

RX11

SYSTEM RELIABILITY TEST
MD-11-DZRXA-E

EP-DZRXA-E-DL-A
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IDENTIFICATION

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1.0 GENERAL PROGRAM INFORMATION

1.1 ABSTRACT

THE RX11 SYSTEM RELIABILITY PROGRAM CONSISTS OF SELECTABLE TESTS THAT CHECK THE OPERATION OF THE RX11 SYSTEM, BY WRITING, READING AND VERIFYING VARIOUS DATA PATTERNS, UNDER VARIOUS (SELECTABLE) HEAD MOVEMENTS. IT CAN TRANSFER DATA AND CHECK FOR ERRORS OVER THE ENTIRE DISKETTE, ALL TRACKS AND SECTORS, OR BETWEEN SEPARATELY SELECTABLE TRACK AND SECTOR ADDRESS LIMITS.

AS WELL AS TRANSFERRING DATA THE PROGRAM ACCUMULATES STATISTICAL DATA ON THE FOLLOWING:

- A. COMPLETED PASSES OF THE PROGRAM
- B. NUMBER OF RESTARTS
- C. NUMBER OF SECTORS WRITTEN/READ
- D. RECOVERABLE AND UNRECOVERABLE FAULTS AS FOLLOWS:

- 1. PARITY ERRORS
- 2. ERROR FLAG ERRORS
- 3. INTERRUPT ERRORS
- 4. SEEK ERRORS
- 5. DATA CRC ERRORS
- 6. CRC NO DATA ERRORS
- 7. DATA NO CRC ERRORS
- 8. DELETED DATA MARK ERRORS
- 9. WRITE ERRORS
- 10. READ ERRORS

- E. TOTAL OF EACH ERROR CODE DETECTED
- F. TOTAL OF TIMES EACH TRACK WAS ACCESSED
- G. TOTAL OF TIMES HEAD MOVED TO A TRACK.
- H. TOTAL OF ERRORS DETECTED PER TRACK PER DRIVE.

THE ABOVE INFORMATION IS REPORTED BY RUNNING THE ERROR DUMP PROGRAM.

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE REQUIREMENTS

THE FOLLOWING EQUIPMENT IS REQUIRED.

- A. PDP-11 SERIES OF COMPUTER WITH MIN 8K MEMORY
- B. RX11 FLOPPY DISK SYSTEM INCLUDING DUAL OR SINGLE DRIVE RX01 AND PDP-11 INTERFACE. (SEE SECTION 2.3 FOR SELECTION OF REGISTER ADDRESSES AND VECTOR ADDRESS)
NOTE: A DISKETTE MUST BE INCLUDED WITH EACH DRIVE TESTED.

C. CONSOLE TELEPRINTER

1.2.1 SOFTWARE REQUIREMENTS

THIS PROGRAM ASSUMES THAT THE RX11 INTERFACE DIAGNOSTIC (MAINDEC - 11 - DZRXB-*) HAS BEEN SUCCESSFULLY RUN ON THIS SYSTEM.

2.0 OPERATING INSTRUCTIONS

2.0.1 OUTLINE OF OPERATING PROCEDURE

THE STANDARD OPERATING PROCEDURE FOR THE RX11 RELIABILITY TEST (TO RUN ALL TESTS ON BOTH DRIVES WITH NO OPERATOR INTERVENTION VIA THE SWITCH REGISTER) IS AS FOLLOWS:

- A. LOAD THE PROGRAM INTO MEMORY
 - 1. IF IT'S BEING LOADED FROM A DISKETTE, REPLACE THE "LIBRARY DISKETTE" WITH A "SCRATCH DISKETTE"
- B. START THE PROGRAM RUNNING AT LOCATION 200
- C. THE PROGRAM WILL TYPE OUT THE FOLLOWING:
 - 1. PROGRAM NAME AND REVISION
 - 2. RX11 REGISTER AND VECTOR ADDRESSES
 - 3. UNITS BEING TESTED
 - 4. "P"ATTERN, "T"EST, AND "S"EQUENCE

IT THEN STARTS RUNNING UNDER THOSE CONDITIONS
- D. IF THERE ARE NO ERRORS, AT THE END OF THE COMPLETED PASS A "D" AND "BELL" IS TYPED, AND THE PROGRAM WILL CONTINUE ON FOR ANOTHER PASS.
- E. HALT THE PROGRAM AS FOLLOWS:
 - 1. IF THERE IS A HARDWARE SWITCH REGISTER, PUT SW 14 UP TO HALT AT THE END OF PASS.
 - 2. IF THERE IS NO SWITCH REGISTER, OR TO HALT AT ANY TIME, HALT THE PROCESSOR.

2.1 LOADING PROCEDURE

LOAD THE PROGRAM INTO MEMORY USING STANDARD PROCEDURE FOR BINARY PAPER TAPES.

MAKE SURE THAT THE TOTAL SYSTEM IS READY FOR OPERATION, DISKETTE INSERTED CORRECTLY, DOORS CLOSED ON DRIVES TO BE TESTED, ETC.

2.2 STARTING ADDRESSES

THE PROGRAM HAS THREE (3) STARTING LOCATIONS.

2.2.1 INITIAL START (LOC. 200)

THIS STARTING LOCATION INITIALIZES THE PROGRAM AS FOLLOWS:

- A. CLEARS ALL ERROR LOGS
- B. RESETS COUNTERS AND CONSTANTS
- C. TYPES OUT RX11 REGISTER AND VECTOR ADDRESSES BEING USED.
- D. TYPES THE DRIVE AND TEST SELECTION IN "DTESTP"
- E. INITIATES THE COLLECTION OF STATISTICAL DATA PERTAINING TO THE OPERATION OF THE RX11 SYSTEM.

2.2.2 RESTART (LOC. 202)

THIS STARTING LOCATION DIRECTS THE PROGRAM TO CONTINUE RUNNING USING DRIVE AND TEST SELECTIONS SPECIFIED IN THE PREVIOUS INITIAL START. IT ALSO CONTINUES TO ACCUMULATE STATISTICAL INFORMATION, AMENDING IT TO THE DATA ALREADY COLLECTED PRIOR TO THIS RESTART.

2.2.3 ERROR DUMP (LOC. 204)

THIS STARTING ADDRESS DIRECTS THE PROGRAM TO PRINT OUT ON THE CONSOLE TELEPRINTER ALL THE DATA ACCUMULATED FROM THE LAST "INITIAL START" TO THE TIME OF THE PRINTOUT. TYPING OUT THIS INFORMATION DOES NOT DESTROY IT, SO A RESTART CAN BE INITIATED AND INFORMATION WILL CONTINUE TO BE COLLECTED.

2.3 OPERATOR ACTION BEFORE STARTING PROGRAM

2.3.1 DEVICE ADDRESS SELECTION

LIKE MOST OPTIONS ON THE PD11 THE RX11 INTERFACE CARD HAS JUMPERABLE REGISTER AND VECTOR ADDRESSES. THIS ALLOWS FOR DEVICES WITH THE SAME STANDARD ADDRESSES TO BE JUMPED TO AN OTHER ADDRESS SO THEY WILL RUN WITHOUT CONFLICT.

THE PROGRAM MUST KNOW WHAT ADDRESSES ARE BEING USED, AS IT IS THROUGH THESE REGISTERS AND VECTOR THAT ALL COMMUNICATION BETWEEN THE PD11 AND RX11 IS HANDLED.

IF THE RX11 SYSTEM UNDER TEST IS JUMPED FOR REGISTER ADDRESS OTHER THAN STANDARD, WHICH IS RXCS=177170 AND RXDB=177172. PLACE IN THE MEMORY LOCATION CALLED "RXCS" (LOC. 1206) ITS NEW ADDRESS, AND IN LOCATION "RXDB" (LOC. 1210) ITS NEW ADDRESS. IF THERE AS A NONSTANDARD INTERRUPT VECTOR ADDRESS (STANDARD IS LOC 264) THEN PLACE IN MEMORY LOCATION CALLED "INTVEC" (LOC. 1204) ITS NEW ADDRESS.

IF THESE THREE MEMORY LOCATIONS DO NOT CONTAIN THE ADDRESSES THAT THE INTERFACE BOARD IS WIRED TO THE PROGRAM WILL REPORT "TEST HUNG" AND HALT, OR HALT AT THE VECTOR ADDRESS THAT IS JUMPED IN. (NOTE: THE VECTOR ADDRESSES CAN NOT BE JUMPED FOR LOCATIONS 200 THROUGH 220 AS THESE ARE USED BY THE PROGRAM)

2.3.2 NON-STANDARD DISKETTE ADDRESS SELECTION

IF IT IS DESIREABLE TO TEST THE DISKETTES BETWEEN TRACK AND SECTOR ADDRESS LIMITS OTHER THAN BETWEEN THE NORMAL OUTER DIAMETER (OD) AND INNER DIAMETER (ID) TRACK ADDRESSES, AND/OR MINIMUM (FIRST) AND MAXIMUM (LAST) SECTOR ADDRESS. THIS IS DONE BY THE OPERATOR MAKING CHANGES TO TWO (2) MEMORY LOCATIONS BEFORE THE PROGRAM IS STARTED. ONE LOCATION IS CALLED OD WHICH CONTAINS TWO BYTES ONE FOR OD AND THE OTHER ID TRACK ADDRESSES. THE OTHER LOCATION IS CALLED FIRST AND IT TOO CONTAINS TWO BYTES ONE FOR FIRST THE OTHER FOR LAST SECTOR ADDRESS. (IF THESE TWO LOCATIONS ARE LEFT CLEARED THE MAX AND MIN VALUES FOR THE ADDRESSES ARE ASSUMED.)

A. DEFINITIONS:

OD = ADDRESS OF TRACK AT OUTER DIAMETER (MIN VALUE=0)
 ID = ADDRESS OF TRACK AT INNER DIAMETER (MAX VALUE=114 [OCTAL])
 FIRST = ADDRESS OF FIRST SECTOR OF TRACK (MIN VALUE=1)
 LAST = ADDRESS OF LAST SECTOR OF TRACK (MAX VALUE=32 [OCTAL])

B. LOCATIONS:

TRACKS LOC. 1200 BITS 14-----8 6-----0
 ID OD

SECTORS LOC. 1202 BITS 12-----8 4-----0
 LAST FIRST

C. RESTRICTIONS:

THE CONTENTS OF "OD" MUST BE LESS THAN OR EQUAL TO THE CONTENTS OF "ID"
 THE CONTENTS OF FIRST MUST BE LESS THAN OR EQUAL TO THE CONTENTS OF "LAST"

IF THESE LOCATIONS ARE CHANGED TO NEW LIMITS, THEN THE PROGRAM WILL ACCESS ONLY THOSE ADDRESSES INCLUSIVE OF AND BETWEEN THESE LIMITS.

2.3.3 SOFTWARE SWITCH REGISTER (LOC. 176)

FOR THE PDP 11 PROCESSORS THAT DO NOT HAVE A HARDWARE SWITCH REGISTER, OR IF THE OPERATOR WISHES TO SELECT THE SOFTWARE SWITCH REGISTER, BY PUTTING ALL THE SWITCHES UP TO A "1". (THIS MUST BE DONE EACH TIME THE PROGRAM IS STARTED AT LOCATION 200, OTHERWISE THE PROGRAM WILL USE THE HARDWARE SWR.) LOCATION 176 IS ASSIGNED AS THE SWITCH REGISTER. BITS SET TO A "1" IN THIS LOCATION HAVE THE SAME FUNCTION AS THE CORRESPONDING SWITCH IN THE HARDWARE SWITCH REGISTER. ALL REFERENCES TO THE SWR ARE INDIRECT AND THE PROGRAM ASSIGNS THE CORRECT ADDRESS OF THE SWR AT "INITIAL START". SEE SECTION 2.4.2 FOR THE SELECTION OF OPERATING CONDITIONS.

TO CHANGE THE SOFTWARE SWR. WHILE THE PROGRAM IS RUNNING, TYPE "CONTROL G". EACH TIME THE SWR. IS TO BE TESTED THE PROGRAM WILL CHECK TO SEE IF THE SOFTWARE SWR IS SELECTED, AND THE PROGRAM IS NOT RUNNING IN AUTO MODE OF RXDP/ACT11. IF BOTH CONDITIONS EXIST THEN THE PROGRAM CHECKS FOR THE CTRL G IN THE KEYBOARD BUFFER. IF THE CTRL G IS THERE THE CONTENTS OF THE SOFTWARE SWR. ARE PRINTED AND A "NEW =" IS ASKED FOR. THE OPERATOR MAY NOW TYPE IN THE NEW SWITCH REGISTER CONTENTS, TERMINATED BY A CARRIAGE RETURN (CR), OR IF HE DOESN'T WANT TO CHANGE THE SWR. JUST TERMINATE WITH THE (CR). NOTE SEE THE CHARACTER RESTRICTIONS BELOW.

WHEN THE PROGRAM DETECTS THE (CR) IT WILL REPLACE THE CONTENTS OF THE SOFTWARE SWR. IF A NEW ONE HAS BEEN TYPED IN, AND RETURN TO THE FLOW OF THE PROGRAM.

NOTE: CHARACTER RESTRICTIONS FOR CHANGING THE SOFTWARE SWR.

1. ONLY OCTAL NUMBERS 0 - 7 ARE ACCEPTED. ANY OTHER CHARACTER TYPED WILL BE PRINTED AS A ? AND THE WHOLE SWR MUST BE RETYPED.
2. TO WIPE OUT A "NEW" CONTENTS JUST TYPED IN, TYPE CTRL U. NOW A NEW CONTENTS CAN BE RETYPED.
3. ONLY 6 OCTAL CHARACTERS WILL BE PUT INTO THE SWR. IF MORE THAN 6 CHARACTERS ARE TYPED IN ONLY THE LAST 6 WILL BE PUT INTO THE SWR.

2.3.4 TEST PARAMETER SELECTION ("DTESTP" LOC. 1212)

THE DRIVE AND TEST SELECTION MUST BE DONE BEFORE THE PROGRAM STARTS. "DTESTP" (LOCATION 1212) IS WHERE THE BITS ARE SET TO TELL THE PROGRAM WHAT DRIVES ARE WANTED AND WHAT TEST TO RUN, AS INDICATED BELOW. WHEN THE PROGRAM STARTS IT WILL TYPE OUT THE TEST CONDITIONS IT IS RUNNING UNDER.

BIT 15 (1) SELECT DRIVE UNIT 1
BIT 14 (1) SELECT DRIVE UNIT 0

THEN SET THE TEST CONDITIONS IN BITS 8 THROUGH 0 AS SHOWN BELOW.

"DTESTP" BITS 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
 UI UO NOT USED D P P P T T T S S S

BIT 9 IF BIT 9 IS ON, ALL WRITE/READ FUNCTIONS WILL
 BE IN THE DELETED DATA MODE.
BIT 8,7,6 SELECTS A DATA PATTERN TO BE USED.
BIT 5,4,3 SELECTS A TEST TO BE PERFORMED.
BIT 2,1,0 SELECTS A HEAD MOVEMENT SEQUENCE.

THE SELECTIONS ARE DEFINED AS FOLLOWS:

P = DATA PATTERN SELECTION

0 DEFAULT TO 7
1 ZEROS
2 ONES
3 FLOATING ZERO
4 FLOATING ONE
5 125
6 314
7 RANDOM

T = FUNCTIONAL TESTS

0 DEFAULT TO 7
1 WRITE ONLY
2 WRITE/READ
3 WRITE/READ CHECK
4 READ CHECK ONLY
5 READ ONLY (CRC CHECK)
6 WRITE/READ CHECK ON ALTERNATING DRIVES *
7 WRITE/READ/READ CHECK **

* NOTE: TEST 6 WRITES THEN READ CHECKS ANY SELECTED DATA PATTERN USING ANY TRACK SEQUENCE, BUT ONE TRACK AT A TIME. FIRST ON UNIT 0 THEN UNIT 1. WHEN BOTH UNITS HAVE ACCESSED THAT TRACK, IT GOES BACK TO UNIT 0 FOR THE NEXT TRACK, ETC.

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** NOTE: THE FIRST HALF OF TEST 7 FORCES THE TRACK SEQUENCE TO INCREMENT UP THROUGH ALL TRACKS DOING WRITE/READ CHECK FUNCTIONS. THIS VERIFIES THAT ALL TRACKS ARE ACCESSABLE. THE SECOND HALF OF THE PASS WILL USE THE SEQUENCE SELECTED BY THE OPERATOR AS INDICATED BELOW, AND ONLY READ CHECK THE DATA JUST WRITTEN. THIS VERIFIES THAT THE DATA CAN BE READ FROM A TRACK AFTER THE HEAD HAS BEEN MOVED AWAY FROM AND BACK TO THAT TRACK. AT THE COMPLETION OF THE PASS THE DELETED DATA BIT IN TEST CONDITIONS IS COMPLEMENTED AND THE NEXT PASS WILL BE RUN UNDER THIS NEW CONDITION.

S = TRACK SEQUENCING

0	DEFAULT TO 7
1	INCREMENT
2	DECREMENT
3	INCREMENT/DECREMENT
4	BOUNCE
5	DECREASING BOUNCE
6	STROBE
7	RANDOM

IF NO BITS ARE SET (ZEROED "DTESTP:") THEN THE PROGRAM WILL SELECT ALL DRIVE UNITS THAT ARE READY AND DEFAULT TO TEST CONDITIONS AS INDICATED.

THE PROGRAM NEXT PRINTS THE REGISTER AND VECTOR ADDRESSES IT WILL USE IN COMMUNICATING WITH THE RX11 SYSTEM. AS EXPLAINED IN SECTION 2.3.1 THE OPERATOR MUST VERIFY THAT THESE ADDRESSES ARE THE ONES JUMPED ON THE RX11 INTERFACE BOARD.

2.4 OPERATOR ACTION TO RUN THE PROGRAM

2.4.1 STARTING THE PROGRAM

SET THE DESIRED STARTING ADDRESS INTO THE SWITCH REGISTER, DEPENDING UPON THE TYPE OF CONSOLE AVAILABLE, LOAD ADDRESS, AND PRESS START.

THE PROGRAM WILL TYPE ITS "MAINDEC" NUMBER AND REVISION, AND DEPENDING UPON THE STARTING ADDRESS DO THE FOLLOWING:

- SA200 - THE PROGRAM WILL TYPE DRIVE AND TEST PARAMETERS, THE TWO REGISTER ADDRESSES, AND VECTOR ADDRESS. IT WILL THEN BEGIN FUNCTIONAL TESTING, AND INFORMATION COLLECTION.
- SA202 - THE PROGRAM WILL CONFIGURE TO CONDITIONS SET IN PREVIOUS "INITIAL START", PRINT OUT THESE CONDITIONS AND CONTINUE FUNCTIONAL TESTING AND DATA COLLECTING. THE ONLY OPERATOR ACTION REQUIRED IS THE DYNAMIC SELECTION OF OPERATING CONDITIONS IN THE SWITCH REGISTER AS REQUIRED.
- SA204 - THIS PROGRAM WILL REPORT VIA THE TELEPRINTER ALL DATA COLLECTED. NO OTHER OPERATOR ACTION IS REQUIRED.

2.4.2 OPERATING CONDITIONS

THE PROGRAM CHECKS FOR OPERATING CONDITIONS AT VARIOUS POINTS WHILE RUNNING. IF THERE IS A HARDWARE SWR THESE CONDITIONS CAN BE CHANGED AND SET WHILE THE PROGRAM IS RUNNING. IF THE SOFTWARE SWR IS IN USE, THEN THESE CONDITIONS MUST BE SET IN LOCATION 176 BEFORE THE PROGRAM STARTS.

SW15 = HALT ON ERROR
 SW14 = HALT AT END OF PASS
 SW13 = DON'T PRINT ERROR MESSAGE
 SW12 = TYPE ONLY 10 DATA ERRORS
 SW11 = NO RETRY ON ERROR. LOG HARD ERROR
 SW08 = NO RECALIBRATION ON SEEK ERRORS
 SW15-SW0 (1) = SELECT SOFTWARE SWITCH REGISTER

NOTE: IF THERE IS A HARDWARE SWITCH REGISTER, AND THE OPERATOR WANTS THE SOFTWARE SWITCH REGISTER. PUT ALL SWITCHES UP (1) BEFORE STARTING THE PROGRAM AT THE INITIAL START ADDRESS.

THE PROGRAM WILL PRINT A "DRIVE(S)" SELECTED CONFIRMATION MESSAGE THAT IT WAS SUCCESSFUL IN FINDING AT LEAST ONE DRIVE READY (DRY) CONDITION ON AN OPERATOR SELECTED DRIVE OR EITHER OR BOTH IF NO SELECTION WAS MADE. THE DRIVES CONFIRMED AS BEING SELECTED BY THE PROGRAM MAY DIFFER FROM THAT SELECTED BY THE OPERATOR IF THE PROGRAM DETECTED A DRIVE TO BE NOT READY.

IF HOWEVER THERE ARE NO DRIVES IN THE DRIVE READY CONDITION THE PROGRAM WILL TYPE "NO DRIVES READY" AND HALT, AS IT CAN'T FUNCTION WITH NO DRIVES READY. WHEN THE REASON FOR ALL DRIVES TO BE NOT READY IS FOUND AND CORRECTED, THE OPERATOR MAY PRESS CONTINUE AND THE PROGRAM WILL GO BACK TO "INITIAL START" OR HE MAY RELOAD THE STARTING ADDRESS HIMSELF.

AS WELL AS "DRIVE(S)" SELECTED THE PROGRAM WILL TYPE OUT THE TEST PARAMETERS SELECTED OR DEFAULTED TO. IF NON-STANDARD TRACK AND/OR SECTOR ADDRESS LIMITS WERE SELECTED (SEE SECTION 2.3.2 OF THIS DOCUMENT) THESE LIMITS WILL ALSO BE PRINTED OUT FOR VERIFICATION BY THE OPERATOR.

2.4.3 ACT11 & XXDP HOOKS

THE PROGRAM HAS THE NECESSARY LOCATIONS SET UP FOR OPERATION UNDER ACT11 AND XXDP OPERATION. THE PROGRAM LOOKS AT THE LOADING MEDIA LOCATION AND IF IT CONTAINS THE NUMBER 10, INDICATING THE FLOPPY DISK LOADED THE PROGRAM, WILL TYPE THE FOLLOWING PROMPT MESSAGE & WAIT FOR A USER RESPONSE:

"CAUTION - IF YOU DESIRE TO TEST UNIT 0
 REPLACE LOAD MEDIUM WITH A SCRATCH DISKETTE
 THEN PRESS CONTINUE"

THUS, IF THE OPERATOR WISHES TO TEST DRIVE UNIT 0, AFTER LOADING THE PROGRAM, HE REMOVES THE LIBRARY DISKETTE FROM DRIVE 0, INSERTS A SCRATCH DISKETTE INTO DRIVE 0, AND PRESSES THE 'CONTINUE' SWITCH

2.5 PROGRAM OPTIONS

THERE ARE A COUPLE OF WAYS THE PROGRAM CAN BE SET UP TO RUN FOR OPTIONAL TESTING.

2.5.1 PSEUDO - SCOPE LOOP

BY SETTING THE ADDRESS LIMITS IN OD AND OR FIRST TO ONE OF TWO TRACKS AND OR SECTORS IT IS POSSIBLE TO PRODUCE A FAIRLY TIGHT PSEUDO - SCOPE LOOP. BY RUNNING ONLY A TEST THAT DOES WRITE ONLY OR READ ONLY ITS POSSIBLE TO SCOPE SPECIFIC FUNCTIONS, I.E. FILL BUFFER, WRITE, READ, EMPTY BUFFER.

2.5.2 DISKETTE COMPATABILITY

TO CHECK FOR DATA TRANSFER COMPATABILITY BETWEEN DRIVE UNITS USE THE FOLLOWING PROCEDURE. (IT IS ASSUMED THE SYSTEM HAS DUAL DRIVE RX01, IF NOT YOU MAY TEST COMPATABILITY BETWEEN DIFFERENT RX11 SYSTEMS BY RUNNING THE SAME TESTS ON BOTH.) THIS TEST INSURES PROPER HEAD ALIGNMENT.

- A. HAVE DISKETTES IN BOTH DRIVES AND DRIVES READY.
- B. CLEAR THE OD/ID AND FIRST/LAST MEMORY LOCATION, FOR TOTAL DISKETTE TRANSFERS.
- C. LOAD THE INITIAL START ADDRESS (LOC 200) AND START THE PROGRAM RUNNING.
- D. SET LOCATION "DTESTP" FOR "DRIVE AND TEST CONDITIONS" ON BOTH DRIVES, ANY "P"ATTERN OF DATA, "S"SEQUENCE #1 (INCRIMENT TRACKS TO INSURE ALL HEAD POSITIONS ARE ALIGNED) AND "T"EST 3 (WRITE/READ CHECK). THIS WILL WRITE THEN READ AND VERIFY THE DATA ON BOTH DISKETTES.
- E. ALLOW THE PROGRAM TO RUN FOR AT LEAST 1 COMPLETE PASS.

NOTE: IF RANDOM PATTERN (0 OR 7) IS SELECTED YOU MUST HALT AT THE END OF THE FIRST PASS, AS ADDITIONAL PASSES CHANGES THE DATA AND YOU WILL GET DATA ERRORS WHEN YOU TRY TO REREAD.

TO HALT AT THE END OF PASS PUT SW14 UP (1) WHEN "OPERATING CONDITIONS" ARE REQUESTED BY THE PROGRAM.

- F. AFTER COMPLETION OF THE PASS, PROGRAM HALTED. SWAP DISKETTES, AND AS YOU ONLY WANT TO READ VERIFY THE DATA, START THE PROGRAM AGAIN AT LOC 200 (INITIAL START).
- G. WHEN REQUESTED SELECT THE SAME DRIVES, PATTERN, AND SEQUENCE, BUT SELECT TEST 4 (READ CHECK ONLY).
- H. ALLOW THE PROGRAM TO RUN AS LONG AS YOU WISH TO VERIFY THAT DATA WRITTEN AND CHECKED ON ONE DRIVE CAN BE READ AND VERIFIED ON THE OTHER DRIVE.

2.5.3 RX11 TO RX8 COMPATABILITY

TO WRITE A DISKETTE ON THE RX11 AND READ/VERIFY THE SAME DATA ON A RX8 REQUIRES THE FOLLOWING:

A. SET UP LOCATION "DTESTP" (1212) WITH ONE OF THE FOLLOWING DATA PATTERNS

P=1	(0'S)	
P=2	(1'S)	
P=5	(125)	*
P=6	(314)	*

* NOTE: IF ONE OF THESE PATTERNS IS SELECTED A MODIFICATION TO THE PROGRAM MUST BE MADE TO ALLOW THIS DATA TO BE READ ON A RX8 SYSTEM. THE MODIFICATION IS IN THE "PAT125" ROUTINE, THE TWO (2) LOCATIONS CONTAINING THE "COMB DATABYTE" INSTRUCTION MUST BE CHANGED TO TWO (2) NOP'S (OCTAL 000240)

B. SET IN "DTESTP" TEST 3 WHICH WILL WRITE AND READ CHECK THE DATA THEREBY VERIFYING THE QUALITY OF THE DATA PRIOR TO THE DISKETTE SWAP.

SET THE SEQUENCE TO 1 TO INSURE THAT ALL TRACKS HAVE BEEN WRITTEN ON.

C. HALT THE PROGRAM AT THE COMPLETION OF ONE PASS.

D. THE DISKETTE IS NOW READY TO BE READ ON THE RX8 SYSTEM. SEE MD-8-DIRXB-* FOR THE PROCEDURE TO READ THIS DISKETTE.

TO READ A DISKETTE THAT WAS WRITTEN ON A RX8 SYSTEM SET UP AS FOLLOWS:

E. SET IN "DTESTP" THE DATA PATTERN THAT WAS USED BY THE RX8 SYSTEM. (SEE NOTE UNDER SECTION A.)

F. SET "DTESTP" FOR TEST 4 (READ CHECK ONLY) AND SEQUENCE 1 TO CHECK ALL TRACKS. START THE PROGRAM, IT SHOULD RUN WITHOUT DATA ERRORS.

2.6 RUN TIME

RUN TIME PER PASS DEPENDS UPON NUMBER OF A FUNCTIONS IN THE TEST SELECTED AND THE TRACK SEQUENCE.

EXAMPLES OF RUN TIMES FOLLOW.

(THESE TIMES ARE FOR 1 DRIVE AND COMPLETE DISKETTE MAXIMUM ID/OD, FIRST/LAST LIMITS. IF OPERATING ON 2 DRIVES DOUBLE THE TIME.)

THESE TIMES ARE FOR A PDP 11/05 PROCESSOR AND MAY CHANGE SLIGHTLY FOR A FASTER PROCESSOR.

TEST SELECTION	P	T	S	TIME/PASS
	7	6	5	3 MIN.30 SEC.
	7	7	4	2 MIN.47 SEC.
	7	7	7	2 MIN.23 SEC.
	6	3	4	1 MIN.46 SEC.
	7	3	1	1 MIN.30 SEC.
	7	1	1	51 SEC.

NOTE: DUE TO THE SLOW SPEED OF THE LSI 11 PROCESSOR, THE RUN TIME IS ABOUT DOUBLE THAT LISTED ABOVE. TO SPEED UP THE RUNNING OF THIS PROGRAM IN THE LSI 11 YOU CAN CHANGE THE INTERLEAVE FACTOR, OF THE SECTORS, USED IN THE PROGRAM. TO DO THIS CHANGE THE CONTENTS OF LOCATION "THREE" FROM OCTAL 3 TO OCTAL 5.

3.0 ERROR DETECTION

3.1 PROGRAM DEFINITIONS

ON MOST ERRORS THE PROGRAM WILL TYPE OUT THE CONTENTS OF "STATUS A" AND "STATUS B".

STATUS A IS THE CONTENTS OF THE RXES (ERROR AND STATUS REGISTER) AT THE TIME THE ERROR IS DETECTED. IT SHOWS THE CRC, PAR, ETC. ERRORS.

STATUS B IS THE "DEFINITIVE ERROR CODES" THAT THE RX01 DETECTED, THAT MAY HAVE CAUSED THE ERROR CONDITION. THESE ERROR CODES ARE DEFINED IN SECTION 3.2.

THE PROGRAM HAS DEFINED THE FOLLOWING AS ERRORS.

3.1.1 WRITE ERROR

A WRITE ERROR IS A RETRIED READ ERROR-IF THE DATA BEING READ IS OF UNKNOWN QUALITY (THE DATA READ IS BEING READ FOR THE FIRST TIME AFTER A WRITE FUNCTION)

3.1.2 READ (CRC) ERROR

A READ ERROR IS A RETRIED READ ERROR WHERE THE QUALITY OF THE DATA BEING READ IS KNOWN GOOD. (THE DATA HAS BEEN READ CORRECTLY SOME TIME PREVIOUSLY.)

3.1.3 CRC AND DATA ERROR

3.1.4 NO CRC ERROR BUT DATA ERROR

3.1.5 CRC ERROR BUT NO DATA ERROR

THE ABOVE THREE ERRORS ARE DETECTED WHEN THE PROGRAM IS VERIFYING THE DATA READ OFF THE DISKETTE AGAINST THE DATA THAT SHOULD HAVE BEEN READ.

UPON A NON-COMPARISON THE PROGRAM TYPES OUT THE "BYTE" NUMBER IN THE SECTOR, THE DATA READ FROM THE DISKETTE "BAD" AND THE EXPECTED DATA "GOOD".

THE DATA PATTERNS ARE FORMATTED AS SHOWN)

0	(TRACK ADDRESS; BITS 6 - 0)
1	(SECTOR ADDRESS; BITS 4 - 0)

BYTES 2 THROUGH 125 CONTAIN THE SELECTED "P"ATTERN.

126	(THE SUM OF ALL BYTES 0 - 125)
127	(THE NEGATIVE OF 2 TIMES BYTE 126)

THE PROGRAM DETECTS A CHECKSUM ERROR BY SUMMING ALL THE DATA READ FROM THE DISKETTE AND COMPARING THAT SUM TO 0.

AT THE END OF THE DATA ERROR TYPEOUT THE PROGRAM TYPES OUT IF THE CHECK SUM ACCUMULATED IS "GOOD" OR HAD "ERRORS". IF BYTES 0 OR 1 HAVE DATA ERRORS THE OPERATOR MUST CHECK THE RESULTS OF THE CHECK SUM. IF IT IS ALSO BAD, THEN THERE WAS A TRUE DATA ERROR. IF THE CHECK SUM IS GOOD, THEN IT MIGHT BE THAT THE HEAD IS NOT OVER THE TRACK EXPECTED, AND THERE IS A POSITIONING ERROR.

3.1.6 SEEK ERROR

A SEEK ERROR IS DEFINED AS NOT A CRC AND NOT A PARITY ERROR. A PROGRAMED RECALIBRATE IS ISSUED TO TRY TO CORRECT EACH SEEK ERROR.

3.1.7 PARITY ERROR

A PARITY ERROR RESULTS FROM AN INCORRECT TRANSFER OF A COMMAND WORD FROM THE RX11 INTERFACE TO THE RX01 MICRO-PROCESSOR CONTROLLER.

3.2 DEFINITIVE ERROR CODES

THE RXD1 MICROCONTROLLER HAS DEFINED THE ERROR CODES AND MEANINGS WHICH ARE AVAILABLE TO THE PROGRAM BY ISSUING COMMAND #7 "READ THE B-CODE STATUS REGISTER".

A DEFINITIVE ERROR CODE REPRESENTS (WHERE) WITHIN A FUNCTION AN ERROR WAS DETECTED.

THE FOLLOWING ARE THE DEFINITIVE ERROR CODES AND MEANINGS:

- 00 - NO ERROR
- 10 - DRIVE 0 FAILED TO SEE HOME FROM INITIALIZE
- 20 - DRIVE 1 FAILED TO SEE HOME FROM INITIALIZE
- 30 - HOME FOUND WHEN STEPPING OUT 10 TRACKS FROM INIT
- 40 - TRIED TO ACCESS A TRACK GREATER THAN 7(DECIMAL)
- 50 - HOME WAS FOUND BEFORE DESIRED TRACK
- 60 - SELF DIAGNOSTIC ERROR
- 70 - DESIRED SECTOR NOT FOUND AFTER SAMPLING 52 HEADERS
- 100 - WRITE PROTECT ERROR
- 110 - MORE THAN 40US AND NO SEP CLOCK DETECTED
- 120 - A PREAMBLE COULD NOT BE FOUND
- 130 - PREAMBLE FOUND BUT NO ID MARK FOUND IN TIME
- 140 - CRC ERROR ON SUPPOSIDLY GOOD HEADER
- 150 - GOOD HEADER (NO CRC ERROR) BUT TRACK COMPARE ERROR
- 160 - IDAM NOT FOUND IN TIME
- 170 - DATA AM NOT FOUND IN TIME
- 200 - DATA CRC ERROR
- 210 - ALL PARITY ERRORS

3.3 UNEXPECTED OR MISSING ERROR CONDITIONS

3.3.1 MISSING DD MARK

AN ERROR WHEN THE PROGRAM WROTE DELETED DATA INFORMATION BUT NO DELETED DATA MARK WAS DETECTED WHEN THE DATA WAS READ.

3.3.2 UNEXPECTED DD MARK

AN ERROR WHEN A DELETED DATA MARK IS DETECTED BUT NO DELETED DATA WAS WRITTEN.

3.3.3 NO INTERRUPT ON DONE

THE INTERRUPT ENABLE BIT WAS SET AND THE DONE FLAG WAS SET BUT NO INTERRUPT OCCURRED.

3.3.4 UNKNOWN INTERRUPT

IF AN INTERRUPT OCCURS FROM ANY OTHER DEVICE WHILE THIS PROGRAM IS RUNNING IT WILL HALT AT THE INTERRUPT VECTOR LOCATION.

IF AN INTERRUPT OCCURS ON INTERRUPT VECTOR LOCATION 264 (RX11), AND THERE IS NO ERROR, DONE, OR ERROR STATUS CONDITION SET, THEN IT WILL BE TAGGED AS AN UNKNOWN INTERRUPT.

3.4 POWER FAILURE

THE PROGRAM TESTS FOR TWO TYPES OF POWER FAILURE, TOTAL SYSTEM POWER LOSS AND RX11 POWER LOSS RESULTING IN A RECALIBRATION OF THE DRIVES.

THE TOTAL SYSTEM POWER FAILURE IS DETECTED BY THE "SYSMAC" SUBROUTINE .SPOWER. WHEN THE POWER IS DETECTED TO BE GOING DOWN, THE REGISTERS ARE SAVED. WHEN THE POWER COMES BACK UP THE REGISTERS ARE RESTORED AND THE MESSAGE "POWER" IS PRINTED. THE PROGRAM THEN AUTOMATICALLY DOES A RESTART.

LOSS OF POWER IN THE RX11 CAUSES A RECALIBRATION OF ALL DRIVES. WHEN THIS HAPPENS, THE "INIT DONE" BIT IS SET IN THE THE RXES REGISTER ALONG WITH THE NORMAL "DONE" FLAG. AT EACH INTERRUPT THE PROGRAM TESTS FOR INIT DONE. IF IT IS FOUND TRUE, THE FUNCTION WAS NOT COMPLETED AND A POWER LOSS MUST HAVE BEEN DETECTED. WHEN THIS HAPPENS THE PROGRAM TYPES OUT "RX11 POWER" AND DOES AN AUTOMATIC RESTART.

IF THERE ARE REPEATED, NOTHING ELSE HAPPENS BUT, RX11 POWER MESSAGES THE INIT DONE FLAG MIGHT BE STUCK ON.

3.5 PROGRAM HUNG

THERE ARE MANY PLACES WHERE THE PROGRAM MUST WAIT FOR AN OPERATION TO BE COMPLETED IN THE RX01. THESE ARE WAITING FOR THE "DONE" FLAG TO INDICATE A FUNCTION IS COMPLETED, OR WAITING FOR A TRANSFER REQUEST "TR" FLAG TO SEND OR RECEIVE THE NEXT BYTE OF INFORMATION. IF THE RX11 DOES NOT COME BACK WITH EITHER OR BOTH OF THESE FLAGS THE PROGRAM WOULD HANG UP.

TO INHIBIT THIS FROM HAPPENING THERE ARE TWO SUBROUTINES USED TO CHECK FOR THESE TWO FLAGS.

THE "DONECK" LOOKS FOR THE DONE FLAG AND IF IT IS NOT SEEN WITHIN A SPECIFIC TIME THE "TEST HUNG" MESSAGE IS PRINTED AND THE PROGRAM HALTS. IN REGISTER 3 (177703) IS THE RETURN ADDRESS OF THE TEST THAT IS WAITING FOR THE DONE FLAG.

"TRCK" LOOKS FOR THE "TR" FLAG. IF IT IS NOT SEEN WITHIN A SPECIFIC TIME IT ALSO PRINTS THE "TEST HUNG" MESSAGE AND HALTS. IN THE SP (177706) IS THE RETURN ADDRESS OF THE TEST WAITING FOR THE TR FLAG.

THE WAITING TIME FOR THE TWO FLAGS DEPENDS UPON THE HOST PROCESSOR AS INDICATED BELOW:

"DONE" WAIT	11/45 BIPOL 14 SEC.
	11/05 CORE 62 SEC.
"TR" WAIT	11/45 BIPOL .44 SEC.
	11/05 CORE 2 SEC.

4.C ERROR REPORTING

ALL ERRORS DETECTED WILL BE REPORTED IF SW13 = 0 FOR OPERATING CONDITIONS. IF SW12 = 1 THEN ONLY 10 DATA ERRORS FOR 1 SECTOR WILL BE REPORTED, AND A TOTAL OF DATA ERRORS FOR THAT SECTOR WILL BE REPORTED AT THE END OF THE SECTOR.

THE END OF PASS INDICATOR TYPED, ALSO INDICATES WHETHER ANY ERRORS OCCURED DURING THAT PASS. IF THERE WERE NO ERRORS THEN A "*" IS PRINTED. IF THERE WERE ERRORS THEN A "-" IS PRINTED. THE TOTAL ACCUMULATED ERRORS AND SYSTEMS OPERATION IS REPORTED BY THE "ERROR DUMP" PROGRAM.

5.0 HALTS

THERE ARE VARIOUS HALT LOCATIONS THROUGHOUT THE PROGRAM. SOME ARE THE RESULTS OF "HARD" ERRORS OTHERS ARE WAITING FOR INTERVENTION. THEY ARE LISTED BELOW:

HALT #	TYPE	DEFINITION
HLT1:	NO ERROR	: CAUTION - LOAD MEDIUM ON UNIT 0
HLT3:	ERROR	: ERRORS FOUND ON RECAL FUNCTIONS
HLT4:	ERROR	: HARD PARITY ERRORS
HLT5:	ERROR	: NO DRIVES READY
HLT6:	ERROR	: SW15 SET ON PARITY ERROR
HLT7:	ERROR	: SW15 SET ON SEEK ERROR
HLT10:	ERROR	: SW15 SET ON CRC GENERATOR ERROR (NO DATES ERROR)
HLT11:	ERROR	: HARD CRC GENERATOR ERROR (NO DATA ERRORS)
HLT12:	ERROR	: SW15 SET ON DATA CRC ERROR
HLT13:	ERROR	: SW15 SET ON MISSING DETECTED DATA ERROR
HLT14:	ERROR	: SW15 SET ON DATA NO CRC ERROR
HLT15:	ERROR	: SW15 SET ON MISSING INTERRUPT AT DONE
HLT16:	NO ERROR	: HALT AT END OF PASS
HLT17:	NO ERROR	: HALT AT END OF ERROR DUMP
HLT20:	ERROR	: PROGRAM HUNG WAITING FOR DONE
HLT21:	ERROR	: PROGRAM HUNG WAITING FOR TR FLAG

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.NLIST CND,MD,MC
.LIST ME
.ENABL ABS,AMA
.MCALL .HEADER,.EQUAT,.SETUP,.\$TYPE,.\$STYPOCT,.SREAD
.MCALL .SPOWER,STARS,.\$DB2D,.\$SB2D,.\$SAVE,.\$TRAP,GETSWR

F02

.TITLE MAINDEC-11-DZRXA-E
;*COPYRIGHT (C) MARCH 21, 1976
;*DIGITAL EQUIPMENT CORP.
;*MAYNARD, MASS. 01754
*
;*PROGRAM BY DAVID L ADAMS
*
;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
;*PACKAGE (MAINDEC-11-DZQAC-CO), MAR 21, 1976.
*
\$TN=1
\$SWR=160000 ;,HALT ON ERROR, LOOP ON TEST, INHIBIT ERROR TYP0UT

000001
160000

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.SBTTL BASIC DEFINITIONS

001200

;*INITIAL ADDRESS OF THE STACK POINTER *** 1200 ***
\$STACK= 1200
;EQUIV EMT,EPROR ;,BASIC DEFINITION OF ERROR CALL
;EQUIV IOT,SCOPE ;,BASIC DEFINITION OF SCOPE CALL

;*MISCELLANEOUS DEFINITIONS

000011
000012
000015
000200
177776

HT= 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


```

57      177774      STKLM= 177774      ;;STACK LIMIT REGISTER
58      177772      PIRQ= 177772      ;;PROGRAM INTERRUPT REQUEST REGISTER
59      177570      DSWR= 177570      ;;HARDWARE SWITCH REGISTER
60      177570      DDISP= 177570      ;;HARDWARE DISPLAY REGISTER
61
62      ;;*GENERAL PURPOSE REGISTER DEFINITIONS
63      000000      R0= %0      ;;GENERAL REGISTER
64      000001      R1= %1      ;;GENERAL REGISTER
65      000002      R2= %2      ;;GENERAL REGISTER
66      000003      R3= %3      ;;GENERAL REGISTER
67      000004      R4= %4      ;;GENERAL REGISTER
68      000005      R5= %5      ;;GENERAL REGISTER
69      000006      R6= %6      ;;GENERAL REGISTER
70      000007      R7= %7      ;;GENERAL REGISTER
71      .EQUIV R6,SP      ;;STACK POINTER
72      .EQUIV R7,PC      ;;PROGRAM COUNTER
73
74      ;;*PRIORITY LEVEL DEFINITIONS
75      000000      PR0= 0      ;;PRIORITY LEVEL 0
76      000040      PR1= 40      ;;PRIORITY LEVEL 1
77      000100      PR2= 100      ;;PRIORITY LEVEL 2
78      000140      PR3= 140      ;;PRIORITY LEVEL 3
79      000200      PR4= 200      ;;PRIORITY LEVEL 4
80      000240      PR5= 240      ;;PRIORITY LEVEL 5
81      000300      PR6= 300      ;;PRIORITY LEVEL 6
82      000340      PR7= 340      ;;PRIORITY LEVEL 7
83
84      ;;*"SWITCH REGISTER" SWITCH DEFINITIONS
85      100000      SW15= 100000
86      040000      SW14= 40000
87      020000      SW13= 20000
88      010000      SW12= 10000
89      004000      SW11= 4000
90      002000      SW10= 2000
91      001000      SW09= 1000
92      000400      SW08= 400
93      000200      SW07= 200
94      000100      SW06= 100
95      000040      SW05= 40
96      000020      SW04= 20
97      000010      SW03= 10
98      000004      SW02= 4
99      000002      SW01= 2
100     000001      SW00= 1
101     .EQUIV SW09,SW9
102     .EQUIV SW08,SW8
103     .EQUIV SW07,SW7
104     .EQUIV SW06,SW6
105     .EQUIV SW05,SW5
106     .EQUIV SW04,SW4
107     .EQUIV SW03,SW3
108     .EQUIV SW02,SW2
109     .EQUIV SW01,SW1
110     .EQUIV SW00,SW0
111
112     ;;*DATA BIT DEFINITIONS (BIT00 TO BIT15)

```


113	100000	BIT15=	100000
114	040000	BIT14=	40000
115	020000	BIT13=	20000
116	010000	BIT12=	10000
117	004000	BIT11=	4000
118	002000	BIT10=	2000
119	001000	BIT09=	1000
120	000400	BIT08=	400
121	000200	BIT07=	200
122	000100	BIT06=	100
123	000040	BIT05=	40
124	000020	BIT04=	20
125	000010	BIT03=	10
126	000004	BIT02=	4
127	000002	BIT01=	2
128	000001	BIT00=	1
129		.EQUIV	BIT09,BIT9
130		.EQUIV	BIT08,BIT8
131		.EQUIV	BIT07,BIT7
132		.EQUIV	BIT06,BIT6
133		.EQUIV	BIT05,BIT5
134		.EQUIV	BIT04,BIT4
135		.EQUIV	BIT03,BIT3
136		.EQUIV	BIT02,BIT2
137		.EQUIV	BIT01,BIT1
138		.EQUIV	BIT00,BIT0
139			
140		;*BASIC "CPU" TRAP VECTOR ADDRESSES	
141	000004	ERRVEC= 4	:: TIME OUT AND OTHER ERRORS
142	000010	RESVEC= 10	:: RESERVED AND ILLEGAL INSTRUCTIONS
143	000014	TBITVEC=14	:: "T" BIT
144	000014	TRTVEC= 14	:: TRACE TRAP
145	000014	BPTVEC= 14	:: BREAKPOINT TRAP (BPT)
146	000020	IOTVEC= 20	:: INPUT/OUTPUT TRAP (IOT) **SCOPE**
147	000024	PWRVEC= 24	:: POWER FAIL
148	000030	EMTVEC= 30	:: EMULATOR TRAP (EMT) **ERROR**
149	000034	TRAPVEC=34	:: "TRAP" TRAP
150	000060	TKVEC= 60	:: TTY KEYBOARD VECTOR
151	000064	TPVEC= 64	:: TTY PRINTER VECTOR
152	000240	PIRQVEC=240	:: PROGRAM INTERRUPT REQUEST VECTOR
153			
154			
155		;SPECIAL EQUATES	
156			
157			
158	000013	RD0STAT	=13
159	000033	RD1STAT	=33
160	000017	RDER	=17
161	000040	DONEBIT	=40
162	000101	FBIE	=101
163	000103	EBIE	=103
164	000105	WRTIE	=105
165	000107	RDIE	=107
166	000115	WTDDIE	=115
167	040001	RECAL	=40001
168	000200	PR4	=200

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169	000340		PR7	=340	
170	000000		OPEN	=0	
171					
172	000000		.=0		
173	000000	000000		.WORD 0,0	
174					
175	000024		.=24		
176	000024	013764		\$PWRDN	
177	000026	000340		340	
178					
179	000034		.=34		
180	000034	013716		\$TRAP	;ADDRESS OF TRAP SERVICE
181	000036	000340		340	
182					
183	000046		.=46		
184	000046	011130		LOGICAL	;ACT11 EOP HOOK
185					
186	000052		.=52		
187	000052	000000		.WORD 0	
188					
189	000174	000174	.=174		
190	000174	000000	DISPREG:	0	
191	000176	000000	SWREG:	0	

;;*****

; STARTING ADDRESSES

; INITIAL START	=200	/CLEARS ALL ERROR LOGS, RESETS COUNTERS, AND ALLOWS FOR
		/SELECTION OF DRIVES AND TEST CONDITIONS
; RESTART	=202	/USES PREVIOUS INITIAL START DRIVES AND TEST
		/SELECTION AND CONTINUES TO ACCUMULATE STATISTICAL DATA
; ERROR REPORT	=204	/PRINTS OUT ALL RUN AND ERROR CONDITIONS
		/ACUMULATED OVER THE RUN OF THE PROGRAM.

.=200

209	000200			BR 1\$	
210	000200	000402		BR 2\$	
211	000202	000403		BR 3\$	
212	000204	000404			
213	000206	000137	001220	1\$: JMP SA200	; OPERATOR SELECTED CONDITIONS
214	000212	000137	002700	2\$: JMP RESTART	; RESTART PROGRAM WITH PREVIOUS CONDITIONS
215	000216	000137	021062	3\$: JMP ERDUMP	; STATISTICAL ERROR PRINT OUT

;;*****

; THE FOLLOWING LOCATIONS "OD" "ID" "FIRST" AND "LAST"
 ; MAY BE CHANGED BY THE OPERATOR MANUALLY HOWEVER FOLLOWING THESE RESTRICTIONS.
 ; (IF THESE LOCATIONS ARE LEFT CLEARED, MAX AND MIN VALUES ARE ASSUMED)

; 1. DEFINITIONS:

```

OD=ADDRESS OF TRACK AT OUTER DIAMETER (MIN VALUE=0)
ID=ADDRESS OF TRACK AT INNER DIAMETER (MAX VALUE=114 [OCTAL])
FIRST=ADDRESS OF FIRST SECTOR OF TRACK (MIN VALUE=1)
LAST=ADDRESS OF LAST SECTOR OF TRACK (MAX VALUE=32 [OCTAL])

```

```

2. LOCATIONS:
   TRACKS  LOC. 1200 BITS 14-----8 6-----0
                        ID      OD
   SECTORS LOC. 1202 BITS 12-----8 4-----0
                        LAST    FIRST

```

3. RESTRICTIONS:
THE CONTENTS OF "OD" MUST BE $\leq$ THE CONTENTS OF "ID"
THE CONTENTS OF FIRST MUST BE $\leq$ THE CONTENTS OF "LAST"

```
001200      001200                      . = 1200
001200      000000          OD:                0
001200      001201          ID=OD+1
001202      000000          FIRST:              0
001202      001203          LAST=FIRST+1
```

```
;THE NEXT WORD IS THE LOCATION OF THE "INTERRUPT VECTOR" ADDRESS
;IF THE HARDWARE IS JUMPERED FOR OTHER THAN STANDARD (224) VECTOR
;ADDRESS, THEN LOAD INTO THIS LOCATION THE NEW VECTOR ADDRESS.
```

```
;IF THIS ADDRESS IS INCORRECT (DOES NOT MATCH THE HARDWARE) THE
;PROGRAM WILL HALT AT THE VECTOR ADDRESS THE HARDWARE IS JUMPERED
;TO, AS ALL OTHER VECTOR ADDRESSES WILL HAVE HALTS IN THEM.
```

*****NOTE*****

```

;THE INTERRUPT VECTOR ADDRESS CAN NOT BE SET FOR ADDRESSES 200
;THRU 243, AS THESE ADDRESS ARE USED BY THE PROGRAM

```

001204 000264 INTVEC: 264

```

.: *****

```

```

;THE FOLLOWING TWO WORDS CONTAIN THE DEVICE CODES FOR
;THE RX11 INTERFACE REGISTERS
;      RXCS = COMMAND STATUS REGISTER
;      RXDB = DATA BUFFER REGISTER (USED AT VARIOUS TIMES FOR:)
;              (RXTA = TRACK ADDRESS)
;              (RXSA = SECTOR ADDRESS)
;              (RXES = ERROR STATUS)
;

```

```

; IF THE RX11 SYSTEM UNDER TEST IS JUMPED FOR REGISTER
; ADDRESSES OTHER THAN STANDARD: RXCS = 177170
;                                RXDB = 177172
;

```

281 ; PLACE IN THESE TWO WORDS THE CORRESPONDING NEW ADDRESSES FOR
 282 ; THE REGISTERS. THE PROGRAM WILL TYPE OUT THE REGISTER
 283 ; ADDRESSES FOR VERIFICATION BY THE OPERATOR. IF THE ADDRESSES
 284 ; ARE INCORRECT (I.E. - DON'T MATCH THE HARDWARE) AND THE PROGRAM
 285 ; IS RUN WITH THE INCORRECT ADDRESSES, A 'HUNG' CONDITION WILL BE
 286 ; REPORTED AND THE PROGRAM WILL 'HALT' AS THE RX11 WILL NOT BE
 287 ; ABLE TO RESPOND TO COMMANDS.

288 ;*****
 289

290 001206 177170
 291 001210 177172

RXCS: 177170
 RXDB: 177172

292 ; BIT ASSIGNMENT IN THE RXCS REGISTER.
 293

294 KEY: R - READ ONLY BIT
 295 W - WRITE ONLY BIT

296 15 - R - ERROR FLAG
 297 14 - W - INITIALIZE (RECALIBRATE)
 298 13 -
 299 12 - NOT USED
 300 11 -
 301 10 -
 302 9 -
 303 8 -
 304 7 - R - TRANSFER REQUEST (TR) FLAG
 305 6 - R/W - INTERRUPT ENABLE
 306 5 - R - DONE FLAG
 307 4 - W - UNIT SELECT
 308 3 - W - FUNCTION
 309 2 - W - FUNCTION
 310 1 - W - FUNCTION
 311 0 - W - GO

312 ; FUNCTION CODES:
 313

314 0 + GO = FILL BUFFER
 315 2 + GO = EMPTY BUFFER
 316 4 + GO = WRITE SECTOR
 317 6 + GO = READ SECTOR
 318 10 (NOT USED)
 319 12 + GO = READ STATUS "A"
 320 14 + GO = WRITE DELETED DATA
 321 16 + GO = READ STATUS "B" (CODES)

322 ; THE FOLLOWING BIT ASSIGNMENTS REPRESENTS THE STATUS AT THE END OF A
 323 ; FUNCTION (EXCEPT FUNCTION "READ STATUS B") DISPLAYED IN THE
 324 ; RX DATA BUFFER (RXDB).
 325

326 15 -
 327 14 - NOT USED
 328 13 -
 329 12 -
 330 11 -
 331 10 -
 332 9 -
 333 8 -
 334 7 - SELECTED DRIVE READY *
 335 6 - DELETED DATA
 336 5 -
 337 4 -
 338 3 - WRITE PROTECT ERROR (WHEN AVAILABLE)
 339 2 - INITIALIZE DONE **

```

;      1 - PARITY ERROR
;      0 - CRC ERROR
; *   VISIBLE ONLY IF THE FUNCTION WAS A #12 "READ STATUS A"
; **  VISIBLE ONLY AFTER AN INITIALIZE [KEY] OR [PROGRAMMED] WAS ISSUED.
DTESTP:      .WORD 0      ;TEST SELECTION WORD
SWR:          .WORD DSWR   ;ADDRESS OF SWITCH REGISTER
DISPLAY:      .WORD DDISP  ; ADDRESS OF DISPLAY REGISTER
;;*****
; START OF OPERATOR SELECTABLE TEST DATA PATTERNS, AND DRIVE UNIT CONDITIONS
; SET THE TEST CONDITIONS WANTED (OR LEAVE 0) IN LOCATION CALLED
; "DTESTP" (LOC. 1212), BEFORE STARTING THE PROGRAM. WHEN THE PROGRAM
; STARTS IT WILL TYPE OUT THE TEST CONDITIONS IT IS OPERATING UNDER.
;
; SWITCH REGISTER BITS
;
; 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
; U1 U0      NOT USED   D P P P T T T S S S
;
; U1  SELECT DRIVE UNIT 1
; U0  SELECT DRIVE UNIT 0
; IF NEITHER DRIVE IS SPECIFIED, PROGRAM WILL SELECT ALL DRIVES
; THAT ARE READY
;
; D =   DELETED DATA FUNCTIONS
;
; IF THIS SWITCH IS ON ALL READ AND WRITE FUNCTIONS WILL BE IN THE
; DELETED DATA MODE
;
; P =   DATA PATTERN SELECTION
;       0 DO PATTERN 7 (RANDOM)
;       1 ZEROS
;       2 ONES
;       3 FLOATING ZERO
;       4 FLOATING ONE
;       5 125
;       6 314
;       7 RANDOM
;
; T =   FUNCTIONAL TESTS
;       0 DO TEST 7 (WRITE/READ/READ CHECK)
;       1 WRITE ONLY
;       2 WRITE/READ
;       3 WRITE/READ CHECK
;       4 READ CHECK ONLY
;       5 READ ONLY
;       6 WRITE/READ CHECK ON ALTERNATE DRIVES
;       7 WRITE/READ/READ CHECK *
;
; * NOTE: THE FIRST HALF OF TEST 7 FORCES THE TRACK SEQUENCE

```

```

001212 000000
001214 177570
001216 177570

```

```

;TO INCRIMENT UP THROUGH ALL THE TRACKS DOING WRITE / READ CHECK FUNCTIONS.
;THIS VERIFIES THAT ALL THE TRACKS ARE ACCESSABLE.
;THE SECOND HALF OF THE PASS WILL USE THE SEQUENCE SELECTED BY THE
;OPERATOR AS INDICATED BELOW, AND ONLY READ CHECK THE DATA JUST WRITTEN.
;THIS VERIFIES THAT THE DATA CAN BE READ FROM A TRACK, AFTER THE HEAD HAS BEEN
;MOVED AWAY FROM AND BACK TO THAT TRACK. AT THE COMPLETION OF THE PASS
;THE DELETED DATA BIT IN TEST CONDITIONS IS COMPLEMENTED AND THE NEXT
;PASS WILL BE RUN UNDER THIS NEW CONDITION.

```

```

S = TRACK SEQUENCING
      0 DO SEQUENCE 7 (RANDOM)
      1 INCREMENT
      2 DECREMENT
      3 INCREMENT/DECREMENT
      4 BOUNCE
      5 DECREASING BOUNCE
      6 STROBE
      7 RANDOM

```

```

;;*****

```

```

;SET THE OPERATING CONDITIONS IN THE SWITCH REGISTER (HARDWARE).
;OR THE SOFTWARE SWITCH REGISTER (LOC. 176) BEFORE STARTING THE PROGRAM.

```

```

;SWITCHES DO THE FOLLOWING WHEN SET TO "1".

```

```

SW 15 =HALT ON ERROR
SW 14 =HALT AT END OF TEST
SW 13 =DON'T PRINT ERROR MESSAGE
SW 12 =TYPE ONLY 10 DATA ERRORS
SW 11 =NO RETRY ON ERROR. LOG HARD ERROR

```

```

SW 8 =NO RECALIBRATION ON SEEK ERRORS

```

```

SW15 - SW0 =SELECT SOFTWARE SWITCH REGISTER

```

```

;;*****

```

435	001220	000005			SA200:	RESET	;INITIALIZE THE RX01
436	001222	012737	177570	001214		MOV #177570,SWR	;RESET TO HARDWARE SWR.
437	001230	012706	001200			MOV #STACK,SP	
438	001234	012746	000340			MOV #PR7,-(SP)	
439	001240	012746	001246			MOV #2\$,-(SP)	
440	001244	000002				RTI	
441	001246	104400	016554		2\$:	TYPE MREV	;PRINT NAME AND REVISION
442	001252	012737	001272	000004		MOV #3\$,4	;SET TIME OUT VECTOR
443	001260	022777	177777	177726		CMP #177777,2SWR	;IS SOFTWARE SWR SELECTED
444	001266	001402				BEG 4\$	;YES, INSERT IT'S ADDRESS
445	001270	000423				BR 5\$	;BRANCH IF NO TIMEOUT TRAP OCCURS
446	001272	022626			3\$:	CMP (SP)+,(SP)+	;RESTORE STACK AFTER TRAP
447	001274	012737	000176	001214	4\$:	MOV #SWREG,SWR	;POINT TO SOFTWARE SWITCH REG.
448	001302	012737	000174	001216		MOV #DISPREG,DISPLAY	;POINT TO SOFTWARE DISP. REG.

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 DZRXAE.P11 GET VALUE FOR SOFTWARE SWITCH REGISTER

```

449 .SBTTL GET VALUE FOR SOFTWARE SWITCH REGISTER
450 001310 005737 000042 TST 0#42 ;;ARE WE RUNNING UNDER XXDP/ACT?
451 001314 001006 BNE 64$ ;;BRANCH IF YES
452 001316 023727 001214 000176 CMP SWR,#SWREG ;;SOFTWARE SWITCH REG SELECTED?
453 001324 001005 BNE 65$ ;;BRANCH IF NC
454 001326 104404 GTSWR ;;GET SOFT-SWR SETTINGS
455 001330 000403 BR 65$
456 001332 112737 000001 013714 64$: MOV #1,$AUTOB ;;SET AUTO-MODE INDICATOR
457 001340 65$:
458 001340 012737 000006 000004 5$: MOV #6,4 ;RESTORE ERROR VECTOR
459 001346 013703 001204 MOV INTVEC,R3 ;SET INTERRUPT VECTOR LOCATIONS
460 001352 012723 007250 MOV #INTSERV,(R3)+
461 001356 012713 000340 MOV #340,(R3)
462 001362 012737 001234 012210 MOV #001234,RAN1 ;INITIALIZE CONSTANTS IN RANDOM NUMBER GENERATOR
463 001370 012737 000765 012212 MOV #000765,RAN2
464 001376 012705 017024 MOV #PARLOG,R5 ;SET UP TO CLEAR ALL COUNTERS
465 001402 005025 1$: CLR (R5)+ ;OF ERRORS,ACCESSES,AND PASSES
466 001404 022705 021044 CMP #PASCNT+2,R5 ;HAVE ALL COUNTERS BEEN CLEARED
467 001410 001374 BNE 1$
468 001412 012705 017004 START1: MOV #RDRETRY,R5 ;SET ALL RETRY COUNTERS TO 10
469 001416 012725 000012 3$: MOV #10,(R5)+
470 001422 022705 017024 CMP #SRETRY+2,R5
471 001426 001373 BNE 3$
472 001430 104400 015167 TYPE ,MRXCS ;TYPE OUT DEVICE REGISTER ADDRESSES
473 001434 013746 001206 MOV RXCS,-(SP) ;;SAVE RXCS FOR TYPEOUT
474 001440 104402 TYPOS ;;GO TYPE--OCTAL ASCII
475 001442 006 .BYTE 6 ;;TYPE 6 DIGITS
476 001443 000 .BYTE 0 ;;SUPPRESS LEADING ZEROS
477 001444 104400 015177 TYPE ,MRXDB
478 001450 013746 001210 MOV RXDB,-(SP) ;;SAVE RXDB FOR TYPEOUT
479 001454 104402 TYPOS ;;GO TYPE--OCTAL ASCII
480 001456 006 .BYTE 6 ;;TYPE 6 DIGITS
481 001457 000 .BYTE 0 ;;SUPPRESS LEADING ZEROS
482 001460 104400 015150 TYPE ,MINTVEC ;AND VECTOR ADDRESS
483 001464 013746 001204 MOV INTVEC,-(SP) ;;SAVE INTVEC FOR TYPEOUT
484 001470 104402 TYPOS ;;GO TYPE--OCTAL ASCII
485 001472 003 .BYTE 3 ;;TYPE 3 DIGIT(S)
486 001473 000 .BYTE 0 ;;SUPPRESS LEADING ZEROS
487 001474 004737 007122 JSR PC,DONECK ;WAIT FOR DONE BIT AFTER RECAL
488 001500 032777 000004 177502 BIT #BIT2,ARXDB ;IS INIT DONE SET
489 001506 001002 BNE 1$ ;YES SKIP NEXT INSTRUCTION
490 001510 104400 015535 TYPE ,INIT1 ;NO,PRINT NO INIT DONE ERROR
491 001514 005777 177466 1$: TST ARXCS ;WAS THERE AN ERROR ON START RECAL
492 001520 100002 BPL TE_TDR ;IF NOT CONTINUE
493 001522 004737 002550 JSR PC,HOME ;YES,DO RECAL AGAIN
494 001526 012737 000012 017014 TESTDR: MOV #10,P2RETRY ;SET THE PARITY RETRY COUNTER
495 001534 005037 010704 CLR UNITSEL ;CLEAR UNIT SELECTION WORD
496 001540 105777 177444 TSTB ARXDB ;IS DRY BIT SET FOR UNIT 0 AFTER RECAL
497 001544 100003 BPL 2$ ;IF NOT SKIP NEXT INSTRUCTION
498 001546 052737 000200 010704 BIS #BIT7,UNITSEL ;YES,SET UNIT 0 READY BIT
499 001554 032737 140000 001212 2$: BIT #140000,DTESTP ;WERE ANY DRIVES SPECIFIED
500 001562 001445 BEQ NOSEL ;NO,SEE IF UNIT 1 IS READY
501 001564 005737 001212 TST DTESTP ;WAS UNIT 1 SELECTED
502 001570 100044 BPL OPCOND ;NO,IT MUST BE UNIT 0
503 001572 004737 001614 JSR PC,DRY1 ;SEE IF UNIT 1 IS READY
504 001576 032737 040000 001212 BIT #40000,DTESTP ;WAS UNIT 0 SELECTED

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505	001604	001036			BNE OPCOND	:YES,CONTINUE
506	001606	105037	010704		CLRB UNITSEL	:NO,CLEAR UNIT 0 READY BIT
507	001612	000433			BR OPCOND	
508						
509	001614	012777	000033	177364	MOV #RD1STAT,ARXCS	:READ STATUS OF UNIT 1
510	001622	004737	007122		JSR PC,DONECK	:WAIT FOR DONE BIT
511	001626	132777	000002	177354	BITB #2,ARXCS	:IS PARITY ERROR BIT SET
512	001634	001411			BEQ 25	:NO,CONTINUE
513	001636	004737	002046		JSR PC,STATER	:YES,GO HANDLE PARITY ERROR
514	001642	000764			BR DRY1	:REISSUE FUNCTION
515	001644	032777	000004	177336	BIT #BIT2,ARXCS	:INIT DONE SHOULD NOT BE SET
516	001652	001402			BEQ 25	
517	001654	104400	015567		TYPE ,MINIT2	:INIT DONE WAS SET PRINT ERROR
518	001660	105777	177324	25:	TSTB ARXCS	:IS UNIT 1 DRY BIT SET
519	001664	100003			BPL 35	:IF NOT SKIP NEXT INSTRUCTION
520	001666	052737	100000	010704	BIS #BIT15,UNITSEL	:YES,SET UNIT . READY BIT
521	001674	000207		35:	RTS PC	
522						
523	001676	004737	001614		JSR PC,DRY1	:TEST UNIT 1 FOR DRY SET
524	001702	105737	010704		TSTB UNITSEL	:IS UNIT 0 SELECTED
525	001706	100016			BPL 15	:NO
526						
527						
528						
529	001710	123727	000041	000010	CMPS #41,#10	:DOES LOCATION 41 CONTAIN THE NUMBER 10?
530	001716	001012			BNE 15	:BRANCH IF NOT
531	001720	005737	000042		TST #42	:CHECK FOR RXDP OPERATION
532	001724	001404			BEQ 25	
533	001726	042737	000200	010704	BIC #200,UNITSEL	:IN CHAIN MODE, DESELECT UNIT 0
534	001734	000403			BR 15	:AND DO NOT HALT
535	001736	104400	014643	25:	TYPE, DOLOAD	:INFORM USER TO REMOVE LOAD MEDIUM
536						:FROM UNIT 0 AND REPLACE WITH
537						:A 'SCRATCH' DISKETTE IF HE
538	001742	000000			HALT	:WISHES TO TEST UNIT 0
539	001744	000241		15:	CLC	:CLEAR C BIT FOR ROR'S THAT FOLLOW
540	001746	013737	001212	011370	MOV DTESTP,SEQUEN	:PUT INITIAL CONDITIONS IN SEQUENCE
541	001754	042737	177770	011370	BIC #177770,SEQUEN	:CLEAR ALL BUT SEQUENCE BITS
542	001762	013737	001212	002140	MOV DTESTP,TEST	:PUT INITIAL CONDITIONS IN TEST
543	001770	042737	177707	002140	BIC #177707,TEST	:CLEAR ALL BUT TEST BITS
544	001776	006037	002140		ROR TEST	:RIGHT JUSTIFY TEST BITS
545	002002	006037	002140		ROR TEST	
546	002006	006037	002140		ROR TEST	
547	002012	013737	001212	010420	MOV DTESTP,PAT	:PUT INITIAL CONDITIONS IN PATTERN
548	002020	006137	010420		ROL PAT	:RIGHT JUSTIFY PATTERN BITS
549	002024	006137	010420		ROL PAT	
550	002030	000337	010420		SWAB PAT	
551	002034	042737	177770	010420	BIC #177770,PAT	:CLEAR ALL BUT PATTERN BITS
552	002042	000137	002722		JMP XSTART	
553						
554	002046	005237	017024		INC PARLOG	:INC PARITY ERROR COUNTER
555	002052	104400	015167		TYPE ,ARXCS	:PRINT THE ARXCS CONTENTS
556	002056	017746	177124		MOV ARXCS,-(SP)	:SAVE ARXCS FOR TYPEOUT
557	002062	104402			TYPOS	:GO TYPE--OCTAL ASCII
558	002064	003			.BYTE 3	:TYPE 3 DIGIT(S)
559	002065	000			.BYTE 0	:SUPPRESS LEADING ZEROS
560	002066	005337	017014		DEC P2RETR	:HAVE 10 ERRORS OCCURED

561	002072	001405				BEG 1\$	;YES, LOG HARD ERROR
562	002074	104400	016017			TYPE ,MPAR	;NO, TYPE PARITY ERROR
563	002100	104400	015052			TYPE ,MCRLF	
564	002104	000207				RTS PC	;RETURN
565	002106	005237	017026	1\$:		INC HPARLOG	;INC HARD PARITY ERROR LOG
566	002112	104400	015755			TYPE ,MUNREC	;PRINT UNRECOVERABLE PARITY ERROR
567	002116	104400	016017			TYPE ,MPAR	
568	002122	104400	015052			TYPE ,MCRLF	
569	002126	104400	015702			TYPE ,MHALT4	
570	002132	000000		HLT4:		HALT	;HALT BECAUSE OF HARD PARITY ERROR
571	002134	000137	001220			JMP SA200	;IF CONTINUE IS PRESSED GO TO START
572	002140	000000		TEST:		0	
573							
574	002142	005002		TSTLIMITS:		CLR R2	;MESSAGE FLAG
575	002144	005737	001200			TST OD	;TEST FOR NO SELECTION OF TRACKS
576	002150	001441				BEG 1\$	;IT WILL BE STANDARD LIMITS
577	002152	123727	001201 000114			CMPB ID, #114	;TEST FOR MAXIMUM ID LIMIT
578	002160	101112				BHI 14\$	
579	002162	001431				BEG 2\$	
580	002164	123737	001200 001201	3\$:		CMPB OD, ID	;OD MUST BE EQUAL OR LESS THAN ID
581	002172	101105				BHI 14\$	
582	002174	004737	002432			JSR PC, TSTMSG	;HAS INITIAL MESSAGE BEEN TYPED
583	002200	104400	015510			TYPE ,MOD	;TYPE BOTH ID AND OD LIMITS
584	002204	113737	001200 002216			MOVB OD, 7\$	
585	002212	004537	014446			JSR R5, SGLDEC	;TYPE SINGLE DECIMAL WORD
586	002216	000000		7\$:		OPEN	
587	002220	104400	015047			TYPE ,DBLSP	
588	002224	104400	015514			TYPE ,MID	
589	002230	113737	001201 002242			MOVB ID, 10\$	
590	002236	004537	014446			JSR R5, SGLDEC	
591	002242	000000		10\$:		OPEN	
592	002244	000403				BR 1\$	
593	002246	105737	001200	2\$:		TSTB OD	;IS OD = 0
594	002252	001344				BNE 3\$	;NO, GO PRINT IT
595	002254	005737	001202	1\$:		TST FIRST	;TEST FOR NO SELECTION OF SECTORS
596	002260	001451				BEG 13\$	;IT WILL BE STANDARD LIMITS
597	002262	123727	001203 000032			CMPB LAST, #32	;TEST FOR NORMAL LAST SECTOR LIMIT
598	002270	101053				BHI 15\$	
599	002272	001440				BEG 4\$	
600	002274	105737	001202	5\$:		TSTB FIRST	;THERE IS NO 0 SECTOR
601	002300	001447				BEG 15\$	
602	002302	123737	001202 001203			CMPB FIRST, LAST	;FIRST MUST BE EQUAL TO OR LESS
603	002310	101043				BHI 15\$	;THAN LAST
604	002312	004737	002432			JSR PC, TSTMSG	
605	002316	104400	015047			TYPE ,DBLSP	
606	002322	104400	015520			TYPE ,MFIRST	;TYPE BOTH FIRST AND LAST LIMITS
607	002326	113737	001202 002340			MOVB FIRST, 11\$	
608	002334	004537	014446			JSR R5, SGLDEC	
609	002340	000000		11\$:		OPEN	
610	002342	104400	015047			TYPE ,DBLSP	
611	002346	104400	015527			TYPE ,MLAST	
612	002352	113737	001203 002364			MOVB LAST, 12\$	
613	002360	004537	014446			JSR R5, SGLDEC	
614	002364	000000		12\$:		OPEN	
615	002366	104400	015240			TYPE ,DBLLF	
616	002372	000404				BR 13\$	

617	002374	123727	001202	000001	4\$:	CMPB FIRST,#1	;IS FIRST SET TO 1
618	002402	001334				BNE 5\$	;NO, GO PRINT IT
619	002404	000207			13\$:	RTS PC	
620							
621	002406	104400	016353		14\$:	TYPE ,002BIG	;PRINT TRACK LIMITS OUT OF RANGE
622	002412	005037	001200			CLR 00	
623	002416	000716				BR 1\$	
624	002420	104400	016455		15\$:	TYPE ,52BIG	;PRINT SECTOR LIMITS OUT OF RANGE
625	002424	005037	001202			CLR FIRST	
626	002430	000765				BR 13\$	
627							
628	002432	005702			TSTMSG:	TST R2	;TEST MESSAGE FLAG
629	002434	001005				BNE 1\$	
630	002436	104400	015446			TYPE ,MNONSTD	;MESSAGE HEADING HAD NOT BEEN TYPED
631	002442	104400	015052			TYPE ,MCRLF	
632	002446	005202				INC R2	;SET THE MESSAGE FLAG
633	002450	000207			1\$:	RTS PC	
634							
635	002452	104400	015052		ICOND:	TYPE ,MCRLF	
636	002456	104400	015417			TYPE ,MICON	;TYPE INITIAL CONDITIONS
637	002462	105737	010704			TSTB UNITSEL	;TEST FOR DRIVE SELECTION
638	002466	100002				BPL 1\$	
639	002470	104400	015106			TYPE ,MUNIT0	;TYPE UNIT 0 SELECTED
640	002474	005737	010704		1\$:	TST UNITSEL	
641	002500	100002				BPL 2\$	
642	002502	104400	015116			TYPE ,MUNIT1	;TYPE UNIT 1 SELECTED
643	002506	104400	015040		2\$:	TYPE ,TAB	
644	002512	004737	010012			JSR PC,TYPSEL	;TYPE TEST SELECTIONS
645	002516	104400	015052			TYPE ,MCRLF	
646	002522	005737	010704			TST UNITSEL	;WERE ANY DRIVES READY
647	002526	001005				BNE CONT12	;YES,CONTINUE
648	002530	104400	015016			TYPE ,MMDRY	;NO,TYPE NO DRIVES MESSAGE
649	002534	000000			HLTS:	HALT	;NO DRIVES CAN'T CONTINUE
650	002536	000137	001220			JMP SA200	;IF CONTINUE IS PRESSED RESTART
651	002542	004737	002142		CONT12:	JSR PC,TSTLIMITS	;TYPE NONSTANDARD TRK AND SEC LIMITS
652	002546	000207				RTS PC	
653							
654	002550	104405			HOME:	CKSWR	
655	002552	032777	000400	176434		BIT #SW8,2SWR	;TEST THE NO RECAL SWITCH
656	002560	001046				BNE RTN	;RETURN IF THE SWITCH IS SET
657	002562	012737	000012	017014		MOV #10.,P2RETRY	;SET UP THE PARITY RETRY COUNTER
658	002570	012737	000012	017010		MOV #10.,D0RETRY	;USE THE D0 RETRY COUNTER FOR RECAL RETRIES
659	002576	012777	040001	176402	2\$:	MOV #RECAL,2RXCS	;ISSUE RECAL FUNCTION
660	002604	004737	007122			JSR PC,DONECK	;WAIT FOR DONE FLAG
661	002610	032777	000002	176372		BIT #2,2RXDB	;WAS THERE A PARITY ERROR
662	002616	001403				BEQ 1\$	;NO,CHECK FOR ANY OTHER ERROR
663	002620	004737	002046			JSR PC,STATERR	;YES,GO REPORT IT
664	002624	000764				BR 2\$	;RETRY RECAL
665	002626	005777	176354		1\$:	TST 2RXCS	;IS THE ERROR FLAG SET
666	002632	100016				BPL XHOME	;IF NOT RETURN
667	002634	004737	010200			JSR PC,RDCODE	;YES,PRINT STATUS REGISTERS
668	002640	123727	010072	000040		CMPB BSTAT,#40	;IS THE B CODE LESS THAN CODE 40
669							; (RECAL CODES ARE 10,20,AND 30)
670	002646	002010				BGE XHOME	;IF NOT RETURN
671	002650	005337	017010			DEC D0RETRY	;HAVE 10 ERRORS OCCURED
672	002654	001350				BNE 2\$	;NO,RETRY

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 DZRXAE.P11 GET VALUE FOR SOFTWARE SWITCH REGISTER

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673 002656 104400 015713          TYPE ,MHALT3          ;YES,CAN'T CONTINUE AS RX11 WILL NOT RECAL
674 002662 000000          HLT3:          HALT
675 002664 000137 001220          JMP SA200          ;IF CONT. SWITCH IS PRESSED GO TO START
676 002670 012737 003001 011362 XHOME:          MOV #1,PRESTRK      ;RESET THE PRESENT TRACK TO TRACK 1
677 002676 000207          RTN:           RTS PC          ;RETURN
678
679          ;;*****
680
681          ;DECODE TEST BITS OF INITIAL CONDITIONS
682          ;BITS 3,4,AND 5 OF THE INITIAL SWR SELECTED THE TEST WHICH
683          ;IS TO BE PREFORMED. THEY ARE AS FOLLOWS:
684
685          :
686          :
687          :
688          :
689          :
690          :
691          :
692          :
693          :
694          :
695          :
696          :
697          :
698          :
699          :
700 002700 012706 001200          RESTART:          MOV #STACK,SP          ;RESET THE STACK POINTER
701 002704 012746 000340          MOV #PR7,-(SP)          ;AND INTERRUPT LEVEL
702 002710 012746 002716          MOV #1$,-(SP)
703 002714 000002          RTI
704 002716 005237 021040          1$:          INC RESTARTCNR          ;INC RESTART COUNTER
705 002722 004737 002452          XSTART:          JSR PC,ICOND          ;TYPE OUT INITIAL CONDITIONS
706 002726 005037 011142          TESTSEL:          CLR CHARCT          ;CLEAR EOP CHARACTER COUNTER
707 002732 012737 000012 017004          MOV #10.,RDRETRY          ;SET UP READ AND WRITE RETRY COUNTERS
708 002740 012737 000012 017006          MOV #10.,WDRETRY
709 002746 005037 004124          CLR ERWRT          ;CLEAR WRITE CAUSED BY ERROR FLAG
710 002752 005037 004122          CLR RDAFTWT          ;CLEAR READ AFTER WRITE FLAG
711 002756 142737 000377 003014          BICB #377,2#BRONTEST          ;CLEAR OUT BRANCH OFFSET
712 002764 005737 002140          TST TEST          ;IF NO TEST SPECIFIED FORCE TEST 7
713 002770 001003          BNE 1$
714 002772 012737 000007 002140          MOV #7,TEST
715 003000 013704 002140          1$:          MOV TEST,R4
716 003004 005304          DEC R4          ;ADJUST TEST BITS FOR CORRECT
717 003006 006304          ASL R4          ;BRANCH OFFSET
718 003010 150437 003014          BISB R4,2#BRONTEST          ;INSERT OFFSET TO BRANCH INST.
719 003014 000777          BR          ;BRANCH BY TEST OFFSET
720 003016 000137 003052          BRONTEST:          JMP WRONLY          ;WRITE ONLY FUNCTION
721 003022 000137 004130          JMP WTRD          ;WRITE THEN READ FUNCTION
722 003026 000137 005456          JMP WTRDCK          ;WRITE THEN READ VERIFY
723 003032 000137 006444          JMP RDCHK          ;READ VERIFY
724 003036 000137 006504          JMP RDONLY          ;READ ONLY FUNCTION
725 003042 000137 006544          JMP DRVSWP          ;WRITE,AND READ VERIFY ON ALTERNATING DRIVES
726 003046 000137 006630          JMP TEST7          ;WRITE,READ,FOLLOWED BY READ VERIFY
727
728

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729
730      ;;*****
731
732      ;THIS IS A WRITE ONLY FUNCTION USING DATA PATTERN AND
733      ;TRACK SEQUENCE SPECIFIED BY INITIAL SWR SETTINGS
734      ; T = 1
735
736      003052 004737 010312      WRONLY:      JSR PC,GETPATTERN      ;SET UP SOFTWARE DATA BUFFER
737      003056 004737 011144      XWRONLY:     JSR PC,INITTRACKS    ;SET UP ID,OD,AND TRACK COUNTER
738      003062 004737 010614      JSR PC,GETUNIT  ;SET UP DRIVE UNIT SELECTION
739      003066 004737 011254      1$:          JSR PC,GETTRACK      ;PICK UP NEXT TRACK
740      003072 004737 003112      JSR PC,WRITE   ;DO THE WRITE FUNCTION
741      003076 005337 011356      DEC TRKCNTR  ;TEST TRACK COUNTER
742      003102 001371
743      003104 004737 010732      BNE 1$
744      003110 000762      JSR PC,STOP        ;CHECK FOR LAST DRIVE AND EOP
745      BR XWRONLY          BR XWRONLY      ;NEXT PASS
746
747      003112 004737 012216      WRITE:        JSR PC,INITSECTOR    ;SET UP FIRST, LAST, AND SECTOR COUNTER
748      003116 004737 012316      XWRITE:      JSR PC,GETSECTOR    ;PICK UP NEXT SECTOR
749      003122 012737 000012      017022      MOV #10.,SRETRY
750      003130 012737 000012      017016      MOV #10.,PRETRY
751      003136 004737 005656      ONEWRT:      JSR PC,ADJSUM        ;SET RETRY COUNTER
752      003142 012746 003372      FILLBUF:     MOV #FILLDONE,-(SP)  ;ADJUST DATA BUFFER AND CHECK SUM FOR ADDRESSES
753      003146 012746 003214      MOV #FILLER,-(SP) ;PUT GOOD RETURN ON STACK
754      003152 005037 006434      CLR BYTECNTR ;PUT ERROR RETURN ON STACK
755      003156 012746 000200      MOV #PR4,-(SP)
756      003162 012746 003170      MOV #1$,-(SP)
757      003166 000002      RTI
758      003170 012777 000101      176010      1$:          MOV #FBIE,DRXCS    ;EXECUTE FILLBUFFER COMMAND
759      003176 004737 007014      FILLFLAG:    JSR PC,TRCK        ;TEST FOR TRANSFER REQUEST FLAG
760      003202 112077 176002      XFRBYTE:     MOVB (RD)+,DRXDB    ;TRANSFER DATA BYTE
761      003206 005237 006434      INC BYTECNTR
762      003212 000771      BR FILLFLAG        ;WAIT FOR NEXT TR FLAG
763
764      003214 005726      FILLER:      TST (SP)+      ;REMOVE THE DONE RETURN FROM THE STACK
765      003216 012737 015366      003264      MOV #FILL,PTYP1+2    ;PUT ADDR OF FILLBUF MESSAGE IN PAR ERR TYP0UT 1
766      003224 012737 015366      003354      MOV #FILL,PTYP2+2    ;PUT ADDR OF FILLBUF MESSAGE IN PAR ERR TYP0UT 2
767      003232 012737 003136      003334      MOV #FILLBUF,PCONT+2  ;IF NOT HARD ERR RETURN THROUGH PCONT TO FILLBUF
768      003240 000137 003244      JMP PARTEST  ;PRINT OUT PAR ERR AND TEST CONDITIONS FOR RETRY
769
770      003244 005237 017024      PARTEST:      INC PARLOG      ;INCREMENT PARITY ERROR
771      003250 104405      CKSWR
772      003252 032777 020000      175734      BIT #SW13,DSWR    ;TEST DON'T PRINT ERROR SWITCH
773      003260 001006      BNE CONT4
774      003262 104400 000000      PTP1:        TYPE ,OFEN      ;PRINT THE PARITY ERROR MESSAGE
775      003266 104400 016017      TYPE ,M'PAR
776      003272 104400 015052      TYPE ,M'CRLF
777      003276 104405      CONT4:      CKSWR
778      003300 005777 175710      TST DSWR      ;TEST HALT ON ERROR SWITCH
779      003304 100001      BPL CONT13
780      003306 000000      HALT6:      HALT
781      003310 032777 004000      175676      CONT13:    BIT #SW11,DSWR  ;HALT ON ERROR
782      003316 001007      BNE CONT5      ;TEST NO RETRY SWITCH
783      003320 005337 017016      DEC PRETRY   ;IF SET LOG HARD ERROR
784      003324 005737 017016      TST PRETRY   ;DECREMENT RETRY COUNTER
785      ;HAVE 10 ERRORS OCCURED

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795 003330 001402 BEQ CONTS ;IF CLEARED LOG HARD ERROR
796 003332 000137 003136 PCONT: JMP FILLBUF ;RETURN TO RETRY TEST THROUGH HERE
797 003336 005237 017026 CONTS: INC HPARLOG ;INC. HARD PARITY ERROR COUNTER
798 003342 104400 015240 TYPE ,DBLIF
799 003346 104400 015755 TYPE ,MUNREC ;TYPE HARD PARITY ERROR
800 003352 104400 000000 PTYP2: TYPE ,OPEN
801 003356 104400 016017 TYPE ,MPAR
802 003362 104400 015052 TYPE ,MCRLF
803 003366 000137 010074 JMP DELUNIT ;GO DELETE THE UNIT,CAN NOT CONTINUE

;SWITCH 9 OF INITIAL TEST CONDITIONS SWITCH SETTINGS IS THE DELETED DATA
;FUNCTION INDICATOR. WHEN THIS BIT IS SET ALL WRITE / READ FUNCTIONS WILL
;SET AND CHECK THE DELETED DATA BIT ON THE DISKETTE.
;*****

800 003372 012737 000012 017016 FILLDONE: MOV #10,PRETRY ;SET UP RETRY COUNTER
801 003400 012746 003462 PEWRITE: MOV #WRTDONE,-(SP) ;SET GOOD RETURN ON STACK
802 003404 012746 003510 MOV #WRTERR,-(SP) ;SET ERROR RETURN ON STACK
803 003410 112737 000105 004120 MOV #WRTIE,FUNCTION ;SET FUNCTION WORD TO WRITE
804 003416 032737 001000 001212 BIT #BIT9,DTEST ;TEST FOR WRITE DELETED DATA
805 003424 001403 BEQ IS
806 003426 112737 000115 004120 MOV #WRTDIE,FUNCTION
807 003434 062737 000001 021030 IS: ADD #1,WTCNTR ;INC TOTAL WRITE FUNCTIONS COUNTER
808 003442 005537 021032 ADC WTCNTR+2 ;DOUBLE PRECISION COUNTER
809 003446 004737 004022 JSR PC,COMMAND ;TRANSFER COMMAND TO DRIVE
810 003452 004737 007122 JSR PC,DONECK ;TEST FOR DONE FLAG
811 003456 000137 007204 JMP NOINTER ;NO INTERRUPT ERROR
812
813 003462 005737 004124 WRTDONE: TST ERWRT ;IS THIS A REWRITE FROM A DATA ERROR
814 003466 001004 BNE IS ;YES GO REREAD THIS SECTOR
815 003470 005337 012306 DEC SECCNTR ;NO TEST SECTOR COUNTER
816 003474 001003 BNE 2$ ;NOT LAST SECTOR GO TO NEXT ONE
817 003476 000207 RTS PC
818 003500 000137 004246 1$: JMP REREAD ;REREAD THE SECTOR
819 003504 000137 003116 2$: JMP XWRITE
820
821 003510 005726 WATER: TST (SP)+ ;REMOVE THE DONE RETURN FROM THE STACK
822 003512 032737 000002 010070 BIT #BIT1,ASTAT ;IS THIS A PARITY ERROR
823 003520 001413 BEQ WRTSEK ;NO, IT MUST BE A SEEK ERROR
824 ;PARITY ERROR DURING A WRITE FUNCTION
825 003522 012737 016010 003264 MOV #MWRITE,PTYP1+2 ;PUT ADDR OF WRITE MESSAGE IN PAR ER TYP0UT 1
826 003530 012737 016010 003354 MOV #MWRITE,PTYP2+2 ;PUT ADDR OF WRITE MESSAGE IN PAR ER TYP0UT 2
827 003536 012737 003400 003334 MOV #REWRITE,PCONT+2 ;IF NOT HARD ERR RETURN THROUGH PCONT TO REWRITE
828 003544 000137 003244 JMP PARTEST ;GO INC LOG AND TEST FOR RETRY
829
830 ;SEEK ERROR DURING A WRITE FUNCTION
831 003550 012737 003130 003674 WRTSEK: MOV #ONEWRT,SEKRTY+2 ;SETUP FOR WRT RETRY ON SEEK ERROR
832 ;(AFTER A RECAL. THE CONTENTS OF SECTOR 1,
833 ;TRACK 1 ARE LOADED INTO THE SECTOR BUFFER.
834 ;TO REWRITE THE CORRECT DATA THE PROGRAM
835 ;MUST REFILL THE SECTOR BUFFER.
836 003556 012737 016010 003630 MOV #MWRITE,STYP1+2 ;PUT ADDR OF WRITE MESSAGE IN SEEK ER TYPEOUT 1
837 003564 012737 016010 003722 MOV #MWRITE,STYP2+2 ;PUT ADDR OF WRITE MESSAGE IN SEEK ER TYPEOUT 2
838 003572 004737 003576 JSR PC,SEEKER ;RECORD SEEK ERROR
839
840 003576 012703 017036 SEEKER: MOV #ZSEKLOG,R3 ;SETUP INC INSTRUCTION FOR UNIT 0 LOG

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841	003602	004737	021044		JSR PC,UILOG	;TEST FOR UNIT 1 LOG
842	003606	005213			INC (R3)	;INCREMENT SEEK ERROR LOG
843	003610	004737	003770		JSR PC,TRKERR	;INC ERROR PER TRACK COUNTERS
844	003614	104405			CKSWR	
845	003616	032777	020000	175370	BIT #SW13,ASWR	;CHECK DON'T PRINT ERROR SWITCH
846	003624	001004			BNE SWHLT1	
847	003626	104400	016010	STYP1:	TYPE ,MWRITE	;PRINT WRITE (READ) SEEK ERROR
848	003632	004737	003736		JSR PC,SEKTYP	
849	003636	104405		SWHLT1:	CKSWR	
850	003640	005777	175350		TST ASWR	;TEST THE HALT ON ERROR SWITCH
851	003644	100001			BPL CONT14	
852	003646	000000		HLT7:	HALT	;HALT ON THE ERROR
853	003650	032777	004000	175336	CONT14:	;CHECK THE NO RETRY SWITCH
854	003656	001007			BIT #SW11,ASWR	;IF SET LOG HARD SEEK ERROR
855	003660	005337	017022		BNE HARDSK	;HAVE 10 ERRORS BEEN LOGED
856	003664	001404			DEC SRETRY	;YES LOG HARD ERROR
857	003666	004737	002550		BEQ HARDSK	;RECALIBRATE DRIVES ON SEEK ERROR
858	003672	000137	003130	SEKRTY:	JSR PC,HOME	;NO RETRY WRITE COMMAND (READ COMAND)
859	003676	012703	017076	HARDSK:	JMP ONEWRT	;SET INC. INST.FOR UNIT 0 ERR LOG
860	003702	004737	021044		MOV #ZHSEKLOG,R3	;TEST FOR UNIT 1 ERROR LOG
861	003706	005213			JSR PC,UILOG	;HARD SEEK ERROR
862	003710	104400	015240		INC (R3)	
863	003714	104400	015755		TYPE ,DBLLF	;TYPE UNRECOVERABLE SEEK ERROR
864	003720	104400	016010	STYP2:	TYPE ,MUNREC	;ON WRITE (READ) COMMAND
865	003724	004737	003736		TYPE ,MWRITE	
866	003730	062706	000002		JSR PC,SEKTYP	
867	003734	000207			ADD #2,SP	;REMOVE SEEK ERROR FROM STACK POINTER
868					RTS PC	;RETURN TO NEXT SECTOR BY DONE RETURN ON STACK
869	003736	104400	015775	SEKTYP:	TYPE ,MSEEK	;TYPE SEEK ERROR
870	003742	104400	014567		TYPE ,MPRES	;TYPE ADDRESS OF TRACK MOVED FROM
871	003746	013737	011362	003760	MOV PRESTRK,15	
872	003754	004537	014446		JSR RS,SGLDEC	
873	003760	000000		15:	OPEN	
874	003762	104400	015052		TYPE ,MCRLF	
875	003766	000207			RTS PC	
876						
877	003770	013705	011360	TRKERR:	MOV TARGET,R5	;SET UP TO INC ERROR PER TRACK COUNTER
878	003774	006305			ASL R5	;ADJUST FOR EVEN ADDRESS
879	003776	062705	020344		ADD #UOTRK,R5	;ADDIN ADDRESS OF UNIT 0 LOG
880	004002	032737	000020	010704	BIT #BIT4,UNITSEL	;CHECK THE UNIT SELECTION BIT
881	004010	001402			BEQ 15	;IF CLEARED UNIT 0 IS ACTIVE
882	004012	062705	020576		ADD #UITRK,R5	;ADJUST FOR UNIT 1 LOG
883	004016	005215		15:	INC (R5)	;INC THE CORRECT COUNTER
884	004020	000207			RTS PC	
885						
886	004022	013705	011360	COMMWORD:	MOV TARGET,R5	;GET TRACK NUMBER
887	004026	006305			ASL R5	;MULTIPLY BY 4 TO DOUBLE PRECISION
888	004030	006305			ASL R5	;INTERLEAVE COUNTER LOCATIONS
889	004032	062705	017174		ADD #TKACC,R5	;ADD ON ADDRESS OF TRACK ACCESS COUNTER
890	004036	062715	000001		ADD #1,(R5)	;INCREMENT THE COUNTER
891	004042	005565	000002		ADC 2(R5)	;ADD CARRY TO HIGH ORDER WORD
892	004046	153737	010704	004120	BISA UNITSEL,FUNCTION	;SET UNIT SELECTION BIT IN COMMAND WORD
893	004054	013777	004120	175124	MOV FUNCTION,ARXCS	;SEND OUT COMMAND TO DRIVE
894	004062	004737	007014		JSR PC,TRCK	;WAIT FOR TR FLAG
895	004066	113777	012310	175114	MOVB TSECTOR,ARXDB	;SEND OUT TARGET SECTOR
896	004074	004737	007014		JSR PC,TRCK	;WAIT FOR TR FLAG

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897 004100 113777 011360 175102      MOV B TARGET, &RXDB      ;SEND OUT TARGET TEACK
898 004106 005046                      CLR -(SP)          ;LOWER INTERUPT LEVEL TO ALLOW AN INTERUPT
899 004110 012746 004116      MOV #15, -(SP)
900 004114 000002                      RTI
901 004116 000207      IS:          RTS PC
902
903 004120 000000      FUNCTION:      0
904 004122 000000      RDAFTWT:      0      ;PEAD AFTER WRITE FUNCTION FLAG
905 004124 000000      ERWRT:        0      ;WRITE CAUSED BY DATA ERROR FLAG
906 004126 000000      DATAK:      0      ;DATA CHECK ON CRC ERROR FLAG
907
908      ;;*****
909
910      ;THIS IS A WRITE ALL SECTORS FOLLOWED BY A READ ALL SECTORS
911      ;WITH DATA PATTERNS AND HEAD SEQUENCING SET BY INITIAL SWR
912      ; T = 2
913
914 004130 005137 004122      WTRD:      COM RDAFTWT      ;SET READ AFTER WRITE FLAG
915 004134 004737 010312      JSR PC, GETPATTERN
916 004140 004737 011144      XWTRD:     JSR PC, INITTRACKS
917 004144 004737 010614      JSR PC, GETUNIT
918 004150 004737 011254      IS:        JSR PC, GETTRACK
919 004154 004737 003112      JSR PC, WRITE
920 004160 004737 004200      JSR PC, READ
921 004164 005337 011356      DEC TRKNTR
922 004170 001367      BNE IS
923 004172 004737 010732      JSR PC, STOP
924 004176 000760      BR XWTRD
925
926      ;;*****
927
928      ;READ DATA FROM THE DISKETTE
929
930
931 004200 004737 012216      READ:      JSR PC, INITSECTOR
932 004204 004737 012316      XREAD:     JSR PC, GETSECTOR
933 004210 012737 000012 017010      MOV #10, DORETRY      ;SET UP RETRY COUNTERS FOR DELETED DATA
934 004216 012737 000012 017012      MOV #10, DATARETRY      ;DATA ERROR
935 004224 012737 000012 017016      MOV #10, PRETRY        ;PARITY
936 004232 012737 000012 017022      MOV #10, SRETRY        ;SEEK
937 004240 012737 000012 017020      MOV #10, CRETRY        ;AND CRC ERRORS
938 004246 005037 004126      REREAD:    CLR DATAK      ;CLEAR CRC DATA CHECK FLAG
939 004252 012746 004316      MOV #RDDONE, -(SP)      ;SET GOOD RETURN ON STACK
940 004256 012746 004460      MOV #RDEK, -(SP)      ;SET READ ERROR RETURN ON STACK
941 004262 112737 000107 004120      MOV B #RDIE, FUNCTION
942 004270 062737 000001 021034      ADD #1, RDCNTR      ;INC TOTAL READ FUNCTIONS COUNTER
943 004276 005537 021036      ADC RDCNTR+2      ;DOUBLE PRECISION COUNTER
944 004302 004737 004022      JSR PC, COMMWORD
945 004306 004737 007122      JSR PC, DONECK
946 004312 000137 007204      JMP NOINTER      ;TEST FOR DONE
947
948
949
950 004316 022737 000012 017004      RDDONE:  CMP #10, RDRETRY      ;IS READ RETRY EQUAL TO 10
951 004324 001420      BEQ CONT1      ;YES, NO ERRORS OCCURED
952 004326 012703 017052      MOV #ZRDLOG, R3      ;SET INC. INST. FOR UNIT 0 ERROR LOG

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953	004332	004737	021044		JSR PC,U1LOG	;TEST FOR UNIT 1 ERROR LOG
954	004336	005213			INC (R3)	;INC RECOVERABLE READ LOG
955	004340	012737	000012	017004	MOV #10.,RDRETRY	;RESET READ RETRY COUNTER
956	004346	104400	015240		TYPE ,DBLLF	
957	004352	104400	015627		TYPE ,MREC	;TYPE RECOVERABLE READ ERROR
958	004356	104400	015674		TYPE ,MREAD	
959	004362	104400	015052		TYPE ,MCRLF	
960	004366	022737	000012	017006	CMP #10.,WTRETRY	;IS WRITE RETRY EQUAL TO 10
961	004374	001420			BEQ CONT2	;YES,NO ERRORS OCCURED
962	004376	012703	017056		MOV #ZWRTLOG,R3	;SET INC.INST.FOR UNIT 0 EPROR LOG
963	004402	004737	021044		JSR PC,U1LOG	;TEST FOR UNIT 1 LOG
964	004406	005213			INC (R3)	;INC RECOVERABLE WRITE LOG
965	004410	012737	000012	017006	MOV #10.,WTRETRY	;RESET THE WRITE RETRY COUNTER
966	004416	104400	015240		TYPE ,DBLLF	
967	004422	104400	015627		TYPE ,MREC	;TYPE RECOVERABLE WRITE ERROR
968	004426	104400	016010		TYPE ,MWRITE	
969	004432	104400	015052		TYPE ,MCRLF	
970	004436	004737	005204		JSR PC,DDCHK	;CHECK FOR DELETED DATA INDICATOR
971	004442	005701			TST R1	;BIT 15 OF R1 IS READ 1 SECTOR FLAG
972	004444	100001			BPL NEXTRD	
973	004446	000207			RTS PC	;IF SET,GO VERIFY DATA JUST READ
974	004450	005337	012306		DEC SECCNTR	
975	004454	001253			BNE XREAD	
976	004456	000207			RTS PC	;READ FUNCTION IS DONE
977						
978	004460	005726			TST (SP)+	;REMOVE THE DONE RETURN FROM THE STACK
979	004462	032737	000002	010070	BIT #BIT1,ASTAT	;IS THIS A PARITY ERROR
980	004470	001413			BEQ 1\$	;NO,SEE IF ITS A CRC ERROR
981					;PARITY ERROR DURING A READ FUNCTION	
982	004472	012737	015674	003264	MOV #MREAD,PTYP1+2	;PUT ADDR OF READ MESSAGE IN PAR ERR TYPEOUT 1
983	004500	012737	015674	003354	MOV #MREAD,PTYP2+2	;PUT ADDR OF READ MESSAGE IN PAR ER TYPEOUT 2
984	004506	012737	004246	003334	MOV #REREAD,PCONT+2	;IF HARD ERR RETURN THROUGH PCONT TO REREAD
985	004514	000137	003244		JMP PARTEST	;RECORD PARITY ERROR AND RETRY FUNCTION
986	004520	032737	000001	010070	BIT #BIT0,ASTAT	;IS THIS A CRC ERROR
987	004526	001014			BNE CRCER	;YES GO TEST AND LOG IT
988					;SEEK ERROR DURING A READ FUNCTION	
989	004530	012737	004246	003674	MOV #REREAD,SEKRTY+2	;SET SEEK CONTINUE FOR READ RETRY
990	004536	012737	015674	003630	MOV #MREAD,STYP1+2	;SET ADDR OF READ MESSAGE IN SEEK ER TYPEOUT 1
991	004544	012737	015674	003722	MOV #MREAD,STYP2+2	;SET ADDR OF READ MESSAGE IN SEEK ER TYPEOUT 2
992	004552	004737	003576		JSR PC,SEEKER	;RECORD SEEK ERROR
993	004556	000734			BR NEXTRD	;GO TO NEXT SECTOR,CAN'T READ THIS ONE
994					;CRC ERROR DETECTED WHILE READING	
995	004560	004737	003770		JSR PC,TRKERR	;INC ERROR PER TRACK COUNTER
996	004564	005701			TST R1	;IF READ ONLY, REPORT DATA CRC ERROR
997	004566	100061			BPL DATAERC	
998	004570	005237	001126		INC DATAEC	;SET DATA CHECK FLAG
999	004574	004737	005536		JSR PC,EMPBUFF	;CHECK FOR A DATA ERROR
1000	004600	005737	006442		TST ER CNTR	;WAS THERE A DATA ERROR
1001	004604	001052			BNE DATAERC	;YES,REREAD AND/OR REWRITE THE DATA
1002	004606	012703	017046		MOV #ZCRCBAD,R3	;SET INC.INST.FOR UNIT 0 ERROR LOG
1003	004612	004737	021044		JSR PC,U1LOG	;TEST FOR UNIT 1 ERROR LOGS
1004	004616	005213			INC (R3)	;NO,INC BAD CRC GENERATOR ERROR
1005	004620	104405			CKSWR	
1006	004622	032777	020000	174364	BIT #SW13,JSWR	;TEST DON'T SWITCH
1007	004630	001004			BNE 2\$	
1008	004632	104400	015644		TYPE ,MBADCRC	;TYPE CRC GENERATOR ERROR

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1009	004636	104400	015052		TYPE ,MCRLF	
1010	004642	104405		2\$:	CKSWR	
1011	004644	005777	174344		TST QSWR	;TEST HALT ON ERROR SWITCH
1012	004650	100001			BPL CONT15	
1013	004652	000000		HLT10:	HALT	;HALT ON ERROR
1014	004654	032777	004000	174332	CONT15:	;CHECK NO RETRY SWITCH
1015	004662	001005			BIT #SW11,QSWR	;IF SET LOG HARD ERROR
1016	004664	005337	017020		BNE 3\$	;HAVE 10 ERRORS BEEN LOGED
1017	004670	001402			DEC CRETRY	;YES, LOG HARD ERROR
1018	004672	000137	004246		BEQ 3\$	;NO, GO REREAD DATA
1019	004676	012703	017106	3\$:	JMP REREAD	;SET INC.INST.FOR UNIT 0 ERROR LOG
1020	004702	004737	021044		MOV #ZHCRCBAD,R3	;TEST FOR UNIT 1 ERROR LOGS
1021	004706	005213			JSR PC,U1LOG	
1022	004710	104400	015240		INC (R3)	
1023	004714	104400	015644		TYPE ,DBLLF	
1024	004720	104400	015052		TYPE ,MBADCRC	;TYPE HARD CRC GENERATOR ERROR
1025	004724	104400	015724		TYPE ,MCRLF	
1026	004730	000000			TYPE ,MHALT11	;AND HALT AS THE CRC GENERATOR DOESN'T WORK
1027				HLT11:	HALT	
1028	004732	012703	017042			;DATA CRC ERROR REREAD AND/OR REWRITE TO GET GOOD DATA
1029	004736	004737	021044		DATA CRC:	MOV #ZCRCLOG,R3
1030	004742	005213			JSR PC,U1LOG	;SET INC.INST.FOR UNIT 0 ERROR LOG
1031	004744	104405			INC (R3)	;TEST FOR UNIT 1 ERROR LOGS
1032	004746	032777	020000	174240	CKSWR	;TRUE DATA CRC ERROR
1033	004754	001004			BIT #SW13,QSWR	;TEST DON'T PRINT ERROR SWITCH
1034	004756	104400	015736		BNE 4\$	
1035	004762	104400	015052		TYPE ,MCRC	;TYPE DATA CRC ERROR
1036	004766	104405		4\$:	TYPE ,MCRLF	
1037	004770	005777	174220		CKSWR	
1038	004774	100001			TST QSWR	;TEST HALT ON ERROR SWITCH
1039	004776	000000		HLT12:	BPL CONT16	
1040	005000	032777	004000	174206	CONT16:	;HALT ON ERROR
1041	005006	001005			HALT	;TEST NO RETRY SWITCH
1042	005010	005337	017004		BIT #SW11,QSWR	;IF SET LOG HARD ERROR
1043	005014	001402			BNE 5\$	;HAVE 10 ERRORS OCCURED
1044	005016	000137	004246		DEC RDRETRY	;YES LOG HARD ERROR OR REWRITE DATA
1045	005022	012703	017102	5\$:	BEQ 5\$	;NO, GO REREAD THIS SECTOR
1046	005026	004737	021044		JMP REREAD	;SET INC.INST.FOR UNIT 0 ERROR LOG
1047	005032	005213			MOV #ZHCRCLOG,R3	;TEST FOR UNIT 1 ERROR LOGS
1048	005034	012737	000012	017004	JSR PC,U1LOG	;INC HARD CRC ERROR LOG
1049	005042	005737	004122		INC (R3)	;RESET READ RETRY COUNTER
1050	005046	001021			MOV #10,RDRETRY	;IS THIS A READ AFTER WRITE FUNCTION
1051	005050	012703	017112		TST RDAFTWT	;YES, GO REWRITE IT
1052	005054	004737	021044		BNE CONT6	;NO, SET INC.INST.FOR UNIT 0 ERROR LOG
1053	005060	005213			MOV #ZHRDLOG,R3	;TEST FOR UNIT 1 ERROR LOGS
1054	005062	104400	015240		JSR PC,U1LOG	;READ ONLY, HARD READ ERROR
1055	005066	104400	015755		INC (R3)	
1056	005072	104400	015674		TYPE ,DBLLF	
1057	005076	104400	015052		TYPE ,MUNREC	;TYPE UNRECOVERABLE READ ERROR
1058	005102	062706	000002		TYPE ,MREAD	
1059	005106	000137	004450		TYPE ,MCRLF	
1060	005112	104405		CONT7:	ADD #2,SP	;REMOVE READ DONE ADDRESS FROM STACK
1061	005114	032777	004000	174072	JMP NEXTRD	;READ NEXT SECTOR CAN'T READ THIS ONE
1062	005122	001011		CONT6:	CKSWR	
1063	005124	005337	017006		BIT #SW11,QSWR	;TEST NO RETRY SWITCH
1064	005130	001406			BNE 7\$	;IF SET LOG HARD ERROR
					DEC WRETRY	;HAVE 10 REWRITES BEEN DONE
					BEQ 7\$	;YES, LOG HARD WRITE ERROR

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1065	005132	005137	004124			COM ERWRT		;NO, SET THE WRITE CAUSED BY ERROR FLAG
1066	005136	062706	000002			ADD #2, SP		;REMOVE RDDONE ADDRESS FROM STACK
1067	005142	000137	003130			JMP ONEWRT		;REWRITE SECTOR THEN REREAD TO CHECK FOR ERROR
1068	005146	012703	017116		7\$:	MOV #ZHWRTLOG, R3		;SET INC. INST. FOR UNIT 0 ERROR LOG
1069	005152	004737	021044			JSR PC, UILOG		;TEST FOR UNIT 1 ERROR LOGS
1070	005156	005213				INC (R3)		;HARD WRITE ERROR
1071	005160	012737	000012	017006		MOV #10, WRTRETRY		;RESET WRITE RETRY COUNTER
1072	005166	104400	015240			TYPE ,DBLLF		
1073	005172	104400	015755			TYPE ,MUNREC		;TYPE UNRECOVERABLE WRITE ERROR
1074	005176	104400	016010			TYPE ,MWRITE		
1075	005202	000735				BR CONT7		
1076								
1077								
1078								
1079	005204	032737	001000	001212	DDCHK:	BIT #BIT9, DTESTP		;TEST BIT 9 AS TO DELETED DATA TRANSFER
1080	005212	001472				BEQ CONT10		
1081	005214	132737	000100	010070		BITB #BIT6, ASTAT		;THIS IS A DELETED DATA FUNCTION
1082	005222	001114				BNE RETURN		;DD BIT SHOULD BE SET
1083	005224	012703	017066			MOV #ZDDMIS, R3		;SET INC INST FOR UNIT 0 ERROR LOG
1084	005230	004737	021044			JSR PC, UILOG		;TEST FOR UNIT 1 ERROR LOGS
1085	005234	005213				INC (R3)		;INC MISSING DELETED DATA LOG
1086	005236	004737	003770			JSR PC, TRKERR		;INC ERROR PER TRACK COUNTER
1087	005242	104405				CKSWR		
1088	005244	032777	020000	173742		BIT #SW13, QSWR		;TEST DON'T PRINT ERROR SWITCH
1089	005252	001011				BNE CONT11		
1090	005254	104400	014506			TYPE ,MDDMIS		;TYPE MISSING DELETED DATA BIT
1091	005260	052737	000400	010704	DDERR:	BIS #BIT8, UNITSEL		;SET HAD ERROR FLAG
1092	005266	004737	007716			JSR PC, TYPADR		;TYPE ADDRESS OF ERROR
1093	005272	104400	015052			TYPE ,MCRLF		
1094	005276	104405			CONT11:	CKSWR		
1095	005300	005777	173710			TST QSWR		;TEST HALT ON ERROR SWITCH
1096	005304	100001				BPL CONT17		
1097	005306	000000				HALT		;HALT ON DELETED DATA ERROR
1098	005310	032777	004000	173676	HLT13:	BIT #SW11, QSWR		;TEST NO RETRY SWITCH
1099	005316	001005			CONT17:	BNE 4\$		;IF SET LOG HARD ERROR
1100	005320	005337	017010			DEC DDRETRY		;HAVE 10 ERRORS BEEN LOGED
1101	005324	001402				BEQ 4\$		;YES LOG HARD ERROR
1102	005326	000137	004246			JMP REREAD		;NO, REREAD SECTOR
1103	005332	012703	017126		4\$:	MOV #ZHDDLOG, R3		;SET INC INST. FOR UNIT 0 ERROR LOG
1104	005336	004737	021044			JSR PC, UILOG		;TEST FOR UNIT 1 ERROR LOGS
1105	005342	005213				INC (R3)		
1106	005344	104400	015240			TYPE ,DBLLF		
1107	005350	104400	015755			TYPE ,MUNREC		;TYPE UNRECOVERABLE DELETED DATA ERROR
1108	005354	104400	015615			TYPE ,MDDER		
1109	005360	104400	015052			TYPE ,MCRLF		
1110	005364	004737	007716			JSR PC, TYPADR		
1111	005370	104400	015052			TYPE ,MCRLF		
1112	005374	000137	004450			JMP NEXTSD		;READ NEXT SECTOR
1113	005400	032737	000100	010070	CONT10:	BIT #BIT6, ASTAT		;THIS IS NOT A DELETED DATA TRANSFER
1114	005406	001422				BEQ RETURN		
1115	005410	012703	017072			MOV #ZUNXDD, R3		;SET INC INST. FOR UNIT 0 ERROR LOG
1116	005414	004737	021044			JSR PC, UILOG		;TEST FOR UNIT 1 ERROR LOGS
1117	005420	005213				INC (R3)		;UNEXPECTED DD BIT SET
1118	005422	052737	000400	010704		BIS #BIT8, UNITSEL		;SET HAD ERROR FLAG
1119	005430	004737	003770			JSR PC, TRKERR		;INC ERROR PER TRACK COUNTER
1120	005434	104405				CKSWR		

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1121 005436 032777 020000 173550      BIT #SW13,DSWR      ;TEST DON'T PRINT ERROR SWITCH
1122 005444 001314      BNE CONT11
1123 005446 104400 014462      TYPE ,MUNXDD      ;TYPE UNEXPECTED DELETED DATA BIT
1124 005452 000702
1125 005454 000207      RETURN:      BR DDERR
1126
1127
1128
1129      ;:*****
1130
1131      ;WRITE ALL SECTORS,READ AND VERIFY ALL SECTORS
1132      ; T = 3
1133
1134 005456 005137 004122      WTRDCK:      COM RDAFTWT      ;SET READ AFTER WRITE FLAG
1135 005462 004737 010312      JSR PC,GETPATTERN
1136 005466 004737 011144      XWTRDCK:      JSR PC,INITTRACKS
1137 005472 004737 010614      JSR PC,GETUNIT
1138 005476 004737 011254      1$:      JSR PC,GETTRACK
1139 005502 004737 003112      JSR PC,WRITE
1140 005506 004737 005526      JSR PC,READCHK
1141 005512 005337 011356      DEC TRKCNTR
1142 005516 001367      BNE 1$
1143 005520 004737 010732      JSR PC,STOP
1144 005524 000760      BR XWTRDCK
1145
1146
1147      ;:*****
1148
1149      ;READ A SECTOR,EMPTY THE SECTOR BUFFER AND VERIFY
1150      ;THE DATA READ AGAINST CORE DATA BUFFER
1151
1152 005526 052701 100000      READCHK:      BIS #BIT15,R1      ;SET READ ONE SECTOR FLAG
1153 005532 004737 004200      JSR PC,READ      ;GO READ ONE SECTOR
1154 005536 005737 012306      EMPBUFF:      TST SECCNTR      ;IF CLEARED NO SECTOR WAS FOUND
1155 005542 001002      BNE 2$
1156 005544 000137 006432      JMP EXIT      ;GO TO NEXT TRACK CAN'T READ THIS ONE
1157 005550 005037 006434      2$:      CLR BYTECNTR      ;CLEAR THE BYTE AND ERROR COUNTERS
1158 005554 005037 006442      CLR ERCNTR
1159 005560 052701 000200      BIS #BIT7,R1      ;R1 BIT 7 IS USED AS FIRST ERROR FLAG
1160 005564 004737 005656      JSR PC,ADJSUM      ;ADJUST DATA AND CK SUM FOR ADDRESSES
1161 005570 005037 005746      CLR CKSUM      ;SET UP FOR CHECK SUM ACCUMULATION
1162 005574 012746 006212      MOV #EMPDONE,-(SP)      ;SET UP RETURN ADDRESSES
1163 005600 012746 005750      MOV #EMPER,-(SP)
1164 005604 005046      CLR -(SP)      ;LOWER INTERRUPT LEVEL
1165 005606 012746 005614      MOV #1$,-(SP)
1166 005612 000002      RTI
1167 005614 012777 000103 173364 1$:      MOV #EBIE,DRXCS      ;LOAD EMPTY BUFFER FUNCTION
1168 005622 004737 007014      EMPFLAG:      JSR PC,TRCK      ;TEST FOR TR FLAG
1169
1170 005626 117737 173356 006436      CKBYTE:      MOVB DRXDB,BADBYTE      ;SAVE BYTE FROM DISKETTE
1171 005634 063737 006436 005746      ADD BADBYTE,CKSUM      ;ACCUMULATE CHECK SUM
1172 005642 123720 006436      CMPB BADBYTE,(R0)+      ;COMPARE AGAINST GOOD BYTE
1173 005646 001054      BNE DATAER      ;IF NOT EQUAL GO TO DATAER
1174 005650 005237 006434      INC BYTECNTR
1175 005654 000762      BR EMPFLAG      ;GET NEXT BYTE
1176

```

1177	005656	113737	011360	016604	ADJSUM:	MOVB TARGET, BUFADR	;SET FIRST AND SECOND BYTES WITH ADDRESS'S
1178	005664	113737	012310	016605		MOVB TSECTOR, BUFADR+1	
1179	005672	013737	010612	005746		MOV SUM, CKSUM	;GET THE PATTERN SUM
1180	005700	063737	011360	005746		ADD TARGET, CKSUM	;ADD TRACK ADDRESS TO CHECK SUM
1181	005706	063737	012310	005746		ADD TSECTOR, CKSUM	;ADD SECTOR ADDRESS TO CHECK SUM
1182	005714	113737	005746	017002		MOVB CKSUM, BUFADR+176	;INSERT CHECK SUM TO DATA BUFFER
1183	005722	106337	005746			ASLB CKSUM	;GENERATE NEGITIVE CHECK SUM
1184	005726	105437	005746			NEGB CKSUM	
1185	005732	113737	005746	017003		MOVB CKSUM, BUFADR+177	;INSERT NEG. SUM INTO DATA BUFFER
1186	005740	012700	016604			MOV #BUFADR, RO	;SET ADDRESS OF BYTE IN RO
1187	005744	000207				RTS PC	;RETURN
1188							
1189	005746	000000			CKSUM:	0	
1190							
1191	005750	005726			EMPER:	TST (SP)+	;REMOVE THE DONE RETURN FROM THE STACK
1192	005752	012737	015402	003264		MOV #EMPTY, PTYP1+2	;PUT ADDR OF EMPTYBUF MESSAGE IN PAR ER TYFOUT 1
1193	005760	012737	015402	003354		MOV #EMPTY, PTYP2+2	;PUT ADDR OF EMPTYBUF MESSAGE IN PAR ER TYFOUT 2
1194	005766	012737	005536	003334		MOV #EMPBUFF, PCONT+2	;NOT HARD ERR RETURN THROUGH PCONT TO EMPTYBUF
1195	005774	000137	003244			JMP PARTEST	;REPORT PARITY ERROR
1196							
1197	006000	052737	000400	010704	DATAER:	BIS #BIT8, UNITSEL	;SET THE HAD ERROR FLAG
1198	006006	005237	006442			INC ERCNTR	;INC THE BYTE ERROR COUNTER
1199	006012	104405				CKSWR	
1200	006014	032777	020000	173172		BIT #SW13, QSWR	;TEST PRINT ERROR SW IN SWR
1201	006022	001052				BNE NOERTYP	;DON'T PRINT THE ERROR
1202	006024	032777	010000	173162		BIT #SW12, QSWR	;TEST PRINT 10 ERRORS SWITCH
1203	006032	001404				BEQ 1\$	;PRINT ALL ERRORS
1204	006034	023727	006442	000012		CMP ERCNTR, #10.	;HAVE 10 ERRORS BEEN TYPED
1205	006042	003052				BGT NOERTYP	;YES, DON'T PRINT ANY MORE
1206	006044	005737	004126		1\$:	TST DATAK	;WAS THIS A READ CHECK DUE TO CRC ERROR
1207	006050	001403				BEQ 2\$	;NO, REPORT DATA ERRORS
1208	006052	105701				TSTB R1	;YES, TEST FIRST ERROR FLAG
1209	006054	106717				BPL TYPERR	;TYPE THE DATA CRC ERROR
1210	006056	000712				BR 3\$	
1211	006060	105701			2\$:	TSTB R1	;TEST FIRST ERROR FLAG
1212	006062	100014				BPL TYPERR	
1213	006064	104400	015052			TYPE ,MCRLF	
1214	006070	104400	014527			TYPE ,MDERHDR	;PRINT ERROR HEADER
1215	006074	104400	015052			TYPE ,MCRLF	
1216	006100	004737	007716			JSR PC, TYPADR	;PRINT TRACK AND SECTOR LOCATIONS
1217	006104	104400	014616		3\$:	TYPE ,MCOLMUN	;SET UP COLMUN HEADINGS
1218	006110	042701	000200			BIC #BIT7, R1	;CLEAR FIRST ERROR FLAG
1219	006114	013737	006434	006126	TYPERR:	MOV BYTECNTR, 1\$	;PRINT BYTE NUMBER
1220	006122	004537	014446			JSR R5, SGLDEC	
1221	006126	000000			1\$:	OPEN	
1222	006130	104400	015047			TYPE ,DBLSP	
1223	006134	013746	006436			MOV BADBYTE, -(SP)	;PRINT BYTE READ FROM DISKETTE
1224	006140	104402				TYPOS	
1225	006142	000003				.WORD 3	
1226	006144	104400	015047			TYPE ,DBLSP	
1227	006150	114037	006440			MOVB -(RO), GOODBYTE	;GET GOOD BYTE
1228	006154	005200				INC RO	;RETURN RO TO NEXT BYTE IN BUFFER
1229	006156	013746	006440			MOV GOODBYTE, -(SP)	
1230	006162	104403				TYPON	;PRINT GOOD DATA
1231	006164	104400	015052			TYPE ,MCRLF	
1232	006170	104405			NOERTYP:	CKSWR	

1233	006172	005777	173016		TST 2SWR	;TEST HALT ON ERROR SWITCH
1234	006176	100001			SPL CONT20	
1235	006200	000000		HLT14:	HALT	
1236	006202	005237	006434	CONT20:	INC BYTECNTR	
1237	006206	000137	005622		JMP EMPFLAG	
1238						
1239	006212	005737	004126	EMPDONE:	TST DATAK	;WAS THIS READCHECK CAUSED BY CRC ERROR
1240	006216	001401			BEQ 1\$	;NO CONTINUE
1241	006220	000207			RTS PC	;YES, RETURN TO CRC ERROR HANDLER
1242	006222	005737	006442	1\$:	TST ERCNTR	;WAS THERE ERRORS
1243	006226	001471			BEQ CONT3	;NO ERRORS
1244	006230	104405			CKSWR	
1245	006232	032777	020000	172754	BIT 2SW13, 2SWR	;YES, TEST DON'T PRINT SWITCH
1246	006240	001024			BNE 2\$	;DON'T PRINT THE ERROR
1247	006242	104400	015333		TYPE, MERC	;PRINT THE TOTAL DATA ERROR COUNT
1248	006246	013737	006442	006260	MOV ERCNTR, 3\$	
1249	006254	004537	014446		JSR RS, SGLDEC	
1250	006260	000000		3\$:	OPEN	
1251	006262	104400	016327		TYPE, MSUM	;INDICATE IF CHECK SUM WAS GOOD OR HAD ERRORS
1252	006266	105737	005746		TSTB CKSUM	
1253	006272	001403			BEQ 4\$	
1254	006274	104400	016067		TYPE, MERS	
1255	006300	000402			BR 5\$	
1256	006302	104400	016322	4\$:	TYPE, MGOOD	
1257	006306	104400	015052	5\$:	TYPE, MCRLF	
1258	006312	012703	017062	2\$:	MOV 2\$DATALOG, R3	;SET INC.INST.FOR UNIT 0 ERROR LOG
1259	006316	004737	021044		JSR PC, UILOG	;TEST FOR UNIT 1 ERROR LOGS
1260	006322	005213			INC (R3)	;INC DATA ERROR LOG
1261	006324	004737	003770		JSR PC, TRKERR	;INC ERROR PER TRACK COUNTER
1262	006330	104405			CKSWR	
1263	006332	032777	004000	172654	BIT 2SW11, 2SWR	;TEST NO RETRY SWITCH
1264	006340	001007			BNE 6\$	;IF SET LOG HARD ERROR
1265	006342	005337	017012		DEC DATARETRY	;HAVE 10 ERRORS BEEN LOGED
1266	006346	001404			BEQ 6\$	
1267	006350	004737	004246		JSR PC, REREAD	;NO, GO REREAD THE DATA
1268	006354	000137	005536		JMP EMPBUFF	;GO RECHECK THE DATA
1269	006360	012703	017122	6\$:	MOV 2\$DATALOG, R3	;YES, SET INC.INST.FOR UNIT 0 ERROR LOG
1270	006364	004737	021044		JSR PC, UILOG	;TEST FOR UNIT 1 ERROR LOGS
1271	006370	005213			INC (R3)	;INC HARD DATA NO STATUS ERROR
1272	006372	104400	015240		TYPE, DBLLF	
1273	006376	104400	015755		TYPE, MUNREC	;TYPE UNRECOVERABLE DATA NO
1274	006402	104400	014527		TYPE, MDERHOR	;STATUS ERROR
1275	006406	104400	015052		TYPE, MCRLF	
1276	006412	005337	012306	CONT3:	DEC SECCNTR	
1277	006416	001405			BEQ EXIT	
1278	006420	004737	004204		JSR PC, XREAD	;READ THE NEXT SECTOR
1279	006424	000137	005536		JMP EMPBUFF	
1280	006430	005001		3\$:	CLR R1	;CLEAR THE ONE READ FLAG
1281	006432	000207		EXIT:	RTS PC	
1282						
1283	006434	000000		BYTECNTR:	0	
1284	006436	000000		BADBYTE:	0	
1285	006440	000000		GOODBYTE:	0	
1286	006442	000000		ERCNTR:	0	
1287						
1288						

;*****

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1289
1290                                     ;READ AND VERIFY ALL SECTORS WRITTEN BY
1291                                     ;PREVIOUS WRITE FUNCTION
1292
1293                                     ;   T = 4
1294
1295 006444 004737 010312      RDCHK:      JSR PC,GETPATTERN
1296 006450 004737 011144      XRDCHK:     JSR PC,INITTRACKS
1297 006454 004737 010614      JSR PC,GETUNIT
1298 006460 004737 011254      1$:         JSR PC,GETTRACK
1299 006464 004737 005526      JSR PC,READCHK
1300 006470 005337 011356      DEC TRKNTR
1301 006474 001371           BNE 1$
1302 006476 004737 010732      JSR PC,STOP
1303 006502 000762           BR XRDCHK
1304
1305
1306 ;;*****
1307
1308                                     ;DO A READ ONLY FUNCTION ON ALL SECTORS
1309                                     ;THIS DOES NOT VERIFY THE DATA, ONLY TESTS FOR CRC ERRORS
1310                                     ;   T = 5
1311
1312 006504 004737 010312      RDONLY:      JSR PC,GETPATTERN
1313 006510 004737 011144      XRDONLY:     JSR PC,INITTRACKS
1314 006514 004737 010614      JSR PC,GETUNIT
1315 006520 004737 011254      1$:         JSR PC,GETTRACK
1316 006524 004737 004200      JSR PC,READ
1317 006530 005337 011356      DEC TRKNTR
1318 006534 001371           BNE 1$
1319 006536 004737 010732      JSR PC,STOP
1320 006542 000762           BR XRDONLY
1321
1322
1323 ;;*****
1324
1325                                     ;WRITE AND READ CHECK ANY DATA PATTERN,AND ANY TRACK SEQUENCE
1326                                     ;BUT ALTERNATE BETWEEN DRIVE UNITS ON EACH TRACK SELECTED.
1327                                     ;   T = 6
1328
1329
1330 006544 005137 004122      DRVSUP:      COM RDAFTWT      ;SET THE READ AFTER WRITE FLAG
1331 006550 004737 010312      JSR PC,GETPATTERN
1332 006554 004737 011144      2$:         JSR PC,INITTRACKS
1333 006560 004737 010614      1$:         JSR PC,GETUNIT      ;SET UP FOR UNIT 0
1334 006564 004737 011254      JSR PC,GETTRACK      ;GET THE TRACK TO BE ACCESSED
1335 006570 004737 003112      JSR PC,WRITE
1336 006574 004737 005526      JSR PC,READCHK
1337 006600 004737 010614      JSR PC,GETUNIT      ;NOW GO TO UNIT 1 ON THE SAME TRACK
1338 006604 004737 003112      JSR PC,WRITE
1339 006610 004737 005526      JSR PC,READCHK
1340 006614 005337 011356      DEC TRKNTR
1341 006620 001357           BNE 1$
1342 006622 004737 010732      JSR PC,STOP
1343 006626 000752           BR 2$
1344

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1345
1346
1347 ;*****
1348 ;THE FIRST HALF OF TEST 7 FORCES THE TRACK SEQUENCE
1349 ;TO INCRIMENT UP THROUGH ALL THE TRACKS DOING WRITE / READ CHECK FUNCTIONS.
1350 ;THIS VERIFIES THAT ALL THE TRACKS ARE ACCESSABLE.
1351 ;THE SECOND HALF OF THE PASS WILL USE THE SEQUENCE SELECTED BY THE
1352 ;OPERATOR AS INDICATED BELOW, AND ONLY READ CHECK THE DATA JUST WRITTEN.
1353 ;THIS VERIFIES THAT THE DATA CAN BE READ FROM A TRACK AFTER THE HEAD HAS BEEN
1354 ;MOVED AWAY FROM AND BACK TO THAT TRACK. AT THE COMPLETION OF THE PASS
1355 ;THE DELETED DATA BIT IN TEST CONDITIONS IS COMPLEMENTED AND THE NEXT
1356 ;PASS WILL BE RUN UNDER THIS NEW CONDITION.
1357 ; T = 0 OR 7
1358 006630 004737 010312 TEST7: JSR PC,GETPATTERN
1359 006634 013737 011370 007012 MOV SEQUEN,SEQSAV ;SAVE THE SELECTED SEQUENCE
1360 006642 012737 000001 011370 TEST7X: MOV #1,SEQUEN ;FORCE INCREMENT SEQUENCE
1361 006650 005137 004122 COM RDAFTWT ;SET READ AFTER WRITE FLAG FOR ERROR TESTING
1362 006654 004737 011144 JSR PC,INITTRACKS
1363 006660 004737 010614 JSR PC,GETUNIT
1364 006664 004737 011254 1$: JSR PC,GETTRACK
1365 006670 004737 003112 JSR PC,WRITE
1366 006674 004737 005526 JSR PC,READCHK
1367 006700 005337 011356 DEC TRKCNTR ;IS THE FIRST HALF OF THE PASS DONE
1368 006704 001367 BNE 1$ ;NO,CONTINUE WRITING AND READING
1369 006706 005037 004122 CLR RDAFTWT ;YES,NOW DO A READ ONLY
1370 006712 013737 007012 011370 MOV SEQSAV,SEQUEN ;USING SELECTED SEQUENCE
1371 006720 004737 011144 JSR PC,INITTRACKS
1372 006724 004737 011254 2$: JSR PC,GETTRACK
1373 006730 004737 005526 JSR PC,READCHK
1374 006734 005337 011356 DEC TRKCNTR ;IS THIS HALF OF THE PASS DONE
1375 006740 001371 BNE 2$ ;NO,CONTINUE READ CHECKING
1376 006742 004737 010732 JSR PC,STOP ;YES,TEST FOR END OF PASS CONDITIONS
1377 006746 032737 040100 010704 BIT #40100,UNITSEL ;HAVE ALL SELECTED UNITS BEEN USED
1378 006754 001332 BNE TEST7X ;IF A USED BIT IS STILL SET GO TO NEXT DRIVE
1379 006756 012706 001200 MOV #1200,SP ;RESET STACK ADDRESS FOR ACT11 EOP
1380 006762 032737 001000 001212 BIT #BIT9,DTESTP ;NEXT PASS,COMPLEMENT D D BIT
1381 006770 001404 BEQ 3$
1382 006772 042737 001000 001212 BIC #BIT9,DTESTP ;IT WAS ON CLEAR IT
1383 007000 000720 BR TEST7X
1384 007002 052737 001000 001212 3$: BIS #BIT9,DTESTP ;IT WAS OFF SET IT
1385 007010 000714 BR TEST7X
1386
1387 007012 000000 SEQSAV: 0
1388 ;*****
1389
1390 ;TEST FOR TRANSFER FLAG AND PROGRAM NOT HUNG
1391
1392 007014 005037 007200 TRCK: CLR HCNTRI ;CLEAR HUNG COUNTER
1393 007020 012746 000340 MOV #PR7,-(SP) ;RAISE INTERRUPT LEVEL TO INHIBIT INTERRUPTS
1394 007024 012746 007032 MOV #3$,-(SP)
1395 007030 000002 RTI
1396 007032 105777 172150 3$: TSTB DRXCS ;TEST FOR TR FLAG
1397 007036 100001 BPL 1$ ;SKIP NEXT INST. IF NOT SET
1398 007040 000207 RTS PC ;RETURN TO TRANSFER DATA
1399 007042 023727 006434 000200 1$: CMP BYTECNTR,#128. ;HAVE 128 BYTES BEEN TRANSFERED
1400 007050 001403 BEQ 2$ ;ALLOW AN INTERUPR IF EQUAL

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E04

MAINDEC-11-DZRXA-E MACY11 27(732) 20-SEP-76 15:46 PAGE 27
 DZRXAE.P11 GET VALUE FOR SOFTWARE SWITCH REGISTER

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1401 007052 005237 007200          INC HCNTR1          ; IF THE HUNG COUNTER OVERFLOWES EITHER
1402                                     ; THERE WAS NO TR FLAG OR NO INTERRUPT OCCURED
1403                                     ; AFTER 128 BYTES TRANSFERED
1404 007056 001365                                     BNE 3$          ; NO OVERFLOW RETEST FOR TR FLAG
1405 007060 132777 000040 172120 2$:  BITB #DONEBIT,ARXCS ; TEST FOR A DONE FLAG WHICH WOULD INDICATE A
1406                                     ; POSSABLE ERROR CONDITION EXISTS WHILE
1407                                     ; TRANSFERING COMMANDS OR DATA
1408 007066 001407                                     BEQ 4$          ; IF DONE NOT SET TYPE HUNG
1409 007070 005037 006434          CLR BYTECNTR        ; CLEAR BYTE COUNTER SO IT WON'T INTERFERE
1410                                     ; WITH TESTING FOR DONE.
1411 007074 005726          TST (SP)+          ; REMOVE THIS RETURN ADDRESS FROM STACK
1412 007076 005046          CLR -(SP)          ; LOWER INTERRUPT LEVEL TO ACCEPT AN INTERRUPT
1413 007100 012746 007106          MOV #4$,-(SP) ; THE INTERRUPT WILL RETURN THROUGH PREVIOUSLY
1414 007104 000002          RTI                ; SET ADDRESSES
1415 007106 005237 007200          INC HCNTR1        ; ALLOW SOME TIME FOR FLAG TO SET
1416 007112 001362          BNE 2$
1417 007114 104400 015432          TYPE ,MHUNG
1418 007120 000000          HLT21:             HALT
1419                                     ; PROGRAM HUNG, SP (177706) CONTAINS RETURN
1420                                     ; ADDRESS OF WAITING LOOP
1421                                     ; TEST FOR DONE FLAG AND PROGRAM HUNG
1422 007122 012603          DONECK:             MOV (SP)+,R3 ; TAKE THE RETURN ADDRESS OF THE STACK INCASE
1423                                     ; THE PROGRAM IS EXPECTING AN INTERRUPT AT DONE
1424 007124 005037 007200          CLR HCNTR1        ; CLEAR THE LOWER HUNG COUNTER
1425 007130 012737 177740 007202          MOV #177740,HCNTR2 ; SET UPER COUNTER FOR 31 FULL LOOPS
1426 007136 032777 000040 172042 2$:  BIT #DONEBIT,ARXCS ; TEST FOR DONE FLAG
1427 007144 001402          BEQ 1$              ; IF NOT SET SKIP RETURN
1428 007146 010346          MOV R3, -(SP)        ; PUT RETURN ADDRESS BACK ON THE STACK
1429 007150 000207          RTS PC              ; RETURN
1430 007152 062737 000001 007200 1$:  ADD #1,HCNTR1 ; WHEN THE DOUBLE WORD COUNTER OVERFLOWES
1431 007160 005537 007202          ADC HCNTR2      ; THE PROGRAM MUST BE HUNG
1432 007164 005737 007202          TST HCNTR2
1433 007170 001362          BNE 2$              ; IF NO OVERFLOW RETEST FOR DONE
1434 007172 104400 015432          TYPE ,MHUNG
1435 007176 000000          HLT20:             HALT
1436                                     ; PROGRAM HUNG, CONTENTS OF R3 (177703) HOLDES
1437                                     ; ADDRESS OF WAITING TEST.
1438 007200 000000          HCNTR1:             0
1439 007202 177740          HCNTR2:             177740
1440                                     ; AN INTERRUPT DID NOT OCCURE AT A FUNCTION DONE FLAG.
1441
1442
1443 007204 005237 017034          NOINTER:        INC INTER          ; INC INTERRUPT ERROR COUNTER
1444 007210 104405          CKSWR
1445 007212 032777 020000 171774          BIT #SW13,ASWR ; TEST DON'T PRINT ERROR SWITCH
1446 007220 001004          BNE 1$              ;
1447 007222 104400 015260          TYPE ,MINTER    ; TYPE NO INTERRUPT ON DONE ERROR
1448 007226 104400 015052          TYPE ,MCRLF
1449 007232 104405          1$:                CKSWR
1450 007234 005777 171754          TST ASWR        ; TEST HALT ON ERROR SWITCH
1451 007240 100001          BPL CONT21
1452 007242 000000          HLT15:             HALT          ; HALT ON ERROR
1453 007244 004737 007250          CONT21:        JSR PC,INTSERV ; JSR TO INTSERV AS IF IT WAS AN INTERRUPT
1454
1455                                     ; ; *****
1456

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F04

MAINDEC-11-DZRXA-E MACY11 27(732) 20-SEP-76 15:46 PAGE 28
 DZRXAE.P11 GET VALUE FOR SOFTWARE SWITCH REGISTER

1457 ;INTERUPT SERVICE

1458											
1459	007250	117737	171734	010070	INTSERV:	MOVB 2RXDB,ASTAT					;SAVE THE ERROR AND STATUS WORD
1460	007256	005777	171724			TST 2RXCS					;TEST THE ERROR FLAG
1461	007262	100450				BMI RXERROR					;THERE WAS AN ERROR GO REPORT IT
1462	007264	032737	000004	010070		BIT #BIT2,ASTAT					;IS INIT DONE SET
1463	007272	001402				BEQ 2\$					;NO, CONTINUE
1464	007274	000137	007702			JMP RXPWR					;YES, REPORT POWER FAILED AND RESTART
1465	007300	032737	000003	010070	2\$:	BIT #3,ASTAT					;ARE PAR OR CRC BITS SET
1466	007306	001023				BNE 1\$					;YES GO LOG ERROR
1467	007310	132777	000040	171670		BITB #DONEBIT,2RXCS					;IS DONE SET
1468	007316	001014				BNE 3\$					;IF SET RETURN TO TEST
1469	007320	005237	017032			INC UKNINT					;INC UNKNOWN INTERRUPT ERROR LOG
1470	007324	104405				CKSWR					
1471	007326	032777	020000	171660		BIT #SW13,2SWR					;TEST DON'T PRINT ERROR SWITCH
1472	007334	001004				BNE 4\$					;DON'T PRINT
1473	007336	104400	015312			TYPE ,MUKNINT					;TYPE UNKNOWN INTERRUPT
1474	007342	104400	015052			TYPE ,MCRLF					
1475	007346	000002			4\$:	RTI					;RETURN FROM THE INTERRUPT
1476	007350	062706	000006		3\$:	ADD #6,SP					;BYPASS INTERRUPT POINTERS ON STACK
1477	007354	000207				RTS PC					;RETURN TO PROGRAM
1478	007356	005237	017030		1\$:	INC NOERLOG					;NO STATUS ERROR FLAG ERROR
1479	007362	104405				CKSWR					
1480	007364	032777	020000	171622		BIT #SW13,2SWR					;TEST DON'T PRINT ERROR SWITCH
1481	007372	001004				BNE RXERROR					
1482	007374	104400	016034			TYPE ,MNOFLAG					;TYPE NO STATUS ERROR ERROR
1483	007400	104400	015052			TYPE ,MCRLF					
1484											
1485	007404	052737	000400	010704	RXERROR:	BIS #BIT8,UNITSEL					;SET HAD ERROR FLAG
1486	007412	012737	000012	017014		MOV #10,P2RETRY					;SET RETRY COUNTER
1487	007420	012777	000017	171560	2\$:	MOV #ORDER,2RXCS					;GET THE ERROR CODE
1488	007426	004737	007122			JSR PC,DONECK					;TEST FOR DONE FLAG
1489	007432	032777	000002	171550		BIT #2,2RXDB					;WAS THERE A PARITY ERROR
1490	007440	001403				BEQ 1\$					;NO, CONTINUE
1491	007442	004737	002046			JSR PC,STATERR					;YES, GO REPORT THE PARITY ERROR
1492	007446	000764				BR 2\$					;REISSUE THE FUNCTION
1493	007450	117737	171534	010072	1\$:	MOVB 2RXDB,BSTAT					;SAVE THE ERROR CODE IN B STATUS
1494	007456	005737	010072			TST BSTAT					;IS THERE A DEFINITE CODE
1495	007462	001407				BEQ NOPRNT					;NO, CONTINUE
1496	007464	013705	010072			MOV BSTAT,R5					;ADJUST ERROR CODE TO PRODUCE AN EVEN ADDR
1497	007470	006005				ROR R5					;OF THE CORRESPONDING COUNTER
1498	007472	006005				ROR R5					
1499	007474	062705	017130			ADD #ERCODE-2,R5					;ADD ON ADD7 OF ERROR LOG -2, AS THERE IS NO 0
1500											;ERROR CODE. THE CONTENTS OF R5 WILL READJUST
1501											;ADDRESS TO CORRECT LOG.
1502	007500	005215				INC (R5)					;INC THE CORRECT ERROR CODE COUNTER
1503	007502	104405			NOPRNT.	CKSWR					
1504	007504	032777	020000	171502		BIT #SW13,2SWR					;TEST PRINT ERROR SWITCH IN SWR
1505	007512	001032				BNE 2\$					
1506	007514	104400	015052			TYPE ,MCRLF					
1507	007520	104400	015063			TYPE ,MERHEADER					;TYPE ERROR HEADER
1508	007524	104400	016142			TYPE ,MPASS					;TYPE PASSES COMPLETED AT ERROR
1509	007530	013737	021042	007542		MOV PASCNTR,1\$					
1510	007536	004537	014446			JSR R5,SGLDEC					
1511	007542	000000			1\$:	OPEN					
1512	007544	104400	015052			TYPE ,MCRLF					

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 DZRXAE.P11 GET VALUE FOR SOFTWARE SWITCH REGISTER

1513	007550	104400	015167			TYPE ,MRXCS	;TYPE COMMAND STATUS REGISTER
1514	007554	013746	004120			FUNCTION,-(SP)	;SAVE FUNCTION FOR TYPEOUT
1515	007560	104402				;;GO TYPE--OCTAL ASCII	
1516	007562	003				;;TYPE 3 DIGIT(S)	
1517	007563	000				;;SUPPRESS LEADING ZEROS	
1518	007564	004737	007716			JSR PC,TYPADR	;TYPE ADDRESSES AND RUN CONDITIONS
1519	007570	104400	015052			TYPE ,MCRLF	
1520	007574	004737	010250			JSR PC,TYP CODE	;PRINT THE STATUS REGISTERS
1521	007600	032737	000020	004120	2\$:	BIT #BIT4,FUNCTION	;WHAT DRIVE IS BEING USED
1522	007606	001006				BNE 6\$	
1523	007610	012777	000013	171370		MOV #RDOSTAT,ARXCS	;DRIVE 0 BEING USED
1524	007616	004737	007122		5\$:	JSR PC,DONECK	;TEST FOR DONE FLAG
1525	007622	000404				BR 7\$	
1526	007624	012777	000033	171354	6\$:	MOV #RD1STAT,ARXCS	;DRIVE 1 BEING USED
1527	007632	000771				BR 5\$	
1528	007634	032777	000002	171346	7\$:	BIT #2,ARXDB	;WAS THERE A PARITY ERROR
1529	007642	001403				BEQ 3\$	;NO CONTINUE
1530	007644	004737	002046			JSR PC,STATERR	;YES,REPORT THE ERROR
1531	007650	000753				BR 2\$	;REISSUE THE COMMAND
1532	007652	105777	171332		3\$:	TSTB ARXDB	;WAS DRIVE READY SET
1533	007656	100406				BMI 4\$	;YES RETURN
1534	007660	104400	015016			TYPE ,MNODRY	
1535	007664	104400	015052			TYPE ,MCRLF	
1536	007670	004737	010074			JSR PC,DELUNIT	;NO GO DELETE THAT UNIT
1537	007674	062706	000004		4\$:	ADD #4,SP	;MOVE ERROR RETURN TO TOP OF STACK
1538	007700	000207				RTS PC	
1539							
1540	007702	104400	016344		RXPWR:	TYPE ,MRX11	;ONLY THE RX11 POWER HAS FAILED
1541	007706	104400	014136			TYPE ,SPOWER	;PRINT POWER FAILED
1542	007712	000137	002700			JMP RESTART	;GO TO RESTART
1543							
1544							
1545	007716	104400	014555		TYPADR:	TYPE ,MTRK	;TYPE TRACK ADDRESS
1546	007722	013737	011360	007734		MOV TARGET,3\$	
1547	007730	004537	014446			JSR R5,SGLDEC	
1548	007734	000000			3\$:	OPEN	
1549	007736	104400	014604			TYPE ,MSECT	;TYPE SECTOR ADDRESS
1550	007742	013737	012310	007762		MOV TSECTOR,2\$	
1551	007750	042737	177740	007762		BIC #177740,2\$	;CLEAR ALL BUT SECTOR ADDRESS
1552	007756	004537	014446			JSR R5,SGLDEC	
1553	007762	000000			2\$:	OPEN	
1554	007764	104400	015047			TYPE ,DBLSP	
1555	007770	032737	000020	010704		BIT #BIT4,UNITSEL	;WHICH DRIVE IS BEING USED
1556	007776	001003				BNE 1\$	
1557	010000	104400	015106			TYPE ,MUNIT0	;TYPE UNIT 0
1558	010004	000402				BR TYPSEL	
1559	010006	104400	015116		1\$:	TYPE ,MUNIT1	;TYPE UNIT 1
1560	010012	104400	015244		TYPSEL:	TYPE ,MPAT	;TYPE PATTERN CODE
1561	010016	013746	010420			PAT,-(SP)	;SAVE PAT FOR TYPEOUT
1562	010022	104402				;;GO TYPE--OCTAL ASCII	
1563	010024	001				;;TYPE 1 DIGIT(S)	
1564	010025	000				;;SUPPRESS LEADING ZEROS	
1565	010026	104400	015047			TYPE ,DBLSP	
1566	010032	104400	015250			TYPE ,MTEST	;TYPE TEST CODE
1567	010036	013746	002140			TEST,-(SP)	;SAVE TEST FOR TYPEOUT
1568	010042	104402				;;GO TYPE--OCTAL ASCII	

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1569	010044	001			.BYTE	1	::TYPE 1 DIGIT(S)
1570	010045	000			.BYTE	0	::SUPPRESS LEADING ZEROS
1571	010046	104400	015047			TYPE ,DBLSP	
1572	010052	104400	015254			TYPE ,MSEQ	::TYPE SEQUENCE CODE
1573	010056	013746	011370		MOV	SEQUEN,-(SP)	::SAVE SEQUEN FOR TYPEOUT
1574	010062	104402			TYPOS		::GO TYPE--OCTAL ASCII
1575	010064	001			.BYTE	1	::TYPE 1 DIGIT(S)
1576	010065	000			.BYTE	0	::SUPPRESS LEADING ZEROS
1577	010066	000207				RTS PC	
1578							
1579	010070	000000			ASTAT:	0	
1580	010072	000000			BSTAT:	0	
1581							
1582	010074	132737	000020	004120	DELUNIT:	BITB #BIT4,FUNCTION	::TEST FOR PRESENTLY USED UNIT
1583	010102	001016				BNE 3\$	
1584	010104	104400	015106			TYPE ,MUNITO	::UNIT 0 HAS BEEN DELETED FROM USE
1585	010110	104400	015126			TYPE ,MDELET	
1586	010114	104400	015240			TYPE ,DBLLF	
1587	010120	042737	000200	010704		BIC #BIT7,UNITSEL	::CLEAR UNIT 0 SELECTION BIT
1588	010126	005737	010704			TST UNITSEL	::WAS UNIT 1 SELECTED FOR USE
1589	010132	100020				BPL 1\$	::UNIT 1 NOT SELECTED GO DUMP ERROR REPORT
1590	010134	000137	002726		2\$:	JMP TESTSEL	::CONTINUE ON OTHER UNIT AT BEGINING OF TEST
1591	010140	104400	015116		3\$:	TYPE ,MUNITI	::UNIT 1 HAS BEEN DELETED FROM USE
1592	010144	104400	015126			TYPE ,MDELET	
1593	010150	104400	015240			TYPE ,DBLLF	
1594	010154	042737	100000	010704		BIC #BIT15,UNITSEL	::CLEAR UNIT 1 SELECTION BIT
1595	010162	105737	010704			TSTB UNITSEL	::WAS UNIT 0 SELECTED FOR USE
1596	010166	100762				BMI 2\$	::YES CONTINUE ON UNIT 0
1597	010170	005137	022514			COM SHORTRPT	::SET SHORT REPORT FLAG
1598	010174	000137	021062		1\$:	JMP ERDUMP	::CAN'T CONTINUE TYPE OUT STATISTICAL REPORT
1599							
1600							
1601	010200	117737	171004	010070	RDCODE:	MOVB #RDXB,ASTAT	::SAVE THE A STATUS
1602	010206	012777	000017	170772	2\$:	MOV #RDER,RXCS	::READ THE B STATUS REGISTER
1603	010214	004737	007122			JSR PC,DONECK	::WAIT FOR DONE FLAG
1604	010220	032777	000002	170762		BIT #2,RXDB	::WAS THERE A PARITY ERROR
1605	010226	001403				BEG 1\$	::NO,CONTINUE
1606	010230	004737	002046			JSR PC,STATERR	::YES,REPORT THE PARITY ERROR
1607	010234	000764				BR 2\$	::RETRY READING STATUS B
1608	010236	117737	170746	010072	1\$:	MOVB #RDXB,BSTAT	::SAVE THE B STATUS CODES
1609	010244	104400	015052			TYPE ,MCRLF	
1610	010250	104400	015210		TYPCODE:	TYPE ,MASTAT	::TYPE THE CONTENTS OF THE TWO STATUS REGISTERS
1611	010254	013746	010070		MOV	ASTAT,-(SP)	::SAVE ASTAT FOR TYPEOUT
1612	010260	104402			TYPOS		::GO TYPE--OCTAL ASCII
1613	010262	003			.BYTE	3	::TYPE 3 DIGIT(S)
1614	010263	000			.BYTE	0	::SUPPRESS LEADING ZEROS
1615	010264	104400	015040			TYPE ,TAB	
1616	010270	104400	015224			TYPE ,MBSTAT	
1617	010274	013746	010072		MOV	BSTAT,-(SP)	::SAVE BSTAT FOR TYPEOUT
1618	010300	104402			TYPOS		::GO TYPE--OCTAL ASCII
1619	010302	003			.BYTE	3	::TYPE 3 DIGIT(S)
1620	010303	000			.BYTE	0	::SUPPRESS LEADING ZEROS
1621	010304	104400	015052			TYPE ,MCRLF	
1622	010310	000207				RTS PC	
1623							
1624							

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;*****

;DECODES THE DATA PATTERN SELECTED IN THE SWR

;BITS 6,7,AND 8 OF THE INITIAL SWR SELECTED THE DATA PATTERN
;TO BE USED AS FOLLOWS:

BITS			DATA PATTERN
8	7	6	
0	0	0	NO PATTERN SPECIFIED (FORCE RANDOM DATA)
0	0	1	ALL ZEROS
0	1	0	ALL ONES
0	1	1	FLOATING ZERO
1	0	0	FLOATING ONE
1	0	1	ALTERNATING BITS
1	1	0	ALTERNATING PAIRS OF BITS
1	1	1	RANDOM

NOTE: ALL DATA PATTERNS WILL BE MODIFIED SO THE FIRST BYTE WILL
CONTAIN THE TRACK ADDRESS. THE SECOND BYTE WILL CONTAIN THE UNIT
NUMBER AND SECTOR ADDRESS IN WHICH THE DATA IS WRITTEN. THE LAST
TWO BYTES CONTAIN THE CHECK SUM NUMBERS.

;*****

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1651 010312 142737 000377 010360 GETPATTERN: BICB #377,2#BRONPAT ;CLEAR BRANCH OFFSET
1652 010320 005037 010612 CLR SUM ;SET UP FOR ACCUMULATION OF CHECK SUM
1653 010324 005737 010420 TST PAT ;IF NO PATTERN SPECIFIED FORCE PATTERN 7
1654 010330 001003 RNE 1$
1655 010332 012737 000007 010420 MOV #7,PAT
1656 010340 013704 010420 1$: MOV PAT,R4 ;GET PATTERN BITS
1657 010344 005304 DEC R4 ;ADJUST FOR CORRECT OFFSET
1658 010346 006304 ASL R4
1659 010350 150437 010360 BISB R4,2#BRONPAT ;INSERT OFFSET
1660 010354 012704 016606 MOV #BUFADR+2,R4 ;SET UP ADDRESS OF FIRST BYTE
1661 010360 000777 BR . ;BRANCH BY OFFSET SELECTED
1662 010362 000137 010422 JMP DATA0 ;000 DATA BYTE
1663 010366 000137 010434 JMP DATA1 ;377 DATA BYTE
1664 010372 000137 010444 JMP FLOAT0 ;FLOAT A 0 THROUGH ALL 1'S
1665 010376 000137 010506 JMP FLOAT1 ;FLOAT A 1 THROUGH ALL 0'S
1666 010402 000137 010514 JMP PAT125 ;125/052 DATA WORD
1667 010406 000137 010534 JMP PAT314 ;314/063 DATA WORD
1668 010412 000137 010544 JMP RANDATA ;RANDOM DATA BYTE

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1671 010416 000000 DATABYTE: 0
1672 010420 000000 PAT: 0

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;*****

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;LOAD SOFTWARE BUFFER WITH ALL ZEROS
; P = 1

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1680 010422 005037 010416 DATA0: CLR DATABYTE

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 DZRXAE.P11 GET VALUE FOR SOFTWARE SWITCH REGISTER

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1681 010426 004737 010564 PATGEN: JSR PC,LOAD ;GO LOAD THE DATA BUFFER
1682 010432 000775 BR PATGEN
1683
1684 ;;*****
1685
1686 ;LOAD SOFTWARE BUFFER WITH ALL ONES
1687 ; P = 2
1688
1689
1690 010434 112737 000377 010416 DATA1: MOVB #377,DATABYTE
1691 010442 000771 BR PATGEN
1692
1693 ;;*****
1694
1695 ;FLOAT A 0 THROUGH ONES IN SOFTWARE BUFFER
1696 ; P = 3
1697
1698
1699 010444 112737 000376 010416 FLOAT0: MOVB #376,DATABYTE ;SET UP A ONES FIELD
1700 010452 000261 XPATGEN: SEC ;SET THE C BIT TO ROTATE THROUGH THE DATA
1701 010454 012702 000000 1$: MOV #0,R2 ;CLR R2 (CAN'T USE "CLR" AS IT CLEARS "C" BIT)
1702 010460 103001 BCC 2$ ;BR IF THE "C" BIT IS CLEARED
1703 010462 005202 INC R2 ;SET R2 IF NOT
1704 010464 004737 010564 2$: JSR PC,LOAD ;GO LOAD THE DATA BUFFER
1705 010470 000241 CLC
1706 010472 005702 TST R2 ;IS R2 NONZERO
1707 010474 001401 BEQ 3$
1708 010476 000261 SEC ;YES, SET THE "C" BIT
1709 010500 106137 010416 3$: ROLB DATABYTE
1710 010504 000763 BR 1$
1711
1712 ;;*****
1713
1714 ;FLOAT A 1 THROUGH ALL ZEROS IN SOFTWARE BUFFER
1715 ; P = 4
1716
1717 010506 005037 010416 FLOAT1: CLR DATABYTE
1718 010512 000757 BR XPATGEN
1719
1720 ;;*****
1721
1722 ;LOAD SOFTWARE BUFFER WITH ALTERNATING 1 AND 0 FOR
1723 ;ONE BYTE AND THE COMPLIMENT INTO THE NEXT
1724 ; P = 5
1725
1726 010514 112737 000125 010416 PAT125: MOVB #125,DATABYTE
1727 010522 004737 010564 XXPATGEN: JSR PC,LOAD
1728 010526 105137 010416 COMB DATABYTE ; * (SEE NOTE BELOW )
1729 010532 000773 BR XXPATGEN
1730
1731 ; * NOTE: TO MAKE PATTERN 5 AND 6 COMPATABLE WITH THE RX8 PATTERNS
1732 ;NOP THIS INSTRUCTION. (CHANGE THESE 2 LOCATIONS TO 000240)
1733 ;THIS CHANGE IS FOR INTERPROCESSOR RX** COMPATABILITY TESTING ONLY.
1734
1735 ;;*****
1736

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 DZRXAE.P11 GET VALUE FOR SOFTWARE SWITCH REGISTER

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1737 ;LOAD SOFTWARE BUFFER WITH ALTERNATING PAIRS OF 1 AND 0 AND
1738 ;COMPLIMENT INTO THE NEXT
1739 ; P = 6
1740
1741 010534 112737 000314 010416 PAT314:      MOVB #314,DATABYTE
1742 010542 000767                                BR XXPATGEN
1743
1744 ;*****
1745
1746 ;LOAD SOFTWARE BUFFER WITH RANDOM DATA PATTERN
1747 ; P = 0 OR 7
1748
1749 010544 004737 012122 RANDATA:      JSR PC,RANGEN      ;GET RANDOM NUMBER
1750 010550 113737 012214 010416      MOVB RANUM,DATABYTE
1751 010556 004737 010564      JSR PC,LOAD
1752 010562 000770      BR RANDATA
1753
1754 010564 063737 010416 010612 LOAD:      ADD DATABYTE,SUM      ;ACCUMULATE THE PATTERN CHECK SUM
1755 010572 113724 010416      MOVB DATABYTE,(R4)+      ;LOAD THE DATA BUFFER
1756 010576 022704 017002      CMP #BUFADR+176,R4      ;HAVE 124 BYTES BEEN GENERATED
1757 010602 001401      BEQ 1$      ;IF YES, RETURN TO TEST
1758 010604 000207      RTS PC      ;IF NO, RETURN TO PATTERN GENERATOR
1759 010606 005726      TST (SP)+      ;TAKE PATTERN RETURN ADDRESS OF STACK
1760 010610 000207      RTS PC      ;RETURN TO TEST
1761
1762 010612 000000      SUM:      0
1763
1764 ;***** **
1765
1766 ;TEST FOR SELECTED UNITS, DRIVE READY, AND USED CONDITIONS
1767 ;ALSO CONTAINS A "HAD ERROR" FLAG TO BE TESTED AT EOP.
1768 ;THE BITS IN UNITSEL ARE USED AS FOLLOWS
1769
1770 ;BIT15 =UNIT 1 SELECTED VIA SWR
1771 ;BIT14 =UNIT 1 USED BIT
1772 ;BIT8  =THIS PASS HAD AN ERROR
1773 ;BIT7  =UNIT 0 SELECTED VIA SWR
1774 ;BIT6  =UNIT 0 USED BIT
1775 ;BIT4  =UNIT SELECTION FOR FUNCTION WORD
1776
1777 ;*****
1778
1779 010614 032737 000100 010704 GETUNIT:  BIT #BIT6,UNITSEL      ;WAS UNIT 0 JUST USED
1780 010622 001012                                BNE 1$      ;UNIT 0 USED CHECK UNIT 1
1781 010624 105737 010704                                TSTB UNITSEL      ;WAS UNIT 0 SELECTED
1782 010630 100007                                BPL 1$      ;NO GO TO UNIT 1
1783 010632 042737 040020 010704      BIC #40020,UNITSEL      ;CLEAR UNIT 1 USED BIT AND FUNCTION UNIT BIT
1784 010640 052737 000100 010704      BIS #BIT6,UNITSEL      ;SET UNIT 0 USED BIT
1785 010646 000207      RTS PC
1786 010650 005737 010704      1$:      TST UNITSEL      ;WAS UNIT 1 SELECTED
1787 010654 100012                                BPL 2$      ;NO RETURN
1788 010656 032737 040000 010704      BIT #BIT14,UNITSEL      ;HAS UNIT 1 BEEN USED
1789 010664 001006                                BNE 2$      ;YES RETURN
1790 010666 042737 000100 010704      BIC #BIT6,UNITSEL      ;CLEAR UNIT 0 USED BIT
1791 010674 052737 040020 010704      BIS #40020,UNITSEL      ;SET UNIT 1 USED BIT AND FUNCTION UNIT BIT
1792 010702 000207      2$:      RTS PC

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 DZRXAE.P11 GET VALUE FOR SOFTWARE SWITCH REGISTER

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1793
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1796 010704 000000 UNITSEL: 0
1797
1798 :TEST THAT ALL UNITS HAVE BEEN ACCESSED
1799
1800 010706 005737 010704 DONE: TST UNITSEL ;IS UNIT 1 SELECTED
1801 010712 100006 BPL 1$ ;NO RETURN
1802 010714 032737 040000 010704 BIT #BIT14,UNITSEL ;YES HAS IT BEEN USED
1803 010722 001002 BNE 1$ ;YES RETURN
1804 010724 062706 000002 ADD #2,SP ;BYPASS NOT DONE RETUPE ON STACK
1805 010730 000207 1$: RTS PC
1806
1807
1808 010732 004737 010706 STOP: JSR PC,DONE ;HAVE ALL DRIVES BEEN USED
1809 010736 005037 007200 CLR MCNTR1
1810 010742 005237 021042 INC PASCNTR ;KEEP TOTAL NUMBER OF PASSES
1811 010746 005737 011142 TST CHARCT ;HAVE 72 EOP INDICATORS BEEN TYPED
1812 010752 001005 BNE 3$
1813 010754 104400 015052 TYPE ,MCRLF ;YES DO A CRLF
1814 010760 012737 177670 011142 MOV #-72, CHARCT ;RESET CHARACTER COUNTER
1815 010766 005237 011142 3$: INC CHARCT
1816 010772 032737 000400 010704 BIT #BIT8,UNITSEL ;TEST HAD ERROR FLAG
1817 011000 001403 BEQ 2$ ;NO ERROR PRINT 0
1818 011002 104400 015057 TYPE ,MEREOP ;HAD ERROR PRINT ?
1819 011006 000404 BR 1$
1820 011010 104400 015055 2$: TYPE ,MEOP ;PRINT EOP INDICATOR
1821 011014 104400 015061 TYPE ,MABELL
1822 011020 104405 1$: CKSWR
1823 011022 032777 040000 170164 BIT #SW14,2SWR ;TEST EOP HALT SWITCH
1824 011030 001417 BEQ CONT22
1825 011032 104400 015052 TYPE ,MCRLF
1826 011036 104400 016142 TYPE ,MPASS ;AT HALT ON PASS PRINT NUMBER OF PASSES COMPLETE
1827 011042 013737 021042 011054 MOV PASCNTR,6$
1828 011050 004537 014446 JSR R5,SGLDEC
1829 011054 000000 6$: OPEN
1830 011056 104400 015052 TYPE ,MCRLF
1831 011062 000000 HLT16: HALT
1832 011064 005037 011142 CLR CHARCT ;THIS CAUSES A CRLF AFTER HALT AT E.O.P.
1833 011070 042737 040500 010704 CONT22: BIC #40500,UNITSEL ;CLEAR USED BITS, AND "HAD ERROR" BIT
1834 011076 022737 000007 010420 CMP #7,PAT ;IF RANDOM DATA GET NEW DATA FOR BUFFER
1835 011104 001002 BNE 2$
1836 011106 004737 010312 JSR PC,GETPATTERN
1837 011112 005237 007200 2$: INC MCNTR1 ;WAIT FOR THE EOP INDICATOR TO BE PRINTED
1838 011116 001375 BNE 2$
1839 011120 013705 000042 MOV #42,R5 ;ACT11 END OF PASS HOOKS
1840 011124 001405 BEQ HERE
1841 011126 000005 RESET
1842 011130 004715 LOGICAL: JSR PC,(R5)
1843 011132 000240 NOP
1844 011134 000240 NOF
1845 011136 000240 NOP
1846 011140 000207 HERE: RTS PC
1847
1848 011142 000000 CHARCT: 0

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1849
1850      ;;*****
1851
1852      ;INITIALIZE TRACK SEQUENCE
1853
1854
1855 011144 042737 100200 001200 INITTRACK:    BIC #100200,OD      ;CLEAR FIRST USED BITS
1856 011152 005737 001200                TST OD                ;TEST CONTENTS OF ID,OD FOR 0
1857 011156 0010C5                      BNE 1$                ;ID,OD SPECIFIED USE THEM
1858 011160 112737 000114 001201          MOVB #114,ID          ;NONE SPECIFIED SET ID TO MAXIMUM
1859 011166 105037 001200                CLRB OD              ;SET OD TO MINIMUM
1860 011172 113737 001200 011360 1$:      MOVB OD,TARGET      ;INIT OD AS PRESENT TRACK
1861 011200 005037 011366                CLR XID              ;INIT WORKING ID AND OD LOCATIONS
1862 011204 113737 001201 011366          MOVB ID,XID
1863 011212 005037 011364                CLR XOD
1864 011216 113737 001200 011364          MOVB OD,XOD
1865 011224 013737 011366 011356          MOV XID,TRKCNT        ;SET UP NUMBER OF TRACK MOVEMENTS
1866 011232 163737 011364 011356          SUB XOD,TRKCNT
1867 011240 005237 011356                INC TRKCNT
1868 011244 052737 100200 001200          BIS #100200,OD      ;SET FIRST TIME BITS IN ID,OD
1869 011252 000207                      RTS PC
1870
1871
1872      ;;*****
1873
1874      ;TEST FOR HEAD SEQUENCE SELECTED BY INITIAL SWR SETTING
1875
1876      ;BITS 0,1,AND 2 OF THE INITIAL SWR SELECTED THE TRACK SEQUENCING
1877      ;TO BE FOLLOWED AS INITICATED BELOW
1878
1879      :
1880      :      BITS      SEQUENCE
1881      :      0      0      0      NO SEQUENCE SPECIFIED (DEFAULT TO SEQ 7)
1882      :      0      0      1      INCREMENT FROM OD TO ID
1883      :      0      1      0      DECREMENT FROM ID TO OD
1884      :      0      1      1      DO PREVIOUS 2 SEQUENCES
1885      :      1      0      0      BOUNCE BETWEEN ID AND OD
1886      :      1      0      1      DECREASING BOUNCE
1887      :      1      1      0      STROBE BETWEEN OD AND DECREMENTING ID
1888      :      1      1      1      RANDOM TRACK SELECTION
1889
1890      ;;*****
1891
1892 011254 113737 011360 011362 GETTRACK:    MOVB TARGET,PRESTRK  ;RESET TO PRESENT TRACK
1893 011262 142737 000377 011320          BICB #377,2#BRONTRK  ;CLEAR OUT BRANCH OFFSET
1894 011270 005737 011370                TST SEQUEN          ;IF NO SEQUENCE SPECIFIED FORCE SEQUENCE 7
1895 011274 001003                      BNE 1$
1896 011276 012737 000007 011370          MOV #7,SEQUEN
1897 011304 013704 011370 1$:            MOV SEQUEN,R4
1898 011310 005304                      DEC R4
1899 011312 006304                      ASL R4
1900 011314 150437 011320          BISB R4,2#BRONTRK  ;THIS BR INST.'S MODIFIED BY THE TEST CONDITIONS
1901
1902
1903 011320 000777                      BR .                ;BRANCH BY OFFSET SELECTED
1904 011322 000137 011372          JMP SEQ1              ;INCREMENT

```


N04

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DZRXAE.P11 GET VALUE FOR SOFTWARE SWITCH REGISTER

1905	011326	000137	011426		JMP SEQ2	; DECREMENT
1906	011332	000137	011460		JMP SEQ3	; INCREMENT/DECREMENT
1907	011336	000137	011524		JMP SEQ4	; BOUNCE ID TO OD
1908	011342	000137	011610		JMP SEQ5	; DECREASING BOUNCE
1909	011346	000137	011742		JMP SEQ6	; STROBE
1910	011352	000137	012022		JMP SEQ7	; RANDOM
1911						
1912	011356	000000		TRKCNTR:	0	
1913	011360	000000		TARGET:	0	
1914	011362	000000		PRESTRK:	0	
1915	011364	000000		XOD:	0	
1916	011366	000000		XID:	0	
1917	011370	000000		SEQUEN:	0	
1918						
1919				;;*****		
1920						
1921				; INCREMENT FROM OD+1 TO ID AND RETURN TO OD		
1922				; S = 1		
1923						
1924	011372	042737	100200	001200	SEQ1:	BIC #100200,OD ; CLEAR FIRST TIME BITS
1925	011400	123737	011366	011362		CMPB XID,PRESTRK ; PRESENT TRACK EQUAL TO ID
1926	011406	001004				BNE 1\$; NO GET NEW TRACK
1927	011410	113737	001200	011360		MOVB OD,TARGET ; YES RETURN TO OD
1928	011416	000461				BR NEWTRK ; NEWTRK INCREMENTS THE TRACK MOVED TO COUNTER
1929						; AND RETURNS TO NEXT TRACK
1930	011420	005237	011360		1\$:	INC TARGET ; ADD 1 TO TARGET TRACK
1931	011424	000456				BR NEWTRK
1932						
1933					;;*****	
1934						
1935					; DECREMENT FROM ID TO OD	
1936					; S = 2	
1937						
1938	011426	105737	001201		SEQ2:	TSTB ID ; FIRST TIME BIT SET
1939	011432	100007				BPL 1\$; NO GET NEXT TRACK
1940	011434	042737	100200	001200		BIC #100200,OD ; YES CLEAR FIRST TIME BITS
1941	011442	113737	011366	011360		MOVB XID,TARGET ; GO TO ID
1942	011450	000444				BR NEWTRK
1943	011452	005337	011360		1\$:	DEC TARGET ; MOVE TO NEXT TRACK
1944	011456	000441				BR NEWTRK
1945						
1946					;;*****	
1947						
1948					; INCREMENT THEN DECREMENT TRACKS	
1949					; S = 3	
1950						
1951	011460	105737	001200		SEQ3:	TSTB OD ; CHECK FIRST TIME BIT
1952	011464	100007				BPL 1\$; NOT FIRST TIME THROUGH
1953	011466	042737	100200	001200		BIC #100200,OD ; CLEAR FIRST TIME BITS
1954	011474	005337	011356			DEC TRKCNTR
1955	011500	006337	011356			ASL TRKCNTR ; RESET TRACK COUNTER TO DOUBLE THE COUNT
1956	011504	013700	011366		1\$:	MOV XID,RO
1957	011510	163700	011364			SUB XOD,RO ; GET DIFFERENCE BETWEEN ID AND OD
1958	011514	163700	011356			SUB TRKCNTR,RO ; IS TRACK COUNTER HALF DONE
1959	011520	002342				BGE SEQ2 ; YES GO DECREMENT TRACKS
1960	011522	000723				BR SEQ1 ; NO CONTINUE INCREMENTING TRACKS

```

1961
1962
1963      ;;*****
1964
1965      ;BOUNCE BETWEEN ID AND OD ONLY
1966      ;   S = 4
1967
1968 011524 042737 100200 001200 SEQ4:      BIC #100200,OD      ;CLEAR THE FIRST TIME BITS
1969 011532 123737 011362 001200      CMPB PRESTRK,OD      ;DID IT JUST DO OD
1970 011540 001404      BEQ IDNEXT      ;YES
1971 011542 113737 001200 011360      MOVB OD,TARGET      ;NO GO TO OD TRACK
1972 011550 000404      BR NEWTRK
1973 011552 113737 001201 011360 IDNEXT:    MOVB ID,TARGET      ;GO DO ID TRACK
1974 011560 000400      BR NEWTRK
1975
1976      ;;*****
1977
1978      ;INCREMENT THE "HEAD MOVED TO" COUNTERS AND RETURN
1979      ;THROUGH HERE FROM ALL TRACK SEQUENCES
1980
1981 011562 013705 011360      NEWTRK:      MOV TARGET,R5      ;GET TRACK ADDRESS
1982 011566 006305      ASL R5      ;MULTIPLY BY 4 TO DOUBLE PRECISION
1983 011570 006305      ASL R5      ;INTERLEAVE COUNTER ADDRESSES
1984 011572 062705 017660      ADD #HOMOVE,R5      ;ADD ON ADDRESS OF HEAD MOVE COUNTER
1985 011576 062715 000001      ADD #1,(R5)      ;INC COUNTER
1986 011602 005565 000002      ADC 2(R5)      ;ADD CARRY TO HIGH ORDER WORD
1987 011606 000207      RTS PC      ;RETURN TO ACCESS NEXT TRACK
1988
1989
1990      ;;*****
1991
1992      ;BOUNCE BETWEEN DECREASING ID AND INCREASING OD
1993      ;   S = 5
1994
1995 011610 105737 001201      SEQ5:      TSTB ID      ;TEST FIRST TIME BIT OF ID
1996 011614 100011      SPL 1$      ;ADJUST FOR ONE EXTRA MOVEMENT TO TRK OD
1997 011616 005237 011356      INC TRKCNTR      ;CLEAR FIRST TIME BIT OF ID
1998 011622 142737 000200 001201      BICB #200,ID      ;MOVE TO ID
1999 011630 113737 011366 011360      MOVB XID,TARGET
2000 011636 000751      BR NEWTRK
2001 011640 105737 001200      1$:      TSTB OD      ;TEST FIRST TIME BIT OF OD
2002 011644 100007      BPL 2$      ;CLEAR FIRST TIME BIT OF OD
2003 011646 142737 000200 001200      BICB #200,OD      ;MOVE TO OD
2004 011654 113737 011364 011360      MOVB XOD,TARGET
2005 011662 000737      BR NEWTRK
2006 011664 132737 000001 011356 2$:      BITB #1,TRKCNTR      ;TEST COUNTER FOR ODD OR EVEN
2007 011672 001006      BNE 3$      ;ODD MOVE TO NEW ID
2008 011674 005237 011364      INC XOD      ;EVEN ADD 1 TO OD
2009 011700 113737 011364 011360      MOVB XOD,TARGET
2010 011706 000405      BR LASTTRK      ;SEE IF LAST TRACK IS BEING ACCESSED
2011 011710 005337 011366      3$:      DEC XID      ;SUBTRACT 1 FROM ID
2012 011714 113737 011366 011360      MOVB XID,TARGET
2013 011722 123727 011356 000001 LASTTRK:    CMPB TRKCNTR,#1
2014 011730 001003      BNE XRETURN
2015 011732 113737 001200 011360      MOVB OD,TARGET      ;THIS IS LAST TRACK RETURN TO OD
2016 011740 000710      XRETURN:      BR NEWTRK

```

```

2017
2018      ;;*****
2019
2020      ;STROBE BETWEEN OD AND DECREASING ID
2021      ; S = 6
2022
2023 011742 105737 001200      SEG6:      TSTB OD      ;CHECK FIRST TIME BIT
2024 011746 100007      BPL 1$      ;NOT FIRST TIME
2025 011750 042737 100200 001200      BIC #100200,OD      ;WAS FIRST TIME,CLEAR THE BITS
2026 011756 005337 011356      DEC TRKCNTR      ;RESET COUNTER TO DOUBLE THE NUMBER OF TRACKS
2027 011762 006337 011356      ASL TRKCNTR
2028 011756 123737 011362 001200 1$:      CMPB PRESTRK,OD      ;WAS OD JUST ACCESSED
2029 011774 001006      BNE ODNEXT      ;NO GO TO OD
2030 011776 113737 011366 011360      MOVB XID,TARGET      ;DECREASING ID IS NEXT TRACK
2031 012004 005337 011366      DEC XID
2032 012010 000664      BR NEWTRK
2033 012012 113737 001200 011360 ODNEXT:      MOVB OD,TARGET      ;OD IS NEXT TRACK
2034 012020 000660      BR NEWTRK
2035
2036
2037
2038      ;;*****
2039      ;RANDOM SEQUENCING OF TRACKS
2040      ;FOR PROPER USE OF RANDOM TRACK SEQUENCING, THE OD/ID LIMITS
2041      ;SHOULD NOT BE SET FOR LESS THAN HALF THE TRACKS.
2042      ; S = 0 OR 7
2043
2044 012022 042737 100200 001200 SEQ7:      BIC #100200,OD      ;CLEAR THE FIRST TIME BITS
2045 012030 004737 012122      JSR PC,RANGEN      ;GET A RANDOM NUMBER
2046 012034 042737 177600 012214      BIC #177600,RANUM      ;CLEAR ALL BUT LOW 7 BITS
2047 012042 123737 012214 011366 IDCOMP:      CMPB RANUM,XID      ;IS RANUM LARGER THAN ID ADDRESS
2048 012050 003404      BLE ODCOMP      ;NO,RANUM IS LESS OR EQUAL TO ID
2049 012052 163737 011366 012214      SUB XID,RANUM      ;YES,SUBTRACT ID FROM IT
2050 012060 000770      BR IDCOMP      ;SEE IF RANUM IS NOW OK
2051 012062 123737 012214 011364 ODCOMP:      CMPB RANUM,XOD      ;IS RANUM SMALLER THAN OD ADDRESS
2052 012070 002004      BGE PRESCHK      ;NO,RANUM IS GREATER OR EQUAL TO OD
2053 012072 063737 011364 012214      ADD XOD,RANUM      ;YES,ADD OD TO RANUM
2054 012100 000770      BR ODCOMP      ;SEE IF RANUM IS NOW OK
2055 012102 123737 012214 011362 PRESCHK:      CMPB RANUM,PRESTRK      ;IF RANUM EQUALS PRESENT TRACK
2056 012110 001744      BEQ SEQ7      ;GET ANOTHER RANDOM NUMBER
2057 012112 013737 012214 011360      MOV RANUM,TARGET      ;RANUM OK PUT IT IN TARGET TRACK
2058 012120 000620      BR NEWTRK
2059
2060 012122 012700 000001      RANGEN:      MOV #1,R0
2061 012126 063700 012210      ADD RAN1,R0
2062 012132 063700 012212      ADD RAN2,R0
2063 012136 042700 170000      BIC #170000,R0
2064 012142 000241      CLC
2065 012144 006100      ROL R0
2066 012146 006100      ROL R0
2067 012150 010037 012210      MOV R0,RAN1
2068 012154 005000      CLR R0
2069 012156 013700 012212      MOV RAN2,R0
2070 012162 006000      ROR R0
2071 012164 006000      ROR R0
2072 012166 063700 012210      ADD RAN1,R0

```

```

2073 012172 042700 170000      BIC #170000,R0
2074 012176 010037 012212      MOV R0,RAN2
2075 012202 010037 012214      MOV R0,RANUM
2076 012206 000207              RTS PC
2077
2078 012210 000000      RAN1:      0
2079 012212 000000      RAN2:      0
2080 012214 000000      RANUM:     0
2081
2082      ;;*****
2083
2084      ;SECTOR INITIALIZATION AND SELECTION
2085
2086 012216 005737 001202      INITSECTOR:  TST FIRST      ;TEST FIRST AND LAST FOR 0
2087 012222 001005              BNE 1$      ;SECTORS SPECIFIED USE THEM
2088 012224 005237 001202      INC FIRST      ;NONE SPECIFIED SET FIRST TO 1
2089 012230 112737 000032 001203      MOV #32,LAST      ;SET LAST TO MAXIMUM
2090 012236 113737 001203 012306      MOV LAST,SECCNTR      ;SET UP SECTOR COUNTER
2091 012244 163737 001202 012306      SUB FIRST,SECCNTR
2092 012252 005237 012306      INC SECCNTR
2093 012256 105037 012307      CLRB SECCNTR+1
2094 012262 113737 001202 012310      MOV FIRST,TSECTOR      ;PUT FIRST SECTOR IN TARGET SECTOR
2095 012270 163737 012314 012310      SUB THREE,TSECTOR      ;SUB 3 FROM TSECTOR AS FIRST TIME THROUGH
2096      ;IT GETS ADDED BACK ON.
2097 012276 012737 000001 012312      MOV #1,INTLEAV      ;SET INTERLEAVE OFFSET
2098 012304 000207              RTS PC
2099
2100 012306 000000      SECCNTR:      0
2101 012310 000000      TSECTOR:      0
2102 012312 000000      INTLEAV:      0
2103 012314 000003      THREE:        3
2104
2105 012316 063737 012314 012310      GETSECTOR:  ADD THREE,TSECTOR      ;ADD 3 FOR INTERLEAVING
2106 012324 123737 001203 012310      CMPB LAST,TSECTOR
2107 012332 002010      BGE 1$      ;NEW SECTOR IS WITHIN LIMITS
2108 012334 113737 001202 012310      MOVB FIRST,TSECTOR      ;RESET TARGET SECTOR TO INTERLEAVE
2109 012342 063737 012312 012310      ADD INTLEAV,TSECTOR      ;ADD ON INTERLEAVE OFFSET VALUE
2110 012350 005237 012312      INC INTLEAV      ;UP DATE THE OFFSET VALUE
2111 012354 000207      1$:          RTS PC
2112
2113      .SBTTL  TYPE ROUTINE
2114
2115      ;*****
2116      ;ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
2117      ;THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
2118      ;NOTE1:      $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
2119      ;NOTE2:      $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
2120      ;NOTE3:      $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
2121      ;
2122      ;
2123      ;CALL:
2124      ;1) USING A TRAP INSTRUCTION
2125      ;      TYPE      ,MESADR      ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
2126      ;OR
2127      ;      TYPE
2128      ;      MESADR

```

EOS

MAINDEC-11-DZRXA-E MACY11 27(732) 20-SEP-76 15:46 PAGE 40
DZRXAE.P11 TYPE ROUTINE

```

2129 ;*
2130
2131 012356 105737 012605 $TYPE: TSTB $TPFLG
2132 012362 100002 BPL 1$
2133 012364 000000 HALT
2134 012366 000407 BR 3$
2135 012370 010046 1$: MOV RO, -(SP)
2136 012372 017600 000002 MOV 2(SP), RO
2137 012376 112046 2$: MOVB (RO)+, -(SP)
2138 012400 001005 BNE 4$
2139 012402 005726 TST (SP)+
2140 012404 012600 60$: MOV (SP)+, RO
2141 012406 062716 000002 3$: ADD #2, (SP)
2142 012412 000002 RTI
2143 012414 122716 000011 4$: CMPB #HT, (SP)
2144 012420 001430 BEQ 8$
2145 012422 122716 000200 CMPB #CRLF, (SP)
2146 012426 001006 BNE 5$
2147 012430 005726 TST (SP)+
2148 012432 104400 TYPE
2149 012434 012607 $CRLF
2150 012436 105037 012572 CLRB $CHARCNT
2151 012442 000755 BR 2$
2152 012444 004737 012526 5$: JSR PC, $TYPEC
2153 012450 123726 012604 6$: CMPB $FILLC, (SP)+
2154 012454 001350 BNE 2$
2155 012456 013746 012602 MOV $NULL, -(SP)
2156
2157 012462 105366 000001 7$: DECB 1(SP)
2158 012466 002770 BLT 6$
2159 012470 004737 012526 JSR PC, $TYPEC
2160 012474 105337 012572 DECB $CHARCNT
2161 012500 000770 BR 7$
2162
2163 ;HORIZONTAL TAB PROCESSOR
2164
2165 012502 112716 000040 8$: MOVB #' (SP)
2166 012506 004737 012526 9$: JSR PC, $TYPEC
2167 012512 132737 000007 012572 BITB #7, $CHARCNT
2168 012520 001372 BNE 9$
2169 012522 005726 TST (SP)+
2170 012524 000724 BR 2$
2171 012526 105777 000044 $TYPEC: TSTB 2$TPS
2172 012532 100375 BPL $TYPEC
2173 012534 116677 000002 000036 MOVB 2(SP), 2$TPB
2174 012542 122766 000015 000002 CMPB #CR, 2(SP)
2175 012550 001003 BNE 1$
2176 012552 105037 012572 CLRB $CHARCNT
2177 012556 000406 BR $TYPEX
2178 012560 122766 000012 000002 1$: CMPB #LF, 2(SP)
2179 012566 001402 BEQ $TYPEX
2180 012570 105227 INCB (PC)+
2181 012572 000000 $CHARCNT: .WORD 0
2182 012574 000207 $TYPEX: RTS PC
2183
2184 012576 177564 $TPS: .WORD 177564

```

```

;; IS THERE A TERMINAL?
;; BR IF YES
;; HALT HERE IF NO TERMINAL
;; LEAVE
;; SAVE RO
;; GET ADDRESS OF ASCIZ STRING
;; PUSH CHARACTER TO BE TYPED ONTO STACK
;; BR IF IT ISN'T THE TERMINATOR
;; IF TERMINATOR POP IT OFF THE STACK
;; RESTORE RO
;; ADJUST RETURN PC
;; RETURN
;; BRANCH IF <HT>
;; BRANCH IF NOT <CRLF>
;; POP <CR><LF> EQUIV
;; TYPE A CR AND LF
;; CLEAR CHARACTER COUNT
;; GET NEXT CHARACTER
;; GO TYPE THIS CHARACTER
;; IS IT TIME FOR FILLER CHARS.?
;; IF NO GO GET NEXT CHAR.
;; GET # OF FILLER CHARS. NEEDED
;; AND THE NULL CHAR.
;; DOES A NULL NEED TO BE TYPED?
;; BR IF NO--GO POP THE NULL OFF OF STACK
;; GO TYPE A NULL
;; DO NOT COUNT AS A COUNT
;; LOOP
;; REPLACE TAB WITH SPACE
;; TYPE A SPACE
;; BRANCH IF NOT AT
;; TAB STOP
;; POP SPACE OFF STACK
;; GET NEXT CHARACTER
;; WAIT UNTIL PRINTER IS READY
;; LOAD CHAR TO BE TYPED INTO DATA REG.
;; IS CHARACTER A CARRIAGE RETURN?
;; BRANCH IF NO
;; YES--CLEAR CHARACTER COUNT
;; EXIT
;; IS CHARACTER A LINE FEED?
;; BRANCH IF YES
;; COUNT THE CHARACTER
;; CHARACTER COUNT STORAGE
;; TTY PRINTER STATUS REG. ADDRESS

```

2185	012600	177566		STPB:	.WORD	177566		:: TTY PRINTER BUFFER REG. ADDRESS
2186	012602	000		\$NULL:	.BYTE	0		:: CONTAINS NULL CHARACTER FOR FILLS
2187	012603	002		\$FILLS:	.BYTE	2		:: CONTAINS # OF FILLER CHARACTERS REQUIRED
2188	012604	012		\$FILLC:	.BYTE	12		:: INSERT FILL CHARS. AFTER A "LINE FEED"
2189	012605	000		\$TPFLG:	.BYTE	0		:: "TERMINAL AVAILABLE" FLAG (BIT(07)=0=YES)
2190	012606	077		\$QUES:	.ASCII	"?"		:: QUESTION MARK
2191	012607	015		\$CRLF:	.ASCII	<15>		:: CARRIAGE RETURN
2192	012610	000012		\$LF:	.ASCII	<12>		:: LINEFEED
2193				.SBTTL	BINARY TO OCTAL (ASCII) AND TYPE			
2194				*****				
2195				:: THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT				
2196				:: OCTAL (ASCII) NUMBER AND TYPE IT.				
2197				:: \$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE				
2198				:: \$CALL:				
2199				::	MOV	NUM,-(SP)		:: NUMBER TO BE TYPED
2200				::	TYPOS			:: CALL FOR TYPEOUT
2201				::	.BYTE	N		:: N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
2202				::	.BYTE	M		:: M=1 OR 0
2203				::				:: 1=TYPE LEADING ZEROS
2204				::				:: 0=SUPPRESS LEADING ZEROS
2205				:: \$STYPON---ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST				
2206				:: \$STYPOS OR \$STYPOC				
2207				:: \$CALL:				
2208				::	MOV	NUM,-(SP)		:: NUMBER TO BE TYPED
2209				::	TYPON			:: CALL FOR TYPEOUT
2210				:: \$STYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER				
2211				:: \$CALL:				
2212				::	MOV	NUM,-(SP)		:: NUMBER TO BE TYPED
2213				::	TYPOC			:: CALL FOR TYPEOUT
2214				:: \$TYPOS: MOV 2(SP),-(SP) :: PICKUP THE MODE				
2215	012612	017646	000000	013035	MOVB	1(SP),\$OFILL		:: LOAD ZERO FILL SWITCH
2216	012616	116637	000001		MOVB	(SP)+,\$OMODE+1		:: NUMBER OF DIGITS TO TYPE
2217	012624	112637	013037		ADD	#2,(SP)		:: ADJUST RETURN ADDRESS
2218	012630	062716	000002		BR	\$TYPON		
2219	012634	000406			MOVB	#1,\$OFILL		:: SET THE ZERO FILL SWITCH
2220	012636	112737	000001	013035	MOVB	#6,\$OMODE+1		:: SET FOR SIX(6) DIGITS
2221	012644	112737	000006	013037	MOVB	#5,\$OCNT		:: SET THE ITERATION COUNT
2222	012652	112737	000005	013034	MOV	R3,-(SP)		:: SAVE R3
2223	012660	010346			MOV	R4,-(SP)		:: SAVE R4
2224	012662	010446			MOV	R5,-(SP)		:: SAVE R5
2225	012664	010546			MOVB	\$OMODE+1,R4		:: GET THE NUMBER OF DIGITS TO TYPE
2226	012666	113704	013037		NEG	R4		
2227	012672	005404			ADD	#6,R4		:: SUBTRACT IT FOR MAX. ALLOWED
2228	012674	062704	000006		MOVB	R4,\$OMODE		:: SAVE IT FOR USE
2229	012700	110437	013036		MOVB	\$OFILL,R4		:: GET THE ZERO FILL SWITCH
2230	012704	113704	013035		MOV	12(SP),R5		:: PICKUP THE INPUT NUMBER
2231	012710	016605	000012		CLP	R3		:: CLEAR THE OUTPUT WORD
2232	012714	005003			ROL	R5		:: ROTATE MSB INTO "C"
2233	012716	006105		15:	BR	3\$		:: GO DO MSB
2234	012720	000404			ROL	R5		:: FORM THIS DIGIT
2235	012722	006105		25:	ROL	R5		
2236	012724	006105			ROL	R5		
2237	012726	006105			ROL	R5		

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MAINDEC-11-DZRXA-E MACY11 27(732) 20-SEP-76 15:46 PAGE 42
 DZRXAE.P11 BINARY TO OCTAL (ASCII) AND TYPE

2241	012730	010503		MOV	R5,R3	
2242	012732	006103		3\$: ROL	R3	:: GET LSB OF THIS DIGIT
2243	012734	105337	013036	DECB	\$OMODE	:: TYPE THIS DIGIT?
2244	012740	100016		BPL	7\$	:: BR IF NO
2245	012742	042703	177770	BIC	#177770,R3	:: GET RID OF JUNK
2246	012746	001002		BNE	4\$	:: TEST FOR 0
2247	012750	005704		TST	R4	:: SUPPRESS THIS 0?
2248	012752	001403		BEQ	5\$	:: BR IF YES
2249	012754	005204		4\$: INC	R4	:: DON'T SUPPRESS ANYMORE 0'S
2250	012756	052703	000060	BIS	#'0,R3	:: MAKE THIS DIGIT ASCII
2251	012762	052703	000040	5\$: BIS	#',R3	:: MAKE ASCII IF NOT ALREADY
2252	012766	110337	013032	MOVB	R3,8\$	:: SAVE FOR TYPING
2253	012772	104400	013032	TYPE	8\$	:: GO TYPE THIS DIGIT
2254	012776	105337	013034	7\$: DECB	\$OCNT	:: COUNT BY 1
2255	013002	003347		BGT	2\$	:: BR IF MORE TO DO
2256	013004	002402		BLT	6\$	:: BR IF DONE
2257	013006	005204		INC	R4	:: INSURE LAST DIGIT ISN'T A BLANK
2258	013010	000744		BR	2\$	:: GO DO THE LAST DIGIT
2259	013012	012605		6\$: MOV	(SP)+,R5	:: RESTORE R5
2260	013014	012604		MOV	(SP)+,R4	:: RESTORE R4
2261	013016	012603		MOV	(SP)+,R3	:: RESTORE R3
2262	013020	016666	000002 000004	MOV	2(SP),4(SP)	:: SET THE STACK FOR RETURNING
2263	013026	012616		MOV	(SP)+,(SP)	
2264	013030	000002		RTI		:: RETURN
2265	013032	000		8\$: .BYTE	0	:: STORAGE FOR ASCII DIGIT
2266	013033	000		.BYTE	0	:: TERMINATOR FOR TYPE ROUTINE
2267	013034	000		\$OCNT: .BYTE	0	:: OCTAL DIGIT COUNTER
2268	013035	000		\$OFILL: .BYTE	0	:: ZERO FILL SWITCH
2269	013036	000000		\$OMODE: .WORD	0	:: NUMBER OF DIGITS TO TYPE
2270				.SBTTL		SAVE AND RESTORE R0-R5 ROUTINES
2271						
2272						::*****
2273						::*SAVE R0-R5
2274						::*CALL:
2275						::* SAVREG
2276						::*UPON RETURN FROM \$SAVREG THE STACK WILL LOOK LIKE:
2277						::*
2278						::*TOP---(+16)
2279						::* +2---(+18)
2280						::* +4---R5
2281						::* +6---R4
2282						::* +8---R3
2283						::*+10---R2
2284						::*+12---R1
2285						::*+14---R0
2286						
2287	013040			\$SAVREG:		
2288	013040	010046		MOV	R0,-(SP)	:: PUSH R0 ON STACK
2289	013042	010146		MOV	R1,-(SP)	:: PUSH R1 ON STACK
2290	013044	010246		MOV	R2,-(SP)	:: PUSH R2 ON STACK
2291	013046	010346		MOV	R3,-(SP)	:: PUSH R3 ON STACK
2292	013050	010446		MOV	R4,-(SP)	:: PUSH R4 ON STACK
2293	013052	010546		MOV	R5,-(SP)	:: PUSH R5 ON STACK
2294	013054	016646	000022	MOV	22(SP),-(SP)	:: SAVE PS OF MAIN FLOW
2295	013060	016646	000022	MOV	22(SP),-(SP)	:: SAVE PC OF MAIN FLOW
2296	013064	016646	000022	MOV	22(SP),-(SP)	:: SAVE PS OF CALL

```

2297 013070 016646 000022      MOV      22(SP),-(SP)    ;;SAVE PC OF CALL
2298 013074 000002      RTI
2299
2300      ;*RESTORE RO-R5
2301      ;*CALL:
2302      ;*      RESREG
2303      $RESREG:
2304 013076 012666 000022      MOV      (SP)+,22(SP)    ;;RESTORE PC OF CALL
2305 013102 012666 000022      MOV      (SP)+,22(SP)    ;;RESTORE PS OF CALL
2306 013106 012666 000022      MOV      (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
2307 013112 012666 000022      MOV      (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
2308 013116 012605      MOV      (SP)+,R5      ;;POP STACK INTO R5
2309 013120 012604      MOV      (SP)+,R4      ;;POP STACK INTO R4
2310 013122 012603      MOV      (SP)+,R3      ;;POP STACK INTO R3
2311 013124 012602      MOV      (SP)+,R2      ;;POP STACK INTO R2
2312 013126 012601      MOV      (SP)+,R1      ;;POP STACK INTO R1
2313 013130 012600      MOV      (SP)+,R0      ;;POP STACK INTO R0
2314 013132 000002      RTI
2315      .SBTTL  TTY INPUT ROUTINE
2316
2317      ;*****
2318 013134 177560      $TKS:  .WORD  177560      ;;TTY KBD STATUS
2319 013136 177562      $TKB:  .WORD  177562      ;;TTY KBD BUFFER
2320      .ENABL  LSB
2321
2322      ;*****
2323      ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
2324      ;*ROUTINE IS ENTERED FROM THE TRAP HANDLER, AND WILL
2325      ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP CALL
2326      ;*WHEN OPERATING IN TTY FLAG MODE.
2327 013140 022737 000176 001214  $CKSWR:  CMP      $SWREG,SWR      ;;IS THE SOFT-SWR SELECTED?
2328 013146 001074      BNE      15$      ;;BRANCH IF NO
2329 013150 105777 177760      TSTB     $TKS      ;;CHAR THERE?
2330 013154 100071      BPL      15$      ;;IF NO, DON'T WAIT AROUND
2331 013156 117746 177754      MOVB     $TKB,-(SP)    ;;SAVE THE CHAR
2332 013162 042716 177600      BIC      $1C177,(SP)    ;;STRIP-OFF THE ASCII
2333 013166 022726 000007      CMP      $7,(SP)+      ;;IS IT A CONTROL G?
2334 013172 001062      BNE      15$      ;;NO, RETURN TO USER
2335 013174 123727 013714 000001  CMPB     $AUTOB,$1      ;;ARE WE RUNNING IN AUTO-MODE?
2336 013202 001456      BEQ      15$      ;;BRANCH IF YES
2337
2338 013204 104400 013665      SGTSWR:  TYPE     , $CNTLG      ;;ECHO THE CONTROL-G (↑G)
2339 013210 104400 013672      TYPE     , $MSWR      ;;TYPE CURRENT CONTENTS
2340 013214 013746 000176      MOV      $SWREG,-(SP)    ;;SAVE SWREG FOR TYPEOUT
2341 013220 104401      TYPEOC     , $MNEW      ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
2342 013222 104400 013703      TYPE     , $MNEW      ;;PROMPT FOR NEW SWR
2343 013226 005046      19$:  CLR      -(SP)      ;;CLEAR COUNTER
2344 013230 005046      CLR      -(SP)      ;;THE NEW SWR
2345 013232 105777 177676      7$:  TSTB     $TKS      ;;CHAR THERE?
2346 013236 100375      BPL      7$      ;;IF NOT TRY AGAIN
2347
2348 013240 117746 177672      MOVB     $TKB,-(SP)    ;;PICK UP CHAR
2349 013244 042716 177600      BIC      $1C177,(SP)    ;;MAKE IT 7-BIT ASCII
2350
2351
2352

```


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DZRXAE.P11 TTY INPUT ROUTINE

```

2353 013250 021627 000025      9$:  CMP      (SP),#25      ;; IS IT A CONTROL-U?
2354 013254 001005              BNE      10$      ;; BRANCH IF NOT
2355 013256 104400 C13660      TYPE      $CNTLU      ;; YES, ECHO CONTROL-U (1U)
2356 013262 062706 000006      20$:  ADD      #6,SP      ;; IGNORE PREVIOUS INPUT
2357 013266 000757              BR       19$      ;; LET'S TRY IT AGAIN
2358
2359
2360 013270 021627 000015      10$:  CMP      (SP),#15      ;; IS IT A <CR>?
2361 013274 001022              BNE      16$      ;; BRANCH IF NO
2362 013276 005766 000004      TST      4(SP)      ;; YES, IS IT THE FIRST CHAR?
2363 013302 001403              BEQ      11$      ;; BRANCH IF YES
2364 013304 016677 000002 165702 MOV      2(SP),@SWR      ;; SAVE NEW SWR
2365 013312 062706 000006      11$:  ADD      #6,SP      ;; CLEAR UP STACK
2366 013316 104400 012607      14$:  TYPE      $CRLF      ;; ECHO <CR> AND <LF>
2367 013322 123727 013715 000001 CMPB     $INTAG,#1      ;; RE-ENABLE TTY KBD INTERRUPTS?
2368 013330 001003              BNE      15$      ;; BRANCH IF NOT
2369 013332 012777 000100 177574 MOV      #100,@$TKS      ;; RE-ENABLE TTY KBD INTERRUPTS
2370 013340 000002      15$:  RTI              ;; RETURN
2371 013342 004737 012526      16$:  JSR      PC,$TYPEC      ;; ECHO CHAR
2372 013346 021627 000060      CMP      (SP),#60      ;; CHAR < 0?
2373 013352 002420              BLT      18$      ;; BRANCH IF YES
2374 013354 021627 000067      CMP      (SP),#67      ;; CHAR > 7?
2375 013360 003015              BGT      18$      ;; BRANCH IF YES
2376 013362 042726 000060      BIC      #60,(SP)+      ;; STRIP-OFF ASCII
2377 013366 005766 000002      TST      2(SP)      ;; IS THIS THE FIRST CHAR
2378 013372 001403              BEQ      17$      ;; BRANCH IF YES
2379 013374 006316              ASL      (SP)      ;; NO, SHIFT PRESENT
2380 013376 006316              ASL      (SP)      ;; CHAR OVER TO MAKE
2381 013400 006316              ASL      (SP)      ;; ROOM FOR NEW ONE.
2382 013402 005266 000002      17$:  INC      2(SP)      ;; KEEP COUNT OF CHAR
2383 013406 056616 177776      BIS      -2(SP),(SP)      ;; SET IN NEW CHAR
2384 013412 000707              BR       7$      ;; GET THE NEXT ONE
2385 013414 104400 012606      18$:  TYPE      $QUES      ;; TYPE ?<CR><LF>
2386 013420 000720              BR       20$      ;; SIMULATE CONTROL-U
2387
2388
2389
2390
2391
2392
2393
2394
2395
2396
2397
2398 013422 011646 000004 000002 $RDCHR: MOV      (SP),-(SP)      ;; PUSH DOWN THE PC
2399 013424 016666 000004 000002 MOV      4(SP),2(SP)      ;; SAVE THE PS
2400 013432 105777 177476      1$:  TSTB     @$TKS      ;; WAIT FOR
2401 013436 100375              BPL      1$      ;; A CHARACTER
2402 013440 117766 177472 000004 MOVB     @$TKB,4(SP)      ;; READ THE TTY
2403 013446 042766 177600 000004 BIC      #1C(177),4(SP)      ;; GET RID OF JUNK IF ANY
2404 013454 026627 000004 000023 CMP      4(SP),#23      ;; IS IT A CONTROL-S?
2405 013462 001013              BNE      3$      ;; BRANCH IF NO
2406 013464 105777 177444      2$:  TSTB     @$TKS      ;; WAIT FOR A CHARACTER
2407 013470 100375              BPL      2$      ;; LOOP UNTIL ITS THERE
2408 013472 117746 177440      MOVB     @$TKB,-(SP)      ;; GET CHARACTER

```

*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY

*CALL:

* RDCHR
* RETURN HERE

;; INPUT A SINGLE CHARACTER FROM THE TTY
;; CHARACTER IS ON THE STACK
;; WITH PARITY BIT STRIPPED OFF

```

$RDCHR: MOV      (SP),-(SP)      ;; PUSH DOWN THE PC
MOV      4(SP),2(SP)      ;; SAVE THE PS
1$:  TSTB     @$TKS      ;; WAIT FOR
BPL      1$      ;; A CHARACTER
MOVB     @$TKB,4(SP)      ;; READ THE TTY
BIC      #1C(177),4(SP)      ;; GET RID OF JUNK IF ANY
CMP      4(SP),#23      ;; IS IT A CONTROL-S?
BNE      3$      ;; BRANCH IF NO
2$:  TSTB     @$TKS      ;; WAIT FOR A CHARACTER
BPL      2$      ;; LOOP UNTIL ITS THERE
MOVB     @$TKB,-(SP)      ;; GET CHARACTER

```

```

2409 013476 042716 177600 BIC #177,(SP) ;;MAKE IT 7-BIT ASCII
2410 013502 022627 000021 CMP (SP)+,#21 ;;IS IT A CONTROL-Q?
2411 013506 001366 BNE 2$ ;;IF NOT DISCARD IT
2412 013510 000750 BR 1$ ;;YES, RESUME
2413 013512 026627 000004 000140 3$: CMP 4(SP),#140 ;;IS IT UPPER CASE?
2414 013520 002407 BLT 4$ ;;BRANCH IF YES
2415 013522 026627 000004 000175 CMP 4(SP),#175 ;;IS IT A SPECIAL CHAR?
2416 013530 003003 BGT 4$ ;;BRANCH IF YES
2417 013532 042766 000040 000004 BIC #40,4(SP) ;;MAKE IT UPPER CASE
2418 013540 000002 4$: RTI ;;GO BACK TO USER
2419 ;;*****
2420 ;;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
2421 ;;*CALL:
2422 ;;* RDLIN ;;INPUT A STRING FROM THE TTY
2423 ;;* RETURN HERE ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
2424 ;;* ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
2425
2426 013542 010346 $RDLIN: MOV R3,-(SP) ;;SAVE R3
2427 013544 012703 013650 1$: MOV $TTYIN,R3 ;;GET ADDRESS
2428 013550 022703 013660 2$: CMP $TTYIN+8.,R3 ;;BUFFER FULL?
2429 013554 101405 BLOS 4$ ;;BR IF YES
2430 013556 104406 RDCHR ;;GO READ ONE CHARACTER FROM THE TTY
2431 013560 112613 MOVB (SP)+,(R3) ;;GET CHARACTER
2432 013562 122713 000177 10$: CMPB #177,(R3) ;;IS IT A RUBOUT
2433 013566 001003 BNE 3$ ;;SKIP IF NOT
2434 013570 104400 012606 4$: TYPE $QUES ;;TYPE A '?'
2435 013574 000763 BR 1$ ;;CLEAR THE BUFFER AND LOOP
2436 013576 111337 013646 3$: MOVB (R3),9$ ;;ECHO THE CHARACTER
2437 013602 104400 013646 TYPE 9$
2438 013606 122723 000015 CMPB #15,(R3)+ ;;CHECK FOR RETURN
2439 013612 001356 BNE 2$ ;;LOOP IF NOT RETURN
2440 013614 105063 177777 CLRB -1(R3) ;;CLEAR RETURN (THE 15)
2441 013620 104400 012610 TYPE $LF ;;TYPE A LINE FEED
2442 013624 012603 MOV (SP)+,R3 ;;RESTORE R3
2443 013626 011646 MOV (SP),-(SP) ;;ADJUST THE STACK AND PUT ADDRESS OF THE
2444 013630 016666 000004 000002 MOV 4(SP),2(SP) ;; FIRST ASCII CHARACTER ON IT
2445 013636 012766 013650 000004 MOV $TTYIN,4(SP)
2446 013644 000002 RTI ;;RETURN
2447 013646 000 9$: .BYTE 0 ;;STORAGE FOR ASCII CHAR. TO TYPE
2448 013647 000 .BYTE 0 ;;TERMINATOR
2449 013650 000010 $TTYIN: .BLKB 8. ;;RESERVE 8 BYTES FOR TTY INPUT
2450 013660 052536 005015 000 $CNTLU: .ASCIIZ /U/<15><12> ;;CONTROL "U"
2451 013665 136 006507 000012 $CNTLG: .ASCIIZ /G/<15><12> ;;CONTROL "G"
2452 013672 005015 053523 020122 $MSWR: .ASCIIZ <15><12>/SWR = /
2453 013700 020075 000
2454 013703 040 047040 053505 $MNEW: .ASCIIZ / NEW = /
2455 013710 036440 000040
2456 013714 000 $AUTOB: .BYTE 0 ;;AUTO MODE FLAG
2457 013715 000 $INTAG: .BYTE 0 ;;INTERRUPT MODE FLAG
2458 .SBTTL TRAP DECODER
2459
2460 ;;*****
2461 ;;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
2462 ;;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
2463 ;;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
2464 ;;*GO TO THAT ROUTINE.

```

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MAINDEC-11-DZRXA-E MACY11 27(732) 20-SEP-76 15:46 PAGE 4E
DZRXAE.P11 TRAP DECODER

```

2465
2466 013716 010046 $TRAP: MOV RD,-(SP) ;;SAVE RD
2467 013720 016600 000002 MOV 2(SP),RD ;;GET TRAP ADDRESS
2468 013724 005740 TST -(RD) ;;BACKUP BY 2
2469 013726 111000 MOV8 (RD),RD ;;GET RIGHT BYTE OF TRAP
2470 013730 006300 ASL RD ;;POSITION FOR INDEXING
2471 013732 016000 013740 MOV $TRPAD(RD),RD ;;INDEX TO TABLE
2472 013736 000200 RTS RD ;;GO TO ROUTINE
2473
2474 .SBTTL TRAP TABLE
2475
2476 ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
2477 ;*BY THE "TRAP" INSTRUCTION.
2478
2479 : ROUTINE
2480 : -----
2481 $TRPAD:
2482 013740 012356 $TYPE ;;CALL=TYPE TRAP+0(104400) TTY TYPEOUT ROUTINE
2483 013742 012636 $TYPOC ;;CALL=TYPOC TRAP+1(104401) TYPE OCTAL NUMBER (WITH LEADING ZEROS)
2484 013744 012612 $TYPOS ;;CALL=TYPOS TRAP+2(104402) TYPE OCTAL NUMBER (NO LEADING ZEROS)
2485 013746 012652 $TYPON ;;CALL=TYPON TRAP+3(104403) TYPE OCTAL NUMBER (AS PER LAST CALL)
2486
2487 013750 013210 $GTSWR ;;CALL=GTSWR TRAP+4(104404) GET SOFT-SWR SETTING
2488
2489 013752 013140 $CKSWR ;;CALL=CKSWR TRAP+5(104405) TEST FOR CHANGE IN SOFT-SWR
2490 013754 013422 $RDCHR ;;CALL=RDCHR TRAP+6(104406) TTY TYPEIN CHARACTER ROUTINE
2491 013756 013542 $RDLIN ;;CALL=RDLIN TRAP+7(104407) TTY TYPEIN STRING ROUTINE
2492 013760 013040 $SAVREG ;;CALL=SAVREG TRAP+10(104410) SAVE RD-R5 ROUTINE
2493 013762 013076 $RESREG ;;CALL=RESREG TRAP+11(104411) RESTORE RD-R5 ROUTINE
2494
2495 .SBTTL POWER DOWN AND UP ROUTINES
2496
2497 ;*****
2498 :POWER DOWN ROUTINE
2499 $PWRDN: MOV $SILLUP,$PWRVEC ;;SET FOR FAST UP
2500 MOV #340,$PWRVEC+2 ;;PRIO:7
2501 MOV RD,-(SP) ;;PUSH RD ON STACK
2502 MOV R1,-(SP) ;;PUSH R1 ON STACK
2503 MOV R2,-(SP) ;;PUSH R2 ON STACK
2504 MOV R3,-(SP) ;;PUSH R3 ON STACK
2505 MOV R4,-(SP) ;;PUSH R4 ON STACK
2506 MOV R5,-(SP) ;;PUSH R5 ON STACK
2507 MOV $SWR,-(SP) ;;PUSH $SWR ON STACK
2508 MOV SP,$SAVR6 ;;SAVE SP
2509 MOV $PWRUP,$PWRVEC ;;SET UP VECTOR
2510 HALT
2511 BR .-2 ;;HANG UP
2512
2513 ;*****
2514 :POWER UP ROUTINE
2515 $PWRUP: MOV $SILLUP,$PWRVEC ;;SET FOR FAST DOWN
2516 MOV $SAVR6,SP ;;GET SP
2517 CLR $SAVR6 ;;WAIT LOOP FOR THE TTY
2518 INC $SAVR6 ;;WAIT FOR THE INC
2519 BNE 1$ ;;OF WORD
2520 MOV (SP)+,$SWR ;;POP STACK INTO $SWR
2521 MOV (SP)+,R5 ;;POP STACK INTO R5

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```

2521 014070 012604      MOV      (SP)+,R4      ;;POP STACK INTO R4
2522 014072 012603      MOV      (SP)+,R3      ;;POP STACK INTO R3
2523 014074 012602      MOV      (SP)+,R2      ;;POP STACK INTO R2
2524 014076 012601      MOV      (SP)+,R1      ;;POP STACK INTO R1
2525 014100 012600      MOV      (SP)+,R0      ;;POP STACK INTO R0
2526 014102 012737 013764 000024      MOV      #SPWRDN,2#PWRVEC ;;SET UP THE POWER DOWN VECTOR
2527 014110 012737 000340 000026      MOV      #340,2#PWRVEC+2 ;;PRIO:7
2528 014116 104400      TYPE      ;;REPORT THE POWER FAILURE
2529 014120 014136      $PWRMG: .WORD $POWER ;;POWER FAIL MESSAGE POINTER
2530 014122 012716      MOV      (PC)+,(SP) ;;RESTART AT RESTART
2531 014124 002700      $PWRAD: .WORD RESTART ;;RESTART ADDRESS
2532 014126 000002      RTI
2533 014130 000000      $ILLUP: HALT ;;THE POWER UP SEQUENCE WAS STARTED
2534 014132 000776      BR      .-2 ;;BEFORE THE POWER DOWN WAS COMPLETE
2535 014134 000000      $SAVR6: 0 ;;PUT THE SP HERE
2536 014136 005015 047520 042527 $POWER: .ASCIZ <15><12>"POWER"
2537 014144 000122
2538
2539      .EVEN
2540      .SBTTL SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
2541
2542      ;;*****
2543      ;;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
2544      ;;UNSIGNED DECIMAL ASCIZ NUMBER.
2545      ;;CALL
2546      ;;*      MOV      NUMBER,-(SP)      ;;PUT BINARY NUMBER ON THE STACK
2547      ;;*      JSR      PC,2#$SB2D      ;;CALL
2548      ;;*      RETURN      ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
2549
2550 014146 016637 000002 014176 $SB2D: MOV      2(SP),1$      ;;SAVE BINARY NUMBER
2551 014154 012746 014176      MOV      1$,-(SP)      ;;SET POINTER
2552 014160 004737 014202      JSR      PC,2#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
2553 014164 062716 000005      ADD      #5,(SP)      ;;ONLY ALLOW FIVE CHARACTERS
2554 014170 012666 000002      MOV      (SP)+,2(SP)      ;;PICKUP POINTER
2555 014174 000207      RTS      PC      ;;RETURN
2556 014176 000000 000000      1$: .WORD 0,0
2557      .SBTTL DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE
2558
2559      ;;*****
2560      ;;THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
2561      ;;DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
2562      ;;POSITIVE.
2563      ;;CALL
2564      ;;*      MOV      #PNTR,-(SP)      ;;POINTER TO LOW WORD OF BINARY NUMBER
2565      ;;*      JSR      PC,2#$DB2D
2566      ;;*      RETURN      ;;THE FIRST ADDRESS OF ASCIZ
2567      ;;IS ON THE STACK
2568
2569
2570 014202 104410      $DB2D: SAVREG      ;;SAVE REGISTERS
2571 014204 016602 000002      MOV      2(SP),R2      ;;PICKUP THE DATA POINTER
2572 014210 012700 014362      MOV      #SDECVL,R0      ;;GET ADDRESS OF "SDECVL" STRING
2573 014214 010066 000002      MOV      R0,2(SP)      ;;PUT ADDRESS OF ASCIZ STRING ON STACK
2574 014220 012201      MOV      (R2)+,R1      ;;PICKUP THE BINARY NUMBER
2575 014222 012202      MOV      (R2)+,R2
2576 014224 012737 000012 014300      MOV      #10,4$      ;;SET UP TO DO 10 CONVERSIONS

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 DZRXAE.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

2577	014232	012704	014312	MOV	#\$TNPWR,R4	;;ADDRESS OF TEN POWER
2578	014236	012705	014314	MOV	#\$TNPWR+2,R5	
2579	014242	005003		1\$: CLR	R3	;;CLEAR PARTIAL
2580	014244	161401		2\$: SUB	(R4),R1	;;SUBTRACT TEN POWER
2581	014246	005602		SBC	R2	
2582	014250	161502		SUB	(R5),R2	
2583	014252	002402		BLT	3\$	;;BR IF TEN POWER TO LARGE
2584	014254	005203		INC	R3	;;ADD 1 TO PARTIAL
2585	014256	000772		BR	2\$	;;LOOP
2586	014260	062401		3\$: ADD	(R4)+,R1	;;RESTORE SUBTRACTED VALUE
2587	014262	005502		ADC	R2	
2588	014264	062402		ADD	(R4)+,R2	
2589	014266	022525		CMP	(R5)+,(R5)+	;;MOVE TO NEXT TEN POWER
2590	014270	052703	000060	BIS	#'0,R3	;;CHANGE PARTIAL TO ASCII
2591	014274	110320		MOVB	R3,(R0)+	;;SAVE IT
2592	014276	005327		DEC	(PC)+	;;DONE?
2593	014300	000000		4\$: .WORD	0	
2594	014302	001357		BNE	1\$	;;BR IF NO
2595	014304	105020		CLRB	(R0)+	;;TERMINATOR
2596	014306	104411		RESREG		;;RESTORE REGISTERS
2597	014310	000207		RTS	PC	;;RETURN
2598	014312	145000		\$TNPWR:	145000	;;1.0E09
2599	014314	035632			35632	
2600	014316	160400			160400	;;1.0E08
2601	014320	002765			2765	
2602	014322	113200			113200	;;1.0E07
2603	014324	000230			230	
2604	014326	041100			041100	;;1.0E06
2605	014330	000017			17	
2606	014332	103240			103240	;;1.0E05
2607	014334	000001			1	
2608	014336	023420			23420	;;1.0E04
2609	014340	000000			0	
2610	014342	001750			1750	;;1.0E03
2611	014344	000000			0	
2612	014346	000144			144	;;1.0E02
2613	014350	000000			0	
2614	014352	000012			12	;;1.0E01
2615	014354	000000			0	
2616	014356	000001			1	;;1.0E00
2617	014360	000000			0	
2618	014362	000014		\$DECVL:	.BLKB 12.	;;RESERVE STORAGE FOR ASCII STRING
2619						
2620						;;*****
2621						
2622						;;TYPE NUMERICAL ASCII STRING,RIGHT JUSTIFIED
2623						;;REPLACING LEADING ZEROS WITH SPACES.
2624						;;
2625						;;FIRST ADDRESS OF ASCII STRING MUST BE ON TOP OF THE STACK
2626						
2627	014376	010046		RTJUST:	MOV R0,-(SP)	;;SAVE R0
2628	014400	016600	000004		MOV 4(SP),R0	;;PICK UP ADDRESS OF ASCII STRING
2629	014404	010037	014436		MOV R0,3\$	;;SAVE ADDRESS FOR TYPE OUT
2630	014410	105710		1\$: TSTB	(R0)	;;IS THIS THE TERMINATOR
2631	014412	001406		BEQ	2\$	;;IF YES TYPE IT OUT
2632	014414	122710	000060		CMPB #'0,(R0)	;;IS IT A ZERO

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DZRXA.E.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

2633	014420	001005			BNE 4\$	; IF NO GO PRINT IT
2634	014422	112720	000040		MOVB #' , (R0)+	; IF YES REPLACE IT WITH A SPACE
2635	014426	000770			BR 1\$	; TEST NEXT CHAR.
2636	014430	112740	000060	2\$:	MOVB #'0, -(R0)	; STRING OFF ALL ZEROS, PUT BACK THE LAST ONE
2637	014434	104400		4\$:	TYPE	; TYPE THE STRING
2638	014436	000000		3\$:	OPEN	
2639	014440	012600			MOV (SP)+, R0	; RESTORE R0
2640	014442	012616			MOV (SP)+, (SP)	; RESTORE THE STACK
2641	014444	000207			RTS PC	; RETURN
2642						
2643						
2644						
2645	014446	012546				
2646	014450	004737	014146	SGLDEC:	MOV (R5)+, -(SP)	; PUT NUMBER TO BE TYPED ON STACK
2647	014454	004737	014376		JSR PC, 2*SSB2D	; CONVERT NUMBER TO DECIMAL
2648	014460	000205			JSR PC, RTJUST	; TYPE THE DECIMAL NUMBER
2649					RTS R5	
2650						
2651	014462	047125	054105	042520	MUNXDD:	.ASCIZ "UNEXPECTED D D MARK"
2652	014470	052103	042105	042040		
2653	014476	042040	046440	051101		
2654	014504	000113				
2655						
2656	014506	020104	020104	040515	MDDMIS:	.ASCIZ "D D MARK MISSING"
2657	014514	045522	046440	051511		
2658	014522	044523	043516	000		
2659						
2660						
2661	014527	104	052101	026101	MDERHDR:	.ASCIZ "DATA, NO STATUS ERROR"
2662	014534	047040	020117	052123		
2663	014542	052101	051525	042440		
2664	014550	051122	051117	000		
2665						
2666	014555	040	047117	052040	MTRK:	.ASCIZ " ON TRACK"
2667	014562	040522	045503	000		
2668						
2669						
2670	014567	040	043040	047522	MPRES:	.ASCIZ " FROM TRACK"
2671	014574	020115	051124	041501		
2672	014602	000113				
2673						
2674	014604	027440	051440	041505	MSECT:	.ASCIZ " / SECTOR"
2675	014612	047524	000122			
2676						
2677	014616	005015	041040	052131	MCOLMUN:	.ASCIZ <15><12>" BYTE BAD GOOD"<15><12>
2678	014624	020105	041040	042101		
2679	014632	020040	047507	042117		
2680	014640	005015	000			
2681						
2682	014643	015	041412	052501	DOLOAD:	.ASCII <15><12>"CAUTION - IF YOU DESIRE TO TEST UNIT 0"
2683	014650	044524	047117	026440		
2684	014656	044440	020106	047531		
2685	014664	020125	042504	044523		
2686	014672	042522	052040	020117		
2687	014700	042524	052123	052440		
2688	014706	044516	020124	060		

2699	014713	015	051012	050105		.ASCII (15)(12)"REPLACE LOAD MEDIUM WITH A SCRATCH DISKETTE"
2690	014720	040514	042503	046040		
2691	014726	040517	020104	042515		
2692	014734	044504	046525	053440		
2693	014742	052111	020110	020101		
2694	014750	041523	040522	041524		
2695	014756	020110	044504	045523		
2696	014764	052105	042524			
2697	014770	005015	044124	047105		.ASCII (15)(12)"THEN PRESS CONTINUE"
2698	014776	050040	042522	051523		
2699	015004	041440	047117	044524		
2700	015012	052516	000105			
2701						
2702	015016	047516	042040	044522	MNOOBY:	.ASCII "NO DRIVES READY"(15)(12)
2703	015024	042526	020123	042522		
2704	015032	042101	006531	000012		
2705						
2706	015040	020040	020040	020040	TAB:	.ASCII (40)(40)(40)(40)(40)(40)
2707	015046	000				
2708						
2709	015047	040	000040		DBLSF:	.ASCII (40)(40)
2710						
2711	015052	005015	000		MCRLF:	.ASCII (15)(12)
2712						
2713	015055	104	000		MEOP:	.ASCII "D"
2714						
2715	015057	055	000		MEREOP:	.ASCII "--"
2716						
2717	015061	007	000		MABELL:	.ASCII (07)
2718						
2719	015063	105	051122	051117	MERHEADER:	.ASCII "ERROR CONDITIONS "
2720	015070	041440	047117	044504		
2721	015076	044524	047117	020123		
2722	015104	000040				
2723						
2724	015106	047125	052111	030040	MUNIT0:	.ASCII "UNIT 0 "
2725	015114	000040				
2726						
2727	015116	047125	052111	030440	MUNIT1:	.ASCII "UNIT 1 "
2728	015124	000040				
2729						
2730	015126	040510	020123	042502	MDELET:	.ASCII "HAS BEEN DELETED."
2731	015134	047105	042040	046105		
2732	015142	052105	042105	000056		
2733						
2734	015150	044440	052116	053040	MINTVEC:	.ASCII " INT VECTOR = "
2735	015156	041505	047524	020122		
2736	015164	020075	000			
2737						
2738	015167	122	041530	020123	MRXCS:	.ASCII "RXCS = "
2739	015174	020075	000			
2740						
2741	015177	040	054122	041104	MRXDB:	.ASCII " RXDB = "
2742	015204	036440	000040			
2743						
2744	015210	052123	052101	051525	MASTAT:	.ASCII "STATUS A = "

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2745	015216	040440	036440	000040		
2746						
2747	015224	052123	052101	051525	MBSTAT:	.ASCIZ "STATUS B = "
2748	015232	041040	036440	000040		
2749						
2750	015240	005015	000012		DBLLF:	.ASCIZ "<15><12><12>"
2751						
2752	015244	036520	000040		MPAT:	.ASCIZ "P= "
2753						
2754	015250	036524	000040		MTEST:	.ASCIZ "T= "
2755						
2756	015254	036523	000040		MSEQ:	.ASCIZ "S= "
2757						
2758	015260	047516	044440	052116	MINTER:	.ASCIZ "NO INTERRUPT AT DONE ERROR"
2759	015266	051105	050125	020124		
2760	015274	052101	042040	047117		
2761	015302	020105	051105	047522		
2762	015310	000122				
2763						
2764	015312	047125	047113	053517	MUKNINT:	.ASCIZ "UNKNOWN INTERRUPT"
2765	015320	020116	047111	042524		
2766	015326	052522	052120	000		
2767						
2768	015333	124	052117	046101	MERCT:	.ASCIZ "TOTAL READ CHECK ERRORS = "
2769	015340	051040	040505	020104		
2770	015346	044103	041505	020113		
2771	015354	051105	047522	051522		
2772	015362	036440	000040			
2773						
2774	015366	044506	046114	052502	MFIL:	.ASCIZ "FILLBUFFER "
2775	015374	043106	051105	000040		
2776						
2777	015402	046505	052120	041131	MEMPTY:	.ASCIZ "EMPTYBUFFER "
2778	015410	043125	042506	020122		
2779	015416	000				
2780						
2781	015417	104	044522	042526	MICON:	.ASCIZ "DRIVE(S) "
2782	015424	051450	020051	000040		
2783						
2784	015432	042524	052123	044040	MHUNG:	.ASCIZ "TEST HUNG"<15><12>"
2785	015440	047125	006507	000012		
2786						
2787	015446	047516	051516	040524	MNONSTD:	.ASCIZ "NONSTANDARD TRACK / SECTOR LIMITS"
2788	015454	042116	051101	020104		
2789	015462	051124	041501	020113		
2790	015470	020057	042523	052103		
2791	015476	051117	046040	046511		
2792	015504	052111	000123			
2793						
2794	015510	042117	000075		MOD:	.ASCIZ "OD="
2795						
2796	015514	042111	000075		MID:	.ASCIZ "ID="
2797						
2798	015520	044506	051522	036524	MFIRST:	.ASCIZ "FIRST="
2799	015526	000				
2800						

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 DZRXAE.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

2801	015527	114	051501	036524	MLAST:	.ASCIZ "LAST="
2802	015534	000				
2803						
2804	015535	111	044516	027124	MINIT1:	.ASCIZ "INIT.DONE NOT SET ERROR" <15><12>
2805	015542	047504	042516	047040		
2806	015550	052117	051440	052105		
2807	015556	042440	051122	051117		
2808	015564	005015	000			
2809						
2810	015567	111	044516	027124	MINIT2:	.ASCIZ "INIT.DONE SET ERROR" <15><12>
2811	015574	047504	042516	051440		
2812	015602	052105	042440	051122		
2813	015610	051117	005015	000		
2814						
2815	015615	104	042040	042440	MODER:	.ASCIZ "D D ERROR"
2816	015622	051122	051117	000		
2817						
2818	015627	122	041505	053117	MREC:	.ASCIZ "RECOVERABLE "
2819	015634	051105	041101	042514		
2820	015642	000040				
2821						
2822	015644	051103	020103	051105	MBADCRG:	.ASCIZ "CRC ERROR NO DATA ERROR"
2823	015652	047522	020122	047516		
2824	015660	042040	052101	020101		
2825	015666	051105	047522	000122		
2826						
2827	015674	042522	042101	000040	MREAD:	.ASCIZ "READ "
2828						
2829	015702	040510	052114	032040	MHALT4:	.ASCIZ "HALT 4" <15><12>
2830	015710	005015	000			
2831						
2832	015713	110	046101	020124	MHALT3:	.ASCIZ "HALT 3" <15><12>
2833	015720	006463	000012			
2834						
2835	015724	040510	052114	030440	MHALT11:	.ASCIZ "HALT 11" <15><12>
2836	015732	006461	000012			
2837						
2838	015736	040504	040524	041440	MCRC:	.ASCIZ "DATA CRC ERROR"
2839	015744	041522	042440	051122		
2840	015752	051117	000			
2841						
2842						
2843	015755	040	047125	042522	MUNREC:	.ASCIZ " UNRECOVERABLE "
2844	015762	047503	042526	040522		
2845	015770	046102	020105	000		
2846						
2847	015775	123	042505	020113	MSEEK:	.ASCIZ "SEEK ERROR"
2848	016002	051105	047522	000122		
2849						
2850	016010	051127	052111	020105	MWRITE:	.ASCIZ "WRITE "
2851	016016	000				
2852						
2853	016017	120	051101	052111	MPAR:	.ASCIZ "PARITY ERROR"
2854	016024	020131	051105	047522		
2855	016032	000122				
2856						

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 DZRXAE.F11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

2857	016034	051105	047522	020122	MNOFLAG:	.ASCIZ "ERROR FLAG ERROR"
2858	016042	046106	043501	042440		
2859	016050	051122	051117	000		
2860						
2861	016055	122	030530	020061	MDUMP:	.ASCIZ "RX11 DUMP"
2862	016062	052504	050115	000		
2863						
2864	016067	105	051122	051117	MERS:	.ASCIZ "ERRORS"
2865	016074	000123				
2866						
2867	016076	044123	051117	020124	MSHORT:	.ASCIZ "SHORT DUMP"
2868	016104	052504	050115	000		
2869						
2870	016111	122	051505	040524	MRESTART:	.ASCIZ "RESTARTS = "
2871	016116	052122	020123	020075		
2872	016124	000				
2873						
2874	016125	120	051501	020123	MNOPAS:	.ASCIZ "PASS ABORTED"
2875	016132	041101	051117	042524		
2876	016140	000104				
2877						
2878	016142	040520	051523	051505	MPASS:	.ASCIZ "PASSES = "
2879	016150	036440	000040			
2880						
2881	016154	051127	052111	042524	MWRTEN:	.ASCIZ "WRITTEN "
2882	016162	020116	000			
2883						
2884	016165	057	000040		MSLASH:	.ASCIZ "/"
2885						
2886	016170	000040			SPACE:	.ASCIZ "<40>"
2887						
2888	016172	051105	047522	051522	MCODES:	.ASCIZ "ERRORS PER ERROR CODES"<15><12>
2889	016200	050040	051105	042440		
2890	016206	051122	051117	041440		
2891	016214	042117	051505	005015		
2892	016222	000				
2893						
2894	016223	124	040522	045503	MTKLOG:	.ASCIZ "TRACK ACCESSED MOVED TO UNIT 0 UNIT 1 ERRORS"<15><12>
2895	016230	020040	041501	042503		
2896	016236	051523	042105	020040		
2897	016244	046440	053117	042105		
2898	016252	052040	020117	020040		
2899	016260	052440	044516	020124		
2900	016266	020060	052440	044516		
2901	016274	020124	020061	051105		
2902	016302	047522	051522	005015		
2903	016310	000				
2904						
2905	016311	050	047516	042516	MNONE:	.ASCIZ "(NONE)"<15><12>
2906	016316	006451	000012			
2907						
2908	016322	047507	042117	000	MGOOD:	.ASCIZ "GOOD"
2909						
2910	016327	040	041440	042510	MSUM:	.ASCIZ "CHECK SUM"
2911	016334	045503	051440	046525		
2912	016342	000040				

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 DZRXAE.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

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2913
2914 016344 005015 054122 030461 MRX11: .ASCIZ <15><12>"RX11 / RXV11"
2915 016352 027440 051040 053130
2916 016360 030461 000
2917
2918 016363 015 052012 040522 002BIG: .ASCII <15><12> "TRACK LIMITS SELECTED OUT OF RANGE,"
2919 016370 045503 046040 046511
2920 016376 052111 020123 042523
2921 016404 042514 052103 042105
2922 016412 047440 052125 047440
2923 016420 020106 040522 043516
2924 016426 026105
2925 016430 051525 047111 020107 .ASCIZ "USING OD=0, ID=114"<15><12>
2926 016436 042117 030075 020054
2927 016444 042111 030475 032061
2928 016452 005015 000
2929
2930 016455 015 051412 041505 S2BIG: .ASCII <15><12> "SECTOR LIMITS SELECTED OUT OF RANGE,"
2931 016462 047524 020122 044514
2932 016470 044515 051524 051440
2933 016476 046105 041505 042524
2934 016504 020104 052517 020124
2935 016512 043117 051040 047101
2936 016520 042507 054
2937 016523 125 044523 043516 .ASCIZ "USING FIRST=1, LAST=32"<15><12>
2938 016530 043040 051111 052123
2939 016536 030475 020034 040514
2940 016544 052123 031475 006462
2941 016552 000012
2942
2943 016554 005015 040515 047111 MREV: .ASCIZ <15><12> "MAINDEC-11-DZRXA-E" <15><12>
2944 016562 042504 026503 030461
2945 016570 042055 051132 040530
2946 016576 042455 005015 000
2947
2948 016604 .EVEN
2949
2950 ;*****
2951
2952 ;THE FOLLOWING LOCATIONS ARE USED FOR DATA STORAGE,RETRY COUNTERS
2953 ;ACCESS COUNTERS ETC.
2954
2955 016604 000200 BUFADR: .BLKB 200
2956
2957 ;RETRY COUNTERS
2958 017004 000012 RDRETRY: 10. ;FOR SETUP PURPOSE RDRETRY MUST BE FIRST ON RETRY LIST
2959 017006 000012 WTRETRY: 10.
2960 017010 000012 DDRETRY: 10.
2961 017012 000012 DATARETRY: 10.
2962 017014 000012 P2RETRY: 10.
2963 017016 000012 PRETRY: 10.
2964 017020 000012 CRETRY: 10.
2965 017022 000012 SRETRY: 10. ;FOR SETUP PURPOSE SRETRY MUST BE LAST ON RETRY LIST
2966
2967
2968 ;GENERAL ERROR COUNTERS

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 DZRXAE.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

2969	017024	000000	PARLOG:	0	;FOR SETUP PURPOSE PARLOG MUST BE FIRST ON COUNTERS LIST
2970	017026	000000	HPARLOG:	0	
2971	017030	000000	NOERLOG:	0	
2972	017032	000000	UKNINT:	0	
2973	017034	000000	INTER:	0	
2974			;DRIVE RELATED ERROR COUNTERS		
2975	017036	000000	ZSEKLOG:	0	; "Z" LOGS ARE FOR DRIVE UNIT "Z"ERO
2976	017040	000000	SEKLOG:	0	;NON"Z" LOGS ARE FOR DRIVE UNIT 1
2977	017042	000000	ZCRCLOG:	0	
2978	017044	000000	CRCLOG:	0	; * * * NOTE: * * *
2979	017046	000000	ZCRCBAD:	0	;ERROR CODES MUST NOT BE CHANGED
2980	017050	000000	CRCBAD:	0	;FROM THIS ORDER. ERROR DUMP
2981	017052	000000	ZRDLOG:	0	;ASSUMES TAGS OF LOGS ARE IN ORDER SHOWN.
2982	017054	000000	RDLOG:	0	
2983	017056	000000	ZWRTLOG:	0	
2984	017060	000000	WRTLOG:	0	
2985	017062	000000	ZDATALOG:	0	
2986	017064	000000	DATALOG:	0	
2987	017066	000000	ZDDMIS:	0	
2988	017070	000000	DDMIS:	0	
2989	017072	000000	ZUNXDD:	0	
2990	017074	000000	UNXDD:	0	
2991	017076	000000	ZHSEKLOG:	0	
2992	017100	000000	HSEKLOG:	0	
2993	017102	000000	ZHCRCLOG:	0	
2994	017104	000000	HCRCLOG:	0	
2995	017106	000000	ZHCRCBAD:	0	
2996	017110	000000	HCRCBAD:	0	
2997	017112	000000	ZHRDLOG:	0	
2998	017114	000000	HRDLOG:	0	
2999	017116	000000	ZHWRTLOG:	0	
3000	017120	000000	HWRTLOG:	0	
3001	017122	000000	ZHDATALOG:	0	
3002	017124	000000	HATALOG:	0	
3003	017126	000000	ZHDDLOG:	0	
3004	017130	000000	HDDLOG:	0	
3005					
3006			;ERROR CODES		
3007	017132	000021	ERCODE:	.BLKW 17.	
3008					
3009			;THE FOLLOWING 2 BLOCKS OF WORDS ARE TRACK ACCESS COUNTER AND		
3010			;HEAD MOVED TO TRACK COUNTERS. THEY ARE DOUBLE PRECISION		
3011			;COUNTERS IN THE FOLLOWING FORMATT:		
3012			;LOC.X LOW ORDER WORD TRACK 0		
3013			;LOC.X+2 HIGH ORDER WORD TRACK 0		
3014			;LOC.X+4 LOW ORDER WORD TRACK 1		
3015			;LOC.X+6 HIGH ORDER WORD TRACK 1		
3016			;ETC.		
3017					
3018					
3019			;TOTAL ACCESS / TRACK		
3020	017174	000232	TKACC:	.BLKW 232	
3021					
3022			;TOTAL HEAD MOVEMENT TO TRACK		
3023	017660	000232	HDMOVE:	.BLKW 232	
3024					

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 DZRXAE.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

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3025                                     ;THE FOLLOWING 2 BLOCKS OF COUNTERS ARE SINGLE PRECISION
3026
3027                                     ;ERROR PER TRACK ON UNIT 0
3028 020344 000115      UOTRK:          .BLKW 115
3029
3030                                     ;ERROR PER TRACK ON UNIT 1
3031 020576 000115      UITRK:          .BLKW 115
3032
3033                                     ;TOTAL WRITE AND READ FUNCTIONS DOUBLE PRECISION COUNTERS
3034 021030 000000 000000      WTCNTR:      .WORD 0,0
3035 021034 000000 000000      RDCNTR:      .WORD 0,0
3036
3037                                     ;RESTART AND PASSES COMPLETED COUNTERS
3038 021040 000000      RESTCNTR:      0
3039 021042 000000      PASCNTR:      0          ;FOR SETUP PURPOSE PASCNTR MUST BE PLACED LAST
3040
3041 021044 032737 000020 010704  UILOG:      BIT #BIT4,UNITSEL      ;TEST FOR UNIT IN OPERATION
3042 021052 001402          BEQ 1$          ;IF BIT 4 IS 0 RETURN AND INC. UNIT 0 COUNTERS
3043 021054 062703 000002          ADD #2,R3      ;ADJUST THE CONTENTS OF R3 FOR
3044                                     ;THE ADDRESS OF UNIT 1 ERROR LOG COUNTERS.
3045 021060 000207      1$:          RTS PC
3046
3047                                     ;STATISTICAL ERROR REPORT ROUTEEN
3048                                     ;PRINTS ALL ERROR LOGS AND OPERATING CONDITIONS
3049
3050                                     ;*****
3051
3052 021062 012706 001200      ERDUMP:      MOV #STACK,SP
3053 021066 104400 015240          TYPE ,DBLLF
3054 021072 005737 022514          TST SHORTRPT          ;IS SHORT REPORT REQUESTED
3055 021076 001405          BEQ 1$          ;NO,PRINT LONG REPORT
3056 021100 104400 015040          TYPE ,TAB
3057 021104 104400 016076          TYPE ,MSHORT          ;YES,TYPE SHORT REPORT HEADER
3058 021110 000404          BR 2$
3059 021112 104400 015040      1$:      TYPE ,TAB
3060 021116 104400 016055          TYPE ,MDUMP          ;TYPE LONG REPORT HEADER
3061 021122 104400 016554      2$:      TYPE ,MREV          ;PRINT NAME AND REVISION OF PROGRAM
3062 021126 004737 002452          JSR PC,ICOND          ;TYPE OUT SELECTED DRIVES AND TESTS
3063 021132 005737 021040          TST RESTCNTR          ;HAVE THERE BEEN ANY RESTARTS
3064 021136 001412          BEQ 3$          ;NO
3065 021140 104400 016111          TYPE ,MRESTART          ;YES,PRINT OUT HOW MANY
3066 021144 013737 021040 021156      MOV RESTCNTR,12$
3067 021152 004537 014446          JSR R5,SGLDEC
3068 021156 000000      12$:      OPEN
3069 021160 104400 015240          TYPE ,DBLLF
3070 021164 005737 021042      3$:      TST PASCNTR          ;HAVE ANY PASSES BEEN COMPLETED
3071 021170 001005          BNE 4$          ;YES,PRINT OUT HOW MANY
3072 021172 104400 016125          TYPE ,MNOPAS          ;NO,TYPE PASS ABORTED
3073 021176 104400 015240          TYPE ,DBLLF
3074 021202 000412          BR 5$
3075 021204 104400 016142      4$:      TYPE ,MPASS          ;TYPE OUT NUMBER OF PASSES
3076 021210 013737 021042 021222      MOV PASCNTR,7$
3077 021216 004537 014446          JSR R5,SGLDEC
3078 021222 000000      7$:      OPEN
3079 021224 104400 015052          TYPE ,MCRLF
3080 021230 005737 022514      5$:      TST SHORTRPT          ;IS THIS A SHORT REPORT

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 DZRXAE.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

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3081 021234 001030 BNE AERRS ;YES,DON'T PRINT WRITE/READ TOTALS
3082
3083 ;PRINTS TOTAL NUMBER OF SECTORS WRITTEN AND/OR
3084 ;READ FOR THE DURATION OF RUN TIME.
3085 021236 104400 016154 TYPE ,MWRTEN ;PRINT WRT/RD MESSAGE
3086 021242 104400 016165 TYPE ,MSLASH
3087 021246 104400 015674 TYPE ,MREAD
3088 021252 104400 015047 TYPE ,DBLSP
3089 021256 012746 021030 MOV #WTCNTR,-(SP) ;ADDRESS OF TOTAL WRITES ON STACK
3090 021262 004737 014202 JSR PC,2*SD82D ;TYPE TOTAL WRITES
3091 021266 004737 014376 JSR PC,RTJUST
3092 021272 104400 016165 TYPE ,MSLASH
3093 021276 012746 021034 MOV #ADCNTR,-(SP) ;ADDRESS OF READS ON STACK
3094 021302 004737 014202 JSR PC,2*SD82D ;TYPE TOTAL READS
3095 021306 004737 014376 JSR PC,RTJUST
3096 021312 104400 015240 TYPE ,DBLLF
3097
3098 ;TYPE OUT MICRO CPU RELATED ERRORS
3099 021316 104400 015052 AERRS: TYPE ,MCRLF
3100 021322 005737 017024 TST PARLOG ;WERE THERE ANY PARITY ERRORS
3101 021326 001435 BEQ 1$
3102 021330 013737 017024 021342 MOV PARLOG,20$ ;YES,TYPE OUT THE NUMBER
3103 021336 004537 014446 JSR R5,SGLDEC
3104 021342 000000 20$: OPEN
3105 021344 104400 015047 TYPE ,DBLSP
3106 021350 104400 016017 TYPE ,MPAR
3107 021354 104400 015052 TYPE ,MCRLF
3108 021360 005737 017026 TST HPARLOG ;WERE THERE ANY HARD PARITY ERRORS
3109 021364 001416 BEQ 1$
3110 021366 013737 017026 021400 MOV HPARLOG,21$ ;YES,TYPE OUT THE COUNT
3111 021374 004537 014446 JSR R5,SGLDEC
3112 021400 000000 21$: OPEN
3113 021402 104400 015047 TYPE ,DBLSP
3114 021406 104400 015755 TYPE ,MUNREC
3115 021412 104400 016017 TYPE ,MPAR
3116 021416 104400 015052 TYPE ,MCRLF
3117 021422 005737 017030 1$: TST NOERLOG ;ANY STATUS ERROR FLAG ERRORS
3118 021426 001414 BEQ 3$ ;IF NONE CHECK NEXT ERROR
3119 021430 013737 017030 021442 MOV NOERLOG,24$ ;YES,TYPE OUT COUNT
3120 021436 004537 014446 JSR R5,SGLDEC
3121 021442 000000 24$: OPEN
3122 021444 104400 015047 TYPE ,DBLSP
3123 021450 104400 016034 TYPE ,MNOFLAG
3124 021454 104400 015052 TYPE ,MCRLF
3125 021460 005737 017034 3$: TST INTER ;ANY NO INTERRUPT ON DONE ERRORS
3126 021464 001414 BEQ 4$ ;IF NONE CHECK NEXT ERROR GROUP
3127 021466 013737 017034 021500 MOV INTER,25$ ;YES,PRINT OUT NUMBER
3128 021474 004537 014446 JSR R5,SGLDEC
3129 021500 000000 25$: OPEN
3130 021502 104400 015047 TYPE ,DBLSP
3131 021506 104400 015260 TYPE ,MINTER
3132 021512 104400 015052 TYPE ,MCRLF
3133 ;TYPES DRIVE RELATED ERRORS
3134 021516 104400 015240 4$: TYPE ,DBLLF
3135 021522 104400 015106 TYPE ,MUNITO ;TYPE OUT COLUMN HEADINGS
3136 021526 104400 015116 TYPE ,MUNITI

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 DZRXAE.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

3137	021532	104400	016170	TYPE ,SPACE	
3138	021536	104400	016067	TYPE ,MERS	
3139	021542	104400	015052	TYPE ,MCRLF	
3140	021546	005002		CLR R2	;R2 USED AS AN ERROR PRINTED FLAG
3141	021550	013746	022516	MOV ZERO,-(SP)	;PUT ADDR OF ZERO MARK ON STACK
3142	021554	012746	014462	MOV #MUNXDD,-(SP)	;PUT ADDRESSES OF ALL RECOVERABLE
3143	021560	012746	014506	MOV #MDDMIS,-(SP)	;ERROR MESSAGES ON THE STACK
3144	021564	012746	014527	MOV #MDERHDR,-(SP)	
3145	021570	012746	016010	MOV #MWRITE,-(SP)	
3146	021574	012746	015674	MOV #MREAD,-(SP)	
3147	021600	012746	015644	MOV #MBADCRC,-(SP)	
3148	021604	012746	015736	MOV #MCRC,-(SP)	
3149	021610	012746	015775	MOV #MSEEK,-(SP)	
3150	021614	012701	017036	MOV #ZSEKLOG,R1	;PUT FIRST ERROR COUNTER IN REGISTER
3151	021620	005716		TST (SP)	;GET ADDRESS OF MESSAGE
3152	021622	001436		BEQ 5\$	;IF 0 FINISHED SOFT ERRS DO HARD ERRS
3153	021624	005721		TST (R1)+	;IS DRIVE 0 COUNTER CLEAR
3154	021626	001005		BNE 6\$	;NO,GO PRINT ERROR COUNTER
3155	021630	005711		TST (R1)	;IS DRIVE 1 COUNTER CLEAR
3156	021632	001003		BNE 6\$	;NO,GO PRINT ERROR COUNTER
3157	021634	005721		TST (R1)+	;ADJUST R1 FOR NEXT UNIT 0 COUNTER
3158	021636	005726		TST (SP)+	;ADJUST STACK FOR NEXT ADDRESS
3159	021640	000767		BR 7\$	;GO TEST NEXT PAIR OF COUNTERS
3160	021642	005202		INC R2	;MAKE ERROR PRINTED FLAG NON ZERO
3161	021644	014137	021654	MOV -(R1),30\$	;TYPE CONTENTS OF UNIT 0 COUNTER
3162	021644	004537	014446	JSR R5,SGLDEC	
3163	021654	000000		OPEN	
3164	021656	104400	015047	TYPE ,DBLSP	
3165	021662	005721		TST (R1)+	;ADJUST R1 FOR UNIT 1 COUNTER
3166	021664	012137	021674	MOV (R1)+,31\$	;TYPE COUNTER,GET ADDR OF NEXT IN R1
3167	021670	004537	014446	JSR R5,SGLDEC	
3168	021674	000000		OPEN	
3169	021676	104400	015047	TYPE ,DBLSP	
3170	021702	012637	021710	MOV (SP)+,13\$	
3171	021706	104400		TYPE	;TYPE ERROR MESSAGE FROM STACK
3172	021710	000000		OPEN	
3173	021712	104400	015052	TYPE ,MCRLF	
3174	021716	000740		BR 7\$	;GET NEXT COUNTER
3175	021720	104400	015052	TYPE ,MCRLF	
3176	021724	013746	022516	MOV ZERO,-(SP)	;PUT ADDR OF ZERO MARK ON THE STACK
3177	021730	012746	015615	MOV #MDDER,-(SP)	;PUT ADDRESS OF ALL HARD ERROR
3178	021734	012746	014527	MOV #MDERHDR,-(SP)	;MESSAGES ON THE STACK
3179	021740	012746	016010	MOV #MWRITE,-(SP)	
3180	021744	012746	015674	MOV #MREAD,-(SP)	
3181	021750	012746	015644	MOV #MBADCRC,-(SP)	
3182	021754	012746	015736	MOV #MCRC,-(SP)	
3183	021760	012746	015775	MOV #MSEEK,-(SP)	
3184	021764	012701	017076	MOV #ZHSEKLOG,R1	;PUT FIRST HARD ERROR COUNTER IN R1
3185	021770	005716		TST (SP)	;GET ADDRESS OF MESSAGE FROM STACK
3186	021772	001437		BEQ BERRS	;IF 0 FINISHED ERROR LOGS
3187	021774	005721		TST (R1)+	;IS DRIVE 0 COUNTER CLEAR
3188	021776	001005		BNE 11\$	;NO,PRINT ERROR COUNTER AND MESSAGE
3189	022000	005711		TST (R1)	;IS DRIVE 1 COUNTER CLEAR
3190	022002	001003		BNE 11\$	;NO,GO PRINT THE ERROR
3191	022004	005721		TST (R1)+	;ADJUST R1 FOR NEXT UNIT 0 LOG
3192	022006	005726		TST (SP)+	;ADJUST STACK FOR NEXT ADDRESS

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 DZRXAE.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

3193	022010	000767		BR 12\$	
3194	022012	014137	022022	MOV -(R1), 32\$	;TYPE CONTENTS OF UNIT 0 COUNTER
3195	022016	004537	014446	JSR R5, SGLDEC	
3196	022022	000000		OPEN	
3197	022024	104400	015047	TYPE ,DBLSP	
3198	022030	005721		TST (R1)+	;ADJUST R1 FOR UNIT 1 COUNTER
3199	022032	012137	022042	MOV (R1)+, 33\$	;TYPE UNIT 1 LOG
3200	022036	004537	014446	JSR R5, SGLDEC	
3201	022042	000000		OPEN	
3202	022044	104400	015047	TYPE ,DBLSP	
3203	022050	104400	015755	TYPE ,MUNREC	;TYPE UNRECOVERABLE
3204	022054	012637	022062	MOV (SP)+, 14\$	
3205	022060	104400		TYPE	;ERROR MESSAGE FROM STACK
3206	022062	000000		OPEN	
3207	022064	104400	015052	TYPE ,MCRLF	
3208	022070	000737		BR 12\$	;GET NEXT LOG
3209				;PRINTS ERRORS PER ERROR CODES	
3210	022072	005702		TST R2	;WAS AN ERROR PRINTED IN THE LAST GROUP
3211	022074	001004		BNE 5\$	;IF R2 IS NONZERO BRANCH
3212	022076	104400	015040	TYPE ,TAB	
3213	022102	104400	016311	TYPE ,MNONE	;TYPE NONE
3214	022106	005002		CLR R2	;CLEAR ERROR PRINTED FLAG AGAIN
3215	022110	104400	015240	TYPE ,DBLLF	
3216	022114	104400	016172	TYPE ,MCOSES	;TYPE ERROR PER ERROR CODE
3217	022120	012700	000001	MOV #1, R0	;SET UP CODE COUNTER
3218	022124	012701	017132	MOV #ERCODE, R1	;GET ADDR OF FIRST ERROR CODE
3219	022130	020027	000022	CMP R0, #22	;IS THE LAST CODE PRINTED
3220	022134	001001		BNE 3\$	;NO TEST THE NEXT ONE
3221	022136	000427		BR TYPTRK	;YES, GO PRINT TRACK INFORMATION
3222	022140	005721		TST (R1)+	;TEST FOR 0 WORD, GET NEXT ADDRESS
3223	022142	001002		BNE 1\$	;IF NOT 0 TYPE COUNT AND CODE NUMBER
3224	022144	005200		INC R0	;INC CODE COUNTER
3225	022146	000770		BR 2\$	
3226	022150	014137	022160	MOV -(R1), 4\$	;PUT CONTENTS OF COUNTER IN OPEN
3227	022154	004537	014446	JSR R5, SGLDEC	;FOR TYPE OUT
3228	022160	000000		OPEN	
3229	022162	104400	015040	TYPE ,TAB	
3230					
3231	022166	010002		MOV R0, R2	;PUT CODE NUMBER IN REGISTER TO
3232	022170	006302		ASL R2	;TYPE IT OUT IN THE FROM OF ERROR CODE
3233	022172	006302		ASL R2	
3234	022174	006302		ASL R2	
3235	022176	010246		MOV R2, -(SP)	;SAVE R2 FOR TYPEOUT
3236	022200	104402		;;GO TYPE--OCTAL ASCII	
3237	022202	004		;;TYPE 4 DIGIT(S)	
3238	022203	001		;;TYPE LEADING ZEROS	
3239	022204	104400	015052	TYPE ,MCRLF	
3240	022210	005200		INC R0	;SET UP FOR NEXT COUNTER
3241	022212	005721		TST (R1)+	;GET NEXT ERROR COUNTER
3242	022214	000745		BR 2\$	
3243				;PRINTS TRACK ACCESS, HEAD MOVEMENT, AND ERRORS PER TRACK	
3244	022216	005702		TST R2	;WAS AN ERROR PRINTED IN LAST GROUP
3245	022220	001004		BNE 5\$	;IF PRINTED ERROR FLAG NONZERO BRANCH
3246	022222	104400	015040	TYPE ,TAB	
3247	022226	104400	016311	TYPE ,MNONE	;TYPE NONE
3248	022232	104400	015240	TYPE ,DBLLF	

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 DZRXAE.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

3249	022236	005737	022514	TST SHORTRPT	; IF SHORT REPORT DON'T TYPE TRACK ACCESS OR ERRO
3250	022242	001121		BNE 6\$	
3251	022244	104400	016223	TYPE MTKLOG	; TYPE FORMAT OF ERROR PRINT OUT
3252	022250	005037	022330	CLR 2\$	; TRACK ADDRESS COUNTER
3253	022254	012704	017170	MOV #TKACC-4,R4	; SET UP ADDRESS OF TRACK ACCESSED
3254	022260	012703	017654	MOV #HDMOVE-4,R3	; ADDRESS OF HEAD MOVEMENT COUNTER
3255	022264	012702	020344	MOV #UOTRK,R2	; UNIT 0 ERROR PER TRACK COUNTER
3256	022270	012701	020576	MOV #UITRK,R1	; UNIT 1 ERROR PER TRACK COUNTER
3257	022274	062704	000004	ADD #4,R4	; ADJUST FOR ADDRESS OF NEXT COUNTER
3258	022300	005714		TST (R4)	; HAS THIS TRACK BEEN ACCESSED
3259	022302	001010		BNE 10\$	; YES, PRINT OUT THE COUNTERS
3260	022304	005764	000002	TST 2(R4)	; TEST UPPER WORD OF ACCESS COUNTER
3261	022310	001005		BNE 10\$	
3262	022312	062703	000004	ADD #4,R3	; THIS TRACK HAS NOT BEEN USED. ADJUST
3263	022316	005722		TST (R2)+	; REGISTERS TO POINT TO NEXT TRACK COUNTERS
3264	022320	005721		TST (R1)+	
3265	022322	000463		BR 12\$	; TEST FOR LAST TRACK
3266	022324	004537	014446	JSR R5, SGLDEC	; TYPE TRACK NUMBER
3267	022330	000000		OPEN	; THIS LOCATION USED AS TRACK ADDR COUNTER
3268	022332	104400	016170	TYPE SPACE	
3269	022336	010446		MOV R4, -(SP)	; TYPE TRACK ACCESSED COUNT
3270	022340	004737	014202	JSR PC, @#SDB2D	
3271	022344	004737	014376	JSR P^, RTJUST	
3272	022350	104400	016170	TYPE SPACE	
3273	022354	062703	000004	ADD #4,R3	
3274	022360	010346		MOV R3, -(SP)	; TYPE HEAD MOVED TO COUNT
3275	022362	004737	014202	JSR PC, @#SDB2D	
3276	022366	004737	014376	JSR PC, RTJUST	
3277	022372	104400	015047	TYPE DBLSP	
3278	022376	104400	016170	TYPE SPACE	
3279	022402	005712		TST (R2)	; ARE THERE ANY UNIT 0 ERRORS
3280	022404	001421		BEQ 20\$	; NO, CHECK UNIT 1
3281	022406	012237	022416	MOV (R2)+, 3\$	; TYPE UNIT 0 ERRORS
3282	022412	004537	014446	JSR R5, SGLDEC	
3283	022416	000000		OPEN	
3284	022420	005711		TST (R1)	; ARE THERE ANY UNIT 1 ERRORS
3285	022422	001420		BEQ 7\$	; NO, GO ADJUST POINTERS
3286	022424	104400	016170	TYPE SPACE	
3287	022430	104400	015047	TYPE DBLSP	
3288	022434	012137	022444	MOV (R1)+, 4\$	; TYPE UNIT 1 ERRORS
3289	022440	004537	014446	JSR R5, SGLDEC	
3290	022444	000000		OPEN	
3291	022446	000407		BR 11\$	; GO TO NEXT TRACK
3292					
3293	022450	005722		TST (R2)+	; NO ERRORS, ADJUST REG. FOR NEXT COUNTER
3294	022452	005711		TST (R1)	; ARE THERE ANY UNIT 1 ERRORS
3295	022454	001403		BEQ 7\$	; NO, GO TO NEXT TRACK
3296	022456	104400	015040	TYPE TAB	; YES, TYPE TAB FOR PLACEMENT
3297	022462	000762		BR 22\$	; GO TYPE THE NUMBER
3298	022464	005721		TST (R1)+	; NO ERRORS, ADJUST REG. FOR NEXT COUNTER
3299	022466	104400	015052	TYPE MCRLF	
3300	022472	005237	022330	INC 2\$	
3301	022476	023727	022330	CMP 2\$, #115	; HAVE ALL TRACK ERRORS BEEN TYPED
3302	022504	001273		BNE 1\$	; NO, TYPE THE NEXT ONE
3303	022506	005037	022514	CLR SHORTRPT	; SET UP FOR LONG REPORT
3304	022512	000000		HLT 17:	; YES DONE

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DZRXA.E.P11 DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

3305				
3306	022514	000000	SHORTRPT:	0
3307	022516	000000	ZERO:	0
3308				
3309	0C0001		.END	

[illegible]

[illegible]

FILLFL	003176	758#	761											
FIRST	001202	246#	247	595	600	602	607	617	625*	2086	2088*	2091	2094	2108
FLOAT0	010444	1664	1699#											
FLOAT1	010506	1665	1717#											
FUNCTI	004120	803*	806*	892*	893	903#	941*	1514	1521	1582				
GETPAT	010312	736	915	1135	1295	1312	1331	1358	1651#	1836				
GETSEC	012316	747	932	2105#										
GETTRA	011254	739	918	1138	1298	1315	1334	1364	1372	1892#				
GETUNI	010614	738	917	1137	1297	1314	1333	1337	1363	1779#				
GNS =	***** U	2482	2483	2484	2485	2487	2489	2490	2491	2492	2493			
GOODBY	006440	1227*	1229	1285#										
GTSWR =	104404	454	2487#											
HARDSK	003676	854	856	859#										
HCNTRI	007200	1392*	1401*	1415*	1424*	1430*	1438#	1809*	1837*					
HCNTR2	007202	1425*	1431*	1432	1439#									
HCRCBA	017110	2996#												
HCRCLO	017104	2994#												
HDATAI	017124	3002#												
HDDLOG	017130	3004#												
HDMOVE	017660	1984	3023#	3254										
HERE	011140	1840	1846#											
HLT10	004652	1013#												
HLT11	004730	1026#												
HLT12	004776	1039#												
HLT13	005306	1097#												
HLT14	006200	1235#												
HLT15	007242	1452#												
HLT16	011062	1831#												
HLT17	022512	3304#												
HLT20	007176	1435#												
HLT21	007120	1418#												
HLT3	002662	674#												
HLT4	002132	570#												
HLT5	002534	649#												
HLT6	003306	780#												
HLT7	003646	852#												
HOME	002550	493	654#	857										
HPARLO	017026	565*	787*	2970#	3108	3110								
HROLOG	017114	2998#												
HSEKLO	017100	2992#												
HT =	000011	51#	2143	2184										
HURTLO	017120	3000#												
ICOND	002452	635#	705	3062										
ID =	001201	245#	577	580	589	1858*	1862	1938	1973	1995	1998*			
IDCOMP	012042	2047#	2050											
IDNEXT	011552	1970	1973#											
INITSE	012216	746	931	2086#										
INITTR	011144	737	916	1136	1296	1313	1332	1362	1371	1855#				
INTER	017034	1443*	2973#	3125	3127									
INTLEA	012312	2097*	2102#	2109	2110*									
INTSER	007250	460	1453	1459#										
INTVEC	001204	268#	459	483										
IOTVEC=	000020	146#												
LAST =	001203	247#	597	602	612	2089*	2090	2106						
LASTTR	011722	2010	2013#											
LF =	000012	52#	2178	2184										

[illegible]

[illegible]

[illegible]

		2296*	2297*	2304*	2305*	2306*	2307*	2308	2309	2310	2311	2312	2313	2331*
		2332*	2333	2340*	2343*	2344*	2348*	2349*	2353	2356*	2360	2362	2364	2365*
		2372	2374	2376*	2377	2379*	2380*	2381*	2382*	2383*	2398*	2399*	2402*	2403*
		2404	2408*	2409*	2410	2413	2415	2417*	2426*	2431	2442	2443*	2444*	2445*
		2466*	2467	2500*	2501*	2502*	2503*	2504*	2505*	2506*	2507	2515*	2519	2520
		2521	2522	2523	2524	2525	2530*	2550	2551*	2553*	2554*	2571	2573*	2627*
		2628	2639	2640*	2645*	3052*	3089*	3093*	3141*	3142*	3143*	3144*	3145*	3146*
		3147*	3148*	3149*	3151	3158	3170	3176*	3177*	3178*	3179*	3180*	3181*	3182*
		3183*	3185	3192	3204	3235*	3269*	3274*						
SPACE	01617C	2886*	3137	3268	3272	3278	3286							
SRETRY	017022	470	748*	855*	936*	2965*								
STACK =	001200	46#	437	700	3052									
START1	001412	468#												
STATER	002046	513	554#	663	1491	1530	1606							
STKLMT=	177774	57#												
STOP	010732	743	923	1143	1302	1319	1342	1376	1808#					
STYP1	003626	836*	847#	990*										
STYP2	003720	837*	864#	991*										
SUM	010612	1179	1652*	1754*	1762#									
SWHLT1	003636	846	849#											
SWR	001214	345#	436*	443	447*	452	655	772	778	781	845	850	853	1006
		1011	1014	1032	1037	1040	1061	1088	1095	1098	1121	1200	1202	1233
		1245	1263	1445	1450	1471	1480	1504	1823	2327	2364*	2506	2519*	
SWREG	000176	191#	447	452	2327	2340								
SW0	= 000001	110#												
SW00	= 000001	100#	110											
SW01	= 000002	99#	109											
SW02	= 000004	98#	108											
SW03	= 000010	97#	107											
SW04	= 000020	96#	106											
SW05	= 000040	95#	105											
SW06	= 000100	94#	104											
SW07	= 000200	93#	103											
SW08	= 000400	92#	102											
SW09	= 001000	91#	101											
SW1	= 000002	109#												
SW10	= 002000	90#												
SW11	= 004000	89#	781	853	1014	1040	1061	1098	1263					
SW12	= 010000	88#	1202											
SW13	= 020000	87#	772	845	1006	1032	1088	1121	1200	1245	1445	1471	1490	1504
SW14	= 040000	86#	1823											

TESTDR	001526	492	494*											
TESTSE	002726	706*	1590											
TEST7	006630	726	1358*											
TEST7X	006642	1360*	1378	1383	1385									
THREE	012314	2095	2103*	2105										
TKACC	017174	889	3020*	3253										
TKVEC =	000060	150*												
TPVEC =	000064	151*												
TRAPVE=	000034	149*												
TRCK	007014	758	894	896	1168	1392*								
TRKCNT	011356	741*	921*	1141*	1300*	1317*	1340*	1367*	1374*	1865*	1866*	1867*	1912*	1954*
		1955*	1958	1997*	2006	2013	2026*	2027*						
TRKERR	003770	843	877*	995	1086	1119	1261							
TRTVEC=	000014	144*												
TSECTO	012310	895	1178	1181	1550	2094*	2095*	2101*	2105*	2106	2108*	2109*		
TSTLIM	002142	574*	651											
TSTMSG	002432	582	604	628*										
TYPADR	007716	1092	1110	1216	1518	1545*								
TYPCOD	010250	1520	1610*											
TYPE =	104400	441	472	477	482	490	517	535	555	562	563	566	567	568
		569	583	587	588	605	606	610	611	615	621	624	630	631
		635	636	639	642	643	645	648	673	774	775	776	788	789
		790	791	792	847	862	863	864	869	870	874	956	957	958
		959	966	967	968	969	1008	1009	1022	1023	1024	1025	1034	1035
		1054	1055	1056	1057	1072	1073	1074	1090	1093	1106	1107	1108	1109
		1111	1123	1213	1214	1215	1217	1222	1226	1231	1247	1251	1254	1256
		1257	1272	1273	1274	1275	1417	1434	1447	1448	1473	1474	1482	1483
		1506	1507	1508	1512	1513	1519	1534	1535	1540	1541	1545	1549	1554
		1557	1559	1560	1565	1566	1571	1572	1584	1585	1586	1591	1592	1593
		1609	1610	1615	1616	1621	1813	1818	1820	1821	1825	1826	1830	2148
		2253	2338	2339	2342	2355	2366	2385	2434	2437	2441	2482*	2528	2637
		3053	3056	3057	3059	3060	3061	3065	3069	3072	3073	3075	3079	3085
		3086	3087	3088	3092	3096	3099	3105	3106	3107	3113	3114	3115	3116
		3122	3123	3124	3130	3131	3132	3134	3135	3136	3137	3138	3139	3164
		3169	3171	3173	3175	3197	3202	3203	3205	3207	3212	3213	3215	3216
		3229	3239	3246	3247	3248	3251	3268	3272	3277	3278	3286	3287	3296
		3299												
TYPERR	006114	1209	1212	1219*										
TYPOC =	104401	2341	24											

[illegible]

MAINDEC-11-DZRXA-E MACY11 27(732) 20-SEP-76 15:46 PAGE 73
DZRXA.E.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

[illegible]

COMMEN	1#	153#														
ENDCOM	1#	153#														
ERROR	47#															
ESCAPE	1#	153#														
GETPRI	1#	153#														
GETSWR	1#	6#	153#	449												
MULT	1#	153#														
NEWST	1#	153#														
POP	1#	153#	2308	2519	2520											
PUSH	1#	153#	2288	2500	2506											
REPORT	1#	153#														
SCCPE	48#															
SETPRI	1#	153#														
SETTRA	2474#	2483	2484	2485	2487	2489	2490	2491	2492	2493						
SETUP	1#	153#														
SKIP	1#	153#														
SLASH	1#	153#														
SPACE	153#															
STARS	1#	6#	153#	194	218	250	270	288	348	413	431	679	698	730	798	
	908	926	1129	1147	1288	1306	1324	1346	1388	1455	1625	1647	1675	1684	1693	
	1712	1720	1735	1744	1764	1777	1850	1873	1890	1919	1933	1946	1963	1976	1990	
	2018	2038	2082	2116	2195	2272	2317	2322	2390	2419	2460	2496	2512	2541	2559	
	2620	2950	3050													
SWRSU	1#	153#														
TRMTRP	2474#															
TYPBIN	1#	153#														
TYPDEC	1#	153#														
TYPNAM	1#	153#														
TYPNUM	1#	153#														
TYPOCS	1#	153#	473	478	483	556	1514	1561	1567	1573	1611	1617	3235			
TYPOCT	1#	153#	2340													
TYPTXT	1#	153#														
\$\$ESCA	1#	153#														
\$\$NEWT	1#	153#														
\$\$SET	2474#	2483	2484	2485	2487	2489	2490	2491	2492	2493						
\$\$SKIP	1#	153#														
.EQUAT	1#	5#	43													
.HEADE	1#	5#	10													
.KT11	1#															
.SETUP	1#	5#	208													
.SWRHI	1#															
.SACT1	1#															
.SAPT8	1#															
.SAPTH	1#															
.SAPTY	1#															
.SASTA	1#															
.SCATC	1#															
.SCMTA	1#															
.SDB20	1#	6#	2557													
.SJB20	1#															
.SDIV	1#															
.SEOP	1#															
.SERRO	1#															
.SERRT	1#															
.SMULT	1#															
.SPOWE	1#	6#	2494													

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MAINDEC-11-DZRXA-E MACY11 27(732) 20-SEP-76 15:46 PAGE 76
DZRXAE.P11 CROSS REFERENCE TABLE -- MACRO NAMES

.SRAND	1#		
.SRDDE	1#		
.SRDOC	1#		
.SREAD	1#	5#	2315
.SR2AZ	1#		
.SSAVE	1#	6#	2270
.SSB20	1#	6#	2539
.SSB20	1#		
.SSCOP	1#		
.SSIZE	1#		
.SSUPR	1#		
.STRAP	1#	6#	2458
.STYFE	1#		
.STYFD	1#		
.STYPE	1#	5#	2114
.STYPO	1#	5#	2193
.S4OCA	1#		
.1170	1#		

ADC	808	891	943	1431	1986	2587									
ADD	807	866	879	882	889	890	942	1058	1066	1171	1180	1181	1430	1476	1499
	1537	1754	1804	1984	1985	2053	2061	2062	2072	2105	2109	2141	2221	2231	2356
ASL	2365	2553	2586	2588	3043	3257	3262	3273							
	717	878	887	888	1658	1899	1955	1982	1983	2027	2379	2380	2381	2470	3232
ASLB	3233	3234													
BCC	1183														
BEQ	1702														
	444	500	512	516	532	561	576	579	596	599	601	662	785	805	823
	856	881	951	961	980	1017	1043	1064	1080	1101	1114	1203	1207	1240	1243
	1253	1266	1277	1381	1400	1408	1427	1463	1490	1495	1529	1605	1707	1757	1817
	1824	1840	1970	2056	2144	2179	2248	2336	2363	2378	2631	3042	3055	3064	3101
	3109	3118	3126	3152	3186	3280	3285	3295							
BGE	670	1959	2052	2107											
BGT	1205	2255	2375	2416											
BHI	578	581	598	603											
BIC	533	541	543	551	1218	1382	1551	1587	1594	1783	1790	1833	1855	1924	1940
	1953	1968	2025	2044	2046	2063	2073	2245	2332	2349	2376	2403	2409	2417	
BICB	711	1651	1893	1998	2003										
BIS	498	520	1091	1118	1152	1159	1197	1384	1485	1784	1791	1868	2250	2251	2383
	2590														
BISB	718	892	1659	1900											
BIT	488	499	504	515	655	661	772	781	804	822	845	853	880	979	986
	1006	1014	1032	1040	1061	1079	1088	1098	1113	1121	1200	1202	1245	1263	1377
	1380	1426	1445	1462	1465	1471	1480	1489	1504	1521	1528	1555	1604	1779	1788
	1802	1816	1823	3041											
BITB	511	1081	1405	1467	1582	2006	2167								
BLE	2048														
BLOS	2429														
BLT	2158	2256	2373	2414	2583										
BMI	1461	1533	1596												
BNE	451	453	467	471	489	505	530	594	618	629	647	656	672	713	742
	773	782	814	816	846	854	922	975	987	1001	1007	1015	1033	1041	1050
	1062	1082	1089	1099	1122	1142	1155	1173	1201	1246	1264	1301	1318	1341	1368
	1375	1378	1404	1416	1433	1446	1466	1468	1472	1481	1505	1522	1556	1583	1654
	1780	1789	1803	1812	1835	1838	1857	1895	1926	2007	2014	2029	2087	2138	2146
	2154	2168	2175	2246	2328	2334	2354	2361	2368	2405	2411	2433	2439	2518	2594
	2633	3071	3081	3154	3156	3188	3190	3211	3220	3223	3245	3250	3259	3261	3302
BPL	492	497	502	519	525	638	641	666	779	851	972	997	1012	1038	1096
	1209	1212	1234	1397	1451	1589	1782	1787	1801	1939	1952	1996	2002	2024	2132
	2172	2244	2330	2346	2401	2407									
BR	210	211	212	445	455	507	514	534	592	616	623	626	664	719	744
	761	924	993	1075	1124	1144	1175	1210	1255	1303	1320	1343	1383	1385	1492
	1525	1527	1531	1558	1607	1661	1682	1691	1710	1718	1729	1742	1752	1819	1903
	1928	1931	1942	1944	1960	1972	1974	2000	2005	2010	2016	2032	2034	2050	2054
	2058	2134	2151	2161	2170	2177	2222	2237	2258	2357	2384	2386	2412	2435	2510
	2534	2585	2635	3058	3074	3159	3174	3193	3208	3221	3225	3242	3265	3291	3297
CLC	539	1705	2064												
CLR	465	495	574	622	625	706	709	710	753	898	938	1157	1158	1161	1164
	1280	1369	1392	1409	1412	1424	1652	1680	1717	1809	1832	1861	1863	2068	2235
	2343	2344	2516	2579	3140	3214	3252	3303							
CLRB	506	1859	2093	2150	2176	2440	2595								
CMP	443	446	452	466	470	950	960	1204	1399	1756	1834	2327	2333	2353	2360
	2372	2374	2404	2410	2413	2415	2428	2589	3219	3301					
CMPB	529	577	580	597	602	617	668	1172	1925	1969	2013	2028	2047	2051	2055
	2106	2143	2145	2153	2174	2178	2335	2367	2432	2438	2632				

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DZRAE.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

COM	914	1065	1134	1330	1361	1597								
COMB	1728													
DEC	560	671	716	741	763	815	855	921	974	1016	1042	1063	1100	1141
	1276	1300	1317	1340	1367	1374	1657	1898	1943	1954	2011	2026	2031	2592
DECB	2157	2160	2243	2254										
EXT	47													
HALT	174	538	570	649	674	780	852	1013	1026	1039	1097	1235	1418	1435
	1831	2133	2509	2533	3304									1452
INC	554	565	632	704	760	770	787	842	861	883	954	964	998	1004
	1030	1047	1053	1070	1085	1105	1117	1174	1198	1228	1236	1260	1271	1021
	1443	1469	1478	1502	1703	1810	1815	1837	1867	1930	1997	2008	2088	1415
	2249	2257	2382	2517	2584	3160	3224	3240	3300					2110
INCB	2180													
LOT	48													
JMP	213	214	215	552	571	650	675	720	721	722	723	724	725	726
	786	793	811	818	819	828	858	946	985	1018	1044	1059	1067	1102
	1156	1195	1237	1268	1279	1464	1542	1590	1598	1662	1663	1664	1665	1112
	1668	1904	1905	1906	1907	1908	1909	1910						1667
JSR	487	493	503	510	513	523	582	585	590	604	608	613	644	651
	663	667	705	736	737	738	739	740	743	746	747	750	758	809
	838	841	843	848	857	860	865	872	894	896	915	916	917	918
	920	923	931	932	944	945	953	963	970	992	995	999	1003	1020
	1046	1052	1069	1084	1086	1092	1104	1110	1116	1119	1135	1136	1137	1029
	1140	1142	1153	1160	1168	1216	1220	1249	1259	1261	1267	1270	1278	1139
	1257	1298	1299	1302	1312	1313	1314	1315	1316	1319	1331	1332	1333	1296
	1336	1337	1338	1339	1342	1358	1362	1363	1364	1365	1366	1371	1372	1335
	1453	1488	1491	1510	1518	1520	1524	1530	1536	1547	1552	1603	1606	1376
	1727	1749	1751	1808	1828	1836	1842	2045	2152	2159	2166	2371	2552	1704
	3062	3067	3077	3090	3091	3094	3095	3103	3111	3120	3128	3162	3167	2647
	3227	3266	3270	3271	3275	3276	3282	3289						3200
MOV	436	437	438	439	442	447	448	458	459	460	461	462	463	454
	469	473	478	483	494	509	540	542	547	556	657	658	659	700
	701	702	707	708	714	715	748	749	751	752	754	755	757	765
	766	800	801	802	825	826	827	831	836	837	840	859	871	886
	893	899	933	934	935	936	937	939	940	952	955	962	965	982
	994	989	990	991	1002	1019	1028	1045	1048	1051	1068	1071	1083	983
	1162	1163	1165	1167	1179	1186	1192	1193	1194	1219	1223	1229	1248	1115
	1359	1360	1370	1379	1393	1394	1413	1422	1425	1428	1486	1487	1496	1269
	1523	1526	1546	1550	1561	1567	1573	1602	1611	1617	1655	1656	1660	1514
	1827	1839	1865	1896	1897	1956	1981	2057	2060	2067	2069	2074	2075	1814
	2136	2140	2155	2218	2226	2227	2228	2234	2241	2259	2260	2261	2262	2135
	2289	2290	2291	2292	2293	2294	2295	2296	2297	2304	2305	2306	2307	2288
	2310	2311	2312	2313	2340	2364	2369	2398	2399	2426	2427	2442	2443	2309
	2466	2467	2471	2498	2499	2500	2501	2502	2503	2504	2505	2506	2507	2445
	2515	2519	2520	2521	2522	2523	2524	2525	2526	2527	2530	2550	2551	2514
	2572	2573	2574	2575	2576	2577	2578	2627	2628	2629	2639	2640	2645	2571
	3076	3089	3093	3102	3110	3119	3127	3141	3142	3143	3144	3145	3146	3052
	3149	3150	3161	3166	3170	3176	3177	3178	3179	3180	3181	3182	3183	3066
	3199	3204	3217	3218	3226	3231	3235	3253	3254	3255	3256	3269	3274	3148
MOV8	456	584	589	607	612	759	803	806	895	897	941	1170	1177	3194
	1185	1227	1459	1493	1601	1608	1690	1699	1726	1741	1750	1755	1858	3288
	1864	1892	1927	1941	1971	1973	1999	2004	2009	2012	2015	2030	2033	1182
	2094	2108	2137	2165	2173	2219	2220	2223	2224	2225	2229	2232	2233	1862
	2348	2402	2408	2431	2436	2469	2591	2634	2636					2090
NEG	2230													2331
NEGB	1184													

ADP	1843	1844	1845												
RESET	435	1841													
ROL	548	549	2065	2066	2236	2238	2239	2240	2242						
ROLB	1709														
ROR	544	545	546	1497	1498	2070	2071								
RTI	440	703	756	900	1166	1395	1414	1475	2142	2264	2298	2314	2370	2418	2446
	2532														
RTS	521	564	619	633	652	677	817	867	875	884	901	973	976	1125	1187
	1241	1281	1398	1429	1477	1538	1577	1622	1758	1760	1785	1792	1805	1846	1869
	1987	2076	2098	2111	2182	2472	2555	2597	2641	2648	3045				
SBC	2581														
SEC	1700	1708													
SUB	1866	1957	1958	2049	2091	2095	2580	2582							
SWAB	550														
TRAP	2474	2483	2484	2485	2487	2489	2490	2491	2492	2493					
TST	450	491	501	531	575	595	628	640	646	665	712	763	778	784	813
	821	850	971	978	996	1000	1011	1037	1049	1095	1154	1191	1206	1233	1239
	1242	1411	1432	1450	1460	1494	1588	1653	1706	1759	1786	1800	1811	1856	1894
	2086	2139	2147	2169	2247	2362	2377	2468	3054	3063	3070	3080	3100	3108	3117
	3125	3151	3153	3155	3157	3158	3165	3185	3187	3189	3191	3192	3198	3210	3222
	3241	3244	3249	3258	3260	3263	3264	3279	3284	3293	3294	3298	3198	3210	3222
TSTB	496	518	524	593	600	637	1208	1211	1252	1396	1532	1595	1781	1938	1951
	1995	2001	2023	2131	2171	2329	2345	2400	2406	2630					
.ASCII	2190	2191	2682	2689	2918	2930									
.ASCII2	2192	2450	2451	2452	2454	2536	2651	2656	2661	2666	2670	2674	2677	2697	2702
	2706	2709	2711	2713	2715	2717	2719	2724	2727	2730	2734	2738	2741	2744	2747
	2750	2752	2754	2756	2758	2764	2768	2774	2777	2781	2784	2787	2794	2796	2798
	2801	2804	2810	2815	2818	2822	2827	2829	2832	2835	2838	2843	2847	2850	2853
	2857	2861	2864	2867	2870	2874	2878	2881	2894	2886	2888	2894	2905	2908	2910
	2914	2925	2937	2943											
.BLKB	2449	2618	2955												
.BLKW	3007	3020	3023	3028	3031										
.BYTE	475	476	480	481	485	486	558	559	1516	1517	1563	1564	1569	1570	1575
	1576	1613	1614	1619	1620	2186	2187	2188	2189	2265	2266	2267	2268	2447	2448
	2456	2457	3237	3238											
.DSABL	2387														
.ENABL	1	4	2320												
.END	3309														
.ENDC	15	47	139	153	195	208	219	251	271	289	349	414	432	452	458
	476	477	481	482	486	487	559	560	680	699	731	799	909	927	1130
	1148	1289	1307	1325	1347	1389	1456	1517	1518	1564	1565	1570	1571	1576	1577
	1614	1615	1620	1621	1626	1648	1676	1685	1694	1713	1721	1736	1745	1765	1778
	1851	1874	1891	1920	1934	1947	1964	1977	1991	2019	2039	2083	2117	2137	2196
	2273	2318	2321	2323	2351	2387	2391	2419	2420	2427	2429	2432	2434	2450	2458
	2461	2467	2470	2482	2483	2484	2485	2486	2487	2488	2489	2490	2491	2492	2493
	2494	2497	2506	2507	2513	2519	2520	2530	2532	2539	2542	2560	2621	2951	3051
	3238	3239													
.EQUIV	47	48	56	71	72	101	102	103	104	105	106	107	108	109	110
	129	130	131	132	133	134	135	136	137	138					
.EVEN	2538	2948													
.IF	11	45	111	139	194	208	218	250	270	288	348	413	431	449	452
	475	476	480	481	485	486	558	559	679	698	730	798	908	926	1129
	1147	1288	1306	1324	1346	1388	1455	1516	1517	1563	1564	1569	1570	1575	1576
	1613	1614	1619	1620	1625	1647	1675	1684	1693	1712	1720	1735	1744	1764	1777
	1850	1873	1890	1919	1933	1946	1963	1976	1990	2018	2038	2082	2116	2137	2195
	2272	2317	2321	2322	2323	2351	2390	2391	2419	2427	2428	2432	2433	2449	2450

MAINDEC-11-DZRXA-E MACY11 27(732) 20-SEP-76 15:46 PAGE 81
 DZRXA.E.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

	2456	2460	2466	2470	2474	2483	2484	2485	2486	2487	2489	2490	2491	2492	2493
	2494	2496	2506	2507	2512	2519	2520	2528	2530	2532	2536	2541	2559	2620	2950
.IFF	3050	3237	3238												
	47	195	219	251	271	289	349	414	432	475	476	480	481	486	559
	680	699	731	799	909	927	1130	1148	1289	1307	1325	1347	1389	1456	1517
	1564	1570	1576	1614	1620	1626	1648	1676	1685	1694	1713	1721	1736	1745	1765
	1778	1851	1874	1891	1920	1934	1947	1964	1977	1991	2019	2039	2083	2117	2196
	2273	2318	2323	2391	2393	2398	2419	2420	2429	2433	2450	2461	2467	2497	2513
	2530	2542	2560	2621	2951	3051	3238	3239							
.IFT	2393	2398													
.IFTF	2338	2391	2394												
.IIF	10	15	20	21	474	479	484	557	1515	1562	1568	1574	1612	1618	2184
	2185	2186	2187	2188	2189	2190	2191	2192	2193	2318	2319	2341	2442	2450	2456
	2457	2458	2482	2483	2484	2485	2487	2489	2490	2491	2492	2493	3236		
.IRP	208	2288	2308	2500	2506	2519	2520								
.LIST	1	3	153	174	208	2419	2474	2482	2483	2484	2485	2486	2487	2488	2489
	2490	2491	2492	2493	2494										
.MACRO	1	2474													
.MCALL	5	6	153												
.NLIST	1	2	153	174	208	2419	2474	2482	2483	2484	2485	2486	2487	2488	2489
	2490	2491	2492	2493	2494										
.REPT	174														
.SBTTL	43	449	2114	2193	2270	2315	2458	2474	2494	2539	2557				
.TITLE	10														
.WORD	173	187	344	345	346	1225	2181	2184	2185	2269	2318	2319	2529	2531	2556
	2593	3034	3035												

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

*.DZRXA.E.SEG/SOL/CRF=SYSMAC.SML,DZRXA.E.P11
 RUN-TIME: 42 44 6 SECONDS
 RUN-TIME RATIO: 375/93=4.0
 CORE USED: 34K (67 PAGES)

Spooler runtime 14 Seconds, 62 KPS, 309 disk reads, 4 disk writes, 94 pages

[illegible]