

TS04

DATA RELIABILITY
CZTSHA0

AH-E455A-MC

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IDENTIFICATION

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PRODUCT CODE: AC-E454A-MC

PRODUCT NAME: CZTSHA0 TS11/TS04 DATA RELIAB

MAINTAINER: DIAGNOSTIC ENGINEERING

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GLOSSARY

ACT	AUTOMATED COMPUTER TEST
APT	AUTOMATED PRODUCT TEST SYSTEM USED IN MANUFACTURING.
BYTE/RECORD/FILE COUNT BRF	IS STORED IN THE 4TH WORD OF THE COMMAND PACKET AND IT'S USE BY THE TS04 DEPENDS ON THE TYPE OF COMMAND.
CMD	TS04 COMMAND (SEE 2.3.14.1 FOR LIST OF COMMANDS).
COMMAND PACKET CMDPKT	FOUR WORD PACKET IN THE CPU MEMORY WHICH CONTAINS ALL INFORMATION NEEDED BY THE TS04 TO EXECUTE A COMMAND.
EXTENDED STATUS	FOUR WORDS OF TS04 STATUS WHICH ARE TRANSFERRED AS PART OF THE MESSAGE PACKET AT THE COMPLETION OF A COMMAND.
MESSAGE PACKET	SEVEN WORD PACKET IN THE CPU MEMORY INTO WHICH THE TS04 STORES STATUS AT THE COMPLETION OF A COMMAND.
PC	PROGRAM COUNTER
PSW	PROCESSOR STATUS WORD
RESIDUAL FRAME COUNT RFC	THIS COUNT IS PART OF THE MESSAGE PACKET AND CONTAINS THE NUMBER OF BYTES/RECORDS /FILES REMAINING TO BE PROCESSED AT THE COMPLETION OF A COMMAND.
TERMINATION CLASS CODE TCC	THREE BIT CODE IN THE TSSR WHICH INDICATES THE TYPE OF COMMAND TERMINATION.
TSBA	TAPE SYSTEM BUS ADDRESS REGISTER.
TSDB	TAPE SYSTEM DATA BUFFER REGISTER.
TSSR	TAPE SYSTEM STATUS REGISTER.
XST0	EXTENDED STATUS REGISTER 0
XST1	EXTENDED STATUS REGISTER 1
XST2	EXTENDED STATUS REGISTER 2
XST3	EXTENDED STATUS REGISTER 3
XXDP	XXDP IS A "CATCH-ALL" NAME FOR A GROUP OF PDP-11 DIAGNOSTIC PACKAGES AVAILABLE ON MULTIMEDIA.

1.0 GENERAL INFORMATION

1.1 PROGRAM ABSTRACT

1.1.1 FUNCTIONAL DESCRIPTION

THIS PROGRAM CAN BE USED AS A BASIC FUNCTION TEST, A DATA RELIABILITY TEST, A COMPATABILITY TEST, OR TO EXECUTE A SEQUENCE OF OPERATOR SELECTED COMMANDS.

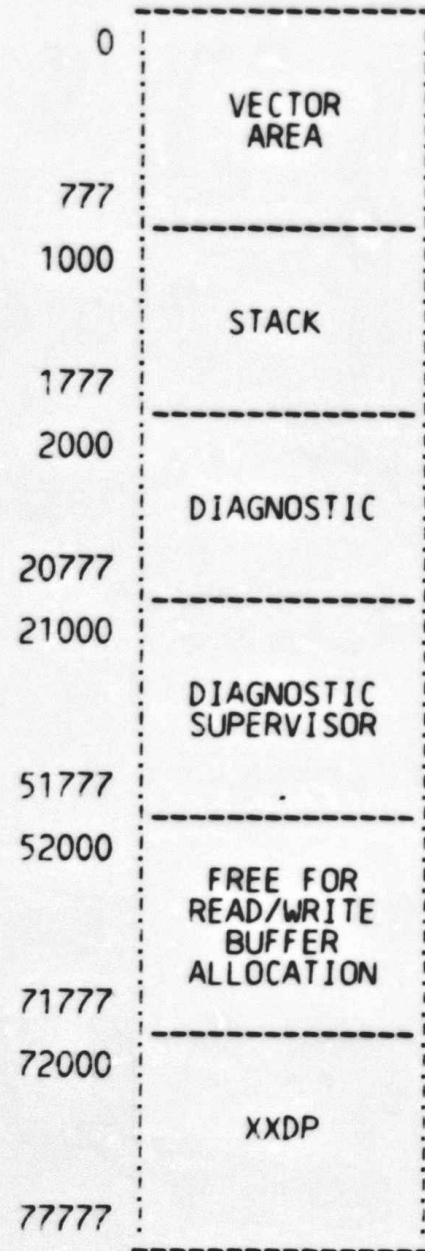
1.1.2 STRUCTURE OF PROGRAM

THIS DIAGNOSTIC OCCUPIES 14.5K WORDS OF MEMORY AND IS COMPATIBLE WITH BOTH XXDP AND ACT. IT CAN BE RUN STANDALONE UNDER XXDP, AND CAN BE CHAINED UNDER XXDP, ACT AND APT IN ACT MODE (SEE "CREATE CORE IMAGE" COMMAND BELOW FOR DETAILS OF CHAINING PROCEDURE). IT IS A SINGLE PROGRAM FROM THE STANDPOINT OF THE DIAGNOSTIC USER, BUT IT CONTAINS A CONTROL MODULE WHICH WILL BE LATER RELEASED INDEPENDENTLY AS A DIAGNOSTIC SUPERVISOR.

WHEN THIS DIAGNOSTIC IS STARTED AT ADDRESS 200, CONTROL GOES FIRST TO THE SUPERVISOR PORTION, WHICH WILL ASK CERTAIN "HARD CORE" QUESTIONS ABOUT THE ENVIRONMENT. THEN IT WILL ENTER COMMAND MODE, INDICATED BY A PROMPT CHARACTER (DS B>). AT COMMAND MODE THE OPERATOR MAY ENTER ANY OF SEVERAL COMMANDS AS DESCRIBED BELOW.

THE SUPERVISOR CODING FOLLOWS IMMEDIATELY THE DIAGNOSTIC TEST CODING, BUT THE SUPERVISOR LISTING HAS BEEN SUPPRESSED FOR GENERAL DISTRIBUTION. A LIMITED DISTRIBUTION HAS BEEN MADE TO FIELD SERVICE OF THE SUPERVISOR ASSEMBLY LISTING, AND IT MAY BE CONSULTED IN EVENT OF A SOFTWARE PROBLEM.

1.1.3 MEMORY MAP



1.1.4 DIAGNOSTIC INFORMATION

THIS DIAGNOSTIC CAN TEST UP TO 4 UNITS SIMULTANEOUSLY. THE 4 UNITS ARE ASSIGNED LOGICAL UNIT NUMBERS 0 - 3 BY THE DIAGNOSTIC.

THERE ARE 5 TESTS IN THIS PROGRAM:

- TEST 1 - BASIC FUNCTIONS.
- TEST 2 - DATA RELIABILITY.
- TEST 3 - WRITE COMPATABILITY/WRITE UTILITY.
- TEST 4 - READ COMPATABILITY/READ UTILITY.
- TEST 5 - OPERATOR SELECTED SEQUENCE.

ERROR RECOVERY IS PERFORMED ON READ, WRITE AND WRITE TAPE MARK ERRORS UNLESS RECOVERY IS INHIBITED BY THE OPERATOR. THE WRITE AND WRITE TAPE MARK RETRY LIMIT IS 16. THE READ FORWARD/READ REVERSE RETRY LIMIT IS 16 (8 IN THE SAME DIRECTION AND 8 IN THE OPPOSITE DIRECTION). FOR MORE INFORMATION ON ERROR RECOVERY PROCEDURES, SEE SECTION 3.0 (ERROR REPORTING).

1.2 SYSTEM REQUIREMENTS

1.2.1 HARDWARE REQUIREMENTS

PDP-11 PROCESSOR WITH 16K OR MORE OF MEMORY
CONSOLE DEVICE (LA30, LA36, VT50, ETC.)
PROGRAM LOAD DEVICE

1.2.2 SOFTWARE REQUIREMENTS

DIAGNOSTIC SUPERVISOR

1.3 RELATED DOCUMENTS AND STANDARDS

XXDP USERS MANUAL MD-11-DZQXA
DIAGNOSTIC SUPERVISOR PROGRAM LISTING
PDP-11 DIAGNOSTIC SUPERVISOR INTERFACE SPECIFICATION.
PDP-11 DIAGNOSTIC SUPERVISOR PROGRAMMER'S GUIDE.
TS11/TS04 PROGRAMMING SPECIFICATION.
TS11/TS04 ENGINEERING SPECIFICATION.
TS11/TS04 COMMAND PACKET SPECIFICATION.

1.4 DIAGNOSTIC HIERARCHY PREREQUISITES

ORDER OF HOST CPU DIAGNOSTIC USAGE:

- 1) CONTROL LOGIC PROGRAM - ALL TESTS.
- 2) DATA RELIABILITY PROGRAM:
 - A) BASIC FUNCTION TEST.
 - B) DATA RELIABILITY TEST.

1.5 ASSUMPTIONS

THE HARDWARE OTHER THAN THE SUBSYSTEM BEING TESTED IS ASSUMED TO WORK PROPERLY. FALSE ERRORS MAY BE REPORTED IF THE PROCESSOR, MEMORY, ETC., DO NOT FUNCTION PROPERLY.

1.6 DIAGNOSTIC HISTORY

2.0 OPERATING INSTRUCTIONS

2.1 LOADING AND STARTING PROCEDURES

2.1.1 LOADING PROCEDURES

THIS PROGRAM MAY BE LOADED FROM PAPER TAPE USING THE ABSOLUTE LOADER.
IT MAY ALSO BE LOADED FROM ANY XXDP LOAD MEDIA.

2.1.2 STARTING PROCEDURES

THE PROGRAM STARTS AT LOCATION 200. USE STANDARD DEC PROCEDURES
TO START THE PROGRAM.

2.1.3 STEPS FOR QUICK AND SIMPLE EXECUTION

THE DIAGNOSTIC CAN BE EXECUTED STANDALONE WITHOUT READING THE REMAINDER OF THIS
DOCUMENT, AS FOLLOWS:

- A) LOAD THE DIAGNOSTIC
- B) START AT ADDRESS 200
- C) ANSWER THE HARDWARE QUESTIONS
- D) RECEIVE PROMPT (DS B>)
- E) ENTER STA<CR>
- F) ANSWER HARDWARE AND SOFTWARE QUESTIONS
- G) GET END OF PASS MESSAGES OR ERROR MESSAGES
- H) TO END EXECUTION, ENTER CONTROL/C

2.1.4 THE SIX STEPS OF EXECUTION

THIS DIAGNOSTIC SHOULD BE LOADED AND STARTED USING NORMAL XXDP
PROCEDURES. THE START COMMAND SHOULD NOT SPECIFY AN ADDRESS, BECAUSE
THE DIAGNOSTIC HAS THE PROPER TRANSFER ADDRESS CODED INTO IT.

WHEN THIS DIAGNOSTIC IS STARTED, THE FOLLOWING STEPS WILL OCCUR:

* STEP 1 *

A SHORT SERIES OF "HARDWARE QUESTIONS" WILL BE ASKED:

QUESTION	MEANING
L-CLK (L) N ?	IS THERE AN L-CLOCK?
P-CLK (L) N ?	IS THERE A P-CLOCK?
50HZ (L) N ?	IS THE POWER 50 CYCLES (AS IN EUROPE)?

LSI (L) N ? IS MACHINE AN LSI?
LPT (L) N ? IS THERE A LINE PRINTER?
MEM (K) (D) 16 ? HOW MANY K OF MEMORY ARE THERE?

THE DEFAULTS (SHOWN AFTER EACH QUESTION) CAN BE SELECTED BY HITTING CARRIAGE RETURN. IT IS POSSIBLE THAT NOT ALL OF THE QUESTIONS WILL BE ASKED: FOR EXAMPLE, IF YOU SAY 'YES' TO THE L-CLOCK QUESTION, THE P-CLOCK QUESTION WILL NOT BE ASKED.

* STEP 2 *

WHEN YOU HAVE ANSWERED ALL THE HARDWARE QUESTIONS, THE DIAGNOSTIC WILL ISSUE THE PROMPT 'DS-B>'. FROM THIS POINT UNTIL THE TIME WHEN YOU RESTART XXDP, YOU WILL BE TALKING TO THE DIAGNOSTIC, NOT XXDP. WE WILL REFER TO THE PRESENCE OF THIS PROMPT AS BEING IN DIAGNOSTIC COMMAND MODE, AS OPPOSED TO XXDP COMMAND MODE.

AT THIS POINT YOU WILL ENTER A "START" COMMAND. THIS IS NOT THE SAME AS THE XXDP "START" COMMAND, WHICH YOU ALREADY ISSUED IN RESPONSE TO THE XXDP DOT PROMPT. THIS "START" COMMAND CAN TAKE A NUMBER OF SWITCHES AND FLAGS (ALL OPTIONAL) AND THE DETAILS OF THESE ARE SET FORTH IN '2.3 DETAILS OF COMMANDS AND SYNTAX'. HOWEVER, IN ORDER TO USE THE PROGRAM, ALL YOU NEED TO SAY IS SOMETHING LIKE THIS:

STA/PASS:1/FLAGS:HOE

THINGS TO NOTE HERE:

1. ONLY THE FIRST THREE CHARACTERS OF THIS OR ANY COMMAND AT THE 'DS-B>' LEVEL NEED TO BE TYPED.
2. THE 'PASS' SWITCH SPECIFIES HOW MANY PASSES YOU DESIRE. A PASS CONSISTS OF RUNNING THE FULL DIAGNOSTIC AGAINST ALL UNITS BEING TESTED (THIS WILL BE EXPLAINED SHORTLY). ONE PASS IS SPECIFIED IN THE ABOVE EXAMPLE.
3. THE 'FLAGS' SWITCH MAY SPECIFY ANY OF A NUMBER OF FLAGS, BUT THE MAIN USEFUL ONES ARE:

LOE LOOP ONE ERROR
HOE HALT ON ERROR
IER INHIBIT ERROR PRINTOUT

THE HOE FLAG IS SPECIFIED IN THE ABOVE EXAMPLE (WE'LL SEE WHY SHORTLY).

* STEP 3 *

WHEN YOU HAVE TYPED IN A "START" COMMAND, THE DIAGNOSTIC WILL COME BACK WITH THE QUESTION "# UNITS?" TO WHICH YOU SHOULD RESPOND BY TYPING IN THE NUMBER OF DEVICES YOU WISH TO TEST.

A WORD OF WARNING HERE: THE NUMBER OF UNITS DEPENDS ON THE TARGET DEVICE OF THE DIAGNOSTIC. FOR EXAMPLE, IF THE DIAGNOSTIC IS DIRECTED AT A DISK DRIVE, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF DRIVES TO BE TESTED. WHEREAS IF THE DIAGNOSTIC WAS DIRECTED AT THE DISK CONTROLLER, THEN THE NUMBER OF UNITS WOULD BE THE NUMBER OF CONTROLLERS. THE TARGET DEVICE OF A DIAGNOSTIC CAN ALWAYS BE DETERMINED BY INSPECTING THE "HEADER" STATEMENT NEAR THE BEGINNING OF THE SOURCE CODE. ONE OF THE OPERANDS OF THIS "HEADER" STATEMENT SHOULD BE THE DEVICE TYPE OF THE DIAGNOSTIC.

* STEP 4 *

WHEN YOU HAVE TYPED IN THE NUMBER OF UNITS TO BE TESTED, THE DIAGNOSTIC WILL ASK YOU THE "HARDWARE QUESTIONS". THE ANSWERS TO THESE QUESTIONS ARE USED TO BUILD TABLES IN CORE, CALLED "HARDWARE P-TABLES". ONE HARDWARE P-TABLE WILL BE BUILT FOR EACH UNIT TO BE TESTED.

THERE ARE SEVERAL HARDWARE QUESTIONS AND THE ENTIRE SERIES WILL BE POSED N TIMES, WHERE N IS THE NUMBER OF UNITS.

SEE 2.3.13 FOR HARDWARE PARAMETERS

THIS REPRESENTS A NEW PHILOSOPHY IN DIAGNOSTIC ENGINEERING. DIAGNOSTIC WILL IN THE FUTURE NOT BE WRITTEN TO AUTOSIZE OR ASSUME STANDARD ADDRESSES: INSTEAD, THEY WILL ASK THE OPERATOR FOR ALL THE INFORMATION THEY NEED TO TEST THE DEVICE.

* STEP 5 *

AFTER YOU HAVE ANSWERED ALL THE HARDWARE QUESTIONS FOR ALL THE UNITS, YOU WILL BE ASKED "CHANGE SW?" IF YOU WANT TO BE ASKED THE SOFTWARE QUESTIONS THAT DETERMINE THE BEHAVIOR OF THIS PROGRAM, TYPE 'Y'. IF YOU WANT TO TAKE ALL THE DEFAULTS TO THESE QUESTIONS, TYPE 'N'. IF YOU TYPE 'Y' YOU WILL BE ASKED THE SOFTWARE QUESTIONS, AND THE ANSWERS WILL BE PUT INTO THE SOFTWARE P-TABLE IN THE PROGRAM. THE SERIES OF QUESTIONS WILL BE ASKED JUST ONCE, REGARDLESS OF THE NUMBER OF UNITS TO BE TESTED.

SEE 2.3.14 FOR SOFTWARE PARAMETERS

* STEP 6 *

AFTER YOU HAVE ANSWERED THE SOFTWARE QUESTIONS, THE DIAGNOSTIC WILL BEGIN TO EXECUTE THE HARDWARE TEST CODE. THERE ARE SEVERAL THINGS THAT CAN HAPPEN NEXT, DEPENDING ON WHETHER A HARDWARE ERROR IS ENCOUNTERED AND ALSO ON WHAT SWITCH VALUES YOU SELECTED ON THE START COMMAND. CONSIDER THE POSSIBILITIES:

1. IF NO ERROR IS ENCOUNTERED, THEN THE DIAGNOSTIC WILL SIMPLY EXECUTE THE DESIRED NUMBER OF PASSES AND RETURN TO COMMAND MODE (PROMPT DS-B>).
2. IF AN ERROR IS ENCOUNTERED, THEN ONE OF THREE THINGS HAPPENS, DEPENDING ON THE SETTINGS OF THE HOE AND LOE FLAGS.

HOE SET: THE ERROR WILL BE REPORTED ON THE CONSOLE AND THE DIAGNOSTIC WILL RETURN TO COMMAND MODE.

LOE SET: THE DIAGNOSTIC WILL LOOP ENLESSLY ON THE BLOCK OF CODE THAT DETECTED THE ERROR.

NEITHER HOE NOR LOE SET: THE ERROR WILL BE REPORTED ON THE CONSOLE AND NORMAL EXECUTION WILL RESUME AS IF NO ERROR HAD OCCURED.

2.2 SPECIAL ENVIRONMENTS

ACT

APT

2.3 PROGRAM OPTIONS

2.3.1 START COMMAND

STA(RT)/TESTS:<TEST-LIST>/PASS:<PASS-CNT>/FLAGS:<FLAG-LIST>/EOP:<INCR>

2.3.1.1 TESTS SWITCH (/TESTS:<TEST-LIST>)

<TEST-LIST> IS A SEQUENCE OF DECIMAL NUMBERS (1:2 ETC.) OR RANGES OF DECIMAL NUMBERS (1-5:8-10 ETC.) THAT SPECIFY THE TESTS TO BE EXECUTED. THE NUMBERS ARE SEPARATED BY COLONS. THE NUMBERS RANGE FROM 1 TO THE LARGEST TEST NUMBER IN THE DIAGNOSTIC. THEY MAY BE SPECIFIED IN ANY ORDER. TESTS WILL BE EXECUTED IN NUMERICAL ORDER REGARDLESS OF THE ORDER OF SPECIFICATION. THE DEFAULT IS TO EXECUTE ALL TESTS. ON THIS AND ALL SWITCHES, THE ANGLE BRACKETS <> ARE PUNCTUATION USED IN THE DEFINITION ONLY, AND ARE NOT TO BE TYPED BY THE OPERATOR. SEE EXAMPLE

AT END OF 2.3.1.

2.3.1.2 PASS SWITCH (/PASS:<PASS-CNT>)

<PASS-CNT> IS A DECIMAL NUMBER INDICATING THE DESIRED NUMBER OF PASSES. A PASS IS DEFINED AS THE EXECUTION OF THE FULL DIAGNOSTIC (ALL SELECTED TESTS) AGAINST ALL UNITS SUBMITTED. THE DEFAULT IS NON-ENDING EXECUTION. IN THIS CASE EXIT FROM THE PROGRAM IS ACCOMPLISHED EITHER BY TYPING A CONTROL/C OR BY OCCURANCE OF AN ERROR WITH THE HALT ON ERROR FLAG BEING SET. THE EXIT IS A RETURN TO COMMAND MODE. SEE EXAMPLE AT END OF 2.3.1.

2.3.1.3 FLAGS SWITCH (/FLAGS:<FLAG-LIST>)

<FLAG-LIST> IS A SEQUENCE OF ELEMENTS OF THE FORM <FLAG>, <FLAG=1>, OR <FLAG=0>, SEPARATED BY COLONS, WHERE <FLAG> HAS ONE OF THE FOLLOWING VALUES:

HOE	HALT ON ERROR, CAUSING COMMAND MODE TO BE ENTERED WHEN AN ERROR IS ENCOUNTERED
LOE	LOOP ON ERROR, CAUSING THE DIAGNOSTIC TO LOOP CONTINUOUSLY WITHIN THE SMALLEST DEFINED BLOCK OF CODING (SEGMENT, SUBTEST, OR TEST) CONTAINING THE ERROR
IER	INHIBIT ERROR REPORTING
IBE	INHIBIT BASIC ERROR REPORTS
IXE	INHIBIT EXTENDED ERROR REPORTS
PRI	DIRECT ALL MESSAGES TO A LINE PRINTER
PNT	PRINT NUMBER OF TEST BEING EXECUTED
BOE	BELL ON ERROR
UAM	RUN IN UNATTENDED MODE, BYPASSING MANUAL INTERVENTION TESTS
ISR	INHIBIT STATISTICAL REPORTS
IDU	INHIBIT DROPPING OF UNITS BY DIAGNOSTIC

THE FLAGS NAMED OR EQUATED TO 1 ARE SET, THOSE EQUATED TO 0 ARE CLEARED. A FLAG NOT SPECIFIED IS CLEARED. IF THE FLAGS SWITCH IS NOT GIVEN ALL FLAGS ARE CLEARED. SEE EXAMPLE AT END OF 2.3.1.

2.3.1.4 END OF PASS SWITCH (/EOP:<INCR>)

<INCR> IS A DECIMAL NUMBER INDICATING HOW OFTEN (IN TERMS OF PASSES) IT IS DESIRED THAT THE END OF PASS MESSAGE BE PRINTED. THE DEFAULT IS AT THE END OF EVERY PASS. SEE EXAMPLE AT END OF 2.3.1.

2.3.1.5 EFFECT OF COMMAND

THE EFFECT OF THE START COMMAND IS TO INITIATE THE HARDWARE PARAMETER DIALOGUE, THE SOFTWARE PARAMETER DIALOGUE, AND THEN THE DIAGNOSTIC TESTS THEMSELVES.

THE HARDWARE PARAMETER DIALOGUE COMMENCES WITH THE QUESTION '# UNITS?' TO WHICH THE OPERATOR REPLIES WITH A DECIMAL NUMBER N FROM 1 TO 64. THE TERM 'UNIT' REFERS TO THE DEVICE TO WHICH THIS SERIES OF DIAGNOSTICS IS DEDICATED. FOLLOWING THIS ARE THE QUESTIONS WHEREBY THE P-TABLES THEMSELVES WILL BE BUILT. EACH P-TABLE IS A CORE-RESIDENT TABLE CONTAINING ALL THE HARDWARE INFORMATION FOR ONE UNIT. THE OPERATOR MUST SUPPLY

N (NUMBER OF UNITS) VALUES FOR EACH QUESTION. HE MAY DO THIS BY GIVING ONE ANSWER TO EACH QUESTION (IN WHICH CASE THE SERIES OF QUESTIONS WILL BE POSED N TIMES) OR BY GIVING N VALUES, SEPARATED BY COMMAS, TO EACH QUESTION (SERIES WILL BE POSED ONCE). EACH QUESTION IS FOLLOWED BY THE RESPONSE RADIX (D FOR DECIMAL, B FOR BINARY, O FOR OCTAL, L FOR YES/NO) IN PARENTHESES AND THE DEFAULT VALUE AFTER THE PARENTHESES.

FOLLOWING THE HARDWARE QUESTIONS ARE THE SOFTWARE QUESTIONS TO BUILD THE SOFTWARE TABLES, WHICH DEFINE THE MODE (QUICK VERIFY ETC.) THAT THE DIAGNOSTIC WILL EXECUTE IN.

WHEN THE QUESTION '# UNITS?' IS ANSWERED, MEMORY STORAGE IS ALLOCATED FOR THE P-TABLES, AND IF THERE IS NOT ENOUGH TO ACCOMMODATE THEM THE MESSAGE 'TOO MANY UNITS' IS ISSUED. IN THIS CASE THE DIAGNOSTIC MUST BE EXECUTED MORE THAN ONCE TO TEST ALL UNITS.

EXAMPLE:

STA/TESTS:1:2-4:6:8-10/PASS:3/FLAGS:IER:HOE=1:UAM:LOE

THIS COMMAND WILL CAUSE THREE PASSES TO BE MADE, EACH PASS CONSISTING OF TESTS 1,2,3,4,6,8,9, AND 10 EXECUTED AGAINST ALL UNITS. THERE IS NO DIFFERENCE BETWEEN SAYING <FLAG> AND SAYING <FLAG=1>. THE NOTATION <FLAG=0> IS MEANINGFUL ONLY ON A COMMAND OTHER THAN START TO CLEAR A FLAG THAT WAS PREVIOUSLY SET. NOTE THAT ON ALL COMMANDS ONLY THE FIRST THREE LETTERS ARE SCANNED.

2.3.2 RESTART COMMAND

```
*****  
RES(TART)/TESTS:<TEST-LIST>/PASS:<PASS-CNT>/FLAGS:<FLAG-LIST>/UNITS:<UNIT-LIST>  
*****
```

2.3.2.1 TESTS, PASS, AND FLAGS SWITCHES

<TEST-LIST>, <PASS-CNT>, AND <FLAG-LIST> ARE AS IN THE START COMMAND.

2.3.2.2 UNITS SWITCH (/UNITS:<UNIT-LIST>)

<UNIT-LIST> IS A SEQUENCE OF DECIMAL NUMBERS (1,2 ETC.) OR RANGES OF DECIMAL NUMBERS (1-5, 8-10 ETC.) THAT SPECIFY THE UNITS TO BE TESTED. THE NUMBERS ARE SEPARATED BY COLONS. THE NUMBERS MAY RANGE FROM 1 THRU N (N IS THE NUMBER OF UNITS SPECIFIED IN THE PREVIOUS START COMMAND). THE NUMBER INDICATES THE POSITION OF THE P-TABLE AS THE DATA WAS ENTERED DURING THE HARDWARE DIAGLOGUE. THE UNITS WHICH ARE SELECTED MUST NOT HAVE BEEN DROPPED BY THE DROP COMMAND. SEE THE DISCUSSION OF ADD AND DROP COMMANDS BELOW. DEFAULT IS TO TEST ALL UNITS WHICH HAVE NOT BEEN DROPPED BY A DROP COMMAND.

2.3.2.3 EFFECT OF COMMAND

THE RESTART COMMAND DIFFERS FROM THE START COMMAND IN THAT THE P-TABLES

FROM THE PREVIOUS START COMMAND (THERE MUST HAVE BEEN ONE) ARE USED, INSTEAD OF NEW ONES BEING BUILT. THE UNITS SWITCH GIVES THE ABILITY TO SELECT A SUBSET OF THESE. THE SOFTWARE DIALOGUE MAY OPTIONALLY BE REEXECUTED (OPERATOR WILL BE ASKED). THE COMMAND CAN BE USED AFTER COMMAND MODE HAS BEEN REENTERED IN ANY OF THE THREE NORMAL WAYS: A) THE REQUESTED NUMBER OF PASSES HAVE BEEN MADE B) AN ERROR WAS ENCOUNTERED WITH THE HALT ON ERROR FLAG SET C) A CONTROL/C WAS ENTERED BY THE OPERATOR.

2.3.3 CONTINUE COMMAND

CON(TINUE)/PASS:<PASS-CNT/FLAGS:<FLAG-LIST>

2.3.3.1 PASS SWITCH (/PASS:<PASS-CNT>)

<PASS-CNT> IS SAME AS IN START COMMAND, BUT THE DEFAULT IS THE UNSATISFIED PASS-CNT FROM THE PREVIOUS START OR RESTART. IF NONE REMAINS, THE DEFAULT IS NON-ENDING EXECUTION.

2.3.3.2 FLAG SWITCH (/FLAGS:<FLAG-LIST>)

<FLAG-LIST> IS SAME AS IN START COMMAND, BUT UNSPECIFIED FLAGS RETAIN THEIR CURRENT VALUE.

2.3.3.3 EFFECT OF COMMAND

CONTINUE MUST FOLLOW A START OR RESTART, AND COMMAND MODE MUST HAVE BEEN ENTERED DUE TO A HALT ON ERROR OR A CONTROL/C. THE EFFECT OF THE COMMAND IS TO GO TO THE BEGINNING OF THE TEST THAT WAS BEING EXECUTED WHEN THE HALT OR CONTROL/C TOOK PLACE. SOFTWARE DIALOGUE MAY OPTIONALLY BE REEXECUTED. HARDWARE PARAMETERS MAY NOT BE CHANGED.

2.3.4 PROCEED COMMAND

PRO(CEED)/FLAGS:<FLAG-LIST>

2.3.4.1 FLAGS SWITCH (/FLAGS:<FLAG-LIST>)

<FLAG-LIST> IS AS IN THE START COMMAND, BUT UNSPECIFIED FLAGS RETAIN THEIR CURRENT VALUE.

2.3.4.2 EFFECT OF COMMAND

PROCEED MUST FOLLOW A START, RESTART, OR CONTINUE. COMMAND MODE MUST HAVE BEEN ENTERED VIA A HALT ON ERROR. THE EFFECT OF THE COMMAND IS TO BEGIN EXECUTION AT THE LOCATION FOLLOWING THE ERROR CALL. NEITHER HARDWARE NOR SOFTWARE PARAMETERS MAY BE ALTERED.

2.3.5 CREATE CORE IMAGE COMMAND

CCI/TESTS:<TEST-LIST>/PASS:<PASS-CNT>/FLAGS:<FLAG-LIST>

2.3.5.1 TESTS, PASS, AND FLAGS SWITCHES

<TEST-LIST>, <PASS-CNT>, <FLAG-LIST>, AND ARE AS
IN THE START COMMAND, EXCEPT THAT THE UAM (UNATTENDED MODE) FLAG
DEFAULTS TO THE SET POSITION.

2.3.5.2 EFFECT OF COMMAND

THE PURPOSE OF THIS COMMAND IS TO CREATE A BIC FILE SUITABLE FOR
CHAIN MODE EXECUTION. THE XXDP PROCEDURE IS AS FOLLOWS:

```
INVOKE THE XXDP UTILITY UPD1 OR UPD2
LOAD XXN:FILE.BIN
START 200
<QUESTIONS AND ANSWERS>
RESTART UPD1 USING RESTART ADDRESS
HICORE ADDRESS (IF 'PASSED 14.5K' MESSAGE CAME)
DUMP XXN:FILE.BIC
```

THE OPERATOR DIALOGUE (HARDWARE AND SOFTWARE) WILL
BE EXECUTED AS IN THE START COMMAND, BUT AT THE END OF THE QUESTIONS
THE HALT STATE WILL BE ENTERED. THE OPERATOR SHOULD THEN
DUMP THE PROGRAM TO THE XXDP LIBRARY USING A BIC EXTENSION
TO INDICATE THAT THIS FILE IS CHAINABLE. HE SHOULD USE THE XXDP UTILITY
UPD1 OR UPD2 TO DO THIS. IF THE P-TABLES EXTEND BEYOND 14.5K, A MESSAGE
WILL BE ISSUED GIVING THE NEW UPPER CORE LIMIT, TO WHICH THE OPERATOR
MUST ADJUST BEFORE DUMPING. HE MAY NOW DELETE THE
NON-CHAINABLE BIN FILE IF DESIRED, SINCE THE BIC FILE HAS ALL THE
CAPABILITIES OF IT.

WHEN THIS BIC FILE IS SUBSEQUENTLY EXECUTED IN CHAIN MODE,
THE OPERATOR DIALOGUES WILL BE BYPASSED. HOWEVER, IF IT IS EXECUTED
STANDALONE, THE DIALOGUE WILL BE REISSUED.

NOTE THAT IF THE MESSAGE 'TOO MANY UNITS' IS ISSUED, TWO OR MORE
CORE IMAGES MUST BE CREATED (WITH DIFFERENT NAMES) TO TEST ALL UNITS.

NOTE THAT ALTHOUGH THE CHAINABLE IMAGE CAN BE EXECUTED ON A
16K MACHINE, THE ORIGINAL CCI CREATION MUST BE DONE ON A
LARGE MACHINE, THE EXACT SIZE BEING DEPENDENT ON WHICH UPDATE
UTILITY IS USED.

2.3.6 ADD COMMAND

ADD/UNITS:<UNIT-LIST>

2.3.6.1 UNITS SWITCH (/UNITS:<UNIT-LIST>

<UNIT-LIST> IS AS IN THE RESTART COMMAND.

2.3.6.2 EFFECT OF COMMAND

THE UNITS SPECIFIED ARE ADDED TO THE TEST SEQUENCE. EACH UNIT MUST HAVE A P-TABLE IN MEMORY DUE TO AN EARLIER HARDWARE DIALOGUE. THIS COMMAND MUST BE FOLLOWED BY A RESTART OR CONTINUE. THE UNITS SWITCH MUST BE SPECIFIED. THE ADD COMMAND IS MEANINGFUL ONLY FOR UNITS THAT WERE PREVIOUSLY DROPPED.

2.3.7 DROP COMMAND

DRO(P)/UNITS:<UNIT-LIST>

2.3.7.1 UNITS SWITCH (/UNITS:<UNIT-LIST>)

<UNIT-LIST> IS AS IN THE RESTART COMMAND.

2.3.7.2 EFFECT OF COMMAND

THE UNITS SPECIFIED WILL BE DROPPED FROM TESTING. THE UNITS WILL BE RESELECTED ONLY BY THE EXECUTION OF AN ADD OR START COMMAND. THE UNITS SWITCH MUST BE ENTERED. THIS COMMAND MUST BE FOLLOWED BY A RESTART OR A CONTINUE COMMAND.

2.3.8 PRINT COMMAND

PRI(NT)

2.3.8.1 EFFECT OF COMMAND

ALL STATISTICS TABLES ACCUMULATED BY THE DIAGNOSTIC ARE PRINTED. THE ISR (INHIBIT STATISTICAL REPORTING) FLAG IS CLEARED.

2.3.9 DISPLAY COMMAND

DIS(PLAY)/UNITS:<UNIT-LIST>

2.3.9.1 UNITS SWITCH (/UNITS:<UNIT-LIST>)

<UNIT-LIST> IS AS IN THE RESTART COMMAND.

2.3.9.2 EFFECT OF COMMAND

THE HARDWARE P-TABLES FOR ALL UNITS UNDER TEST ARE PRINTED OUT IN THE

FORMAT IN WHICH THEY WERE ENTERED. ANY UNITS THAT WERE DROPPED BY THE OPERATOR 'DROP' COMMAND ARE SO DESIGNATED.

2.3.10 FLAGS COMMAND

FLA(GS)

2.3.10.1 EFFECT OF COMMAND

THE CURRENT SETTINGS OF ALL FLAGS ARE PRINTED.

2.3.11 ZFLAGS COMMAND

ZFL(AGS)

2.3.11.1 EFFECT OF COMMAND

ALL FLAGS ARE CLEARED.

2.3.12 CONTROL CHARACTERS

A CONTROL C (^C) ENTERED DURING THE EXECUTION OF A DIAGNOSTIC CAUSES A RETURN TO COMMAND MODE.

A CONTROL Z (^Z) ENTERED DURING ONE OF THE THREE OPERATOR DIALOGUES (HARD CORE QUESTIONS (SEE 1.1.1), HARDWARE DIALOGUE (SEE 2.3.1.5), OR SOFTWARE DIALOGUE (SEE 2.3.1.5) CAUSES THE DEFAULTS TO BE TAKEN FOR THE REMAINDER OF THAT DIALOGUE.

A CONTROL O (^O) ENTERED DURING THE EXECUTION OF A DIAGNOSTIC CAUSES ALL TELETYPE OUTPUT TO BE SUPPRESSED FOR THE REMAINDER OF THE DIAGNOSTIC OR UNTIL ANOTHER ^O IS TYPED, WHICH RESTORES NORMAL TELETYPE OUTPUT.

2.3.13 HARDWARE PARAMETERS

THE FOLLOWING QUESTIONS WILL BE ASKED ON A START COMMAND. THE VALUE LOCATED TO THE LEFT OF THE QUESTION MARK IS THE DEFAULT VALUE THAT WILL BE TAKEN ON A CARRIAGE RETURN RESPONSE.

TSDB ADDRESS (172520) ?

VECTOR (150) ?

2.3.14 SOFTWARE PARAMETERS

THE FOLLOWING QUESTIONS ARE ASKED IF REQUESTED ON A START, RESTART,
OR CONTINUE. THEY ALLOW FLEXABILITY IN THE WAY THE PROGRAM BEHAVES.

CLEAR COUNTERS (L) Y ?

RESET RANDOM VARIABLES (L) N ?

HALT AFTER EACH CMD (L) N ?

DISABLE INTERRUPTS (L) N ?

INHIBIT RECOVERY (L) N ?

CHANGE CMD SEQUENCE (L) N ?

NOTE: THIS QUESTION SHOULD BE ANSWERED (N) UNLESS AN
OPERATOR SELECTED SEQUENCE IS TO BE EXECUTED.
IF THIS QUESTION WAS ANSWERED (N), NO MORE
QUESTIONS WILL BE ASKED. IF THIS QUESTION WAS
ANSWERED Y, THE FOLLOWING QUESTIONS MUST BE
ANSWERED OR DEFAULTED WITH A <CR> ONLY:

INHIBIT RFC ERROR REPORTS (L) N ?		
CHARACTERISTICS CODE (O) 40 ?	(0,20,40,200)	(OCTAL)
CMD/2 (D) 5 ?	(1-27)	(DECIMAL)
BRF COUNT (D) 4096 ?	(1-4K)	(DECIMAL)
# OF OPERATIONS (D) 10 ?	(1-65K)	(DECIMAL)
PATTERN (D) 7 ?	(0-8)	(DECIMAL)
CMD/3 (D) 5 ?	(1-27)	(DECIMAL)
BRF COUNT (D) 4096 ?	(1-4K)	(DECIMAL)
# OF OPERATIONS (D) 10 ?	(1-65K)	(DECIMAL)
PATTERN (D) 7 ?	(0-8)	(DECIMAL)
CMD/4 (D) 5 ?	(1-27)	(DECIMAL)
BRF COUNT (D) 4096 ?	(1-4K)	(DECIMAL)
# OF OPERATIONS (D) 10 ?	(1-65K)	(DECIMAL)
PATTERN (D) 7 ?	(0-8)	(DECIMAL)
CMD/5 (D) 5 ?	(1-27)	(DECIMAL)
BRF COUNT (D) 4096 ?	(1-4K)	(DECIMAL)
# OF OPERATIONS (D) 10 ?	(1-65K)	(DECIMAL)
PATTERN (D) 7 ?	(0-8)	(DECIMAL)

NOTE: THE PROGRAM AUTOMATICALLY INSERTS AN CHARACTERISTIC 40
AS THE FIRST COMMAND IN THE SEQUENCE TABLE. IF A
DIFFERENT CHARACTERISTIC IS DESIRED, THE OPERATOR SHOULD
ENTER THAT CHARACTERISTIC CODE. A TOTAL OF 4 COMMANDS
MAY BE ENTERED IN ADDITION TO THE SET CHARACTERISTICS
COMMAND. IF THE OPERATOR WISHES TO USE LESS THAN 4
COMMANDS, AN END COMMAND MUST BE ENTERED AND THEN A
CONTROL Z (^Z) CAN BE ENTERED TO TERMINATE P-TABLE DIALOGUE.

2.3.14.1 COMMAND LIST FOR USE IN P-TABLE DIALOGUE.

CODE	COMMAND	DESCRIPTION
1 =	DRI	DRIVE INITIATE.
2 =	RDF	READ FORWARD.
3 =	RDR	READ REVERSE.
4 =	WRT	WRITE.
5 =	WTV	WRITE/VERIFY. IE. WRITE N RECORDS; READ REVERSE AND CHECK N RECORDS OF DATA; READ FORWARD AND CHECK N RECORDS.
6 =	SRF	SPACE RECORDS FORWARD.
7 =	SRR	SPACE RECORDS REVERSE.
8 =	RNR	READ NEXT REVERSE, IE. SPACE FWD, READ REV.
9 =	RNF	READ NEXT FORWARD, IE. READ FWD, SPACE REV.
10 =	RPF	READ PREVIOUS FWD, IE. SPACE REV, READ FWD.
11 =	RPR	READ PREVIOUS REV, IE. READ REV, SPACE FWD.
12 =	WRR	WRITE RETRY.
13 =	RWD	REWIND.
14 =	MBR	MESSAGE BUFFER RELEASE.
15 =	WTM	WRITE TAPE MARK.
16 =	WTR	WRITE TAPE MARK RETRY.
17 =	SFF	SPACE FILES FORWARD.
18 =	SFR	SPACE FILES REVERSE.
19 =	GES	GET EXTENDED STATUS.
20 =	ERS	ERASE 3 INCHES OF TAPE.
21 =	UNL	UNLOAD.
22 =	CLN	CLEAN TAPE
23 =	SCH	SET DEVICE CHARACTERISTIC. WHERE BRF=200, 40, 20, 0. 200 = ENABLE SKIP TAPE MARKS STOP (STOP AT LOGICAL EOT) 40 = ENABLE ATTENTION INTERRUPTS. 20 = ENABLE MESSAGE BUFFER RELEASE INTERRUPTS. SEE TS11/TS04 PROGRAMMING SPECIFICATION FOR DESCRIPTION.
24 =	DIA	DIAGNOSTICS. SEE TS11/TS04 PROGRAMMING SPECIFICATION FOR DESCRIPTION. ODT MUST BE USED TO LOAD DIAGNOSTIC DATA INTO THE WRITE BUFFER BEFORE THIS CMD IS ISSUED.
25 =	JMP	JUMP TO THE NTH COMMAND IN THE COMMAND SEQUENCE TABLE, WHERE N IS DEFINED IN THE BRF FIELD.
26 =	DLY	DELAY 'N' MILLISECONDS WHERE N IS DEFINED IN THE # OF OPERATIONS.
27 =	END	END OF COMMAND SEQUENCE.

2.3.14.2 DATA PATTERN LIST FOR USE IN P-TABLE DIALOGUE.

PATTERN #	DESCRIPTION.
0	INCREMENTING PATTERN. 0 - 377.
1	ALL '1'S PATTERN.
2	ALL '0'S PATTERN.
3	'1' BIT WALKING FROM R TO L IN A FIELD OF '0'S.
4	'0' BIT WALKING FROM R TO L IN A FIELD OF '1'S.
5	ALTERNATING '1' AND '0' BITS WITH ALTERNATE BYTES COMPLIMENTED. (125/252)
6	ALTERNATING BYTES OF 000 AND 377.
7	RANDOM DATA PATTERN.
8	NO PATTERN GENERATION.

2.3.15 EXTENDED DISCUSSION OF P-TABLE DIALOGUE

THE FULL CAPABILITY OF THE HARDWARE DIALOGUE IS REVEALED BY THE FOLLOWING DISCUSSION OF WHAT HAPPENS INTERNALLY.

AS SOON AS THE QUESTION "# UNITS?" IS ANSWERED (WITH THE NUMBER N, SAY) SPACE IN CORE IS ALLOCATED FOR N P-TABLES. ALL OF THE P-TABLES ARE OF THE SAME FORMAT, AND THERE IS A ONE-TO ONE CORRESPONDENCE BETWEEN THE HARDWARE PARAMETER QUESTIONS AND THE SLOTS IN THE P-TABLE FORMAT.

ON THE FIRST TRIP THRU THE QUESTIONS, ALL OF THE SLOTS IN ALL OF THE P-TABLES ARE FILLED. IF THE OPERATOR TYPES IN LESS THAN N EXPLICIT VALUES IN RESPONSE TO A PARTICULAR QUESTION, THESE VALUES ARE PLACED IN THE P-TABLES (ONE VALUE GOING INTO THE PROPER SLOT OF EACH P-TABLE BEGINNING WITH THE FIRST P-TABLE) UNTIL THE STRING OF VALUES IS EXHAUSTED. THE LAST VALUE IN THE STRING BECOMES THE NEW DEFAULT AND IS USED TO FILL THAT SLOT IN THE REMAINING P-TABLES.

ON SUBSEQUENT TRIPS THRU THE QUESTIONS, THE SAME PROCESS IS CARRIED OUT, EXCEPT THAT THE EARLIEST P-TABLE NOT TO HAVE RECEIVED AN EXPLICIT VALUE IN ANY OF ITS SLOTS NOW ASSUMES THE ROLE THAT TABLE NUMBER ONE PLAYED IN THE FIRST TRIP.

THE SERIES OF QUESTIONS IS REISSUED UNTIL AT LEAST ONE QUESTION HAS RECEIVED N EXPLICIT VALUES FROM THE OPERATOR.

IN GIVING A STRING OF VALUES, COMMAS WITHOUT INTERVENING VALUES MAY BE USED TO INDICATE A REPETITION OF THE LAST NAMED VALUE.

A STRING OF VALUES MAY BE GIVEN AS A RANGE (6-10 FOR EXAMPLE). IF THE VALUES REPRESENT PURE NUMERICAL DATA, THIS SAMPLE RANGE TRANSLATES TO THE STRING 6,7,8,9,10 (AN INCREMENT OF 1). IF THE VALUES ARE ADDRESSES, THE SAMPLE RANGE TRANSLATES TO THE STRING 6,8,10 (AN INCREMENT OF 2).

NOW LET US SEE HOW WE COULD USE THESE CAPABILITIES TO CONSTRUCT A SET OF P-TABLES. ASSUME THAT WE HAVE 64 UNITS, AND THAT THERE ARE THREE HARDWARE PARAMETERS FOR EACH (THREE SLOTS IN THE P-TABLE, THREE HARDWARE QUESTIONS IN THE DIALOGUE). LET THE DESIRED VALUE FOR THE FIRST PARAMETER BE THE NUMBER 75 FOR ALL 64 TABLES. LET THE DESIRED VALUE FOR THE SECOND PARAMETER BE EQUAL TO THE UNIT NUMBER (1,2,3,...,64) EXCEPT FOR UNIT 50, WHICH SHOULD RECEIVE THE VALUE 49. LET THE DESIRED VALUE FOR THE THIRD PARAMETER BE THE NUMBER 76 FOR THE FIRST 20 UNITS AND THE NUMBER 77 FOR THE LAST 44 UNITS.

THE FOLLOWING DIALOGUE WOULD ACCOMPLISH THIS GOAL:

UNITS (D) ? 64

UNIT 1

<QUESTION 1> ? 75

<QUESTION 2> ? 1-20

<QUESTION 3> ? 76

UNIT 21

<QUESTION 1> ?

<QUESTION 2> ? 21-49,,51-64
<QUESTION 3> ? 77

THE FIRST TIME THE SERIES IS ASKED, SLOT ONE RECEIVES A 75 IN ALL 64 TABLES. SLOT TWO RECEIVES THE VALUES 1,2,3,.....,20 IN TABLES 1 THRU 20 AND A CONSTANT 20 IN TABLES 21 THRU 64. SLOT THREE RECEIVES A CONSTANT 76 IN ALL 64 TABLES.

THE SECOND TIME THRU THE SERIES, TABLES 21 THRU THE END ARE GOING TO BE AFFECTED (NOTE THAT THIS PIECE OF INFORMATION IS PRINTED OUT FOR THE OPERATOR IN THE FORM 'UNIT XX' AT THE BEGINNING OF EACH SERIES). QUESTION 1 IS RESPONDED TO BY A <CR>, SO SLOT ONE STAYS AT CONSTANT 75 IN TABLES 21 THRU 64, SINCE NO NEW EXPLICIT VALUES ARE TYPED IN. SLOT TWO GETS THE VALUES 21,22,23,.....,49 IN TABLES 21 THRU 49, AND GETS A 49 IN SLOT 50, AND GETS THE VALUES 51,52,53,.....,64 IN TABLES 51 THRU 64. SLOT THREE GETS THE VALUE 77 IN TABLES 21 THRU 64.

THE DIALOGUE IS TERMINATED WHEN THE SOFTWARE RECOGNIZES THAT 64 EXPLICIT VALUES HAVE BEEN GIVEN FOR AT LEAST ONE QUESTION (NAMELY QUESTION 2).

2.3.16 EXAMPLES OF SOFTWARE P-TABLE DIALOGUE

2.3.16.1 BASIC FUNCTION AND DATA RELIABILITY WITH ALL ERROR REPORTING ENABLED

- A) RECEIVE PROMPT (DS B>)
- B) ENTER STA/TES:1-2<CR>
- C) ANSWER HARDWARE QUESTIONS.
- D) PROCEED WITH THE FOLLOWING DIALOGUE:

CHANGE SW (L) ?	Y<CR>
CLEAR COUNTERS (L) N ?	Y<CR>
RESET RANDOM VARIABLES (L) N ?	N<CR>
HALT AFTER EACH CMD (L) N ?	N<CR>
DISABLE INTERRUPTS (L) N ?	N<CR>
INHIBIT RECOVERY (L) N ?	N<CR>
CHANGE CMD SEQUENCE (L) N ?	N<CR>

2.3.16.2 TO SET UP A SCOPE LOOP FOR A FAILURE IN BASIC FUNCTIONS.

- A) RECEIVE PROMPT (DS B>)
- B) ENTER STA/TES:1/FLA:LOE:IER:ISR:IDU<CR>
- C) ANSWER HARDWARE QUESTIONS.
- D) PROCEED WITH THE FOLLOWING DIALOGUE:

CHANGE SW (L) ?	Y<CR>
CLEAR COUNTERS (L) N ?	Y<CR>
RESET RANDOM VARIABLES (L) N ?	N<CR>
HALT AFTER EACH CMD (L) N ?	N<CR>
DISABLE INTERRUPTS (L) N ?	N<CR>
INHIBIT RECOVERY (L) N ?	N<CR>
CHANGE CMD SEQUENCE (L) N ?	N<CR>

2.3.16.3 TO SET UP A SCOPE LOOP FOR A FAILURE IN DATA RELIABILITY

- A) RECEIVE PROMPT (DS B>)
- B) ENTER STA/TES:5/FLA:IER:ISR:IDU/EOP:1000<CR>
- C) ANSWER HARDWARE QUESTIONS.
- D) PROCEED WITH THE FOLLOWING DIALOGUE:

CHANGE SW (L) ?	Y<CR>	
CLEAR COUNTERS (L) N ?	Y<CR>	
RESET RANDOM VARIABLES (L) N ?	N<CR>	
HALT AFTER EACH CMD (L) N ?	N<CR>	
DISABLE INTERRUPTS (L) N ?	Y<CR>	
INHIBIT RECOVERY (L) N ?	Y<CR>	
CHANGE CMD SEQUENCE (L) N ?	Y<CR>	
INHIBIT RFC ERROR REPORTS (L) N ?	Y<CR>	
CHARACTERISTICS CODE (O) 40 ?	40<CR>	
CMD/2 (D) 5 ?	13<CR>	(REWIND) (COULD BE ANY COMMAND)
BRF COUNT (D) 4096 ?	1<CR>	
# OF OPERATIONS (D) 10 ?	1<CR>	
PATTERN (D) 7 ?	1<CR>	
CMD/3 (D) 5 ?	4<CR>	(WRITE) (COULD BE ANY COMMAND)
BRF (D) 4096 ?	1000<CR>	
# OF OPERATIONS (D) 10 ?	10000<CR>	
PATTERN (D) 7 ?	1<CR>	
CMD/4 (D) 5 ?	27<CR>	(END) (COULD BE ANY COMMAND)
BRF (D) 4096 ?	<^Z>	

2.4 EXECUTION TIMES

2.4.1 SYSTEM CONFIGURATION

PDP11/34
MOS MEMORY
LA36
TS11/TS04

2.4.2 TEST EXECUTION TIMES

TEST 1 - BASIC FUNCTIONS - 30 SECONDS PER PASS.
TEST 2 - DATA RELIABILITY - 45 MINUTES PER PASS.
TEST 3 - WRITE COMPATABILITY - 16 MINUTES PER PASS.
TEST 4 - READ COMPATABILITY - 22 MINUTES PER PASS.
TEST 5 - OPERATOR SELECTED SEQUENCE - DEPENDS ON SEQUENCE SELECTED.

NOTE: ALL EXECUTION TIMES ARE SHOWN FOR ONE UNIT DEPRATION.
APPROXIMATELY 10% WILL BE ADDED TO ALL EXECUTION TIMES
FOR EACH ADDITIONAL UNIT.

3.0 ERROR INFORMATION

3.1 ERROR REPORTING

ALL ERROR REPORTS EXCEPT FOR ERRORS #1 AND #17 INCLUDE A DUMP OF THE FOLLOWING INFORMATION:

ERROR #, TEST #, SUBTEST #, PROGRAM COUNTER, UNIT #, COMMAND, PREVIOUS COMMAND, PASS COUNT, # OF RECORDS FROM BOT, THE COMMAND PACKET, TSSR, TCC, TSBA, RFC, AND THE EXTENDED STATUS REGISTERS (SEE 2.3.14.1 FOR LIST OF COMMANDS).

STANDARD ERROR REPORT FORMAT:

```
CZTSH SFT ERR XXXXX TST XXX SUB XXX PC: XXXXXX
(ASCII ERROR MESSAGE)
XXX CMD FAILED - UNIT X PASS: XXXXX RECORD: XXXXX
PREVIOUS CMD WAS XXX
CMDPKT TSBA RFC TSSR TCC
XXXXXX XXXXXX XXXXXX XXXXXX X
XXXXXX
XXXXXX
XXXXXX
XST0 XST1 XST2 XST3
XXXXXX XXXXXX XXXXXX XXXXXX
```

EXAMPLE OF AN ERROR REPORT:

```
CZTSH SFT ERR 00009 TST 002 SUB 000 PC: 010606
RECOVERABLE ERROR
WRT CMD FAILED - UNIT 2 PASS: 2 RECORD: 254
PREVIOUS CMD WAS WRT
CMDPKT TSBA RFC TSSR TCC
100005 002324 000000 100210 4
051766
000000
000371
XST0 XST1 XST2 XST3
000350 000002 100004 000000
```

3.1.1 ERROR #1 - COMMAND PACKET ADDRESS NOT ON A MODULO 4 BOUNDARY:

IF THIS ERROR IS REPORTED, THE PROGRAM DID NOT LOAD PROPERLY. THIS IS A SYSTEM FATAL ERROR AND THE PROGRAM MUST BE RELOADED TO CORRECT IT.

3.1.2 ERROR #2 - TS04 NOT READY:

BEFORE ANY COMMAND IS ISSUED TO THE TS04, THE SUBSYSTEM READY BIT IN THE TSS4 IS CHECKED. IF THE SSR IS NOT SET, THE PROGRAM

REPORTS THE NOT READY ERROR. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST SEQUENCE UNLESS THE IDU OPTION IS USED.

3.1.3 ERROR #3 - NO RESPONSE ERROR:

ONCE THE TSDB IS LOADED, THE TS04 HAS ONE MILLISECOND TO RESPOND OR THE PROGRAM REPORTS A NO RESPONSE ERROR. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST SEQUENCE UNLESS THE IDU OPTION IS USED.

3.1.4 ERROR #4 - NO INTERRUPT ERROR:

COMMAND WAS ISSUED AND NO INTERRUPT RECEIVED. THE PROGRAM REPORTS THAT NO INTERRUPT OCCURRED. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.5 SPECIAL CONDITION ERRORS:

IF, DURING EXECUTION, AN INCIDENT OCCURS FORCING THE TSSR SPECIAL CONDITION BIT TO SET, THE PROGRAM WILL SELECT ONE OF 8 ERROR HANDLING ROUTINES, DEPENDING ON THE TERMINATION CLASS CODE.

THE TERMINATION CLASS CODES IN THE TSSR ARE PROCESSED AS FOLLOWS WHEN SPECIAL CONDITION IS SET:

3.1.5.1 ERROR #5 - TERMINATION CLASS CODE 0, UNDEFINED SPECIAL CONDITION

THE ERROR IS REPORTED, A HARD ERROR IS LOGGED AND THE PROGRAM PROCEEDS NORMALLY.

3.1.5.2 ERROR #6 - TERMINATION CLASS CODE 1, ATTENTION CONDITION

THIS TCC INDICATES THAT THE DRIVE HAS UNDERGONE A STATUS CHANGE SUCH AS GOING OFFLINE OR COMING ONLINE. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.5.3 ERROR #7 - TERMINATION CLASS CODE 2, TAPE STATUS ALERT

A STATUS CONDITION HAS BEEN ENCOUNTERED THAT MAY HAVE SIGNIFICANCE TO THE PROGRAM. BITS OF INTEREST INCLUDE TMK, RLS, LET, RLL, EOT. ACTION TAKEN DEPENDS ON THE TEST BEING EXECUTED. IF THE CONDITION IS UNEXPECTED, THE ERROR IS REPORTED AND A HARD ERROR IS LOGGED. THE PROGRAM PROCEEDS NORMALLY.

3.1.5.4 ERROR #8 - TERMINATION CLASS CODE 3, FUNCTION REJECT

THE SPECIFIED FUNCTION WAS NOT INITIATED. BITS OF INTEREST ARE RMR, OFL, VCK, BOT, ILC, WLE, ILA, AND NBA. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

31.5.5 ERROR #9 - TERMINATION CLASS CODE 4, RECOVERABLE ERROR

TAPE POSITION IS ONE RECORD BEYOND WHAT ITS POSITION WAS WHEN THE FUNCTION WAS INITIATED. RECOVERY PROCEDURE IS TO LOG THE ERROR AND ISSUE THE APPROPRIATE RETRY COMMAND. IF RETRY LIMIT IS REACHED BEFORE THE ERROR IS RECOVERED, RETRY LIMIT EXCEEDED IS REPORTED AS DESCRIBED IN ERROR #14 BELOW.

3.1.5.6 ERROR #10 - TERMINATION CLASS CODE 5, RECOVERABLE ERROR

TAPE POSITION HAS NOT CHANGED. RECOVERY PROCEDURE IS TO LOG THE ERROR AND RE-ISSUE THE ORIGINAL COMMAND. IF RETRY LIMIT IS REACHED BEFORE THE ERROR IS RECOVERED, RETRY LIMIT EXCEEDED IS REPORTED AS DESCRIBED IN ERROR #14 BELOW.

3.1.5.7 ERROR #11 - TERMINATION CLASS CODE 6, UNRECOVERABLE ERROR

TAPE POSITION HAS BEEN LOST. THE ONLY VALID RECOVERY PROCEDURE IS TO REWIND AND START OVER AT BOT UNLESS THE TAPE HAS LABELS OR SEQUENCE NUMBERS. IF DENSITY CHECK IS SET THIS DIAGNOSTIC WILL REWIND AND RETRY THE COMMAND, OTHERWISE THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.5.8 ERROR #12 - TERMINATION CLASS CODE 7, FATAL SUBSYSTEM ERROR

THE SUBSYSTEM IS INCAPABLE OF PROPERLY PERFORMING COMMANDS OR AT LEAST ITS INTEGRITY IS SERIOUSLY QUESTIONABLE. REFER TO THE FATAL CLASS CODE FIELD IN THE TSSR REGISTER FOR ADDITIONAL INFORMATION ON THE TYPE OF FATAL ERROR. THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.6 ERROR #13 - RFC NON-ZERO ERROR:

IF, AFTER EXECUTION, THE RESIDUAL FRAME COUNT IS NON-ZERO, THE ERROR IS REPORTED AND A HARD ERROR IS LOGGED. THE PROGRAM THEN PROCEEDS NORMALLY. THE REPORTING AND LOGGING OF THESE ERRORS IS OPTIONAL.

3.1.7 ERROR #14 - RETRY LIMIT EXCEEDED:

ON A WRITE COMMAND THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

ON A READ COMMAND THIS ERROR IS LOGGED AS A HARD ERROR AND

THE PROGRAM PROCEEDS NORMALLY.

3.1.8 ERROR #15 - TOO MANY INTERRUPTS:

IF MORE THAN ONE INTERRUPT OCCURS PER COMMAND, THIS ERROR IS REPORTED. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.9 ERROR #16 - CAPSTAN RUNAWAY:

CAPSTAN DID NOT STOP WITHIN ACCEPTABLE WINDOW AFTER LAST COMMAND. THE PROGRAM WILL ISSUE A GET STATUS COMMAND BEFORE REPORTING THE ERROR SO THAT THE DEAD TRACK FIELD IN EXTENDED STATUS REGISTER 2 WILL CONTAIN THE TACH COUNT WHEN THE TAPE STOPPED. THIS IS A FATAL DEVICE ERROR AND THE DEVICE WILL BE DROPPED FROM THE TEST CYCLE UNLESS THE IDU OPTION IS USED.

3.1.10 ERROR #17 - DATA COMPARE ERROR:

IF A DATA VALIDATION ERROR OCCURS DURING A WRITE/VERIFY COMMAND, THE PROGRAM PRINTS WHAT THE DATA SHOULD HAVE BEEN AND WHAT THE DATA WAS, AND PRINTS THE BYTE AND RECORD NUMBER THE ERROR OCCURRED ON. A HARD ERROR IS LOGGED AND THE PROGRAM PROCEEDS NORMALLY.

3.2 ERROR HALTS

ERROR HALTS ARE SUPPORTED PER DESCRIBED IN THE PREVIOUS SECTION WITH /FLAG:HOE. THERE ARE NO OTHER HALTS.

4.0 PERFORMANCE REPORT

UNIT X PASS:XXXXX RECORD:XXXXX
BYTES WRITTEN = XXX,XXX,XXX,XXX
BYTES READ REV = XXX,XXX,XXX,XXX
BYTES READ FWD = XXX,XXX,XXX,XXX

	WRT	RDR	RDF
RECOVERABLE ERRORS	- XXXXX	XXXXX	XXXXX
UNRECOVERABLE ERRORS	- XXXXX	XXXXX	XXXXX

SPECIAL CONDITION	HARD/FATAL	DATA COMPARE
XXXXX	XXXXX	XXXXX

5.0 TEST SUMMARIES

5.1 TEST 1 -

BASIC FUNCTIONS.

EXECUTES AND VERIFIES CORRECT COMPLETION OF ALL TS04 FUNCTIONS.

SUBTEST 1 - SET CHAR, DRIVE INIT, GET STATUS.

- + SET CHARACTERISTIC 200.
- + DRIVE INITIATE.
- + SET CHARACTERISTIC 20.
- + GET STATUS
- + SET CHARACTERISTIC 40.
- + PRINT TS04 MICROCODE LEVEL (PASS 1 ONLY)

SUBTEST 2 - REWIND.

- + REWIND.
- + REWIND AT BOT.

SUBTEST 3 - WRITE/VERIFY.

- + WRITE/VERIFY PATTERN 1.
- + WRITE/VERIFY PATTERN 2.
- + WRITE/VERIFY PATTERN 3.
- + WRITE/VERIFY PATTERN 4.
- + WRITE/VERIFY PATTERN 5.
- + WRITE/VERIFY PATTERN 6.
- + WRITE/VERIFY PATTERN 0.

SUBTEST 4 - WRITE TAPE MARK, ERASE.

- + WRITE TAPE MARK.
- + WRITE 10 RECORDS
- + ERASE 10 TIMES
- + WRITE TAPE MARK.
- + WRITE TAPE MARK RETRY.

SUBTEST 5 - SPACE FILES.

- + SPACE 2 FILES REVERSE.
- + SPACE 2 FILES FORWARD.

- + SPACE 2 FILES REVERSE.
- + SPACE 2 FILES FORWARD.

SUBTEST 6 - SPACE RECORDS.

- + REWIND.
- + SPACE 7 RECORDS FORWARD.
- + SPACE 7 RECORDS REVERSE.
- + SPACE 7 RECORDS FORWARD.
- + SPACE 7 RECORDS REVERSE.

SUBTEST 7 - WRITE RETRY.

- + REWIND.
- + WRITE DATA.
- + WRITE RETRY.

SUBTEST 8 - READ REV RETRY.

- + READ REVERSE.
- + READ NEXT REVERSE.
- + READ NEXT FORWARD.

SUBTEST 9 - READ FWD RETRY.

- + READ FORWARD.
- + READ PREVIOUS FORWARD.
- + READ PREVIOUS REVERSE.

SUBTEST 10 - CLEAN.

- + CLEAN.
- + REWIND.

SUBTEST 11 - WRITE/VERIFY SWAPPED DATA BYTES.

- + WRITE/VERIFY EVEN LENGTH (RECORD 1).
- + WRITE/VERIFY ODD LENGTH (RECORD 2).
- + SET DATA BYTE SWAP.
- + WRITE/VERIFY EVEN LENGTH (RECORD 3).
- + WRITE/VERIFY ODD LENGTH (RECORD 4).
- + CLEAR DATA BYTE SWAP.

SUBTEST 12 - READ SWAPPED DATA BYTES.

- + READ REV RECORD 4.
- + READ REV RECORD 3.
- + SET DATA BYTE SWAP.
- + READ REV RECORD 2.
- + READ REV RECORD 1.
- + READ FWD RECORD 1.
- + READ FWD RECORD 2.
- + CLEAR DATA BYTE SWAP.
- + READ FWD RECORD 3.
- + READ FWD RECORD 4.

5.2 TEST 2 - DATA RELIABILITY.

1. THE TAPE IS INITIATED WITH THE FOLLOWING COMMANDS:
SET CHARACTERISTIC 40
REWIND
WRITE/VERIFY 63 RECORDS OF RANDOM LENGTH AND DATA
2. WRITE AND READ COMMANDS ARE SELECTED AT RANDOM AND ARE EXECUTED A RANDOM NUMBER OF TIMES WITH RANDOM LENGTHS AND RANDOM PATTERN UNTIL END OF TAPE IS REACHED.
3. AT THE END OF EACH PASS, A REWIND COMMAND IS ISSUED AND A PERFORMANCE REPORT IS PRINTED.

NOTE: IF A RESTART COMMAND IS USED TO INITIATE TEST 1, THE INITIAL REWIND COMMAND IS NOT ISSUED.

5.3 TEST 3 - WRITE COMPATABILITY/WRITE UTILITY.

WRITES RECORDS OF RANDOM LENGTHS AND DATA FROM BOT TO EOT.

5.4 TEST 4 - READ COMPATABILITY/READ UTILITY.

READS ENTIRE TAPE, FORWARD AND REVERSE.

5.5 TEST 5 - EXECUTE OPERATOR SELECTED COMMAND SEQUENCE.

THE SEQUENCE OF COMMANDS ENTERED BY THE OPERATOR IS EXECUTED. IF NO COMMANDS WERE ENTERED, A DEFAULT SEQUENCE OF WRITE/VERIFY RANDOM DATA IS EXECUTED.

6.0 DEVICE INFORMATION TABLES

6.1 GENERAL

THE TS04 TAPE SUBSYSTEM CONSISTS OF A TS11 UNIBUS TO SERIAL BUS CONTROLLER CONNECTED TO A TS04 DRIVE. FROM A SOFTWARE VIEWPOINT THIS CONFIGURATION IS UNIQUE (FOR A UNIBUS DEVICE) IN A NUMBER OF WAYS:

- A. ONLY ONE REGISTER MAY BE WRITTEN - TSDB (TAPE SYSTEM DATA BUFFER),
- B. TWO REGISTERS MAY BE READ - TSSR AND TSBA (TAPE SYSTEM STATUS REGISTER AND TAPE SYSTEM BUS ADDRESS REGISTER),
- C. COMMANDS ARE NOT WRITTEN TO THE DRIVE; RATHER, COMMAND POINTERS ARE WRITTEN WHICH POINT TO COMMAND PACKETS SOMEWHERE IN CPU MEMORY. THE COMMAND POINTER IS USED BY THE TS04 SUBSYSTEM TO FETCH THE WORD(S) WITHIN THE COMMAND PACKET. THE WORDS WITHIN THE COMMAND PACKET ARE:
 - 1. COMMAND WORD
 - 2. LOW ORDER BUFFER ADDRESS
 - 3. HIGH ORDER BUFFER ADDRESS
 - 4. BYTE COUNT
- D. THE TSSR CONTAINS ALL THE INFORMATION WHICH WILL BE NECESSARY TO DETERMINE WHETHER:
 - 1. THE DRIVE IS READY TO ACCEPT ANOTHER COMMAND,
 - 2. THE PREVIOUS COMMAND WAS EXECUTED WITHOUT ERROR.IF EITHER OF THE ABOVE CONDITIONS IS UNTRUE AT "JOB DONE" OR "COMMAND INITIATION" TIME, IT MAY BE NECESSARY TO GET THE EXTENDED STATUS REGISTERS TO DETERMINE WHAT ACTION IS TO BE TAKEN AND/OR LOG THE ERROR INFORMATION.
- E. EXTENDED STATUS REGISTERS ARE NOT READ DIRECTLY FROM DRIVE REGISTERS; RATHER, A "GET STATUS" COMMAND IS ISSUED WHICH WILL CAUSE THE TS04 TO TRANSFER EXTENDED STATUS INFORMATION TO THE MEMORY AREA POINTED TO BY THE BUFFER ADDRESS OF THE "GET STATUS" COMMAND. THERE ARE FOUR EXTENDED STATUS REGISTERS. SEE 6.3.
- F. THE TSDB MUST BE WRITTEN WITH A DATO INSTRUCTION TO PROPERLY WRITE THE COMMAND POINTER. A DATOB WILL CAUSE A MAINTENANCE FUNCTION. A DATO TO THE TSSR WILL CAUSE SUBSYSTEM INIT.
- G. COMMAND PACKETS MUST RESIDE ON DIVIDE BY FOUR MEMORY BOUNDARIES (AS OPPOSED TO DIVIDE BY 2 OR WORD BOUNDARIES) .

6.2 UNIBUS INTERFACE SPECIFICATIONS

<u>TS11/ TS04</u>	<u>INT. VECTOR</u>	<u>UNIBUS ADDRESS</u>	<u>REGISTER</u>
FIRST	150	772520 772522	TSBA/TSDB TSSR
SECOND	154	772524 772526	TSBA/TSDB TSSR
THIRD	160	772530 772532	TSBA/TSDB TSSR
FOURTH	164	772534 772536	TSBA/TSDB TSSR

6.3 BIT DEFINITIONS FOR TS11/TS04 REGISTERS

6.3.1 TS11/TS04 REGISTER SUMMARY

	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
TSBA	A15	A14	A13	A12	A11	A10	A09	A08	A07	A06	A05	A04	A03	A02	A01	A00
TSDB	P15	P14	P13	P12	P11	P10	P09	P08	P07	P06	P05	P04	P03	P02	P17	P16
TSSR	SC	UPE	SPE	RMR	NXM	NBA	A17	A16	SSR	OFL	FC1	FC0	TC2	TC1	TC0	
XST0	TMK	RLS	LET	RLL	WLE	NEF	ILC	ILA	MOT	ONL	IE	VCK	PED	WLK	BOT	EOT
XST1	DLT		COR	CRS	TIG	DBF	SCK		IPR	SYN	IPO	IED	POS	POL	UNC	MTE
						NZO				DRP	ITM	LCO	NZN	LRC	CRC	VPE
XST2	OPM	SIP	BPE	CAF		WCF		DTP	DT7	DT6	DT5	DT4	DT3	DT2	DT1	DT0
XST3	MICRO DIAGNOSTIC ERROR CODE							LMX	OPI	REV	CRF	DCK	NOI		RIB	

TERMINATION CLASS CODES (TSSR TC0-TC2):

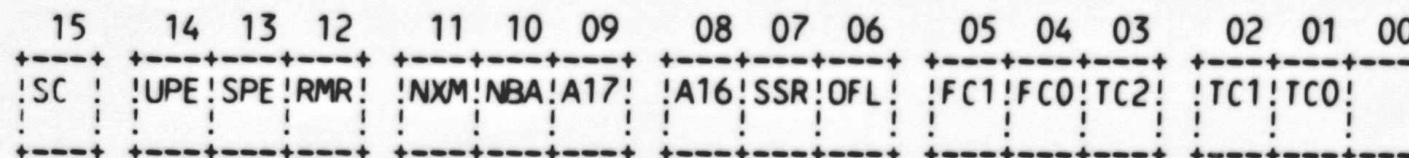
- 0 = NORMAL TERMINATION
- 1 = ATTENTION CONDITION
- 2 = TAPE STATUS ALERT
- 3 = FUNCTION REJECT
- 4 = RECOVERABLE ERROR - TAPE POSITION = ONE RECORD
DOWN TAPE FROM START OF FUNCTION
- 5 = RECOVERABLE ERROR - TAPE NOT MOVED
- 6 = UNRECOVERABLE ERROR - TAPE POSITION LOST
- 7 = FATAL CONTROLLER ERROR

FATAL CLASS CODES (TSSR FC0-FC1):

- 0 = MICRO DIAGNOSTIC FAILURE (DISPLAYED IN TS04 OPERATOR PANEL AND XST3).
- 1 = I/O SEQUENCER CROM PARITY ERROR.
- 2 = MICROPROCESSOR CROM PARITY ERROR.
SILO PARITY ERROR.
SERIAL BUS PARITY ERROR DETECTED AT TS11 (SPE).
SERIAL BUS PARITY ERROR DETECTED AT TS04 (BPE).
FATAL ERROR HALTS 1750-1777 IN TS04 PROGRAM COUNTER DISPLAY.
- 3 = LOSS OF AC POWER HAS BEEN DETECTED.

6.3.2 TS11 STATUS REGISTER (TSSR)

UNIBUS ADDRESS + 2 - READ ONLY

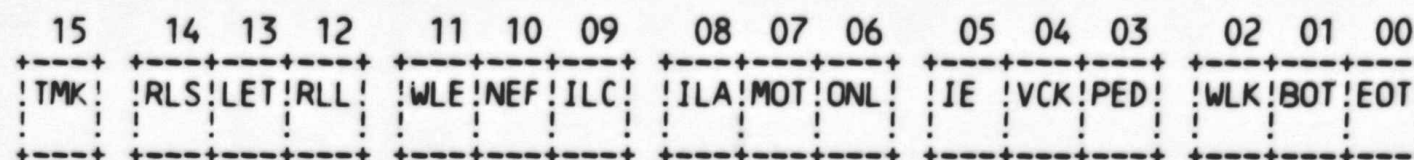


BIT	NAME	TCC	DEFINITION
15	SC	S	SPECIAL CONDITION. WHEN SET, INDICATES THAT THE LAST COMMAND DID NOT COMPLETE WITHOUT INCIDENT. SPECIFICALLY, EITHER AN ERROR WAS DETECTED OR AN EXCEPTION CONDITION OCCURRED. EXCEPTION CONDITIONS CAN BE TAPE MARKS ON READ COMMANDS, REVERSE MOTION AND AT BOT, EOT WHILE WRITING, ETC. MAY ALSO BE SET BY THE ERROR BITS CONTAINED IN THE TSSR REGISTER: UPE, SPE, RMR, AND NXM. THE TERMINATION CLASS BITS ARE SOMETHING OTHER THAN 0 (UNLESS RMR IS THE ONLY ERROR - SEE RMR).
14	UPE	4/5	UNIBUS PARITY ERROR. SET BY THE TS11 WHEN IT DETECTS A PARITY ERROR ON THE UNIBUS DATA WHEN TRANSFERRING TO OR FROM THE CPU'S MEMORY.
13	SPE	7	SERIAL BUS PARITY ERROR. THIS BIT IS SET BY THE TS11 WHEN IT DETECTS A SERIAL BUS PARITY ERROR ON DATA RECEIVED FROM THE TS04.
12	RMR	S	REGISTER MODIFICATION REFUSED. SET BY THE TS11 WHEN A COMMAND POINTER IS LOADED INTO TSDB AND SUB-SYSTEM READY (SSR) IS NOT SET. NOTE THAT THIS BIT CAUSES SPECIAL CONDITION BUT NO TERMINATION CLASS (IN FACT, THE TS04 NEVER SEES THIS ERROR) BECAUSE ON A SYSTEM WITH NO BUGS, THIS BIT MAY COME UP ON AN ATTENTION MESSAGE. IF ATTNS ARE NOT ENABLED, THIS BIT COMING UP IS AN INDICATION OF EITHER A FATAL CONTROLLER ERROR OR A SOFTWARE BUG.
11	NXM	4/5	NON-EXISTENT MEMORY. SET BY THE TS11 WHEN TRYING TO TRANSFER TO OR FROM A MEMORY LOCATION WHICH DOES NOT EXIST. MAY OCCUR WHEN FETCHING THE COMMAND PACKET, FETCHING OR STORING DATA, OR STORING THE MESSAGE PACKET.
10	NBA	S	NEED BUFFER ADDRESS. WHEN SET, INDICATES THAT THE TS04 NEEDS A MESSAGE BUFFER ADDRESS. THIS

			BIT IS CLEARED DURING THE SET CHARACTERISTICS COMMAND (IF A GOOD ADDRESS WAS GIVEN).
09	A17	S	BUS ADDRESS BIT 17. A17 AND A16 (BIT 08) TRACK THE VALUES OF BITS 17 AND 16 OF THE TSBA REGISTER.
08	A16	S	BUS ADDRESS BIT 16. SEE A17 (BIT 09).
07	SSR	S	SUB-SYSTEM READY. WHEN SET, INDICATES THAT THE TS11/TS04 SUBSYSTEM IS NOT BUSY AND IS READY TO ACCEPT A NEW COMMAND POINTER.
06	OFL	S,1,3	OFF-LINE. WHEN SET, INDICATES THAT THE TS04 IS OFF-LINE AND UNAVAILABLE FOR ANY TAPE MOTION COMMANDS. THIS BIT CAN CAUSE A TERMINATION CLASS OF 1 (ON ATTN INTERRUPT) OR 3 (RESULTS IN NEF).
05	FC1	7	FATAL TERMINATION CLASS 01. FC1 AND FC0 (BIT 04) ARE USED TO INDICATE THE TYPE OF FATAL ERROR WHICH HAS OCCURRED ON THE TS04. THESE BITS ARE VALID ONLY WHEN SC IS SET AND THE TERMINATION CLASS CODE BITS ARE ALL SET (111).
04	FC0	7	FATAL TERMINATION CLASS 00. SEE FC1 (BIT 05).
03	TC2	S	TERMINATION CLASS BIT 02. THIS BIT, ALONG WITH THE TC1 AND TC0 BITS, ACT AS AN OFFSET VALUE WHENEVER AN ERROR OR EXCEPTION CONDITION OCCURS ON A COMMAND. EACH OF THE EIGHT POSSIBLE VALUES OF THIS FIELD REPRESENT A PARTICULAR CLASS OF ERRORS OR EXCEPTIONS. THE CONDITIONS IN EACH CLASS HAVE SIMILAR SIGNIFICANCE AND, AS APPLICABLE, RECOVERY PROCEDURES. THE CODE PROVIDED IN THIS FIELD IS EXPECTED TO BE UTILIZED AS AN OFFSET INTO A DISPATCH TABLE FOR HANDLING OF THE CONDITION.
02	TC1	S	TERMINATION CLASS BIT 01. SEE TC2 (BIT 03).
01	TC0	S	TERMINATION CLASS BIT 00. SEE TC2 (BIT 03).
00	-	-	NOT USED.

UNIBUS ADDRESS + 2 - WRITE ONLY
SUBSYSTEM INITIALIZE

6.3.3 EXTENDED STATUS REGISTER 0 (XSTAT0)



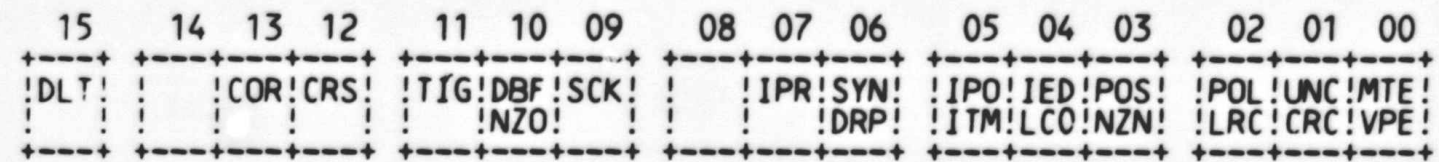
BIT	NAME	TCC	DEFINITION
15	TMK	S,2	TAPE MARK DETECTED. SET WHENEVER A TAPE MARK WAS DETECTED DURING A READ, SPACE, OR SKIP COMMAND AND AS A RESULT OF THE WRITE TAPE MARK OR WITE TAPE MARK RETRY COMMANDS.
14	RLS	2	RECORD LENGTH SHORT. THIS BIT INDICATES THAT EITHER THE RECORD'S LENGTH WAS SHORTER THAN THE BYTE COUNT ON READ OPERATIONS, A SPACE RECORD OPERATION ENCOUNTERED A TAPE MARK OR BOT BEFORE THE POSITION COUNT WAS EXHAUSTED, OR A SKIP TAPE MARKS COMMAND WAS TERMINATED BY ENCOUNTERING BOT OR A DOUBLE TAPE MARK (IF THAT OPERATIONAL MODE IS ENABLED, SEE LET) PRIOR TO EXHAUSTING THE POSITION COUNTER.
13	LET	2	LOGICAL END OF TAPE. SET ONLY ON THE SKIP TAPE MARKS COMMAND WHEN EITHER TWO CONTIGUOUS TAPE MARKS ARE DETECTED OR WHEN MOVING OFF OF BOT AND THE FIRST RECORD ENCOUNTERED IS A TAPE MARK. THE SETTING OF THIS BIT WILL NOT OCCUR UNLESS THIS MODE OF TERMINATION IS ENABLED THROUGH USE OF THE SET CHARACTERISTICS COMMAND.
12	RLL	2	RECORD LENGTH LONG. WHEN SET, THIS BIT INDICATES THAT THE RECORD READ WAS LONGER THAN THE BYTE COUNT SPECIFIED.
11	WLE	3,6	WRITE LOCK ERROR. WHEN SET, INDICATES THAT A WRITE OPERATION WAS ISSUED BUT THE MOUNTED TAPE DID NOT CONTAIN A WRITE ENABLE RING OR THE WRT LOCK SWITCH ACTIVATED DURING THE OPERATION.
10	NEF	3	NON-EXECUTABLE FUNCTION. WHEN SET, INDICATES THAT THE COMMAND COULD NOT BE EXECUTED DUE TO ONE OF THE FOLLOWING CONDITIONS: <ul style="list-style-type: none"> - THE COMMAND SPECIFIED REVERSE TAPE DIRECTION BUT THE TAPE WAS ALREADY POSITIONED AT BOT. - THE ISSUING OF ANY COMMAND, EXCEPT REWIND,

UNLOAD, OR A COMMAND WITH THE CLEAR VOLUME CHECK (CVC) BIT SET, WHEN THE VOLUME CHECK BIT IS SET.

- ANY COMMAND, EXCEPT GET STATUS OR DRIVE INITIALIZE, WHEN THE TS04 IS OFF-LINE.
- ANY WRITE COMMAND WHEN THE TAPE DOES NOT CONTAIN A WRITE ENABLE RING (WRITE LOCK STATUS - WLS).

09	ILC	3	ILLEGAL COMMAND. SET WHEN A COMMAND IS ISSUED AND EITHER ITS COMMAND FIELD OR ITS COMMAND MODE FIELD CONTAINS CODES WHICH ARE NOT SUPPORTED BY THE TS04.
08	ILA	3	ILLEGAL ADDRESS. (MORE THAN 18 BITS OR ODD WHEN AN EVEN ADDRESS IS REQUIRED.)
07	MOT	S	TAPE IS MOVING.
06	ONL	S	ON LINE. WHEN SET, INDICATES THAT THE TS04 IS ON-LINE AND OPERABLE.
05	IE	S	INTERRUPT ENABLE. REFLECTS THE STATE OF THE INTERRUPT ENABLE BIT SUPPLIED ON THE LAST COMMAND.
04	VCK	S	VOLUME CHECK. WHEN SET, INDICATES THAT THE DRIVE HAS BEEN EITHER POWERED DOWN OR TURNED OFF-LINE. CLEARED BY THE CLEAR VOLUME CHECK (CVC) BIT IN THE COMMAND HEADER WORD. THIS BIT CAN CAUSE A TERMINATION CLASS OF 3.
03	PED	S	PHASE ENCODED DRIVE. WHEN SET, INDICATES THAT THE TS04 IS CAPABLE OF READING AND WRITING ONLY 1600 BPI PHASE ENCODED DATA. WHEN RESET, INDICATES THAT THE TS04 HAS ONLY 800 BPI NRZI DATA CAPABILITIES.
02	WLK	S,3	WRITE LOCKED. WHEN SET, INDICATES THAT THE MOUNTED REEL OF TAPE DOES NOT HAVE A WRITE-ENABLE RING INSTALLED. THE TAPE IS, THEREFORE, WRITE PROTECTED.
01	BOT	S,3	BEGINNING OF TAPE. WHEN SET, INDICATES THAT THE TAPE IS POSITIONED AT THE LOAD POINT AS DENOTED BY THE BOT REFLECTIVE STRIP ON THE TAPE.
00	EOT	S,2	END OF TAPE. THIS BIT IS SET WHENEVER THE TAPE IS POSITIONED AT OR BEYOND THE END OF TAPE REFLECTIVE STRIP. DOES NOT RESET UNTIL THE TAPE PASSES OVER THE REFLECTIVE STRIP IN THE REVERSE DIRECTION UNDER PROGRAM CONTROL.

6.3.4 EXTENDED STATUS REGISTER 1 (XSTAT1)

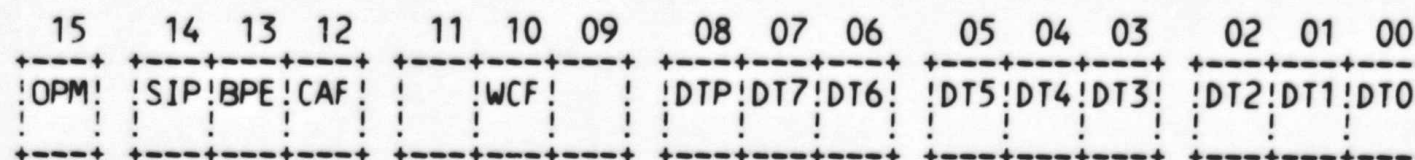


BIT	NAME	TCC	DEFINITION
15	DLT	4	DATA LATE. SET WHEN THE I/O SILO IS FULL ON A READ OR EMPTY ON A WRITE. THESE CONDITIONS OCCUR WHENEVER THE UNIBUS LATENCY EXCEEDS THE DATA TRANSFER RATE OF THE TS04.
14	-	-	NOT USED.
13	COR	S	CORRECTABLE DATA. IN PHASE ENCODED MODE, A CORRECTABLE DATA ERROR HAS BEEN ENCOUNTERED.
12	CRS	4	CREASE DETECTED. FOR NRZI, ALL DATA TRACKS DROPPED OUT FOR MORE THAN THREE CHARACTER TIMES BUT FOR LESS THAN .1 INCHES OF TAPE. FOR PE, EIGHT OUT OF NINE DATA TRACKS WENT DEAD FOR LESS THAN .1 INCHES BEFORE A VALID POSTAMBLE WAS DETECTED.
11	TIG	4	TRASH IN THE GAP. NON-ERASED DATA WAS DETECTED IN A GAP DURING A READ, WRITE, WRITE TAPE MARK, OR ERASE COMMAND.
10	DBF	4	EXCESSIVE SKEW. FOR NRZI, DATA OCCURRED BETWEEN THE 50% MARK AND THE 100% MARK OF THE NRZI DATA WINDOW. FOR PE, IT TOOK MORE THAN FIVE CHARACTERS IN READ-AFTER-WRITE OR TEN CHARACTERS IN READ TO PROPERLY CENTER THE WINDOWS OF THE FORMAT CHANNEL LOGIC.
	NZO	4	NRZ FIFO OVERRUN.
09	SCK	4	SPEED CHECK. TAPE SPEED WAS OFF BY MORE THAN 5% DURING A WRITE DATA OPERATION. NOTE THAT SPEED AVERAGED OVER 8 TICKS AND THE AVERAGE MUST BE OFF 5% TO CAUSE THIS ERROR.
08	-	-	NOT USED.
07	IPR	S,4	INVALID PREAMBLE. SET ON A PE DRIVE IF THE PREAMBLE APPEARS TO BE SHORTER THAN 36 CHARACTERS OR LONGER THAN 44 CHARACTERS. ALSO

SET IF THE PREAMBLE IS INCORRECTLY ENCODED BEYOND THE FIFTEENTH CHARACTER IN READ OR THE TENTH CHARACTER IN READ-AFTER-WRITE.

06	SYN	4	SYNCH FAILURE. SET ON A PE DRIVE IF THE FORMATTER WAS UNABLE TO ACHIEVE SYNCHRONIZATION IN THE PREAMBLE.
	DRP	4	NRZ RECORD DROPPED A CHARACTER (THE NEXT CHARACTER WAS TO BE CONSIDERED CRC).
05	IPO	S,4	INVALID POSTAMBLE. SET ON A PE DRIVE DURING READ OR WRITE IF ANY OF THE FIRST 39 CHARACTERS OF THE POSTAMBLE ARE NOT READ CORRECTLY.
	ITM	S,4	ILLEGAL TAPE MARK FOR NRZ.
04	IED	4	INVALID END DATA. FOR PE, EIGHT OUT OF NINE TRACKS WENT DEAD BEFORE THE POSTAMBLE WAS DETECTED.
	LRO	4	FOR NRZI, DATA WAS NOT DETECTED IN EITHER THE LRCC OR CRCC WINDOWS. (LRC WAS ZERO)
03	POS	S,4	POSTAMBLE SHORT. SET ON PE DRIVES DURING A READ OR WRITE WHEN LESS THAN 38 ALL-ZEROES CHARACTERS ARE READ FOLLOWING THE ALL-ONES CHARACTER.
	NZN	S,4	NRZ NOISE RECORD (FEWER THAN 13(10) FRAMES).
02	POL	4	POSTAMBLE LONG. SET ON PE DRIVES DURING READ OR WRITE OPERATIONS WHEN THE POSTAMBLE EXCEEDS 42 CHARACTERS.
	LRC	4	LRC ERROR. SET ON NRZI DRIVES WHEN THE LRCC CHARACTER WAS FOUND IN ERROR.
01	UNC	4	UNCORRECTABLE DATA. SET ON PE DRIVES WHEN A PARITY ERROR OCCURRED WITHOUT A CORRESPONDING DEAD TRACK INDICATION.
	CRC	4	CRC ERROR. SET ON NRZI DRIVES WHEN THE CRC CHARACTER WAS FOUND TO BE IN ERROR.
00	MTE	4	MULTI-TRACK ERROR. SET ON PE DRIVES WHEN MORE THAN ONE DEAD TRACK OCCURRED IN THE PREAMBLE OR IN THE DATA FIELD.
	VPE	4	VERTICAL PARITY ERROR. SET ON NRZI DRIVES WHEN A CHARACTER DID NOT CONTAIN AN ODD NUMBER OF ONE BITS.

6.3.5 EXTENDED STATUS REGISTER 2 (XSTAT2)

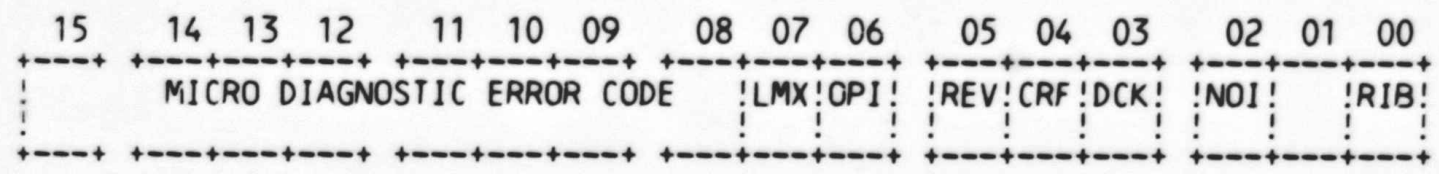


BIT	NAME	TCC	DEFINITION
15	OPM	S	OPERATION IN PROGRESS. (TAPE MOVING)
14	SIP	7	SIL0 PARITY ERROR. CAUSES FATAL CLASS 2 BECAUSE THE ERROR MIGHT HAVE OCCURRED DURING THE TRANSMISSION OF THE MESSAGE PACKET.
13	BPE	7	SERIAL BUS PARITY ERROR AT DRIVE. SET BY THE TS04 WHEN A PARITY ERROR IS DETECTED ON DATA TRANSMITTED FROM THE TS11 TO THE TS04. CAUSES FATAL CLASS 2 BECAUSE THE ERROR MIGHT HAVE OCCURRED DURING THE TRANSMISSION OF THE MESSAGE PACKET.
12	CAF	7	CAPSTAN ACCELERATION FAIL. AFTER ACCELERATING TAPE FOR .2 INCHES, THE TAPE SPEED WAS CHECKED AND FOUND TO BE OUT OF TOLERANCE BY MORE THAN 10%.
11	-	-	NOT USED.
10	WCF	7	DESKEW BUFFER FAIL. ONE OF THE DESKEW BUFFERS FAILED TO ASSERT 'OUTPUT READY' WITHIN 20 MICROSECONDS AFTER BEING ENABLED. THE DEAD TRACK BITS WILL INDICATE ON WHICH TRACKS THIS FAILURE OCCURRED.
09	-	-	NOT USED.
08	DTP	S	DEAD TRACK PARITY. THE BITS DTP THROUGH DTO INDICATE WHICH TRACK(S) WENT DEAD, IF ANY, DURING THE LAST DATA TRANSFER OPERATION. IF DESKEW BUFFER FAIL (DBF) IS SET, THESE BITS INDICATE WHICH CHANNEL FAILED.
07	DT7	S	DEAD TRACK 7. SEE DTP.
06	DT6	S	DEAD TRACK 6. SEE DTP.
05	DT5	S	DEAD TRACK 5. SEE DTP.
04	DT4	S	DEAD TRACK 4. SEE DTP.
03	DT3	S	DEAD TRACK 3. SEE DTP.

02 DT2 S DEAD TRACK 2. SEE DTP.
01 DT1 S DEAD TRACK 1. SEE DTP.
00 DT0 S DEAD TRACK 0. SEE DTP.

NOTE: ON A SET CHARACTERISTICS COMMAND, THE UCODE LEVEL IS RETURNED
IN DT7 THRU DT0. ON A GET STATUS COMMAND, THE RESIDUAL CAPSTAN
TICK COUNT (INTERNALLY R7) IS RETURNED IN DT7 THRU DT0.

6.3.6 EXTENDED STATUS REGISTER 3 (XSTAT3)



BIT	NAME	TCC	DEFINITION
15 TO 08			MICRO DIAGNOSTIC ERROR CODE. (SEE LIST OF CODES BELOW). ALL ERROR CODES IN THE TABLE WILL BE DISPLAYED ON THE TS04 CONTROL PANEL BUT ONLY CODES HIGHER THAN 110 WILL BE AVAILABLE TO CPU DIAGNOSTICS FOR PRINTOUT IN THE MICRO DIAGNOSTIC ERROR CODE FIELD OF XSTAT3. THIS ERROR CODE FIELD IS VALID ONLY WHEN THE TERMINATION CLASS CODE IN THE TSSR EQUALS 7 AND THE FATAL CLASS CODE IN THE TSSR EQUALS 0, INDICATING AN INTERNAL DIAGNOSTIC FAILURE.
07	NTL	6	LIMIT EXCEEDED. SET WHEN THE TAPE TENSION ARMS HAVE EXCEEDED THEIR ALLOWABLE TRAVEL AND HAVE CAUSED THE ACTIVATION OF THE LIMIT SWITCHES. NO TENSION EXISTS ON THE MOUNTED TAPE.
06	OPI	6	OPERATION INCOMPLETE. SET WHEN A READ, SPACE, OR SKIP OPERATION HAS MOVED 25 FEET OF TAPE WITHOUT DETECTING ANY DATA ON THE TAPE.
05	REV	5	DIRECTION OF CURRENT OPERATION WAS REVERSE (BUT IS 0 IF REWIND OR FORWARD)
04	CRF	7	CAPSTAN RESPONSE FAILURE. A MOTION COMMAND WAS GIVEN TO THE CAPSTAN BUT WE DID NOT GET A TICK BACK WITHIN A REASONABLE AMOUNT OF TIME.
03	DCK	5,6	DENSITY CHECK. SET ON PE DRIVES WHEN A PE IDENTIFICATION BURST WAS NOT DETECTED WHEN MOVING OFF OF BOT. SET ON NRZI DRIVES WHEN A NON-NRZI IDENTIFICATION BURST WAS FOUND WHEN MOVING OFF OF BOT.
02	NOI	6	NOISE RECORD. SET DURING A READ OR SPACE OPERATION WHEN A BURST OF FLUX CHANGES, WHICH DO NOT QUALIFY AS A RECORD (BUT TOO MANY TO IGNORE), ARE DETECTED: NRZI: AT LEAST TWO CHARACTERS IN A ROW BUT LESS THAN TWELVE, FOLLOWED BY A CHARACTER IN EITHER THE CRCC OR LRCC WINDOWS.

PE: AT LEAST 24 CHARACTERS IN A ROW THAT DO NOT QUALIFY AS A TAPE MARK OR A DATA PREAMBLE.

01 - - NOT USED.

00 RIB 2 REVERSE INTO BOT. A READ, SPACE, OR SKIP COMMAND ALREADY IN PROGRESS HAS ENCOUNTERED THE BOT MARKER WHEN MOVING TAPE IN THE REVERSE DIRECTION. TAPE MOTION WILL BE HALTED AT BOT.

MICRO DIAGNOSTIC ERROR CODES

FOLLOWING IS A LIST OF THE ERRORS WHICH ARE DISPLAYED IN THE MICRO DIAGNOSTIC ERROR CODE (XSTAT3 BITS 15 - 08) AND ALSO IN THE LIGHTS ON THE TS04 CONTROL PANEL, DUE TO FAILURES ON THE CAPSTAN BOARD, I/O BOARDS, WRITE BOARD, READ BOARD, OR FORMATTER BOARD. THE MICRO WILL BE IN A TIGHT LOOP IN THE DISPM PROGRAM, WAITING FOR OPERATOR OR CPU INTERVENTION WHILE THE ERROR IS BEING DISPLAYED IN THE CONSOLE LIGHTS. IT IS APPARENT THAT AN ERROR IS BEING DISPLAYED IF THE 'UOK' LIGHT IS NOT LIGHTED, THE PROCESSOR IS NOT STOPPED, AND AN OCTAL NUMBER (100-377) IS BEING DISPLAYED IN THE LIGHTS. TO SCOPE LOOP THESE TESTS, ENTER MAINTENANCE MODE (ON-LINE SWITCH TO 'OFF' POSITION, MAINTENANCE SWITCH UP, PRESS RESET), ENTER THE OFF-LINE TEST NUMBER (SEE SCOPE LOOP COLUMN BELOW) IN THE OPERATOR CONSOLE LIGHTS (ENTER ONES WITH LEFT-MOST SWITCH, ENTER ZEROES WITH RIGHT-MOST SWITCH), AND PRESS ON-LINE BUTTON. TEST WILL LOOP UNTIL ON-LINE SWITCH IS RETURNED TO OFF-LINE POSITION, ERRORS WILL BE DISPLAYED CONTINUOUSLY.

ERROR (DISPLAY)	PROGRAM	ERROR DESCRIPTION	LIKELY MODULE	SCOPE LOOP
337	OPERATIONAL CODE	CAPSTAN RUNAWAY ERROR (H3.RNY). CAPSTAN DIDN'T STOP WITHIN ACCEPTABLE WINDOW AFTER LAST COMMAND.		
100	IOTSM	BASIC I/O MICRO FAILURE (PARITY ERROR, IOATN, HANDSHAKING, AND DATA WINDOW TEST BETWEEN THE I/O AND MAIN MICROS. NOTE: CAN ALSO BE CAUSED BY THE SERIAL BUS .SHIN (SHIFT IN) STUCK ASSERTED.	M8967	14
101	IOTSM	ERROR IN I/O CONTROL REGISTER TEST	M8966 M8967	15
102	IOTSM	FAILURE OF FRAME COUNTER TEST	M8966	15

103	IOTSM	FAILURE OF I/O SILO NON-PARITY ERROR DATA TEST OR THE WRITE FLAG.	M8966 M8963	16
104	IOTSM	FAILURE OF I/O SILO PARITY ERROR TEST OR DATA LATE TEST.	M8966	17
105	IOTSM	FAILURE OF SHIFT LOOP WITH ZEROES.	M8965	20
106	IOTSM	FAILURE OF SHIFT LOOP WITH ONES.	M8965	21
107	IOTSM	FAILURE OF SHIFT LENGTH MUX.	M8965	22
110	IOTSM	FAILURE TO RECEIVE CORRECT OP-CODE FROM TS11 WHEN WE SENT DATA OVER THE SERIAL BUS.	M8965 TS11 MOTHER BD SBUS CABLE	47
111	CATSM	FAILURE OF 1 KHZ CLOCK TEST. TSTS TAC SYNC FLOP AND ATTN, TOO.	G159 CBUS CABLE M8963	2
112	CATSM	LIGHT REGISTER CHANGED WHEN MOTION REGISTER WAS CLEARED.	G159	3,4
113	CATSM	FWD OR MVG BITS WRONG AFTER 1 TICK OF SIMULATED COMMAND AND TACH PULSES.	G159	3,4
114	CATSM	FAILURE OF SIMULATED CAPSTAN SPEED TEST. THE CAPSTAN SPEED COUNTER WAS OUT OF RANGE WHEN TAPE MOTION AT SPEED WAS SIMULATED.	G159	3,4
115	CATSM	FAILURE OF SIMULATED SLOW CAPSTAN TEST. SPEED COUNTER DID NOT LATCH UP WITH MAX COUNT WHEN SLOW TACH TICKS WERE SIMULATED.	G159	3,4
116	CATSM	FAILURE OF SIMULATED CAPSTAN DECEL TEST. COUNTER NOT ZERO FOR FORWARD OR 377 FOR REVERSE WHILE DECELERATING, OR MVG BIT NOT 1.	G159	3,4
117	CATSM	FAILURE OF MOVING FLOP TO GO TO ZERO AFTER STOPPING (DIRECTION REVERSAL FOR ONE TACH TICK).	G159	3,4
120	PETSM	FAILURE OF WRITE BOARD TO TURN ON AND EMPTY THE SILO, OR DATA LATE BIT DOESN'T WORK.	M8929 M8966	23
121	PETSM	FAILURE OF WRITE BOARD TO EMPTY SILO AT CORRECT SPEED.	M8929	23
124	PETSM	FORMATTER FLAG DOESN'T WORK ON THE	M8922	24

		M8922.		
125	PETSM	FORMATTER SILO FILLING AND DATA ERROR	M8922 M8923 M8924	24
126	PETSM	PEAK SHIFT TEST ERROR	M8922 M8923 M8924	25
127	PETSM	FORMATTER TABLE LOOKUP ROM CHECKSUM TEST ERROR	M8922 M8923 M8924	26

&


```
2278 .TITLE PROGRAM HEADER AND TABLES
2279 .SBTTL PROGRAM HEADER
2280
2281 .ENABL ABS,AMA
2282 = 2000
2283 002000 002000 BGNMOD
2284
2285 :++
2286 : THE PROGRAM HEADER IS THE INTERFACE BETWEEN
2287 : THE DIAGNOSTIC PROGRAM AND THE SUPERVISOR.
2288 :--
2289
2290 002000 POINTER ALL
2291
2292
2293 002000 HEADER CZTSH,A,0,5000,5000,2700,,E,DESCM
2294 002000
2295 002010 L$NAME::
2296 002011 L$REV::
2297 002012 L$DEPO::
2298 002014 L$UNIT::
2299 002016 L$TIML::
2300 002020 L$HPCP::
2301 002022 L$SPCP::
2302 002024 L$HPTP::
2303 002026 L$SPTP::
2304 002030 L$LADP::
2305 002032 L$STA::
2306 002034 L$CO::
2307 002036 L$EFLG::
2308 002040 L$APT::
2309 002042 L$DTP::
2310 002044 L$EXP1::
2311 002046 L$EXP2::
2312 002050 L$EXP3::
2313 002052 L$MREV::
2314 002054 L$TIM1::
2315 002056 L$TIMU::
2316 002062 L$EF::
2317 002064 L$SPC::
2318 002066 L$DEVP::
2319 002070 L$REPP::
2320 002072 L$DRCT::
2321 002074 L$DRS::
2322 002076 L$AUT::
2323 002100 L$DUT::
2324 002102 L$STID::
2325 002104 L$DESC::
2326 002106 L$IICP::
2327 L$CCP::
```

PROGRAM HEADER AND TABLES
CZTSHA.P11 28-DEC-78 14:34

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DISPATCH TABLE

SEQ 0050

2328
2329
2330
2331
2332
2333
2334
2335 002110
2336 002112
2337

.SBTTL DISPATCH TABLE

:++
: THE DISPATCH TABLE CONTAINS THE STARTING ADDRESS OF EACH TEST.
: IT IS USED BY THE SUPERVISOR TO DISPATCH TO EACH TEST.
:--

DISPATCH 5
L\$DISPATCH::


```
2338 .SBTTL DEFAULT HARDWARE P-TABLE
2339
2340 :++
2341 : THE DEFAULT HARDWARE P-TABLE CONTAINS DEFAULT VALUES OF
2342 : THE TEST-DEVICE PARAMETERS. THE STRUCTURE OF THIS TABLE
2343 : IS IDENTICAL TO THE STRUCTURE OF THE RUN-TIME P-TABLE.
2344 :--
2345
2346 002124 BGNHW DFPTBL
2347 002126 L$HW::
2348 002126 DFPTBL::
2349
2350
2351 002126 172520 172520 :TSD8 ADDRESS.
2352 002130 000150 150 :VECTOR ADDRESS.
2353
2354 002132 ENDPHW
2355 002132 L10000:
```

```
2356 .SBTTL SOFTWARE P-TABLE
2357
2358 :++
2359 : THE SOFTWARE P-TABLE CONTAINS THE VALUES OF THE PROGRAM
2360 : PARAMETERS THAT CAN BE CHANGED BY THE OPERATOR.
2361 :--
2362
2363 002132          BGNSW  SFPTBL
2364 002134          L$SW::
2365 002134          SFPTBL::
2366
2367 002134          001      CLRFLG:: .BYTE 1      ;CLEAR COUNTERS FLAG.
2368 002135          000      RRANV:: .BYTE 0      ;RESET RANDOM VARIABLES EACH PASS FLAG.
2369 002136          000      HAE:: .BYTE 0      ;HALT AFTER EACH COMMAND FLAG.
2370 002137          000      .BYTE 0      ;SPARE.
2371 002140          000      .BYTE 0      ;SPARE.
2372 002141          000      .BYTE 0      ;SPARE.
2373 002142          000      DINT:: .BYTE 0      ;DISABLE INTERRUPTS FLAG.
2374 002143          000      IREC:: .BYTE 0      ;INHIBIT ERROR RECOVERY FLAG.
2375 002144          000      CHGFLG:: .BYTE 0      ;CHANGE CMD SEQ TABLE FLAG.
2376 002145          000      .BYTE 0      ;SPARE.
2377 002146          000      PIRE:: .BYTE 0      ;INHIBIT RESIDUAL FRAMECOUNT ERROR REPORT FLAG.
2378 002147          000      .BYTE 0      ;SPARE.
2379 002150          000040    CHAR:: CH.EAI      ;CHARACTERISTICS CODE (DEFAULT = 40).
2380 002152          000005    CMDD:: .WORD 5      ;COMMAND 2 (DEFAULT = WRITE/VERIFY).
2381 002154          010000    .WORD DATCNT      ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE)
2382 002156          000012    .WORD 12      ;NUMBER OF OPERATIONS (DEFAULT = 10).
2383 002160          000007    .WORD RANP      ;PATTERN (DEFAULT = RANDOM).
2384 002162          000005    .WORD 5      ;COMMAND 3 (DEFAULT = WRITE/VERIFY).
2385 002164          010000    .WORD DATCNT      ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
2386 002166          000012    .WORD 12      ;NUMBER OF OPERATIONS (DEFAULT = 10).
2387 002170          000007    .WORD RANP      ;PATTERN (DEFAULT = RANDOM).
2388 002172          000005    .WORD 5      ;COMMAND 4 (DEFAULT = WRITE/VERIFY).
2389 002174          010000    .WORD DATCNT      ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
2390 002176          000012    .WORD 12      ;NUMBER OF OPERATIONS (DEFAULT = 10).
2391 002200          000007    .WORD RANP      ;PATTERN (DEFAULT = RANDOM).
2392 002202          000005    .WORD 5      ;COMMAND 5 (DEFAULT = WRITE/VERIFY).
2393 002204          010000    .WORD DATCNT      ;BYTE COUNT (DEFAULT = MAX BUFFER SIZE).
2394 002206          000012    .WORD 12      ;NUMBER OF OPERATIONS (DEFAULT = 10).
2395 002210          000007    .WORD RANP      ;PATTERN (DEFAULT = RANDOM).
2396 002212          000033    .WORD 33      ;END OF CMD SEQ TABLE CODE.
2397
2398 002214          ENDSW
2399 002214          L10001:
2400
2401 002214          ENDMOD
```



```
2402
2403
2404 .TITLE GLOBAL AREAS
2405 .SBTTL GLOBAL EQUATES SECTION
2406 002214 BGNMOD
2407
2408
2409 :++
2410 : THE GLOBAL EQUATES SECTION CONTAINS PROGRAM EQUATES THAT
2411 : ARE USED IN MORE THAN ONE TEST.
2412 :--
2413 002214
2414
2415 : EQUALS
2416 : BIT DIFINITIONS
2417 100000 BIT15== 100000
2418 040000 BIT14== 40000
2419 020000 BIT13== 20000
2420 010000 BIT12== 10000
2421 004000 BIT11== 4000
2422 002000 BIT10== 2000
2423 001000 BIT09== 1000
2424 000400 BIT08== 400
2425 000200 BIT07== 200
2426 000100 BIT06== 100
2427 000040 BIT05== 40
2428 000020 BIT04== 20
2429 000010 BIT03== 10
2430 000004 BIT02== 4
2431 000002 BIT01== 2
2432 000001 BIT00== 1
2433
2434 001000 BIT9== BIT09
2435 000400 BIT8== BIT08
2436 000200 BIT7== BIT07
2437 000100 BIT6== BIT06
2438 000040 BIT5== BIT05
2439 000020 BIT4== BIT04
2440 000010 BIT3== BIT03
2441 000004 BIT2== BIT02
2442 000002 BIT1== BIT01
2443 000001 BIT0== BIT00
2444
2445 : EVENT FLAG DEFINITIONS
2446 : EF32:EF17 RESERVED FOR SUPERVISOR TO PROGRAM COMMUNICATION
2447 : EF16:EF01 AVAILABLE FOR PROGRAM USE
2448
2449 000040 EF.START== 32. ; START COMMAND WAS ISSUED
2450 000037 EF.RESTART== 31. ; RESTART COMMAND WAS ISSUED
2451 000036 EF.CONTINUE== 30. ; CONTINUE COMMAND WAS ISSUED
2452 000035 EF.NEW== 29. ; A NEW PASS HAS BEEN STARTED
2453 000034 EF.PWR== 28. ; A POWER-FAIL/POWER-UP OCCURRED
2454
2455 000020 EF16== 16.
2456 000017 EF15== 15.
2457 000016 EF14== 14.
```

```

2458      000015      EF13== 13.
2459      000014      EF12== 12.
2460      000013      EF11== 11.
2461      000012      EF10== 10.
2462      000011      EF09== 9.
2463      000010      EF08== 8.
2464      000007      EF07== 7.
2465      000006      EF06== 6.
2466      000005      EF05== 5.
2467      000004      EF04== 4.
2468      000003      EF03== 3.
2469      000002      EF02== 2.
2470      000001      EF01== 1
2471
2472      ;
2473      ; PRIORITY LEVEL DEFINITIONS
2474      ;
2474      000340      PRI07== 340
2475      000300      PRI06== 300
2476      000240      PRI05== 240
2477      000200      PRI04== 200
2478      000140      PRI03== 140
2479      000100      PRI02== 100
2480      000040      PRI01== 40
2481      000000      PRI00== 0
2482
2483
2484      ; REGISTER USAGE.
2485      ;
2486      ; R0 - PASSES PARAMETERS TO/FROM DIAGNOSTIC SUPERVISOR.
2487      ; R1 - COMMAND SEQUENCE TABLE POINTER.
2488      ; R2 - GENERAL PURPOSE REGISTER.
2489      ; R3 - GENERAL PURPOSE REGISTER.
2490      ; R4 - GENERAL PURPOSE REGISTER.
2491      ; R5 - CURRENT LOGICAL DEVICE NUMBER X 2.
2492      ; R6 - STACK POINTER.
2493      ; R7 - PROGRAM COUNTER.
2494
2495      ;THE FOLLOWING ARE BIT DEFINITIONS FOR THE TSSR REGISTERS.
2496
2497      100000      TS.SC==100000      ;SPECIAL CONDITION BIT.
2498      040000      TS.UPE==40000      ;UNIBUS PARITY ERROR
2499      020000      TS.SPE==20000      ;SERIAL BUS PARITY ERROR.
2500      010000      TS.RMR==10000      ;REGISTER MODIFICATION REFUSED.
2501      004000      TS.NXM==4000      ;NON-EXISTENT MEMORY.
2502      002000      TS.NBA==2000      ;NEED BUFFER ADDRESS.
2503      001000      TS.A17==1000      ;BUS ADDRESS BIT 17.
2504      000400      TS.A16==400      ;BUS ADDRESS BIT 16.
2505      000200      TS.SSR==200      ;UNIT READY BIT.
2506      000100      TS.OFL==100      ;OFF LINE.
2507      177717      TSC.FCC==177717      ;FATAL CLASS CODE MASK.
2508      177761      TSC.TCC==177761      ;TERMINATION CLASS CODE MASK.

```



```
2509 ;THE FOLLOWING ARE BIT DEFINITIONS FOR THE COMMAND WORD
2510
2511 100000 ACK.C==100000 ;ACKNOWLEDGE BIT
2512 040000 CVC.C==40000 ;CLEAR VOLUME CHECK.
2513 020000 OPP.C==20000 ;OPPOSITE BIT
2514 010000 SWB.C==10000 ;SWAP BYTE BIT
2515 004000 MOD.C3==4000 ;MODE BIT 3
2516 004000 BRP.C==4000 ;BYTE/RECORD/FILE COUNT FLAG BIT. NOT USED
2517 ;BY TS04 BUT USED INTERNALLY BY THIS PROGRAM ONLY.
2518 002000 MOD.C2==2000 ;MODE BIT 2
2519 001000 MOD.C1==1000 ;MODE BIT 1
2520 000400 MOD.C0==400 ;MODE BIT 0
2521 000200 IE.C==200 ;INTERRUPT ENABLE
2522 000100 FMT.C1==100 ;FORMAT BIT 1
2523 000100 VFY.C==100 ;WRITE VERIFY FLAG BIT. INTERNAL USE ONLY.
2524 ;NOT USED BY TS04.
2525 000040 FMT.C0==40 ;FORMAT BIT 0.
2526 000040 JMP.C==40 ;JUMP BIT-TO DIRECT THIS PROGRAM TO JUMP TO
2527 ;A CERTAIN LOCATION IN THE COMMAND SEQUENCE
2528 ;TABLE. INTERNAL USE ONLY.
2529 000020 CMD.C4==20 ;COMMAND BIT 4
2530 000020 DLY.C==20 ;INSERT DELAY. INTERNAL USE ONLY.
2531 000010 CMD.C3==10 ;COMMAND BIT 3
2532 000004 CMD.C2==4 ;COMMAND BIT 2
2533 000002 CMD.C1==2 ;COMMAND BIT 1
2534 000001 CMD.C0==1 ;COMMAND BIT 0
2535
2536 ; BIT DEFINITIONS FOR DEVICE CHARACTERISTICS.
2537
2538 000200 CH.ESS==200 ;ENABLE SKIP TAPE MARKS STOP (STOP AT LOGICAL EOT).
2539 000040 CH.EAI==40 ;ENABLE ATTENTION INTERRUPTS.
2540 000020 CH.ERI==20 ;ENABLE MESSAGE BUFFER RELEASE INTERRUPTS.
2541 000040 DFTSCH==CH.EAI ;DEFAULT CHARACTERISTICS CODE.
2542
2543 ;THE FOLLOWING INDICATES THE RELATIVE POSITIONS OF THE STATUS WORDS
2544 ;IN THE MESSAGE BUFFER.
2545
2546 000004 MS.RFC==4 ;RESIDUAL FRAME COUNT.
2547 000006 MS.XS0==6 ;EXT STATUS REG 0
2548 000010 MS.XS1==10 ;EXT STATUS REG 1
2549 000012 MS.XS2==12 ;EXT STATUS REG 2
2550 000014 MS.XS3==14 ;EXT STATUS REG 3
2551
2552 ;THE FOLLOWING ARE BIT DEFINITIONS FOR EXTENDED STATUS REGISTER 0.
2553
2554 100000 X0.TMK==100000 ;TAPE MARK.
2555 040000 X0.RLS==40000 ;RECORD LENGTH SHORT.
2556 020000 X0.LET==20000 ;LOGICAL EOT.
2557 010000 X0.RLL==10000 ;RECORD LENGTH LONG.
2558 000100 X0.ONL==100 ;ON LINE BIT.
2559 000002 X0.BOT==2 ;BOT BIT.
2560 000001 X0.EOT==1 ;EOT BIT.
2561
2562 ;THE FOLLOWING ARE BIT DEFINITIONS FOR EXTENDED STATUS REGISTER 3.
2563
2564 000010 X3.DCK==10 ;DENSITY CHECK.
```

```
2565      000337      X3.RNY==337      ;CAPSTAN RUNAWAY UDIAG ERROR CODE.
2566
2567      ;THE FOLLOWING DEFINITIONS SHOW THE RELATIVE POSITIONS OF THE COMMAND
2568      ;PACKET ENTRIES.
2569
2570      000000      CP.CMD==0      ;CMDPKT+0==TS04 COMMAND.
2571      000002      CP.ADL==2      ;CMDPKT+2==BUFFER ADDRESS LOW.
2572      000004      CP.ADH==4      ;CMDPKT+4==BUFFER ADDRESS HIGH.
2573      000006      CP.CNT==6      ;CKDPKT+6==BYTE/FILE/RECORD COUNT
2574
2575      ;
2576      ; MISCELLANEOUS DEFINITIONS.
2577      000340      INTPRI==PRI07      ;PRIORITY TO BE USED IN INTERRUPT STATE.
2578      002366      TSBA==TSDB      ;DATA BUFFER ADDRESS REGISTER.
2579      000010      SCHCNT==10      ;ARBITRARY BYTE LENGTH FOR CHARACTERISTIC
2580      ;BUFFER LENGTH. (EVEN #)
2581      000016      MSGCNT==16      ;MESSAGE BUFFER LENGTH IN BYTES. (EVEN #)
2582      002750      DIABLK==DATAWT      ;WRITE BUFFER ALSO USED FOR DIAG CMD.
2583      000020      DIACNT==20      ;DIAGNOSTIC COMMAND BUFFER EXTENT.
2584      010000      DATCNT==4096.      ;MAXIMUM RECORD LENGTH IN BYTES.
2585      ;THIS COUNT SHOULD BE A MULTIPLE OF 256 TO INSURE
2586      ;PROPER READ/WRITE BUFFER ALLOCATION BY THE SUPER.
2587      000260      CNTLEN==CNTEND-CNTBGN      ;LENGTH OF STATISTICAL COUNTER AREA.
2588      177700      RNOPSC==177700      ;RANDOM # OF OPERATIONS MASK.
2589      000007      RANP==7      ;CODE TO SELECT RANDOM PATTERN.
2590      000020      RRECL==16.      ;READ RECOVERY ATTEMPT LIMIT.
2591      000020      WRECL==16.      ;WRITE RECOVERY ATTEMPT LIMIT.
2592      153624      RANBC==153624      ;CONSTANT USED TO RESET RANDOM # GENERATOR BASE.
2593      032561      RANSC==32561      ;CONSTANT USED TO RESET RANDOM # SAVE LOCATION.
2594      177774      NINUSE==177774      ;NOT IN USE CODE FOR DEVICE STATE TABLE.
2595      177740      NCMD.C==ACK.C!CVC.C!OPP.C!SWB.C!MOD.C3!MOD.C2!MOD.C1!MOD.CO!IE.C!FMT.C1!FMT.CO
2596      ;NOT 'COMMAND' BITS.
2597
2598      ;THE FOLLOWING DEFINES THE COMMAND WORD FOR EACH TS04 COMMAND.
2599
2600      100013      DRI== ACK.C!CMD.C3!CMD.C1!CMD.CO      ;DRIVE INIT.
2601
2602      104001      RDF== ACK.C!BRF.C!CMD.CO      ;READ FORWARD
2603
2604      104401      RDR== ACK.C!BRF.C!MOD.CO!CMD.CO      ;READ REVERSE
2605
2606      104005      WRT== ACK.C!BRF.C!CMD.CO!CMD.C2      ;WRITE COMMAND
2607
2608      104105      WTV== ACK.C!BRF.C!VFY.C!CMD.CO!CMD.C2      ;WRITE VERIFY
2609
2610      104010      SRF== ACK.C!BRF.C!CMD.C3      ;SPACE RECORD FORWARD
2611
2612      104410      SRR== ACK.C!BRF.C!MOD.CO!CMD.C3      ;SPACE RECORD REVERSE
2613
2614
2615
2616
2617
2618
2619
2620
```


2621	105401	RNR==	ACK.C!BRF.C!MOD.C1!MOD.CO!CMD.CO	
2622				;READ REV RETRY1 - REREAD NEXT REVERSE, IE. SPACE FWD, READ REVERSE
2623				
2624	125401	RNF==	ACK.C!BRF.C!OPP.C!MOD.C1!MOD.CO!CMD.CO	
2625				;READ REV RETRY2 - REREAD NEXT FORWARD, IE.READ FORWARD, SPACE REVERSE
2626				
2627	105001	RPF==	ACK.C!BRF.C!MOD.C1!CMD.CO	
2628				;READ FWD RETRY1 - REREAD PREVIOUS FORWARD, IE. SPACE REVERSE, READ FORW
2629				
2630	125001	RPR==	ACK.C!BRF.C!OPP.C!MOD.C1!CMD.CO	
2631				;READ FWD RETRY2 - REREAD PREVIOUS REVERSE, IE. READ REVERSE, SPACE FORW
2632				
2633	105005	WRR==	ACK.C!MOD.C1!BRF.C!CMD.C2!CMD.CO	
2634				;WRITE RETRY
2635				
2636	102010	RWD==	ACK.C!MOD.C2!CMD.C3	
2637				;REWIND COMMAND
2638				
2639	100012	MBR==	ACK.C!CMD.C3!CMD.C1	
2640				;MESSAGE BUFFER RELEASE
2641				
2642	100011	WTM==	ACK.C!CMD.C3!CMD.CO	
2643				;WRITE TAPE MARK.
2644				
2645	101011	WTR==	ACK.C!MOD.C1!CMD.C3!CMD.CO	
2646				;WRITE TAPE MARK RETRY.
2647				
2648	105010	SFF==	ACK.C!BRF.C!MOD.C1!CMD.C3	
2649				;SPACE FILE FORWARD
2650				
2651	105410	SFR==	ACK.C!BRF.C!MOD.CO!MOD.C1!CMD.C3	
2652				;SPACE FILE REVERSE
2653				
2654	100017	GES==	ACK.C!CMD.CO!CMD.C1!CMD.C2!CMD.C3	
2655				;GET EXTENDED STATUS
2656				
2657	100411	ERS==	ACK.C!MOD.CO!CMD.C3!CMD.CO	
2658				;ERASE 3 INCHES OF TAPE
2659				
2660	100412	UNL==	ACK.C!MOD.CO!CMD.C3!CMD.C1	
2661				;UNLOAD COMMAND
2662				
2663	101012	CLN==	ACK.C!MOD.C1!CMD.C3!CMD.C1	
2664				;ERASE TAPE.
2665				
2666	140004	SCH==	ACK.C!CVC.C!CMD.C2	
2667				;SET DEVICE CHARACTERISTICS.
2668	100006	DIA==	ACK.C!CMD.C2!CMD.C1	
2669				;DIAGNOSTICS.
2670	000040	JMP==	JMP.C	
2671				;JUMP TO 'N'TH COMMAND
2672	000020	DLY==	DLY.C	
2673				;DELAY 'N' MS.
2674	177777	END==	177777	
				;END OF COMMAND SEQUENCES

```

2675      .SBTTL  GLOBAL DATA SECTION
2676
2677      :++
2678      : THE GLOBAL DATA SECTION CONTAINS DATA THAT ARE USED
2679      : IN MORE THAN ONE TEST.
2680      :--
2681
2682      :
2683      : STORAGE FOR DEVICE REGISTERS
2684      :
2685      :         DEVREG  0,0
2686      L$DR::
2687      L$DRST::
2688
2689
2690      :
2691      :         COMMAND PACKET.
2692      :
2693      :         =          .+3&177774      ;MUST BE ON MOD 4 BOUNDRY.
2694      :         CNDPKT:: 0          ;1ST WORD IS TS04 COMMAND.
2695      :         0          ;2ND WORD IS THE BUFFER LOW ADDRESS.
2696      :         0          ;3RD WORD IS THE BUFFER HIGH ADDRESS.
2697      :         0          ;4TH WORD IS THE BYTE/RECORD/FILE COUNT.
2698
2699      :
2700      :         GET STATUS COMMAND PACKET.
2701      :
2702      :         =          .+3&177774      ;MUST BE ON MOD 4 BOUNDRY.
2703      :         GSCP::  .WORD  GES
2704
2705      :
2706      :         MESSAGE BUFFER RELEASE COMMAND PACKET.
2707      :
2708      :         =          .+3&177774      ;MUST BE ON MOD 4 BOUNDRY.
2709      :         BRCPK::  .WORD  MBR
2710
2711      :
2712      :         REWIND COMMAND PACKET (USED IN ERROR RECOVERY ONLY)
2713      :
2714      :         =          .+3&177774      ;MUST BE ON A MODULE 4 BOUNDARY.
2715      :         RWCPK::  .WORD  RWD
2716      :         .WORD  1
2717
2718      :
2719      :         WORK AREA FOR ANALYSIS OF MESSAGE PACKET CONTENTS.
2720      :
2721      :         MSGPKT::  .BLKW  7          ;1ST WORD:: MESSAGE TYPE.
2722      :                                     ;2ND WORD:: DATA FIELD LENGTH.
2723      :                                     ;3RD WORD:: RESIDUAL FRAME COUNT.
2724      :                                     ;4TH WORD:: XSTAT0
2725      :                                     ;5TH WORD:: XSTAT1
2726      :                                     ;6TH WORD:: XSTAT2
2727      :                                     ;7TH WORD:: XSTAT3

```

```

002214
002216
002222
002224 000000
002226 000000
002230 000000
002232 000000
002234 002234
002234 100017
002240 002240
002240 100012
002244 002244
002244 102010
002246 000001
002250 000007

```



```

2728      ;      MESSAGE PACKETS.
2729
2730 002266 000007      MSGPK0:: .BLKW 7      ;MESSAGE PACKET FOR DEVICE #0
2731 002304 000007      MSGPK1:: .BLKW 7      ;MESSAGE PACKET FOR DEVICE #1
2732 002322 000007      MSGPK2:: .BLKW 7      ;MESSAGE PACKET FOR DEVICE #2
2733 002340 000007      MSGPK3:: .BLKW 7      ;MESSAGE PACKET FOR DEVICE #3
2734
2735      ;      SET CHARACTERISTIC BLOCK.
2736
2737 002356 002266      SCHBK:: MSGPK0      ;1ST WORD:: MSGPKT ADDR LO(SET UP BY EXECUTE ROUTINE).
2738 002360 000000      0      ;2ND WORD:: MSGPKT ADDR HI.
2739 002362 000016      MSGCNT      ;3RD WORD:: MSG BUFFER LENGTH (BYTES)
2740 002364 000040      CH.EAI      ;4TH WORD:: CHARACTERISTICS WORD(SET BY SETUP ROUTINE).
2741
2742      ;      TS04 REGISTER ADDRESSES.
2743
2744
2745 002366 000004      TSDB:: .BLKW 4      ;TS04 DATA BUFFER ADDRESSES.
2746 002376 000004      TSSR:: .BLKW 4      ;TS04 STATUS REGISTER ADDRESSES.
2747 002406 000004      TSVCT:: .BLKW 4      ;TS04 VECTOR ADDRESSES.
2748
2749      ;      ADDRESSES OF MESSAGE PACKETS.
2750
2751 002416 002266      MSGPKA:: MSGPK0      ;DEVICE 0.
2752 002420 002304      MSGPK1      ;DEVICE 1.
2753 002422 002322      MSGPK2      ;DEVICE 2.
2754 002424 002340      MSGPK3      ;DEVICE 3.
2755
2756      ;      ADDRESSES OF INTERRUPT HANDLING ROUTINES.
2757
2758 002426 005674      TS4INT:: TS4IN0      ;DEVICE 0.
2759 002430 005710      TS4IN1      ;DEVICE 1.
2760 002432 005724      TS4IN2      ;DEVICE 2.
2761 002434 005740      TS4IN3      ;DEVICE 3.
2762
2763      ;      TS04 CODE LEVELS, WILL BE STORED AFTER SCH CMD IN BASIC FUNCTION TEST
2764
2765 002436 000000      TS4CL:: 0      ;DEVICE 0
2766 002440 000000      0      ;DEVICE 1
2767 002442 000000      0      ;DEVICE 2
2768 002444 000000      0      ;DEVICE 3
2769
2770      ;      UNIT NUMBERS OF ALL DEVICES BEING TESTED(1-4).
2771      ;      WHEN DEVICE IS NOT IN USE, IT'S LOCATION WILL = -3.
2772      ;      R5 WILL ALWAYS CONTAIN THE PRESENT LOGICAL UNIT NUMBER X 2.
2773
2774 002446 177774      DEVTBL:: .WORD NINUSE
2775 002450 177774      .WORD NINUSE
2776 002452 177774      .WORD NINUSE
2777 002454 177774      .WORD NINUSE
2778 002456 177777      .WORD END

```

```

2779 ; COUNTER AREA.
2780
2781 002460 002460 CNTBGN=.
2782 002460 000020 WRBC:: .BLKW 20 ;BYTES WRITTEN.
2783 002520 000020 RRBC:: .BLKW 20 ;BYTES READ REV.
2784 002560 000020 RFBC:: .BLKW 20 ;BYTES READ FWD.
2785 002620 000004 WRREC:: .BLKW 4 ;RECOVERABLE WRITE ERRORS.
2786 002630 000004 WRUNR:: .BLKW 4 ;UNRECOVERABLE WRITE ERRORS.
2787 002640 000004 RRREC:: .BLKW 4 ;RECOVERABLE READ REV ERRORS.
2788 002650 000004 RRUNR:: .BLKW 4 ;UNRECOVERABLE READ REV ERRORS.
2789 002660 000004 RFREC:: .BLKW 4 ;RECOVERABLE READ FWD ERRORS.
2790 002670 000004 RFUNR:: .BLKW 4 ;UNRECOVERABLE READ FWD ERRORS.
2791 002700 000004 PASCNT:: .BLKW 4 ;PASS COUNT.
2792 002710 000004 SCCNT:: .BLKW 4 ;SPECIAL CONDITION COUNT.
2793 002720 000004 VFYCNT:: .BLKW 4 ;COUNT OF TSO4 WRITE VERIFY ERRORS.
2794 002730 000004 HRDCNT:: .BLKW 4 ;COUNT OF # OF TIMES WE SAW HARD ERRORS.
2795 002740 002740 CNTEND=. ;END OF STATICTICAL COUNTERS.
2796 002740 000004 RECCNT:: .BLKW 4 ;NUMBER OF RECORDS FROM BOT(CLEARED ONLY ON REWIND).
2797
2798
2799 ; THE FOLLOWING ARE THE DEFINITIONS OF VARIABLES
2800 ; USED BY THE PROGRAM.
2801
2802 002750 000000 DATAW:: .WORD 0 ;WRITE BUFFER ADDRESS.
2803 002752 000000 DATARD:: .WORD 0 ;READ BUFFER ADDRESS.
2804 002754 000000 NCNT:: .WORD 0 ;STORAGE FOR VALUE OF N.
2805 002756 000000 NCNT1:: .WORD 0 ;TEMP STORAGE FOR VALUE OF N.
2806 002760 000000 BRFCNT:: .WORD 0 ;STORAGE FOR BPCR VALUE.
2807 002762 177777 CMDWRD:: .WORD END ;CONTAINS COMMAND WORD BEING EXECUTED PRESENTLY.
2808 002764 177777 CMDSAV:: .WORD END ;SAVE LOCATION FOR CMD WORD DURING ERROR RECOVERY
2809 002766 177777 PCMDWD:: .WORD END ;CONTAINS PREVIOUS COMMAND WORD.
2810 002770 000000 CMDLG:: .WORD 0 ;CURRENT COMMAND LOGGING CODE.
2811 002772 000000 LENMSK:: .WORD 0 ;RANDOM WRITE LENGTH MASK, TO BE SET UP BY TESTS
2812 002774 153624 RANB:: .WORD 153624 ;RANDOM # GENERATOR BASE.
2813 002776 032561 RANS:: .WORD 32561 ;RANDOM # SAVE LOCATION.
2814 003000 000000 TIME1:: .WORD 0 ;TIME COUNT 1.
2815 003002 000000 TIME2:: .WORD 0 ;TIME COUNT 2.
2816 003004 000000 JLOOP:: .WORD 0 ;JMP COMMAND LOOP COUNT.
2817 003006 000000 JLOC:: .WORD 0 ;JMP COMMAND LOCATION COUNT.
2818 003010 000000 PATTERN:: .WORD 0 ;PATTERN SELECT CODE.
2819 003012 000000 CTCC:: .WORD 0 ;CURRENT TERMINATION CLASS CODE.
2820 003014 000000 R5SAVE:: .WORD 0 ;LOCATION FOR SAVING CURRENT DEVICE POINTER.

```



```
2821 ; ERROR FLAG AREA, THESE FLAGS ARE CLEARED DURING INITIALIZATION AND
2822 ; AFTER EACH COMMAND IS COMPLETED.
2823
2824 003016 BGNFLG=.
2825 003016 000000C RETRYC:: .WORD 0 ;# OF RECOVERY ATTEMPTS EXECUTED.
2826 003020 000 RECLOG:: .BYTE 0 ;RECORD COUNT HAS BEEN UPDATED FOR THIS RECORD.
2827 003021 000 ERLOG:: .BYTE 0 ;DATA BYTES AND ERRORS HAVE BEEN LOGGED FOR THIS RECORD.
2828 003022 000 RWERR:: .BYTE 0 ;READ/WRITE ERROR HAS OCCURED.
2829 003023 000 UNREC:: .BYTE 0 ;UNRECOVERABLE ERROR HAS OCCURED.
2830 003024 000 ERRREC:: .BYTE 0 ;ERROR RECOVERY MODE.
2831 003025 000 DROPED:: .BYTE 0 ;CURRENT UNIT HAS BEEN DROPPED
2832 .EVEN
2833 003026 ENDERF=.
2834
2835 ; ADDITIONAL FLAGS, THESE FLAGS ARE CLEARED DURING INITIALIZATION.
2836
2837 003026 000004 INTFLG:: .BLKW 4 ;INTERRUPT OCCURRED FLAGS FOR EACH DEVICE.
2838 003036 000 RANDOM:: .BYTE 0 ;RANDOM EVERYTHING FLAG.
2839 003037 000 VFYFLG:: .BYTE 0 ;SET DURING WRITE/VERIFY COMMAND.
2840 003040 000 EOTFLG:: .BYTE 0 ;EOT HAS BEEN REACHED ON THIS PASS
2841 003041 000 RPTFLG:: .BYTE 0 ;PERFORMANCE REPORT HAS BEEN REQUESTED.
2842 003042 000 SWBFLG:: .BYTE 0 ;ENABLES SWAP BYTE FUNCTION WHEN NOT EQUAL TO ZERO.
2843 003043 000 IRE:: .BYTE 0 ;INHIBIT RESIDUAL FRAME COUNT ERROR REPORT.
2844 .EVEN
2845 003044 ENDFLG=.
2846
2847 ; ADDITIONAL FLAGS, THESE FLAGS ARE CLEARED ONLY AFTER BEING CHECKED.
2848
2849 003044 000 STAF LG:: .BYTE 0 ;START FLAG - SET BY INIT CODE IF STARTING.
2850 003045 000 PWRFLG:: .BYTE 0 ;POWER FAILURE FLAG - SET ONLY DURING INIT.
2851 .EVEN
```

```
2852                                     :THE FOLLOWING IS THE COMMAND SEQUENCE TABLE. THE TABLE
2853                                     :HAS DEFAULT VALUES AT PROGRAM LOAD AS SHOWN. THESE VALUES
2854                                     :CAN BE UPDATED BY A TEST OR BY OPERATOR INPUT.
2855
2856 003046 140004      CMDSEQ:: .WORD SCH           ;SET CHARACTERISTICS.
2857 003050 000040      .WORD CH.EAI
2858 003052 000001      .WORD 1
2859 003054 000000      .WORD 0
2860 003056 104105      CMDSE2:: .WORD WTV           ;WRITE VERIFY
2861 003060 010000      .WORD DATCNT          ;MAX BUFFER LENGTH.
2862 003062 000012      .WORD 00012          ;TEN TIMES.
2863 003064 000007      .WORD RANP           ;RANDOM PATTERN.
2864 003066 104105      .WORD WTV           ;WRITE VERIFY..
2865 003070 010000      .WORD DATCNT          ;MAX BUFFER LENGTH.
2866 003072 000012      .WORD 00012          ;TEN TIMES;
2867 003074 000007      .WORD RANP           ;RANDOM PATTERN.
2868 003076 104105      .WORD WTV           ;WRITE VERIFY.
2869 003100 010000      .WORD DATCNT          ;MAX BUFFER LENGTH.
2870 003102 000012      .WORD 00012          ;TEN TIMES.
2871 003104 000007      .WORD RANP           ;RANDOM PATTERN.
2872 003106 104105      .WORD WTV           ;WRITE VERIFY.
2873 003110 010000      .WORD DATCNT          ;MAX BUFFER LENGTH.
2874 003112 000012      .WORD 00012          ;TEN TIMES.
2875 003114 000007      .WORD RANP           ;RANDOM PATTERN.
2876 003116 000004      .BLKW 4              ;EXTENSTION TO HOLD 1 MORE CMD.
2877 003126 177777      ; SEQEND:: .WORD END          ;SOFT END OF SEQUENCE TABLE.
2878 003130 177777      .WORD END
2879 003132 177777      .WORD END
2880 003134 177777      .WORD END
2881 003136 177777      .WORD END          ;HARD END OF SEQUENCE TABLE.
```



```

2882                                     ;THE FOLLOWING IS THE TS04 COMMAND TABLE
2883
2884 003140 100013          CMTDBL:: .WORD DRI          ;DRIVE INIT.
2885 003142 104001          .WORD RDF          ;READ FORWARD.
2886 003144 104401          .WORD RDR          ;READ REVERSE.
2887 003146 104005          .WORD WRT          ;WRITE
2888 003150 104105          .WORD WTV          ;WRITE/VERIFY. (WRITE ALL RECORDS, RDR AND
2889                                     ;CHECK DATA ON ALL RECORDS, RDF AND
2890                                     ;CHECK DATA ON ALL RECORDS.)
2891 003152 104010          .WORD SRF          ;SPACE 'N' RECORDS FORWARD.
2892 003154 104410          .WORD SRR          ;SPACE 'N' RECORDS REVERSE.
2893 003156 105401          .WORD RNR          ;READ NEXT REVERSE. I.E., SPACE FWD, READ REVERSE.
2894 003160 125401          .WORD RNF          ;READ NEXT FORWARD, I.E., READ FORWARD, SPACE REVERSE.
2895 003162 105001          .WORD RPF          ;READ PREVIOUS FORWARD. I.E., SPACE REVERSE, READ FORWAR
2896 003164 125001          .WORD RPR          ;READ PREVIOUS REVERSE. I.E., READ REVERSE, SPACE FORWAR
2897 003166 105005          .WORD WRR          ;WRITE RETRY.
2898 003170 102010          .WORD RWD          ;REWIND.
2899 003172 100012          .WORD MBR          ;MESSAGE BUFFER RELEASE
2900 003174 100011          .WORD WTM          ;WRITE TAPE MARK
2901 003176 101011          .WORD WTR          ;WRITE TAPE MARK RETRY.
2902 003200 105010          .WORD SFF          ;SPACE 'N' FILES FORWARD.
2903 003202 105410          .WORD SFR          ;SPACE 'N' FILES REVERSE.
2904 003204 100017          .WORD GES          ;GET EXTENDED STATUS.
2905 003206 100411          .WORD ERS          ;ERASE 3 INCHES OF TAPE.
2906 003210 100412          .WORD UNL          ;REWIND AND UNLOAD.
2907 003212 101012          .WORD CLN          ;CLEAR TAPE.
2908 003214 140004          .WORD SCH          ;SET CHARACTERISTICS.
2909 003216 100006          .WORD DIA          ;DIAGNOSTIC COMMAND.
2910 003220 000040          .WORD JMP          ;JUMP TO THE NTH COMMAND IN THE SEQUENCE.
2911 003222 000020          .WORD DLY          ;DELAY 'N' MS.
2912 003224 177777          .WORD END          ;END OF COMMAND TABLE
2913

```

2914 ; THE FOLLOWING TABLE CONTAINS THE ASCII FOR EACH COMMAND.
2915
2916 003226 051104 111 CMDASC:: .ASCII /DRI/ ;DRIVE INIT.
2917 003232 .EVEN
2918 003232 042122 106 .ASCII /RDF/ ;READ FORWARD.
2919 003236 .EVEN
2920 003236 042122 122 .ASCII /RDR/ ;READ REVERSE.
2921 003242 .EVEN
2922 003242 051127 124 .ASCII /WRT/ ;WRITE
2923 003246 .EVEN
2924 003246 052127 126 .ASCII /WTV/ ;WRITE/VERIFY. (WRITE ALL RECORDS, RDR AND CHECK DATA
2925 ;ON ALL RECORDS, RDF AND CHECK DATA ON ALL RECORDS.)
2926 .EVEN
2927 003252 051123 106 .ASCII /SRF/ ;SPACE 'N' RECORDS FORWARD.
2928 003256 .EVEN
2929 003256 051123 122 .ASCII /SRR/ ;SPACE 'N' RECORDS REVERSE.
2930 003262 .EVEN
2931 003262 047122 122 .ASCII /RNR/ ;READ NEXT REVERSE. I.E., SPACE FWD READ REVERSE.
2932 003266 .EVEN
2933 003266 047122 106 .ASCII /RNF/ ;READ NEXT FORWARD, I.E., READ FORWARD, SPACE REVERSE.
2934 003272 .EVEN
2935 003272 050122 106 .ASCII /RPF/ ;READ PREVIOUS FORWARD. IE., SPACE REVERSE, READ FORWARD
2936 003276 .EVEN
2937 003276 050122 122 .ASCII /RPR/ ;READ PREVIOUS REVERSE. IE., READ REVERSE, SPACE FORWARD
2938 003302 .EVEN
2939 003302 051127 122 .ASCII /WRR/ ;WRITE RETRY.
2940 003306 .EVEN
2941 003306 053522 104 .ASCII /RWD/ ;REWIND.
2942 003312 .EVEN
2943 003312 041115 122 .ASCII /MBR/ ;MESSAGE BUFFER RELEASE
2944 003316 .EVEN
2945 003316 052127 115 .ASCII /WTM/ ;WRITE TAPE MARK
2946 003322 .EVEN
2947 003322 052127 122 .ASCII /WTR/ ;WRITE TAPE MARK RETRY.
2948 003326 .EVEN
2949 003326 043123 106 .ASCII /SFF/ ;SPACE 'N' FILES FORWARD.
2950 003332 .EVEN
2951 003332 043123 122 .ASCII /SFR/ ;SPACE 'N' FILES REVERSE.
2952 003336 .EVEN
2953 003336 042507 123 .ASCII /GES/ ;GET EXTENDED STATUS.
2954 003342 .EVEN
2955 003342 051105 123 .ASCII /ERS/ ;ERASE 3 INCHES OF TAPE.
2956 003346 .EVEN
2957 003346 047125 114 .ASCII /UNL/ ;REWIND AND UNLOAD.
2958 003352 .EVEN
2959 003352 046103 116 .ASCII /CLN/ ;CLEAN TAPE.
2960 003356 .EVEN
2961 003356 041523 110 .ASCII /SCH/ ;SET CHARACTERISTICS. WHERE BRF=200, 40, 20, 0.
2962 ;SEE TS11/TS04 PROGRAMMING SPECIFICATION FOR DESCRIPTION
2963 003362 .EVEN
2964 003362 044504 101 .ASCII /DIA/ ;DIAGNOSTICS. SEE TS11/TS04 PROGRAMMING SPECIFICATION
2965 ;FOR DESCRIPTION. ODT MUST BE USED TO LOAD DIAGNOSTIC D
2966 ;INTO THE WRITE BUFFER BEFORE THIS CMD IS ISSUED.
2967 003366 .EVEN
2968 003366 046512 120 .ASCII /JMP/ ;JUMP TO THE NTH COMMAND IN THE COMMAND
2969 ;SEQUENCE TABLE, WHERE N IS DEFINED IN

2970
 2971
 2972 003372 046104 131
 2973
 2974
 2975
 2976 003376 047105 104
 2977 003402 003402
 2978
 2979
 2980
 2981
 2982
 2983
 2984
 2985 003402 000102
 2986
 2987

.EVEN
 .ASCII /DLY/

 .EVEN
 .ASCII /END/
 .EVEN

;THE # OF OPERATIONS.
 ;DELAY 'N' MS, WHERE N IS DEFINED IN
 ;THE # OF OPERATIONS.

 ;END OF COMMAND SEQUENCE.

```

:*****
:*****
:      PATCH AREA
:
:      .BLKW 66.
:*****
:*****

```

2988
2989
2990
2991
2992
2993
2994
2995
2996
2997
2998
2999
3000
3001
3002
3003
3004
3005
3006
3007

.SBTTL GLOBAL TEXT SECTION

:++
: THE GLOBAL TEXT SECTION CONTAINS FORMAT STATEMENTS,
: MESSAGES, AND ASCII INFORMATION THAT ARE USED IN
: MORE THAN ONE TEST.
:--

:
: NAMES OF DEVICES SUPPORTED BY PROGRAM
:

:
: DEVTYP <TS04>
L\$DVTYP::

:
: FORMAT STATEMENTS USED IN PRINT CALLS
:

.NLIST BEX

003614	051524	032060	042040	DESCM::	.ASCIZ	/TS04 DRT/
003625	045	022516	052501	CODELM::	.ASCIZ	/%N%AUNIT %D1%S2%ATS04 CODE LEVEL = P%03%N%N/
	003702				.EVEN	
003702	054130	020130	046503	HALTM::	.ASCIZ	/XXX CMD - TYPE <CR> TO CONTINUE/
003742	046503	020104	040520	CMDPKM::	.ASCIZ	/CMD PACKET ADR NOT ON MODULO 4 BOUNDARY/
	004012				.EVEN	
004012	054130	020130	040504	WT'ERM::	.ASCIZ	/XXX DATA COMPARE ERROR/
004041	116	020117	051524	TOERM::	.ASCIZ	/NO TS04 RESPONSE/
004062	047125	042504	044506	SCERM::	.ASCIZ	/UNDEFINED SPECIAL CONDITION/
004116	043122	020103	047516	RFCERM::	.ASCIZ	/RFC NON ZERO/
004133	124	030123	020064	NSSRM::	.ASCIZ	/TS04 NOT READY/
004152	042522	051124	020131	RLEXM::	.ASCIZ	/RETRY LIMIT EXCEEDED ON ABOVE ERROR/
004216	052101	042524	052116	ATTNM::	.ASCIZ	/ATTENTION CONDITION - UNIT OFF LINE/
004262	052506	041516	044524	FUNRM::	.ASCIZ	/FUNCTION REJECT/
004302	040506	040524	020114	FATSM::	.ASCIZ	/FATAL SUBSYSTEM ERROR/
004330	047516	044440	052116	NOINTM::	.ASCIZ	/NO INTERRUPT/
004345	124	050101	020105	TSAM::	.ASCIZ	/TAPE STATUS ALERT/
004367	124	047517	046440	TOOMM::	.ASCIZ	/TOO MANY INTERRUPTS/
004413	103	050101	052123	RNYM::	.ASCIZ	/CAPSTAN RUNAWAY/
004433	122	041505	053117	RERM::	.ASCIZ	/RECOVERABLE ERROR/
004455	125	051116	041505	URERM::	.ASCIZ	/UNRECOVERABLE ERROR/
004501	045	022516	052501	DROPDM::	.ASCIZ	/%N%AUNIT %D1%A HAS BEEN DROPPED%N/
004543	045	022516	040501	AUDRPM::	.ASCIZ	/%N%AALL UNITS DROPPED%N%N/
					.LIST	BEX
					.EVEN	

3008 004576


```

3009          .SBTTL  GLOBAL ERROR REPORT SECTION
3010
3011          :++
3012          : THE GLOBAL ERROR REPORT SECTION CONTAINS THE PRINTB AND PRINTX CALLS
3013          : THAT ARE USED IN MORE THAN ONE TEST.  IT ALSO INCLUDES THE ASCII MESSAGES
3014          : THAT ARE USED BY THE PRINTB AND PRINTX CALLS..
3015          :--
3016
3017
3018 004576          BGNMSG  DTAERM
3019 004576          DTAERM:
3020
3021 004576          PRINTB  #DTAER1,DEVTBL(R5),<B,TIME1>,<B,TIME2>,R2,RECCNT(R5)
3022
3023 004644          EXIT    MSG
3024
3025
3026
3027 004650 040445 047125 052111 DTAER1: .NLIST  BEX
          .ASCIZ  '%AUNIT %D1%A  WAS:%B8%A  S/B:%B8%A  BYTE:%D4%A  RECORD:%D5%N'
          .LIST   BEX
          .EVEN
3028          004746
3029
3030 004746          ENDMSG
3031 004746          L10002:
3032
3033 004750          BGNMSG  STAERM
3034 004750          STAERM:
3035
3036 004750          PRINTB  #STAER1,DEVTBL(R5),PASCNT(R5),RECCNT(R5)
3037 005004          PRINTX  #STAER7
3038 005024          PRINTX  #STAER2
3039 005044          PRINTX  #STAER3,CMDPKT,@TSDB(R5),MSGPKT+MS.RFC,@TSSR(R5),CTCC
3040 005110          PRINTX  #STAER4,CMDPKT+2,CMDPKT+4,CMDPKT+6
3041 005144          PRINTX  #STAER0
3042 005164          PRINTX  #STAER6,MSGPKT+MS.XS0,MSGPKT+MS.XS1,MSGPKT+MS.XS2,MSGPKT+MS.XS3
3043 005224          EXIT    MSG
3044
3045 005230 040445 054130 020130 STAER1: .NLIST  BEX
          .ASCIZ  '/%AXXX CMD FAILED - UNIT %D1%S3%APASS:%D5%S3%ARECORD:%D5%N/
          .EVEN
          005322 040445 051120 053105 STAER7: .ASCIZ  '/%APREVIOUS CMD WAS  XXX %N/
          005355   045 041501 042115 STAER2: .ASCIZ  '/%ACMDPKT%S2%ATSBA%S4%ARFC%S5%ATSSR%S3%ATCC%N/
          005432 047445 022466 031123 STAER3: .ASCIZ  '/%06%S2%06%S2%06%S2%06%S2%D1%N/
          005470 047445 022466   116 STAER4: .ASCII  '/%06%N/
          005475   045 033117 047045 .ASCII  '/%06%N/
          005502 047445 022466 000116 .ASCIZ  '/%06%N/
          005510 040445 051530 030124 STAER0: .ASCIZ  '/%AXST0%S4%AXST1%S4%AXST2%S4%AXST3%N/
          005554 047445 022466 031123 STAER6: .ASCIZ  '/%06%S2%06%S2%06%S2%06%N/
          .LIST   BEX
          .EVEN
3046
3047
3048 005604          ENDMSG
3049 005604          L10003:

```

3050	005606					BGNMSG	NURTYM
3051	005606					NURTYM::	
3052	005606					EXIT	MSG
3053							
3054						.NLIST	BEX
	005612	040445	042522	047503	NURTY1:	.ASCIZ	/%ARECOVERED FROM ABOVE ERROR ON RETRY #D2%A.%N/
						.LIST	BEX
						.EVEN	
3055							
3056							
3057	005672					ENDMSG	
3058	005672				L10004:		


```
3059      .SBTTL  GLOBAL SUBROUTINES SECTION
3060
3061      :++
3062      : THE GLOBAL SUBROUTINES SECTION CONTAINS THE .SUBROUTINES
3063      : THAT ARE USED IN MORE THAN ONE TEST.
3064      :--
3065
3066      :      MODULES TO HANDLE TS04 INTERRUPTS.
3067
3068      005674      BGNSRV  TS4IN0          ;DEVICE 0.
3069      005674      TS4IN0::
3070      005674          SETPRI INTPRI          ;SET INTERRUPT PRIORITY.
3071      005702          LET INTFLG := INTFLG + #1      ;SET INTERRUPT OCCURRED FLAG.
3072      005706          ENDSRV
3073      005706      L10005:
3074
3075      005710      BGNSRV  TS4IN1          ;DEVICE 1.
3076      005710      TS4IN1::
3077      005710          SETPRI INTPRI          ;SET INTERRUPT PRIORITY.
3078      005716          LET INTFLG+2 := INTFLG+2 + #1  ;SET INTERRUPT OCCURRED FLAG.
3079      005722          ENDSRV
3080      005722      L10006:
3081
3082      005724      BGNSRV  TS4IN2          ;DEVICE 2.
3083      005724      TS4IN2::
3084      005724          SETPRI INTPRI          ;SET INTERRUPT PRIORITY.
3085      005732          LET INTFLG+4 := INTFLG+4 + #1  ;SET INTERRUPT OCCURRED FLAG.
3086      005736          ENDSRV
3087      005736      L10007:
3088
3089      005740      BGNSRV  TS4IN3          ;DEVICE 3.
3090      005740      TS4IN3::
3091      005740          SETPRI INTPRI          ;SET INTERRUPT PRIORITY.
3092      005746          LET INTFLG+6 := INTFLG+6 + #1  ;SET INTERRUPT OCCURRED FLAG.
3093      005752          ENDSRV
3094      005752      L10010:
```

:

```
3095      :      SUBROUTINE TO STORE A SET CHARACTERISTIC COMMAND AS
3096      :      THE FIRST ENTRY IN THE SEQUENCE TABLE.
3097      :      INPUTS:
3098      :      OUTPUTS:
3099      :      REGISTERS:
3100      :      CALLS:
3101
3102 005754      SETCH:: LET R1 := #CMDSEQ      :INIT COMMAND SEQUENCE TABLE POINTER.
3103 005760 012721 140004      MOV #SCH,(R1)+      :THIS CODE SETS UP A SET CHARACTERISTIC
3104 005764 012721 000040      MOV #DFTSCH,(R1)+      :COMMAND AS THE FIRST COMMAND IN THE
3105 005770 012721 000001      MOV #1,(R1)+      :SEQUENCE TABLE.
3106 005774 005721      TST (R1)+      :SKIP PATTERN LOCATION.
3107 005776 000207      RTS PC
3108
3109
3110
3111
3112      :      SUBROUTINE TO STORE A REWIND COMMAND IN THE SEQUENCE TABLE
3113      :      INPUTS:
3114      :      OUTPUTS:
3115      :      REGISTERS:
3116      :      CALLS:
3117
3118 006000      SETRW:: LET (R1)+ := #RWD      :CMD = REWIND.
3119 006004      LET (R1)+ := #1      :BRF.
3120 006010      LET (R1)+ := #1      :# OF OPERATIONS.
3121 006014 005721      TST (R1)+      :SKIP PATTERN.
3122 006016 000207      RTS PC      :RETURN
```



```

3123      :      SUBROUTINE TO EXECUTE ALL COMMANDS IN THE SEQUENCE TABLE ON ALL
3124      :      DEVICES.
3125      :      INPUTS:
3126      :      OUTPUTS:      R2 = TERMINATION INDICATOR (0=END OF TABLE,1=EOT)
3127      :      REGISTERS:
3128      :      CALLS:      CMDAC,SETUP,EXECUTE,GOWAIT,CKHAE,NEXTU,FIRSTU,VFYDAT.
3129
3130      006020      EXALL:: LET R1 := #CMDSEQ      ;INIT SEQUENCE TABLE POINTER.
3131      006024      WHILE (R1) NE #END DO      ;WHILE THERE ARE CMDS IN THE SEQUENCE TABLE.
3132      006032      004737 006450      JSR PC,SETUP      ;GO SETUP THE COMMAND BLOCK.
3133      006036      WHILE NCNT NE #0 DO      ;WHILE THERE ARE RECORDS REMAINING:
3134      006044      004737 006360      JSR PC,CMDAC      ;STORE CMD ASCII IN ERROR MESSAGE.
3135      006050      IFB RANDOM NE #0 THEN      ;IF IN RANDOM MODE:
3136      006056      IF CMDWRD EQ #WRT THEN      ;IF CMD IS A WRITE THEN:
3137      006066      IFB VFYFLG NE #0 THEN      ;IF DATA IS TO BE VERIFIED THEN:
3138      006074      LET BRFCNT := RANS CLR.BY #177740 ;ALLOW BYTE COUNT OF 16-31.
3139      006110      ELSE      ;ELSE IF DATA IS NOT TO BE VERIFIED:
3140      006112      LET RANB := RANB + RANS
3141      006120      LET RANS := RANS + RANB
3142      006126      LET BRFCNT := RANS CLR.BY LENMSK ;SET UP RANDOM LENGTH
3143      006142      ENDIF
3144      006142      IF BRFCNT LT #^D16 THEN ;DC NOT ALLOW BYTE COUNT OF LESS THAN 16.
3145      006152      LET BRFCNT := #20 ;CHANGE 0 TO 16 BYTES.
3146      006160      ENDIF
3147      006160      LET CMDPKT+CP.CNT := BRFCNT ;MOVE BRFCNT TO CMD PACKET.
3148      006166      ENDIF
3149      006166      ENDIF
3150      006166      004737 012300      JSR PC,FIRSTU      ;SET UP FOR FIRST UNIT.
3151      006172      IF DEVTBL(R5) EQ #END THEN ;IF ALL DEVICES HAVE BEEN DROPPED:
3152      006202      DOCLN ;DO CLEAN CODE + TERMINATE PASS.
3153      006204      ENDIF
3154      006204      WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE DEVICES:
3155      006214      004737 007316      JSR PC,EXECUTE ;GO EXECUTE THE COMMAND.
3156      006220      004737 012326      JSR PC,NEXTU ;FIND NEXT UNIT IN TEST CYCLE.
3157      006224      ENDDO
3158      006226      IFB RPTFLG NE #0 THEN ;IF REPORT HAS BEEN REQUESTED THEN:
3159      006234      LET RPTFLG :B= #0 ;CLR THE FLAG.
3160      006240      DORPT ;PRINT THE PERFORMANCE REPORT.
3161      006242      ENDIF
3162      006242      004737 012300      JSR PC,FIRSTU ;SET UP FOR FIRST UNIT.
3163      006246      WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE DEVICES:
3164      006256      004737 007600      JSR PC,GOWAIT ;GO WAIT FOR INTERRUPT + CHECK FOR ERRORS.
3165      006262      IF #X0.EOT SETIN MSGPKT+MS.XSO THEN ;IF AT EOT:
3166      006272      LET EOTFLG :B= #1 ;SET EOT FLAG.
3167      006300      ENDIF
3168      006300      004737 012326      JSR PC,NEXTU ;FIND NEXT UNIT IN TEST CYCLE.
3169      006304      ENDDO
3170      006306      004737 012672      JSR PC,CKHAE ;CHECK HALT AFTER EACH CMD FLAG.
3171      006312      IFB EOTFLG NE #0 THEN ;IF EOT HAS BEEN REACHED THEN:
3172      006320      LET EOTFLG :B= #0 ;CLR EOT FLAG.
3173      006324      LET R2 := #1 ;SET EOT INDICATORS
3174      006330      000412      BR EXARTN ;RETURN
3175      006332      ENDIF
3176      006332      LET NCNT := NCNT - #1 ;UPDATE RECORD COUNT.
3177      006336      LET PCMDWD := CMDWRD ;SAVE PREVIOUS COMMAND WORD.
3178      006344      ENDDO

```

```
3179 006346 004737 011540          JSR  PC,VFYDAT          :IF LAST CMD WAS A WRITE VERIFY, THEN GO
3180                                     :VERIFY THE LAST N RECORDS OF DATA.
3181 006352                                     ENDDO
3182 006354          LET R2 := #0          :SET NORMAL RETURN INDICATOR.
3183 006356 000207          EXARTN: RTS PC          :RETURN.
3184
3185
3186
3187
3188 :           THIS SUBROUTINE STORES THE ASCII FOR THE CURRENT COMMAND AND PREVIOUS
3189 :           COMMAND IN THE STANDARD ERROR MESSAGE.  ON ENTRY LOCATION CMDWRD
3190 :           CONTAINS CURRENT CMD AND LOCATION DCMWD CONTAINS PREVIOUS CMD.
3191 :           INPUTS:
3192 :           OUTPUTS:
3193 :           REGISTERS:          R3, R4.
3194 :           CALLS:             GCMDA
3195
3195 006360          CMDAC:: LET R4 := CMDWRD          :R4 = CMD BINARY.
3196 006364 004737 006422          JSR  PC,GCMDA          :GET CMD ASCII.
3197 006370 012337 005232          MOV  (R3)+,STAER1+2      :MOVE CMD ASCII
3198 006374 111337 005234          MOV  (R3),STAER1+4      :INTO MSG.
3199 006400          LET R4 := PCMDWD          :R4 = PREVIOUS CMD BINARY.
3200 006404 004737 006422          JSR  PC,GCMDA          :GET CMD ASCII.
3201 006410          LET STAER7+24 := (R3)+      :MOVE CMD ASCII
3202 006414          LET STAER7+26 := B= (R3)    :INTO MSG.
3203 006420 000207          RTS  PC             :RETURN. GO EXECUTE NEXT FUNCTION.
3204
3205
3206
3207
3208 :           SUBROUTINE TO FIND THE ASCII EQUIVILENT OF THE COMMAND IN R4.
3209 :           ADDRESS OF ASCII 1ST WORD IS RETURNED IN R3.
3210 :           INPUTS:          R4 = PRESENT COMMAND WORD.
3211 :           OUTPUTS:        R3 = ADDRESS OF PRESENT COMMAND ASCII.
3212 :           REGISTERS:
3213 :           CALLS:
3214
3214 006422          GCMDA:: LET R3 := #0          :INIT CMD TBL POINTER.
3215 006424          WHILE CMTBL(R3) NE R4 DO      :UNTIL CURRENT CMD IS FOUND:
3216 006432          LET R3 := R3 + #2          :SEARCH CMD TABLE.
3217 006436          ENDDO
3218 006440          LET R3 := R3 SHIFT +1 + #CMDASC :POINT TO ASCII FOR THAT COMMAND.
3219 006446 000207          RTS  PC             :RETURN.
```



```

3220      :      THIS SUBROUTINE LOADS THE TS04 COMMAND PACKET FROM ONE
3221      :      ENTRY IN THE SEQUENCE TABLE.
3222      :      INPUTS:
3223      :      OUTPUTS:
3224      :      REGISTERS:      R2, R3.
3225      :      CALLS:      GENPAT.
3226
3227 006450  SETUP:: LET CMDLG := #0      ;CLR CMD LOGGING CODE(DISABLES LOGGING)
3228 006454 012137 002224  MOV      (R1)+,CMDPKT      ;LOAD THE COMMAND WORD.
3229 006460 011137 002232  MOV      (R1),CMDPKT+CP.CNT ;LOAD THE BYTE/RECORD/FILE COUNT.
3230 006464 011137 002760  MOV      (R1),BRFCNT      ;SAVE BRFC FOR THIS COMMAND.
3231 006470 013702 002224  MOV      CMDPKT,R2      ;GET CMD.
3232 006474 042702 177740  BIC      #NCMD.C,R2      ;CLR ALL BUT CMD BITS.
3233 006500 010203      MOV      R2,R3      ;SAVE IT TWICE.
3234 006502 162703 000010  SUB      #CMD.C3,R3      ;POSITION COMMAND?
3235 006506 001003      BNE      2$      ;BR IF NOT.
3236 006510 011137 002226  MOV      (R1),CMDPKT+2    ;MOVE BPCR IN 2ND PKT WORD FOR POSITION CMD.
3237 006514 000461      BR      3$
3238 006516      2$:      IF CMDPKT EQ #WTM THEN      ;IF CMD IS A WRITE TAPE MARK THEN:
3239 006526      LET CMDLG := #2      ;WTM LOGGING CODE IS 2.
3240 006534      ENDIF
3241 006534 010203      MOV      R2,R3
3242 006536 162703 000001  SUB      #CMD.CO,R3      ;IS IT A READ?
3243 006542 001017      BNE      1$      ;BR IF NOT.
3244 006544 013737 002752 002226  MOV      DATARD,CMDPKT+CP.ADL ;IF SO, LOAD THE BUFFER ADDR.
3245 006552      IF #MOD.CO SETIN CMDPKT THEN ;IF CMD IS A READ REV THEN:
3246 006562      LET CMDLG := #4      ;LOGGING CODE IS 4.
3247 006570      ELSE
3248 006572      LET CMDLG := #6      ;ELSE - IF CMD IS A READ FWD:
3249 006600      ENDIF      ;LOGGING CODE IS 6.
3250 006600 000427      BR      3$      ;CONTINUE.
3251 006602 010203      1$:      MOV      R2,R3      ;IS IT
3252 006604 162703 000004  SUB      #CMD.C2,R3      ;A SET CHARACTERISTICS CMD?
3253 006610 001011      BNE      4$      ;BR IF NOT.
3254 006612      LET CMDPKT+CP.ADL := #SCHBK ;SET UP ADR LO FOR SET CHAR.
3255 006620 012737 000010 002232  MOV      #SCHCNT,CMDPKT+CP.CNT ;SET BUFFER EXTENT
3256 006626      LET SCHBK+6 := (R1)      ;STORE CHARACTERISTIC CODE IN SCH BLOCK.
3257 006632 000412      BR      3$      ;CONTINUE.
3258 006634 010203      4$:      MOV      R2,R3      ;IS IT
3259 006636 162703 000006  SUB      #CMD.C1!CMD.C2,R3 ;A DIAGNOSTIC (DIA) CMD?
3260 006642 001006      BNE      3$      ;BR IF NOT.
3261 006644 012737 000020 002232  MOV      #DIACNT,CMDPKT+CP.CNT ;LOAD BUFFER EXTENT.
3262 006652 012737 002750 002226  MOV      #DIABLK,CMDPKT+CP.ADL ;LOAD BUFFER ADR LOW.
3263 006660 005721      3$:      TST      (R1)+      ;POINT TO N (NUMBER OF TIMES TO EXECUTE THIS INS
3264 006662 012137 002754      MOV      (R1)+,NCNT      ;SAVE N.
3265 006666      LET NCNT1 := NCNT      ;SAVE N.
3266 006674 012137 003010  MOV      (R1)+,PATERN      ;SAVE PATTERN CODE FOR CURRENT CMD.
3267 006700 010203      MOV      R2,R3      ;IS IT
3268 006702 162703 000005  SUB      #CMD.CO!CMD.C2,R3 ;A WRITE?
3269 006706 001010      BNE      5$      ;BR IF NOT.
3270 006710 013737 002750 002226  MOV      DATAWT,CMDPKT+CP.ADL ;LOAD WRITE BUFFER LO ORDER.
3271 006716 004737 007030  JSR      PC,GENPAT      ;GO GENERATE THE WRITE PATERN.
3272 006722      LET CMDLG := #2      ;WRITE LOGGING CODE IS 2.
3273 006730      5$:      IF #VFY.C SETIN CMDPKT THEN ;IF DATA VERIFICATION IS REQUIRED:
3274 006740      LET VFY.LG := #1      ;SET VERIFY FLAG.
3275 006746 042737 000100 002224  BIC      #VFY.C,CMDPKT ;CLEAR VERIFY BIT(NOT USED BY HARDWARE).

```

```
3276 006754      ELSE
3277 006756      LET VFYFLG :B= #0      ;IF DATA VERIFICATION IS NOT REQUIRED:
3278 006762      ENDIF      ;CLR VERIFY FLAG.
3279 006762      LET PCMDWD := CMDWRD      ;SAVE PREVIOUS CMD WORD.
3280 006770      LET CMDWRD := CMDPKT      ;SAVE PRESENT CMD WORD.
3281 006776      IFB SWBFLG NE #0 THEN      ;IF SWAP BYTES IS ENABLED:
3282 007004      LET CMDPKT := CMDPKT SET.BY #SWB.C ;SET SWAP BIT IN COMMAND.
3283 007012      ENDIF
3284 007012 042737 004000 002224      BIC #BRF.C,CMDPKT      ;CLR BRP BIT (INTERNAL ONLY).
3285 007020      LET CMDSAV := CMDPKT      ;SAVE 1ST WORD OF COMMAND PACKET.
3286 007026 000207      RTS PC      ;RETURN.
```



```

3287 : THIS SUBROUTINE SETS UP AND CALLS THE APPROPRIATE SUBROUTINE TO GENERATE
3288 : THE DESIRED PATTERN FOR THE WRITE AND WRITE/VERIFY COMMANDS.
3289 : INPUTS:
3290 : OUTPUTS:
3291 : REGISTERS: R2, R3, R4.
3292 : CALLS: PATRO - PATR7
3293
3294 007030 013703 003010 GENPAT:: MOV PATERN,R3
3295 007034 LET R3 := R3 SHIFT 1 ;SET UP PATTERN ROUTINE POINTER.
3296 007036 013704 002760 MOV BRFCNT,R4 ;SAVE BYTE COUNT.
3297 007042 005204 INC R4 ;
3298 007044 LET R4 := R4 CLR.BY #1 ;
3299 007050 013702 002750 MOV DATAWT,R2 ;SAVE DATA WRITE BUFFER ADDRESS.
3300 007054 004773 007062 JSR PC,@PATTBL(R3) ;GO GENERATE THE APPROPRIATE PATTERN.
3301 007060 000207 RTS PC ;RETURN TO SETUP SUBROUTINE.
3302
3303 ;TS04 WRITE PATTERN LOOKUP TABLE. USED TO JSR TO THE
3304 ;CORRECT DATA PATTERN GENERATING ROUTINE.
3305
3306 007062 007104 PATTBL: PATRO
3307 007064 007142 PATR1
3308 007066 007162 PATR2
3309 007070 007172 PATR3
3310 007072 007216 PATR4
3311 007074 007230 PATR5
3312 007076 007242 PATR6
3313 007100 007262 PATR7
3314 007102 007314 PATR8
3315
3316
3317 ;INCREMENTING PATTERN. 0 - 377.
3318
3319 007104 PATRO:: LET R3 := #400
3320 007110 1$: LET R4 := R4 - #2 ;DECREMENT WORD COUNT.
3321 007114 100411 BMI 2$ ;BR IF DONE.
3322 007116 LET (R2)+ := R3 ;STORE DATA WORD.
3323 007120 LET R3 := R3 + #1002 ;UPDATE PATTERN.
3324 007124 IF R3 EQ #1000 THEN ;IF PATTERN HAS WRAPPED AROUND THEN:
3325 007132 LET R3 := #400 ;INIT THE PATTERN AGAIN.
3326 007136 ENDF
3327 007136 000764 BR 1$ ;DO IT AGAIN.
3328 007140 000207 2$: RTS PC ;RETURN.
3329
3330 ;ALL ONE'S PATTERN.
3331
3332 007142 012703 177777 PATR1:: MOV #-1,R3 ;ALL ONES PATTERN;.
3333 007146 ZROPAT: LET R4 := R4 - #2 ;DECREMENT BYTE COUNT.
3334 007152 100402 BMI 1$ ;DONE?,BR IF YES.
3335 007154 010322 MOV R3,(R2)+ ;IF NOT LOAD NEXT BYTE WITH PATTERN.
3336 007156 000773 BR ZROPAT ;DO IT AGAIN.
3337
3338 007160 000207 1$: RTS PC ;RETURN.

```

```
3339                ;ALL ZEROES PATTERN.
3340
3341 007162 005003    PATR2:: CLR    R3                ;CLR PATTERN REGISTER.
3342 007164 004737 007146 JSR    PC,ZROPAT        ;GO GENERATE IT.
3343 007170 000207    RTS     PC                ;RETURN.
3344
3345                ;ONE BIT WALKING FROM R TO L IN A FIELD OF ZEROES.
3346
3347 007172 012703 000401 PATR3:: MOV    #401,R3        ;INIT PATTERN REGISTER.
3348 007176          WLKZRO: LET R4 := R4 - #2        ;DECREMENT WORD COUNT.
3349 007202 100404    BMI    1$                ;BR IF DONE.
3350 007204 010322    MOV    R3,(R2)+        ;LOAD DATA.
3351 007206 006303    ASL    R3                ;SHIFT PATTERN.
3352 007210 005503    ADC    R3                ;ADD CARRY BACK INTO PATTERN.
3353 007212 000771    BR     WLKZRO        ;DO IT AGAIN.
3354 007214 000207    1$:  RTS     PC                ;RETURN.
3355
3356                ;ZERO BIT WALKING FROM R TO L IN A FIELD OF 1'S.
3357
3358 007216 012703 177376 PATR4:: MOV    #177376,R3        ;INIT PATTERN REGISTER.
3359 007222 004737 007176 JSR    PC,WLKZRO        ;GO GENERATE ;IT.
3360 007226 000207    RTS     PC                ;RETURN.
3361
3362                ;ALTERNATING ONE AND ZERO BITS WITH ALTERNATE BYTES
3363                ;COMPLEMENTED.
3364
3365 007230 012703 125125 PATR5:: MOV    #125125,R3        ;INIT PATTERN REGISTER.
3366 007234 004737 007146 JSR    PC,ZROPAT        ;GO GENERATE IT.
3367 007240 000207    RTS     PC                ;RETURN.
3368
3369                ;ALTERNATING BYTES OF 000 AND 377.
3370
3371 007242 012703 177400 PATR6:: MOV    #177400,R3        ;INIT PATTERN REGISTER.
3372 007246          1$:  LET R4 := R4 - #2        ;DECREMENT WORD COUNT.
3373 007252 100402    BMI    2$                ;BR IF DONE.
3374 007254 010322    MOV    R3,(R2)+        ;LOAD DATA.
3375 007256 000773    BR     1$                ;DO IT AGAIN.
3376 007260 000207    2$:  RTS     PC                ;RETURN.
3377
3378                ;RANDOM PATTERN GENERATOR
3379
3380 007262          PATR7:: LET R4 := R4 - #2        ;DECREMENT WORD COUNT
3381 007266 100411    BMI    GIT                ;BR IF DONE.
3382 007270 063737 002776 002774 ADD    RANS,RANB        ;GET NEW #.
3383 007276 063737 002774 002776 ADD    RANB,RANS        ;SAVE #.
3384 007304 013722 002776    MOV    RANS,(R2)+        ;CONTINUE.
3385 007310 000764    BR     PATR7        ;RETURN
3386 007312 000207    GIT:  RTS     PC
3387
3388                ; NO PATTERN GENERATION.
3389
3390 007314 000207    PATR8:: RTS     PC                ;RETURN.
```



```

3391      :      THIS SUBROUTINE INITIATES TS04 COMMAND EXECUTION
3392      :      AND CHECKS FOR TS04 RESPONSE.
3393      :      INPUTS:
3394      :      OUTPUTS:
3395      :      REGISTERS:      R2, R3, R4.
3396      :      CALLS:      DROPU, MOVMSG, FIRSTU, NEXTU.
3397
3398 007316  EXCUTE:: LET TIME1 := #-1      ;INIT TIMEOUT COUNTER.
3399 007324      REPEAT      ;WAIT -
3400 007324      LET TIME1 := TIME1 - #1      ;UPDATE TIMEOUT COUNTER.
3401 007330      IF TIME1 EQ #0 THEN      ;IF TIMED OUT:
3402 007336 004737 010020      JSR PC,MOVMSG      ;MOVE CURRENT PACKET MSG.
3403 007342      LET R2 := #2      ;ERROR NUMBER.
3404 007346      LET R4 := #NSSRM      ;MESSAGE ADDRESS.
3405 007352 004737 012350      JSR PC,DROPU      ;DROP THE UNIT.
3406 007356 000507      BR EXCRTN      ;RETURN.
3407 007360      ENDIF
3408 007360      UNTIL #TS.SSR SETIN @TSSR(R5)      ;WAIT UNTIL DEVICE IS READY.
3409 007370      IF CMDWRD EQ #SCH THEN      ;IF WE ARE DOING A SET CHAR CMD THEN:
3410 007400      LET R5SAVE := R5      ;SAVE CURRENT DEVICE POINTER.
3411 007404 004737 012300      JSR PC,FIRSTU      ;FIND FIRST UNIT.
3412 007410      WHILE DEVTBL(R5) NE #END DO
3413 007420 004737 007764      JSR PC,WSSR      ;WAIT FOR UNIT READY OR TIME OUT,
3414 007424 004737 012326      JSR PC,NEXTU      ;FIND NEXT UNIT.
3415 007430      ENDDO
3416 007432      LET R5 := R5SAVE      ;RESTORE CURRENT DEVICE POINTER.
3417 007436      LET SCHBK := MSGPKA(R5)      ;SET UP ADR OF MSG PKT IN SCH BLOCK.
3418 007444      ENDIF
3419 007444      LET R3 := MSGPKA(R5)      ;ADR OF THIS UNIT'S MSG PACKET.
3420 007450      LET R2 := #0      ;CLR COUNTER.
3421 007452      WHILE R2 NE #MSGCNT DO      ;WHILE THERE ARE MORE LOCATIONS:
3422 007460      LET (R3)+ := #-1      ;INIT THE MSG PACKET WITH ALL 1'S
3423 007464      LET R2 := R2 + #2      ;UPDATE COUNTER.
3424 007470      ENDDO
3425 007472 105737 002142      TSTB DINT      ;ARE INTERRUPTS DISABLED.
3426 007476 001020      BNE 1$      ;BR IF YES.
3427 007500      IFB INTFLG(R5) GT #1 THEN      ;IF MORE THAN ONE INTERRUPT HAS OCCURED:
3428 007510      LET R2 := #15.      ;ERROR NUMBER,
3429 007514      LET R4 := #TOOMM      ;MESSAGE ADDRESS.
3430 007520 004737 012350      JSR PC,DROPU      ;DROP THE UNIT
3431 007524 000424      BR EXCRTN      ;RETURN - UNIT HAS BEEN DROPPED.
3432 007526      ENDIF
3433 007526      LET INTFLG(R5) := #0      ;CLR INTERRUPT FLAG FOR THIS DEV.
3434 007532 052737 000200 002224      BIS #IE.C,CMDPKT      ;SET INT ENABLE BIT.
3435 007540 012775 002224 002366 1$:      MOV #CMDPKT,@TSDB(R5)      ;LOAD TSDB WITH CMDPKT ADDRESS
3436      ;THIS INITIATES COMMAND EXECUTION.
3437 007546      IF #TS.SSR SETIN @TSSR(R5) THEN      ;IF READY DID NOT DROP THEN:
3438 007556 004737 010020      JSR PC,MOVMSG      ;MOVE CURRENT MESSAGE PACKET TO COMMON.
3439 007562      LET R2 := #3      ;ERROR NUMBER.
3440 007566      LET R4 := #TOERM      ;MESSAGE ADDRESS.
3441 007572 004737 012350      JSR PC,DROPU      ;DROP THE UNIT
3442 007576      ENDIF
3443 007576 000207      EXCRTN: RTS PC      ;RETURN.

```

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3444 : THIS SUBROUTINE WAITS FOR THE TS04 INERRUPT OR DONE BIT TO SET AND ALLOWS THE
3445 : OPERATOR TO TRANSFER CONROL TO THE SUPERVISOR.
3446 : UPON APPEARANCE OF THE INTERRUPT OR DONE, CHECK TSSR FOR STATUS ERRORS,
3447 : LOG BYTES AND ERRORS AND PERFORM ERROR RECOVERY IF NESSASARY.
3448 : INPUTS:
3449 : OUTPUTS:
3450 : REGISTERS: R2, R3.
3451 : CALLS: DROPU, MOVMSG, RECUD, CHKERR, LOG, CLRERR.
3452 :
3453 007600 GOWAIT:: LET TIME1 := #-1 ;INIT TIME OUT COUNTER.
3454 007606 REPEAT ;REPEAT UNTIL INTERRUPT OCCURES:
3455 007606 BREAK ;GO TO THE SUPER TO ALLOW TTY INPUT.
3456 007610 IF CMDWRD EQ #RWD THEN ;IF COMMAND WAS REWIND THEN:
3457 007620 WAITUS 100. ;WAIT AN EXTRA 10 MSEC EACH LOOP.
3458 007626 ENDIF
3459 007626 IFB DINT EQ #0 THEN ;IF INTERRUPTS ARE ENABLED.
3460 007634 LET R2 := INTFLG(R5) ;FETCH INTERRUPT OCCURRED FLAG.
3461 007640 ELSE ;IF IN BRUTUS MODE:
3462 007642 LET R3 := COMP #TS.SSR ;SET UP A MASK FOR THE DONE BIT.
3463 007650 LET R2 := @TSSR(R5) CLR.BY R3 ;FETCH DONE BIT.
3464 007656 ENDIF
3465 007656 LET TIME1 := TIME1 - #1 ;UPDATE TIMEOUT COUNTER.
3466 007662 IF TIME1 EQ #0 THEN ;IF TIME OUT HAS OCCURRED:
3467 007670 004737 010020 JSR PC,MOVMSG ;MOVE CURRENT MSG PACKET TO COMMON AREA.
3468 007674 LET R2 := #4 ;ERROR NUMBER.
3469 007700 LET R4 := #NOINTM ;MESSAGE ADDRESS.
3470 007704 004737 012350 JSR PC,DROPU ;DROP THE UNIT.
3471 007710 000412 BR GOWRTN ;RETURN.
3472 007712 ENDIF
3473 007712 UNTIL R2 NE #0 ;REPEAT UNTIL INTERRUPT OR READY OCCURES.
3474 007716 004737 010020 JSR PC,MOVMSG ;MOVE CURRENT MSG. PACKET TO COMMON AREA.
3475 007722 004737 010070 JSR PC,RECUD ;UPDATE THE RECORD COUNT.
3476 007726 004737 010212 JSR PC,CHKERR ;CHECK FOR STATUS ERRORS.
3477 007732 004737 011254 JSR PC,LOG ;LOG BYTES AND ERRORS.
3478 007736
3479 007742 004737 007750 GOWRTN: LET R3 := #ENDERF ;CLEAR ALL ERROR FLAGS
3480 007746 000207 JSR PC,CLRERR ;RETURN IF DONE.
RTS PC

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```

3481      :      SUBROUTINE TO CLEAR FLAGS.
3482      :      INPUTS:      R3 = LWA TO BE CLEARED + 2.
3483      :      OUTPUTS:
3484      :      REGISTERS:    R2
3485      :      CALLS:
3486
3487 007750 CLRERR:: LET R2 := #BGNFLG
3488 007754 REPEAT
3489 007754     LET (R2)+ := #0
3490 007756 UNTIL R2 EQ R3
3491 007762 000207 RTS PC
3492
3493
3494
3495      :      SUBROUTINE TO WAIT UNTIL CURRENT UNIT IS READY OR UNTIL TIME OUT.
3496      :      INPUTS:
3497      :      OUTPUTS:
3498      :      REGISTERS:
3499      :      CALLS:
3500
3501 007764 WSSR:: LET TIME1 := #-1           ;INIT TIMEOUT COUNTER.
3502 007772 REPEAT                       ;REPEAT UNTIL DEV READY OR TIMEOUT:
3503 007772     BREAK                       ;BREAK TO THE SUPERVISOR.
3504 007774     LET TIME1 := TIME1 - #1     ;UPDATE TIMEOUT COUNTER.
3505 010000 UNTIL #TS.SSR SETIN @TSSR(R5) OR TIME1 EQ #0
3506      :      ;REPEAT UNTIL DEV READY OR TIMEOUT.
3507 010016 000207 RTS PC                ;RETURN.
3508
3509
3510
3511      :      SUBROUTINE TO MOVE THE CURRENT MESSAGE PACKET TO THE COMMON AREA AND
3512      :      TO UPDATE THE CURRENT TERMINATION CLASS CODE.
3513      :      INPUTS:
3514      :      OUTPUTS:
3515      :      REGISTERS:    R2, R3.
3516      :      CALLS:
3517
3518 010020 MOVMSG:: LET R3 := MSGPKA(R5)     ;ADR OF THIS DEVICE'S MSG.
3519 010024 LET R2 := #0                     ;CLR COUNTER.
3520 010026 WHILE R2 NE #MSGCNT DO         ;WHILE THERE ARE MORE LOCATIONS:
3521 010034     LET MSGPKT(R2) := (R3)+   ;MOVE MSG TO COMMON AREA.
3522 010040     LET R2 := R2 + #2         ;UPDATE COUNTER.
3523 010044 ENDDO
3524 010046 LET R2 := @TSSR(R5) CLR.BY #TSC.TCC ;FETCH THE TERMINATION CLASS CODE.
3525 010056 LET CTCC := R2 SHIFT -1         ;SAVE THE TCC.
3526 010066 000207 RTS PC

```

```

3527      :      SUBROUTINE TO UPDATE THE RECORD COUNT.
3528      :      INPUTS:
3529      :      OUTPUTS:
3530      :      REGISTERS:
3531      :      CALLS:
3532
3533 010070 RECUD:: IFB RECLOG EQ #0 THEN          ;IF RECORD HAS NOT BEEN LOGGED:
3534 010076      IF #BITO NOTSETIN CTCC THEN      ;IF TCC IS EVEN THEN:
3535 010106      LET RECLOG :B= RECLOG + #1      ;SET RECORD LOGGED,
3536 010112      IF CMDWRD EQ #RWD THEN          ;IF THIS IS A REWIND CMD:
3537 010122      LET RECCNT(R5) := #0          ;CLEAR RECORD COUNT,
3538 010126      ELSE
3539 010130      IF #BRF.C SETIN CMDWRD THEN      ;IF BRF USED, UPDATE RECORD COUNT.
3540 010140      IF #MOD.CO NOTSETIN CMDWRD THEN ;IF A FORWARD CMD:
3541 010150      IF #MOD.CO NOTSETIN PCMDWD THEN ;IF PREV CMD WAS A FWD ALSO:
3542 010160      LET RECCNT(R5) := RECCNT(R5) + #1 ;INCREMENT RECORD COUNT.
3543 010164      ENDIF
3544 010164      ELSE
3545 010166      IF #MOD.CO SETIN PCMDWD THEN      ;IF REVERSE CMD:
3546 010176      IF RECCNT(R5) NE #0 THEN          ;IF PREVIOUS CMD WAS A REV ALSO:
3547 010204      LET RECCNT(R5) := RECCNT(R5) - #1 ;INSURE A POSITIVE COUNT.
3548 010210      LET RECCNT(R5) := RECCNT(R5) - #1 ;DECREMENT RECORD COUNT.
3549 010210      ENDIF
3550 010210      ENDIF
3551 010210      ENDIF
3552 010210      ENDIF
3553 010210      ENDIF
3554 010210      ENDIF
3555 010210      ENDIF
000207      RTS      PC          ;RETURN.

```



```

3556 : THIS IS THE ERROR CHECK SUBROUTINE. AFTER INTERRUPT THIS
3557 : SUBROUTINE IS CALLED TO CHECK THE TSO4 STATUS.
3558 : IF SPECIAL COND IS SET THEN THE TCC HANDLING SUBROUTINE IS ENTERED.
3559 : IF THE RFC IS NON ZERO FOR A COMMAND REQUIRING A BPCR,
3560 : THEN AN ERROR RFC IS REPORTED,
3561 : INPUTS:
3562 : OUTPUTS:
3563 : REGISTERS: R2, R4.
3564 : CALLS: TCC0-TCC7.
3565 :
3566 010212 CHKERR:: IF #TS.SC SETIN @TSSR(R5) THEN ;IF SPECIAL COND STATUS IS SET THEN:
3567 010222 IF CTCC NE #2 THEN ;IF TCC IS NOT 2 THEN:
3568 010232 IFB ERRREC EQ #0 THEN ;IF NOT IN ERROR RECOVERY:
3569 010240 005265 002710 INC SCNT(R5) ;INC SC COUNTER.
3570 010244 ENDIF
3571 010244 ENDIF
3572 010244 LET R2 := CTCC SHIFT 1 ;CURRENT TCC X 2.
3573 010252 004772 010344 JSR PC,@TCCRA(R2) ;GO TO THE TCC HANDLING SUBROUTINE.
3574 010256 ELSE
3575 010260 IF #BRF.C SETIN CMDWRD THEN ;IF BRF IS USED IN THIS CMD THEN:
3576 010270 IF MSGPKT+MS.RFC NE #0 THEN ;IF THERE IS AN RFC THEN:
3577 010276 IFB RANDOM EQ #0 THEN ;IF NOT IN RANDOM MODE:
3578 010304 IFB IRE EQ #0 THEN ;IF RFC ERROR REPORTS ARE ALLOWED:
3579 010312 LET HRDCNT(R5) := HRDCNT(R5) + #1 ;UPDATE HARD ERROR COUNT
3580 010316 ERRHRD #13,RFCERM,STAERM ;REPORT RFC ERROR
3581 010326 ENDIF
3582 010326 ENDIF
3583 010326 ENDIF
3584 010326 ENDIF
3585 010326 ENDIF
3586 010326 IFB RWERR NE #0 THEN ;IF A READ/WRITE ERROR HAS OCCURRED THEN:
3587 010334 LET CMDPKT := CMDSAV ;RESTORE CMD PACKET AFTER ERROR RECOV.
3588 010342 ENDIF
3589 010342 000207 RTS PC ;RETURN.
3590 :
3591 : ADDRESSES OF TCC HANDLING ROUTINES FOR TERMINATION CLASS CODES 0 - 7.
3592 :
3593 010344 010364 TCCRA: TCC0
3594 010346 010402 TCC1
3595 010350 010420 TCC2
3596 010352 010514 TCC3
3597 010354 010532 TCC4
3598 010356 010656 TCC5
3599 010360 010742 TCC6
3600 010362 011104 TCC7

```

```
3601      :      SUBROUTINE TO HANDLE TERMINATION CLASS CODE 0, UNDEFINED SPECIAL
3602      :      CONDITION ERROR.
3603      :      INPUTS:
3604      :      OUTPUTS:
3605      :      REGISTERS:
3606      :      CALLS:
3607
3608 010364      TCC0:: LET HRDCNT(R5) := HRDCNT(R5) + #1 ;UPDATE HARD ERROR COUNT.
3609 010370      ERRHRD #5,SCERM,STAERM ;REPORT SPECIAL CONDITION ERROR.
3610 010400 000207      RTS PC ;RETURN.
3611
3612
3613
3614
3615
3616      :      SUBROUTINE TO HANDLE TERMINATION CLASS CODE 1, ATTENTION CONDITION.
3617      :      THIS TCC INDICATES THAT THE DRIVE HAS UNDERGONE A STATUS CHANGE
3618      :      SUCH AS GOING OFFLINE OR COMING ONLINE.
3619      :      INPUTS:
3620      :      OUTPUTS:
3621      :      REGISTERS:      R2,R4
3622      :      CALLS:      DROPU
3623
3624 010402      TCC1:: LET R2 := #6 ;ERROR NUMBER.
3625 010406      LET R4 := #ATTNM ;MESSAGE ADDRESS.
3626 010412 004737 012350      JSR PC,DROPU ;DROP THE UNIT.
3627 010416 000207      RTS PC ;RETURN.
```



```

3628 : SUBROUTINE TO HANDLE TERMINATION CLASS CODE 2, TAPE STATUS ALERT.
3629 : A STATUS CONDITION HAS BEEN ENCOUNTERED THAT MAY HAVE SIGNIFICANCE
3630 : TO THE PROGRAM. BITS OF INTEREST INCLUDE TMK, RLS, LET, RLL, EOT.
3631 : INPUTS:
3632 : OUTPUTS:
3633 : REGISTERS:
3634 : CALLS:
3635 :
3636 010420 TCC2:: IF #X0.TMK!X0.RLS!X0.LET!X0.RLL SETIN MSGPKT+MS.XS0 THEN
3637 : ;IF TAPE MARK, RECORD LENGTH ERROR OR
3638 : ;LOGICAL EOT THEN:
3639 010430 IF #X0.TMK!X0.LET NOTSETIN MSGPKT+MS.XS0 THEN ;IF RECORD LENGTH ERROR:
3640 010440 IFB IRE NE #0 OR RANDOM NE #0 THEN ;IF RFC ERROR REPORTS ARE
3641 : ;INHIBITED OR IN RANDOM MODE THEN:
3642 010454 000416 BR TC2RTN ;RETURN - TCC2 CAUSED BY EOT.
3643 010456 ENDF
3644 010456 ENDF
3645 010456 IFB ERRREC NE #0 THEN ;IF WE ARE IN ERROR RECOVERY THEN:
3646 010464 LET UNREC :B= UNREC + #1 ;SET UNRECOVERABLE FLAG FOR LOG.
3647 010470 ELSE ;ELSE - IF NOT IN ERROR RECOVERY:
3648 010472 LET SCCNT(R5) := SCCNT(R5) + #1 ;INCREMENT THE SPEC COND COUNTER.
3649 010476 ENDF
3650 010476 LET HRDCNT(R5) := HRDCNT(R5) + #1 ;UPDATE HARD ERROR COUNT.
3651 010502 ERRHRD #7,TSAM,STAERM ;REPORT TAPE STATUS ALERT.
3652 010512 ENDF
3653 010512 000207 TC2RTN: RTS PC ;RETURN.
3654 :
3655 :
3656 :
3657 :
3658 :
3659 : SUBROUTINE TO HANDLE TERMINATION CLASS CODE 3, FUNCTION REJECT.
3660 : THE SPECIFIED FUNCTION WAS NOT INITIATED. BITS OF INTEREST ARE
3661 : RMR, OFL, VCK, BOT, ILC, WLE, ILA, AND NBA.
3662 : INPUTS:
3663 : OUTPUTS:
3664 : REGISTERS: R2,R4
3665 : CALLS: DROPU
3666 :
3667 010514 TCC3:: LET R2 := #8. ;ERROR NUMBER.
3668 010520 LET R4 := #FUNRM ;MESSAGE ADDRESS.
3669 010524 004737 012350 JSR PC,DROPU ;DROP THE UNIT.
3670 010530 000207 RTS PC ;RETURN.

```

```

3671 : SUBROUTINE TO HANDLE TERMINATION CLASS CODE 4, RECOVERABLE ERROR.
3672 : TAPE POSITION IS ONE RECORD BEYOND WHAT ITS POSITION WAS WHEN
3673 : THE FUNCTION WAS INITIATED. RECOVERY PROCEDURE IS TO LOG THE
3674 : ERROR AND ISSUE THE APPROPRIATE RETRY COMMAND.
3675 : INPUTS:
3676 : OUTPUTS:
3677 : REGISTERS: R2,R4.
3678 : CALLS: RTLE, EXCUTE, GOWAIT, DROPU
3679
3680 010532 004737 011122 TCC4:: JSR PC,RTLE ;CHECK FOR RETRY LIMIT EXCEEDED.
3681 010536 IF CMDLG GT #2 THEN ;IF READ CMD THEN:
3682 010546 LET R2 := #RRECL SHIFT -1 ;R2=READ RETRY COUNT LIMIT / 2
3683 010554 IF RETRYC GE R2 THEN ;IF RETRY COUNT IS MORE THAN HALF LIMIT:
3684 010562 LET CMDPKT := CMDPKT SET.BY #OPP.C ;SET OPPOSITE BIT FOR RETRY2.
3685 010570 ENDIF
3686 010570 ENDIF
3687 010570 IF RETRYC EQ #0 THEN ;IF THIS IS THE ORIGINAL ERROR THEN:
3688 010576 ERRSOFT #9,RERM,STAERM ;REPORT RECOVERABLE ERROR
3689 010606 ENDIF
3690 010606 LET RETRYC := RETRYC + #1 ;UPDATE RETRY COUNT.
3691 010612 LET CMDPKT := CMDPKT SET.BY #MOD.C1 ;SET RETRY BIT IN CMD PACKET.
3692 010620 IFB IREC EQ #0 THEN ;IF ERROR RECOVERY ENABLED:
3693 010626 LET ERRREC :B= ERRREC + #1 ;SET ERROR RECOVERY FLAG.
3694 010632 POP R2,R2 ;POP 2 RTN ADRS FROM STACK.
3695 010636 004737 007316 JSR PC,EXCUTE ;GO EXECUTE THE RETRY COMMAND.
3696 010642 000137 007600 JMP GOWAIT ;GO WAIT FOR INTERRUPT + CHECK STATUS.
3697 010646 ELSE ;ELSE IF ERROR RECOVERY IS NOT ENABLED:
3698 010650 LET UNREC :B= UNREC + #1 ;SET UNRECOVERABLE ERROR FLAG.
3699 010654 ENDIF
3700 010654 000207 RTS PC ;RETURN

```



```
3701      :      SUBROUTINE TO HANDLE TERMINATION CLASS CODE 5, RECOVERABLE ERROR.  
3702      :      TAPE POSITION HAS NOT CHANGED. RECOVERY PROCEDURE IS TO LOG THE  
3703      :      ERROR AND RE-ISSUE THE ORIGINAL COMMAND.  
3704      :      INPUTS:  
3705      :      OUTPUTS:  
3706      :      REGISTERS:      R2,R4.  
3707      :      CALLS:      RTLE, EXCUTE, GOWAIT, DROPJ.  
3708  
3709 010656 004737 011122      TCC5:: JSR PC,RTLE      ;CHECK FOR RETRY LIMIT EXCEEDED  
3710 010662      IF RETRYC EQ #0 THEN      ;IF THIS IS THE ORIGINAL ERROR THEN:  
3711 010670      ERRSOFT #10,RERM,STAERM      ;REPORT RECOVERABLE ERROR.  
3712 010700      ENDIF  
3713 010700      LET RETRYC := RETRYC + #1      ;UPDATE RETRY COUNTER.  
3714 010704      IFB IREC EQ #0 THEN      ;IF ERROR RECOVERY IS ENABLED:  
3715 010712      LET ERRREC :B= ERRREC + #1      ;SET ERROR RECOVERY FLAG.  
3716 010716      POP R2,R2      ;POP 2 RTN ADRS FROM STACK.  
3717 010722 004737 007316      JSR PC,EXCUTE      ;GO RE-ISSUE THE COMMAND.  
3718 010726 000137 007600      JMP GOWAIT      ;GO WAIT FOR INTERRUPT + CHECK STATUS.  
3719 010732      ELSE      ;ELSE IF ERROR RECOVERY IS NOT ENABLED:  
3720 010734      LET UNREC :B= UNREC + #1      ;SET UNRECOVERABLE ERROR FLAG.  
3721 010740      ENDIF  
3722 010740 000207      RTS PC      ;RETURN.  
3723  
3724
```

```

3725 : SUBROUTINE TO HANDLE TERMINATION CLASS CODE 6, UNRECOVERABLE ERROR.
3726 : TAPE POSITION HAS BEEN LOST. THE ONLY VALID RECOVERY PROCEDURE
3727 : IS TO REWIND AND START OVER AT BOT UNLESS THE TAPE HAS LABELS OR
3728 : SEQUENCE NUMBERS. THIS DIAGNOSTIC WILL REWIND AND RETRY THE
3729 : COMMAND ONLY IF DENSITY CHECK IS SET, OTHERWISE THE UNIT WILL BE
3730 : DROPPED FROM THE TEST SEQUENCE.
3731 : INPUTS:
3732 : OUTPUTS:
3733 : REGISTERS: R2, R4
3734 : CALLS: RTLE, WSSR, EXCUTE, GOWAIT, DROPU
3735
3736 010742 TCC6:: IF X3.DCK NOTSETIN MSGPKT+MS.XS3 THEN
3737 : IF THERE IS NO DENSITY CHECK THEN:
3738 010752 IF CMDLG NE #0 THEN ;IF CMD IS A READ OR WRITE THEN:
3739 010760 LET RWERR :B= RWERR + #1 ;SET RD/WR ERROR FLAG,
3740 010764 LET UNREC :B= UNREC + #1 ;SET UNRECOVERABLE ERROR FLAG.
3741 010770 ENDIF ;
3742 010770 LET R2 := #11. ;ERROR NUMBER.
3743 010774 LET R4 := #URERM ;MESSAGE ADDRESS.
3744 011000 004737 012350 JSR PC,DROPU ;REPORT ERROR + DROP UNIT.
3745 011004 ;ELSE-IF THERE IS DENSITY CHECK:
3746 011006 004737 011122 JSR PC,RTLE ;CHECK FOR RETRY LIMIT EXCEEDED.
3747 011012 IF RETRYC EQ #0 THEN ;IF THIS IS THE ORIGINAL ERROR THEN:
3748 011020 ERRSOFT #11,URERM,STAERM ;REPORT DENSITY CHECK ERROR.
3749 011030 ENDIF ;
3750 011030 LET RETRYC := RETRYC + #1 ;UPDATE RETRY COUNT.
3751 011034 IFB IRE EQ #0 THEN ;IF ERROR RECOVERY IS ENABLED THEN:
3752 011042 LET ERRREC :B= ERRREC + #1 ;SET ERROR RECOVERY FLAG,
3753 011046 LET @TSDB(R5) := #RWCPK ;ISSUE A REWIND COMMAND,
3754 011054 004737 007764 JSR PC,WSSR ;WAIT FOR SUBSYSTEM READY,
3755 011060 POP R2,R2 ;POP 2 RTN ADR'S FROM STACK,
3756 011064 004737 007316 JSR PC,EXCUTE ;REISSUE THE COMMAND,
3757 011070 000137 007600 JMP GOWAIT ;WAIT FOR INTERRUPT
3758 011074 ;ELSE-IF ERR REC DISABLED:
3759 011076 LET UNREC :B= UNREC + #1 ;SET UNRECOVERABLE ERROR FLAG.
3760 011102 ENDIF ;
3761 011102 ENDIF ;
3762 011102 000207 RTS PC ;RETURN

```



```

3763      :      SUBROUTINE TO HANDLE TERMINATION CLASS CODE 7, FATAL SUBSYSTEM
3764      :      ERROR. THE SUBSYSTEM IS INCAPABLE OF PROPERLY PERFORMING
3765      :      COMMANDS OR AT LEAST ITS INTEGRITY IS SERIOUSLY QUESTIONABLE.
3766      :      REFER TO THE FATAL CLASS CODE FIELD IN THE TSSR REGISTER FOR
3767      :      ADDITIONAL INFORMATION ON THE TYPE OF FATAL ERROR.
3768      :      INPUTS:
3769      :      OUTPUTS:
3770      :      REGISTERS:      R2, R4
3771      :      CALLS:
3772
3773 011104  TCC7:: LET R2 := #12.      ;ERROR NUMBER.
3774 011110      LET R4 := #FATSM      ;MESSAGE ADDRESS.
3775 011114 004737 012350 JSR PC,DROPU      ;DROP THE UNIT.
3776 011120 000207      RTS PC      ;RETURN.
3777
3778
3779
3780      :      SUBROUTINE TO CHECK FOR RETRY LIMIT EXCEEDED. PRINTS ERROR MESSAGE
3781      :      IF EXCEEDED AND DROP UNIT UNLESS COMMAND IS A READ.
3782      :      INPUTS:
3783      :      OUTPUTS:
3784      :      REGISTERS:      R2, R4.
3785      :      CALLS:      DROPU
3786
3787 011122  RTLE:: IF CMDLG EQ #0 THEN      ;IF CMD IS NOT A READ OR WRITE THEN:
3788 011130      LET R2 := #11.      ;ERROR NUMBER.
3789 011134      LET R4 := #URERM      ;MESSAGE ADDRESS.
3790 011140 004737 012350 JSR PC,DROPU      ;DROP THE UNIT.
3791 011144      POP R2
3792 011146 000441      BR RTLRTN      ;AND RETURN.
3793 011150      ENDIF
3794 011150      LET RWERR :B= RWERR + #1      ;SET READ/WRITE ERROR FLAG.
3795 011154      IF CMDLG EQ #2 THEN      ;IF CMD IS A WRT OR WTM:
3796 011164      IF RETRYC EQ #WRECL THEN      ;IF RETRY COUNT HAS REACHED LIMIT:
3797 011174      LET UNREC :B= UNREC + #1      ;SET UNRECOVERABLE FLAG
3798 011200      LET R2 := #14.      ;ERROR NUMBER.
3799 011204      LET R4 := #RLEXM      ;MESSAGE ADDRESS.
3800 011210 004737 012350 JSR PC,DROPU      ;DROP THE UNIT.
3801 011214      POP R2
3802 011216 000415      BR RTLRTN      ;AND RETURN.
3803 011220      ENDIF
3804 011220      ELSE
3805 011222      IF RETRYC EQ #RRECL THEN      ;ELSE - CMD IS A READ:
3806 011232      LET UNREC :B= UNREC + #1      ;IF RETRY COUNT HAS REACHED LIMIT:
3807 011236      ERRSOFT #14,RLEXM,STAERM      ;SET UNRECOVERABLE FLAG
3808 011246      POP R2      ;REPORT RECOVERABLE ERROR.
3809 011250 000400      BR RTLRTN      ;AND RETURN.
3810 011252      ENDIF
3811 011252      ENDIF
3812 011252 000207      RTLRTN: RTS PC      ;RETURN

```

```

3813      :      SUBROUTINE TO LOG BYTES READ/WRITTEN.
3814      :      ALSO UPDATES READ/WRITE ERROR COUNTERS.
3815      :      INPUTS:
3816      :      OUTPUTS:
3817      :      REGISTERS:      R2, R3, R4.
3818      :      CALLS:
3819
3820      LOG::  IFB ERLOG EQ #0 THEN      ;IF DATA AND ERRORS HAVE NOT BEEN LOGGED THEN:
3821      LET ERLOG :=B= ERLOG + #1      ;SET LOG DONE FLAG.
3822      LET R4 := CMDLG      ;GET CURRENT CMD LOGGING CODE.
3823      IF R4 NE #0 THEN      ;IF THERE IS A CODE THEN:
3824      LET R4 := R4 - #2      ;ADJUST THE CODE FOR TABLE INDEX.
3825      LET R2 := R5 + BINC(R4) + #CNTBGN ;R2 = ADR OF BYTE COUNT LSW.
3826      LET (R2) := (R2) + BRFCNT      ;ADD BRFCNT TO LSW.
3827      IF MSGPKT+MS.RFC LOS BRFCNT THEN ;IF THE RFC IS LOWER OR THE SAME AS BRFC THEN
3828      LET (R2) := (R2) - MSGPKT+MS.RFC ;SUBTRACT RFC FROM EXPECTED BRFC.
3829      ENDIF
3830      LET R3 := R2 + #10      ;R3 = ADR OF 2ND WORD.
3831      WHILE (R2) GT #999. DO
3832      LET (R2) := (R2) - #1000.      ;UPDATE BYTE COUNT
3833      LET (R3) := (R3) + #1      ;2ND WORD.
3834      ENDDO
3835      LET R2 := R3 + #10      ;R2 = ADR OF 3RD WORD.
3836      WHILE (R3) GT #999. DO
3837      LET (R3) := (R3) - #1000.      ;UPDATE BYTE COUNT
3838      LET (R2) := (R2) + #1      ;3RD WORD.
3839      ENDDO
3840      LET R3 := R2 + #10      ;R3 = ADR OF 4TH WORD.
3841      WHILE (R2) GT #999. DO
3842      LET (R2) := (R2) - #1000.      ;UPDATE BYTE COUNT
3843      LET (R3) := (R3) + #1      ;4TH WORD.
3844      ENDDO
3845      IFB RWERR NE #0 THEN      ;IF R/W ERROR, UPDATE ERROR COUNT.
3846      LET R2 := R5 + EINC(R4) + #WRREC ;R2 = ADR OF COUNTER.
3847      IFB UNREC NE #0 THEN      ;IS THE ERROR UNRECOVERABLE?
3848      LET R2 := R2 + #10      ;YES, POINT TO NEXT COUNTER.
3849      LET (R2) := (R2) + #1      ;UPDATE THE ERROR COUNTER
3850      ELSE      ;ELSE - IF ERROR IS RECOVERABLE:
3851      LET (R2) := (R2) + #1      ;UPDATE THE ERROR COUNTER
3852      IFB IREC EQ #0 THEN      ;IF ERROR RECOVERY IS ENABLED:
3853      PRINTB #NURTY1,RETRYC      ;PRINT # OF RETRIES TO RECOVER.
3854      ENDIF
3855      ENDIF
3856      ENDIF
3857      ENDIF
3858      ENDIF
3859      RTS PC
3860      :      INDEXES TO BYTE COUNTERS.
3861      BINC:  0      ;WRITE.
3862      40      ;READ REV.
3863      100     ;READ FWD.
3864      :      INDEXES TO READ/WRITE ERROR COUNTERS.
3865      EINC:  0      ;WRITE.
3866      20      ;READ REV.
3867      40      ;READ FWD.

```



```
3868      :      IF A WRITE/VERIFY COMMAND IS ISSUED, CONTROL IS THEN
3869      :      TRANSFERRED TO THIS SUBROUTINE TO READ REVERSE, CHECK DATA,
3870      :      READ FORWARD, CHECK DATA, THEN CONTINUE TO NEXT COMMAND.
3871      :      INPUTS:
3872      :      OUTPUTS:
3873      :      REGISTERS:
3874      :      CALLS:          VFEXC.
3875
3876 011540  VFYDAT:: IFB VFYFLG NE #0 THEN          :IF DATA IS TO BE VERIFIED:
3877 011546      LET PCMDWD := CMDWRD              :SAVE THE PREVIOUS COMMAND WORD.
3878 011554      LET CMDWRD := #RDR                :COMMAND IS READ REV.
3879 011562      LET CMDLG := #4                    :SET UP CMD LOGGING INDEX.
3880 011570 004737 011624      JSR PC,VFEXC        :GO READ ALL THE RECORDS REV.
3881 011574      LET PCMDWD := CMDWRD              :SAVE THE PREVIOUS COMMAND WORD.
3882 011602      LET CMDWRD := #RDF                :COMMAND IS READ FWD.
3883 011610      LET CMDLG := #6                    :SET UP CMD LOGGING INDEX.
3884 011616 004737 011624      JSR PC,VFEXC        :GO READ ALL RECORDS FWD.
3885 011622
3886 011622 000207      ENDIF
                       RTS      PC      ;RETURN.
```

```

3887      :      SUBROUTINE TO EXECUTE THE READ AND VERIFY, FORWARD OR REVERSE.
3888      :      INPUTS:
3889      :      OUTPUTS:
3890      :      REGISTERS:      R2
3891      :      CALLS:      CMDAC, EXCUTE, GOWAIT, CKDATA, CKHAE, NEXTU, FIRSTU.
3892
3893 011624 VFEXC:: LET CMDPKT := CMDWRD CLR.BY #BRF.C ;COMMAND PACKET = READ REV OR FWD.
3894 011640 IFB SWBFLG NE #0 THEN ;IF BYTES ARE TO BE SWAPPED:
3895 011646 LET CMDPKT := CMDPKT SET.BY #SWB.C ;SET SWAB BIT IN CMD PACKET.
3896 011654 ENDIF
3897 011654 LET CMDSAV := CMDPKT ;SAVE COMMAND PACKET 1ST WORD.
3898 011662 LET NCNT := NCNT1 ;SET NUMBER OF RECORDS.
3899 011670 013737 002752 002226 MOV DATARD,CMDPKT+CP.ADL ;SAVE BUFFER START ADDRESS.
3900 011676 WHILE NCNT NE #0 DO ;WHILE THERE ARE RECORDS REMAINING:
3901 011704 004737 006360 JSR PC,CMDAC ;STORE CMD ASCII IN ERROR MSG.
3902 011710 004737 012300 JSR PC,FIRSTU ;SET UP FOR FIRST UNIT.
3903 011714 IF DEVTBL(R5) EQ #END THEN ;IF ALL UNITS HAVE BEEN DROPPED THEN:
3904 011724 DOCLN ;DO CLEAN CODE AND TERMINATE PASS.
3905 011726 ENDIF
3906 011726 WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE DEVICES REMAINING:
3907 011736 LET R2 := DATARD + #8. ;INIT READ BUFFER POINTER.
3908 011746 WHILE R2 NE DATARD DO ;UNTIL 8 BYTES HAVE BEEN SET,
3909 011754 LET -(R2) := #-1 ;INIT READ BUFFER.
3910 011760 ENDDO
3911 011762 004737 007316 JSR PC,EXCUTE ;GO EXECUTE THE COMMAND.
3912 011766 IFB DROPED EQ #0 THEN ;IF UNIT HAS NOT BEEN DROPPED THEN:
3913 011774 004737 007600 JSR PC,GOWAIT ;GO WAIT FOR DONE BIT.
3914 012000 ENDIF
3915 012000 IFB DROPED EQ #0 THEN ;IF UNIT HAS NOT BEEN DROPPED THEN:
3916 012006 004737 012042 JSR PC,CKDATA ;GO VERIFY DATA.
3917 012012 ENDIF
3918 012012 004737 012672 JSR PC,CKHAE ;CHECK FOR HALT AFTER EACH CMD.
3919 012016 004737 012326 JSR PC,NEXTU ;GO FIND THE NEXT UNIT.
3920 012022 ENDDO
3921 012024 LET NCNT := NCNT - #1 ;UPDATE THE RECORD COUNT.
3922 012030 LET PCMDWD := CMDWRD ;SAVE PREVIOUS COMMAND WORD.
3923 012036 ENDDO
3924 012040 000207 RTS PC ;RETURN.
3925

```



```

3926 : SUBROUTINE TO COMPARE DATA BETWEEN READ AND WRITE BUFFERS
3927 : AND PRINT ERROR MESSAGE ON MISCOMPARE.
3928 : INPUTS:
3929 : OUTPUTS:
3930 : REGISTERS: R2, R3, R4.
3931 : CALLS: GCMDA
3932 :
3933 012042 CKDATA:: IF MSGPKT+MS.RFC LOS BRFCNT THEN ;IF RFC IS LOWER OR THE SAME AS BRFCNT THEN:
3934 012052 LET R3 := BRFCNT - MSGPKT+MS.RFC ;VERIFY LENGTH = EXP LEN - RFC.
3935 012062 ELSE ;ELSE, IS RFC IS NEGATIVE:
3936 012064 LET R3 := BRFCNT ;VERIFY LENGTH = EXP LEN.
3937 012070 ENDIF
3938 012070 IF R3 NE #0 THEN ;IF THE LENGTH IS NOT ZERO THEN:
3939 012074 LET CKDCNT := R3 - #1 ;SAVE VERIFICATION LENGTH - 1.
3940 012104 LET R4 := CMDWRD ;R4=CMD BINARY.
3941 012110 004737 006422 JSR PC,GCMDA ;GET CMD ASCII.
3942 012114 LET WTVERM := (R3)+ ;MOVE CMD ASCII.
3943 012120 LET WTVERM+2 := (R3) ;INTO MSG.
3944 012124 105037 012276 CLR CKDFF ;INIT 1ST TIME THRU FLAG.
3945 012130 005002 CLR R2 ;INIT BYTE COUNTER
3946 012132 LET R3 := DATAW ;GET WRITE BUFFER ADDRESS.
3947 012136 LET R4 := DATARD ;GET READ BUFFER ADDRESS.
3948 012142 REPEAT ;REPEAT UNTIL ALL DATA IS COMPARED:
3949 012142 IF R2 EQ CKDCNT THEN ;IF THIS IS THE LAST BYTE THEN:
3950 012150 IFB SWBFLG NE #0 THEN ;IF BYTE SWAPPING IS ENABLED THEN:
3951 012156 IF #BIT00 NOTSETIN CKDCNT THEN ;IF RECORD LENGTH IS ODD THEN:
3952 012166 105723 TSTB (R3)+ ;LAST BYTE WILL BE IN
3953 012170 105724 TSTB (R4)+ ;THE UPPER BYTE.
3954 012172 ENDIF
3955 012172 ENDIF
3956 012172 ENDIF
3957 012172 121314 CMPB (R3),(R4) ;ARE THEY EQUAL.
3958 012174 001430 BEQ 3$ ;BR IF SO.
3959 012176 105737 012276 TSTB CKDFF ;1 ST TIME THRU?
3960 012202 001007 BNE 2$ ;BR IF NOT.
3961 012204 005265 002720 INC VFYCNT(R5) ;INC THE VERIFY ERROR COUNTER.
3962 012210 005265 002730 INC HRDCNT(R5) ;INC THE HARD ERROR COUNT.
3963 012214 LET CKDFF := #1 ;CLR 1ST TIME THRU FLAG.
3964 012222 111437 003000 2$: MOVB (R4),TIME1 ;SAVE WAS DATA FOR TYP0UT.
3965 012226 042737 177400 003000 BIC #177400,TIME1 ;CLEAR GARBAGE.
3966 012234 111337 003002 MOVB (R3),TIME2 ;SAVE SHOULD BE DATA FOR TYP0UT.
3967 012240 042737 177400 003002 BIC #177400,TIME2 ;CLEAR GARBAGE.
3968 012246 ERRHRD #17,WTVERM,DIAERM ;REPORT WRITE/ VERIFY ERROR.
3969 012256 105723 3$: TSTB (R3)+ ;UPDATE WRITE BUFFER ADDRESS.
3970 012260 105724 TSTB (R4)+ ;UPDATE READ BUFFER ADDRESS.
3971 012262 105722 TSTB (R2)+ ;UPDATE BYTE COUNTER.
3972 012264 UNTIL R2 GT CKDCNT ;END OF DATA COMPARE REPEAT LOOP.
3973 012272 ENDIF
3974 012272 000207 RTS PC ;OTHERWISE, RETURN.
3975
3976 012274 000000 CKDCNT: .WORD 0 ;# OF BYTES TO BE VERIFIED -1.
3977 012276 000 CKDFF: .BYTE 0 ;FIRST TIME THRU DATA ERROR LOOP FLAG.
3978 012300 .EVEN

```

```
3979          :      SUBROUTINE TO FIND THE FIRST DEVICE IN THE TEST SEQUENCE.  
3980          :      INPUTS:  
3981          :      OUTPUTS:  
3982          :      REGISTERS:  
3983          :      CALLS:  
3984  
3985 012300    FIRSTU:: LET DROPE :B= #0          :CLR UNIT DROPPED FLAG  
3986 012304    LET R5 := #0          :CLR DEVICE POINTER.  
3987 012306    WHILE DEVTBL(R5) EQ #NINUSE DO :WHILE DEVICES ARE NOT IN USE:  
3988 012316    LET R5 := R5 + #2          :POINT TO NEXT DEVICE.  
3989 012322    ENDDO  
3990 012324    RTS      PC          :RETURN WITH 1ST DEVICE IN R5.  
3991  
3992  
3993  
3994  
3995  
3996          :      SUBROUTINE TO FIND THE NEXT UNIT IN THE TEST CYCLE.  
3997          :      INPUTS:  
3998          :      OUTPUTS:  
3999          :      REGISTERS:  
4000          :      CALLS:  
4001  
4002 012326    NEXTU:: LET DROPE :B= #0          :CLR UNIT DROPPED FLAG  
4003 012332    REPEAT          :REPEAT UNTIL THE NEXT DEVICE IS FOUND.  
4004 012332    LET R5 := R5 + #2          :UPDATE DEVICE TABLE POINTER.  
4005 012336    UNTIL DEVTBL(R5) NE #NINUSE  
4006 012346    RTS      PC          :RETURN.  
4007  
4008  
4009
```



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4010      :      SUBROUTINE TO DROP A DEVICE FROM THE TEST SEQUENCE.
4011      :      *****
4012      :      THIS SUBROUTINE DYNAMICALLY MODIFIES A SUPERVISOR CALL. *****
4013      :      *****
4014      :      INPUTS:          R2=ERROR #, R4=BASIC MESSAGE ADDRESS.
4015      :      OUTPUTS:
4016      :      REGISTERS:       R2, R4
4017      :      CALLS:          MOVMSG, PRXST, LOG
4018
4019 012350 DROPU:  LET DRO100+2 := R2          ;STORE ERROR # IN ERROR CALL.
4020 012354      LET DRO100+4 := R4          ;STORE MSG ADR IN ERROR CALL.
4021 012360      LET HRDCNT(R5) := HRDCNT(R5) + #1 ;INCREMENT THE HARD ERROR COUNT.
4022 012364      LET DROPN := DEVTBL(R5)      ;SAVE # OF DEVICE TO BE DROPPED.
4023 012372 DRO100: ERRDF R2,R4,STAERM      ;PRINT THE ERROR MESSAGE,
4024 012402      LET R4 := MSGPKT+MS.XS3 SHIFT -8. ;GET UDIAG ERROR CODE FROM XSTAT3.
4025 012426      LET @TSDB(R5) := #GSCP      ;INITIATE A GET STATUS COMMAND.
4026 012434      WAITUS 10.                  ;GO TO SUPER-WAIT 1 MSEC.
4027 012442      JSR PC,MOVMSG              ;MOVE MSG PACKET TO COMMON AREA.
4028 012446      IFB R4 EQ #X3.RNY THEN     ;IF WE HAVE A CAPSTAN RUNAWAY THEN:
4029 012454      ERRDF #16,RNYM,STAERM     ;REPORT CAPSTAN RUNAWAY WITH TACH CNT.
4030 012464      ENDIF
4031 012464      JSR PC,PRXST              ;PRINT EXTENDED STATUS REGISTERS.
4032 012470      IFB RECLOG NE #0 THEN     ;IF THE RECORD HAS BEEN LOGGED THEN:
4033 012476      JSR PC,LOG                ;LOG DATA BYTES + RD/WR ERRORS.
4034 012502      ENDIF
4035 012502      DORPT                      ;PRINT PERFORMANCE REPORT
4036 012504      IF PASCNT(R5) NE #0 THEN
4037 012512      LET PASCNT(R5) := PASCNT(R5) - #1
4038 012516      ENDIF
4039 012516      LET R0 := R5 SHIFT -1     ;R0=LOGICAL DEVICE NUMBER
4040 012522      DODU R0                    ;DROP THE UNIT.
4041 012524      BCOMPLETE DRO200          ;BR IF DROPPING OF UNITS IS ENABLED.
4042 012526      IFB IREC EQ #0 THEN      ;IF RECOVERY IS ENABLED THEN:
4043 012534      LET @TSSR(R5) := #0      ;ISSUE SUBSYSTEM INIT.
4044 012540      LET STAFLG :B= STAFLG + #1 ;SET START FLAG TO ENABLE REWIND.
4045 012544      DOCLN                    ;DO CLEAN CODE AND ABORT PASS.
4046 012546      ELSE                      ;ELSE - RECOVERY IS DISABLED:
4047 012550      BR DRORTN                ;RETURN AND CONTINUE TEST SEQUENCE.
4048 012552      ENDIF
4049 012552 DRO200: PRINTF #DROPPDM,DROPN ;PRINT DROP DEVICE MESSAGE
4050 012576      LET DROPED :B= #1        ;SET UNIT DROPPED FLAG.
4051 012604      DRORTN: RTS PC           ;RETURN.
4052
4053 012606      DROPN: .WORD 0           ;# OF UNIT TO BE DROPPED

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4054      :      SUBROUTINE TO PRINT EXTENDED STATUS REGISTERS.
4055      :      INPUTS:
4056      :      OUTPUTS:
4057      :      REGISTERS:
4058      :      CALLS:
4059
4060 012610 PRXST:: PRINTX #STAERO          ;TYPE OUT THE X-ST REGS.
4061 012630 PRINTX #STAER6,MSGPKT+MS.XS0,MSGPKT+MS.XS1,MSGPKT+MS.XS2,MSGPKT+MS.XS3
4062 012670 000207 RTS PC
4063
4064
4065
4066
4067      :      SUBROUTINE TO HALT AFTER EACH COMMAND.
4068      :      INPUTS:
4069      :      OUTPUTS:
4070      :      REGISTERS:      R3, R4
4071      :      CALLS:
4072
4073 012672 CKHAE:: IFB HAE NE #0 THEN          ;IF HALT FLAG IS SET:
4074 012700 MANUAL                          ;IS MANUAL INTERVENTION ALLOWED?
4075 012702 BNCOMPLETE CKHRTN              ;BR IF NOT.
4076 012704 LET R4 := CMDWRD                ;COMMAND WORD.
4077 012710 004737 006422 JSR PC,GCMDA      ;FETCH ADR OF CMD ASCII.
4078 012714 LET HALTM := (R3)+              ;MOVE CMD ASCII
4079 012720 LET HALTM+2 :B= (R3)            ;INTO MESSAGE.
4080 012724 GMANIL HALTM,TIME1,1,YES        ;HALT - WAIT FOR AN OEPRATOR INPUT.
4081 012740 10000$:
4082 012740 ENDIF
4083 012740 000207 CKHRTN: RTS PC          ;RETURN
4084 .EVEN
4085
4086 012742 ENDMOD

```


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051445 032462 040445
040445 042522 047503
045 052501 051116
040445 050123 041505
051445 022465 032504

.TITLE MISCELLANEOUS SECTIONS
.SBTTL REPORT CODING SECTION

BGNMOD

;++
: THE REPORT CODING SECTION CONTAINS THE
: 'PRINTS' CALLS THAT GENERATE STATISTICAL REPORTS.
:--

BGNRPT

L\$RPT::

```
LET R5SAVE := R5 :SAVE CURRENT DEVICE POINTER.
JSR PC,FIRSTU :FIND THE FIRST UNIT.
WHILE DEVTBL(R5) NE #END DO :WHILE THERE ARE MORE DEVICES:
PRINTS #RPT1A,DEVTBL(R5),PASCNT(R5),RECCNT(R5)
PRINTS #RPT1B,WRBC+30(R5),WRBC+20(R5),WRBC+10(R5),WRBC(R5)
PRINTS #RPT1C,RRBC+30(R5),RRBC+20(R5),RRBC+10(R5),RRBC(R5)
PRINTS #RPT1D,RFBC+30(R5),RFBC+20(R5),RFBC+10(R5),RFBC(R5)
PRINTS #RPT1E
PRINTS #RPT1F,WRREC(R5),RRREC(R5),RFREC(R5)
PRINTS #RPT1G,WRUNR(R5),RRUNR(R5),RFUNR(R5)
PRINTS #RPT1H
PRINTS #RPT1I,SCCNT(R5),HRDCNT(R5),VFYCNT(R5)
JSR PC,NEXTU :FIND THE NEXT UNIT.
ENDDO
LET R5 := R5SAVE :RESTORE CURRENT DEVICE POINTER.
EXIT RPT
```

```
.NLIST BEX
RPT1A: .ASCIZ /%N%N%AUNIT %D1%S3%APASS:%D5%S3%ARECORD:%D5%N/
RPT1B: .ASCIZ /%ABYTES WRITTEN = %D3%A,%Z3%A,%Z3%A,%Z3%N/
RPT1C: .ASCIZ /%ABYTES READ REV = %D3%A,%Z3%A,%Z3%A,%Z3%N/
RPT1D: .ASCIZ /%ABYTES READ FWD = %D3%A,%Z3%A,%Z3%A,%Z3%N/
RPT1E: .ASCIZ /%S25%AWRT%S4%ARDR%S4%ARDF%N/
RPT1F: .ASCIZ /%ARECOVERABLE ERRORS - %D5%S2%D5%S2%D5%N/
RPT1G: .ASCIZ /%AUNRECOVERABLE ERRORS - %D5%S2%D5%S2%D5%N%N/
RPT1H: .ASCIZ '%ASPECIAL CONDITION%S3%AHARD/FATAL%S3%ADATA COMPARE%N''
RPT1I: .ASCIZ /%S5%D5%S11%D5%S9%D5%N%N/
```

.LIST BEX
.EVEN

ENDRPT

L10011:

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4122
4123
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014140

014140

```

4125      .SBTTL INITIALIZE SECTION
4126
4127      :++
4128      : THE INITIALIZE SECTION CONTAINS THE CODING THAT IS PERFORMED
4129      : AT THE BEGINNING OF EACH PASS.
4130      :--
4131
4132      BGNINIT
4133      L$INIT::
4134
4135      INIT10: IF #BIT0!BIT1 SETIN #CMDPKT THEN ;IF CMD PACKET IS NOT ON MODULO 4 BOUNDRY:
4136      ERRSF #1,CMDPKM ;PRINT ERROR MSG,
4137      WAITMS 100. ;GO TO SUPERVISOR, WAIT 10 SECONDS.
4138      BR INIT10 ;
4139      ENDIF
4140
4141      IFB CLRFLG NE #0 THEN ;IF CLR COUNTERS FLAG SET:
4142      CLRB CLRFLG ;INIT CLR FLAG.
4143      LET R2 := #0
4144      WHILE R2 NE #CNTLEN DO ;CLR ALL STATISTICAL COUNTERS.
4145      LET WRBC(R2) := #0
4146      LET R2 := R2 + #2
4147      ENDDO
4148      ENDIF
4149
4150      IFB RRANV NE #0 THEN ;IF RESET RANDOM VARIABLE FLAG IS SET THEN:
4151      LET RANB := #RANBC ;RESET RANDOM BASE #.
4152      LET RANS := #RANSC ;RESET RANDOM SAVE LOCATION.
4153      ENDIF
4154
4155      READEF #EF.START ;READ START COMMAND EVENT FLAG.
4156      BNCOMPLETE INIT15 ;BRANCH IF NOT STARTING.
4157      LET STAF LG :B= STAF LG + #1 ;SET START COMMAND FLAG.
4158      LET R5 := #6
4159      REPEAT ;INITIATE UNIT NUMBER TABLE
4160      LET DEVTBL(R5) := #NINUSE ;BY STORING NOT IN USE IN EACH LOCATION.
4161      LET R5 := R5 - #2
4162      UNTIL R5 EQ #0
4163      LET R5 := L$UNIT SHIFT 1
4164      REPEAT ;STORE ALL UNIT
4165      LET R5 := R5 - #2 ;NUMBERS IN DEVTBL.
4166      LET DEVTBL(R5) := R5 SHIFT -1 + #1
4167      UNTIL R5 EQ #0
4168
4169      INIT15: READEF #EF.PWR ;HAS THERE BE A POWER FAILURE?
4170      BNCOMPLETE INIT16 ;BRANCH IF NOT.
4171      LET STAF LG :B= STAF LG + #1 ;IF SO - SET THE START FLAG.
4172      LET PWRFLG :B= PWRFLG + #1 ;IF SO - SET THE POWER FAIL FLAG.
4173
4174      INIT16: JSR PC,FIRSTU ;INIT DEVICE POINTER.
4175      LET R2 := #0 ;INIT DEVICE COUNTER.
4176      WHILE DEVTBL(R5) NE #END DO
4177      LET R2 := R2 + #1
4178      LET R0 := R5 SHIFT -1
4179      GPHARD R0,R0 ;GET HARDWARE P TABLE FROM SUPER.
4180      LET TSDB(R5) := (R0) ;SAVE TSDB ADDRESS.

```



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4181 014410          LET TSSR(R5) := (R0) + #2      ;SAVE TSSR ADDRESS.
4182 014422          LET TSVCT(R5) := (R0)      ;SAVE INTERRUPT VECTOR ADDRESS.
4183 014426          SETVEC TSVCT(R5),TS4INT(R5),#INTPRI ;SET UP INTERRUPT PROCESSING CONDITIONS.
4184 014454          IFB PWRFLG EQ #0 THEN      ;IF POWER FAIL HAS NOT OCCURRED THEN:
4185 014462          LET PASCNT(R5) := PASCNT(R5) + #1 ;UPDATE PASS COUNT.
4186 014466          ENDIF
4187 014466 004737 012326 JSR PC,NEXTU      ;DO IT FOR ALL DEVICES.
4188 014472          ENDDO
4189
4190 014474          IF R2 EQ #0 THEN      ;IF THERE ARE NO UNITS:
4191 014500          PRINTF #AUDRPM      ;PRINT ALL UNITS DROPPED.
4192 014520          WAITMS 50.      ;GO TO SUPERVISOR, WAIT 5 SECONDS.
4193 014526          BREAK      ;GO TO SUPERVISOR, CHECK TTY.
4194 014530          DOCLN      ;DO CLEAN CODE + ABORT PASS.
4195 014532          ENDIF
4196
4197 014532 004737 012300 JSR PC,FIRSTU      ;SET UP FOR FIRST UNIT.
4198 014536          WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE DEVICES:
4199 014546          LET TIME1 := #-1      ;INIT TIMEOUT COUNTER.
4200 014554          REPEAT      ;REPEAT UNTIL UNIT IS ON LINE:
4201 014554          BREAK      ;BREAK TO THE SUPERVISOR.
4202 014556          LET TIME1 := TIME1 - #1 ;UPDATE TIMEOUT COUNTER.
4203 014562          IF TIME1 EQ #0 THEN ;IF TIMED OUT THEN:
4204 014570 004737 010020 JSR PC,MOVMSG      ;MOVE MSG PACKET TO COMMON AREA.
4205 014574 004737 010402 JSR PC,TCC1      ;PRINT UNIT OFFLINE + DROP UNIT.
4206 014600          ELSE      ;ELSE - IF NOT TIMED OUT:
4207 014602          LET @TSDB(R5) := #GSCP ;ISSUE GET STATUS COMMAND.
4208 014610          WAITUS 100. ;WAIT 10 MSEC.
4209 014616          ENDIF
4210 014616          UNTIL #TS.OFL NOTSETIN @TSSR(R5) OR TIME1 EQ #0
4211          ;REPEAT UNTIL ON LINE OR TIMED OUT.
4212 014634 004737 012326 JSR PC,NEXTU      ;SET UP FOR NEXT UNIT.
4213 014640          ENDDO
4214
4215 014642          LET R2 := #DATCNT SHIFT -8. ;GENERATE PAGE COUNT FROM MAX LENGTH.
4216 014666          BUFFER R2,R3 ;REQUEST MEMORY FROM SUPER FOR RD/WR BUFFERS.
4217 014674          BCOMPLETE INIT20 ;BRANCH IF ENOUGH MEMORY IS AVAILABLE.
4218 014676          DOCLN ;DO CLEAN CODE + TERMINATE PASS.
4219 014700          INIT20: LET DATAW := R3 ;SAVE WRITE BUFFER ADDRESS.
4220 014704          LET DATARD := #DATCNT + R3 ;SAVE READ BUFFER ADDRESS.
4221
4222 014716          LET CHGFLG :B= #0 ;CLR CHANGE CMD SEQ TBL FLAG.
4223 014722          LET R3 := #ENDFLG
4224 014726 004737 007750 JSR PC,CLRERR ;CLEAR ALL FLAGS.
4225 014732          LET PWRFLG :B= #0 ;CLEAR THE POWER FAIL FLAG.
4226
4227 014736          EXIT INIT
4228          .EVEN
4229
4230 014742          ENDINIT
4231 014742          L10012:
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015014

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.SBTTL CLEANUP CODING SECTION

;++
: THE CLEANUP CODING SECTION CONTAINS THE CODING THAT IS PERFORMED
: AT THE END OF EACH PASS.
:--

BGNCLN
L\$CLEAN::

JSR PC,FIRSTU
WHILE DEVTBL(R5) NE #END DO
JSR PC,WSSR
LET @TSDB(R5) := #BRCPK
CLRVEC TSVCT(R5)
JSR PC,NEXTU
ENDDO
UNBUFF DATAWT

EXIT CLN
.EVEN

ENDCLN

:FIND FIRST UNIT.

:WAIT FOR UNIT READY OR TIMEOUT,
:ISSUE MSG BUFFER RELEASE CMD.
:RELEASE INTERRUPT VECTORS FOR ALL DEV.
:FIND NEXT UNIT.

:RELEASE THE READY/WRITE BUFFERS TO SUPER.

L10013:


```
4257 .SBTTL DROP UNIT SECTION
4258
4259 :++
4260 : THE DROP-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
4261 : TO NO LONGER BE TESTED.
4262 :--
4263
4264 015022          BGNDU
4265 015022 L$DU::
4266
4267 015022          LET R5 := R0 SHIFT 1          :R5 = LOGICAL DEVICE NUMBER X 2.
4268 015026 004737 007764 JSR PC,WSSR          :WAIT FOR UNIT READY OR TIMEOUT.
4269 015032          LET @TSDB(R5) := #BRCPK      :ISSUE MSG BUFFER RELEASE CMD.
4270 015040          LET DEVTBL(R5) := #NINUSE   :SET NOT IN USE FLAG FOR THE DEVICE.
4271 015046          CLRVEC TSVCT(R5)          :RELEASE THE INTERRUPT VECTOR.
4272
4273 015054          EXIT DU
4274          .EVEN
4275
4276 015060          ENDDU
4277 015060 L10014:
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4278 .SBTTL ADD UNIT SECTION
4279
4280 :++
4281 : THE ADD-UNIT SECTION CONTAINS THE CODING THAT CAUSES A DEVICE
4282 : TO BE (A) TESTED FOR THE FIRST TIME, OR (B) RESUMED IN TESTING. IF
4283 : 'EF.AUNIT' IS SET, THE UNIT WILL BE TESTED AS A NEW UNIT.
4284 :--
4285
4286 015062 BGNAU
4287 015062 L$AU::
4288
4289
4290 015062 LET R5 := R0 SHIFT 1 ;R5 = LOGICAL DEVICE NUMBER X 2.
4291 015066 LET DEVTBL(R5) := R0 + #1 ;STORE UNIT # IN DEVICE TABLE.
4292 015076 GPHARD R0,R0 ;GET HARDWARE P TABLE FROM SUPER.
4293 015100 LET TSDB(R5) := (R0) ;SAVE TSDB ADDRESS.
4294 015104 LET TSSR(R5) := (R0) + #2 ;SAVE TSSR ADDRESS.
4295 015116 LET TSVCT(R5) := (R0) ;SAVE INTERRUPT VECTOR ADDRESS.
4296 015122 SETVEC TSVCT(R5),TS4INT(R5),#INTPRI ;SET UP INTERUPT PROCESSING CONDITIONS.
4297 015150 LET INTFLG(R5) := #0 ;CLEAR INTERRUPT FLAGS.
4298
4299 015154 EXIT AU
4300
4301 .EVEN
4302
4303 015160 ENDAU
4304 015160 L10015:
4305
4306 015162 ENDMOD
4307
```



```

4308
4309 .TITLE HARDWARE TESTS
4310
4311 .SBTTL TEST 1: BASIC FUNCTIONS.
4312
4313 :++
4314 : TEST TO EXECUTE ALL TS04 FUNCTIONS.
4315 :--
4316
4317 015162 BGNMOD
4318
4319 015162 BGNTST
4320 015162 T1::
4321
4322 015162 LET RANDOM :B= #0 ;CLR THE RANDOM OPERATIONS FLAG.
4323
4324 015166 BGNSUB ;SUBTEST 1 - SET CHAR, DRIVE INIT, GET STATUS.
4325 015166 T1.1:
4326
4327 015170 LET R2 := #BFSEQ0 ;ADR OF CMD SEQ.
4328 015174 004737 015754 JSR PC,BFSEQ ;SET UP CMD SEQ.
4329 015200 004737 006020 JSR PC,EXALL ;EXECUTE CMD SEQ ON ALL DEVICES.
4330 015204 004737 012300 JSR PC,FIRSTU ;FIND THE FIRST UNIT.
4331 015210 WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE DEVICES:
4332 015220 LET R2 := MSGPKA(R5) ;GET MSG PACKET ADR,
4333 015224 LET R2 := R2 + #12 ;GET XSTAT2 ADR,
4334 015230 LET TS4CL(R5) := (R2) CLR.BY #177400 ;STORE CODE LEVEL FROM DTR BYTE,
4335 015242 IF PASCNT(R5) EQ #1 THEN ;IF THIS IS PASS 1 THEN:
4336 015252 PRINTF #CODELM,DEVTBL(R5),TS4CL(R5) ;PRINT THE TS04 MICROCODE LEVEL.
4337 015302 ENDF
4338 015302 004737 012326 JSR PC,NEXTU ;FIND NEXT UNIT.
4339 015306 ENDDO
4340 015310 ENDSUB
4341 015310 L10017:
4342
4343 015312 BGNSUB ;SUBTEST 2 - REWIND.
4344 015312 T1.2:
4345
4346 015314 LET R2 := #BFSEQ1 ;ADR OF CMD SEQ.
4347 015320 004737 015754 JSR PC,BFSEQ ;SET UP CMD SEQ.
4348 015324 004737 006020 JSR PC,EXALL ;EXECUTE CMD SEQ ON ALL DEVICES.
4349 015330 ENDSUB
4350 015330 L10020:
4351
4352 015332 BGNSUB ;SUBTEST 3 - WRITE/VERIFY.
4353 015332 T1.3:
4354
4355 015334 LET R2 := #BFSEQ2 ;ADR OF CMD SEQ.
4356 015340 004737 015754 JSR PC,BFSEQ ;SET UP CMD SEQ.
4357 015344 004737 006020 JSR PC,EXALL ;EXECUTE CMD SEQ ON ALL DEVICES.
4358 015350 ENDSUB
4359 015350 L10021:
4360
4361 015352 BGNSUB ;SUBTEST 4 - WRITE TAPE MARK, ERASE.
4362 015352 T1.4:
4363

```

```
4364 015354          LET R2 := #BFSEQ3          :ADR OF CMD SEQ.
4365 015360 004737 015754 JSR      PC,BFSEQ          :SET UP CMD SEQ.
4366 015364 004737 006020 JSR      PC,EXALL          :EXECUTE CMD SEQ ON ALL DEVICES.
4367 015370          ENDSUB
4368 015370          L10022:
4369
4370 015372          BGNSUB          :SUBTEST 5 - SPACE FILES.
4371 015372          T1.5:
4372
4373 015374          LET R2 := #BFSEQ4          :ADR OF CMD SEQ.
4374 015400 004737 015754 JSR      PC,BFSEQ          :SET UP CMD SEQ.
4375 015404 004737 006020 JSR      PC,EXALL          :EXECUTE CMD SEQ ON ALL DEVICES.
4376 015410          ENDSUB
4377 015410          L10023:
4378
4379 015412          BGNSUB          :SUBTEST 6 - SPACE RECORDS.
4380 015412          T1.6:
4381
4382 015414          LET R2 := #BFSEQ5          :ADR OF CMD SEQ.
4383 015420 004737 015754 JSR      PC,BFSEQ          :SET UP CMD SEQ.
4384 015424 004737 006020 JSR      PC,EXALL          :EXECUTE CMD SEQ ON ALL DEVICES.
4385 015430          ENDSUB
4386 015430          L10024:
4387
4388 015432          BGNSUB          :SUBTEST 7 - WRITE RETRY.
4389 015432          T1.7:
4390
4391 015434          LET R2 := #BFSEQ6          :ADR OF CMD SEQ.
4392 015440 004737 015754 JSR      PC,BFSEQ          :SET UP CMD SEQ.
4393 015444 004737 006020 JSR      PC,EXALL          :EXECUTE CMD SEQ ON ALL DEVICES.
4394 015450          ENDSUB
4395 015450          L10025:
4396
4397 015452          BGNSUB          :SUBTEST 8 - READ REV RETRY.
4398 015452          T1.8:
4399
4400 015454          LET R2 := #BFSEQ7          :ADR OF CMD SEQ.
4401 015460 004737 015754 JSR      PC,BFSEQ          :SET UP CMD SEQ.
4402 015464 004737 006020 JSR      PC,EXALL          :EXECUTE CMD SEQ ON ALL DEVICES.
4403 015470          ENDSUB
4404 015470          L10026:
4405
4406 015472          BGNSUB          :SUBTEST 9 - READ FWD RETRY.
4407 015472          T1.9:
4408
4409 015474          LET R2 := #BFSEQ8          :ADR OF CMD SEQ.
4410 015500 004737 015754 JSR      PC,BFSEQ          :SET UP CMD SEQ.
4411 015504 004737 006020 JSR      PC,EXALL          :EXECUTE CMD SEQ ON ALL DEVICES.
4412 015510          ENDSUB
4413 015510          L10027:
4414
4415 015512          BGNSUB          :SUBTEST 10- CLEAN.
4416 015512          T1.10:
4417
4418 015514          LET R2 := #BFSEQ9          :ADR OF CMD SEQ.
4419 015520 004737 015754 JSR      PC,BFSEQ          :SET UP CMD SEQ.
```



```

4420 015524 004737 006020          JSR    PC,EXALL          ;EXECUTE CMD SEQ ON ALL DEVICES.
4421 015530                          ENDSUB
4422 015530          L10030:
4423
4424 015532                          BGNSUB          ;SUBTEST 11 - WTV SWAPPED DATA BYTES.
4425 015532          T1.11:
4426
4427 015534                          LET R2 := #BFSE10      ;ADR OF CMD SEQ.
4428 015540 004737 015754          JSR    PC,BFSEQ      ;SET UP CMD SEQ.
4429 015544 004737 006020          JSR    PC,EXALL      ;WRITE/VERIFY RECORDS 1 AND 2.
4430 015550                          LET SWBFLG :B= #1     ;ENABLE BYTE SWAPPING.
4431 015556 004737 006020          JSR    PC,EXALL      ;WRITE/VERIFY RECORDS 3 AND 4.
4432 015562                          LET SWBFLG :B= #0     ;DISABLE BYTE SWAPPING.
4433 015566
4434 015566          L10031:
4435
4436 015570                          LET R2 := DATAW + #8. ;INIT WRITE BUFFER POINTER.
4437 015600                          WHILE R2 NE DATAW DO ;UNTIL 8 BYTES HAVE BEEN SWAPPED.
4438 015606 000342          SWAB -(R?)          ;SWAP DATA BYTES IN WRITE BUFFER.
4439 015610                          ENDDO
4440
4441 015612                          BGNSUB          ;SUBTEST 12 - READ SWAPPED DATA BYTES.
4442 015612          T1.12:
4443
4444 015614                          LET CMDWRD := #RDR    ;CMD IS READ REV.
4445 015622 004737 011624          JSR    PC,VFEXC      ;VERIFY ODD LENGTH SWAP (RECORD 4).
4446 015626                          LET CMDPKT+CP.CNT := #10 ;CHANGE BYTE COUNT TO 8.
4447 015634 004737 011624          JSR    PC,VFEXC      ;VERIFY EVEN LENGTH SWAP (RECORD 3).
4448 015640                          LET SWBFLG :B= #1     ;ENABLE BYTE SWAPPING.
4449 015646                          LET CMDPKT+CP.CNT := #7 ;CHANGE BYTE COUNT TO 7.
4450 015654 004737 011624          JSR    PC,VFEXC      ;VERIFY ODD LENGTH SWAP (RECORD 2).
4451 015660                          LET CMDPKT+CP.CNT := #10 ;CHANGE BYTE COUNT TO 8.
4452 015666 004737 011624          JSR    PC,VFEXC      ;VERIFY EVEN LENGTH SWAP (RECORD 1).
4453 015672                          LET CMDWRD := #RDF    ;CMD IS READ FWD.
4454 015700 004737 011624          JSR    PC,VFEXC      ;VERIFY EVEN LENGTH SWAP (RECORD 1).
4455 015704                          LET CMDPKT+CP.CNT := #7 ;CHANGE BYTE COUNT TO 7.
4456 015712 004737 011624          JSR    PC,VFEXC      ;VERIFY ODD LENGTH SWAP (RECORD 2).
4457 015716                          LET SWBFLG :B= #0     ;DISABLE BYTE SWAPPING.
4458 015722                          LET CMDPKT+CP.CNT := #10 ;CHANGE BYTE COUNT TO 8.
4459 015730 004737 011624          JSR    PC,VFEXC      ;VERIFY EVEN LENGTH SWAP (RECORD 3).
4460 015734                          LET CMDPKT+CP.CNT := #7 ;CHANGE BYTE COUNT TO 7.
4461 015742 004737 011624          JSR    PC,VFEXC      ;VERIFY ODD LENGTH SWAP (RECORD 4).
4462 015746                          ENDSUB
4463 015746          L10032:
4464
4465 015750                          EXIT    TST

```



```

4466      :      SUBROUTINE TO MOVE A COMMAND SEQUENCE TO THE SEQUENCE TABLE.
4467      :      INPUTS:          R2 = FWA OF COMMAND SEQUENCE.
4468      :      OUTPUTS:
4469      :      REGISTERS:
4470      :      CALLS:
4471
4472 015754 BFSEQ: LET R1 := #CMDSEQ           ;INIT SEQ TABLE ADDRESS.
4473 015760      WHILE (R2) NE #END DO      ;WHILE THERE ARE MORE COMMANDS:
4474 015766      LET (R1)+ := (R2)+         ;MOVE COMMANDS TO SEQ TABLE.
4475 015770      ENDDO
4476 015772      LET (R1) := #END          ;STORE END OF SEQUENCE CODE.
4477 015776      RTS PC                    ;RETURN.
4478
4479
4480
4481
4482
4483 016000 140004
4484 016002 000200
4485 016004 000001
4486 016006 000000
4487 016010 100013
4488 016012 000001
4489 016014 000001
4490 016016 000000
4491 016020 140004
4492 016022 000020
4493 016024 000001
4494 016026 000000
4495 016030 100017
4496 016032 000001
4497 016034 000001
4498 016036 000000
4499 016040 140004
4500 016042 000040
4501 016044 000001
4502 016046 000000
4503 016050 177777
4504
4505 016052 102010
4506 016054 000001
4507 016056 000002
4508 016060 000000
4509 016062 177777
4510
4511 016064 104105
4512 016066 010000
4513 016070 000001
4514 016072 000001
4515 016074 104105
4516 016076 010000
4517 016100 000001
4518 016102 000002
4519 016104 104105
4520 016106 010000
4521 016110 000001
    
```

```

:      BASIC FUNCTION COMMAND SEQUENCE
BFSEQ0: .WORD  SCH           ;SET CHAR. 200.          (1)
          200
          1
          0
          DRI           ;DRIVE INIT.          (2)
          1
          1
          0
          SCH           ;SET CHAR. 20          (3)
          20
          1
          0
          GES           ;GET STATUS.          (4)
          1
          1
          0
          SCH           ;SET CHAR. 40.          (5)
          40
          1
          0
          .WORD  END
BFSEQ1:      RWD           ;REWIND TWICE.          (6)
          1
          2
          0
          .WORD  END
BFSEQ2:      WTV           ;WRITE/VERIFY PAT 1.   (7)
          DATCNT
          1
          1
          WTV           ;WTV PAT 2.           (8)
          DATCNT
          1
          2
          WTV           ;WTV PAT 3.           (9)
          DATCNT
          1
    
```


4522	016112	000003	3			
4523	016114	104105	WTV		;WTV PAT 4.	(10)
4524	016116	010000	DATCNT			
4525	016120	000001	1			
4526	016122	000004	4			
4527	016124	104105	WTV		;WTV PAT 5.	(11)
4528	016126	010000	DATCNT			
4529	016130	000001	1			
4530	016132	000005	5			
4531	016134	104105	WTV		;WTV PAT 6.	(12)
4532	016136	010000	DATCNT			
4533	016140	000001	1			
4534	016142	000006	6			
4535	016144	104105	WTV		;WTV PAT 0.	(13)
4536	016146	010000	DATCNT			
4537	016150	000001	1			
4538	016152	000000	0			
4539	016154	177777	.WORD	END		
4540						
4541	016156	100011	BFSEQ3:	WTM	;WRITE TAPE MARK.	(14)
4542	016160	000001	1			
4543	016162	000001	1			
4544	016164	000000	0			
4545	016166	104005	WRT		;WRITE 10 RECORDS.	(15)
4546	016170	010000	DATCNT			
4547	016172	000010	10			
4548	016174	000001	1			
4549	016176	100411	ERS		;ERASE 10 TIMES.	(16)
4550	016200	000001	1			
4551	016202	000010	10			
4552	016204	000000	0			
4553	016206	100011	WTM		;WRITE TAPE MARK.	(17)
4554	016210	000001	1			
4555	016212	000001	1			
4556	016214	000000	0			
4557	016216	101011	WTR		;WTR RETRY	(18)
4558	016220	000001	1			
4559	016222	000001	1			
4560	016224	000000	0			
4561	016226	177777	.WORD	END		
4562						
4563	016230	105410	BFSEQ4:	SFR	;SPACE 2 FILES REV.	(19)
4564	016232	000002	2			
4565	016234	000001	1			
4566	016236	000000	0			
4567	016240	105010	SFF		;SPACE 2 FILES FWD.	(20)
4568	016242	000002	2			
4569	016244	000001	1			
4570	016246	000000	0			
4571	016250	105410	SFR		;SPACE 2 FILES REV.	(21)
4572	016252	000001	1			
4573	016254	000002	2			
4574	016256	000000	0			
4575	016260	105010	SFF		;SPACE 2 FILES FWD.	(22)
4576	016262	000001	1			
4577	016264	000002	2			

4578	016266	000000		0		
4579	016270	177777		END		
4580			.WORD			
4581	016272	102010	BFSEQ5:	RWD	;REWIND.	(23)
4582	016274	000001		1		
4583	016276	000001		1		
4584	016300	000000		0		
4585	016302	104010		SRF	;SPACE 7 RECORDS FWD.	(24)
4586	016304	000007		7		
4587	016306	000001		1		
4588	016310	000000		0		
4589	016312	104410		SRR	;SPACE 7 RECORDS REV.	(25)
4590	016314	000007		7		
4591	016316	000001		1		
4592	016320	000000		0		
4593	016322	104010		SRF	;SPACE 7 RECORDS FWD.	(26)
4594	016324	000001		1		
4595	016326	000007		7		
4596	016330	000000		0		
4597	016332	104410		SRR	;SPACE 7 RECORDS REV.	(27)
4598	016334	000001		1		
4599	016336	000007		7		
4600	016340	000000		0		
4601	016342	177777		END		
4602			.WORD			
4603	016344	102010	BFSEQ6:	RWD	;REWIND.	(28)
4604	016346	000001		1		
4605	016350	000001		1		
4606	016352	000000		0		
4607	016354	104005		WRT	;WRITE.	(29)
4608	016356	010000		DATCNT		
4609	016360	000001		1		
4610	016362	000001		1		
4611	016364	105005		WRR	;WRITE RETRY.	(30)
4612	016366	010000		DATCNT		
4613	016370	000001		1		
4614	016372	000001		1		
4615	016374	177777		END		
4616			.WORD			
4617	016376	104401	BFSEQ7:	RDR	;READ REV.	(31)
4618	016400	010000		DATCNT		
4619	016402	000001		1		
4620	016404	000001		1		
4621	016406	105401		RNR	;READ NEXT REV.	(32)
4622	016410	010000		DATCNT		
4623	016412	000001		1		
4624	016414	000001		1		
4625	016416	125401		RNF	;READ NEXT FWD.	(33)
4626	016420	010000		DATCNT		
4627	016422	000001		1		
4628	016424	000001		1		
4629	016426	177777		END		
4630			.WORD			
4631	016430	104001	BFSEQ8:	RDF	;READ FWD.	(34)
4632	016432	010000		DATCNT		
4633	016434	000001		1		

4634	016436	000001		1			
4635	016440	105001		RPF		;READ PREVIOUS FWD.	(35)
4636	016442	010000		DATCNT			
4637	016444	000001		1			
4638	016446	000001		1			
4639	016450	125001		RPR		;READ PREVIOUS REV.	(36)
4640	016452	010000		DATCNT			
4641	016454	000001		1			
4642	016456	000001		1			
4643	016460	177777	.WORD	END			
4644							
4645	016462	101012	BFSEQ9: .WORD	CLN		;CLEAN.	(37)
4646	016464	000001		1			
4647	016466	000001		1			
4648	016470	000000		0			
4649	016472	102010		RWD		;REWIND	(38)
4650	016474	000001		1			
4651	016476	000001		1			
4652	016500	000000		0			
4653	016502	177777	.WORD	END		;END OF SEQUENCE.	
4654							
4655	016504	104105	BFSE10:	WTV		;WRITE/VERIFY EVEN LENGTH.	(39)
4656	016506	000010		10			
4657	016510	000001		1			
4658	016512	000000		0			
4659	016514	104105		WTV		;WRITE/VERIFY ODD LENGTH.	(40)
4660	016516	000007		7			
4661	016520	000001		1			
4662	016522	000000		0			
4663	016524	177777	.WORD	END			
4664			.EVEN				
4665							
4666	016526		ENDTST				
4667	016526		L10016:				

4668
4669
4670
4671
4672
4673 016530
4674 016530
4675
4676 016530
4677 016536
4678 016544
4679 016554 004737 005754
4680 016560
4681 016566 004737 006000
4682 016572
4683 016576
4684 016576
4685 016602
4686 016606
4687 016614
4688 016616
4689 016622
4690 016622
4691 016630
4692 016636
4693 016646 004772 016762
4694 016652
4695 016654
4696 016660 004737 006020
4697 016664
4698 016670
4699 016674 004737 017022
4700 016700
4701 016712
4702 016720
4703 016724 004737 006020
4704 016730
4705 016736
4706 016742 004737 006000
4707 016746
4708 016752 004737 006020
4709
4710 016756
4711

.SBTTL TEST 2: DATA RELIABILITY.

:++
: TEST TO CHECK THE DATA RELIABILITY OF THE TS04.
:--

T2:: BGNTST

```
LET RANDOM :B= #1 ;SET THE RANDOM OPERATIONS FLAG.
LET R2 := #DATCNT - #1 ;SET UP THE RECORD LENGTH MASK.
LET LENMSK := COMP R2 ;ALLOW MAXIMUM BUFFER.
JSR PC,SETCH ;CMD 1 = SET CHARACTERISTIC.
IFB STAF LG NE #0 THEN ;IF STARTING THEN:
  JSR PC,SETRW ;CMD2=REWIND
  LET STAF LG :B= #0 ;CLR START FLAG.
ENDIF
LET (R1)+ := #WTV ;CMD3 = WRITE/ VERIFY.
LET (R1)+ := #DATCNT ;SET BR F TO MAX FOR PATTERN GENERATION.
LET R2 := COMP #RNOPSC ;63 OPERATIONS.
LET (R1)+ := R2 ;RANDOM PATTERN.
LET (R1)+ := #RANP ;REPEAT TO EOT:
REPEAT ;FILL SEQ TBL WITH RANDOM CMDS.
  WHILE R1 LT #SEQEND DO
    LET RANS := RANS + RANB
    LET R2 := RANS CLR.BY #177741 ;R2 = RANDOM # (0 - 36).
    JSR PC,@RANCMD(R2) ;SET UP A RANDOM CMD + BR F.
  ENDDO
  LET (R1) := #END ;STORE END OF SEQUENCE CODE IN TABLE.
  JSR PC,EXALL ;GO EXECUTE ALL CMDS IN SEQUENCE TABLE.
  LET R1 := #CMDSEQ ;INIT CMD SEQ TBL POINTER,
  UNTIL R2 NE #0 ;REPEAT UNTIL EOT IS REACHED
  JSR PC,RANRD ;SET UP READ REV/FWD CMDS,
  LET CMDSEQ+4 := COMP #RNOPSC ;# OF RECORDS FOR READ REV.
  LET CMDSEQ+14 := CMDSEQ+4 ;# OF RECORDS FOR READ FORWARD.
  LET (R1) := #END ;STORE END OF SEQUENCE CODE IN SEQ TABLE.
  JSR PC,EXALL ;GO EXECUTE READ REV/FWD OF LAST N RECORDS.
  LET RPTFLG :B= #1 ;REQUEST PERFORMANCE REPORT DURING REWIND.
  LET R1 := #CMDSEQ ;INIT SEQ TBL POINTER,
  JSR PC,SETRW ;STORE REWIND IN SEQ TBL,
  LET (R1) := #END ;STORE END IN SEQ TBL,
  JSR PC,EXALL ;EXECUTE REWIND CMD ON ALL UNITS

EXIT TST
```


4712 : ADDRESSES OF SUBROUTINES USED TO SET UP RANDOM OPERATIONS IN
4713 : THE DATA RELIABILITY TEST.

4714				
4715	016762	017110	RANCMD: RANWV	:WRITE/VERIFY.
4716	016764	017076	RANWR	:WRITE.
4717	016766	017076	RANWR	:WRITE.
4718	016770	017076	RANWR	:WRITE.
4719	016772	017076	RANWR	:WRITE.
4720	016774	017076	RANWR	:WRITE.
4721	016776	017076	RANWR	:WRITE.
4722	017000	017076	RANWR	:WRITE.
4723	017002	017022	RANRD	:READ.
4724	017004	017022	RANRD	:READ.
4725	017006	017022	RANRD	:READ.
4726	017010	017022	RANRD	:READ.
4727	017012	017022	RANRD	:READ.
4728	017014	017022	RANRD	:READ.
4729	017016	017022	RANRD	:READ.
4730	017020	017022	RANRD	:READ.

4731
4732
4733
4734
4735
4736 : SUBROUTINE TO SET UP READ COMMANDS IN SEQUENCE TABLE.
4737 :
4738 : INPUTS:
4739 : OUTPUTS:
4740 : REGISTERS: R2
4741 : CALLS:

4742	017022		RANRD: LET (R1)+ := #RDR	:STORE READ REV CMD.
4743	017026		LET (R1)+ := #DATCNT	:SET BRF TO MAX FOR READ RANDOM LENGTHS.
4744	017032		LET RANB := RANB + RANS	
4745	017040		LET R2 := RANB CLR.BY #RNOPSC	
4746	017050		LET (R1)+ := R2	:SET RANDOM # OF OPERATIONS.
4747	017052		LET (R1)+ := #RANP	:RANDOM PATTERN.
4748	017056		LET (R1)+ := #RDF	:STORE READ FWD CMD.
4749	017062		LET (R1)+ := #DATCNT	:SET BRF TO MAX TO READ RANDOM LENGTHS.
4750	017066		LET (R1)+ := R2	:SET RANDOM # OF OPERATIONS.
4751	017070		LET (R1)+ := #RANP	:RANDOM PATTERN.
4752	017074	000207	RTS PC	

```
4753      :      SUBROUTINE TO SET UP A WRITE COMMAND IN THE SEQUENCE TABLE.
4754      :      INPUTS:
4755      :      OUTPUTS:
4756      :      REGISTERS:
4757      :      CALLS:
4758
4759 017076  RANWR: LET (R1)+ := #WRT          ;STORE WRITE CMD.
4760 017102 004737 017122 JSR PC,RANW          ;STORE BRf, # OF OPERATIONS, PATTERN.
4761 017106 000207          RTS PC
4762
4763
4764
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4766
4767      :      SUBROUTINE TO SET UP A WRITE/VERIFY COMMAND IN THE SEQUENCE TABLE.
4768      :      INPUTS:
4769      :      OUTPUTS:
4770      :      REGISTERS:
4771      :      CALLS:
4772
4773 017110  RANWV: LET (R1)+ := #WTV          ;STORE WRITE/VERIFY CMD.
4774 017114 004737 017122 JSR PC,RANW          ;STORE BRf, # OF OPERATIONS, PATTERN.
4775 017120 000207          RTS PC
4776
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4779
4780
4781      :      SUBROUTINE TO STORE BRf, # OF OPERATIONS, PATTERN IN COMMAND
4782      :      SEQUENCE TABLE FOR WRITE AND WRITE/VERIFY COMMANDS.
4783      :      INPUTS:
4784      :      OUTPUTS:
4785      :      REGISTERS:      R2
4786      :      CALLS:
4787
4788 017122  RANW: LET (R1)+ := #DATCNT          ;SET BRf TO MAX FOR PATTERN GENERATION.
4789          ;RANDOM BRf WILL BE GENERATED FOR EACH RECORD.
4790 017126          LET RANB := RANB + RANS
4791 017134          LET R2 := RANB CLR.BY #RNOPSC
4792 017144          LET (R1)+ := R2          ;SET RANDOM # OF OPERATIONS.
4793 017146          LET (R1)+ := #RANP          ;RANDOM PATTERN.
4794 017152 000207          RTS PC          ;RETURN.
4795
4796          .EVEN
4797
4798 017154          L10033: ENDTST
4799 017154
4800
```


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017164
017172
004737 005754
004737 006000

017212
017212
004737 017076
017224
017226
004737 006020
017232
017236
017242
004737 006000
017246
004737 006020
017252
017256

017262

017266
017266

```
.SBTTL TEST 3: WRITE COMPATABILITY/WRITE UTILITY.  
:++  
: TEST TO WRITE RECORDS FROM BOT TO EOT.  
:--  
  
T3::      BGNTST  
  
          LET RANDOM := #1  
          LET R2 := #DATCNT - #1  
          LET LENMSK := COMP R2  
          JSR PC,SETCH  
          JSR PC,SETRW  
          REPEAT  
            WHILE R1 LT #SEQEND DO  
              JSR PC,RANWR  
            ENDDO  
            LET (R1) := #END  
            JSR PC,EXALL  
            LET R1 := #CMDSEQ  
          UNTIL R2 NE #0  
          JSR PC,SETRW  
          LET (R1) := #END  
          JSR PC,EXALL  
  
          EXIT TST  
  
          .EVEN  
  
          ENDTST  
  
L10034:
```

:SET THE RANDOM OPERATIONS FLAG.
:SET UP THE RECORD LENGTH MASK.
:ALLOW MAXIMUM BUFFER.
:CMD 1 = SET CHARACTERISTIC.
:CMD2=REWIND
:REPEAT TO EOT.
:WHILE THERE IS MORE ROOM IN SEQ TABLE:
 ;STORE A WRITE CMD IN SEQUENCE TABLE.

:STORE END OF SEQUENCE CODE IN TABLE.
:EXECUTE ALL CMDS IN SEQ TBL ON UNITS.
:INIT SEQ TBL POINTER,
:REPEAT UNTIL EOT IS REACHED
:STORE REWIND IN SEQ TBL,
:STORE END IN SEQ TBL,
:EXECUTE REWIND CMD ON ALL UNITS

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017270
017270

017270
017276 004737 005754
017302 004737 006000

017306
017312
017316
017322
017326
017332 004737 006020
017336
017342
017346
017352 004737 012300
017356
017362
017366
017372 004737 006020

017376

017402
017402

.SBTTL TEST 4: READ COMPATABILITY/READ UTILITY.

:++
: TEST TO READ ENTIRE TAPE FORWARD AND REVERSE.
:--

T4:: BGNTST

LET RANDOM :B= #1
JSR PC,SECH
JSR PC,SETRW
LET (R1)+ := #RDF
LET (R1)+ := #DATCNT
LET (R1)+ := #77777
LET (R1)+ := #RANP
LET (R1) := #END
JSR PC,EXALL
LET R1 := #CMDSEQ
LET (R1)+ := #RDR
LET (R1)+ := #DATCNT
JSR PC,FIRSTU
LET (R1)+ := RECNT(R5)
LET (R1)+ := #RANP
LET (R1) := #END
JSR PC,EXALL

:SET THE RANDOM OPERATIONS FLAG.
:CMD 1 = SET CHARACTERISTIC.
:CMD2=REWIND.
:CMD3 = READ FORWARD.
:SET LENGTH TO MAX FOR UNKNOWN LENGTHS.
:SET RECORD COUNT TO MAX FOR WHOLE TAPE.
:PATTERN = RANDOM.
:STORE END OF SEQUENCE CODE IN TABLE.
:EXECUTE ALL CMDS IN SEQ TBL ON ALL UNITS.
:INIT CMD SEQ TBL POINTER.
:CMD1 = READ REVERSE.
:SET LENGTH TO MAX FOR UNKNOWN LENGTHS.
:SET UP R5 TO FIND RECORD COUNT.
:RECORD COUNT = # OF RECORDS ON TAPE.
:PATTERN = RANDOM.
:STORE END OF SEQUENCE CODE IN TABLE.
:GO EXECUTE READ REV. OF ENTIRE TAPE.

EXIT TST

.EVEN

ENDTST

L10035:

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 4871
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 4873
 4874 017404
 4875 017404
 4876
 4877 017404
 4878 017410
 4879 017416 004737 005754
 4880 017422
 4881 017430
 4882 017434 004737 020014
 4883 017440 004737 020014
 4884 017444 004737 020014
 4885 017450 004737 020014
 4886 017454 004737 020014
 4887 017460
 4888 017464
 4889 017470
 4890 017476 022711 000040
 4891 017502 001024
 4892 017504
 4893 017510 012137 003006
 4894 017514
 4895 017520 022137 003004
 4896 017524 001003
 4897 017526
 4898 017532 000756
 4899 017534
 4900 017540 005337 003006
 4901 017544 001751
 4902 017546
 4903 017552 000772
 4904 017554 022711 000020
 4905 017560 001015
 4906 017562
 4907 017566
 4908 017572
 4909 017600 005337 003002
 4910 017604 001372
 4911 017606
 4912 017612 000726
 4913 017614 004737 006450
 4914 017620
 4915 017626 004737 006360
 4916 017632 004737 012300
 4917 017636
 4918 017646
 4919 017650
 4920 017650
 4921 017660 004737 007316
 4922 017664 004737 012326
 4923 017670

.SBTTL TEST 5: EXECUTE OPERATOR SELECTED COMMAND SEQUENCE.

:++
 : TEST TO EXECUTE OPERATOR SELECTED COMMAND SEQUENCE.
 :--

T5:: BGNST

```

LET RANDOM := #0
LET IRE :B= PIRE
JSR PC,SETCH
LET CMDSEQ+2 := CHAR
LET R2 := #CMDD
JSR PC,PTCMDS
JSR PC,PTCMDS
JSR PC,PTCMDS
JSR PC,PTCMDS
JSR PC,PTCMDS
LET JLOOP := #0
LET R1 := #CMDSEQ
3$: WHILE (R1) NE #END DO
    CMP #JMP.C,(R1)
    BNE 6$
    LET R1 := R1 + #2
    MOV (R1)+,JLOC
    LET JLOOP := JLOOP + #1
    CMP (R1)+,JLOOP
    BNE 1$
    LET R1 := R1 + #2
    BR 3$
1$: LET R1 := #CMDSEQ
2$: DEC JLOC
    BEQ 3$
    LET R1 := R1 + #10
    BR 2$
6$: CMP #DLY.C,(R1)
    BNE 4$
    LET R1 := R1 + #4
    LET TIME2 := (R1)
7$: WAITUS 10.
    DEC TIME2
    BNE 7$
    LET R1 := R1 + #4
    BR 3$
4$: JSR PC,SETUP
    WHILE NCNT NE #0 DO
        JSR PC,CMDAC
        JSR PC,FIRSTU
        IF DEVTBL(R5) EQ #END THEN
            DOCLN
        ENDIF
        WHILE DEVTBL(R5) NE #END DO
            JSR PC,EXCUTE
            JSR PC,NEXTU
        ENDDO
    
```

:CLEAR RAMDOM MODE FLAG.
:MOVE INHIBIT RFC ERROR REPORT FLAG.
:CMD 1 = SET CHARACTERISTIC.
:MOVE CHAR CODE FROM P TBL TO SEQ TBL.
:R2 POINTS TO CMD2 IN SOFT P TABLE.
:MOVE CMD 2 FROM P TBL TO SEQ TBL.
:MOVE CMD 3 FROM P TBL TO SEQ TBL.
:MOVE CMD 4 FROM P TBL TO SEQ TBL.
:MOVE CMD 5 FROM P TBL TO SEQ TBL.
:MOVE END CMD FROM P TBL TO SEQ TBL.
:CLEAR JMP CMD LOOP COUNT.
:INIT SEQUENCE TABLE POINTER.
:WHILE THERE ARE CMDS LEFT IN SEQUENCE TBLE:
:IS THIS A JUMP CMD?
:BR IF NOT.
:POINT TO BRF.
:SAVE BRF (LOCATION).
:UPDATE THE LOOP COUNT.
:HAS LOOP COUNT BE SATISFIED?
:IF NOT, JMP AGAIN.
:IF SO, ADJUST SEQ POINTER
:AND GO TO NEXT COMMAND.
:INIT CMD SEQ TABLE POINTER.
:DECR LOCATION COUNTER.
:IF THIS IS THE RIGHT LOCATION TO JMP TO, GO SET
:IF NOT, UPDATE SEQ POINTER TO NEXT CMD.
:DO IT AGAIN.
:DELAY?
:BR IF NOT.
:R1 = LOCATION OF N COUNT.
:SAVE N COUNT.
:GO TO SUPER-WAIT 1 MSEC.
:POINT TO NEXT CMD.
:GO CHECK NEXT CMD.
:GO SETUP THE COMMAND BLOCK.
:WHILE THERE ARE RECORDS REMAINING:
:STORE CMD ASCII IN ERROR MSG.
:SET UP FOR 1ST UNIT.
:IF ALL DEVICES HAVE BEEN DROPPED:
:DO CLEAN CODE AND ABORT PASS.
:WHILE THERE ARE UNITS REMAINING:
:GO EXECUTE THE COMMAND.
:FIND NEXT UNIT.

```
4924 017672 004737 012300      JSR PC,FIRSTU      ;SET UP FOR 1ST UNIT.
4925 017676                    WHILE DEVTBL(R5) NE #END DO ;WHILE THERE ARE MORE UNITS.
4926 017706 004737 007600      JSR PC,GOWAIT      ;GO WAIT FOR INTERRUPT + CHECK FOR ERRORS.
4927 017712 023727 002762 100017  CMP CMDWRD,#GES    ;IS THIS A GET STATUS CMD?
4928 017720 001002                    BNE 5$             ;BR IF NOT.
4929 017722 004737 012610      JSR PC,PRXST       ;PRINT EXTENDED STATUS REGISTERS.
4930 017726                    5$: IF #X0.EOT SETIN MSGPKT+MS.XS0 OR #X0.BOT SETIN MSGPKT+MS.XS0 THEN
4931 017746                    LET NCNT := #1             ;FORCE TERMINATION OF COMMAND.
4932 017754                    ENDF
4933 017754 004737 012672      JSR PC,CKHAE       ;CHECK HALT AFTER EACH CMD FLAG.
4934 017760 004737 012326      JSR PC,NEXTU       ;FIND NEXT UNIT IN TEST SEQUENCE.
4935 017764                    ENDDO
4936 017766                    LET NCNT := NCNT - #1      ;UPDATE RECORD COUNT.
4937 017772                    LET PCMDWD := CMDWRD       ;SAVE PREVIOUS COMMAND WORD.
4938 020000                    ENDDO
4939 020002 004737 011540      JSR PC,VFYDAT      ;IF LAST CMD WAS A WRITE VERIFY, THEN GO
4940                                ;VERIFY THE LAST N RECORDS OF DATA.
4941 020006                    ENDDO
4942
4943 020010                    ENDT5: EXIT TST
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4949
4950 : SUBROUTINE TO MOVE A COMMAND FROM THE SOFTWARE P TABLE TO
4951 : THE COMMAND SEQUENCE TABLE.
4952 : INPUTS: R2 = POINTER TO SOFT 'P' TABLE
4953 : OUTPUTS:
4954 : REGISTERS: R3.
4955 : CALLS:
4956
4957 020014 PTCMDS: LET R3 := (R2)+ - #1 SHIFT +1 ;R3 = COMMAND TABLE INDEX.
4958 020022 LET (R1)+ := CMDTBL(R3) ;MOVE COMMAND WORD.
4959 020026 LET (R1)+ := (R2)+ ;MOVE # OF BYTES.
4960 020030 LET (R1)+ := (R2)+ ;MOVE # OF OPERATIONS.
4961 020032 LET (R1)+ := (R2)+ ;MOVE PATTERN CODE.
4962 020034 000207 RTS PC
4963 .EVEN
4964
4965 020036 ENDTST
4966 020036 L10036:
4967
4968 020040 ENDMOD
```


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4990 020064
4991
4992
020066 051524 041104 040440
020103 126 041505 047524
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4995 020112
4996 020112

.TITLE PARAMETER CODING
.SBTTL HARDWARE PARAMETER CODING SECTION
BGNMOD
:
:++
: THE HARDWARE PARAMETER CODING SECTION CONTAINS MACROS
: THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES. THE
: MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
: INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES. THE
: MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
: WITH THE OPERATOR.
:--
BGNHRD
L\$HARD::
GPRMA TS4ADR,0,0,160000,177564,YES
GPRMD TS4VCT,2,0,777,60,776,YES
EXIT HRD
.NLIST BEX
TS4ADR: .ASCIZ /TSDB ADDRESS/
TS4VCT: .ASCIZ /VECTOR/
.LIST BEX
.EVEN
ENDHRD
L10037:

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4998
4999
5000
5001
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5003
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5008 020112
5009 020114
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5013 020122
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5017 020152
5018 020160
5019 020162
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5021 020202
5022 020214
5023 020226
5024 020240
5025 020252
5026 020264
5027 020276
5028 020310
5029 020322
5030 020334
5031 020346
5032 020360
5033 020372
5034 020404
5035 020416
5036 020430
5037 020442
5038 020442

.SBTTL SOFTWARE PARAMETER CODING SECTION

:++
: THE SOFTWARE PARAMETER CODING SECTION CONTAINS MACROS
: THAT ARE USED BY THE SUPERVISOR TO BUILD P-TABLES THE
: MACROS ARE NOT EXECUTED AS MACHINE INSTRUCTIONS BUT ARE
: INTERPRETED BY THE SUPERVISOR AS DATA STRUCTURES. THE
: MACROS ALLOW THE SUPERVISOR TO ESTABLISH COMMUNICATIONS
: WITH THE OPERATOR.
:--

BGNSFT
L\$SOFT::

GPRML CLRM,0,1,YES
GPRML RRVM,0,400,YES
GPRML HAEM,2,1,YES
GPRML DINTM,6,1,YES
GPRML IRECM,6,400,YES
GPRML CHGM,10,1,YES
XFERF ENDSP
GPRML IREM,12,1,YES
GPRMD CHARM,14,0,377,0,200,YES
GPRMD CMD2M,16,D,37,1,33,YES
GPRMD BPCRM,20,D,-1,1,DATCNT,YES
GPRMD NUMBM,22,D,-1,1,-1,YES
GPRMD PATTM,24,D,17,0,10,YES
GPRMD CMD3M,26,D,37,1,33,YES
GPRMD BPCRM,30,D,-1,1,DATCNT,YES
GPRMD NUMBM,32,D,-1,1,-1,YES
GPRMD PATTM,34,D,17,0,10,YES
GPRMD CMD4M,36,D,37,1,33,YES
GPRMD BPCRM,40,D,-1,1,DATCNT,YES
GPRMD NUMBM,42,D,-1,1,-1,YES
GPRMD PATTM,44,D,17,0,10,YES
GPRMD CMD5M,46,D,37,1,33,YES
GPRMD BPCRM,50,D,-1,1,DATCNT,YES
GPRMD NUMBM,52,D,-1,1,-1,YES
GPRMD PATTM,54,D,17,0,10,YES

ENDSP:
EXIT SFT

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020444	046103	040505	020122	CLRM:	.ASCIZ	/CLEAR COUNTERS/
020463	122	051505	052105	RRVM:	.ASCIZ	/RESET RANDOM VARIABLES/
020512	040510	052114	040440	HAEM:	.ASCIZ	/HALT AFTER EACH CMD/
020536	044504	040523	046102	DINTM:	.ASCIZ	/DISABLE INTERRUPTS/
020561	111	044116	041111	IREFM:	.ASCIZ	/INHIBIT RECOVERY/
020602	044103	047101	042507	CHGM:	.ASCIZ	/CHANGE CMD SEQUENCE/
020626	047111	044510	044502	IREFM:	.ASCIZ	/INHIBIT RFC ERROR REPORT/
020657	103	040510	040522	CHARM:	.ASCIZ	/CHARACTERISTICS CODE/
020704	046503	027504	000062	CMD2M:	.ASCIZ	'CMD/2'
020712	051102	020106	047503	BPCRM:	.ASCIZ	/BRF COUNT/
020724	020043	043117	047440	NUMBM:	.ASCIZ	/# OF OPERATIONS/
020744	040520	052124	051105	PATM:	.ASCIZ	/PATTERN/
020754	046503	027504	000063	CMD3M:	.ASCIZ	'CMD/3'
020762	046503	027504	000064	CMD4M:	.ASCIZ	'CMD/4'
020770	046503	027504	000065	CMD5M:	.ASCIZ	'CMD/5'

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5043 020776
5044 020776
5045
5046 020776
5047 020776
5048 020776

.NLIST BEX
.LIST BEX
.EVEN
ENDSF T
L10040:
LASTAD
L\$LAST::
ENDMOD

5049			.SBTTL	DIAGNOSTIC SUPERVISOR -- LOW CORE SET UP	
5050	051572	000000	.WORD	0	;SPACE FOR USER POOL POINTER
	051574	000000	.WORD	0	;SIZE
	051576	000000	.WORD	0	;CHECKSUM (NOT CURRENTLY USED)
	051600	000000	.WORD	0	;SIZE OF H.W. PTAB. ALLOCATION
		051604			
		000200			
			END.SUPV=.	+2	
			.END	200	

HAEM	020512	5015	5040#														
HAL TM	003702 G	3007#	4079*	4080*	4081												
HCORED	025540	5050#															
HCOREQ	025450	5050#															
HCORET	021264 G	5050#*															
HC.ADR	021034 G	5050#															
HC.DEF	021026 G	5050#															
HC.DIA	021024 G	5050#															
HELP =	000000	2278#	2280	2292	2328	2338	2350	2367	2483	2688	3002	3003	3020	3026			
		3027	4101	4119	4135	4228	4242	4253	4267	4274	4289	4300	4987	4992			
		5011	5040														
HERTZ.	025410	5050#															
HOLDSP=	000020	5050#															
HRDCNT	002730 G	2794#	3580*	3609*	3651*	3962*	4022*	4114									
Hw.ADR	021032 G	5050#															
H\$AAB	045070	5050#															
IE.C =	000200 G	2521#	2595	3434													
ININIT	021254 G	5050#*															
INITIA	040302	5050#															
INIT.M	026366	5050#															
INIT.R	021070 G	5050#															
INIT10	014142	4135#	4138														
INIT15	014336	4157	4169#														
INIT16	014356	4171	4174#														
INIT20	014700	4218	4219#														
INPUTA	041230	5050#															
INTFLG	003026 G	2837#	3072*	3079*	3086*	3093*	3428	3434*	3461	4298*							
INTFOR	034526	5050#															
INTPRI=	000340 G	2577#	3071	3078	3085	3092	4184	4297									
INVAL.	025334	5050#															
INVINT	034364	5050#															
INV.SW	022366	5050#															
IN.SUF	027336	5050#															
IRE	003043 G	2843#	3579	3641	3752	4879*											
IREC	002143 G	2374#	3693	3715	3853	4043											
IRECM	020561	5017	5040#														
IREM	020626	5020	5040#														
ISAU =	000041	2280#	4287#	4305#													
ISCLN =	000041	2280#	4240#	4253	4257#												
ISDU =	000041	2280#	4265#	4278#													
ISHRD =	000041	4985#	4997#														
ISINIT=	000041	2280#	4133#	4228	4232#												
ISMOD =	000041	2280#	2284#	2402#	2407#	4087#	4092#	4307#	4318#	4969#	4974#	5049#					
ISMSG =	000041	2280#	3019#	3032#	3034#	3050#	3051#	3059#									
ISPWR =	000041	2280#															
ISRPT =	000041	2280#	4099#	4125#													
ISSEG =	000041	2280#	4320	4325	4344	4353	4362	4371	4380	4389	4398	4407	4416	4425			
		4442	4674	4808	4842	4875											
ISSFT =	000041	5009#	5045#														
ISSRV =	000041	2280#	3069#	3074#	3076#	3081#	3083#	3088#	3090#	3095#							
ISSUB =	000041	2280#	4320	4325#	4341#	4342#	4344#	4350#	4351#	4353#	4359#	4360#	4362#	4368#			
		4369#	4371#	4377#	4378#	4380#	4386#	4387#	4389#	4395#	4396#	4398#	4404#	4405#			
		4407#	4413#	4414#	4416#	4422#	4423#	4425#	4434#	4435#	4442#	4463#	4464#	4674			
		4808	4842	4875													
ISTST =	000041	2280#	4320#	4325	4344	4353	4362	4371	4380	4389	4398	4407	4416	4425			
		4442	4466	4667#	4668#	4674#	4711	4799#	4800#	4808#	4828	4832#	4833#	4842#			

		4863	4867#	4868#	4875#	4944	4966#	4967#
JLOC	003006 G	2817#	4893*	4900*				
JLOOP	003004 G	2816#	4888*	4895*				
JMP	= 000040 G	2670#	2910					
JMP.C	= 000040 G	2526#	2670	4890				
J\$JMP	= 000167	2280#	3024	3044	3053	4118	4274	4300
KBPTR	021106 G	5050#*						
KBUF	021110 G	5050#*						
LENMSK	002772 G	2811#	3143	4679*	4813*			
LINE.F	021324 G	5050#*						
LOAD.F	025764	5050#*						
LOG	011254 G	3477	3820#	4033				
LOGMSG	040274	5050#						
LPBFR	021104 G	5050#*						
LPCNTR	021102 G	5050#*						
LPT.AD	025426	5050#						
LPT.RE	025422	5050#						
LSI.RE	025416	5050#						
LUP	046370	5050#						
LUP.AD	033374	5050#*						
L\$APT	002036 G	2307#						
L\$AU	015062 G	2322	4287#					
L\$AUT	002074 G	2321#						
L\$CCP	002106 G	2326#						
L\$CLEA	014744 G	2327	4240#					
L\$CO	002032 G	2305#						
L\$DEPO	002011 G	2296#						
L\$DESC	002102 G	2324#						
L\$DEVP	002064 G	2317#						
L\$DISP	002112 G	2309	2336#					
L\$DR	002216 G	2320	2686#					
L\$DRCT	002070 G	2319#						
L\$DRS	002072 G	2320#						
L\$DRST	002222 G	2321	2687#					
L\$DTP	002040 G	2308#						
L\$DU	015022 G	2323	4265#					
L\$DUT	002076 G	2322#						
L\$DVTY	003606 G	2318	3000#					
L\$EF	002056 G	2315#						
L\$EFLG	002034 G	2306#						
L\$EXP1	002042 G	2309#						
L\$EXP2	002044 G	2310#						
L\$EXP3	002046 G	2311#						
L\$HARD	020042 G	2300	4985#					
L\$HPCP	002016 G	2299#						
L\$HPTP	002022 G	2301#						
L\$HW	002126 G	2302	2347#					
L\$IICP	002104 G	2325#						
L\$INIT	014142 G	2326	4133#					
L\$LADP	002026 G	2303#						
L\$LAST	020776 G	2304	5047#					
L\$MREV	002050 G	2312#						
L\$NAME	002000 G	2294#						
L\$REPP	002066 G	2318#						
L\$REV	002010 G	2295#						
L\$RPT	012742 G	2319	4099#					

LSSOFT	020114	G	2301	5009#	
LSSPC	002062	G	2316#		
LSSPCP	002020	G	2300#		
LSSPTP	002024	G	2302#		
LSSTA	002030	G	2304#		
LSSW	002134	G	2303	2364#	
LSTIML	002014	G	2298#		
LSTIMU	002054	G	2314#		
LSTIM1	002052	G	2313#		
LSTSTI	002100	G	2323#		
LSUNIT	002012	G	2297#	4164	
L.CLK.	025374		5050#		
L10000	002132		2347	2355#	
L10001	002214		2364	2399#	
L10002	004746		3024	3031#	
L10003	005604		3044	3049#	
L10004	005672		3053	3058#	
L10005	005706		3073#		
L10006	005722		3080#		
L10007	005736		3087#		
L10010	005752		3094#		
L10011	014140		4118	4124#	
L10012	014742		4228	4231#	
L10013	015020		4253	4256#	
L10014	015060		4274	4277#	
L10015	015160		4300	4304#	
L10016	016526		4466	4667#	
L10017	015310		4341#		
L10020	015330		4350#		
L10021	015350		4359#		
L10022	015370		4368#		
L10023	015410		4377#		
L10024	015430		4386#		
L10025	015450		4395#		
L10026	015470		4404#		
L10027	015510		4413#		
L10030	015530		4422#		
L10031	015566		4434#		
L10032	015746		4463#		
L10033	017154		4711	4799#	
L10034	017266		4828	4832#	
L10035	017402		4863	4867#	
L10036	020036		4944	4966#	
L10037	020112		4985	4991	4996#
L10040	020776		5009	5039	5044#
MAJ.IN	021060	G	5050#*		
MAJ.LO	046470		5050#*		
MAJ.US	021062	G	5050#*		
MAN.TI	001244		5050#		
MAP16	051176	G	5050#		
MASK.B	030100		5050#		
MASK.W	030076		5050#		
MBR =	100012	G	2639#	2708	2899
MEM.SI	025436		5050#		
MIN.IN	021054	G	5050#*		
MIN.US	021056	G	5050#*		

READ.P	046472	G	5050#										
RECCNT	002740	G	2796#	3022	3037	3538*	3543*	3547	3548*	4106	4858		
RECLOG	003020	G	2826#	3534	3536*	4033							
RECLD	010070	G	3475	3533#									
REGBAC	051162	G	5050#										
REGSAV	051146	G	5050#										
REQN.P	021052	G	5050#*										
REQN.T	025744	G	5050#*										
RERM	004433	G	3007#	3689	3712								
RETRYC	003016	G	2825#	3684	3688	3691*	3711	3714*	3748	3751*	3797	3806	3854
RE.SET	022534	G	5050#										
RFBC	002560	G	2784#	4109									
RF CERM	004116	G	3007#	3581									
RFREC	002660	G	2789#	4111									
RFUNR	002670	G	2790#	4112									
RLEXM	004152	G	3007#	3800	3808								
RNF =	125401	G	2624#	2894	4625								
RNOPSC =	177700	G	2588#	4687	4701	4746	4792						
RNR =	105401	G	2621#	2893	4621								
RNYM	004413	G	3007#	4030									
RPF =	105001	G	2627#	2895	4635								
RPR =	125001	G	2630#	2896	4639								
RPTFLG	003041	G	2841#	3159	3160*	4705*							
RPT1A	013360	G	4106	4120#									
RPT1B	013435	G	4107	4120#									
RPT1C	013510	G	4108	4120#									
RPT1D	013563	G	4109	4120#									
RPT1E	013636	G	4110	4120#									
RPT1F	013672	G	4111	4120#									
RPT1G	013745	G	4112	4120#									
RPT1H	014022	G	4113	4120#									
RPT1I	014110	G	4114	4120#									
RF:ANV	002135	G	2368#	4151									
RRBC	002520	G	2783#	4108									
RRCL =	000020	G	2590#	3683	3806								
RRREC	002640	G	2787#	4111									
RRUNR	002650	G	2788#	4112									
RRVM	020463	G	5014	5040#									
RSTACK	050422	G	5050#										
RTLE	011122	G	3680	3709	3746	3787#							
RTLRTN	011252	G	3792	3802	3809	3812#							
RWCPK	002244	G	2715#	3754									
RWD =	102010	G	2636#	2715	2898	3119	3457	3537	4505	4581	4603	4649	
RWERR	003022	G	2828#	3587	3740*	3795*	3846						
RSSAVE	003014	G	2820#	3411*	3417	4103*	4117						
SAVEDO =	022732	G	5050#										
SCCNT	002710	G	2792#	3569*	3649*	4114							
SCERM	004062	G	3007#	3610									
SCH =	140004	G	2666#	2856	2908	3103	3410	4483	4491	4499			
SCHBK	002356	G	2737#	3255	3257*	3418*							
SCHCNT =	000010	G	2579#	3255									
SEARCH	042430	G	5050#										
SEGSTA	021276	G	5050#*										
SEQEND	003126	G	2877#	4691	4817								
SETCH	005754	G	3102#	4679	4813	4845	4879						
SETRW	006000	G	3118#	4681	4706	4814	4823	4846					

TSD8	002366	G	2578	2745#	3040	3435*	3754*	4026*	4181*	4208*	4247*	4270*	4294*		
TSSR	002376	G	2746#	3040	3409	3438	3464	3506	3525	3567	4044*	4182*	4211	4295*	
TST.AB	030212		5050#												
TST.TO	022414		5050#												
TSVCT	002406	G	2747#	4183*	4184	4248	4272	4296*	4297						
TS.A16=	000400	G	2504#												
TS.A17=	001000	G	2503#												
TS.NBA=	002000	G	2502#												
TS.NXM=	004000	G	2501#												
TS.OFL=	000100	G	2506#	4211											
TS.RMR=	010000	G	2500#												
TS.SC =	100000	G	2497#	3567											
TS.SPE=	020000	G	2499#												
TS.SSR=	000200	G	2505#	3409	3438	3463	3506								
TS.UPE=	040000	G	2498#												
TS4ADR	020066		4988	4992#											
TS4CL	002436	G	2765#	4335*	4337										
TS4INT	002426	G	2758#	4184	4297										
TS4INO	005674	G	2758	3069#											
TS4IN1	005710	G	2759	3076#											
TS4IN2	005724	G	2760	3083#											
TS4IN3	005740	G	2761	3090#											
TS4VCT	020103		4989	4992#											
TYPEC	040620		5050#												
TYPEPC	034514		5050#												
TYPFLA	044136		5050#												
TYPLIN	040516		5050#												
TYPNUM	040100		5050#												
TYPSTR	040536		5050#												
TYP.ER	034344		5050#												
TY.UNI	027356		5050#												
T\$ARGC=	000003		2295#	3022#	3037#	3038#	3039#	3040#	3041#	3042#	3043#	3854#	4050#	4061#	4062#
			4106#	4107#	4108#	4109#	4110#	4111#	4112#	4113#	4114#	4192#	4337#		
T\$CODE=	156004		4081#	4988#	4989#	4991#	5013#	5014#	5015#	5016#	5017#	5018#	5019#	5020#	5021#
			5022#	5023#	5024#	5025#	5026#	5027#	5028#	5029#	5030#	5031#	5032#	5033#	5034#
			5035#	5036#	5037#	5039#									
T\$ERCO=	000021		3581#	3610#	3652#	3689#	3712#	3749#	3808#	3969#	4024#	4030#	4137#		
T\$ERRN=	000001		2280#	3581#	3610#	3652#	3689#	3712#	3749#	3808#	3969#	4024#	4030	4137#	
T\$EXCP=	000000		4988#	4989#	5021#	5022#	5023#	5024#	5025#	5026#	5027#	5028#	5029#	5030#	5031#
			5032#	5033#	5034#	5035#	5036#	5037#							
T\$FLAG=	000041		3024#	3044#	3053#	4118#	4228#	4253#	4274#	4300#	4466#	4711#	4828#	4863#	4944#
			4991#	5039#											
T\$HILI=	000010		4988#	4989#	5021#	5022#	5023#	5024#	5025#	5026#	5027#	5028#	5029#	5030#	5031#
			5032#	5033#	5034#	5035#	5036#	5037#							
T\$LOLI=	000000		4988#	4989#	5021#	5022#	5023#	5024#	5025#	5026#	5027#	5028#	5029#	5030#	5031#
			5032#	5033#	5034#	5035#	5036#	5037#							
T\$LSYM=	010000		2280#	2356	2400	3032	3050	3059	3074	3081	3088	3095	4125	4232	4257
			4278	4305	4342	4351	4360	4369	4378	4387	4396	4405	4414	4423	4435
			4464	4668	4800	4833	4868	4967	4997	5045					
T\$MCAL=	177777		1#	2280											
T\$NEST=	177777		2280#	2284#	2347#	2355#	2364#	2399#	2402#	2407#	3019#	3031#	3034#	3049#	3051#
			3058#	3069#	3073#	3076#	3080#	3083#	3087#	3090#	3094#	4087#	4092#	4099#	4124#
			4133#	4231#	4240#	4256#	4265#	4277#	4287#	4304#	4307#	4318#	4321#	4326#	4341#
			4345#	4350#	4354#	4359#	4363#	4368#	4372#	4377#	4381#	4386#	4390#	4395#	4399#
			4404#	4408#	4413#	4417#	4422#	4426#	4434#	4443#	4463#	4667#	4675#	4799#	4809#
			4832#	4843#	4867#	4876#	4966#	4969#	4974#	4985#	4991	4996#	5009#	5019	5039

X\$TRUE= 000020
X0.BOT= 000002 G
X0.EOT= 000001 G
X0.LET= 020000 G
X0.ONL= 000100 G
X0.RLL= 010000 G
X0.RLS= 040000 G
X0.TMK= 100000 G
X3.DCK= 000010 G
X3.RNY= 000337 G
ZROPAT 007146
\$BGNLE= 177777
\$BREG 026042
\$ENDAD 050260 G
\$ERFLG= 000400

2280#												
2559#	4931											
2560#	3166	4931										
2556#	3637	3640										
2558#												
2557#	3637											
2555#	3637											
2554#	3637	3640										
2564#	3737											
2565#	4029											
3333#	3336	3342	3366									
2280#												
5050#*												
5050#												
2280#	3072#	3079#	3086#	3093#	3103#	3119#	3120#	3121#	3131#	3139#	3141#	3142#
3143#	3146#	3148#	3160#	3167#	3173#	3174#	3177#	3178#	3183#	3196#	3200#	3202#
3203#	3215#	3217#	3219#	3228#	3240#	3247#	3249#	3255#	3257#	3266#	3273#	3275#
3278#	3280#	3281#	3283#	3286#	3296#	3299#	3320#	3321#	3323#	3324#	3326#	3334#
3349#	3373#	3381#	3399#	3401#	3404#	3405#	3411#	3417#	3418#	3420#	3421#	3423#
3424#	3429#	3430#	3434#	3440#	3441#	3454#	3461#	3463#	3464#	3466#	3469#	3470#
3479#	3488#	3490#	3502#	3505#	3519#	3520#	3522#	3523#	3525#	3526#	3536#	3538#
3543#	3548#	3573#	3580#	3588#	3609#	3625#	3626#	3647#	3649#	3651#	3668#	3669#
3683#	3685#	3691#	3692#	3694#	3699#	3714#	3716#	3721#	3740#	3741#	3743#	3744#
3751#	3753#	3754#	3760#	3774#	3775#	3789#	3790#	3795#	3798#	3799#	3800#	3807#
3822#	3823#	3825#	3826#	3827#	3829#	3831#	3833#	3834#	3836#	3838#	3839#	3841#
3843#	3844#	3847#	3849#	3850#	3852#	3878#	3879#	3880#	3882#	3883#	3884#	3894#
3896#	3898#	3899#	3908#	3910#	3922#	3923#	3935#	3937#	3940#	3941#	3943#	3944#
3947#	3948#	3964#	3986#	3987#	3989#	4003#	4005#	4020#	4021#	4022#	4023#	4025#
4026#	4038#	4040#	4044#	4045#	4051#	4077#	4079#	4080#	4103#	4117#	4144#	4146#
4147#	4152#	4153#	4158#	4159#	4161#	4162#	4164#	4166#	4167#	4172#	4173#	4176#
4178#	4179#	4181#	4182#	4183#	4186#	4200#	4203#	4208#	4216#	4220#	4221#	4223#
4224#	4226#	4247#	4268#	4270#	4271#	4291#	4292#	4294#	4295#	4296#	4298#	4323#
4328#	4333#	4334#	4335#	4347#	4356#	4365#	4374#	4383#	4392#	4401#	4410#	4419#
4428#	4431#	4433#	4437#	4445#	4447#	4449#	4450#	4452#	4454#	4456#	4458#	4459#
4461#	4473#	4475#	4477#	4677#	4678#	4679#	4683#	4685#	4686#	4687#	4688#	4689#
4692#	4693#	4696#	4698#	4701#	4702#	4703#	4705#	4706#	4708#	4743#	4744#	4745#
4746#	4747#	4748#	4749#	4750#	4751#	4752#	4760#	4774#	4789#	4791#	4792#	4793#
4794#	4811#	4812#	4813#	4820#	4822#	4825#	4845#	4848#	4849#	4850#	4851#	4852#
4854#	4855#	4856#	4858#	4859#	4860#	4878#	4879#	4881#	4882#	4888#	4889#	4893#
4895#	4898#	4900#	4903#	4907#	4908#	4912#	4932#	4937#	4938#	4958#	4959#	4960#
4961#	4962#											
2280#	3132	3134	3136	3137	3138	3145	3152	3155	3159	3164	3166	3172
3216	3239	3246	3274	3282	3325	3402	3410	3413	3422	3428	3438	3457
3460	3467	3521	3534	3535	3537	3540	3541	3542	3546	3547	3567	3568
3569	3576	3577	3578	3579	3587	3637	3640	3641	3646	3682	3684	3688
3693	3711	3715	3737	3739	3748	3752	3788	3796	3797	3806	3821	3824
3828	3832	3837	3842	3846	3848	3853	3877	3895	3901	3904	3907	3909
3913	3916	3934	3939	3950	3951	3952	3988	4029	4033	4037	4043	4074
4105	4136	4142	4145	4151	4177	4185	4191	4199	4204	4245	4332	4336
4438	4474	4681	4691	4817	4890	4915	4918	4921	4926	4931		
2280#	3072	3079	3086	3093	3103	3119	3120	3121	3131	3132	3134	3136
3137	3138	3139	3141	3142	3143	3145	3146	3148	3152	3155	3159	3160
3164	3166	3167	3172	3173	3174	3177	3178	3183	3196	3200	3202	3203
3215	3216	3217	3219	3228	3239	3240	3246	3247	3249	3255	3257	3266
3273	3274	3275	3278	3280	3281	3282	3283	3286	3296	3299	3320	3321
3323	3324	3325	3326	3334	3349	3373	3381	3399	3401	3402	3404	3405

\$F\$AND= 000310

\$F\$BAD= 000401

3410	3411	3413	3417	3418	3420	3421	3422	3423	3424	3428	3429	3430
3434	3438	3440	3441	3454	3457	3460	3461	3463	3464	3466	3467	3469
3470	3479	3488	3490	3502	3505	3519	3520	3521	3522	3523	3525	3526
3534	3535	3536	3537	3538	3540	3541	3542	3543	3546	3547	3548	3567
3568	3569	3573	3576	3577	3578	3579	3580	3587	3588	3609	3625	3626
3637	3640	3641	3646	3647	3649	3651	3668	3669	3682	3683	3684	3685
3688	3691	3692	3693	3694	3699	3711	3714	3715	3716	3721	3737	3739
3740	3741	3743	3744	3748	3751	3752	3753	3754	3760	3774	3775	3788
3789	3790	3795	3796	3797	3798	3799	3800	3806	3807	3821	3822	3823
3824	3825	3826	3827	3828	3829	3831	3832	3833	3834	3836	3837	3838
3839	3841	3842	3843	3844	3846	3847	3848	3849	3850	3852	3853	3877
3878	3879	3880	3882	3883	3884	3894	3895	3896	3898	3899	3901	3904
3907	3908	3909	3910	3913	3916	3922	3923	3934	3935	3937	3939	3940
3941	3943	3944	3947	3948	3950	3951	3952	3964	3986	3987	3988	3989
4003	4005	4020	4021	4022	4023	4025	4026	4029	4033	4037	4038	4040
4043	4044	4045	4051	4074	4077	4079	4080	4103	4105	4117	4136	4142
4144	4145	4146	4147	4151	4152	4153	4158	4159	4161	4162	4164	4166
4167	4172	4173	4176	4177	4178	4179	4181	4182	4183	4185	4186	4191
4199	4200	4203	4204	4208	4216	4220	4221	4223	4224	4226	4245	4247
4268	4270	4271	4291	4292	4294	4295	4296	4298	4323	4328	4332	4333
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\$F\$DEC= 000220
\$F\$DO = 000340

\$F\$FAL= 000405
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4918	4921	4926	4931	4932	4937	4938	4958	4959	4960	4961	4962	
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\$F\$INC = 000210
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	4750	4751	4752	4760	4774	4789	4791	4792	4793	4794	4811	4812	4813
	4817	4820	4822	4825	4845	4848	4849	4850	4851	4852	4854	4855	4856
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	3828	3832	3837	3842	3846	3848	3853	3877	3895	3901	3904	3907	3909
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	3325	3402	3410	3428	3438	3457	3460	3467	3534	3535	3537	3540	3541
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	3150	3152	3154	3155	3159	3160	3162	3164	3166	3167	3168	3172	3173
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	3579#	3582#	3583#	3584#	3585#	3586#	3587#	3589#	3637#	3640#	3641#	3644#	3645#
	3646#	3650#	3653#	3682#	3684#	3686#	3687#	3688#	3690#	3693#	3700#	3711#	3713#
	3715#	3722#	3737#	3739#	3742#	3748#	3750#	3752#	3761#	3762#	3788#	3794#	3796#
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	3589	3637#	3653	3682#	3687	3688#	3690	3693#	3700	3711#	3713	3715#	3722
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	3950#	3957											
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3955	3956	3957	3974	3988	3990	4004	4031	4035	4039	4047	4049	4083
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\$LSTTA= 177777

\$SAV5 051376 G
\$SSKO = 050245

\$TAGLE= 177777

\$TAGNU= 050257

\$TEMP = 000402

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PRINTF	1#	4049	4191	4336											
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PUSH	1#														
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READEF	1#	4155	4169												
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RETURN	1#														
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	3715	3720	3737	3739	3746	3748	3752	3759	3788	3796	3797	3805	3806	3821	3824
	3828	3832	3835	3837	3840	3842	3845	3846	3848	3851	3853	3877	3895	3901	3904
	3907	3909	3911	3913	3916	3921	3924	3934	3936	3939	3949	3950	3951	3952	3988
	3990	4004	4029	4033	4037	4043	4047	4074	4105	4116	4136	4142	4145	4148	4151
	4160	4165	4177	4185	4189	4191	4199	4201	4204	4207	4214	4245	4250	4332	4336
	4340	4438	4440	4474	4476	4681	4690	4691	4695	4816	4817	4819	4890	4915	4918
	4921	4924	4926	4931	4936	4939	4942								
\$\$SELE	1#														
\$\$SETS	1#	3132	3134	3136	3137	3138	3140	3145	3152	3155	3158	3159	3164	3166	3170
	3172	3179	3182	3216	3218	3239	3246	3248	3274	3277	3282	3325	3400	3402	3410
	3413	3416	3422	3425	3428	3438	3455	3457	3460	3462	3467	3489	3503	3521	3524
	3534	3535	3537	3539	3540	3541	3542	3545	3546	3547	3567	3568	3569	3575	3576
	3577	3578	3579	3587	3637	3640	3641	3646	3648	3682	3684	3688	3693	3698	3711
	3715	3720	3737	3739	3746	3748	3752	3759	3788	3796	3797	3805	3806	3821	3824
	3828	3832	3835	3837	3840	3842	3845	3846	3848	3851	3853	3877	3895	3901	3904
	3907	3909	3911	3913	3916	3921	3924	3934	3936	3939	3949	3950	3951	3952	3988
	3990	4004	4029	4033	4037	4043	4047	4074	4105	4116	4136	4142	4145	4148	4151
	4160	4165	4177	4185	4189	4191	4199	4201	4204	4207	4214	4245	4250	4332	4336
	4340	4438	4440	4474	4476	4681	4690	4691	4695	4816	4817	4819	4890	4915	4918
	4921	4924	4926	4931	4936	4939	4942								
\$\$SETT	1#														

. ABS. 051602 000

ERRORS DETECTED: 0

CZTSHA,CZTSHA/CRF/SOL=SVC.SML,SPMAC.SML,CZTSHA.DOC,CZTSHA.P11,DOCTOR.P11
 RUN-TIME: 114 118 8 SECONDS
 RUN-TIME RATIO: 351/241=1.4
 CORE USED: 27K (53 PAGES)