIR	=	\$PASSC+2	;BUFFER WAIT COUNT
000066	\$RPDS	=	\$FAIR+2	;RPIIE REGISTER STORAGE
000070	\$RPER	=	\$RPDS+2	;ERROR REGISTER
000072	\$RPCS	=	\$RPER+2	;CONTROL REGISTER
000074	\$RPWC	=	\$RPCS+2	;WORD COUNT REGISTER
000076	\$RPBA	=	\$RPWC+2	;BUFFER ADDRESS REGISTER
000100	\$RPCA	=	\$RPBA+2	;CYLINDER ADDRESS REGISTER
000102	\$RPDA	=	\$RPCA+2	;SECTOR/ADDRESS REGISTER
000104	\$RPM1	=	\$RPDA+2	;MAINTENANCE REGISTER #1
000106	\$SUCA	=	\$RPM1+2	;SELECTED UNIT CYLINDER ADDR REGISTER
000110	\$SILO	=	\$SUCA+2	;SILO REGISTER





```

5442 024610 000000 .WORD 0
5443 024612 000000 .WORD 0
5444 024614 000000 .WORD 0
5445 024616 000000 .WORD 0
5446 024620 000000 .WORD 0
5447 024622 000000 .WORD 0
5448 024624 000000 .WORD 0
5449 024626 000000 .WORD 0
5450 024630 000000 .WORD 0

```

;BLOCK FOR DRIVE 3

```

5451 024632 003 000 BLK3: .BYTE 3,0 ;DRIVE NUMBER
5452 024634 000000 .WORD 0
5453 024636 000000 .WORD 0
5454 024640 000000 .WORD 0
5455 024642 000000 .WORD 0
5456 024644 000000 .WORD 0
5457 024646 024720 .WORD +52
5458 024650 000000 .WORD 0
5459 024652 000000 .WORD 0
5460 024654 000000 .WORD 0
5461 024656 000000 .WORD 0
5462 024660 000000 .WORD 0
5463 024662 000000 .WORD 0
5464 024664 000000 .WORD 0
5465 024666 000000 .WORD 0
5466 024670 000000 .WORD 0
5467 024672 000000 .WORD 0
5468 024674 000000 .WORD 0
5469 024676 000000 .WORD 0
5470 024700 000000 .WORD 0
5471 024702 000000 .WORD 0
5472 024704 000000 .WORD 0
5473 024706 000000 .WORD 0
5474 024710 000000 .WORD 0
5475 024712 000000 .WORD 0
5476 024714 000000 .WORD 0
5477 024716 000000 .WORD 0
5478 024720 000000 .WORD 0
5479 024722 000000 .WORD 0
5480 024724 000000 .WORD 0
5481 024726 000000 .WORD 0
5482 024730 000000 .WORD 0
5483 024732 000000 .WORD 0
5484 024734 000000 .WORD 0
5485 024736 000000 .WORD 0
5486 024740 000000 .WORD 0
5487 024742 000000 .WORD 0

```

;BLOCK FOR DRIVE 4

```

5488 024744 004 000 BLK4: .BYTE 4,0 ;DRIVE NUMBER
5489 024746 000000 .WORD 0
5490 024750 000000 .WORD 0
5491 024752 000000 .WORD 0

```



5554	025126	000000	.WORD	0
5555	025130	000000	.WORD	0
5556	025132	000000	.WORD	0
5557	025134	000000	.WORD	0
5558	025136	000000	.WORD	0
5559	025140	000000	.WORD	0
5560	025142	000000	.WORD	0
5561	025144	000000	.WORD	0
5562	025146	000000	.WORD	0
5563	025150	000000	.WORD	0
5564	025152	000000	.WORD	0
5565	025154	000000	.WORD	0
5566	025156	000000	.WORD	0
5567	025160	000000	.WORD	0
5568	025162	000000	.WORD	0
5569	025164	000000	.WORD	0
5570	025166	000000	.WORD	0

;BLOCK FOR DRIVE 6

5574	025170	006	000	BLK6:	.BYTE	6,0	;DRIVE NUMBER
5575	025172	000000			.WORD	0,0	
5576	025174	000000			.WORD	0,0	
5577	025176	000000			.WORD	0,0	
5578	025200	000000			.WORD	0,0	
5579	025202	000000			.WORD	0,0	
5580	025204	025256			.WORD	0,+52	
5581	025206	000000			.WORD	0,0	
5582	025210	000000			.WORD	0,0	
5583	025212	000000			.WORD	0,0	
5584	025214	000000			.WORD	0,0	
5585	025216	000000			.WORD	0,0	
5586	025220	000000			.WORD	0,0	
5587	025222	000000			.WORD	0,0	
5588	025224	000000			.WORD	0,0	
5589	025226	000000			.WORD	0,0	
5590	025230	000000			.WORD	0,0	
5591	025232	000000			.WORD	0,0	
5592	025234	000000			.WORD	0,0	
5593	025236	000000			.WORD	0,0	
5594	025240	000000			.WORD	0,0	
5595	025242	000000			.WORD	0,0	
5596	025244	000000			.WORD	0,0	
5597	025246	000000			.WORD	0,0	
5598	025250	000000			.WORD	0,0	
5599	025252	000000			.WORD	0,0	
5600	025254	000000			.WORD	0,0	
5601	025256	000000			.WORD	0,0	
5602	025260	000000			.WORD	0,0	
5603	025262	000000			.WORD	0,0	
5604	025264	000000			.WORD	0,0	
5605	025266	000000			.WORD	0,0	
5606	025270	000000			.WORD	0,0	
5607	025272	000000			.WORD	0,0	
5608	025274	000000			.WORD	0,0	
5609	025276	000000			.WORD	0,0	

```

5610 025300 000000 .WORD 0
5611
5612 ;BLOCK FOR DRIVE 7
5613
5614 025302 007 000 BLK7: .BYTE 7,0 ;DRIVE NUMBER
5615 025304 000000 .WORD 0
5616 025306 000000 .WORD 0
5617 025310 000000 .WORD 0
5618 025312 000000 .WORD 0
5619 025314 000000 .WORD 0
5620 025316 025370 .WORD 0
5621 025320 000000 .WORD +52
5622 025322 000000 .WORD 0
5623 025324 000000 .WORD 0
5624 025326 000000 .WORD 0
5625 025330 000000 .WORD 0
5626 025332 000000 .WORD 0
5627 025334 000000 .WORD 0
5628 025336 000000 .WORD 0
5629 025340 000000 .WORD 0
5630 025342 000000 .WORD 0
5631 025344 000000 .WORD 0
5632 025346 000000 .WORD 0
5633 025350 000000 .WORD 0
5634 025352 000000 .WORD 0
5635 025354 000000 .WORD 0
5636 025356 000000 .WORD 0
5637 025360 000000 .WORD 0
5638 025362 000000 .WORD 0
5639 025364 000000 .WORD 0
5640 025366 000000 .WORD 0
5641 025370 000000 .WORD 0
5642 025372 000000 .WORD 0
5643 025374 000000 .WORD 0
5644 025376 000000 .WORD 0
5645 025400 000000 .WORD 0
5646 025402 000000 .WORD 0
5647 025404 000000 .WORD 0
5648 025406 000000 .WORD 0
5649 025410 000000 .WORD 0
5650 025412 000000 .WORD 0
5651
5652 ;GENERAL PURPOSE DPB - USED BY 'READHD' & 'RECALT'
5653
5654 025414 000000 000000 177775 GENDPB: .WORD 0,0,-3,CYLDER
5655 025422 033636
5656 025424 000000 000000 025434 .WORD 0,0,GENREG,0
5657 025432 000000
5658 025434 000012 GENREG: .BLKW 12 ;REGISTER STORAGE IF ERROR
5659
5660 ;*****
5661
5662 .SBTTL TABLES, CONSTANTS, AND VARIABLE LOCATIONS
5663
5664 ;*****
5665

```

```

5666 025460 000000          ASNLST: .WORD 0          ;BIT SET FOR EACH ASSIGNED DRIVE
5667
5668 025462 000000 000000 000000 ORDERQ: .WORD 0,0,0,0,0,0,0,0,0,0 ;LIST OF DRIVES PERFORMING COMMANDS
5669 025470 000000 000000 000000
5670 025476 000000 000000 000000
5671
5672 025504 000000 000000 000000 DUNIT: .WORD 0,0,0,0,0,0,0,0,0,0 ;ADDRESSES OF DRIVES TO BE DEASSIGNED
5673 025512 000000 000000 000000
5674 025520 000000 000000 000000
5675
5676 025526 000000 000000 000000 NEWUNT: .WORD 0,0,0,0,0,0,0,0,0,0 ;ADDRESSES OF NEWLY ASSIGNED DRIVES
5677 025534 000000 000000 000000
5678 025542 000000 000000 000000
5679
5680 025550 000000 000000 000000 AVAIL: .WORD 0,0,0,0,0,0,0,0,0,0 ;LIST OF DRIVES WAITING FOR PARAMETERS
5681 025556 000000 000000 000000
5682 025564 000000 000000 000000
5683
5684 025572 000000 000000 000000 WAIT: .WORD 0,0,0,0,0,0,0,0,0,0 ;LIST OF DRIVES WAITING FOR BUFFERS
5685 025600 000000 000000 000000
5686 025606 000000 000000 000000
5687
5688 025614 000000          BUFTBL: .WORD 0          ;BUFFER ALLOCATION TABLE ENTRY COUNT
5689 025616 000000 000000          .WORD 0,0
5690 025622 000000 000000          .WORD 0,0
5691 025626 000000 000000          .WORD 0,0
5692 025632 000000 000000          .WORD 0,0
5693 025636 000000 000000          .WORD 0,0
5694 025642 000000 000000          .WORD 0,0
5695 025646 000000 000000          .WORD 0,0
5696 025652 000000 000000          .WORD 0,0
5697 025656 000000 000000          .WORD 0,0
5698 025662 000000 000000          .WORD 0,0
5699 025666 000000 000000          .WORD 0,0
5700 025672 000000 000000          .WORD 0,0
5701 025676 000000 000000          .WORD 0,0
5702 025702 000000 000000          .WORD 0,0
5703 025706 000000 000000          .WORD 0,0
5704 025712 000000 000000          .WORD 0,0
5705 025716 000000 000000          .WORD 0,0
5706 025722 000000 000000          .WORD 0,0
5707 025726 000000 000000          .WORD 0,0
5708 025732 000000 000000          .WORD 0,0
5709
5710 025736          BLKADR:          ;ADDRESS OF EACH UNIT BLOCK START
5711 025736 024274          .WORD BLK0
5712 025740 024406          .WORD BLK1
5713 025742 024520          .WORD BLK2
5714 025744 024632          .WORD BLK3
5715 025746 024744          .WORD BLK4
5716 025750 025056          .WORD BLK5
5717 025752 025170          .WORD BLK6
5718 025754 025302          .WORD BLK7
5719
5720 025756 003          COMTBL: .BYTE WRTSEK          ;WRITE WITH IMPLIED SEEK (CODE = 0)
5721 025757 013          .BYTE WRITE          ;WRITE WITHOUT IMPLIED SEEK (CODE = 1)

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5722 025760 007 .BYTE WRTCHK ;WRITE CHECK (CODE = 2)  
5723 025761 005 .BYTE RDSEK ;READ WITH IMPLIED SEEK (CODE = 3)  
5724 025762 017 .BYTE READ ;READ WITHOUT IMPLIED SEEK (CODE = 4)

5725  
5726  
5727 025764 .EVEN

;;\*\*\*\*\*

.SBTTL DATA PATTERNS

;;\*\*\*\*\*

5735 025764 000000 STNDAT: .WORD 0 ;STANDARD DATA PATTERN POINTER TABLE  
5736 025766 026070 .WORD DATA1  
5737 025770 026130 .WORD DATA1+40  
5738 025772 026170 .WORD DATA1+100  
5739 025774 026230 .WORD DATA1+140  
5740 025776 026270 .WORD DATA1+200  
5741 026000 026330 .WORD DATA1+240  
5742 026002 026370 .WORD DATA1+300  
5743 026004 026430 .WORD DATA1+340  
5744 026006 026470 .WORD DATA1+400  
5745 026010 026530 .WORD DATA1+440  
5746 026012 026570 .WORD DATA1+500  
5747 026014 026630 .WORD DATA1+540  
5748 026016 026670 .WORD DATA1+600  
5749 026020 026730 .WORD DATA1+640  
5750 026022 026770 .WORD DATA1+700  
5751 026024 026030 .WORD DATA0 ;ZER0ES  
5752 026026 026732 .WORD DATA1+642 ;ONES

5753  
5754 026030 000000 DATA0: .WORD 0 ;STANDARD PATTERN 0  
5755 026032 000000 .WORD 0  
5756 026034 000000 .WORD 0  
5757 026036 000000 .WORD 0  
5758 026040 000000 .WORD 0  
5759 026042 000000 .WORD 0  
5760 026044 000000 .WORD 0  
5761 026046 000000 .WORD 0  
5762 026050 000000 .WORD 0  
5763 026052 000000 .WORD 0  
5764 026054 000000 .WORD 0  
5765 026056 000000 .WORD 0  
5766 026060 000000 .WORD 0  
5767 026062 000000 .WORD 0  
5768 026064 000000 .WORD 0  
5769 026066 000000 .WORD 0

5770  
5771 026070 000001 DATA1: .WORD 000001 ;STANDARD PATTERN 1  
5772 026072 000003 .WORD 000003  
5773 026074 000007 .WORD 000007  
5774 026076 000017 .WORD 000017  
5775 026100 000037 .WORD 000037  
5776 026102 000077 .WORD 000077  
5777 026104 000177 .WORD 000177

5778	026106	000377	.WORD	000377
5779	026110	000777	.WORD	000777
5780	026112	001777	.WORD	001777
5781	026114	003777	.WORD	003777
5782	026116	007777	.WORD	007777
5783	026120	017777	.WORD	017777
5784	026122	037777	.WORD	037777
5785	026124	077777	.WORD	077777
5786	026126	177777	.WORD	177777
5787				
5788	026130	177776	.WORD	177776
5789	026132	177774	.WORD	177774
5790	026134	177770	.WORD	177770
5791	026136	177760	.WORD	177760
5792	026140	177740	.WORD	177740
5793	026142	177700	.WORD	177700
5794	026144	177600	.WORD	177600
5795	026146	177400	.WORD	177400
5796	026150	177000	.WORD	177000
5797	026152	176000	.WORD	176000
5798	026154	174000	.WORD	174000
5799	026156	170000	.WORD	170000
5800	026160	160000	.WORD	160000
5801	026162	140000	.WORD	140000
5802	026164	100000	.WORD	100000
5803	026166	000000	.WORD	000000
5804				
5805	026170	000000	.WORD	000000
5806	026172	000000	.WORD	000000
5807	026174	000000	.WORD	000000
5808	026176	177777	.WORD	177777
5809	026200	177777	.WORD	177777
5810	026202	177777	.WORD	177777
5811	026204	000000	.WORD	000000
5812	026206	000000	.WORD	000000
5813	026210	177777	.WORD	177777
5814	026212	177777	.WORD	177777
5815	026214	000000	.WORD	000000
5816	026216	177777	.WORD	177777
5817	026218	000000	.WORD	000000
5818	026220	177777	.WORD	177777
5819	026222	000000	.WORD	000000
5820	026224	177777	.WORD	177777
5821	026226	000000	.WORD	000000
5822	026228	000000	.WORD	000000
5823	026230	000000	.WORD	000000
5824	026232	000000	.WORD	000000
5825	026234	000000	.WORD	000000
5826	026236	000000	.WORD	000000
5827	026238	000000	.WORD	000000
5828	026240	000000	.WORD	000000
5829	026242	000000	.WORD	000000
5830	026244	000000	.WORD	000000
5831	026246	000000	.WORD	000000
5832	026248	000000	.WORD	000000
5833	026250	000000	.WORD	000000
5834	026252	010421	.WORD	010421
5835	026254	021042	.WORD	021042
5836	026256	031463	.WORD	031463
5837	026258	042104	.WORD	042104
5838	026260	052525	.WORD	052525
5839	026262	063146	.WORD	063146
5840	026264	073567	.WORD	073567
5841	026266	104210	.WORD	104210
5842	026268	114631	.WORD	114631
5843	026270	125252	.WORD	125252
5844	026272	135673	.WORD	135673

;STANDARD PATTERN 2

;STANDARD PATTERN 3

;STANDARD PATTERN 4



5900	026443	077577	.WORD	077577	;STANDARD PATTERN 8 (WORST CASE PATTERN)
5901	026443	077577	.WORD	077577	
5902	026443	077577	.WORD	077577	
5903	026443	077577	.WORD	077577	
5904	026443	077577	.WORD	077577	
5905	026443	077577	.WORD	077577	
5906	026443	077577	.WORD	077577	
5907	026443	077577	.WORD	077577	
5908	026443	077577	.WORD	077577	
5909	026443	077577	.WORD	077577	
5910	026443	077577	.WORD	077577	
5911	026443	077577	.WORD	077577	
5912	026443	077577	.WORD	077577	
5913	026443	077577	.WORD	077577	
5914	026443	077577	.WORD	077577	
5915	026443	077577	.WORD	077577	
5916	026443	077577	.WORD	077577	
5917	026443	077577	.WORD	077577	
5918	026443	077577	.WORD	077577	
5919	026443	077577	.WORD	077577	
5920	026443	077577	.WORD	077577	
5921	026443	077577	.WORD	077577	
5922	026443	077577	.WORD	077577	
5923	026443	077577	.WORD	077577	
5924	026443	077577	.WORD	077577	
5925	026443	077577	.WORD	077577	
5926	026443	077577	.WORD	077577	
5927	026443	077577	.WORD	077577	
5928	026443	077577	.WORD	077577	
5929	026443	077577	.WORD	077577	
5930	026443	077577	.WORD	077577	
5931	026443	077577	.WORD	077577	
5932	026443	077577	.WORD	077577	
5933	026443	077577	.WORD	077577	
5934	026443	077577	.WORD	077577	
5935	026443	077577	.WORD	077577	
5936	026443	077577	.WORD	077577	
5937	026443	077577	.WORD	077577	
5938	026443	077577	.WORD	077577	
5939	026443	077577	.WORD	077577	
5940	026443	077577	.WORD	077577	
5941	026443	077577	.WORD	077577	
5942	026443	077577	.WORD	077577	
5943	026443	077577	.WORD	077577	
5944	026443	077577	.WORD	077577	
5945	026443	077577	.WORD	077577	
5946	026443	077577	.WORD	077577	
5947	026443	077577	.WORD	077577	
5948	026443	077577	.WORD	077577	
5949	026443	077577	.WORD	077577	
5950	026443	077577	.WORD	077577	
5951	026470	000001	.WORD	000001	;STANDARD PATTERN 9
5952	026472	000002	.WORD	000002	
5953	026474	000004	.WORD	000004	
5954	026476	000010	.WORD	000010	
5955	026500	000020	.WORD	000020	
5956	026502	000040	.WORD	000040	
5957	026504	000100	.WORD	000100	
5958	026506	000200	.WORD	000200	
5959	026510	000400	.WORD	000400	
5960	026512	001000	.WORD	001000	
5961	026514	002000	.WORD	002000	
5962	026516	004000	.WORD	004000	
5963	026520	010000	.WORD	010000	
5964	026522	020000	.WORD	020000	
5965	026524	040000	.WORD	040000	
5966	026526	100000	.WORD	100000	
5967	026530	177776	.WORD	177776	;STANDARD PATTERN 10
5968	026532	177775	.WORD	177775	
5969	026534	177773	.WORD	177773	
5970	026536	177767	.WORD	177767	
5971	026540	177757	.WORD	177757	
5972	026542	177737	.WORD	177737	
5973	026544	177677	.WORD	177677	
5974	026546	177577	.WORD	177577	
5975	026550	177377	.WORD	177377	
5976	026552	176777	.WORD	176777	
5977	026554	175777	.WORD	175777	
5978	026556	173777	.WORD	173777	
5979	026558	167777	.WORD	167777	
5980	026560	157777	.WORD	157777	
5981	026562	157777	.WORD	157777	
5982	026564	137777	.WORD	137777	
5983	026566	077777	.WORD	077777	
5984	026570	172666	.WORD	172666	;STANDARD PATTERN 11
5985	026572	155555	.WORD	155555	
5986	026574	172666	.WORD	172666	
5987	026576	155555	.WORD	155555	
5988	026600	172666	.WORD	172666	

593	026602	155555	.WORD	155555
594	026604	172666	.WORD	172666
595	026606	155555	.WORD	155555
596	026608	172666	.WORD	172666
597	026610	155555	.WORD	155555
598	026612	172666	.WORD	172666
599	026614	155555	.WORD	155555
600	026616	172666	.WORD	172666
601	026618	155555	.WORD	155555
602	026620	172666	.WORD	172666
603	026622	155555	.WORD	155555
604	026624	172666	.WORD	172666
605	026626	155555	.WORD	155555
606	026628	172666	.WORD	172666
607	026630	077777	.WORD	077777
608	026632	137777	.WORD	137777
609	026634	157777	.WORD	157777
610	026636	167777	.WORD	167777
611	026638	173777	.WORD	173777
612	026640	175777	.WORD	175777
613	026642	176777	.WORD	176777
614	026644	177377	.WORD	177377
615	026646	177577	.WORD	177577
616	026648	177677	.WORD	177677
617	026650	177737	.WORD	177737
618	026652	177757	.WORD	177757
619	026654	177767	.WORD	177767
620	026656	177773	.WORD	177773
621	026658	177775	.WORD	177775
622	026660	177776	.WORD	177776
623	026662	153333	.WORD	153333
624	026664	066667	.WORD	066667
625	026666	153333	.WORD	153333
626	026668	066667	.WORD	066667
627	026670	153333	.WORD	153333
628	026672	066667	.WORD	066667
629	026674	153333	.WORD	153333
630	026676	066667	.WORD	066667
631	026678	153333	.WORD	153333
632	026680	066667	.WORD	066667
633	026682	153333	.WORD	153333
634	026684	066667	.WORD	066667
635	026686	153333	.WORD	153333
636	026688	066667	.WORD	066667
637	026690	153333	.WORD	153333
638	026692	066667	.WORD	066667
639	026694	153333	.WORD	153333
640	026696	066667	.WORD	066667
641	026698	153333	.WORD	153333
642	026700	066667	.WORD	066667
643	026702	153333	.WORD	153333
644	026704	066667	.WORD	066667
645	026706	153333	.WORD	153333
646	026708	066667	.WORD	066667
647	026710	153333	.WORD	153333
648	026712	066667	.WORD	066667
649	026714	153333	.WORD	153333
650	026716	066667	.WORD	066667
651	026718	153333	.WORD	153333
652	026720	066667	.WORD	066667
653	026722	153333	.WORD	153333
654	026724	066667	.WORD	066667
655	026726	153333	.WORD	153333
656	026728	066667	.WORD	066667
657	026730	153333	.WORD	153333
658	026732	066667	.WORD	066667
659	026734	153333	.WORD	153333
660	026736	066667	.WORD	066667
661	026738	153333	.WORD	153333
662	026740	066667	.WORD	066667
663	026742	153333	.WORD	153333
664	026744	066667	.WORD	066667
665	026746	153333	.WORD	153333
666	026748	066667	.WORD	066667
667	026750	153333	.WORD	153333
668	026752	066667	.WORD	066667

;STANDARD PATTERN 12

;STANDARD PATTERN 13

;STANDARD PATTERN 14

6002	026754	177777	.WORD	177777
6003	026756	177777	.WORD	177777
6004	026760	177777	.WORD	177777
6005	026762	177777	.WORD	177777
6006	026764	177777	.WORD	177777
6007	026766	177777	.WORD	177777
6008				
6009	026770	177777	.WORD	177777
6010	026772	177777	.WORD	177777
6011	026774	000000	.WORD	000000
6012	026776	000000	.WORD	000000
6013	027000	000000	.WORD	000000
6014	027002	000000	.WORD	000000
6015	027004	000000	.WORD	000000
6016	027006	000000	.WORD	000000
6017	027010	000000	.WORD	000000
6018	027012	000000	.WORD	000000
6019	027014	000000	.WORD	000000
6020	027016	000000	.WORD	000000
6021	027020	000000	.WORD	000000
6022	027022	000000	.WORD	000000
6023	027024	000000	.WORD	000000
6024	027026	000000	.WORD	000000
6025				
6026				
6027				
6028				
6029				
6030				
6031				
6032	027030	050122	030461	042040
6033	027036	042111	023516	020124
6034	027044	042522	050123	047117
6035	027052	020104	047524	040440
6036	027060	042104	042522	051523
6037	027066	047111	000107	
6038				
6039	027072	047111	040526	044514
6040	027100	020104	050122	030461
6041	027106	041440	046517	040515
6042	027114	042116	000	
6043				
6044	027117	125	042116	043105
6045	027124	047111	042105	044440
6046	027132	052116	051105	052522
6047	027140	052120	043040	047522
6048	027146	020115	044124	020105
6049	027154	050122	030461	000
6050				
6051	027161	103	047101	052047
6052	027166	046440	052101	044103
6053	027174	042040	052101	020101
6054	027202	042522	042101	053440
6055	027210	052111	020110	020101
6056	027216	047520	052124	051105
6057	027224	000116		

;STANDARD PATTERN 15

;;\*\*\*\*\*

.SBTTL PRINTER/TELETYPE MESSAGES

;;\*\*\*\*\*

EM1: .ASCIZ 3RP11 DIDN'T RESPOND TO ADDRESSING3

EM2: .ASCIZ 2INVALID RP11 COMMAND3

EM3: .ASCIZ 2UNDEFINED INTERRUPT FROM THE RP113

EM10: .ASCIZ 2CAN'T MATCH DATA READ WITH A PATTERN3

6058						
6059	027226	040504	040524	041440	EM12:	.ASCIZ 2DATA COMPARE ERRORS2
6060	027234	046517	040520	042522		
6061	027242	042440	051122	051117		
6062	027250	000123				
6063						
6064	027252	042447	051122	020047	EM15:	.ASCIZ 2'ERR' NOT SET BUT 'RPER' CONTENTS NOT ZERO2
6065	027260	047516	020124	042523		
6066	027266	020124	052502	020124		
6067	027274	051047	042520	023522		
6068	027302	041440	047117	042524		
6069	027310	052116	020123	047516		
6070	027316	020124	042532	047522		
6071	027324	000				
6072						
6073	027325	127	051117	020104	EM16:	.ASCIZ 2WORD COUNT NOT ZERO OR BUFFER ADDRESS WRONG2
6074	027332	047503	047125	020124		
6075	027340	047516	020124	042532		
6076	027346	047522	047440	020122		
6077	027354	052502	043106	051105		
6078	027362	040440	042104	042522		
6079	027370	051523	053440	047522		
6080	027376	043516	000			
6081						
6082	027401	123	043117	053524	EM17:	.ASCIZ 2SOFTWARE TIMEOUT DURING POSITIONING2
6083	027406	051101	020105	044524		
6084	027414	042515	052517	020124		
6085	027422	052504	044522	043516		
6086	027430	050040	051517	052111		
6087	027436	047511	044516	043516		
6088	027444	000				
6089						
6090	027445	123	043117	053524	EM20:	.ASCIZ 2SOFTWARE TIMEOUT DURING I/O2
6091	027452	051101	020105	044524		
6092	027460	042515	052517	020124		
6093	027466	052504	044522	043516		
6094	027474	044440	047457	000		
6095						
6096	027501	104	044522	042526	EM21:	.ASCIZ 2DRIVE OFFLINE2
6097	027506	047440	043106	044514		
6098	027514	042516	000			
6099						
6100	027517	104	044522	042526	EM22:	.ASCIZ 2DRIVE UNSAFE2
6101	027524	052440	051516	043101		
6102	027532	000105				
6103						
6104	027534	042523	045505	044440	EM23:	.ASCIZ 2SEEK INCOMPLETE2
6105	027542	041516	045517	046120		
6106	027550	052105	000105			
6107						
6108	027554	047125	041111	051525	EM24:	.ASCIZ 2UNIBUS TRANSFER ERROR2
6109	027562	052040	040522	051516		
6110	027570	042506	020122	051105		
6111	027576	047522	000122			
6112						
6113	027602	047503	052116	047522	EM25:	.ASCIZ 2CONTROLLER ERROR2

# H10

MD-11-DZRP1-B, RPI1E MULTI-DRIVE EXERCISER PROGRAM  
DZRP1B.CMB PRINTER/TELETYPE MESSAGES

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6114	027610	046114	051105	042440	
6115	027616	051122	051117	000	
6116					
6117	027623	116	051117	042455	EM26: .ASCIZ @NON-EXISTENT DISK ADDRESS@
6118	027630	044530	051123	047105	
6119	027636	020124	044504	045523	
6120	027644	040440	042104	042522	
6121	027652	051523	000		
6122					
6123	027655	104	052101	020101	EM27: .ASCIZ @DATA ERROR@
6124	027662	051105	047522	000122	
6125					
6126	027670	051127	052111	020105	EM32: .ASCIZ @WRITE CHECK ERROR (NO DATA ERROR)@
6127	027676	044103	041505	020113	
6128	027704	051105	047522	020122	
6129	027712	047050	020117	040504	
6130	027720	040524	042440	051122	
6131	027726	051117	000051		
6132					
6133	027732	051127	052111	020105	EM33: .ASCIZ @WRITE CHECK ERROR (DATA ERROR BITS SET)@
6134	027740	044103	041505	020113	
6135	027746	051105	047522	020122	
6136	027754	042050	052101	020101	
6137	027762	051105	047522	020122	
6138	027770	044502	051524	051440	
6139	027776	052105	000051		
6140					
6141	030002	042510	042101	051105	EM34: .ASCIZ @HEADER NOT FOUND@
6142	030010	047040	052117	043040	
6143	030016	052517	042116	000	
6144					
6145	030023	104	051117	040515	EM35: .ASCIZ @FORMAT ERROR WHILE SEARCHING FOR INITIAL SECTOR@
6146	030030	020124	051105	047522	
6147	030036	020122	044127	046111	
6148	030044	020105	042523	051101	
6149	030052	044103	047111	020107	
6150	030060	047506	020122	047111	
6151	030066	052111	040511	020114	
6152	030074	042523	052103	051117	
6153	030102	000			
6154					
6155	030103	110	040505	042504	EM36: .ASCIZ @HEADER NOT FOUND, CYLINDER IN HEADER DOES NOT COMPARE@
6156	030110	020122	047516	020124	
6157	030116	047506	047125	026104	
6158	030124	041440	046131	047111	
6159	030132	042504	020122	047111	
6160	030140	044040	040505	042504	
6161	030146	020122	047504	051505	
6162	030154	047040	052117	041440	
6163	030162	046517	040520	042522	
6164	030170	000			
6165					
6166	030171	104	043111	042506	EM37: .ASCIZ @DIFFERENT ERROR DURING RETRY@
6167	030176	042522	052116	042440	
6168	030204	051122	051117	042040	
6169	030212	051125	047111	020107	

6170	030220	042522	051124	000131					
6171									
6172	030226	042447	051122	020047	EM43:	.ASCIZ	2'ERR'	SET BUT NOT ERROR BITS SET2	
6173	030234	042523	020124	052502					
6174	030242	020124	047516	020124					
6175	030250	051105	047522	020122					
6176	030256	044502	051524	051440					
6177	030264	052105	000						
6178									
6179	030267	127	044522	042524	EM44:	.ASCIZ	2WRITE PROTECTION VIOLATION2		
6180	030274	050040	047522	042524					
6181	030302	052103	047511	020116					
6182	030310	044526	046117	052101					
6183	030316	047511	000116						
6184									
6185	030322	047506	046522	052101	EM45:	.ASCIZ	2FORMAT ERROR DURING I/O2		
6186	030330	042440	051122	051117					
6187	030336	042040	051125	047111					
6188	030344	020107	027511	000117					
6189									
6190	030352	050122	042101	000122	DH1:	.ASCIZ	2RPAOR2		
6191	030360	051104	020126	020043	DH2:	.ASCIZ	2DRV #	RPCS2	
6192	030366	020040	050122	051503					
6193	030374	000							
6194	030375	122	042120	020123	DH3:	.ASCIZ	2RPOS	RPCS2	
6195	030402	020040	051040	041520					
6196	030410	000123							
6197	030412	020040	020040	020040	DH10:	.ASCII	2	BUFFER2<15><12>	
6198	030420	020040	052502	043106					
6199	030426	051105	005015						
6200	030432	051104	020126	020043		.ASCIZ	2DRV #	START CYL TRK SEC2	
6201	030440	020040	052123	051101					
6202	030446	020124	020040	054503					
6203	030454	020114	020040	020040					
6204	030462	051124	020113	020040					
6205	030470	020040	042523	000103					
6206	030476	042101	051104	020040	DH10A:	.ASCIZ	2ADDR	CONTENTS2	
6207	030504	020040	047503	052116					
6208	030512	047105	051524	000					
6209	030517	040	020040	020040	DH12:	.ASCII	2	GOOD BAD2<15><12>	
6210	030524	020040	043440	047517					
6211	030532	020104	020040	041040					
6212	030540	042101	005015						
6213	030544	042101	051104	020040		.ASCIZ	2ADDR	DATA DATA2	
6214	030552	020040	040504	040524					
6215	030560	020040	020040	040504					
6216	030566	040524	000						
6217	030571	124	052117	046101	DH14:	.ASCIZ	2TOTAL COMPARE ERRORS:2		
6218	030576	041440	046517	040520					
6219	030604	042522	042440	051122					
6220	030612	051117	035123	000					
6221	030617	104	053122	021440	DH15:	.ASCIZ	2DRV #	RPOS RPER RPCS2	
6222	030624	020040	051040	042120					
6223	030632	020123	020040	051040					
6224	030640	042520	020122	020040					
6225	030646	051040	041520	000123					

6226	030654	020040	020040	020040	DH16:	.ASCII	a	EXPTD	ACTUAL	a(15)<12>
6227	030652	020040	054105	052120						
6228	030670	020104	020040	041501						
6229	030676	052524	046101	005015						
6230	030704	051104	020126	020043		.ASCIZ	aDRV #	RPBA	RPBA	RPWC
6231	030712	020040	050122	040502				RPDS	RPER	RPCS
6232	030720	020040	020040	050122						
6233	030726	040502	020040	020040						
6234	030734	050122	041527	020040						
6235	030742	020040	050122	051504						
6236	030750	020040	020040	050122						
6237	030756	051104	020040	020040						
6238	030764	050122	051503	020040						
6239	030772	020040	000							
6240	030775	104	053122	021440	DH17:	.ASCIZ	aDRV #	RPDS	RPER	RPCS
6241	031002	020040	051040	042120				RPWC	RPBA	
6242	031010	020123	020040	051040						
6243	031016	042520	020122	020040						
6244	031024	051040	041520	020123						
6245	031032	020040	051040	053520						
6246	031040	020103	020040	051040						
6247	031046	041120	000101							
6248	031052	050122	040503	020040	DH17A:	.ASCIZ	aRPCA	RPDA	RPM1	SUCA
6249	031060	020740	050122	040504				SIL02		
6250	031066	020110	020040	050122						
6251	031074	030515	020040	020040						
6252	031102	052523	040503	020040						
6253	031110	020040	044523	047514						
6254	031116	000								
6255	031117	040	020040	020040	DH23:	.ASCII	a	PREV	DEST	a(15)<12>
6256	031124	020040	050040	042522						
6257	031132	020126	020040	042040						
6258	031140	051505	006524	012						
6259	031145	104	053122	021440		.ASCIZ	aDRV #	CYL	CYL	RPDS
6260	031153	020040	041440	046131				RPER	RPCS	
6261	031160	020040	020040	041440						
6262	031166	046131	020040	020040						
6263	031174	051040	042120	020123						
6264	031202	020040	051040	042520						
6265	031210	020122	020040	051040						
6266	031216	041520	000123							
6267	031222	050122	040503	020040	DH23A:	.ASCIZ	aRPCA	SUCA		
6268	031230	020040	052523	040503						
6269	031236	000								
6270	031237	104	053122	021440	DH24:	.ASCIZ	aDRV #	RPDS	RPER	RPCS
6271	031244	020040	051040	042120				RPBA		
6272	031252	020123	020040	051040						
6273	031260	042520	020122	020040						
6274	031266	051040	041520	020123						
6275	031274	020040	051040	041120						
6276	031302	000101								
6277	031304	051104	020126	020043	DH25:	.ASCIZ	aDRV #	RPDS	RPER	RPCS
6278	031312	020040	050122	051504						
6279	031320	020040	020040	050122						
6280	031326	051105	020040	020040						
6281	031334	050122	051503	000						



6338	032010	001216			DT1:	.WORD	RPAOR
6339	032012	001264	001166		DT2:	.WORD	DRIVE, \$REGO+RPCS
6340	032016	021104	021106		DT3:	.WORD	RPERRS, RPERRS+2
6341	032022	001122	001126		DT11:	.WORD	\$BDAOR, \$BDDAT
6342	032026	001264	013164	013156	DT10:	.WORD	DRIVE, CMBUF, CMCYL, CMTRK, CMSEC
6343	032034	013162	013160				
6344	032040	001122	001124	001126	DT13:	.WORD	\$BDAOR, \$GDDAT, \$BDDAT
6345	032046	013150			DT14:	.WORD	ERCTR
6346	032050	001264	001162	001164	DT15:	.WORD	DRIVE, \$REGO+RPDS, \$REGO+RPER, \$REGO+RPCS
6347	032056	001166					
6348	032060	001264	001124	001172	DT16:	.WORD	DRIVE, \$GDDAT, \$REGO+RPBA, \$REGO+RPWC, \$REGO+RPDS, \$REGO+RPER
6349	032066	001170	001162	001164			
6350	032074	001166				.WORD	\$REGO+RPCS
6351	032076	001264	001162	001164	DT17:	.WORD	DRIVE, \$REGO+RPDS, \$REGO+RPER, \$REGO+RPCS, \$REGO+RPWC, \$REGO+RPBA
6352	032104	001166	001170	001172			
6353	032112	001174	001176	001200	DT17A:	.WORD	\$REGO+RPCA, \$REGO+RPDA, \$REGO+RPM1, \$REGO+20, \$REGO+22
6354	032120	001202	001204				
6355	032124	001264	001124	001126	DT23:	.WORD	DRIVE, \$GDDAT, \$BDDAT, \$REGO+RPDS, \$REGO+RPER, \$REGO+RPCS
6356	032132	001162	001164	001166			
6357	032140	001174	001202		DT23A:	.WORD	\$REGO+RPCA, \$REGO+20
6358	032144	001264	001162	001164	DT24:	.WORD	DRIVE, \$REGO+RPDS, \$REGO+RPER, \$REGO+RPCS, \$REGO+RPBA
6359	032152	001166	001172				
6360	032156	001264	001162	001164	DT25:	.WORD	DRIVE, \$REGO+RPDS, \$REGO+RPER, \$REGO+RPCS
6361	032164	001166					
6362	032166	001264	001162	001164	DT26:	.WORD	DRIVE, \$REGO+RPDS, \$REGO+RPER, \$REGO+RPCS, \$REGO+RPCA, \$REGO+RPDA
6363	032174	001166	001174	001176			
6364	032202	001264	001266	001270	DT27:	.WORD	DRIVE, CYL.ER, TRK.ER, SEC.ER, \$REGO+RPDS, \$REGO+RPER, \$REGO+RPCS
6365	032210	001272	001162	001164			
6366	032216	001166					
6367	032220	001174	001172	001174	DT27A:	.WORD	\$REGO+RPWC, \$REGO+RPBA, \$REGO+RPCA, \$REGO+RPDA, \$REGO+RPM1, \$REGO+20, \$REGO+22
6368	032226	001176	001200	001202			
6369	032234	001264					
6370	032236	001264	001124	001162	DT34:	.WORD	DRIVE, \$GDDAT, \$REGO+RPDS, \$REGO+RPER, \$REGO+RPCS, \$REGO+RPDA
6371	032244	001164	001166	001176			
6372	032252	001174	001202	033636	DT34A:	.WORD	\$REGO+RPCA, \$REGO+20, CYLDER, CYLDER+2, CYLDER+4
6373	032260	033640	033642				
6374							
6375	032264	000001			DF1:	.WORD	1 ;1 'DH' LINE
6376	032266	001				.BYTE	1 ;# OF ENTRIES IN 'DH' LINE
6377	032267	000				.BYTE	0 ;ENTRIES ARE ALL OCTAL
6378							
6379							
6380	032270	000001			DF2:	.WORD	1 ;2 ENTRIES IN THE 'DH'
6381	032272	002				.BYTE	2
6382	032273	000				.BYTE	0
6383							
6384	032274	000002			DF10:	.WORD	2
6385	032276	005				.BYTE	5
6386	032277	000				.BYTE	0
6387	032300	030476				.WORD	DH10A
6388	032302	000				.BYTE	0
6389	032303	000				.BYTE	0
6390							
6391	032304	000002			DF12:	.WORD	2
6392	032306	005				.BYTE	5
6393	032307	000				.BYTE	0

6394	032310	030517		.WORD	DH12	
6395	032312	000		.BYTE	0	
6396	032313	000		.BYTE	0	
6397						
6398	032314	000001	DF13:	.WORD	1	
6399	032316	003		.BYTE	3	
6400	032317	000		.BYTE	0	
6401						
6402	032320	000001	DF14:	.WORD	1	
6403	032322	001		.BYTE	1	
6404	032323	001		.BYTE	1	;ITEM IS DECIMAL
6405						
6406	032324	000001	DF15:	.WORD	1	
6407	032326	004		.BYTE	4	
6408	032327	000		.BYTE	0	
6409						
6410	032330	000001	DF16:	.WORD	1	
6411	032332	007		.BYTE	7	
6412	032333	000		.BYTE	0	
6413						
6414	032334	000002	DF17:	.WORD	2	;2 'DH' LINES
6415	032336	006		.BYTE	6	
6416	032337	000		.BYTE	0	
6417	032340	031052		.WORD	DH17A	
6418	032342	005		.BYTE	5	
6419	032343	000		.BYTE	0	
6420						
6421	032344	000002	DF23:	.WORD	2	
6422	032346	006		.BYTE	6	
6423	032347	000		.BYTE	0	
6424	032350	031222		.WORD	DH23A	
6425	032352	002		.BYTE	2	
6426	032353	000		.BYTE	0	
6427						
6428	032354	000001	DF24:	.WORD	1	
6429	032356	005		.BYTE	5	
6430	032357	000		.BYTE	0	
6431						
6432	032360	000001	DF26:	.WORD	1	
6433	032362	006		.BYTE	6	
6434	032363	000		.BYTE	0	
6435						
6436	032364	000002	DF27:	.WORD	2	;2 'DH' LINES
6437	032366	007		.BYTE	7	
6438	032367	000		.BYTE	0	
6439	032370	031503		.WORD	DH27A	
6440	032372	007		.BYTE	7	
6441	032373	000		.BYTE	0	
6442						
6443	032374	000002	DF34:	.WORD	2	
6444	032376	006		.BYTE	6	
6445	032377	000		.BYTE	0	
6446	032400	031673		.WORD	DH34A	
6447	032402	005		.BYTE	5	
6448	032403	000		.BYTE	0	
6449						

6450											
6451	032404	047503	052116	047105	LIN11H:	.ASCII	CONTENTS OF ERROR SECTOR (REPORTED ABOVE)	<15>	<12>		
6452	032412	051524	047440	020106							
6453	032420	051105	047522	020122							
6454	032426	042523	052103	051117							
6455	032434	024040	042522	047520							
6456	032442	052122	042105	040440							
6457	032450	047502	042526	006451							
6458	032456	012									
6459	032457	101	042104	020122		.ASCIZ	ADDR	DATA	<15>	<12>	
6460	032464	020040	042040	052101							
6461	032472	006501	000012								
6462	032476	040				SPACE4:	.ASCII	/	/		
6463	032477	040				SPACE3:	.ASCII	/	/		
6464	032500	040				SPACE2:	.ASCII	/	/		
6465	032501	040	000			SPACE1:	.ASCIZ	/	/		
6466	032503	122	030120	000062		RPO2:	.ASCIZ	/RPO2/			
6467	032510	050122	031460	000		RPO3:	.ASCIZ	/RPO3/			
6468	032515	104	044522	042526		UNTMSG:	.ASCIZ	/DRIVE /			
6469	032522	000040									
6470	032524	047440	043106	044514		UNTOFF:	.ASCIZ	/ OFFLINE/			
6471	032532	042516	000								
6472	032535	040	047117	044514		UNTON:	.ASCIZ	/ ONLINE/			
6473	032542	042516	000								
6474	032545	040	047516	020124		UNTNOT:	.ASCIZ	/ NOT BEING TESTED/			
6475	032552	042502	047111	020107							
6476	032560	042524	052123	042105							
6477	032566	000									
6478	032567	040	046101	042522		UNTASN:	.ASCIZ	/ ALREADY BEING TESTED/			
6479	032574	042101	020131	042502							
6480	032602	047111	020107	042524							
6481	032610	052123	042105	000							
6482	032615	040	047125	040523		NOTSAF:	.ASCIZ	/ UNSAFE/			
6483	032622	042506	000								
6484	032625	104	044522	042526		SYSTAT:	.ASCIZ	/DRIVE STATUS: /	<15>	<12>	<12>
6485	032632	051440	040524	052524							
6486	032640	035123	005015	000012							
6487	032646	051104	053111	020105		STATHD:	.ASCII	/DRIVE PERFORMANCE SUMMARY /	<15>	<12>	
6488	032654	042520	043122	051117							
6489	032662	040515	041516	020105							
6490	032670	052523	046515	051101							
6491	032676	006531	012								
6492	032701	104	053122	050040			.ASCII	/DRV PASS ORDERS	SEEKS	WRDS READ/	
6493	032706	051501	020123	051117							
6494	032714	042504	051522	020040							
6495	032722	051440	042505	051513							
6496	032730	020040	053440	042122							
6497	032736	020123	042522	042101							
6498	032744	051440	043117	020124			.ASCIZ	/ SOFT HARD SUSI MISP OTHER /	<15>	<12>	
6499	032752	040510	042122	051440							
6500	032760	051525	020111	044515							
6501	032766	050123	047440	044124							
6502	032774	051105	005015	000							
6503	033001	007	043077	052101		DROPNG:	.ASCIZ	<07> / FATAL OR EXCESSIVE ERRORS /			
6504	033006	046101	047440	020122							
6505	033014	054105	042503	051523							

6506	033022	053111	020105	051105	
6507	033030	047522	051522	000	
6508	033035	105	042116	047440	ENDPAS: .ASCIZ /END OF PASS/
6509	033042	020106	040520	051523	
6510	033050	000			
6511	033051	015	042412	042116	ENDTST: .ASCIZ <15><12>/END OF TEST/
6512	033056	047440	020106	042524	
6513	033064	052123	000		
6514	033067	040	042504	051501	DEASSG: .ASCIZ / DEASSIGNED/
6515	033074	044523	047107	042105	
6516	033102	000			
6517	033103	015	025012	025052	DRNUM: .ASCIZ <15><12>/***** DRIVE # /
6518	033110	025052	025052	025052	
6519	033116	020052	051104	053111	
6520	033124	020105	020043	000	
6521	033131	040	052123	051101	ASGND: .ASCIZ / STARTED/<15><12>
6522	033136	042524	006504	000012	
6523	033144	000077			QUES: .ASCIZ /?/
6524	033146	047111	040526	044514	INVL: .ASCIZ /INVALID COMMAND/<15><12>
6525	033154	020104	047503	046515	
6526	033162	047101	006504	000012	
6527	033170	020077	047111	040526	BADENT: .ASCIZ /? INVALID ENTRY/<15><12>
6528	033176	044514	020104	047105	
6529	033204	051124	006531	000012	
6530	033212	005015	051120	043517	INTDON: .ASCIZ <15><12>/PROGRAM INITIALIZATION COMPLETE, ENTER COMMANDS/<15><12>
6531	033220	040522	020115	047111	
6532	033226	052111	040511	044514	
6533	033234	040532	044524	047117	
6534	033242	041440	046517	046120	
6535	033250	052105	026105	042440	
6536	033256	052116	051105	041440	
6537	033264	046517	040515	042116	
6538	033272	006523	000012		

.EVEN

6541	033276	033571			
6542	033300	001216			
6543	033302	033600			
6544	033304	001220			
6545	033306	033501			
6546	033310	001306			
6547	033312	033531			
6548	033314	001324			
6549	033316	033535			
6550	033320	001326			
6551	033322	033541			
6552	033324	001330			
6553	033326	033545			
6554	033330	001332			
6555	033332	033551			
6556	033334	001334			
6557	033336	033555			
6558	033340	001336			
6559	033342	033511			
6560	033344	001312			
6561	033346	033626			

  

PARLST:	.WORD	PAR11		;PARAMETER ENTRY LIST
	.WORD	RPAOR		
	.WORD	PAR12		
	.WORD	RPVEC		
	.WORD	PAR1		
	.WORD	BUFSZ		;LOCATION
	.WORD	PAR4		
	.WORD	LC		
	.WORD	PAR5		
	.WORD	FC		
	.WORD	PAR6		
	.WORD	LT		
	.WORD	PAR7		
	.WORD	FT		
	.WORD	PAR8		
	.WORD	LS		
	.WORD	PAR9		
	.WORD	FS		
	.WORD	PAR2		;PARAMETER NAME
	.WORD	INTRVL		
	.WORD	PAR19		

```

6562 033350 001304 .WORD PASCNT
6563 033352 033561 .WORD PAR10
6564 033354 001316 .WORD SEKMOD
6565 033356 033607 .WORD PAR14
6566 033360 001320 .WORD RATIO
6567 033362 033521 .WORD PAR3
6568 033364 001314 .WORD CHPLMT
6569 033366 033616 .WORD PAR15
6570 033370 001322 .WORD AUTOCK
6571 033372 020000 .WORD 0 ;TABLE TERMINATOR
6572
6573 033374 047105 042524 020122 ASKPAR: .ASCIZ /ENTER PARAMETERS:/(15)(12)(12)
6574 033402 040520 040522 042515
6575 033410 042524 051522 006472
6576 033416 005012 000
6577 033421 015 042412 051122 NGPAR: .ASCIZ <15><12>/ERROR IN PARAMETER: /
6578 033426 051117 044440 020116
6579 033434 040520 040522 042515
6580 033442 042524 035122 020040
6581 033450 000
6582 033451 040 051040 026505 REPAR: .ASCIZ / RE-ENTER PARAMETERS/(15)(12)
6583 033456 047105 042524 020122
6584 033464 040520 040522 042515
6585 033472 042524 051522 005015
6586 033500 000
6587
6588 033501 102 043125 051522 PAR1: .ASCIZ /BUFRSZ /
6589 033506 020132 000
6590 033511 111 052116 053122 PAR2: .ASCIZ /INTRVL /
6591 033516 020114 000
6592 033521 103 050115 046514 PAR3: .ASCIZ /CHPLMT /
6593 033526 020124 000
6594 033531 114 020103 000 PAR4: .ASCIZ /LC /
6595 033535 106 020103 000 PAR5: .ASCIZ /FC /
6596 033541 114 020124 000 PAR6: .ASCIZ /LT /
6597 033545 106 020124 000 PAR7: .ASCIZ /FT /
6598 033551 114 020123 000 PAR8: .ASCIZ /LS /
6599 033555 106 020123 000 PAR9: .ASCIZ /FS /
6600 033561 123 045505 047515 PAR10: .ASCIZ /SEKMOD /
6601 033566 020104 000
6602 033571 122 040520 051104 PAR11: .ASCIZ /RPADR /
6603 033576 000040
6604 033600 050122 042526 020103 PAR12: .ASCIZ /RPVEC /
6605 033606 000
6606 033607 122 052101 047511 PAR14: .ASCIZ /RATIO /
6607 033614 000040
6608 033616 052501 047524 045503 PAR15: .ASCIZ /AUTOCK /
6609 033624 000040
6610 033626 040520 041523 052116 PAR19: .ASCIZ /PASCNT /
6611 033634 000040
6612
6613 .EVEN
6614
6615 033636 000000 000000 000000 CYLDER: .WORD 0,0,0 ;HEADER BUFFER FOR 'READHD' ROUTINE
6616
6617 033644 ENOPGM = . ;BUFFERS START HERE

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6618
6619 033544 005015 046412 044501 TITLE: .ASCII <15><12><12>/MAINDEC-11-DZRP1-B/<15><12>
6620 033552 042116 041505 030455
6621 033660 026461 055104 050123
6622 033666 026461 006502 012
6623 033673 122 030520 042461 .ASCIIZ /RPI1E MULTI-DRIVE EXERCISER PROGRAM/<15><12><12>
6624 033700 046440 046122 044522
6625 033706 042055 044522 042526
6626 033714 042440 042530 041522
6627 033722 051511 051105 050040
6628 033730 047522 051107 046501
6629 033736 005015 000012
6630
6631 .EVEN
6632 .SBTTL ROUTINE TO SIZE MEMORY
6633
6634 *****
6635 *CALL:
6636 * JSR PC,SSIZE
6637 * RETURN
6638 *SLSTAD WILL CONTAIN THE LAST AVAILABLE MEMORY LOCATION
6639
6640 033742 010046 SSIZE: MOV RO,-(SP) ;;SAVE RO ON THE STACK
6641 033744 010146 MOV RI,-(SP) ;;SAVE RI ON THE STACK
6642 033746 013746 000004 MOV @#ERRVEC,-(SP) ;;SAVE PRESENT ERROR VECTOR PS & PC
6643 033752 013746 000006 MOV @#ERRVEC+2,-(SP)
6644 033756 010600 MOV SP,RO ;;SAVE THE STACK POINTER
6645 ;;SET THE ERRVEC PS TO THE PRESENT PS
6646 033760 104400 TRAP ;;PUSH OLD PSH AND PC ON STACK
6647 033762 012637 000006 MOV (SP)+,@#ERRVEC+2 ;;SAVE THE PSH IN @#ERRVEC+2
6648 033766 012737 034006 000004 MOV #25,@#ERRVEC ;;SET FOR TIMEOUT
6649 033774 012701 020000 MOV #20000,R1 ;;FIRST ADDRESS
6650 034000 005711 1$: TST (R1) ;;TEST THIS ADDRESS
6651 034002 005721 TST (R1)+ ;;STEP TO NEXT ADDRESS
6652 034004 000775 BR 1$ ;;TRY ANOTHER
6653 034006 162701 000002 2$: SUB #2,R1 ;;DROP PACK
6654 034012 010006 MOV RO,SP ;;RESTORE THE STACK
6655 034014 012637 000006 MOV (SP)+,@#ERRVEC+2 ;;RESTORE ERROR VECTOR
6656 034020 012637 000004 MOV (SP)+,@#ERRVEC
6657 034024 010137 034036 MOV R1,SLSTAD ;;LAST ADDRESS
6658 034030 012601 MOV (SP)+,R1 ;;RESTORE R1
6659 034032 012600 MOV (SP)+,RO ;;RESTORE RO
6660 034034 000207 RTS PC
6661 034036 000000 SLSTAD: .WORD 0 ;;CONTAINS THE LAST ADDRESS
6662
6663 000001 .END

```















QSEK	021156	4711#	4856	4887	4888	4890	4899	4901	4903	5234											
QTRANS	021200	4714#	4859	4909	4911	4912	4922	4923	4925	5028	5248										
QUES	033144	2910	6523#																		
QWAIT	021244	4720#	4899#	4922*	5059	5065*	5165	5183*													
RANMRT	006230	2311	2400#																		
RATIO	001320	1341#	1852	2309	6566																
ROCHR =	104410	4302	4627#																		
ROLIN =	104411	1777	2760	4628#																	
ROSEK =	000005	1163#	2385	2465	5236	5723															
ROY =	000200	1208#																			
READ =	000017	1168#	2372	3766	5242	5724															
READOR	006666	2476	2502#	3558	3645	3845															
READHD	015402	3612	3761#																		
RECALT	015350	3576	3604	3627	3665	3749#															
RECALD	015354	2823	3750#																		
REDAPK	011106	2792	2905#																		
REL RUF	005056	2109	2184#	3565	3652																
REPAR	033451	1863	6582#																		
RESREG=	104413	2207	2265	2568	2580	2795	3219	4563	4630#	4787	4819	4870	4983	5126							
		5214																			
RESVEC=	000010	1132#																			
RETRY	015472	3574	3577	3590	3663	3666	3781#														
RPADR	001216	1297#	1800	4776	4850	4976	5138	5198	6338	6542											
RPBA =	000010	1150#	4937*	6348	6351	6358	6367														
RPCA =	000012	1151#	4893*	4915*	4938*	6353	6357	6362	6367	6372											
RPCS =	000007	1148#	4802*	4869*	4875*	4887*	4895*	4909*	4917*	4931*	4944*	4998*	5000	5005*							
		5009*	5044	5048*	5061*	5074	5139*	5147	5160*	5161*	5199*	6339	6346	6350							
		6351	6355	6358	6360	6362	6364	6370													
RPDA =	000014	1152#	4894*	4916*	4939*	6353	6362	6367	6370												
RPDS =	000000	1146#	4803	4805	4807	4809	4814	4999*	5041	5043	5062	5069*	5070	5072							
		5167	5169	5171	5173	6346	6348	6351	6355	6358	6360	6362	6364	6370							
RPER =	000002	1147#	3613	6346	6348	6351	6355	6358	6360	6362	6364	6370									
RPERRS	021104	4642#	4764	5043*	5044*	6340															
RPINIT	021314	1808	4761#																		
RPM1 =	000016	1153#	6353	6367																	
RPM2 =	000020	1154#	5203																		
RPM3 =	000022	1155#																			
RPPRIO	001222	1299#	4763	4775	4833																
RPTMR	023360	2725	5105#																		
RPVEC	001220	1298#	4773	6544																	
RPWC =	000006	1149#	4936*	6348	6351	6367															
RPZERO	011656	3040	3042	3044	3046#																
RPZRC	011742	3039*	3041*	3043*	3045*	3058	3065*														
RP02	032503	1890	6466#																		
RP03	032510	1893	6467#																		
RP11	021566	2272	3751	3767	4832#																
RO =	=%000000	1053#	1779*	1805*	1930*	1933	1935	1938	1983*	1987	2024*	2025*	2026*	2027*							
		2028*	2029*	2030*	2031*	2032*	2033*	2034*	2046*	2047	2049	2056*	2059*	2064							
		2066*	2081*	2084*	2089*	2093	2101*	2103	2122	2123	2126	2128*	2129*	2130							
		2132*	2133*	2152	2163	2165*	2166	2167*	2188	2190	2196	2197	2201	2202							
		2209	2210	2239	2241	2243	2247	2251	2252	2254	2270	2271	2272*	2275*							
		2276*	2277*	2278	2280*	2281*	2294*	2297	2301*	2303*	2312	2318*	2328*	2338*							
		2348*	2366	2369*	2370	2372	2375	2379	2381	2383*	2385*	2387*	2388*	2393*							
		2394*	2409	2413*	2430	2432	2434	2439	2441*	2443*	2444*	2445*	2446*	2447							
		2450	2452*	2453*	2454*	2460*	2461*	2462*	2463	2465*	2467*	2469*	2470*	2477*							
		2478*	2503	2509	2514	2548*	2552*	2559*	2561	2564*	2576	2577	2596	2626							

		2627	2628	2629	2630	2640	2642*	2649	2651*	2658	2660*	2667	2669*	2676
		2678*	2693	2732*	2829*	2831*	2834*	2881*	2926	2946	2949	2954	2965	2974
		2977	2980	2983	2987	2991	2995	3001	3008	3017*	3021	3024	3046	3047*
		3048	3050*	3051*	3053	3055*	3056*	3061*	3083	3084*	3099	3100	3102*	3103*
		3119*	3121*	3133*	3138*	3146*	3148*	3149*	3159*	3161*	3161*	3162*	3163*	3164*
		3165*	3166	3172	3177	3180*	3181	3185	3186	3202	3207	3210	3212*	3220
		3242	3244	3253	3255	3257	3259	3268	3270	3273	3274	3275	3276	3277
		3278	3422	3428	3432	3434	3436	3438	3440	3478	3480	3483	3486	3489
		3492	3495	3498	3501	3504	3507	3545	3547	3549	3550	3554	3559*	3560*
		3561*	3562	3566*	3567*	3570*	3599	3600	3609	3611	3622	3624	3628	3629*
		3637	3646*	3647*	3648*	3649	3653*	3654*	3657*	3658	3707	3709	3711	3712
		3713	3730	3749	3751*	3763	3764	3767*	3783	3788	3790	3843	3848	3850
		3851	3852	3853	3854	3855	3856	3857	3858	3859	3905	3906*	3907	3910*
		4046	4056*	4060	4076	4077	4090*	4386	4393*	4396*	4398*	4403*	4410*	4411
		4414*	4421*	4422	4426*	4433	4437*	4459	4484*	4499	4502*	4505*	4509*	4512*
		4515	4519*	4539*	4540	4558*	4562*	4595	4596*	4597	4598*	4599*	4600*	4601*
		4836	4838*	4841	4845*	4891*	4913*	4934*	4969	4970*	5029*	5080*	5249*	5251
		5253*	5271	5273*	6640	6644*	6654	6659*						
R1	=%000001	1054*	1778*	1969*	1970	1972	1974*	1976*	1977	1979	1981*	1983	1993*	2074*
		2075*	2094*	2100*	2101	2105*	2106	2112*	2116	2146	2151*	2152	2156*	2160*
		2162	2163*	2166*	2173	2175*	2176*	2185*	2191	2193*	2196*	2197*	2201*	2202*
		2209*	2210*	2217	2225	2227	2229*	2230*	2251*	2257*	2494*	2496*	2524*	2525*
		2526*	2534*	2535*	2536*	2615	2616*	2623*	2625*	3076	3078	3080	3095	3097
		3101*	3125*	3177*	3189	3193	3273*	3281	3299	3311	3319	3363	3365*	3372*
		3382	3385	3402	3404*	3410	3417*	3684	3685	3690*	3711*	3720*	3722*	3728
		3730	3733	3841	3849*	3850*	3851*	3852*	3853*	3854*	3855*	3856*	3857*	3858*
		3859*	3861*	4047	4060*	4061	4065	4089*	4387	4392*	4397*	4415*	4418	4422*
		4431*	4432	4436*	4460	4483*	4500	4503*	4506*	4510*	4511*	4513*	4514*	4516
		4518*	4541*	4547*	4553*	4764*	4766*	4767	4770*	4771	4777*	4779*	4780*	4782*
		4784*	4801*	4802	4811*	4813*	4816	4818	4889*	4890*	4896	4897*	4898*	4899*
		4900*	4901*	4910*	4911*	4918	4919	4920*	4921*	4922*	4923*	4932*	4945	4946*
		4947*	4948*	4950*	4961	4989*	4990*	4991	4992*	4993*	4994*	4999	4999	5011
		5027	5028*	5036*	5050*	5054*	5058*	5059	5060*	5061	5064*	5065*	5066*	5067*
		5068	5069	5076	5078	5079*	5082*	5083	5086*	5089*	5096	5109*	5117*	5119
		5139	5140*	5141*	5142*	5145	5149	5154	5164*	5165	5166*	5178*	5181*	5182*
		5163*	5184*	5185	5186	5225	5228*	5234*	5248*	5252*	5265	5270*	5281*	5283*
		6641	6649*	6650	6651	6653*	6657	6658*						
R2	=%000002	1055*	1785	1788	2000*	2017	2019*	2021*	2024	2035*	2043*	2044	2046	2068
		2073	2075	2147	2149*	2154*	2159*	2171*	2177*	2186*	2194*	2199*	2211	2212*
		2220*	2224*	2231*	2252*	2258*	2561*	2562*	2577*	2578*	2600	2604*	2605	2609*
		2610	2614*	2617*	2618	3080*	3081*	3132	3135*	3181*	3199*	3289*	3291*	3292
		3306*	3691	3693*	3727*	3735*	3842	3860*	4048	4059*	4063*	4066	4073*	4074*
		4075	4080*	4098*	4288	4399*	4407*	4412	4435*	4461	4482*	4501	4504*	4507*
		4517*	4538*	4541	4542*	4548*	4549*	4554*	4555*	4765*	4767	4769*	4771	4835
		4836*	4837*	4842*	4876*	4878*	4879*	4888*	4893	4894	4895	4912*	4915	4916
		4933*	4936	4937	4938	4939	4940	4941	4942	4949	4964*	4966*	4995*	4997*
		5014*	5016*	5018*	5025	5031*	5032*	5033*	5034*	5035*	5059*	5085*	5088*	5091*
		5093*	5150*	5153*	5157*	5159*	5165*	5175*	5177*	5180*	5199	5200*	5210*	5226
		5230	5232	5236	5238	5240	5242	5244	5246*	5270				
R3	=%000003	1056*	1874*	1900*	1916*	1923*	1959*	1964*	1999*	2007*	2148	2158*	2173*	2174*
		2175	2176	2188*	2199*	2190*	2191	2256*	2260*	2262*	2547*	2553*	2566*	2802*
		2807*	2936*	2852*	2860*	2869*	2887*	2891*	2923	2928*	2930*	2933*	2935*	2939*
		3006	3010*	3013*	3016*	3117	3118*	3126*	3128*	3130*	3132*	3135	3136*	3142
		3143	3144	3145	3146	3147*	3195*	3195*	3298*	3308*	3409*	3412*	3680	3683*
		3688*	3695*	3988	3997*	4003*	4004*	4007*	4012*	4013*	4014	4023*	4049	4057*
		4058*	4072*	4075*	4084*	4085*	4087*	4297	4299*	4300	4303*	4304	4311*	4312

		4314	4322	4326	4328*	4334	4336	4338*	4341*	4389	4411*	4412*	4414	4434*
		4462	4481*	4546*	4551*	4557*	4558	4773*	4774*	4775*	5051*	5052	5055*	5110*
R4	=%000004	5111	5113*	5118	5202*	5204	5206	5207	5209	5211	5212			
		1057*	1756*	1767	1773	1786	1873*	1877	1881	1891	1902*	1917*	1922*	2001*
		2006*	2013	2023	2214*	2215*	2216*	2217	2253*	2254*	2255	2263	2546*	2549
		2551*	2557	2565*	2575*	2576*	2592	2801*	2805*	2809	2818	2822	2824	2827*
		2828*	2829	2835*	2838*	2849*	2853*	2854	2856	2857*	2858*	2859*	2862*	2874*
		2877*	2878	2880*	2881	2890*	2912	2924	2926*	2927*	2929*	2932*	2934*	2938*
		2944	2945*	2946*	2947	2948*	2949*	2958*	3007	3008*	3009*	3012*	3015*	3020*
		3021*	3022	3023*	3024*	3186*	3187*	3297	3403*	3405*	3406	3414*	3989	3991*
		3992*	3993*	3994	3995*	4009	4011*	4019*	4022*	4463	4480*	4544*	4547	4553
		4555	4776*	4802*	4803	4805	4807	4809	4814	4850*	4869*	4875*	4887*	4893*
		4894*	4895*	4909*	4915*	4916*	4917*	4931*	4936*	4937*	4938*	4939*	4944*	4976*
		4998*	4999*	5000	5005*	5009*	5041	5043	5044	5048*	5061*	5062	5069*	5070
		5072	5074	5138*	5139*	5147	5160*	5161*	5167	5169	5171	5173	5198*	5199*
		5208												
R5	=%000005	1058*	1719*	1720*	1721	1773*	1774	1785*	1788*	1960*	1961	1963*	1972	1979
		1992*	2002*	2003	2005*	2021	2022*	2061*	2062	2064*	2070*	2071	2073*	2090*
		2091	2093*	2113*	2114	2116*	2213*	2214	2216	2219*	2225*	2227*	2228*	2229
		2230	2255*	2257	2263*	2292	2307*	2309	2315*	2316*	2317*	2318	2322*	2323*
		2325*	2327*	2328	2332*	2333*	2335*	2337*	2338	2342*	2343*	2345*	2347*	2348
		2352*	2353*	2355	2357	2368*	2369	2393	2395*	2400*	2405*	2407	2411*	2413
		2418*	2420	2424*	2469	2762*	2763*	2765	2767	2769	2771*	2772	2776	2780
		2784	2790	2803	2805	2850	2853	2864	2875	2877	2925	2937*	3031	3033*
		3179*	3183*	3204*	3215	3297*	3299	3320	3364	3366*	3371*	3384	3406*	3410
		3990	3996*	3998*	4000*	4001*	4002*	4003	4021*	4050	4052*	4054*	4061*	4065*
		4080	4086*	4464	4479*	4545*	4549	4556	5203*	5204				
R6	=%000006	1059*	1061	1675*	1676									
R7	=%000007	1060*	1062											
SAVEFG	021132	1809*	4704*	5002	5094									
SAVER1	013144	3285*	3310*	3344*	3361	3365	3369*							
SAVERS	013146	3286*	3370*	3345*	3366	3370*								
SAVREG=	104412	2184	2545	2545	2573	2747	3156	4537	4629*	4761	4800	4849	4975*	5108
		5197												
SC	023034	4981	5041*											
SCMND	010772	2782	2874*											
SC0	023076	5007	5015	5017	5019	5042	5050*	5124						
SC1	023104	505*	5056											
SC2	023112	5054*	5063	5084	5095	5098								
SC3	023122	5053	5058*											
SDOTAL	007306	2563	2579	2592*										
SECOND	010140	1727*	2688	2698*	2699	2701*	2702*	2703	2705*	2739*				
SEC.ER	001272	1320*	3847*	6364										
SECK =	000011	1165*	4917	5230										
SECKWT	021126	4684*	4919*	5076	5083*	5096*	5186*							
SEKMOD	001316	1340*	2972	6564										
SETVEC	003302	1853	1869*											
SIJTYP	007270	2556	2574	2585*										
SILO =	000026	1157*	5212											
SIXTEE	010144	1723*	1724*	2694*	2696*	2697*	2743*							
SIZMEM	002370	1734*	1737*	1738*										
SKIER	014424	3491	3599*											
SP	=%000006	1061*	1678*	1688*	1696*	1700	1774*	1778	1790*	1795*	1823*	1830*	1834*	1838*
		1842*	1846*	1850*	1854*	1859	1877*	1967*	2013*	2054*	2056	2082*	2084	2106*
		2112	2146*	2147*	2148*	2158	2159	2160	2162*	2211*	2232	2224	2270*	2275
		2292*	2357*	2358*	2359*	2361	2363*	2374*	2375*	2376*	2377	2386*	2395	2458

2475*	2477	2478	2499*	2502*	2503*	2504*	2505*	2507*	2508*	2509*	2510*	2512*
2514*	2530*	2539*	2541*	2596*	2600*	2605*	2610*	2615*	2618*	2625	2626*	2627*
2628*	2629*	2630*	2693*	2724*	2732	2748*	2749*	2750*	2751*	2752	2756*	2762
2816*	2840*	2912*	2923*	2924*	2925*	2937	2938	2939	2944*	2954*	2958	2987*
2995*	3001*	3006*	3007*	3015	3016	3029*	3030*	3031*	3033	3034	3046*	3047
3057	3061	3062*	3117*	3147	3189*	3193*	3248*	3253*	3254*	3255*	3256	3257
3263*	3363*	3364*	3371	3372	3396*	3402*	3404	3416*	3417	3549*	3550*	3551
3557*	3559	3560	3568*	3570	3609*	3610*	3611*	3644*	3646	3647	3655*	3657
3680*	3695	3712*	3713*	3714*	3715*	3717	3719*	3720	3723*	3728*	3733*	3761
3762	3772*	3773	3795*	3798	3815	3816*	3818*	3841*	3842*	3844*	3846	3847
3860	3861	3869	3905*	3906	3907*	3909	3910	3911*	3913	3915	3917	3923
3925*	3927*	3935*	3939*	3943	3944	3948	3980*	3981	3982	3983*	3988*	3989*
3990*	3996	4021	4021	4023	4024*	4025*	4066*	4047*	4048*	4049*	4050*	4051*
4052	4055*	4068	4070*	4072	4082	4084	4086	4087	4088	4089	4090	4092*
4093*	4136*	4137*	4138	4142	4144	4153	4155	4158	4161*	4162*	4163	4168
4170	4172*	4173	4189*	4190*	4191	4201	4208*	4211*	4212*	4216*	4217*	4219
4222*	4229	4232*	4236	4238	4240	4241*	4248	4250	4252*	4253	4255*	4256*
4257*	4258*	4259*	4274*	4275*	4276*	4277*	4278*	4284*	4297*	4298*	4303	4306
4310*	4317	4321*	4340	4341	4342*	4343*	4344*	4385*	4386*	4387*	4388*	4389*
4390*	4391*	4392	4393	4395*	4399	4402*	4405*	4416*	4420*	4423	4424	4427*
4428*	4429	4432*	4433*	4434	4435	4436	4437	4438*	4459*	4460*	4461*	4462*
4463*	4464*	4465*	4466*	4467*	4468*	4475*	4476*	4477*	4478*	4479	4480	4481
4482	4483	4484	4499*	4500*	4501*	4517	4518	4519	4538	4540*	4595*	4596
4606*	4607*	4762*	4786	4832*	4835*	4842	4844	4940*	4941*	4942*	4943*	4944
5027*	5036	5078*	5082	5113	5128*	5208*	5209*	5210	5225*	5252	5264*	5267*
5272	6640*	6641*	6642*	6643*	6644	6647	6654*	6655	6656	6658	6659	
1776	1887	2613	2622	6465#								
2599	2603	2608	3197	3206	3217	3732	6464#					
2595	6463#											
1880	1896	6462#										
1036#	1309	1678	1790	1795								
1309#												
1241	1668#	1942										
1242	1670#											
2587	6487#											
1310#	1717*	1950	1954*	2731*								
2107	2122#											
1955	2545#	2894										
1047#												
2255	2263	3406	3414	5735#								
5115	5138#											
5144	5164#											
5168	5177#											
5172	5180#											
5176	5179	5182#										
5146	5148	5163	5170	5174	5188#							
1156#												
1176#	3242	4803	5070	5167								
1181#	4805	5072	5171									
1182#	4809	5173										
1180#	4814											
1178#	3242	3489	4807	5169								
1177#	5062											
1175#												
4877	4967	5004	5008	5097	5151	5187	5197#					
1270#	1676	1690*	1692	1698*	1711	1871	1952	2295	2305	2437	2456	2754

SPACE1 032501  
SPACE2 032500  
SPACE3 032477  
SPACE4 032476  
STACK = 001100  
STACK1 001246  
START 002016  
START1 002024  
STATHO 032646  
STATIN 001250  
STATIS 004626  
STATPR 007126  
STKLMT= 177774  
STNDAT 025764  
STO 023472  
STO1 023636  
STO2 023716  
STO3 023734  
STO4 023746  
STO5 023776  
SUCA = 000024  
SUFU = 001000  
SUOL = 040000  
SURDY = 100000  
SURPO3= 020000  
SUSI = 004000  
SUSU = 002000  
SLMP = 000400  
SVRP11 024000  
SMR 001140









STOTAL=	000050	2626	2676	2678*	2965	5313#	5314												
STPB	001152	1275#	3943*	3954															
STPFLG	001157	1279#	1718*	3901	3954														
STPS	001150	1274#	3941	3954															
STRAP	021020	1E82	4595#																
STRAP2	021042	4606#	4617																
STRK =	000013	2026#	2338*	2450	2452*	3277	3559*	3646*	3761*	5302#	5303								
STRP =	000014	4610#	4619#	4620#	4621#	4622#	4623#	4624	4625#	4626	4627#	4628#	4629#	4630#					
		4631#																	
STRPAD	021054	4600	4617#																
STSTNA	001102	1252#	3864	3883															
STTYIN	020132	4299	4300	4312	4330	4344	4348#												
STYPB#	##### U	4623																	
STYPOS	016522	4045#	4622																
STYPE	016054	3901#	4610	4618															
STYPEC	016224	3922	3929	3936	3941#	3942	4247												
STYPEX	016272	3947	3949	3952#															
STYPOC	016320	3985#	4619																
STYPOB	016334	3984	3987#	4621															
STYPOS	016274	3980#	4620																
SWROL =	000020	2031*	2152	2163	2165*	2166	2167*	2188	2197	2202	2210	2247	2252	2369*					
		2387	2460*	3253	3274	3562	3566*	3649	3653*	3712	5305#	5306							
SWROM =	000004	2032*	2033*	2387*	2388*	2461*	2462*	3567*	3654*	5298#	5299								
SOFILL	016517	3981*	3985*	3995	4030#														
SYOCAT=	##### U	3874																	
.	= 034040	1218#	1222#	1230	1231#	1233#	1235#	1239#	1249#	1296	1677	2063	2072	2092					
		2205	2244	2246	2248	2250	3481	3484	3487	3490	3493	3496	3499	3502					
		3505	3508	3883	3954	4099#	4104	4108#	4109	4110#	4348#	4349	4356#	4585#					
		5340	5380	5420	5460	5500	5540	5580	5620	5658#	5727#	6336#	6617						



.SCMTA	10	10030	1243
.SDS2D	10	10030	4524
.SDS20	10		
.SDIV	10	10030	4358
.SEOP	10		
.SERRO	10	10030	3826
.SERRT	10	10030	
.SMULT	10		
.SPOWE	10		
.SRAND	10	10030	4487
.SRDOE	10		
.SRDOC	10		
.SREAD	10	10030	4101
.SR2A2	10		
.SSAVE	10	10030	4441
.SSB2D	10		
.SSB20	10		
.SSCOP	10		
.SSIZE	10	10030	6632
.SSUPR	10		
.STRAP	10	10030	4587
.STYPB	10		
.STYPD	10	10030	4033
.STYPE	10	10030	3884
.STYPO	10	10030	3955
.S4OCA	10		
.1170	10		

ROC	2129	2133	2277	2281	4510	4513	4554								
FOO	1963	1974	1981	2005	2019	2035	2075	2128	2132	2156	2166	2174	2190	2193	2210
	2216	2219	2225	2228	2276	2280	2317	2327	2337	2347	2363	2376	2386	2496	2530
	2539	2552	2559	2562	2564	2578	2604	2609	2614	2617	2840	2927	2932	3009	3058
	3132	3146	3165	3212	3248	3255	3263	3275	3396	3414	3416	3690	3691	3713	3723
	3795	3911	3983	3993	4065	4222	4232	4241	4412	4509	4511	4512	4514	4553	4555
	5209	5283													
ASL	2165	2189	2215	2424	2827	2857	2880	2948	3023	3126	3128	3130	3162	3163	3164
	3254	3719	4255	4256	4257	4505	4599	4897	4920	4946	4992	5058	5064	5140	5164
	5182														
ASR	2030	4070	5055												
	2125	2167	2835	2859	3616	3617	3618	3619	3620	3621	4900	4948	4994	5060	5067
	5142	5166	5184												
BCC	4071	4413													
BOS	3127	3129	3131	3188											
BEQ	1760	1768	1806	1813	1870	1882	1892	1901	1915	1919	1951	1971	1973	1978	1980
	2018	2045	2050	2057	2067	2102	2104	2124	2127	2131	2150	2155	2164	2170	2172
	2187	2192	2218	2240	2259	2279	2296	2300	2324	2334	2344	2356	2371	2380	2404
	2410	2495	2717	2727	2766	2804	2825	2833	2837	2851	2855	2861	2876	2876	2879
	3096	3167	3173	3178	3182	3196	3203	3245	3260	3269	3302	3304	3307	3312	3323
	3362	3377	3381	3393	3407	3423	3429	3479	3484	3487	3490	3493	3496	3499	3502
	3505	3508	3546	3555	3623	3638	3697	3704	3708	3710	3718	3726	3731	3741	3755
	3771	3784	3789	3791	3863	3866	3914	3949	4010	4147	4200	4239	4254	4282	4318
	4430	4806	4854	4857	4860	4863	4868	4978	5024	5047	5073	5077	5095	5144	5172
	5201	5231	5237	5239	5241	5243	5245	5266	5282						
BGE	4425														
BGT	2310	4017	4079	4171	4251	4401	4962	5012	5114	5120	5155	5268			
BHI	1820	2449	2768	2966	2975	2981	3079	3288							
BHIS	1747	1826	1829	1833	1837	1841	1845	1849	1853	2205	2244	2248	2362	2378	2641
	2650	2659	2668	2677	2978	3552	3564	3651							
BIC	2316	2368	2405	2445	2504	2751	3081	3610	4007	4137	4162	4172	4190	4217	4252
	4385	4780	5005												
BICB	2771	2856	2947	3022	4816	4991	5068	5083	5096	5149	5185	5186			
BIS	4012	4013	4073	4074	4259	4402	4420	4557	4943	5018	5085	5088	5091	5093	5157
	5159														
BISB	2023	4818	4896	4918	4919	4941	4942	4945							
BIT	1871	1952	2235	2305	2437	2439	2456	2786	2963	2989	3157	3235	3242	3303	3380
	3422	3428	3432	3434	3436	3438	3440	3483	3486	3489	3492	3495	3498	3501	3504
	3507	3613	3637	3696	3703	3705	3709	3725	3740	3788	3790	3865	3872	4803	4805
	4807	4809	4814	5052	5062	5070	5072	5074	5167	5169	5171	5173	5226		
BITB	1891	2126	2239	2366	2379	2381	2409	2549	2557	2808	2818	2854	2878	3270	3547
	3937	5025	5076												
BLE	3200	3328	5213												
BLO	2448	2770	2976	2982	2984	2992	3077	3331	3335	4313					
BLOS	1757	1822	2153	2451	4301	4768	4772								
BLT	3928	4018	4062	4078	4169	4249	4400	4550	4963	5112	5156				
BMI	1883	2435	2464	2826	3785	4069	5001	5013	5148						
BNE	1677	1693	1710	1712	1722	1735	1749	1754	1816	1872	1921	1931	1934	1936	1953
	1962	1965	1967	2004	2008	2042	2048	2063	2072	2085	2092	2115	2178	2195	2221
	2232	2242	2261	2298	2306	2313	2367	2373	2392	2408	2421	2431	2433	2438	2440
	2457	2550	2554	2558	2567	2624	2685	2695	2700	2704	2709	2713	2719	2729	2753
	2755	2773	2777	2781	2785	2787	2791	2809	2819	2821	2889	2892	2931	2936	2964
	2973	2990	3014	3049	3054	3098	3158	3205	3211	3216	3236	3243	3258	3271	3300
	3309	3317	3357	3379	3411	3413	3433	3435	3437	3439	3441	3481	3548	3614	3659
	3689	3706	3736	3794	3873	3908	3916	3924	3938	3945	4008	4067	4139	4145	4151
	4156	4164	4176	4186	4192	4220	4224	4230	4237	4244	4287	4305	4307	4323	4327

	4337	4417	4508	4561	4781	4804	4808	4810	4815	4852	4866	4882	4904	4926	4953
	4955	5026	5042	5053	5056	5063	5071	5075	5106	5123	5146	5168	5170	5174	5205
BPL	5227	5233													
	2506	2511	3231	3878	3902	3942	4006	4053	4083	4160	4188	4214	4394	4419	4785
	5003														
BR	1669	1695	1714	1751	1769	1787	1789	1792	1802	1885	1888	1903	1975	1982	1995
	2009	2020	2035	2052	2065	2069	2077	2096	2157	2168	2179	2200	2223	2233	2246
	2250	2264	2365	2384	2406	2423	2436	2466	2497	2513	2529	2538	2555	2560	2722
	2757	2775	2779	2763	2789	2793	2839	2841	2843	2863	2870	2883	2886	2893	2979
	2999	3018	3040	3042	3044	3052	3082	3120	3134	3191	3198	3213	3218	3290	3294
	3296	3310	3315	3321	3325	3415	3553	3575	3578	3581	3585	3591	3593	3630	3640
	3664	3667	3671	3721	3738	3787	3904	3921	3931	3940	3947	3984	3999	4020	4064
	4081	4154	4233	4260	4262	4316	4325	4331	4333	4404	4406	4409	4552	4812	4817
	4839	4892	4914	4935	4965	4968	4980	5007	5015	5017	5019	5030	5084	5087	5090
	5092	5098	5116	5121	5158	5163	5176	5179	5229	5235	5247	5250	5269	5284	6652
CLC	1744	4408													
CLR	1668	1675	1706	1717	1720	1729	1730	1791	1793	1794	1818	1873	1910	1917	1954
	1992	1993	2000	2001	2002	2022	2043	2054	2059	2082	2089	2253	2358	2374	2411
	2502	2508	2521	2523	2533	2546	2575	2800	2801	2849	2874	2929	2934	2945	3012
	3020	3030	3045	3118	3136	3159	3179	3284	3285	3286	3332	3336	3369	3370	3568
	3629	3655	3693	3714	3997	4056	4059	4120	4157	4203	4211	4212	4276	4277	4298
	4321	4390	4421	4546	4766	4777	4783	4837	4889	4910	4989	4996	5031	5050	5065
	5109	5110	5162	5183	5202										
CLRB	1718	1728	2730	3283	3318	3781	3920	3946	4085	4328	4338	4427	4562	4811	4843
	4984	5089	5127	5181											
CMP	1676	1692	1711	1721	1746	1755	1819	1821	1825	1828	1832	1836	1840	1844	1848
	1852	1933	1935	1972	1979	2047	2130	2152	2191	2204	2217	2243	2247	2278	2309
	2361	2377	2407	2447	2640	2649	2658	2667	2676	2716	2752	2754	2965	2974	2977
	2930	2983	2991	3257	3287	3299	3330	3334	3410	3478	3480	3551	3554	3562	3622
	3649	3730	4077	4138	4144	4146	4150	4155	4163	4168	4170	4175	4185	4191	4219
	4229	4236	4248	4250	4286	4300	4312	4556	4767	4771	5119	5204	5212		
CMPB	1920	2241	2297	2312	2370	2372	2450	2699	2703	2708	2712	2718	2728	2765	2767
	2769	2772	2776	2780	2784	2790	2803	2850	2864	2875	3048	3076	3078	3097	3268
	3545	3658	3707	3793	3913	3915	3923	3944	3948	4199	4223	4243	4304	4322	4326
	4336	5145	5230	5232	5236	5238	5240	5242	5244						
COM	3183	3204													
DEC	1900	1964	2007	2066	2154	2169	2171	2177	2194	2220	2226	2231	2258	2260	2553
	3566	2623	2836	2860	2891	2930	3013	3055	3161	3195	3199	3306	3308	3378	3412
	3688	3735	4283	4311	4416	4428	4559	4784	5267						
DECB	2505	2510	3927	3930	4005	4016	4395								
EMT	1037														
HALT	1222	2245	2249	2274	3698	3742	3753	3769	3879	3903					
INC	1734	1869	1902	1922	2006	2198	2199	2203	2325	2335	2345	2353	2551	2565	2642
	2651	2660	2669	2678	2694	2763	2838	2862	2890	3017	3051	3101	3125	3280	3329
	3333	3337	3368	3374	3868	4011	4019	4063	4167	4174	4258	4285	4405	4507	4551
	4779	5054	5117												
INCB	2698	2702	2706	2707	2711	2715	2721	3786	3792	3862	3950				
IOT	1038														
JMP	1241	1242	1807	1824	1831	1835	1839	1843	1847	1851	1855	1864	1926	1932	1942
	1968	2086	2118	2302	2314	2459	2490	2759	2811	2814	2817	2900	2906	2967	3232
	3338	3424	3449	3460	3466	3474	3482	3485	3488	3491	3494	3497	3500	3503	3506
	3509	4143	4226												
JSR	1707	1736	1779	1808	1905	1907	1924	1938	1955	1985	1991	1994	2011	2051	2053
	2055	2058	2060	2076	2083	2087	2088	2095	2107	2108	2109	2110	2111	2117	2272
	2233	2304	2308	2311	2326	2336	2346	2354	2360	2364	2392	2401	2419	2422	2429
	2442	2455	2468	2476	2556	2563	2574	2579	2586	2597	2598	2601	2602	2606	2607

MOV

2611	2612	2620	2621	2631	2632	2725	2774	2778	2782	2788	2792	2810	2813	2823
2830	2867	2882	2885	2894	3005	3032	3119	3121	3133	3138	3169	3233	3234	3237
3247	3262	3293	3295	3305	3314	3324	3326	3359	3367	3373	3387	3395	3431	3448
3459	3465	3471	3473	3516	3522	3528	3534	3540	3558	3565	3569	3573	3574	3576
3577	3580	3583	3584	3587	3590	3602	3603	3604	3612	3626	3627	3632	3642	3643
3645	3652	3656	3660	3663	3665	3666	3669	3670	3673	3674	3692	3687	3716	3751
3767	3782	3817	3845	3874	3922	3929	3936	4141	4202	4247	4778	4838	4840	4855
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MOV8

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ROR	3998	4000	4001	4002	4004	4410	4415	4506							
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5972	5973	5975	5976	5977	5978	5979	5980	5981	5982	5983	5984	5985	5986	5987
5988	5989	5990	5992	5993	5994	5995	5996	5997	5998	5999	6000	6001	6002	6003
6004	6005	6006	6007	6009	6010	6011	6012	6013	6014	6015	6016	6017	6018	6019
6020	6021	6022	6023	6024	6338	6339	6340	6341	6342	6344	6345	6346	6348	6350
6351	6353	6355	6357	6358	6360	6362	6364	6367	6370	6372	6375	6380	6384	6387
6391	6394	6398	6402	6406	6410	6414	6417	6421	6424	6428	6432	6436	6439	6443
6446	6541	6542	6543	6544	6545	6546	6547	6548	6549	6550	6551	6552	6553	6554
6555	6556	6557	6558	6559	6560	6561	6562	6563	6564	6565	6566	6567	6568	6569
6570	6571	6615	6661											

ERRORS DETECTED: 0  
DEFAULT GLOBALS GENERATED: 0

#, NOM. SEQ/SOL/CRF/NL: TOC/PAGNUM=DZRP18.SML, DZRP18.CMB  
RUN-TIME: 44 66 10 SECONDS  
RUN-TIME RATIO: 284/121=2.3  
CORE USED: 35K (69 PAGES)

C13

Spooler routine 23 Seconds, 97 KCS, 64M disk reads, 3 disk writes, 157 pages  
C:\spooler\spooler.exe -s -d -f -l -m -n -o -p -r -t -u -v -w -x -y -z -A -B -C -D -E -F -G -H -I -J -K -L -M -N -O -P -Q -R -S -T -U -V -W -X -Y -Z -AA -AB -AC -AD -AE -AF -AG -AH -AI -AJ -AK -AL -AM -AN -AO -AP -AQ -AR -AS -AT -AU -AV -AW -AX -AY -AZ -BA -BB -BC -BD -BE -BF -BG -BH -BI -BJ -BK -BL -BM -BN -BO -BP -BQ -BR -BS -BT -BU -BV -BW -BX -BY -BZ -CA -CB -CC -CD -CE -CF -CG -CH -CI -CJ -CK -CL -CM -CN -CO -CP -CQ -CR -CS -CT -CU -CV -CW -CX -CY -CZ -DA -DB -DC -DD -DE -DF -DG -DH -DI -DJ -DK -DL -DM -DN -DO -DP -DQ -DR -DS -DT -DU -DV -DW -DX -DY -DZ -EA -EB -EC -ED -EE -EF -EG -EH -EI -EJ -EK -EL -EM -EN -EO -EP -EQ -ER -ES -ET -EU -EV -EW -EX -EY -EZ -FA -FB -FC -FD -FE -FF -FG -FH -FI -FJ -FK -FL -FM -FN -FO -FP -FQ -FR -FS -FT -FU -FV -FW -FX -FY -FZ -GA -GB -GC -GD -GE -GF -GG -GH -GI -GJ -GK -GL -GM -GN -GO -GP -GQ -GR -GS -GT -GU -GV -GW -GX -GY -GZ -HA -HB -HC -HD -HE -HF -HG -HH -HI -HJ -HK -HL -HM -HN -HO -HP -HQ -HR -HS -HT -HU -HV -HW -HX -HY -HZ -IA -IB -IC -ID -IE -IF -IG -IH -II -IJ -IK -IL -IM -IN -IO -IP -IQ -IR -IS -IT -IU -IV -IW -IX -IY -IZ -JA -JB -JC -JD -JE -JF -JG -JH -JI -JJ -JK -JL -JM -JN -JO -JP -JQ -JR -JS -JT -JU -JV -JW -JX -JY -JZ -KA -KB -KC -KD -KE -KF -KG -KH -KI -KJ -KK -KL -KM -KN -KO -KP -KQ -KR -KS -KT -KU -KV -KW -KX -KY -KZ -LA -LB -LC -LD -LE -LF -LG -LH -LI -LJ -LK -LL -LM -LN -LO -LP -LQ -LR -LS -LT -LU -LV -LW -LX -LY -LZ -MA -MB -MC -MD -ME -MF -MG -MH -MI -MJ -MK -ML -MM -MN -MO -MP -MQ -MR -MS -MT -MU -MV -MW -MX -MY -MZ -NA -NB -NC -ND -NE -NF -NG -NH -NI -NJ -NK -NL -NM -NN -NO -NP -NQ -NR -NS -NT -NU -NV -NW -NX -NY -NZ -OA -OB -OC -OD -OE -OF -OG -OH -OI -OJ -OK -OL -OM -ON -OO -OP -OQ -OR -OS -OT -OU -OV -OW -OX -OY -OZ -PA -PB -PC -PD -PE -PF -PG -PH -PI -PJ -PK -PL -PM -PN -PO -PP -PQ -PR -PS -PT -PU -PV -PW -PX -PY -PZ -QA -QB -QC -QD -QE -QF -QG -QH -QI -QJ -QK -QL -QM -QN -QO -QP -QQ -QR -QS -QT -QU -QV -QW -QX -QY -QZ -RA -RB -RC -RD -RE -RF -RG -RH -RI -RJ -RK -RL -RM -RN -RO -RP -RQ -RR -RS -RT -RU -RV -RW -RX -RY -RZ -SA -SB -SC -SD -SE -SF -SG -SH -SI -SJ -SK -SL -SM -SN -SO -SP -SQ -SR -SS -ST -SU -SV -SW -SX -SY -SZ -TA -TB -TC -TD -TE -TF -TG -TH -TI -TJ -TK -TL -TM -TN -TO -TP -TQ -TR -TS -TT -TU -TV -TW -TX -TY -TZ -UA -UB -UC -UD -UE -UF -UG -UH -UI -UJ -UK -UL -UM -UN -UO -UP -UQ -UR -US -UT -UU -UV -UW -UX -UY -UZ -VA -VB -VC -VD -VE -VF -VG -VH -VI -VJ -VK -VL -VM -VN -VO -VP -VQ -VR -VS -VT -VU -VV -VW -VX -VY -VZ -WA -WB -WC -WD -WE -WF -WG -WH -WI -WJ -WK -WL -WM -WN -WO -WP -WQ -WR -WS -WT -WU -WV -WW -WX -WY -WZ -XA -XB -XC -XD -XE -XF -XG -XH -XI -XJ -XK -XL -XM -XN -XO -XP -XQ -XR -XS -XT -XU -XV -XW -XX -XY -XZ -YA -YB -YC -YD -YE -YF -YG -YH -YI -YJ -YK -YL -YM -YN -YO -YP -YQ -YR -YS -YT -YU -YV -YW -YX -YY -YZ -ZA -ZB -ZC -ZD -ZE -ZF -ZG -ZH -ZI -ZJ -ZK -ZL -ZM -ZN -ZO -ZP -ZQ -ZR -ZS -ZT -ZU -ZV -ZW -ZX -ZY -ZZ