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IDENTIFICATION

PRODUCT CODE: AC-9398G-MC
PRODUCT NAME: CZTMDGO TH 11 DATA RELIAB 9TRK
PROGRAM DATE: 16 JUNE 1984
MAINTAINER: DIAGNOSTIC ENGINEERING
AUTHOR: JEREMY MITT

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1. ABSTRACT

THE TH11 DATA RELIABILITY PROGRAM COLLECTS STATISTICAL INFORMATION PERTAINING TO THE DATA RELIABILITY OF THE TH11, TU10 WHEN RUN FOR EXTENDED PERIODS OF TIME. IT USES A NUMBER OF DIFFERENT PARAMETERS CONTROLLING DATA PATTERNS, RECORD LENGTHS, WRITING AND READING SEQUENCES AND STOPPING MODES (NONSTOP, START-STOP, RANDOM STALL DELAY).

2. REQUIREMENTS

2.1 EQUIPMENT

POP-11 WITH TH11 AND 1 TO 8 TU10 TAPE UNITS (9 CHANNEL ONLY)

2.2 STORAGE

2.2.1 PROGRAM STORAGE

THE ROUTINE REQUIRES 4K OF MEMORY.

2.3 PRELIMINARY PROGRAMS

THE TH11 INSTRUCTION TEST AND TH11 DRIVE FUNCTION TIMER MUST RUN PROPERLY BEFORE ATTEMPTING TO USE THIS PROGRAM.

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL BINARY TAPES SHOULD BE FOLLOWED:

1. ABSOLUTE LOADER MUST BE IN MEMORY.
2. PLACE BINARY TAPE IN READER.
3. LOAD ADDRESS +7500 (+ DETERMINED BY LOCATION OF LOADER)
4. PRESS "START" (PROGRAM WILL LOAD).

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4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

FOR INITIAL OPERATION OF PROGRAM ALL SWITCHES SHOULD BE - 0
(OR DOWN).

***IF SOFTWARE SWITCH REGISTER IS USED THE PROGRAM WILL ALLOW MODIFICATION OF
THE SOFTWARE SWITCH REGISTER IMMEDIATELY AFTER THE START OF PROGRAM.
THE PROGRAM WILL TYPE THE FOLLOWING*
SMR=XXXXXX NEW- (REFER TO SECTION 5.1 FOR OPERATOR OPTIONS.)

4.2 STARTING ADDRESS

200 - BASIC TEST (AUTOMATIC PARAMETER AND UNIT SELECTION)

204 - OPERATOR CONTROLLED PARAMETER TEST (WITH 4K MEMORY AVAILABLE)

210 - " " " " (" 8K " ")

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4.3 PROGRAM AND/OR OPERATOR ACTION
 LOAD PROGRAM INTO MEMORY
 SET DESIRED TU10 TAPE UNITS ON-LINE AND WRITE ENABLED
 LOAD STARTING ADDRESS 200 (204 OR 210 TO SELECT PARAMETERS AND UNITS)
 START PROGRAM-PROGRAM WILL BEGIN TESTING FOR LOAD ADDRESS OF 200 OTHERWISE
 SELECT TAPE UNITS (REFERENCE 4.3.1)
 SELECT PARAMETERS (REFERENCE 4.3.2)
 TYPE CARRIAGE RETURN AND PROGRAM WILL BEGIN TESTING.
 ***THE PROGRAM WILL ALLOW THE LOADING OF SOFTWARE SWITCH REGISTER
 AFTER PROGRAM HAS BEEN STARTED BY TYPING OUT THE FOLLOWING
 SWR=XXXXXX NEW= (REFER TO SECT 5.1 FOR OPERATOR ACTION).

4.3.1 TAPE UNIT SELECTION

STARTING THE PROGRAM AT 200 WILL RESULT IN AUTOMATIC SELECTION
 OF THE UNITS TO BE TESTED (REFERENCE 4.3.1.2) OTHERWISE STARTING
 AT 204 OR 210 WILL ALLOW OPERATOR TO SELECT THE UNITS.

THE PROGRAM WILL TYPE "SELECT UNITS". ANY CONFIGURATION OF
 1 TO 8 UNITS MAY BE SELECTED BY TYPING THE UNIT NUMBERS ON
 THE TELETYPE. ANY SEQUENCE OF NUMBERS MAY BE TYPED. AFTER
 EACH NUMBER IS TYPED A COMMA (,) WILL BE PRINTED. TYPING THE
 SAME UNIT NUMBER TWICE WILL CAUSE THAT UNIT NUMBER TO BE DELETED.
 TYPING ANY KEY OTHER THAN 0 THRU 7 WILL CAUSE A QUESTION MARK
 (?) TO BE PRINTED AND THAT KEY WILL BE IGNORED.

TO TERMINATE UNIT SELECTION TYPE A CARRIAGE RETURN. WHEN
 CARRIAGE RETURN IS TYPED THE PROGRAM WILL CONTINUE TO THE
 "PARAMETER SELECTION" UNLESS NO UNITS WERE SELECTED AND IN
 THAT EVENT WILL RETURN TO THE BEGINNING OF "SELECT UNITS".

4.3.1.1 TAPE UNIT SELECTION EXAMPLES

SELECT UNITS 3,4,5
 SELECT UNITS 5,3,4

IN EITHER CASE, UNITS 3,4,5 ARE SELECTED.

SELECT UNITS
 SELECT UNITS

A CARRIAGE RETURN WAS TYPED WITH NO UNITS SELECTED.

SELECT UNITS 1,9?,1,2

ONLY UNIT 2 SELECTED, UNIT 1 WAS DELETED (TYPED TWICE)
 AND THE 9 WAS IGNORED.

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4.3.1.2 AUTOMATIC UNIT SELECTION

STARTING AT 200 WILL RESULT IN AUTOMATIC SELECTION OF UNITS TO BE TESTED. A UNIT WILL BE SELECTED FOR TESTING IF IT MEETS THE FOLLOWING CRITERIA:

- 1. IT IS ON-LINE
- 2. IT IS NINE(9) TRACK
- 3. IT IS WRITE ENABLED

IF THE ABOVE CRITERIA IS NOT MEET BY A LEAST ONE(1) UNIT OPERATOR SELECTION WILL BE REQUIRED (REFERENCE 4.3.1).

4.3.2 PARAMETER SELECTION

STARTING THE PROGRAM AT 200 WILL RESULT IN AN AUTOMATIC SELECTION OF TEST PARAMETERS (REFERENCE 4.3.2.8) OTHERWISE STARTING AT ADDRESS 204 OR 210 WILL ALLOW OPERATOR TO SELECT PARAMETERS. THERE ARE FIVE TYPES OF PARAMETERS TO BE CONTROLLED BY THE OPERATOR. THEY INCLUDE; TEST NUMBER, PATTERN, RECORD LENGTH, WRITE MODE, AND READ MODE. THE PROGRAM WILL PRINT:

"TST PAT RLS WMD RMD"

- TST-TEST NUMBER
- PAT-PATTERN
- RLS-RECORD LENGTH SEQUENCE
- WMD-WRITE START/STOP MODE
- RMD-READ START/STOP MODE

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4.3.2.1 TEST NUMBER

THERE ARE 6 TESTS AVAILABLE FOR SELECTION (0 THRU 5).

TEST	DESCRIPTION
0	WRITE 1 RECORD, REPEAT ON ALL UNITS, CONTINUE TO END OF TAPE.
1	WRITE 256 RECORDS, REPEAT FOR ALL UNITS, CONTINUE TO END OF TAPE.
2	WRITE 256 RECORDS, REPEAT FOR ALL UNITS, BACKSPACE 256 RECORDS, REPEAT FOR ALL UNITS, READ 256 RECORDS, REPEAT FOR ALL UNITS, CONTINUE TO END OF TAPE.
3	WRITE 1 RECORD, REPEAT FOR ALL UNITS, BACKSPACE, REPEAT FOR ALL UNITS, READ 1 RECORD, REPEAT FOR ALL UNITS, CONTINUE TO END OF TAPE.
4	WRITE 1 RECORD, REPEAT FOR ALL UNITS, REPEAT FOR 256 RECORDS, BACKSPACE 256 RECORDS, REPEAT FOR ALL UNITS, READ 1 RECORD, REPEAT FOR ALL UNITS, REPEAT FOR 256 RECORDS, CONTINUE TO END OF TAPE.
5	READ 1 RECORD, REPEAT FOR ALL UNITS, CONTINUE TO END OF TAPE.

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4.3.2.2 PATTERN

THERE ARE 8 DATA PATTERNS AVAILABLE FOR SELECTION (0 THRU 7)

PATTERN	DESCRIPTION	DATA	CHANNELS
0	HALF FREQUENCY, OUTSIDE SKEW	010	001
		004	400
		010	001
		004	400
		ETC.	ETC.
1	SLIDING "1"	000	040
		200	004
		100	010
		040	020
		020	100
		010	001
		004	400
		002	002
		001	200
2	HIGH FREQUENCY, ALTERNATING CHANNELS	274	525
		274	525
		ETC.	ETC.

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PATTERN	DESCRIPTION	DATA	CHANNELS
3	THREE 0'S, THRU 1'S, THRU 0'S	037	703
		037	703
		037	703
		300	054
		300	054
		300	054
		076	523
		076	523
		076	523
		201	244
		201	244
		201	244
		174	531
		174	531
		174	531
		003	242
		003	242
		003	242
		370	135
		370	135
		370	135
		007	602
		007	602
		007	602
		360	174
		360	174
		360	174
		ETC.	ETC.

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4 INCREMENTING PATTERN 000 040
001 200
002 002
003 202
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377 777
ETC. ETC.

5 EACH CHANNEL 3 BITS 000 040
000 040
000 040
200 004
200 004
200 004
100 010
100 010
100 010
040 020
040 020
040 020
020 100
020 100

PATTERN DESCRIPTION DATA CHANNELS

020 100
010 001
010 001
010 001
004 400
004 400
004 400
002 002
002 002
002 002
001 200
001 200
001 200
ETC. ETC.

6 HIGH FREQUENCY ALL CHANNELS 377 777
377 777
ETC. ETC.

7 RANDOM ? ?

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4.3.2.3 RECORD LENGTH SEQUENCE

THERE ARE 4 TYPES OF RECORD LENGTH SEQUENCES FOR SELECTION (0 THRU 3)

RLS	DESCRIPTION
0	MINIMUM LENGTH RECORDS (4 BYTES)
1	MAXIMUM LENGTH RECORDS (1024 BYTES)
2	VARYING LENGTH RECORDS, MINIMUM TO MAXIMUM (1ST RECORD=4 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES LONGER UNTIL 256TH RECORD=1024 BYTES)
3	VARYING LENGTH RECORDS, MAXIMUM TO MINIMUM (1ST RECORD=1048 BYTES, EACH SUCCESSIVE RECORD IS 4 BYTES SHORTER UNTIL 256TH RECORD=4 BYTES)

4.3.2.4 WRITE START/STOP MODE

THERE ARE 3 TYPES OF WRITE MODES FOR SELECTION (0 THRU 2)

WMD	DESCRIPTION
0	NONSTOP - NO WAITING BETWEEN WRITE OPERATIONS. NEW COMMAND IS ISSUED WHEN CU READY SETS.
1	START/STOP - FULL STOP BETWEEN WRITE OPERATIONS. NEW COMMAND IS ISSUED WHEN TU READY SETS.
2	RANDOM - FULL STOP WITH RANDOM DELAY (1-256 MILLISECONDS)

4.3.2.5 READ START/STOP MODE

THERE ARE 3 TYPES OF MODES FOR SELECTION (0 THRU 2)

RMD	DESCRIPTION
0	NONSTOP - NO WAITING BETWEEN READ OPERATIONS. NEW COMMAND IS ISSUED WHEN CU READY SETS.
1	START/STOP - FULL STOP BETWEEN READ OPERATIONS. NEW COMMAND IS ISSUED WHEN TU READY SETS.
2	RANDOM - FULL STOP WITH RANDOM DELAY (1-256 MILLISECONDS)

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4.3.2.6 FINAL TEST SELECT APPROVAL

AFTER SELECTING RMO, IF ALL PARAMETERS SELECTED ARE LEGAL, "OK" WILL BE PRINTED. IF THE PARAMETERS SELECTED STILL CORRESPOND TO THE OPERATORS INTENTIONS HE MUST TYPE A CARRIAGE RETURN TO SAVE THE PARAMETERS. TYPING ANY OTHER KEY NOW, OR IN FACT AT ANY TIME DURING PARAMETER SELECTION TYPING AN ILLEGAL KEY WILL CAUSE THE PRESENT PARAMETERS TO BE DELETED AND A NEW PARAMETER SELECTION TO BE INITIATED. UP TO TEN SETS OF PARAMETER SELECTIONS CAN BE MADE. EACH SET WILL BE EXECUTED AFTER THE PREVIOUS SET REACHES END OF TAPE. TO TERMINATE PARAMETER SELECTION A SECOND CARRIAGE RETURN MUST BE TYPED AFTER SELECTING A SET OF PARAMETERS.

4.3.2.7 TEST SELECTION EXAMPLES

TST	PAT	RLS	WMO	RMO	
3	2	1	0	0	OK (CR)
3	K?				
0	0	2	2	2	OKX?
0	1	2	1	0	OK (CR)

(CR)

TWO PARAMETERS SETS WERE SELECTED BY THE ABOVE SEQUENCE

TESTS, PATTERN 2, MAXIMUM RECORD LENGTH, WRITE NONSTOP, AND READ NONSTOP.

TEST 0, PATTERN 1, VARYING RECORD LENGTH (MIN TO MAX), WRITE START/STOP, READ NONSTOP.

(NOTE: EVEN THOUGH TEST 0 IS A WRITE ONLY TEST, ALL PARAMETERS MUST BE SATISFIED.) (IN THIS CASE RMO HAS NO EFFECT)

IN THE SECOND PARAMETER SET A "K" WAS TYPED WHICH WAS ILLEGAL AND THE SET WAS REINITIALIZED.

IN THE THIRD PARAMETER SET AN "X" WAS TYPED INSTEAD OF A CARRIAGE RETURN AND THE PARAMETERS WERE IGNORED. AFTER AT LEAST ONE GOOD SET WAS SELECTED A CARRIAGE RETURN WAS TYPED AT THE BEGINNING OF THE PARAMETER SELECTION AND THE PROGRAM WOULD START TESTING.

4.3.2.8 AUTOMATIC PARAMETER SELECTION

STARTING AT 200 WILL CAUSE THE FOLLOWING TEST PARAMETERS TO BE SELECTED AUTOMATICALLY :

TST	PAT	RLS	WMO	RMO
3	6	1	1	1
4	0	2	2	2
2	7	2	2	2

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5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

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

CONTROL:

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

- 1) TYPE CONTROL G <↑G>; THIS WILL ALLOW THE TTY TO ENTER DATA INTO LOC. 176 AT SELECTED POINTS WITHIN THE PROGRAM.
- 2) THE MACHINE WILL THEN TYPE: SMR=XXXXXXNEW= (XXXXXX IS THE OCTAL CONTENTS OF THE SOFTWARE SWITCH REGISTER.)
- 3) AFTER THE ''NEW='' HAS BEEN TYPED THEN THE OPERATOR. CAN DO ONE OF THE FOLLOWING AT THE TTY:
 - A) TYPE A NUMBER TO BE LOADED INTO LOC. 176 FOLLOWED BY A <CR>. (ONLY NUMBERS BETWEEN 0-7 WILL BE ACCEPTED AND ONLY 6 NUMBERS WILL BE ALLOWED)
IF A <CR> IS THE FIRST KEY DEPRESSED THE SOFTWARE SWITCH REGISTER CONTENTS WILL NOT BE CHANGED.
 - B) IF A CONTROL U <↑U> IS DEPRESSED THEN THE PROGRAM WILL SEND YOU BACK TO STEP 2.

THE OPERATIONAL SWITCH SETTINGS ARE USED TO:

- A. ALTER ERROR RECOVERY PROCEDURES
- B. DELETE ERROR PRINTOUTS
- C. CAUSE A TEST SEQUENCE TO BE REPEATED WITH A VARIATION THE PATTERN, RECORD LENGTH SEQUENCE, WRITE MODE, OR READ MODE

5.1.1 SWITCHES TO ALTER ERROR RECOVERY

THE FUNCTION PERFORMED IS WITH THE SWITCH IN THE "1" (OR UP) POSITION.

SW	FUNCTION	PURPOSE
3	PRINT AFTER (000010)PARITY ERRORS	USE OF THIS SWITCH WILL CAUSE THE DATA READ TO BE COMPARED

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4 DELETE READ RE-TRYS
(000020)

5 DELETE WRITE XIRG
(000040)

6 WRITE STATISTICAL
(0001000)RECOVERY

WITH THE DATA WRITTEN AFTER A PARITY ERROR HAS OCCURRED
NOTE: THE PARITY ERROR BIT SETTING IN THE STATUS REGISTER IS CAUSED BY THE LOGICAL 'OR' OF BOTH LATERAL (CHARACTER) AND LONGITUDINAL (CHANNEL) PARITY ERRORS.

USE OF THIS SWITCH WILL CAUSE DELETION OF THE NORMAL SEQUENCE OF TRYING TO RE-READ A RECORD AFTER A READ ERROR. THIS WOULD BE USEFUL FOR SCOPING READ OPERATIONS.

USE OF THIS SWITCH WILL CAUSE RECORDS WITH WRITE ERRORS TO BE LEFT ON TAPE. THE READ PASS WITH DATA TYPEOUTS SELECTED WOULD BE USEFUL FOR DETERMINING WRITE ERROR ORIGINS.

USE OF THIS SWITCH WILL CAUSE A BACKSPACE 2 RECORDS, SPACE FORWARD 1 RECORD, REWRITE RECORD SEQUENCE TO BE USED INSTEAD OF WRITE XIRG SO THAT THE RECORD WILL BE REWRITTEN ON APPROXIMATELY THE SAME AREA OF TAPE WHERE THE WRITE ERROR OCCURRED. THIS METHOD KEEPS THE INTER-RECORD GAP FROM GETTING LARGER. DATA IS WRITTEN OVER THE SAME SPOT ON TAPE TO TRY AND FIND BAD TAPE.

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5.1.2 SWITCHES TO CONTROL ERROR PRINTOUTS

THE FUNCTION PERFORMED IS WITH THE SWITCH IN THE "1" (OR UP) POSITION.

SW	FUNCTION	PURPOSE
13	SUPPRESS ERROR (020000)PRINTOUT	THE STATISTICS CONCERNING THE NUMBER AND TYPES OF ERRORS WILL BE PRINTED WHEN THE TAPE UNIT REACHES END OF TAPE. FOR LONG PERIODS OF TESTING (OVERNIGHT, ETC) IT MAY BE SUFFICIENT TO RECEIVE THIS INFORMATION AND NOT HAVE A TYPEOUT EACH TIME AN ERROR OCCURRED.
8	PRINT ERROR STATISTICS (000400)	AFTER COMPLETION OF EVERY RECORD LENGTH SEQUENCE INSTEAD OF AFTER END OF TAPE AS IS NORMAL.

5.1.3 SWITCH TO ALTER TEST PARAMETERS

THE FUNCTION PERFORMED IS WITH EACH SWITCH IN THE "1" (OR UP) POSITION.

SW	FUNCTION	PURPOSE
0	CHANGE PATTERN	AFTER COMPLETION OF A TEST SEQUENCE REPEAT WITH NEXT PATTERN. UNTIL PATTERN 7 IS REACHED.

THIS FEATURE IS USEFUL FOR TESTING MANY COMBINATIONS OF TEST PATTERNS WITHOUT REQUIRING THE OPERATOR TO TYPE IN A LARGE NUMBER OF PARAMETERS.

EXAMPLE: TST PAT RLS LMD RMD
 3 2 0 0 0
 4 6 0 0 0

WITH SMO=1

TEST 3 WILL BE EXECUTED 6 TIMES (PATTERNS 2-7) AND THEN TEST 4 WILL BE EXECUTED 2 TIMES (PATTERNS 6,7)

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6. ERRORS

6.1 WRITE ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A WRITE OPERATION.

A. WRITE STATUS ERROR

CORD	STATUS	RECORD	LENGTH	EXPECTED	ACTUAL
XXXXXX	XXXXXX				

THIS WILL OCCUR IF ERROR (BIT 15 OF COMMAND REGISTER) SETS ON A WRITE COMMAND. THE CONTENTS OF THE COMMAND AND STATUS REGISTER IS PRINTED ALONG WITH THE RECORD NUMBER AND RECORD LENGTH.

B. XING WRITTEN 4 TIMES

THIS WILL OCCUR IF A WRITE STATUS ERROR CANNOT BE ELIMINATED IN 4 ATTEMPTS AT RE-WRITING THE RECORD WITH EXTENDED INTERRECORD GAP. NOT POSSIBLE DURING TEST 0 OR 1 AS THESE ARE "WRITE ONLY" TESTS AND IT IS NOT ABSOLUTELY NECESSARY FOR THE RECORDS TO BE WRITTEN PROPERLY. SETTING SWITCH 5 TO A "1" WILL DELETE "WRITE WITH XING".

C. END OF TAPE

DRV	PAT	MODE	RECORD	LENGTH
0	7	SSTP	1276	MAX

WRITE ERRORS = 5
RECOVERED AT 1 = 3
RECOVERED AT 3 = 1
PERMANENT BADSPOT = 1

DRV = UNIT NUMBER
PAT = PATTERN NUMBER
MODE = WRITE START/STOP MODE
RECORD = NUMBER OF RECORDS
LENGTH = LENGTH OF RECORDS

ON UNIT 0, USING PATTERN 7, WRITE MODE START/STOP, 1276 RECORDS OF MAXIMUM (1024 BYTES) LENGTH WERE WRITTEN. DURING THAT TIME 5 WRITE STATUS ERRORS OCCURRED, 3 WERE RECOVERED ON THE 1ST RE-WRITE, 1 RECOVERED ON THE 3RD RE-WRITE. THE REMAINING ERROR NOT RECOVERED IS CONSIDERED TO BE CAUSED BY A PERMANENT BAD SPOT ON TAPE.

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6.2 READ ERRORS

THE FOLLOWING ERROR TYPEOUTS ARE POSSIBLE DURING A READ OPERATION:

A. READ STATUS ERROR

COND	STATUS	RECORD LENGTH	EXPECTED	ACTUAL
XXXXXX	XXXXXX	47	4	XXXXXX XXXXXX

THIS WILL OCCUR WHEN ERROR (BIT 15 OF COMMAND REGISTER) SETS DURING A READ OPERATION. THE CONTENTS OF THE COMMAND AND STATUS REGISTERS IS PRINTED ALONG WITH THE RECORD NUMBER AND RECORD LENGTH. ALSO PRINTED OUT IF SM<03> IS SET TO A 1 (SEE SECTION 5.1.1) ARE THE EXPECTED AND ACTUAL DATA VALUES FOR A READ STATUS ERROR CAUSED BY A PARITY ERROR

B. READ DATA ERROR

COND	STATUS	RECORD LENGTH	EXPECTED	ACTUAL
XXXXXX	XXXXXX	107	1024	177777 175777

THIS WILL OCCUR WHEN THE DATA READ DOES NOT AGREE WITH THE DATA WRITTEN. THE CONTENTS OF THE COMMAND AND STATUS REGISTERS IS PRINTED, ALONG WITH THE RECORD NUMBER AND RECORD LENGTH. ALSO PRINTED IS THE CONTENTS OF THE MEMORY ADDRESS FROM WHICH THE DATA WAS WRITTEN (EXPECTED) AND THE CONTENTS OF THE MEMORY ADDRESS INTO WHICH IT WAS READ (ACTUAL). THIS INDICATES THE FIRST DATA TRANSFER ERROR FOUND FOR THE RECORD. NO ATTEMPT IS MADE TO DETERMINE IF THERE ARE OTHER DATA ERRORS IN THE RECORD.

C. READ PASS

END OF TAPE

DRV	PAT	MODE	RECORD LENGTH
3	4	NSTP	1276 H-MAX

READ STATUS ERRORS = 3
DATA ERRORS = 1
NON RECOVERABLE ERRORS = 0

ON UNIT 3, USING PATTERN 4, READ MODE NONSTOP, 1276 RECORDS OF VARYING LENGTH (4 TO 1024) WERE READ. DURING THAT TIME 2 READ STATUS ERRORS AND 1 DATA ERROR OCCURRED. THERE WERE 0 NON-RECOVERABLE ERRORS WHICH INDICATES THAT THE STATUS AND DATA ERRORS WERE ELIMINATED BY RE-READING THE RECORD UP TO THREE TIMES.

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6.3 ERROR RECOVERY PROCEDURES

6.3.1 WRITE ERROR RECOVERY

THE PROCEDURE TO RECOVER FROM A WRITE ERROR IS DETERMINED BY THE FOLLOWING:

- A. IS IT A "WRITE ONLY" TEST OR WILL THE DATA BE READ?
- B. IS "WRITE STATISTICAL RECOVERY" SELECTED (SW 6-1)?
- C. IS "DELETE WRITE WITH XIRG" SELECTED (SW 5-1)?

6.3.1.1 IF IT IS A "WRITE ONLY" TEST AND "WRITE STATISTICAL RECOVERY" IS NOT SELECTED (SW 6-0) THE WRITE ERROR IS SIMPLY COUNTED AND THE PROGRAM PROCEEDS TO THE NEXT RECORD.

6.3.1.2 IF IT IS A "WRITE ONLY" TEST AND "WRITE STATISTICAL RECOVERY" IS SELECTED (SW 6-1), A WRITE ERROR IS COUNTED AND THEN A RECOVERY SEQUENCE (BACKSPACE 2 RECORDS, SPACE FORWARD 1 RECORD, REWRITE RECORD) IS ENTERED. THIS RECOVERY SEQUENCE WILL BE REPEATED UP TO 7 TIMES IF THE WRITE ERROR PERSISTS. IF A WRITE ERROR IS NOT ELIMINATED AFTER THE 8TH ATTEMPT IT IS COUNTED AS A PERMANENT BAD SPOT ON TAPE. STATISTICS ARE SAVED TO INDICATE HOW MANY TIMES THE REWRITE SEQUENCE HAD TO BE REPEATED TO RECOVER FROM EACH WRITE ERROR.

6.3.1.3 IF IT IS A "WRITE AND READ" TEST AND "WRITE STATISTICAL RECOVERY" IS SELECTED (SW 6-1) AND "WRITE WITH XIRG" IS NOT DELETED (SW 5-0) THE PROGRAM WILL FIRST ATTEMPT TO DO A "WRITE STATISTICAL RECOVERY". IF A PERMANENT BAD SPOT IS ENCOUNTERED THE PROGRAM WILL THEN ATTEMPT TO RECOVER WITH A "WRITE WITH XIRG". FAILURE TO RECOVER AT THIS POINT SHOULD RESULT IN A READ ERROR DURING THE READ PASS.

6.3.1.4 IF IT IS A "WRITE AND READ" TEST AND "WRITE STATISTICAL RECOVERY" IS NOT SELECTED (SW 6-0) AND "WRITE WITH XIRG" IS NOT DELETED (SW 5-0) THE PROGRAM WILL TRY TO RECOVER ONLY BY REWRITING THE RECORD WITH EXTENDED INTERRECORD GAP. FAILURE TO RECOVER SHOULD RESULT IN A READ ERROR DURING READ PASS.

6.3.2 READ ERROR RECOVERY

A READ ERROR CAN OCCUR FOR TWO REASONS: STATUS ERROR OR DATA ERROR. A PROPER COUNT IS TAKEN FOR EACH TYPE OF ERROR. RECOVERY OF A READ ERROR WILL CONSIST OF TRYING TO RE-READ THE RECORD UP TO TWO MORE TIMES (UNLESS SW 4-1 TO DELETE READ RE-TRYS FOR SCOPING PURPOSES). IF THE ERROR PERSISTS IT IS CONSIDERED "NON-RECOVERABLE" AND THE PROGRAM WILL CONTINUE WITH THE NEXT RECORD.

7. RESTRICTIONS

NONE

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8. MISCELLANEOUS

8.1 TAPE LENGTH

SINCE EACH OF THE TESTS DEPEND ON REACHING THE "EOT" REFLECTOR FOR TERMINATING IT COULD BE ADVANTAGEOUS TO USE A "SHORT" TAPE. THIS WOULD ALLOW FOR LESS TIME TO RUN A SERIES OF TESTS WHILE VARYING THE TEST PARAMETERS (REFERENCE 5.1.3). HOWEVER, THIS IS NOT INTENDED TO IMPLY THAT CONSTANTLY CHANGING THE TEST PARAMETERS CONSTITUTES A MORE DIFFICULT TEST OF DATA RELIABILITY. THE LENGTH OF TIME UNDER TEST IS MORE LIKELY TO SUPPLY THAT. IN ANY EVENT, IF A "SHORT" TAPE IS DESIRED, JUST PLACE AN "EOT" REFLECTIVE STRIP APPROXIMATELY 50 FEET DOWN TAPE FROM THE "BOT" MARKER. SO THAT THE TAPE IS STILL USEFUL AS A "LONG" TAPE ANOTHER "BOT" MARKER COULD BE PLACED A SHORT DISTANCE (APPROXIMATELY 10 FEET) FARTHER DOWN ON TAPE. THIS WOULD EFFECTIVELY GIVE YOU TWO TAPES. CARE MUST BE EXERCISED WHEN MOUNTING THE TAPE TO POSITION IT AT THE PROPER "BOT" MARKER.

8.2 MEMORY AVAILABLE

THE PROGRAM REQUIRES 4K OF MEMORY. IF 8K IS AVAILABLE, STARTING THE PROGRAM AT ADDRESS 200 OR 210 WILL EXPAND THE WRITE AND READ BUFFERS SO THAT THE MINIMUM LENGTH RECORDS WILL BE 8 BYTES AND MAXIMUM LENGTH RECORDS WILL BE 2048 BYTES.

9. PROGRAM DESCRIPTION

9.1 GENERAL DESCRIPTION

THE PROGRAM IS DESIGNED AROUND TWO MAIN SUBROUTINES "WRITE" AND "READ" AND A SERIES OF MINOR SUBROUTINES FOR MANIPULATING UNIT SELECTION, HANDLING ERROR STATISTICS, AND RECORD POSITIONING. IF MORE THAN ONE UNIT IS SELECTED THE UNIT WITH THE LOWEST NUMBER IS SELECTED FIRST AND WHEN THE SEQUENCE IS COMPLETED THEN THE NEXT LOWEST UNIT NUMBER IS SELECTED UNTIL ALL UNITS HAVE BEEN SELECTED. THIS PROCESS IS REPEATED UNTIL ALL UNITS REACH END OF TAPE.

9.2 TEST 0

THIS IS A "WRITE ONLY" TEST. THE PROCEDURE IS TO WRITE 1 RECORD. REPEAT FOR ALL UNITS, CONTINUE UNTIL EOT. WRITE MODE OF NONSTOP (MNO=0) WILL NOT BE AN EFFECTIVE SELECTION FOR THIS TEST BECAUSE THE WRITE ROUTINE IS EXITED AFTER EACH RECORD TO DETERMINE IF ANY OTHER UNITS ARE SELECTED. READ MODE (RMO) HAS NO EFFECT ON THIS TEST.

9.3 TEST 1

THIS IS A "WRITE ONLY" TEST SIMILAR TO TEST 0 EXCEPT A SEQUENCE OF 256 RECORDS IS WRITTEN ON EACH UNIT BEFORE CHANGING TO THE NEXT UNIT. READ MODE (RMO) HAS NO EFFECT ON THIS TEST.

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9.4 TEST 2

THIS IS A "WRITE AND READ" TEST. THE PROCEDURE IS TO WRITE 256 RECORDS ON EACH UNIT, THEN BACKSPACE 256 RECORDS ON EACH UNIT, THEN READ 256 RECORDS ON EACH UNIT, AND THEN REPEAT THE SEQUENCE UNTIL ALL UNITS ARE AT EOT.

9.5 TEST 3

THIS IS A "WRITE AND READ" TEST. THE PROCEDURE IS TO WRITE 1 RECORD, BACKSPACE, READ 1 RECORD AND REPEAT FOR EACH UNIT, THEN REPEAT THE SEQUENCE UNTIL ALL UNITS ARE AT EOT. WRITE MODE OR READ MODE OF NONSTOP (WNO=0 OR RNO=0) WILL NOT BE EFFECTIVE FOR THIS TEST.

9.6 TEST 4

THIS IS A "WRITE AND READ" TEST. IT IS SIMILAR TO TEST 2 EXCEPT UNITS ARE CHANGED BETWEEN EACH RECORD DURING WRITE, BACKSPACE, AND READ. WRITE MODE OR READ MODE OF NONSTOP (WNO=0 OR RNO=0) WILL NOT BE EFFECTIVE FOR THIS TEST.

9.7 TEST 5

THIS IS A "READ ONLY" TEST. THE PROCEDURE IS TO READ 1 RECORD, REPEAT FOR ALL UNITS, AND CONTINUE UNTIL ALL UNITS ARE AT EOT. THE MAIN PURPOSE OF THIS TEST IS TO PROVE COMPATIBILITY AMONG TAPE UNITS. A TAPE THAT IS WRITTEN ON ONE UNIT SHOULD BE ABLE TO BE READ ON ANY OTHER UNIT. TEST PARAMETERS THAT SELECT PATTERN AND RECORD LENGTH SEQUENCE MUST BE THE SAME AS THOSE USED TO WRITE THE DATA ON TAPE. ANY OF THE OTHER TESTS (0 THRU 4) CAN BE USED TO GENERATE THE DATA.

10. LISTING

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.TITLE TH 11 DATA RELIAB 9TRK

REVISION HISTORY

REVISD SEPT 1971, J.RODENMISER

REVISD AUGUST 1972, J. LACEY

REVISD TO REV.B SEPT., 1973 BY BRUCE BURGESS - DIAGNOSTIC ENGINEERING
THE FOLLOWING ADDITIONS AND/OR CORRECTIONS MAKE

UP REV.B :

- (A) CODE TO COVER ACT-11 AND MAGTAPE DDP OPTIONS
- (B) SECTION TO PRINT OUT GOOD AND BAD DATA (EXPECTED AND ACTUAL) ON READ STATUS ERRORS CAUSED BY PARITY ERRORS. THIS SECTION IS ENABLED BY SETTING SW<03> TO A '1'. SEE SECTION 5.1.1 OF THE DOCUMENT.

REVISD TO REV. D MAR.,1976 BY SAM CARPENTER-DIAGNOSTIC ENGINEERING

- (A) MODIFIED TO SUPPORT SOFTWARE SWITCH REGISTER
- (B) ALSO SUPPORTS THE DYNAMIC LOADING OF THE SOFTWARE SWITCH REGISTER FROM TTY BY PRESSING A CNTL G
- (C) PROGRAM WILL ALLOW THE LOADING OF THE SOFTWARE SWITCH REGISTER AT START IF NO HARDWARE SWITCH REGISTER IS AVAILABLE OR IF THE HARDWARE SWITCH REGISTER CONTAINS ALL 1'S.

REVISD DECEMBER 1977, CLEM WALSH

REVISD JUNE 1984, JEREMY MITT
CZTHBG - ADDED XON/XOFF FUNCTIONALITY TO SUPPORT REMOTE DIAGNOSIS.

872		
873	000000	R0=#0
874	000001	R1=#1
875	000002	R2=#2
876	000003	R3=#3
877	000004	R4=#4
878	000005	R5=#5
879	000006	SP=#6
880	000007	PC=#7

881		
882	000000	
883		000000
884		
892		000034
893	000034	012306
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```
.ENABL ABS, AMA
.=0
;TRAP CATCHER IN UNUSED LOCATIONS 0-476
```

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.=34
TRAP34
```

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;.....
;SOFTWARE SWITCH REGISTER IS LOCATED AT LOC. 176
;BEFORE STARTING REFER TO SECTION 5.1 OF DOCUMENT
;.....
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.....
                MODIFIED DEC 16 1977
                **
                ACT11 AND XXDP HOOKS
                --
.....
                ;SVPC=      ;SAVE PC
                ;=40
DRIVE:  .BYTE  0          ;DRIVE # FOR XXDP LOAD MEDIUM
                ;ASSEMBLE AS A 0
                ;=41
MEDIUM: .BYTE  0          ;XXDP LOAD MEDIUM
                ;ASSEMBLE AS A 0
                ;=42
                .WORD  0          ;AUTO/MAN MODE INDICATOR
                ;ASSEMBLE AS A 0
                ;=46
                .WORD  ;ENDAD      ;SET TO ;ENDAD IN .;EOP
                ;=52
                .WORD  0          ;CHARACTERISTICS OF PROGRAM
                ;SET TO 0
                ;=;SVPC      ;RESTORE PC
.....

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MODIFIED DEC 16 1977

**
ACT11 AND XXDP MODE INDICATORS

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AUTOM: .WORD 0 ;AUTOMATIC MODE INDICATOR
ACT11M: .BYTE 0 ;ACT11 AUTO MODE INDICATOR
XXDPM: .BYTE 0 ;XXDP AUTO MODE INDICATOR
ADUMPM: .BYTE 0 ;ACT11 DUMP MODE INDICATOR
XDUMPM: .BYTE 0 ;XXDP DUMP MODE INDICATOR

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957
958          000176          .-176
959 000176  000000          SWREG: .WORD 0          ;SOFTWARE SWITCH REGISTER
960          000200          .-200
961 000200  000137  001356          JMP          AUTOST
962 000204  000137  002070          JMP          MEMAK
963 000210  000137  002114          JMP          MEMBK
964
965          000500          STACK=500
966          000500          .-500
967 000500  172520          HTS:   172520
968 000502  172522          HTC:   172522
969 000504  172524          BC:    172524
970 000506  172526          CA:    172526
971 000510  177776          CC:    177776
972 000512  177570          SMR:   177570
973 000514  177560          TKS:   177560
974 000516  177562          TKB:   177562
975 000520  177564          TPS:   177564
976 000522  177566          TPB:   177566
977 000524  002000          MAXLEN: 1024.          ;MAX RECORD LENGTH
978 000526  000004          MINLEN: 4.            ;MIN RECORD LENGTH
979 000530  014142          WBUF:  BUFFER          ;STARTING ADDRESS OF WRITE BUFFER
980 000532  016142          RBUF:  BUFFER+1024.   ;STARTING ADDRESS OF READ BUFFER
981 000534  000224          MTV:   224
982
983          ;TEMPORARY STORAGE AREAS
984 000536  000000          %CTRLS: 0          ;JM>> XON/XOFF FLAG
985 000540  000000          ATST:  0
986 000542  000000          DRYSEL: 0
987 000544  000000          STRLEN: 0
988 000546  000000          LENGTH: 0
989 000550  000000          MSBITS: 0
990 000552  000000          SVRECR: 0
991 000554  000000          COMMAND: 0
992 000556  000000          CORVBT: 0
993 000560  000000          CDRIVE: 0
994 000562  000000          RDPASS: 0
995 000564  000000          WRPASS: 0
996 000566  000000          BLKINC: 0
997 000570  000000          STATRD: 0
998 000572  000000          WRCHK:  0
999 000574  000000          0
1000 000576  000000          0
1001 000600  000000          0
1002 000602  000000          0
1003 000604  000000          0
1004 000606  000000          0
1005 000610  000000          0
1006
1007 000612  000000          PERMS:  0
1008 000614  000000          RECORD: 0
1009 000616  000000          WRRECR: 0
1010 000620  000000          LASRCR: 0
1011 000622  000000          RDERRS: 0
1012 000624  000000          DAERRS: 0
1013 000626  000000          NRREAD: 0

```


1014 000630 000000
 1015 000632 000000
 1016 000634 000000
 1017
 1018 000636 000656
 1019 000640 000722
 1020 000642 000766
 1021 000644 001032
 1022 000646 001076
 1023 000650 001142
 1024 000652 001206
 1025 000654 001252
 1026
 1027 000656 000000
 1028 000722 000000
 1029 000722 000000
 1030 000766 000000
 1031 000766 000000
 1032 001032 000000
 1033 001032 000000
 1034 001076 000000
 1035 001076 000000
 1036 001142 000000
 1037 001142 000000
 1038 001206 000000
 1039 001206 000000
 1040 001252 000000
 1041 001252 000000
 1042 001316 000000
 1043 001316 000000
 1044 001320 000000
 1045 001322 000000
 1046 001324 000000
 1047 001326 000000
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 1049 001330 000000
 1050 001332 000000
 1051 001334 000000
 1052 001336 000000
 1053 001340 000000
 1054 001342 000000
 1055 001344 000000
 1056 001346 000000
 1057 001350 000000
 1058 001352 000000
 1059 001354 000000
 1060
 1061 001356 012706 000500
 1062 001362 104432
 1063 001364 004737 012364
 1064 001370 022737 000176 000512
 1065 001376 001004
 1066 001400 004737 012004
 1067 001404 004737 012364
 1068 001410 012737 177777 000540
 1069 001416 012737 036025 001330
 1070 001424 012737 040052 001332

WRTLEN: 0
 READLN: 0
 MODES: 0
 DRVADR: D0TAB
 D1TAB
 D2TAB
 D3TAB
 D4TAB
 D5TAB
 D6TAB
 D7TAB
 D0TAB: 0
 .-D0TAB+44
 D1TAB: 0
 .-D1TAB+44
 D2TAB: 0
 .-D2TAB+44
 D3TAB: 0
 .-D3TAB+44
 D4TAB: 0
 .-D4TAB+44
 D5TAB: 0
 .-D5TAB+44
 D6TAB: 0
 .-D6TAB+44
 D7TAB: 0
 .-D7TAB+44
 CHARIN: 0
 NUNTEST: 0
 PARAM: 0
 TSTEX: 0
 TEST: 0
 TSTTBL: 0
 0
 0
 0
 0
 0
 0
 0
 0
 0
 0
 0
 0
 0
 0
 AUTOST: MOV #STACK,SP
 SUSMR JSR PC,CKMODE
 CMP #SMREG,SMR
 BNE 11
 JSR PC,CNTLU
 JSR PC,CKMODE
 11: MOV #-1,ATST
 MOV #36025,TSTTBL
 MOV #40052,TSTTBL+2

; CHARACTER JUST INPUT
 ; NUMBER OF TEST
 ; TEST PARAMETERS
 ; POINTS TO TEST PARAMETERS TO BE EXECUTED
 ; CONTAINS CURRENT TEST NUMBER
 ; TEST TABLE
 ; UP TO 10 TESTS CAN BE SELECTED TO
 ; BE RUN IN CONSECUTIVE ORDER
 ; SETUP THE SP
 ; CHECK FOR HARDWARE SWICH REG
 ; CHECK FOR MODE OF OPERATION +- C.W
 ; ALLOW SMREG TO BE CHANGED
 ; CHECK FOR MODE OF OPERATION
 ; SETUP TEST PARAMETERS


```

1185 002224 005737 000550          TST      MSBITS          ;YES, WERE ANY DRIVES SELECTED
1186 002230 001744          BEQ      START1         ;NO
1187 002232 005737 000540          TST      ATST           ;YES--IS AUTO SWITCH SET?
1188 002236 001452          BEQ      SELTST         ;NO--GO SELECT TESTS
1189 002240 000137 003050          JMP      EXECUT         ;YES--GO START TESTING
1190 002244 122737 000070 001316 SELD1:  CFPB      #70,CHARIN ;IS CHARACTER A VALID NUMBER 0-7?
1191 002252 003404          BLE     SELD2           ;NO, PRINT "?"
1192 002254 122737 000060 001316  CFPB      #60,CHARIN ;IS CHARACTER A VALID NUMBER 0-7?
1193 002262 003406          BLE     VALID          ;YES
1194 002264 004737 012546          JSR     PC,READY       ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
1195 002270 012777 000077 176224  MOV     #'?,STPB      ;PRINT '?'
1196 002276 000424          BR      VAL4
1197          ;HAVE VALID DRIVE NUMBER
1198 002300 142737 000270 001316  VALID:  BICB      #270,CHARIN ;MASK OUT NUMBER
1199 002306 105137 001316          CFPB      CHARIN
1200 002312 012700 000200          MOV     #200,R0       ;INITIALIZE BIT POSITION FOR DRIVE 0
1201
1202
1203 002316 105237 001316          VAL1:  INCB      CHARIN ;+1 TO DRIVE SELECT
1204 002322 001402          BEQ     VAL2           ;HAVE DRIVE OF EQUAL TO ZERO
1205 002324 006200          ASR     R0             ;MOVE BIT POSITION TO NEXT DRIVE
1206 002326 000773          BR      VAL1          ;TRY AGAIN
1207 002330 130037 000550          VAL2:  BITB      R0,MSBITS ;COMPARE DRIVE SELECT WITH PREVIOUS SELECTED
1208 002334 001003          BNE     VAL3           ;DRIVE WASN'T PREVIOUSLY SET, SO SET IT NOW.
1209 002336 150037 000550          BISS   R0,MSBITS
1210 002342 000402          BR      VAL4
1211 002344 140037 000550          VAL3:  BICB      R0,MSBITS ;DRIVE WAS SET, CLEAR IT.
1212 002350 004737 012546          VAL4:  JSR     PC,READY ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
1213 002354 012777 000054 176140  MOV     #'.,STPB      ;PRINT COMMA
1214 002362 000713          BR      SELDRV        ;RETURN TO WAIT FOR NEXT KEY
1215          ;HAVE DRIVES SELECTED-NOW GET TEST SELECTION
1216 002364 012702 012712  SELTST: MOV     #MSG2,R2
1217 002370 104404          TOP
1218 002372 005037 001320          CLR     NUTST         ;PRINT 'SELECT TESTS'
1219 002376 012700 001330          MOV     #TSTBL,R0    ;CLEAR TEST NUMBERS SELECTED
1220 002402 104400          SELT1: WAITKY ;INITIALIZE TEST TABLE POINTER
1221 002404 122737 000015 001316  CFPB      #15,CHARIN ;WAS CHARACTER A CARRIAGE RETURN?
1222 002412 001005          BNE     SELT2         ;WERE ANY TESTS SELECTED?
1223 002414 005737 001320          TST     NUTST        ;NO
1224 002420 001412          BEQ     SELT3         ;YES, EXECUTE TESTS
1225 002422 000137 003050          JMP     EXECUT        ;IS CHARACTER A VALID NUMBER 0-5
1226 002426 122737 000066 001316  SELT2:  CFPB      #66,CHARIN ;NO
1227 002434 003404          BLE     SELT3         ;IS CHARACTER A VALID NUMBER 0-5
1228 002436 122737 000060 001316  CFPB      #60,CHARIN ;YES
1229 002444 003404          BLE     SELPAT        ;YES
1230 002446 012702 012664          SELT3: MOV     #MSG0,R2
1231 002452 104404          TOP
1232 002454 000752          BR      SELT1        ;RETURN TO WAIT FOR TEST SELECT
1233 002456 013704 001316  SELPAT: MOV     CHARIN,R4 ;ROTATE TEST NUMBER INTO POSITION
1234 002462 000304          SHAB   R4
1235 002464 006104          ROL    R4
1236 002466 006104          ROL    R4
1237 002470 006104          ROL    R4
1238 002472 006104          ROL    R4
1239 002474 042704 107777          BIC     #107777,R4
1240 002500 104430          SP3
1241          ;HAVE VALID TEST SELECTED, NOW GET SELECTED PATTERN

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1299 002766 001402      BEQ      .+6
1300 002770 000137 002446    JMP      SELT3
1301 002774 004737 012546    JSR      PC,READY      ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
1302 003000 012777 000012 175514    MOV      #12,BTPB
1303 003006 004737 012546    JSR      PC,READY      ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
1304 003012 012777 000040 175502    MOV      #40,BTPB
1305 003020 010420      MOV      R4,(0)+
1306 003022 005237 001320      INC      NUMTST      ;+1 TO TEST COUNT
1307 003026 022737 000012 001320    CMP      #10.,NUMTST ;EQUAL TO TEN YET
1308 003034 001402      BEQ      SELOK1      ;YES
1309 003036 000137 002402      JMP      SELT1      ;NO, ACCEPT NEXT SET
1310 003042 012702 012742      SELOK1: MOV     #MSG5,R2
1311 003046 104404      TOP
1312
1313      ;EXECUTE SELECTED TEST
1314 003050 005037 000634      EXECUT: CLR     MODES      ;INITIALIZE MODES
1315 003054 012737 001330 001324    MOV      #TSTTBL,TSTEX
1316 003062 017737 176236 001322    EXEC:   MOV      #TSTEX,PARAM ;GET TEST PARAMETERS
1317 003070 013700 001322      EXEC1: MOV      PARAM,R0
1318 003074 042700 007777      BIC      #7777,R0
1319 003100 010037 001326      MOV      R0,TEST
1320 003104 001475      BEQ      TEST0
1321 003106 022700 010000      CMP      #10000,R0
1322 003112 001516      BEQ      TEST1
1323 003114 022700 020000      CMP      #20000,R0
1324 003120 001537      BEQ      TEST2
1325 003122 022700 030000      CMP      #30000,R0
1326 003126 001002      BNE      1+
1327 003130 000137 003536      JMP      TEST3
1328 003134 022700 040000      1+:   CMP      #40000,R0
1329 003140 001402      BEQ      .+6
1330 003142 000137 004176      JMP      TEST5
1331 003146 000137 003654      JMP      TEST4
1332      ;RETURN HERE AFTER COMPLETION OF TEST
1333 003152 104434      DONE:  CKSMR      ;CHECK FOR CNTL G
1334 003154 012702 014067      MOV      #MSG26,R2
1335 003160 104404      TOP
1336 003162 032777 000001 175322    BIT      #1,BSMR      ;IS SW 0-1 TO REPEAT TEST WITH ALL PATTERNS
1337 003170 001413      BEQ      DONE1      ;NO
1338 003172 013700 001322      MOV      PARAM,R0
1339 003176 042700 170777      BIC      #170777,R0
1340 003202 022700 007000      CMP      #7000,R0      ;REACHED PATTERN 7?
1341 003206 001404      BEQ      DONE1      ;YES
1342 003210 062737 001000 001322    ADD      #1000,PARAM ;NO, +1 TO PATTERN
1343 003216 000724      BR       EXEC1      ;REPEAT TEST
1344 003220 005337 001320      DONE1: DEC      NUMTST
1345 003224 001021      BNE      DOAGN
1346 003226 013701 000042      MOV      #M42,R1
1347 003232 001002      BNE      #ENDAD
1348 003234 000000      HALT
1349 003236 104434      CKSMR
1350 003240 004711      #ENDAD: JSR      PC,(R1)
1351 003242 000240      NOP
1352 003244 000240      NOP
1353 003246 000240      NOP
1354 003250 105737 000402      TSTB    ACT11M      ;ACT11 MODE? .. C.W
1355 003254 001405      BEQ      DOAGN      ;BRANCH - IF NO .. C.W

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1356 003256 0127C2 014074      MOV      @MSG27,R2      ;GET END OF PASS MESSAGE
1357 003262 104404                TOP                ;TYPE END OF PASS
1358 003264 000137 001356      JMP      AUTOST      ;CONTINUE TEST
1359 003270 062737 000002 001324 DOAGN:  ADD      @2,TSTEX
1360 003276 000671                BR                EXEC      ;DO NEXT TEST
1361
1362      ;TEST0
1363      ;WRITE ONE RECORD, CHANGE DRIVES, GO TO EOT
1364 003300 052737 000002 000634 TEST0:  BIS      @2,MODES      ;EXIT WRITE EVERY RECORD, NO READ PASS
1365 003306 104420                CLRALL            ;CLEAR ERROR COUNTERS AND REMIND
1366 003310 104416                GENPAT           ;GENERATE PATTERN
1367 003312 104410                TO:             RSFDRV           ;RESET DRIVE SELECTION TO LOWEST NUMBER
1368 003314 104414                TOA:            MVCTRS           ;RESTORE DRIVE COUNTERS
1369 003316 052737 000040 000634      BIT      @40,MODES   ;IS THIS DRIVE AT EOT?
1370 003324 001002                BNE            TOB      ;YES, SKIP WRITE
1371 003326 104402                WRITIT          ;WRITE
1372 003330 104406                SVCTRS          ;SAVE DRIVE COUNTERS
1373
1374 003332 104422                TOB:            CHGDRV           ;ANY MORE DRIVES SELECTED?
1375 003334 000767                BR                TOA      ;YES
1376 003336 004737 004770      JSR      PC,ALLEOT   ;ARE ALL DRIVES AT EOT?
1377 003342 000763                BR                TO      ;NO
1378 003344 000137 003152      JMP      DONE        ;YES, EXIT
1379
1380      ;TEST1
1381 003350 052737 000001 000634 TEST1:  BIS      @1,MODES      ;EXIT WRITE AFTER RLS, NO READ PASS
1382 003356 104420                CLRALL            ;CLEAR ERROR COUNTERS AND REMIND
1383 003360 104416                GENPAT           ;GENERATE PATTERN
1384 003362 104410                T1:             RSFDRV           ;RESET DRIVE SELECTION TO LOWEST NUMBER
1385 003364 104414                T1A:            MVCTRS           ;RESTORE DRIVE COUNTERS
1386 003366 052737 000040 000634      BIT      @40,MODES   ;IS THIS DRIVE AT EOT?
1387 003374 001002                BNE            T1B      ;YES, SKIP WRITE
1388 003376 104402                WRITIT          ;WRITE
1389 003400 104406                SVCTRS          ;SAVE DRIVE COUNTERS
1390 003402 104422                T1B:            CHGDRV           ;ANY MORE DRIVE SELECTED?
1391 003404 000767                BR                T1A      ;YES
1392 003406 004737 004770      JSR      PC,ALLEOT   ;ARE ALL DRIVES AT EOT?
1393 003412 000763                BR                T1      ;NO
1394 003414 000137 003152      JMP      DONE        ;YES EXIT
1395
1396      ;TEST2
1397      ;WRITE A RECORD LENGTH SEQUENCE , CHANGE DRIVES
1398      ;BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES, CONTINUE TO EOT ON ALL DRIVES
1399 003420 052737 000005 000634 TEST2:  BIS      @5,MODES      ;EXIT WRITE AFTER RLS, DO READ PASS
1400 003426 104420                CLRALL            ;CLEAR ERROR COUNTERS AND REMIND
1401 003430 104416                GENPAT           ;GENERATE PATTERN
1402 003432 104410                T2:             RSFDRV           ;SET DRIVE SELECTION TO LOWEST NUMBER
1403 003434 104414                T2A:            MVCTRS           ;RESTORE DRIVE COUNTERS
1404 003436 032737 000040 000634      BIT      @40,MODES   ;IS THIS DRIVE AT EOT?
1405 003444 001002                BNE            T2B      ;YES, SKIP WRITE
1406 003446 104402                WRITIT          ;WRITE
1407 003450 104406                SVCTRS          ;SAVE DRIVE COUNTERS
1408 003452 104422                T2B:            CHGDRV           ;ANYMORE DRIVERS SELECTED?
1409 003454 000767                BR                T2A      ;YES
1410 003456 104414                T2C:            MVCTRS           ;RESTORE DRIVE COUNTERS
1411 003460 032737 000020 000634      BIT      @20,MODES   ;IS THIS READ AT EOT?
1412 003466 001003                BNE            T2D      ;YES, SKIP BACKSPACE

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1413 003470 004737 011064 JSR PC,GOBKMD ;BACKSPACE
1414 003474 104406 SVCTRS ;SAVE DRIVE COUNTERS
1415 003476 104422 T20: CHGDRV ;ANY MORE DRIVES SELECTED?
1416 003500 000766 BR T2C ;YES
1417 003502 104414 T2E: MVCTRS ;RESTORE DRIVE COUNTERS
1418 003504 032737 000020 000634 BIT #20,MODES ;IS THIS READ AT EOT
1419 003512 001001 BNE T2F ;YES, SKIP READ
1420 003514 104424 READIT ;READ
1421 003516 104406 T2F: SVCTRS ;SAVE DRIVE COUNTERS
1422 003520 104422 CHGDRV ;ANYMORE DRIVES SELECTED?
1423 003522 000767 BR T2E ;YES
1424 003524 004737 004770 JSR PC,ALLEOT ;ARE ALL DRIVES AT EOT?
1425 003530 000740 BR T2 ;NO
1426 003532 000137 003152 JNP DONE ;YES EXIT
1427
1428 ;TEST3
1429 ;WRITE ONE RECORD, CHANGE DRIVES, BACKSPACE, CHANGE DRIVES, READ, CHANGE DRIVES
1430 003536 052737 000006 000634 TEST3: BIS #6,MODES ;EXIT WRITE EVERY RECORD, DO READ PASS
1431 003544 104420 CLRALL ;CLEAR ERROR COUNTERS AND REWIND
1432 003546 104416 GENPAT ;GENERATE PATTERN
1433 003550 104410 T3: RSFDRV ;SET DRIVE SELECTION TO LOWEST NUMBER
1434 003552 104414 TSA: MVCTRS ;RESTORE DRIVE COUNTERS
1435 003554 032737 000040 000634 BIT #40,MODES ;IS THIS DRIVE AT EOT?
1436 003562 001002 BNE T3B ;YES, SKIP WRITE
1437 003564 104402 WRITIT ;WRITE
1438 003566 104406 T3B: SVCTRS ;SAVE DRIVE COUNTERS
1439 003570 104422 CHGDRV ;ANY MORE DRIVES SELECTED
1440 003572 000767 BR TSA ;YES
1441
1442 003574 104414 T3C: MVCTRS ;RESTORE DRIVE COUNTERS
1443 003576 032737 000020 000634 BIT #20,MODES ;IS THIS DRIVE AT EOT
1444 003604 001002 BNE T3D ;YES, SKIP BACKSPACE
1445 003606 004737 011064 JSR PC,GOBKMD ;BACKSPACE
1446 003612 104406 T3D: SVCTRS ;SAVE DRIVE COUNTERS
1447 003614 104422 CHGDRV ;ANY MORE DRIVES SELECTED?
1448 003616 000766 BR T3C ;GO
1449 003620 104414 T3E: MVCTRS ;RESTORE DRIVE COUNTERS
1450 003622 032737 000020 000634 BIT #20,MODES ;IS THIS DRIVE AT EOT?
1451 003630 001001 BNE T3F ;YES, SKIP READ
1452 003632 104424 READIT ;READ
1453 003634 104406 T3F: SVCTRS ;SAVE DRIVE COUNTERS
1454 003636 104422 CHGDRV ;ANY MORE DRIVES SELECTED
1455 003640 000767 BR T3E ;YES
1456 003642 004737 004770 JSR PC,ALLEOT ;ARE ALL DRIVES AT EOT?
1457 003646 000740 BR T3 ;NO
1458 003650 000137 003152 JNP DONE ;YES, EXIT
1459
1460 ;TEST4
1461 ;WRITE RECORD, CHANGE DRIVES, REPEAT FOR RECORD LENGTH SEQUENCE
1462 ;READ RECORD, CHANGE DRIVES, REPEAT FOR RLS
1463 003654 052737 000006 000634 TEST4: BIS #6,MODES ;EXIT WRITE EVERY RECORD, DO READ PASS
1464 003662 104416 GENPAT ;GENERATE PATTERN
1465 003664 032777 000014 175432 BIT #14,BTSTEX
1466 003672 001006 BNE T4 ;
1467 003674 042737 000007 000634 BIC #7,MODES
1468 003702 052737 000005 000634 BIS #5,MODES ;EXIT WRITE AFTER RLS, DO READ PASS
1469 003710 104420 T4: CLRALL ;CLEAR ERROR COUNTERS AND REWIND

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1527 ;TEST5
1528 ;READ ONLY
1529 ;RANDOM PATTERN INVALID EXCEPT FOR SPECIFIC CASES
1530 004176 052737 000002 000634 TEST5: BIS #2,MODES
1531 004204 104420 CLRALL ;CLEAR ERROR COUNTERS AND REWIND
1532 004206 104416 GENPAT ;GENERATE PATTERN
1533 004210 012737 177777 004456 TS: MOV #1,TSFLAG ;ENABLE EXIT FROM WRITE ROUTINE
1534 004216 104402 WRITIT ;ENTER WRITE ONLY TO INITIALIZE RECORD SEQUENCE
1535 004230 032737 000010 000634 BIT #10,MODES ;ARE WE AT END OF RLS?
1536 004226 001402 BEQ TSA ;YES
1537 004230 004737 005610 JSR PC,TESINC ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1538 004234 013737 000614 004460 TSA: MOV RECORD,TSINC
1539 004242 005037 000614 CLR RECORD
1540 004246 052737 000010 000634 TSB: BIS #10,MODES ;INDICATE AT START OF RLS
1541 004254 104410 RSFDRV ;SET DRIVE SELECTION TO LOWEST DRIVE NUMBER
1542 004256 104414 TSC: MVCTRS ;RESTORE DRIVE COUNTERS
1543 004260 032737 000020 000634 BIT #20,MODES ;IS THIS DRIVE AT EOT
1544 004266 001007 BNE TSD ;YES
1545 004270 013737 000614 000620 MOV RECORD,LASRCR
1546 004276 063737 004460 000620 ADD TSINC,LASRCR ;CURRENT RECORD * SEQUENCE LENGTH
1547 004304 104406 SVCTRS ;SAVE DRIVE COUNTERS
1548 004306 104422 TSD: CHGDRV ;ANYMORE DRIVES?
1549 004310 000762 BR TSC ;YES
1550 004312 104410 RSFDRV ;SET DRIVE SELECTION TO LOWEST NUMBER
1551 004314 104414 TSE: MVCTRS ;RESTORE DRIVE COUNTERS
1552 004316 032737 000020 000634 BIT #20,MODES ;IS THIS DRIVE AT EOT?
1553 004324 001021 BNE TSG ;YES
1554 004326 013737 000620 000552 MOV LASRCR,SVRECR ;SAVE END OF RLS RECORDS
1555 004334 032737 000003 001322 BIT #3,PARAM ;IS READ MODE MONSTOP
1556 004342 001405 BEQ TSF ;YES GO TO END RLS
1557 004344 013737 000614 000620 MOV RECORD,LASRCR ;NEXT TO BE READ
1558 004352 005237 000620 INC LASRCR ;+1 EXIT READ AFTER ONE RECORD
1559 004356 104424 TSF: READIT ;READ
1560 004360 013737 000552 000620 MOV SVRECR,LASRCR ;RESTORE END RECORD
1561 004366 104406 SVCTRS ;SAVE DRIVE COUNTERS
1562 004370 104422 TSG: CHGDRV ;ANY MORE DRIVES?
1563 004372 000750 BR TSE ;YES
1564 004374 004737 004770 JSR PC,ALLEOT ;ALL AT EOT?
1565 004400 000402 BR TSH ;NO
1566 004402 000137 003152 JPP DONE ;YES EXIT
1567 004406 104410 TSH: RSFDRV ;SET DRIVE SELECTION TO LOWEST NUMBER
1568 004410 104414 TSJ: MVCTRS ;RESTORE DRIVE COUNTERS
1569 004412 023737 000614 000620 CMP RECORD,LASRCR ;ARE WE AT END OF RLS?
1570 004420 001003 BNE TSK ;NO
1571 004422 042737 000010 000634 BIC #10,MODES ;YES,
1572 004430 104422 TSK: CHGDRV ;ANY MORE DRIVES SELECTED?
1573 004432 000766 BR TSJ ;YES
1574 004434 032737 000010 000634 BIT #10,MODES ;AT END OF RLS?
1575 004442 001324 BNE TSE ;NO
1576 004444 004737 004770 JSR PC,ALLEOT ;ALL DRIVES AT EOT?
1577 004450 000657 BR TS ;NO
1578 004452 000137 003152 JPP DONE ;YES, EXIT
1579 004456 000000 TSFLAG: 0
1580 004460 000000 TSINC: 0
1581 ;SAVE DRIVE RECORD AND ERROR COUNTERS
1582 SVCTR: JSR PC,CTRDEX
1583 004462 004737 004516

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1584 004466 012021          SVC1:  MOV      (0), (1),
1585 004470 022700 000636      CMP      @DRVADR, R0
1586 004474 001374          BNE      SVC1
1587 004476 000207          RTS      PC
1588          ;RESET DRIVE COUNTERS BACK INTO PROGRAM
1589 004500 004737 004516      MVCTR:  JSR      PC, CTRDEX
1590 004504 012120          MV1:    MOV      (1), (0),
1591 004506 022700 000636      CMP      @DRVADR, R0
1592 004512 001374          BNE      MV1
1593 004514 000207          RTS      PC
1594          ;SET UP POINTERS FOR MOVE AND SAVE COUNTERS
1595 004516 012700 000572      CTRDEX: MOV      @RCHCK, R0
1596 004522 012701 000636      MOV      @DRVADR, R1
1597 004526 063701 000560      ADD      @DRIVE, R1
1598 004532 063701 000560      ADD      @DRIVE, R1
1599 004536 011101          MOV      @R1, R1
1600 004540 000207          RTS      PC
1601          ;CLEAR ALL DRIVE COUNTERS
1602 004542 104410          CLRAL:  RSFDRV
1603 004544 004737 004732      CLR1:   JSR      PC, REWIND
1604 004550 004737 005076      JSR      PC, CLRIBL
1605 004554 104406          SVCTRS
1606 004556 104422          CHGDRV
1607 004560 000711          BR      CLR1
1608 004562 052737 000010 000634      BIS      #10, MODES      ;AT END OF RLS
1609 004570 005037 004456      CLR      TSFLAG
1610 004574 000207          RTS      PC
1611          ;RESET DRIVE SELECTION TO LOWEST NUMBER
1612 004576 005037 000560      RSFDR: CLR      @DRIVE      ;START WITH DRIVE 0
1613 004602 012737 000200 000536      MOV      #200, @DRVBT    ;BIT FOR DRIVE 0
1614 004610 033737 000530 000536      RSF1:   BIT      @MSBITS, @DRVBT ;IS DRIVE SELECTED?
1615 004616 001006          BNE      RSF2            ;YES
1616 004620 005237 000560          INC      @DRIVE        ;NO + 1 TO DRIVE
1617 004624 000241          CLC
1618 004626 006037 000556      ROR      @DRVBT        ;ROTATE DRIVE BIT
1619 004632 000766          BR      RSF1            ;REPEAT
1620 004634 013737 000560 000534      RSF2:   MOV      @DRIVE, @COMMAND
1621 004642 000337 000534          SWAB      @COMMAND
1622 004646 052737 060000 000534      BIS      #60000, @COMMAND ;800 BPI, 9 TRACK
1623 004654 032777 001000 173630      BIT      #1000, @SMR    ;TEST PARITY SELECTED
1624 004662 001403          BEQ      .+10           ;ODD
1625 004664 052737 004000 000534      BIS      #4000, @COMMAND ;EVEN
1626 004672 000207          RTS      PC
1627
1628          ;SELECT NEXT DRIVE IN SEQUENCE
1629          ;+1 WORD TO EXIT ADDRESS IF LAST DRIVE TESTED
1630 004674 005237 000560      CHGDR:  INC      @DRIVE      ;+1 TO DRIVE NUMBER
1631 004700 000241          CLC
1632 004702 006037 000556      ROR      @DRVBT        ;MOVE MASK BIT OVER 1 PLACE
1633 004706 001004          BNE      @CHG1         ;BRANCH IF MORE DRIVES SELECTED
1634 004710 104410          RSFDRV
1635 004712 062716 000002          ADD      #2, @SP
1636 004716 000207          RTS      PC
1637 004720 033737 000536 000530      CHG1:  BIT      @DRVBT, @MSBITS
1638 004726 001762          BEQ      @CHGDR
1639 004730 000741          BR      @RSF2
1640

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1641 ;REWIND DRIVE TO BOT
1642 004732 105777 173544 REWIND: TSTB BMTC
1643 004736 100375 BPL .-4 ;WAIT FOR CONTROL UNIT
1644 004740 013777 000554 173534 MOV COMAND,BMTC ;SELECT DRIVE
1645 004746 006077 173526 ROR BMTS
1646 004752 103375 BCC .-4 ;WAIT FOR TU READY
1647 004754 052777 000016 173520 BIS #16,BMTC ;REWIND
1648 004762 004737 005122 JSR PC,GOWAIT
1649 004766 000207 RTS PC ;EXIT
1650 ;ARE ALL DRIVES AT END OF TAPE
1651 004770 104410 ALLEOT: RSFDRV
1652 004772 104414 ALL1: MVCTRS
1653 004774 032737 000060 000634 BIT #60,MODES ;AT EOT?
1654 005002 001403 BEQ ALLEOS ;NO
1655 005004 104422 CHGDRV ;DONE ALL DRIVES?
1656 005006 000771 BR ALL1 ;NO
1657 005010 000427 BR ALL3
1658 005012 032777 000400 173472 ALLEOS: BIT #400,BSMR ;TEST SWITCH 8 TO EXIT AT END OF SEQUENCE
1659 005020 001425 BEQ ALL2 ;NO, GO TO EOT
1660 005022 032737 000010 000634 BIT #10,MODES ;AT END OF SEQUENCE
1661 005030 001421 BEQ ALL2 ;NO, EXIT, DON'T DUMP ERROR COUNTERS
1662 ;DUMP ERROR COUNTERS ON ALL DRIVES
1663 005032 104410 CTRDMP: RSFDRV
1664 005034 104414 MVCTRS
1665 005036 005737 004456 TST TSFLAG
1666 005042 001006 BNE CTRD1 ;DUMP READ ONLY
1667 005044 004737 006146 JSR PC,ENDT1
1668 005050 032737 000004 000634 BIT #4,MODES ;READ PASS SELECTED?
1669 005056 001402 BEQ CDEND ;NO
1670 005060 004737 010320 CTRD1: JSR PC,RNDTP1
1671 005064 104422 CDEND: CHGDRV ;DONE ALL DRIVES
1672 005066 000762 BR CTRDMP+2 ;NO
1673 005070 062716 000002 ALL3: ADD #2,(6) ;INCREMENT RETURN POINT
1674 005074 000207 ALL2: RTS PC
1675
1676 ;CLEAR READ AND WRITE TABLES
1677 005076 012700 000572 CLRTBL: MOV #MRCHEK,RO
1678 005102 005020 CLRT1: CLR (0)+
1679 005104 020027 000634 CMP RO,#MODES
1680 005110 001374 BNE CLRT1
1681 005112 042737 000070 000634 BIC #70,MODES
1682 005120 000207 RTS PC
1683 ;INTERRUPT ENABLE, GO, WAIT FOR INTERRUPT
1684 005122 012777 000200 173360 GOWAIT: MOV #200,BCC ;SET PRIORITY LEVEL 4
1685 005130 012777 005164 173376 MOV #GW1,BMTV ;SET INTERRUPT RETURN
1686 005136 012737 000001 005152 MOV #1,WAIT1
1687 005144 052777 000101 173330 BIS #101,BMTC ;INTERRUPT ENABLE, GO
1688 005152 000001 WAIT1: WAIT ;WAIT FOR INTERRUPT
1689 005154 012777 000340 173326 MOV #340,BCC ;RESTORE PRIORITY LEVEL 7
1690 005162 000207 RTS PC ;EXIT
1691 005164 012737 000001 005152 GW1: MOV #1,WAIT1
1692 005172 000002 RTI ;RETURN FROM INTERRUPT
1693
1694 ;WRITE RECORD SECTION
1695 005174 005737 000614 WRITI: TST RECORD ;IS THIS THE FIRST RECORD
1696 005200 001031 BNE NOINCR ;NO, SKIP SET UP OF RECORD LENGTH AND BLOCK INCREMENT
1697 005202 013737 000524 000544 MOV MAXLEN,STRLEN

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1698 005210 012737 177774 000566      MOV      @-4.,BLKINC
1699 005216 032737 000020 001322      BIT      @20,PARAM
1700 005224 001006      BNE     W1
1701 005226 013737 000526 000544      MOV      MINLEN,STLEN
1702 005234 012737 000004 000566      MOV      @4.,BLKINC
1703 005242 013737 000544 000630 W1:      MOV      STRLEN,WRLEN
1704 005250 032737 000040 001322      BIT      @40,PARAM      ;DOES RECORD LENGTH CHANGE?
1705 005256 001002      BNE     NOINCR      ;YES
1706 005260 005037 000566      CLR     BLKINC      ;NO
1707 005264 013737 000614 000616 NOINCR:  MOV     RECORD,MRRECR
1708 005272 005737 004456      TST     T5FLAG
1709 005276 001401      BEQ     ,+4
1710 005300 000207      RTS     PC      ;EXIT WRITE ROUTINE IF TEST 5
1711 005302 005037 000564      CLR     WRPASS
1712 005306 013777 000534 173166 STRTOP:  MOV     COMAND,BMTC      ;SELECT UNIT
1713 005314 105777 173162      TSTB    BMTC
1714 005320 100375      BPL     ,+4      ;WAIT FOR CU READY
1715 005322 006077 173152      ROR     BMTC      ;WAIT FOR TU READY
1716 005326 103375      BCC     ,+4
1717 005330 013777 000630 173146 NONSTP:  MOV     WRLEN,BBC      ;SET BYTE COUNT
1718 005336 005477 173142      NEG     BBC
1719 005342 013777 000530 173136      MOV     WBUF,BCA      ;SET CURRENT ADDRESS
1720 005350 052777 000004 173124      BIS     @4,BMTC      ;WRITE
1721 005356 004737 005122      JSR     PC,GOMAIT      ;INTERRUPT ENABLE, GO, WAIT FOR DONE
1722      ;RETURN HERE AFTER INTERRUPT
1723 005362 017737 173112 000570      MOV     BMTC,STATRD      ;SAVE STATUS
1724 005370 005777 173106      TST     BMTC
1725 005374 100542      BMI     ERROR      ;HAVE ERROR FLAG, CHECK FOR EOT
1726 005376 005737 000564      TST     WRPASS      ;WAS THIS A RECOVERY PASS
1727 005402 001410      BEQ     TSTSTP      ;NO
1728 005404 013700 000564      MOV     WRPASS,RO      ;YES
1729 005410 006300      ASL     RO
1730 005412 062700 000572      ADD     @RCHEX,RO
1731 005416 005210      INC     @RO
1732 005420 005037 000564      CLR     WRPASS      ;+1 TO APPROPRIATE RECOVERY PASS COUNTER
1733 005424 032737 000014 001322 TSTSTP:  BIT     @14,PARAM      ;IS WRITE MODE NONSTOP?
1734 005432 001023      BNE     STOPOP      ;NO
1735 005434 005737 000564      TST     WRPASS      ;YES
1736 005440 001333      BNE     NONSTP
1737 005442 004737 005610      JSR     PC,TESINC      ;CHANGE RECORD LENGTH
1738 005446 032737 000001 000634      BIT     @1,MODES      ;EXIT AFTER RLS?
1739 005454 001405      BEQ     W10      ;NO
1740 005456 032737 000010 000634      BIT     @10,MODES      ;YES, ARE WE AT END OF RLS?
1741 005464 001721      BEQ     NONSTP      ;NO
1742 005466 000207      RTS     PC      ;YES
1743 005470 032737 000002 000634 W10:     BIT     @2,MODES      ;EXIT EVERY RECORD?
1744 005476 001714      BEQ     NONSTP      ;NO
1745 005500 000207      RTS     PC      ;YES
1746 005502 032737 000010 001322 STOPOP:  BIT     @10,PARAM      ;IS WRITE MODE RANDOM?
1747 005510 001414      BEQ     W11      ;NO
1748      ;RANDOM STALL DELAY
1749 005512 004737 007214      JSR     PC,RANGEN
1750 005516 052737 177400 007364      BIS     @177400,RANDOM
1751 005524 012704      MOV     @-200.,R4      ;DELAY 1 MILLISECOND
1752 005530 005204      INC     R4
1753 005532 001376      BNE     ,+2
1754 005534 005237 007364      INC     RANDOM

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1755 005540 001371      BNE      RAN1
1756 005542 005737 000564      W11:    TST      WRPASS
1757 005546 001257      BNE      STRTOP
1758 005550 004737 005610      JSR      PC, TESINC
1759 005554 032737 000001 000634      BIT      @1, MODES      ;EXIT AFTER RLS?
1760 005562 001405      BEQ      W12            ;NO
1761 005564 032737 000010 000634      BIT      @10, MODES     ;YES, ARE WE AT END OF RLS?
1762 005572 001645      BEQ      STRTOP        ;NO
1763 005574 000207      RTS      PC            ;YES
1764 005576 032737 000002 000634      W12:    BIT      @2, MODES ;EXIT EVERY RECORD?
1765 005604 001640      BEQ      STRTOP        ;NO
1766 005606 000207      RTS      PC            ;YES
1767      ;SEE IF RECORD LENGTH SHOULD BE CHANGED
1768 005610 005237 000614      TESINC: INC      RECORD  ;+1 TO RECORD COUNT
1769 005614 042737 000010 000634      BIC      @10, MODES     ;NOT END OF RLS UNLESS SET BELOW
1770 005622 005737 000566      TST      BLKINC
1771 005626 001416      BEQ      TSINC2
1772 005630 063737 000566 000630      ADD      @1, KINC, WRTLEN
1773 005636 023737 000630 000526      CMP      WRTLEN, MINLEN ;RECORD LENGTH TOO SHORT?
1774 005644 002404      BLT      RESETL        ;YES, RESET
1775 005646 023737 000630 000524      CMP      WRTLEN, MAXLEN ;RECORD LENGTH TOO LONG?
1776 005654 003403      BLE      TSINC2        ;NO
1777 005656 013737 000544 000630      RESETL: MOV      STRLEN, WRTLEN ;YES, RESET
1778 005664 105737 000614      TSINC2: TSTB     RECORD  ;IS RECORD A MULTIPLE OF 256
1779 005670 001003      BNE      TSINC3        ;NO
1780 005672 052737 000010 000634      BIS      @10, MODES     ;INDICATE AT END OF RLS
1781 005700 000207      TSINC3: RTS      PC
1782
1783
1784      ;HAVE AN ERROR FLAG DURING WRITE OPERATION
1785      ;IF ERROR IS CAUSED BY END OF TAPE FLAG DUMP WRITE ERROR COUNTERS
1786      ;FOR ALL OTHER ERRORS: PRINT COMMAND AND STATUS REGISTERS AND RECORD NUMBER
1787      ;IF READ PASS IS SELECTED, TRY TO RECOVER BY WRITING WITH XING.
1788 005702 104434      ERRGR: CKSMR          ;CHECK FOR CNTL G
1789 005704 032737 175600 000570      BIT      @175600, STATRD ;AT EOT?
1790 005712 001510      BEQ      ENDTAP        ;YES
1791 005714 005737 000564      TST      WRPASS
1792 005720 001002      BNE      ERR1          ;FIRST ERROR?
1793 005722 005237 000572      INC      WRCHK         ;YES, + 1 TO WRITE ERROR
1794 005726 032777 020900 172556      ERR1:  BIT      @20000, BSMR ;TYPE ALL ERRORS?
1795 005734 001010      BNE      TESREC        ;NO
1796 005736 012702 012774      MOV      @MSG7, R2
1797 005742 104404      TOP                  ;PRINT ERROR
1798 005744 013737 000630 000546      MOV      WRTLEN, LENGTH
1799 005752 004737 011174      JSR      PC, PRS
1800 005756 032777 000100 172526      TESREC: BIT      @100, BSMR ;RECOVER STATISTICALLY SELECTED?
1801 005764 001410      BEQ      TESRC1        ;NO
1802 005766 005237 000564      INC      WRPASS        ;+1 TO WRITE RECOVER
1803 005772 022737 000010 000564      CMP      @8, WRPASS     ;HAVE WE TRIED TO WRITE RECOVER 8 TIMES?
1804 006000 001020      BNE      STREC1        ;NO
1805 006002 005237 000612      INC      PERMS         ;YES, +1 TO PERMANENT BADSPOT?
1806 006006 032737 000004 000634      TESRC1: BIT      @4, MODES ;IS READ PASS SELECTED?
1807 006014 001402      BEQ      .+6           ;NO
1808 006016 004737 010644      JSR      PC, XRGREC
1809 006022 005037 000564      CLR      WRPASS
1810 006026 032737 002000 000570      BIT      @2000, STATRD
1811 006034 001037      BNE      ENDTAP

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1812	006036	000137	005542		JMP	W11	
1813	006042	004737	010242		STREC1: JSR	PC,BACK1	
1814	006046	004737	010242		JSR	PC,BACK1	;BACKSPACE 2 RECORDS
1815	006052	032777	000040	172420	BIT	@40,@MTC	
1816	006060	001402			BEQ	.+6	
1817	006062	000137	005306		JMP	STRTOP	
1818	006066	012777	177777	172410	MOV	@-1,@BC	
1819	006074	013777	000554	172400	MOV	COMAND,@MTC	
1820	006102	052777	000010	172372	BIS	@10,@MTC	
1821	006110	004737	005122		JSR	PC,GOWAIT	;SPACE FORWARD 1 RECORD
1822	006114	042777	000016	172360	BIC	@16,@MTC	
1823	006122	052777	000004	172352	BIS	@4,@MTC	;CHANGE FROM SPACE TO WRITE
1824	006130	000137	005306		JMP	STRTOP	
1825							
1826	006134	005237	000614		;DRIVE IS AT EOT		
1827	006140	052737	000040	000634	ENDTAP: INC	RECORD	
1828	006146	012702	013757		BIS	@40,MODES	;INDICATE DRIVE AT EOT
1829	006152	104404			ENDT1: MOV	@MSG24,R2	
1830	006154	012702	013022			TOP	
1831	006160	104404			MOV	@MSG8,R2	
						TOP	

1833									
1834									
1835									
1836	006162	104434							
1837	006164	013737	000554	011350					
1838	006172	000337	011350						
1839	006176	142737	000170	011350					
1840									
1841	006204	052737	000260	011350					
1842	006212	004737	011352						
1843	006216	104430							
1844	006220	013737	001322	011350					
1845	006226	000337	011350						
1846	006232	006037	011350						
1847	006236	042737	000170	011350					
1848	006244	052737	000260	011350					
1849	006252	004737	011352						
1850	006256	013737	001322	011350					
1851	006264	042737	177763	011350					
1852	006272	012702	013510						
1853	006276	022737	000004	011350					
1854	006304	001002							
1855	006306	012702	013464						
1856	006312	022737	000010	011350					
1857	006320	001002							
1858	006322	012702	013476						
1859	006326	104404							
1860	006330	013702	000614						
1861	006334	104426							
1862	006336	013737	001322	011350					
1863	006344	042737	177717	011350					
1864	006352	012702	013540						
1865	006356	022737	000020	011350					
1866	006364	001002							
1867	006366	012702	013547						
1868	006372	022737	000040	011350					
1869	006400	001002							
1870	006402	012702	013522						
1871	006406	022737	000060	011350					
1872	006414	001002							
1873	006416	012702	013531						
1874	006422	104404							
1875	006424	012702	013556						
1876	006430	104404							
1877	006432	013702	000572						
1878	006436	104426							
1879	006440	012700	000574						
1880	006444	112737	000060	013617					
1881	006452	105237	013617						
1882	006456	005710							
1883	006460	001405							
1884	006462	012702	013600						
1885	006466	104404							
1886	006470	011002							
1887	006472	104426							
1888	006474	005720							
1889	006476	020027	000612						

!DUMP WRITE ERRORS

WRTDMP: CKSMR

!CHECK FOR CNTL G

MOV COMMAND,CHAR
 SHAB CHAR
 BICB #170,CHAR
 BIS #260,CHAR
 JSR PC,OCTP
 SP3
 MOV PARAM,CHAR
 SHAB CHAR
 ROR CHAR
 BIC #170,CHAR
 BIS #260,CHAR
 JSR PC,OCTP
 MOV PARAM,CHAR
 BIC #177763,CHAR
 MOV #MSG14,R2
 CFP #4,CHAR
 BNE ..6
 MOV #MSG12,R2
 CFP #10,CHAR
 BNE ..6
 MOV #MSG13,R2
 TOP
 MOV RECORD,R2
 DECPRT
 MOV PARAM,CHAR
 BIC #177717,CHAR
 MOV #MSG17,R2
 CFP #20,CHAR
 BNE ..6
 MOV #MSG18,R2
 CFP #40,CHAR
 BNE ..6
 MOV #MSG15,R2
 CFP #60,CHAR
 BNE ..6
 MOV #MSG16,R2
 TOP
 MOV #MSG19,R2
 TOP
 MOV WRCHEK,R2
 DECPRT
 MOV #WRCHEK*2,R0
 MOV #60,MSG20*17
 WRTD1: INCB MSG20*17
 TST BR0
 BEQ WRTD2
 MOV #MSG20,R2
 TOP
 MOV (0),R2
 DECPRT
 WRTD2: TST (0)
 CFP R0,#WRCHEK*20

!PRINT DRIVE NUMBER

!PRINT PATTERN NUMBER

!PRINT WRITE MODE

!PRINT RECORD NUMBER

!PRINT RECORD LENGTH SEQUENCE

!PRINT "WRITE ERRORS-"

!PRINT STATISTICAL RECOVERY

!RECOVERED AT X
 !JUST INCREMENTING

1890	006502	001363				BNE	WRTD1		
1891	006504	005737	000612			TST	PERMS		
1892	006510	001001				BNE	.+4		:SKIP PRINT IF = 0
1893	006512	000207				RTS	PC		
1894									
1895									
1896	006514	012702	013622			MOV	@MSG20A,R2		
1897	006520	104404					TOP		
1898	006522	013702	000612			MOV	PERMS,R2		:PRINT "PERMANENT BADSPOT"
1899	006526	104426					DECPRT		
1900	006530	000207				RTS	PC		
1901									
1902	006532	013702	000530						
1903	006536	013737	001322	006644		GENPA: MOV	MBUF,R2	:INITIALIZE BUFFER	
1904	006544	042737	170777	006644		MOV	PARAM,GP1	:CHECK PARAMETERS FOR PATTERN SELECTED	
1905	006532	001435				BIC	@170777,GP1		
1906	006534	022737	001000	006644		BEQ	PAT0		
1907	006562	001437				CMP	@1000,GP1		
1908	006564	022737	002000	006644		BEQ	PAT1		
1909	006572	001457				CMP	@2000,GP1		
1910	006574	022737	003000	006644		BEQ	PAT2		
1911	006602	001461				CMP	@3000,GP1		
1912	006604	022737	004000	006644		BEQ	PAT3		
1913	006612	001501				CMP	@4000,GP1		
1914	006614	022737	005000	006644		BEQ	PAT4		
1915	006622	001510				CMP	@5000,GP1		
1916	006624	022737	006000	006644		BEQ	PAT5		
1917	006632	001402				CMP	@6000,GP1		
1918	006634	000137	007174			BEQ	.+6		
1919	006640	000137	007160			JMP	PAT7		
						JMP	PAT6		

1921				
1922	006644	000000		GP1: 0
1923				;PATTERN 0
1924				;HALF FREQUENCY OUTSIDE SKEW
1925	006646	012722	002010	PAT0: MOV @2010,(2) ;(010)(004)
1926	006652	023702	000532	CMP RBUF,R2
1927	006656	001373		BNE PAT0
1928	006660	000207		RTS PC
1929				;PATTERN 1
1930				;SLIDING 1 BIT (ISOLATED BIT)
1931	006662	012700	006710	PAT1: MOV @P17,R0
1932	006666	012022		PAT1A: MOV (0),(2)
1933	006670	023702	000532	CMP RBUF,R2
1934	006674	001001		BNE .+4
1935	006676	000207		RTS PC
1936	006700	022700	006732	CMP @PAT2,R0
1937	006704	001370		BNE PAT1A
1938	006706	000765		BR PAT1
1939	006710	100000		P17: 100000
1940	006712	020100		20100
1941	006714	004020		4020
1942	006716	001004		1004
1943	006720	000001		1
1944	006722	040200		40200
1945	006724	010040		10040
1946	006726	002010		2010
1947	006730	000402		402
1948				
1949				;PATTERN 2
1950				;HIGH FREQUENCY EVERY OTHER TRACK
1951	006732	012722	136274	PAT2: MOV @136274,(2) ;(274)(274)
1952	006736	023702	000532	CMP RBUF,R2
1953	006742	001373		BNE PAT2
1954	006744	000207		RTS PC
1955				;PATTERN 3
1956				;THREE 0'S, THREE 1'S, THREE 0'S.
1957	006746	012700	006774	PAT3: MOV @P37,R0
1958	006752	012022		PAT3A: MOV (0),(2)
1959	006754	023702	000532	CMP RBUF,R2
1960	006760	001001		BNE .+4
1961	006762	000207		RTS PC
1962	006764	022700	007016	CMP @PAT4,R0
1963	006770	001370		BNE PAT3A
1964	006772	000765		BR PAT3
1965	006774	140037		P37: 140037
1966	006776	100476		100476
1967	007000	001574		1574
1968	007002	003770		3770
1969	007004	017760		17760
1970	007006	037300		37300
1971	007010	076201		76201
1972	007012	174003		174003
1973	007014	170007		170007
1974				;PATTERN 4
1975				;INCREMENTING PATTERN (0-377)
1976	007016	105037	007042	PAT4: CLRB P4A
1977	007022	113722	007042	P4: MOVB P4A,(2)

1978 007026 105257 007042
 1979 007032 025702 000532
 1980 007036 001371
 1981 007040 000207
 1982 007042 000000
 1983
 1984
 1985
 1986 007044 012700 007072
 1987 007050 012022
 1988 007052 025702 000532
 1989 007056 001001
 1990 007060 000207
 1991 007062 022700 007160
 1992 007066 001370
 1993 007070 000765
 1994 007072 000000
 1995 007074 100000
 1996 007076 100200
 1997 007100 040100
 1998 007102 020100
 1999 007104 020040
 2000 007106 010020
 2001 007110 004020
 2002 007112 004010
 2003 007114 002004
 2004 007116 001004
 2005 007120 001002
 2006 007122 000401
 2007 007124 000001
 2008 007126 000000
 2009 007130 100200
 2010 007132 040200
 2011 007134 040100
 2012 007136 020040
 2013 007140 010040
 2014 007142 010020
 2015 007144 004010
 2016 007146 002010
 2017 007150 002004
 2018 007152 001002
 2019 007154 000402
 2020 007156 000401
 2021
 2022
 2023 007160 012722 177777
 2024 007164 025702 000532
 2025 007170 001373
 2026 007172 000207
 2027
 2028
 2029
 2030
 2031 007174 004737 007214
 2032 007200 013722 007364
 2033 007204 025702 000532
 2034 007210 001371

INCB P4A
 CMP RBUF,R2
 BNE P4
 RTS PC
 P4A: 0
 ;PATTERN 5
 ;EACH TRACK 3 BITS
 PAT5: MOV @PST,R0
 PAT5A: MOV (0),(2)
 CMP RBUF,R2
 BNE .+4
 RTS PC
 CMP @PAT6,R0
 BNE PAT5A
 BR PAT5
 PST: 0
 100000
 100200
 40100
 20100
 20040
 10020
 4020
 4010
 2004
 1004
 1002
 401
 1
 0
 100200
 40200
 40100
 20040
 10040
 10020
 4010
 2010
 2004
 1002
 402
 401
 ;PATTERN 6
 ;HIGH FREQUENCY ALL TRACKS
 PAT6: MOV @-1,(2)
 CMP RBUF,R2
 BNE PAT6
 RTS PC
 ;PATTERN 7
 ;RANDOM
 PAT7: JSR PC,RANGEN
 MOV RANDOM,(2)
 CMP RBUF,R2
 BNE PAT7

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2035 007212 000207          RTS      PC
2036          ;RANDOM NUMBER GENERATOR
2037          ;EXIT WITH RANDOM NUMBER IN LOCATION NAMED "RANDOM"
2038 007214 010037 007372  RANGEN: MOV    RO,SVO          ;SAVE REGISTERS
2039 007220 010137 007374          MOV    R1,SV1
2040 007224 010237 007376          MOV    R2,SV2
2041 007230 010337 007400          MOV    R3,SV3
2042 007234 013700 007366          MOV    LONUM,RO          ;SET UP LOW DIGIT
2043 007240 013701 007370          MOV    MINUM,R1         ;SET UP HIGH DIGIT
2044 007244 012703 000007          MOV    #7,R3           ;SET UP SHIFT COUNT
2045 007250 005002          CLR    R2
2046 007252 006300  RANG1:  ASL    RO          ;SHIFT RO LEFT AND
2047 007254 006101          ROL    R1          ;ROTATE CARRY INTO LSB OF R1 AND
2048 007256 006102          ROL    R2          ;ROTATE CARRY OUT OF R1 INTO R2
2049 007260 005303          DEC    R3           ;DECREMENT R3
2050 007262 001373          BNE   RANG1        ;CONTINUE SHIFT LOOP
2051 007264 063700 007366          ADD    LONUM,RO       ;ADD NUMBER TO MAKE X 129
2052 007270 005501          ADC    R1           ;PROPAGATE CARRY
2053 007272 063701 007370          ADD    MINUM,R1      ;ADD NUMBER TO MAKE X 129
2054 007276 005502          ADC    R2           ;PROPAGATE CARRY
2055 007300 062700 001057          ADD    #1057,RO      ;ADD LOW CONSTANT
2056 007304 005501          ADC    R1           ;PROPAGATE CARRY
2057 007306 005502          ADC    R2           ;PROPAGATE CARRY
2058 007310 062701 047401          ADD    #47401,R1    ;ADD HIGH CONSTANT
2059 007314 005502          ADC    R2           ;PROPAGATE CARRY
2060 007316 062702 000006          ADD    #6,R2        ;ADD HIGH CONSTANT
2061 007322 060200          ADD    R2,RO        ;RE-PRIME RO WITH HIGH DIGIT
2062 007324 005501          ADC    R1           ;PROPAGATE CARRY
2063 007326 010037 007364          MOV    RO,RANDOM     ;SAVE RANDOM NUMBER
2064 007332 010037 007366          MOV    RO,LONUM      ;PUT RO BACK IN LONUM
2065 007336 010137 007370          MOV    R1,MINUM     ;PUT R1 BACK IN MINUM
2066 007342 013700 007372          MOV    SVO,RO       ;RESTORE REGISTERS
2067 007346 013701 007374          MOV    SV1,R1
2068 007352 013702 007376          MOV    SV2,R2
2069 007356 013703 007400          MOV    SV3,R3
2070 007362 000207          RTS      PC          ;EXIT
2071 007364 000000  RANDOM:  0
2072 007366 000000  LONUM:  0
2073 007370 000000  MINUM:  0
2074 007372 000000  SVO:    0
2075 007374 000000  SV1:    0
2076 007376 000000  SV2:    0
2077 007400 000000  SV3:    0
2078
2079
2080          ;READ RECORD SECTION
2081 007402 005737 000614  READI:  TST    RECORD          ;FIRST RECORD?
2082 007406 001003          BNE   #R1           ;NO
2083 007410 013737 000544 000632  MOV    STRLEN,READLN  ;SET INITIAL READ LENGTH
2084 007416 012737 177775 000562  #R1:   MOV    #-3,ROPASS  ;INITIALIZE READ PASS COUNTER
2085 007424 013777 000554 171030  ROSTPD: MOV    COMMAND,BMTC
2086 007432 105777 171044          TSTB   BMTC
2087 007436 100375          BPL    #-4          ;WAIT FOR CONTROL UNIT READY
2088 007440 006077 171034          ROR    BMTC
2089 007444 103375          BCC    #-4          ;WAIT FOR TAPE UNIT READY
2090 007446 013700 000532  READGO: MOV    RBUF,RO
2091 007452 013701 000632          MOV    READLN,R1

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2092 007456 105020          RG1:  CLRB   (0),          ;CLEAR READ BUFFER
2093 007460 005301          DEC    R1
2094 007462 001375          BNE    RG1
2095 007464 013777 000632 171012  MOV    READLN,BBC          ;SET BYTE COUNT
2096 007472 005477 171006          NEG    BBC
2097 007476 013777 000532 171002  MOV    RBUF,BCA          ;SET CURRENT ADDRESS
2098 007504 013777 000554 170770  MOV    COMMAND,BMTC
2099 007512 052777 000002 170762  BIS    @2,BMTC
2100 007520 004757 005122          JSR    PC,GOMAIT
2101                                ;RETURN HERE AFTER INTERRUPT
2102 007524 017757 170750 000570  MOV    BMTC,STATRD
2103 007532 005777 170744          TST    BMTC          ;ANY STATUS ERRORS
2104 007536 100504          BMI    RDERRO          ;YES
2105                                ;CHECK FOR DATA ERRORS
2106 007540 013700 000532          MOV    RBUF,R0
2107 007544 013701 000530          MOV    WBUF,R1
2108 007550 013702 000632          MOV    READLN,R2
2109 007554 022021          ;RS:  CMP    (0),(1),          ;CHECK FOR PROPER DATA TRANSFER
2110 007556 001045          BNE    DATERR          ;HAVE DATA ERROR
2111 007560 162702 000002          SUB    @2,R2          ;CHECKED ALL TRANSFERS?
2112 007564 001375          BNE    ;RS          ;NO
2113 007566 032757 000003 001322  RTSSTP: BIT    @3,PARAM
2114 007574 001007          BNE    RDSTPC
2115 007576 004757 010172          JSR    PC,RDINCR          ;INCREMENT FOR NEXT BLOCK
2116 007602 023757 000614 000620  CMP    RECORD,LASRCR
2117 007610 001316          BNE    READGO
2118 007612 000207          RTS    PC
2119 007614 032757 000002 001322  RDSTPC: BIT    @2,PARAM          ;EXIT READIT
2120 007622 001414          BEQ    RDSTP          ;IS READ MODE RANDOM?
2121 007624 004757 007214          RNDROS: JSR    PC,RANGEN          ;NO
2122 007630 052757 177400 007364  BIS    @177400,RANDOM
2123 007636 012704 177470          RND51: MOV    @-200,R4          ;DELAY 1 MILLISECOND
2124 007642 005204          INC    R4
2125 007644 001376          BNE    -2
2126 007646 005257 007364          INC    RANDOM
2127 007652 001371          BNE    RND51
2128 007654 004757 010172          RDSTP: JSR    PC,RDINCR
2129 007660 023757 000614 000620  CMP    RECORD,LASRCR          ;DONE LAST RECORD?
2130 007666 001256          BNE    RDSTPD          ;NO
2131 007670 000207          RTS    PC          ;YES EXIT
2132                                ;HAVE DATA ERROR
2133 007672 032777 020000 170612  DATERR: BIT    @20000,BSMR          ;TYPE ALL READ ERRORS?
2134 007700 001014          BNE    DATER1          ;NO
2135 007702 012702 013144          MOV    @MSG9A,R2
2136 007706 104404          TOP
2137 007710 013757 000632 000546  MOV    READLN,LENGTH
2138 007716 004757 011174          JSR    PC,PRTS
2139 007722 014102          MOV    -(1),R2          ;PRINT EXPECTED DATA
2140 007724 104412          OCTPRT
2141 007726 014002          MOV    -(0),R2          ;PRINT ACTUAL DATA
2142 007730 104412          OCTPRT
2143 007732 022757 177775 000562  DATER1: CMP    @-3,RDPASS
2144 007740 001002          BNE    .+6
2145 007742 005257 000624          INC    DAERRS          ;+1 TO DATA ERRORS
2146 007746 000464          BR     RTSR1
2147                                ;STATUS INDICATES AN ERROR, CHECK FOR EOT
2148 007750 104434          RDERRO: CKSMR          ;CHECK FOR CNTL G

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2149 007752 032737 175600 000570 BIT #175600,STATRD ;IS ERROR LEGITIMATE OR EOT?
2150 007760 001552 BEQ RNDTAP ;HAVE EOT
2151 007762 032777 020000 170522 BIT #20000,BSMR ;TYPE ALL READ ERRORS?
2152 007770 001044 BNE RTSREC ;NO
2153 007772 012702 013117 MOV #MSG9,R2
2154 007776 104404 TOP ;PRINT ERROR
2155 010000 013737 000632 000546 MOV READLN,LENGTH
2156 010006 004737 011174 JSR PC,PRTS
2157 010012 032777 010000 170460 BIT #10000,BMTS ;STATUS ERROR DUE TO PARITY
2158 ;ERROR?
2159 010020 001430 BEQ RTSREC ;BRANCH IF NOT
2160 010022 032777 000010 170462 BIT #10,BSMR ;SEE IF USER WANTS DATA COMPARE!
2161 010030 001424 BEQ RTSREC ;BRANCH IF NOT
2162 010032 013700 000530 MOV RBUF,R0 ;PICK UP STARTING ADDRESS OF
2163 ;WRITE BUFFER
2164 010036 013701 000532 MOV RBUF,R1 ;PICK UP STARTING ADDRESS OF
2165 ;READ BUFFER
2166 010042 013702 000632 MOV BREADLN,R2 ;PICK UP RECORD LENGTH IN BYTES
2167 010046 022021 10: CMP (R0),(R1) ;COMPARE WHAT SHOULD HAVE BEEN
2168 ;WRITTEN WITH WHAT WAS!!
2169 010050 001004 BNE 20 ;BRANCH IF NOT THE SAME
2170 010052 162702 000002 SUB #2,R2 ;DROP OFF A WORD FROM RECORD
2171 ;LENGTH
2172 010056 001406 BEQ 30 ;BRANCH IF ALL OF RECORD DATA
2173 ;CHECKS
2174 010060 000772 BR 10 ;GO TO COMPARE NEXT BYTE
2175 010062 014002 20: MOV -(R0),R2 ;PICK UP THE DATA VALUE THAT
2176 ;SHOULD HAVE BEEN WRITTEN
2177 010064 104412 OCTPRT ;PRINT EXPECTED VALUE OF
2178 ;WRITTEN DATA
2179 010066 014102 MOV -(R1),R2 ;PICK UP THE DATA VALUE THAT
2180 ;WAS WRITTEN
2181 010070 104412 OCTPRT ;PRINT ACTUAL VALUE OF THE
2182 ;DATA READ
2183 010072 000403 BR RTSREC ;CONTINUE WITH TESTING
2184 010074 012702 013406 30: MOV #MSG100,R2 ;INDICATE RECORD DATA COMPARES
2185 ;DESPITE THE PARITY ERROR
2186 ;CAUSING THE READ STATUS ERROR
2187 010100 104404 TOP
2188 ;+ 1 TO RDERRS IF FIRST ERROR PASS
2189 010102 104434 RTSREC: CKSMR ;CHECK FOR CNTL G
2190 010104 022737 177775 000562 CMP #3,RDPASS
2191 010112 001002 BNE .+6
2192 010114 005237 000622 INC RDERRS ;+1 TO STATUS ERRORS
2193 010120 032777 000020 170364 RTSR1: BIT #20,BSMR ;DELETE READ RETRYS (SM 4)?
2194 010126 001011 BNE RPASS3 ;YES
2195 010130 005237 000562 INC RDPASS ;DONE ALL RE-READS?
2196 010134 001404 BEQ RPASS1 ;YES
2197 010136 004737 010242 JSR PC,BACK1 ;NO, BACKSPACE TAPE
2198 010142 000137 007424 JFP RDSTPD ;GO AGAIN
2199 010146 005237 000626 RPASS1: INC RREAD ;+1 TO NONRECOVERABLE READ
2200 010152 012737 177775 000562 RPASS3: MOV #3,RDPASS
2201 010160 032737 002000 000570 BIT #2000,STATRD ;AT EOT?
2202 010166 001054 BNE RNDTP1 ;YES, TYPE "EOT"
2203 010170 000631 BR RDSTP
2204 ;SET UP POINTERS FOR NEXT RECORD
2205

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2206	010172	005237	000614		RDINCR: INC	RECORD	
2207	010176	005737	000566		TST	BLKINC	
2208	010202	001416			BEG	RESTR1	
2209					;RECORD	LENGTH IS CHANGING, COUNT IT	
2210	010204	063737	000566	000632	ADD	BLKINC,READLN	
2211	010212	023737	000632	000526	CMP	READLN,MINLEN	;IS LENGTH LESS THAN MINIMUM
2212	010220	002404			BLT	RESTR1	;NO
2213	010222	023737	000632	000524	CMP	READLN,MAXLEN	;IS LENGTH GREATER THAN MAXIMUM?
2214	010230	003403			BLE	RESTR1	;NO
2215	010232	013737	000544	000632	RESTR1: MOV	STRLEN,READLN	;RESET INITIAL LENGTH
2216	010240	000207			RESTR1: RTS	PC	
2217					;BACKSPACE ONE RECORD		
2218	010242	006077	170232		BACK1: ROR	BMTS	
2219	010246	103375			BCC	.-4	;WAIT FOR TAPE UNIT READY
2220	010250	012777	177777	170226	MOV	#-1,BBC	;COUNT 1 RECORD
2221	010256	013777	000554	170216	MOV	COMAND,BMTC	;SELECT DRIVE
2222	010264	052777	000012	170210	BIS	#12,BMTC	;ISSUE BACKSPACE
2223	010272	004737	005122		JSR	PC,GOWAIT	
2224	010276	042777	000016	170176	BIC	#16,BMTC	
2225	010304	000207			RTS	PC	
2226					;DRIVE HAS REACHED EOT IN READ MODE		
2227	010306	004737	010172		RNDTAP: JSR	PC,RDINCR	
2228	010312	052737	000020	000634	BIS	#20,MODES	;INDICATE AT EOT
2229	010320	012702	014023		RNDTP1: MOV	#MSG25,R2	
2230	010324	104404				TOP	
2231	010326	012702	013022		MOV	#MSG8,R2	
2232	010332	104404				TOP	
2233					;DUMP ERROR COUNTERS		
2234	010334	104434			READP: CKSMR		;CHECK FOR CNTL G
2235	010336	013737	000554	011350	MOV	COMAND,CHAR	
2236	010344	000337	011350		SMB	CHAR	
2237	010350	142737	000170	011350	BICB	#170,CHAR	
2238	010356	052737	000260	011350	BIS	#260,CHAR	
2239	010364	004737	011352		JSR	PC,OCTP	;PRINT DRIVE NUMBER
2240	010370	104430			SP3		
2241	010372	013737	001322	011350	MOV	PARAM,CHAR	
2242	010400	000337	011350		SMB	CHAR	
2243	010404	006037	011350		ROR	CHAR	
2244	010410	042737	000170	011350	BIC	#170,CHAR	
2245	010416	052737	000260	011350	BIS	#260,CHAR	
2246	010424	004737	011352		JSR	PC,OCTP	;PRINT PATTERN NUMBER
2247							
2248	010430	013737	001322	011350	MOV	PARAM,CHAR	
2249	010436	042737	177774	011350	BIC	#177774,CHAR	
2250	010444	012702	013510		MOV	#MSG14,R2	
2251	010450	022737	000001	011350	CMP	#1,CHAR	
2252	010456	001002			BNE	..6	
2253	010460	012702	013464		MOV	#MSG12,R2	
2254	010464	022737	000002	011350	CMP	#2,CHAR	
2255	010472	001002			BNE	..6	
2256	010474	012702	013476		MOV	#MSG13,R2	
2257	010500	104404				TOP	;PRINT READ MODE
2258	010502	013702	000614		MOV	RECORD,R2	
2259	010506	104426			DECPRT		;PRINT RECORD NUMBER
2260	010510	013737	001322	011350	MOV	PARAM,CHAR	
2261	010516	042737	177717	011350	BIC	#177717,CHAR	
2262	010524	012702	013540		MOV	#MSG17,R2	


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2263 010530 022737 000020 011350      CMP      #20,CHAR
2264 010536 001002                      BNE      .+6
2265 010540 012702 013547      MOV      @MSG18,R2
2266 010544 022737 000040 011350      CMP      #40,CHAR
2267 010552 001002                      BNE      .+6
2268 010554 012702 013522      MOV      @MSG15,R2
2269 010560 022737 000060 011350      CMP      #60,CHAR
2270 010566 001002                      BNE      .+6
2271 010570 012702 013531      MOV      @MSG16,R2
2272 010574 104404                      TOP
2273 010576 012702 013652      MOV      @MSG21,R2      ;PRINT RECORD LENGTH SEQUENCE
2274 010602 104404                      TOP
2275 010604 013702 000622      MOV      @DERRS,R2
2276 010610 104426                      DECPRT
2277 010612 012702 013702      MOV      @MSG22,R2
2278 010616 104404                      TOP
2279 010620 013702 000624      MOV      @DARRS,R2
2280 010624 104426                      DECPRT
2281 010626 012702 013723      MOV      @MSG23,R2
2282 010632 104404                      TOP
2283 010634 013702 000626      MOV      @RREAD,R2
2284 010640 104426                      DECPRT
2285 010642 000207      RTS      PC
2286
2287
2288
2289      ;WRITE RECOVERY UTILIZING EXTENDED INTERRECORD GAP
2290      ;USED AFTER EVERY 7 REWRITES OR AFTER
2291      ;EACH WRITE ERROR IF STATISTICAL RECOVERY NOT SELECTED
2292      ;USED ONLY IF READ PASS SELECTED
2293 010644 104434      XRGRC: CKSMR      ;CHECK FOR CNTL G
2294 010646 012737 177774 000564      MOV      #4,WRPASS      ;COUNT 4 REWRITES
2295 010654 032777 000040 167630      XRG0: BIT      #40,BSMR      ;DELETE WRITE XIRG (SM 5)
2296 010662 001036                      BNE      XRGRCD
2297 010664 004737 010242                      JSR      PC,BACK1      ;YES
2298 010670 105777 167606                      TSTB     @BTC
2299 010674 100375                      BPL      .-4
2300 010676 013777 000554 167576      MOV      @COMAND,@BTC
2301 010704 052777 000014 167570      BIS      #14,@BTC      ;WRITE XIRG
2302 010712 013777 000630 167564      MOV      @RTLEN,@BC      ;SET BYTE COUNT
2303 010720 005477 167560                      NEG      @BC
2304 010724 013777 000530 167554      MOV      @BUF,@CA      ;SET CURRENT ADDRESS
2305 010732 006077 167542                      ROR      @BTS      ;WAIT FOR TU READY
2306 010736 103375                      BCC      .-4
2307 010740 004737 005122                      JSR      PC,GOWAIT
2308
2309      ;RETURN HERE AFTER INTERRUPT
2310 010744 017737 167530 000570      MOV      @BTS,STATRD      ;SAVE STATUS
2311 010752 005777 167524                      TST      @BTC
2312 010756 100403                      BMI      XRG5      ;HAVE ERROR FLAG, CHECK FOR EOT
2313 010760 005037 000564      XGRCD: CLR      @WRPASS
2314 010764 000207                      RTS      PC      ;EXIT WRITE XIRG
2315 010766 032737 175600 000570      XRG5: BIT      #175600,STATRD
2316 010774 001771                      BEQ      XGRCD      ;ONLY EOT, EXIT
2317 010776 005237 000564                      INC      @WRPASS      ;DONE 4 XIRG
2318 011002 001324                      BNE      XRG0
2319      ;PRINT STATUS AFTER 4 XIRG ERRORS

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2320 011004 012702 012774          MOV    #MSG7,R2
2321 011010 104404          TOP
2322 011012 013737 000630 000546    MOV    WRTLEN,LENGTH ;PRINT WRITE STATUS ERROR
2323 011020 004737 011174          JSR    PC,PRTS        ;PRINT STATUS, COMMAND, RECORD, LENGTH
2324 011024 012702 013436          MOV    #MSG11,R2
2325 011030 104404          TOP
2326 011032 032737 002000 000570    BIT    #2000,STATRD  ;PRINT "XIRG WRITTEN 4 TIMES"
2327 011040 001701          BEQ    XRGREC
2328 011042 042777 000016 167432    BIC    #16,BMTC
2329 011050 052777 000006 167424    BIS    #6,BMTC        ;WRITE AN EOF
2330 011056 004737 005122          JSR    PC,GOMAIT
2331 011062 000207          RTS    PC
2332
2333          ;GO BACKWARD ON TAPE X RECORDS
2334 011064 013737 000614 000620    GOBKMD: MOV    RECORD,LASRCR
2335 011072 013737 000616 000614    MOV    WRECR,RECORD
2336 011100 001003          BNE    GOB1          ;IS NEW RECORD=0
2337 011102 004737 004732          JSR    PC,REWIND    ;YES,REWIND
2338 011106 000207          RTS    PC          ;EXIT
2339 011110 013777 000620 167366    GOB1:  MOV    LASRCR,BBC ;SET BYTE COUNT TO DIFFERENCE
2340 011116 163777 000616 167360    SUB    WRECR,BBC    ;BETWEEN LASRCR AND WRECR
2341 011124 005477 167354          NEG    BBC
2342 011130 013777 000554 167344    MOV    COMMAND,BMTC
2343 011136 105777 167340          TSTB  BMTC        ;WAIT FOR CU READY
2344 011142 100375          BPL    #-4
2345 011144 006077 167330          ROR    BMTC        ;WAIT FOR TU READY
2346 011150 103375          BCC    #-4
2347 011152 042777 000016 167322    BIC    #16,BMTC
2348 011160 052777 000012 167314    BIS    #12,BMTC
2349 011166 004737 005122          JSR    PC,GOMAIT
2350 011172 000207          RTS    PC
2351
2352
2353
2354          ;PRINT COMMAND, STATUS, RECORD NUMBER, LENGTH
2355 011174 012702 013167          PRTS:  MOV    #MSG98,R2
2356 011200 104404          TOP
2357 011202 017702 167274          MOV    BMTC,R2
2358 011206 104412          OCTPRT
2359 011210 013702 000570          MOV    STATRD,R2
2360 011214 104412          OCTPRT
2361 011216 013702 000614          MOV    RECORD,R2
2362 011222 005202          INC    R2
2363 011224 104426          DECPRT
2364 011226 013702 000546          MOV    LENGTH,R2
2365 011232 104426          DECPRT
2366 011234 000207          RTS    PC
2367 011236 104434          CKSMR
2368          ;CHECK FOR CNTL G
2369 011240 012737 000060 011350    ;PRINT OCTAL VALUE IN REGISTER 2
2370 011246 005702          OCTPR: MOV    #'0,CHAR ;INITIALIZE 1ST NUMBER AS 0
2371 011250 100003          TST    R2          ;IS VALUE POSITIVE
2372 011252 012737 000061 011350    BPL    OCT1        ;YES PRINT 0
2373 011260 004737 011352          MOV    #'1,CHAR    ;NO PRINT 1
2374 011264 006102          JSR    PC,OCTP
2375 011266 006102          ROL    R2
2376 011270 012737 177773 011346    ROL    R2
          MOV    #-5,OCT ;COUNT 5 DIGITS

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2577 011276 006102          OCT2:  ROL  R2
2578 011300 006102          ROL  R2
2579 011302 006102          ROL  R2
2580 011304 010237 011350  MOV  R2,CHAR      ;SAVE DIGIT
2581 011310 042737 177770 011350 BIC  #177770,CHAR ;CLEAR OTHER BITS
2582 011316 052737 000060 011350 BIS  #60,CHAR     ;MAKE ASCII DIGIT
2583 011324 006002          ROR  R2
2584 011326 004737 011352  JSR  PC,OCTP      ;PRINT
2585 011332 006102          ROL  R2
2586 011334 005237 011346  INC  OCT          ;+1 TO DIGIT COUNT
2587 011340 001356          BNE  OCT2        ;NOT DONE
2588 011342 104430          SPS
2589 011344 000207          RTS  PC          ;EXIT
2590
2591 011346 000000          OCT:   0
2592 011350 000000          CHAR:  0
2593 011352 004737 012546  OCTP:  JSR  PC,READY  ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
2594 011356 013777 011350 167136 MOV  CHAR,STPB
2595 011364 000207          RTS  PC          ;PRINT IT
2596
2597          ;PRINT DECIMAL VALUE IN REGISTER 2
2598 011366 012737 177773 011542 DECP: MOV  #5,DIGCNT
2599 011374 012737 011550 011546 MOV  #DECPNT+2,DECPNT
2400 011402 012737 000040 011544 MOV  #40,ZERO
2401 011410 012737 177777 011540 TYPT1: MOV  #-1,DIGIT
2402 011416 005237 011540 TYPT2: INC  DIGIT
2403 011422 167702 000120          SUB  #DECPNT,R2
2404 011426 100373          BPL  TYPT2
2405 011430 067702 000112          ADD  #DECPNT,R2
2406 011434 004737 011462          JSR  PC,DECOUT
2407 011440 005237 011542          INC  DIGCNT
2408 011444 001002          BNE  TYPT3
2409 011446 104430          SPS
2410 011450 000207          RTS  PC
2411 011452 062737 000002 011546 TYPT3: ADD  #2,DECPNT
2412 011460 000753          BR   TYPT1
2413 011462 005737 011540          DECOUT: TST DIGIT
2414 011466 001010          BNE  DEC1
2415 011470 022737 177777 011542 CMP  #-1,DIGCNT
2416 011476 001404          BEQ  DEC1
2417 011500 013737 011544 011540 MOV  ZERO,DIGIT
2418 011506 000406          BR   DEC2
2419 011510 012737 000060 011544 DEC1: MOV  #60,ZERO
2420 011516 052737 000060 011540 BIS  #60,DIGIT
2421
2422 011524 004737 012546          DEC2: JSR  PC,READY  ;JM>> WAIT UNTIL READY TO OUTPUT CHARACTER
2423 011530 013777 011540 166764 MOV  DIGIT,STPB
2424 011536 000207          RTS  PC
2425 011540 000000          DIGIT: 0
2426 011542 000000          DIGCNT: 0
2427 011544 000040          ZERO:  40
2428 011546 011550          DECPNT: .+2
2429 011550 023420          10000.
2430 011552 001750          1000.
2431 011554 000144          100.
2432 011556 000012          10.
2433 011560 000001          1.

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2434                                     ;KEYBOARD INPUT
2435 011562 105777 166726      WAITK:  TSTB  BTKS      ;WAIT FOR KEY
2436 011566 100375                                     BPL  WAITK
2437 011570 117737 166722 001316      MOVB  BTKB,CHARIN ;GET CHARACTER
2438 011576 142737 000200 001316      BICB  @200,CHARIN ;CLEAR PARITY
2439 011604 105777 166710      WAITK1: TSTB  BTPS      ;WAIT FOR TELEPRINTER READY
2440 011610 100375                                     BPL  WAITK1
2441 011612 113777 001316 166702      MOVB  CHARIN,BTPB ;ECHO CHARACTER
2442 011620 000207                                     RTS  PC           ;EXIT
2443                                     ;TYPE 3 SPACES
2444 011622 012702 011632      SPSX:  MOV  @SPSA,R2
2445 011626 104404                                     TOP
2446 011630 000207                                     RTS  PC
2447 011632 057 040 040  SPSA:  .ASCII  / /
2448 011635 040 057
2449                                     .EVEN
2450 011640 142777 000177 166652      TO:    BICB  @177,BTPS ;CLEAR TELETYPE FLAGS
2451 011646 112237 011732      MOVB  (2),EOPK ;SAVE MESSAGE DELIMITER
2452 011652 121237 011732      TOP1:  CFPB  BR2,EOPK ;IS CHARACTER THE SECOND MESSAGE DELIMITER?
2453 011656 001001      BNE  ..4 ;NO
2454 011660 000207      RTS  PC           ;YES, EXIT
2455 011662 121227 000100      CFPB  BR2,'B ;IS CHARACTER AN B WHICH INDICATES A CARRIAGE RET.
2456 011666 001405      BEQ  TOP2 ;YES
2457 011670 004737 012546      JSR  PC,READY ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
2458 011674 112277 166622      MOVB  (2),BTPB ;PRINT CHARACTER
2459 011700 000764      BR  TOP1
2460 011702 004737 012546      TOP2:  JSR  PC,READY ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
2461 011706 112777 000215 166606      MOVB  @215,BTPB ;CR
2462 011714 004737 012546      JSR  PC,READY ;JH>> WAIT UNTIL READY TO OUTPUT CHARACTER
2463 011720 112777 000212 166574      MOVB  @212,BTPB ;LF
2464 011726 005202      INC  R2
2465 011730 000750      BR  TOP1
2466 011732 000000      EOPK:  0
2467 011734 022737 000176 000512      CKSMR: CFP  @SMR,SMR ;SOFTWARE SWITCH REG PRESENT
2468 011742 001035      BNE  OUT ;NO, GET OUT
2469 011744 105777 166544      TSTB  BTKS ;YES, WAIT FOR
2470 011750 100032      BPL  OUT ;READY, GET CHARACTER
2471 011752 017737 166540 001316      MOV  BTKB,CHARIN ;AND STRIP OFF
2472 011760 042737 177600 001316      BIC  @177600,CHARIN ;THE GARBAGE
2473 011766 022737 000007 001316      CFP  @7,CHARIN ;IS IT A <1G>
2474 011774 001020      BNE  OUT
2475 011776 012702 014111      MOV  @CNTG,R2
2476 012002 104404      TOP
2477 012004 012702 014117      CNTLU: MOV  @MSMR,R2
2478 012010 104404      TOP
2479 012012 017702 166474      MOV  @SMR,R2
2480 012016 104412      OCTPRT
2481 012020 012702 014127      MOV  @HMEM,R2
2482 012024 104404      TOP
2483 012026 005037 012230      CLR  @TEMPST
2484 012032 004737 012040      JSR  PC,@READ ;GO READ A LINE
2485 012036 000207      OUT:  RTS  PC ;RETURN TO MAIN BODY OF PROGRAM
2486
2487 012040 005037 012230      @READ: CLR  TEMPST
2488 012044 012737 000007 012232      MOV  @7,COUNT
2489 012052 104400      10:  WAITKY

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2490 012054 042737 177600 001316      BIC      @177600,CHARIN ;STRIP OFF GARBAGE
2491 012062 122737 000025 001316      CHPB     @25,CHARIN      ;IS IT A 'U'?
2492 012070 001002                    BNE      24          ;BRANCH IF NOT
2493 012072 005726                    TST      (SP),          ;POP THE STACK
2494 012074 000743                    BR CNTLU ;START OVER
2495 012076 122737 000015 001316 24:      CHPB     @15,CHARIN      ;IS IT A <CR>?
2496 012104 001011                    BNE      48          ;BRANCH IF NOT
2497 012106 012702 014137      MOV      @MCRFL,R2     ;DO CRLF
2498 012112 104404                    TOP
2499 012114 022737 000007 012232      CHPB     @7,COUNT       ;WAS IT FIRST CHARACTER
2500 012122 001036                    BNE      78          ;CHANGE SWR IF NOT FIRST ONE
2501 012124 005726                    TST      (SP),          ;POP THE STACK
2502 012126 000743                    BR      OUT           ;GET OUT
2503 012130 122737 000060 001316 44:      CHPB     @60,CHARIN
2504 012136 003004                    BGT      58
2505 012140 122737 000067 001316      CHPB     @67,CHARIN
2506 012146 002004                    BGE      68
2507 012150 012702 012664 54:      MOV      @MSG0,R2
2508 012154 104404                    TOP
2509 012156 000743                    BR      34           ;START OVER IF NOT LEGAL CHARACTER
2510 012160 006337 012230 64:      ASL      TEMPST
2511 012164 006337 012230      ASL      TEMPST
2512 012170 006337 012230      ASL      TEMPST
2513 012174 142737 000060 001316      BICB     @60,CHARIN      ;GET KITTY-GRITTY
2514 012202 153737 001316 012230      BICB     CHARIN,TEMPST
2515 012210 005337 012232      DEC      COUNT        ;ONLY WANT 6 DIGITS
2516 012214 001755                    BEQ      58
2517 012216 000715                    BR      18
2518 012220 013777 012230 166264 74:      MOV      TEMPST,BSMR   ;CHANGE SWITCH REGISTER CONTENTS
2519 012226 000736                    BR      84
2520
2521 012230 000000      TEMPST: 0
2522 012232 000000      COUNT: 0
2523
2524 012234 013746 000006      SUSMR:  MOV      @06,-(SP) ;SAVE VECTORS
2525 012240 013746 000004      MOV      @04,-(SP)
2526 012244 012737 012264 000004      MOV      @14,@04      ;SET UP FOR TIMEOUT
2527 012252 022777 177777 166232      CHPB     @-1,BSMR     ;REFERENCE HARDWARE SWITCH REGISTER
2528 012260 001402                    BEQ      24
2529 012262 000404                    BR      34
2530 012264 022626                    CHPB     (SP), (SP),   ;ADJUST STACK
2531 012266 012737 000176 000512 24:      MOV      @SMREG,SWR    ;POINT TO SOFTWARE SWITCH REG
2532 012274 012637 000004 34:      MOV      (SP),@04
2533 012300 012637 000006      MOV      (SP),@06     ;RESTORE VECTORS
2534 012304 000207                    RTS      PC
2535
2536      ;TRAP HANDLER
2537 012306 011666 000002      TRAP34: MOV      @SP,2(6)
2538 012312 162716 000002      SUB      @2,BSR
2539 012316 013646                    MOV      @6,-(6)
2540 012320 062716 105726      ADD      @TABLE-104400,BSR
2541 012324 013607                    MOV      @6,-PC
2542 012326 011562      TABLE: WAITK
2543 012330 005174                    MVRTI
2544 012332 011640                    TO
2545 012334 004462                    SVCTR
2546 012336 004576                    RSFDR

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2547	012340	011240	OCTPR
2548	012342	004500	HWCTR
2549	012344	006532	GENPA
2550	012346	004542	CLRAL
2551	012350	004674	CHGDR
2552	012352	007402	READI
2553	012354	011366	DECPR
2554	012356	011622	SP3X
2555	012360	012234	SUSMR
2556	012362	011734	CKSMR
2557		104400	MAITKY-104400
2558		104402	WRITIT-104402
2559		104404	TOP-104404
2560		104406	SVCTRS-104406
2561		104410	RSFDRV-104410
2562		104412	OCTPRT-104412
2563		104414	HWCTRS-104414
2564		104416	GENPAT-104416
2565		104420	CLRAL-104420
2566		104422	CHGDRV-104422
2567		104424	READIT-104424
2568		104426	DECPRT-104426
2569		104430	SP3-104430
2570		104432	SUSMR-104432
2571		104434	CKSMR-104434
2572			

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2574
2575      | .....
2576      |
2577      |
2578      | ..
2579      |      CHECK FOR DUMP MODE OR AUTOMATIC/ACT11-XXDP MODE
2580      |
2581
2582 012364 005037 000400  CMODE: CLR      AUTOM      ;INIT AUTOMATIC MODE INDICATOR
2583 012370 105037 000402      CLRB     ACT11M     ;INIT ACT11 AUTO MODE INDICATOR
2584 012374 105037 000403      CLRB     XDUPM     ;INIT XXDP AUTO MODE INDICATOR
2585 012400 105037 000404      CLRB     ADUPM     ;INIT ACT11 DUMP MODE INDICATOR
2586 012404 105037 000405      CLRB     XDUPM     ;INIT XXDP DUMP MODE INDICATOR
2587 012410 005737 000042      TST      8042      ;AUTO MODE?
2588 012414 001425      BEQ      20      ;BRANCH - IF NO
2589 012416 005237 000400      INC      AUTOM     ;SET AUTO MODE INDICATOR
2590 012422 032737 020000 000052  BIT      020000,8052 ;MANUAL INTERVENTION?
2591 012430 001402      BEQ      60      ;BRANCH - IF NO
2592 012432 000137 012512      JFP      ABORT     ;ABORT THE PROGRAM
2593 012435 023737 000042 000046 60:  CFP      8042,8046 ;ACT11 MODE?
2594 012444 001403      BEQ      10      ;BRANCH - IF YES
2595 012446 105237 000403      INCB     XDUPM     ;INDICATE XXDP AUTO MODE
2596 012452 000416      BR       50      ;AND EXIT
2597 012454 105237 000402 10:  INCB     ACT11M     ;INDICATE ACT11 AUTO MODE
2598 012460 012777 020111 166024  MOV      020111,804R ;SET SWITCH REGISTER
2599 012466 000410      BR       50      ;AND EXIT
2600 012470 105737 000041 20:  TSTB    8041      ;MAN/MODE VIA ACT11/PAPER TAPE?
2601 012474 001003      BNE     30      ;BRANCH - IF NOT
2602 012476 105237 000404      INCB     ADUPM     ;INDICATE MAN/MODE VIA ACT11/PAPER TAPE
2603 012502 000402      BR       50      ;AND EXIT
2604 012504 105237 000405 30:  INCB     XDUPM     ;INDICATE MANUAL MODE VIA XXDP
2605 012510 000207 50:  RTS      PC       ;RETURN
2606
2607      | .....
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012512 000005
012514 012702 012642
012520 004737 104404
012524 105737 000403
012530 001405
012532 013700 000042
012536 005037 000042
012542 004710
012544 000777

```

: .....
:                               MODIFIED DEC 16 1977
:
: ..
:                               DISCONTINUE TESTING FOR ILLEGAL CONDITIONS
: ..
:
ABORT: RESET                       ;CLEAR THE WORLD
MOV      @MSG00,R2                 ;GET ABORT MESSAGE
JSR      PC, TOP                   ;PRINT ABORT MESSAGE
TSTB    XXDPH                      ;XXDP AUTO MODE
BEQ      10                        ;BRANCH - IF NOT
MOV      @B42,R0                   ;GET MONITOR EXIT ADDRESS
CLR      @B42                      ;USE AS ABORT FLAG
JSR      PC,(R0)                   ;EXIT TO XXDP MONITOR
BR       .                          ;AND HANG
:
: .....

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012546 105777 165742
012552 100024
012554 117737 165736 000537
012562 142737 000200 000537
012570 122737 000023 000537
012576 001004
012600 112737 000377 000536
012606 000757
012610 122737 000021 000537
012616 001002
012620 105037 000536
012624 105777 165670
012632 105737 000536
012636 100743
012640 000207

```
.....
!*
!* THIS ROUTINE WILL SEE WAIT UNTIL WE CAN OUTPUT A CHARACTER.
!* IT WILL CHECK TO SEE IF AN XON (^Q) OR XOFF (^S) HAS BEEN
!* TYPED AT THE KEYBOARD.
!*
!* JUNE 16, 1984
!*
!*
```

```
READY: TSTB @TKS ;JH>> SEE IF CHARACTER TYPED AT KEYBOARD
        BPL RDY2 ;JH>> BRANCH IF NO CHARACTER
        MOVB @TKB,@CTRLS+1 ;JH>> BRANCH IF NO CHARACTER
        BICB @200,@CTRLS+1 ;JH>> SAVE CHARACTER IN TEMP LOCATION
        CHPB @23,@CTRLS+1 ;JH>> STRIP OFF PARITY BIT
        BNE RDY1 ;JH>> SEE IF CHARACTER IS AN XOFF
        MOVB @377,@CTRLS ;JH>> BRANCH IF NOT ^S
        BR READY ;JH>> SET XOFF FLAG
        CHPB @21,@CTRLS+1 ;JH>> LOOK FOR ANOTHER CHARACTER...
        BNE RDY2 ;JH>> SEE IF CHARACTER IS AN XON
        CLRB @CTRLS ;JH>> BRANCH IF NOT ^Q
        STPS ;JH>> CLEAR XOFF FLAG
        BPL READY ;JH>> SEE IF PRINTER READY
        TSTB @CTRLS ;JH>> BRANCH IF NOT READY
        BFI READY ;JH>> SEE IF XOFF FLAG IS SET
        RTS PC ;JH>> BRANCH IF FLAG IS SET
        ;JH>> OTHERWISE, FINALLY READY TO PRINT CHARACTER
```



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2662                                     ;TEXT MESSAGES
2663
2664 012642      057      100      120  MSG00: .ASCII      ;/PROGRAM ABORTED/;
      012645      122      117      107
      012650      122      101      115
      012653      040      101      102
      012656      117      122      124
      012661      105      104      057
2665 012664      057      077      100  MSG0:  .ASCII      ;/78 /;
      012667      040      057
2666 012671      057      100      123  MSG1:  .ASCII      ;/BSELECT UNITS /;
      012674      105      114      105
      012677      103      124      040
      012702      125      116      111
      012705      124      123      040
      012710      040      057
2667 012712      057      100      124  MSG2:  .ASCII      ;/BTST PAT RLS WPD RWDB /;
      012715      123      124      040
      012720      120      101      124
      012723      040      122      114
      012726      123      040      127
      012731      115      117      040
      012734      122      115      117
      012737      100      040      057
2668 012742      057      115      101  MSG5:  .ASCII      ;/MAX TESTS SELECTED/;
      012745      130      040      124
      012750      105      123      124
      012753      123      040      123
      012756      105      114      105
      012761      103      124      105
      012764      104      100      057
2669 012767      057      040      117  MSG6:  .ASCII      ;/ OK/;
      012772      113      057
2670 012774      057      100      127  MSG7:  .ASCII      ;/WRITE STATUS ERROR/;
      012777      122      111      124
      013002      105      040      123
      013005      124      101      124
      013010      125      123      040
      013013      105      122      122
      013016      117      122      100
      013021      057
2671 013022      057      105      116  MSG8:  .ASCII      ;/END OF TAPE*****B;
      013025      104      040      117
      013030      106      040      124
      013033      101      120      105
      013036      052      052      052
      013041      052      052      052
      013044      052      052      052
      013047      052      052      052
      013052      052      052      052
      013055      052      052      052
      013060      052      052      100
2672 013063      104      122      126      .ASCII      ;DRV PAT MODE RECORD LENGTH/;
      013066      040      120      101
      013071      124      040      115
      013074      117      104      105
      013077      040      122      105
    
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	013102	103	117	122					
	013105	104	040	114					
	013110	105	116	107					
	013113	124	110	100					
	013116	057							
2673	013117	057	100	122	MSG9:	.ASCII		;/BREAD STATUS ERROR/;	
	013122	105	101	104					
	013125	040	123	124					
	013130	101	124	125					
	013133	123	040	105					
	013136	122	122	117					
	013141	122	100	057					
2674	013144	057	100	122	MSG9A:	.ASCII		;/BREAD DATA ERROR/;	
	013147	105	101	104					
	013152	040	104	101					
	013155	124	101	040					
	013160	105	122	122					
	013163	117	122	100					
	013166	057							
2675	013167	057	103	117	MSG9B:	.ASCII		;/COND STATUS RECORD LENGTH EXPECTED ACTUAL/;	
	013172	115	104	040					
	013175	040	040	040					
	013200	040	123	124					
	013203	101	124	125					
	013206	123	040	040					
	013211	040	122	105					
	013214	103	117	122					
	013217	104	040	040					
	013222	040	114	105					
	013225	116	107	124					
	013230	110	040	105					
	013233	130	120	105					
	013236	103	124	105					
	013241	104	040	101					
	013244	103	124	125					
	013247	101	114	100					
	013252	057							
2676	013253	057	100	103	MSG10A:	.ASCII		;/BCZTMG08RECORD LIMITS IN BYTES/;	
	013256	132	124	115					
	013261	102	107	060					
	013264	100	122	105					
	013267	103	117	122					
	013272	104	040	114					
	013275	111	115	111					
	013300	124	123	040					
	013303	111	116	040					
	013306	102	131	124					
	013311	105	123	100					
2677	013314	115	111	116		.ASCII	;/MINLEN MAXLEN /;		
	013317	114	105	116					
	013322	040	040	115					
	013325	101	130	114					
	013330	105	116	100					
	013333	040	057						
2678	013335	054	100	105	MSG10B:	.ASCII		;/BEXERCISING UNITS,/	
	013340	130	105	122					
	013343	103	111	123					

	013346	111	116	107		
	013351	040	125	116		
	013354	111	124	123		
	013357	054				
2679	013360	054	100	116	MSG10C: .ASCII	/.BNO DRIVES AVAILABLE./
	013363	117	040	104		
	013366	122	111	126		
	013371	105	123	040		
	013374	101	126	101		
	013377	111	114	101		
	013402	102	114	105		
	013405	054				
2680	013406	057	040	040	MSG10D: .ASCII	;/ RECORD DATA COMPARES/;
	013411	122	105	103		
	013414	117	122	104		
	013417	040	104	101		
	013422	124	101	040		
	013425	103	117	115		
	013430	120	101	122		
	013433	105	123	057		
2681	013435	057	130	111	MSG11: .ASCII	;/XIRG WRITTEN 4 TIMES/;
	013441	122	107	040		
	013444	127	122	111		
	013447	124	124	105		
	013452	116	040	064		
	013455	040	124	111		
	013460	115	105	123		
	013463	057				
2682	013464	057	040	040	MSG12: .ASCII	;/ SSTP /;
	013467	040	123	123		
	013472	124	120	040		
	013475	057				
2683	013476	057	040	040	MSG13: .ASCII	;/ RNDM /;
	013501	040	122	116		
	013504	104	115	040		
	013507	057				
2684	013510	057	040	040	MSG14: .ASCII	;/ NSTP /;
	013513	040	116	123		
	013516	124	120	040		
	013521	057				
2685	013522	057	115	055	MSG15: .ASCII	;/M-MAX/;
	013525	115	101	130		
	013530	057				
2686	013531	057	115	055	MSG16: .ASCII	;/M-MIN/;
	013534	115	111	116		
	013537	057				
2687	013540	057	115	111	MSG17:	.ASCII ;/MIN /;
	013543	116	040	040		
	013546	057				
2688	013547	057	115	101	MSG18:	.ASCII ;/MAX /;
	013552	130	040	040		
	013555	057				
2689	013556	057	100	127	MSG19: .ASCII	;/BWRITE ERRORS = /;
	013561	122	111	124		
	013564	105	040	105		
	013567	122	122	117		
	013572	122	123	040		

2690	013575	075	040	057			
	013600	057	100	122	MSG20:	.ASCII	;/@RECOVERED AT 0 /;
	013603	105	103	117			
	013606	126	103	122			
	013611	105	104	040			
	013614	101	124	040			
	013617	060	040	057			
2691	013622	057	100	120	MSG20A:	.ASCII	;/@PERMANENT BADSPOTS = /;
	013625	105	122	115			
	013630	101	116	105			
	013633	116	124	040			
	013636	102	101	104			
	013641	123	120	117			
	013644	124	123	040			
	013647	075	040	057			
2692	013652	057	100	122	MSG21:	.ASCII	;/@READ STATUS ERRORS = /;
	013655	105	101	104			
	013660	040	123	124			
	013663	101	124	125			
	013666	123	040	105			
	013671	122	122	117			
	013674	122	123	040			
	013677	075	040	057			
2693	013702	057	100	104	MSG22:	.ASCII	;/@DATA ERRORS = /;
	013705	101	124	101			
	013710	040	105	122			
	013713	122	117	122			
	013716	123	040	075			
	013721	040	057				
2694	013723	057	100	116	MSG23:	.ASCII	;/@NON-RECOVERABLE ERRORS = /;
	013726	117	116	055			
	013731	122	105	103			
	013734	117	126	105			
	013737	122	101	102			
	013742	114	105	040			
	013745	105	122	122			
	013750	117	122	123			
	013753	040	075	040			
	013756	057					
2695	013757	057	100	052	MSG24:	.ASCII	;/@*****WRITE PASS /;
	013762	052	052	052			
	013765	052	052	052			
	013770	052	052	052			
	013773	052	052	052			
	013776	052	052	052			
	014001	052	052	052			
	014004	052	127	122			
	014007	111	124	105			
	014012	040	120	101			
	014015	123	123	040			
	014020	040	040	057			
2696	014023	057	100	052	MSG25:	.ASCII	;/@*****READ PASS /;
	014026	052	052	052			
	014031	052	052	052			
	014034	052	052	052			
	014037	052	052	052			
	014042	052	052	052			

	014045	052	052	052			
	014050	052	122	105			
	014053	101	104	040			
	014056	120	101	123			
	014061	123	040	040			
	014064	040	040	057			
2697	014067	057	100	100	MSG26:	.ASCII	;/BBB/;
	014072	100	057				
2698	014074	057	105	116	MSG27:	.ASCII	;/END OF PASS/;
	014077	104	040	117			
	014102	106	040	120			
	014105	101	123	123			
	014110	057					
2699	014111	057	100	136	#CNTG:	.ASCII	;/BYGB/;
	014114	107	100	057			
2700	014117	057	100	123	#MSR:	.ASCII	;/BSMR= /;
	014122	127	122	075			
	014125	040	057				
2701	014127	057	040	116	#NEW:	.ASCII	;/ NEW= /;
	014132	105	127	075			
	014135	040	057				
2702	014137	057	100	057	#CRLF:	.ASCII	;/B/;
2703						.EVEN	
2704							
2705	014142	014142			BUFFER:.		;WRITE BUFFER BEGINS HERE
2706							
2707	000001					.END	

ABORT	012512	D1TAB	000722	MSG24	013757	RDERRO	007750	STATRD	000570
ACT11M	000402	D2TAB	000766	MSG25	014023	RDEERS	000622	STOPOP	005502
ADUMPH	000404	D3TAB	001032	MSG26	014067	RDINCR	010172	STREC1	006042
ALLEOS	005012	D4TAB	001076	MSG27	014074	RDPASS	000562	STRLEN	000544
ALLEOT	004770	D5TAB	001142	MSG5	012742	RDSTP	007654	STRTOP	005306
ALL1	004772	D6TAB	001206	MSG6	012767	RDSTPC	007614	SUSMR	104432
ALL2	005074	D7TAB	001252	MSG7	012774	RDSTPD	007424	SUSMR	012234
ALL3	005070	ENDTAP	006134	MSG8	013022	RDY1	012610	SVCTR	004462
ATST	000540	ENDT1	006146	MSG9	013117	RDY2	012624	SVCTRS-	104406
AUTOM	000400	EDPK	011732	MSG9A	013144	READGO	007446	SVC1	004466
AUTOST	001356	ERROR	005702	MSG9B	013167	READI	007402	SVRECR	000552
BACK1	010242	ERR1	005726	HTC	000502	READIT-	104424	SVO	007372
BC	000504	EXEC	003062	HT5	000500	READLN	000632	SV1	007374
BLKINC	000566	EXECUT	003050	HTV	000534	READMP	010334	SV2	007376
BUFFER	014142	EXEC1	003070	HVCTR	004500	READY	012546	SV3	007400
CA	000506	GENPA	006532	HVCTRS-	104414	RECORD	000614	SMR	000512
CC	000510	GENPAT-	104416	HV1	004504	RESETL	005656	SMREG	000176
CDMEND	005064	GOBKWD	011064	NDINCR	005264	RESTR	010232	TABLE	012326
CDRIVE	000560	GOB1	011110	NONSTP	005330	RESTR1	010240	TEMPST	012230
CDRVBT	000556	GOMAIT	005122	ND.SEL	001670	REWIND	004732	TESINC	005610
CHAR	011330	GP1	006644	NRREAD	000626	RG1	007456	TESRC1	006006
CHARIN	001316	GW1	005164	NUMTST	001320	RANDRS	007624	TESREC	005756
CHGR	004674	HIDUM	007370	NRRET	001476	RANDS1	007636	TEST	001326
CHGRV-	104422	IDSELF	001700	NXT.TU	001614	RANDTAP	010306	TESTO	003300
CHG1	004720	LASRCR	000620	OCT	011346	RANDTP1	010320	TEST1	003350
CHODE	012364	LENGTH	000546	OCTP	011352	RPASS1	010146	TEST2	003420
CKSMR	104434	LONGM	007366	OCTPR	011240	RPASS3	010152	TEST3	003536
CKSMR	011734	LOOPER	002014	OCTPRT-	104412	RSFDR	004576	TEST4	003654
CLRAL	004542	MAXLEN	000524	OCT1	011260	RSFDRV-	104410	TEST5	004176
CLRAL-	104420	MEMUM	000041	OCT2	011276	RSF1	004610	TKB	000516
CLRTBL	005076	MEMK	002070	OUT	012036	RSF2	004634	TKS	000514
CLRT1	005102	MEMK	002114	OVER4K	001524	RTSREC	010102	TO	011640
CLR1	004544	MIDLEN	000526	PARAM	001322	RTSR1	010120	TOP	104404
CNTLU	012004	NODES	000634	PAT0	006646	RTSSTP	007566	TOP1	011652
COMAND	000554	MSBITS	000550	PAT1	006662	SELDRV	002212	TOP2	011702
COUNT	012232	MSG0	012664	PAT1A	006666	SELD1	002244	TPB	000522
CTRDEX	004516	MSG00	012642	PAT2	006732	SELD2	002264	TPS	000520
CTRDMP	005032	MSG1	012671	PAT3	006746	SELGK1	003042	TRAP34	012306
CTRD1	005060	MSG10A	013253	PAT3A	006752	SELPAT	002456	TSINC2	005664
DAERRS	000624	MSG10B	013335	PAT4	007016	SELR1S	002550	TSINC3	005700
DATER	007672	MSG10C	013360	PAT5	007044	SELRM1	002732	TSTEX	001324
DATER1	007732	MSG10D	013406	PAT5A	007050	SELRM2	002746	TSTSTP	005424
DECOU	011462	MSG11	013436	PAT6	007160	SELR1	002600	TSTTBL	001330
DECPNT	011546	MSG12	013464	PAT7	007174	SELR2	002616	TU.SEL	001546
DECP	011366	MSG13	013476	PERMS	000612	SELR3	002632	TYPT1	011410
DECPRT-	104426	MSG14	013510	PRTS	011174	SELTS1	002364	TYPT2	011416
DEC1	011510	MSG15	013522	P1T	006710	SEL T1	002402	TYPT3	011452
DEC2	011524	MSG16	013531	P3T	006774	SEL T2	002426	TO	003312
DIGCNT	011542	MSG17	013540	P4	007022	SEL T3	002446	TOA	003314
DIGIT	011540	MSG18	013547	P4A	007042	SELW1	002664	TOB	003332
DOAGN	003270	MSG19	013556	P5T	007072	SELW2	002700	T1	003362
DONE	003152	MSG2	012712	RANDOM	007364	SP3	104430	T1A	003364
DONE1	003220	MSG20	013600	RANGEN	007214	SP3A	011632	T1B	003402
DRIVE	000040	MSG20A	013622	RANG1	007252	SP3X	011622	T2	003432
DRVADR	000636	MSG21	013652	RANSTP	005512	STACK	000500	T2A	003434
DRVSEL	000542	MSG22	013702	RAN1	005524	START	002136	T2B	003452
DOTAB	000656	MSG23	013723	RBUF	000532	START1	002142	T2C	003456

T2D	003476	T4G	004026	T5G	004370	MBUF	000530	XRGREC	010644
T2E	003502	T4H	004030	T5H	004406	MRCHEK	000572	XRGO	010654
T2F	003516	T4J	004046	T5INC	004460	MRITI	005174	XRG5	010766
T3	003550	T4K	004054	T5J	004410	MRITIT-	104402	XXDPM	000403
T3A	003552	T4L	004056	T5K	004430	MRPASS	000564	ZERO	011544
T3B	003570	T4M	004130	USSTST	001626	MRREC	000616	%CNTG	014111
T3C	003574	T4N	004142	USS.OK	001644	MRTDMP	006162	%CTRLS	000536
T3D	003612	T4P	004146	VALID	002300	MRTD1	006452	%ENDAD	003240
T3E	003620	T5	004210	VAL1	002316	MRTD2	006474	%PCRLF	014137
T3F	003634	T5A	004234	VAL2	002330	MRTLEN	000630	%NEW	014127
T4	003710	T5B	004246	VAL3	002344	M1	003242	%SMR	014117
T4A	003712	T5C	004256	VAL4	002350	M10	003470	%READ	012040
T4B	003714	T5D	004306	WAITK	011562	M11	003542	%R1	007416
T4C	003740	T5E	004314	WAITKY-	104400	M12	003576	%R5	007554
T4D	003742	T5F	004356	WAITK1	011604	XDUMPH	000405	%SVPC -	000036
T4E	003774	T5FLAG	004456	WAIT1	005152	XRGRC0	010760	%ZERO:	002034
T4F	004010								

. ABS. 014144 000
000000 001

ERRORS DETECTED: 0

VIRTUAL MEMORY USED: 8232 WORDS (33 PAGES)
DYNAMIC MEMORY: 19748 WORDS (75 PAGES)
ELAPSED TIME: 00:00:57
CZTHBG.BIN,CZTHBG/-SP/CR/ML:TOC-CZTHBG.P11

SYMBOL	VALUE	REFERENCES
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ACT11M	000402	022-949 23-1119 23-1334 *26-2583 *26-2597
ADUPPM	000404	022-951 *26-2585 *26-2602
ALLEOS	005012	23-1654 023-1658
ALLEOT	004770	23-1376 23-1592 23-1424 23-1456 23-1523 23-1564 23-1576 023-1651
ALL1	004772	023-1652 23-1656
ALL2	005074	23-1659 23-1661 023-1674
ALL3	005070	23-1657 023-1673
ATST	000540	023-985 *23-1068 *23-1171 23-1187
AUTOM	000400	022-948 *26-2582 *26-2589
AUTOST	001336	23-961 023-1061 23-1338
BACK1	010242	23-1813 23-1814 23-2197 025-2218 23-2297
BC	000504	023-969 23-1717 23-1718 23-1818 23-2095 23-2096 23-2220 23-2302 23-2303
		25-2339 25-2340 25-2341
BLKINC	000566	023-996 *23-1698 *23-1702 *23-1706 23-1770 23-1772 23-2207 23-2210
BUFFER	014142	23-979 23-980 23-1077 23-1082 23-1086 *23-1139 23-1140 23-1159 23-1165
		23-1170 029-2705
CA	000506	023-970 23-1719 23-2097 23-2304
CC	000510	023-971 23-1684 23-1689
COMEND	005064	23-1669 023-1671
CORIVE	000560	023-993 23-1597 23-1598 *23-1612 *23-1616 23-1620 *23-1630
CORVBT	000536	023-992 *23-1613 23-1614 *23-1618 *23-1632 23-1637
CHR	011350	*24-1837 *24-1838 *24-1839 *24-1841 *24-1844 *24-1845 *24-1846 *24-1847 *24-1848
		*24-1850 *24-1851 24-1853 24-1856 *24-1862 *24-1863 24-1865 24-1868 24-1871
		*25-2235 *25-2236 *25-2237 *25-2238 *25-2241 *25-2242 *25-2243 *25-2244 *25-2245
		*25-2248 *25-2249 25-2251 23-2254 *25-2260 *25-2261 23-2263 23-2266 23-2269
		*25-2369 *25-2372 *25-2380 *25-2381 *25-2382 025-2392 23-2394
CHARIN	001316	023-1043 23-1183 23-1190 23-1192 *23-1198 *23-1199 *23-1203 23-1221 23-1226
		23-1228 23-1233 23-1243 23-1245 *23-1247 *23-1248 *23-1249 23-1250 23-1255
		23-1257 23-1261 23-1265 23-1271 23-1273 23-1277 23-1283 23-1285 23-1289
		23-1298 *25-2437 *25-2438 23-2441 *25-2471 *25-2472 23-2473 *25-2490 23-2491
		23-2495 23-2503 23-2505 *25-2513 23-2514
CHGR	004674	023-1630 23-1638 23-2551
CHDRV	- 104422	23-1374 23-1390 23-1408 23-1415 23-1422 23-1439 23-1447 23-1454 23-1474
		23-1485 23-1492 23-1500 23-1516 23-1521 23-1548 23-1562 23-1572 23-1606
		23-1655 23-1671 025-2366
CHG1	004720	23-1633 023-1637
CHODE	012364	23-1063 23-1067 026-2582
CKSMR	- 104434	23-1333 23-1349 23-1788 24-1836 23-2148 23-2189 23-2234 23-2293 23-2367
		025-2571
CKSMR	011734	025-2467 23-2536
CLRAL	004542	023-1602 23-2530
CLRAL	- 104420	23-1365 23-1382 23-1400 23-1431 23-1469 23-1531 025-2365
CLRTBL	005076	23-1604 023-1677
CLRT1	005102	023-1678 23-1680
CLR1	004544	023-1603 23-1607
CNFLU	012004	23-1066 23-1176 025-2477 23-2494
CONAND	000534	023-991 *23-1620 *23-1621 *23-1622 *23-1625 23-1644 23-1712 23-1819 24-1837
		23-2085 23-2098 23-2221 23-2235 23-2300 23-2342
COUNT	012232	*23-2488 23-2499 *23-2515 025-2522
CTRDEX	004516	23-1583 23-1589 023-1595
CTROMP	005032	023-1663 23-1672

SYMBOL	VALUE	REFERENCES
CTRD1	005060	23-1666 *23-1670
DAERRS	000624	*23-1012 *25-2145 25-2279
DATERR	007672	25-2110 *25-2133
DATER1	007732	25-2134 *25-2143
DECOUT	011462	25-2406 *25-2413
DECPNT	011546	25-2399 *25-2399 25-2403 25-2405 *25-2411 *25-2426
DECPR	011366	*25-2398 25-2553
DECPRT	- 104426	23-1124 23-1126 24-1861 24-1878 24-1887 24-1899 25-2259 25-2276 25-2280
		25-2284 25-2363 25-2365 *25-2368
DEC1	011510	25-2414 25-2416 *25-2419
DEC2	011524	25-2418 *25-2422
DIGCNT	011542	*25-2398 *25-2407 25-2415 *25-2426
DIGIT	011540	*25-2401 *25-2402 25-2413 *25-2417 *25-2420 25-2423 *25-2425
DOAGN	003270	23-1345 23-1355 *23-1359
DONE	003152	*23-1333 23-1378 23-1394 23-1426 23-1458 23-1525 23-1566 23-1578
DONE1	003220	23-1337 23-1341 *23-1344
DRIVE	000040	*21-913
DRVADP	000636	*23-1018 23-1585 23-1591 23-1596
DRVSEL	000542	*23-986 *23-1094 23-1101 *23-1113
DOTAB	000656	23-1018 *23-1027 23-1028
D1TAB	000722	23-1019 *23-1029 23-1030
D2TAB	000766	23-1020 *23-1031 23-1032
D3TAB	001032	23-1021 *23-1033 23-1034
D4TAB	001076	23-1022 *23-1035 23-1036
D5TAB	001142	23-1023 *23-1037 23-1038
D6TAB	001206	23-1024 *23-1039 23-1040
D7TAB	001252	23-1025 *23-1041 23-1042
ENDTAP	006134	23-1790 23-1811 *23-1826
ENDT1	006146	23-1667 *23-1828
EQPK	011732	*25-2451 25-2452 *25-2466
ERROR	005702	23-1725 *23-1788
ERR1	005726	23-1792 *23-1794
EXEC	003062	*23-1316 23-1360
EXECUT	003050	23-1161 23-1189 23-1225 *23-1314
EXEC1	003070	*23-1317 23-1343
GENPA	006532	*24-1902 25-2549
GENPAT	- 104416	23-1366 23-1383 23-1401 23-1432 23-1464 23-1532 *25-2564
GOBKGD	011064	23-1413 23-1445 23-1498 *23-2334
GOB1	011110	25-2336 *25-2339
GOWAIT	005122	23-1648 *23-1684 23-1721 23-1821 25-2100 25-2223 25-2307 25-2330 25-2349
GP1	006644	*24-1903 *24-1904 24-1906 24-1908 24-1910 24-1912 24-1914 24-1916 *25-1922
GM1	005164	23-1685 *23-1691
MINUM	007370	*23-1074 *23-1178 25-2043 25-2053 *25-2065 *25-2073
IDSELF	001700	23-1098 *23-1119
LASRCR	000620	*23-1010 23-1506 23-1508 *23-1511 *23-1512 *23-1514 23-1519 *23-1545 *23-1546
		23-1554 *23-1557 *23-1558 *23-1560 23-1569 25-2116 25-2129 *25-2334 25-2339
LENGTH	000546	*23-988 *23-1798 *25-2137 *25-2153 *25-2322 25-2364
LONUM	007366	*23-1073 *23-1177 25-2042 25-2051 *25-2064 *25-2072
LOOPER	002014	*23-1147 23-1156
MAXLEN	000524	*23-977 *23-1081 *23-1085 23-1125 *23-1164 *23-1169 23-1697 23-1775 25-2213
MEDIUM	000041	*21-917
MEMAK	002070	23-962 *23-1163

SYMBOL	VALUE	REFERENCES
MEMBK	002114	23-963 023-1168
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		23-1418 023-1430 23-1435 23-1443 23-1450 023-1463 023-1467 023-1468 023-1476
		23-1479 23-1487 23-1490 23-1496 23-1504 023-1530 23-1535 023-1540 23-1543
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		23-1738 23-1740 23-1743 23-1759 23-1761 23-1764 023-1769 023-1780 23-1806
		023-1827 023-2228
MSBITS	000550	023-989 023-1095 023-1112 23-1127 23-1147 023-1181 23-1185 23-1207 023-1209
		023-1211 23-1614 23-1637
		23-1230 23-2507 023-2665
MSG0	012664	27-2619 023-2644
MSG00	012642	23-1179 023-2676
MSG1	012671	23-1137 023-2678
MSG10A	013253	23-1121 023-2679
MSG10B	013333	23-1137 023-2678
MSG10C	013360	23-1131 023-2679
MSG10D	013406	25-2184 023-2680
MSG11	013436	23-2324 023-2681
MSG12	013464	24-1855 23-2253 023-2682
MSG13	013476	24-1858 23-2254 023-2683
MSG14	013510	24-1852 23-2250 023-2684
MSG15	013522	24-1870 23-2268 023-2685
MSG16	013531	24-1873 23-2271 023-2686
MSG17	013540	24-1864 23-2262 023-2687
MSG18	013547	24-1867 23-2265 023-2688
MSG19	013556	24-1875 023-2689
MSG2	012712	23-1216 023-2667
MSG20	013600	024-1880 024-1881 24-1884 023-2690
MSG20A	013622	24-1896 023-2691
MSG21	013652	23-2273 023-2692
MSG22	013702	23-2277 023-2693
MSG23	013723	23-2281 023-2694
MSG24	013757	23-1828 023-2695
MSG25	014023	23-2229 023-2696
MSG26	014067	23-1334 023-2697
MSG27	014074	23-1356 023-2698
MSG5	012742	23-1310 023-2668
MSG6	012767	23-1295 023-2669
MSG7	012774	23-1796 23-2320 023-2670
MSG8	013022	23-1830 23-2231 023-2671
MSG9	013117	23-2153 023-2673
MSG9A	013144	23-2135 023-2674
MSG9B	013167	23-2355 023-2675
HTC	000502	023-968 23-1093 23-1097 23-1101 23-1642 23-1644 23-1647 23-1687 23-1712
		23-1713 23-1720 23-1724 23-1819 23-1820 23-1822 23-1823 23-2085 23-2086
		23-2098 23-2099 23-2103 23-2221 23-2222 23-2224 23-2298 23-2300 23-2301
		23-2311 23-2328 23-2329 23-2342 23-2343 23-2347 23-2348 23-2357
HTS	000500	023-967 23-1103 23-1108 23-1110 23-1645 23-1715 23-1723 23-1815 23-2088
		23-2102 23-2157 23-2218 23-2305 23-2310 23-2345
HTV	000534	023-981 23-1685
HWCTR	004500	023-1589 23-2548
HWCTRS	104414	23-1368 23-1385 23-1403 23-1410 23-1417 23-1434 23-1442 23-1449 23-1471

SYMBOL	VALUE	REFERENCES
		23-1478 23-1489 23-1495 23-1503 23-1518 23-1542 23-1551 23-1568 23-1652
		23-1644 025-2563
IV1	004504	025-1590 23-1592
NDINCR	005264	23-1696 23-1705 023-1707
NDNSTP	005330	023-1717 23-1736 23-1741 23-1744
NO_SEL	001670	23-1100 23-1107 23-1109 23-1111 023-1113
NHREAD	000626	023-1013 025-2199 23-2283
NMPTST	001320	023-1044 023-1072 023-1218 23-1223 023-1306 23-1307 023-1344
NO99ET	001476	23-1076 023-1079
NDT.TU	001614	023-1101 23-1113
OCT	011346	025-2376 025-2386 025-2391
OCTP	011352	24-1842 24-1849 25-2239 23-2246 23-2373 23-2384 025-2393
OCTPR	011240	025-2369 23-2347
OCTPRT	104412	23-2140 23-2142 23-2177 23-2181 23-2358 23-2360 23-2480 023-2362
OCT1	011260	23-2371 023-2373
OCT2	011276	023-2377 23-2387
OUT	012036	23-2468 23-2470 23-2474 023-2485 23-2502
OVERMK	001524	23-1078 023-1084
PARM	001322	023-1045 023-1316 23-1317 23-1338 023-1342 23-1509 23-1535 23-1699 23-1704
		23-1733 23-1746 24-1844 24-1850 24-1862 24-1903 23-2113 23-2119 23-2241
		23-2248 23-2260
PATO	006646	24-1905 023-1923 23-1927
PAT1	006662	24-1907 023-1931 23-1938
PAT1A	006666	023-1932 23-1937
PAT2	006732	24-1909 23-1936 023-1951 23-1953
PAT3	006746	24-1911 023-1957 23-1964
PAT3A	006752	023-1958 23-1963
PAT4	007016	24-1913 23-1962 023-1976
PAT5	007044	24-1915 023-1986 23-1993
PAT5A	007050	023-1987 23-1992
PAT6	007160	24-1919 23-1991 023-2023 23-2025
PAT7	007174	24-1918 023-2031 23-2034
PERMS	000612	023-1007 023-1805 24-1891 24-1898
PRTS	011174	23-1799 23-2138 23-2156 23-2323 023-2335
P1T	006710	23-1931 023-1939
P3T	006774	23-1957 023-1965
P4	007022	023-1977 23-1980
P4A	007042	023-1976 23-1977 023-1978 023-1982
P5T	007072	23-1986 023-1994
RANDOM	007364	023-1750 023-1754 23-2032 023-2063 023-2071 023-2122 023-2126
RANGEN	007214	23-1749 23-2031 023-2038 23-2121
RANG1	007232	023-2046 23-2050
RANSTP	005512	023-1749
RAN1	005524	023-1751 23-1755
RBLF	000532	023-980 023-1082 023-1086 023-1165 023-1170 23-1926 23-1933 23-1952 23-1959
		23-1979 23-1988 23-2024 23-2033 23-2090 23-2097 23-2106 23-2164
RDERR0	007750	23-2104 023-2148
RDERRS	000622	023-1011 023-2192 23-2275
RDINCR	010172	23-2115 23-2128 023-2206 23-2227
RDPASS	000562	023-994 023-2084 23-2143 23-2190 023-2195 023-2200
RDSTP	007654	23-2120 023-2128 23-2203
RDSTPC	007614	23-2114 023-2119

SYMBOL	VALUE	REFERENCES
RDSTPD	007424	025-2085 25-2130 25-2198
RDY1	012610	28-2649 028-2652
RDY2	012624	28-2645 28-2653 028-2655
READGO	007446	025-2090 25-2117
READI	007402	025-2081 25-2532
READIT	104424	23-1420 23-1452 23-1513 23-1559 025-2567
READLN	000632	023-1015 025-2083 23-2091 25-2095 25-2108 25-2137 25-2155 25-2166 025-2210
		25-2211 25-2213 025-2215
READNP	010334	025-2234
READY	012546	23-1194 23-1212 23-1301 23-1303 25-2393 25-2422 25-2457 25-2460 25-2462
		028-2644 28-2651 28-2656 28-2658
RECORD	000614	023-1008 23-1472 23-1506 23-1511 23-1519 23-1538 023-1539 23-1545 23-1557
		23-1569 23-1695 23-1707 023-1768 23-1778 023-1826 24-1860 23-2081 23-2116
		25-2129 025-2206 25-2258 25-2334 025-2335 25-2361
RESETL	003656	23-1774 023-1777
RESTR	010232	25-2212 025-2215
RESTR1	010240	25-2208 25-2214 025-2216
REXIND	004732	23-1603 023-1642 25-2337
RG1	007456	025-2092 25-2094
RNDXDS	007624	025-2121
RND51	007636	025-2123 25-2127
RNDTAP	010306	25-2150 025-2227
RNDTP1	010320	23-1670 25-2202 025-2229
RPASS1	010146	25-2196 025-2199
RPASS3	010152	25-2194 025-2200
RSFDR	004576	023-1612 25-2546
RSFDRV	104410	23-1367 23-1384 23-1402 23-1433 23-1470 23-1477 23-1494 23-1502 23-1541
		23-1550 23-1567 23-1672 23-1634 23-1651 23-1663 025-2561
RSF1	004610	023-1614 23-1619
RSF2	004634	23-1615 023-1620 23-1639
RTSREC	010102	25-2152 25-2159 23-2161 23-2183 025-2189
RTSR1	010120	25-2146 025-2193
RTSSTP	007566	025-2113
SELDRV	002212	023-1182 23-1214
SEL01	002244	23-1184 023-1190
SEL02	002264	23-1191 023-1194
SEL0K1	003042	23-1308 023-1310
SELPAT	002456	23-1229 023-1233
SELRLS	002530	023-1234
SELRM1	002732	23-1286 023-1289
SELRM2	002746	23-1284 23-1288 023-1292
SELR1	002600	23-1258 023-1261
SELR2	002616	23-1262 023-1265
SELR3	002632	23-1256 23-1260 23-1264 023-1268
SELTST	002364	23-1188 023-1216
SELT1	002402	023-1220 23-1232 23-1309
SELT2	002426	23-1222 023-1226
SELT3	002446	23-1224 23-1227 023-1230 23-1244 23-1246 23-1266 23-1278 23-1290 23-1300
SELM1	002664	23-1274 023-1277
SELM2	002700	23-1272 23-1276 023-1280
SP3	104430	23-1240 23-1251 23-1268 23-1280 23-1292 24-1843 23-2240 23-2388 23-2409
		025-2569

CZTMBG
SYMBOL CROSS REFERENCE

CREATED BY MACRO ON 13-JUL-84 AT 10:18

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CREF V01

SEQ 69

SYMBOL	VALUE	REFERENCES
SP3A	011632	25-2444 025-2447
SP3X	011622	025-2444 25-2554
STACK	- 000500	025-965 23-1061 23-1172
START	002136	23-1166 023-1171
START1	002142	23-1134 023-1172 23-1186
STATRD	000570	023-997 023-1723 23-1789 23-1810 025-2102 25-2149 25-2201 025-2310 25-2315
		25-2326 25-2359
STOPOP	005502	23-1734 023-1746
STREC1	006042	23-1804 023-1813
STRLEN	000544	023-987 023-1697 025-1701 23-1703 23-1777 25-2063 25-2215
STRTOP	005306	023-1712 23-1757 23-1762 23-1765 23-1817 23-1824
SUSMR	- 104432	23-1062 23-1173 025-2570
SUSMR	012234	025-2524 25-2555
SVCTR	003462	023-1583 25-2545
SVCTRS	- 104406	23-1372 23-1389 23-1407 23-1414 23-1421 23-1438 23-1446 23-1453 23-1473
		23-1484 23-1499 23-1515 23-1547 23-1561 23-1605 025-2560
SVC1	004466	023-1584 23-1586
SVRECR	000552	023-990 023-1481 23-1483 023-1508 23-1514 023-1554 23-1560
SVO	007372	025-2038 25-2066 025-2074
SV1	007374	025-2039 25-2067 025-2075
SV2	007376	025-2040 25-2068 025-2076
SV3	007400	025-2041 25-2069 025-2077
SMR	000512	023-972 23-1064 23-1174 23-1336 23-1623 23-1658 23-1794 23-1800 25-2133
		25-2151 25-2160 25-2193 25-2295 25-2467 25-2479 25-2518 25-2527 025-2531
		25-2598
SMREG	000176	023-959 23-1064 23-1174 25-2467 25-2531
TABLE	012326	25-2540 025-2542
TEPST	012230	025-2483 025-2487 025-2510 025-2511 025-2512 025-2514 25-2518 025-2521
TESINC	005610	23-1537 23-1737 23-1758 023-1768
TESRC1	006006	23-1801 023-1806
TESREC	005756	23-1795 023-1800
TEST	001326	023-1047 023-1319
TEST0	003300	23-1320 023-1364
TEST1	003350	23-1322 023-1381
TEST2	003420	23-1324 023-1399
TEST3	003536	23-1327 023-1430
TEST4	003654	23-1331 023-1463
TEST5	004176	23-1330 023-1530
TKB	000516	023-974 25-2437 25-2471 28-2646
TKS	000514	023-973 25-2435 25-2469 28-2644
TO	011640	025-2450 25-2544
TOP	- 104404	23-1122 23-1132 23-1138 23-1160 23-1180 23-1217 23-1231 23-1296 23-1311
		23-1335 23-1357 23-1797 23-1829 23-1831 24-1859 24-1874 24-1876 24-1885
		24-1897 25-2136 25-2154 25-2187 25-2230 25-2232 25-2257 25-2272 25-2274
		25-2278 25-2282 25-2321 25-2325 25-2336 25-2445 25-2476 25-2478 25-2482
		25-2498 25-2508 025-2559 27-2620
TOP1	011652	025-2452 25-2459 25-2465
TOP2	011702	25-2456 025-2460
TPB	000522	023-976 23-1195 23-1213 23-1302 23-1304 25-2394 25-2423 25-2441 25-2458
		25-2461 25-2463
TPS	000520	023-975 25-2439 25-2450 28-2655
TRAP34	012306	20-893 025-2537

SYMBOL	VALUE	REFERENCES
TSINC2	005664	23-1771 23-1776 #23-1778
TSINC3	005700	23-1779 #23-1781
TSTEX	001324	#23-1046 #23-1315 23-1316 #23-1359 23-1465
TSTSTP	005424	23-1727 #23-1733
TSTTBL	001330	#23-1049 #23-1069 #23-1070 #23-1071 23-1219 23-1315
TU_SEL	001546	23-1083 #23-1092
TYPT1	011410	#23-2401 23-2412
TYPT2	011416	#23-2402 23-2404
TYPT3	011452	23-2408 #23-2411
TO	003312	#23-1367 23-1377
TOA	003314	#23-1368 23-1375
TOB	003332	23-1370 #23-1374
T1	003362	#23-1384 23-1393
T1A	003364	#23-1385 23-1391
T1B	003402	23-1387 #23-1390
T2	003432	#23-1402 23-1425
T2A	003434	#23-1403 23-1409
T2B	003452	23-1405 #23-1408
T2C	003456	#23-1410 23-1416
T2D	003476	23-1412 #23-1415
T2E	003502	#23-1417 23-1423
T2F	003516	23-1419 #23-1421
T3	003550	#23-1433 23-1457
T3A	003552	#23-1434 23-1440
T3B	003570	23-1436 #23-1439
T3C	003574	#23-1442 23-1448
T3D	003612	23-1444 #23-1446
T3E	003620	#23-1449 23-1455
T3F	003634	23-1451 #23-1453
T4	003710	23-1466 #23-1469
T4A	003712	#23-1470 23-1524
T4B	003714	#23-1471 23-1475
T4C	003740	#23-1477 23-1491
T4D	003742	#23-1478 23-1486
T4E	003774	23-1480 #23-1485
T4F	004010	#23-1489 23-1493
T4G	004026	23-1488 #23-1494
T4H	004030	#23-1495 23-1501
T4J	004046	23-1497 #23-1499
T4K	004054	#23-1502 23-1520
T4L	004056	#23-1503 23-1517
T4M	004130	23-1510 #23-1513
T4N	004142	23-1505 23-1507 #23-1516
T4P	004146	#23-1518 23-1522
T5	004210	#23-1533 23-1577
T5A	004234	23-1536 #23-1538
T5B	004246	#23-1540
T5C	004256	#23-1542 23-1549
T5D	004306	23-1544 #23-1548
T5E	004314	#23-1551 23-1563 23-1575
T5F	004356	23-1556 #23-1559
T5FLAG	004456	#23-1533 #23-1579 #23-1609 23-1665 23-1708

SYMBOL	VALUE	REFERENCES
TSG	004370	23-1553 023-1562
TSH	004406	23-1565 023-1567
TSINC	004460	*23-1538 23-1546 023-1580
TSJ	004410	023-1568 23-1573
TSK	004430	23-1570 023-1572
USSTST	001626	023-1103 23-1106
USS.OK	001644	23-1104 023-1108
VALID	002300	23-1193 023-1198
VAL1	002316	023-1203 23-1206
VAL2	002330	23-1204 023-1207
VAL3	002344	23-1208 023-1211
VAL4	002350	23-1196 23-1210 023-1212
MAITK	011562	023-2435 23-2436 23-2542
MAITKY	104400	23-1182 23-1220 23-1242 23-1254 23-1270 23-1282 23-1297 23-2489 023-2557
MAITK1	011604	023-2439 23-2440
MAIT1	005152	*23-1686 023-1688 *23-1691
MBUF	000530	023-979 23-1719 24-1902 25-2107 25-2162 25-2304
MRCHK	000572	023-998 23-1595 23-1677 23-1730 *23-1793 24-1877 24-1879 24-1889
MRITI	005174	023-1695 23-2543
MRITIT	104402	23-1371 23-1388 23-1406 23-1437 23-1482 23-1534 023-2558
MRPASS	000564	023-995 *23-1711 23-1726 23-1728 *23-1732 23-1735 23-1756 23-1791 *23-1802
		23-1803 *23-1809 *23-2294 *23-2313 *23-2317
MRRECR	000616	023-1009 *23-1472 23-1481 *23-1483 *23-1707 23-2335 23-2340
MRTDMP	006162	024-1836
MRTD1	006452	024-1881 24-1890
MRTD2	006474	24-1883 024-1888
MRTLEN	000630	023-1014 *23-1703 23-1717 *23-1772 23-1773 23-1775 *23-1777 23-1798 23-2302
		23-2322
M1	005242	23-1700 023-1703
M10	005470	23-1739 023-1743
M11	005542	23-1747 023-1756 23-1812
M12	005576	23-1760 023-1764
XDUMPH	000405	022-952 *26-2586 *26-2604
XRGCD	010760	23-2296 023-2313 23-2316
XRGREC	010644	23-1808 023-2293 23-2327
XRGO	010654	023-2295 23-2318
XRG5	010766	23-2312 023-2315
XODPH	000403	022-950 *26-2584 *26-2595 27-2621
ZERO	011544	*23-2400 23-2417 *23-2419 *23-2427
ICNTG	014111	23-2475 029-2699
ICTRLS	000536	023-984 *28-2646 *28-2647 28-2648 *28-2650 28-2652 *28-2654 28-2657
IENDAD	003240	21-925 23-1133 23-1347 023-1350
ICORLF	014137	23-2497 029-2702
INMEM	014127	23-2481 029-2701
INSMR	014117	23-2477 029-2700
IBREAD	012040	23-2484 023-2487
IR1	007416	23-2082 023-2084
IR5	007554	023-2109 23-2112
ISVPC	000036	021-911 21-931
IZERO	002034	23-1148 023-1152